Percy Treyvaud Memorial Park

Draft Masterplan

January 2019

Issue C 19/03/19

City of STONNINGTON

williams ross architects

Williams Ross Architects
Suite 1, 70 Kerr Street, Fitzroy, Victoria 3065
Tel (03) 9416 3044

email@williamsross.com | www.williamsross.com

ACN 005 624 868 | ABN 96 005 624 868

Directors: Virginia Ross, Christopher Hose,
Stephen Maxwell, Tamara Beck

Issue	Date
A	21/01/19
B	30/01/19
C	19/03/19

Table of Contents

1 Introduction

1.1 The intention of this report

On October 30, 2017, Council confirmed Percy Treyvaud Memorial Park as the locale of a new multipurpose sport and recreation facility.

The City of Stonnington facilitated community feedback on four concept site options for Percy Treyvaud Memorial Park in November 2018. The feedback process was designed to elicit qualitative feedback to inform the design. The detailed findings of this process and feedback have been summarised in Council's report - *Percy Treyvaud Memorial Park Masterplan - Engagement Report, January 2019*.

This report analyses the feedback on design elements of the concept site options and provides recommendations for design changes for the draft Percy Treyvaud Memorial Park master plan.

The masterplan includes the development of four indoor sports courts, plus upgraded facilities for the Chadstone Recreation and Civic Club and its sport sections of the Chadstone Bowls Club and Chadstone Tennis Club, as well as seasonal clubs and casual users of the park.

1.2 The project process

The diagram below summarises the project process and input to date.

- Establish Project Governance Structure
- Formation of project Stakeholder Group
- Stakeholder consultation
- Development of project principles
- Background analysis and site investigations
- Community consultation
- Preparation of four draft concept site options
- **Stage One Community Consultation**
- Develop preferred concept into draft master plan
- Stage Two: exhibition of draft masterplan
- Preparation of final master plan
- Design and implementation

1.3 Consultation analysis methodology

The *Percy Treyvaud Memorial Park Masterplan - Engagement Report, January 2019* concluded the community provided significantly more commentary on Options 1 and 3. Therefore the following section analyses Option 1 and 3 feedback only.

Please refer to the engagement report for general feedback across all options. The following analysis covers specific design elements in Option 1 and 3.

As was done in the engagement report, the following analysis assesses feedback against the project principles previous established with input from the Stakeholder Group and community consultation. These are (in short form):

1. Community and social benefit;

2. Increase, sport, recreation and wellbeing participation;

3. Environmental sustainability;

4. Be sensitive to the local community (separated into five components)

    a. Noise

    b. Light

    c. Safety

    d. Traffic

    e. Parking

5. Attractive and functional design;

6. Retain and protect open space; and

7. Balance different needs

The community provided both positive and negative feedback. It is important to record both positive and negative commentary to inform the next iteration of design.

Key members of the consultant team have reviewed the feedback and provided comments and recommendations across Architectural, Landscape and Traffic related issues. These comments and recommendations, along with the findings from technical reports, will inform the recommended design changes to be implemented in the draft Masterplan.

2. Existing Conditions

‘this is an active place for community and sport’

2 Existing Conditions

2.1 Existing Site Context

Percy Treyvaud Memorial Park is located on Chadstone Road in Malvern East. It is bounded to the east by Quentin Road, to the west by Chadstone Road and to the north and south by residential properties.

2.2 Existing Site Conditions

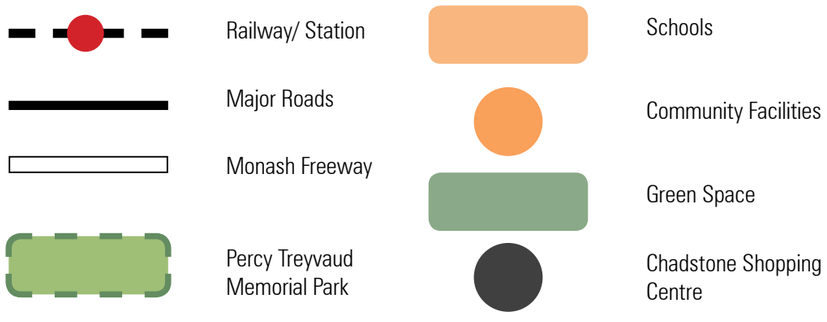
The site houses two grassed ovals, two bowling greens, seven tennis courts and several aging buildings home to community sport and recreation organisations. An asphalt driveway cuts though the site from Chadstone Road to Quentin Road providing formal on-site car parking for 97 vehicles. A private, members car park is accessed from this driveway for the Bowls and Tennis clubs containing approximately 10 -12 informal car spaces.

The northern part of the site contains a significant tree-lined path providing a green buffer to the residents to the north. Other features of the site include:

- A wetland to the west with bridge over for pedestrian access
- Rotunda structure close to Quentin Road
- A local level playground close to Quentin Road
- A 24-hour access toilet facility
- Hit-up wall to the south
- Pedestrian pathways with seats to the east, south and west of the ovals
- Cricket nets between the two ovals

The site slopes steeply from the east at Quentin Road down to the west at Chadstone Road. There is also a significant cross-fall from the north landscape buffer down towards the ovals at the centre of the site.

Source: Google Earth



2.3 Existing Site Use

Percy Treyvaud Memorial Park is a much loved and frequented local community park. Local community members, Malvern East residents and Stonnington residents take part in both organised and informal sports and recreation activities at the park. For organised sport activities, the park is also frequented by visiting sports club members daily.

Percy Treyvaud Memorial Park is home to the following community sports organisations:

- Chadstone Bowls Club
- Chadstone Tennis Club
- Chadstone Recreation and Civic Club
- Chadstone Lacrosse Club
- East Malvern Tooronga Cricket Club

The informal activities occurring in the park include:

- Dog-walking
- Walking and running
- Exercise activities
- Playground
- Use of the hit-up wall
- Fauna watching

Other organised, but more infrequent use of the park includes:

- Local primary school use of the ovals or tennis courts
- Walking groups
- Other cricket or football clubs use the ovals when their home-grounds are being refurbished

2.4 Existing Site

Percy Treyvaud Memorial Park has been described as an 'oasis' by local residents. It is a well-frequented green space for locals and community sports organisations.

The northern landscape buffer is a treed area with pedestrian path connecting Chadstone Road and Quentin Road. Access to the ovals or park from this area is via the street footpaths.

The CRCC, Bowls Club and Tennis Club areas contain sports courts, parking and clubhouses. The area is fenced and accessible by club members.

There is a local level playground at the Quentin Road end of the site.

The existing driveway and car park provides vehicle access between Chadstone Road and Quentin Road with no dedicated pedestrian pathway.

Compliant disability access across the site and into some facilities is problematic due to the slope. Ramp access is provided to the CRCC and Bowls Club and between bowls greens.

The two ovals to the south are in good condition, however there are some issues with drainage due to the location of the cricket nets.

The wetlands to Chadstone Road are supplied by a Melbourne Water drain through the site. A bridge provides pedestrian access across and into the park from Chadstone Road.

A pedestrian pathway is located to the south of the ovals. Connection to the pathway is via the street footpaths. A hit-up wall and basketball ring are located to the south of the west oval.

Seating, public BBQ facilities, rubbish bins and drinking fountains are located around the park.

2.5 Existing Facilities

Existing facilities on site are aging, individual buildings are located along the asphalted driveway and car park through the site. Photos of these facilities are opposite. There is also a rotunda and public toilet on site.

Facilities are generally in need of upgrade and would not perform well in terms of energy efficiency. Change facilities in particular need to be brought up to current standards for disability access and female friendly sporting facilities. Storage in facilities is dispersed and inadequate creating access and occupational health and safety issues for clubs.

View of car park

View of car park towards tennis

CRCC and Chadstone Bowls Club facility

Oval Pavilion

CRCC and Chadstone Bowls Club facility

Oval Pavilion

Tennis Club

Tennis courts

3 What We Heard

Feedback is listed below under the project principles. Comments from the architect, landscape architect and / or traffic engineers are provided in response to each item.

Design Principle	Option 1 - Community Feedback	Option 3 - Community Feedback	Consultant Response
1. Community and social benefit	▪ Positive comments on the open spatial design and location of sporting activities and community spaces. ▪ The location of the social spaces overlooking the bowling greens was noted as an attractive design element, creating a community space that is spatially separate to the stadium ▪ The design having the 'least disruption' to the current functionality and character of Percy Treyvaud Memorial Park ▪ Some respondents were concerned that this design separates and isolates the other sporting clubs, including restricting pedestrian movement through and around the precinct and inadequate viewing for other sports.	▪ Many respondents made positive comments on the design to locate the bowls and the tennis clubs together, with the connecting social spaces and amenities, which is believed to create a 'community feel' as well as positively contributing to social inclusion, interaction and safety ▪ Feedback on the roof terrace design element was positive, with mention that the space would create a social benefit for both local and sporting communities.	In general, option 3 provides the greatest pedestrian permeability to the site through the creation of the north-south access. Option 1 stretches the development from Chadstone Road to Quentin Road with reduced landscape buffer to Quentin Road, bringing the tennis courts closer to the street.
2. Increase sport, recreation and wellbeing participation	▪ Design would create an inclusive and accessible area for the community and clubs to enjoy sport and recreation activities in the park. ▪ The location is impractical (too far away) from the high-use junior cricket field ▪ Visual dominance of the stadium fronting Chadstone Road would lessen the exposure (visibility) of other co-located sporting opportunities (i.e. cricket, lacrosse, tennis and bowls) and potentially reduce the awareness and participation of these sports	▪ The feedback for option 3 did not specifically relate to this design principal ▪ Whilst all four concept design options recommended the installation of a fitness station, most people commented more favourable in relation to 'option 3'.	In Option 1, the form of the stadium does hide the bowls and tennis clubs from view from Chadstone Road and the facility entry points. Facility users accessing the stadium would park in the basement and go directly into the stadium without interacting with or seeing the bowls and tennis clubs. The location of cricket nets in their compliant size and orientation is difficult in each of the options. Further discussion with the cricket club and Council is required.
3. Environmental sustainability	▪ There was no direct feedback about environmental sustainability, except for those relating to open space and tree removal which are addressed under principle 6 below	▪ There was no direct feedback about environmental sustainability, except for those relating to open space and tree removal which are addressed under principle 6 below	
4. Sensitive to the local community			
a. Noise	▪ Concern about increased noise from the new stadium	▪ Concern about increased noise from the new stadium	In both options the stadium will be designed to mitigate noise from the stadium. It will be designed as a sealed structure and mechanically ventilated with no openable windows. Doors from the stadium to outside will be for emergency exit only and fitted with automatic closers.
b. Light	▪ There was no direct feedback about light spill. Feedback regarding lighting levels for safety are addressed under principle 4c below	▪ There was no direct feedback about light spill. Feedback regarding lighting levels for safety are addressed under principle 4c below	
c. Safety	▪ Stadium located at Chadstone Road it would create further risk to the safety of pedestrians and residents due to increasing traffic in the already congested area of Chadstone Road ▪ Concerns about anti-social behaviour was also raised, especially the isolated location of the shelter and barbecue area abutting residential dwellings to the south of the site, exacerbating the already occurring behaviour experienced in the evenings at the existing rotunda ▪ Concerns about appropriate level of lighting to outdoor spaces at night	▪ The single level of car park was well received due to the perceived safety and its contribution to a low site profile. ▪ The large shelter and barbecue facilities in the south-west corner of the park is not well received, as there are concerns about anti-social behaviour. ▪ Some concern about anti-social behaviour between the 'social spaces' and the tennis courts or the north to south walk through. ▪ Some concerns about the removal of part of the footpath on Quentin Road to accommodate parking, as it is a popular route for getting into the park, Chadstone Shopping Centre and children walking to school ▪ Concerns about appropriate level of lighting to outdoor spaces at night	The outdoor spaces should all be designed to Crime Prevention Through Environmental Design (CPTED) principles. The elevated walkway and roof terrace should be designed to have a high level of natural, passive surveillance from the oval side, including: - balustrades design for fall safety but be visually permeable and not restrict views of the area - planting to be a combination of low shrubbery and canopy trees to allow for views of the area - good lighting shall be provided along the walkway to limit dark areas - fencing can be used to limit access to areas such as the roof terrace outside the tennis courts
d. Traffic	▪ Location of the stadium fronting Chadstone Road would contain the traffic to the western end of the park and the design will have the least detrimental impact on surrounding local streets and residential areas	▪ Concern about traffic flow into neighbouring streets as the Stadium is closer to Quentin Road	Traffic engineers have confirmed that Chadstone Road does have the capacity for the additional vehicle movements generated by the new users of the site. The vehicle entry and exit points are the same in Option 3 as in Option 1. Good, clear signage on Chadstone Road will direct drivers into the car park to access the stadium. The pedestrian entry into the stadium is via the foyer just west of the centre of the site, which is in the same location as in Option 1. The distance to walk to the stadium entry is longer from Quentin Road than Chadstone Road.

Design Principle	Option 1 - Community Feedback	Option 3 - Community Feedback	Consultant Response
e. Parking	▪ The second level car park designed to increase capacity is a positive features as there is the ability to accommodate additional on site parking, but a negative feature relating to cost ▪ As the two-levels of basement car parking are underground, access to the ovals is difficult when carrying large equipment bags ▪ Many respondents preferred the removal of the small on site car park off Quentin Road, however, there was a recurring theme that the car parking and/or a drop off zone on Quentin Road is a valuable design element to release the traffic pressure from Chadstone Road	▪ The inclusion of on-street parking at Quentin Road was also considered to be a positive design feature. It was a recurring theme in the feedback that the more even distribution of amenities and the parking at Quentin Road will spread the traffic and the parking across the area and therefore lessen the pressure on Chadstone Road. However, some consider this to be the most disruptive to the most residents, specifically Quentin Road residents. This concern was also reiterated at the on site consultation sessions. ▪ Concern was also raised relating to the safety of cars reversing out of the angled parking on Quentin Road into traffic. ▪ Number of space in basement car park inadequate ▪ Single level car park with ability to walk into the park without going through the building was viewed positively	Since the exhibition of the site concept studies, the traffic engineers have completed the assessment of parking required on site and concluded 214 spaces are required. Please refer the traffic report in the appendix. This means the current two-level car park in Option 1 provides in excess of the parking requirements and could be reduced to address cost without impacting on the functionality of the site. However, the two levels of basement car parking in Option 1 are not as functional as a single level car park with on-grade access to the park in Option 3. The Option 3 car park needs to increase its capacity to the recommended number of car spaces. The Quentin Road angled parking appears to not be desirable for residents, but does provide additional parking for park users. For this to be deleted the basement car park will need to increase slightly.
5. Attractive and functional design	▪ Supportive comments suggested the Chadstone Road siting of the stadium reduces the visual and physical impact on the park and that stadium siting is consistent with the existing built form of the commercial development and activity on Chadstone Road ▪ There was concern that the stadium design is the tallest, bulkiest and least visually attractive; visually overpowering and dominating the park, Chadstone Road and the surrounds ▪ There was also some concern that the height of the stadium would over shadow the bowling greens during playing times ▪ Some concern over functional layout of tennis courts ▪ Positive comments on the bowls and the tennis clubs being located in close proximity to each other and how the social spaces and amenities are well integrated.	▪ Positive sentiment from respondents of the use of the slope of the land to reduce the visual bulk of the stadium in 'option 3'. Overall, it was recognised that the design of this option presents the least visual impact or 'presence', in both height and length. ▪ Some stated that the stadium was too close to the oval and would overshadow the oval. ▪ There was strong opinion that this option presented the most even and logical distribution of amenities to satisfy all stakeholders. ▪ Positive comments on the bowls and the tennis clubs being located in close proximity to each other and how the social spaces and amenities are well integrated. ▪ Some respondents noted that the social spaces in 'option 3' seem excessive and unnecessary. ▪ There was some positive feedback on the roof terrace design and the social benefits it would bring to both sport participants and the community. ▪ There was mention of the ease of viewing sports in this option, specifically courtside tennis viewing from multiple directions. Many people stated that more seating should be provided. ▪ The functional layout for tennis was preferred in this option	**Visual bulk** Option 1 - Due to the location of the basement car park, the stadium cannot be lowered into the site any further. Visual bulk can be reduced through the use of canopies, low height glazing and facade treatments to articulate the facade and help it feel less dominant. Option 3 - the impact of visual bulk is lessened to the site as the stadium is built into the site. On the upper floor the north-south access breaks up the building mass facing the northern landscape buffer **Overshadowing of sports fields** In Option 1 the stadium will overshadow the western bowling rink in the afternoon approximately 2m in summer and 9m in winter. In Option 3 the stadium will cast a shadow past the bottom of the existing batter of the oval in Summer from 0 to 4 meters, and in Winter from 8 to 12 meters. **Functional Design** Social spaces size and number are the same in each option and are based on the existing provision of spaces on site for Bowls and Tennis. The Cricket and Lacrosse social space has been increased by 30sq.m on the existing in line with the relevant sporting body guidelines recommendations for local clubs.
6. Retain and protect open space	▪ Some noted that this option increased open space on the northern boundary near Abbotsford Avenue and required fewer number of trees to be removed compared to other options. ▪ Maintaining the strong line of established trees on the northern and eastern boundaries was also positively viewed by respondents. ▪ Some provided feedback that 'option one' created the least amount of community open space compared to 'option 3' by the lack of north/south access.	▪ Some concern about the loss of open space and trees, some believed that this design would result in the highest loss of trees, which in turn would disturb the birdlife and other wildlife ▪ Other respondents enjoyed the concept of creating open space that flows between the tennis and the bowls clubs, with positive sentiment also received on the design of the public garden and the north to south walk through	**Tree Loss** Tree loss in Option 1 is the least of all options. In the detail design phase a more detailed assessment of trees near the perimeter of the development will be undertaken to assess whether any additional trees can be preserved. For Option 3, the tree loss can be reduced through changes to the location and alignment of the tennis courts and stadium. In the detail design phase a more detailed assessment of trees near the perimeter of the development will be undertaken to assess whether any additional trees can be preserved. **Open space** Option 1 does not allow any space for north-south access in the centre of the site as the courts are lined up end-to-end. Option 3 has the larger gain in public open space.
7. Balance different needs	▪ There was some opinion that 'option 1' does not benefit the other sports and clubs located at the park. ▪ Some respondents believe the Chadstone Road traders would be adversely impacted as precinct users are more likely to use parking associated with business trade for the stadium. ▪ Some respondents provided positive feedback on retaining the playground abutting Quentin Road to allow the afternoon sun.	▪ There was a recurring theme that this concept option delivers the greatest community benefit, in particular design elements to maximise open space, community access and the equitable distribution of activities within the park. ▪ There was the opposing view that this concept option has the most impact on Quentin Road residents.	In Option 1, the form of the stadium does hide the bowls and tennis clubs from view from Chadstone Road and the facility entry points. Facility users accessing the stadium would park in the basement and go directly into the stadium without interacting with or seeing the bowls and tennis clubs.

4. Technical Reports

4 Technical Reports Summary

4.1 Technical Reports

The following technical reports have been completed to inform the draft master plan:

- Functional Brief, prepared by Williams Ross Architects
- Assessment of tree removal for Options 1 and 3, prepared by ACLA
- Site Traffic Report, prepared by Irwinconsult
- Sustainability Opportunities Report, prepared by BRT Consulting Engineers

A summary of each report is included in this section.

Please refer to the appendix for all reports.

A detailed Arboricultural Report was prepared by Greenwood Consulting, dated 13th January 2019. This has been provided as a separate supporting report available on the Stonnington website.

4.2 Functional Brief

The Functional Brief for the Percy Treyvaud Memorial Park was drafted in two sections - the wider park brief and the facility brief.

Stakeholder and community consultation have informed both sections of the brief. Council officer input and consultant team input have also informed the brief in terms of resolving issues with existing conditions and bringing facilities up to contemporary community standards.

The master plan brief has been informed by individual consultations with stakeholder resident representatives, as well as the wider Stakeholder Group. Wider resident input has been provided through the resident representatives and on an individual basis.

The detail functional brief for the sporting activities has been informed by the following relevant sporting codes and requirements to ensure new facilities are compliant to current standards:

- Bowls Australia, Bowling Rink Construction Guidelines
- Tennis Australia
- Netball Victoria Facilities Guide
- Basketball Victoria Facilities Guide
- Combined NV and BV court layouts, 2017
- Lacrosse Victoria Strategic Facilities Plan, 2016 and update provided by Chadstone Lacrosse Club
- Cricket Australia Community Cricket Facility Guidelines Functional Brief

4.3 Tree Removal Assessment

Greenwood Consulting prepared a detailed assessment of all trees from the north boundary of the site to the north edge of the existing ovals. Each tree was physically numbered and tagged on site with each tree identified, described and assessed in the full report. This report is available on the Stonnington website.

ACLA landscape architects reviewed the arboricultural report against all options to determine likely tree removal required. Assessment of Options 1 and 3 is included in the appendix.

Tree Assessment Criteria

The tree assessment encompasses a variety of criteria. Two important definitions are below:

1. Significant Tree

Definition from Stonnington Council General Local Laws 2018:

"Significant Tree" means a tree or palm:

a. with a trunk circumference of 140cm or greater measured 1.4m above its base;

b. with a total circumference of all its trunks of 140cm or greater measured 1.4m above its base;

c. with a trunk circumference 180cm or greater measured at its base; or

d. with a total circumference of all its trunks of 180cm or greater measured at its base.

2. Retention Value

Definition from the Arboricultural Report prepared by Greenwood Consulting:

Retention value is comprised of two parts - the Amenity Value of the tree rated as Very Low to Very High and the Useful Life Expectancy (ULE) of the tree.

The Amenity Value of the tree relates to the contribution of the tree to the aesthetic amenity of the area. The primary determinants of amenity are tree health, size and form.

This value is then modified by the Useful Life Expectancy of the tree, with short ULE values reducing the Retention Value and long ULE increasing the Retention Value.

A Retention Value is then applied to the tree from Very Low up to very High.

Trees noted as "Recommended for Removal" are done so on the basis of poor, or worse, health and / or structure of the tree.

In summary:

Option 1 - Trees to be removed (significant)

Number	Retention Value
0	Very High
6	High
10	Moderate
0	Low
0	Very Low
1	Recommended for removal

Option 1 - Trees to be removed (not significant)

Number	Retention Value
0	Very High
0	High
16	Moderate
28	Low
2	Very Low
4	Recommended for removal

Option 3 - Trees to be removed (significant)

Number	Retention Value
0	Very High
7	High
11	Moderate
0	Low
0	Very Low
1	Recommended for removal

Option 3 - Trees to be removed (not significant)

Number	Retention Value
0	Very High
0	High
22	Moderate
37	Low
3	Very Low
5	Recommended for removal

4.4 Traffic Report

Traffic and parking studies have now been completed. Irwinconsult prepared a traffic engineering report covering the following items relating to the site:

- existing site traffic conditions, vehicle and pedestrian accesses
- existing car parking capacity and occupancy
- existing site intersection counts
- assessment of existing car parking demand based on activities on site at varying times of year
- assessment of new car parking demand created by the new uses on site at varying times of year
- advice on traffic and car park layouts

Irwinconsult's key findings include:

- A conservative assessment of the future car parking demand across the whole site in the Summer Season suggests a peak demand of up to 214 car parking spaces when all uses operate at their respective peaks
- A conservative assessment of the future car parking demand across the whole site in the Winter Season suggests a peak demand of up to 208 car parking spaces when all uses operate at their respective peaks
- It is recommended the development provide 214 on-site car parking spaces
- The impacts of future development traffic on the park entry intersection has been assessed in SIDRA, and the findings indicate that the changes to this intersection operation would be acceptable

Council undertook a separate traffic study which assessed the existing condition of the local street network, as well as predictions of the impact of the operation of the indoor facility and the future growth of Chadstone Shopping Centre.

Please refer to this separate report available on Council's website.

4.5 Sustainability Opportunities Report

The following is a high-level list of Environmental Sustainable Design opportunities for this project:

Management

- City of Stonnington's commitment to environmental and energy conservation targets.
- BCA 2017 Section J Deemed to Satisfy requirements achieved.
- Metering to allow monitoring and management of energy and water.

Water Efficiency

- Sanitary fixtures with 5 and 6 star WELS ratings
- Water efficient landscaping including garden planting and lawn areas.
- Rainwater collection for W.C. and amenity use and immediate landscaping

Energy Efficiency

- 10% increase in energy efficiency requirements from that detailed in the National Construction Code including lighting, building insulation, air conditioning and ventilation systems
- Double glazed window system through the development to provide increased thermal and acoustic performance for the facility
- Installation of LED lighting throughout with central lighting control to be provided
- Daylight Dimming
- Installation of heat recovery Variable Refrigerant Flow (VRF) air conditioning system
- Labyrinth for pre-cooling of air to naturally ventilated spaces including indoor stadium
- Instantaneous gas hot water system
- Solar power
- Green roof systems to reduce heat load and heat loss

Stormwater

- Stormwater should be captured by rainwater tanks or rain-gardens to minimise negative environmental impacts of stormwater runoff and maximise on-site re-use of stormwater.

Indoor Environment Quality

- Mechanical conditioning of the air into the stadium to ensure the building can be sealed to improve efficiency and manage acoustics.
- Natural ventilation and light to all habitable rooms.
- Installation of Heat Recovery Unit to supply fresh air
- Independent climate control to all offices and common areas.
- Double glazing throughout the development to improve acoustic and thermal performance of the building envelope.
- Use of vegetation to pre-cool air intake into sports hall

Transport

- Provision of easy pedestrian access to the facility at the public entrance.
- Access to public transport at property frontage.
- Provision of cycling facilities and path connections to the facility entry and around the park

Waste Management

- Provision of individual rubbish and recyclable waste throughout the facility.
- Garden maintenance contractor engaged to remove and recycle 'green' waste.
- Dedicated waste enclosure to house waste and recycling bins

4.6 Acoustic Design

Background noise measurements were undertaken at Percy Treyvaud Memorial Park to provide a benchmark for future design of mechanical equipment, and a basis for advice for appropriate building fabric design to limit noise from the stadium.

The overall acoustical design objective is to create a comfortable environment, acknowledging that the building houses noisy activities that will be loud at times. Maximising acoustic absorption through internal building materials will assist in reducing some of the impact of such activities.

Noise reverberation and transfer / disturbance between the sports courts and separate activity areas i.e. social spaces, meeting room should be minimised where possible.

