AMENDMENT NO. 06

TO

STRUCTURE PLAN NO. 80

This Structure Plan was prepared under the provisions of Part 9 of the City of Wanneroo District Planning Scheme No. 2

AMENDMENT NO. 06
TO
STRUCTURE PLAN NO. 80

The Western Australian Planning Commission, pursuant to Part 9 of District Planning Scheme No. 2, hereby amends the above Structure Plan by:

1. Replacing the existing Plan No. 1: *Structure Plan No. 80 Drovers Place* with the attached amended plan.
2. Including a new Plan No. 2: *Drovers Place West Precinct* pertaining to Lots 6, 7, 8 and 12462 Drovers Place, Joondalup.
3. Deleting existing clauses 2.0 – 5. 0 of Part 1 – Statutory Provisions and renumbering the remaining clauses.
4. Amending the new clause 2.0 to read:

   "The Structure Plan shall come into operation when it is approved by the Western Australian Planning Commission."

5. Insert a new clause 4.0 after clause 3.0 General Objectives to read:

   "4.0 DROVERS PLACE WEST PRECINCT – SUBDIVISION AND DEVELOPMENT REQUIREMENTS

   4.1 Precinct Area

   The Drovers Place West Precinct shall apply to Lots 6, 7, 8 and 12462 Drovers Place, Joondalup as depicted on Plan No. 1: *Structure Plan No. 80 Drovers Place.*

   4.2 Land Use Zones And Reserves

   Plan No. 2: Drovers Place West Precinct outlines land use, zones and reserves applicable within the Drovers Place West Precinct.

   4.3 Residential Density

   Residential densities applicable to the Drovers Place West Precinct shall be generally in accordance with the residential densities shown on Plan No. 2: Drovers Place West Precinct.

   4.4 Public Open Space

   The provision of a minimum of 10% public open space being provided in accordance with the WAPC's Liveable Neighbourhoods. Public open space is to be provided generally in accordance with Plan 1, with a Public Open Space Schedule to be provided at the time of subdivision for determination by the WAPC.

   4.5 Subdivision And Development Requirements

   a) *The design of development adjacent to Yellagonga Regional Park shall limit the visual impact of site levels, retaining walls, and fencing. Visually impermeable fencing and retaining walls above 1 metre in height shall be prohibited adjacent to Yellagonga Regional Park.*
   b) *The City of Wanneroo's "Medium-Density Housing Standards (R-MD) Local Planning Policy (R-MD Codes LPP) sets out acceptable variations to the deemed-to-comply provisions of the R-Codes for lots coded R25-R60. Except in a situation where an approved Local Development Plan imposing R-Code variations for lots coded R-60 or less applies, the variations set out in the R-MD codes LPP apply to this Local Structure Plan and thereby constitute Acceptable Development within the Structure Plan area.*

4.6 Local Development Plans

Local Development Plans are to be prepared in accordance with Part 6 of Schedule 2 – Deemed provisions for Local Planning Schemes, Planning and Development (Local Planning Schemes) Regulations 2015, prior to any subdivision and/or development that is affected by the following design considerations:

a) Lots with vehicle access from a laneway.
b) Lots with a direct interface with Public Open Space / Regional Open Space.
c) Any lots that propose grouped or multiple dwelling development.
d) Lots affected by an Asset Protection Zone.

4.7 Additional Information

Additional Information	***Approval Stage***	***Consultation Required***
Landscape Management Strategy, including: a) *Detailed site analysis including topography, vegetation, tree survey, view corridors and microclimate. The vegetation analysis and tree survey shall clearly identify and justify the extent of:* • *Any clearing that is proposed during the development stages; and* • *Vegetation that will be retained and managed at the development stages.* b) *Footpaths and shared paths, linking with Yellagonga Regional Park;* c) *Integration of landscaping and public realm with Yellagonga Regional Park;* d) *Principles of landscape design;* e) *Maintenance of visual relationship with Yellagonga Regional Park;* f) *Uniform fencing for lots adjacent to Yellagonga Regional Park;* g) *Earthworks plan with indicative design levels and likely extent of retaining walls; and* h) *Ensuring that Yellagonga Regional Park is not adversely affected by weed invasion and fertilisers, including a prohibition on the use of flora species known to be invasive or environmentally damaging in landscaping.*	*Subdivision*	*City of Wanneroo*
Dieback Management Plan, including protocols and guidance to prevent construction works introducing dieback to Yellagonga Regional Park	*Condition of subdivision approval*	*Department of Parks and Wildlife*
Midge Management Plan, including control measures, provisions for signage to be maintained during lot sales, and notifications on title to warn of midge nuisance in the area.	*Condition of subdivision approval*	*Department of Health*
Urban Water Management Plan	*Condition of subdivision approval*	*Department of Water*

6. Amending the new clause 5.1 to read:

"Tables A-E form part of the Structure Plan and prescribe the standards, requirements and prerequisites for subdivision and development in the Central, Western and Southern precincts designated on Plan 1."

7. Amending clauses 1.1 and 1.2 of Table A – General Planning Requirements as follows:

   "1.1 Subdivision and development of land within the Central, Western and Southern precincts shall be in accordance with DAPs approved by the City pursuant to clause 9.14 of the Scheme. The City shall not accept a DAP that is geographically smaller than the area of a Precinct, as illustrated on Plan 1.

   1.2 The City will not support subdivision or approve development within the Central, Western and Southern precincts in the absence of a DAP, unless it is satisfied that:

   (a) The subdivision proposed is for the amalgamation of lots or part lots, or is for, the consolidation of land for "superlot" purposes to facilitate land assembly for development.

   (b) The development proposed is of a scale and permanence that will not prejudice the design of the DAP, the timely provision of infrastructure and services to the area; or other development in the Structure Plan area."

8. Deleting clauses 3, 5 and 7 from Table B - Planning Requirements for the Western Precinct and renumbering the remaining clauses.

9. Amending Table E Planning Framework by removing the comment associated with the Issue of 'Movement – Traffic Reports'.

ENDORSEMENT PAGE

This Structure Plan is prepared under the provisions of the City of Wanneroo District Planning Scheme No. 2

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON:

…….

Signed for and on behalf of the Western Australian Planning Commission:

…….

an officer of the Commission duly authorised by the Commission pursuant to section 16 of the *Planning and Development Act 2005* for that purpose, in the presence of:

……. Witness

…….. Date

……..Date of Expiry

EXPLANATORY REPORT

1. BACKGROUND

The land the subject of this amendment comprises Lots 6, 7, 8 and 12462 Drovers Place, Joondalup (subject land). The subject land is currently located in the Western Precinct of Structure Plan No. 80 (SP 80).

SP 80 was adopted by the WAPC on 10th July 2012 and has since been the subject of a number of amendments and amendment requests.

Amendment No. 150 to District Planning Scheme No. 2 (DPS 2) was conditionally approved by the WAPC on 16th September 2016. Amendment No. 150 'normalises' land within the structure plan area by zoning it 'Special Use' and including a new Schedule of land-use controls (derived from SP 80) implemented by the creation of a 'Special Control Area' applicable to the land. The WAPC's conditional approval to Amendment No. 150 required the removal of Lots 6, 7, 8 and 12462 Drovers Place, Joondalup from the rezoning. The timing for gazettal of Amendment No. 150 is currently unknown.

The purpose of this amendment request is twofold:

1. Facilitate the rezoning of Lots 6, 7 and 8 Drovers Place for residential development; and
2. Update the structure and content of Part 1 of SP 80 to more closely conform with the WAPC's Structure Plan framework and ensure a planning framework remains in place for the subject land.

This Explanatory Report provides an overview and justification for the proposed amendment, supported by updated technical reporting including a Transport Report, Bushfire Management Plan and Environmental Assessment.

2. SUMMARY OF PROPOSED AMENDMENT

The amendment request proposes to rezone Lots 6, 7 and 8 Drovers Place for residential development and to undertake consequent amendments to the structure and content of SP 80 to facilitate this change whilst complying with the WAPC's Structure Plan framework.

The proposed Amendments are included in a Draft Structure Plan provided as Attachment A to this report. The proposed amendments are summarised as follows:

1. Delete the operational provisions of SP 80 that are not consistent with the WAPC's Structure Plan framework. Removal of these provisions has no effect on the operation of ASP 80, but ensures that should relevant ASP provisions be revoked (on gazettal of Amendment No. 150) that the remaining Structure Plan is consistent with the requirements of the current Structure Plan format required by the WAPC.
2. Rezone Lots 6, 7 and 8 to 'Residential' as depicted on the amendment to the existing SP 80 Plan No. 1, as well as other minor plan modifications to accord with the WAPC's determination of Amendment No. 150, including rezoning Lot 12462 Drovers Place to 'Public Use' as directed in Amendment No. 150.
3. Provide a new Plan No. 2 depicting detailed structure plan design for the subject land including the allocation of residential densities of R30, R40 and R60.
4. Foreshadow revocation of aspects of SP 80 (relating to the balance of land within the Structure Plan area) by introduction of standalone provisions for a new 'Drovers Place West Precinct' applicable to the subject land. These subdivision and development controls are included in a new clause 4 prepared in accordance with the format specified in the Structure Plan Framework.
5. The clause 4 controls are based on existing SP 80 controls, modified in accordance with the direction provided in Amendment No. 150 and contemporary structure plan provisions. Of particular note:
    - Controls are retained to manage the relationship of development to Yellagonga Regional Park, especially in relation to fencing and retaining;
    - The requirement for Local Development Plans (Table A, clause 1) is 'normalised' as a condition of subdivision consistent with current practice and the direction provided by the WAPC in its determination of Amendment No. 150;
    - Provisions from the previous Local Development Plan requirement retained by the WAPC in its determination of Amendment No. 150 are incorporated as requirements of a Landscape Management Strategy to be prepared at the subdivision stage;
    - The requirement for a Dieback Management Plan and Midge Management Plan are imposed as conditions of subdivision; and
    - No provisions are included regarding traffic infrastructure upgrades, cost sharing or the requirement for dedicated emergency access to the fire station, consistent with the WAPC's determination of Amendment No. 150.
6. As directed in Amendment No. 150, references to the subject land are also removed through the balance of the existing ASP provisions, specifically:
    - Table A – clauses 1.1 and 1.2;
    - Table B; and
    - Exclude from the operation of Table E (in lieu of new provisions at clause 4).
7. Provisions for the balance of land in the Western Precinct are retained without modification.

Further discussion and supporting justification for these proposed modifications is provided below.

3. JUSTIFICATION FOR PROPOSED AMENDMENT

3.1 Conforming to Structure Plan Framework and Future Proofing Structure Plan

Updating the format of the Structure Plan ensures it complies with the statutory requirements of the *Planning and Development (Local Planning Schemes) Regulations 2015* (Regulations) and the operational aspects of the WAPC Structure Plan framework.

The proposed structural and formatting changes have no operational impact on the existing SP as it relates to land within the SP area other than the subject land.

The amendments include exclusion of the subject land from the operation of the current tables (as directed in the WAPC direction for Amendment No. 150) and the inclusion of new subdivision and development controls specific to the subject land in a new section.

Updating the SP in this way ensures that should aspects of the exiting Structure Plan be revoked as a consequence of the gazettal of Amendment No. 150, that the remaining SP is a 'compliant' planning instrument and continues to provide an appropriate decision-making framework to guide the subdivision and development of the subject land.

3.2 Structure Plan Design

To support this request a new Plan No. 2 has been prepared that considers the site's unique characteristics including site topography and drainage, bushfire hazard, tree retention (based on a tree survey undertaken by PGV Environmental), pedestrian and cyclist connectivity, connection and response to the surrounding Yellagonga Regional Park, view corridors and traffic.

Detailed consideration of these factors addresses the design investigation requirements specified in Amendment No. 150 [1] and thereby justifies removal of the redundant SP requirement for the preparation of a Local Development Plan (LDP) for the subject land prior to subdivision. Removal of the intermediate LDP step is also consistent with the direction now provided by the Regulations and the SP Guidelines.

The outcomes of these investigations are incorporated into the Structure Plan design at 'Plan 2: Drovers Place West Precinct' provided at Appendix C. This depicts the location of residential density, roads and street blocks, open space, drainage and dual use path connectivity from the southern extent of the proposed structure plan area to other existing and future dual use paths.

Plan No. 2 is developed in accordance with the requirements of the SP Framework, enabling this to be adopted as the approved SP for the subject land in the event that the balance of SP 80 is revoked.

3.3 Modifications to Plan No. 1

The existing Plan No. 1 has also been updated (Attachment B) to accord with the proposed SP modifications, as well as updates to accord with the WAPC's determination of Amendment No. 150. The modifications include:

1. Depict the 'Residential' zone for Lots 6, 7 and 8;
2. Modification of the precinct boundaries to depict the new spatial controls for the 'Drovers Place West Precinct';
3. Removal of the reference to signalised intersections, retaining only the location of the major intersections accessing the precinct; and
4. Reserving Lot 12462 for 'Public Use'.

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[1] Amendment No. 150 details these requirements at Schedule 19, Clause 1.3.5(a) as:
"Detailed site analysis including topography, vegetation, tree survey, view corridors, and microclimate. The vegetation analysis and tree survey shall clearly identify and justify the extent of:
(i) Any clearing that is proposed during the subdivision and/or development stages; and
(ii) Vegetation that will be retained and managed at the subdivision and development stages."

3.4 Suitability of Residential Land Use for Lots 6, 7 and 8 Drovers Place

A key driver for this amendment is to rezone Lots 6, 7 and 8 Drovers Place from the current 'Special Use' designation to 'Residential'.

When SP 80 was prepared it was intended that the subject land would be developed as a private Catholic Senior College. The development of other school sites in the area has resulted in the decision not to proceed with the College in this location, meaning that an alternative land use needs to be considered for Lots 6, 7 and 8 Drovers Place. The proposal to rezone the land to 'Residential' represents the most contextually appropriate, logical and highest and best use of the land.

Development of the land for residential purposes resolves the issues associated with development of the land for a senior school, in particular resolution of the traffic impacts of this high intensity land use. The proposed residential use should therefore be supported as a superior land use outcome for the site and locality, given that:

1. Residential development improves the transport and access issues associated with the previous educational use, with a reduction in traffic volumes of up to 88% at peak times compared to the educational use (see also Section 3.9 below);
2. Environmental impacts will be well managed through a comprehensive suite of management plans, design controls and initiatives required to guide future development (see also Section 3.5 below).
3. Future residents will derive greater benefit from the high amenity provided by the adjacent Yellagonga Regional Park including its extensive network of walk and cycle trails;
4. Residential use complements the long established residential development on the adjacent Lot 5 to the east;
5. The subject site is the most suited to development of all the precincts within the current Structure Plan area, which are subject to land use and management controls to deal with Compatible-Use Wetland Buffers and High Groundwater Areas that do not affect the subject site;
6. Contributes to achieving residential infill targets established in Directions 2031 and the North-West Sub-regional Planning Framework for this high value location;
7. Is more viable in the long term than the introduction of further tourism and tourist accommodation uses into the precinct;
8. Is located within the 500 metre walkable catchment of the Drovers Place Commercial Precinct which caters for the weekly shopping needs, services and amenities of future residents;
9. Will contribute to the viability of established commercial activities in the Structure Plan area and surrounds;
10. Has good access to the wider transport network with excellent vehicle and public transport linkages with Joondalup Drive providing direct access to the Joondalup City Centre and Wanneroo;
11. Can be fully serviced with relevant utilities; and
12. The attached Bushfire Management Plan (appendix F) demonstrates that the risk of bushfire can be managed, fully meeting the acceptable solutions of the Bushfire Protection Criteria of State Planning Policy 3.7: Planning in Bushfire Prone Areas.

3.5 Residential Density

Plan No. 2 allocates residential densities of R30, R40 and R60 to the new 'Residential' zone. Based on the design depicted at Plan No. 2 an indicative yield of 225 dwellings is achieved.

Council previously resolved to refuse a previous proposal for residential use of the subject land (Amendment No. 2 to SP 80) citing as one of the reasons for refusal that:

> "*The proposed residential density is considered to be excessive in view of the environmental significance of Lake Joondalup and the Yellagonga Regional Park and midge management issues associated with the area."*

There is no basis to presume that development at the densities proposed will have any additional impact on the environmental significance of Lake Joondalup and the Yellagonga Regional Park, than would development at lower densities. The basis for this is detailed below:

1. Lots 6, 7 and 8 Drovers Place are one of the few undeveloped privately owned landholdings surrounding Lake Joondalup, which is surrounded by a large number of residential estates in close proximity to the Lake, and with high visibility to Regional Park users, particularly along the eastern boundary of the Lake and at the southern end near Ocean Reef Road. The environmental values of the Regional Park have been able to be maintained with this level of development and it is not logical that development of this site, particularly given the tight controls environmental controls to be imposed, will result in unacceptable environmental impacts;
2. Compared to other precincts within the SP area that are already developed, the subject site is the least environmentally constrained, with these other areas being subject to land use and management controls to deal with Compatible-Use Wetland Buffers and High Groundwater Areas. This includes the developed Regents Garden residential development on the eastern boundary of the subject site;
3. No clearing or intrusion into the Yellagonga Regional Park is proposed. As demonstrated in the Environmental Assessment Report (Attachment E) the site is located outside the Conservation Category Wetland (CCW) boundary (excepting a negligible portion of Lot 7 that is proposed to be included in open space). This compares favourably to other development in the SP area, including the adjacent Regents Garden development which lies within the CCW boundary;
4. Environmental impacts will be well managed through a comprehensive suite of management plans, design controls and initiatives required to guide future development including a Dieback Management Plan, Midge Management Plan (and notifications on title), Urban Water Management Plan, Landscaping Management Strategy (LMS) to prevent weed incursion and control fertilizer use, Bushfire Management and fencing controls;
5. Vegetation clearing as a result of the residential development depicted on Plan No. 2 will result in significantly less clearing of significant vegetation than would occur under the approved educational use. The required LMS includes a requirement for the provision of a detailed tree survey that will confirm the trees currently identified in the SP design can be accommodated and retained at the subdivision and development stages;
6. A Midge Management Plan will be prepared at subdivision stage. The Plan will include control measures, provision for signage and notifications on title to warn of midge nuisance in the area. Implementation of the Plan, together with current midge treatment at Lake Joondalup by government agencies should minimise the midge nuisance factor for future residents;
7. Future residents should not experience any greater nuisance from midges than the residents of the large number of existing residential estates in close proximity to the Lake;

8. During consultation associated with Amendment No. 2, all of the 'environmental' agencies to which the application was referred, being the Department of Water, the Department of Parks and Wildlife and the City's Environmental Committee, supported the proposal subject to imposition of management conditions, all of which are satisfied in the current range of measures to be imposed on future development;
9. The proposed densities, yielding in the order of 225 dwellings contribute to meeting the local dwelling targets established in Directions 2031 and the North-West Sub-regional Planning Framework; and
10. Consistent with current design practice, the proposed densities allow for a more diverse range of housing types to be provided that suit different price points and lifestyle needs, than the uniform 'lower density' development that characterises existing development around Lake Joondalup.

This extensive range of measures ensures that development will respond appropriately to its interface with the Regional Park, and provides numerous opportunities for approval agencies to closely monitor development to achieve positive environmental outcomes as part of the subsequent planning, design and development process.

3.6 Integration of Development with Yellagonga Regional Park

The new subdivision and development requirements at clause 4.4(a) retain the essence of the existing SP 80 controls and Amendment No. 150 modifications, specifically Schedule 19, clause 2.3.1, which require that *"The design of development adjacent to Yellagonga Regional Park shall limit the visual impact of site levels, retaining walls, and fencing. Visually impermeable fencing and retaining walls above 1 metre in height shall be prohibited adjacent to Yellagonga Regional Park*."

The provisions do not include proposed clause 2.3.2 that refers to the requirement that *"Development shall be designed at a scale and level that would render it unobtrusive from the Yellagonga Regional Park boundary and shall be screened from the park by way of local native vegetation."*

While this additional screening control may have been considered appropriate when the site was to be developed as a school, now that the land is to be developed for residential purposes it is more important to ensure that there are strong visual and physical links with the Park. There is no reference in the existing Part 2: Explanatory Report for SP 80 stipulating why this control was introduced.

The following matters are raised in support of removal of clause 2.3.2:

- The general controls for Drovers Place, and specifically the commercial development of the Central Precinct, emphasise the requirement for the integration of development with Yellagonga Regional Park, in particular the *Objectives for the Special Control Area, Clause 1.2(b) which states are to "Facilitate adaptive built form that maintains a visual relationship with and provides pedestrian access to Yellagonga Regional Park"*;
- There are already numerous controls dealing with the design of development adjacent to the Yellagonga Regional Park that make the use of vegetation screening redundant, and in some cases are in direct conflict with this requirement. These include:
  - Provision of view corridors, dual-use path linkages, the integration of landscaping and the consideration of visual relationships with the Park; and
  - Managing the visual impact of site levels, retaining walls.

- The purpose of the screening requirement is not articulated in the supporting documentation accompanying SP 80 and it does not make logical sense given:
  - The interface with Yellagonga Regional Park at the western boundary comprises dense vegetation and is not publically accessible. The SP design shows a road interface to the majority of this boundary.
  - The SP design shows that the interface along the southern boundary will be principally public open space adjacent to the reserve, which in this location comprises a highly degraded and non-accessible area.
- Most critically, the requirement, particularly for screening, will prevent passive surveillance from the development of the adjacent Yellagonga Regional Park which is contrary to accepted CPTED principles.

It is clear that the sensitive augmentation of the relationship of development to Yellagonga Regional Park is the desired outcome, and that clause 2.3.2 should be removed to facilitate this outcome.

3.7 Management Plans and Strategies

The Amendment makes provision for the preparation and approval of the following management plans as conditions of subdivision, consistent with the direction provided in Amendment No. 150 for the balance of the SP area:

1. Dieback Management Plan;
2. Midge Management Plan; and
3. Urban Water Management Plan.

It is noted that a Fire Management Plan is already provided as part of this amendment request (Attachment E) and is therefore not required at the subdivision stage.

The Amendment also requires the preparation of a LMS. This consolidates the balance of requirements for LDPs within the SP area specified at Schedule 19, Clause 1.3.5 of Amendment No. 150, excluding those items that the WAPC required to be removed in its determination i.e. those relating to subdivision design and built form requirements. The LMS also incorporates the Landscaping Plan requirements specified at 'Special Control Area No. 1 Table' of Amendment No. 150 excepting the requirement that only local native plants may be used in landscaping.

This last requirement is omitted to provide greater flexibility for plant selection in public and private planting. This will ensure that the most appropriate species can be selected in each circumstance to satisfy both aesthetic and functional considerations. For instance, enabling alternatives to the use of native species where effective shading of public footpaths is required.

Consistent with the approach adopted in SP 80, the LMS is required as a precursor to subdivision approval to demonstrate that these important local environmental factors are given due regard.

3.8 Bushfire Management

The Amendment is supported by a Bushfire Management Plan (BMP) at Appendix F that demonstrates that the assessed bushfire risk is manageable and will be achieved by implementation of the bushfire risk management measures detailed in the BMP.

Assessment of the planned location, vegetation and consideration of planned infrastructure indicates that compliance is able to be achieved against all applicable bushfire related legislation, policy, standards and guidelines, including the Bushfire Protection Criteria.

The Assessment confirms that proposed location of future development will result in it being subject to BAL-29 or lower subject to maintenance of the required separation distances from the classified vegetation. Asset Protection Zones (APZ) creating a low fuel area will be required to be incorporated into the landscaping surrounding any future buildings within the proposed development. Part 1 of the SP identifies that this will be achieved through the use of LDP's for affected lots imposed as a condition of subdivision approval.

Future buildings within 100 metres of classified vegetation will be constructed to standards corresponding to a determined BAL, as required by *AS 3959-2009 Construction of buildings in bushfire prone areas*. As the SP does not identify the actual location of building works within the development, there may be a requirement to determine the BAL for individual building works once the actual building site has been identified.

3.9 Traffic Considerations

The Amendment is supported by a revised Transport Impact Assessment (TIA) provided as Appendix D to this report. This provides a comprehensive analysis of the proposed residential scenario, as well as a comparative analysis of anticipated traffic from the approved education establishment land use.

In Council's consideration of Amendment No. 2 to SP 80, it cited as one of the reasons for refusal that:

> *"The proposal is considered to generate excessive traffic that cannot be accommodated on the local road network and the arrangements for vehicle access are considered to be unsatisfactory."*

The key findings of the TIA summarised below, clearly demonstrate that both traffic volumes and network impacts will in fact **be improved** as a result of the rezoning from 'education establishment' to 'residential':

1. The proposed residential development of 225 dwellings would generate traffic flows of approximately 1800 vehicles per day (180 vehicles per hour (vph) during weekday AM and PM peak hours). In comparison, the previous proposal for a 1500-student private school on this site would have generated much higher traffic flows of 1500vph during 8-9am and 3-4pm peak periods. This comparative analysis is summarised in Table 1.

Table 1: Traffic Generation

Time Period	Current proposal: Residential (225 dwellings)	Previous proposal: Education (1500 students)
8-9AM traffic generation (in/out vph)	45 / 135	750 / 750
3-4PM traffic generation (in/out vph)	112 / 68	750 / 750
Daily traffic generation (vpd)	1800	3000

The residential traffic generation is therefore only 12% of the school's traffic generation during peak periods, so permitting residential development will have significant benefits in terms of future traffic flows;

2. Drovers Place has access to Joondalup Drive via an existing unsignalised T-intersection. Intersection capacity analysis indicates that the existing unsignalised Joondalup Drive / Drovers Place intersection will not have spare capacity to accommodate additional traffic generated by residential development of the subject site or the proposed further development in the Central Precinct. Analysis indicates it was already at capacity in 2016 with long delays for turning movements, which will progressively get worse as Joondalup Drive traffic volumes continue to increase. Improvements will be required at this intersection even if there was no future development on Lots 6, 7 and 8;
3. Analysis of total turning traffic flows at the Joondalup Drive / Drovers Place intersection indicates that traffic from the proposed development of 225 dwellings on the subject site would represent 30.8% of total turning traffic in the AM peak and 20.9% of total turning traffic in the PM peak at this intersection when the Drovers Place Precinct is fully developed. If AM and PM peak traffic flows are considered together the subject site will contribute 24.9% of the total turning traffic at this intersection and the additional development in the Central Precinct would represent 42.7% of total turning traffic at this intersection. If the focus is purely on traffic increase rather than total traffic then the subject site will contribute 36.8% of the increase and the additional Central Precinct development would contribute the other 63.2% of the increase in turning traffic flows at this intersection;
4. Joondalup Drive (west of Wanneroo Road) already carries 50,000 vehicles per day which is significantly greater than the 35,000vpd capacity attributed to this dual carriageway road standard (2 lanes each way) in the WAPC *Liveable Neighbourhoods* Policy, so it should already be upgraded to 3 lanes each way regardless of any future development in the Drovers Place Precinct;
5. The Amendment proposes no change to current access arrangements in the approved SP, specifically the location of the future intersection with Joondalup Drive;
6. Residential development of the subject site will have little impact on Drovers Place west of the subject site but will contribute to traffic increases on the section of Drovers Place abutting the subject site. Therefore it would be reasonable for development of the subject site to contribute to improvements on the abutting section of Drovers Place such as a central median, on-road cycle lanes, embayed parking in the southern verge and a footpath in the southern verge. If required these would be imposed as standard conditions of subdivision approval; and
7. No specific provisions are included in the Amendment regarding traffic infrastructure upgrades, cost sharing or the requirement for dedicated emergency access to the fire station, consistent with the WAPC's determination of Amendment No. 150.

4. CONCLUSION

The purpose of this submission is to seek approval for an amendment to SP 80 to:

1. Facilitate the rezoning of Lots 6, 7 and 8 Drovers Place for residential development; and
2. Update the structure and content of Part 1 of SP 80 to conform with the WAPC's Structure Plan framework.

The proposed rezoning is depicted on Plan No.s 1 and 2. Plan No. 2 is developed in accordance with the requirements of the SP Framework, and incorporates a considered response to the site's topography and drainage, bushfire hazard, tree retention, pedestrian and cyclist connectivity, Yellagonga Regional Park, view corridors and traffic.

The proposed Amendment may be supported on the basis that:

1. It provides the required planning and development controls to facilitate high quality residential development of the land that respects its environmental context and provides a viable land use alternative to the current educational establishment use which will no longer be developed;
2. Residential development improves the transport and access issues associated with the previous educational use, with a reduction in traffic volumes of up to 88% at peak times compared to the educational use;
3. Residential development will have any no additional impact on the environmental significance of Lake Joondalup and the Yellagonga Regional Park than the approved education establishment use. An extensive suite of management plans, design controls and strategies ensures that future development will respond appropriately to its interface the Park, and provides numerous opportunities for approval agencies to monitor development to achieve positive environmental outcomes as part of the subsequent planning, design and development process;
4. Bushfire hazard has been extensively considered in a BMP accompanying the application, which demonstrates that the potential risk of bushfire can be managed, fully meeting the acceptable solutions of the Bushfire Protection Criteria of State Planning Policy 3.7: Planning in Bushfire Prone Areas; and
5. The Amendment ensures that should aspects of SP 80 be revoked as a consequence of the gazettal of Amendment No. 150, that the remaining SP is a 'compliant' planning instrument that will provide an appropriate decision-making framework to guide the subdivision and development of the subject land.

APPENDIX A

DRAFT STRUCTURE PLAN NO. 80 – PART 1

DROVERS PLACE PRECINCT

STRUCTURE PLAN NO. 80
VERSION - JUNE 2017

This Structure Plan was prepared under the provisions of Part 9 of City of Wanneroo District Planning Scheme No. 2

The Drovers Place Precinct Structure Plan No. 80 was adopted by the Council of the City of Wanneroo on 24 July 2012 and the Western Australian Planning Commission on 10 July 2012 and subsequently amended as follows:

Record of Amendments made to the Agreed Structure Plan No. 80

AMENDMENT NO.	DESCRIPTION OF AMENDMENT	WAPC ADOPTED	COUNCIL ADOPTED
1	Amend table 'C' – Planning Requirements for the Central Precinct as follows: ▪ Introducing Hairdresser with a general training component and with a minimum area of 150 m2 (Lot 810); ▪ Introducing Large Format Liquor Store with a minimum area of 1,250 m2 (lot 811). ▪ Deleting, Butcher, Bakery and Fishmonger.	22 October 2013	20 August 2013
3	(a) Replacing the Intent in Table "C" – Planning Requirements for the Central Precinct, as follows: ▪ The intent of the Central Precinct is to accommodate warehouses, showrooms, trade and professional services and small scale complementary and incidental retailing uses, as well as providing for retail and commercial businesses which require large areas such as bulky goods and category/theme-based retail outlets that provide for the needs of the community but which due to their nature are generally not appropriate to or cannot be accommodated in a commercial area. ▪ Development within the Central Precinct should provide a built form that respects and recognises the environment of Yellagonga Regional Park. (b) Adding in Table "C" – Planning Requirements for the Central Precinct: ▪ "Pharmacy" as a discretionary 'D' use; (c) Adding in Table "C" – Planning Requirements for the Central Precinct, provisions for Permitted 'P' uses within the Special Zone, and ▪ "Medical Centre" as a permitted 'P' use.	16 July 2015	26 May 2015

AMENDMENT NO.	SUMMARY OF THE AMENDMENT	AMENDMENT TYPE	DATE APPROVED BY WAPC
5	1. Amend objective (b) of Clause 7.0, General Objectives to read: (b) *For land within the Central Precinct, reflect the intent and land use permissibility of the Business zone in District Planning Scheme No. 2;* 2. Substitute a new Table 'C' – Planning Requirements for the Central Precinct to implement the following changes: ▪ Assign the Business Zone in District Planning ▪ Scheme No. 2 to the Central Precinct; ▪ Align the land use permissibility of the Central ▪ Precinct with the Business Zone in District ▪ Planning Scheme No. 2; ▪ Add the definitions "large format category / ▪ theme based showroom", "Retail Nursery" and "Growers Mart" for the Central Precinct; ▪ Identify a list of additional uses that may be contemplated in addition to the land use permissibility applicable to the Business Zone; Modify and delete various provisions contained in Section 3 that are no longer applicable to the Business development intended for the Central Precinct. 3. Delete Table F – Infrastructure Provision. 4. Amend the Structure Plan map by changing the zone of the Central Precinct from 'Special Use' to 'Business' Zone.	Major	5 August 2016
6	1. Amend Plan No. 1 by depicting Lots 6, 7, 8 Drovers Place as 'Residential', Lot 12462 Drovers Place 'Public Use – Fire Station' and including these lots in a new 'Drovers Place West Precinct'. 2. Include a new Plan No. 2: Drovers Place West Precinct pertaining to Lots 6, 7, 8 and 12462 Drovers Place. 3. Delete existing clauses 2.0 – 5. 0 of Part 1 – Statutory Provisions and renumbering the remaining clauses. 4. Amend the new clause 2.0 to read: *"The Structure Plan shall come into operation when it is approved by the Western Australian Planning Commission."*	Major	

6 Continued...	5. Insert a new clause 4.0 'Drovers Place West Precinct – Subdivision And Development Requirements'. 6. Amend the new clause 5.1 to read: *"Tables A-E form part of the Structure Plan and prescribe the standards, requirements and prerequisites for subdivision and development in the Central, Western and Southern precincts designated on Plan 1."* 7. Amend clauses 1.1 and 1.2 of Table A – General Planning Requirements as follows: *"1.1 Subdivision and development of land within the Central, Western and Southern precincts shall be in accordance with DAPs approved by the City pursuant to clause 9.14 of the Scheme. The City shall not accept a DAP that is geographically smaller than the area of a Precinct, as illustrated on Plan 1.* "1.2 The City will not support subdivision or approve development within the Central, Western and Southern precincts in the absence of a DAP, unless it is satisfied that: *(a) The subdivision proposed is for the amalgamation of lots or part lots, or is for, the consolidation of land for "superlot" purposes to facilitate land assembly for development.* *(b) The development proposed is of a scale and permanence that will not prejudice the design of the DAP, the timely provision of infrastructure and services to the area; or other development in the Structure Plan area."* 8. Delete clauses 3, 5 and 7 from Table B - Planning Requirements for the Western Precinct and renumbering the remaining clauses. 9. Amend Table E Planning Framework by removing the comment associated with the Issue of 'Movement – Traffic Reports'.	Major	

Part 1

STATUTORY PROVISIONS

1.0 STRUCTURE PLAN AREA

The Drovers Place Precinct Structure Plan ("the Structure Plan") shall apply to the area located within the "Structure Plan Boundary" as depicted on Plan 1 – Structure Plan.

2.0 OPERATION

The Structure Plan shall come into operation when it is approved by the Western Australian Planning Commission.

3.0 GENERAL OBJECTIVES

The general objectives of the Structure Plan are to:

(a) Guide subdivision and provide for a variety of appropriate land uses and development in the distinct precincts, where proposals will have high exposure to Yellagonga Regional Park, Wanneroo Road, Drovers Place and Joondalup Drive;

(b) For land within the Central Precinct, reflect the intent and land use permissibility of the Business zone in District Planning Scheme No. 2;

(c) Facilitate adaptive built form that maintains a visual relationship with and provides pedestrian access to Yellagonga Regional Park; and

(d) To protect and enhance the environmental, heritage, and landscape values of the Structure Plan area and adjacent regional park.

