

# Clause 55 Response

13 Darnley Street, Braybrook,  
3019

Proposal for 2 side-by-side dwellings  
on a double-fronted lot

Designed by Residential Space  
March 2024

## **Introduction**

This submission relates to plans drawn by Residential Space, and the application for a proposed side-by-side townhouse dual occupancy at 13 Darnley Street, in the place of the existing run-down home on the site. Located on a 678 square metre block, the site is situated within a General Residential 1 Zone in the suburb of Braybrook, on Darnley Street. The site is close to the corner of Wilson Street and is very close to Skinner Reserve and the Maribyrnong City Council buildings. Hence, it is close to a broad range of services and facilities – from schools through to parks, shopping areas and public transport. Darnley Street and the surrounding area is somewhat eclectic in nature, with many older homes, but also several newer contemporary homes and developments of 1-2 storeys. The site is within the ‘incremental change area, within the Garden Court neighbourhood character region.

This proposal is for two single fronted side-by-side modern 2-storey dwellings offering 3 bedrooms each, with 1 bedroom and all other facilities available at ground floor level in unit 2, but all bedrooms at first floor in unit 1. The proposed dwellings provide a comfortable living standard that is affordable and will therefore suit a range of people and family types in this area that is surrounded by a broad range of services and employment hubs. The proposed infill development is beneficial in this area as it adds extra housing with more liveable spaces and is located close to work hubs and so many services.

The proposal requires a permit application and a Clause 55 Assessment as part of this application. This assessment is provided in the following pages.

## **The Site and Environs**

The site is located in a General Residential Zone 1 area, on Darnley Street, Braybrook, very near to the Wilson Street corner. The Street has a range of housing types including older homes, inter-war homes as well as newer two-storey homes and townhouses. Most homes have driveways and on-site parking, as well as informal gardens. Front fences range from none, to landscaped frontages and low to medium height brick and metal fences. Setbacks along the street also vary. The site is close to buses, shops, parkland, schools and major roads and employment hubs.

The area is going through a stage of incremental change, with pockets of infill housing replacing many of the older homes that do not warrant renovation or restoration. The proposal makes good use of the site and the available space to provide two compact but comfortable town houses that will provide a good and affordable housing option for a range of ‘family types’ in the area.

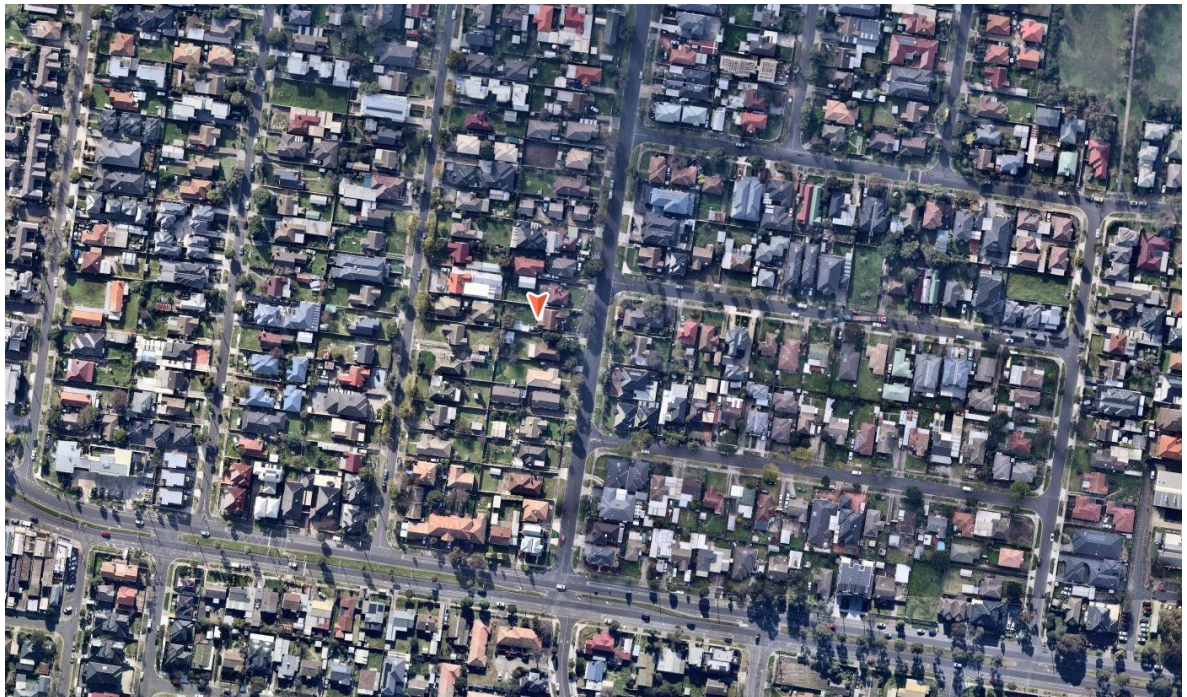


## Aerial View of the Site and Surrounds

(Courtesy of Nearmap)



Broad aerial map, with the subject site indicated by the blue arrow

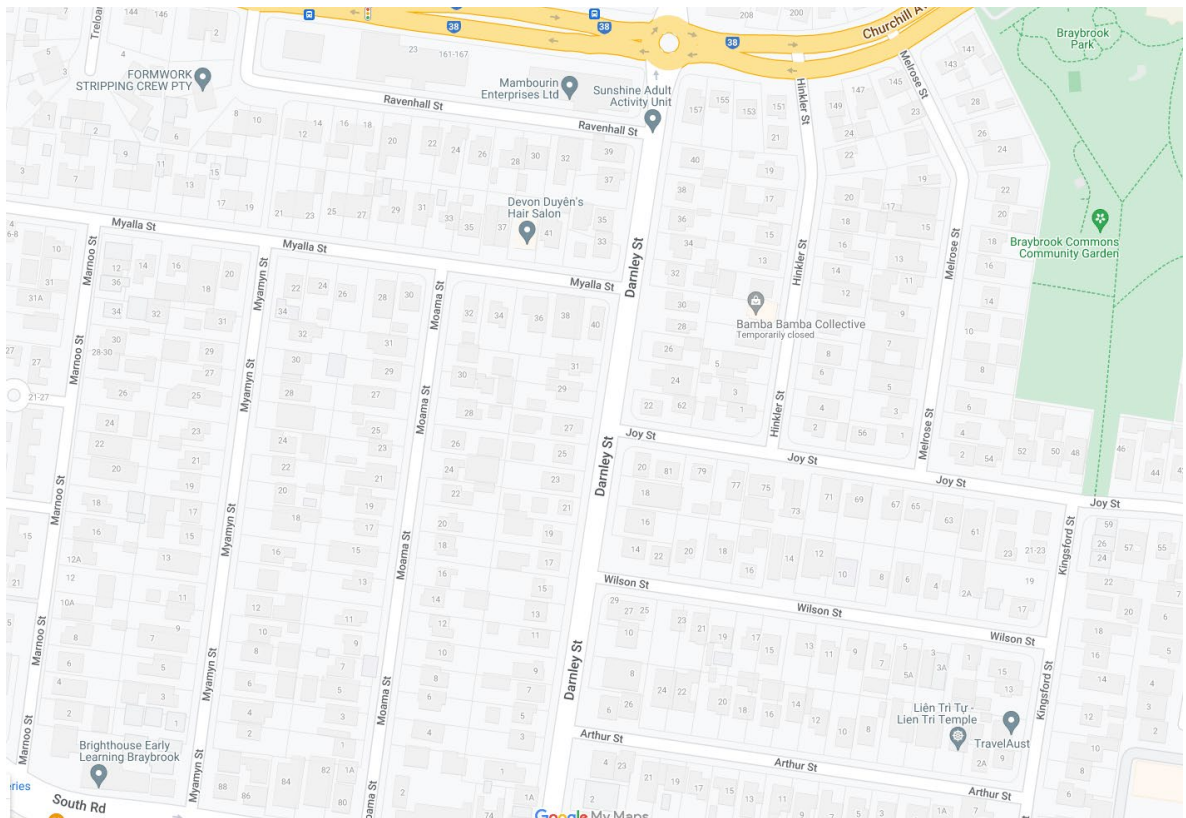


Closer aerial map, with the site indicated by the red arrow





Close up aerial, with the site indicated by the red arrow



Map of the area around the subject site, Courtesy of Google Street View  
(Please refer to end pages of report for Street View images.)



## Planning Scheme - Zones and Overlays

The dwelling is in a General Residential Zone (GRZ1), with no special overlay requirements other than standard Clause 55 requirements affecting the block.

### GRZ1

The purpose of the General Residential Zone is to encourage development that respects the neighbourhood character of the area as well as encourages a diversity of housing types and housing growth in locations where there is good access to services and transport. The proposal relates to a site that is close to buses that run along both Churchill Avenue to the north and South Road to the south. The site is close to multiple schools and similar community services, Maribyrnong City Council, Braybrook Park and library and the adjacent shopping strip, the Braybrook train Station as well as multiple bus routes and a vast array of services. The site is between Ballarat Road and Sunshine Road, and also close to Central West Shopping Centre. Hence, the proposal to create 2 higher density dwellings with 3 bedrooms each and with different living styles offered in each home serves the purpose of the General Residential Zone.

### GARDEN COURT

The site is also within the Preferred neighbourhood Character area "Garden Court", which seeks to maintain existing dwellings and gardens and provide replacement buildings that enhance the spacious, informal streetscapes and characteristics of the area. New development should incorporate wide pitched roof forms and well-articulated facades that include variations in materials. Carparking structures should not dominate the front façade with garages set back behind the front line of the façade. Dwellings should also be surrounded by spacious gardens that include canopy trees, shrubs and lawn with low or no front fencing. Whilst the proposal is new replacement housing and narrower than the existing older dwellings, the proposal provides a second dwelling on the lot, at a time when new housing is very much needed, and the side-by-side element of the proposal is a compromise that provides improved livability as opposed to the alternate front and back unit concept (as it gives better safety and integration with the street for both dwellings, and better amenity for all occupants). The proposal does incorporate pitched roof forms, articulation and a range of materials that are sympathetic to the area. Car parking is slightly set back either side of the front porches, and good planting opportunities have been provided across the site. The proposal avoids boundary to boundary design, with just one side wall of a single garage on the northern boundary and no other boundary abutting walls. The proposal has gone through several iterations in order to have a balance of meeting council's garden court requirements and also achieving the required spaces for the owner and for good livability/amenity for future occupants, including provision of on-site sheltered and secure car parking that is unobtrusive to the front façade of the dwelling. We feel that these compromises are reasonable in the context of the current dire lack of housing and given that the homes are well designed with good amenity. There are also already similar examples of side-by-side developments in the immediate vicinity, so the proposal is not at all out of character.

There are no other zones or overlays applicable to the site. Hence, the proposal complies with the general zoning concerns and overlays that are relevant to the site and immediate area.

## Clause 55 Response – 13 Darnley Street, Braybrook

This planning submission provides an overview as to how the proposed design at 13 Darnley Street, Braybrook takes into consideration the requirements of Clause 55. The site, a 678 square metre block, is located within a General Residential 1 Zone in the suburb of Braybrook, on Darnley Street. The site is close to the corner of Wilson Street and is therefore very close to Skinner Reserve and the Maribyrnong City Council buildings. Hence, it is close to a broad range of services and facilities – from schools through to parks, shopping areas and public transport. Darnley Street and the surrounding area is somewhat eclectic in nature, with many older homes, but also several newer contemporary homes and developments of 1-2 storeys. The site is within the 'incremental change area, within the Garden Court neighbourhood character region. The 13 Darnley Street site is a double fronted block with a frontage of around 15.2m, that currently contains an older somewhat run-down dwelling.

This proposal is for two single fronted side-by-side modern 2-storey dwellings offering 3 bedrooms each, with 1 bedroom and all other facilities available at ground floor level for unit 2. It offers a dual occupancy development in the place of the existing home, with each dwelling offering multiple bedrooms, and comfortable living spaces over 2 levels. Unit 1 has an internal light-court/garden and both units have a good-sized backyard that opens off the living room. Both dwellings will also meet the energy rating requirements, hence contributing to improvements in energy-saving living standards across the municipality. Both dwellings also provide on-site garaged carparking and storage facilities. The proposed dwellings provide a comfortable living standard that is affordable and will therefore suit a range of people and family types in this area that is surrounded by a broad range of services and employment hubs. The proposed infill development is beneficial in this area as it adds much needed extra housing with more liveable spaces and facilities than those offered on the site currently and is located close to work hubs and so many services.

A summary of the proposal is provided below:

	Floor Area	SPOS	Bedrooms	Car Parking
<b>Site Area 678 sqm</b>				
<b>Unit 1</b>	272 sqm (inc porch, garage, alfresco)	79sqm (+ 24 POS)	3 bedrooms	1 garage space, 1 car space
<b>Unit 2</b>	311 sqm (inc porch, garage, pergola)	76 sqm (+34 POS)	3 bedrooms (1 at grnd flr)	1 garage space, 1 car space

Site Coverage: Proposed 57% (meets the maximum requirement of 60%)

Permeable area: 278 sqm, or 41% (which meets the minimum 20% requirement)

Garden Area: 243 sqm, or 36% (which meets the minimum requirement of 35%)

Max building height: 7.8m (unit 1 and unit 2) – both are under 9m high, which meets regulation.

Front setback: The front setback is 9.04m to the front of the dwellings, where the neighbouring setbacks are also 9.1m on both sides – which is a slight variation to the standard. (The 3.4m high front porches are setback 7.9-8.05m, but they encroach less than 2.5m, which complies). (See TP01 & TP 02 for broader context of surrounding setbacks and the range in distances.)



