SUPPORTING ASSESSMENT INFORMATION

CITY PLANNING COMMITTEE MEETING (OPEN PORTION OF THE MEETING)

MONDAY 29 FEBRUARY 2016

AT 5.00 P.M.

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6. COMMITTEE ACTING AS PLANNING AUTHORITY

6.1 APPLICATIONS UNDER THE HOBART INTERIM PLANNING SCHEME 2015

6.1.1 51 SANDY BAY ROAD, SANDY BAY - DEMOLITION AND 21 MULTIPLE DWELLINGS - PLN-15-01514-01 – FILE REF: 7659940 & P/51-53/820

37x's

Attached are copies of reports and other additional information that support the content of the Officer's report contained in the agenda, referred at this item.

Attachment 1

MILAN PRODANOVIC B.E. PEng
TRAFFIC ENGINEERING & ROAD SAFETY

TRAFFIC IMPACT ASSESSMENT

PROPOSED

RESIDENTIAL APARTMENT DEVELOPMENT

51 SANDY BAY ROAD

BATTERY POINT

OCTOBER 2015

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51 SANDY BAY ROAD

BATTERY POINT

OCTOBER 2015

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EMAIL: milglad@bigpond.net.au ABN: 51 345 664 433

CONTENTS

REFERENCES:

- Australian Standard AS 1742.2-2009 – Manual of uniform traffic control devices Part 2: Traffic control devices for general use
- AUSTROADS – Guide to Road Safety Part 6: Road Safety Audit (2009)
- Road Traffic Authority NSW – Guide to Traffic Generating Developments, 2002
- Road and Maritime Services (Transport) - Guide to Traffic Generating Developments; Updated traffic surveys (August 2013)
- AUSTROADS – Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (2009)
- AUSTROADS – Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings (2009)
- Australian Standard AS 2890 – Parking Facilities, Part 1 – Off-street car parking
- Australian Standard AS 2890 – Parking Facilities, Part 6 – Off-street parking for people with disabilities
- Hobart Interim Planning Scheme 2015

1. INTRODUCTION

A development application is to be lodged with the Hobart City Council for a 21 residential apartment development at 51 Sandy Bay Road in Battery Point.

This traffic Impact Assessment (TIA) of the proposed residential apartment development has been prepared to support the development application.

The TIA report considers the existing road and traffic characteristics along Sandy Bay Road in the area of the development site as well as vehicle access off Sandy Bay Road to and from the development site. An assessment is made of the traffic activity that the residential apartment development will generate and the effect that this traffic will have on Sandy Bay Road.

Consideration is given to the required access arrangements and available sight distances at the junction of the access driveway with Sandy Bay Road. An assessment is also made of internal traffic circulation and parking arrangements within the development site having regard to current applicable Australian Standards and Hobart Interim Planning Scheme (2015) requirements.

The report is based on the Department of State Growth (DSG) - Traffic Impact Assessment Guidelines. The techniques used in the investigation and assessment incorporate best practice road safety and traffic management principles.

2. SITE DESCRIPTION

The proposed development site is located on the western side of Sandy Bay Road, around 90m to the south of the Hampden Road intersection and around 130m to the northeast of the St Georges Terrace junction.

Land use development along Sandy Bay Road is mixed with residential unit development, tourist accommodation, offices and small retail businesses.

The location of the development site has been highlighted on the extract from the street atlas for this area, seen in Figure 2.1.

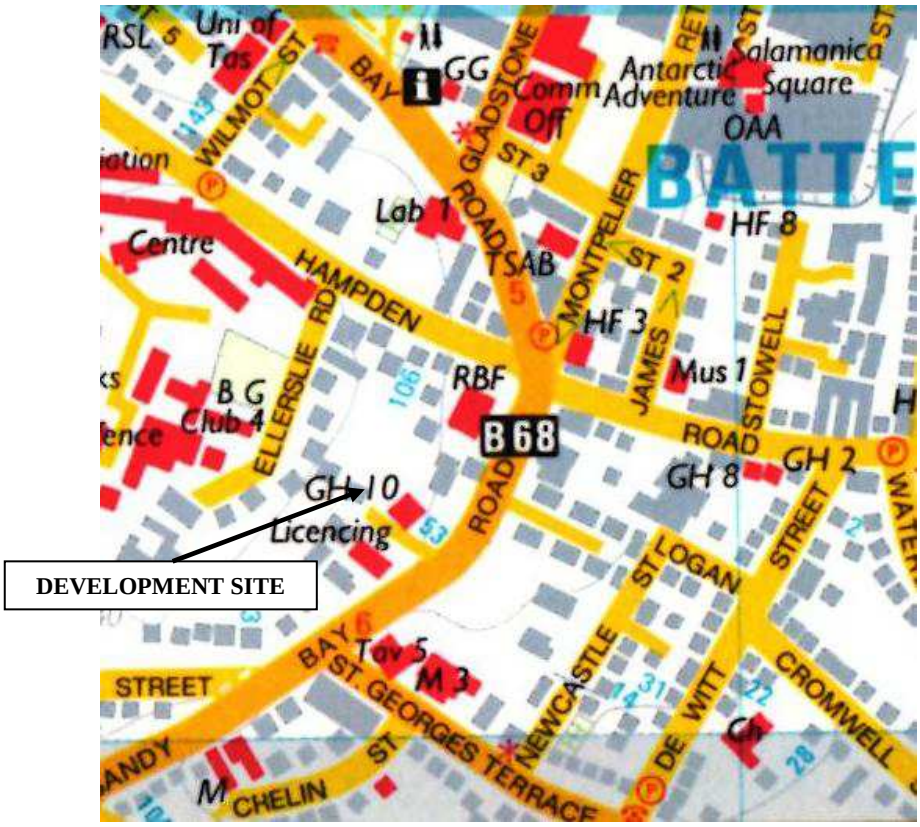


Figure 2.1: Extract of street atlas showing location of proposed residential apartment development site

3. DEVELOPMENT PROPOSAL

The development site at 51 Sandy Bay Road lies behind the Gattonside Heritage Accommodation business. There is an old residential dwelling currently on the property.

The residential dwelling on the development site is to be demolished and a new building will be constructed. The new building will have 21 one-bedroom residential apartments. Parking for 21 resident vehicles will be provided on Level C1 and six visitor parking spaces as well as a motorcycle parking space on the Level C2. There will also be a bicycle storage area on Level C1 capable of accommodating up to 10 bicycles.

The apartments will occupy three floor levels (A1 to A3). The floor area of the apartments will vary between around 43m^2 and 68m^2.

Vehicle and pedestrian access to all of the apartments will be off Sandy Bay Road via an access driveway that runs beside the northern boundary of the Gattonside property (at 53 sandy Bay Road) to the main part of the development site.

The proposed site layout and design of the two parking levels of the residential apartment building together with traffic access and parking details is shown on the drawings included as Attachment A to this report.

A view of the main part of the development site from the access driveway showing the existing house to be demolished is seen in Photograph 3.1.

Photograph 3.1: View of development site from access driveway

4. EXISTING ROAD AND TRAFFIC ENVIRONMENT

4.1 Road Characteristics

The only road of relevance to the proposed residential apartment development under consideration is Sandy Bay Road between Hampden Road and St Georges Terrace.

Sandy Bay Road has the function of a major arterial road.

In the area between the above two intersections Sandy Bay Road follows a sweeping left hand horizontal curve to the north on a fairly flat grade.

The width of Sandy Bay Road in the area of the development site is around 13.6m between kerb faces. There are footpaths along both sides of the road with the footpath past the development site access driveway having a width of around 2.3m.

The road is marked into four traffic lanes with two traffic lanes available for northbound and southbound travel in the morning and afternoon peak traffic period respectively, through 'clearway' restrictions.

A view of the geometric character of Sandy Bay Road in the area of the development site is seen in Photograph 4.1.

The 50km/h urban speed limit applies to Sandy Bay Road.

The current access driveway to the development site has a gutter crossover width of around 6.9m, a width of 5.3m at the back of footpath and 5.0m at the property boundary which lies 4.9m from the back footpath. Within the property the access driveway varies in width from around 6.3m a few metres inside of the property to around 5.8m at the end of the driveway where it enters the main part of the site.

A view of access driveway from Sandy Bay Road is seen in Photograph 4.2.

Photograph 4.1: View to north along Sandy Bay Road with development site access ahead on left

Photograph 4.2: View of access driveway to development site off Sandy Bay Road

4.2 Traffic Activity

Enquires with the Hobart City Council regarding traffic data for Sandy Bay Road in the area of the development site resulted in advice being received that the nearest site on Sandy Bay Road for which traffic data was available is the south of Osborne Street. The location is some 120m to the south of Byron Street and some 500m to the south of the development site.