4.0 DROVERS PLACE WEST PRECINCT – SUBDIVISION AND DEVELOPMENT REQUIREMENTS

4.1 Precinct Area

The Drovers Place West Precinct shall apply to Lots 6, 7, 8 and 12462 Drovers Place, Joondalup as depicted on Plan No. 1: Structure Plan No. 80 Drovers Place.

4.2 Land Use Zones And Reserves

Plan No. 2: Drovers Place West Precinct outlines land use, zones and reserves applicable within the Drovers Place West Precinct.

4.3 Residential Density

Residential densities applicable to the Drovers Place West Precinct shall be generally in accordance with the residential densities shown on Plan No. 2: Drovers Place West Precinct.

4.4 Public Open Space

The provision of a minimum of 10% public open space being provided in accordance with the WAPC's Liveable Neighbourhoods. Public open space is to be provided generally in accordance with Plan 1, with a Public Open Space Schedule to be provided at the time of subdivision for determination by the WAPC.

4.5 Subdivision And Development Requirements

(a) The design of development adjacent to Yellagonga Regional Park shall limit the visual impact of site levels, retaining walls, and fencing. Visually impermeable fencing and retaining walls above 1 metre in height shall be prohibited adjacent to Yellagonga Regional Park.

(b) The City of Wanneroo's "Medium-Density Housing Standards (R-MD) Local Planning Policy (R-MD Codes LPP) sets out acceptable variations to the deemed-to-comply provisions of the R-Codes for lots coded R25-R60. Except in a situation where an approved Local Development Plan imposing R-Code variations for lots coded R-60 or less applies, the variations set out in the R-MD codes LPP apply to this Local Structure Plan and thereby constitute Acceptable Development within the Structure Plan area.

4.6 Local Development Plans

Local Development Plans are to be prepared in accordance with Part 6 of Schedule 2 – Deemed provisions for Local Planning Schemes, Planning and Development (Local Planning Schemes) Regulations 2015, prior to any subdivision and/or development that is affected by the following design considerations:

(a) Lots with vehicle access from a laneway.

(b) Lots with a direct interface with Public Open Space / Regional Open Space.

(c) Any lots that propose grouped or multiple dwelling development.

(d) Lots affected by an Asset Protection Zone.

4.7 Additional Information

ADDITIONAL INFORMATION	APPROVAL STAGE	CONSULTATION REQUIRED
Landscape Management Strategy, including: (a) Detailed site analysis including topography, vegetation, tree survey, view corridors and microclimate. The vegetation analysis and tree survey shall clearly identify and justify the extent of: (b) Any clearing that is proposed during the development stages; and (c) Vegetation that will be retained and managed at the development stages. (d) Footpaths and shared paths, linking with Yellagonga Regional Park; (e) Integration of landscaping and public realm with Yellagonga Regional Park; (f) Principles of landscape design; (g) Maintenance of visual relationship with Yellagonga Regional Park; (h) Uniform fencing for lots adjacent to Yellagonga Regional Park; (i) Earthworks plan with indicative design levels and likely extent of retaining walls; and (j) Ensuring that Yellagonga Regional Park is not adversely affected by weed invasion and fertilisers, including a prohibition on the use of flora species known to be invasive or environmentally damaging in landscaping.	Subdivision	City of Wanneroo

Dieback Management Plan, including protocols and guidance to prevent construction works introducing dieback to Yellagonga Regional Park	Condition of subdivision approval	Department of Parks and Wildlife
Midge Management Plan, including control measures, provisions for signage to be maintained during lot sales, and notifications on title to warn of midge nuisance in the area.	Condition of subdivision approval	Department of Health
Urban Water Management Plan	Condition of subdivision approval	Department of Water

5.0 TABLES

5.1 Tables A-E form part of the statutory provisions of the Structure Plan and prescribe the standards, requirements and prerequisites for subdivision and development in the Central, Western and Southern precincts designated on Plan 1.

5.2 Table A – General Planning Requirements.
Table B – Planning Requirements for the Western Precinct.
Table C – Planning Requirements for the Central Precinct.
Table D – Planning Requirements for the Southern Precinct.
Table E – Planning Framework for Drovers Place.

5.3 Prior to any subdivision or development being supported in the Central, Western or Southern Precincts, the City will require the preparation and approval of the strategies and plans specified in Table E at the corresponding stage.

TABLE A – GENERAL PLANNING REQUIREMENTS

1. Detailed Area Plans	1.1 Subdivision and development of land within the Central, Western and southern Precincts shall be in accordance with DAPs approved by the City pursuant to clause 9.14 of the Scheme. The City shall not accept a DAP that is geographically smaller than the area of a Precinct, as illustrated on Plan 1. 1.2 The City will not support subdivision or approve development within the Central, Western and southern Precincts in the absence of a DAP, unless it is satisfied that: (a) The subdivision proposed is for the amalgamation of lots or part lots, or is for the consolidation of land for "superlot" purposes to facilitate land assembly for development. (b) The development proposed is of a scale and permanence that will not prejudice the design of the DAP, the timely provision of infrastructure and services to the area; or other development in the Structure Plan area. 1.3 Pursuant to Clause 9.14.4 of the scheme, DAP's will be advertised to members of the public and government agencies in accordance with the provisions of Part 6.7 of the scheme. 1.4 In addition to any general matters required to be included within a DAP under Clause 9.14.2 of the Scheme and any specific matters required to be included under Tables A – F, a DAP shall illustrate the following things if they are applicable: (a) Detailed site analysis including topography, vegetation, tree survey, view corridors, and microclimate; (b) Final road alignments, open space, and indicative lot configuration; (c) Streetscape details including cross sections showing dimensions of pavement, parking, verge, paths, road reserve, and indicative landscaping; (d) Footpaths and shared paths, linking with Yellagonga Regional Park; (e) Special road treatments, such as shared spaces and pedestrian crossings; (f) Integration of landscaping and public realm with Yellagonga Regional Park; (g) Maintenance of visual relationship with Yellagonga Regional Park; (h) Permitted setbacks; (i) Built form envelopes showing mandatory and desirable active frontages, access locations, and main entries; (j) Built form requirements relating to solar passive design, such as cross ventilation, shading, access to winter sun, etc; (k) Residential and noise sensitive buildings to be designed in accordance with the values listed in Australian Standard 2107 – Acoustics – Recommended design sound levels and reverberation times for building interiors.

Detailed Area Plans Continued...	(l) Fencing; (m) Signage; (n) Any variations to the R-codes; (o) Earthworks plan with indicative design levels and likely extent of retaining walls; (p) Principles for landscaping design; (q) Other requirements as provided by Table E – Planning Framework.
2. Compatible Use Wetland Buffers	2.1 Areas designated as a compatible-use wetland buffer in Plan 1 shall preclude development, however will allow low-impact uses, including: (a) Water sensitive urban design best management practices; (b) Passive recreational facilities as deemed appropriate by the City; (c) Amenity landscaping utilising locally native species; and (d) Other low-impact uses as deemed appropriate by the City in consideration of the advice of the Department of Environment and Conservation. 2.2 Any application for development or subdivision within or adjacent to the compatible use wetland buffer shall be supported by a Wetland Management Plan that incorporates the following to the satisfaction and specification of the City of Wanneroo and Department of Environment and Conservation". (a) A concept plan showing the location of wetland compatible uses to be included within the buffer area, and those areas to be rehabilitated with native vegetation; (b) A re-vegetation plan to provide for the planting of native vegetation within the wetland buffer area. (c) Midge management plans; (d) Fertiliser and irrigation management plan; and (e) Urban Water Management Plan demonstrating: • Onsite retention and treatment of all stormwater up to the one year critical duration rainfall event; • Attenuation of peak flows to pre-clearing levels; and • The use of appropriate water sensitive urban design structural controls to achieve above design criteria.

3. High Groundwater Areas	3.1 The City will not support subdivision or approve development in the Structure Plan onland that is shown on Plan 1 as a high groundwater area, unless it can be demonstrated to the City's satisfaction that: (a) Finished floor levels, without the use of a controlled groundwater level, can be achieved that have 1.2 metre separation from historical maximum groundwater levels and 0.5 metre separation from 100 Year ARI Top Water Level in flood storage areas; (b) The introduction of fill to achieve (a) will not present any interruption to flood water flows in the 100 Year ARI flood event; (c) The introduction of fill to achieve (a) will coordinate with natural levels at the common boundary with Yellagonga Regional Park; (d) Batters arising from introduced fill shall result in no retaining walls greater than one metre required, and that batters can be revegetated to prevent future erosion; (e) Fill introduced to the site shall be clean of Phytophthora dieback, weeds and accredited as such; (f) All stormwater up to and including the 1 Year ARI critical duration event shall be infiltrated at source and not conveyed through the drainage network to infiltration areas in open space or drainage reserves; (g) Stormwater leaving the development site shall not exceed pre-development flow rates. All post development stormwater shall be attenuated on the development site and off-line from overland flow paths. 3.2 The conditions above shall be demonstrated to the City in the form of Urban Water Management Plans that incorporate an indicative earthworking plan, indicative design levels and Modelling of 100 year flood levels for Lake Joondalup in addition to the requirements of the *Drovers Place Water Management Framework (City of Wanneroo, 2009) and Urban Water Management Plans - Guidelines for preparing plans and for complying with subdivision conditions (Department of Water, 2008)*. 3.3 Draft Urban Water Management Plans shall be submitted with the lodgement of subdivision or development applications. 3.4 Urban Water Management Plans shall be finalised by the applicant and approved by the City of Wanneroo and Department of Water as a condition of subdivision or development prior to commencement of site works.

TABLE B – PLANNING REQUIREMENTS FOR THE WEST PRECINCT

1. Intent	1.1	The intent for the Western Precinct is to provide a diverse precinct of community, education, and private recreation uses that integrate with the environment of Yellagonga Regional Park.
2. Zoning – Lot 5 Drivers Place	2.1	The Residential zone shall apply to Lot 5 Drovers Place, as shown on Plan 1.
	2.2	The Residential Density Code of R20 shall apply to Lot 5 Drovers Place.
	2.3	Development and land use permissibility within Lot 5 Drovers Place shall be in accordance with Clause 3.4 'the Residential Zone' of the Scheme.
3. Zoning – Lot 4 Drivers Place	3.1	Special Use Zone - Discretionary 'D' uses within the Special Use Zone for Lot 4 shall include: • Holiday village/resort • Mast or antenna • Private recreation • Public exhibition facility • Reception Centre • Restaurant
	3.2	All other uses shall be Prohibited 'X'.
4. Conditions Lots 4 Droves Place	4.1	The design of development adjacent to the Yellagonga Regional Park shall limit the visual impact of site levels, retaining walls, and fencing. Visually impermeable fencing and/or retaining walls above 1 metre in height shall be prohibited adjacent to Yellagonga Regional Park.
	4.2	Development shall be designed at a scale and level that would render it unobtrusive from the Yellagonga Regional Park boundary and shall be screened from the park by way of local native vegetation
5. Detailed Area Plan requirements	5.1	In addition to the general requirements of Table A, a DAP for the Western Precinct shall include • Parking Controls • Built form requirements to provide passive surveillance of the public realm and Yellagonga Regional Park • Built form requirements for reduction of impervious area to facilitate water sensitive urban design

TABLE C – PLANNING REQUIREMENTS FOR THE CENTRAL PRECINCT

1. Intent	1.1 The intent of the Central Precinct is to accommodate warehouses, showrooms, trade and professional services and small scale complementary and incidental retailing uses, as well as providing for retail and commercial businesses which require large areas such as bulky goods and category/theme-based retail outlets that provide for the needs of the community but which due to their nature are generally not appropriate to or cannot be accommodated in a commercial area. 1.2 Development within the Central Precinct should provide a built form that respects and recognises the environment of Yellagonga Regional Park.
2. Zoning	2.1 Zoning The Central Precinct is assigned as a Business Zone in District Planning Scheme No. 2 (DPS 2) 2.2 Land Use Permissibility In accordance with clause 9.8.3(a) of DPS 2, the permissibility of land uses within the Central Precinct is to be in accordance with the Business Zone as specified in Table 1 of the Scheme. The land use definitions in Schedule 1 of the Scheme apply. 2.3 Definitions <u>Large format category / theme based showroom</u> – Means premises wherein goods, which are otherwise excluded by the showroom definition under DPS 2, are displayed and may be offered for sale or hire that: (a) are not a supermarket or department store; (b) are a category / theme based retail outlet; (c) due to their nature are generally not appropriate to or cannot be accommodated in a commercial area; and (d) has a minimum gross floor area of 500m_2. <u>Retail Nursery</u> - Means land and/or buildings used for the storage, display and retail sale of nursery and horticultural products including plants, seeds, bulbs, seedlings, trees and other nursery stock and products associated with horticulture, domestic gardens, outdoor living, garden décor and clothing for gardening and may include associated outdoor leisure products and an incidental café. <u>Growers Mart</u> – Means any land or buildings used for the wholesale distribution and retail sale of primary products including fruit and vegetables, meat, fish, bread.

Zoning continued...	2.4 Additional Uses In addition to the uses listed as 'P' or 'D' uses in the Business Zone in Table 1 in DPS 2, the following uses are 'D' uses pursuant to clause 3.2.2 of DPS 2: • Growers mart (Lots 810 and 811 Wanneroo Road only); • Retail Nursery; • Large format category/theme based showroom; • Self-storage units (Lot 811 Wanneroo Road only).
3. Development Provisions	3.1 Development adjacent to the Yellagonga Regional Park shall coordinate with natural levels at the common boundary with Yellagonga Regional Park to minimise the visual impact of site levels, retaining walls, and fencing to the satisfaction of the City of Wanneroo. Retaining walls above 1 metre in height shall be discouraged. 3.2 The location and design of buildings, access ways and footpaths shall provide for view corridors to the Yellagonga Regional Park. 3.3 The bulk and scale of any future development shall have regard for preserving the views, significance and character of and visual relationship to Yellagonga Regional Park. 3.4 A connected access road shall be provided at the time of subdivision/development between the southern intersection of Wanneroo Road and Clarkson Avenue and Drovers Place, generally as shown on Plan 1. The applicant shall prepare and implement an easement in gross in favour of the public at large to specification and satisfaction of the City of Wanneroo. 3.5 The owner of Lot 1 Wanneroo Road shall provide dedicated road access and frontage to the existing sewer pumping station and pressure main located along the northern boundary of the site. Any alternative arrangement for access will require the consent of the Water Corporation in writing, prior to the City approving any Detailed Area Plan, or supporting any Subdivision or Development for the site. 3.6 Facilitated access across the site to the controlled access intersection between Drovers Place and Joondalup Drive, generally as shown on Plan 1, to be preserved by an easement in gross in favour of the public. 3.7 Service areas shall be integrated within the development and designed to minimise any negative visual impacts along the interface with the Yellagonga Regional Park and Wanneroo Road. All service areas are to be appropriately screened from the public realm to the satisfaction of the City of Wanneroo. 3.8 Hardscape shall provide for reduction of impervious area to facilitate water sensitive urban design. 3.9 Building facades shall be of a high architectural standard utilising brick, masonry, concrete and glazing and include colour schemes sympathetic to the natural environment to the satisfaction of the City of Wanneroo.

Development Provisions continued...	3.10 Buildings are to be designed to suit local climatic conditions, be energy efficient and designed to help reduce the risk and fear of crime. 3.11 New buildings are to be of a quality of architectural design that is consistent with the role, setting and natural character of the precinct. 3.12 Buildings are to provide opportunities for passive surveillance and be sited to enable and encourage pedestrian access to Yellagonga Regional Park. This may include glazing and seating or alfresco areas to integrate development with the Park, enabling the community to enjoy the natural setting. 3.13 A minimum of eight (8)% of the site shall be provided as landscaping in addition to the Compatible-Use Wetland Buffer defined in Plan 1.
4. Detailed Area Plan Requirements	4.1 In addition to the general requirements of Table A, a DAP for the Central Precinct may include to the satisfaction of the City: • Floorspace allocation controls/restrictions • Parking Controls • Permitted building heights • Built form and landscape concept requirements to be developed to ensure passive surveillance of the public realm (including Yellagonga Regional Park and Wanneroo Road), proposed car parking areas and promote the integration of the development with the Yellagonga Regional Reserve. • Robust built form to facilitate adaptable use over time • Interface between Business and Special Residential zones • Opportunities to retain heritage buildings within development • Opportunities to locate surface stormwater flows and areas suitable for stormwater infiltration • Service area locations and access/egress arrangements.

TABLE D – PLANNING REQUIREMENTS FOR THE SOUTH PRECINCT

1. Intent	1.1 The intent of the Southern Precinct is to provide for single dwellings in a natural landscape setting, whilst protecting adjacent natural assets
2. Land Use Permissibility	2.1 The Special Residential zone of the Scheme shall apply to the Southern Precinct, as shown in Plan 1. 2.2 Land use permissibility within the Southern Precinct shall be in accordance with Part 3.19 of the Scheme - Special Residential Zone except as follows: Prohibited ('X') Uses: • Cattery • Child Care Centre • Consulting Room
3. Special Residential Provisions	3.1 A minimum lot size of not less than 2,000m2. 3.2 Subdivision shall be in accordance with an approved Detailed Area Plan for the precinct. 3.3 Detailed Area Plans shall identify building envelopes with a maximum area of 800 sq m on all lots. Multiple building envelopes may be proposed within a single lot to accommodate structures such as outbuildings, sheds and gazebos providing the total land area of all envelopes does not exceed 800 m2 and no more than three separate envelopes are proposed. 3.4 All lots shall be connected to a reticulated sewage system. 3.5 With the exception of a suitable access driveway, development (including earthworks) shall be located within the building envelope identified on the approved Development Guide Plan. 3.6 No vegetation shall be cleared or removed outside the building envelope, or that area used for an approved vehicular access, without the prior approval of the City. 3.7 An application for development approval shall be supported by a revegetation plan, to provide vegetation screening of a minimum of 5 metres along the boundary with Yellagonga Regional Park to meliorate midge nuisance.
4. Detailed Area Plan requirements	4.1 In addition to the general requirements of Table A, a DAP for the Southern Precinct shall include: • Interface between Business and Special Residential zones • Opportunities to retain heritage buildings within development

TABLE E – PLANNING FRAMEWORK

○ **Framework and/or indicative plan with clear explanation of how issue to be resolved**

• **Issue to be resolved**

Issue	IN DROVERS PLACE PRECINCT STRUCTURE PLAN	IN DETAILED AREA PLAN	WITH LODGMENT OF SUBDIVISION/ DEVELOPMENT APPLICATION	WITH LODGMENT OF SUBDIVISION/ DEVELOPMENT APPLICATION	DURING DEVELOPMENT	Comments
Contextual Analysis						
Strategic planning context	●					In Part 2
Overall site analysis	●					In Part 2
Detailed precinct site analysis		●				Structure Plan to clarify matters to be addresses in DAP
Statutory Planning						
Zoning	●					
Precincts	●					
Land use	○	○			●	
Building design		○			●	
Landscape design		○			●	
Vehicle access		○			●	
Parking		○			●	
Movement						
Traffic Reports	●	●			●	
Dual Use Path	○	○			●	
Environment and Ecology						
Wetland Management				●	●	Wetland rehabilitation plans shall be developed and implemented as a condition of subdivision
Site Contamination				●		Prior to commencement of site works on Lots 1, 10 and 132 Wanneroo Road and Lot 5 Drovers Place, investigation for soil and groundwater contamination is to be carried out to the specifications of the Department of Environment and Conservation. Any remediation works, including validation of remediation, is to be completed to the specifications of the Department of Environment and Conservation prior to the commencement of any site works.

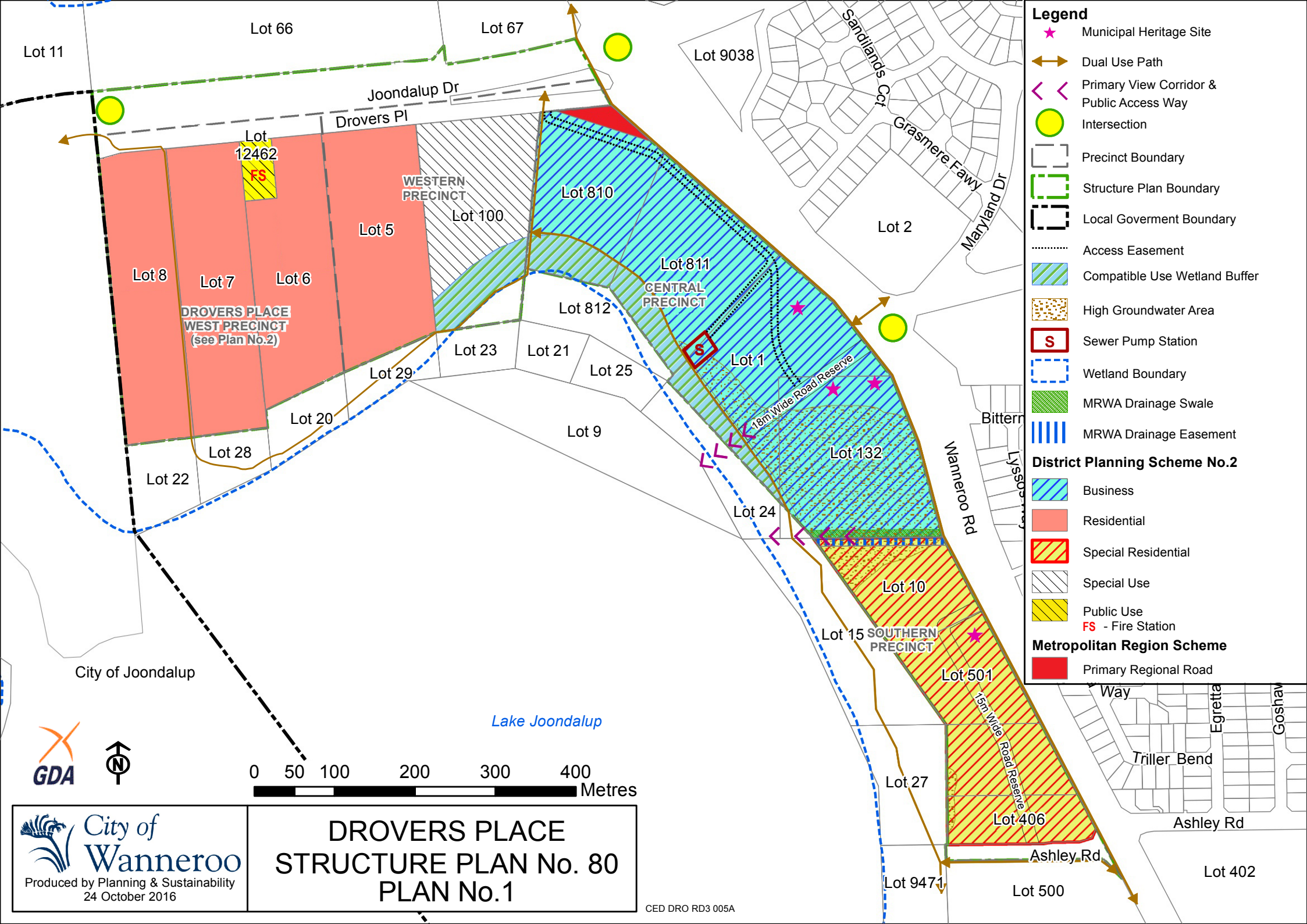
Issue	IN DROVERS PLACE PRECINCT STRUCTURE PLAN	IN DETAILED AREA PLAN	WITH LODGMENT OF SUBDIVISION/ DEVELOPMENT APPLICATION	WITH LODGMENT OF SUBDIVISION/ DEVELOPMENT APPLICATION	DURING DEVELOPMENT	Comments
Acid Sulphate Soils		○		●	●	Acid sulfate soils investigations are required at the subdivision and development stages of the planning process. The submission of an acid sulfate soils selfassessment form and preparation of an acid sulfate soils management plan is required as a condition of subdivision and development approval for proposals in moderate to high risk areas in accordance with the WAPC's Planning Bulletin 64/2009 "Acid Sulfate Soils".
Urban Water Management	○	○	●		●	An Urban Water Management Plan is to be prepared prior to the commencement of site works to the specifications of the Department of Water. The approved Urban Water Management Plan is to be implemented by the landowner, including construction of identified wastewater, stormwater and groundwater management systems.
Dieback Management Plan				●	●	The Dieback Management Plan shall include protocols and guidance to prevent construction works introducing dieback to Yellagonga Regional Park.
Fire Management Plan				●	●	

Issue	IN DROVERS PLACE PRECINCT STRUCTURE PLAN	IN DETAILED AREA PLAN	WITH LODGMENT OF SUBDIVISION/ DEVELOPMENT APPLICATION	WITH LODGMENT OF SUBDIVISION/ DEVELOPMENT APPLICATION	DURING DEVELOPMENT	Comments
Midge Management Plan				●	●	The Midge Management Plan is to include control measures, provisions for signage to be maintained during lot sales, and notifications on title to warn of midge nuisance in the area.
Landscaping				●	●	Landscaping plans, excluding preexisting domestic gardens within building envelopes in the Southern Precinct, shall ensure that Yellagonga Regional Park is not adversely affected by weed invasion, fertilisers or the spread of dieback from their lots. Flora species known to be invasive or environmentally damaging are not to be used and only local native plants may be used for landscaping.
Infrastructure						
Earthworks and Contours				●	●	Earthworking plans shall avoid retaining walls greater than one metre in height, and provide for landscaping to soften the impact of retaining walls facing Yellagonga Regional Park.
Uniform Fencing				●	●	Uniform fencing for special residential lots adjacent to Yellagonga Regional Park and Wanneroo Road shall be provided to the satisfaction of the City and the Department of Environment and Conservation/Main Roads respectively (as appropriate).

Issue	IN DROVERS PLACE PRECINCT STRUCTURE PLAN	IN DETAILED AREA PLAN	WITH LODGMENT OF SUBDIVISION/ DEVELOPMENT APPLICATION	WITH LODGMENT OF SUBDIVISION/ DEVELOPMENT APPLICATION	DURING DEVELOPMENT	Comments
Heritage						
Ethnographic Survey				○	●	Site protocols shall be developed to manage archaeological sites or assets should they be identified
Historical Buidlings		○		●	●	Any development or subdivision likely to impact upon Ashby House, Henry Chitty House, Ernie Chitty House and/ or Charles Aubrey Gibbs House shall be considered in accordance with the recommendations of the City's Municipal Inventory.

APPENDIX B

PLAN NO. 1: STRUCTURE PLAN NO. 80 DROVERS PLACE



City of Wanneroo

Produced by Planning & Sustainability
24 October 2016

DROVERS PLACE STRUCTURE PLAN No. 80 PLAN No.1

CED DRO RD3 005A

APPENDIX C

PLAN NO. 2: DROVERS PLACE WEST PRECINCT

JOONDALUP DRIVE

DROVERS PLACE

POS

R60

R30

R40

6m ROAD RESERVE

18m ROAD RESERVE

15m ROAD RESERVE

JOONDALUP FIRE STATION

LOT 12462

LOT 8

LOT 7

LOT 6

30.9m ROAD RESERVE

12m ROAD RESERVE

REGENTS GARDEN RESIDENTIAL CARE

YELLAGONGA REGIONAL PARK

LAKE JOONDALUP NATURE RESERVE

LEGEND

- STRUCTURE PLAN BOUNDARY
- 18 CONTOURS
- LOT 8 EXISTING LOT No./BOUNDARY

DENSITY

- R30
- R40
- R60

OTHER

- POS/DRAINAGE
- INDICATIVE ASSET PROTECTION ZONE (APZ))
- PRINCIPAL SHARED PATH (EXISTING)
- PRINCIPAL SHARED PATH (PROPOSED)
- VIEW CORRIDORS

Note: APZ in accordance with Approved Bushfire Management Plan

robertsday.com.au

N

1:1500

SIZE A3

0 metres 15 30 45 60 75

REF NO. CED DRO

DRAW NO. RD1 004

REV. D

PLAN No.2: DROVERS PLACE WEST PRECINCT

Lots 6, 7, 8 and 12462 Drover's Place

City of Wanneroo

APPENDIX D

TRANSPORT IMPACT ASSESSMENT
(TRANSCORE, MAY 2017)

Lots 6, 7, 8 & 12462 Drovers Place, Wanneroo

Proposed Structure Plan Amendment

Transport Impact Assessment

PREPARED FOR:
Catholic Education Office of WA

May 2017

Document history and status

Author	Revision	Approved by	Date	Revision type
R White	r03	B Bordbar	8/05/2017	Draft
R White	r03a	B Bordbar	28/05/2017	Final

File name: t13239-rw-r03a.docx

Author: Robin White

Project manager: Behnam Bordbar

Client: Catholic Education Office of WA

Project: Lots 6, 7 & 8 Drovers Place, Wanneroo

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1.0 Introduction

This Transport Impact Assessment has been prepared by Transcore on behalf of the Catholic Education Office of WA with regard to a proposed amendment to the City of Wanneroo *Drovers Place Precinct Structure Plan No. 80 (ASP 80)*.

The particular focus of this report is Lots 6, 7, 8 Drovers Place, which are now proposed for residential development instead of a future education establishment, and Lot 12462 which is the fire station and will remain as such. This would require a modification to ASP 80 to permit residential development on this site.

The subject site (Lots 6, 7, 8 and 12462) is located on the southern side of Drovers Place in Wanneroo as shown in **Figure 1**.

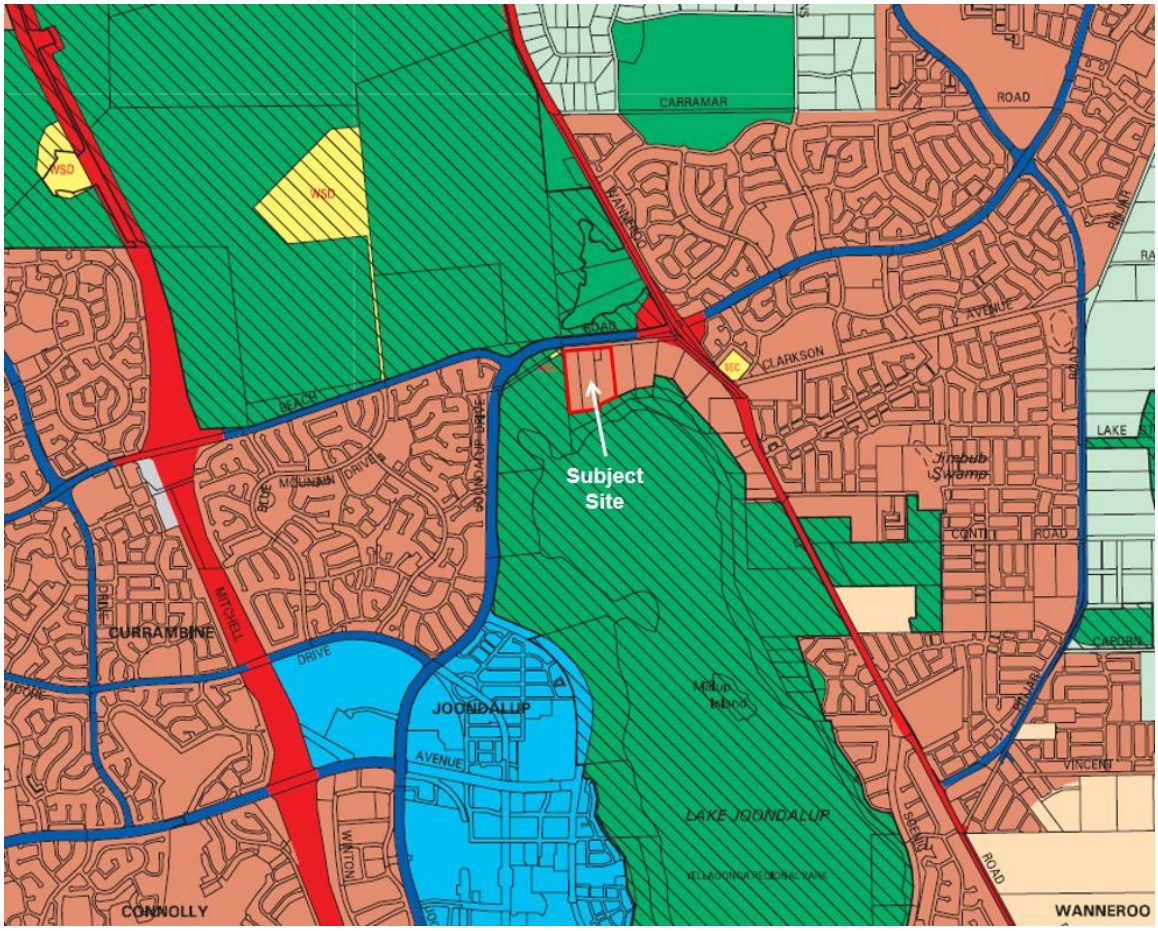


Figure 1: Site location

This report includes analysis of the future traffic flows that would be generated by future residential development of this site and the future upgraded intersection requirements to maintain access from Drovers Place to Joondalup Drive to serve this area in future.

2.0 Proposed Structure Plan Amendment

The existing *Drovers Place Precinct Structure Plan No. 80* (ASP 80 – August 2016) is illustrated in **Figure 2** and a larger copy (including the legend, etc.) is provided at **Appendix A**.

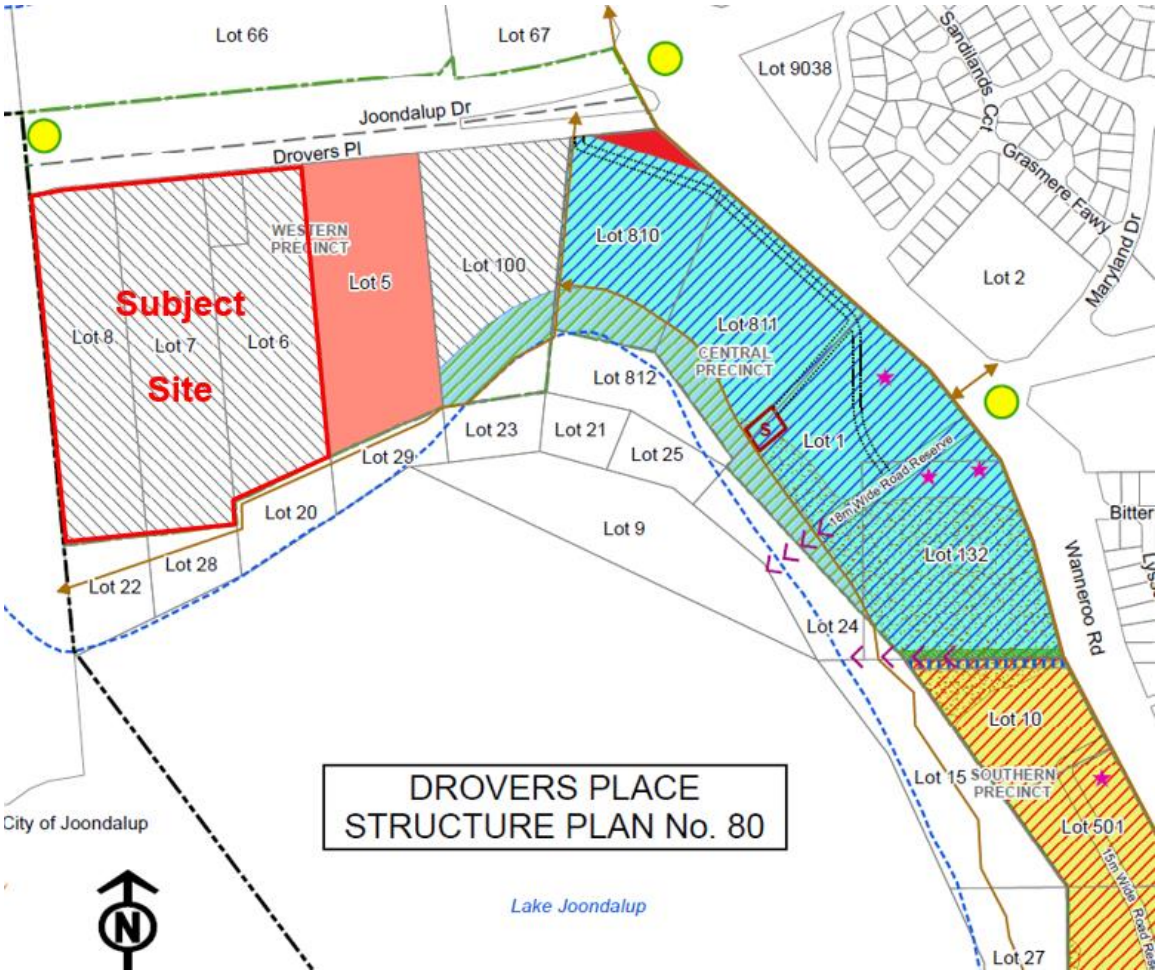


Figure 2: Site location within existing Structure Plan No. 80

Lots 6, 7 and 8 are currently a Special Use Zone in ASP 80, allowing education establishment as a discretionary use, which reflects previous planning for a 1500-student private school on this site. Other discretionary uses are low scale tourism-related uses, as determined by Council, including tearooms, local arts and crafts, art galleries and restaurants/café. All other uses are currently prohibited.