Extraneous noise from other court events as well as the adjacent mechanical services plant should be minimised. The stadium will be mechanically ventilated and air-conditioned to avoid noise from the stadium being intrusive.

4.7 Town Planning

Percy Treyvaud Memorial park is located in the Public Park and recreation Zone (PPRZ). The subject site is partly affected by a Special Building Overlay (SBO) across the ovals. This overlay is not located over the development site.

Given the proposed use and development will be carried out on behalf of the City of Stonnington which is the public land manager, a planning permit is not required under the provisions of the Public Park and Recreation Zone.

Aboriginal Cultural Heritage Sensitivity

The south-west corner of the park is in an 'area of cultural heritage sensitivity'. The development is not located in this area.

Advertising Signs

The Public Park and Recreation Zone is in Category 4 - Sensitive areas for advertising signs. The type and size of advertising signs is limited within this category.

Car Parking

Under Clause 52.06-6 of the planning scheme, car parking spaces must be provided to the satisfaction of the responsible authority.

Native Vegetation

Under Clause 52.17 of the planning scheme a planning permit is required to remove, destroy or lop native vegetation.

A Tree Work permit is also required for pruning or removal of any trees classified as a 'Significant Tree' under the City of Stonnington General Local Laws 2018.

Bicycle Facilities

Under Clause 52.34 of the planning scheme bicycle facilities are required to be provided in association with a sports and recreation facility.

5. Draft Masterplan

5 Draft Masterplan

5.1 Design principles

The community feedback and final technical reports have clarified key design elements for the project. These have been incorporated into the draft masterplan on the following pages and the Functional Brief in the appendix.

These are discussed under the relevant design principle below.

1. Community and social benefit

The majority of the feedback that addressed this principle saw it being delivered by:

- providing good and accessible pedestrian access through and around the precinct
- creating a 'community feel' through a strong connection between the bowls and tennis clubs, social spaces and amenities
- providing good visibility of sporting clubs and outdoor playing field
- providing the elevated roof terrace as a community space and for viewing of sports

The draft masterplan seeks to provide this by locating bowls and tennis close together while maintaining views to other outdoor sports from the open public spaces; providing accessibly compliant pathways across the site, to and around the ovals; and designing the roof terrace to be accessible and provide benefit to the community.

2. Increase sport, recreation and wellbeing participation

Many saw visibility and exposure of the outdoor courts and park facilities as the best way to increase participation in a range of sport and recreation activities.

The draft masterplan locates the outdoor sports courts to increase their visibility to attract interest and participation of the community.

3. Environmental sustainability

The draft masterplan seeks to incorporate practical and innovative environmentally sustainable practices as recommended in the Environmental Sustainability Report, refer appendix.

4. Sensitive to the local community

This design principle is broken down into the topics of noise, light, safety,traffic and parking.

a. Noise

Feedback around noise was mostly concerned with the noise that may come from the new stadium. The draft masterplan seeks to address this by mechanically ventilating the stadium so that the building fabric is well sealed.

b. Light

Feedback around lighting was mostly concerned with providing safe lighting levels in surrounding park areas at night. The draft master plan will address this through use of CPTED principles as discussed below.

c. Safety

Most of the concern around safety issues were focused on deterring anti-social behaviour in outdoor spaces, providing pedestrian safety during busy times when more cars were accessing this site, and designing the car park to be a safer place.

All park, outdoor and car park spaces will be designed to Crime Prevention Through Environmental Design (CPTED) principles in the draft master plan.

Pedestrian safety can be addressed by maintaining the Quentin Road footpath, setting the stadium back into the site so that it does not compromise sight-lines for vehicles entering and exiting the site, and providing a single level car park with on-grade access to the park via a pedestrian only forecourt.

The draft masterplan removes the proposed shelter and BBQ to the south-west corner of the park as this was not supported in the feedback.

The playground will remain in its exiting location, with some additional treatment to the road side to improve safety for young children.

d. Traffic

The majority of feedback regarding traffic focused on keeping traffic to the facility on Chadstone Road rather than the neighbouring local streets.

The draft masterplan will address this through strong site signage on Chadstone Road to alert motorists to the parking entry off Chadstone Road. The drop-off facility will remain on Chadstone Road. With the recommended amount of car spaces being provided, regular users will know they can find parking on site. The single level car park in the draft masterplan will provide park and facility users close and easy entry to the facility entry and ovals.

e. Parking

The community want enough on-site car spaces to accommodate the activity during the summer peak sports season at Percy Memorial Park.

The traffic engineer's report recommends 214 car spaces be provided on site for this peak and this is reflected in the draft masterplan.

Feedback was generally against having the off-street parking on Quentin Road. The draft master plan removes this and retains the existing Quentin Road footpath along the park edge.

5. Attractive and functional design

The two key elements addressed by the feedback under this principle were visual bulk and functional design.

Visual bulk

The majority of feedback desired a reduction in visual bulk of the stadium to residential properties and street interfaces.

The draft masterplan seeks to reduce the impact of visual bulk by locating the stadium where it can be set into the ground and away from street interfaces. The roof terrace and north-south access divides the upper storey of the facility and reduces the perception of building mass to the north.

The perception of visual bulk to the park will be reduced through architectural treatment including the elevated walkway.

Functional design

The design needs to balance the functional needs of all facility and general park users.

The draft masterplan seeks to achieve this by:

- Providing all car parking on a single level:
  - to provide on grade access to the park without going through the building
  - to provide multiple pedestrian access points out to the ovals
  - to provide on grade access into the building from the car park
  - to reduce the need for steep vehicle ramps
  - to reduce cost
- Locating the stadium so that it does not overshadow the bowling greens, and minimises the overshadowing to the east oval in winter
- Reviewing other functional detail layouts with facility users in the next phase of design

6. Retain and protect open space

The community wants access to high quality, connected and accessible public open space; to not lose access to public open space; and to remove as few trees as possible.

The north-south connection and general retention of north and east set backs to the tennis courts in the draft master plan provides the additional public open space and retention of more trees in comparison to previous options.

Open Space Calculations

In the concept options study, each option was analysed and compared to the existing conditions of the site to assess how the provision of open space is affected. Only the areas affected by the facility development were measured.

The existing spaces on site can be described as follows:

- Northern landscape buffer - the strip of high quality landscape between northern residents and the existing sports' fence line
- Southern green open space - any grassed area or garden bed that is accessible at any time
- Roof terrace - open space that is accessible while the centre is open
- Driveway and car parking - all asphalted and gravel areas that vehicles regularly use
- Outdoor sports courts - fenced areas of outdoor sports courts
- Outdoor sports social areas - fenced areas of outdoor green space
- Buildings

The adjacent diagrams compare the existing site condition with the draft masterplan. The diagrams should be read in conjunction with the legends. Red dashed lines indicate the location of the existing bowls and tennis fences and the perimeter of the existing asphalted areas.

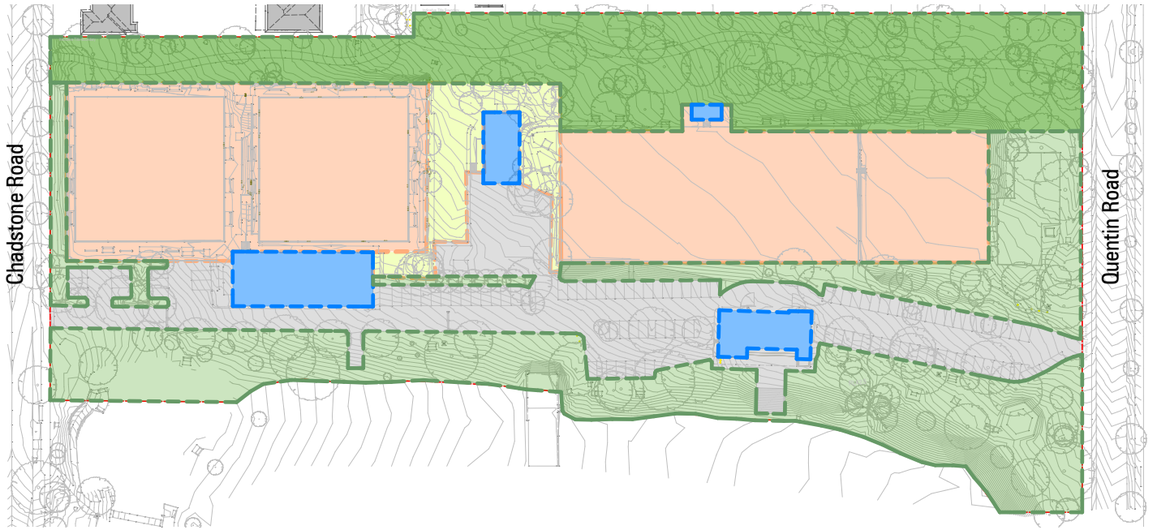
Net open space change is calculated by comparing the existing northern landscape buffer and public green open space with the corresponding spaces in the draft masterplan.

Summary of the draft master plan open space calculations:

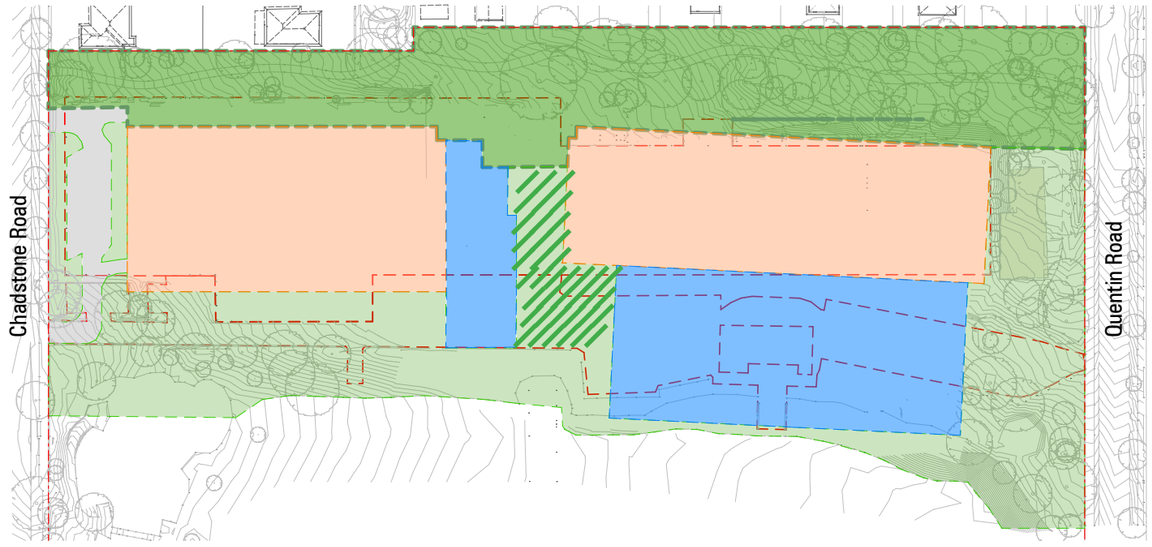
Northern landscape buffer increased by 1,020m^2

Southern green open space is increased by 140m^2

Net gain in public open space 1,160m^2



Existing Site Condition



Draft Masterplan Site Condition

Legend	Space	Existing Area m2	draft Masterplan m2	Difference to Existing m2
	Northern landscape buffer	5,900 m2	6,920 m2	+1,020 m2
	Southern green open space	7,200 m2	7,340 m2	+140m2
	Roof terrace	0 m2	900 m2	+900m2
	Driveway and car parking	4,420 m2	640 m2	- 3,780m2
	Outdoor sports courts	8,100 m2	7,280 m2	- 820 m2
	Dedicated outdoor sports social areas	1,050 m2	90 m2	- 960 m2
	Buildings	980m2	4,480 m2	+3,500 m2
	Total	**27,650 m2**	**27,650 m2**	

Tree Removal

The draft masterplan requires the following tree removal, which is the lowest of all options:

The draft masterplan also seeks to retain the open space set back and established line of trees to the north and east of the development site.

Please refer to the definition of significant tree and retention value in the previous section of this report.

Trees to be removed (significant)

Number	Retention Value
0	Very High
6	High
8	Moderate
1	Low
0	Very Low
1	Recommended for removal

Trees to be removed (not significant)

Number	Retention Value
0	Very High
0	High
20	Moderate
26	Low
1	Very Low
4	Recommended for removal

Nett Tree Gain

The draft masterplan proposes 134 new trees be planted across the site. With 67 trees removed there is a nett gain of 67 trees across the site.

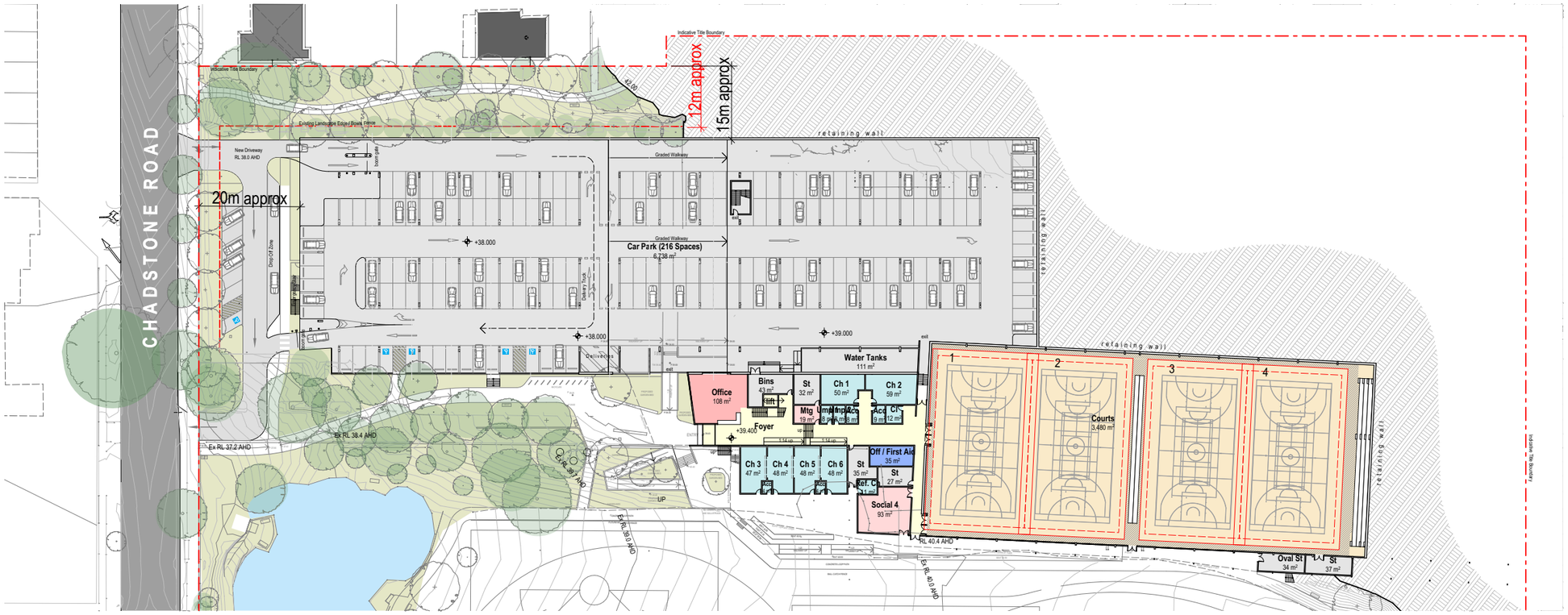
7. Balance different needs

There was a strong sentiment in the feedback that the development should be fairly distributed across the park to provide:

- good sight-lines and exposure to all sports
- strong views into all public open space and to outdoor courts
- centre the building and set it into the slope to reduce the visible bulk
- create pedestrian access north-south as well as east-west

The draft masterplan seeks to achieve this by setting the stadium into the slope, creating the north-south access with good visual permeability, and creating good pedestrian access and viewing to all outdoor sports areas.

Draft Masterplan

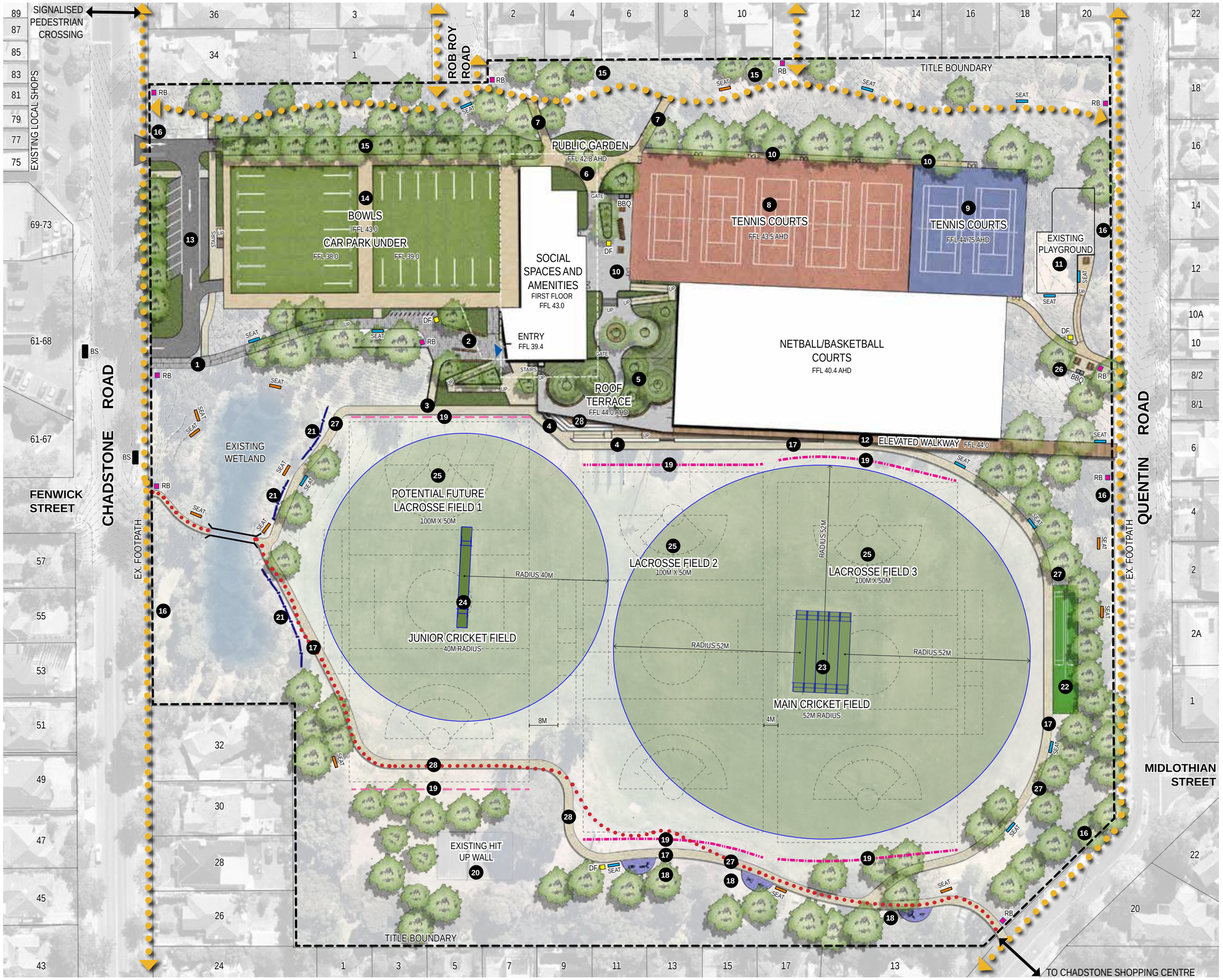


Upper Level Floor Plan

Lower Level Floor Plan

1:1000 @ A3

williams ross architects



LEGEND

- Footpaths To Be Retained
- Paths To Be Removed
- BS — Bus Stops
- SEAT — Existing Seating
- SEAT — Proposed Seating
- DF — Proposed Drink Fountain
- RB — Proposed Rubbish Bin With Doggie Bags
- BBQ — Proposed Public BBQs
- Proposed Building Entry
- Proposed Paths
- Proposed Feature Paving
- Proposed Roof Terrace & Walkway
- Proposed Barrier Fence
- Proposed Ball Catch Nets
- Potential Future Lacrosse Field 1 Ball Catch Nets
- Proposed Trees

KEY FEATURES

1. Main pedestrian access from Chadstone Road
2. Entry forecourt with seating and bike parking facilities
3. Access to sports fields from entry forecourt
4. Spectator tiered seating
5. Roof terrace with seating areas, planting and views into the indoor court stadium
6. Public landscape with seating areas and planting
7. Pedestrian access link to public gardens and roof terrace
8. Synthetic clay tennis courts (5)
9. Plexipave tennis courts or similar (2)
10. Access to tennis courts
11. Existing playspace to be retained.
12. Elevated walkway with views over sports fields and connection to Quentin Road
13. Off street car parking and drop off zone
14. New bowling green comprising 14 rinks (synthetic lawn)
15. Enhancement of northern buffer with additional trees
16. New vehicle exclusion bollards to perimeter of park
17. Pedestrian loop path around sports fields
18. Fitness Stations
19. Ball catch safety netting to protect spectators and pedestrians (To Lacrosse Fields 2 and 3 + potential future nets to Lacrosse Field 1)
20. Existing hit up wall retained
21. Low barrier fence to prevent balls entering wetland
22. Cricket practice nets (fully enclosed)
23. Main cricket oval and wicket pitch to remain
24. Junior cricket oval and wicket pitch to remain
25. Lacrosse sports field orientated north-south (2 + 1 potential future)
26. Open air picnic area
27. Improved lighting for night safety
28. Existing path to be relocated when future lacrosse field is established

Publicly accessible toilet facility

ACLA CONSULTANTS
Landscape Architecture & Design
Suite 2, 751 Nicholson Street,
North Carlton VIC 3054
T. 9381 4366
www.acla.net.au

CLIENT: City of STONNINGTON

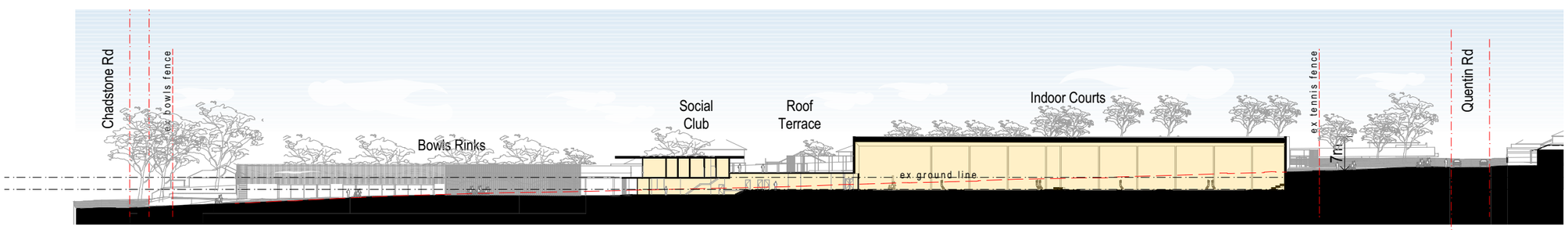
PERCY TREYVAUD SPORTS PARK MASTER PLAN
DRAFT MASTER PLAN

0 2.5 5 10 15 25m
SCALE
1:500 @ A1
1:1000 @ A3

PROJECT NO. 1807
DRAWING NO. 1807-MP1

ISSUE	STATUS	DATE	ISSUE	STATUS	DATE
0	DRAFT MASTER PLAN	31/10/18			
1	DRAFT MASTER PLAN	18/01/19			
2	DRAFT MASTER PLAN	18/03/19			

View from Chadstone Road

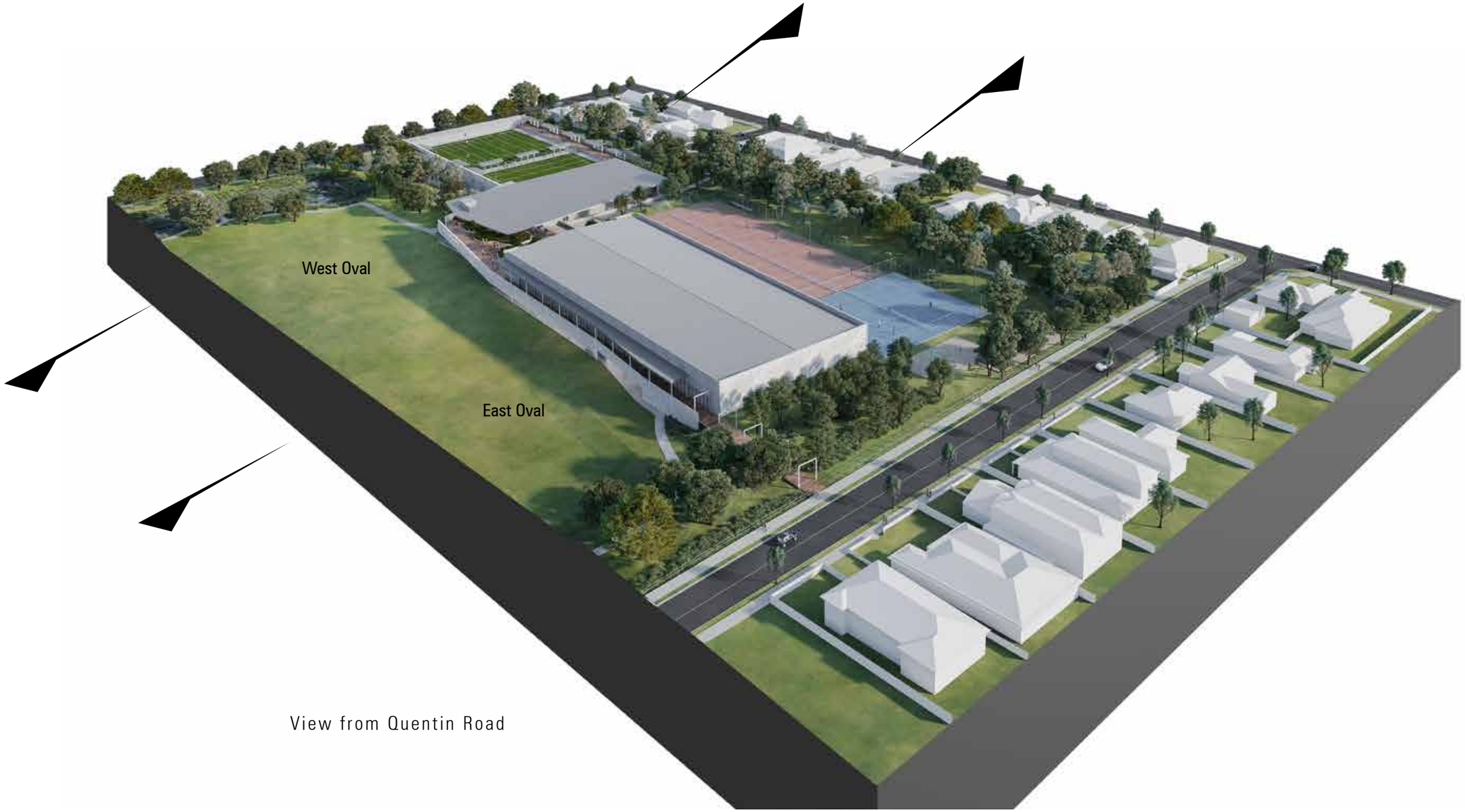


Long Section

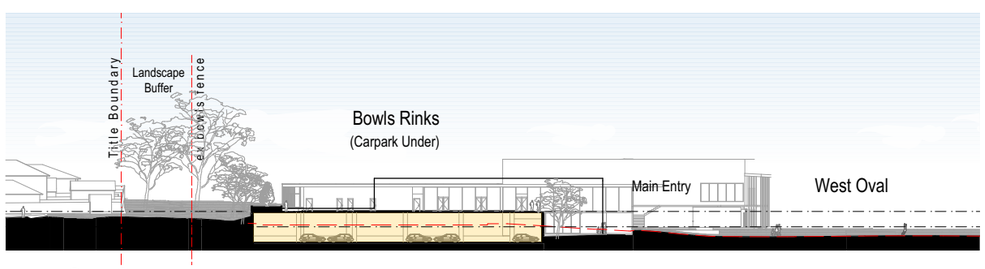
Sections - 1:1000 @ A3

williams ross architects

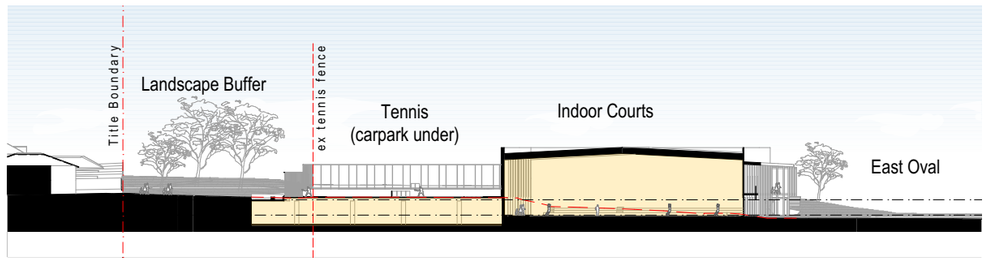
Percy Treyvaud Memorial Park Draft Masterplan



View from Quentin Road



West Oval Section



East Oval Section

Percy Treyvaud Memorial Park Draft Masterplan

Sections - 1:1000 @ A3

williams ross architects

A. Functional Brief

A. Functional Brief

How the brief was developed

As a master plan with a new sporting facility, the brief for the Percy Treyvaud Memorial Park was drafted in two sections - the wider park brief and the facility brief.