The available data is from a traffic survey which was undertaken by the Council in April 2008. The survey recorded an average weekday traffic volume of 28,620 vehicles/day.

The morning and afternoon two way peak hour traffic volume was 2,152 vehicles/hour and 2,493 vehicles/hour respectively. The average hourly weekday traffic volume is summarised in Figure 4.1.

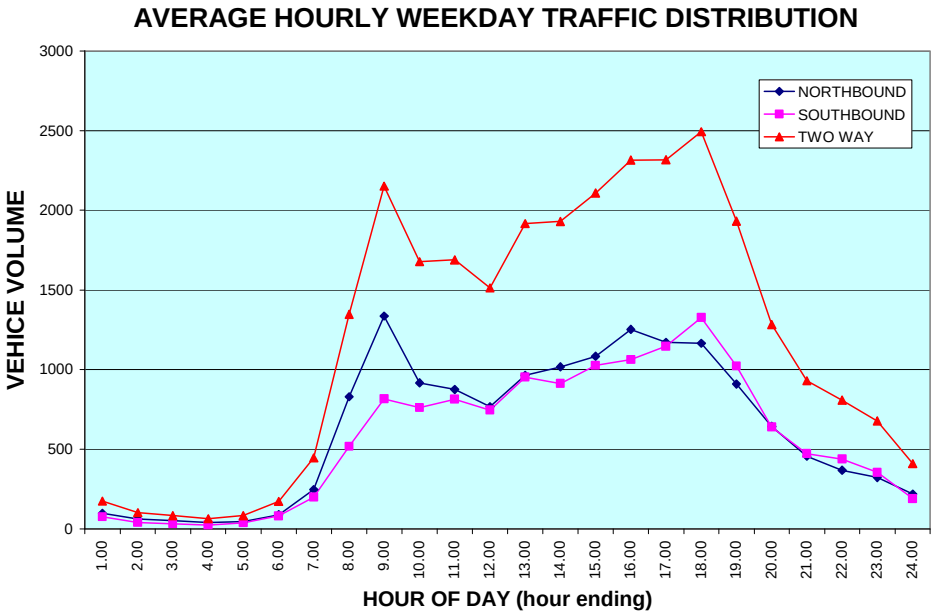


Figure 4.1: Average Hourly Weekday Traffic Volume on Sandy Bay Road – April 2008

The traffic volume at this site would be higher than that passing the development site as Byron Street would add a larger volume of traffic to Sandy Bay Road to south of the Byron Street junction than would St Georges Terrace add to Sandy Bay Road to the north of St Georges Terrace.

In order to have knowledge of the current volumes on Sandy Bay Road passing the development site, morning and afternoon peak hour traffic volume surveys were undertaken adjacent to the development site during the 4:30pm – 5:30pm period on Tuesday 2 September 2015 and during the 8:00pm – 9:00am period on Thursday 4 September 2015. During these surveys the numbers of turning vehicles to and from other properties in the immediate area of the development were also recorded.

The results of these surveys have been summarised in Figures 4.2 and 4.3.

As can be seen from these surveys the peak hour traffic volumes on this section of Sandy Bay Road are around 1,650 – 1,800 vehicles/hour which indicates the daily traffic volume would be around 17,000 vehicles/day.

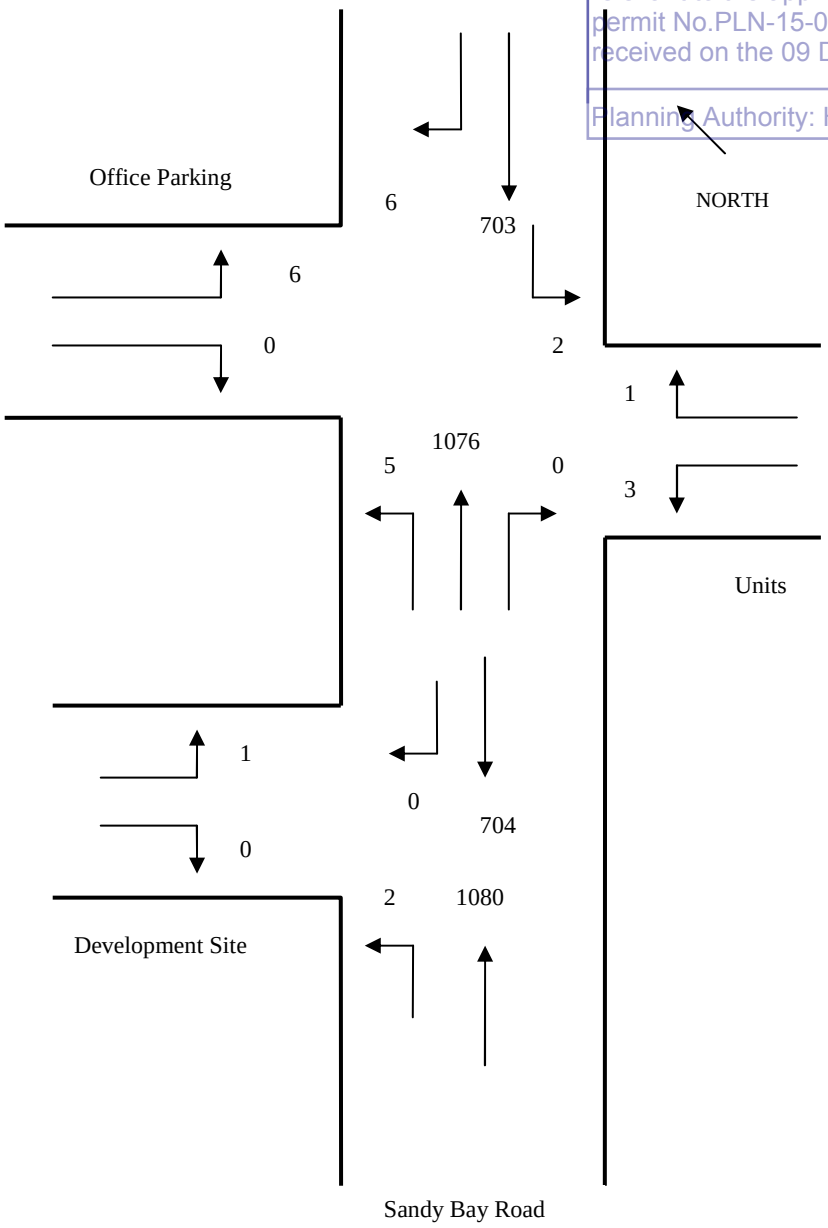


Figure 4.2: Passing and turning traffic volumes on Sandy Bay Road at development site – 8:00am to 9:00am