This report considers a proposal by the owner of Lots 6, 7 and 8 that these three lots be used for Residential instead, in accordance with the proponent's proposal for residential subdivision of this area.

The proposed local structure plan for the subject site is illustrated in **Figure 3.**

Figure 3: Proposed Local Structure Plan

The proposed residential subdivision of this site is anticipated to accommodate approximately 225 dwellings. It would be accessed via two access street intersections onto Drovers Place on the northern side. The plan also incorporates a dual use path around the southern side of the site and up through the site as part of a future dual use path route around the whole Drovers Place Precinct as envisaged by Structure Plan No 80.

3.0 Existing Situation

3.1 Existing Land Use

Some properties within the Drovers Place Precinct are still rural in nature but others have been developed in accordance with Structure Plan No. 80.

Existing land uses on Lots 6, 7 and 8 are rural in nature with no existing dwellings on these lots, as shown in **Figure 4**. Lot 12462 is occupied by a fire station, which will remain in place when the subject site is developed.

Figure 4: Existing land use

Immediately to the east of the subject site Lot 5 houses the Regents Garden aged care resort. East of that on Lot 4 is the existing Botanic Golf Gardens. Together these properties make up the "Western Precinct" in Structure Plan No. 80 and all are accessed from Drovers Place.

Drovers Market Place and other commercial developments are located in the "Central Precinct" at the corner of Wanneroo Rd and Joondalup Drive. It has access from the eastern end of Drovers Place as well as from Wanneroo Road.

The Neerabup Water Supply Pumping Station is located at the western end of Drovers Place and has a driveway access at this location.

3.2 Existing Road Network

Drovers Place provides access to each property along the northern frontage of the Drovers Place Precinct. It is constructed as a 6m-wide, kerbed single carriageway road and is constructed as a cul-de-sac at both ends. Drovers Place is subject to the standard 50 km/h urban speed limit.

Joondalup Drive is reserved as an Other Regional Road in the Metropolitan Region Scheme and is designated as a District Distributor (A) in the Main Roads WA Metropolitan Functional Road Hierarchy. It is constructed as a dual carriageway, two lanes in each direction, with a wide central median (approximately 13m wide). It has an 80 km/h speed limit.

The carriageway of Drovers Place is approximately 24m away from the westbound carriageway of Joondalup Drive. Access to Drovers Place from Joondalup Drive is provided by a single connection opposite the subject site, west of the existing fire station. This Drovers Place road connection forms a full movement T-junction at Joondalup Drive as shown in **Figure 5**.

Figure 5: Existing Joondalup Drive intersection

3.3 Public Transport

There are existing bus stop embayments on Joondalup Drive directly opposite the subject site, west of the Drovers Place intersection. There are four existing bus routes that pass the site on Joondalup Drive as shown in **Figure 6**. These are routes 390 and 391 (Joondalup station to Banksia Grove), as well as 467 and 468 (Joondalup station to Whitfords station via Wanneroo).

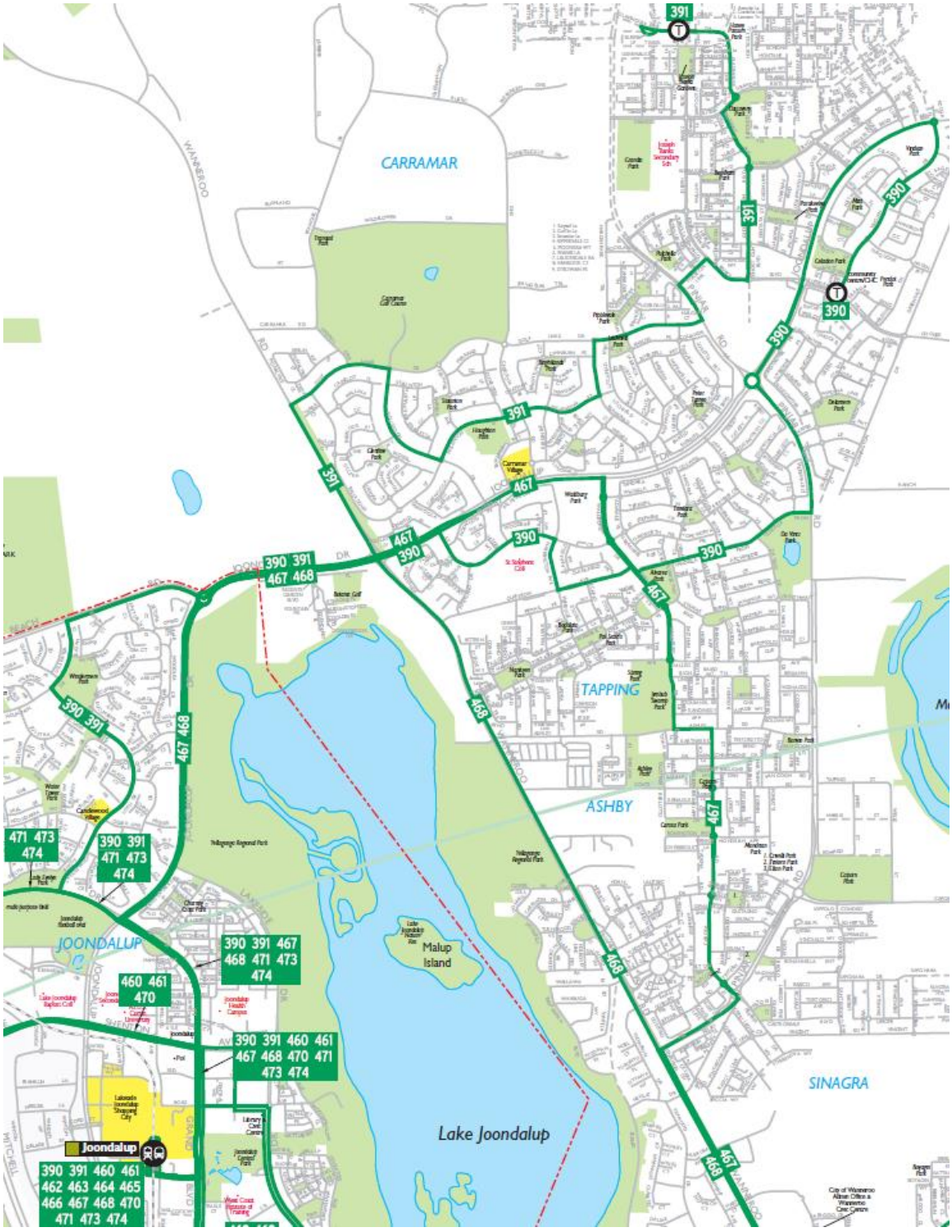


Figure 6: Existing bus routes

Currently, bus routes 390 and 391 together provide services past the subject site at 10-minute frequency on weekdays and 30-minute frequency on weekends. Bus routes 467 and 468 provide services past the subject site as well, each with a frequency of 10 to 30 minutes on weekdays and hourly on weekends.

3.4 Pedestrian and Cyclist Facilities

The Department of Transport's Perth Bike Map series (see **Figure 7**) shows Drovers Place as a good road riding environment with connections at both ends to a network of shared paths through the existing residential areas of Joondalup to the west and Carramar to the east.

In addition to the bicycle facilities shown on **Figure 7** there is also an existing 2m wide footpath along the southern side of Drovers Place, although it crosses to the northern side of Drovers Place opposite Lot 8 to connect with the 3m shared path that leads westward from Drovers Place. There are also 2.5m wide footpath links from Drovers Place to the bus stops on both sides of Joondalup Drive.

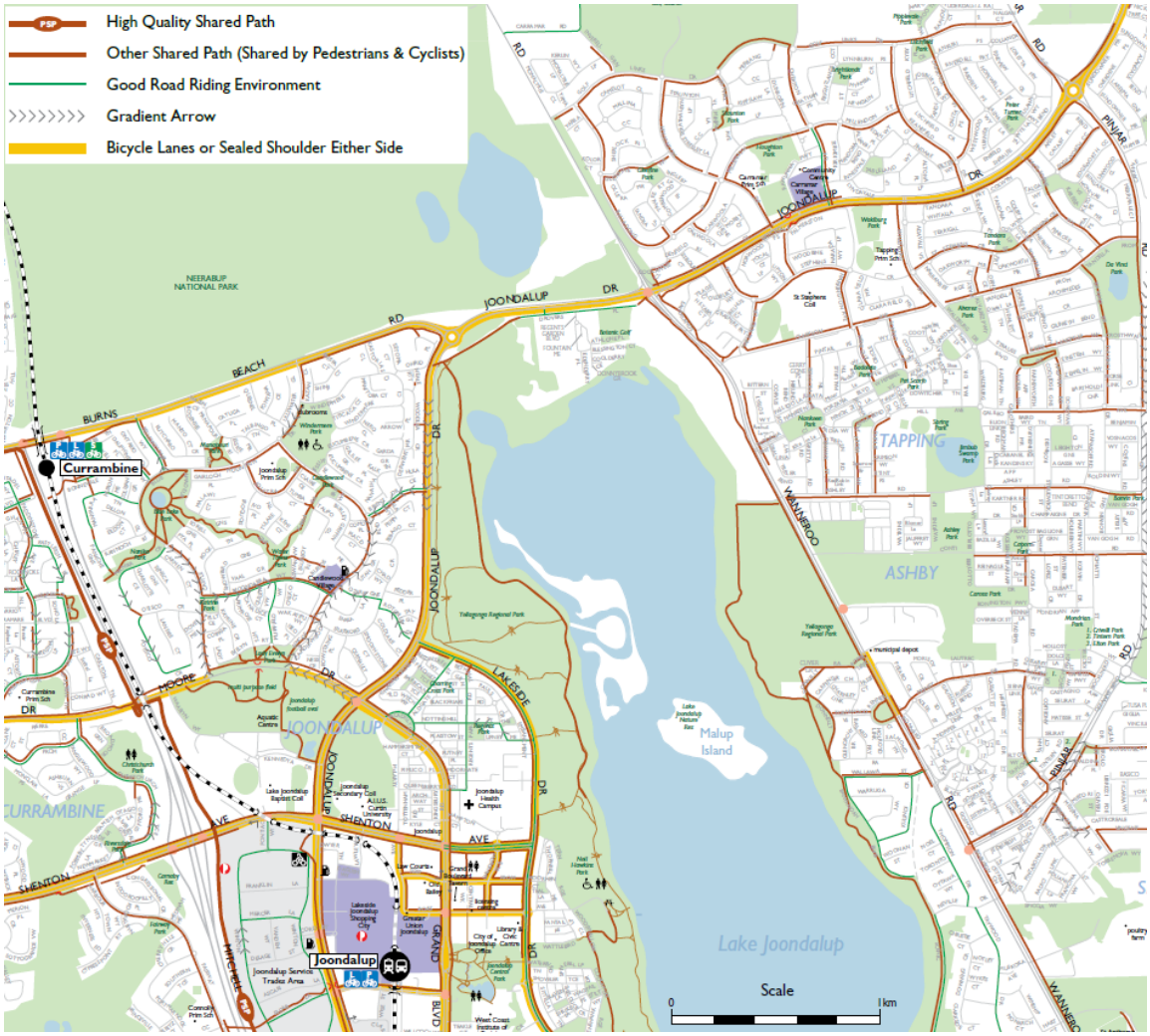


Figure 7: Bike map

3.5 Changes to Surrounding Road Network

The intersection of Wanneroo Road and Joondalup Drive is ultimately planned to be grade separated. The land affected by this future interchange is shown by the red Primary Regional Roads reservation in the Metropolitan Region Scheme map, as can be seen in **Figure 1**. At this stage, no time frame is available for this future grade separated intersection.

Structure Plan 80 (see **Appendix A**) proposes a 4-way signalised intersection at the Wanneroo Road / Clarkson Ave intersection, which will service the "Central Precinct". This intersection will also provide an alternate access route to Wanneroo Road from the "Western Precinct" via Drovers Place and internal traffic routes through the "Central Precinct". ASP 80 includes a requirement in the Central Precinct that "a connected access road shall be provided at the time of subdivision / development between the southern intersection of Wanneroo Road and Clarkson Avenue and Drovers Place, ... [as well as] ... an easement in gross in favour of the public at large ...", which confirms the legal right for traffic from the subject site to use that access route as appropriate.

Structure Plan 80 (ASP 80) also proposes a signalised intersection for the connection from Drovers Place to Joondalup Drive opposite the subject site.

4.0 Proposed Transport Network

4.1 Road Hierarchy

The hierarchy of roads in and around the LSP area is illustrated in **Figure 8**

Figure 8: Road Hierarchy

Some key characteristics proposed for the relevant road classifications have been summarised in **Table 1**. Some dimensions are different than standard Liveable Neighbourhoods cross sections and are discussed further below.

Table 1: Road Hierarchy

Road Classification	Indicative upper volume (vpd)	Indicative road reserve width (m)	Indicative road pavement width (m)
Neighbourhood Connector A	7,000	23m	2 x 5m (incl. cycle lanes), 2m median and embayed parking
Neighbourhood Connector B	3,000	18m	7m (7.4m on bus routes) and embayed parking
Access Street A / B	3,000	18m to 30.9m	2 x 3.5m, median (width varies) and embayed parking
Access Street C	3,000	15.4m to 16m	7.2m
Access Street D	1,000	14.2m to 15m	6m
Laneway	300	6m	6m typical

It should be noted that these road reserve widths and other dimensions are indicative and may be subject to further adjustment in consultation with the Department of Planning and City of Wanneroo during detailed subdivision design.

Drovers Place

Drovers Place is currently understood to be carrying less than 3,000vpd but ultimately, when Drovers Place Central Precinct (the commercial precinct west of Wanneroo Road) is fully developed it is anticipated that traffic volumes on Drovers Place will increase above 3,000vpd and Drovers Place may need to be upgraded to Neighbourhood Connector A status. For most of Drovers Place this might involve upgrading to two 3.5m traffic lanes and two 1.5m cycle lanes without any provision of a central median or embayed parking in the verge.

However, for the western section of Drovers Place, westwards from the fire station, it would be appropriate to include embayed parking in the southern verge only (as visitor parking for adjacent residential development in the LSP area) and a central median up to 2m wide restricting right turn movements along this section due to proximity to the future signalised intersection on Joondalup Drive for access to/from Drovers Place (refer section 5.4 for further discussion).

All of the streets within the LSP area will carry less than 3,000vpd and will be classified as Access Streets.

Access Streets

The basic standard of access street proposed in this LSP area is anticipated to be a 6m wide carriageway in a 15m road reserve. This road standard is proposed where the future total traffic volumes are less than 1,000vpd. The northern end of the eastern access street into the LSP area from Drovers Place is anticipated to carry 1,100vpd but most of the length of this street will carry less than 1,000vpd and it is planned as an Access Street D. All other access streets in the LSP area will carry less than 1,000vpd.

The western access street into the LSP area from Drovers Place is anticipated to carry less than 1,000vpd but is planned as a boulevard-style Access Street A/B as an entry statement into the LSP area from Drovers Place and to accommodate an avenue of existing mature trees within the LSP area.

Laneways
The proposed road reserve width of laneways in the LSP area is 6.0 metres. These would typically be designed with flush kerbing (i.e. at the same level as the laneway pavement) and central drainage, and can accommodate two-way vehicle movement and rubbish collection. Details relating to the design of these laneways will be addressed during the subdivision planning stages.

It is recommended that visitor car parking should be constructed in the road reserve where available adjacent to proposed lots serviced by laneways.

4.2 Public Transport

Existing bus services on Joondalup Drive close to the LSP area are described in section 3.3 of this report. No additional public transport services are proposed within the LSP area.

4.3 Pedestrian and Cyclist Facilities

The proposed pedestrian and cyclist network for the LSP area is outlined in **Figure 9**.

Footpaths at least 1.5m wide would be provided on at least one side of all roads.

Laneway lots are to have footpath access to the visitor parking bays provided for them in the road reserve.

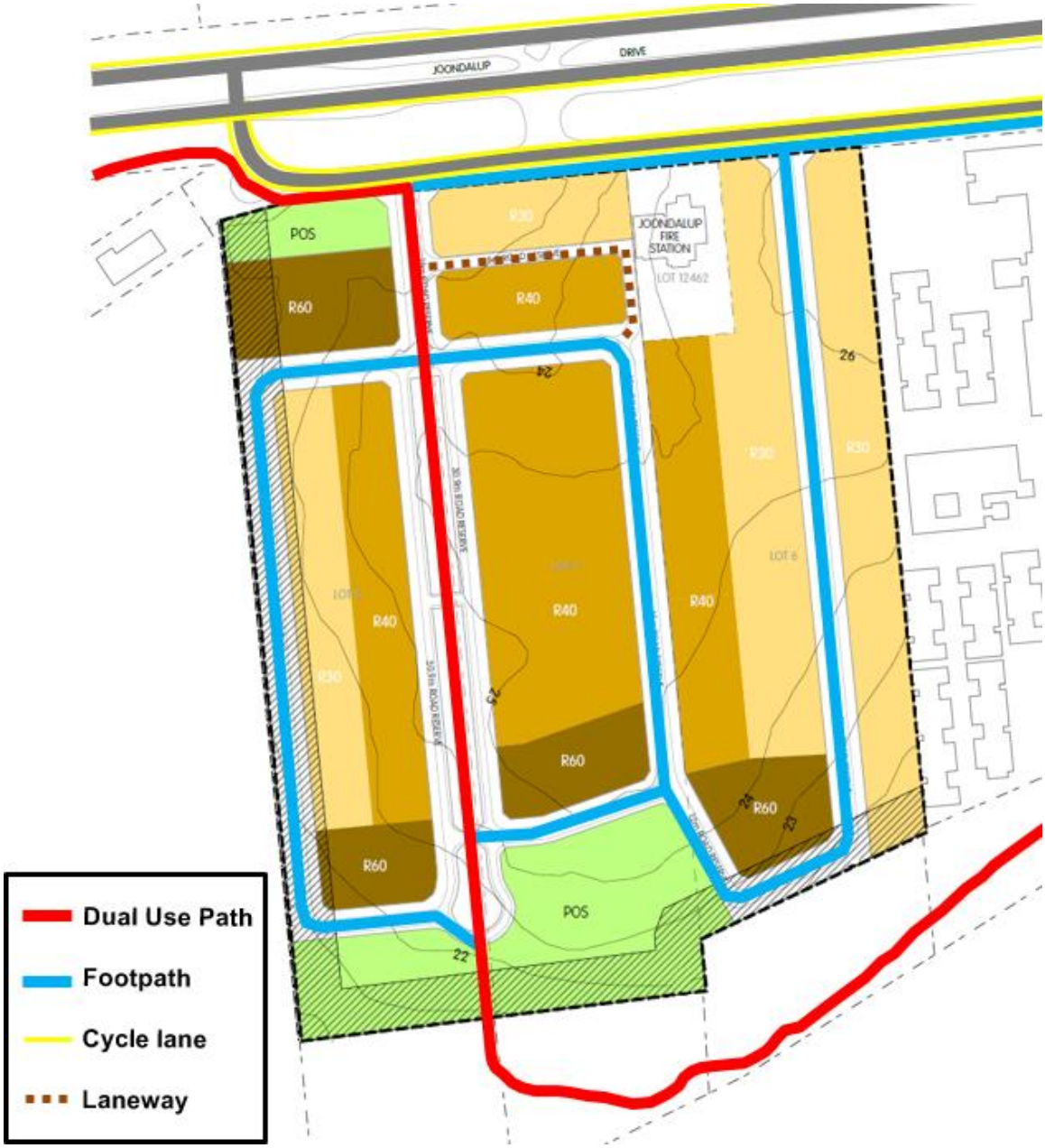


Figure 9: Pedestrian and cyclist facilities

5.0 Analysis of the Transport Network

5.1 Assessment Period

For this assessment it is assumed that residential development of the subject site could be completed by 2019, so that is the base year for the initial assessment.

The post-development assessment year that has been adopted for this analysis is 2031, which is consistent with the planning horizon generally adopted in current strategic planning and regional transport modelling such as the Main Roads WA regional operational model (ROM).

For residential development the appropriate periods for assessment are weekday AM and PM peak periods, which are typically around 8-9am and 3-4pm on the adjacent section of Joondalup Drive.

5.2 Traffic generation and distribution

For typical suburban residential development the appropriate daily traffic generation rate is 8 vehicle trips per day (vpd) per dwelling, which corresponds to the peak hour trip generation rate of 0.8 vehicles per hour per dwelling recommended in the Western Australian Planning Commission (WAPC) *Transport Impact Assessment Guidelines* (2016). This rate is used for the proposed residential development in this transport assessment.

The resultant traffic generation of future residential development (225 dwellings) on the subject site is summarised in **Table 2**. The traffic generation of a previous proposal for a 1500-student private school development on this site is also shown for comparison.

Table 2: Traffic Generation

Time Period	Current proposal: Residential (225 dwellings)	Previous proposal: Education (1500 students)
8-9AM traffic generation (in/out vph)	45 / 135	750 / 750
3-4PM traffic generation (in/out vph)	112 / 68	750 / 750
Daily traffic generation (vpd)	1800	3000

For the previous proposal of a school development on the subject site the trip distribution was assessed as 50% west / 50% east from the site based on catchment area for the proposed private school. However, for residential development on this site there would be more trips to and from the Joondalup area and less to and from

the north and east. A trip distribution of 60% west / 40% east from the site is considered more appropriate for this residential development.

The resultant peak hour traffic flows from the proposed 225 dwellings residential development of the subject site are shown in **Figure 10**.

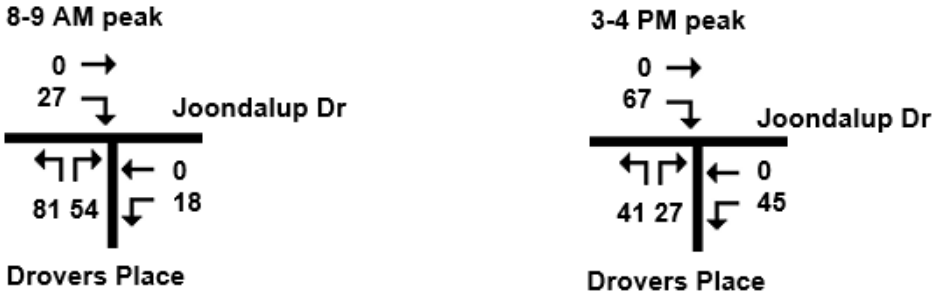


Figure 10: Traffic flows generated by 225 dwellings development

In addition, further development in the Central Precinct will also add more traffic travelling to and from the west via Drovers Place. The *Drovers Place Wanneroo Central Precinct, Various Lots Traffic Impact Study* (Transcore, May 2015) estimated a future PM peak hour traffic increase of 206vph in / 206vph out via Drovers Place when the Central Precinct is fully developed. Based on the mix of land uses anticipated in the Central Precinct it is anticipated that AM peak hour traffic increases would be about 50% of the PM peak increases (because retail traffic generation is much lower in the weekday AM peak period), so the resultant traffic increases from full development of the Central Precinct are as indicated in **Figure 11**.

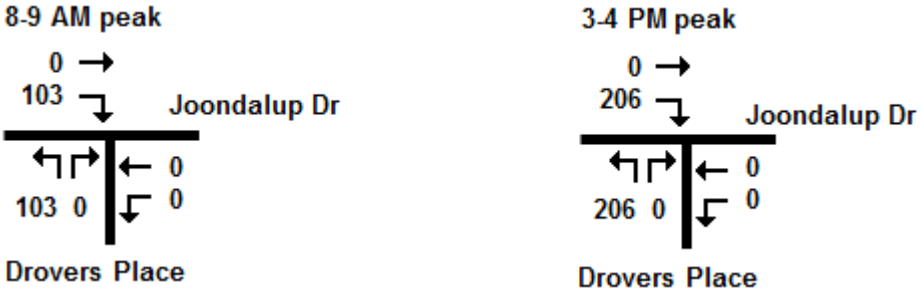


Figure 11: Traffic increase generated by full development of Central Precinct

5.3 Traffic Flow Forecasts

A Main Roads WA traffic count in November 2014 recorded an average weekday traffic (AWT) flow of 47,870 vehicles per day (vpd) on Joondalup Drive west of Wanneroo Road. (A February 2016 MRWA count recorded 50,812 vpd AWT.)

Existing turn movements at the Joondalup Drive / Drovers Place intersection were counted in December 2012 during an afternoon peak hour and recorded traffic flows of 124vph out and 111vph in. In 2014 a City of Wanneroo traffic count recorded 116vph westbound / 69vph eastbound (8-9am on Wednesday 5 March

2014) and 159vph westbound / 98vph eastbound (3-4pm Friday 28 Feb 2014) on Drovers Place.

The MRWA ROM traffic model forecasts for Joondalup Drive reported in the 2011 GHD report *City of Wanneroo Report for Drovers' Place Traffic Study Update* (July 2011) are 56,700 vpd in 2021 and 57,400 vpd in 2031. This represents a growth rate of 2.49% per year between 2014 and 2021, then 0.12% per year after 2021. For this analysis the through traffic flows on Joondalup Drive are assumed to increase at these rates of growth.

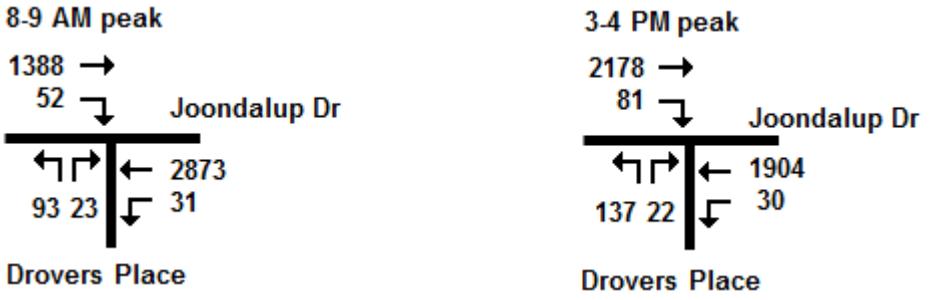


Figure 12: 2016 Base traffic flows (without development on the subject site nor the Central Precinct)

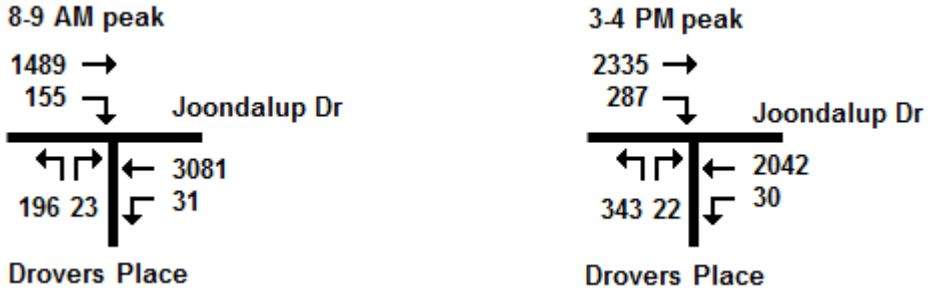


Figure 13: 2019 Traffic flows with Central Precinct fully developed

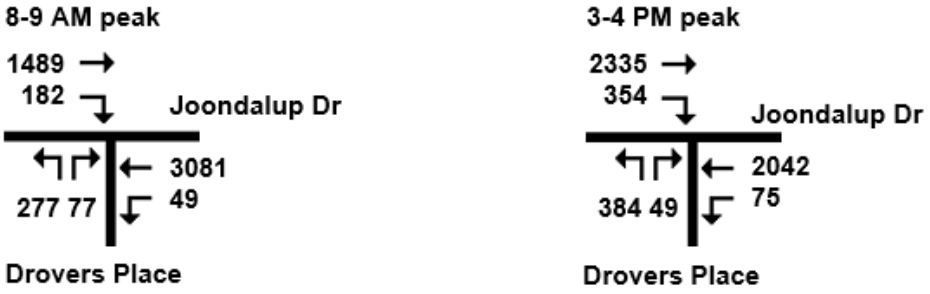


Figure 14: 2019 Traffic flows with 225 dwellings and Central Precinct fully developed

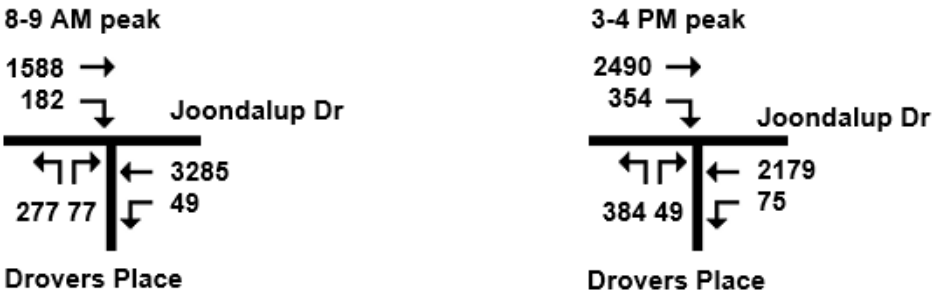


Figure 15: 2031 Traffic flows with 225 dwellings and Central Precinct fully developed

The different components or sources of turning traffic flows at this intersection are shown in Figures 10, 11 and 12 and are summarised in **Table 3** and the effects of the previous proposal for a 1500-student private school is also shown for comparison.

Table 3: Turn traffic flows at Joondalup Drive / Drovers Place intersection

Scen-ario	Source of Traffic	AM Peak	AM %	PM Peak	PM %	AM+PM Peaks	AM+PM %
Current proposal: Residential development	Existing turn traffic	199vph	34.0%	270vph	31.3%	469	32.4%
	Central Precinct traffic increase	206vph	35.2%	412vph	47.8%	618	42.7%
	Lots 6, 7&8 traffic (225 dwellings)	180vph	30.8%	180vph	20.9%	360	24.9%
	Total	**585vph**	**100%**	**862vph**	**100%**	**1447**	**100%**
Previous proposal: Education facility	Existing turn traffic	199vph	10.5%	270vph	12.4%	469	11.5%
	Central Precinct traffic increase	206vph	10.8%	412vph	18.9%	618	15.1%
	Lots 6, 7&8 traffic (1500 students)	1500vph	78.7%	1500vph	68.7%	3000	73.4%
	Total	**1905vph**	**100%**	**2182vph**	**100%**	**4087**	**100%**

In comparison, the previous proposal of a 1500-student education facility would have generated traffic flows of 1500vph during both of these peak periods instead

of the 180vph generated by the proposed residential development. If that school was built the total turn traffic at this intersection would be more than doubled in the 3-4pm peak and tripled in the 8-9am peak hour. Therefore there would be significantly less congestion at the proposed intersection if residential development is permitted on this site instead of the educational facility currently permitted on this site.

The information in **Table 3** indicates that traffic from the proposed development of 225 dwellings on the subject site (Lots 6, 7 & 8) would represent 30.8% of total turning traffic in the AM peak and 20.9% of total turning traffic in the PM peak at this intersection when the Drovers Place Precinct is fully developed. If AM and PM peak traffic flows are considered together the subject site will contribute 24.9% of the total turn traffic at this intersection and the additional development in the Central Precinct would represent 42.7% of total turning traffic at this intersection. If the focus is purely on traffic increase rather than total traffic then the subject site will contribute 36.8% of the increase and the additional Central Precinct development would contribute the other 63.2% of the increase in turning traffic flows at this intersection.

5.4 Roads and Intersections

The proposed local structure plan for the subject site shows two access roads leading into the proposed residential subdivision from Drovers Place, one west of the fire station and one east of the fire station. In the full development scenario for the Drovers Place Precinct it is anticipated that the future signalised intersection on Joondalup Drive at the western end of Drovers Place would have peak hour traffic queues that may extend back past the western access road intersection (see intersection analysis in section 5.5 below), so it is anticipated that the western access road intersection would be restricted to left in / left out to/from Drovers Place. Preliminary analysis (assuming all of the residential traffic travels to/from Joondalup Drive) indicates daily traffic flows of approximately 700vpd out from the western access road and 1100vpd (900 in / 200 out) at the eastern access road.

Four-way intersections on access streets may be constructed with entry treatments on the side roads, such as raised plateau treatments, and give way signage to alert drivers on the side roads before entering these priority-controlled intersections and to manage traffic speed on these approaches. The intersection layout of the 4-way intersection on the western access road (see **Figure 16**) would be subject to detailed design at subdivision approval stage.