Stakeholder and community consultation have informed both sections of the brief. Council officer input and consultant team input have also informed the brief in terms of resolving issues with existing conditions and bringing facilities up to contemporary community standards.

The master plan brief has been informed by individual consultations with stakeholder resident representatives, as well as the wider Stakeholder Group. Wider resident input has been provided through the resident representatives and on an individual basis.

The detail functional brief for the sporting activities has been informed by the following relevant sporting codes and requirements to ensure new facilities are compliant to current standards:

- Bowls Australia, Bowling Rink Construction Guidelines
- Tennis Australia
- Netball Victoria Facilities Guide
- Basketball Victoria Facilities Guide
- Combined NV and BV court layouts, 2017
- Lacrosse Victoria Strategic Facilities Plan, 2016 and update provided by Chadstone Lacrosse Club
- Cricket Australia Community Cricket Facility Guidelines

Park Master Plan Brief

The broader master plan for the park has been developed in consultation with the stakeholder group, local community and council officers.

The imagery opposite provides examples of the types of landscape elements suitable for the park.

The following feedback has been incorporated into each site concept option where possible:

Park flora and fauna

- Retain or increase the northern landscape buffer
- Retain or enhance the wetlands appearance and function
- Take care to preserve existing flora and fauna (Existing fauna: Microbats; Tawny Frogmouth Owls; Pobblebonk Frogs, Antechinus, Herons, Egrets, Plovers) and improve habitat where possible.
- Avoid the removal of mature healthy trees. If unavoidable and absolutely necessary the loss is to be offset with appropriate additional tree planting and additional indigenous garden bed planting.
- Consider access to the reserve by providing a north-south connection from the east-west path north of the site to the main part of the reserve.
- Improve access within the reserve by creating a loop path.
- Consider realigning the path to the south of the reserve if necessary as it is located too close to the sports oval in some locations. Though it has been repaired in some places along its length it is generally in decent condition.
- Ensure any replacements/additions to street trees use the same species as existing to comply with specified tree planting schemes.
- Within the site use an appropriate mix of indigenous and exotic species where additional tree/garden bed planting is to be provided.

Water sensitive urban design

- Retain existing wetland system. It receives regular maintenance from Council, but requires a maintenance upgrade.
- As there is not an anticipated increase in run-off from the development the existing wetland system should be able to cope. Additional rain gardens throughout the development will assist in water treatment.
- Garden beds will receive establishment watering but will not be irrigated beyond that point.
- Consideration should be given to providing passive watering from ground surface runoff.

Pedestrian pathway networks

- Provide universal access throughout the site.
- Ensure access considers all types of pedestrian park user: recreational walkers; dog walkers and runners

Vehicle access and car parking

- Remove the ability for vehicles to cut through the park from Chadstone Road to Quentin Road
- Provide an appropriate amount of car parking for existing and new uses
- Consider parking access and control mechanisms to discourage parking on the site by Chadstone shoppers

Existing ovals

- Retain existing oval size and location
- Retain or enhance space for spectators to the north edge of the ovals
- If cricket nets are to be removed they need to be replaced in close proximity to the new facility for training
- Provide sports netting to north and south of main oval

Community Exercise

- Consider introducing an activity trail with exercise equipment to encourage an active community.
- Provide level outdoor spaces, other than the ovals, which are less programmed and are available for personal training, or group activities such as tai chi and boot camps.

General park facilities

- Retain the hit-up wall, basketball hoop
- Playground could be relocated - preferably further from the road, or review edge treatments if kept in existing location
- Increase seating opportunities
- Increase shelter around the park
- Increase provision of bins with doggie bag dispensers
- Provide recycling bins associated with the new stadium as it is a significant new community facility. Include helpful signage about appropriate use in order to reduce potential contamination
- Increase provision of drinking fountains
- Keep existing number of public BBQs and consider increasing if appropriate
- Provide publicly accessible toilet facility for park users

Embankment Seating - Oval Views

Landscape Materials and Narrative

Water Sensitive Urban Design Elements

Fitness and Activities

Shelter

Stadium Building Form

Entry and Overlooking the Oval

Green Roof or Terrace Elements

williams ross architects

Building Form and Design

The imagery on this page provides examples of the aesthetic, materials and form that would be suitable for new facilities at Percy Treyvaud Memorial Park. Imagery collected is from various designers work and provide reference point only.

Facility Brief

The starting point for the facility brief was the Council resolution that the new multi-purpose sport and recreation facility host:

- Four Indoor Sports Courts
- Chadstone Bowls Club
- Chadstone Tennis Club
- Chadstone Recreation and Civic Club; and
- Summer and winter season users of the sportsgrounds including Chadstone Lacrosse Club

The following describes the spaces required to support the above activities in the new development:

Shared public spaces

- Main centre entry close to reception
- Lift and stair access from the car park directly to the reception area
- Foyer spaces throughout with space for display of memorabilia of all clubs and the local community
- Kiosk with potential merchandise / retail associated with the reception counter
- Public amenities, including unisex and accessible facilities

Administration facilities

- Reception counter with provision for centre manager office
- Shared sports association office accommodation that can accommodate 5-6 people
- Office storage and support spaces
- Meeting space for sporting associations that can accommodate 8-10 people
- Staff facilities such as kitchenette and lockers

Social spaces and support spaces

- Social spaces to reflect the size and number of the existing spaces on site:
  - Social Space 1, 125m^2
  - Social Space 2, 125m^2, with operable wall to Social Space 1
  - Social Space 3, 100m^2
  - Social Space 4, 100m^2
- CRCC bar and lounge facility with storage and cool-room
- Shared main kitchen suitable for plating, catering and service into the social spaces
- Kitchenettes, fridges and lockable pantry in social spaces that do not have direct access into the main kitchen space
- Allocated storage for clubs using shared facilities
- Furniture stores adjacent each space or accessed from communal corridor space

Indoor sports courts and support spaces

- Main sports hall with 4 x indoor sports courts designed to Netball Victoria and Basketball Victoria guidelines
- Minimum 8.3m to underside of any structure or hanging element within the court zone
- Provision of spectator seating to each court outside of run-off zones
- Provision of scorer and team benches outside of run-off zones
- Tournament office with direct access / line of sight into the indoor courts
- Retractable basketball backboards and goals
- Removable netball posts and padding with suitable floor sleeve and cap
- Team benches - 14 seats each
- Score's table (mobile or fixed)
- Scoreboard, Game Clock, Shot Clock
- Lighting - 500 lux for competition, 300 lux training
- Suitable acoustic treatment for absorption of sound during matches
- Storage directly off courts for sports equipment (balls, training kits)
- Storage directly off courts for cleaning equipment eg mops

Outdoor sports courts and support spaces

Bowls:

- 2 x 7 rink synthetic grass greens
- Minimum 2m circulation around rinks
- Seating and shelters to be provided around rinks
- External lighting to rinks
- Outdoor access storage for maintenance

Tennis Courts

- 7 new courts with compliant run-off and circulation
- 5 courts to be synthetic clay, and 2 to be plexipave, or similar
- External lighting to all courts
- Full perimeter fencing with access gates
- Court 1 to be show court with spectator seating closest to the social space or outdoor viewing area
- Outdoor access storage for maintenance equipment and sports equipment

Change and amenities

Indoor Courts:

- 2 x change rooms
- Accessible changerooms
- 2 x Umpire / Referee change rooms
- First aid room

Ovals:

To be accessed directly from the ovals, ideally positioned between the two ovals:

- 4 x change rooms in pairs for home / away teams
- Storage for personal equipment / bags in changerooms
- Accessible changeroom
- Referee change rooms
- First aid room (shared with indoor courts, well located for access)

Acoustic Design

Background noise measurements were undertaken at Percy Treyvaud Memorial Park to provide a benchmark for future design of mechanical equipment, and a basis for advice for appropriate building fabric design to limit noise from the stadium.

The overall acoustical design objective is to create a comfortable environment, acknowledging that the building houses noisy activities that will be loud at times. Maximising acoustic absorption through internal building materials will assist in reducing some of the impact of such activities.

Noise reverberation and transfer / disturbance between the sports courts and separate activity areas i.e. social spaces, meeting room should be minimised where possible.

The building fabric needs to be suitable to provide acoustic control. Amplified speakers, and surfaces should be designed

to avoid acoustic anomalies such as flutter, echo, etc.

Extraneous noise from other court events as well as the adjacent mechanical services plant should be minimised.

The stadium will be mechanically ventilated and air-conditioned to avoid noise from the stadium being instrusive to neighbours.

Functional Operation & Division

Functional operation to facilitate multiple users in the facility at one time is important to the viability of the centre. Analysis of event and user timetabling has been undertaken in the Business Case, which will inform the following discussion and building layouts.

In general facility planning should enable:

- Patrons to move about without intruding upon the court run-off zones.
- Viewing and waiting areas off court to partially separate courts to avoid ball interruption between sports.
- Access to amenities and administration functions without interruption to other activities.
- Access to user storage without interruption to other activities

Occupational Health and Safety

The centre is to be configured wherever possible as safe as practicable an environment for all occupants of the centre in accordance with all relevant Acts, Regulations and Codes of Practice. Ideally, risks should be eliminated. Where this is not possible, design and / or operational measures are to be identified to reduce and manage safety risks.

Working at Heights

Sports Halls consist of large volumes, with clearance heights over 8m high. This means that maintenance to lighting, mechanical systems etc will need to be achieved at this height. Using LED light fittings and highly durable materials to ceilings and high level walls will assist in minimising the need to access high level areas often.

Safe and efficient access is required for working at heights to install and repair lighting, mechanical services, and clean highlight windows or skylights.

Note: it is not acceptable for maintenance access to be achieved by ladders at these heights.

Desirably, the construction of the floor should allow for access via scissor lifts, and safe roof access should be provided for cleaning of windows and skylights.

Roof Safety

A safe access system to all roof areas, in accordance with relevant Occupational Health and Safety Acts and Codes of Practice, is required for maintenance access. Note that this could include access via cherry picker, etc, where agreed with the Proprietor.

Roof safety relies upon, where possible:

- Limiting access to those trained to safely access the roof.
- Roof safety harness points system for access to routine maintenance / cleaning locations.
- Safe access to and from the roof via designated stairs (not ladders), roof walkways, paths, and roof perimeter barriers.

Building and Site Services

Key features of the proposed facility include;

- Hydraulic Services: Existing pressure and flow information to be provided by the water authority to assess hydrant coverage in the future design
- Electrical Services: Upgrading of electrical mains, new switchboards, along with a new sub-station may be required on site.
- Security – scope inclusive of: integrated members system, AV reticulation, scoreboards digital signage, clocks and hearing loop system
- Mechanical Services:
  Mechanical ventilation to all spaces, including to the stadium. Opportunities to temper incoming fresh air and heat exchangers should be investigated in line with sustainability principles.
  Offices, meeting rooms and the like could have reverse cycle air-conditioning.
- The use of large overhead fans off-court areas to further increase the cooling effect of air movement is to be considered. To accommodate such fans, additional building height is required as well as structural load capacity.
- Building Management System (BMS) to control all heating, cooling, ventilation and lighting.

Regulatory Requirements

The design, construction and operation of the facility are to comply with all relevant Acts, Regulations and Codes of Practice.

Building Occupancy and Amenities

In consultation with Council an appropriate maximum occupation is to be determined, notwithstanding the building's use is limited to sports activities only. Unless otherwise instructed by Council, the building will not be designed or approved for any other activity that further increases the building occupation.

The Certificate of Occupancy will define the number of people legally allowed to be accommodated in the centre at any one time. This figure is based on two factors, the emergency egress provision for safety purposes and the toilet amenities, for health purposes.

Amenity numbers will be determined by occupancy, and as a function of the activities in the centre.

Egress

Escape and egress from all areas is to be achieved as per maximum travel distances.

BCA Section J: Energy Efficiency

The centre design must achieve, and preferably exceed, the requirements of BCA Section J, subject to approval of additional measures by the Proprietor.

Deemed to Satisfy Compliance

Section J regulations have become more stringent and deemed to satisfy compliance will be more difficult to achieve in this type of building.

The use of transparency and transparent materials is key to the success of the centre. The design intent is to provide visual connection between programs and the inside and out. It is essential to the quality of the space and the comfort and enjoyment of patrons and staff that areas of glazing are proposed to the Foyer and administration areas. Equally important, is the use of transparency into these spaces from the Entry Forecourt and building approach. The Foyer should draw patrons in and through to the Sports Hall. This separation line between the two zones should be transparent.

As the requirements for natural light vary for different sports, the Sports Hall may require some skylights / clerestory windows as well as some low level light for views.

Design Life of Elements

The desirable design life of building elements, subject to reasonable wear and tear and weathering, are as follows:

- Building structure – 50 years minimum
- External finishes – Applied finishes: 5 – 10 years (e.g. paint) - 15 years (e.g. acrylic render); Integral materials – 20 – 25 years
- Roof cladding – 15 – 25 years as per manufacturer's warranty
- Building services – design life of plant & infrastructure:
  - mechanical plant 15 – 25 years
  - electrical equipment 25 years
- Hydraulic pipe work – 50 years
- Floor surfaces:
  - Public areas – 20 years (e.g. stone, ceramic tile, polished concrete, carpet excluded).
  - Sports Courts – 20+ years (e.g. composite timber). Note: surfacing of courts is subject to user wear and tear – similar venues in Melbourne provide re-surfacing on a 3-5 year schedule.
  - Social and Meeting Room– 5 – 8 years (eg. carpet)
  - Offices – 5 - 8 years (e.g. carpet)
  - Toilet amenities – 20+ years (e.g. ceramic tile, marmoleum)

- Internal fit out (walls, partitions, joinery) – 20 years
- Kitchen / servery joinery – 20+years (stainless steel)

Marketing, Promotions – Building Imagery, Signage

The building design should be striking and integrate opportunities for high quality, interactive signage (changing with promotions) in order to heighten the profile of the centre and attract visitors.

Materials, Finishes, Maintenance

The design should adopt wherever possible, affordable materials with the greatest durability and lowest practical maintenance demand, as well as take environmental sustainability into account.

Maintenance – Access, Repairs

The facility design must take into account means of efficient and safe access to building elements for maintenance and repair purposes (e.g. changing globes, accessing plant areas, conducting routine maintenance).

Seating, Furniture & Equipment

Supplementary furniture and equipment is to be provided within budget means, as agreed with Council. Fixed or loose bench seating to be provided for all sports courts. Loose furniture for the foyers, administration and social areas.

Future-proofing – Services, Access, Expansion

Continuous, accessible pathways for building and technical infrastructure are desirable throughout the facility to easily enable future services upgrades and expansion of services capacity.

Switchboards / sub-boards will be designed with 30% spare capacity both in physical space and in the cable capacity feeding to each board, for future provision.

B. Tree Removal Assessment

B. Tree Removal Assessments

Tree removal assessments prepared by ACLA Landscape architects based on the Arboricultural report

Tree removal assessments are provided for:

- Draft masterplan
- Option 1
- Option 3

Please note: tree removal is shown in the context of the existing site plan for each option and the draft master plan.

Tree Assessment Criteria

The tree assessment encompasses a variety of criteria. Two important definitions are below:

1. Significant Tree

Definition from Stonnington Council General Local Laws 2018:

"Significant Tree" means a tree or palm:

a. with a trunk circumference of 140cm or greater measured 1.4m above its base;

b. with a total circumference of all its trunks of 140cm or greater measured 1.4m above its base;

c. with a trunk circumference 180cm or greater measured at its base; or

d. with a total circumference of all its trunks of 180cm or greater measured at its base.

2. Retention Value

Definition from the Arboricultural Report prepared by Greenwood Consulting:

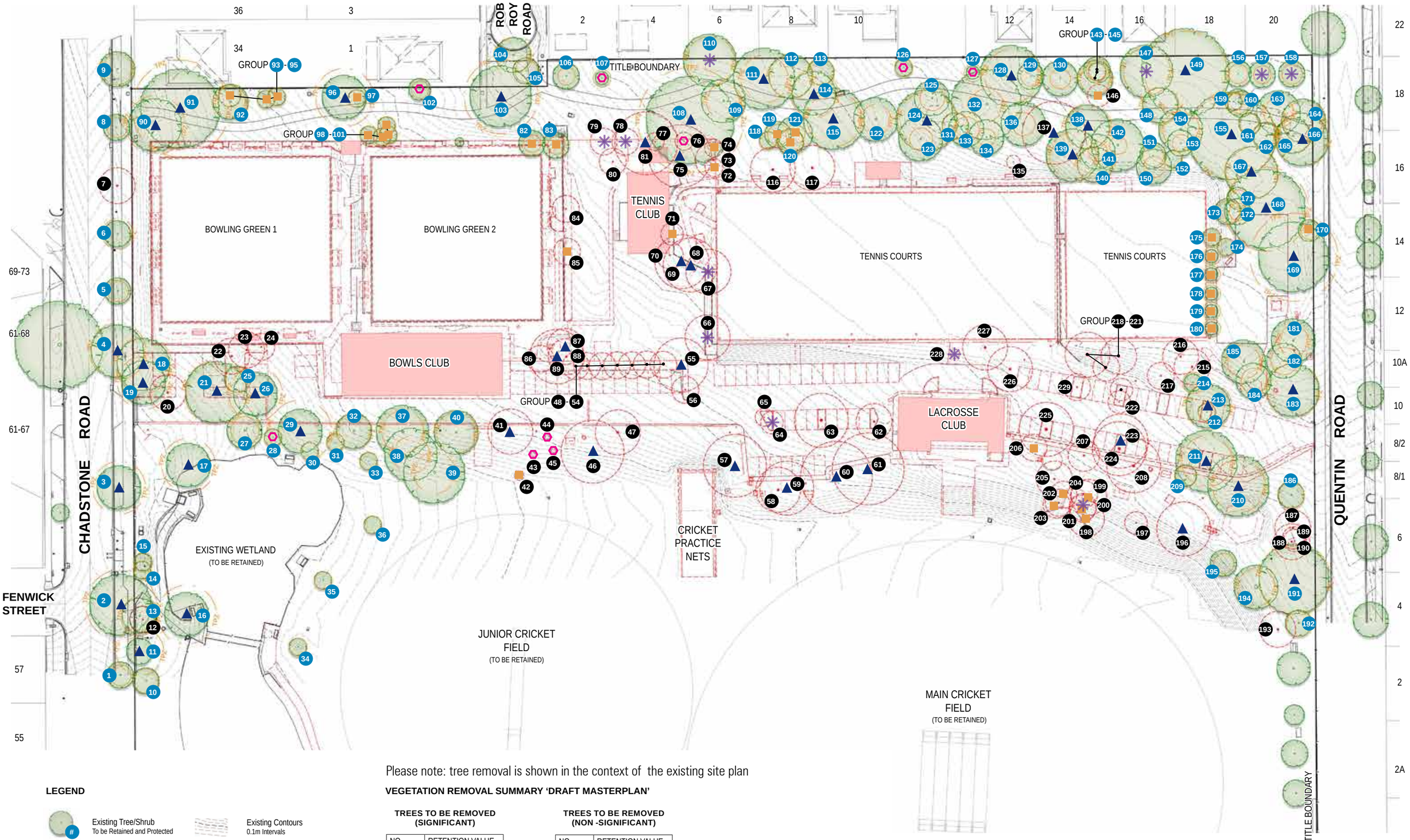
Retention value is comprised of two parts - the Amenity Value of the tree rated as Very Low to Very High and the Useful Life Expectancy (ULE) of the tree.

The Amenity Value of the tree relates to the contribution of the tree to the aesthetic amenity of the area. The primary determinants of amenity are tree health, size and form.

This value is then modified by the Useful Life Expectancy of the tree, with short ULE values reducing the Retention Value and long ULE increasing the Retention Value.

A Retention Value is then applied to the tree from Very Low up to very High.

Trees noted as "Recommended for Removal" are done so on the basis of poor, or worse, health and / or structure of the tree.