## **Merits of the Proposal in terms of State and Local Planning Policy**

This proposal is positive in terms of providing some diversity in the offering of housing in the area, which is rich in supporting infrastructure. The proposal is a significant improvement in the presentation of the site, which has become run-down and somewhat ramshackle. The existing home in this 'incremental change' area is unlikely to be retained or restored, and hence, is a perfect site for medium density townhouse infill development. The proposal replaces the existing dwelling with 2 dwellings that offer varied living spaces and 3 good-sized bedrooms in this well-serviced location. The dwellings will provide modern living standards and therefore promote housing that meets current community need, something that Clause 16 'housing supply' seeks to do. The proposal provides an improvement to the existing housing stock, providing greater choice for a variety of 'family types' and in an affordable fashion. The dwellings are close to good public transport options, shops, parks, schools and employment hubs and are therefore a positive proposal in terms of improved housing options near solid infrastructure and services. The dwellings will deliver a higher standard of living to meet the needs of future owners in this area and provide well-designed more spacious 3 bedroom living in easily maintainable dwellings that will also be built to meet current sustainable energy requirements. The location of the dwellings, in an already established area and close to multiple activity centres, jobs, services and transport would be attractive for a broad range of people. Hence, the proposal meets with the objectives of Clause 16 and the Municipal Strategy aims of policy 21.07 (housing).

Whilst the proposed dwellings do have garage doors that are visible in the front façade, other aspects of the design meet with the Garden Court characteristics of the area. The proposal will have canopy trees, lawn and no front fencing, and it will provide replacement buildings that enhance the characteristics of the area with well-articulated facades and variations in materials. The proposal increases the height of the buildings on the site, but is not out of character in the streetscape due to the newer homes that have been built in the streetscape and broader area. The proposal provides diversity in the offering in the area, whilst optimising the location and improving the liveability of housing stock in the area. The design proposal meets the key issues and objectives of the relevant residential policies of the site and area.

## Design Response (Checklist) to the Objectives and Standards of Clause 55 of the ResCode Planning Scheme for 13 Darnley Street, Braybrook

Code	Description	Objectives-Response	Standards-Response	Comments
B1	Neighbourhood character	★	★	<p>Whilst the dwellings proposed are double storey and of a height that contrasts with those either side, the height of these dwellings is not unusual in the context of the broader streetscape and neighbourhood. There are several newer double storey homes and town-houses in the immediate vicinity and the streetscape is quite varied in nature. Homes from a range of building eras are represented along the street and neighbouring streets. Many of the older homes are being demolished in this area and replaced with new homes that are more energy efficient and provide more modern facilities, to better suit today's lifestyle. Hence, we feel that the proposal is appropriate in the context of the neighbourhood and respects the emerging character of the area, which is in a state of significant change. The proposed dwellings provide extra new housing with good amenities in a changing streetscape and area.</p>
B2	Residential Policy	★	★	<p>The site is within an area of 'incremental change and within the Garden Court neighbourhood character area. The proposal meets the Municipal Strategic aims, as outlined in the Municipal Strategic Statement (policy 21.07 – incremental change area) in that it extends housing choice in an area that has good access to services and infrastructure, and provides much-needed infill development that respects the scale and form of surrounding development. The proposal is medium density, providing 2 townhouses in the place of an existing home that is unlikely to be retained or restored. The proposal contributes to the range of housing choice, providing a mix of housing whilst also encouraging housing affordability. The proposed dwellings are well located, close to a range of services and employment hubs, so they meet the Clause 16 housing supply objectives. (Please also refer to previous page for more detail.)</p>

Key

- ★ Meets the objective/standard
- ∨ Varies the objective
- NA Not applicable to this application



Code	Description	Objectives-Response	Standards-Response	Comments
B3	Dwelling diversity	NA	NA	Development only consists of two dwellings.
B4	Infrastructure	★	★	Uses existing services.
B5	Integration with the street	★	★	The proposed development has good orientation to the streetscape, with both entrances facing the street and having independent entries. There is no front fencing and vehicle and pedestrian links are sound. The proposal should improve the streetscape by removing a dwelling with limited street presence and replacing it with two dwellings that tie in well with the more recent developments in the area.
B6	Street setback	∨	∨	The front setback is 9.04m to the front of the dwellings, where the neighbouring setbacks are 9.1m on both sides – which is a slight variation to the standard. (The 3.4m high front porches are setback 7.9-8.05m, but they encroach less than 2.5m, which complies)
B7	Building height	★	★	The proposed dwellings are two-storey in height, with both units being 7.8m high, which complies. The dwellings are reasonably well articulated and they use of a range of materials to help reduce the visual bulk. They are also designed to look slightly different from one another. The proposal will not be out of character with the emerging character of the area. The dwellings are under 9m in height and meet the Standard.
B8	Site coverage	★	★	57% site coverage, which meets the maximum site coverage allowable.
B9	Permeability	★	★	41% of the site is permeable, which is greater than the minimum requirement of 20% pervious surfaces. Hence, the proposal complies.
B10	Energy efficiency	★	★	Achieved – all efforts possible in the context of this site have been made to achieve good energy rating. It is requested by the owner that the Energy Rating Certificate be a condition of permit.

Key

★	Meets the objective/standard
∨	Varies the objective
NA	Not applicable to this application

Code	Description	Objectives-Response	Standards-Response	Comments
B11	Open space	NA	NA	Not Applicable – no public or communal land provided on site.
B12	Safety	★	★	Achieved. Both dwellings face Darnley Street and have outlooks to the street from the entry porch and the first floor front facing room windows. The proposed dwellings will provide good lighting and surveillance opportunities.
B13	Landscaping	★	★	A landscape concept plan has been submitted with this application and we believe it meets the landscape requirements of council and the area. It aims to be as in keeping with the Garden Court Area requirements as possible for a new development site. The landscape plan is designed to meet Standard B13 requirements.
B14	Access	★	★	Vehicle access to unit 1 is via the existing crossover which is shared with number 11 Darnley Street. This crossover will require some extension to the north to enable the 3m wide crossover and the now-required visual splays for the new driveway. Vehicle access to unit 2 is via a 3m wide new proposed crossover, where the entire frontage is 15.24m. Hence, the 2 accessways do not exceed 40% of the total street frontage. The crossovers are located to avoid impact on the street trees, and will not have a negative impact on the neighbourhood character. Good access to service and delivery vehicles is provided. And whilst the proposal does reduce the on street carparking by one space to provide a crossover, only one crossover is provided for each dwelling, which complies.
B15	Parking location	★	★	Achieved – Provided on-site parking is convenient and avoids traffic and parking difficulties in the neighbourhood. Residents are also protected from vehicular noise within the development. The onsite parking is the garages at the front of the units, and a potential tandem car space in front of the garage in each case. The proposal does, however, involve a proposed second crossover.

Key

- ★ Meets the objective/standard
- v Varies the objective
- NA Not applicable to this application



Code	Description	Objectives-Response	Standards-Response	Comments
B16	Parking provision	NA	NA	B16 is no longer applicable. Nevertheless, a single car garage space and a single tandem car space is provided for both dwellings.
B17	Side and rear setbacks	★	★	On the southern side boundary, the unit 1 ground floor side walls have a height of around 3.5m or less where the setback is 1.1m to 1.8m, which complies. The proposed first floor wall height on the southern side of unit 1 is 6m, where the setback to the boundary fence is 1.8m, which complies. On the northern side boundary, the unit 2 ground floor side walls have a height of around 3.4m or less where the side setbacks are 1.1m-1.8m, which complies. The proposed first floor wall height on the southern side of unit 2 is 5.9m, where the setback to the boundary fence is 1.8m or greater, which also complies. The rear setbacks of the ground floor and first floor are greater than 4m and also comply.
B18	Walls on boundaries	★	★	The only wall on boundary is the northern side boundary of the Unit 2 garage (which runs for 8.7m on the boundary shared with number 15 Darnley Street). All other walls are more than 1m from the side and rear boundaries. The proposed design complies with B18.
B19	Daylight to existing windows	★	★	Achieved. Daylight to existing habitable room windows is not affected by the proposal.
B20	North-facing windows	★	★	The proposal does not impact negatively on solar access to northerly light of surrounding dwellings as the northern windows of number 11 Darnley Street are well set back from the adjoining boundary. The north-facing windows at 11 Darnley Street are 6.9 metres from their shared boundary with number 13, and a total of 8.7m from the unit 1 first floor side walls where the wall height is around 6m, which complies. Please also refer to the shadow diagrams which show existing and proposed new shadows.

Key

- ★ Meets the objective/standard
- ∨ Varies the objective
- NA Not applicable to this application

Code	Description	Objectives-Response	Standards-Response	Comments
B21	Overshadowing open space	★	★	Minimal overshadowing of the SPOS of the property of 11 Darnley Street occurs as a result of the proposal. There is a narrow shadow cast along the boundary of number 11 and 13 Darnley Street, and the width of this shadow reduces through the middle of the day. The shadow does not impact on the bulk of the SPOS area, rather running along the side driveway alongside the dwelling towards the garage at the rear, and much of the shadow would currently already exist due to the existing fence-line shadow and existing large shading trees on the site at 11 Darnley Street. Hence, the proposal complies. (See Shadow Diagrams in plans and site images in this report.)
B22	Overlooking	★	★	Restricted where required, with obscured glass and/or highlight windows on the upper floor of the dwellings. No overlooking will occur.
B23	Internal views	★	★	Restricted.
B24	Noise impacts	★	★	Domestic.
B25	Accessibility	∨	∨	The design of unit 2 enables living at ground floor, as the kitchen, laundry, a single bedroom and a bathroom are provided at ground floor level. Unit 1 has all services except bedrooms at ground floor level. Hence, someone with limited mobility could easily function in unit 2, and guests of limited mobility could easily function at ground floor level in unit 1. Hence, the design is reasonably sensitive to the needs of people with limited mobility and both dwellings provide access to the entrance from the pedestrian links from Darnley Street
B26	Dwelling entry	★	★	Achieved. The entries are visible and easily identifiable, providing shelter and a sense of personal address. Both dwellings have their own street frontage.
B27	Daylight to new windows	★	★	Achieved. All proposed habitable rooms have windows with good access to daylight.

Key

- ★ Meets the objective/standard
- ∨ Varies the objective
- NA Not applicable to this application

Code	Description	Objectives-Response	Standards-Response	Comments
B28	Private open space	★	★	The proposal provides 79 square metres of SPOS and an extra 24 square metres of POS for unit 1, and 76 square metres of SPOS plus 34 square metres of POS for unit 2. The SPOS areas meet the requirements of B28, with appropriate dimensions and with the SPOS areas accessible via the living room areas. The SPOS is also well oriented to the sun and is positioned at the rear of the block in both cases.
B29	Solar access to open space	★	★	Secluded private open space is located to the rear and to the west of the dwellings. Both also have good northerly aspect. Hence, the private open space of both dwellings receives good sunlight and daylight throughout the day.
B30	Storage	★	★	6m3 Provided in the form of a storage space within the garage area of each dwelling.
B31	Design detail	★	★	Contributory and respectful of emerging surrounding neighbourhood character. Uses similar roof forms, window and door proportions to the newer dwellings in the area. The streetscape has a number of newer homes including a few homes that are two storey (including number 28, 18, 16 and number 8 opposite the subject site. There are also a number two -storey homes in the adjacent Wilson Street.
B32	Front fences	★	★	No front fence has been proposed for either dwelling. The landscaping across the front of the properties will delineate the public street spaces from the private space of the proposed dwellings.
B33	Common property	★	★	The development will clearly delineate public and private land. There is no common property as part of the proposal.
B34	Site services	★	★	Site services can be installed and easily maintained. Bins will be located beyond the garages in the external side service area of the SPOS and can be easily moved to the street through the garage on collection days. A new mail box will be provided at the front of each dwelling, and it will comply with Australia Post standards.

Key

- ★ Meets the objective/standard
- ∨ Varies the objective
- NA Not applicable to this application

## **Conclusion**

The proposal meets most all of the standards of Rescode with some very minor variations in terms of Street Setback (B6) and Accessibility (B25). However, the proposal provides good quality extra infill housing at a time when extra housing is much needed. It will improve the look of the block, which currently contains a very rundown dwelling that is unlikely to be restored or improved, and the proposed design provides excellent amenity for the future occupants of both dwellings whilst having minimal or no impact on surrounding neighbours.

The proposed design is not out of place in the changing streetscape, where other similar developments and similar setbacks have been approved and built in recent years. Hence, we feel that this proposal is of merit and we consider it to be a good design response to the site and surrounds.

Given that the area is in a state of growth and change, we feel that the proposal provides positive infill housing of a high standard, whilst being designed to meet current requirements in terms of accessibility, landscaping and energy rating. The proposed dwellings also provide homes that suit a range of different 'family types' in this well-serviced area.

Whilst the proposed dwellings create a higher presence in the streetscape than the dwellings either side, they do tie in well with recent developments in the street and the area more broadly. Given the benefits of the improvements to the site and the much-needed added housing stock this proposal will provide in the area, we hope that council will support this proposal.

(Please refer to the following pages for current streetscape images of the site and surrounds.)