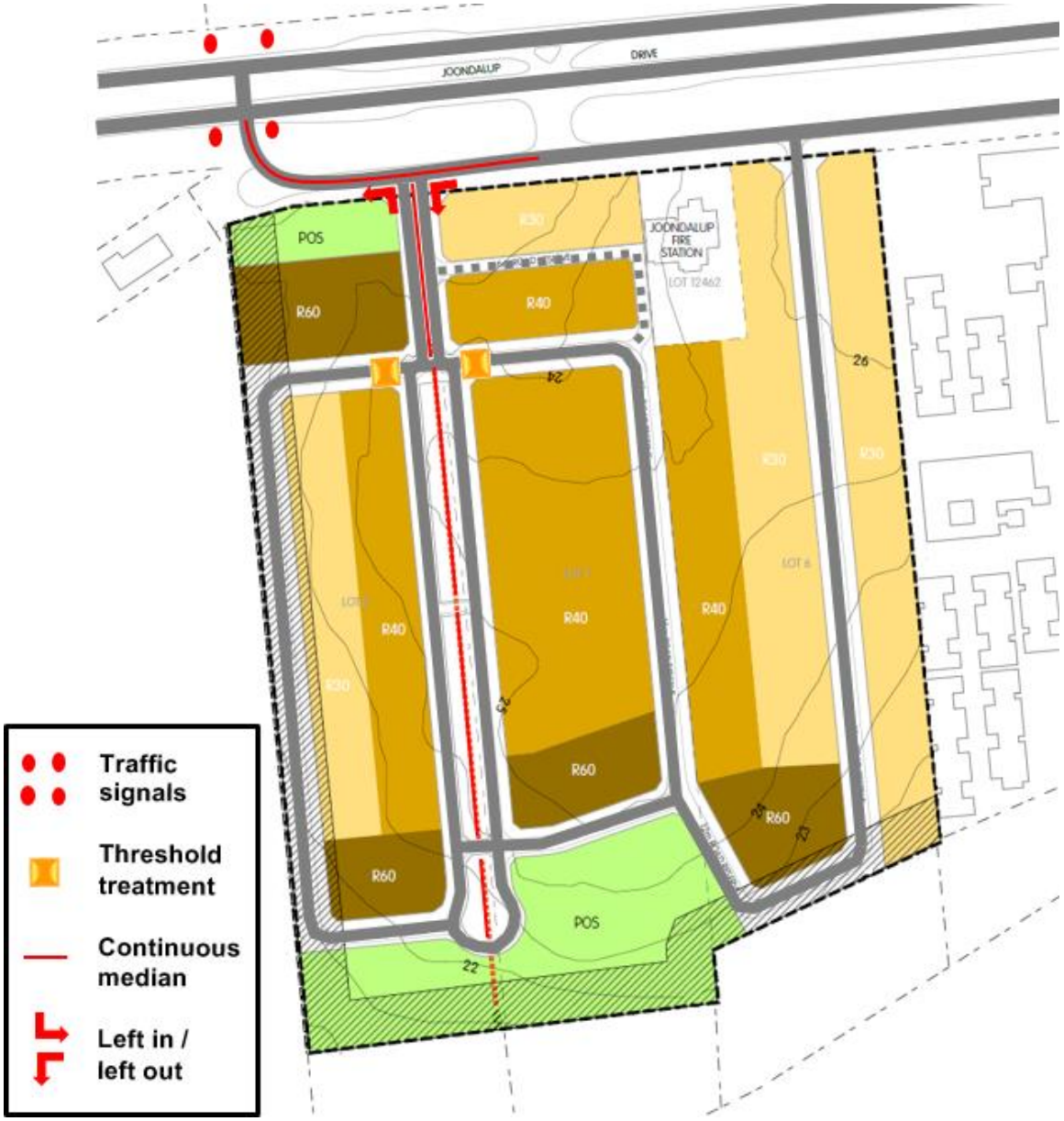


Figure 16: Intersection treatments

5.5 Intersection Analysis

Intersection capacity analysis has been undertaken for the Joondalup Drive / Drovers Place access intersection for the AM and PM peak hour flows in various scenarios. The analyses for the traffic flows shown in **Figures 12, 13, 14 and 15** are documented in this report.

Capacity analysis of these intersections has been undertaken using the SIDRA computer software package. SIDRA is an intersection modelling tool commonly used by traffic engineers for all types of intersections. SIDRA outputs are presented in the form of Degree of Saturation, Level of Service, Average Delay and 95% Queue. These characteristics are defined as follows:

- Degree of Saturation is the ratio of the arrival traffic flow to the capacity of the approach during the same period. The Degree of Saturation ranges from close to zero for infrequent traffic flow up to one for saturated flow or capacity.
- Level of Service is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. In general, there are 6 levels of service, designated from A to F, with Level of Service A representing the best operating condition (i.e. free flow) and Level of Service F the worst (i.e. forced or breakdown flow).
- Average Delay is the average of all travel time delays for vehicles through the intersection.
- 95% Queue is the queue length below which 95% of all observed queue lengths fall.

The results of the SIDRA analysis are summarised in Appendix C.

Joondalup Dr / Drovers Pl unsignalised T-intersection

The SIDRA analysis at Tables C1a and C1b in Appendix C indicate that the existing unsignalised T-intersection will already be congested in 2016 without adding any traffic from residential development on the subject site or additional traffic from further development in the Central Precinct. Several turn movements will be over capacity in both AM and PM peak periods, and operating at level of service F due to the very long delays these turn movements will experience. The analysis indicates potential for queue lengths to extend out of the existing right turn pocket on Joondalup Drive.

Joondalup Dr / Drovers Pl signalised intersection (2019)

The SIDRA analysis in Tables C2a and C2b assesses a signalised Joondalup Dr / Drovers Pl intersection, with the additional traffic generated by full development of the Central Precinct but no residential development on the subject site.

The SIDRA analysis in Tables C3a and C3b assesses a signalised Joondalup Dr / Drovers Pl intersection, with the additional traffic generated by full development of the Central Precinct and with residential development of 225 dwellings on the subject site.

A signal cycle time of 150 seconds is assumed in each of these SIDRA analyses as these signals would need to be coordinated with the Wanneroo Rd / Joondalup Drive signalised intersection.

In both of these 2019 scenarios it was found to be necessary to include widening of Joondalup Drive to 3 lanes each way through this signalised intersection to provide sufficient capacity for the very high through traffic movements on Joondalup Drive. Comparison of Figures C2 and C3 indicates that the only difference in the modelled intersection layout between these two scenarios is a longer right turn lane length in the median of Joondalup Drive (increased from 150m to 200m) if the additional traffic from the Central Precinct and the subject site are both included.

The SIDRA analysis indicates that this intersection would operate at overall level of service B in the AM peak hour and C in the PM peak although individual right turn

movements will be at level of service E or F. This is still a very substantial improvement on the operation of the existing unsignalised intersection documented above. These average delays of 62 to 88 seconds for the right turn traffic are still substantially less than the 150 second cycle time modelled for this intersection, so these vehicles would still not be waiting longer than one signal cycle during these peak periods. Substantially longer delays are already common at many other signalised intersections around the Perth metropolitan area. Most importantly, through traffic on Joondalup Drive would still operate at level of service A, B or C and the intersection will be at less than 90% of capacity overall in both land use development scenarios, so a signalised intersection at this location should be considered appropriate.

Joondalup Dr / Drovers Pl signalised intersection (2031)

At some point in the future it is anticipated that Joondalup Drive will need to be upgraded to 6 lanes (i.e. 3 traffic lanes each way) to accommodate the forecast traffic volume of 56,700 vpd in 2021 and 57,400 vpd in 2031. (The WAPC *Liveable Neighbourhoods* Policy attributes a capacity of 35,000vpd to the 2 lanes each way, dual carriageway road standard of an Integrator A like the current Joondalup Drive.)

The SIDRA analysis in Tables C4a and C4b assesses this intersection with Joondalup Drive upgraded to 3 lanes each way to accommodate the forecast 2031 traffic volumes on Joondalup Drive. This analysis assumes full development of the Central Precinct and residential development of 225 dwellings on the subject site. The SIDRA results indicate this intersection would be at 81% of capacity in the AM peak and 74% of capacity in the PM peak, at overall level of service B in the AM peak and C in the PM peak period. One of the right turn movements would be at level of service F in each peak hour due to delays of 80 to 90 seconds on that movement. Through traffic on Joondalup Drive would still operate at level of service A, B or C and the intersection will be at less than 90% of capacity overall, so a signalised intersection at this location is still considered appropriate.

5.6 Development Traffic Impact

Joondalup Drive (west of Wanneroo Road) already carries an average weekday traffic flow of 50,812 vehicles per day (February 2016 MRWA traffic count) which is significantly greater than the 35,000vpd capacity attributed to this dual carriageway road standard (2 lanes each way) in the WAPC Liveable Neighbourhoods Policy, so it should already be upgraded to 3 lanes each way regardless of any future development in the Drovers Place Precinct.

Development in the Drovers Place Precinct only generates turning traffic movements at the Joondalup Drive / Drovers Place intersection, not through traffic movements on Joondalup Drive. Analysis of total turning traffic flows at the Joondalup Drive / Drovers Place intersection (see **Table 3** above) indicates that traffic from the proposed development of 225 dwellings on the subject site would represent 30.8% of total turning traffic in the AM peak and 20.9% of total turning traffic in the PM peak at this intersection when the Drovers Place Precinct is fully developed. If AM and PM peak traffic flows are considered together the subject site will contribute 24.9% of the total turn traffic at this intersection and the additional

development in the Central Precinct would represent 42.7% of total turning traffic at this intersection. If the focus is purely on traffic increase rather than total traffic then the subject site will contribute 36.8% of the increase and the additional Central Precinct development would contribute the other 63.2% of the increase in turning traffic flows at this intersection. Final details of each proposed development and potentially additional development proposals by other land owners may alter these percentages in future.

5.7 Access to Frontage Properties

The WAPC *Liveable Neighbourhoods* policy requires that "Development along integrator B and neighbourhood connector streets with ultimate vehicle volumes over 5000 vehicles per day should be designed either so vehicles entering the street can do so travelling forward, or are provided with alternative forms of vehicle access. Wider lots with paired driveways and protected reversing areas in the parking lane may be used on streets with up to 7000 vehicles per day."

This restriction will apply to all residential lots fronting Drovers Place in the LSP area as traffic volumes on Drovers Place will be in excess of 5000vpd when the Drovers Place Precinct (particularly the Central Precinct west of Wanneroo Rd) is fully developed. Therefore all lots along Drovers Place will have access from rear laneways or side roads.

All of the other roads in the LSP area are expected to carry less than 3000vpd, so no restriction on vehicular access is required.

5.8 Emergency Vehicle Access

When a 1500-student private school development was previously being proposed on the subject site there was concern expressed that there would be significant congestion on Drovers Place and lengthy queues at the Joondalup Drive / Drovers Place intersection before and after school hours. Consequently ASP 80 currently includes a requirement for any development application for an education establishment to accommodate a dedicated emergency vehicle access (from Joondalup Drive) to the existing fire station.

With the current proposal to rezone the subject site for residential development instead the potential for traffic congestion and queues will be greatly reduced and the requirement to accommodate a dedicated emergency vehicle access does not apply.

5.9 Access to Public Transport

Pedestrian movements across Joondalup Drive will be accommodated by the proposed traffic lights at the Joondalup Drive / Drovers Place intersection. This will facilitate access to and from the bus stop on the northern side of Joondalup Drive,

which already provides high frequency bus services in this area, as detailed in section 3.3 above.

6.0 Conclusions

This Transport Impact Assessment relates to a proposed amendment to the City of Wanneroo *Drovers Place Precinct Structure Plan No 80*. In particular this report addresses a proposal to permit residential development on Lots 6, 7 and 8 instead of a future education establishment.

The subject site includes Lot 12462 which is the existing fire station and will remain as such.

Potential residential development on Lots 6, 7 and 8 is anticipated to accommodate approximately 225 dwellings.

Residential development of 225 dwellings would generate traffic flows of approximately 1800 vehicles per day (180 vehicles per hour (vph) during weekday AM and PM peak hours). In comparison, the previous proposal for a 1500-student private school on this site would have generated much higher traffic flows of 1500vph during 8-9am and 3-4pm peak periods. The residential traffic generation would only be 12% of the school's traffic generation during these peak periods, so permitting residential development instead on this site would have significant benefits in terms of future traffic flows.

In addition there are currently proposals for further development in the Central Precinct of the Drovers Place Precinct Structure Plan area, which are estimated to generate traffic increases of 206vph during the weekday AM peak hour and 412vph during the PM peak period.

The subject site is located on the south side of Drovers Place, which is constructed as a single carriageway, two-lane road. The proposed further development in the Central Precinct (further east from the subject site) will increase traffic volumes on Drovers Place into the 3000-7000vpd range of a Neighbourhood Connector A road, so improvements will be required along Drovers Place. Residential development of the subject site will have little impact on Drovers Place west of the subject site but will contribute to traffic increases on the section of Drovers Place abutting the subject site. Therefore it would be reasonable for development of the subject site to contribute to improvements on the abutting section of Drovers Place such as a central median up to 2m wide, 1.5m on-road cycle lanes, embayed parking in the southern verge and a footpath in the southern verge.

Drovers Place has access to Joondalup Drive via an existing unsignalised T-intersection. Intersection capacity analysis indicates that the existing unsignalised Joondalup Drive / Drovers Place intersection will not have spare capacity to accommodate additional traffic generated by residential development of the subject site or the proposed further development in the Central Precinct. Analysis indicates it was already at capacity in 2016 with long delays for turning movements, which will progressively get worse as Joondalup Drive traffic volumes continue to increase. Improvements will be required at this intersection even if there was no future development on Lots 6, 7 and 8.

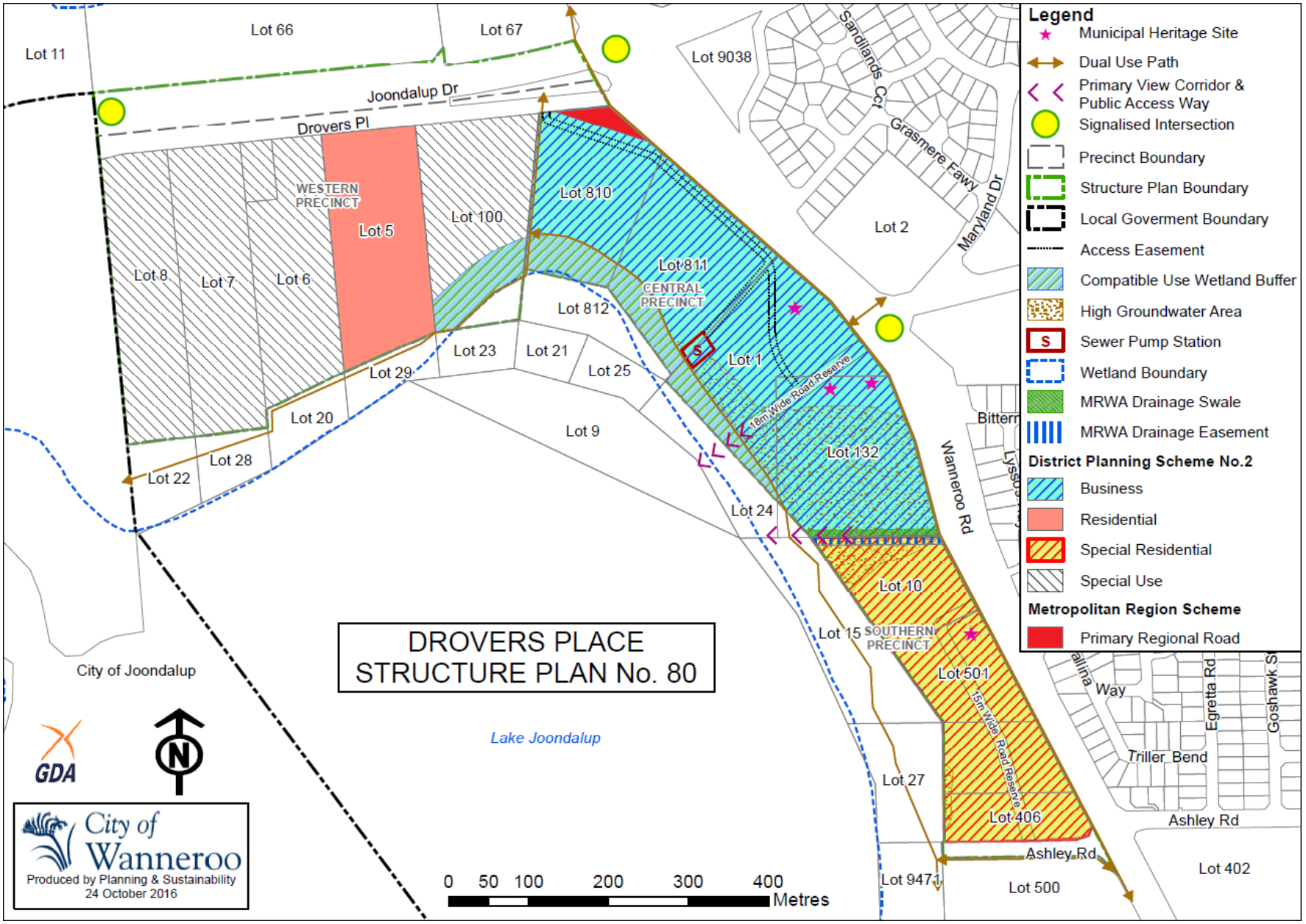
Structure Plan No 80 proposes a future signalised intersection on Joondalup Drive to provide access from Drovers Place. However, Main Roads WA currently prefers roundabouts instead of traffic signals when intersections require this degree of improvement, so the form of intersection treatment appropriate in this case would need to be agreed in consultation with Main Roads WA.

Joondalup Drive (west of Wanneroo Road) already carries 50,000 vehicles per day which is significantly greater than the 35,000vpd capacity attributed to this dual carriageway road standard (2 lanes each way) in the WAPC *Liveable Neighbourhoods* Policy, so it should already be upgraded to 3 lanes each way regardless of any future development in the Drovers Place Precinct.

Analysis of total turning traffic flows at the Joondalup Drive / Drovers Place intersection indicates that traffic from the proposed development of 225 dwellings on the subject site would represent 30.8% of total turning traffic in the AM peak and 20.9% of total turning traffic in the PM peak at this intersection when the Drovers Place Precinct is fully developed. If AM and PM peak traffic flows are considered together the subject site will contribute 24.9% of the total turning traffic at this intersection and the additional development in the Central Precinct would represent 42.7% of total turning traffic at this intersection. If the focus is purely on traffic increase rather than total traffic then the subject site will contribute 36.8% of the increase and the additional Central Precinct development would contribute the other 63.2% of the increase in turning traffic flows at this intersection.

Appendix A

Drovers Place
Structure Plan No. 80
(August 2016)


Legend
Municipal Heritage Site
Dual Use Path
Primary View Corridor & Public Access Way
Signalised Intersection
Precinct Boundary
Structure Plan Boundary
Local Goverment Boundary
Access Easement
Compatible Use Wetland Buffer
High Groundwater Area
Sewer Pump Station
Wetland Boundary
MRWA Drainage Swale
MRWA Drainage Easement
District Planning Scheme No.2
Business
Residential
Special Residential
Special Use
Metropolitan Region Scheme
Primary Regional Road
DROVERS PLACE
STRUCTURE PLAN No. 80
Lake Joondalup
City of Joondalup
GDA
City of Wanneroo
Produced by Planning & Sustainability
24 October 2016
0 50 100 200 300 400
Metres
Lot 11
Lot 66
Lot 67
Lot 9038
Joondalup Dr
Drovers Pl
Sandilands Ccr
Grasmere Fawy
Maryland Dr
Lot 2
WESTERN PRECINCT
Lot 5
Lot 100
Lot 810
Lot 8
Lot 7
Lot 6
Lot 811
CENTRAL PRECINCT
Lot 812
Lot 23
Lot 21
Lot 25
Lot 29
Lot 1
18m Wide Road Reserve
Lot 20
Lot 9
Lot 28
Lot 22
Lot 132
Wanneroo Rd
Lot 24
Lot 10
Lot 15
SOUTHERN PRECINCT
Lot 501
15m Wide Road Reserve
Lot 27
Lot 406
Ashley Rd
Lot 9471
Lot 500
Lot 402
Triller Bend
Egretta Rd
Goshawk S
Way

Appendix B

Proposed Local Structure Plan
Lots 6, 7, 8 and 12462 Drovers Place, Wanneroo


JOONDALUP
DRIVE
DROVERS
PLACE
POS
R60
R30
R40
6m ROAD RESERVE
18m ROAD RESERVE
15m ROAD RESERVE
JOONDALUP FIRE STATION
LOT 12462
REGENTS GARDEN RESIDENTIAL CARE
LOT 8
LOT 7
LOT 6
30.9m ROAD RESERVE
12m ROAD RESERVE
YELLAGONGA REGIONAL PARK
LAKE JOONDALUP NATURE RESERVE
LEGEND
STRUCTURE PLAN BOUNDARY
CONTOURS
EXISTING LOT No./BOUNDARY
DENSITY
R30
R40
R60
OTHER
POS/DRAINAGE
INDICATIVE ASSET PROTECTION ZONE (APZ)
PRINCIPAL SHARED PATH (EXISTING)
PRINCIPAL SHARED PATH (PROPOSED)
VIEW CORRIDORS
Note: APZ in accordance with Approved Bushfire Management Plan
N
1:1500
SIZE A3
REF NO. CED DRO
DRAW NO. RD1 004
REV. D
LOCAL STRUCTURE PLAN
Lots 6, 7, 8 and 12462 Drover's Place
City of Wanneroo

Appendix C

SIDRA Intersection Analysis

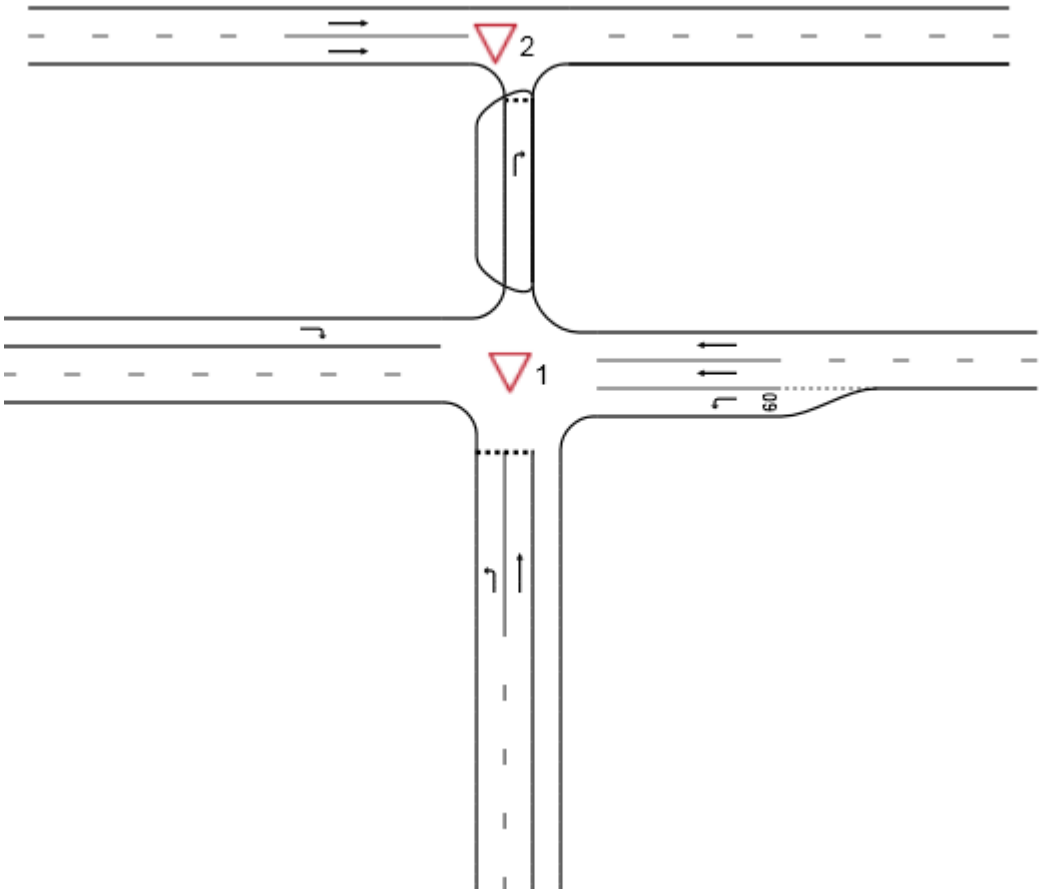


Figure C1. Joondalup Drive / Drovers Place T-junction existing layout analysed in SIDRA

(Note: The two-stage right turn out to the median then to Joondalup Drive eastbound requires this intersection to be modelled as two intersections linked together in SIDRA Network analysis. The right turn in is modelled as part of intersection 1. The distance between the two intersections is 13m, which is the existing median width (diagram not to scale).

Table C1a. SIDRA results – Joondalup Dr / Drovers Place existing unsignalised T-junction– 2016 AM peak (no development on Lots 6, 7 & 8)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Drovers Pl (S)													
1	L2	93	1.0	93	1.0	0.721	59.4	LOS F	3.0	21.0	0.97	1.17	29.8
2	T1	23	1.0	23	1.0	3.833	2951.3	LOS F	19.1	135.1	1.00	1.35	0.6
Approach		116	1.0	116	1.0	3.833	632.8	LOS F	19.1	135.1	0.98	1.21	4.3
East: Joondalup Dr (E)													
4	L2	31	1.0	31	1.0	0.017	7.0	LOS A	0.0	0.0	0.00	0.63	65.1
5	T1	2787	2.0	2787	2.0	0.716	0.2	LOS A	0.0	0.0	0.00	0.00	79.3
Approach		2818	2.0	2818	2.0	0.716	0.3	NA	0.0	0.0	0.00	0.01	79.1
West: Joondalup Dr (W)													
12	R2	52	1.0	52	1.0	8.667	7126.0	LOS F	47.4	334.6	1.00	1.29	0.5
Approach		52	1.0	52	1.0	8.667	7126.0	NA	47.4	334.6	1.00	1.29	0.5
All Vehicles		2986	1.9	2986	1.9	8.667	148.9	NA	47.4	334.6	0.06	0.08	17.7

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Median Storage Area													
3	R2	23	1.0	6	1.0	0.016	7.3	LOS A	0.0	0.3	0.73	0.71	49.9
Approach		23	1.0	6[N1]	1.0	0.016	7.3	LOS A	0.0	0.3	0.73	0.71	49.9
West: Joondalup Dr (W)													
11	T1	1267	2.0	1267	2.0	0.326	0.0	LOS A	0.0	0.0	0.00	0.00	79.9
Approach		1267	2.0	1267	2.0	0.326	0.0	NA	0.0	0.0	0.00	0.00	79.9
All Vehicles		1290	2.0	1273[N1]	2.0	0.326	0.1	NA	0.0	0.3	0.00	0.00	79.7

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.
Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.0 %
Number of Iterations: 5 (maximum specified: 10)

N1 Arrival Flow value is reduced due to capacity constraint at oversaturated upstream lanes.

Table C1b. SIDRA results – Joondalup Dr / Drovers Place existing unsignalised T-junction– 2016 PM peak (no development on Lots 6, 7 & 8)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Drovers Pl (S)													
1	L2	137	1.0	137	1.0	0.353	14.6	LOS B	1.3	9.0	0.79	0.96	47.0
2	T1	22	1.0	22	1.0	0.947	379.4	LOS F	3.3	23.3	1.00	1.17	4.4
Approach		159	1.0	159	1.0	0.947	65.1	LOS F	3.3	23.3	0.82	0.99	27.3
East: Joondalup Dr (E)													
4	L2	30	1.0	30	1.0	0.016	7.0	LOS A	0.0	0.0	0.00	0.63	65.1
5	T1	1821	2.0	1821	2.0	0.468	0.1	LOS A	0.0	0.0	0.00	0.00	79.7
Approach		1851	2.0	1851	2.0	0.468	0.2	NA	0.0	0.0	0.00	0.01	79.5
West: Joondalup Dr (W)													
12	R2	81	1.0	81	1.0	2.134	1119.5	LOS F	32.7	231.1	1.00	2.02	3.0
Approach		81	1.0	81	1.0	2.134	1119.5	NA	32.7	231.1	1.00	2.02	3.0
All Vehicles		2091	1.9	2091	1.9	2.134	48.5	NA	32.7	231.1	0.10	0.16	37.2

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Arrival Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Median Storage Area													
3	R2	22	1.0	22	1.0	0.338	59.7	LOS F	0.9	4.9	0.97	1.02	20.9
Approach		22	1.0	22	1.0	0.338	59.7	LOS F	0.9	4.9	0.97	1.02	20.9
West: Joondalup Dr (W)													
11	T1	2167	2.0	2167	2.0	0.557	0.1	LOS A	0.0	0.0	0.00	0.00	79.6
Approach		2167	2.0	2167	2.0	0.557	0.1	NA	0.0	0.0	0.00	0.00	79.6
All Vehicles		2189	2.0	2189	2.0	0.557	0.7	NA	0.9	4.9	0.01	0.01	78.5

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.

Largest change in Average Back of Queue or Degree of Saturation for any lane during the last three iterations: 0.0 %

Number of Iterations: 5 (maximum specified: 10)

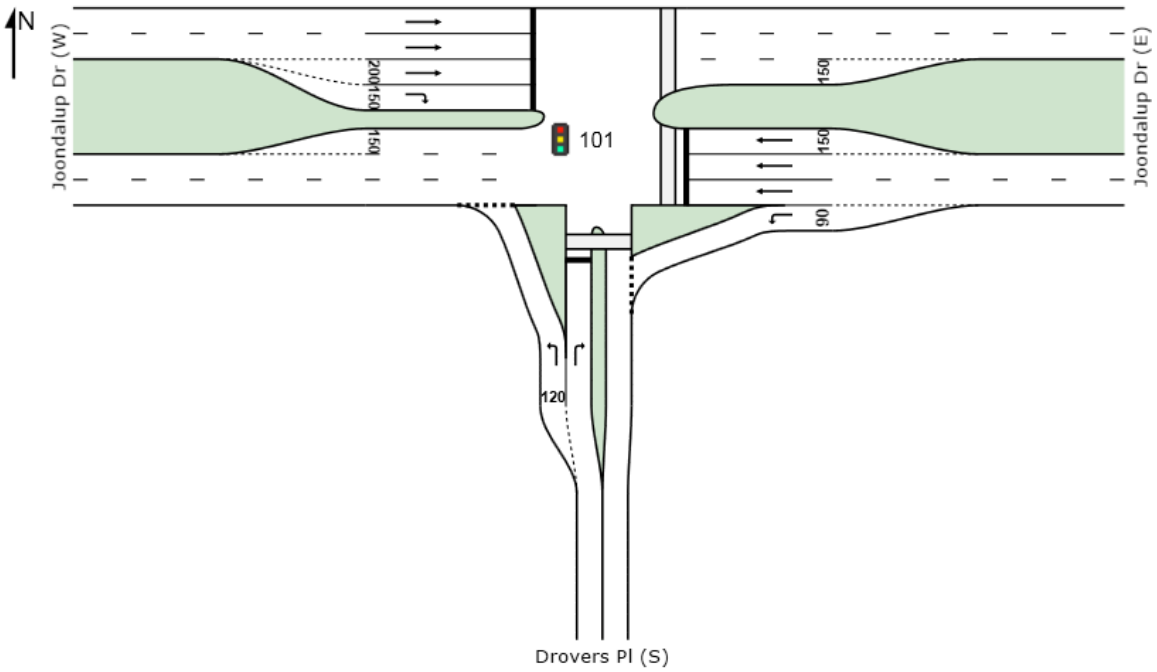


Figure C2. Joondalup Drive / Drovers Place signalised intersection layout analysed in SIDRA (Interim scenario while Joondalup Drive is two lanes each way)

Table C2a. SIDRA results – Joondalup Dr / Drovers Pl signalised intersection – 2019 AM peak with no development on Lots 6, 7 & 8

Signals - Fixed Time Isolated Cycle Time = 150 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Drovers Pl (S)											
1	L2	196	1.0	0.473	54.9	LOS D	12.8	90.2	0.93	1.01	31.2
3	R2	23	1.0	0.309	84.8	LOS F	1.7	12.3	1.00	0.71	24.8
Approach		219	1.0	0.473	58.0	LOS E	12.8	90.2	0.93	0.98	30.4
East: Joondalup Dr (E)											
4	L2	31	1.0	0.020	8.7	LOS A	0.3	2.1	0.17	0.63	54.1
5	T1	3081	2.0	0.851	12.3	LOS B	58.9	419.5	0.64	0.60	63.0
Approach		3112	2.0	0.851	12.2	LOS B	58.9	419.5	0.64	0.60	62.9
West: Joondalup Dr (W)											
11	T1	1489	2.0	0.373	7.5	LOS A	13.9	98.8	0.39	0.35	68.7
12	R2	155	1.0	0.780	82.6	LOS F	11.8	83.0	1.00	0.86	25.8
Approach		1644	1.9	0.780	14.6	LOS B	13.9	98.8	0.45	0.40	59.3
All Vehicles		4975	1.9	0.851	15.0	LOS B	58.9	419.5	0.59	0.55	58.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

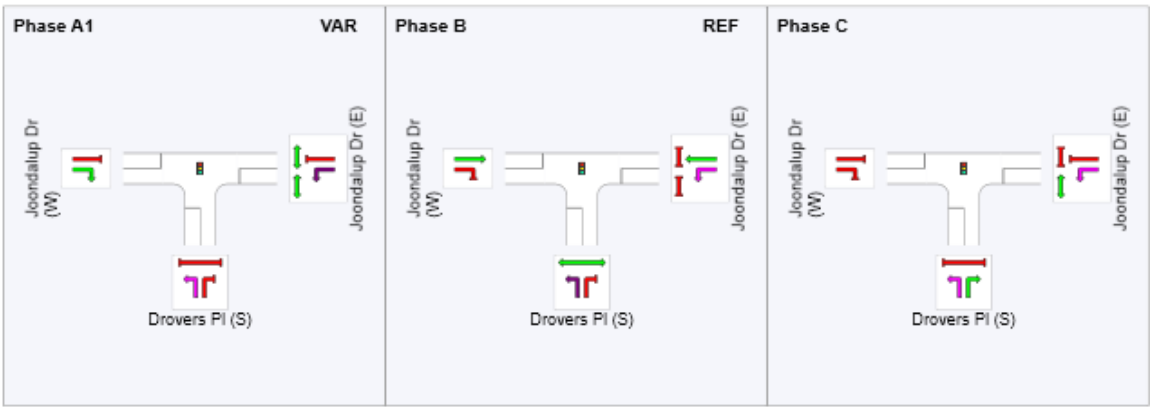
Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	7.4	LOS A	0.1	0.1	0.31	0.31
P21	East Stage 1	50	55.6	LOS E	0.2	0.2	0.86	0.86
P22	East Stage 2	50	66.4	LOS F	0.2	0.2	0.94	0.94
All Pedestrians		150	43.1	LOS E			0.71	0.71

Phase Timing Results

Phase	A1	B	C
Phase Change Time (sec)	128	0	116
Green Time (sec)	16	110	6
Phase Time (sec)	22	116	12
Phase Split	15 %	77 %	8 %

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.