Please note: tree removal is shown in the context of the existing site plan

LEGEND

- Existing Tree/Shrub — To be Retained and Protected
- TPZ — Tree Protection Zone
- Existing Tree/Shrub — To be removed
- Existing Building — To be demolished
- Existing Items — To be demolished
- Existing Contours — 0.1m Intervals
- Tree Classification: Refer to Schedule of Existing Trees on Sheet 1807-TA4
- Significant Tree
- Small Tree
- Shrub
- Weed

VEGETATION REMOVAL SUMMARY 'DRAFT MASTERPLAN'

TREES TO BE REMOVED (SIGNIFICANT)

NO.	RETENTION VALUE
0	Very High
6	High
8	Moderate
1	Low
0	Very Low
1	Remove

TREES TO BE REMOVED (NON -SIGNIFICANT)

NO.	RETENTION VALUE
0	Very High
0	High
20	Moderate
26	Low
1	Very Low
4	Remove

ACLA CONSULTANTS
Landscape Architecture & Design
Suite 2, 751 Nicholson Street,
North Carlton VIC 3054
T. 9381 4366
www.acla.net.au

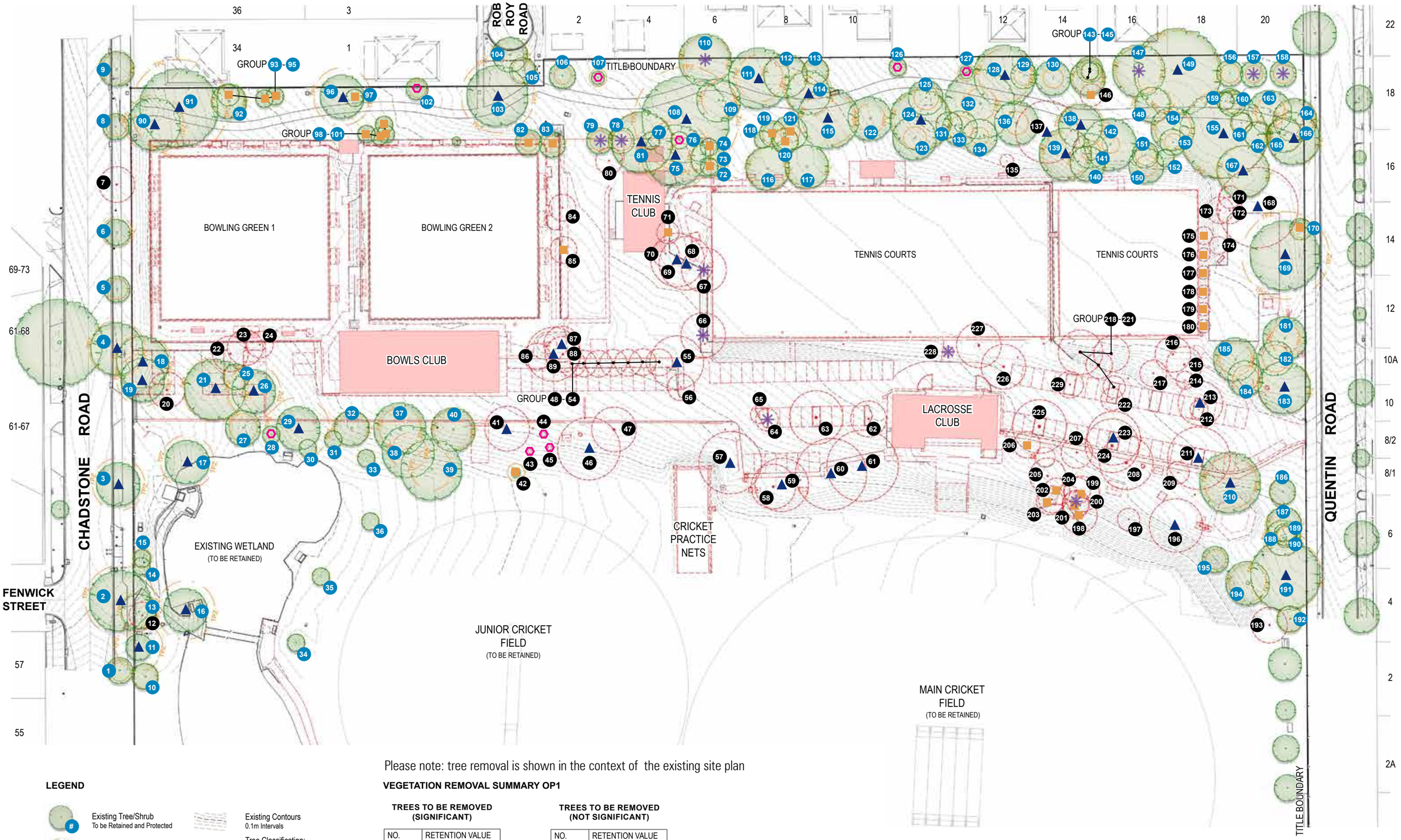
CLIENT City of STONNINGTON

PERCY TREYVAUD SPORTS PARK
VEGETATION REMOVAL SUMMARY 'DRAFT MASTERPLAN'

0 2.5 5 10 15 20m
SCALE 1:400 @ A1

PROJECT NO. 1807
DRAWING NO. 1807-TA1

ISSUE	STATUS	DATE	ISSUE	STATUS	DATE
0	TREE ANALYSIS FOR REVIEW	11/01/19			
1	DRAFT MASTERPLAN	18/01/19			



Please note: tree removal is shown in the context of the existing site plan

LEGEND

- Existing Tree/Shrub — To be Retained and Protected
- TPZ — Tree Protection Zone
- Existing Tree/Shrub — To be removed
- Existing Building — To be demolished
- Existing Items — To be demolished
- Existing Contours — 0.1m Intervals
- Tree Classification: Refer to Schedule of Existing Trees on Sheet 1807-TA2
- Significant Tree
- Small Tree
- Shrub
- Weed

VEGETATION REMOVAL SUMMARY OP1

TREES TO BE REMOVED (SIGNIFICANT)

NO.	RETENTION VALUE
0	Very High
6	High
10	Moderate
0	Low
0	Very Low
1	Remove

TREES TO BE REMOVED (NOT SIGNIFICANT)

NO.	RETENTION VALUE
0	Very High
0	High
16	Moderate
28	Low
2	Very Low
4	Remove

ACLA CONSULTANTS
Landscape Architecture & Design
Suite 2, 751 Nicholson Street,
North Carlton VIC 3054
T. 9381 4366
www.acla.net.au

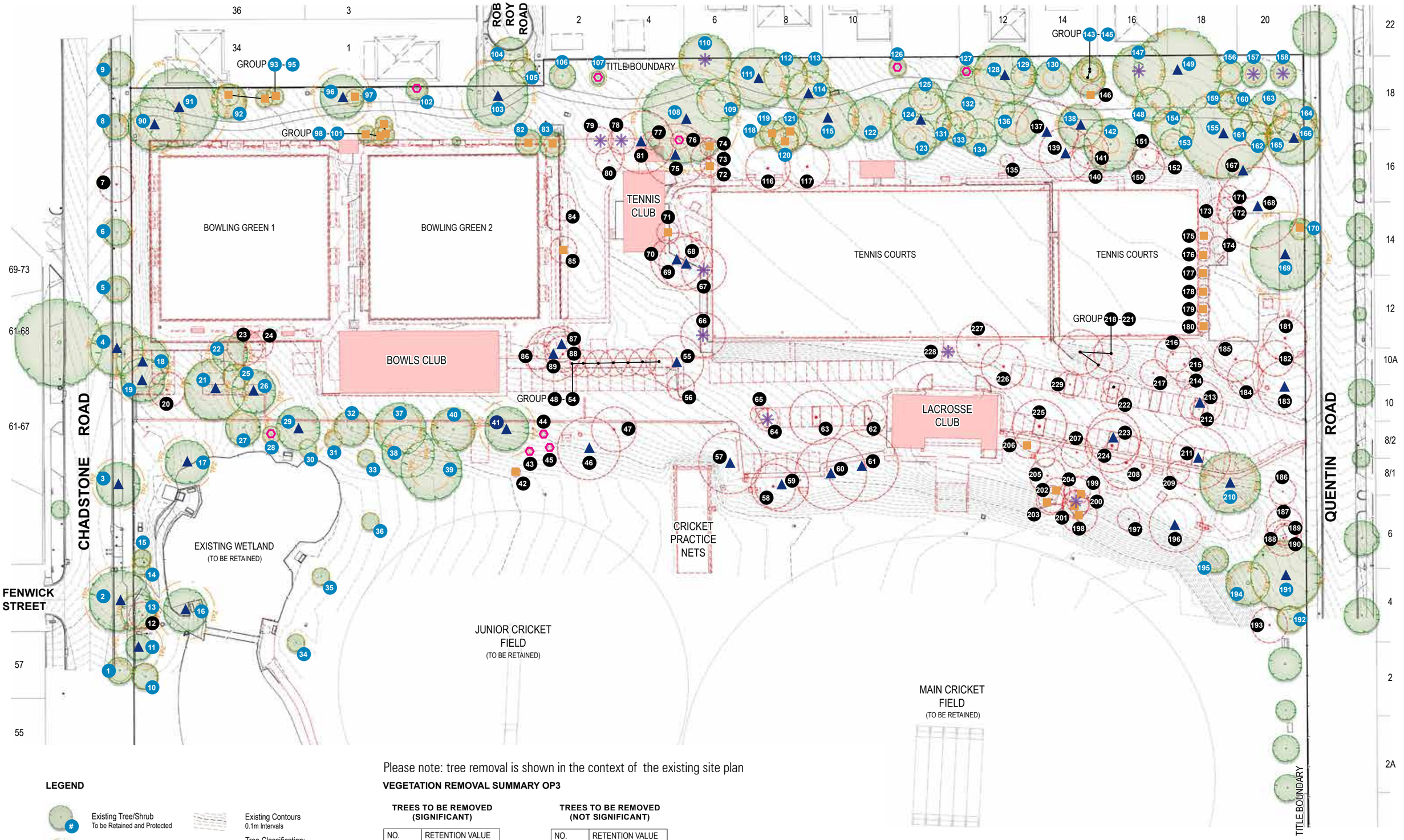
CLIENT: City of STONNINGTON

PERCY TREYVAUD SPORTS PARK - TREE ANALYSIS
OPTION 1 - EXISTING CONDITIONS AND DEMOLITION PLAN

0 2.5 5 10 15 20m
SCALE 1:400 @ A1

PROJECT NO. 1807
DRAWING NO. 1807-TA1

ISSUE	STATUS	DATE	ISSUE	STATUS	DATE
0	TREE ANALYSIS FOR REVIEW	11/01/19			



Please note: tree removal is shown in the context of the existing site plan

LEGEND

- Existing Tree/Shrub — To be Retained and Protected
- TPZ — Tree Protection Zone
- Existing Tree/Shrub — To be removed
- Existing Building — To be demolished
- Existing Items — To be demolished
- Existing Contours — 0.1m Intervals
- Tree Classification: Refer to Schedule of Existing Trees on Sheet 1807-TA4
- Significant Tree
- Small Tree
- Shrub
- Weed

VEGETATION REMOVAL SUMMARY OP3

TREES TO BE REMOVED (SIGNIFICANT)

NO.	RETENTION VALUE
0	Very High
7	High
11	Moderate
2	Low
0	Very Low
1	Remove

TREES TO BE REMOVED (NOT SIGNIFICANT)

NO.	RETENTION VALUE
0	Very High
0	High
22	Moderate
37	Low
3	Very Low
5	Remove

ACLA CONSULTANTS
Landscape Architecture & Design
Suite 2, 751 Nicholson Street,
North Carlton VIC 3054
T. 9381 4366
www.acla.net.au

CLIENT City of STONNINGTON

PERCY TREYVAUD SPORTS PARK - TREE ANALYSIS
OPTION 3 - EXISTING CONDITIONS AND DEMOLITION PLAN

0 2.5 5 10 15 20m
SCALE 1:400 @ A1

PROJECT NO. 1807
DRAWING NO. 1807-TA3

ISSUE	STATUS	DATE	ISSUE	STATUS	DATE
0	TREE ANALYSIS FOR REVIEW	11/01/19			

C. Traffic Engineer Report

C. Traffic Engineers Report

As prepared by Irwinconsult Engineers

irwinconsult

Percy Treyvaud Sports Facility
Proposed Community and Recreation Centre Redevelopment
Traffic Engineering Report

19 March 2019
Revision 04
Job Number: 18ME0204

Melbourne Office
L3 289 Wellington Parade South
EAST MELBOURNE VIC 3002
t +613 9622 9700
mlb@irwinconsult.com.au

Bendigo Office
L1 133 McCrae Street
BENDIGO VIC 3550
t +613 5442 6333
bgo@irwinconsult.com.au

Darwin Office
82 Smith Street
DARWIN NT 0800
t +618 8980 5900
drw@irwinconsult.com.au

Directors Joe Bruno, Phil Gardiner
Peter Hale, Barry Roben, Dean Whiteley
Member Green Building Council Australia

www.irwinconsult.com.au

ABN 89 050 214 894

Document Control

Project Title: Percy Treyvaud Sports Facility
Project No: 18ME0204

Revision	Date				
00	19/11/2018	File name	18ME0204-20181119-SC4-Traffic Engineering Report-00.Docx		
		Description	Draft Report Issue		
			Prepared	Checked	Approved
		Initial	SC4	SP5	SP5
		Date	19/11/2018	19/11/2018	19/11/2018
01	22/11/2018	File name	18ME0204-20181122-SC4-Traffic Engineering Report-01.docx		
		Description	Revised Draft Report Issue		
			Prepared	Checked	Approved
		Initial	SC4	SP5	SP5
		Date	22/11/2018	22/11/2018	22/11/2018
02	26/11/2018	File name	18ME0204-20181126-SC4-Traffic Engineering Report-02.docx		
		Description	Revised Draft Report Issue		
			Prepared	Checked	Approved
		Initial	SC4	SP5	SP5
		Date	26/11/2018	26/11/2018	26/11/2018
03	14/01/2019	File name	18ME0204-20181126-SC4-Traffic Engineering Report-02.docx		
		Description			
			Prepared	Checked	Approved
		Initial	SP5	SC4	SP5
		Date	21/01/2019	21/01/2019	21/01/2019
03b	30/01/2019	File name	18ME0204-20190130-SC4-Traffic Engineering Report-03b.docx		
		Description	Revised Final Report		
			Prepared	Checked	Approved
		Initial	SC4	SP5	SP5
		Date	30/01/2019	30/01/2019	30/01/2019
04	19/03/2019	File name	18ME0204-20190319-SC4-Traffic Engineering Report-04.docx		
		Description	Revised Final Report		
			Prepared	Checked	Approved
		Initial	SC4	SC4	SC3
		Date	19/03/2019	19/03/2019	19/03/2019

Contents

List of Figures

List of Tables

1 Introduction

Irwinconsult has been engaged by Williams Ross Architects, on behalf of City of Stonnington to provide traffic engineering input into the proposed a new multipurpose sport and recreation facility.

This report discusses the traffic implications of the proposal, including the adequacy of parking provisions, the suitability of the site access arrangements and the likely impacts on existing proximate traffic conditions.

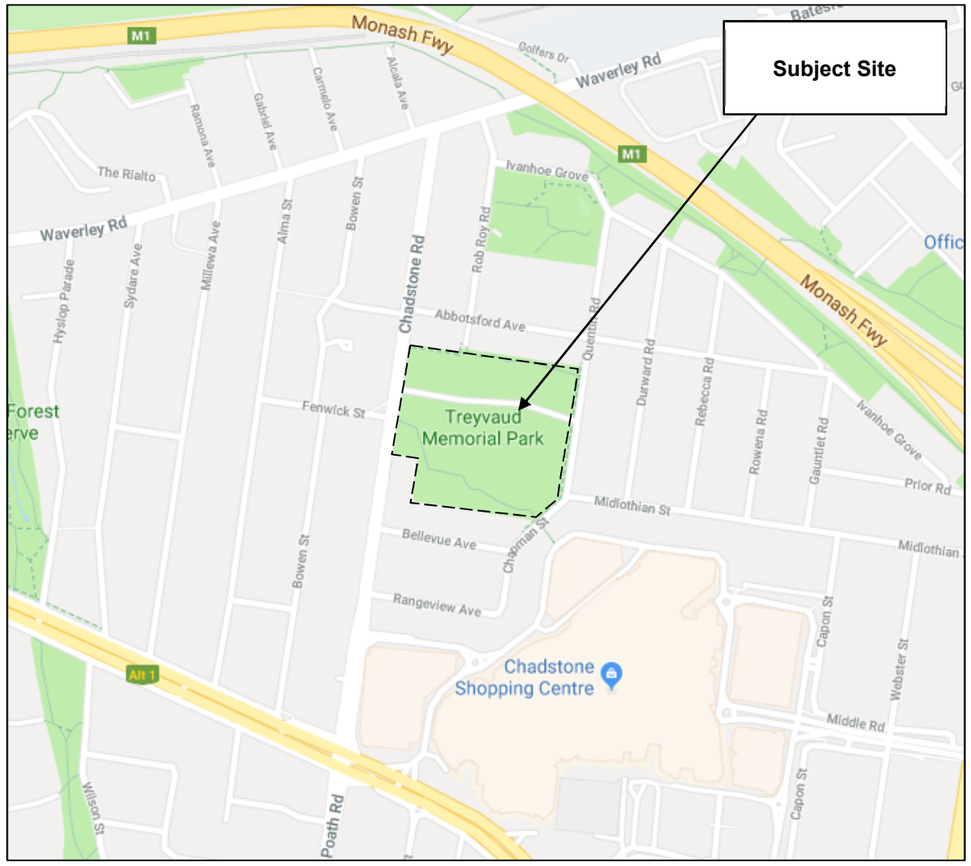
2 Background and Existing Conditions

2.1 Site Location and Land Use

The subject site is located within the Public Park and Recreation Zone (PPRZ) under the Stonnington Planning Scheme, and is partly located within the Principal Public Transport Network (PPTN). It is currently occupied by the Chadstone Recreation and Civic Club, which incorporates the Chadstone Bowls Club and Chadstone Tennis Club. The Chadstone Lacrosse Club and East Malvern Tooronga Cricket Club are also occupants on site.

The site has frontages to Chadstone Road, Quentin Road and Chapman Street along its boundaries, and abuts Rob Roy Road along its northern boundary. Land uses surrounding the subject site primarily comprise residential and retail uses including Chadstone Shopping Centre. The location of the subject site in the context of the surrounding road network is shown in Figure 1.

Figure 1 Site Location (source: Google Maps)



2.2 Road Network

2.2.1 Chadstone Road

Chadstone Road is a local road managed by Stonnington City Council and runs generally north-south. The site has an approximate 170m frontage to Chadstone Road. Adjacent to the subject site, Chadstone Road comprises a single carriageway with a total width of approximately 11m. The carriageway accommodates one traffic lane in each direction, with unrestricted parallel parking available adjacent to some sections of the site frontage.

An entry to a Service Road is provided opposite the northern end of the subject site, granting vehicle access to a row of angled parking located adjacent to a retail strip. A PTV bus stop is situated along the site on Chadstone Road.

A double-width crossover provides vehicle access to and from the site on Chadstone Road. The posted speed limit in the area is 60 km/h.

2.2.2 Quentin Road

Quentin Road is a local road managed by Stonnington City Council that runs parallel to Chadstone Road at the rear of the subject site. It comprises a carriageway of approximately 8m width and accommodate two way and kerbside parking on both sides. The site has approximately 200m frontage to Quentin Road.

There is one single-width access point onto the site from Quentin Road, however it appears both entry and exit are permitted. The default urban speed limit of 50km/h applies adjacent to the site, however a 40 km/h zone begins at the northern boundary.

2.2.3 Chapman Street

Chapman Street is a local street with an approximately 7m wide carriageway that provides two-way movements. The site has approximately 45m frontage to Chapman Street. Kerbside parking along the site frontage is not permitted.

The default urban speed limit of 50 km/h applies along the road.

2.3 Existing Parking Conditions

Irwinconsult has undertaken a car parking occupancy survey of the on-site car park. The area included the 97 formal car parking bays as well as the informal gravel area adjacent to the Tennis Club clubroom. This survey was undertaken on Thursday 18 October and Saturday 20 October 2018 between 7:00am to 19:00pm. These days were agreed upon with Council and supported by the stakeholder group, and it is noted that a fete was held at a nearby school on the Saturday of the surveys.

A summary of the results from the Saturday survey is presented in Table 1 as parking occupancy was universally higher on Saturday than Thursday. Full details for both days are attached in Appendix A. The informal gravel area is assumed to have capacity for 13 cars based on its dimensions and standard bay and aisle dimension requirements.

Table 1 Summary of Parking Survey Results – Saturday 20 October 2018

Location	Occupied/ Vacant	Capacity	Number of Cars												
			7:00am	8:00am	9:00am	10:00am	11:00am	12:00pm	1:00pm	2:00pm	300pm	4:00pm	5:00pm	6:00pm	7:00pm
Subject Site (formal parking)	Spaces Occupied	97	0	1	1	1	9	39	67	**70**	62	5	40	26	23
	Spaces Vacant		97	96	96	96	88	58	30	**27**	35	92	57	71	74
Subject Site (gravel parking)	Spaces Occupied	13	0	0	1	2	4	5	5	**6**	7	6	5	3	2
	Spaces Vacant		13	13	12	11	9	8	8	**7**	6	7	8	10	11

At the time of the survey, it is understood that the Chadstone Bowls Club hosted two home matches (understood to be a typical peak period for the Bowls Club), and there was some tennis activity including coaching and casual play. There was no match play on either of the cricket fields.

The survey found that the peak parking occupancy occurred at 2:00pm (as denoted in **bold** in the above table), where there were:

- 70 of the 97 formal spaces on-site were occupied, and
- Six cars were observed within the informal gravel car park adjacent to the Tennis Club.

This equates to a total of 76 cars parked on-site.

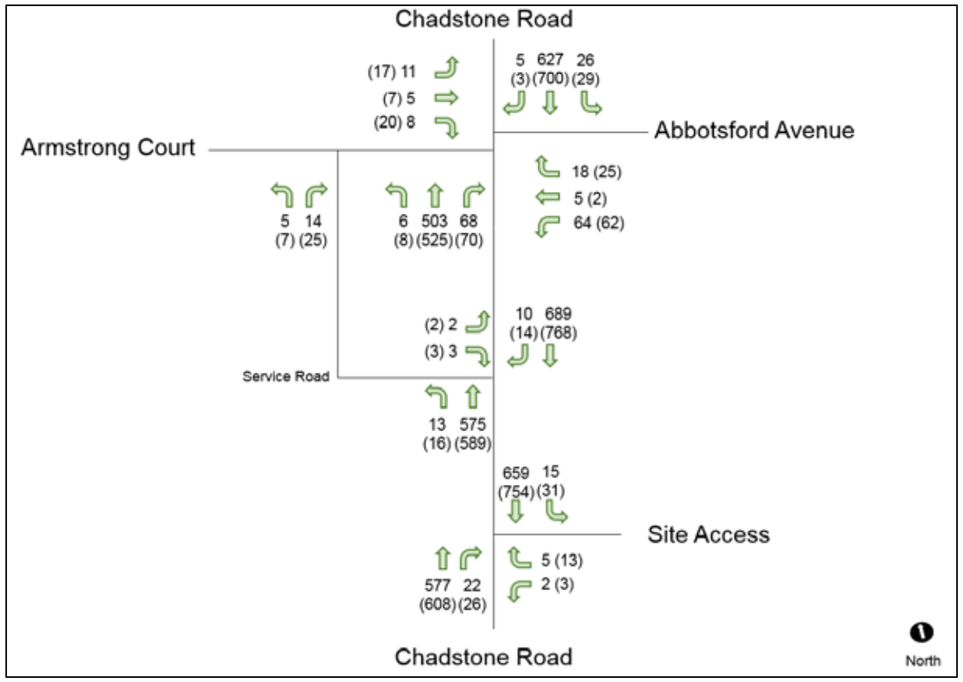
2.4 Existing Traffic Conditions

Irwinconsult has undertaken turning movement counts along Chadstone Road between Abbotsford Avenue and the existing Site Access. These surveys were undertaken on Thursday 18 October 2018 and Saturday 20 October 2018 between 7:00-12:00pm and 12:00-19:00pm. The AM peak hour occurred between 11:00am and 12:00pm, and the PM peak hour occurred between 12:00pm and 13:00pm on Saturday.

It is noted that traffic volumes were higher during the Saturday peak than the Thursday peak, which is not typical of usual road network operations. This is likely due to the fete that had taken place at Malvern Valley Primary School on Saturday 20 October. The proximity of Chadstone Shopping Centre, which tends to be busier on weekends than weekdays, may also be a factor.

The turning volumes at these intersections at their respective peak hours are illustrated in Figure 2.

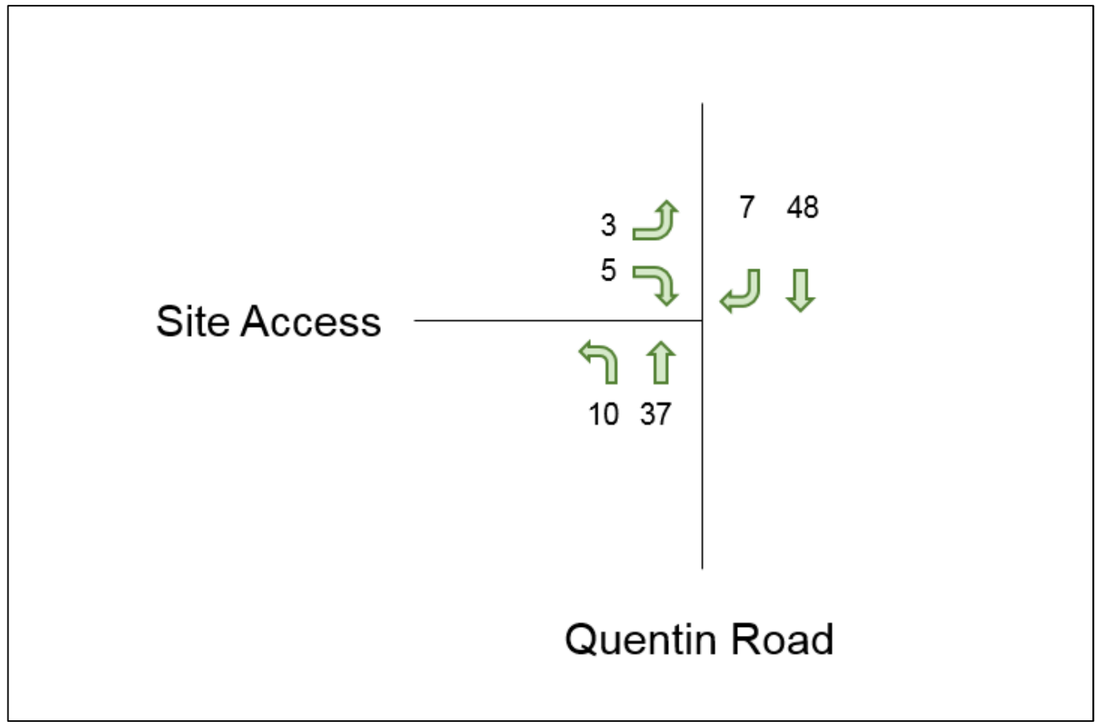
Figure 2 Existing Peak Hour Turning Movements – Chadstone Road



In addition to the above, turning movement counts at various other intersections nearby were undertaken on Saturday 20 October 2018 by other consultants, and results have been provided to Irwinconsult. One such location is the site access along Quentin Road, where the observed peak occurred between 12:00pm and 13:00pm, which is consistent with the count undertaken by Irwinconsult along Chadstone Road.

The peak hour turning movements (12:00pm-13:00pm) obtained during this survey as provided by other consultants is shown below in Figure 3.

Figure 3 Existing Peak Hour Turning Movements – Quentin Road Site Access



2.4.1 Intersection Operating Conditions

SIDRA is a computer program that is widely used to model the performance of intersections and provides information on the delays to motorists, queue lengths and the capacity of an intersection to accommodate traffic. For signalised and unsignalised intersections, the intersection degree of saturation (DoS) measures the degree to which a movement at an intersection approaches the capacity for that movement (i.e. the ratio of the demand flow/capacity).

The operational characteristics and level of service are generally considered acceptable when DoS is less than 0.90 – 0.95 (0.80 – 0.85 for an unsignalised intersections). At higher values longer queues and delays are experienced by motorists on the side road which results in motorists becoming frustrated and potentially selecting inappropriate or smaller gaps in the traffic to enter the intersection (refer to Table 2).

The level of service (LoS) performance criteria for intersections is generally based on delays, which applies to individual movement, approach and intersection total delays. For an intersection, a LOS of A – D is considered satisfactory, with LOS of E and F indicating increased delays.

Table 2 Intersection Degree of Saturation

Degree of Saturation	Description of Intersection Operation
Less than 0.65	Excellent operating conditions.
0.6 – 0.7	Very good operating conditions.
0.7 – 0.8	Good operating conditions.
0.8 – 0.95	Acceptable operating conditions.

The volumes in Figure 2 have been input to SIDRA and processed as a single network, and the key performance indicators of network summarised in Table 3. Detailed outputs including movement summaries for each site are attached in Appendix C.

Table 3 Existing Intersection Operating Conditions

Peak Period	Existing Operating Characteristics		
	DOS	Ave Delay (sec)	Level of Service
AM Peak	0.35	1.20	A
PM Peak	0.40	1.60	A

A review of these results finds that the network currently operates under 'Excellent' conditions, with a degree of saturation of 0.40 and an average delay of 1.6 seconds during the PM peak.