## Design Response Street Elevation Photographs

Please refer to attached street elevations; provided in the form of photographs that show the proposal in the context of adjacent buildings; inserted below.  
(Please note that these images are courtesy of © Google Maps Streetview)

### West side of Darnley Street (South to North)



1 Darnley St, 3 Darnley St and 5 Darnley St



3 Darnley St and 5 Darnley St





5 Darnley St and Units at 7 Darnley St



7 Darnley St and 9 Darnley St



9 Darnley St and 11 Darnley St



11 Darnley St and 13 Darnley St (subject site)





11 Darnley St and 13 Darnley Street – the subject site





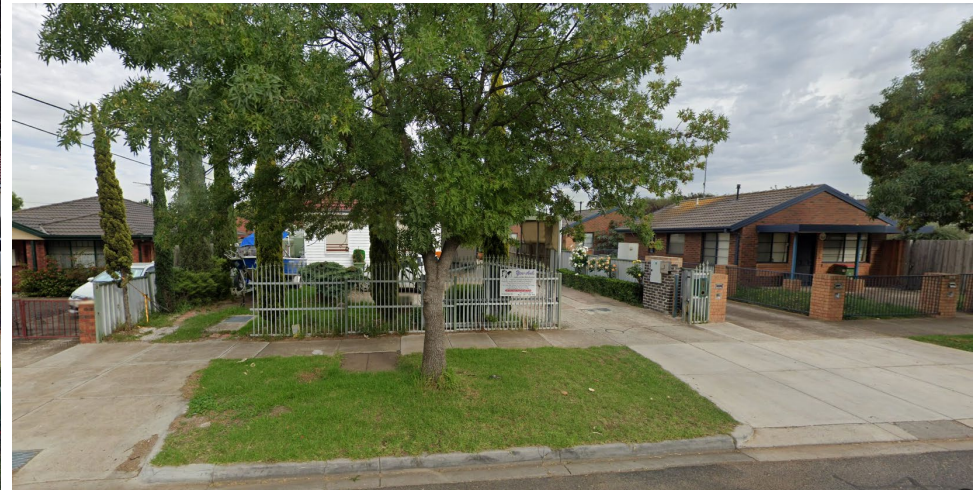
13 Darnley St (subject site) and 15 Darnley St



15 Darnley St and 17 Darnley St



15 Darnley St and 17 Darnley St



19 Darnley St and 21 Darnley St





19 Darnley St and 21 Darnley St cont.



21 Darnley St and 23 Darnley St

**East Side of Darnley Street (North to South)**



Darnley St – intersection with Joy St, and 18 Darnley St



18 Darnley St and 16B and 16A Darnley St



Corner of Wilson St, viewed from Darnley St



View East along Wilson St from Darnley St, and two corner dwellings





Property on corner of Wilson St and Darnley St, and 10 Darnley St



10 Darnley Street - Opposite the subject Site, and 8 Darnley St



8 Darnley St and 6 Darnley St (on the corner of Arthur St)



6 Darnley St, view East along Arthur St and 4 Darnley St

CITY OF MARIBYRNONG  
ADVERTISED PLAN

# WSUD Report

## 13 Darnley Street, Braybrook VIC

09/07/2024



Frater  
Consulting  
Services Pty Ltd

(03) 8691 6928  
[admin@fraterconsultingservices.com.au](mailto:admin@fraterconsultingservices.com.au)  
[fraterconsultingservices.com.au](http://fraterconsultingservices.com.au)

a part of  
Sustainability  
Tech Partners Pty Ltd

The logo for Sustainability Tech Partners is a white line-art graphic on a dark teal background. It features a central vertical line with several horizontal lines radiating from the top, creating a starburst or tree-like shape.

# Water Sensitive Urban Design (WSUD) Report

## Proposed Residential Development

### Table of Contents

Initiatives to be Marked on Drawings.....	3
Introduction.....	4
Site Description.....	5
Proposed Development .....	5
Stormwater Management Objectives.....	6
Development Characteristics .....	7
Stormwater Management Initiatives .....	8
Stormwater Assessment Results.....	9
Conclusion .....	11
Appendix A – WSUD Maintenance & Installation.....	12

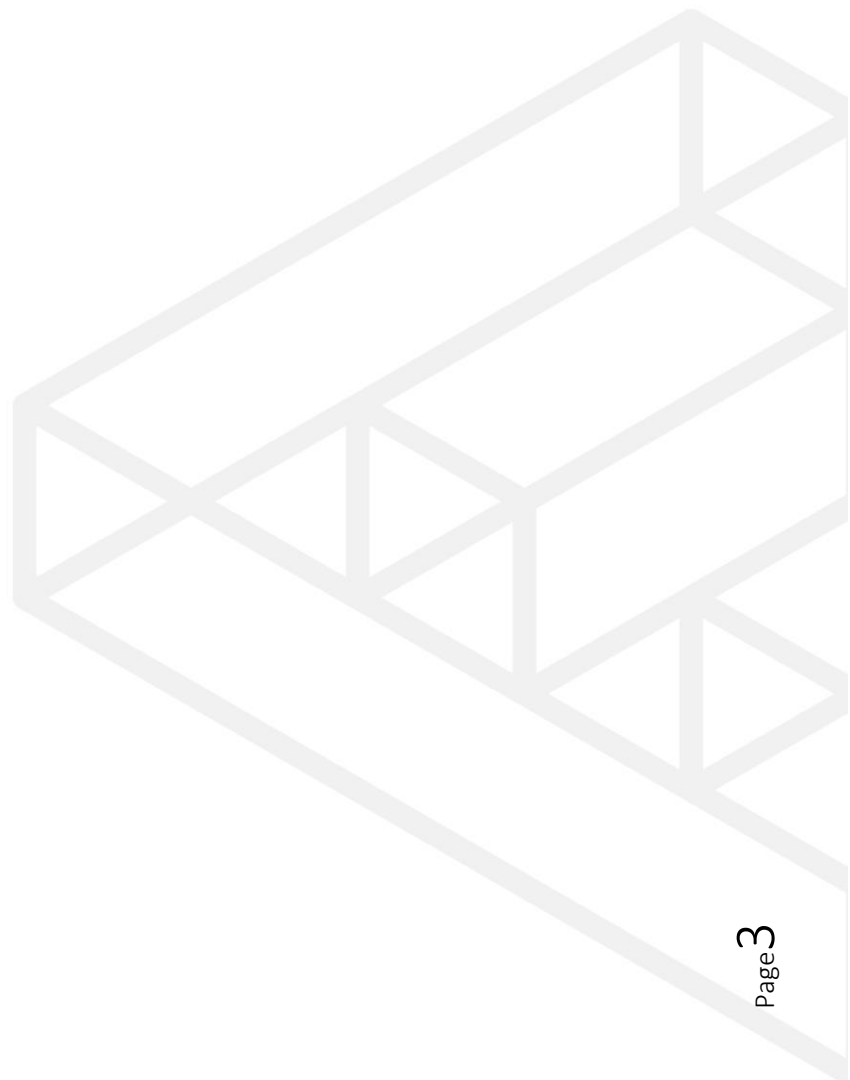
### **DOCUMENT VERSION**

Version	Date	Changelog	Author	Review
0	27/04/23	Issued for Client Review	KT	DG
1	09/07/24	Updated as per latest plan and RFI item 7	DG	-



## INITIATIVES TO BE MARKED ON DRAWINGS

- Mark-up showing the roof catchment area to be diverted to the Rainwater tank for each dwelling – If required, the use of charged pipe system will be explicitly acknowledged on the drawings and charged pipes will not be running underneath the building footprint
- Location and size of each Rainwater tank proposed
- Note showing connection to the toilets and laundry
- Extent of individual permeable driveways

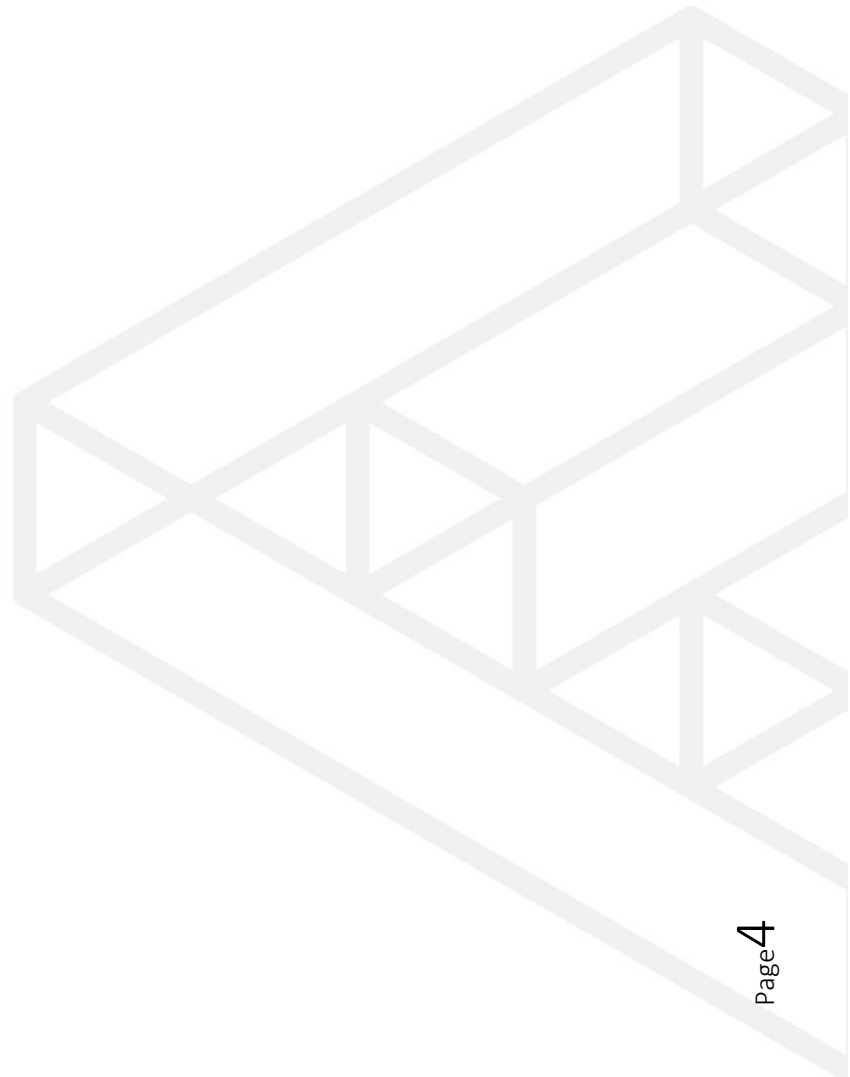


## INTRODUCTION

Framer Consulting Services has been engaged to undertake a Water Sensitive Urban Design Report (WSUD) for the proposed residential development located at 13 Darnley Street, Braybrook. This has been prepared to address the requirements of Maribyrnong City Council especially Clause 53.18 of the Local Planning Policy *Stormwater Management in Urban Development (Water Sensitive Urban Design)*.

This report includes an assessment of the proposed development, to determine the potential impacts as a result of stormwater runoff from the site during rainfall events. The report identifies several initiatives that will be implemented into the development to minimise these stormwater impacts. These initiatives are appropriate and practical for the site to ensure the proposed development meets the target water quality objectives required by the City of Maribyrnong.

The site has been assessed using the STORM Calculator. Melbourne Water has developed the STORM (Stormwater Treatment Objective – Relative Measure) Calculator to analyse the impacts of stormwater quality based on various treatment methods applied to a development. The STORM Calculator is able to display the amount of effective treatment that typical WSUD measures will provide in relation to best practice targets.





## SITE DESCRIPTION

The proposed site is located at 13 Darnley Street, Braybrook. The 678m<sup>2</sup> site is currently occupied by a single-storey house which is proposed to be demolished prior to construction of the development. It is located approximately 13kms west of the Melbourne CBD.

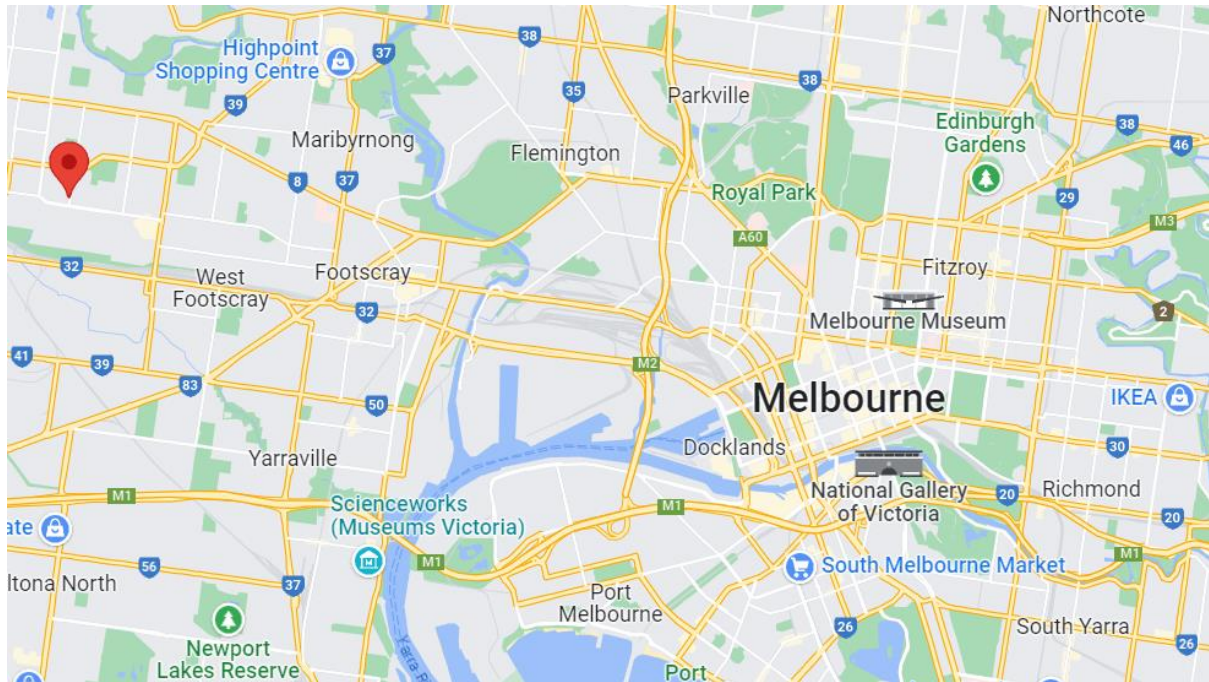


Figure 1: Location of the proposed development in Braybrook in relation to Melbourne CBD (Source: Google Maps)

## PROPOSED DEVELOPMENT

The proposal consists of the development of the site into two double-storey townhouses (2 x 3-bedroom). The area of the site is 678m<sup>2</sup>. Each townhouse will be provided with an undercover garage and individual driveways opening on Darnley Street.

## STORMWATER MANAGEMENT OBJECTIVES

The City of Maribyrnong has recognised the importance of stormwater management and its effects on the surrounding environment. As a result, a local planning policy, Clause 53.18 “*Stormwater Management (Water Sensitive Urban Design)*”, has been introduced into the City of Maribyrnong Planning Scheme. New developments, or extensions to existing buildings that are 50m<sup>2</sup> in floor area or greater, must adhere to the local policy.