REF: Reference Phase
VAR: Variable Phase

Table C2b. SIDRA results – Joondalup Dr / Drovers Pl signalised intersection – 2019 PM peak with no development on Lots 6, 7 & 8

Signals - Fixed Time Isolated Cycle Time = 150 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Drovers Pl (S)											
1	L2	343	1.0	0.495	34.5	LOS C	17.9	126.7	0.83	0.99	37.7
3	R2	22	1.0	0.295	84.7	LOS F	1.7	11.8	1.00	0.71	24.9
Approach		365	1.0	0.495	37.6	LOS D	17.9	126.7	0.84	0.97	36.6
East: Joondalup Dr (E)											
4	L2	30	1.0	0.021	10.2	LOS B	0.4	2.9	0.23	0.64	52.9
5	T1	2042	2.0	0.619	18.3	LOS B	33.0	234.6	0.65	0.59	57.1
Approach		2072	2.0	0.619	18.1	LOS B	33.0	234.6	0.64	0.59	57.1
West: Joondalup Dr (W)											
11	T1	2335	2.0	0.699	19.9	LOS B	40.4	287.5	0.71	0.65	55.7
12	R2	287	1.0	0.680	64.4	LOS E	19.3	135.9	0.97	0.85	29.6
Approach		2622	1.9	0.699	24.7	LOS C	40.4	287.5	0.74	0.67	50.8
All Vehicles		5059	1.9	0.699	23.0	LOS C	40.4	287.5	0.71	0.66	51.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

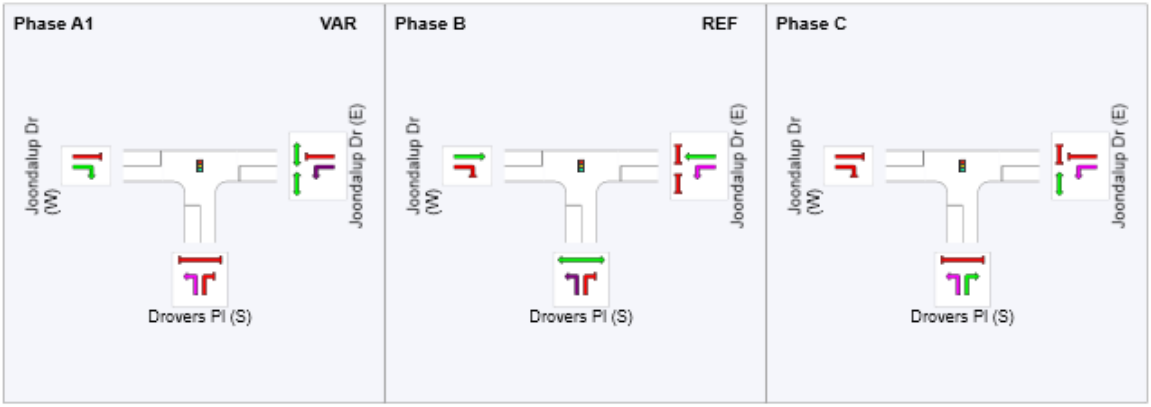
Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	14.1	LOS B	0.1	0.1	0.43	0.43
P21	East Stage 1	50	41.2	LOS E	0.2	0.2	0.74	0.74
P22	East Stage 2	50	50.5	LOS E	0.2	0.2	0.82	0.82
All Pedestrians		150	35.3	LOS D			0.67	0.67

Phase Timing Results

Phase	A1	B	C
Phase Change Time (sec)	110	0	98
Green Time (sec)	34	92	6
Phase Time (sec)	40	98	12
Phase Split	27 %	65 %	8 %

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.



REF: Reference Phase
VAR: Variable Phase

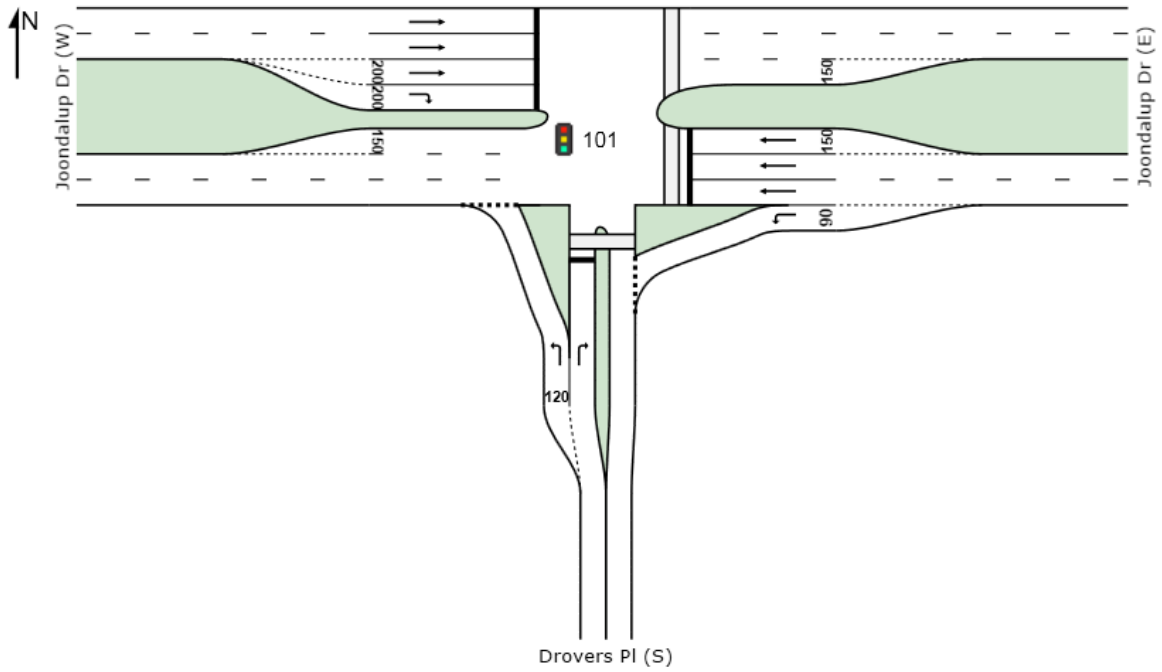


Figure C3. Joondalup Drive / Drovers Place signalised intersection layout analysed in SIDRA (Interim scenario while Joondalup Drive is two lanes each way)

Table C3a. SIDRA results – Joondalup Dr / Drovers Pl signalised intersection – 2019 AM peak (with 225 dwelling development)

Signals - Fixed Time Isolated Cycle Time = 150 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand 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 per veh	Average Speed km/h
South: Drovers Pl (S)											
1	L2	277	1.0	0.616	60.2	LOS E	17.6	124.6	0.95	1.06	29.9
3	R2	77	1.0	0.775	87.2	LOS F	6.1	42.7	1.00	0.87	24.4
Approach		354	1.0	0.775	66.1	LOS E	17.6	124.6	0.96	1.02	28.5
East: Joondalup Dr (E)											
4	L2	49	1.0	0.031	9.0	LOS A	0.5	3.7	0.18	0.64	53.8
5	T1	3081	2.0	0.870	14.8	LOS B	61.6	438.6	0.68	0.65	60.4
Approach		3130	2.0	0.870	14.7	LOS B	61.6	438.6	0.68	0.65	60.3
West: Joondalup Dr (W)											
11	T1	1489	2.0	0.383	8.7	LOS A	14.9	106.3	0.42	0.38	67.2
12	R2	182	1.0	0.862	87.3	LOS F	14.5	102.2	1.00	0.91	25.0
Approach		1671	1.9	0.862	17.3	LOS B	14.9	106.3	0.48	0.43	56.7
All Vehicles		5155	1.9	0.870	19.1	LOS B	61.6	438.6	0.63	0.60	54.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

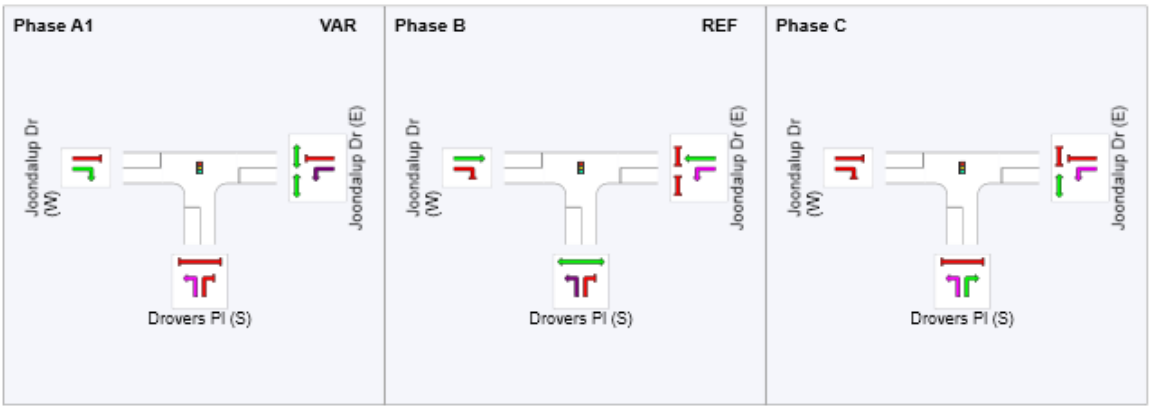
Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	8.4	LOS A	0.1	0.1	0.33	0.33
P21	East Stage 1	50	53.0	LOS E	0.2	0.2	0.84	0.84
P22	East Stage 2	50	65.5	LOS F	0.2	0.2	0.94	0.94
All Pedestrians		150	42.3	LOS E			0.70	0.70

Phase Timing Results

Phase	A1	B	C
Phase Change Time (sec)	127	0	113
Green Time (sec)	17	107	8
Phase Time (sec)	23	113	14
Phase Split	15 %	75 %	9 %

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.



REF: Reference Phase
VAR: Variable Phase

Table C3b. SIDRA results – Joondalup Dr / Drovers Pl signalised intersection – 2019 PM peak (with 225 dwelling development)

Signals - Fixed Time Isolated Cycle Time = 150 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand 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 per veh	Average Speed km/h
South: Drovers Pl (S)											
1	L2	384	1.0	0.515	35.2	LOS D	19.2	135.4	0.81	0.99	37.4
3	R2	49	1.0	0.657	87.5	LOS F	3.8	27.1	1.00	0.79	24.4
Approach		433	1.0	0.657	41.1	LOS D	19.2	135.4	0.83	0.97	35.3
East: Joondalup Dr (E)											
4	L2	75	1.0	0.055	11.5	LOS B	1.3	9.1	0.28	0.66	52.0
5	T1	2042	2.0	0.668	21.6	LOS C	37.0	263.2	0.70	0.64	54.3
Approach		2117	2.0	0.668	21.2	LOS C	37.0	263.2	0.69	0.64	54.2
West: Joondalup Dr (W)											
11	T1	2335	2.0	0.739	23.5	LOS C	43.9	312.7	0.77	0.71	52.8
12	R2	354	1.0	0.731	61.7	LOS E	23.7	167.0	0.98	0.86	30.2
Approach		2689	1.9	0.739	28.5	LOS C	43.9	312.7	0.80	0.73	48.1
All Vehicles		5239	1.8	0.739	26.6	LOS C	43.9	312.7	0.76	0.71	48.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

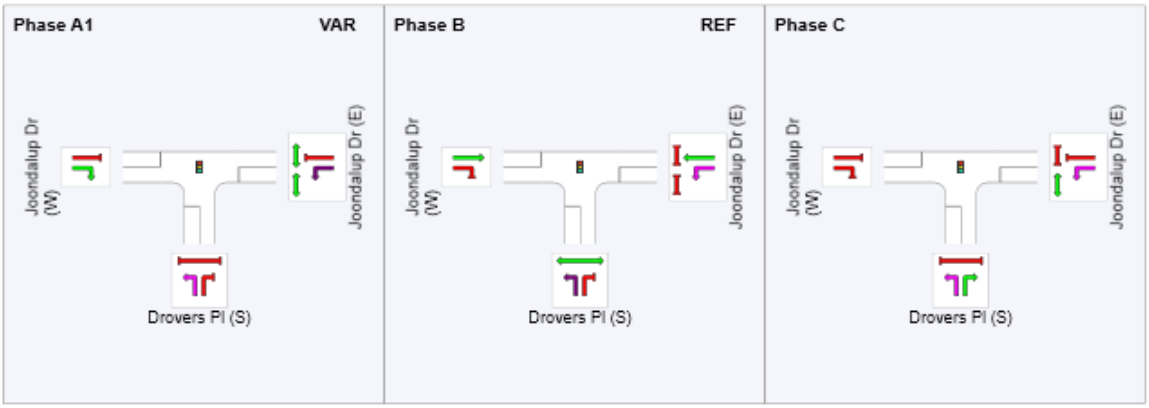
Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	16.4	LOS B	0.1	0.1	0.47	0.47
P21	East Stage 1	50	37.5	LOS D	0.2	0.2	0.71	0.71
P22	East Stage 2	50	46.5	LOS E	0.2	0.2	0.79	0.79
All Pedestrians		150	33.5	LOS D			0.65	0.65

Phase Timing Results

Phase	A1	B	C
Phase Change Time (sec)	105	0	93
Green Time (sec)	39	87	6
Phase Time (sec)	45	93	12
Phase Split	30 %	62 %	8 %

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.



REF: Reference Phase
VAR: Variable Phase

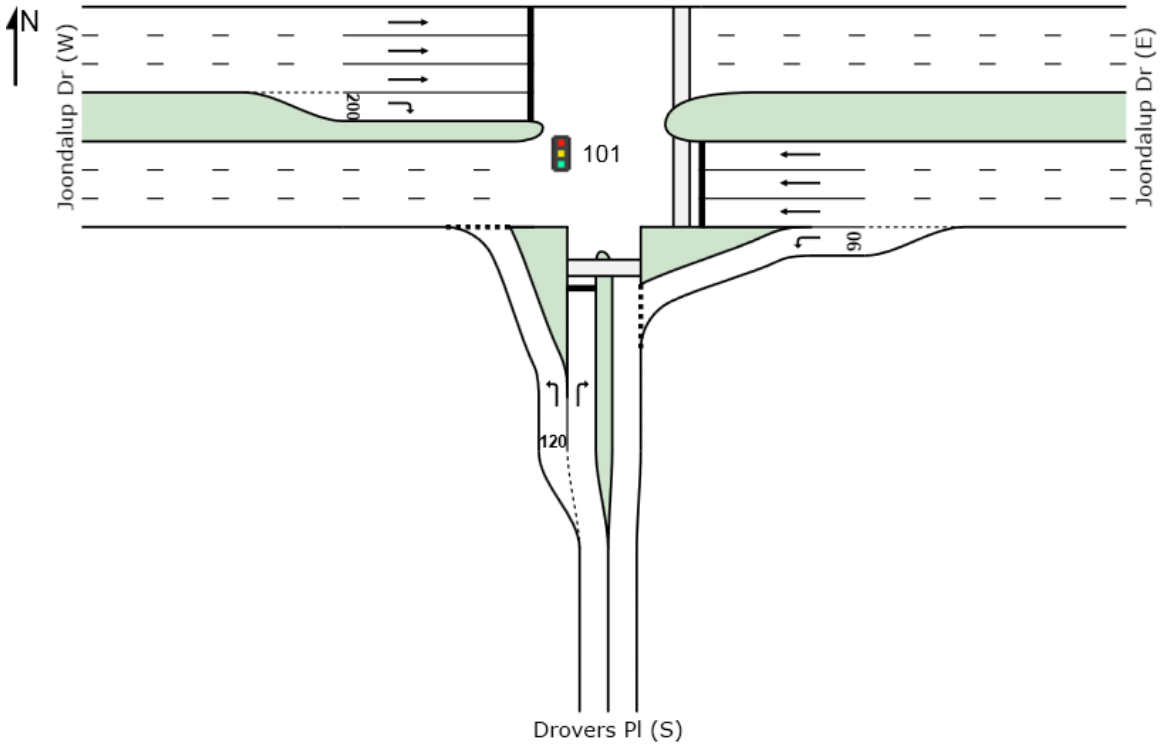


Figure C4. Joondalup Drive / Drovers Place signalised intersection layout analysed in SIDRA (Ultimate scenario with Joondalup Drive upgraded to three lanes each way)

Table C4a. SIDRA results – Joondalup Dr / Drovers Pl signalised intersection – 2031 AM peak (with 225 dwelling development)

Signals - Fixed Time Isolated Cycle Time = 150 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand 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 per veh	Average Speed km/h
South: Drovers Pl (S)											
1	L2	277	1.0	0.583	56.3	LOS E	17.3	122.2	0.93	1.05	30.8
3	R2	77	1.0	0.775	87.2	LOS F	6.1	42.7	1.00	0.87	24.4
Approach		354	1.0	0.775	63.1	LOS E	17.3	122.2	0.95	1.01	29.2
East: Joondalup Dr (E)											
4	L2	49	1.0	0.032	9.0	LOS A	0.5	3.7	0.18	0.64	53.8
5	T1	3285	2.0	0.812	16.2	LOS B	54.9	391.0	0.75	0.71	59.0
Approach		3334	2.0	0.812	16.1	LOS B	54.9	391.0	0.74	0.71	58.9
West: Joondalup Dr (W)											
11	T1	1588	2.0	0.389	9.7	LOS A	15.5	110.6	0.45	0.40	66.0
12	R2	182	1.0	0.771	79.7	LOS E	13.6	96.0	1.00	0.86	26.3
Approach		1770	1.9	0.771	16.9	LOS B	15.5	110.6	0.50	0.45	57.1
All Vehicles		5458	1.9	0.812	19.4	LOS B	54.9	391.0	0.68	0.64	54.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

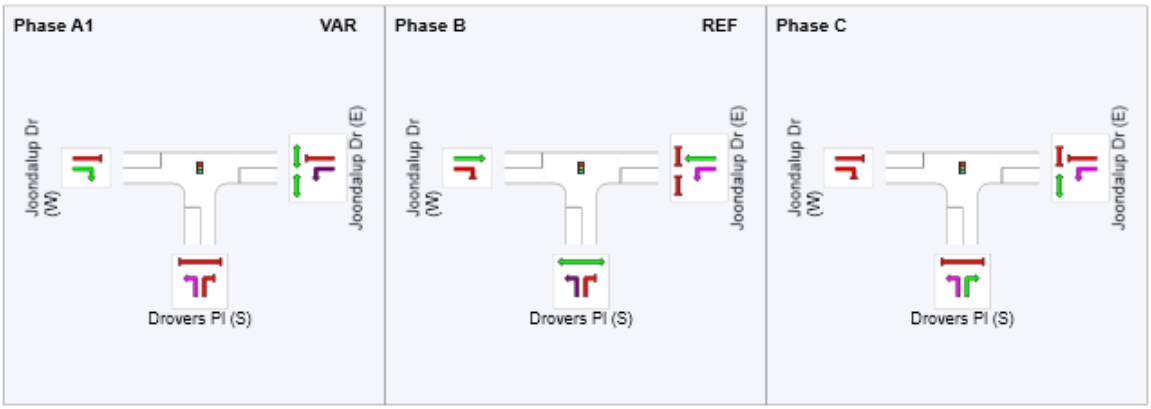
Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	9.0	LOS A	0.1	0.1	0.35	0.35
P21	East Stage 1	50	51.4	LOS E	0.2	0.2	0.83	0.83
P22	East Stage 2	50	63.6	LOS F	0.2	0.2	0.92	0.92
All Pedestrians		150	41.3	LOS E			0.70	0.70

Phase Timing Results

Phase	A1	B	C
Phase Change Time (sec)	125	0	111
Green Time (sec)	19	105	8
Phase Time (sec)	25	111	14
Phase Split	17 %	74 %	9 %

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.



REF: Reference Phase
VAR: Variable Phase

Table C4b. SIDRA results – Joondalup Dr / Drovers Pl signalised intersection – 2031 PM peak (with 225 dwelling development)

Signals - Fixed Time Isolated Cycle Time = 150 seconds (User-Given Cycle Time)

Movement Performance - Vehicles

Mov ID	OD Mov	Demand 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 per veh	Average Speed km/h
South: Drovers Pl (S)											
1	L2	384	1.0	0.522	36.8	LOS D	19.3	136.4	0.82	1.00	36.8
3	R2	49	1.0	0.657	87.5	LOS F	3.8	27.1	1.00	0.79	24.4
Approach		433	1.0	0.657	42.6	LOS D	19.3	136.4	0.84	0.97	34.8
East: Joondalup Dr (E)											
4	L2	75	1.0	0.055	11.5	LOS B	1.3	9.1	0.28	0.66	52.0
5	T1	2179	2.0	0.664	22.3	LOS C	36.6	260.8	0.73	0.67	53.8
Approach		2254	2.0	0.664	21.9	LOS C	36.6	260.8	0.71	0.67	53.7
West: Joondalup Dr (W)											
11	T1	2490	2.0	0.736	24.3	LOS C	43.6	310.2	0.80	0.74	52.2
12	R2	354	1.0	0.731	61.7	LOS E	23.7	167.0	0.98	0.86	30.2
Approach		2844	1.9	0.736	29.0	LOS C	43.6	310.2	0.82	0.75	47.8
All Vehicles		5531	1.8	0.736	27.2	LOS C	43.6	310.2	0.78	0.73	48.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

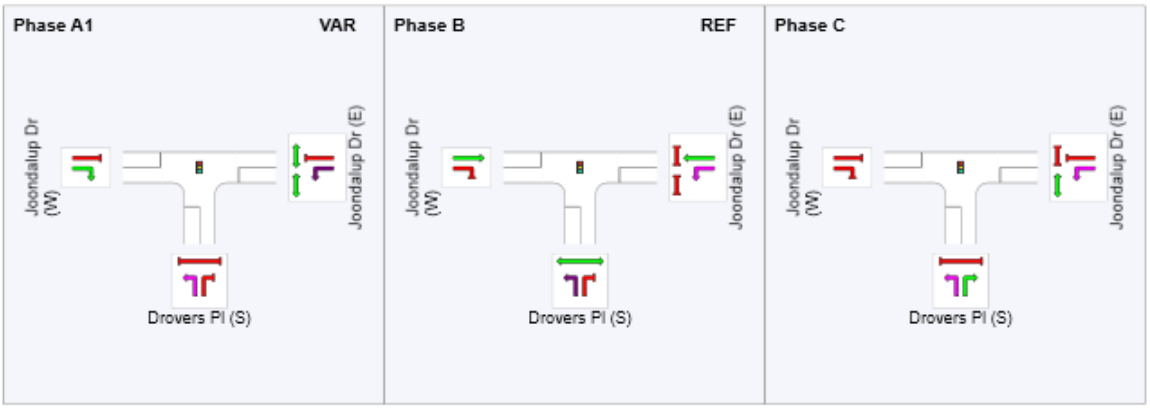
Movement Performance - Pedestrians

Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Average Back of Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	South Full Crossing	50	16.4	LOS B	0.1	0.1	0.47	0.47
P21	East Stage 1	50	37.5	LOS D	0.2	0.2	0.71	0.71
P22	East Stage 2	50	46.5	LOS E	0.2	0.2	0.79	0.79
All Pedestrians		150	33.5	LOS D			0.65	0.65

Phase Timing Results

Phase	A1	B	C
Phase Change Time (sec)	105	0	93
Green Time (sec)	39	87	6
Phase Time (sec)	45	93	12
Phase Split	30 %	62 %	8 %

See the Phase Information section in the Detailed Output report for more detailed information including input values of Yellow Time and All-Red Time, and information on any adjustments to Intergreen Time, Phase Time and Green Time values in cases of Pedestrian Actuation, Phase Actuation and Phase Frequency values (user-specified or implied) less than 100%.



REF: Reference Phase
VAR: Variable Phase

APPENDIX E

ENVIRONMENTAL ASSESSMENT
(PGV ENVIRONMENTAL, MAY 2017)

pgv ENVIRONMENTAL

Phone + 61 8 6500 8801
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Email paul@pgv.net.au

Unit 1, 61 Guthrie Street
Osborne Park WA 6017

ABN 44 981 725 498
Knightside Nominees Pty Ltd

19 May 2017

Shaun Mayne

Catholic Education Office of WA
PO Box 198
LEEDERVILLE WA 6903

Dear Shaun,

RE: Lots 6,7 & 8 Drovers Place, Wanneroo – Environmental Assessment

Following is our environmental assessment of the proposal to develop Lots 6, 7 & 8 Drovers Place, Wanneroo (the site) for residential purposes.

1 Structure Plan

A Structure Plan has been prepared by Roberts Day for the site on behalf of the Catholic Education Office (Attachment 1). The Plan includes residential development at a density code of R30 – R60 over most of the site. R30 areas are located on the perimeter of the lots on the northern, eastern and western sides with higher density at R40 in the central area. R60 areas are proposed on parts of the Structure Plan surrounding Public Open Space (POS) (Attachment 1).

The western and southern boundaries of the development abut Yellagonga Regional Park. The interface along the southern boundary includes a road and POS. The interface along the western boundary consists mostly of a road as well as two small areas of POS and two short sections where future lots directly abut the Park.

2 Environmental Factors

Land Use

The site was previously used for agricultural purposes including a small orchard on Lot 6. The three lots contained dwellings and sheds, all of which have been dismantled and taken off-site.

The site is currently not used for any purposes.

Topography

The site is generally flat with the highest point at 26m AHD in the north-east corner and the lowest point at 20m AHD in the south-west corner.

Soils

The soil type on most of the site is mapped as the Karrakatta Sand Yellow Phase which consists of low hilly to gently undulating terrain with yellow sand over limestone. No limestone is outcropping on the site.

A small portion of the south-west corner of the site is mapped as Spearwood Wet, Lake Phase and is described as a lake. This description does not accurately apply to the south-west corner of the site which is considered more like the Karrakatta Sand type.

Hydrology

Groundwater beneath the site is at least 3.5m below ground surface level and is not considered to be an issue for development. A portion in the southwestern corner of the site has a minimum of 1.5m below ground surface level and may require some sand fill.

Wetlands

Lake Joondalup, a Conservation Category Wetland (CCW), is located to the south of the site. The nominal minimum 50m buffer between development and the boundary of the CCW lies outside the development site's southern boundary apart from a very small incursion into the south-east corner of Lot 7 (Attachment 2). The 50m buffer is included in POS in the southern part of the site.

Vegetation and Flora

The native vegetation on the site has largely been cleared or is very degraded where present. Some poor quality *Jacksonia furcellata* and *J. sternbergiana* occur at the northern end of Lots 7 and 8. A large number of trees occurs on lots 7 and 8. PGV Environmental undertook a tree survey on 24 March 2017 (Attachment 3). Most of the trees were exotic however some Jarrah (*Eucalyptus marginata*) and a few stands of Marri (*Corymbia calophylla*) trees occur in the central parts of Lots 7 and 8 (Plate 1).

Plate 1 Stand of Marri trees on Lot 7

A prominent avenue of mature Lemon-scented Gums (*Corymbia citriodora*) is located on the eastern boundary of Lot 6 (Plate 2). These trees are retained in a 12m median down the centre of the 'proposed boulevard'.

Plate 2 Avenue of Lemon-scented Gum trees (Lot 8)

No conservation significant flora species or ecological communities would be expected to occur on the site given its degraded condition.

In response to the tree survey POS includes areas containing native species including a large stand of Marri trees with Jarrah and Banksia. The remainder of the POS retains large specimens of Lemon-scented gums and Sydney Flooded Gum.

Fauna

The vegetation on the site has limited value for native fauna and limited potential for any conservation significant species. The trees on the site would be used by a range of bird species.

The Marri and Jarrah trees provide potential habitat for Carnaby's Black Cockatoo. No evidence of foraging activity on the Marri and Jarrah nuts was observed during the March 2017 tree survey.

Potential Contamination

A Preliminary Site Investigation undertaken by Coffey Environments (2008) did not identify any constraints on development related to contamination issues. Some on-site building debris and rubbish will require removal and disposal prior to development.

Acid Sulphate Soils

The site has a Low risk of Acid Sulphate Soils (ASS) and a subdivision application is unlikely to trigger a development condition that requires further ASS investigations.

Stormwater Drainage

The site when fully developed will drain to the north-west, south-west and south-east. Any stormwater drainage infrastructure will need to be designed according to the principles contained in the Drovers Place Structure Plan Water Management Framework prepared by the City of Wanneroo (undated), which is the equivalent to a Local Water Management Strategy (LWMS). The Framework supports the incorporation of Water Sensitive Urban Design to protect the environmental values of the bushland and wetland areas within the adjoining Yellagonga Regional Park. Urban Water Management Plans (UWMP) will be prepared at subdivision.

Midges

Midges are nuisance insects. The main source for midges that may impact on the site are primarily from Lake Joondalup, located approximately 100m to the south, as well as from standing water within the development.

Cultural Heritage

No Aboriginal Heritage Sites occur on the site.

3 Environmental Assessment

PGV Environmental considers that the Structure Plan (Attachment 1) is environmentally acceptable for the following reasons:

- No intact native vegetation or conservation significant flora or vegetation occurs on the site;
- The Public Open Space and entry road median design retains many of the mature Lemon-scented Gum trees as well as some other native and exotic trees in the southern POS area including Marri trees with some Jarrah and Banksia as well as some exotic species;

- inclusion of native and exotic trees in POS and road reserves on site will retain habitat for bird species;
- All development is located outside the 50m buffer to Lake Joondalup;
- A hard interface (road) or POS is provided between the development and Yellagonga Regional Park. Where there are two short sections of lots directly abutting the western bushland area, access into the Park will be prevented by uniform fencing along the property boundary; and
- Stormwater run-off up to the 1:100 ARI will be consistent with the City of Wanneroo's Water Management Framework for the Drovers Place Structure Plan and additional detail on stormwater management will be provided in an UWMP to be submitted at subdivision.
- A Midge Management Plan may be required to include control measures, provision for signage and notifications on title to warn of midge nuisance in the area.

Please contact me if you would like to discuss this assessment further.

Yours sincerely

Paul van der Moezel
Managing Director

References

City of Wanneroo (undated) *Drovers Place Structure Plan Water Management Framework*. Prepared in support of the Drovers Place Structure Plan.

Coffey Environments (2008). *Environmental Assessment Lots 6, 7 & 8 (Now Proposed Lot 100) Drovers Place, Wanneroo.* Prepared fro David Barnao & Co. Property Consultants. 17 August 2008, Report EP2008/109.

Attachments

Attachment 1	Precinct Plan (Roberts Day – RD3 003 Rev D)
Attachment 2	Geomorphic Wetlands and ASS Risk Mapping
Attachment 3	Tree Locations

robertsday.com.au

N

1:1500 SIZE A3

0 metres 15 30 45 60 75

REF NO. CED DRO

DRAW NO. RD1 004

REV. D

LOCAL STRUCTURE PLAN
Lots 6, 7, 8 and 12462 Drover's Place
City of Wanneroo

Attachment 2

10232-wkpln02.dgn

PINPOINT CARTOGRAPHICS (08) 9562 7136

pgv ENVIRONMENTAL

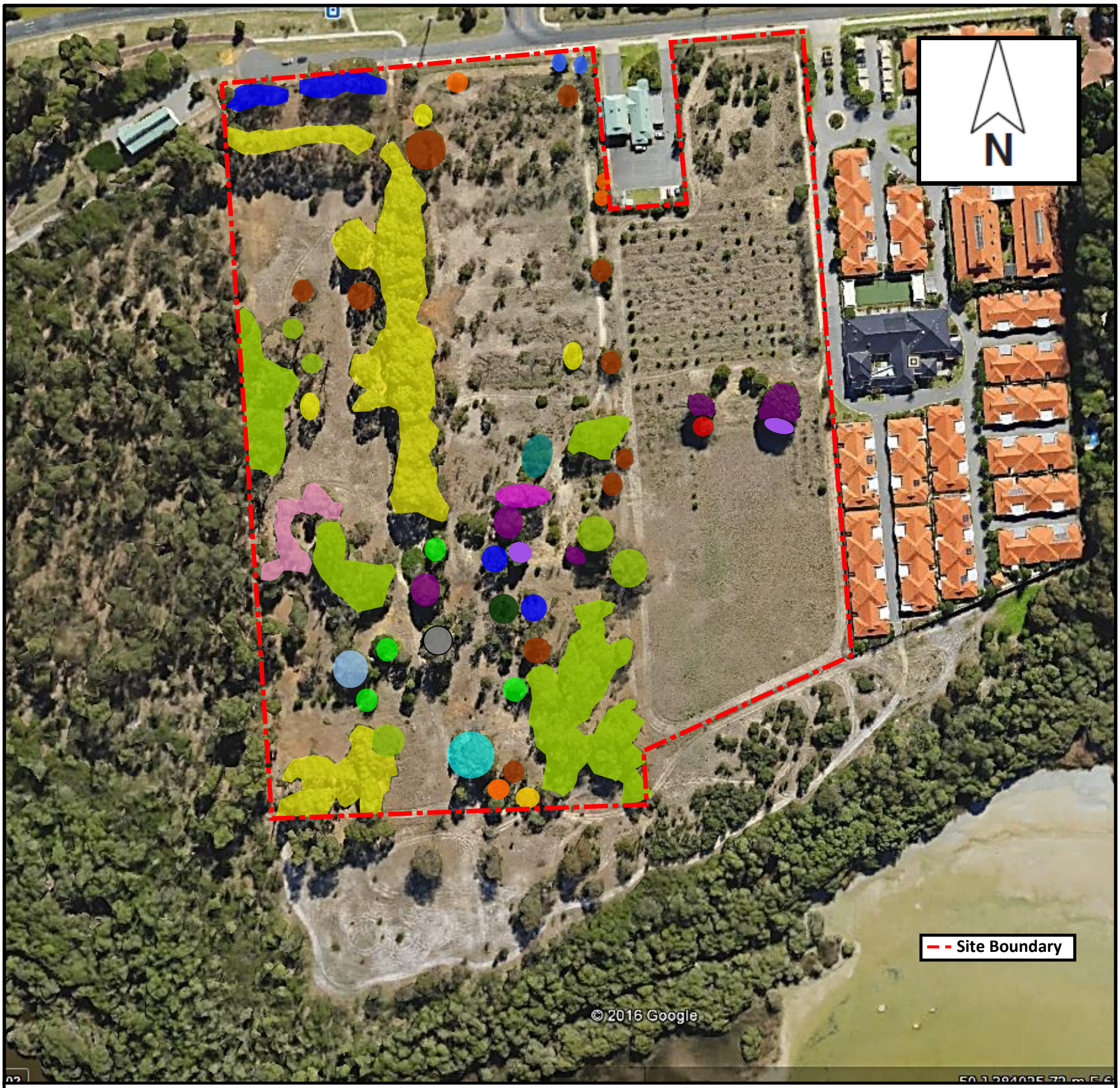
Catholic Education Office of WA
LOTS 6, 7 & 8 DROVER'S PLACE
WANNEROO

Drawn: P. van der Moezel	Date: 11 Apr 2017
Job: 10232 Rpt: -	Revision: A

GEOMORPHIC WETLANDS AND ASS RISK MAPPING

Workplan 2

Attachment 3



Marri	Fig	Jacaranda
Jarrah	Palm	Coral Tree
Tuart	Fiddlewood	WA Christmas Tree
Banksia spp.	Swamp Mahogany	Sheoak
Lemon-scented Gum	Sydney Flooded Gum	Rottnest Island Pine
Cypress	Ironbark	Norfolk Island Pine

pgv ENVIRONMENTAL

Catholic Education Office of WA
Lots 6, 7 and 8 Drovers Place, Wanneroo

Drawn: Paul Van der Moezel	Date: 27 March 2017
Job: 10232	Revision A

TREE LOCATIONS

WORKPLAN 1

Aerial sourced from Google Earth

APPENDIX F

BUSHFIRE MANAGEMENT PLAN
(BUSHFIRE PRONE PLANNING, APRIL 2017)

BPP Group Pty Ltd | ABN: 39 166 551 784
1/42 Victoria Street Midland WA 6056
PO Box 3489 Midland WA 6936
08 6477 1144 | admin@bushfireprone.com.au

Bushfire Management Plan (Strategic Planning Proposal)

Lot 6, 7 & 8 Drovers Place, Joondalup

City of Wanneroo

Project Number:	15502-1
Assessment Date:	31 March 2017
Report Date:	7 April 2017

Plan Details

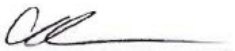
BMP Template v5.7	*©2017 BPP Group Pty Ltd*

Plan Version	Submitted to	Submitted Date
v1.0	Landowner & Proponent	-

Plan Version	Amendment Record	Submitted Date
v1.1	Changed plan layout (mapping) RW & MS 19 May 2017	19-May-17

Compliance Statement

This Bushfire Management Plan (the Plan) meets the requirements of both the *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas* (SPP 3.7) and the supporting *Guidelines for Planning in Bushfire Prone Areas* (WAPC v1.1 2017; the 'Guidelines').