3 Proposal

Based on architectural site plans, the proposed sporting facility will include the following:

- The reconstruction of the existing bowling rinks and tennis courts including existing associated facilities such as the clubhouses and bar/lounge area,
- The construction of a new indoor stadium facility with four mixed sports courts (netball and basketball), which includes ancillary uses such as offices, social rooms, change rooms and food and drink areas.

The proposed bowls facility will comprise 14 rinks in total, reduced from the existing 16 rinks.

In addition, the site plan indicates the following:

- Modification of the access arrangements along Chadstone Road, to provide two separate vehicle access points,
- Two new on-site car parking areas accessible via Chadstone Road, one being at-grade providing angle parking and a drop-off zone, and the other being a major car parking area underneath the proposed bowls club,
- Removal of the existing car park and vehicle access point along Quentin Road.

Preliminary site plans illustrate that the new on-site carparks will provide approximately 208 spaces under the bowls club and 8 spaces at-grade at the front of the site. This equates to a total of 216 car parking spaces, or an increase of 119 car parking spaces from the existing 97.

It is noted that plans are currently still fluid with the intention of all required car parking spaces to be provided on-site subject to the outcome of the car parking assessment.

4 Parking Requirements and Provision

4.1 Statutory Parking Requirements

Table 1 to Clause 52.06 of the Stonnington Planning Scheme specifies car parking requirements for various land uses. The number of car parking spaces required for the development under the Planning Scheme is shown in Table 4 below and is calculated based on changes in on-site uses. It is noted that a Minor Recreation Facility is not listed in Table 1 to Clause 52.06, therefore parking provision for this use is subject to the satisfaction of the Responsible Authority (RA).

Table 4 Statutory Car Parking Requirements

Use	Inventory or Change in Inventory	Statutory Parking Rate	Required Spaces
Bowling Green	Decrease of 2 rinks (from 16 to 14 rinks)	6 spaces to each rink plus 50% of the requirement of any ancillary use	0 spaces
Tennis Court – other than in conjunction with a dwelling	No change	4 spaces to each court plus 50% of the requirement of any ancillary use	0 spaces
Minor Recreation Facility	3,554 sqm or four (4) mixed courts	Not listed in Table 1	To the satisfaction of the RA
Total Parking Requirement	**50% of ancillary requirement plus spaces for Minor Recreation Facility to the satisfaction of the RA**		

With reference to preliminary site plans, the ancillary uses include a 148 sqm office. The four social rooms have been excluded as they would serve a similar function to the existing clubhouses, and the bar/lounge area currently exists on-site. Table 5 below outlines the ancillary requirements associated with these spaces, noting that as the subject site is partially located within the PPTN, the Column B rates from Clause 52.06 apply.

Table 5 Statutory Car Parking Requirements – Ancillary Uses

Ancillary Use	Inventory	Statutory Parking Rate	Ancillary Requirement
Office	148 sqm	3 spaces to each 100 sqm of net floor area	4 spaces
Total Ancillary Requirement			**4 spaces**
50% Ancillary Requirement			**2 spaces**

Based on the above, there is a requirement to provide an additional 2 car parking spaces on site for the ancillary office space. Further car parking spaces are required for the new minor recreation facility to the satisfaction of the Responsible Authority. In view of this, a Car Parking Demand Assessment has been undertaken to assess the likely parking demands associated with the site.

The Car Parking Demand Assessment must assess the car parking demands likely to be generated by the proposal with regards to the following:

- *The likelihood of multi-purpose trips within the locality which are likely to be combined with a trip to the land in connection with the proposed use.*
- *The variation of car parking demand likely to be generated by the proposed use over time.*
- *The short-stay and long-stay car parking demand likely to be generated by the proposed use.*
- *The availability of public transport in the locality of the land.*
- *The convenience of pedestrian and cyclist access to the land.*
- *The provision of bicycle parking and end of trip facilities for cyclists in the locality of the land.*
- *The anticipated car ownership rates of likely or proposed visitors to or occupants (residents or employees) of the land.*
- *Any empirical assessment or case study.*

Clause 52.06-7 of the Planning Scheme further provides decision guidelines to reduce or waive the statutory parking requirement as follows. They are also useful for consideration when a statutory rate is not nominated in the scheme for the proposed use.

- *The Car Parking Demand Assessment.*
- *Any relevant local planning policy or incorporated plan.*
- *The availability of alternative car parking in the locality of the land, including:*
  - *Efficiencies gained from the consolidation of shared car parking spaces.*
  - *Public car parks intended to serve the land.*
  - *On street parking in non-residential zones.*
  - *Streets in residential zones specifically managed for non-residential parking.*
  - *On street parking in residential zones in the locality of the land that is intended to be for residential use.*
- *The practicality of providing car parking on the site, particularly for lots of less than 300 square metres.*
- *Any adverse economic impact a shortfall of parking may have on the economic viability of any nearby activity centre.*
- *The future growth and development of any nearby activity centre.*
- *Any car parking deficiency associated with the existing use of the land.*
- *Any credit that should be allowed for car parking spaces provided on common land or by a Special Charge Scheme or cash-in-lieu payment.*
- *Local traffic management in the locality of the land.*
- *The impact of fewer car parking spaces on local amenity, including pedestrian amenity and the amenity of nearby residential areas.*
- *The need to create safe, functional and attractive parking areas.*
- *Access to or provision of alternative transport modes to and from the land.*
- *The equity of reducing the car parking requirement having regard to any historic contributions by existing businesses.*
- *The character of the surrounding area and whether reducing the car parking provision would result in a quality/positive urban design outcome.*
- *Any other matter specified in a schedule to the Parking Overlay.*
- *Any other relevant consideration.*

Each of the above guidelines relevant in this instance is discussed below.

4.2 Car Parking Assessment – Existing Uses

4.2.1 Likely Parking Demands – Bowls Club & Tennis Club

Given that the proposal will see a reduction in the number bowls rinks and no change in the number of tennis courts, it is considered that the existing peak parking demand would be representative of the future peak parking demand.

As discussed in Section 2.3, the on-site car parking survey was undertaken on a peak match day for the Bowls Club (with two home matches) as well as a typical activity period on the tennis courts. Therefore, it is considered that the peak car parking occupancy of 76 spaces (70 in asphalt parking plus 6 within gravel area) recorded on that day is representative of the typical peak parking demand of the future Bowls and Tennis uses.

The tennis component of this parking demand is estimated to be 20 spaces. This is based on 5 courts being operational, 4 players for each court, and 1 umpire for each court, with 20% car pooling.

4.2.2 Likely Parking Demands – Cricket

It is understood that at the existing fields, cricket and lacrosse are played in different seasons. To this end, the parking demands associated with the fields is conservatively taken as the peak associated with the cricket field as cricket teams feature more players than lacrosse teams. With two teams of 11 players, plus a coach on each team and two umpires, it is expected that a typical cricket match would attract 26 people directly associated with the match.

Irwinconsult staff undertook a spot parking survey of Jordan Reserve on Saturday 17 November, 2018 at approximately 2:00pm. At this time, a match was being played at this ground. The ground was selected as the cricket facilities have a dedicated car park that is most likely only utilised by those attending the cricket match. With ample parking provided on-site immediately adjacent to the pavilion, it is expected that everyone attending the cricket match would park their vehicle in this carpark. There was no significant spectator attendance at this match.

In this instance, a spot survey is considered appropriate given that cricket fields typically do not schedule consecutive match play. At the time of the survey, there were 20 vehicles parked on-site. This suggests that 6 people arrived by other means, such as public/active transport or carpooled with another player.

Correspondingly, it is considered that the provision of 20 car parking spaces for the existing cricket/fields would be sufficient.

4.2.3 Likely Parking Demands – Lacrosse

Lacrosse games are held on the existing fields on both Saturdays and Sundays during the Winter months. During this period, there are no bowls tournaments. Table 6 outlines the no of persons on-site during lacrosse games:

Table 6 Timetable for Lacrosse matches

Team	Time	Teams/Fields	Players	Officials	Spectators	Total
U11 & U13 Boys	Saturday 8am-10am	2 teams – 2 fields	60	16	50	126
U15 & U17 Boys	Saturday 9.30am-12.30pm	2 teams – 2 fields	60	16	50	126
Senior Men	Saturday 11.30am-5pm	3 teams – 2 fields	110	24	100	234
U13, U15 & U17 Girls	Sunday 8.30am-1.00pm	3 teams – 2 fields	90	24	65	179
Senior Women	Sunday 12pm-5pm	2 teams – 2 fields	60	16	50	126

The peak period is during the senior men's matches where there could be up to 234 persons on-site. This includes spectators, officials and players. There is a crossover between the junior boys and senior men's matches on a Saturday, as well as the women's matches on Sunday. However, during these periods, it is likely the junior matches are finishing well before the senior matches commence and the juniors that stay for the senior games are included in the spectator numbers.

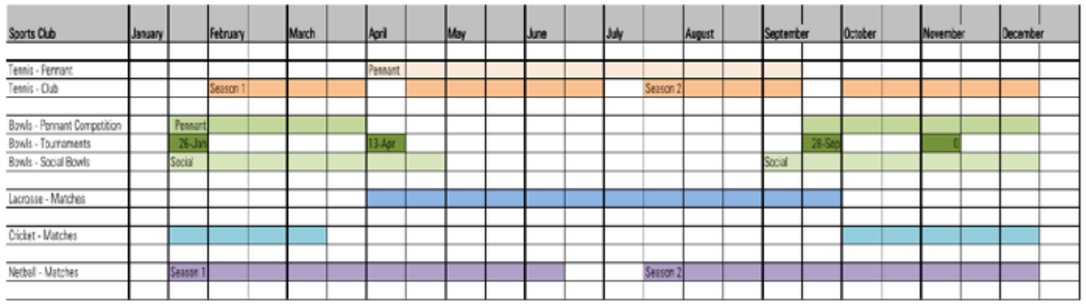
In order to assess the likely parking demand, a parking rate of 0.3 spaces / attendee has been adopted for the lacrosse games. This is based on the parking rate for a place of assembly and assumes 3.3 persons per car. The parking rate is considered representative for sports with a large number of spectators.

During the peak period on a Saturday afternoon, it has been estimated there is a peak parking demand of 70 spaces.

4.2.4 Seasonal Variation

The variation of different sports on-site is outlined in Table 7 below. The table indicates that the peak operation is February to March and October to December where the Bowls (pennant), Tennis and Cricket are in season. While there is some seasonal crossover between Lacrosse and Bowls in September, this is during finals for Lacrosse and early season for Bowls and not peak operation.

Table 7 Sport Seasons



Peak events

Throughout the year, there are various peak sporting events which generate a higher parking demand than the typical peak use. This includes Bowls Tournaments (4 per year), Lacrosse finals which attract a high number of spectators from outside the local area (1-2 per year) and the Lacrosse Family Day (1 per year).

Sporting field car parks are designed for typical peak use rather than these infrequent events. Designing for these infrequent events is likely to result in increased capital and maintenance costs and significant hardstand areas which would be unused for the majority of the year.

4.3 Car Parking Assessment – Future Uses

4.3.1 Likely Parking Demands – Mixed Courts (First Principles Assessment)

Among the typical indoor sports that could be featured on the mixed courts, netball tends to feature the largest teams with seven players per side. Therefore, an assessment for the mixed courts has been undertaken based on netball match play.

For assessment purposes, the following assumptions have been adopted for a match day:

- Each active court would feature 18 players (7 players plus 2 subs per team),
- Each active court would have four staff (two officials plus two coaches),
- An additional two sports association staff would be present across the site,
- All four courts would be active at the same time on a peak match day, and
- Each player and official arrives in a separate vehicle and parks their vehicle on-site.

An allowance has been made for carpooling at a rate of 2 players per team, equal to a reduction in 4 cars per court. This results in 14 cars per court for players, or 56 across the four courts.

Furthermore, it is understood that the netball fixtures would be scheduled with a 10-15 minute break between consecutive matches. During this period, it is expected that a number of players would leave the site prior to the arrival of players for the following match. Adopting a changeover parking demand rate of 75% of all players is considered suitable given the potential length of the break between matches.

This equates to a peak parking demand of 98 spaces for players (56 x 1.75) and 18 spaces for staff, for a total of 116 spaces during a peak match day (average of 29 spaces per court). This first principles assessment contains conservative assumptions, therefore it is expected that the peak parking demand associated with the four courts would be lower than 116 spaces. A summary of this assessment is presented in Table 8.

Table 8 Summary of First Principles Assessment

User	Number of Cars
Players	9 per team = 18 per court
Minus Carpooling Allowance	2 per team = 4 per court
Plus 75% Changeover Allowance	14 x 75% =10.5 per court
Plus Coaches	2 per court
Plus Match Officials	2 per court
Total per Court	**28.5 per court = 114 car parking spaces**
Plus Sports Association Staff	2 across site
Grand Total for Indoor Stadium	**= 116 car parking spaces**

4.3.2 Likely Parking Demands – Mixed Courts (Various Case Studies)

Case study data held by Irwinconsult relating to various netball courts around Melbourne provides further refinement to the assessment above.

Dales Park, Oakleigh South

Firstly, the Traffic Impact Assessment prepared by O'Briens Traffic for the feasibility stage of this project included a case study of an existing netball facility in Oakleigh South. This facility comprises eight netball courts, with the survey capturing a day where matches were played on all eight courts, including finals which typically generator larger spectator attendance. No other parking demand-generating uses or activities were present on-site during the survey.

The survey found a peak parking demand of 213 cars for the eight courts, equal to an average of 26 spaces per court. Applied to the proposed development of four courts, this equates to an anticipated parking demand for 107 spaces. This is lower than the estimate provided in the first principles assessment, despite being related to a finals match day.

Vermont South Netball Courts

Further case study data held by Irwinconsult relating to netball courts along Hanover Road, Vermont South, utilised intercept surveys to determine parking demand rates. People present at the courts during match day were interviewed about their method of travel to the site, and a rate of 0.36 vehicles per person was determined.

Whilst patronage numbers for the proposed facility are not known, it is reasonable to expect that most players would typically arrive with 1-2 other people (parents, siblings etc.). For the peak period with 98 players found in the first principles assessment, this would equate to 196-294 players and spectators plus 10 officials. Application of the rate of 0.36 vehicles per person results in a range between 74-109 cars that can typically be expected on a peak day.

State Netball and Hockey Centre

Case study data held by Irwinconsult relating to the State Netball and Hockey Centre (SNHC) in Parkville included a survey of the site during a typical weekday evening that saw netball matches played without any hockey play. These surveys indicated parking demand for between 8-15 cars per court for players plus 6 cars per court for officials.

However, the SNHC is a premier sporting venue, generally attracting higher level of play with more officials and spectators. The operational and locational characteristics of the SNHC are significantly different to that of the proposed facility at Percy Treyvaud Memorial Park. Despite this, the range of 8-15 cars per court for players is generally consistent with the first principles assessment, with the main difference in overall car parking demand coming from the extra officials presumably required for higher level matches, which highlights the conservative nature of the first principles assessment undertaken above.

4.3.3 Likely Parking Demands – Ancillary Uses

The statutory requirement to provide two car parking spaces for the ancillary office is considered appropriate.

4.3.4 Likely Parking Demands – Summary

Based on the preceding, it is concluded conservatively that the provision of 116 car parking spaces for the stadium would be sufficient in accommodating the anticipated demand, noting that the absolute peak occurs during the brief changeover period between netball matches.

A summary of the likely parking demands associated with the overall site is provided in Table 9.

Table 9 Anticipated Car Parking Demand

Use	Anticipated Summer Season Parking Demand	Anticipated Winter Season Parking Demand
Bowls Club & Tennis Club	76 spaces	20 spaces
Cricket & Lacrosse Fields	20 spaces	70 spaces
New Indoor Stadium	116 spaces	116 spaces
New Ancillary Office	2 spaces	2 spaces
Total Parking Demand	**214 spaces**	**208 spaces**

It is anticipated that the peak parking demand would be 214 car parking spaces during summer, assuming all uses on-site uses feature match play simultaneously.

4.3.5 Alternative Transport Options

Based on the site's location, there is opportunity for some uptake of alternative transport modes due to the bus services located on Chadstone Road at the site's frontage. This stop services route 612, which operates between Box Hill and Chadstone Shopping Centre.

Being located within a large residential catchment, it is reasonable to assume that some players would walk to the site. Accordingly, it is considered that the peak parking demand generated by the site would be lower than 214 spaces.

4.4 Availability of Car Parking

A modified car park layout prepared by Irwinconsult illustrates the provision of 181 spaces across the three car parking areas. It is recommended that on-site parking adequately cater for the anticipated demand of up to 214 spaces to avoid an overflow on parking onto adjacent streets.

4.5 Disabled Parking Considerations

Under the BCA requirements, a gymnasium or recreation centre is classified as a Class 9b building (other assembly building) and carries a requirement of 1 disabled space per 50 car parking spaces or part thereof if the total car parking provision is up to 1000 spaces.

With 216 spaces proposed, there is a requirement to provide 5 disabled car parking bays, which have been provided. One of these five bays has been provided in the at-grade spaces angled spaces at the front of the site.

4.6 Bicycle Parking Considerations

Table 1 to Clause 52.34-3 of the Planning Scheme specifies bicycle parking requirements for various land uses. On-site bicycle parking spaces shall be provided in accordance with relevant rates as listed within Clause 52.34. The rates which dictate the number of bicycle parking spaces required for the development under the Planning Scheme is shown in Table 10.

In this context, the requirement for staff is understood to only apply to regular staff employed directly by the facility, as opposed to match or league officials who would only be on site sporadically during match play and therefore treated as visitors. It is adopted that there would be no more than 4 such staff members on-site at once.

For bicycle assessment purposes, the Minor Sports and Recreation use includes the indoor stadium only. There is no requirement to provide bicycle parking to either a Bowling Green use or a Tennis Court use.

Table 10 Statutory Bicycle Parking Rates

Use	Inventory	Statutory Rates		Bicycle Parking Requirement	
		Employee/Resident	Visitor	Employee/Resident	Visitor
Minor Sports and Recreation Facility	3,554 sqm 4 staff (approx.)	1 per 4 employees	1 to each 200 sqm of net floor area	1 space	18 spaces
Total				**19 spaces total** **(1 staff space, 18 visitors spaces)**	

There is a requirement to provide 19 bicycle parking spaces for the development.

5 Traffic Generation and Impacts

5.1 Traffic Generation

As discussed in Section 2.4, a turning movement survey was undertaken on Thursday 18 October and Saturday 20 October, 2018. The Saturday survey captured a typical peak period associated with the Bowls Club and Tennis Club, however there was no activity on the cricket fields at the time.

In order to assess future traffic impacts, the peak traffic generation associated with the mixed courts as well as the cricket/lacrosse field must be considered. This assessment builds upon the assessment outlined within the Car Parking Assessment, as follows:

- During netball match play, 16 cars arrive (seven players and one coach per team) and 16 cars leave within the same hour for each of the four courts,
- During cricket match play, 20 cars arrive (11 players plus one coach per team, plus two umpires) and stay for over one hour (it is considered likely that these movements will occur outside of the Saturday peak period, however have been included to ensure a conservative assessment),
- No movements among centre staff or match officials as they typically arrive prior to start of play and leave after the end of play.

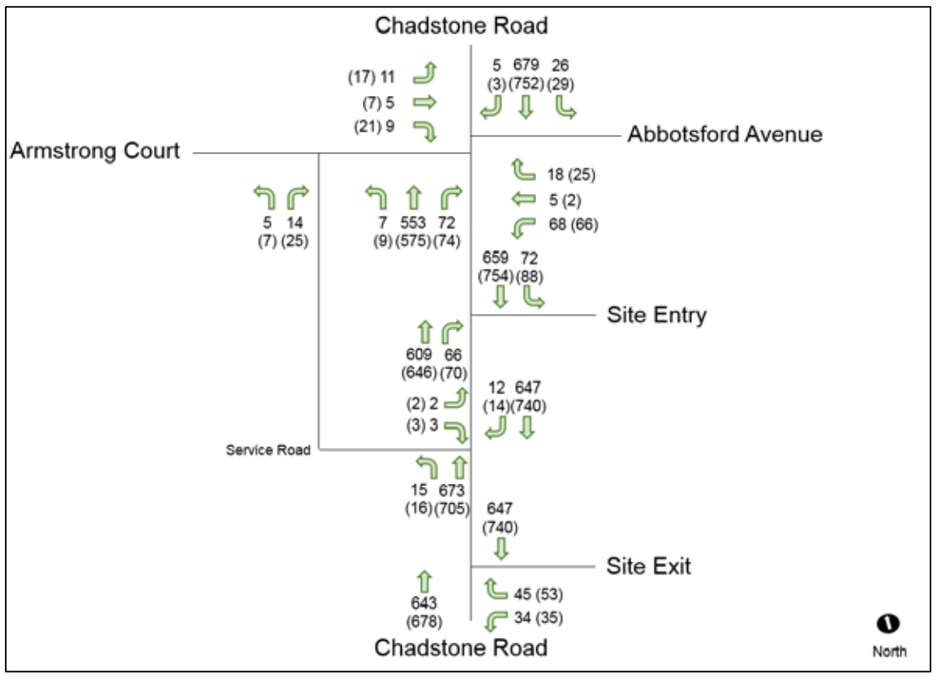
Further to the above, given the closure of the Quentin Road car park, all existing traffic movements in and out of the site via Quentin Road has been redistributed to the Chadstone Road site access. As illustrated in Section 2.4, the existing traffic volumes at the Quentin Road site access includes 17 inbound movements and 8 outbound movements during the peak hour.

The above equates to an additional 101 inbound movements and 72 outbound movements expected during the development peak hour.

5.2 Traffic Distribution

The above movements have been distributed among the local road network as per the existing distribution outlined in Section 2.4. The resulting movements are shown below in Figure 4.

Figure 4 Future Peak Hour Turning Volumes



5.3 Traffic Impacts

The volumes above have been input to SIDRA to assess the impact of development traffic. The assessment has been undertaken on the assumption that there are no changes to the intersections with the exception of volumes.

The future operating characteristics as determined in SIDRA have been compared to existing characteristics, as outlined in Table 11. Detailed SIDRA network comparison reports are attached in Appendix B and movement summaries attached in Appendix C.

Table 11 Existing vs Future Intersection Operating Conditions

Peak Period	Existing Operating Characteristics				Future Operating Characteristics				Change in Operating Characteristics			
	DOS	Ave Delay [sec]	Level of Service	95th %ile Queue [m]	DOS	Ave Delay [sec]	Level of Service	95th %ile Queue [m]	DOS	Ave Delay [sec]	Level of Service	95th %ile Queue [m]
AM Peak	0.35	1.20	A	10.5	0.40	1.40	A	13.2	+0.05	+0.2	-	+2.7
PM Peak	0.40	1.60	A	13.1	0.45	1.80	A	18.6	+0.05	+0.2	-	+5.5

A review of the above shows that the impacts of the development on Chadstone Road are well within the acceptable limits of operation, particularly with the future degree of saturation being well within the 'Excellent' range. Furthermore, no change in level of service is expected, with very minor increases in average delays.

The volumes generated by the development are therefore considered acceptable and no additional works are required on the external road network.

6 Car Parking Design Considerations

The following assessment of car parking design is based on modified car park layouts (SK006-SK021) prepared by Irwinconsult dated 21 September 2018.

6.1 Car Parking Design

The development has proposed 216 parking spaces, which includes 5 accessible spaces (and adjacent shared space). Of these spaces, 208 have been provided under the facility, with 8 spaces along the frontage. A separate drop off area is also provided.

The car park has been designed in accordance with the Stonnington Planning Scheme requirements with all car parking bays a minimum of 2.6m width by 4.9m length accessed via an aisle of at least 6.4m width. Where car parking spaces are provided adjacent to a solid obstruction, additional clearance of at least 300mm has been provided.

The accessible parking spaces is provided at 2.6 width with an adjacent shared zone of 2.6m width, and both the parking space and shared zone are at least 4.9m in length. The proposed accessible parking arrangements are considered satisfactory and in accordance with AS2890.6:2009.

At the site frontage, there are 8 no 60 degree parking spaces, including one accessible parking space (and adjacent shared space). It is likely the angled bays will be signed as 15 minute short term parking, for persons picking up or dropping off patrons. A separate drop off /pick up zone has been proposed which would be signed as 2 minute parking (or No Parking). This area has been designed to accommodate buses as well as emergency service vehicles.

The car park layout complies with the requirements of the planning scheme and Australian Standards and the design of car parking spaces is considered satisfactory.

6.2 Site Access and Circulation

The proposal includes two vehicle crossings, via Chadstone Road. A separate entry and exit arrangement has been proposed to improve circulation and reduce traffic impacts at one location. The entry is located at the northern end of the site (approximately 15m south of the site boundary). The egress is located just south of the existing vehicle crossing.

At the site access, there is sufficient space on the existing carriageway for left and right turn movements into the site to occur clear of through movements. As such, no left or right turn lanes have been proposed. At the site egress, separate left and right turn lanes are proposed to improve capacity and reduce delays for exiting vehicles.

Both the access and egress have been positioned clear of existing intersections and are considered satisfactory.

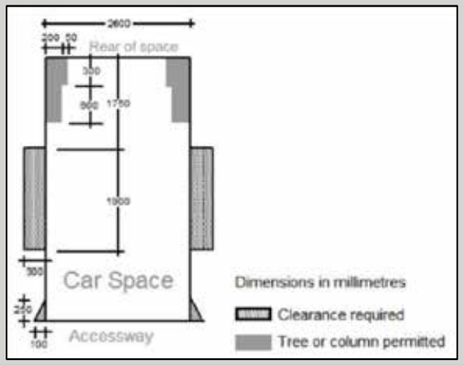
There are 3 east-west access aisles which are proposed to be one-way. A two way north-south aisle has been posited centrally to assist with vehicle circulation. Swept path diagrams attached within Appendix D demonstrate that circulation within the site is satisfactory in accordance with Australian Standards AS2890.1:2004.

6.3 Compliance with Clause 52.06-9

Design Standards 1, 2, 3 and 4 of Clause 52.06-9 of the Planning Scheme lists various requirements in relation to car park accessways, parking spaces, ramp gradients and mechanical parking. Table 12 provides a summary of the suitability of the proposal against these requirements.