The objectives that form part of the Stormwater Management Policy include:

- To achieve the best practice water quality performance objectives as set out in the Urban Stormwater Best Practice Environmental Management Guidelines, Victoria Stormwater Committee 1999 (as amended). Currently, these water quality performance objectives are:
  - Suspended Solids - 80% retention of typical urban annual load
  - Total Nitrogen - 45% retention of typical urban annual load
  - Total Phosphorus - 45% retention of typical urban annual load
  - Litter - 70% reduction of typical urban annual load
- To promote the use of water sensitive urban design, including stormwater reuse.
- To mitigate the detrimental effect of development on downstream waterways, by the application of best practice stormwater management through water sensitive urban design for new development.
- To minimise peak stormwater flows and stormwater pollutants to improve the health of water bodies, including creeks, rivers and bays.
- To reintegrate urban water into the landscape to facilitate a range of benefits, including microclimate cooling, local habitat and provision of attractive spaces for community use and well-being.

To assess these initiatives, the STORM tool – which is an industry-accepted tool – is used to comply with these initiatives. The results are presented in this report.

# DEVELOPMENT CHARACTERISTICS

## Site Delineation

For the purpose of the assessment, the development has been delineated into the following surface types:

- Site area of 678m<sup>2</sup>;
- Part of the roof area runoff of dwelling 1 of 184.5m<sup>2</sup> which will be diverted into rainwater tank(s);
- Part of the roof area runoff of dwelling 2 of 179.5m<sup>2</sup> which will be diverted into rainwater tank(s);

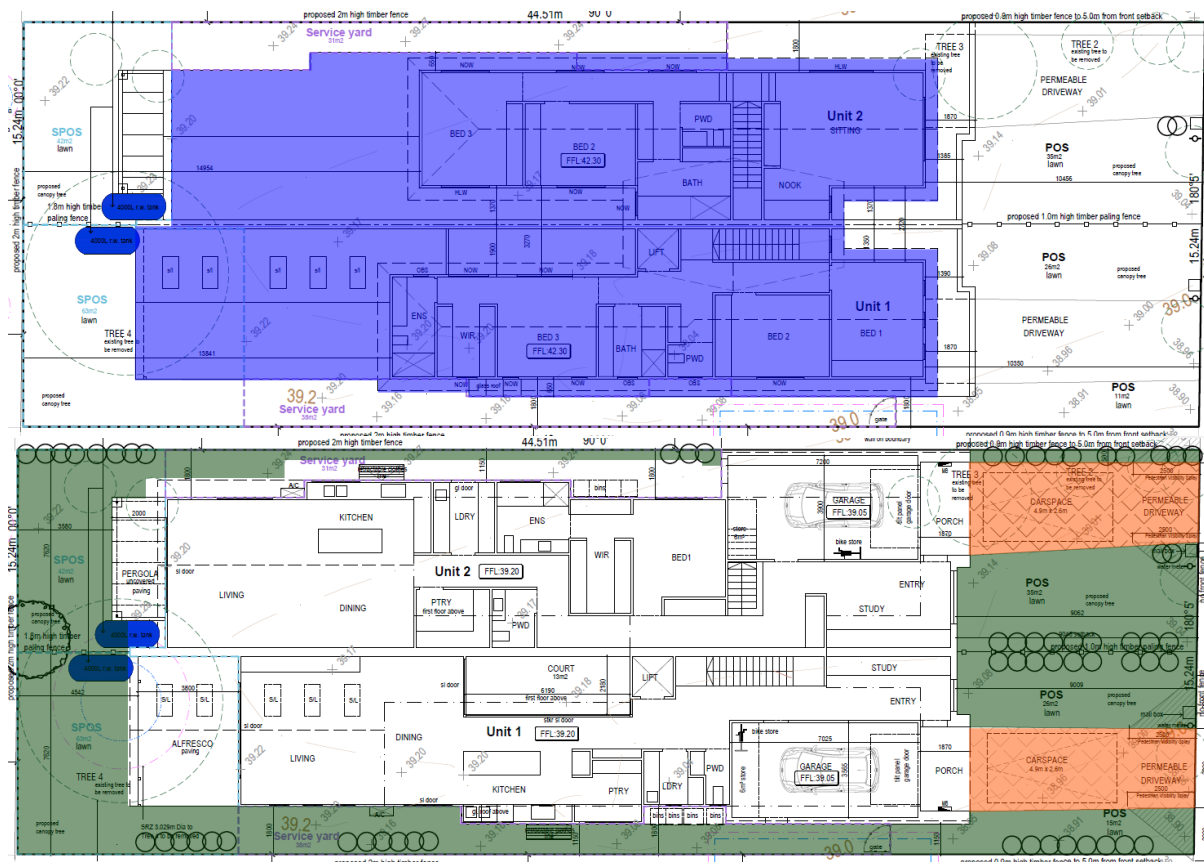


Figure 2: Roof catchment area for each dwelling to RWT (blue), permeable area (green) and permeable driveway (orange)

- Permeable area of 197m<sup>2</sup> comprised of landscaped area, permeable paving and other pervious surfaces in the backyards;
- Individual driveway of dwelling 1 and 2 of 54m<sup>2</sup> to be designed to be permeable; and
- Remainder of impervious areas of 63m<sup>2</sup> comprised of unconnected roof areas and other impervious areas around the site.

## STORMWATER MANAGEMENT INITIATIVES

The following section presents the stormwater management initiatives that have been identified for the proposed development.

### **Rainwater Tank**

#### ***(Rainwater tank for toilet flushing and laundry for each dwelling)***

The roof catchment area of each townhouse (as described above) will be diverted to 4,000L rainwater tanks for each townhouse. The rainwater collected will be used for toilet flushing and laundry in all townhouses.

If required, a charged pipe system or multiple tanks will be installed to collect water from part of the roof of each dwelling.

**In the case of a charged pipe system, the charged pipes will not be running underneath the slab and the stakeholders (builder/developer/architect) will be required to explicitly acknowledge this solution and have the capacity to install it.**

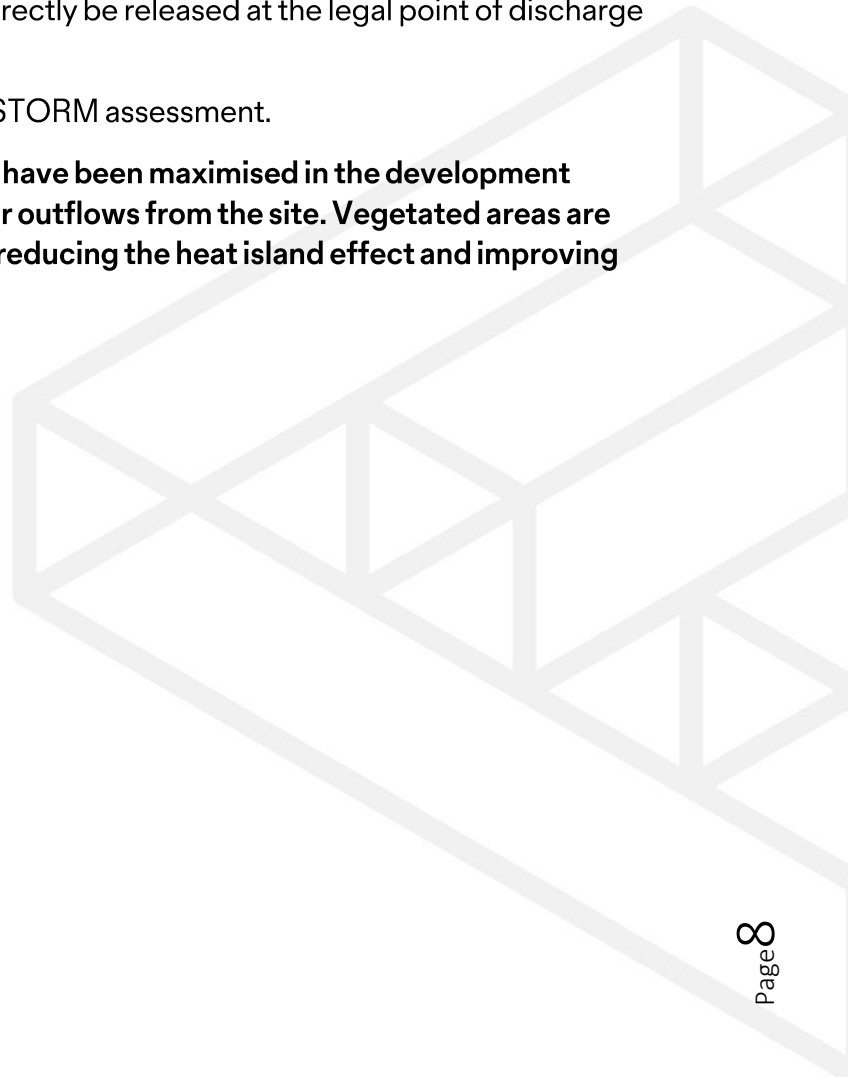
### **Permeable Paving**

Both individual driveways for dwelling 1 and 2 will be designed to be permeable. This will help towards reducing the overall stormwater outflows from the site.

The remainder of impervious areas will directly be released at the legal point of discharge on site.

Permeable areas are excluded from the STORM assessment.

**It should be noted that permeable areas have been maximised in the development which will reduce the overall stormwater outflows from the site. Vegetated areas are provided in the proposed development reducing the heat island effect and improving the**



## STORMWATER ASSESSMENT RESULTS

The initiatives and areas described above have been applied to the STORM calculator and the proposed development has achieved a score of 100%.



### STORM Rating Report

TransactionID: 0  
 Municipality: MARIBYRNONG  
 Rainfall Station: MARIBYRNONG  
 Address: 13 Darnley Street  
 Braybrook  
 VIC 3019  
 Assessor: Frater Consulting Services  
 Development Type: Residential - Multiunit  
 Allotment Site (m2): 678.00  
 STORM Rating %: 100

Description	Impervious Area (m2)	Treatment Type	Treatment Area/Volume (m2 or L)	Occupants / Number Of Bedrooms	Treatment %	Tank Water Supply Reliability (%)
Roof 1 to RWT	184.50	Rainwater Tank	4,000.00	4	114.10	95.80
Roof 2 to RWT	179.50	Rainwater Tank	4,000.00	4	119.60	94.60
Other impervious areas	63.00	None	0.00	0	0.00	0.00

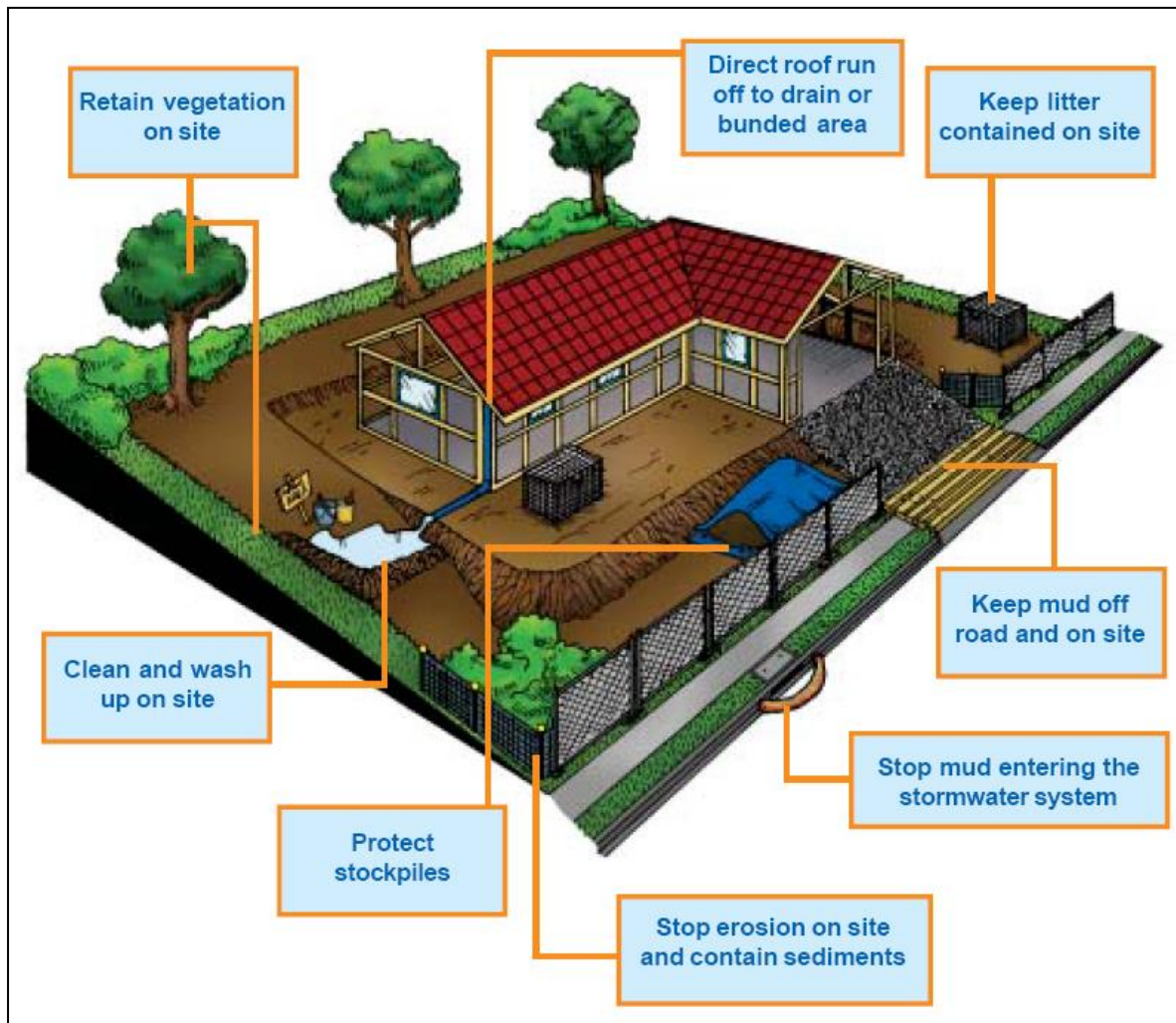
Please note that an additional occupant has been input in STORM for each dwelling to account for the laundry connection.

We have assumed that on average a household will have a 3 WELS star washing machine and will run two loads per week. Based on data from WELS, 3-Star washing machines have an average consumption per load of 102 L. With two loads per week, this would represent 204 L/week for laundry or 29L/day. STORM input assumes that one bedroom/occupant represents a daily consumption of 20L/day therefore connection to laundry (29L/day) has been input as an additional occupant.