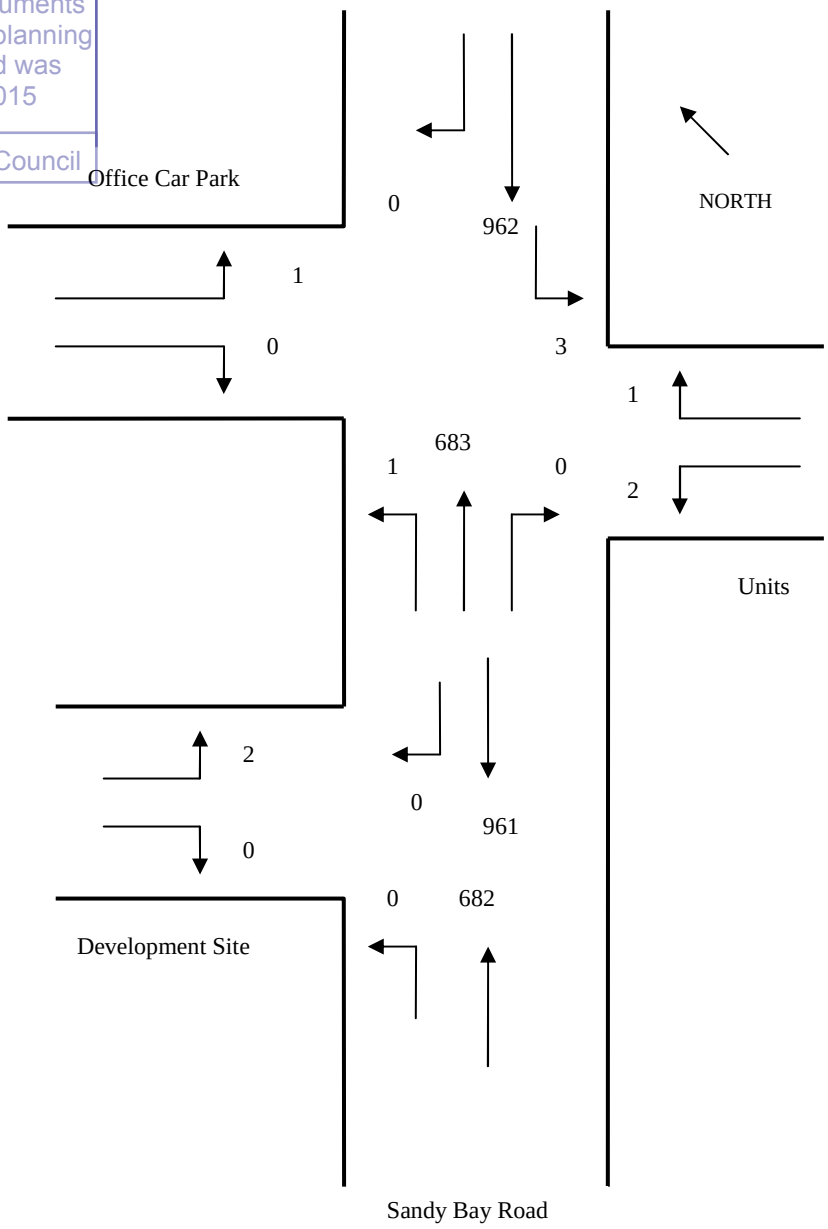


Figure 4.3: Passing and turning traffic volumes on Sandy Bay Road at development site – 4:30am to 5:30am

4.3 Crash Record

All crashes that result in personal injury are required to be reported to Tasmania Police. Tasmania Police record all crashes that they attend. Any crashes that result in property damage only, which are reported to Tasmania Police, are also recorded even though they may not visit the site.

Details of reported crashes are collated and recorded on a computerised database that is maintained by DSG.

Information was requested from DSG about any reported crashes along Sandy Bay Road between Hampden Road and St Georges Terrace over the last five and a half years since January 2010. Advice has been received that the database has record of 16 reported crashes in this area.

There have been four crashes in 2011 and five in 2012; in other years there have been two reported crashes.

In the first two years there were four rear end crashes, a hit object and a parking incident. Since then there have been no rear end crashes but there have been five 'hit parked car' or other object incidents, two crashes by vehicles emerging from a driveway, two parking incidents and a motorcycle loss of control in the late evening.

The loss of control crash resulted in serious injury and one of the emerging from driveway crashes resulted in minor injury.

Having regard to the high traffic volume on Sandy Bay Road, the crash record is not of particular concern.

5. TRAFFIC GENERATION BY THE DEVELOPMENT

As outlined in Section 3 of this report, the development being proposed is the construction of 21 residential apartments, all with only one bedroom.

In considering the traffic activity that each dwelling on the lots will generate when occupied, guidance is normally sought from the New South Wales, Road Traffic Authority document – Guide to Traffic Generating Developments. The RTA guide is a nationally well accepted document that provides advice on trip generation rates and vehicle parking requirements for new developments.

The updated 'Technical Direction' to the Guide dated August 2013 advises that the trip generation for residential dwellings in regional areas of New South Wales is 7.4 trips/dwelling/day.

This is consistent with findings by this consultant for dwellings in Tasmania. Surveys in the built up areas of Tasmania over a number of years have found that typically this figure is 8.0 trips/dwelling/day with smaller residential units generating around 4 trips/unit/day and larger units generating around 6 trip/unit/day.

As part of the peak hour traffic surveys undertaken on Sandy Bay Road recently (see Section 4.2 of this report) the number of vehicles turning into and out of driveways at or near the development site was also recorded. This included the 20 residential units in Governor's Square at 74 Sandy Bay Road which have car parking access opposite the development site (four of the 20 units in this development have car parking access off Newcastle Street).

From Figures 4.2 and 4.3 it can be seen these Governor's Square units generated six vehicle movements in both the morning and afternoon peak hour. Assuming this traffic generation of 6 vehicles/hour in these peak traffic periods is 10% of the daily traffic generation, as is normally found in residential areas, the traffic generation for the 16 units with access off Sandy Bay Road is 3.75 vehicles/unit/hour. The units each have **two bedrooms**.

Having regard to this and the above discussion about traffic generation, the proposed **one bedroom** apartments are expected to generate probably an average around 3 vehicles/apartment/day having also regard to the relatively close proximity of the development site to the Hobart CBD and Sandy Bay shopping centre as well as passing public transport services. However for the purpose of this assessment the traffic generation rate 4 vehicles/apartment/day will be applied.

Applying this trip generation rate of 4 trips/apartment/day to the proposed 21 apartments, when fully developed and occupied they can be expected to generate some 84 vehicle movements per day and around 9 vehicles/hour during peak traffic periods, again based on the peak hour traffic being the typical 10% of the daily traffic volume.

6. TRAFFIC ASSESSMENT AND IMPACT

This section of the report evaluates the impact of the expected traffic from the proposed residential apartment development on Sandy Bay Road.

An assessment has been made of the adequacy of available intersection sight distances along Sandy Bay Road at the site access driveway junction; consideration has been given to the proposed internal site layout with respect to traffic circulation and parking as well as pedestrian accessibility to the road network and to public transport.

6.1 Operational Impact of Increased Traffic Activity

The total traffic generation from the proposed 21 residential apartments is expected to be a total of around 84 vehicles/day and around 9 vehicles/hour during peak traffic periods.

The origin and destination for these vehicles will mostly be to and from the north, to the Hobart CBD and areas beyond to the north and east. Having regard to the findings from observation of turning traffic activity along this section of Sandy Bay Road during the peak hour traffic surveys, the likely turning traffic movements which the proposed development will generate are presented in Figures 6.1 and 6.2.

Although the passing traffic volumes on Sandy Bay Road during the peak hour periods are very high, it can be seen from Figures 4.1 and 4.2 that motorist undertake right turn movements into and out of existing driveways along this section of Sandy Bay Road.

Conflicting traffic volumes for right turn movements from Sandy Bay Road into a driveway are little higher than left turn movements out of a driveway but there are more than sufficient gaps in the passing traffic for these vehicles not to experience excessive delays when crossing or entering a single traffic stream.

Right turn movements from a driveway into Sandy Bay Road are more difficult during peak hour periods due to the two way traffic volume. However these movements can and do occur safely.

The site observations have shown that these right turn motorists utilised gaps in the traffic flow in both directions created by the upstream traffic signals. Some motorists were at times prepared to wait a significant period of time for the gap in the traffic stream, others waited for shorter time periods and then decided to turn left and obviously travel ‘around the block’ to their destination. These driver patterns were obvious with the Governor’s Square development.

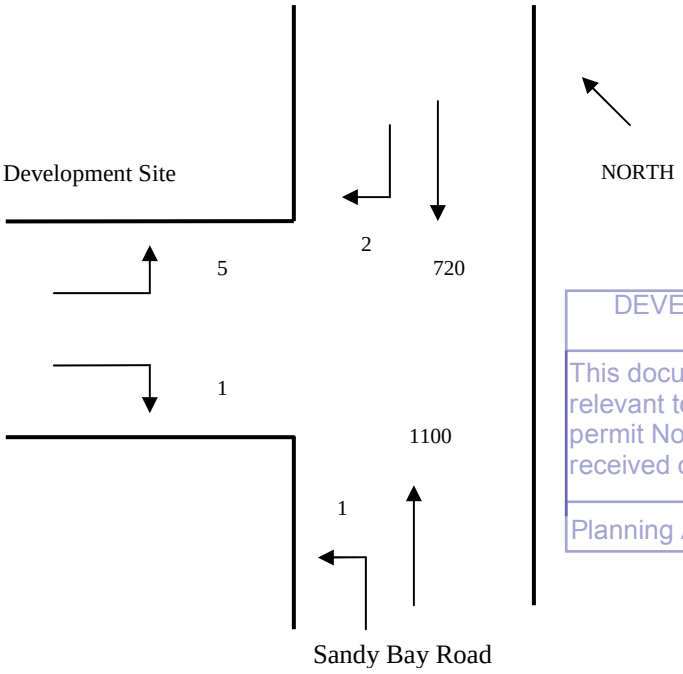


Figure 6.1: Expected turning traffic volumes generated by the development site – AM peak