Table 12 Compliance with Clause 52.06-9

Clause 52.06-8 Design Criteria	Irwinconsult Response
Design Standard 1 - Accessways	
▪ Be at least 3 metres wide	**Satisfied.**
▪ Have an internal radius of at least 4 metres at changes of direction or intersection or be at least 4.2 metres wide.	**Satisfied.**

▪ Allow vehicles parked in the last space of a dead-end accessway in public car parks to exit in a forward direction with one manoeuvre.	**Not applicable.** **No dead-end accessways.**
▪ Provide at least 2.1 metres headroom beneath overhead obstructions, calculated for a vehicle with a wheel base of 2.8 metres.	**Satisfied.**
▪ If the accessway serves 4 or more car spaces or connects to a road in a Road Zone, the accessway must be designed so that cars can exit the site in a forward direction.	**Satisfied.**
▪ Provide a passing area at the entrance at least 5 metres wide and 7 metres long if the accessway serves 10 or more car parking spaces and is either more than 50 metres long or connects to a road in a Road Zone.	**Not applicable.** **Vehicle access points along Chadstone Road are entry/exit only.**
▪ Have a corner splay or area at least 50 percent clear of visual obstructions extending at least 2 metres along the frontage road from the edge of an exit lane and 2.5 metres along the exit lane from the frontage, to provide a clear view of pedestrians on the footpath of the frontage road. The area clear of visual obstructions may include an adjacent entry or exit lane where more than 1 lane is provided, or adjacent landscaped areas, provided the landscaping in those areas is less than 900mm in height.	**Satisfied.**
▪ If an accessway to 4 or more car parking spaces is from land in a Road Zone, the access to the car spaces must be at least 6 metres from the road carriageway.	**Not applicable.** **Accessways are not from land in a Road Zone.**
Design Standard 2 – Car parking spaces	
▪ Dimensions of car parking spaces and accessways – Table 2.	**Satisfied.**
▪ Car spaces in garages or carports must be at least 6 metres long and 3.5 metres wide for a single space and 5.5 metres wide for a double space measured inside the garage or carport.	**Not applicable.** **No garage/car port parking.**
▪ Where parking spaces are provided in tandem (one space behind the other) an additional 500 mm in length must be provided between each space.	**Not applicable.** **No tandem parking.**
▪ Where two or more car parking spaces are provided for a dwelling, at least one space must be under cover.	**Not applicable.** **No dwellings on-site.**
A wall, fence, column, tree, tree guard or any other structure that abuts a car space must not encroach into the area marked 'clearance required' on Diagram 1, other than: ▪ A column, tree or tree guard, which may project into a space if it is within the area marked 'tree or column permitted' on Diagram 1.	**Satisfied.**
▪ A structure, which may project into the space if it is at least 2.1 metres above the space. **Diagram 1 Clearance to car parking spaces** 	
▪ Disabled car parking spaces must be designed in accordance with Australian Standard AS2890.6-2009 (disabled) and the Building Code of Australia. Disabled car parking spaces may encroach into an accessway width specified in Table 2 by 500mm.	**Satisfied.**
Design Standard 3 – Gradients	
▪ Accessway grades must not be steeper than 1:10 (10 per cent) within 5 metres of the frontage to ensure safety for pedestrians and vehicles. The design must have regard to the wheelbase of the vehicle being designed for; pedestrian and vehicular traffic volumes; the nature of the car park; and the slope and configuration of the vehicle crossover at the site frontage. This does not apply to accessways serving three dwellings or less.	**Satisfied.**
▪ Ramps must have the maximum grades as outlined below and be designed for vehicles travelling in a forward direction. **Type** / **Length Ramp** / **Max Grade** Public: <20m: 1:5 Public: >20m: 1:6 Private: <20m: 1:4 Private: >20m: 1:5	**Satisfied.**
▪ Transitions provided where grade change of 12.5% or more for summit grade change and 15% for a sag grade change.	**Not applicable.** **Proposed grades are within allowable limits.**

Design Standard 4 – Mechanical Parking	
▪ At least 25 per cent of the mechanical car parking spaces can accommodate a vehicle clearance height of at least 1.8 metres	**Not applicable.**
▪ Car parking spaces that require the operation of the system are not allocated to visitors unless used in a valet parking situation.	**Not applicable.**

6.4 Queue Assessment

In order to discourage shoppers/staff from Chadstone Shopping Centre from parking within the proposed car park, a parking management system is proposed. The system would be controlled by a boom gate and use license plate recognition software for regular users, and tickets for other patrons.

A queue assessment was undertaken during the peak period to ensure that vehicles were not queuing onto Chadstone Road. The queue assessment was undertaken in accordance with The Austroads Guide to Traffic Management Part 2: Traffic Theory.

The following key characteristics of the analysis are outlined below:

- Approach volume of 81 vehicles in the peak 15 minute period;
- Analysis based on a peak 15 minute period;
- Capacity of 112 vehicles per 15 minute period;
- 1 approach lane (additional capacity due to the second short lane has been allowed for in capacity);

The analysis is based on the following queue theory equations:

p(N+1) = (1-%)

N+1 = logp(1-%)

N = logp(1-%)-1

The analysis indicated an 85th percentile queue (the queue which occurs 15% of the time) of 5 vehicles, and 95th percentile queue (the queue which occurs 5% of the time) of 8 vehicles. There is sufficient space on-site to store these vehicles without queues extending onto Chadstone Road. As such, the proposed on-site queue storage is considered satisfactory.

6.5 Loading Facilities

The majority of deliveries to the site would occur via delivery vans and would occur outside of peak periods. The exception to this is the Keg Deliveries which would occur via a flat-bed truck and would occur up to once per month.

The loading bay has capacity for 2 delivery vans, which is considered satisfactory. Keg trucks would either park partially in the loading bay, or within the access aisle. Given that these would occur when there is low usage of the park, the loading arrangements are considered satisfactory.

7 Conclusion

The proposal seeks to redevelop part of the Percy Treyvaud Memorial Park on Chadstone Road, Malvern East. The project will see the reconstruction of the existing Bowls Club resulting in a reduction in two bowling rinks, and a reconstruction of the seven existing tennis courts. A new indoor stadium containing four mixed sports courts is also proposed, along with modified site access and car parking arrangements.

The development is considered satisfactory from a traffic engineering perspective, given the following:

- Future car parking demands across the whole site suggests a peak demand of up to 214 car parking spaces can be expected when all uses operate at their respective peaks concurrently. The proposed development has 216 spaces, satisfying the demand outlined above;
- There are opportunities for patrons and staff to utilise sustainable transport options to travel to and from the site.
- It is recommended that the on-site car parking be capable of accommodating the peak parking demand of 214 spaces.
- The statutory requirement for bicycles parking shall be met by on-site provisions.
- The impacts of future development traffic on proximate intersections have been assessed in SIDRA, and the findings indicate that the changes to intersection operation would be acceptable;
- The car park layout has been designed in accordance with Planning Scheme and Australian Standards and is considered satisfactory;
- Separate access and egress have been provided onto Chadstone Road and are considered satisfactory.

Appendix A **Parking Survey Results**

Parking Chadstone (Edit).xlsx

Parking Occupancy Survey

Date:	Thursday, 18 October 2018
Location:	Chadstone
Weather:	Fine
Customer:	Irwinconsult

Prepared by TRANS TRAFFIC SURVEY for irwinconsult

Public Parking (1/0)	Map Ref	Street	Section	Side	Restriction	Clear Way	Capacity	Parking Occupancy											
								7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00
1		Car Park			Unrestricted		96	0	0	2	4	9	8	8	8	9	10	11	20	28
1		Car Park			Disable		1	0	0	0	0	0	0	0	1	1	1	0	0	0

Parking Occupancy Survey

Date:	Saturday, 20 October 2018
Location:	Chadstone
Weather:	Fine
Customer:	Irwinconsult

Prepared by TRANS TRAFFIC SURVEY for irwinconsult

Public Parking (1/0)	Map Ref	Street	Section	Side	Restriction	Clear Way	Capacity	Parking Occupancy											
								7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00
1		Car Park			Unrestricted		96	0	1	1	1	9	38	66	69	61	53	39	25	22
1		Car Park			Disable		1	0	0	0	0	0	1	1	1	1	1	1	1	1

Appendix B **SIDRA Network Comparison Outputs**

USER REPORT FOR NETWORK

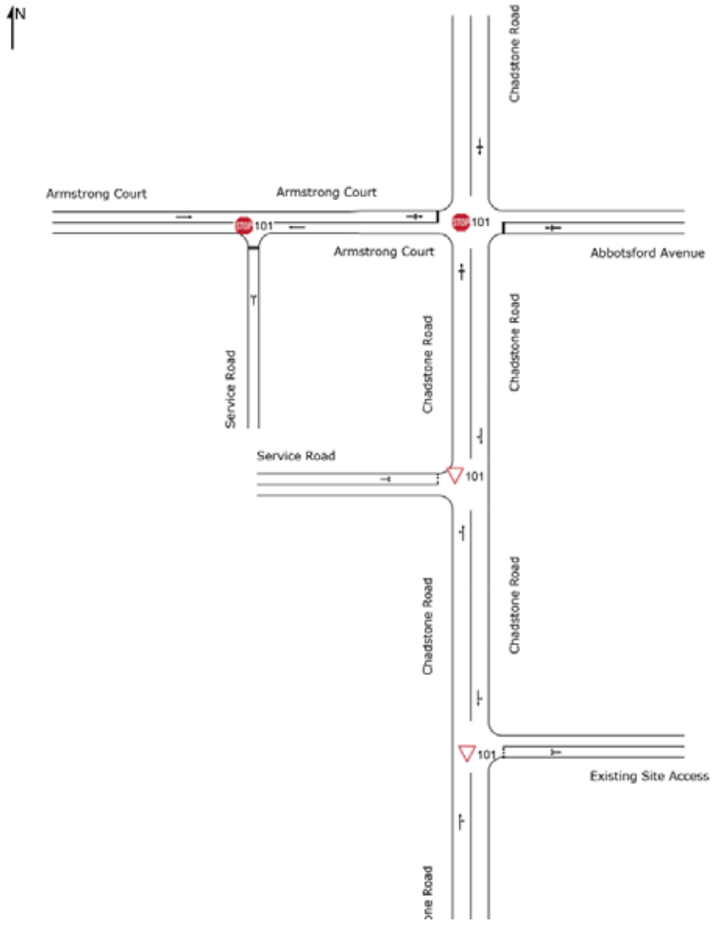
Project: 18ME0204-20181114-NS3-Sidra Analysis

Template: Default Network User Report

Network: N101 [Existing Network (AM)]

Existing Network
Network Category: (None)

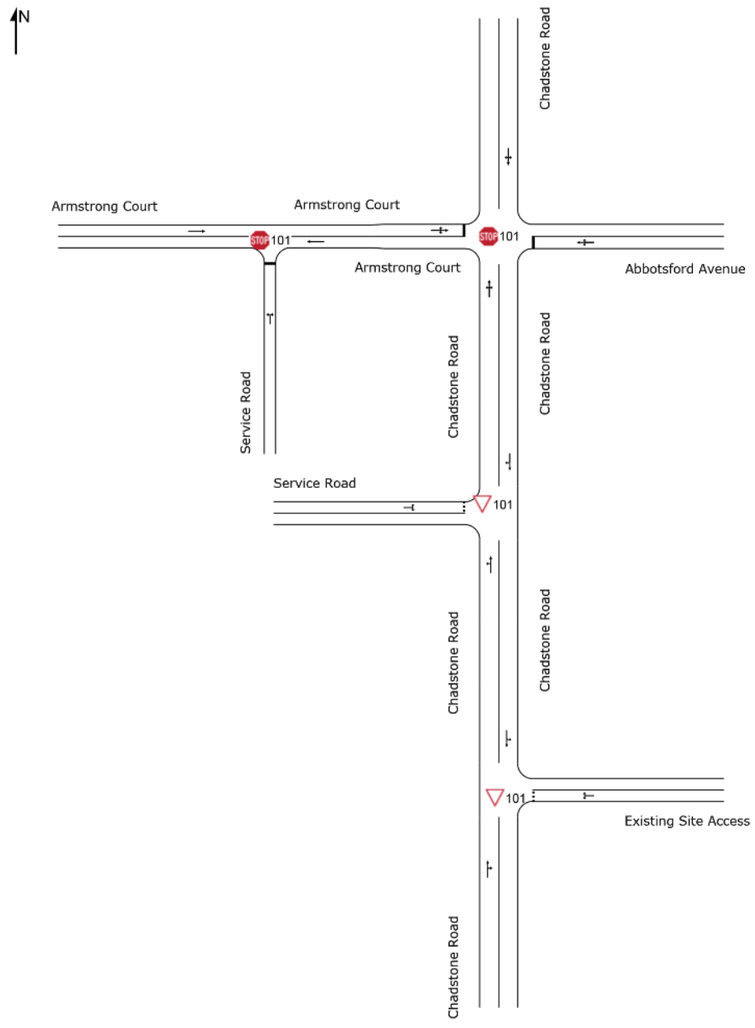
Network Layout



Network: N101 [Existing Network (PM)]

Existing Network
Network Category: (None)

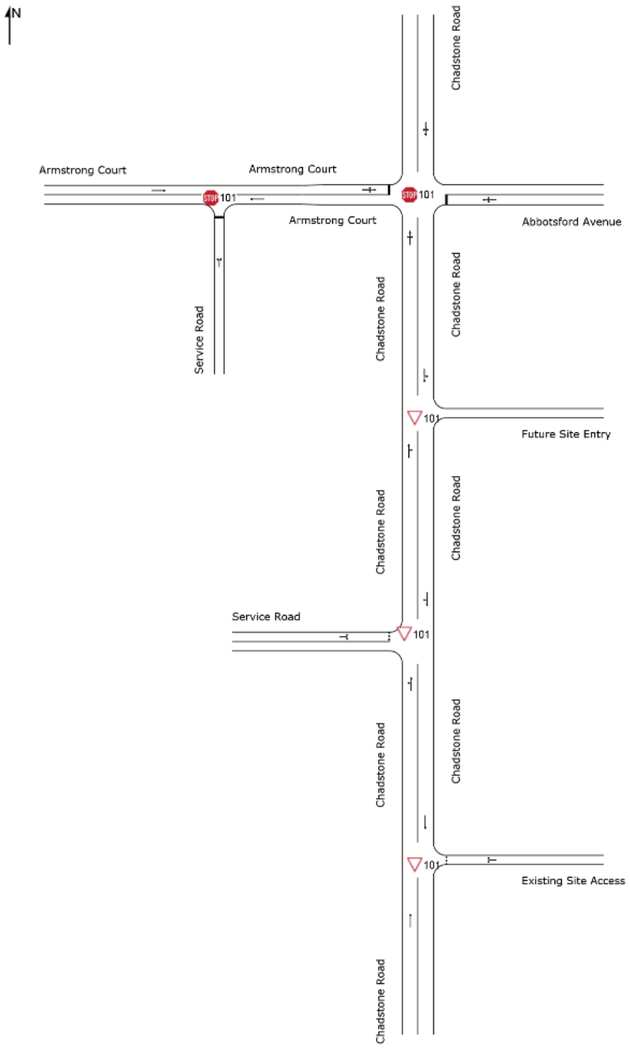
Network Layout



Network: N101 [Proposed Network (AM)]

New Network
Network Category: (None)

Network Layout



NETWORK OUTPUT COMPARISON

Comparison of Network Summary Statistics

Network A: N101 [Existing Network (AM)]

Network B: N101 [Proposed Network (AM)]

Network Performance (Vehicles Only) - Hourly Values					
Performance Measure	Units	Network A	Network B	Difference Network B - Network A	% Difference Diff / Network A
Network Level of Service (LOS)		LOS A	LOS A	NA	NA
Travel Time Index		9.37	9.10	-0.27	-2.9
Speed Efficiency		0.94	0.92	-0.02	-2.6
Congestion Coefficient		1.06	1.09	0.03	2.7
Travel Speed (Average)	km/h	56.6	55.2	-1.5	-2.6
Travel Distance (Total)	veh-km/h	1613.5	1744.8	131.3	8.1
Travel Time (Total)	veh-h/h	28.5	31.6	3.1	11.0
Desired Speed	km/h	60.0	60.0	0.0	0.0
Demand Flows (Total for all Sites)	veh/h	4181	5923	1742	41.7
Arrival Flows (Total for all Sites)	veh/h	4181	5923	1742	41.7
Demand Flows (Entry Total)	veh/h	1467	1640	173	11.8
Midblock Inflows (Total)	veh/h	6	24	18	283.3
Midblock Outflows (Total)	veh/h	-28	-35	-6	0.0
Percent Heavy Vehicles (Demand)	%	0.0	0.0	0.0	0.0
Percent Heavy Vehicles (Arrival)	%	0.0	0.0	0.0	0.0
Degree of Saturation		0.353	0.398	0.045	12.7
Control Delay (Total)	veh-h/h	1.38	2.36	0.98	71.1
Control Delay (Average)	sec	1.2	1.4	0.2	20.8
Control Delay (Worst Lane)	sec	18.2	21.7	3.5	19.2
Control Delay (Worst Movement)	sec	33.6	41.8	8.2	24.3
Geometric Delay (Average)	sec	0.5	0.4	0.0	-2.4
Stop-Line Delay (Average)	sec	0.7	1.0	0.3	35.0
Queue Storage Ratio (Worst Lane)		0.15	0.35	0.20	137.6
Total Effective Stops	veh/h	260	413	153	59.1
Effective Stop Rate		0.06	0.07	0.01	12.3
Proportion Queued		0.08	0.10	0.02	20.6
Performance Index		33.9	40.6	6.7	19.6
Cost (Total)	$/h	794.00	1002.65	208.65	26.3
Fuel Consumption (Total)	L/h	109.1	132.8	23.7	21.7
Fuel Economy	L/100km	6.8	7.6	0.8	12.5
Carbon Dioxide (Total)	kg/h	256.4	312.0	55.6	21.7
Hydrocarbons (Total)	kg/h	0.020	0.025	0.005	24.8
Carbon Monoxide (Total)	kg/h	0.324	0.389	0.065	20.0
NOx (Total)	kg/h	0.061	0.079	0.019	30.6

Network Performance (Vehicles Only) - Annual Values

Network A - Hours per Year: 480
Network B - Hours per Year: 480

Performance Measure	Units	Network A	Network B	Difference Network B - Network A	% Difference Diff / Network A
Demand Flows (Total for all Sites)	veh/y	2,006,905	2,843,116	836,211	41.7
Delay	veh-h/y	663	1,134	471	71.1
Effective Stops	veh/y	124,637	198,292	73,655	59.1
Travel Distance	veh-km/y	774,476	837,488	63,012	8.1
Travel Time	veh-h/y	13,678	15,184	1,507	11.0
Cost	$/y	381,122	481,272	100,151	26.3
Fuel Consumption	L/y	52,380	63,734	11,354	21.7
Carbon Dioxide	kg/y	123,093	149,774	26,682	21.7
Hydrocarbons	kg/y	10	12	2	24.8
Carbon Monoxide	kg/y	155	186	31	20.0
NOx	kg/y	29	38	9	30.6

Network Performance (Persons Only) - Hourly Values

Performance Measure	Units	Network A	Network B	Difference Network B - Network A	% Difference Diff / Network A
Travel Speed (Average)	km/h	56.6	55.2	-1.5	-2.6
Travel Distance (Total)	pers-km/h	1936.2	2093.7	157.5	8.1
Travel Time (Total)	pers-h/h	34.2	38.0	3.8	11.0
Demand Flows (Total for all Sites)	pers/h	5017	7108	2091	41.7
Arrival Flows (Total for all Sites)	pers/h	5017	7108	2091	41.7
Control Delay (Total)	pers-h/h	1.66	2.83	1.18	71.1
Control Delay (Average)	sec	1.2	1.4	0.2	20.8
Control Delay (Worst Movement)	sec	33.6	41.8	8.2	24.3
Total Effective Stops	pers/h	312	496	184	59.1
Effective Stop Rate		0.06	0.07	0.01	12.3
Proportion Queued		0.08	0.10	0.02	20.6
Performance Index		33.9	40.6	6.7	19.6
Cost (Total)	$/h	794.00	1002.65	208.65	26.3

Network Performance (Persons Only) - Annual Values

Network A - Hours per Year: 480
Network B - Hours per Year: 480

Performance Measure	Units	Network A	Network B	Difference Network B - Network A	% Difference Diff / Network A
Demand Flows (Total for all Sites)	pers/y	2408287	3411739	1003453	41.7
Delay	pers-h/y	795	1361	565	71.1
Effective Stops	pers/y	149565	237951	88386	59.1
Travel Distance	pers-km/y	929372	1004986	75614	8.1
Travel Time	pers-h/y	16413	18221	1808	11.0
Cost	$/y	381122	481272	100151	26.3

NETWORK OUTPUT COMPARISON

Comparison of Network Summary Statistics

Network A: N101 [Existing Network (PM)]

Network B: N101 [Proposed Network (PM)]

Network Performance (Vehicles Only) - Hourly Values

Performance Measure	Units	Network A	Network B	Difference Network B - Network A	% Difference Diff / Network A
Network Level of Service (LOS)		LOS A	LOS A	NA	NA
Travel Time Index		9.13	8.96	-0.18	-1.9
Speed Efficiency		0.92	0.91	-0.02	-1.7
Congestion Coefficient		1.08	1.10	0.02	1.8
Travel Speed (Average)	km/h	55.3	54.4	-1.0	-1.7
Travel Distance (Total)	veh-km/h	1767.1	1907.5	140.4	7.9
Travel Time (Total)	veh-h/h	31.9	35.1	3.1	9.8

Network Performance (Vehicles Only) - Annual Values

Network A - Hours per Year: 480
Network B - Hours per Year: 480

Performance Measure	Units	Network A	Network B	Difference Network B - Network A	% Difference Diff / Network A
Demand Flows (Total for all Sites)	veh/y	2,202,442	3,126,568	924,126	42.0
Delay	veh-h/y	1,009	1,479	470	46.5
Effective Stops	veh/y	159,712	231,283	71,571	44.8
Travel Distance	veh-km/y	848,225	915,604	67,379	7.9
Travel Time	veh-h/y	15,332	16,842	1,510	9.8
Cost	$/y	429,782	537,373	107,591	25.0
Fuel Consumption	L/y	58,611	70,948	12,337	21.0
Carbon Dioxide	kg/y	137,736	166,728	28,992	21.0
Hydrocarbons	kg/y	11	13	3	23.8
Carbon Monoxide	kg/y	173	207	34	19.6
NOx	kg/y	33	43	10	29.4

Network Performance (Persons Only) - Hourly Values					
Performance Measure	**Units**	**Network A**	**Network B**	**Difference Network B - Network A**	**% Difference Diff / Network A**
Travel Speed (Average)	km/h	55.3	54.4	-1.0	-1.7
Travel Distance (Total)	pers-km/h	2120.6	2289.0	168.4	7.9
Travel Time (Total)	pers-h/h	38.3	42.1	3.8	9.8
Demand Flows (Total for all Sites)	pers/h	5506	7816	2310	42.0
Arrival Flows (Total for all Sites)	pers/h	5506	7816	2310	42.0
Control Delay (Total)	pers-h/h	2.52	3.70	1.17	46.5
Control Delay (Average)	sec	1.6	1.7	0.1	3.2
Control Delay (Worst Movement)	sec	42.9	43.1	0.1	0.3
Total Effective Stops	pers/h	399	578	179	44.8
Effective Stop Rate		0.07	0.07	0.00	2.0
Proportion Queued		0.10	0.11	0.01	13.5
Performance Index		39.6	46.3	6.7	16.9
Cost (Total)	$/h	895.38	1119.53	224.15	25.0

Network Performance (Persons Only) - Annual Values					
Network A - Hours per Year: 480 Network B - Hours per Year: 480					
Performance Measure	**Units**	**Network A**	**Network B**	**Difference Network B - Network A**	**% Difference Diff / Network A**
Demand Flows (Total for all Sites)	pers/y	2642931	3751883	1108952	42.0
Delay	pers-h/y	1211	1775	564	46.5
Effective Stops	pers/y	191654	277540	85885	44.8
Travel Distance	pers-km/y	1017870	1098725	80855	7.9
Travel Time	pers-h/y	18398	20210	1812	9.8
Cost	$/y	429782	537373	107591	25.0

Appendix C **SIDRA Network Site Outputs**

USER REPORT FOR NETWORK SITE

Project: 18ME0204-20181114-NS3-Sidra Analysis

Template: Default Site User Report

Site: 101 [Ex Chadstone Rd/Abbotsford Ave (AM)]

Network: 1 [Existing Network (AM)]

Chadstone Road / Abbotsford Avenue
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Chadstone Road														
1	L2	6	0.0	6	0.0	0.340	9.7	LOS A	1.5	10.5	0.26	0.09	0.33	40.8
2	T1	529	0.0	529	0.0	0.340	1.3	LOS A	1.5	10.5	0.26	0.09	0.33	56.1
3	R2	72	0.0	72	0.0	0.340	9.8	LOS A	1.5	10.5	0.26	0.09	0.33	53.5
Approach		607	0.0	607	0.0	0.340	2.4	NA	1.5	10.5	0.26	0.09	0.33	55.8
East: Abbotsford Avenue														
4	L2	67	0.0	67	0.0	0.261	13.1	LOS B	0.9	6.5	0.74	1.03	0.83	39.0
5	T1	5	0.0	5	0.0	0.261	28.1	LOS D	0.9	6.5	0.74	1.03	0.83	39.0
6	R2	19	0.0	19	0.0	0.261	33.6	LOS D	0.9	6.5	0.74	1.03	0.83	46.0
Approach		92	0.0	92	0.0	0.261	18.2	LOS C	0.9	6.5	0.74	1.03	0.83	41.1
North: Chadstone Road														
7	L2	27	0.0	27	0.0	0.330	6.3	LOS A	0.1	0.9	0.02	0.03	0.02	58.0
8	T1	660	0.0	660	0.0	0.330	0.1	LOS A	0.1	0.9	0.02	0.03	0.02	59.3
9	R2	5	0.0	5	0.0	0.330	8.9	LOS A	0.1	0.9	0.02	0.03	0.02	59.3
Approach		693	0.0	693	0.0	0.330	0.4	NA	0.1	0.9	0.02	0.03	0.02	59.2
West: Armstrong Court														
10	L2	12	0.0	12	0.0	0.104	6.9	LOS A	0.3	2.2	0.76	0.96	0.76	38.5
11	T1	5	0.0	5	0.0	0.104	22.5	LOS C	0.3	2.2	0.76	0.96	0.76	38.4
12	R2	8	0.0	8	0.0	0.104	28.5	LOS D	0.3	2.2	0.76	0.96	0.76	4.4
Approach		25	0.0	25	0.0	0.104	17.4	LOS C	0.3	2.2	0.76	0.96	0.76	33.4
All Vehicles		1417	0.0	1417	0.0	0.340	2.7	NA	1.5	10.5	0.18	0.14	0.22	55.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Ex Service Rd Exit (AM)]