## **Stormwater Management at Construction Site**

To manage stormwater management in the construction stage, measures will be put in place to minimise the likelihood of contaminating stormwater. This will mean ensuring buffer strips are in place, sediment traps are installed, and the site will be kept clean from any loose rubbish. The builder will follow the process outlined in “Keeping Our Stormwater Clean – A Builder’s Guide” by Melbourne Water.



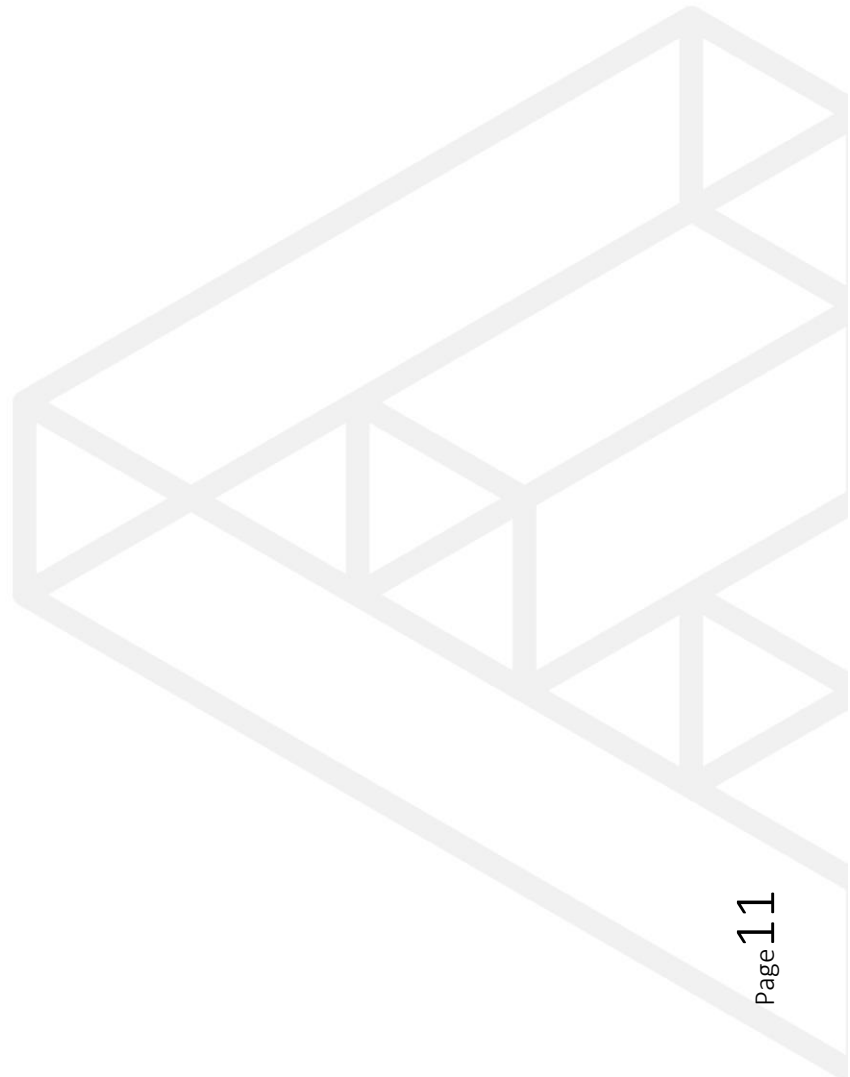
Copies of “Keeping Our Stormwater Clean – A Builder’s Guide” booklet can be downloaded from the following website.

<https://www.clearwatervic.com.au/resource-library/guidelines-and-strategy/keeping-our-stormwater-clean-a-builders-guide.php>

## CONCLUSION

With the proposed stormwater treatment measures incorporated into the development at 13 Darnley Street, Braybrook; the design will achieve a score of 100% for the development which meets the minimum performance standards of the City of Maribyrnong planning scheme. The proposed development will incorporate a rainwater tank for each dwelling with an effective capacity of 4,000L connected to the toilets and laundry as well as individual permeable driveway.

The development has managed the outflows and quality of stormwater runoff from the site by achieving more than 45% reduction in the typical annual load of total nitrogen, thus achieving best practice objectives. The builder will also be required to adhere to Melbourne Water's stormwater management guidelines during the construction stage.



## APPENDIX A – WSUD MAINTENANCE & INSTALLATION

### **Installation**

#### **Rainwater Tank(s)**

The rainwater tank(s) will be installed above ground. Its manufacturer or material has not been nominated. It will be installed with a mesh insect cover over the inlet pipe to ensure the tank does not become a breeding ground for pests. Mesh needs to be installed over overflow pipes and if a manhole is present it needs to be properly sealed.

Please refer to the architectural drawings for the location of the rainwater tank.

#### **Pumps**

The pumps required either to divert the stormwater runoff to the rainwater tank or to distribute the collected water to the end use (toilets and laundry) will be required to be installed as per the chosen manufacturer specifications.

#### **Permeable Paving**

Permeable paving used for the driveway shall be installed in strict accordance with the site plans and the permeable paving manufacturer's specific drawings and requirements.

### **Inspection Requirements**

#### **Rainwater Tanks**

Inspections of roof areas and gutters leading to the tank should take place every 6 months. Rainwater in the tanks should be checked every 6 months for mosquito infestation.

The rainwater tank should be examined every 2 years for sludge buildup.

Ensure the monitoring system (be it digital or a simple float system) is functioning properly by checking the water level in the rainwater tanks.

#### **Pumps**

The pumps required will be required to be routinely inspected by listening for the day-to-day operation of the pumps. Unusual noise or no noise should be investigated. Inspection should occur as per the chosen manufacturer's specifications.

#### **Permeable Paving**

Permeable paving should be inspected for damage after large storm events (48.2mm in one hour is considered a large storm event in Melbourne – 1 in a 100-year storm) and should be inspected every 3 months.

During the inspection, the following should be looked for:

- Water ponding on porous joints or permeable pavers;

- Soggy and boggy soils;
- Uneven surface;
- Rubbish, leaf litter and sediment; and
- Blocked underdrainage.

## **Clean Out / Maintenance Procedure**

### **Rainwater Tank, Roof and Gutters**

Rainwater tanks will require the roof and gutters onsite to be maintained; gutters should be checked, maintained and cleaned every six months to avoid blockages from occurring. If a leaf-blocking system is installed this can be completed annually.

Any trees onsite should be maintained every 6 months with branches overhanging the roof removed.

Water ponding in gutters should be avoided as this provides a breeding ground for mosquitos; tanks should also not become breeding grounds for mosquitoes. If mosquitoes are detected in the tank remedial steps need to occur to prevent breeding. If mosquitoes or other insects are found in rainwater tanks, the point of entry should be located and repaired. As well as preventing further access, this will prevent the escape of emerging adults. Gutters should be inspected to ensure they do not contain ponded water and be cleaned if necessary.

Please refer to

<http://www.health.gov.au/internet/publications/publishing.nsf/Content/ohp-enhealth-raitank-cnt-l~ohp-enhealth-raitank-cnt-l-5~ohp-enhealth-raitank-cnt-l-5.5> for more information on mosquito control.

Rainwater tanks should be checked by a regular maintenance person every 3–6 months to ensure that connection to the building is maintained and there are no blockages.

A simple way to ensure the tank is operating as intended would be through the installation of a smart monitoring device (e.g. OneBox®). These systems allow users to operate tanks remotely from the internet or smartphone, monitor and control the tanks in real time, allow the automatic release of stored water before storm events, alert users if there is any blockage and view tank history and usage patterns.

Alternatively, onsite tank gauges can help those familiar with the tank know if the tank is not working correctly.

### **Pumps**

Maintenance should occur as per the chosen manufacturer's specifications. All strainers and filters should be cleaned every 6 months. Good quality pumps should provide trouble-free service for up to 10 years.

### **Permeable Paving**

Permeable paving will require ongoing maintenance based on the inspection. The following maintenance task could be required:



Item	What to check for	Inspected	Maintenance undertaken	Further action required or comment
<b>Civil components – Permeable pavement</b>				
<b>Permeability</b>	Pavement area is free draining (i.e. no clogging of the pavement surface).  Clogging is generally evident by water ponding on the surface of the permeable paving more than 2 hours after rainfall.			
<b>Pavement surface</b>	No uneven paver surface (i.e. pavement surface lifting and rutting).  No physical damage to the pavement surface – look for cracks and holes.			
<b>Infill material</b>	Infill material is present between pavers.  No scour occurring.			
<b>Landscape components – Permeable pavement</b>				
<b>Weeds</b>	Less than 10% of infill surface area (where present) covered by weeds.			

## Commissioning

### Rainwater Tank

All rainwater tanks should be washed or flushed out before use. All inlets and outlets should be correctly sealed to prevent insects from entering. Connection to all toilets and laundry in the development should be tested (dye test or equivalent).

Please note if new roof coating or paint is to be installed then the first few run-offs after installation need to be discarded.

### Pumps

Commissioning should occur as per the chosen manufacturer's specifications.

### Permeable Paving

Commissioning should occur as per the chosen manufacturer's specifications.



## Summary

The following needs to occur onsite to ensure compliance with WSUD requirements and maintain the operation of the rainwater tank and connections onsite.

Task	When?	Requirement
Inspect Rainwater tanks	Every 6 months	<ul style="list-style-type: none"> <li>• Check for any damage/compression</li> <li>• Mosquitoes infestation</li> </ul>
	Every 2 years	<ul style="list-style-type: none"> <li>• Sludge Build up – if sludge build-up occurs a vacuum tank needs to be called out to the site.</li> </ul>
Inspect roofs & gutters	Every 6 months	<ul style="list-style-type: none"> <li>• Clean out of leaves/debris.</li> <li>• Remove any overhanging branches onsite.</li> </ul>
Inspection of Permeable Paving	3-Monthly	<ul style="list-style-type: none"> <li>• Check joints</li> <li>• Check soil</li> <li>• Check for blockages</li> <li>• Check for ponding</li> <li>• Check for uneven surfaces</li> </ul>
	Following a large storm event	





**LANDSCAPES BY DESIGN**

Call 1300 322 048

Landscape Architecture and Design Consulting Arborists

Web: [www.landscapesbydesign.com.au](http://www.landscapesbydesign.com.au) | [www.treereportsmelbourne.com.au](http://www.treereportsmelbourne.com.au)

LANDSCAPE DESIGN

TREE REPORTS

CONSULTATION

PROJECT MANAGEMENT

5 Oakley St,

Melbourne, Victoria

VIC 3767

Phone: (09) 7097 2289

Email: [admin@landscapesbydesign.com.au](mailto:admin@landscapesbydesign.com.au)

**CITY OF MARIBYRNONG  
ADVERTISED PLAN**

## Arboricultural Impact Assessment

For ...

**Residential Space**

Location ...

**13 Darnley Street  
Braybrook VIC**

Development Plans by ...  
Residential Space

18-06-24 Council RFI Rev G dated 13-05-2024

Prepared by ...

**Darrell Mcleod**

Diploma of Horticulture  
Diploma of Horticulture – Arboriculture  
ISA Certified Arborist  
Member (610) Landscape Design Institute

[admin@landscapesbydesign.com.au](mailto:admin@landscapesbydesign.com.au)

**1300 322 048**

**2<sup>nd</sup> September 2024**

**Landscapes by Design and Tree Reports Melbourne**

Darrell Mcleod: Landscape Designer and Consulting Arborist - Director  
Diploma of Horticulture  
Diploma of Horticulture - Arboriculture  
Member - Landscape Design Institute - LDl



# LANDSCAPES BY DESIGN

Call 1300 322 048

Landscape Architecture and Design Consulting Arborists

Web: [www.landscapesbydesign.com.au](http://www.landscapesbydesign.com.au) | [www.treereportsmelbourne.com.au](http://www.treereportsmelbourne.com.au)

LANDSCAPE DESIGN

TREE REPORTS

CONSULTATION

PROJECT MANAGEMENT

Email: [admin@landscapesbydesign.com.au](mailto:admin@landscapesbydesign.com.au)

5 Oakley St,  
Mount Dandenong,  
VIC 3767

ABN 67097422449

## Brief

I was contacted by you and asked to provide an Arboricultural Impact Assessment (AIA) of the trees to this property to be retained or neighbouring that could be impacted upon by the proposed development. This company provided a previous arborist report for this site dated 11th April 2023 and this AIA is using the same numbering as per that report.

Council has requested that the mature tree to the nature strip to the front of 15 Darnley Street be included. We have numbered it as 01A.

## Method

The trees were inspected visually; as per Australian standard 4970 – Protection of Trees on Development Sites (AS 4970), as required to facilitate this report. Heights and canopy spreads estimated, Diameter at Breast Height (DBH) and Diameter at Buttress (DAB) measured within subject site only, unless neighbouring trees are accessible; otherwise, their DBH and DAB are estimated. No root excavations were carried out and images were taken as required.

## The Site

The site is typical to older properties in the area containing an established home, neglected gardens and little slope.

## Planning Controls and or Overlays

We only report on trees that are under the control planning controls or overlays unless otherwise necessary.

Following a review of <http://services.land.vic.gov.au>, it appears there is no Vegetation Protection Overlay or Significant Landscape Overlay pertaining to this property. Therefore, within the site we will only include canopy trees that fulfill local permit conditions and include neighbouring vegetation that could be impacted upon. No vegetation should be removed from the site, until approved by the relevant authority.



## Trees Assessed

If a development proceeds ...

Trees 1 orange is a Council nature strip Desert Ash in front of 13 Darnley Street and Tree 1A green is in the neighbouring nature strip to the front of 15 Darnley Street. Both must be protected with Tree Protection Fencing (TPF) to the extent of their Tree Protection Zones (TPZ) running along the back of kerb to the edge of the footpath. There is to be no more than 10% encroachment into its TPZ, unless it can be proven that it would not affect its root system, by means of a Non-Destructive Root Investigation (NDRI) or similar. Alternatively, other protection methods such as mulching, planking, branch, and trunk protection and the like as per Definitions following must be used as per AS 4970.