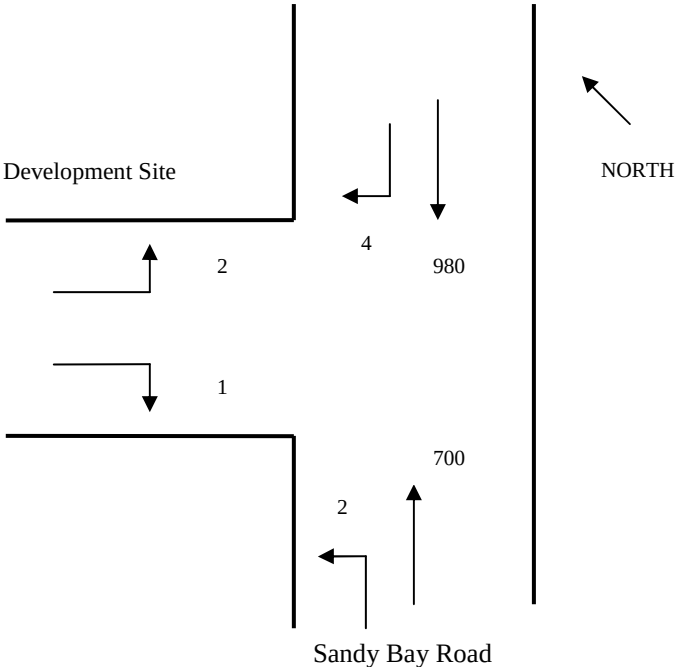


Figure 6.2: Expected turning traffic volumes generated by the development site – PM peak

In the case of the proposed apartment development it will generate a lesser demand for right turn movements onto Sandy Bay Road than the Governor's Square development.

If motorist wish to avoid right turn movements there are easy 'round the block' alternative routes, the same as for other developments in this part of Battery Point, via Sandy Bay Road and Hampden Road to Davey Street (to the south).

All turn movements to and from Sandy Bay Road are much easier during off peak periods with fewer passing vehicles and more gaps in the traffic stream.

The crash history along this section of Sandy Bay Road over the last five year and more does not indicate any significant safety or conflict issues with frontage development turning traffic.

As a result of this assessment it is concluded no additional traffic management measures need to be introduced along Sandy Bay Road in the area of the development site and there is no justification to consider introducing any turning movement controls.

6.2 Assessment of Available Sight Distances at Development Site Access Driveway to Sandy Bay Road

An assessment has been undertaken of the available sight distances at the proposed junction of the development site access driveway with Sandy Bay Road.

Views along Sandy Bay Road for motorists entering Sandy Bay Road from the site access driveway are seen in Photographs 6.1 and 6.2 while the available sight lines southwards from a vehicle turning right into the site access driveway and also to the north from the rear of a vehicle turning right into the site access driveway are seen in Photographs 6.3 and 6.4.

The available sight distance to the north and south from the point where a vehicle would stop and give way when entering Sandy Bay Road (around 2.5m back from kerb line), was measured to be around 100m.

For a vehicle turning right into the site access driveway the available forward sight distance to the south is around 140m while the sight distance to the rear of a right turning vehicle (forward sight distance for a vehicle approaching the turning vehicle from behind) is around 130m.

The current speed limit along Sandy Bay Road is 50km/h. It has been estimated the approach speed of vehicles is slightly less than 50km/h.

The current Austroads guidelines require the sight distances for a 50km/h approach speeds to be 97m. The Hobart Interim Planning Scheme requires sight distances of only 80m.

The available sight distances are therefore sufficient to meet the minimum requirements in both cases.

Photograph 6.1: View to south along Sandy Bay Road from development site access driveway

Photograph 6.2: View to north along Sandy Bay Road from development site access driveway

Photograph 6.3: View to south along Sandy Bay Road from vehicle turning right into development site access driveway

Photograph 6.4: View to north along Sandy Bay Road from rear of vehicle turning right into development site access driveway

6.3 Internal Traffic Access, Circulation and Car Parking Design

Consideration has been given to the proposed layout and design of the internal access driveway which will service the residential apartments. A review has also been undertaken of the car parking layout and adequacy of parking on the site.

The site layout drawing has been reviewed having due regard for the requirement of AS 2890 – Part 1.

Access driveway

The existing driveway to 51 Sandy Bay Road will service two way vehicle access as well as pedestrian and bicycle access between the development site and Sandy Bay Road.

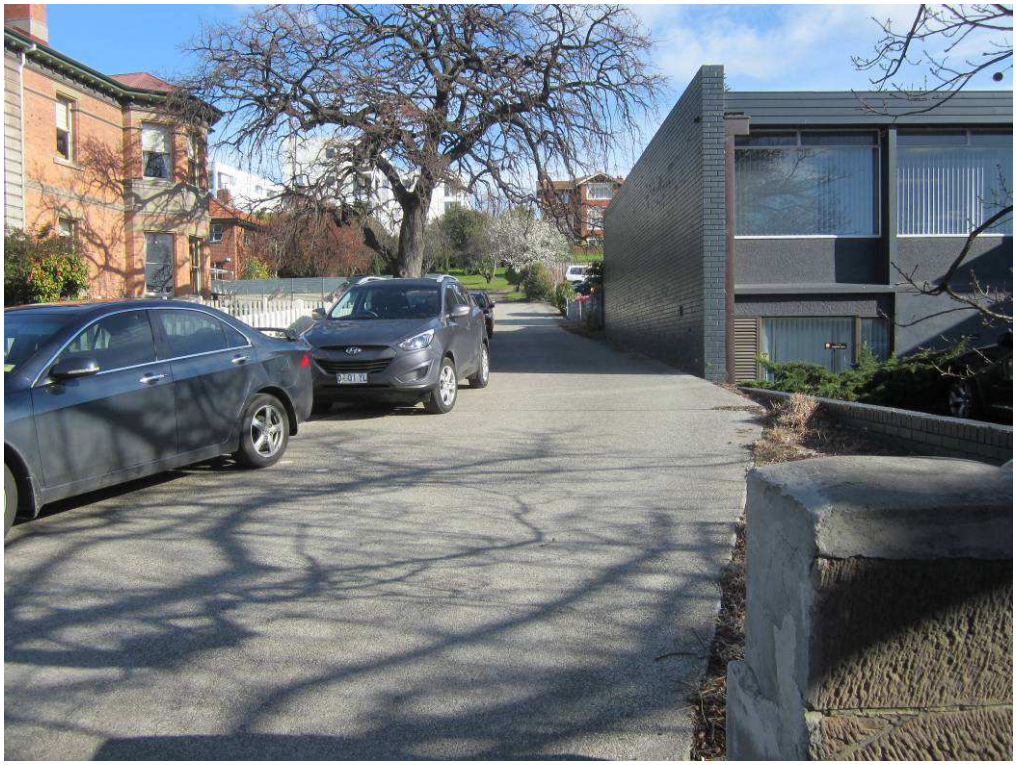
As indicated earlier, outside the property the access driveway has a width at the gutter of around 6.9m crossover, a width of 5.3m at the back of footpath (side obstructions splayed to increase effective width) and 5.0m at the property boundary which lies 4.9m from the back footpath.

Within the property, the access driveway varies in width from around 6.3m just inside of the property, to around 5.8m at the end of the driveway where it enters the main part of the site.

Overall this width is sufficient to accommodate two way vehicle movements over the full length of the access driveway, i.e. the continuous passing of vehicles within the property and simultaneous entry and exit movements at the Sandy Bay Road junction. The design and character of the driveway will also accommodate pedestrians and cyclists as there is more than sufficient width for cars to safely pass any pedestrian or cyclist in this environment.

Views of the driveway are seen in Photographs 6.5 and 6.6 as well as Photograph 4.2.

Photograph 6.5: View along access driveway from development site towards Sandy Bay Road



Photograph 6.6: View along access driveway from Sandy Bay Road towards development site

Parking bays

The Planning Scheme requires 1 space per dwelling plus 1 dedicated visitor parking space per 4 dwellings (rounded up to the nearest whole number) for multiple dwelling developments with units that have one bedroom.

With 21 one-bedroom apartments proposed in this development, the required parking supply is 21 resident spaces and 5.25 visitor spaces, or 27 car spaces in total.

This number of car parking spaces will be provided on the site on the two levels of parking. This development does not require any disabled car parking spaces to be provided.

As there are more than 19 car parking spaces on the site, the scheme requires one motorcycle parking space on the site. Provision for parking of a motorcycle is made on Level C1.

It is most likely that some residents in these apartments will not own a car; therefore there will be a parking surplus on the site.