Network: 1 [Existing Network (AM)]

Service Road/Armstrong Court
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Service Road														
1	L2	5	0.0	5	0.0	0.017	8.1	LOS A	0.1	0.4	0.08	0.94	0.08	47.9
3	R2	15	0.0	15	0.0	0.017	7.6	LOS A	0.1	0.4	0.08	0.94	0.08	28.1
Approach		20	0.0	20	0.0	0.017	7.7	LOS A	0.1	0.4	0.08	0.94	0.08	38.7
East: Armstrong Court														
5	T1	17	0.0	17	0.0	0.009	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		17	0.0	17	0.0	0.009	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
West: Armstrong Court														
11	T1	20	0.0	20	0.0	0.010	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		20	0.0	20	0.0	0.010	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
All Vehicles		57	0.0	57	0.0	0.017	2.7	NA	0.1	0.4	0.03	0.33	0.03	53.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Ex Chadstone Rd/Service Rd (AM)]

Network: 1 [Existing Network (AM)]

Chadstone Road/Service Road
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Chadstone Road														
1	L2	14	0.0	14	0.0	0.292	3.5	LOS A	0.0	0.0	0.00	0.01	0.00	24.6
2	T1	605	0.0	605	0.0	0.292	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	58.4
Approach		619	0.0	619	0.0	0.292	0.1	NA	0.0	0.0	0.00	0.01	0.00	56.1
North: Chadstone Road														
8	T1	725	0.0	725	0.0	0.353	0.1	LOS A	0.2	1.5	0.03	0.01	0.04	57.0
9	R2	11	0.0	11	0.0	0.353	9.3	LOS A	0.2	1.5	0.03	0.01	0.04	36.0
Approach		736	0.0	736	0.0	0.353	0.3	NA	0.2	1.5	0.03	0.01	0.04	56.4
West: Service Road														
10	L2	2	0.0	2	0.0	0.015	5.1	LOS A	0.0	0.3	0.71	0.79	0.71	9.6
12	R2	3	0.0	3	0.0	0.015	14.9	LOS B	0.0	0.3	0.71	0.79	0.71	9.6
Approach		5	0.0	5	0.0	0.015	11.0	LOS B	0.0	0.3	0.71	0.79	0.71	9.6
All Vehicles		1360	0.0	1360	0.0	0.353	0.2	NA	0.2	1.5	0.02	0.01	0.02	55.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Ex Site Access (AM)]

Network: 1 [Existing Network (AM)]

Existing Site Access
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Chadstone Road														
2	T1	607	0.0	607	0.0	0.315	0.4	LOS A	0.5	3.6	0.09	0.02	0.11	58.4
3	R2	23	0.0	23	0.0	0.315	10.6	LOS B	0.5	3.6	0.09	0.02	0.11	54.7
Approach		631	0.0	631	0.0	0.315	0.8	NA	0.5	3.6	0.09	0.02	0.11	58.3
East: Existing Site Access														
4	L2	2	0.0	2	0.0	0.023	8.6	LOS A	0.1	0.5	0.75	0.86	0.75	41.5
6	R2	5	0.0	5	0.0	0.023	17.3	LOS C	0.1	0.5	0.75	0.86	0.75	19.0
Approach		7	0.0	7	0.0	0.023	14.8	LOS B	0.1	0.5	0.75	0.86	0.75	30.2
North: Chadstone Road														
7	L2	16	0.0	16	0.0	0.335	3.5	LOS A	0.0	0.0	0.00	0.01	0.00	12.9
8	T1	694	0.0	694	0.0	0.335	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	59.8
Approach		709	0.0	709	0.0	0.335	0.1	NA	0.0	0.0	0.00	0.01	0.00	58.5
All Vehicles		1347	0.0	1347	0.0	0.335	0.5	NA	0.5	3.6	0.05	0.02	0.05	58.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR NETWORK SITE

Project: 18ME0204-20181114-NS3-Sidra Analysis

Template: Default Site User Report

Site: 101 [Ex Chadstone Rd/Abbotsford Ave (PM)]

Network: 5 [Existing Network (PM)]

Chadstone Road / Abbotsford Avenue
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Chadstone Road														
1	L2	8	0.0	8	0.0	0.366	10.9	LOS B	1.9	13.1	0.31	0.09	0.40	38.0
2	T1	553	0.0	553	0.0	0.366	1.8	LOS A	1.9	13.1	0.31	0.09	0.40	55.3
3	R2	74	0.0	74	0.0	0.366	11.1	LOS B	1.9	13.1	0.31	0.09	0.40	52.8
Approach		635	0.0	635	0.0	0.366	3.0	NA	1.9	13.1	0.31	0.09	0.40	54.9
East: Abbotsford Avenue														
4	L2	65	0.0	65	0.0	0.360	15.9	LOS C	1.3	9.2	0.82	1.06	1.03	34.9
5	T1	2	0.0	2	0.0	0.360	35.7	LOS E	1.3	9.2	0.82	1.06	1.03	34.9
6	R2	26	0.0	26	0.0	0.360	42.9	LOS E	1.3	9.2	0.82	1.06	1.03	43.0
Approach		94	0.0	94	0.0	0.360	24.0	LOS C	1.3	9.2	0.82	1.06	1.03	38.0
North: Chadstone Road														
7	L2	31	0.0	31	0.0	0.366	6.0	LOS A	0.1	0.6	0.01	0.03	0.02	58.1
8	T1	737	0.0	737	0.0	0.366	0.0	LOS A	0.1	0.6	0.01	0.03	0.02	59.4
9	R2	3	0.0	3	0.0	0.366	9.3	LOS A	0.1	0.6	0.01	0.03	0.02	59.4
Approach		771	0.0	771	0.0	0.366	0.3	NA	0.1	0.6	0.01	0.03	0.02	59.3
West: Armstrong Court														
10	L2	18	0.0	18	0.0	0.265	9.3	LOS A	0.8	5.9	0.84	1.03	0.95	32.9
11	T1	7	0.0	7	0.0	0.265	30.9	LOS D	0.8	5.9	0.84	1.03	0.95	32.8
12	R2	21	0.0	21	0.0	0.265	38.1	LOS E	0.8	5.9	0.84	1.03	0.95	3.0
Approach		46	0.0	46	0.0	0.265	25.8	LOS D	0.8	5.9	0.84	1.03	0.95	24.8
All Vehicles		1545	0.0	1545	0.0	0.366	3.6	NA	1.9	13.1	0.21	0.15	0.26	54.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Ex Service Rd Exit (PM)]

Network: 5 [Existing Network (PM)]

Service Road/Armstrong Court
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Service Road														
1	L2	7	0.0	7	0.0	0.030	8.1	LOS A	0.1	0.7	0.08	0.94	0.08	47.9
3	R2	26	0.0	26	0.0	0.030	7.6	LOS A	0.1	0.7	0.08	0.94	0.08	28.1
Approach		34	0.0	34	0.0	0.030	7.7	LOS A	0.1	0.7	0.08	0.94	0.08	37.5
East: Armstrong Court														
5	T1	14	0.0	14	0.0	0.007	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		14	0.0	14	0.0	0.007	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
West: Armstrong Court														
11	T1	20	0.0	20	0.0	0.011	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		20	0.0	20	0.0	0.011	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
All Vehicles		67	0.0	67	0.0	0.030	3.8	NA	0.1	0.7	0.04	0.47	0.04	50.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

▽ Site: 101 [Ex Chadstone Rd/Service Rd (PM)]

⧾ Network: 5 [Existing Network (PM)]

Chadstone Road/Service Road
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Chadstone Road														
1	L2	17	0.0	17	0.0	0.300	3.5	LOS A	0.0	0.0	0.00	0.02	0.00	24.5
2	T1	620	0.0	620	0.0	0.300	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	58.1
Approach		637	0.0	637	0.0	0.300	0.1	NA	0.0	0.0	0.00	0.02	0.00	55.4
North: Chadstone Road														
8	T1	808	0.0	808	0.0	0.398	0.2	LOS A	0.3	2.4	0.04	0.01	0.06	55.9
9	R2	15	0.0	15	0.0	0.398	9.8	LOS A	0.3	2.4	0.04	0.01	0.06	35.6
Approach		823	0.0	823	0.0	0.398	0.4	NA	0.3	2.4	0.04	0.01	0.06	55.2
West: Service Road														
10	L2	2	0.0	2	0.0	0.018	5.2	LOS A	0.1	0.4	0.75	0.81	0.75	8.3
12	R2	3	0.0	3	0.0	0.018	18.2	LOS C	0.1	0.4	0.75	0.81	0.75	8.3
Approach		5	0.0	5	0.0	0.018	13.0	LOS B	0.1	0.4	0.75	0.81	0.75	8.3
All Vehicles		1465	0.0	1465	0.0	0.398	0.3	NA	0.3	2.4	0.03	0.02	0.04	54.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

▽ Site: 101 [Ex Site Access (PM)]

⧾ Network: 5 [Existing Network (PM)]

Existing Site Access
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Chadstone Road														
2	T1	640	0.0	640	0.0	0.343	0.8	LOS A	0.8	5.6	0.13	0.03	0.16	57.6
3	R2	27	0.0	27	0.0	0.343	12.6	LOS B	0.8	5.6	0.13	0.03	0.16	54.1
Approach		667	0.0	667	0.0	0.343	1.3	NA	0.8	5.6	0.13	0.03	0.16	57.4
East: Existing Site Access														
4	L2	3	0.0	3	0.0	0.076	9.6	LOS A	0.2	1.5	0.83	0.93	0.83	37.9
6	R2	14	0.0	14	0.0	0.076	22.2	LOS C	0.2	1.5	0.83	0.93	0.83	15.5
Approach		17	0.0	17	0.0	0.076	19.8	LOS C	0.2	1.5	0.83	0.93	0.83	23.0
North: Chadstone Road														
7	L2	33	0.0	33	0.0	0.390	3.5	LOS A	0.0	0.0	0.00	0.02	0.00	12.9
8	T1	794	0.0	794	0.0	0.390	0.0	LOS A	0.0	0.0	0.00	0.02	0.00	59.7
Approach		826	0.0	826	0.0	0.390	0.1	NA	0.0	0.0	0.00	0.02	0.00	57.4
All Vehicles		1511	0.0	1511	0.0	0.390	0.9	NA	0.8	5.6	0.07	0.03	0.08	57.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR NETWORK SITE

Project: 18ME0204-20190319-SC4-Sidra Analysis

Template: Default Site User Report

Site: 101 [Pr Chadstone Rd/Abbotsford Ave (AM)]

Network: 3 [Proposed Network (AM)]

Chadstone Road / Abbotsford Avenue
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Chadstone Road														
1	L2	7	0.0	7	0.0	0.378	10.1	LOS B	1.9	13.2	0.29	0.09	0.39	36.6
2	T1	582	0.0	582	0.0	0.378	1.7	LOS A	1.9	13.2	0.29	0.09	0.39	55.6
3	R2	76	0.0	76	0.0	0.378	10.2	LOS B	1.9	13.2	0.29	0.09	0.39	52.9
Approach		665	0.0	665	0.0	0.378	2.7	NA	1.9	13.2	0.29	0.09	0.39	55.2
East: Abbotsford Avenue														
4	L2	72	0.0	72	0.0	0.321	14.8	LOS B	1.2	8.2	0.79	1.05	0.96	36.8
5	T1	5	0.0	5	0.0	0.321	34.8	LOS D	1.2	8.2	0.79	1.05	0.96	36.8
6	R2	19	0.0	19	0.0	0.321	41.8	LOS E	1.2	8.2	0.79	1.05	0.96	44.4
Approach		96	0.0	96	0.0	0.321	21.2	LOS C	1.2	8.2	0.79	1.05	0.96	38.9
North: Chadstone Road														
7	L2	27	0.0	27	0.0	0.356	6.5	LOS A	0.1	1.0	0.02	0.03	0.03	58.0
8	T1	715	0.0	715	0.0	0.356	0.1	LOS A	0.1	1.0	0.02	0.03	0.03	59.3
9	R2	5	0.0	5	0.0	0.356	9.6	LOS A	0.1	1.0	0.02	0.03	0.03	59.3
Approach		747	0.0	747	0.0	0.356	0.4	NA	0.1	1.0	0.02	0.03	0.03	59.2
West: Armstrong Court														
10	L2	12	0.0	12	0.0	0.140	7.4	LOS A	0.4	2.9	0.82	0.98	0.82	35.4
11	T1	5	0.0	5	0.0	0.140	27.9	LOS D	0.4	2.9	0.82	0.98	0.82	35.3
12	R2	9	0.0	9	0.0	0.140	35.7	LOS E	0.4	2.9	0.82	0.98	0.82	3.6
Approach		26	0.0	26	0.0	0.140	21.7	LOS C	0.4	2.9	0.82	0.98	0.82	29.5
All Vehicles		1535	0.0	1535	0.0	0.378	3.1	NA	1.9	13.2	0.20	0.13	0.26	54.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Pr Service Rd Exit (AM)]

Network: 3 [Proposed Network (AM)]

Service Road/Armstrong Court
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Service Road														
1	L2	5	0.0	5	0.0	0.017	8.1	LOS A	0.1	0.4	0.07	0.95	0.07	47.9
3	R2	15	0.0	15	0.0	0.017	7.6	LOS A	0.1	0.4	0.07	0.95	0.07	28.1
Approach		20	0.0	20	0.0	0.017	7.7	LOS A	0.1	0.4	0.07	0.95	0.07	38.7
East: Armstrong Court														
5	T1	13	0.0	13	0.0	0.006	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		13	0.0	13	0.0	0.006	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
West: Armstrong Court														
11	T1	12	0.0	12	0.0	0.006	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		12	0.0	12	0.0	0.006	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
All Vehicles		44	0.0	44	0.0	0.017	3.5	NA	0.1	0.4	0.03	0.43	0.03	51.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Pr Site Entry (AM)]

Network: 3 [Proposed Network (AM)]

Future Site Entry
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Chadstone Road														
2	T1	641	0.0	641	0.0	0.398	1.6	LOS A	1.9	13.1	0.27	0.07	0.37	23.7
3	R2	69	0.0	69	0.0	0.398	8.9	LOS A	1.9	13.1	0.27	0.07	0.37	35.6
Approach		711	0.0	711	0.0	0.398	2.3	NA	1.9	13.1	0.27	0.07	0.37	26.8
North: Chadstone Road														
7	L2	76	0.0	76	0.0	0.364	4.3	LOS A	0.0	0.0	0.00	0.06	0.00	43.3
8	T1	694	0.0	694	0.0	0.364	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	54.4
Approach		769	0.0	769	0.0	0.364	0.4	NA	0.0	0.0	0.00	0.06	0.00	51.7
All Vehicles		1480	0.0	1480	0.0	0.398	1.3	NA	1.9	13.1	0.13	0.06	0.18	40.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Pr Chadstone Rd/Service Rd (AM)]

Network: 3 [Proposed Network (AM)]

Chadstone Road/Service Road
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Chadstone Road														
1	L2	16	0.0	16	0.0	0.345	3.5	LOS A	0.0	0.0	0.00	0.01	0.00	37.9
2	T1	708	0.0	708	0.0	0.345	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	58.4
Approach		724	0.0	724	0.0	0.345	0.1	NA	0.0	0.0	0.00	0.01	0.00	57.5
North: Chadstone Road														
8	T1	681	0.0	681	0.0	0.337	0.2	LOS A	0.3	2.2	0.05	0.01	0.06	47.8
9	R2	13	0.0	13	0.0	0.337	7.9	LOS A	0.3	2.2	0.05	0.01	0.06	23.1
Approach		694	0.0	694	0.0	0.337	0.4	NA	0.3	2.2	0.05	0.01	0.06	46.2
West: Service Road														
10	L2	2	0.0	2	0.0	0.017	5.8	LOS A	0.0	0.3	0.75	0.82	0.75	8.9
12	R2	3	0.0	3	0.0	0.017	16.0	LOS C	0.0	0.3	0.75	0.82	0.75	8.9
Approach		5	0.0	5	0.0	0.017	11.9	LOS B	0.0	0.3	0.75	0.82	0.75	8.9
All Vehicles		1423	0.0	1423	0.0	0.345	0.3	NA	0.3	2.2	0.03	0.01	0.03	52.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Pr Site Exit (AM)]

Network: 3 [Proposed Network (AM)]

Future Site Exit
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Chadstone Road														
2	T1	677	0.0	677	0.0	0.319	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		677	0.0	677	0.0	0.319	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
East: Existing Site Access														
4	L2	36	0.0	36	0.0	0.234	9.4	LOS A	0.8	5.4	0.76	0.92	0.83	41.2
6	R2	47	0.0	47	0.0	0.234	19.5	LOS C	0.8	5.4	0.76	0.92	0.83	18.6
Approach		83	0.0	83	0.0	0.234	15.2	LOS C	0.8	5.4	0.76	0.92	0.83	33.2
North: Chadstone Road														
8	T1	681	0.0	681	0.0	0.321	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		681	0.0	681	0.0	0.321	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1441	0.0	1441	0.0	0.321	0.9	NA	0.8	5.4	0.04	0.05	0.05	58.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

USER REPORT FOR NETWORK SITE

Project: 18ME0204-20190319-SC4-Sidra Analysis

Template: Default Site User Report

Site: 101 [Pr Chadstone Rd/Abbotsford Ave (PM)]

Network: 6 [Proposed Network (PM)]

Chadstone Road / Abbotsford Avenue
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Chadstone Road														
1	L2	9	0.0	9	0.0	0.407	11.6	LOS B	2.4	16.6	0.34	0.09	0.47	33.2
2	T1	605	0.0	605	0.0	0.407	2.2	LOS A	2.4	16.6	0.34	0.09	0.47	54.6
3	R2	78	0.0	78	0.0	0.407	11.7	LOS B	2.4	16.6	0.34	0.09	0.47	52.0
Approach		693	0.0	693	0.0	0.407	3.4	NA	2.4	16.6	0.34	0.09	0.47	54.2
East: Abbotsford Avenue														
4	L2	69	0.0	69	0.0	0.359	16.7	LOS C	1.3	9.4	0.83	1.06	1.04	35.2
5	T1	2	0.0	2	0.0	0.359	43.1	LOS E	1.3	9.4	0.83	1.06	1.04	35.2
6	R2	26	0.0	26	0.0	0.359	40.1	LOS E	1.3	9.4	0.83	1.06	1.04	43.2
Approach		98	0.0	98	0.0	0.359	23.5	LOS C	1.3	9.4	0.83	1.06	1.04	38.2
North: Chadstone Road														
7	L2	31	0.0	31	0.0	0.392	6.2	LOS A	0.1	0.7	0.01	0.02	0.02	58.1
8	T1	792	0.0	792	0.0	0.392	0.0	LOS A	0.1	0.7	0.01	0.02	0.02	59.4
9	R2	3	0.0	3	0.0	0.392	10.1	LOS B	0.1	0.7	0.01	0.02	0.02	59.4
Approach		825	0.0	825	0.0	0.392	0.3	NA	0.1	0.7	0.01	0.02	0.02	59.3
West: Armstrong Court														
10	L2	18	0.0	18	0.0	0.270	10.0	LOS A	0.9	6.1	0.86	1.03	0.97	32.6
11	T1	7	0.0	7	0.0	0.270	38.4	LOS E	0.9	6.1	0.86	1.03	0.97	32.5
12	R2	22	0.0	22	0.0	0.270	35.7	LOS E	0.9	6.1	0.86	1.03	0.97	2.9
Approach		47	0.0	47	0.0	0.270	26.4	LOS D	0.9	6.1	0.86	1.03	0.97	24.2
All Vehicles		1663	0.0	1663	0.0	0.407	3.7	NA	2.4	16.6	0.22	0.14	0.30	53.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Pr Service Rd Exit (PM)]

Network: 6 [Proposed Network (PM)]

Service Road/Armstrong Court
Site Category: (None)
Stop (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Service Road														
1	L2	7	0.0	7	0.0	0.030	8.1	LOS A	0.1	0.7	0.08	0.94	0.08	47.9
3	R2	26	0.0	26	0.0	0.030	7.6	LOS A	0.1	0.7	0.08	0.94	0.08	28.1
Approach		34	0.0	34	0.0	0.030	7.7	LOS A	0.1	0.7	0.08	0.94	0.08	37.5
East: Armstrong Court														
5	T1	13	0.0	13	0.0	0.006	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		13	0.0	13	0.0	0.006	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
West: Armstrong Court														
11	T1	21	0.0	21	0.0	0.011	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	60.0
Approach		21	0.0	21	0.0	0.011	0.0	NA	0.0	0.0	0.00	0.00	0.00	60.0
All Vehicles		67	0.0	67	0.0	0.030	3.8	NA	0.1	0.7	0.04	0.47	0.04	50.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Pr Site Entry (PM)]

Network: 6 [Proposed Network (PM)]

Future Site Entry
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Chadstone Road														
2	T1	680	0.0	680	0.0	0.445	2.5	LOS A	2.7	18.6	0.34	0.07	0.49	18.4
3	R2	74	0.0	74	0.0	0.445	11.5	LOS B	2.7	18.6	0.34	0.07	0.49	32.8
Approach		754	0.0	754	0.0	0.445	3.4	NA	2.7	18.6	0.34	0.07	0.49	21.8
North: Chadstone Road														
7	L2	93	0.0	93	0.0	0.420	4.3	LOS A	0.0	0.0	0.00	0.06	0.00	43.2
8	T1	794	0.0	794	0.0	0.420	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	54.1
Approach		886	0.0	886	0.0	0.420	0.5	NA	0.0	0.0	0.00	0.06	0.00	51.3
All Vehicles		1640	0.0	1640	0.0	0.445	1.8	NA	2.7	18.6	0.16	0.07	0.23	37.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Pr Chadstone Rd/Service Rd (PM)]

Network: 6 [Proposed Network (PM)]

Chadstone Road/Service Road
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Chadstone Road														
1	L2	17	0.0	17	0.0	0.405	3.5	LOS A	0.0	0.0	0.00	0.01	0.00	37.8
2	T1	742	0.0	742	0.0	0.405	0.0	LOS A	0.0	0.0	0.00	0.01	0.00	58.4
Approach		759	0.0	759	0.0	0.405	0.1	NA	0.0	0.0	0.00	0.01	0.00	57.4
North: Chadstone Road														
8	T1	779	0.0	779	0.0	0.387	0.3	LOS A	0.4	3.0	0.06	0.01	0.08	45.7
9	R2	15	0.0	15	0.0	0.387	9.0	LOS A	0.4	3.0	0.06	0.01	0.08	22.8
Approach		794	0.0	794	0.0	0.387	0.5	NA	0.4	3.0	0.06	0.01	0.08	44.2
West: Service Road														
10	L2	2	0.0	2	0.0	0.022	6.1	LOS A	0.1	0.4	0.79	0.85	0.79	7.5
12	R2	3	0.0	3	0.0	0.022	20.4	LOS C	0.1	0.4	0.79	0.85	0.79	7.5
Approach		5	0.0	5	0.0	0.022	14.7	LOS B	0.1	0.4	0.79	0.85	0.79	7.5
All Vehicles		1558	0.0	1558	0.0	0.405	0.3	NA	0.4	3.0	0.03	0.01	0.04	51.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Site: 101 [Pr Site Exit (PM)]

Network: 6 [Proposed Network (PM)]

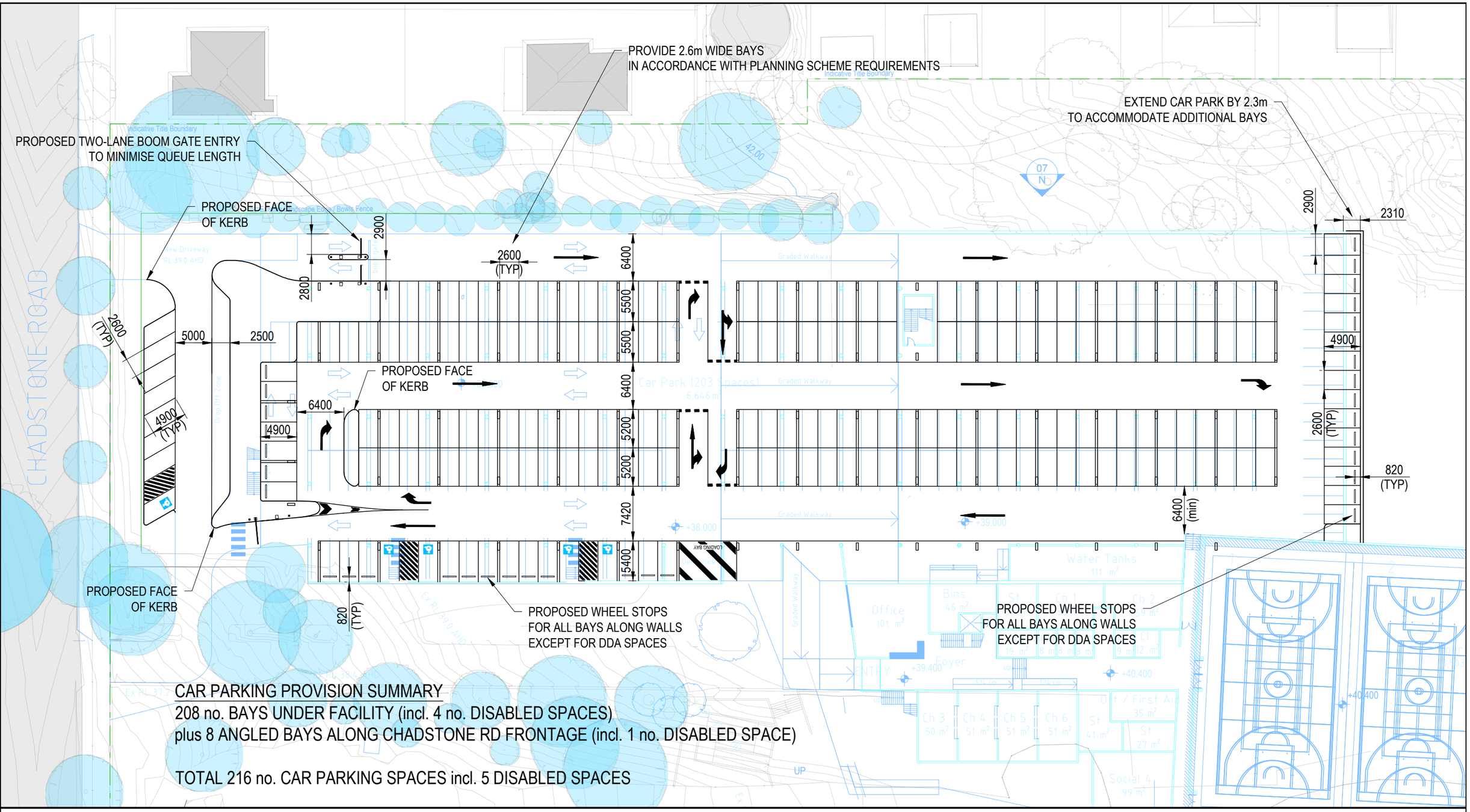
Future Site Exit
Site Category: (None)
Giveway / Yield (Two-Way)

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Chadstone Road														
2	T1	714	0.0	714	0.0	0.336	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		714	0.0	714	0.0	0.336	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
East: Existing Site Access														
4	L2	37	0.0	37	0.0	0.197	10.0	LOS A	0.6	4.4	0.73	0.90	0.76	43.6
6	R2	56	0.0	56	0.0	0.197	13.6	LOS B	0.6	4.4	0.73	0.90	0.76	21.6
Approach		93	0.0	93	0.0	0.197	12.1	LOS B	0.6	4.4	0.73	0.90	0.76	35.7
North: Chadstone Road														
8	T1	779	0.0	779	0.0	0.367	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		779	0.0	779	0.0	0.367	0.0	NA	0.0	0.0	0.00	0.00	0.00	59.9
All Vehicles		1585	0.0	1585	0.0	0.367	0.7	NA	0.6	4.4	0.04	0.05	0.04	58.5

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Network Data dialog (Network tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Appendix D Modified Car Park Layouts & Swept Path Diagrams



CAR PARKING PROVISION SUMMARY

208 no. BAYS UNDER FACILITY (incl. 4 no. DISABLED SPACES)
plus 8 ANGLED BAYS ALONG CHADSTONE RD FRONTAGE (incl. 1 no. DISABLED SPACE)

TOTAL 216 no. CAR PARKING SPACES incl. 5 DISABLED SPACES

18ME0204 SK022

PERCY TREYVAUD SPORTS FACILITY
PROPOSED CAR PARK ARRANGEMENTS
SC4 17.01.2019

0 10 20m

SCALE 1:500 @A3

irwinconsult

NORTH

SLOW SPEED ENVIRONMENT WITHIN FACILITY.
300mm CLEARANCE LINES APPROPRIATE.