Author	Bushfire Planning and Design (BPAD) Accreditation		Signature
Alex Aitken	Level 2 Bushfire Planning Practitioner	BPAD37739	

BPP Group Pty Ltd t/a Bushfire Prone Planning ACN: 39 166 551 784

Reviewed/Approved	Bushfire Planning and Design (BPAD) Accreditation		Signature
Mike Scott	Level 3 Bushfire Planning and Design Practitioner	27795	

BPP Group Pty Ltd t/a Bushfire Prone Planning ACN: 39 166 551 784

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1 Executive Summary

This Bushfire Management Plan (the Plan) has been prepared to support a proposed Local Structure Plan over Lots 6, 7 & 8 Drovers Place, Joondalup within the City of Wanneroo.

The development site is within a designated bushfire prone area and the Proposal requires the application of *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas* (SPP 3.7). The assessed bushfire risk is considered to be manageable and will be achieved by the identified stakeholders implementing and maintaining the bushfire risk management measures that are presented in this Plan.

Assessment of the planned location, vegetation and consideration of planned infrastructure indicates that compliance is able to be achieved against all applicable bushfire related legislation, policy, standards and guidelines, including the Bushfire Protection Criteria.

Against the Bushfire Protection Criteria, the decision maker's assessment of this Proposal is to be on the basis of it being able to meet the acceptable solutions for all four elements to be demonstrated in future planning stages and once construction and landscaping is complete.

Future buildings within 100 metres of classified vegetation will be constructed to standards which correspond to a determined BAL, as required by *AS 3959-2009 Construction of buildings in bushfire prone areas*. As this proposal does not identify the actual location of building works within the development, there may be a requirement to determine the BAL for individual building works once the actual building site has been identified.

The development site is adjacent to the Yellagonga Regional Reserve and Lake Joondalup Nature Reserve that may require additional environmental conditions in future planning stages to be complied with. No native vegetation is proposed to be cleared as part of this Local Structure plan as the onsite vegetation is introduced species and previously managed/cleared open woodlands within an old market garden/orchard.

2 Application of SPP 3.7

The *State Planning Policy No. 3.7: Planning in Bushfire Prone Areas* (SPP 3.7) provides the foundation for land use planning to address bushfire risk in Western Australia.

This Proposal must consider SPP 3.7 and, if required, comply with its policy measures. The determination of this requirement is presented below.

Application of SPP 3.7 Policy Measures – Primary Triggers	
The subject Proposal is a higher order strategic planning document, a strategic planning proposal or a subdivision or development application:	✓
The project site is in a designated bushfire prone area on the WA Map of Bushfire Prone Areas:	✓
The project site is not located in a designated bushfire prone area on the WA Map of Bushfire Prone Areas but the existing vegetation type and condition dictate that it should be:	
The project site is in an area not yet designated as bushfire prone but is proposed to be developed in a way that introduces a bushfire hazard (*Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017 s3.2.2*):	
Application of SPP 3.7 Policy Measures – Secondary Trigger/s	
The Proposal is a strategic planning proposal, subdivision or development application relating to land that has or will have a Bushfire Hazard Level above low and/or where a Bushfire Attack Level rating above BAL-LOW applies (SPP 3.7 s6.2):	✓
The subject Proposal is a development application for the construction or/and use of a single house or ancillary dwelling on a lot or lots greater than 1100m^2 and subject to BAL-40 or BAL-FZ (LPS Amendment Regulations 2015):	
The subject Proposal is a development application for the construction or/and use of a habitable building (other than a single house or ancillary dwelling), or a specified building on any lot size and subject to a BAL rating above BAL-LOW (LPS Amendment Regulations 2015):	

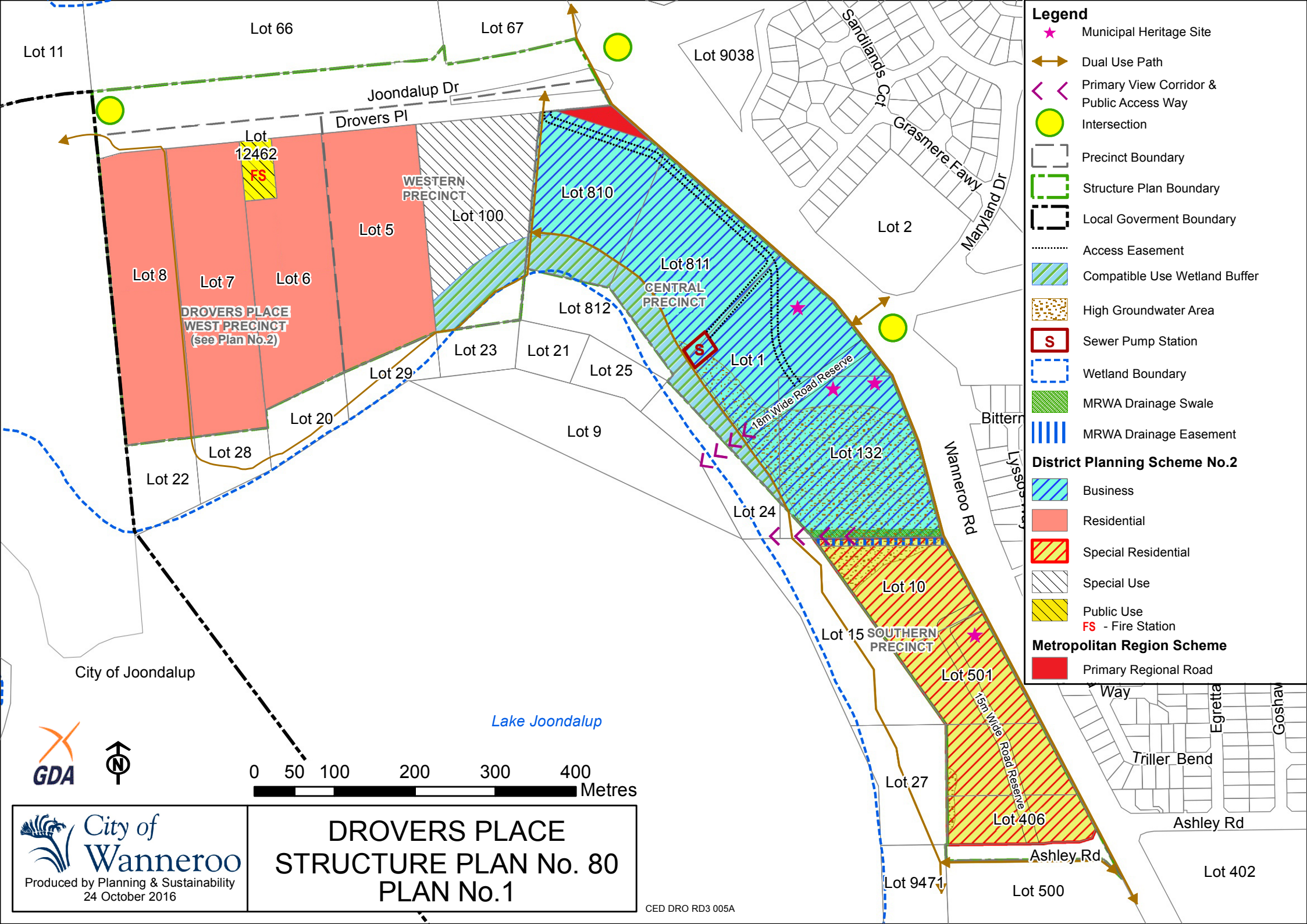
3 Commissioning and the Land Use Proposal

Bushfire Prone Planning (BPP Group Pty Ltd) has been commissioned to carry out the assessments and prepare the required bushfire planning documentation to accompany the proponent's planning submission associated with their proposed land use project.

Commissioning Record	
Landowner / Proponent:	Roman Catholic Archbishop of Perth
BPP Commissioned by:	Catholic Education WA (CEWA)- Shaun Mayne
Purpose:	To support a proposed local structure plan
Project Location	
Subject Site and Address:	Lot No. 6, 7 & 8 Drovers Place, Joondalup
Local Government:	City of Wanneroo
Zoning and R-Code:	-
Project Description	
Description:	
Building Class:	-
Lot Areas:	Refer to Table 3.1

Table 3.1: Proposed subdivision lot areas for Lot 6, 7 & 8 Drovers Place, Joondalup

Current Lot (ha)		
Lot 6	**Lot 7**	**Lot 8**
2.9253	3.2947	3.0727



City of Wanneroo

Produced by Planning & Sustainability
24 October 2016

DROVERS PLACE STRUCTURE PLAN No. 80 PLAN No.1

CED DRO RD3 005A

robertsday.com.au

N

1:1500 SIZE A3

0 metres 15 30 45 60 75

REF NO. CED DRO

DRAW NO. RD1 004

REV. D

LOCAL STRUCTURE PLAN
Lots 6, 7, 8 and 12462 Drover's Place
City of Wanneroo

Figure 3.1

Proposed Development

Lots 6, 7, & 8 on Plan 7782
Drovers Place
Joondalup

LEGEND

- Lots 6, 7 & 8
- Other Lots
- Existing Hydrant
- Development

Residential Zones

- R30
- R40
- R60

Road Reserve

- Road Reserve

SCALE (A3)

0 25 50 75 100

Metres

LOCALITY

N

Aerial Image: Landgate Aug 2016

BUSHFIRE PRONE PLANNING

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator
Map created on: 19/05/2017
Map compiled by: Bruce Greentree

4 The Planning Submission and the Documents Required

Policy measures in *SPP 3.7* (and further instruction in the associated document *Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017*) set out the bushfire planning information (including bushfire risk assessments) that are to accompany a planning submission. It is dependent on the type of proposal and stage of the development process. In most circumstances this information is to be presented in the form of a Bushfire Management Plan (BMP).

The Planning Submission – Stage and Specific Land Use or Development	
Planning Stage:	Strategic - local structure/master plan
For Submission to:	WA Planning Commission (WAPC)
Project Type:	Subdivision - one lot into a large number of lots
'Vulnerable' Land Use:	No
'High Risk' Land Use:	No
'Minor' Development:	No
'Unavoidable' Development:	No

This Bushfire Management Plan will include the information indicated by the check mark. If an item is checked it is required by either: SPP 3.7 or by a local government variation. It may also have been prepared at an earlier planning stage and therefore re-included or included by the assessor as it improves the information presented in this Bushfire Management Plan.

Bushfire Hazard Level Assessment	Bushfire Attack Level Contour Map	Bushfire Attack Level Assessment	Identify any issues arising from the BAL contour map or BAL assessment	Identify and specifically address the list of issues related to strategic level planning and defined in the *Guidelines s5.2*	Demonstrate compliance with the Bushfire Protection Criteria can be achieved in subsequent planning stages	Demonstrate compliance with the Bushfire Protection Criteria
✓	✓		✓	✓	✓	

5 Assessment of Bushfire Risk

5.1 Vegetation Assessment/Classification and Ground Slope

5.1.1 Existing Vegetation

All vegetation within 100 metres of the subject site has been identified and classified or excluded and presented in Table 5.1.1. This has been done with accordance with *AS 3959-2009* and reference to the *Visual Guide for Bushfire Risk Assessment in WA* (WAPC February 2016).

The vegetation has been assessed as it will be in its mature state and where deemed appropriate, in its unmanaged state. The areas of classified vegetation that will determine bushfire risk are defined on the topography and vegetation map Figure 5.1. Representative photos of each vegetation area is presented after the table.

Table 5.1.1: Vegetation types identified, the applied classification and effective slope

All Vegetation Within 100 metres of Subject Site			
Vegetation Area	**Identified Types (AS3959) or Description if 'Excluded'**	**Applied Classification**	**Effective Slope Under Classified Vegetation (degrees)**
1	Open Woodland B-06	Class B Woodland	0.6
2	Open Forest A-03	Class A Forest	0-5
3	Open Forest A-03	Class A Forest	0-5
4	Open Scrub D-14	Class D Scrub	2.4
5	Open Tussock Grassland G-22	Class G Grassland	3
6	Open Woodland B-05	Class G Grassland	0
Note: When more than one vegetation type is present each type is classified separately with the worst case scenario being applied. The predominant vegetation is not necessarily the worst case scenario.			

Vegetation Area 1 **Classification Applied:** Class B Woodland

Assessment Comment: offsite banksia woodland, eucalypt, grass trees, shrub understorey, tree height ~9m

Photo ID: 1a

Photo ID: 1b

Vegetation Area 2 **Classification Applied:** Class A Forest

Assessment Comment: offsite forest, tuart, banksia, grass trees, moderate shrub understorey with grass patches, tree height ~18m

Photo ID: 2a

Photo ID: 2b

Vegetation Area 2 **Classification Applied:** Class A Forest

Assessment Comment: offsite forest, road reserve with multi use path, thick acacia understorey, established fire break on boundary (see photo 2d)

Photo ID: 2c

Photo ID: 2d

Vegetation Area 3 **Classification Applied:** Class A Forest

Assessment Comment: offsite forest, eucalypt, closed scrub understorey, acacia, melaleuca, tree height ~18m,

Photo ID: 3a

Photo ID: 3b

Vegetation Area 4 **Classification Applied:** Class D Scrub

Assessment Comment: offsite scrub, acacia scrub ~3m height, grass understorey, bare sandy soils

Photo ID: 4a

Photo ID: 4b

Vegetation Area 5 **Classification Applied:** Class G Grassland

Assessment Comment: offsite grassland, very poor condition with bare sand patches

Photo ID: 5a

Vegetation Area 6 **Classification Applied:** Class G Grassland

Assessment Comment: onsite grassland, open woodland structure with varying degrees of canopy cover including exotic species such as fruit and palm trees

Photo ID: 6a

Photo ID: 6b

5.1.2 Vegetation Excluded from Classification

Certain areas and vegetation within 100m of the subject site may be assessed as 'low threat or non-vegetated'. These are to be excluded from classification and are therefore rated BAL-LOW. They must be managed to maintain the specifications set out in AS3959-2009 s2.2.3.2 in perpetuity (refer to Appendix 3 'Vegetation Classification Exclusions').

Managed gardens surrounding the development to the east of the subject site has been excluded from classification as presenting a low bushfire threat as per AS 3959-2009s2.2.3.2 (f).

5.1.3 Expected On-site Vegetation Changes Due to Proposed Subdivision or Development

In assessing vegetation for bushfire threat, consideration must be given to possible future vegetation changes likely on the site that is being assessed, particularly those that would have the potential to increase the bushfire risk.

This may be due to growth of existing vegetation or growth of planned landscape plantings, including future roadside or water course re-vegetation. There must be careful consideration of the creation of vegetation corridors where they join offsite vegetation and may provide a route for fire to enter an area of future development.

For this Proposal the future onsite vegetation has been considered and is expected to be maintained as "low threat" with a BAL rating of BAL-Low. It will meet *AS 3959-2009 s2.2.3.2* requirements (refer Appendix 3 'Vegetation Classification Exclusions').

Figure 5.1

Topography & Classified Vegetation

Lots 6, 7, & 8 on Plan 7782
Drovers Place
Joondalup

LEGEND

- Lots 6, 7 & 8
- Other Lots
- Photo Locations
- Development
- Area of Interest - 150m extent

Classified Vegetation

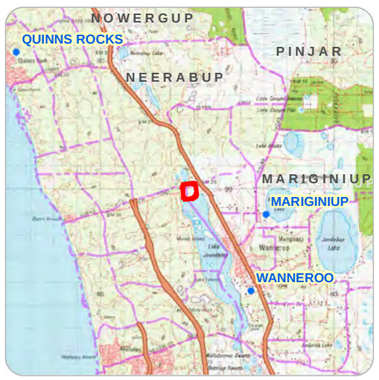
- Class (A) Forest
- Class (B) Woodland
- Class (D) Scrub
- Class (G) Grassland
- Exclusion - 2.2.3.2

SCALE (A3)

0 25 50 75 100 125 150

Metres

LOCALITY



N

Aerial Image: Landgate Aug 2016

BUSHFIRE PRONE PLANNING

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator
Map created on: 19/05/2017
Map compiled by: Bruce Greentree

5.2 Bushfire Hazard Level (BHL) Assessment

"A Bushfire Hazard Level assessment provides a 'broad-brush' means of determining the potential intensity of a bushfire for a particular area. The Bushfire Hazard Level assessment assists in informing the suitability of land contained within strategic planning proposals for future subdivision and development. It is a pre-development tool used to inform decision making to ensure a holistic understanding of the bushfire risk ('Guidelines' Appendix 2)".

SPP 3.7 and the 'Guidelines' indicate that BHL assessments are required to accompany all strategic planning proposals (planning schemes and structure plans) unless the future lot layout of the Proposal is known in which case a Bushfire Attack Level assessment incorporating a BAL Contour Map provides more detailed information and is more appropriate.

Assessment Results

The results of the Bushfire Hazard Level assessment detailing the vegetation type, class and the hazard levels assigned, are presented in Table 5.2.1 and visually in Figure 5.2 as a Bushfire Hazard Level Map. If additional assessment inclusions are required in this Plan, they are identified in Table: 5.2.2

Table 5.2.1: BHL assessment

Bushfire Hazard Level Assessment	
Data Used (methodology as per the 'Guidelines' Appendix 2):	**site inspection + aerial map data**
Assessed Area	**Bushfire Hazard Level**
Land inside the external boundary of the subject site:	**Moderate**
Land within 100 metres of external boundary of the subject site:	**Moderate + Extreme**

The Bushfire Hazard Level mapping demonstrates that the Bushfire Hazard Level to which future and existing residences will be exposed, will be reduced after development.

Table 5.2.2: Required additional assessment.

Rationale for the Inclusion/Exclusion of a Bushfire Hazard Level Assessment in this BMP	
A BHL assessment has been included in this BMP as the Proposal is at a strategic planning stage with the location of future lots unknown.	Yes
A BHL assessment has been requested by the relevant decision maker (WAPC, DFES or LGA).	-
A BHL assessment has not been conducted for this BMP as the lot layout is known and/or the Proposal is for a subdivision or development application. A Bushfire Attack Level assessment can provide more appropriate and detailed information.	-

5.2.1 Identification of Specific Issues Arising from BHL Assessment

The bushfire hazard assessment undertaken for the Proposal indicates a Moderate to Low rating on the site, which is deemed as 'manageable' enabling the implementation of appropriate low fuel zones to be developed.

The design of the development plans have taken into account the offsite bushfire risk and provided buffers to any future buildings that may be constructed within the development.

Figure 5.2

Bushfire Hazard Level

Lots 6, 7, & 8 on Plan 7782
Drovers Place
Joondalup

LEGEND

- Lots 6, 7 & 8
- Other Lots
- Development
- Area of Interest - 150m extent

Bushfire Hazard Mapping

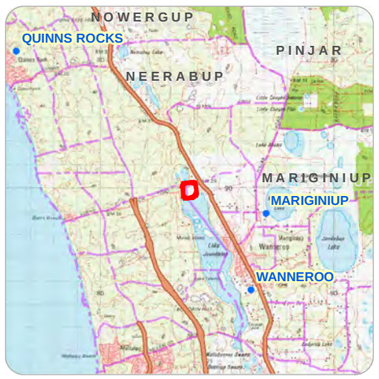
- Extreme Bushfire Hazard
- Moderate Bushfire Hazard
- Low Bushfire Hazard

SCALE (A3)

0 25 50 75 100 125 150

Metres

LOCALITY



N

Aerial Image: Landgate Aug 2016

BUSHFIRE PRONE PLANNING

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator
Map created on: 19/05/2017
Map compiled by: Bruce Greentree

5.3 Bushfire Attack Level (BAL) Assessment – BAL Contour Map

Bushfire Prone Planning's BAL Contour Map Guide

Description and Purpose of the BAL Contour Map ('Guidelines')

A Bushfire Attack Level (BAL) Contour Map identifies land suitable and unsuitable for development and guides the location of building envelopes within a development site. The BAL Contour Map is a scale map of a development site (which can include proposed or an existing lot layout), which identifies indicative BAL ratings across the development site and within the immediate surrounding area. The map illustrates potential bushfire attack levels and radiant heat impacts in relation to any classified vegetation that will remain within 100 metres of the assessment area once development is constructed i.e. when the land has been cleared and all the subdivision works have been undertaken. It needs to take into account any vegetation that will remain or will be introduced when the works are complete (source: *WAPC Factsheet "BAL Contour Maps" Version 2 January 2016*).

BAL Contour Map Interpretation

The contour map will present different coloured contour intervals constructed around the classified bushfire prone vegetation. These represent the different Bushfire Attack Levels (BAL's) that exist as the distance increases away from the classified vegetation. Each BAL represents a set range of radiant heat flux (refer to Appendix 2) that can be generated by the bushfire in that vegetation. The width of each shaded contour interval (i.e. the applicable vegetation separation distances corresponding to a BAL rating) will vary and is determined by calculations involving vegetation type, fuel structure, ground slope, and climatic conditions (i.e. the expected fire behaviour). They are unique to a site and can vary across a site.

The Primary Use of BAL Contour Mapping - Planning

BAL contour mapping is primarily a planning tool that can give an overview as to the suitability of a site for development with respect to the extent to which bushfire is a potential threat to future buildings and persons on the subject land.

The mapping considers the development site (i.e. all existing or proposed lots) and does not consider the bushfire risk at an individual lot level or over different development time frames. Rather it is assessing the situation that will exist when the entire development has been completed, including any vegetation management that would reasonably be expected to take place as part of establishing buildings on the lots. On this basis, it helps decision makers determine the suitability of the proposed development for planning approval.

As a result, there will be situations where, for the purposes of planning, classifiable vegetation is not contoured (e.g. e.g. Grassland or when the assumption is made that all onsite vegetation can be removed and/or modified). However, at a specific point in time (prior to full completion of a development) this vegetation may impact on a proposed buildings BAL rating.

A Secondary Use of BAL Contour Mapping - Building

Building approval (and the issue of a building permit) requires that a BAL rating is determined for an actual building and not just a lot or a building envelope (i.e. an 'area'). Determination of this BAL rating must consider the actual location of a building within an individual lot and its separation distance from any classified vegetation at the actual time of applying for building approval. It is a site-specific assessment based on the buildings design and location at a given point in time.

This specific assessment (BAL report and BAL certificate) required for a building application cannot always be derived from an assessment that is primarily designed to inform planning decisions. As a result, there are limitations to obtaining a single BAL rating for a future building of unknown location, from a BAL contour map assessment.

Nonetheless, there are limited specific situations where the required building application information (i.e. a BAL Certificate) might be obtained quickly and cost effectively from a BAL contour map assessment. When these 'determined' BAL's can be derived is explained in Section 5.3.2 'BAL's As Indicated / Determined by the BAL Contour Map'.

Figure 5.3

BAL Contour Map

Lots 6, 7, & 8 on Plan 7782
Drovers Place
Joondalup

LEGEND

- Lots 6, 7 & 8
- Other Lots
- Development
- Area of Interest - 150m extent

Bushfire Attack Levels (Method 1)

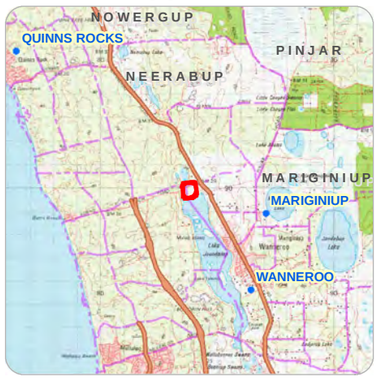
- BAL FZ (Indicative only)
- BAL 40 (Indicative only)
- BAL 29 (Indicative only)
- BAL 19 (Indicative only)
- BAL 12.5 (Indicative only)
- BAL LOW (Indicative only)

SCALE (A3)

0 25 50 75 100 125 150

Metres

LOCALITY



N

Aerial Image: Landgate Aug 2016

BUSHFIRE PRONE PLANNING

Coordinate System: GDA 1994 MGA Zone 50
Projection: Universal Transverse Mercator
Map created on: 19/05/2017
Map compiled by: Bruce Greentree

5.3.1 Construction of the BAL Contours - Statement of Site Data and 'Separation Distance Range' Applied

For the subject site, the vegetation separation distance range that corresponds to each Bushfire Attack Level (and represented by Figure 5.3, the BAL Contour Map), has been derived from:

1. An AS3959-2009 Method 1 assessment and sourced from AS3959-2009 Table 2.4.3; and/or
2. An AS3959-2009 Method 2 assessment as per AS3959-2009 Appendix B.

Table 5.3.1: Construction of the BAL contours

Statement of Site Data and 'Separation Distance Range' Applied			
Vegetation Area	BAL Assessment Method Used	Site Data Applied in the BAL Assessment	Separation Distance Range Applied/Determined
1	AS3959-2009 Method 1	Refer to Table 5.1.1	The distance corresponding to each BAL Rating as per AS3959-2009 Table 2.4.3
2			
3			
4			
5			
6			

5.3.2 BAL's as Indicated / Determined by the Contour Map

Bushfire Prone Planning's Interpretation of Deriving BAL Ratings from the BAL Contour Map

Indicative BAL Ratings

If the assessed BAL for a lot or building envelope (the 'area') is stated as being 'indicative', it is because that 'area' is impacted by more than one BAL contour interval and/or classifiable vegetation remains on the lot, or on adjacent lots, that can influence a future building's BAL rating (and this vegetation may have been omitted from being contoured for planning purposes e.g. Grassland or when the assumption is made that all onsite vegetation can be removed and/or modified). In this report the indicative BAL is presented as either the highest BAL impacting the 'area' or as a range of achievable BAL's within the 'area' – whichever is the most appropriate.

The BAL rating that will apply to any future building within that 'area' will be dependent on:

1. vegetation management onsite; and/or
2. vegetation remaining on adjacent lots; and/or
3. the actual location of the future building within that 'area'.

A BAL Certificate cannot be provided for future buildings within an 'area' with an indicative BAL until the location of any future building has been determined. It usually requires an onsite visit and a BAL assessment report to be produced before the certificate can be issued.

Determined BAL Ratings

If the assessed BAL for a Lot or building envelope (the 'area') or existing building, is stated as being 'determined' it is because that 'area' or building is impacted by a single BAL contour interval. This has been determined by offsite classified vegetation, and no classifiable vegetation currently exists on the lot or on adjacent lots (i.e. it has been cleared to a minimal fuel, low bushfire threat state).

As a result, a determined BAL can be provided in this limited situation because:

1. No classified vegetation is required to be removed or modified to achieve the determined BAL, either within the lot or on adjacent lots (or if vegetation is excluded from classification, it is reasonable to assume it will be maintained in this state into the future); and
2. A future building can be located anywhere within the 'area' and be subject to the determined BAL rating; and
3. The degree of certainty is more than sufficient to allow for any small discrepancy that might occur in the mapping of the BAL contours.

A BAL Certificate (referring to the BAL Contour Map assessment) can be provided for a future building on those 'areas' assessed as having a determined BAL as long as the assessment is still valid and there is no requirement reassess the vegetation and update the contour map (this is a dependant on the time that has passed since the original assessment). Note also that a BAL Certificate will only remain valid for one year).

Once actual building locations are determined at a later planning stage, the BAL ratings for specific buildings or building envelopes may need to be determined by an onsite visit with the actual vegetation separation distances being measured.

As this proposal is for a local structure plan the BAL Contour map has been included to present that the proposed development can achieve an acceptable BAL-29 rating for any future buildings to be constructed within the development site to assist in future planning decisions.

5.3.3 Identification of Specific Issues Arising from BAL Contour Map

Onsite Vegetation

Vegetation onsite is within the control of the subject site's landowner and therefore can potentially be removed or modified to lower the bushfire risk, subject to any approval being required by a local government.

The existing vegetation onsite of the subject site is comprised of historical orchards, introduced trees, open woodland and grassland. The entire site will be cleared and managed as part of the proposed development with minor areas of public open space to be developed and managed as low threat vegetation.

Offsite Vegetation

Vegetation offsite is not within the control of the subject site's landowner and therefore the vegetation cannot be removed or modified by the landowner and as a result the assessed BAL's determined by this vegetation are unable to be reduced.

6 Environmental Considerations

"Many bushfire prone areas also have high biodiversity values. SPP 3.7 Policy objective 5.4 recognises the need to consider bushfire risk management measures alongside environmental, biodiversity and conservation values" ('Guidelines' s2.3).

"Clearing of native vegetation in Western Australia requires a clearing permit under Part V, Division 2 of the Environmental Protection Act 1986 unless clearing is for an exempt purpose. Exemptions from requiring a clearing permit are contained in Schedule 6 of the Act or are prescribed in the Environmental Protection Regulations" ('Guidelines' s2.3).

Existing conservation areas that are potentially affected by the development proposal are required to be identified. This may result in vegetation removal/modification prohibition or limitations. These areas include:

- National Parks;
- Nature Reserves; and
- Bush Forever sites.

Further, the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act), administered by the Australian Government Department of Environment, provides a national scheme of environment and heritage protection and biodiversity conservation. The objectives of the of the EPBC Act include the protection of the environment with respect to matters of national environmental significance and conservation of Australian biodiversity.

Nationally threatened species and ecological communities are a specific matter of significance. Areas of vegetation can be classified as a Threatened Ecological Community (TEC) under the EPBC Act and consequently have removal restrictions imposed.

6.1 Native Vegetation and Re-vegetation

Protection of Native Vegetation

For the proposed development site, have any existing conservation areas been identified?	Yes
Type of existing conservation classification:	Conservation Category Wetland
Other identified conservation issue to be considered:	Threatened Flora
For the proposed development site, have any areas of native vegetation been identified as species that might result in the classification of the area as a Threatened Ecological Community (TEC)?	Yes

Potential TEC species identified:	Banksia Woodlands of the Swan Coastal Plain

Comment:
The proposed development is adjacent to the Lake Joondalup Nature Reserve. The development is not clearing any native vegetation but is adjacent to the Banksia Woodlands within the Yellagonga Regional Park.

Minimising Removal of Native Vegetation

Establishing development in bushfire prone areas can adversely affect the retention of native vegetation through clearing associated with the creation of Asset Protection and Hazard Separation Zones. Where loss of vegetation is not acceptable or causes conflict with landscape or environmental objectives, it will be necessary to consider available options to minimise the removal of native vegetation.

Options to Minimise Removal of Native Vegetation	Considered and Implemented in this Proposal
Reduce lot yield	N/A
Cluster development	N/A
Construct building to a higher standard as per BCA and AS 3959-2009	Yes
Modify the development location	No

Comment: All future Class 1,2 or 3 buildings to be constructed within the development will comply with AS3959-2009.

Riparian Vegetation Maintenance and Re-vegetation

Where, as part of the Proposal, revegetation of waterway foreshore, wetland or coastal buffers is necessary for their protection or management, this bushfire management plan assesses the ability and practicality of maintaining vegetation separation distances corresponding to determined BAL's.

Maintenance and/or re-vegetation of riparian and/or coastal areas is part of this Proposal?	Yes
Can the required BAL separation distance be maintained into the future?	Yes

Comment: Due to the nearby Lake Joondalup Nature Reserve there may be some environmental conditions that may be subjected by DPAW in future planning stages.

Impact on Adjoining Land

Does this planning proposal satisfy bushfire protection requirements within the boundaries of the land being developed so as not to impact on the bushfire and environmental management of neighbouring reserves, properties or conservation covenants?	Yes

Comment: clearing and management of the onsite vegetation will reduce the bushfire risk to the adjacent developments.

7 Bushfire Risk Management Measures

7.1 The Bushfire Protection Criteria – Assessment of Compliance

State Planning Policy 3.7 Planning in Bushfire Prone Areas (DoP 2015) requires an assessment against the bushfire protection criteria requirements contained in the Guidelines for Planning in Bushfire Prone Areas (DoP/DFES v1.1 2017) Section 4.5 and Appendix 4.

This assessment is to accompany any strategic planning proposal, subdivision application or development application.

Strategic planning proposals need to demonstrate that compliance can be achieved in subsequent planning stages. Subdivision and development applications must demonstrate compliance within the boundary of the subject site or provide justification for those criteria that are not able to be fully met.

The bushfire protection criteria are divided into four elements location, siting and design, vehicular access and water.

For each element, there is:

1. An intent stating the required outcome (overall aim);
2. A performance principle that is a general statement of how best to achieve the intent; and
3. One or more specific criteria to be addressed and for which an acceptable solution is provided as an example of one way of meeting the criteria (and therefore the elements intent).

A proposals compliance with each element is determined by either one or a combination of the following:

1. For each relevant criterion, fully meeting the requirements of the acceptable solution (which automatically achieves the intent for that criteria); and/or
2. For one or more relevant criteria, not fully meeting the requirements of the acceptable solution but achieving the requirements of the performance principle by employing a relatively minor variation on the acceptable solution; and/or
3. For one or more relevant criteria, developing an alternative solution that will achieve the performance principle.

Bushfire Prone Planning presents the required assessment against all the bushfire protection criteria as a separate table for each element and includes the intent, the performance principle and acceptable solution examples, for convenient reference.

Summarised Outcome of the Assessment Against the Bushfire Protection Criteria							
Element *each element consists of one or more applicable 'acceptable solutions'*	**Complies With All Applicable 'Acceptable Solutions'** *or will comply*	**Achieves the Intent of the Element for All Applicable 'Acceptable Solutions'** *or will achieve*	**Required Basis of the Planning Assessment**				**Notes**
			Acceptable Solutions		**Performance Principle**		
			Complies With All Applicable 'Acceptable Solutions' *or will comply*	**Achieves the Intent of the Element** *(or will achieve)* *For one or more applicable 'acceptable solutions' the solution is not fully met. A variation of the solution is provided and justified.*	*An Alternative Solution is Developed and Presented*	**As Minor or Unavoidable Development**	
Location	Will in the Future	Yes	✓			N/A	
Siting and Design of Development	Will in the Future	Yes	✓				
Vehicular Access	Will in the Future	Yes	✓				
Water	Yes	Yes	✓				

Bushfire Protection Criteria - Element 1- Location			
Intent: To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure.			
Performance Principle P1 (to be complied with to meet the intent and used to develop alternative solutions): The intent may be achieved where the strategic planning proposal, subdivision or development application is located in an area where the bushfire hazard assessment is or will, on completion, be moderate or low **OR** a BAL-29 or below applies **AND** the risk can be managed. For unavoidable development in areas where BAL-40 or BAL-FZ applies, demonstrating that the risk can be managed to the satisfaction of DFES and the decision-maker.			
Acceptable Solution	**Further Explanation**	**Compliance**	**Assessment Statements**
A1.1 Development Location The strategic planning proposal, subdivision and development application is located in an area where the bushfire hazard assessment is or will, on completion, be moderate or low; **OR** Be subject to BAL-29 or below; **AND** the risk can be managed.	Land is most suitable for land use intensification where hazard levels are low. Where there is an extreme bushfire hazard level or requirements for use of BAL-40 or BAL-FZ construction standards, the land is not considered suitable for development unless it meets the definition of minor or unavoidable development. Minor development requires local government planning approval. Unavoidable development requires demonstrating that risk can be managed to the satisfaction of DFES, WAPC and local government.	Will Fully Comply with the Acceptable Solution	The proposed development is located within a designated bushfire prone area. By implementing the positioning and vegetation management measures identified in this Plan the proposed development can meet the acceptable solution of being subject to BAL-29 or below and result in the bushfire risk being able to be managed. It does not require the use of BAL-40 or BAL-FZ construction standards.