The planning scheme does not require any onsite bicycle storage. However there will be a storage area in the building capable of accommodating some 10 bicycles. It is common to see cyclists along Sandy Bay Road passing this site on route to and from the Sullivans Cove area.

All the resident and visitor parking spaces will be compliant with AS 2890.1. The parking bays will have the minimum required dimensions of 5.4m length and 2.4m width and the 300mm clearances at the side of the bays for door opening. The parking aisle will have a width of 5.8m wide with at least a 1.0m aisle extension for vehicle manoeuvre when exiting the end bays, all as required by the Australian Standard for residential parking.

There is sufficient space at both entry points to the car parking levels as well as along the driveway and along the parking aisles to accommodate the passing of cars.

Provision has been made for a car to turning around on the visitor parking level in case all the spaces are occupied. Such a facility is not required on the resident parking level because vehicles entering this level will have an available allocated parking space.

Ramp access

There will be a ramped access to each level of car parking. The change in grade of successive ramps, as shown on the site layout drawings, is well less than required by AS 2890.1 and there will be more than sufficient bottoming out clearance for all cars. While this part of the access driveway is shown as a series of ramps, it should be constructed as a continuous curved (vertically) ramp.

6.4 Public Transport Services

Metro Tasmania currently operates regular bus services along Sandy Bay Road past the development site. There are bus stops for both directions of travel located less than 200m walking distance from the development site.

This is well within the normally accepted maximum walking distance of 400m to/from bus stops.

Metro Tasmania timetable and route map for this area is included with this report in Attachment B.

7. SUMMARY AND RECOMMENDATIONS

This Traffic Impact Assessment has been prepared in support of the development application to the Hobart City Council for the construction of 21 residential apartments at 51 Sandy Bay Road in Battery Point.

The assessment has reviewed the existing road and traffic environment along Sandy Bay Road in the area of the development site. While Sandy Bay Road carries a high traffic volume, no issues of concern have been identified with respect to the level of traffic activity and the operation of the traffic.

There is record of 16 reported crashes along Sandy Bay Road between Hampden Road and St Georges Terrace over the last five and a half years since January 2010.

The crash types have been fairly mixed from year to year. Despite the high traffic volume along Sandy Bay Road, the crash record is not of particular concern, particularly with only two injury crashes.

It has been estimated that the proposed development with 21 residential apartments when fully developed and occupied will generate some 84 vehicle movements per day and around 9 vehicles/hour during peak traffic periods, based on the peak hour traffic being the typical 10% of the daily traffic volume.

The origin and destination for these vehicles will mostly be to and from the north, to the Hobart CBD and areas beyond. From site observations of the behaviour of drivers entering and leaving Sandy Bay Road in this area it was found that entering and turning motorists utilised gaps in the traffic stream in both directions created by the upstream traffic signals.

Some motorists when entering Sandy Bay Road were at times prepared to wait a significant period of time for a gap, others waited for shorter time periods and then decided to turn left and obviously travel ‘around the block’ to their destination. If motorist wish to avoid right turn movements there are an easy ‘round the block’ alternative routes, the same as for other developments along Sandy Bay Road

As a result of this assessment it is concluded no additional traffic management measures need to be introduced along Sandy Bay Road in the area of the development site and there is no justification to consider introducing any turning movement controls.

An assessment has been undertaken of the available sight distances at the proposed junction of the development site access driveway with Sandy Bay Road. Applying current Austroads guidelines it has been found the available sight distances are sufficient to meet the minimum requirements.

Consideration has been given to the proposed layout and design of the internal access, traffic circulation provisions and parking arrangements as well as pedestrian access, having regard to relevant Australian Standards.

It has been concluded the design meets the requirement of AS 2890 – Part 1 and Part 6 and therefore the Planning Scheme.

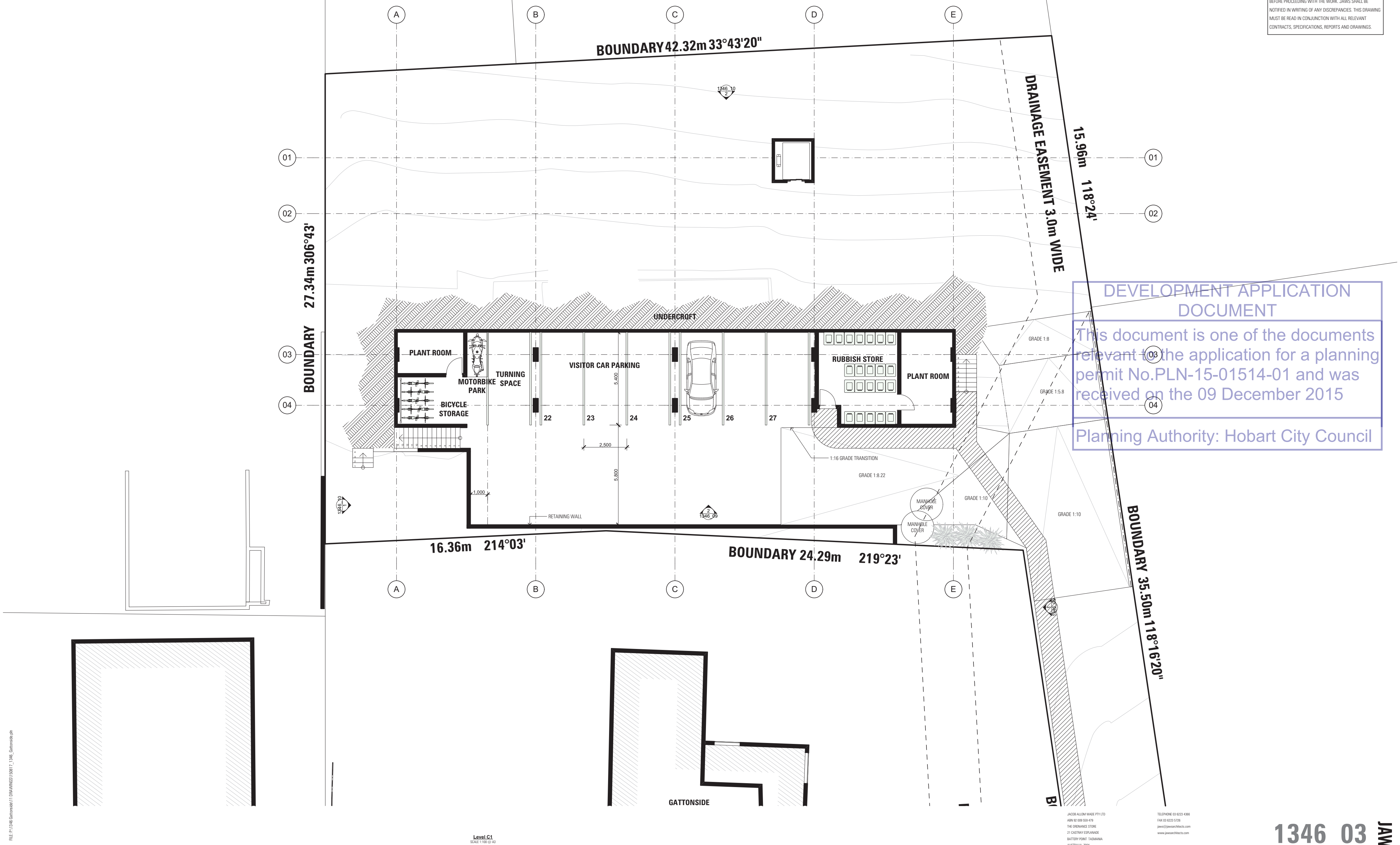
The number of car and motorcycle parking spaces that will be provided on-site meets the planning scheme requirements.

Metro Tasmania currently operates various bus services along Sandy Bay Road past the development site. Bus stops are within 200m walking distance which is well within the normally accepted maximum walking distance of 400m to/from bus routes.

It has been concluded that the proposed residential apartment development can be supported on traffic grounds as it will not give rise to any adverse safety or operational traffic issues.

ATTACHMENT A

Drawings of proposed layout of car parking at residential apartment development



DEVELOPMENT APPLICATION DOCUMENT

This document is one of the documents relevant to the application for a planning permit No.PLN-15-01514-01 and was received on the 09 December 2015

Planning Authority: Hobart City Council

DO NOT SCALE DRAWINGS. WRITTEN DIMENSIONS GOVERN. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE. ALL DIMENSIONS SHALL BE VERIFIED ON SITE BEFORE PROCEEDING WITH THE WORK. JAWS SHALL BE NOTIFIED IN WRITING OF ANY DISCREPANCIES. THIS DRAWING MUST BE READ IN CONJUNCTION WITH ALL RELEVANT CONTRACTS, SPECIFICATIONS, REPORTS AND DRAWINGS.