STAIRS TO BE RELOCATED OUTSIDE OF CARPARK (CLEAR OF SHARED ZONE)

INGRESS

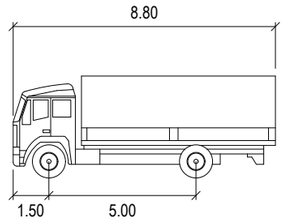
STAIRS TO BE RELOCATED OUTSIDE OF CARPARK (CLEAR OF SHARED ZONE)

SLOW SPEED ENVIRONMENT WITHIN FACILITY.
300mm CLEARANCE LINES APPROPRIATE.

EGRESS

irwinconsult

NORTH



MRV

	meters
Width	: 2.50
Track	: 2.50
Lock to Lock Time	: 6.0
Steering Angle	: 34.0

VEHICLE LEGEND

8.8m TRUCK 300mm CLEARANCE

8.8m TRUCK OVERHANG

8.8m TRUCK CENTRELINE

AUSTROADS 8.8m TRUCK

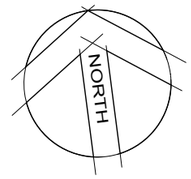
18ME0204 SK023

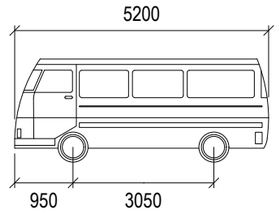
AUSTROADS 8.8m RIGID TRUCK
SITE INGRESS/EGRESS MANOEUVRE
SC4 17.01.2019

0 10 20m

SCALE 1:500 @A3

irwinconsult





VAN	mm
Width	: 1940
Track	: 1840
Lock to Lock Time	: 6.0
Steering Angle	: 33.5

VEHICLE LEGEND

5.2m VAN 300mm CLEARANCE

5.2m VAN OVERHANG

5.2m VAN CENTRELINE

AUSTROADS 5.2m VAN

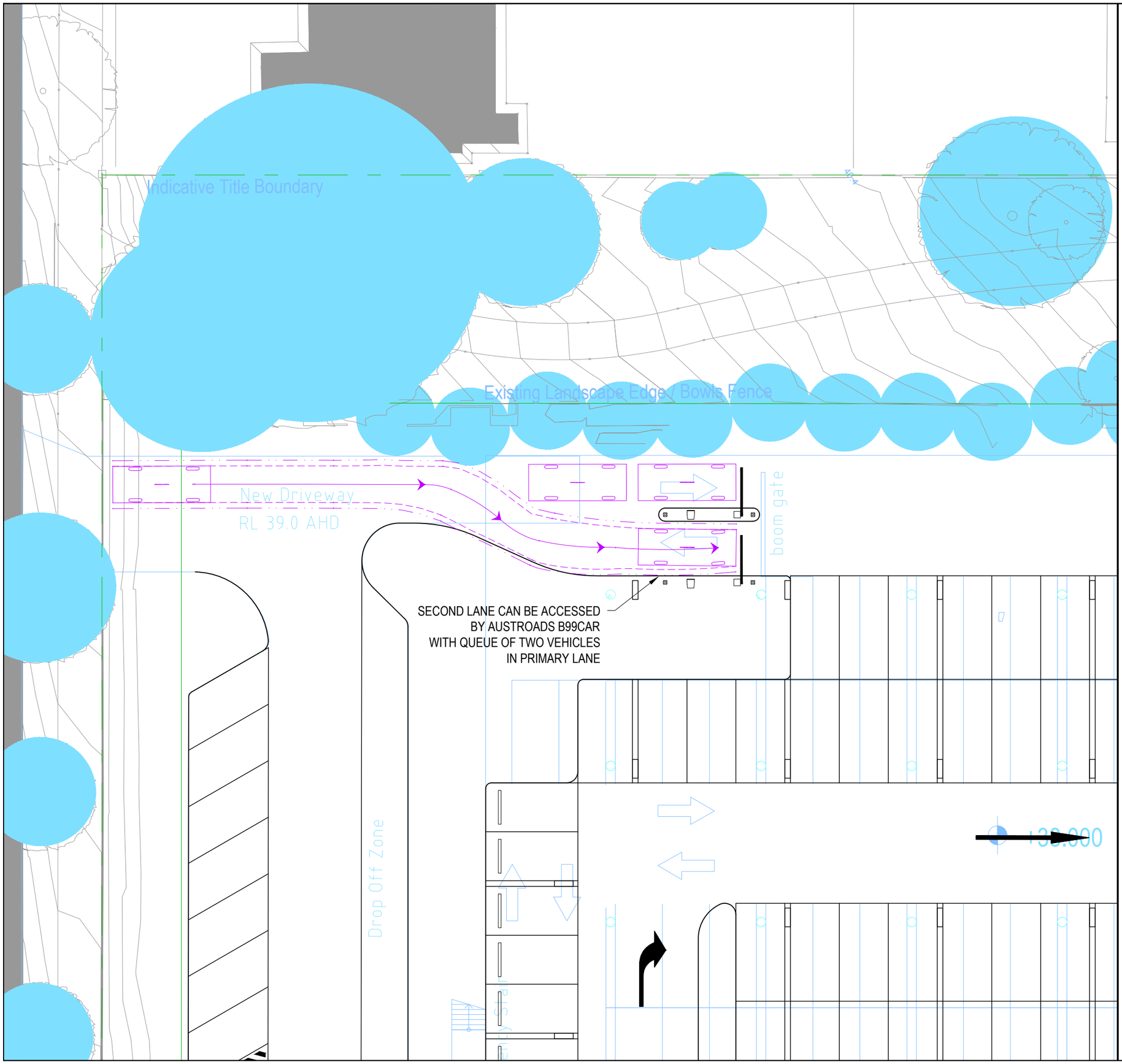
18ME0204 SK024

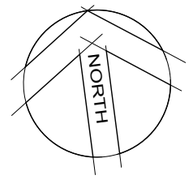
AUSTROADS B99 VAN
SITE INGRESS/EGRESS MANOEUVRE
SC4 17.01.2019

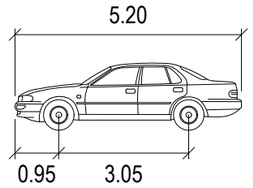
0 10 20m

SCALE 1:500 @A3

irwinconsult







B99 meters

Width	:	1.94
Track	:	1.84
Lock to Lock Time	:	6.00
Steering Angle	:	33.50

VEHICLE LEGEND

B99CAR 300mm CLEARANCE

B99CAR OVERHANG

B99CAR CENTRELINE

AUSTROADS B99CAR

18ME0204 SK025

AUSTROADS B99CAR
BOOM GATE ENTRY MANOEUVRE
SC4 17.01.2019

0 5 8m

SCALE 1:200 @A3

D. Sustainability Report

D. Sustainability Report

As prepared by BRT Consulting Engineers

PERCY TREYVAUD
Sports Park Redevelopment

SUSTAINABILITY

High Level ESD Opportunity Report

JOB NO. : 10251
STATUS : For Issue
DATE : January 2019
REVISION : 01

BRT Consulting Pty Ltd
159 Victoria Parade
Collingwood VIC 3066
T 03 9417 2971 F 03 9417 5851
E melb@brt.com.au

consulting engineers
BRT

BRT Consulting Pty Ltd
159 Victoria Parade
Collingwood VIC 3066
T 03 9417 2971 F 03 9417 5851
E melb@brt.com.au

consulting engineers
BRT

1 TABLE OF CONTENTS

BRT Consulting Pty Ltd
159 Victoria Parade
Collingwood VIC 3066
T 03 9417 2971 F 03 9417 5851
E melb@brt.com.au

2 EXECUTIVE SUMMARY

The following is high level ESD opportunity report details sustainable design initiatives that chould be incorporated as part of the Percy Treyvaud Sports Park redevelopment. Percy Treyvaud Park is located on Chadstone Road, Malvern East, which is located within the City of Stonnington.

The proposed redevelopment includes:

- New outdoor bowling green
- New 4-court indoor basketball facility
- New 7 outside tennis courts.
- Associated social spaces to accommodate spaces above
- Sports office
- Change facilities for spaces above and the ovals

The client's objective in undertaking the redevelopment site is to provide a sustainable development that will provide a state-of-the-art indoor/outdoor sports facility with enhanced internal and external environment for users/occupants and staff whilst reducing recurrent energy consumption and the environment impact on the site

The following is a summary of the proposed sustainable design initiatives proposed for the redevelopment;

Management

- City of Stonnington's commitment to environmental targets.
- BCA 2017 Section J Deemed to Satisfy requirements achieved.
- Metering to allow monitoring and management of energy and water.

Water Efficiency

- The following fixture star ratings are proposed for the development;
  - Shower – 3 Star WELS (<6 l/m)
  - Bathroom taps – 6 Star WELS
  - Kitchen Taps – 6 Star WELS
  - Dishwasher – 6 Star WELS
  - WC's – 5 Star WELS
- Water efficient landscaping including garden planting and lawn areas.
- Rainwater collection for W.C. and amenity use and immediate landscaping

Energy Efficiency

- 10% increase in energy efficiency requirements from that detailed in BCA Section J requirements including lighting, building insulation, air conditioning and ventilation systems.
- Double glazed window system through the development to provide increased thermal and acoustic performance for the facility
- Installation of LED lighting throughout with central lighting control to be provided,
- Daylight Dimming,
- Installation of heat recovery Variable Refrigerant Flow (VRF) air conditioning system.
- Labyrinth for pre-cooling of air to naturally ventilated spaces including indoor stadium,
- Instantaneous gas hot water system,
- Photovoltaic system.

BRT Consulting Pty Ltd
159 Victoria Parade
Collingwood VIC 3066
T 03 9417 2971 F 03 9417 5851
E melb@brt.com.au

Stormwater

- Stormwater should be captured by rainwater tanks or raingardens to minimise negative environmental impacts of stormwater runoff and maximise onsite re-use of stormwater.

Indoor Environment Quality

- Natural ventilation and light to all habitable rooms.
- Installation of Heat Recovery Unit to supply fresh air where natural ventilation isn't viable,
- Independent climate control to all offices and common areas.
- Double glazing throughout the development to improve acoustic and thermal performance of the building envelope.
- Use of vegetation to pre-cool air intake into sports hall

Transport

- Provision of easy pedestrian access to the facility at the public entrance.
- Access to public transport at property frontage.

Waste Management

- Provision of individual rubbish and recyclable waste throughout the facility.
- Garden maintenance contractor engaged to remove and recycle 'green' waste.
- Dedicated waste enclosure to house waste and recycling bins.

3 SUSTAINABILITY ANALYSIS

The following tools, which are required for Sustainability Management Plans, were utilised to assess the proposed development;

- Built Environment Sustainability Scorecard (BESS),
- BCA 2017- Section J.

4 ENVIRONMENTALLY SUSTAINABLE DEVELOPMENT TARGETS

The following sustainability targets are highlighted as part of the Built Environment Sustainability Scorecard. It is proposed that the development should use the following benchmarks;

4.1 Energy Conservation Design Targets

The proposed development should aspire to better the following ESD targets across the facility;

		Targets
i)	Facades demonstrate improvement in required NCC insulation levels	min 10%
ii)	All glazing demonstrate improvement in required NCC glazing calculator	min 10%
iii)	Heating and cooling systems within one star of the best available	Yes
iv)	Water heating systems within one star of the best available	Yes

4.2 Water Conservation Design Targets

		Targets
i)	Highest rated WELS rating for fixture and fittings	Yes
ii)	Water metering	Yes

4.3 Fossil Fuel Minimisation for Transport

		Targets
i)	Site is within close proximity to public transport	Yes
ii)	The site is pedestrian friendly	Yes

4.4 Appropriate Landscaping

		Targets
i)	Landscaping ensures efficient use of water	Yes

4.5 Waste Minimisation

		Targets
i)	Onsite management of food and garden waste	100%
ii)	Recycling facilities conveniently located	100%

4.6 Enhancement of Indoor Environmental Quality

-	Natural lighting for circulation and working planes.
-	Openable windows in conjunction with mechanical ventilation/air-conditioning control.
-	Direct line of site to outside via windows.
-	The use of natural vegetation external to the building façade in lieu of concrete and/or asphalt to absorb solar energy rather than reflect the energy through the building facade
-	Staff training in use of lighting and air conditioning system operation
-	Pre cooling of air to sports hall using Labyrinth and vertical gardens

BRT Consulting Pty Ltd
159 Victoria Parade
Collingwood VIC 3066
T 03 9417 2971 F 03 9417 5851
E melb@brt.com.au
consulting engineers
BRT

Percy Treyvaud – Sports Park Redevelopment - ESD Opportunities

5 MANAGEMENT

5.1 Thermal Performance Modelling

The building should be designed to maximise the use of energy use by meeting, and in places exceeding, the Building Code of Australia's 2017 Section J Deemed to Satisfy requirements, refer to the Energy Section for additional details.

5.2 Metering

All energy and water to the development should be metered to allow for monitoring and management of both energy and water.

This would include:

- Cold Water
- Hot Water
- Electrical Power
- Electrical Lighting Internal
- Electrical Lighting External

Without regular monitoring and review of the energy and resources used, there is no way to knowing that the systems are providing the benefit that they promised.

Combined with a building management system described below, metering provides important feedback on failures and maintenance. Programming of digital systems will ensure that the building operation is optimised for minimum energy consumption and maximum return on investment.

6 WATER

6.1 Water Efficient Fixtures

The site is proposed to be provided with water efficient fixtures throughout. Using the Water Efficient Labelling Standard (WELS) rating system, the following ratings are proposed;

- Shower – 3 Star WELS (<6 l/m)
- Bathroom taps – 6 Star WELS
- Kitchen Taps – 6 Star WELS
- Dishwasher – 6 Star WELS
- WC's – 5 Star WELS

6.2 Rainwater Collection and Reuse

The proposed roof building area is approximately 3500m^2. This would allow, on average, approximately 175 kL of capture a month. The usage for W.C and other amenities would most likely only be in the order of 20kL per month. The remaining water can be used for planting around the building that could be used as part of a pre-cooling system for natural ventilation system. It is proposed that the tanks could be located below ground as part of the carpark

structure. The tanks could form part of a labyrinth system to pre-cool air required to ventilate the sports courts.

6.3 Landscape Design

Plant species should be carefully selected for drought tolerance, to minimise ongoing maintenance and for aesthetic reasons. The species selection should also consider the proposed siting of planting to ensure suitability both to optimise growth characteristics based on microclimate and also considering the ultimate size at maturity.

With the ability to capture a significant amount of water, certain plants around the building, particularly selected to green walls, to be used to condition air, could be selected even if they require some watering. An automatic drip irrigation system will control the amount of moisture provided to encourage growth.

7 ENERGY

7.1 BESS Energy Deemed to Satisfy Benchmarks

To minimise energy usage the development has been designed to meet the BESS Energy Section Deemed to Satisfy requirements for insulation, glazing, heating and cooling systems and the water heating system;

7.1.1 Insulation

The proposed insulation exceeds the minimum BCA Section J requirements for energy efficiency by at least 10%. Following table details the proposed requirements;

BCA Section J Items	BCA Minimum Requirements	Proposed Minimum Requirements
Building Insulation Value		
Wall	2.8	3.08
Ceiling	3.2	3.52
Floor	N/A	N/A

7.1.2 Glazing

The development should be provided with double glazing throughout the development. The glazing system should be designed to exceed the minimum BCA Section J requirements for energy efficiency by at least 10%.

7.1.3 Heating & Cooling Systems

The social spaces and the offices shall be provided with heating and ventilation.

The change rooms shall be provided with heating and the sports hall will be mechanically ventilated so the hall can be sealed for acoustics. There will be no heating to the sports hall.

BRT Consulting Pty Ltd
159 Victoria Parade
Collingwood VIC 3066
T 03 9417 2971 F 03 9417 5851
E melb@brt.com.au
consulting engineers
Percy Treyvaud – Sports Park Redevelopment - ESD Opportunities

7.1.3.1 Heat Recovery Variable Refrigerant Flow Air Conditioning

A Heat Recovery Variable Refrigerant Flow (VRF) air conditioning system is proposed to be installed throughout the air-conditioned spaces. The system performance and energy efficiency provide an estimated 30-40% energy saving over standard split refrigerant air conditioning systems and significantly greater energy savings over central plant systems.

The system will enable local and central control to all individual fan coil units located in each room/space giving the ability to isolate units when room(s) are not occupied and/or when internal conditions are met. Local control within each space will provide the occupant(s) the ability to isolate the air conditioning and provide natural ventilation to the space by the use of openable windows. The system will give the staff the ability to choose the method of heating/cooling of each individual space. Central control of the system will also enable the facility to monitor and limit setpoint temperature and operation throughout the facility

The heat recovery component also enables the system to operate in simultaneous heating and cooling mode and allows energy to be transferred from space to space without the need for compressor power. This heat recovery mode further enhances the efficiency of the VRF system.

The use of a central control system will also provide the control, monitoring and management of the integrated building systems to ensure energy conservation while optimising the indoor environmental quality. The use of local A/C controls to enable the isolation of the local A/C unit will enable and maximise the use of natural ventilation during favourable conditions.

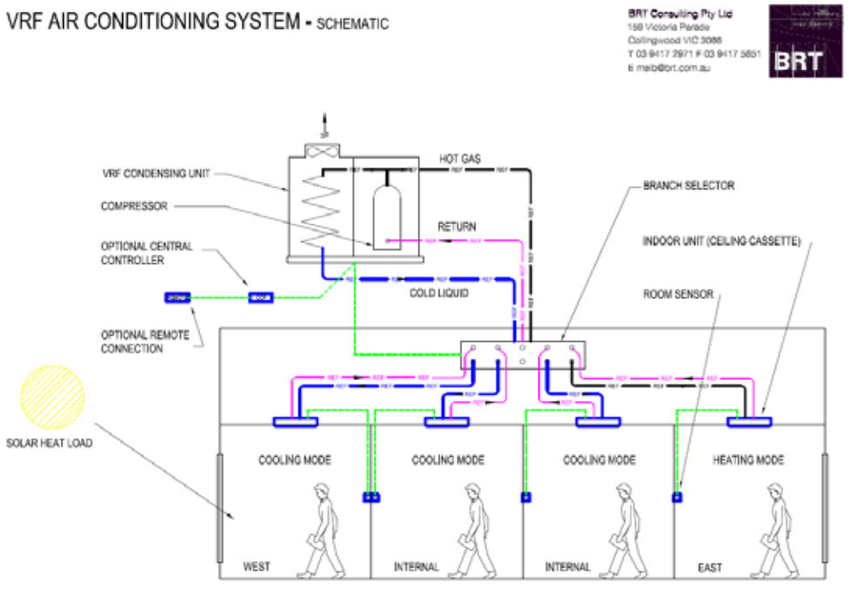


Figure 1 – VRF Air Conditioning System

7.1.4 Water Heating System

The development is proposed to be served by a central natural gas instantaneous hot water system. The system should be a minimum 6-star rating.

7.1.5 Building Management System (BMS or DDC)

A Building Management System or Direct Digital Control system (DDC) is a system that can control the mechanical systems similar to a lighting control system. Some of the features of a DDC system include:

- Automatic control and monitoring of the mechanical systems to maintain desired set points and minimise energy consumption;
- Automatic control of the illumination systems to minimise energy consumption;
- Monitoring of building security system;
- Interfaces with emergency control panels such as fire detection and alarm, EWIS and smoke management for annunciation of alarm signals as required;
- Monitoring and control of emergency evacuation lighting system;
- Monitoring of all authority meters;
- Digital sub-metering of Gas, Water, Electricity;
- Speed controls on fans;
- CO_2 monitoring and control to minimise outside air;
- Set up of trending of operation, occupancy, temperatures and conditions within the space;
- 365-day time clock control.

7.2 Internal Lighting

Lighting control system is a method of controlling all lighting from a digital source that can optimize the operation of lighting by using:

- Movement sensor to only operate lighting during occupation;
- Light sensors to turn off or dim lights when lighting levels are acceptable from natural sources;

Integrate with security and mechanical systems to optimize/minimize operation.

The proposed lighting should exceed the minimum BCA Section J requirements for energy efficiency by at least 20%.

A Dynalite central lighting control system should be installed to maximise efficiency of lighting system to ensure lights are only on as required and dimmed where daylighting can provide adequate lighting levels.

7.2.1 Daylight Dimming

Daylight dimming allows lighting to be continuously adjusted in proportion to the amount of sunlight available. Daylight dimming can keep a steady light level while dimming or brightening lighting as daylight increases or decreases.

BRT Consulting Pty Ltd
159 Victoria Parade
Collingwood VIC 3066
T 03 9417 2971 F 03 9417 5851
E melb@brt.com.au
consulting engineers
BRT

Percy Treyvaud – Sports Park Redevelopment - ESD Opportunities

7.3 Photovoltaic System

Generation of power using Photovoltaic (PV) panels. The price of panels has reduced considerable over the past few years to the point that solar panels can provide a 5-year payback on investment.

Generally, the energy required to run the facility will be greater than the capacity that could be located on the available roof area. Therefore, power will not be exported from the site.

Current advice is to maximise the available PV Generation.

There is an opportunity of installing 250kW of solar power generation on the roof.

The final size of the solar system should be matched to the maximum capacity of the facility. Due to the ad hoc nature of the usage, there may be an opportunity to install batteries into this development.

Father investigation and load balance will be required and the design progresses.

BRT will investigate the current battery technology, including life cycle and payback costs.

8 STORMWATER

8.1 Stormwater Collection

It is proposed that a STORM or MUSIC assessment will need to be undertaken for the new roof area, and all other areas of the development which could be considered as rejuvenation or maintenance works of the existing site.

Stormwater should be be captured by rainwater tanks or raingardens to minimise negative environmental impacts of stormwater runoff and maximise onsite re-use of stormwater.

9 INDOOR ENVIRONMENTAL QUALITY

9.1 Natural Light

The building design should maximise the use of natural ventilation and daylight through operable windows. The use and treatment of natural light can enhance the feeling and wellbeing of staff and users . The treatment and use of the natural light should be carefully located to minimise solar heat gain to the building envelope and/or cause nuisance of glare or shadowing internally.

BRT Consulting Pty Ltd
159 Victoria Parade
Collingwood VIC 3066
T 03 9417 2971 F 03 9417 5851
E melb@brt.com.au

9.2 Window Systems

All new windows should be provided with double glazed windows throughout which will enhance the indoor environment for staff and users

A double-glazed window system will also enhance the thermal and acoustic performance for all building occupants. Double glazed windows will minimise the inducement of cold drafts during low ambient temperatures which will allow staff to minimise the use of window furnishings and enhance their outlook through uncovered windows.

A double-glazed system will also provide acoustic treatment and reduction of transmission of external noises including traffic, the acoustic performance will enhance the indoor environment.

9.3 Ventilation

With the exception of the Sport all, the majority of the building is proposed to be naturally ventilated through openable windows. However due to the nature of the layout, mechanical ventilation is required to be provided to the internal areas. A heat exchanger system should be used to provide ventilation in accordance with the BCA requirements. The heat exchanger reduces the overall energy costs by extracting stale air and then recovering the heating or cooling energy to either warm or cool the incoming fresh air.

10 TRANSPORTATION

The site is served well by public transport.

- Route 612 Chadstone Road
- Several Routes from Chadstone shopping centre

It is proposed that there be significant bicycle parking. The exact number to be determined following review of City Of Stonnington requirements.

11 WASTE

11.1 Convenience of Recycling

As part of the operation of the facility an Operational Waste Management Plan should be provided. The installation of general, recycling and green waste bins should be provided throughout the facility to enable the separation of rubbish at the source.

williams ross architects

Suite 1, 70 Kerr Street, Fitzroy, Victoria 3065
Tel (03) 9416 3044

email@williamsross.com | www.williamsross.com