Tree 1 has a TPZ area of 96.2 m<sup>2</sup> and encroachment into TPZ by the proposed crossover of 9.3 m<sup>2</sup> or 9.6 % which as per AS 4970 is less than 10 % and acceptable as it is external to Structural Root Zone with area contiguous to TPZ for future root expansion. All works within its TPZ must be supervised by an arborist with minimum level 5 qualifications.

Darrell Mcleod: Landscape Designer and Consulting Arborist - Director

Diploma of Horticulture

Diploma of Horticulture - Arboriculture

Member - Landscape Design Institute - LDI



# LANDSCAPES BY DESIGN

Call 1300 322 048

Landscape Architecture and Design Consulting Arborists

Web: [www.landscapesbydesign.com.au](http://www.landscapesbydesign.com.au) | [www.treereportsmelbourne.com.au](http://www.treereportsmelbourne.com.au)

LANDSCAPE DESIGN

TREE REPORTS

CONSULTATION

PROJECT MANAGEMENT

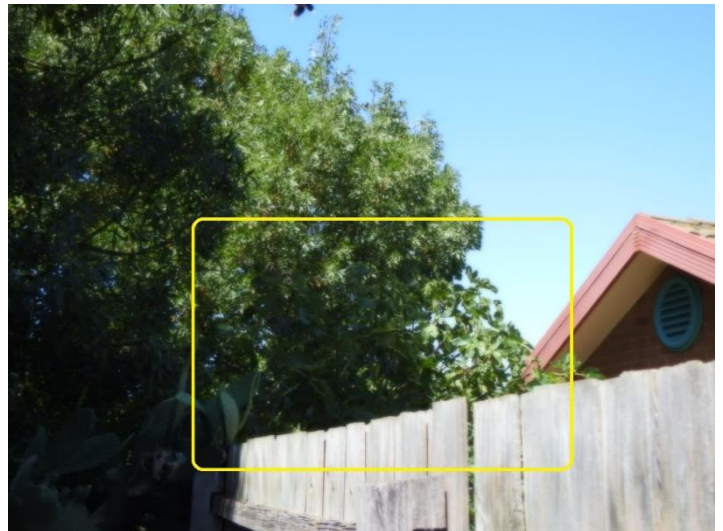
Email: [admin@landscapesbydesign.com.au](mailto:admin@landscapesbydesign.com.au)

5 Oakley St,  
Mount Dandenong,  
VIC 3767

ABN 67097422449



Group One is a row of neighbouring Lilly Pilly over the southern boundary fence. There is an existing concrete driveway within 13 Darnley Street which must be retained during demolition and construction until project end. The southern edge of the proposed development within TPZ must be excavated for using non-destructive methods using hydro excavation. If any roots are discovered greater than 45 mm or a mass of fibrous roots engineered footing methods such as piers, beams, cantilever footings and the like must be employed to protect those roots to allow the building to be constructed. If such roots are discovered within the proposed building footprint within TPZ that area must be lined under with an impervious membrane to protect those roots. All such works must be supervised by an arborist with minimum level 5 qualifications.



Tree 5 image above left is a neighbouring Ornamental Pear. It must be protected to the extent of its minimum 2 metres TPZ radius from centre of trunks unless it can be proven that any encroachment will not affect its root system, by means of a NDRI or similar. Alternatively, other protection methods such a mulching, planking, branch and trunk protection and the like as per Definitions following must be used as per AS 4970.

Tree 6 image above right highlighted yellow is a neighbouring Common Fig that must be protected as per Tree 5.

## Site Sketch Tree Legend Definitions Etc follow ...

Regards

Darrell Mcleod

**Darrell Mcleod: Landscape Designer and Consulting Arborist - Director**  
Diploma of Horticulture  
Diploma of Horticulture - Arboriculture  
Member - Landscape Design Institute - LDI





# LANDSCAPES BY DESIGN

Call 1300 322 048

Landscape Architecture and Design Consulting Arborists

Web: [www.landscapesbydesign.com.au](http://www.landscapesbydesign.com.au) | [www.treereportsmelbourne.com.au](http://www.treereportsmelbourne.com.au)

LANDSCAPE DESIGN

TREE REPORTS

CONSULTATION

PROJECT MANAGEMENT

Email: [admin@landscapesbydesign.com.au](mailto:admin@landscapesbydesign.com.au)

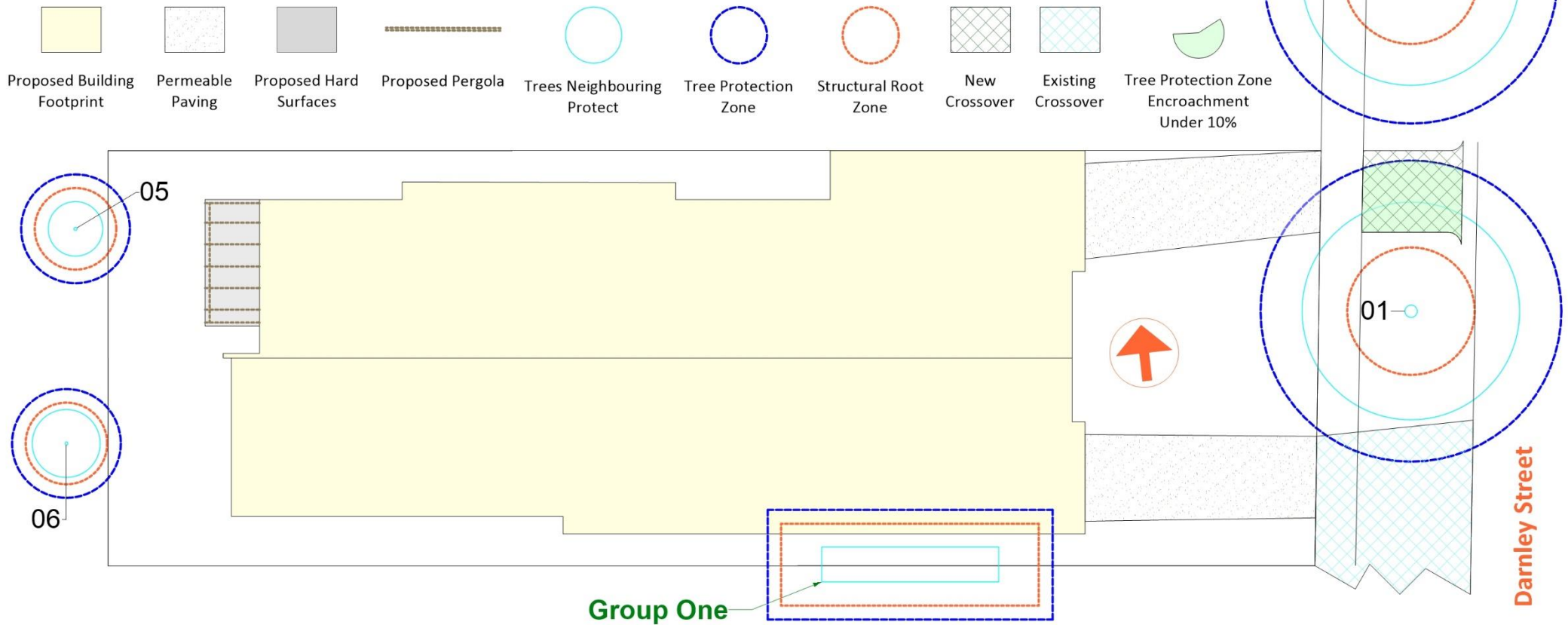
5 Oakley St,  
Mount Dandenong,  
VIC 3767

ABN 67097422449

## Site Sketch

Scale: 1:200 @ A4

Neighbouring 15 Darnley Street



Darrell Mcleod: Landscape Designer and Consulting Arborist - Director  
Diploma of Horticulture  
Diploma of Horticulture - Arboriculture  
Member - Landscape Design Institute - LDI



# LANDSCAPES BY DESIGN

Call 1300 322 048

Landscape Architecture and Design Consulting Arborists

Web: [www.landscapesbydesign.com.au](http://www.landscapesbydesign.com.au) | [www.treereportsmelbourne.com.au](http://www.treereportsmelbourne.com.au)

LANDSCAPE DESIGN

TREE REPORTS

CONSULTATION

PROJECT MANAGEMENT

5 Oakley St,  
Mount Dandenong,  
VIC 3767

ABN 67097422449

Email: [admin@landscapesbydesign.com.au](mailto:admin@landscapesbydesign.com.au)

## Tree Legend

Tree Protection Zones (TPZ) and Structural Root Zones (SRZ) are mm radius from Centre of Trunk

No	Botanical Name	Common Name	Origin	Height	Canopy	DBH @ 1.4 m	TPZ	DAB	SRZ	Condition	SULE	Significance	Form	Structure	Vigour	Ret Value	Age
01	Fraxinus angustifolia	Desert Ash	Exotic	7000	8000	461	5532	440	2344	Average	Short (5-15 yrs)	Less Significant	Poor	Average	Average	Council	Mature
01A	Fraxinus angustifolia	Desert Ash	Exotic	7000	8000	450	5400	500	2474	Average	Short (5-15 yrs)	Less Significant	Poor	Average	Average	Council	Mature
05	Pyrus calleryana	Ornamental Pear	Exotic	3000	2000	110	2000	100	1500	Poor	Medium (16-39 yrs)	Less Significant	Poor	Average	Poor	Neighbouring	Semi Mature
06	Ficus carica	Common Fig	Exotic	2500	2500	100	2000	90	1500	Average	Medium (16-39 yrs)	Less Significant	Average	Average	Average	Neighbouring	Mature

Darrell Mcleod: Landscape Designer and Consulting Arborist - Director

Diploma of Horticulture

Diploma of Horticulture - Arboriculture

Member - Landscape Design Institute - LDI



## Definitions - As per Australian Standard 4970 – 2009 – Protection of Trees on Development Sites (AS 4970):

AS 4970 Defines a Trees as ...

1.4.6 Tree Long lived woody perennial plant greater than (or usually greater than) 3 m in height with one or relatively few main stems or trunks (or as defined by the determining authority).

Therefore, unless otherwise required by the determining authority or if it is neighbouring and could be impacted upon, we do not include any plants under this size.

### Determining the Tree Protection Zone (TPZ)

The radius of the TPZ is calculated for each tree by multiplying its DBH x 12.  $TPZ = DBH \times 12$

Where - DBH = trunk diameter measured at 1.4 metres above ground; radius is measured from the centre of the stem at ground level.

A TPZ should not be less than 2 metres and no greater than 15 metres except where crown protection is required. Some instances may require variations to the TPZ.

The TPZ of palms, other monocots, cycads and tree ferns should not be less than 1 metre outside the crown projection.

This area is an estimate of the space required to maintain the health of a tree long term. It is entirely possible to work inside this Zone providing due care is exercised according to AS 4970.

### Determining the Structural Root Zone (SRZ)

The SRZ is the area required for tree stability. A larger area is required to maintain a viable tree. The SRZ only needs to be calculated when major encroachment into a TPZ is proposed.

There are many factors that affect the size of the SRZ; e.g. tree height, crown area, soil type, soil moisture etc. The SRZ may also be influenced by natural or built structures, such as rocks and footings. An indicative SRZ radius can be determined from the trunk diameter measured immediately above the root buttress using the following formula:

$SRZ \text{ radius} = (D \times 50)^{0.42} \times 0.64$

Where -  $D$  = trunk diameter, in m, measured above the root buttress.

The SRZ for trees with trunk diameters less than 0.15m will be 1.5m.

It needs to be emphasised that this is an indicative calculation which generalizes all the conditions influencing the estimate. SRZ is often less than the indicated calculation. An Exploratory Root Excavation (ERE) or root investigation according to AS 4970 may provide more information on the extent of these roots.

### TPZ and SRZ Encroachment

Any encroachment into TPZ should be advised and supervised by a qualified Arborist

AS 4970 says:

#### 3.3.2 Minor encroachment

If the proposed encroachment is less than 10% of the area of the TPZ and is outside the SRZ detailed root investigations should not be required.

The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ.

AS 4970 also says:

#### 3.3.4 TPZ encroachment considerations

When determining the potential impacts of encroachment into the TPZ, the project arborist should consider the following:

(a) Location and distribution of the roots to be determined through non-destructive investigation methods (pneumatic, hydraulic, hand digging or ground penetrating radar). Photographs should be taken, and a root zone map prepared.

NOTE: Regardless of the method, roots must not be cut, bruised, or frayed during the process.

It is imperative that exposed roots are kept moist, and the excavation back filled as soon as possible.

(b) The potential loss of root mass resulting from the encroachment: number and size of roots.

(c) Tree species and tolerance to root disturbance.

(d) Age, vigour, and size of the tree.

(e) Lean and stability of the tree.

NOTE: Roots on the tension side are likely to be most important for supporting the tree and are likely to extend for a greater distance.

(f) Soil characteristics and volume, topography and drainage.

(g) The presence of existing or past structures or obstacles affecting root growth.

(h) Design factors.

Tree sensitive construction measures such as pier and beam, suspended slabs, cantilevered building sections, screw piles and contiguous piling can minimize the impact of encroachment.



When siting a structure near to a tree, the future growth of the tree, both above and below ground should be taken into account. Precautions should be taken at the planning and design stage to minimize potential conflict between trees and new structures

When the root zone is reactive clay, techniques such as localized pier and beam (bridged), screw pile footings or root and soil moisture control barriers may be appropriate to minimize effects on structures.

NOTE: Collaboration may be required between the project arborist and the geotechnical or structural engineer.

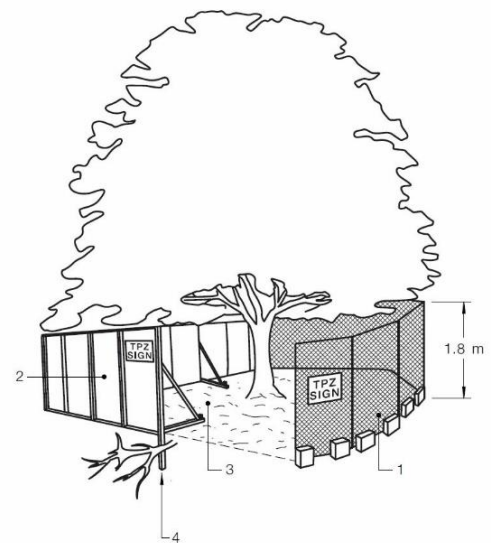
Landscapes by Design believes it is vital to ensure that construction is strong enough to withstand any encroachment by the tree as it grows. Pro-active measure like root control barriers and moisture barriers before trees grow to maximum size may be considered.