Level C1
SCALE 1:100 @ A3

PRELIMINARY

PROJECT
GATTONSIDE APARTMENTS
51 - 52 Sandy Bay Road
Battery Point, TAS, 7004

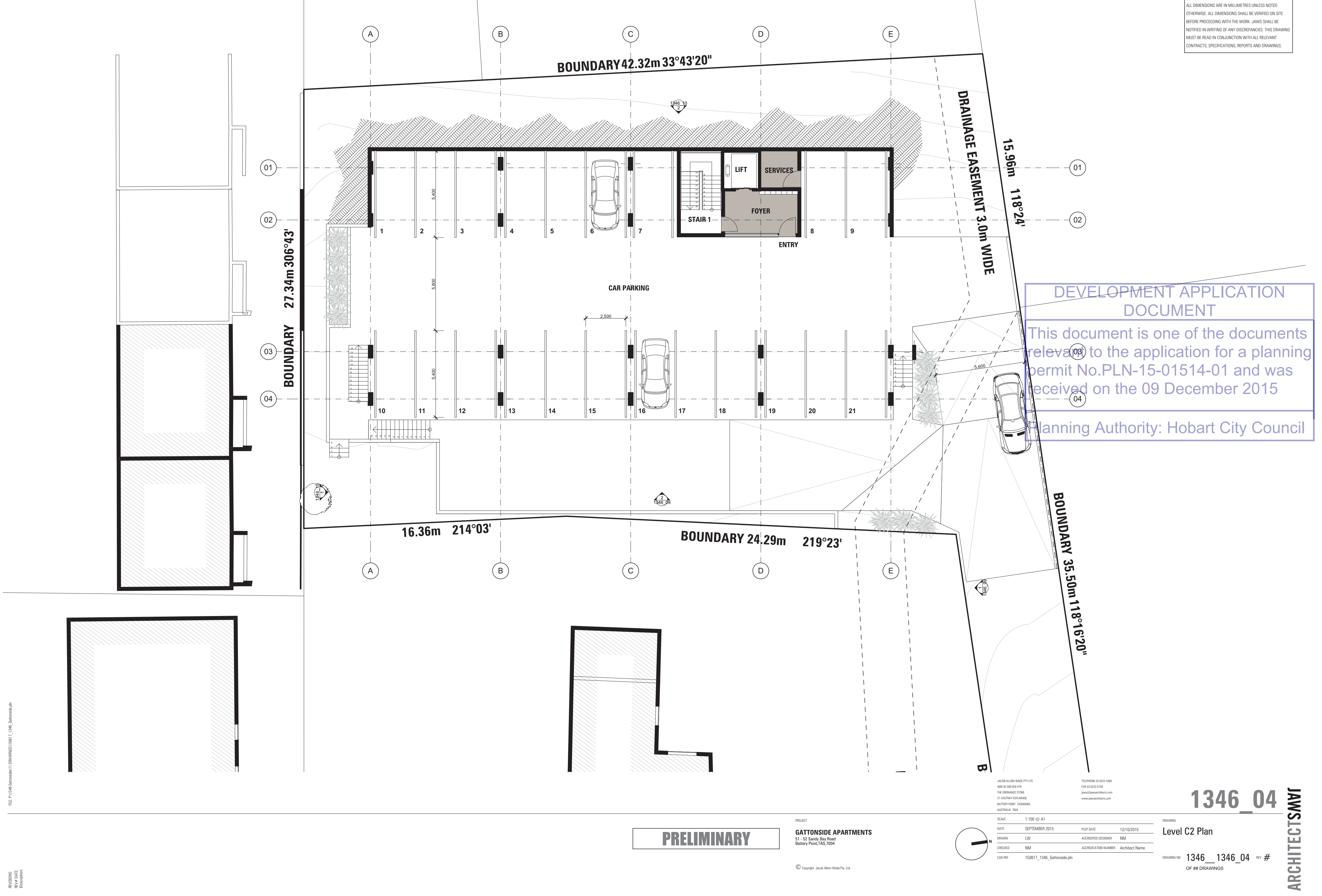
SCALE 1:100 @ A1
DATE SEPTEMBER 2015
PLOT DATE 12/10/2015
DRAWN LW
ACCREDITED DESIGNER NM
CHECKED NM
ACCREDITATION NUMBER Architect Name
CAD REF 150817_1346_Gattonside.pln

DRAWING
Level C1 Plan
DRAWING NO 1346__1346_03 REV #
OF ## DRAWINGS

1346_03

JAWS ARCHITECTS

CPC Supporting Info. 29/2/2016 Item No. 6.1.1



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Planning Authority: Hobart City Council

ATTACHMENT B

Metro Tasmania bus route maps and timetables for Battery Point and Sandy Bay

Look for bus numbers

51
52
53
54
55
154
888

Sandy Bay & University to Hobart City

Buses operate linking:

- Lower Sandy Bay
- University
- Sandy Bay
- Battery Point
- Hobart City

For details of additional services between Lower Sandy Bay and Hobart City via Sandy Bay Rd please refer to Routes 61–68 Kingston timetable.

See back for detailed route descriptions

Effective 3 November 2013

Bus Route Descriptions

51 **Hobart City to Hobart City Loop** via Regent St, University, Churchill Ave, Lower Sandy Bay & Sandy Bay. Service operates Monday–Friday.

52 **53** **Hobart City to Hobart City Loop** via Sandy Bay, University, Lower Sandy Bay & Churchill Ave. Service operates 7 days.

54 **55** **Hobart City to Hobart City Loop** via Regent St, University, Churchill Ave, Lower Sandy Bay & Sandy Bay. Service operates Monday–Friday.

154 **Hobart City to Hobart City Loop** via Salamanca Pl, Battery Point, Sandy Bay & St Canice Ave. Service operates Monday–Friday.

888 **Hobart City to Hobart City Loop** via University of Tasmania (Medical Science Precinct), Regent St & University of Tasmania (Sandy Bay Campus). **Service operates Monday–Friday during University Semester only.**

Metro
For timetables, maps, fares and tickets call the Information Hotline
13 22 01
or visit
www.**metrotas**.com.au
PO Box 61, Moonah TAS 7009

TG10509 | Version 7 | 3 Nov. 2012

Welcome Aboard *Metro*

This timetable details the bus services operated by ***Metro*** in the areas listed on the cover.

Our bus services will enable you to go shopping, to work, to school or to social events, quickly and comfortably.

At the bus stop please ensure you "hail" the bus driver of the bus you wish to catch and where possible tender the correct fare.

Please move to the back of the bus and make the seats in the front rows of the bus available for elderly or less able passengers.

Copies of timetables and other information about services we operate are available by calling **13 22 01** or by visiting www.**metrotas**.com.au.

How to use this timetable

1. Using the route map provided, find the two timing points you are located between.
2. Locate these two timing points on the timetables.
3. Your bus is scheduled to arrive between the times shown for these points. For example, if your bus stop is situated between timing points (A) and (B) on the map, then the bus is scheduled to arrive between the time listed for (A) and the time listed for (B).

Please note all times are approximate only and may vary due to traffic conditions. It is advisable to be at your bus stop at least five minutes ahead of the indicated time.

Metro Tickets

A range of tickets are available for travel on ***Metro*** services. Tickets work on a sectional basis: the further you travel, the more you pay. Section numbers are indicated on all bus stops.

Our most popular ticket options include:

- ***Single use*** tickets, which are purchased from the bus driver; or
- ***Metro Greencard***, a smartcard that can be recharged with credit. Customers may recharge on any ***Metro*** bus (cash only), online or at a ***Metro*** agent.