Bushfire Protection Criteria - Element 2 - Siting and Design of Development

Intent: To ensure that the siting and design of development minimises the level of bushfire impact *(note: not related to construction standards to apply).*

Performance Principle P2 (to be complied with to meet the intent and used to develop alternative solutions): The intent may be achieved where the siting and design of the strategic planning proposal, subdivision or development application, including roads, paths and landscaping, is appropriate to the level of bushfire risk that applies to the site. That it incorporates a defendable space and significantly reduces the heat intensities at the building surface thereby minimising the bushfire risk to people, property and infrastructure, including compliance with AS3959 if appropriate.

Acceptable Solution	Further Explanation	Compliance	Assessment Statements
A2.1 Asset Protection Zone (APZ) Every habitable building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements: **Width:** Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a bushfire does not exceed 29 kW/m^2 (BAL-29) in all circumstances. **Location:** The APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot/s will be managed in a low-fuel state on an ongoing basis, in perpetuity. **Management:** The APZ is managed in accordance with the requirements of 'Standards for Asset Protection Zones' ('Guidelines' Appendix 4, Element 2 Schedule 1). Also, refer to Appendix 3 and 4 of this Plan/Report.	The APZ is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level by reducing fuel loads (predominantly combustible vegetation). The required width of the APZ varies with the vegetation impacting the site and ground slopes. The APZ is to include a defendable space (minimum 3m width) – an area adjoining the asset in which vegetation is kept to an absolute minimum and free from combustible items and obstructions – to facilitate fire fighting operations. Where the loss of vegetation is not acceptable or causes conflict with landscape and environmental objectives, then the development may need to be modified.	Will Fully Comply with the Acceptable Solution	The proposed development meets the acceptable solution by: • Being able to partially establish an APZ of the required dimensions (as determined by the classified vegetation impacting the Site and the relevant ground slopes) within the boundary of development; • The balance of the required APZ dimensions being contributed by an area on adjoining land that is assessed as being managed in a low-fuel state and which can most reasonably be expected to be managed this way in perpetuity. • Part of/The balance of the required APZ dimensions are made up of an area consisting of public roads, footpaths and verges; and • The landowner/s having the responsibility of implementing the requirements of the 'Standards for APZ's' and continuing to manage the APZ to maintain it in a low fuel state.

Bushfire Protection Criteria - Element 3 - Vehicular Access			
Intent: To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.			
Performance Principle P3 (to be complied with to meet the intent and used to develop alternative solutions): The intent may be achieved where the internal layout, design and construction of public and private vehicular access and egress in the subdivision /development allow emergency and other vehicles to move through it easily and safely at all times.			
Acceptable Solution	**Further Explanation**	**Compliance**	**Assessment Statements**
A3.1 Two access routes Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents and the public at all times and under all weather conditions.	This is to apply to access routes leading into a subdivision as well as those within a subdivision. All access should accommodate type 3.4 fire appliances (4WD 7t chassis). Two-way access should be provided as a public road, however, where a public road cannot be provided (and this will need to be demonstrated by the proponent providing justification), an emergency access way may be considered.	Will Fully Comply with the Acceptable Solution	Joondalup Drive provides safe access and egress to two different destinations. As a sealed public road, it is available to all residents and the public at all times and under all weather conditions.

Bushfire Protection Criteria - Element 3 - Vehicular Access (continued)

Intent: To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event.

Performance Principle P3 (to be complied with to meet the intent and used to develop alternative solutions): The intent may be achieved where the internal layout, design and construction of public and private vehicular access and egress in the subdivision /development allow emergency and other vehicles to move through it easily and safely at all times.

Acceptable Solution	Further Explanation	Compliance	Assessment Statements
A3.2 Public Road Minimum trafficable surface of 6m. Constructed to meet the technical requirements stated in Appendix 5.	In special circumstances, where ≤8 lots serviced, a minimum 4m trafficable surface for a maximum of 90 might be approved.	Will Fully Comply with the Acceptable Solution	All public roads will be designed and constructed to comply with the Local governments and Guidelines requirements. See Appendix 5 for details.
A3.3 Cul-de-sacs - (includes dead-end roads). A maximum length of 200m with a 17.5m turnaround. 600m length if cul-de-sacs services ≤8 lots and is joined to another cul-de-sac by an emergency access way of <600m). Constructed to meet the technical requirements stated in Appendix 5.	Should be avoided in bushfire prone areas as they do not provide access/egress in different directions. Where no alternative exists this will need to be demonstrated by the proponent including if the lot layout already exists. Cul-de-sac is to connect to a public road.	N/A	
A3.4 Battle-axe Maximum length 600m, minimum width 6m, passing bays @ 200m, turnaround area @ 500m and at house site. Constructed to a minimum of private driveway standards. Constructed to meet the technical requirements stated in Appendix 5.	Should be avoided in bushfire prone areas If no alternative exists this will need to be demonstrated by the proponent.	N/A	

Bushfire Protection Criteria - Element 3 - Vehicular Access (continued)			
Acceptable Solutions	**Further Explanation**	**Compliance**	**Assessment Statements**
A3.5 Private Driveways Are required where a house is >50m from a public road. Passing bays @ 200m, turnaround area @ 500m and within 50m of house. Bridges/culverts to support 15t. All weather surface. Constructed to meet the technical requirements stated in Appendix 5.		Will Fully Comply with the Acceptable Solution	
A3.6 Emergency Access Way Provided as a right of way or public access easement in gross (maximum length of 600m) to ensure accessibility to the public and fire services in emergencies. It should comply with minimum standards for a public road and be signposted. Constructed to meet the technical requirements stated in Appendix 5.	An access way that does not provide through access to a public road is to be avoided in bushfire prone areas. Where no alternative exists this will need to be demonstrated by the proponent. It is to be provided as an alternative link to a public road during emergencies.	N/A	
A3.7 Fire Service Access Routes - (perimeter roads) Provided as rights of way or public access easements in gross; all weather surface and allow for two-way traffic; dead-end roads not permitted; turnarounds every 500m; less than 600m to a public road and be signposted. Constructed to meet the technical requirements stated in Appendix 5.	Fire service access routes should be established to separate bushfire prone areas from developed areas and to provide access within and around the edge of the subdivisions and related development. To be used during bushfire suppression operations and prevention work.	N/A	
A3.8 Firebreak Width Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three metres or to the level prescribed in the local firebreak notice issued by the local government.		Will Fully Comply with the Acceptable Solution	The proposed development will comply with the requirements of the local government annual firebreak notice issued under s33 of the Bush Fires Act 1954.

Bushfire Protection Criteria - Element 4 – Water

Intent: To ensure water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.

Performance Principal P4 (to be complied with to meet the intent and used to develop alternative solutions): The intent may be achieved where the subdivision, development or land use is provided with a permanent and secure supply that is sufficient for firefighting purposes.

Acceptable Solution	Further Explanation	Compliance	Assessment Statements
A4.1 Reticulated Areas The subdivision, development or land use is provided with a reticulated water supply, in accordance with the specifications of the relevant water supply authority and DFES. Constructed to meet the technical requirements stated in Appendix 6.	The Water Corporations 'No 63 Water Reticulation Standard' is deemed to be the baseline criterion for developments and should be applied unless local water supply authorities' conditions apply. Additionally, any local government variation must be met (s8.4).	Fully Complies with the Acceptable Solution	A reticulated water supply is available in the area of the subject site. Installation of several hydrants will be required within the proposed development to meet Water Corp DS63 standards.
A4.2 Non-Reticulated Areas Water tanks for firefighting purposes with a hydrant or standpipe are provided. Minimum of 50,000l/tank; minimum 1 tank/25 lots (or part thereof); house ≤2km from a tank; 20min turnaround time for 2.4 appliance; hardstand area suitable for 3.4 appliance within 3m of tank Must meet the technical requirements stated in Appendix 6. Any local government variation must also be met (s8.4).	The specification of the requirements for the proposal being assessed will be set by the water supply authority and DFES. A procedure must be in place to ensure that water tanks are maintained at or above the designated capacity at all times, including home tanks on single lots. This could be in the form of an agreement with the local government and the fire service. Water tanks and associated facilities are vested in the relevant local government	N/A	
A4.3 Non-reticulated Areas (Individual Lots) Single lots above 500 m^2 need a dedicated static water supply on the lot that has the effective capacity of 10,000 litres. Must meet the technical requirements stated in Appendix 6.	A4.3 is only for use if creating one additional lot and cannot be applied cumulatively.	N/A	

7.2 Location of Buildings and Applicable BAL's

Future buildings on the proposed lots are to be located in areas where an appropriate Bushfire Attack Level rating can be achieved and where minimal removal of valuable existing native vegetation is required to achieve this rating. The intent is to have the subject land of this Proposal located in an area where the bushfire hazard level is, or will on completion, be moderate or low or be subject to a maximum Bushfire Attack Level of BAL-29.

The proposed subdivision is unlikely to be approved if the indicative BAL rating for future buildings on any proposed lots is either BAL-40 or BAL-FZ as it is unacceptable on planning grounds. The exception will be if it meets the definition of unavoidable development ('Guidelines' s5.4 and s5.7). If this applies the appropriate additional assessment and input from the relevant authorities, if required, is included in this Plan.

The proposed location of the development will result in it being subject to BAL-29 or lower. As such it is located appropriately but the required separation distances from the classified vegetation will need to be maintained. These distances are stated in the next section of this Plan, Section 7.3 'Vegetation Management'.

7.3 Vegetation Management

Ongoing Maintenance of Assessed Vegetation

1. Where any existing or planned, re-vegetation has been assessed as "low threat" (meeting AS 3959-2009 Section 2.2.3.2 requirements) and excluded from classification then this area will be managed to continue to meet those requirements (refer to Appendix 3) and enable the buildings to retain their determined BAL ratings;

2. Any classified vegetation onsite (i.e. within a subject lot) that has directly contributed to the determined BAL rating for a given building, will be managed such as to not change that vegetation to a higher risk classification; and

3. Where a local government issues an annual firebreak notice under s33 of the Bush Fires Act 1954, this will be complied with.

Bushfire Protection Zones

The *Guidelines for Planning in Bushfire Prone Areas (WAPC v1.1 2017)* set out the requirements to create an Asset Protection Zone (APZ) and a Hazard Separation Zone (HSZ). The aim of these bushfire protection zones is to have a fire of diminishing intensity and flame length as it approaches development. These reduced fuel loads will reduce the intensity of radiant heat onto the buildings, thereby increasing their survivability. This will also be important for firefighter and occupant's safety during fire suppression activities.

Asset Protection Zone (APZ) – This is to be established, within a subject lot's boundary such that a building will not be subject to a BAL rating greater than BAL-29. On a lot size where it is possible to achieve, it is to be a minimum width of 20 metres and increased when directed to the width required such that such that a building will not be subject to a BAL rating greater than BAL-29.

The APZ must be maintained as either a non-vegetated area or as low threat vegetation managed in a minimal fuel condition as per AS 3959-2009 s2.2.3.2 (e) and (f). A minimal fuel condition is stated in the standard as meaning "there is insufficient fuel available to significantly increase the severity of the bushfire attack" and being "recognisable as short cropped grass for example to a nominal height of 100mm."

Hazard Separation Zone (HSZ) - Where the lot size permits, a Hazard Separation Zone (HSZ) should also be established.

Refer to Appendix 3 and Appendix 4 for specific technical requirements.

Establishing the APZ

An Asset Protection Zone (APZ) creating a low fuel area will be required to be incorporated into the landscaping surrounding any future buildings within the proposed development (Refer Figure 3.1) or BAL separation distance (Refer Figure 5.3).

Minimum Vegetation Separation Distances

The minimum separation distance from any classified vegetation, that corresponds to the proposed indicative BAL indicated on the BAL contour map will be maintained as either a non-vegetated area or as low threat vegetation managed in a minimal fuel condition as per AS 3959-2009 s2.2.3.2 (e) and (f). A minimal fuel condition is stated in the standard as meaning "there is insufficient fuel available to significantly increase the severity of the bushfire attack" and being "recognisable as short cropped grass for example to a nominal height of 100mm." Refer to Appendix 3 of this Plan for further detail.

It is also recognised that the local government issues an annual firebreak notice under s33 of the Bush Fires Act 1954 and this will be complied with.

7.4 Vehicular Access – Element 3 of the Bushfire Protection Criteria

The intent of the 'Vehicular Access' element of the bushfire protection criteria is "to ensure that the vehicular access/egress servicing a subdivision/development is available and safe during a bushfire event". The performance principle to be met is that "The internal layout, design and construction of public and private roads must allow emergency and other vehicles to move through the subdivision/development easily and safely at all times".

The required outcome is that in the event of a bushfire, personal safety must be able to be maintained when travelling on the access/egress route.

How this Proposal complies with the acceptable solutions for the vehicular access criterion and is stated in Section 7.1 'The Bushfire Protection Criteria – Assess and Demonstrate Compliance'. If additional information is required to further demonstrate compliance and/or present alternative solutions, this is presented below in this Section 7.4 'Vehicular Access'.

All relevant vehicle access requirements will be designed and constructed to the relevant technical requirement in future planning stages. The existing design shown in Figure 3.1 and 3.2 indicate that all vehicle access provisions of the guidelines can be complied with.

7.5 Firefighting Water Supply

The intent is to ensure water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire. This intent may be achieved where the subdivision, development or land use is provided with a permanent and secure supply that is sufficient for firefighting purposes.

A reticulated water supply exists in the vicinity of the development site. The required hydrants and access will be installed as per the technical requirements detailed in Appendix 6 that are applicable to Water Corp DS63 and DFES requirements.

7.6 Building Construction Standards

7.6.1 Future Habitable Buildings on the Subject Site

Building Classes 1, 2, 3 and 10a

The Building Code of Australia (BCA) contains bushfire construction requirements that are applied to residential buildings of Class 1, 2 or 3 and associated Class 10a buildings and decks. These are required by the BCA to be designed and constructed to reduce the risk of ignition from a bushfire, appropriate to the potential for ignition caused by burning embers, radiant heat or flame generated by a bushfire, and the intensity of the bushfire attack on the building - as quantified by the BAL rating for the development site.

The BCA references *AS3959-2009 Construction of buildings in bushfire prone areas* or the *(NASH) Standard – Steel Framed Construction in Bushfire Prone* Areas (for Class 1a and 1b buildings only) as deemed to satisfy solutions that provide one way of complying with the Building Code's bushfire performance requirements.

Note: Higher construction standards can be either applied by a planning authority or presented as a part of an alternative solution in this Plan to enable compliance with the intent of the Bushfire Protection Criteria.

Buildings Classes 4 to 9

The BCA does not require Class 4-9 buildings to meet bushfire performance requirements. However, the responsible planning authority may condition planning approval with the requirement for the building works to be designed and constructed to reduce the risk of ignition from a bushfire - or a proponent might voluntarily adopt this approach.

The required bushfire performance measures will be those necessary to reduce the potential risk of ignition caused by burning embers, radiant heat or flame generated by a bushfire, and the intensity of the bushfire attack on the building - as quantified by the assessed BAL rating for the development site.

These measures would need to be determined by a Fire Engineer (with reference to AS3959-2009), certified in working drawings and approved by the responsible authority.

Bushfire Prone Planning Recommendation - When the subject site is in a designated bushfire prone area and the determined BAL is BAL-LOW, AS3959-2009 does not provide any specific construction requirements. However, Bushfire Prone Planning considers a building in this situation to still be at some risk of an ember attack. To improve the protection for occupants as well as the building itself, we recommend that consideration be given to constructing the proposed building works to the standard corresponding to BAL-12.5.

Bushfire Prone Planning Recommendation – in line with the intent of State Planning Policy 3.7 of preserving life and reducing the impact of bushfire on property and infrastructure, we recommend that the construction of a Class 4-9 building should apply bushfire performance measures appropriate to the assessed BAL rating. The appropriate bushfire performance measures will need to be determined by a Fire Engineer and approved by the responsible planning authority.

This Plan has provided achievable (or indicative) BAL's rather than determined BAL's because any future building works actual location is unknown. Once actual building locations have been determined confirmation or reassessment of the BAL may be required prior to the construction of any buildings.

8 Compliance Statements - of the Proposal and this Plan

This section of the Plan makes statements with respect to the Proposal's compliance against the components of the WA framework for bushfire risk management. It also states how the content of this BMP satisfies the requirements of SPP 3.7.

The key components of the WA framework for bushfire risk management are summarised in Appendix 1.

8.1 State Planning Policy No. 3.7: Planning in Bushfire Prone Areas

SPP 3.7 Policy Objectives - Proposal Compliance Statement		The Proposal Meets Objectives
s5.1	Avoid any increase in the threat of bushfire to people property and infrastructure	**Yes**
Implementation of the bushfire risk management measures as set out in this Plan, including meeting the requirements of the bushfire protection criteria; will avoid any increase in the threat of bushfire.		
s5.2	Identify and consider bushfire risks in decision-making at all stages of the planning and development process (to reduce vulnerability to bushfire).	**Yes**
The bushfire risks have been identified and assessed, as relevant for the stage of this planning submission, using the tools prescribed in *SPP 3.7* (and the associated document *Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017*). Refer to Section 5 'Assessment of Bushfire Risk'.		
s5.3	Ensure that all stages of planning submissions take into account bushfire protection requirements and include specified bushfire protection methods.	**Yes**
The bushfire protection requirements and any specified protection methods, relevant for the stage of this planning submission, have been taken into account and presented in Section 7 'Bushfire Risk Management Measures'.		
s5.4	Achieve an appropriate balance between bushfire risk management measures; biodiversity conservation values; environmental protection and biodiversity management; and landscape amenity, with consideration of climate change.	**Yes**
The components of this objective have been considered along with the requirements set out in the 'Guidelines' s2.3. Identifying and addressing issues relevant for the stage of this planning submission is presented in this Plan in Section 6 'Environmental Considerations'.		

SPP 3.7 Policy Measures – BMP Compliance Statement		This BMP is Compliant
s6.1	Higher order strategic planning documents in bushfire prone areas	**Yes**
The requirements stated in SPP 3.7 s6.3 include provision of high level consideration of relevant bushfire hazards when identifying or investigating land for future development.		
s6.2	Strategic planning proposals, subdivision and development applications	**Yes**
Plans relating to land that has or will have a BHL above low and/or where a BAL rating above BAL-Low apply, are to comply with these policy measures. If the proposal has or will on completion have a moderate BHL and/or where BAL-12.5 to BAL-29 applies, it may be considered for approval when the required information is provided and it can be undertaken in accordance with policy measures 6.3, 6.4 or 6.5.		
s6.3	Information to accompany strategic planning proposals	**Yes**
The requirements stated in SPP 3.7 s6.3 include provision of a Bushfire Hazard Level assessment (or a BAL contour map if lots are known), identify issues arising from the relevant assessment and demonstrate that compliance with the Bushfire Protection Criteria can be achieved in subsequent planning stages. Refer to Section 5 of this Plan.		
s6.4	Information to accompany subdivision applications	**N/A**
s6.5	Information to accompany development applications	**N/A**
s6.6	Vulnerable or high risk land uses (subdivision and development applications).	**N/A**

SPP 3.7 Policy Measures – BMP Compliance Statement		This BMP is Compliant
s6.7	Strategic planning proposals, subdivision or development applications in areas where an extreme BHL and/or BAL-40 or BAL-FZ applies	**N/A**
s6.8	Advice of State/relevant authority/s for emergency services to be sought	**N/A**
s6.9	Advice of State/relevant agencies/authorities for environmental protection to be sought	**Yes**
For all stages of planning proposals, advice from relevant authorities has been sought, considered and is referenced in Section 7 of this Plan where: • The clearing of vegetation within protected environmentally sensitive areas is proposed • Substantial clearing of native vegetation is proposed • Development abuts land managed by a State or Federal authority		
s6.10	Bushfire conditions may be imposed by the decision maker (detailed requirements including modifications and/or conditions)	**Yes**
WAPC and/or the local government may, as a condition of approval, require that a notification be placed on certificates of title and notice of the notification on the deposited plan advising that the lots are in a designated bushfire prone area and subject to a Bushfire Management Plan. This is noted in Section 9 'Responsibilities for Implementation and Maintenance'.		

8.2 Guidelines for Planning in Bushfire Prone Areas (WAPC v1.1 2017)

The 'Guidelines' are designed to assist in the interpretation of SPP3.7's objectives and policy measures. As such they have been referenced and complied with in compiling this Bushfire Management Plan which is to accompany the planning submission. This Plan contains, as a minimum, the information required as per the 'Guidelines' checklist.

8.3 Bushfire Protection Criteria (WAPC v1.1 2017 'Guidelines')

The proposed land use has been assessed against the bushfire protection criteria. The assessment of the bushfire risk management measures (i.e. those relevant to each element) and the demonstration of how the proposal meets the criteria are presented in Section 7.1 of this Plan - 'Bushfire Protection Criteria - Assess and Demonstrate Compliance'.

Where the proposal has not been able to fully meet an acceptable solution for a given element or an alternative solution is proposed, then the appropriate sub section of Section 7 'Bushfire Risk Management Measures', demonstrates how the Proposal will comply with the performance principle and the intent of that element. Any required advice and recommendations from DFES and other referral authorities will be included.

8.4 Local Variations to Bushfire Protection Criteria

Are there any endorsed local variations to the bushfire protection criteria (e.g. through a local planning policy) that are to apply to the proposed land use and therefore addressed in Section 7 'Bushfire Risk Management Measures' of this Plan?	No
Does the proposal satisfy the local variations to the bushfire protection criteria?	N/A

8.5 WA Building Act 2011

Relevant regulations associated with the Act are the *Building Regulations 2012* and the Building *Amendment Regulations (No 3)* 2015. The legislation adopts the Building Code of Australia as the minimum technical requirement for the design and construction of buildings and certain other structures in WA and prescribes applicable building standards for certain classes of buildings located in areas designated by the Fire and Emergency Services Commissioner as bushfire prone areas (identified on the Map of Bushfire Prone Areas).

Is this land use proposal at a planning stage at which lot layout is known and construction of buildings (any class) is being proposed?	No

If the response is 'No', then this Proposal is at a planning stage where specific compliance with the Building Act 2011 is not required – rather it will apply at future planning stages. However, if a BAL Contour Map and/or BAL assessment has been provided as part of this Plan, they can apply and may be able to be used for any future planning application (at the applicable planning stage involving construction of buildings).

If the response is 'Yes', then one of the situations below will apply to this proposal.

The Nature of this Land Use Proposal	Applicable
A proposal for a single house or ancillary dwelling (Class 1); or a specified building located in a bushfire prone area on a lot less than 1100m2 or on a lot equal to or greater than 1100m2 but subject to a BAL of BAL-29 or less, does not need to lodge a development application (but will require a building permit application). However, the relevant local government can additionally require that a development application is submitted for planning approval. Bushfire construction requirements will apply in both cases.	-
A proposal for a single house or ancillary dwelling (i.e. Class 1); or a specified building located in a bushfire prone area on a lot equal to or greater than 1100m2 but subject to BAL-40 or BAL-FZ must lodge a development application and bushfire construction requirements will apply.	-
A proposal, regardless of lot size, for a habitable building other than a single house or ancillary dwelling (i.e. Class 2 or 3 residential or accommodation buildings); or a specified building, located in a bushfire prone area, must lodge a development application and bushfire construction requirements will apply.	-
A proposal, regardless of lot size, for mixed use, commercial, industrial buildings or public facilities (i.e. Class 4-9 buildings), located in a bushfire prone area, and must lodge a development application. Bushfire construction requirements will not apply (unless the local government additionally requires them to apply).	-

This Proposal is for a planning stage that does not yet require compliance with the *WA Building Act 2011.* However, the obligation for future buildings to be constructed to the standard corresponding to the determined bushfire attack levels is noted in Section 9 of this Plan 'Responsibilities for Implementation and Maintenance'.

8.6 AS 3959 Construction of Buildings in Bushfire Prone Areas (2009 as amended)

This Proposal complies with the methodology set out in *AS 3959* to classify vegetation that is a bushfire threat and to calculate the bushfire attack levels presented as a BAL Contour Map and/or a BAL assessment in Section 5 of this Plan 'Assessment of Bushfire Risk'.

For the construction of any Class 1, 2, 3 buildings and associated Class 10a buildings and decks, this land use proposal will comply with the construction requirements, set out in *AS 3959,* that correspond to the determined bushfire attack level/s for the subject site. This obligation is stated in Section 9 of this Plan 'Responsibilities for Implementation and Maintenance'.

8.7 Local Government Firebreak Notice

This Proposal complies with the requirements of the relevant local government notice by stating the landowner's obligations in Section 9 of this Plan 'Responsibilities for Implementation and Maintenance.' Additionally, the obligation is noted in Section 7.3 'Vegetation Management'.

9 Responsibilities for Implementation & Maintenance

This section sets out the responsibilities of landowners/proponents (including future landowners), builders and local government in relation to the implementation and maintenance of the requirements of SPP 3.7 and the 'Guidelines'.

9.1 Landowner / Proponent Responsibilities (and those acting on their behalf)

Implementation

- Ensure anyone listed as having responsibility under the Plan has endorsed it and is provided with a copy for their information. This includes the landowners/proponents, local government and any other authorities or referral agencies ('Guidelines' s4.6.3).

- Construction of public roads must comply with the standards (Appendix 5 'Vehicular Access').

- Construction of private driveways must comply with the standards (Appendix 5 'Vehicular Access').

- Installation of a reticulated water supply must comply with the standards (Appendix 6 'Water') or the requirements set out by the relevant local government.

- Implement the low fuel Asset Protection Zone (APZ) as per s7.3 'Vegetation Management' and Appendix 4 'APZ'.

- Before any of the subject lots are sold, each individual lot is to be compliant with the local government's annual firebreak notice (referenced in this Plan s7.3 'Vegetation Management' and Appendix 4 'APZ').

- Ensure all future buildings the landowner/proponent has responsibility for, are designed and constructed in full compliance with the requirements of the WA Building Act 2011 and the referenced Building Code of Australia (BCA), and with any identified additional requirements of the relevant local government. This should include due consideration of constructing any Class 4-9 buildings to the standard corresponding to their determined BAL even though not required by the BCA.

  For any Class 1, 2, or 3 buildings and associated Class 10a buildings or decks this will include compliance with AS 3959-2009 *Construction of Buildings in Bushfire Prone Areas* (2009 as amended) and/or the National Association of Steel Housing – *(NASH) Standard – Steel Framed Construction in Bushfire Prone Areas,* whereby construction standards corresponding to the assessed BAL will be applied (Appendix 2 'Bushfire Risk Assessment – Methodology Explained').

Deposited Plan and Certificate of Title – Potential Obligation

The WAPC may condition a subdivision application approval with a requirement for the landowner / proponent to place a notification onto the certificate(s) of title and a notice of the notification onto the diagram or plan of survey (deposited plan). This will be done pursuant to Section 165 of the Planning and Development Act 2005 ('Hazard etc. affecting land, notating titles as to:') and applies to lots with a determined BAL rating of BAL-12.5 or above.

The notification will be required to state: 'This land is within a bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner and may be subject to a Bushfire Management Plan. Additional planning and building requirements may apply to development on this land'.

Maintaining Compliance

- Current and future landowners/proponents must continue to apply the bushfire management measures set out in this Plan. They must inform any builders (of future structures on a Lot) of the existence of the Plan and the responsibilities it contains.

- The landowner/proponent is responsible for the ongoing review and implementation of the Bushfire Management Plan to ensure that the bushfire risk management measures remain effective. Bushfire plans do not expire and should be seen as a 'living document'. They may require updating in certain circumstances, including (but not limited to) if site conditions change, if further details are required at subsequent stages of the planning process or to reflect new technologies or methodologies in best practice bushfire risk management ('Guidelines' s4.6.4 and s4.6.5).

- Respond to and comply with fire protection or hazard management notices issued by the local government. This includes compliance with the City of Wanneroo Fire and Burning Information notice (the current requirements can be found on the City of Wanneroo website), issued under s33 of the Bush Fires Act 1954 as directed by the 'Guidelines' s6.1 and referenced in this Plan s7.3 'Vegetation Management', s8.7 'Local Government Firebreak Notice' and Appendix 4 'APZ and HSZ'.

- Maintain the low fuel Asset Protection Zone (APZ) within the Lot boundary as per s7.2 'Vegetation Management' and Appendix 4 'APZ'.

- Where any existing or planned re-vegetation has been assessed as "low threat" (meeting AS 3959-2009 Section 2.2.3.2 requirements) and excluded from classification then this area will be managed to continue to meet those requirements and enable the buildings to retain their indicative BAL ratings.

- Any classified vegetation that has directly contributed to the determined BAL rating for a given Lot or building, must be managed such as to not change that vegetation to a higher risk classification.

9.2 Builder Responsibilities

The builder (generally named on the building permit) is responsible for ensuring that the building or incidental structure to which a building permit applies is, on completion, compliant with the Building Code of Australia (BCA).

For Classes 1a, 1b, 2, 3 and associated 10a buildings or decks located in a designated bushfire prone area, compliance with the BCA requires that these buildings are constructed to the requirements corresponding to their bushfire attack level rating.

The construction standards for Class 1a and 1b buildings are contained in:

- *AS 3959 - 2009 Construction of buildings in bushfire prone areas; or*
- National Association of Steel Housing – *(NASH) Standard – Steel Framed Construction in Bushfire Prone Areas*.

The construction standards for Classes 2, 3 and associated 10a buildings or decks are contained in:

- *AS 3959 - 2009 Construction of buildings in bushfire prone areas.*

The building/s must also comply with any additional local government requirements.

For any Class 4-9 buildings the builder must comply with any construction requirements that are additional to those contained in the BCA. Of particular issue is any requirement, made by the relevant local government or the owner, to construct to the standard corresponding to the determined BAL for proposed buildings.

9.3 Local Government Responsibilities

Implementation

- Provide advice where the clearing of locally significant vegetation is proposed.

- Register this Bushfire Management Plan and keep a record of the sites referred to for the purpose of identify servicing and infrastructure gaps. ('Guidelines' s4.6.4).

Maintaining Compliance

- Develop and maintain district bushfire fighting services and facilities.

- Monitor landowner compliance with the annual firebreak notice issued under s33 of the Bush Fires Act 1954.

On land vested in their control, the local government must give due consideration to future actions, that have the potential of changing the BAL ratings an existing habitable building (or existing BAL assessed development site) will be subject to. These actions include:

1. *Any planned revegetation of an area; and/or*
2. *The reduction of any vegetation management over an area that has in the past and is currently, actively managed to a minimal fuel condition and it would be a most reasonable expectation that it would continue to be managed this way.*

Specifically, the local government should:

1. *In revegetating an area/s, give due consideration to how it would be assessed from a bushfire perspective (as per AS 3959-2009). The intent must be to not increase the current BAL rating of an existing neighbouring habitable building (or assessed development site). Important considerations include awareness of existing classifiable vegetation in the area, the new plant species proposed to be used and the landscaping design.*

2. *Continue to manage vegetation areas to a minimum fuel condition if, in aa existing Bushfire Attack Level assessment, they have been assessed as low threat vegetation. But only if:*
    a. *The vegetation area has been <u>correctly</u> excluded from classification as per AS 3959-2009 s2.2.3.2 (f); and*
    b. *If the vegetation area was to be no longer managed, this would result in the neighbouring existing habitable building (or assessed development site) being subject to a higher BAL rating.*

10 Appendices – Advisory Information Only

Appendix 1

The WA Framework for Bushfire Risk Management

This section of the Bushfire Management Plan sets out the applicable legislation, regulations, policies, guidelines, documents, and associated bushfire risk assessments that a Bushfire Management Plan will need to reference and where applicable, comply with. Statements of compliance against these requirements, as required by the 'Guidelines', are presented in Section 8 of this Plan.

The state government of WA has committed to addressing bushfire through the implementation of a risk-based system of land-use planning and development that aims to reduce the risk of bushfire.
The legislative means of facilitating this is through the ***Planning and Development Act 2005*** and its interaction with the ***Fire and Emergency Services Act 1998*** and the ***Building Act 2011***.

Planning and Development (Local Planning Schemes) Amendment Regulations 2015

These regulations are given effect under the ***Planning and Development Act 2005***. The *Planning and Development (Local Planning Schemes) Regulations 2015* are amended to introduce 'Schedule 2 Part 10A 'Bushfire Risk Management' which establishes the *deemed provisions relating to bushfire risk management.*

"The deemed provisions relating to bushfire risk management work with the State Planning Policy 3.7: Planning in Bushfire Prone Areas (SPP 3.7) and Guidelines for Planning in Bushfire Prone Areas (Guidelines); Map of Bushfire Prone Areas; Building Regulations 2012 and Building Code of Australia to guide planning and development proposals in bushfire prone areas to ensure bushfire risk is properly managed.

The deemed provisions provide a mechanism to require a development approval, and through this the application of SPP 3.7 and the Guidelines, to development on sites where BAL-40 or BAL-Flame Zone (FZ) applies. SPP 3.7 sets out the planning hierarchy and the information required at each stage of the planning process whilst the Guidelines provide information on how SPP 3.7 should be implemented" (source: WAPC Planning Bulletin 111/2015 Planning in Bushfire Prone Areas).

The ***deemed bushfire provisions***:

- Only apply to development that is proposed on a site in a designated bushfire prone area.
- Override any existing local planning scheme provisions relating to bushfire, including any inconsistent provisions, apart from special control areas.
- Are in addition to any provisions relating to development in a bushfire prone area that apply to a special control area.
- Can be supplemented by a local planning scheme (by implementing a special control area) but not varied or exempted.
- Are applied and work through the following legislation, regulations, policies, guidelines, and documents – each of which this Bushfire Management Plan will address.

Map of Bushfire Prone Areas

The Map of Bushfire Prone Areas identifies land that has been designated as being bushfire prone by the Fire and Emergency Services Commissioner under the *Fire and Emergency Services (Bushfire Prone Areas) Order 2015* as part of the ***Fire and Emergency Services Act 1998***.

Designation as a bushfire prone area (highlighted as pink on the map) reflects the potential of bushfire to affect that site. It acts as a mechanism for initiating further assessment in the planning and building process. This can involve bushfire risk assessment and management measures being required in planning submissions and activation of the bushfire construction requirements of the Building Code of Australia.

State Planning Policy No. 3.7: Planning in Bushfire Prone Areas (SPP 3.7)

This policy is made under the ***Planning and Development Act 2005*** and provides the foundation for land use planning to address bushfire risk management in Western Australia.

SPP 3.7 applies to every stage of the planning process (i.e. all higher order strategic planning documents; strategic planning proposals; subdivision and development applications) in designated bushfire prone areas. It also applies to an area not yet designated as bushfire prone but is proposed to be developed in a way that introduces a bushfire hazard (*Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017 s3.2.2*).

The objectives of this policy are to:

- Ensure that all stages of land use planning (higher order strategic planning documents; strategic planning proposals; subdivision and development applications) identify and consider bushfire risk and apply specified bushfire protection measures; and
- To have an outcome that will avoid any increase in the threat of bushfire to people, property and infrastructure, preserve life and achieve an appropriate balance between bushfire risk management measures and all environmental conservation aspects.

Policy measures to achieve the objectives are defined and:

- They vary according to the type and scale of the planning proposal and stage of the development process;
- They set out the information to be prepared for each type of proposal; and
- They refer to the Guidelines *for Planning in Bushfire Prone Areas (WAPC v1.1 2017)* as supporting this policy and providing the procedural detail for assessment and presentation of the required information.

Guidelines for Planning in Bushfire Prone Areas (WAPC v1.1 2017)

These Guidelines are designed to supplement and assist in the interpretation of SPP3.7's objectives and policy measures. They provide advice on how bushfire risk is to be addressed when planning, designing or assessing a planning proposal.