## Tree Protection Fencing

The image to the right provides an example of suitable protective fencing:

### Legend:

1. Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2. Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3. Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ. Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.
- 4.



Tree Protection Fencing must be erected prior to any works of any nature commencing and before any machinery or materials are brought onto the site. Once erected this protective fencing must not be removed or altered until such time as all works associated with the construction are complete, unless approved and supervised by an Arborist.

It must have signs attached to it saying "Tree Protection Zone – Stay Out" at maximum 2.4 metres centres or on each panel

Immediately following erection of the Tree Protection Fencing, the Tree Protection Zones are to be weeded and then mulched with 75 mm depth leaf mulch or similar, that has been aged for at least 12 weeks.

No trenching or excavation is to occur within this Tree Protection Zones. If underground services must be routed within the TPZ, they should be installed by directional drilling or in manually excavated trenches. The directional drilling bore should be at least 600 mm deep. The project arborist should assess the likely impacts of boring and bore pits on retained trees. A NDRI may assist in this case. See Later section.

The Tree Protection Fencing Zone should be secured to restrict access.

AS 4687 – Temporary Fencing and Hoardings specifies applicable fencing requirements. Shade cloth or similar should be attached to reduce the transport of dust, other particulate matter, and liquids into the protected area.

Fence posts and supports should have a diameter greater than 20 mm and be located clear of roots.

Existing perimeter fencing and other structures may be suitable as part of the protective fencing.

If it is necessary to remove the Tree Protection Fencing to allow works to be carried out it must be reinstated daily immediately following completion of works. If works are carried out within the Tree Protection Zones, this work must be supervised by an Arborist. During required work suitable planking should be laid within the Tree Protection Zone to protect against compaction to the roots of the tree / trees from workers and others. It is recommended that machinery does not enter the Tree Protection Zone (see 4.2 from AS 4970 below: "Activities generally excluded"), however rumble boards, plates, or sheets of heavy-duty materials over mulch and an impervious membrane must be used if vehicles need to move through the zone. Excavation can be carried out by machine using skilled operators briefed by and observed by an Arborist. Excavators should be used and if possible, with the vehicle located outside the TPZ with its arm moving within it. In the case of a NDRI being conducted the workmen and their equipment are only in the area for a short time however extreme care must be taken to protect the trunk, canopy, and roots of the tree/s.





# LANDSCAPES BY DESIGN

Call 1300 322 048

Landscape Architecture and Design Consulting Arborists

Web: [www.landscapesbydesign.com.au](http://www.landscapesbydesign.com.au) | [www.treereportsmelbourne.com.au](http://www.treereportsmelbourne.com.au)

LANDSCAPE DESIGN

TREE REPORTS

CONSULTATION

PROJECT MANAGEMENT

Email: [admin@landscapesbydesign.com.au](mailto:admin@landscapesbydesign.com.au)

5 Oakley St,  
Mount Dandenong,  
VIC 3767

ABN 67097422449

## Irrigation

During warmer periods the Tree Protection Zones should be irrigated with 1 litre of clean water for every 1 cm of trunk girth measured at the soil / trunk interface on a weekly basis.

No persons, vehicles or machinery are to enter the Tree Protection Zones unless authorised to do so, preferably with permission from the Determining Authority.

No fuel, oil dumps or chemicals are allowed to be used or stored within the Tree Protection Zones; the servicing and refuelling of equipment and vehicles must be carried out away from the TPZ; no storage of material or equipment is to take place within them; nothing whatsoever, including temporary services wires, nails, screws or any other fixing device, is to be attached to any tree.

## Activities Restricted Within TPZ

Activities generally excluded from the TPZ include but are not limited to — (a) machine excavation including trenching.

(b) excavation for silt fencing.

(c) cultivation.

(d) storage.

(e) preparation of chemicals, including preparation of cement products.

(f) parking of vehicles and plant.

(g) refuelling.

(h) dumping of waste;

(i) wash down and cleaning of equipment.

(j) placement of fill.

(k) lighting of fires.

(l) soil level changes.

(m) temporary or permanent installation of utilities and signs, and

(n) physical damage to the tree

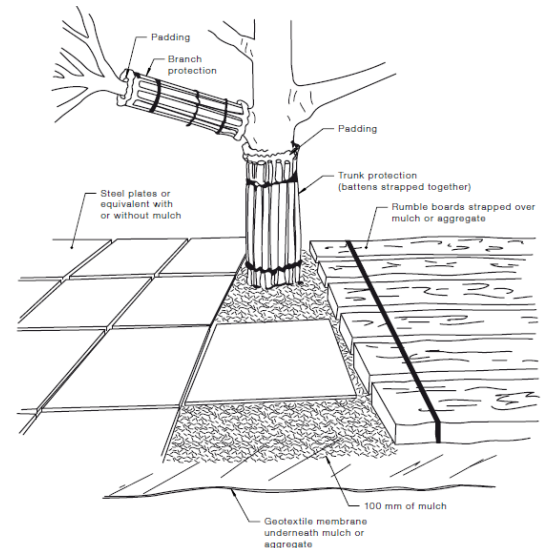
## Non-Destructive Root Investigation (NDRI)

A (NDRI) according to AS 4970 may be conducted to provide more information on the extent of a trees SRZ or encroachment over 10% into TPZ.

The SRZ is an indicative measure, and the actual positions and extent of the roots can only be determined by an investigation. A trench is carefully excavated along a pre-determined line (for example, the edge of a proposed slab or decking posts) to a depth of at least 650 mm and no more than 300mm wide. If roots are located, they must be carefully exposed without any damage to the root. The position and size of any roots found can be photographed, recorded and mapped. If there are too many large roots or root mats found the Arborist may decide to move the trench further out from centre of trunk. A NDRI may indicate that a building can or cannot be placed in the proposed location, or that piers/stumps can be placed between roots, or that roots are not extending far enough to directly damage a building/path/pipe. The NDRI map may lead to design and engineering changes to enable a building, extensions, or earthworks that encroach into the TPZ, to proceed or be moved. Where possible the trenching is done by hand but there are times when machinery or water pressure excavation can be used under the supervision of an Arborist.

## Trunk and Branch Protection

Trees impacted upon by construction works should be protected as per the Sketch 1 below. It is suggested that suitable rubberised padding material be used under 75 by 50 hardwood timber which is strapped with galvanised tin strapping approximately 30 mm wide at 900 mm spacing from bottom of trunk upwards and nailed or screwed to the hardwood timber with 25 mm long galvanised fasteners. The rubberised padding material should be perforated to allow air to the trunk, and not soak water into itself. No nails or screws are to enter the tree trunk or branches and care must be taken to ensure that no materials bite into the tree surface and scar or damage its surface in any way.



## Ground Protection

The planking to the right in the sketch following is an example of the planking that could be used. If temporary access for machinery is required within the TPZ, ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Measures should include a permeable membrane such as Geo-textile fabric beneath a layer of mulch or crushed rock, below rumble boards as per sketch 1. Rubber matting and packing plywood may also be used. Under this planking or sheeting within the TPZ, a 75 mm layer of leaf mulch or similar, aged for at least 12 weeks and proven to contain no toxic substances must be installed. These measures may also be applied to root zones beyond the TPZ. Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.



## Root Protection during Works within the TPZ

Some approved works within the TPZ, such as regrading, installation of piers or landscaping may have the potential to damage roots. If the grade is to be raised the material should be coarser or more porous than the underlying material. Depth and compaction should be minimized.

Manual excavation is the preferred method and should be carried out under the supervision of an arborist to identify roots critical to tree stability and determine the actual extent of the SRZ. A NDRI may be used with photographs and maps to serve as a guide for designers and workers. Relocation or redesign of construction works may be required. (See preceding section)

Where the project arborist identifies roots to be pruned within or at the outer edge of the TPZ, they should be pruned with a final cut back to undamaged wood. Pruning cuts should be made with sharp tools such as secateurs, pruners, handsaws or chainsaws. Pruning wounds should not be treated with dressings or paints. It is not acceptable for roots within the TPZ to be 'pruned' with machinery such as backhoes or excavators. Where roots within the TPZ are exposed by excavation, temporary root protection should be installed to prevent them drying out. This may include jute mesh or hessian sheeting as multiple layers over exposed roots and excavated soil profile, extending to the full depth of the root zone. Root protection sheeting should be pegged in place and kept moist during the period that the root zone is exposed. Other excavation works in proximity to trees, including landscape works such as paving, irrigation and planting can adversely affect root systems. The project arborist should be consulted and supervise any works.

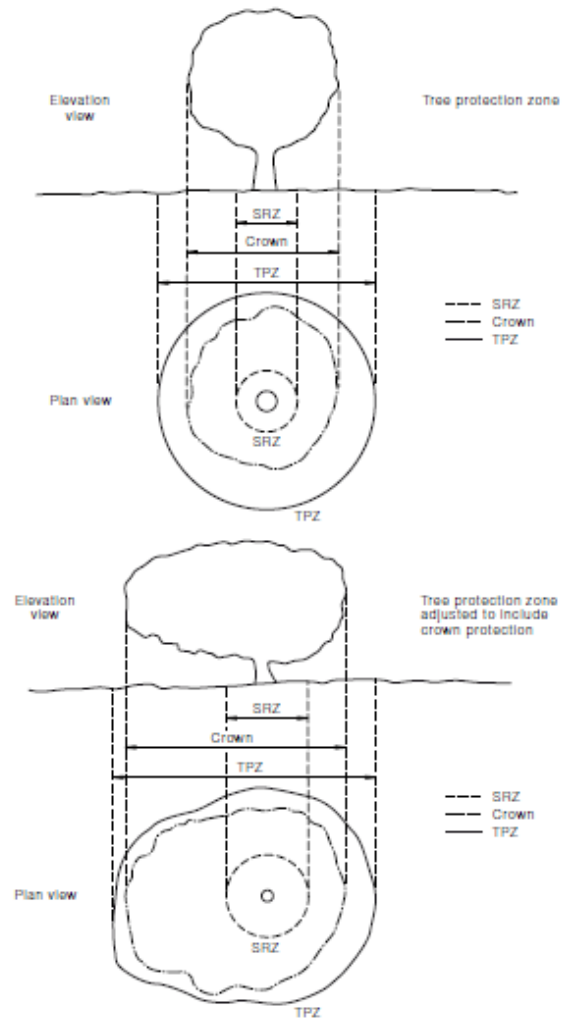
## TPZ Encroachment Over 10%

If the proposed building footprint encroaches into the TPZ more than 10%; either the building footprint will have to change to reduce the encroachment to 10% or a NDRI could be carried out by an Arborist to determine the exact location of any roots present. Prior to a NDRI make certain to contact the Determining Authority to see if permission is required. If roots are discovered belonging to the tree that are under 40 mm diameter, they could be cut by an arborist to allow either the entire building footprint to be accommodated, or if that is not possible, a smaller redesigned building footprint to be accommodated. If the TPZ is varied following a NDRI (as per AS 4970) room must be allowed for the lost area to be compensated for elsewhere. Roots greater than 40 mm diameter and fibrous root mats or clumps greater than 50mm diameter should not be cut but need to be worked around. A well-qualified arborist may cut a root greater than 40 mm diameter, but not greater than 50 mm diameter unless given permission to cut from the Determining Authority.

Alternatively, if a NDRI shows it is impossible to vary the TPZ, alternative "tree friendly" construction methods could be employed, such as installing a building slab above grade, pier, and beam methods, or building on stumps. Piers and stumps can be relocated to avoid damage to any significant roots discovered by the NDRI. These alternative building methods should be specified by a suitably qualified person.

## Crown Protection

Tree crowns may be injured by machinery such as excavators, drilling rigs, cranes, trucks, hoarding installation and scaffolding. The TPZ may need to include additional protection of above ground parts of the tree. Where crown protection is required, it will usually be located at least one metre outside the perimeter of the crown (see Figure 2). The erection of scaffolding may require an additional setback from the edge of the crown. Crown protection may include pruning, tying-back of branches or other measures. If pruning is required, requirements are specified in AS 4373 and should be undertaken before the establishment of the TPF. NOTE: Pruning may require approval from the Determining Authority. See following section on



NOTE: Refer to Clause 3.2 for calculation of TPZ.  
FIGURE 2 INDICATIVE TREE PROTECTION ZONE



# LANDSCAPES BY DESIGN

Call 1300 322 048

Landscape Architecture and Design Consulting Arborists

Web: [www.landscapesbydesign.com.au](http://www.landscapesbydesign.com.au) | [www.treereportsmelbourne.com.au](http://www.treereportsmelbourne.com.au)

LANDSCAPE DESIGN

TREE REPORTS

CONSULTATION

PROJECT MANAGEMENT

Email: [admin@landscapesbydesign.com.au](mailto:admin@landscapesbydesign.com.au)

5 Oakley St,  
Mount Dandenong,  
VIC 3767

ABN 67097422449

## Installing Underground Services within TPZ

All services should be routed outside the TPZ. If underground services must be routed within the TPZ, they should be installed by directional drilling or in manually excavated trenches. The directional drilling bore should be at least 600 mm deep. The project arborist should assess the likely impacts of boring and bore pits on retained trees.

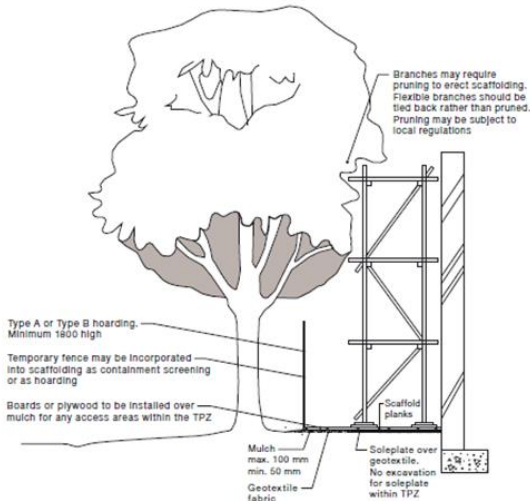
For manual excavation of trenches, the project arborist should advise on roots to be retained and should monitor the works. Manual excavation may include the use of pneumatic and hydraulic tools.