For more information on all ***Metro*** tickets please call **13 22 01** or visit www.**metrotas**.com.au

Hobart City - Sandy Bay - University - Lower Sandy Bay

51 52 53 54 55 154

	Hobart City Franklin Sq	St Ann's Davey St	Sandy Bay Shops	University Stop 12	Casino Stop 11 (River side)	St Canice Ave	Lower Sandy Bay (River side)	Lower Sandy Bay (Mountn. side)
map ref	G	F	E	D	C	B	A	A
Look for bus numbers	Departs Stop O							
Monday to Friday								
	52 6.50	....	6.53	6.57	6.59	....	X7.06	....
	54 7.12	....	7.17	7.20	7.22	....	Z7.28	....
	51S 7.20	7.22	....	7.28	....	....	....	W7.37
	54 7.27	....	7.33	7.37	7.40	....	Z7.43	....
	51S 7.48	7.50	....	7.56	....	....	....	W8.05
	54 7.52	....	7.57	8.00	8.02	....	Z8.08	....
	51 8.02	8.04	....	8.10	....	....	....	W8.19
	51S 8.12	8.14	....	8.20	....	....	....	W8.29
	55S 8.18	8.20	....	M8.27	....	....	....	....
	54 8.20	....	8.25	8.28	8.30	....	Z8.36	....
	55 8.40	8.42	....	8.48	....	....	....	Y8.58
	54 8.55	....	9.00	9.03	9.05	....	Z9.11	....
am	**55** 9.10	9.12	....	9.18	....	....	....	Y9.28
	54 9.25	....	9.30	9.33	9.35	....	Z9.41	....
	154 9.35	....	9.43	....	9.46	W9.52	....	....
	55 9.40	9.42	....	9.48	....	....	....	Y9.58
	54 9.55	....	10.00	10.03	10.05	....	Z10.11	....
	55 10.10	10.12	....	10.18	....	....	....	Y10.28
	54 10.25	....	10.30	10.33	10.35	....	Z10.41	....
	154 10.35	....	10.43	....	10.46	W10.52	....	....
	55 10.40	10.42	....	10.48	....	....	....	Y10.58
	54 10.55	....	11.00	11.03	11.05	....	Z11.11	....
	55 11.10	11.12	....	11.18	....	....	....	Y11.28
	54 11.25	....	11.30	11.33	11.35	....	Z11.41	....
	55 11.40	11.42	....	11.48	....	....	....	Y11.58
	54 11.55	....	12.00	12.03	12.05	....	Z12.11	....
	55 12.10	12.12	....	12.18	....	....	....	Y12.28
	54 12.25	....	12.30	12.33	12.35	....	Z12.41	....
	154 12.35	....	12.43	....	12.46	W12.52	....	....
	55 12.40	12.42	....	12.48	....	....	....	Y12.58
	54 12.55	....	1.00	1.03	1.05	....	Z1.11	....
	55 1.10	1.12	....	1.18	....	....	....	Y1.28
	54 1.25	....	1.30	1.33	1.35	....	Z1.41	....
	55 1.40	1.42	....	1.48	....	....	....	Y1.58
	54 1.55	....	2.00	2.03	2.05	....	Z2.11	....
	55 2.10	2.12	....	2.18	....	....	....	Y2.28
	154 2.20	....	2.28	....	2.31	W2.37	....	....
	54 2.25	....	2.30	2.33	2.35	....	Z2.41	....
	55 2.40	2.42	....	2.48	....	....	....	Y2.58
pm	**54** 2.55	....	3.00	3.03	3.05	....	Z3.11	....
	55 3.10	3.12	....	3.18	....	....	....	Y3.28
	54 3.25	....	3.30	3.33	3.35	....	Z3.41	....
	55 3.40	3.42	....	3.48	....	....	....	Y3.58
	54 3.55	....	4.00	4.03	4.05	....	Z4.11	....
	55 4.10	4.12	....	4.18	....	....	....	Y4.28
	54 4.25	....	4.30	4.33	4.35	....	Z4.41	....
	55 4.40	4.42	....	4.48	....	....	....	Y4.58
	54 5.00	....	5.05	P	5.08	....	Z5.14	....
	55 5.10	5.12	....	5.18	....	....	....	Y5.28
	54 5.25	....	5.30	P	5.33	....	Z5.39	....
	55 5.30	5.32	....	5.38	....	....	....	Y5.48
	54 5.45	....	5.51	P	5.54	....	Z6.01	....
	55 5.50	5.52	....	5.58	....	....	....	Y6.08
	53 6.10	....	6.14	6.18	....	....	....	Y6.28

52
53

Hobart City - Sandy Bay - University - Lower Sandy Bay

	Hobart City Franklin Sq	Sandy Bay Shops	University Stop 12	Casino Stop 11 (River side)	Lower Sandy Bay (River side)	Lower Sandy Bay (Mountn side)
map ref	G	E	D	C	A	A
Look for bus numbers	Departs Stop O					

Monday to Friday (cont...)

	52	6.30	6.33	6.37	6.39	X6.46	....
	52	6.55	6.58	7.02	7.04	X7.11	....
	53	7.25	7.28	7.32	....	....	Y7.40
pm	52	8.40	8.43	8.47	8.49	X8.56	....
	53	9.40	9.43	9.47	....	....	Y9.55
	52♿	10.40	10.43	10.47	10.49	X10.56	....
	53F	11.40	11.43	11.47	....	....	Y11.55
am	52F	12.40	12.43	12.47	12.49	X12.56	....

Saturday

	53	7.45	7.48	7.52	....	....	Y8.00
	52♿	8.20	8.23	8.27	8.29	X8.34	....
	53♿	8.55	8.59	9.03	....	....	Y9.13
	52	9.25	9.29	9.33	9.35	X9.41	....
am	53♿	9.55	9.59	10.03	....	....	Y10.13
	52♿	10.25	10.29	10.33	10.35	X10.41	....
	53	10.55	10.59	11.03	....	....	Y11.13
	52♿	11.25	11.29	11.33	11.35	X11.41	....
	53♿	11.55	11.59	12.03	....	....	Y12.13
	52	12.25	12.29	12.33	12.35	X12.41	....
	53	12.55	12.59	1.03	....	....	Y1.13
	52♿	1.25	1.29	1.33	1.35	X1.41	....
	53♿	1.55	1.59	2.03	....	....	Y2.13
	52	2.25	2.29	2.33	2.35	X2.41	....
	53	2.55	2.59	3.03	....	....	Y3.13
	52	3.25	3.29	3.33	3.35	X3.41	....
	53	3.55	3.58	4.02	....	....	Y4.10
	52	4.25	4.28	4.32	4.34	X4.39	....
pm	53	4.55	4.58	5.02	....	....	Y5.10
	52♿	5.25	5.28	5.32	5.34	X5.39	....
	53	5.55	5.58	6.02	....	....	Y6.10
	52♿	6.40	6.43	6.47	6.49	X6.54	....
	53	7.40	7.43	7.47	....	....	Y7.55
	52♿	8.40	8.43	8.47	8.49	X8.54	....
	53♿	9.40	9.43	9.47	....	....	Y9.55
	52♿	10.40	10.43	10.47	10.49	X10.54	....
	53♿	11.40	11.43	11.47	....	....	Y11.55
am	52♿	12.40	12.43	12.47	12.49	X12.54	....

Sunday & Public Holidays

	52♿	8.40	8.43	8.47	8.49	X8.54	....
am	53♿	9.40	9.43	9.47	....	....	Y9.55
	52♿	10.40	10.43	10.47	10.49	X10.54	....
	53♿	11.40	11.43	11.47	....	....	Y11.55
	52♿	12.40	12.43	12.47	12.49	X12.54	....
	53♿	1.40	1.43	1.47	....	....	Y1.55
	52♿	2.40	2.43	2.47	2.49	X2.54	....
	53♿	3.40	3.43	3.47	....	....	Y3.55
pm	52♿	4.40	4.43	4.47	4.49	X4.54	....
	53♿	5.40	5.43	5.47	....	....	Y5.55
	52♿	6.40	6.43	6.47	6.49	X6.54	....
	53♿	7.40	7.43	7.47	....	....	Y7.55

888 Hobart City - University

Service operates during University Semester only

	University (Medical) Campbell St	**Hobart City** Franklin Sq	St Ann's Davey St	University Stop 12
map ref	H	G	F	D
Look for bus numbers		Departs Stop **O**		

Monday to Friday

am	888	....	8.26	8.31	8.41
	888	....	8.33	8.38	8.48
	888	....	8.48	8.53	9.03
	888	....	9.03	9.08	9.18
	888	....	9.18	9.21	9.28
	888	....	9.33	9.36	9.43
	888	....	9.48	9.51	9.58
	888	....	10.00	10.03	10.10
	888	....	10.15	10.18	10.25
	888	10.22	10.30	10.33	10.40
	888	10.37	10.45	10.48	10.55
	888	10.52	11.00	11.03	11.10
	888	11.07	11.15	11.18	11.25
	888	11.22	11.30	11.33	11.40
	888	11.37	11.45	11.48	11.55
	888	11.52	12.00	12.03	12.10
pm	888	12.07	12.15	12.18	12.25
	888	12.22	12.30	12.33	12.40
	888	12.37	12.45	12.48	12.55
	888	12.52	1.00	1.03	1.10
	888	1.07	1.15	1.18	1.25
	888	1.22	1.30	1.33	1.40
	888	1.37	1.45	1.48	1.55
	888	1.52	2.00	2.03	2.10
	888	2.07	2.15	2.18	2.25
	888	2.22	2.30	2.33	2.40
	888	2.37	2.45	2.48	2.55
	888	2.52	3.00	3.03	3.10
	888	3.07	3.15	3.18	3.25
	888	3.22	3.30	3.33	3.40
	888	3.37	3.45	3.48	3.55
	888	3.52	4.00	4.03	4.10
	888	4.07	4.15	4.18	4.25
	888	4.22	4.24	....	....
	888	4.37	4.39	....	....