As an endorsed standard (by the Office of Bushfire Risk Management), these Guidelines, in conjunction with SPP 3.7, are the predominant documents in the State for use by decision making authorities and referral agencies, during the consideration of strategic planning proposals, subdivisions and development applications.

The Guidelines set out the interrelationships between, and requirements for, various assessment tools used to assess risk in the planning context, as prescribed by SPP 3.7. These include:

- A Bushfire Hazard Level assessment;
- A Bushfire Attack Level (BAL) Contour Map;
- A Bushfire Attack Level (BAL) assessment;
- The Bushfire Protection Criteria; and
- A Bushfire Management Plan

The 'Guidelines' reference the Bushfire Attack Level descriptions and assessment methodologies that are defined in AS 3959.

Bushfire Protection Criteria

The bushfire protection criteria (set out in the 'Guidelines Appendix 4) are a performance based system of assessing bushfire risk management measures. An assessment against the criteria is to be undertaken for any strategic planning proposal, subdivision and development application for a site that has or will on completion, have a bushfire hazard level above 'Low or a BAL rating above BAL-LOW.

The protection criteria consist of four elements: Location; Siting and Design of Development; Vehicular Access; and Water.
Each element has three components: Intent; Acceptable Solutions; and a Performance Principle. How to apply the Criteria is set out in the 'Guidelines' s4.5.2.

Local Variations to Bushfire Protection Criteria

Local governments may seek to add or to modify the acceptable solutions to recognise special local or regional circumstances (e.g. topography / vegetation / climate which reinforce the intent of a particular bushfire protection element and apply across a defined locality.

These endorsed (by WAPC and DFES) variations will be in the form of a local planning scheme amendment /provision or special control area. Currently they may be in the form of a local planning policy.

WA Building Regulations 2012

These regulations exist under the **WA Building Act 2011** and adopt the **Building Code of Australia** as the minimum technical requirements for the design and construction of buildings and certain other structures in WA.

Most development in WA requires a building permit before construction can commence. This process typically occurs after the planning process.

The Regulations include the **Building Amendment Regulations (No.3) 2015** that prescribe applicable building standards for buildings located in areas designated by the Fire and Emergency Services Commissioner as bushfire prone areas (identified on the Map of Bushfire Prone Areas).

Building Code of Australia (BCA)

The BCA provides minimum technical requirements for the construction of buildings. These are presented as Volumes One and Two of the National Construction Code series.

The BCA requires an assessment of the potential intensity of bushfire attack for specific classes of residential buildings located in designated bushfire prone areas (Classes 1a, 1b, 2, 3 and associated 10a buildings or decks).

The BCA requires that these buildings are constructed to the requirements corresponding to their bushfire attack level rating.

Compliance with BCA bushfire requirements for Class 1a and 1b buildings in designated bushfire prone areas can be demonstrated by compliance with:

a. Australian Standard *AS 3959 Construction of buildings in bushfire prone areas; or*
b. National Association of Steel Housing – *(NASH) Standard – Steel Framed Construction in Bushfire Prone Areas.*

Compliance with BCA bushfire requirements for Classes 2, 3 and associated 10a buildings or decks in designated bushfire prone areas can be demonstrated by compliance with:

a. Australian Standard *AS 3959 Construction of buildings in bushfire prone areas.*

AS 3959 Construction of Buildings in Bushfire Prone Areas (2009 as amended)

The objective of this Standard is to prescribe construction details for buildings to reduce the risk of ignition from a bushfire, appropriate to the:

a) Potential for ignition caused by embers, radiant heat or flame generated by a bushfire; and
b) Intensity of the bushfire attack on the building.

To achieve this, the Standard defines six categories of Bushfire Attack Level (BAL), details their assessment methodology and specifies constructions standards corresponding to each.

Western Australia Bush Fires Act 1954 (as amended)

'An Act to make better provision for diminishing the dangers resulting from bush fires, for the prevention, control and extinguishment of bush fires'. Matters addressed in the Act include prohibited burning times, total fire bans, bushfire control and extinguishment

The Act sets out the authority given to local government which enables them to:

- Control and extinguish bushfires
- Establish and maintain Bushfire Brigades
- Require landowners and/or occupiers to install and maintain firebreaks to their required specifications
- Require landowners and/or occupiers manage bushfire fuel loads upon the land to their required specifications

The applicable document is the annually issued ***Firebreak Notice*** published by the relevant local government that sets out the obligations for landowners and/or occupiers.

Other Applicable Local Government Documents

These may include:

- Local planning scheme provisions.
- Local planning strategy references to bushfire risk management.
- Local planning strategy references to environment.
- Applicable structure plans
- Special control area provisions
- Previous planning approvals

Other Documents

These may include:

- Any existing Bushfire Management Plan, Bushfire Hazard Level assessment or BAL assessment prepared over the site.
- Relevant landscaping plans applicable to the subject site.

Appendix 2

Bushfire Risk Assessment – Understanding the Methodology

In SPP 3.7 'bushfire risk' is defined as "the chance of a bushfire igniting, spreading and causing damage to people, property and infrastructure."

"Before a strategic planning proposal, subdivision or development application can be considered, it is necessary to understand the extent of the bushfire hazard and its potential to affect people, property and infrastructure. An assessment of bushfire risk is a key component of deciding whether a strategic planning proposal, subdivision or development application should be approved in an area with a potential bushfire threat (from the 'Guidelines')."

Policy measures in *SPP 3.7* (and the associated document *Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017*) prescribe the various assessment tools to be used to assess bushfire risk in the planning context. These are:

- Bushfire Hazard Level assessment;
- Bushfire Attack Level (BAL) Contour Map;
- Bushfire Attack Level (BAL) assessment;
- Bushfire protection criteria; and
- Bushfire Management Plan

The intent of this Appendix 'Bushfire Risk Assessment – Understanding the Methodology' is to provide an overview of the methodology used in assessing the Bushfire Hazard Level and the Bushfire Attack Level.

Bushfire Hazard Level Assessment Methodology

Used at a strategic planning level, this methodology rates bushfire hazards into three potential categories of low, moderate and extreme by considering the following characteristics:

- Vegetation types and areas
- Effective ground slope under the vegetation threat
- Existing land use on and around the area being assessed
- Prevailing climatic conditions when appropriate

These results are presented as a Bushfire Hazard Level Map.

Bushfire Attack Level Assessment Methodology

The Australian Standard *AS 3959-2009 Construction of Buildings in Bushfire Prone Areas* defines a Bushfire Attack Level (BAL) as:

"A means of measuring the severity of a building's potential exposure to ember attack, radiant heat and direct flame contact, using increments of radiant heat expressed in kilowatts per metre squared, and is the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire."

AS 3959-2009 defines six categories of Bushfire Attack Level (BAL) (*AS 3959 Appendix G*); provides the assessment methodology (*AS 3959 s2 and Appendix B);* and specifies constructions standards corresponding to each BAL (*AS 3959 s3 Table 3.1*). The BAL's and corresponding descriptions of the predicted levels of exposure and heat flux exposure thresholds are contained in the table on the following page.

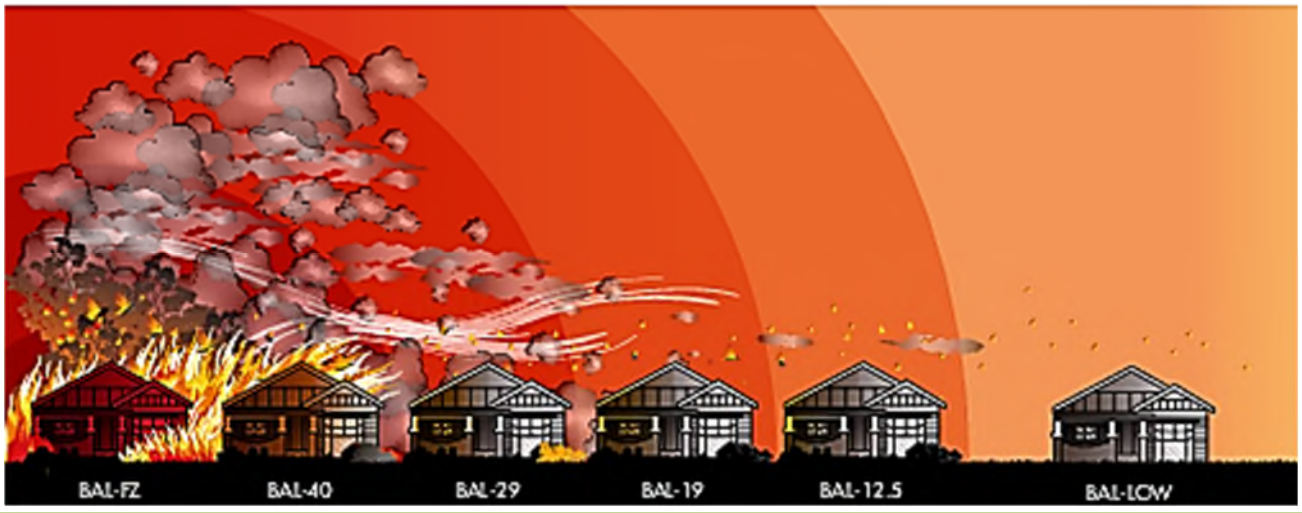
AS 3959-2009 provides two methods to calculate Bushfire Attack Levels:

1. Method 1 **-** a simplified procedure that involves five procedural steps to determine the BAL. It is subject to some limitations of the circumstances in which it can be used.
2. Method 2 **-** a detailed procedure using calculations to determine BALs where a more specific result is sought or site conditions are outside the scope of Method 1. In particular, the use of Method 2 is to apply if the effective slope under the classified vegetation is greater than 20^0 down slope (and no more than 30^0 down slope) and the slope of the land between the site and the classified vegetation is no more than 20^0 regardless of slope type.

Method 1 – Summarised Procedure

- Determination of the area to be assessed
- Determine predominant vegetation type(s) within 100 metres of the site and classify
- Determination of distance of the site, building or building envelop from the classified vegetation type(s)
- Determination of the effective slope under the classified vegetation type(s)
- Determination of BAL's - Forest Fire Danger Index (FFDI) of 80 is used for WA

Separation Distance: *The distance from a subject site (or building) to a specific area of classified vegetation (i.e. the bushfire threat) is labelled in the tables of this Plan as a separation distance. This distance is measured to a point in the vegetation area represented by the "edge of the vegetation" as per AS 3959 -2009 s2.2.4 and the "base of the bushfire prone vegetation (not the canopy)" as per the BAL Assessment [Basic] Factsheet Version 1 December 2015 WAPC. The exact point of measurement is then decided by the assessor on the basis of the fuel structure and expected fire behaviour. If a precautionary approach is considered appropriate to a given situation the measurement will be taken at the canopy line.*

Bushfire Attack Level Definitions and Corresponding Sections Specifying Construction Requirements (Source: *AS 3959-2009, Appendix G and Table 3.1*)		
Bushfire Attack Level (BAL)	**Description of Predicted Bushfire Attack and Levels of Heat Flux Exposure**	**Construction Section of AS 3959**
BAL - LOW	There is insufficient risk to warrant specific construction requirements but there is still some risk.	4
BAL - 12.5	There is risk of ember attack. The construction elements are expected to be exposed to a heat flux not greater than 12.5 kW/m^2	3 and 5
BAL - 19	There is a risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 19 kW/m^2	3 and 6
BAL - 29	There is an increased risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to an increased level of radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 29 kW/m^2	3 and 7
BAL - 40	There is a much increased risk of ember attack and burning debris ignited by wind borne embers, a likelihood of exposure to a high level of radiant heat and some likelihood of direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux not greater than 40 kW/m^2	3 and 8
BAL - FZ	There is an extremely high risk of ember attack and burning debris ignited by wind borne embers, a likelihood of exposure to an extreme level of radiant heat and direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux greater than 40 kW/m^2	3 and 9
		

Appendix 3

Vegetation Classification Exclusions (AS 3959-2009 s2.2.3.2)

Certain vegetation can be excluded from being classified in which case the Bushfire Attack Level shall be rated as BAL-LOW and no bushfire specific construction requirements apply. Such vegetation is one or a combination of the following:

a) Vegetation of any type that is more than 100m from the site.

b) Single areas of vegetation less than 1ha in area and not within 100m of other areas of vegetation being classified.

c) Multiple areas of vegetation less than 0.25ha in area and not within 20m of the site or each other.

d) Strips of vegetation less than 20m in width regardless of length and not within 20m of the site or each other, or other areas of vegetation being classified.

e) Non-vegetated areas, including waterways, roads, footpaths, buildings, and rocky outcrops.

f) Low threat vegetation, including grassland managed in a **minimal fuel condition** (i.e. insufficient fuel available to significantly increase the severity of a bushfire attack – recognisable as short cropped grass to a nominal height of 100mm for example), maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks.

Appendix 4

Asset Protection Zones (APZ) - Description, Establishment, Maintenance and Standards

Source: Guidelines for Planning in Bushfire Prone Areas (DoP/DFES v1.1 2017) Appendix 4 Element 2

Description: An APZ is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level (by reducing fuel loads). The width of the required APZ varies with slope and vegetation. The APZ should at a minimum be of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m² (BAL-29). It should be lot specific.

(For subdivision planning, hazard separation in the form of using subdivision design elements or excluded and low threat vegetation adjacent to the lot may be used to reduce the dimensions of the APZ within the lot).

Defendable Space: The APZ includes a defendable space which is an area adjoining the asset within which firefighting operations can be undertaken to defend the structure. Vegetation within the defendable space should be kept at an absolute minimum and the area should be free from combustible items and obstructions. The width of the defendable space is dependent on the space which is available on the property, but as a minimum should be 3 metres.

Establishment: The APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity. The APZ may include public roads, waterways, footpaths, buildings, rocky outcrops, golf courses, maintained parkland as well as cultivated gardens in an urban context, but does not include grassland or vegetation on a neighbouring rural lot, farmland, wetland reserves and unmanaged public reserves.

Native Vegetation: APZ's can adversely affect the retention of native vegetation. Where the loss of vegetation is not acceptable or causes conflict with landscape or environmental objectives, such as waterway foreshore areas and wetland buffers, reducing lot yield may be necessary to minimise the removal and modification of remnant vegetation.

Responsibility: It is the responsibility of the landowner/proponent to maintain their APZ in accordance with Schedule 1 'Standards for Asset Protection Zones'. It is likely that this requirement is also contained in the firebreak notice issued by local government under s33 of the Bushfire Act 1954.

Regardless of whether an Asset Protection Zone exists in accordance with the acceptable solutions and is appropriately maintained, it should be noted that fire fighters are not obliged to protect an asset if they think the separation distance between the dwelling and vegetation is unsafe.

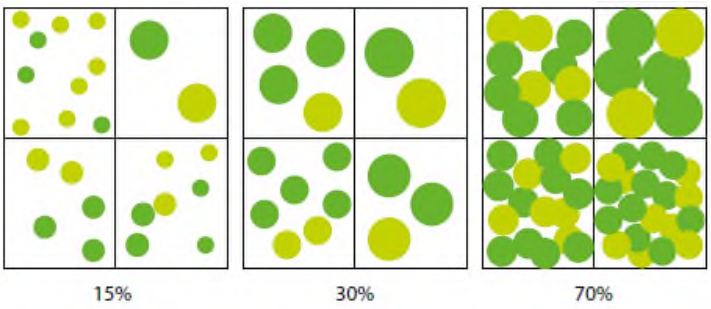
Standards for Asset Protection Zones

Fences: within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.

Objects: within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.

Fine Fuel Load: combustible dead vegetation matter less than 6 mm in thickness reduced to and maintained at an average of two tonnes per hectare. The visual guide below shows a fuel load that equates to approximately 2t/ha (source: Shire of Augusta Margaret River's Firebreak and Fuel Reduction Hazard Notice).

Trees (> 5 metres in height): trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy. Diagram below represents tree canopy cover at maturity.



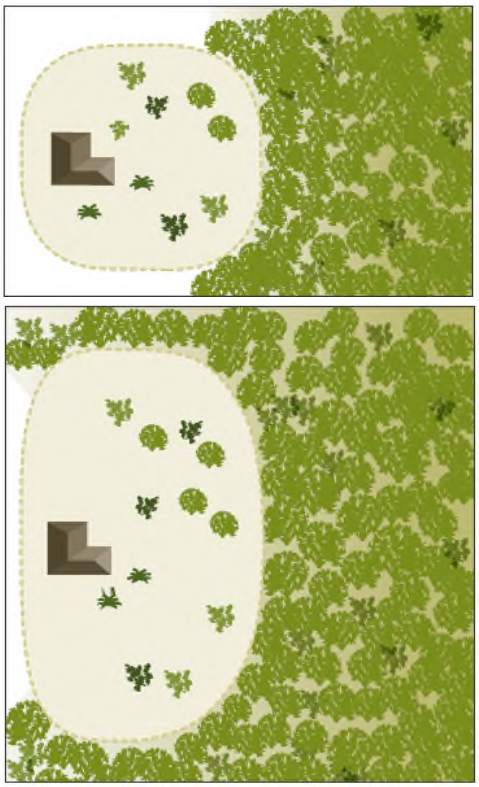
Shrubs (0.5 metres to 5 metres in height): should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m2 in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.

Ground covers (<0.5 metres in height): can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 mm in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.

Grass: should be managed to maintain a height of 100 mm or less.

Note that individual local governments may increase the APZ standard compared to the standard stated above. These would be additional requirements and will be contained in their annual firebreak notice issued under s33 of the Bushfires Act 1954 and are to be complied with.

The example diagrams below illustrate how the required dimensions of the APZ will be determined by the type and location of the vegetation



Additional DFES Guidance

a) Store firewood at least 20 metres away from the building.
b) Keep gutters free of leaves and other combustible material.
c) Roof mounted evaporative coolers to be fitted with ember screens.
d) Gas cylinders to vent away from a building and be tethered to prevent falling over.
e) Driveways and access ways must allow for safe passage of a fire appliance to all buildings on the land.
f) Land owners/occupiers must maintain compliance with the local government's annual firebreak notice issued under s33 of the Bush Fires Act 1954.

Appendix 5

Technical Requirements - Bushfire Protection Criteria (Vehicular Access)

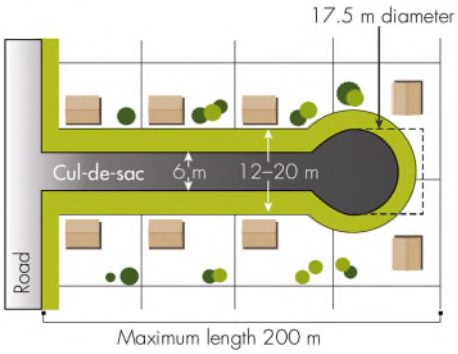
Vehicular Access – Technical Requirements of Acceptable Solutions - Part 1

Source: *Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017*

Acceptable Solution 3.3 Cul-de-sacs (including a dead-end road)

Their use in bushfire prone areas should be avoided. Where no alternative exists then the following requirements are to be achieved:

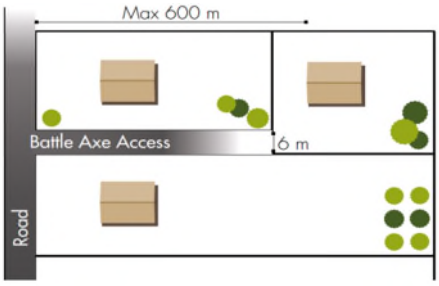
- Maximum length is 200m. If public emergency access is provided between cul-de-sac heads (as a right of way or public access easement in gross), the maximum length can be increased to 600m provided no more than 8 lots are serviced and the emergency access way is less than 600m in length;
- Turnaround area requirements, including a minimum 17.5m diameter head to allow type 3.4 fire appliances to turn around safely;
- The cul-de-sac connects to a public road that allows for travel in two directions; and
- Meet the additional design requirements set out in Part 2 of this appendix.



Acceptable Solution 3.4 Battle-axe

Their use in bushfire prone areas should be avoided. Where no alternative exists then the following requirements are to be achieved:

- Maximum length 600m and minimum width 6m; and
- Comply with minimum standards for private driveways.



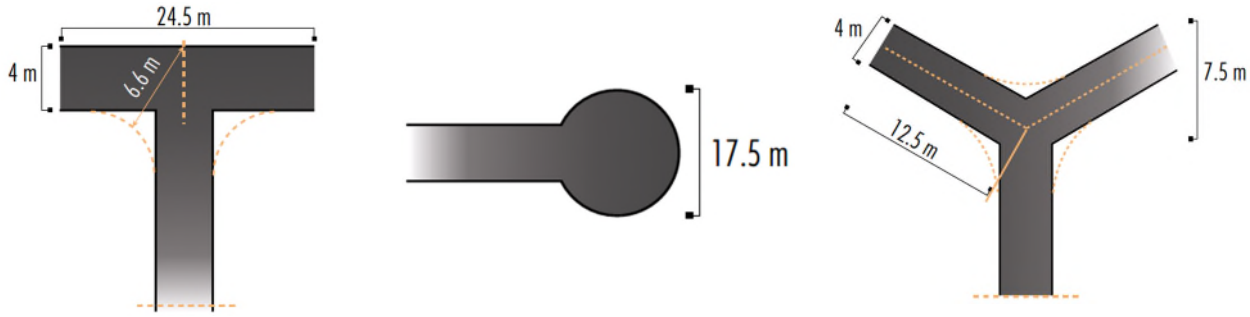
Acceptable Solution 3.5 Private Driveways

The following requirements are to be achieved:

- The design requirements set out in Part 2 of this appendix; and

Where the house site is more than 50 metres from a public road:

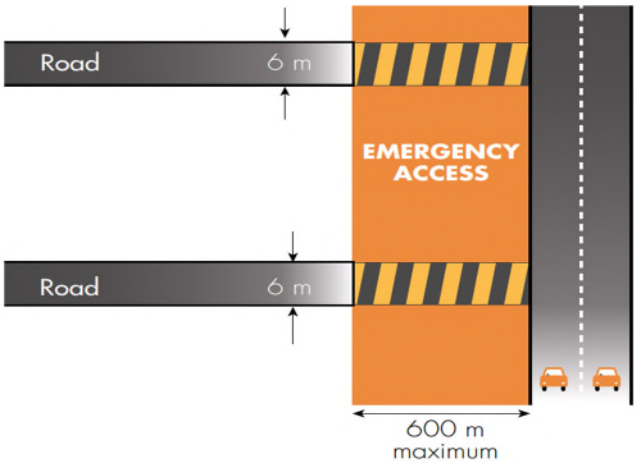
- Passing bays every 200 metres with a minimum length of 20 metres and a minimum width of two metres (ie combined width of the passing bay and constructed private driveway to be a minimum six metres);
- Turn-around areas every 500 metres and within 50 metres of a house, designed to accommodate type 3.4 fire appliances to turn around safely (ie kerb to kerb 17.5 metres);
- Any bridges or culverts are able to support a minimum weight capacity of 15 tonnes; and
- All weather surface (i.e. compacted gravel, limestone or sealed).



Acceptable Solution 3.6 Emergency Access Way

An access way that does not provide through access to a public road is to be avoided bushfire prone areas. Where no alternative exists, an emergency access way is to be provided as an alternative link to a public road during emergencies. The following requirements are to be achieved:

- No further than 600 metres from a public road;
- Must be signposted including where they ajoin public roads;
- Provided as a right of way or public access easement in gross;
- Where gates are used they must not be locked and they must be a minimum width of 3.6 metres with design and construction approved by local government (refer to the example in this appendix); and
- Meet the additional design requirements set out in Part 2 of this appendix.



Acceptable Solution 3.7 Fire Service Access Routes (Perimeter Roads)

Are to be established to provide access within and around the edge of subdivision and related development and to provide direct access to bushfire prone areas for firefighters and link between public road networks for firefighting purposes. Fire service access is used during bushfire suppression activities but can also be used for fire prevention work. The following requirements are to be achieved:

- No further than 600 metres from a public road (driveways may be used as part of the designated fire service access;
- Dead end roads not permitted;
- Allow for two-way traffic (i.e. two 3.4 fire appliances);
- Provide turn-around areas designed to accommodate 3.4 fire appliances and to enable them to turn around safely every 500m (i.e. kerb to kerb 17.5 metres);
- All weather surface (i.e. compacted gravel, limestone or sealed) and have erosion control measures in place;
- Must be adequately sign posted;
- Where gates are used they must be a minimum width of 3.6 metres with design and construction approved by local government (refer to the example in this appendix) and may be locked (use a common key system);
- Meet the additional design requirements set out in Part 2 of this appendix;
- Provided as right of ways or public access easements in gross; and
- Management and access arrangements to be documented and in place.

A3.8 Firebreak Width

Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three meters or to the level as prescribed in the local firebreak notice issued by the local government.

Vehicular Access - Technical Requirements of Acceptable Solutions - Part 2 Source: *Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017*					
Technical Component	Vehicular Access Types				
	Public Roads	Cul-de-sacs	Private Driveways	Emergency Access Ways	Fire Service Access Routes
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal clearance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	4.5	4.5	4.5	4.5
Maximum grade <50 metres	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum cross-fall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius (m)	8.5	8.5	8.5	8.5	8.5

* A six metre trafficable surface does not necessarily mean paving width. It could, for example, include four metres of paving and one metre of constructed road shoulders. In special circumstances, where 8 lots or less are being serviced, a public road with a minimum trafficable surface of four metres for a maximum distance of ninety metres may be provided subject to the approval of both the local government and DFES.

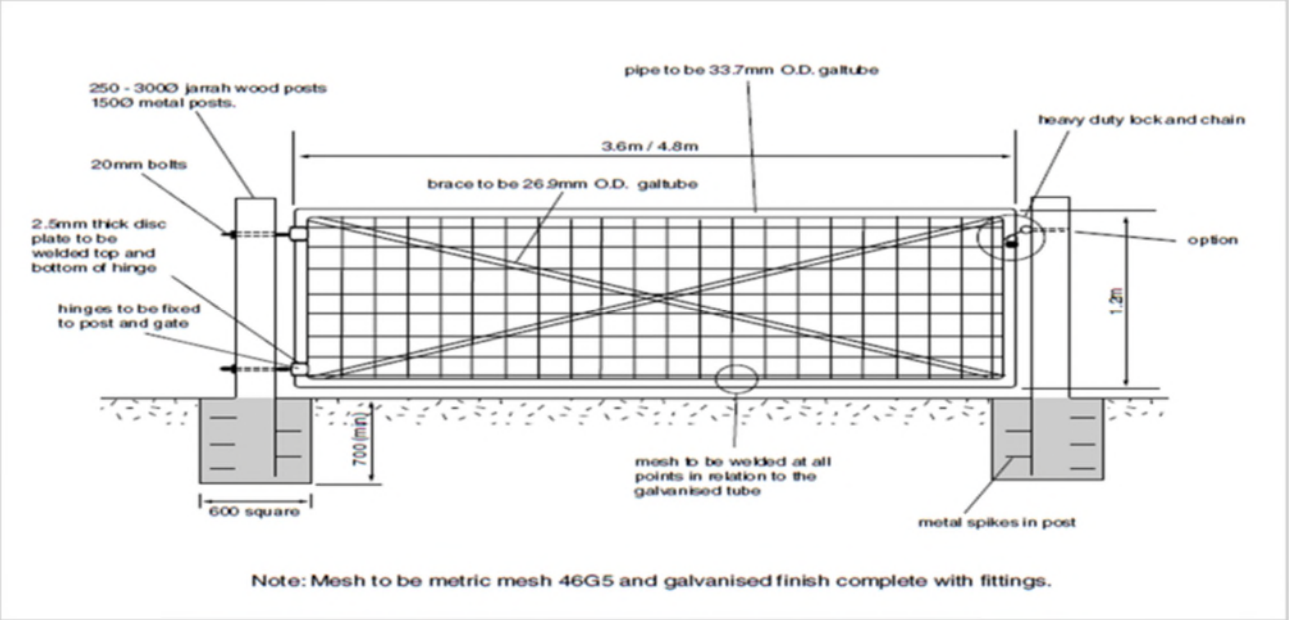
Vehicular Access - Technical Requirements of Acceptable Solutions

Gates and Signs

(example requirements – check with local government)

Gates (Bollards)

- Minimum width 3.6m
- Design and construction to be approved by relevant local government.
- Emergency access way gates must not be locked.
- Fire service access route gates may be locked but only with a common key that is available to local fire service personnel.
- Bollards will be to the relevant local government specifications



Note: Mesh to be metric mesh 46G5 and galvanised finish complete with fittings.

Signs

- Minimum height above ground of 0.9m.
- Lettering height to be 100mm.
- To display the words (as appropriate) “Emergency Access Only” or “Fire Service Access – No Public Access”.
- Design and construction to be approved by the relevant local government.
- Size 600mm x 400mm.
- Sign colour red, base (white) area is reflective background.
- Rounded corners, radius 20mm.
- White key-line 3mm wide, 3mm from outside edge.
- Suggested mounting hole six 6mm diameter.

Appendix 6

Technical Requirements - Bushfire Protection Criteria (Water)

Source: *Guidelines for Planning in Bushfire Prone Areas WAPC v1.1 2017* and DFES website

Acceptable Solution 4.1 Reticulated Areas

The requirement is to supply a reticulated water supply, together with fire hydrants, in accordance with the specifications set by DFES and the relevant water supply authority (WA Water Corporation or Aqwest - Bunbury or Busselton Water). The Water Corporation's 'No 63 Water Reticulation Standard' is deemed to be the baseline criteria for developments and should be applied unless local water supply authority's conditions apply. Key specifications in the most recent version/revision of the design standard include:

- ***Residential Standard*** – hydrants are to be located so that the maximum distance between the hydrants shall be no more than 200 metres.

- ***Commercial Standard*** – hydrants are to be located with a maximum of 100 metre spacing in Industrial and Commercial areas.

- ***Rural Residential Standard*** – where minimum site areas per dwelling is 10,000 m^2 (1ha), hydrants are to be located with a maximum 400m spacing. If the area is further subdivided to land parcels less than 1ha, then the residential standard (200m) is to be applied.

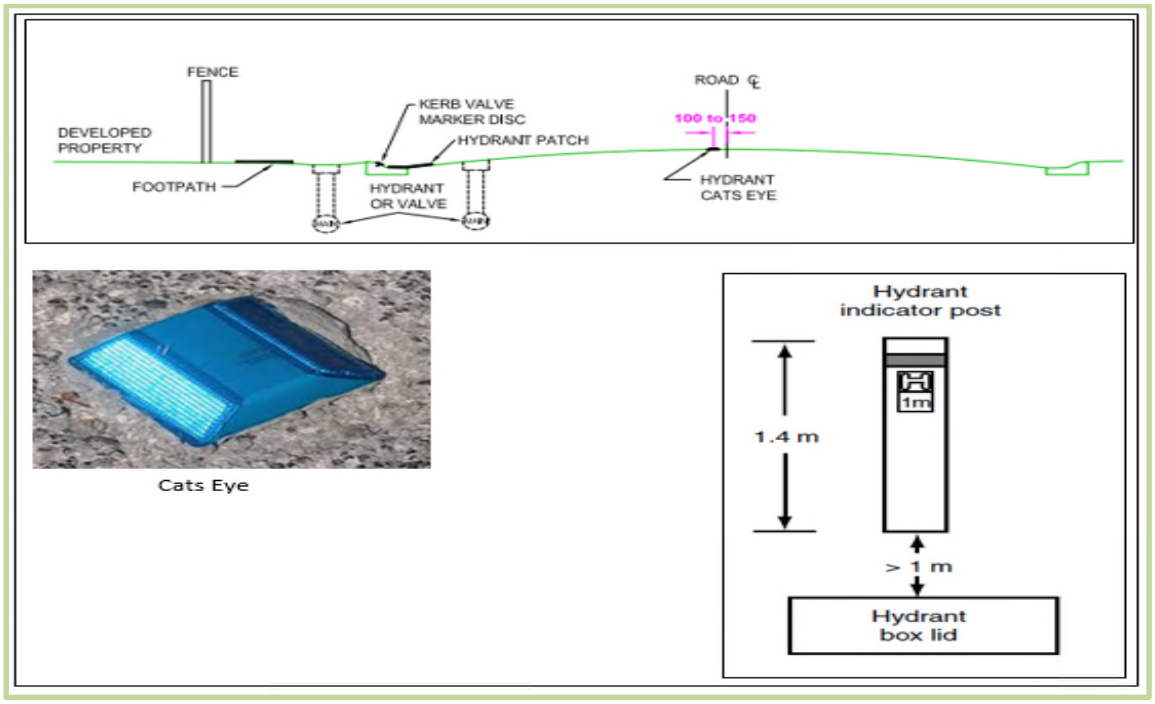


Figure A4.1: Hydrant Location and Identification Specifications

Acceptable Solution 4.2 Non-Reticulated Areas

Static water supplies are used by firefighters in areas where there is no reticulated water supply. Water tanks are the only acceptable static water source acceptable to meet Element 4 (Water) of the Bushfire Protection Criteria as per the *Guidelines for Planning in Bushfire Prone Areas (WAPC 2015 v1.1 2017) Appendix 4*.

The requirements for the development being assessed can be increased by the relevant local government. If a variation applies it will be noted in s7.1 and s7.5.

Volume:	50,000 litres per tank
Ratio of tanks to lots:	1 tank per 25 lots (or part thereof)
Location:	No more than two kilometres to the furthermost house site within the residential development to allow a 2.4 fire appliance to achieve a 20-minute turnaround time at legal road speeds.
Tank Construction:	Above ground tanks constructed using concrete or metal. Stands of raised tanks are constructed using non-combustible materials and heat shielding where applicable (required for metal stands).
Pipe Construction:	Galvanised or copper (PVC if buried 300mm below ground).
Access:	Hardstand and turnaround areas suitable for a 3.4 appliance (i.e. kerb to kerb 17.5metres) are provided within three metres of each tank.
Couplings:	Tanks are to be fitted with a full flow gate (not ball) valve and a 100mm cam-lock coupling of metal/alloy construction (source: DFES). Examples below:
	 
Ownership and Responsibility:	Water tanks and associated facilities are vested in the relevant local government. A procedure must be in place to ensure that water tanks are maintained at or above designated capacity at all times.

Acceptable Solution 4.3 Non-Reticulated Areas - Individual Lots

This solution is only for use if creating one additional lot and cannot be applied cumulatively (*Guidelines for Planning in Bushfire Prone Areas WAPC 2015 v1.1 2017 Appendix 4)*.

Single lots above 500 m^2 need a dedicated static water supply on the lot that has an effective capacity of 10,000 litres (*Guidelines for Planning in Bushfire Prone Areas WAPC 2015 v1.1 2017)*.

An Example Local Government Requirement:

Volume:	Minimum 10,000 litres (effective) per tank dedicated to firefighting purposes. The storage tank must not facilitate sharing the water for domestic use (danger of contamination).
Tank Construction:	Above ground tanks constructed using concrete or metal.
Pipe Construction:	Galvanised or copper (PVC if buried 300mm below ground).
Access:	Hardstand and turnaround area suitable for a 3.4 appliance (i.e. kerb to kerb 17.5metres) is provided at the tank.
Couplings:	Tanks are to be fitted with a full flow gate (not ball) valve and a 50mm or 100mm cam-lock coupling of metal/alloy construction. Examples below:
Responsibility:	A procedure must be in place to ensure that water tanks are maintained at or above designated capacity at all times.

Recommended coupling 50mm