## Pruning and Removal of Trees

If pruning is required, it should be carried out in accordance with Australian Standard 4373 - Pruning of Amenity Trees (AS4373) and any root pruning also as per AS 4973 – Specialist advice from a person with a minimum AQF Level 4 in Arboriculture should be sought before any root pruning occurs.

Prior to the pruning of or removal of any tree the Determining Authority, usually the local council must be consulted to be certain the pruning or removal is allowed by them and is lawful.

In any development seek approval for tree removal and encroachment into the TPZ of trees from the Determining Authority; before planning or building preparation and drawings are completed. This is to ensure that building or other drawings are not prepared based on this report, when a relevant Determining Authority does not allow the trees nominated in our report to be removed, or their TPZ's encroached into.



NOTE: Excavation required for the insertion of support posts for tree protection fencing should not involve the severance of any roots greater than 20 mm in diameter, without the prior approval of the project arborist.

FIGURE 5 INDICATIVE SCAFFOLDING WITHIN A TPZ

## Scaffolding

Where scaffolding is required, it should be erected outside the TPZ. Where it is essential for scaffolding to be erected within the TPZ, branch removal should be minimized. This can be achieved by designing scaffolding to avoid branches or tying back branches.

Where pruning is unavoidable it must be specified by the project arborist in accordance with AS 4970 and 4373.

NOTE: Pruning works may require approval by the determining authority.

Ground below the scaffolding should be protected by boarding (e.g. scaffold board or plywood sheeting) as shown in Trunk and Branch Protection earlier. Where access is required, a board walk, or other surface material should be installed to minimize soil compaction. Boarding should be placed over a layer of mulch and impervious sheeting to prevent soil contamination. The boarding should be left in place until the scaffolding is removed.

There is a risk of materials falling off the scaffold decking and into the TPZ, damaging the tree. Care must be exercised, and solid walls or mesh barriers be installed on any scaffolding over the TPZ.

Impervious membrane, mulch, boards or plywood must be used under the scaffold soleplates and no excavation is to be performed for the soleplates. It may be possible to erect secondary fencing inside the general TPZ fencing to further protect the tree from

damage.

Darrell Mcleod: Landscape Designer and Consulting Arborist - Director

Diploma of Horticulture

Diploma of Horticulture - Arboriculture

Member - Landscape Design Institute - LDI



# LANDSCAPES BY DESIGN

Call 1300 322 048

Landscape Architecture and Design Consulting Arborists

Web: [www.landscapesbydesign.com.au](http://www.landscapesbydesign.com.au) | [www.treereportsmelbourne.com.au](http://www.treereportsmelbourne.com.au)

LANDSCAPE DESIGN

TREE REPORTS

CONSULTATION

PROJECT MANAGEMENT

Email: [admin@landscapesbydesign.com.au](mailto:admin@landscapesbydesign.com.au)

5 Oakley St,

Mount Dandenong,

VIC 3767

ABN 67097422449

## Our Definitions:

Origin	Where the species originates from.
<b>Category</b>	<b>Description</b>
Not Set	Not reported
Endemic	A native to Australia that occurs naturally but only to that local area.
Native	Occurs naturally within Australia and its territories.
Exotic	Occurs naturally outside of Australia and its territories.
Indigenous	A native to Australia that occurs naturally in the local area and other places.
SULE	Safe Useful Life Expectancy
<b>Category</b>	<b>Description</b>
Not Set	Not reported.
Long (40+yrs)	Expected to live over 40 years.
Medium (16-39yrs)	Expected to between 16 and 39 years.
Short (5-15yrs)	Expected to between 5 and 15 years.
Removal	We recommend removal of this tree.
Significance	The landscape value of the tree
<b>Category</b>	<b>Description</b>
Not Set	Not reported.
Most Significant	The most significant tree within the tree data collection area. Does not mean "Significant" as determined by the Relevant Authority.
Highly Significant	A tree deemed to be a good representative of its species and advantageous to the tree data collection area.
Less Significant	Not deemed to share the values of Most or Highly but may be suitable for retention determined by tree data collection area requirements.
Least Significant	Old in poor condition declining and really not suitable for retention.
Hazardous	A tree that may fail, is likely to fail and dependent upon report type may trigger a Hazard Tree Assessment.





# LANDSCAPES BY DESIGN

Call 1300 322 048

Landscape Architecture and Design Consulting Arborists

Web: [www.landscapesbydesign.com.au](http://www.landscapesbydesign.com.au) | [www.treereportsmelbourne.com.au](http://www.treereportsmelbourne.com.au)

LANDSCAPE DESIGN

TREE REPORTS

CONSULTATION

PROJECT MANAGEMENT

Email: [admin@landscapesbydesign.com.au](mailto:admin@landscapesbydesign.com.au)

5 Oakley St,  
Mount Dandenong,  
VIC 3767  
ABN 67097422449

<b>Condition</b>	<b>The overall condition or health of the tree.</b>
<b>Form</b>	<b>The general shape of the tree as usually exhibited by this species</b>
<b>Structure</b>	<b>Is the tree sound and well-formed for the species?</b>
<b>Vigour</b>	<b>Is the tree growing well with good leaf cover if not deciduous during winter?</b>
<b>Category</b>	<b>Description</b>
<b>Not Set</b>	Not reported.
<b>Excellent</b>	Excellent example of the species pertaining to that criteria.
<b>Good</b>	Good example of the species pertaining to that criteria. It could be better.
<b>Average</b>	Canopy that is not full with some pathogen damage, visible amounts of deadwood, may contain epicormic growth and may require arboricultural work, feeding and the like.
<b>Poor</b>	Poor example of the species pertaining to that criteria and may be better removed.
<b>Retention Value</b>	<b>Is the tree suitable for retention?</b>
<b>Category</b>	<b>Description</b>
<b>Not Set</b>	Not reported.
<b>High</b>	The tree should be retained if possible even if that means project modification or room retained for tree to grow into the future.
<b>Moderate</b>	The tree is suitable for retention, but other factors may mean it can be removed.
<b>Low</b>	The tree can be considered for removal. It has low intrinsic value and or not suitable for retention.
<b>Neighbouring</b>	The tree is neighbouring or external to the tree data collection site but must be considered if it could be impacted upon as per AS 4970 protection of Development Sites criteria for protection.
<b>Council</b>	Same as neighbouring but the responsibility of the Relevant Authority.
<b>Hazardous</b>	A tree that may fail, is likely to fail and dependent upon report type may trigger a Hazard Tree Assessment.
<b>Age</b>	<b>The age of the tree</b>
<b>Category</b>	<b>Description</b>
<b>Not Set</b>	Not reported.
<b>Young</b>	Tree is still small or juvenile.
<b>Semi Mature</b>	The tree has not reached it full mature or expected maximum size for its species.
<b>Mature</b>	The tree has not reached it full mature or expected maximum size for its species.
<b>Over Mature</b>	Old in poor condition declining and really not suitable for retention.

Generally Neighbouring Trees must be retained and protected unless suitable arrangements can be made for their removal with the owner, and that removal is legal.

Council trees to streets or neighbouring parks are that Council's responsibility but must be protected.

After a tree report is submitted that includes Council trees, it is suggested that council should inspect their trees to ensure they are safe and worthy of retention.



# LANDSCAPES BY DESIGN

Call 1300 322 048

Landscape Architecture and Design Consulting Arborists

Web: [www.landscapesbydesign.com.au](http://www.landscapesbydesign.com.au) | [www.treereportsmelbourne.com.au](http://www.treereportsmelbourne.com.au)

LANDSCAPE DESIGN

TREE REPORTS

CONSULTATION

PROJECT MANAGEMENT

Email: [admin@landscapesbydesign.com.au](mailto:admin@landscapesbydesign.com.au)

5 Oakley St,  
Mount Dandenong,  
VIC 3767  
ABN 67097422449

## Definitions - Terms:

**Acute Branch Crotch** – Angle on the inner side of the branch crotch is less than 90 degrees.

**Apical Dominance** - the main central stem of the plant is dominant over the other branches.

**Bacterial Wet Wood** - is a bacterial disease of certain trees, primarily elm, cottonwood, poplar, boxelder, ash, aspen, fruitless mulberry and oak.

**Branch Union** – point where a branch originates from the trunk or another branch; may be referred to as a crotch.

**Bracket Fungi or Shelf Fungi** - are the fruiting structures of many different fungi that cause heartwood decay in standing trees.

**Co-dominant Stems** – Co-dominant stems are two stems or trunks of equal size that develop from 2 apical buds at the tip of the same stem. Each co-dominant stem is a direct extension of the stem below its origin. There are no branch collars or trunk collars at the base of co-dominant stems' (Dr Alex Shigo) – Similar to Bi-furcated meaning two, Tri-furcated meaning three and Quadrifurcated meaning four.

**Compartmentalise** – (CODIT: Compartmentalization of Decay in Trees. Dr Alex Shigo) natural process of defence in trees by which they wall off decay in wood and heal wounds.

**Crown Gall** - plant disease probably caused by the bacteria or invasion of some sort into the tree

**Dead Wooding** - Removal of dead, dying and diseased branches throughout the crown.

**De-current** – growth habit developing a more rounded form with multiple scaffold branches

**Determining / Relevant Authority** – Usually refers to the Council responsible for the property being assessed but includes any government or semi-governmental authority that has control or liability under common law, and the role to encourage and enforce the developmental process including legislation relating to trees and plants.

**Epicormic Shoots** - An epicormic shoot is a shoot growing from an epicormic bud which lies underneath the bark of a trunk, stem, or branch of a plant. In older wood, epicormic shoots can result from severe defoliation or radical pruning.

**Etiolation** - is a process in plants grown in partial or complete absence of light. It is characterized by long, weak stems; smaller, sparser leaves due to longer internodes; and a pale-yellow colour (chlorosis).

**Ex-current** - growth habit with pyramidal crown and a central leader

**Fall Zone** – area under a tree or adjacent to it where if it failed it could impact upon.

**Frass** – Granular wood particles produced by borer insects that can be fine, medium, or coarse depending on the type of insect.

**Flush Cut** - Pruning technique in which both branch and stem tissue are removed; generally considered poor practice. Flush cuts can allow decay to enter back into the main trunk or branch.

**Gall** - abnormal outgrowth of tissues and can be caused by various parasites, from fungi and bacteria to insects and mites. Sometimes called a burl.

**Ground Heaving** – ground lifting or heaving as the root plate of a trees moves.

**Hedges** – Have a minimum TPZ and SRZ respectively of 2 and 1.5 metres from centre of trunk and neighbouring that could be impacted are assessed.

**Included Bark** - bark that becomes embedded in a crotch between branch and trunk or Co-Dominant Stems and causes a weak structure.

**Indigenous** – a plant occurring naturally in the area or region of the subject site.

**Kino** - Sap oozing from a tree caused by structural damage and / or disease or pests.

**Later Growth** – growth formed later in a tree's life cycle with perhaps poor attachment.

**Obtuse Branch Crotch** – where the angle on the inner side of the union is greater than 90 degrees.

**Phototropism or Phototrophic Lean** - is the phenomenon in which plants follow or grow towards a light source, most commonly the sun.

**Picus Tomograph** - used for tree risk assessments in order to measure the thickness of the residual wall of trees with internal defects such as cavities or decay non-invasively with sound waves sent through the tree.

**Reaction Wood** - tree wood formed because of mechanical stress helping to provide strength to affected areas as in leaning trees, wind exposure, over weighting, compartmentalisation of decay etc. A sign a tree could fail.

**Scaffold Branch** – the permanent or structural branches of a tree

**Senescence / Senescent** – the condition or process of growing old especially the condition resulting from the transitions and accumulations of the deleterious aging process.

**Significant Roots** – Generally those greater than 50 mm diameter or a mass of fibrous roots but depends on tree size, species and distance from tree.

**Torsional Loading** – When a tree generally by the wind has had part of its structure twisted as it grows.

?? – After a tree's name means identity of species may not be exact.



# LANDSCAPES BY DESIGN

Call 1300 322 048

Landscape Architecture and Design Consulting Arborists

Web: [www.landscapesbydesign.com.au](http://www.landscapesbydesign.com.au) | [www.treereportsmelbourne.com.au](http://www.treereportsmelbourne.com.au)

LANDSCAPE DESIGN

TREE REPORTS

CONSULTATION

PROJECT MANAGEMENT

Email: [admin@landscapesbydesign.com.au](mailto:admin@landscapesbydesign.com.au)

5 Oakley St,  
Mount Dandenong,  
VIC 3767  
ABN 67097422449

## Disclaimer etc

Given factors like environmental, vegetative, and other overlays and local or other planning controls it is difficult to accommodate or satisfy all parties when assessing trees and other vegetation. It is very difficult to establish clear outcomes and impossible to determine that a tree can be deemed safe under all circumstances. No guarantee can be given that a tree is totally safe or will remain healthy given short-term adverse weather conditions or long-term climatic conditions or other environmental and physical factors. No guarantees can be given for any part of a trees current or future stability. The writer and Landscapes by Design Pty Ltd does not accept any responsibility for any tree or part of it assessed, with regard to its ongoing stability and safety, or its capacity to damage property, other assets, or people.

## References

AS 4970 – Protection of Trees on Development Sites

As 4373 – Pruning of Amenity Trees

AS 2870 Residential Slab and Footing Design – Pertaining to Trees

The Body Language of Trees – Mattheck and Breloer

Dictionary of Managing Trees in Urban Environments – Danny D Draper and Peter A Richards

Eucalypts of Victoria and Tasmania – Dean Nicolle

Field Guide to Eucalypts – Brooker and Kleinig

Arborists Certification Study Guide – International Society of Arboriculture

Flora of Melbourne - Marilyn Bull

Native Trees and Shrubs of Southeastern Australia - Leon Costermans

Eucalypts and Illustrate Guide to Identification - Brooker and Kleinig

A Field Guide to Australian Trees – Ivan Holliday