Explanations

F Bus operates Fridays only.
M Bus continues to Mt Carmel College via Regent St and Nelson Rd.
P Bus bypasses University on outward journey. Travels via Sandy Bay Rd direct instead.
S Bus operates school days only.
W Bus continues to Hobart City via Sandy Bay. Please see pages 5 and 6.
X Bus continues to Hobart City via Churchill Ave, University and Sandy Bay. Please see pages 5 and 6.
Y Bus continues to Hobart City via University and Sandy Bay. Please see pages 5 and 6.
Z Bus continues to Hobart City via Churchill Ave, University and Regent St. Please see pages 5 and 6.
Wheelchair-accessible service.

Routes 51, 54, 55, 154 & 888 do not operate on Weekends or Public Holidays.

Lower Sandy Bay - University - Sandy Bay - Hobart City

51 52 53 54 55 154

	Lower Sandy Bay (River side)	Lower Sandy Bay (Mountn. side)	St Canice Ave	Casino Stop 12 (Mountain side)	University Stop 12	Sandy Bay Shops	**Hobart City** Franklin Sq
map ref	A	A	B	C	D	E	G

Look for bus numbers

Monday to Friday

am	**52**	7.06	....	....	....	7.14	7.17	7.22
	54	7.28	....	....	....	7.37	....	7.46
	51S	....	7.37	....	7.42	....	7.45	7.50
	54	7.43	....	....	....	7.52	....	8.01
	51S	....	8.05	....	8.10	....	8.13	8.18
	54	8.08	....	....	....	8.17	....	8.26
	51	....	8.19	....	8.24	....	8.27	8.32
	54	C8.24	....	....	....	8.33	....	8.42
	51S	....	8.29	....	8.34	....	8.37	8.42
	54	8.36	....	....	....	8.45	....	8.54
	54	C8.54	....	....	....	9.03	....	9.12
	55	....	8.58	....	9.03	9.06	9.10	9.17
	54	9.11	....	....	....	9.20	....	9.29
	55	....	9.28	....	9.33	9.36	9.40	9.47
	54	9.41	....	....	....	9.50	....	9.59
	154	....	....	9.55	10.00	....	10.03	10.12
	55	....	9.58	....	10.03	10.06	10.10	10.17
	54	10.11	....	....	....	10.20	....	10.29
	55	....	10.28	....	10.33	10.36	10.40	10.47
	54	10.41	....	....	....	10.50	....	10.59
	154	....	....	10.55	11.00	....	11.03	11.12
	55	....	10.58	....	11.03	11.06	11.10	11.17
	54	11.11	....	....	....	11.20	....	11.29
	55	....	11.28	....	11.33	11.36	11.40	11.47
	54	11.41	....	....	....	11.50	....	11.59
	55	....	11.58	....	12.03	12.06	12.10	12.17
pm	**54**	12.11	....	....	....	12.20	....	12.29
	55	....	12.28	....	12.33	12.36	12.40	12.47
	54	12.41	....	....	....	12.50	....	12.59
	154	....	....	12.55	1.00	....	1.03	1.12
	55	....	12.58	....	1.03	1.06	1.10	1.17
	54	1.11	....	....	....	1.20	....	1.29
	55	....	1.28	....	1.33	1.36	1.40	1.47
	54	1.41	....	....	....	1.50	....	1.59
	55	....	1.58	....	2.03	2.06	2.10	2.17
	54	2.11	....	....	....	2.20	....	2.29
	55	....	2.28	....	2.33	2.36	2.40	2.47
	154	....	....	2.40	2.45	....	2.48	2.57
	54	2.41	....	....	....	2.50	....	2.59
	55	....	2.58	....	3.03	3.06	3.10	3.17
	54	3.11	....	....	....	3.20	....	3.29
	55	....	3.28	....	3.33	3.36	3.40	3.47
	54	3.41	....	....	....	3.50	....	3.59
	55	....	3.58	....	4.03	4.06	4.10	4.17
	54	4.11	....	....	....	4.20	....	4.29
	55	....	4.28	....	4.33	4.36	4.40	4.47
	54	4.41	....	....	....	4.50	....	4.59
	55	....	4.58	....	5.03	5.06	5.10	5.17
	54	5.14	....	....	....	5.23	....	5.32
	55	....	5.28	....	5.33	5.36	5.40	5.47
	54	5.39	....	....	....	5.48	....	5.57
	55	....	5.48	....	5.53	5.56	6.00	6.07
	54	6.01	....	....	....	6.11	....	6.20
	55	....	6.08	....	6.13	6.16	6.20	6.27

52
53

Lower Sandy Bay - University - Sandy Bay - Hobart City

		Lower Sandy Bay (River side)	Lower Sandy Bay (Mountn. side)	Casino Stop 12 (Mountain side)	University Stop 12	Sandy Bay Shops	**Hobart City** Franklin Sq
	map ref	A	A	C	D	E	G
	Look for bus numbers						

Monday to Friday (cont...)

pm	**53**	....	6.28	6.33	6.37	6.41	6.47
	52	6.46	....	....	6.54	6.57	7.02
	52	7.11	....	....	7.19	7.22	7.27
	53	....	7.40	7.45	7.48	7.52	7.57
	52	8.56	....	....	9.04	9.07	9.12
	53	....	9.55	10.00	10.03	10.07	10.12
	52 ♿	10.56	....	....	11.04	11.07	11.12
	53F	....	11.55	12.00	12.03	12.07	12.12
am	**52F**	12.56	....	....	1.04	1.07	1.12

Saturday

am	**53**	....	8.00	8.05	8.08	8.12	8.17
	52 ♿	8.34	....	....	8.44	8.47	8.52
	53 ♿	....	9.13	9.18	9.22	9.26	9.32
	52	9.41	....	....	9.52	9.56	10.02
	53 ♿	....	10.13	10.18	10.22	10.26	10.32
	52 ♿	10.41	....	....	10.52	10.56	11.02
	53	....	11.13	11.18	11.22	11.26	11.32
	52 ♿	11.41	....	....	11.52	11.56	12.02
pm	**53** ♿	....	12.13	12.18	12.22	12.26	12.32
	52	12.41	....	....	12.52	12.56	1.02
	53	....	1.13	1.18	1.22	1.26	1.32
	52 ♿	1.41	....	....	1.52	1.56	2.02
	53 ♿	....	2.13	2.18	2.22	2.26	2.32
	52	2.41	....	....	2.52	2.56	3.02
	53	....	3.13	3.18	3.22	3.26	3.32
	52	3.41	....	....	3.52	3.56	4.02
	53	....	4.10	4.15	4.18	4.22	4.27
	52	4.39	....	....	4.49	4.52	4.57
	53	....	5.10	5.15	5.18	5.22	5.27
	52 ♿	5.39	....	....	5.49	5.52	5.57
	53	....	6.10	6.15	6.18	6.22	6.27
	52 ♿	6.54	....	....	7.04	7.07	7.12
	53	....	7.55	8.00	8.03	8.07	8.12
	52 ♿	8.54	....	....	9.04	9.07	9.12
	53 ♿	....	9.55	10.00	10.03	10.07	10.12
	52 ♿	10.54	....	....	11.04	11.07	11.12
	53 ♿	....	11.55	12.00	12.03	12.07	12.12
am	**52** ♿	12.54	....	....	1.04	1.07	1.12

Sunday & Public Holidays

am	**52** ♿	8.54	....	....	9.04	9.07	9.12
	53 ♿	....	9.55	10.00	10.03	10.07	10.12
	52 ♿	10.54	....	....	11.04	11.07	11.12
	53 ♿	....	11.55	12.00	12.03	12.07	12.12
pm	**52** ♿	12.54	....	....	1.04	1.07	1.12
	53 ♿	....	1.55	2.00	2.03	2.07	2.12
	52 ♿	2.54	....	....	3.04	3.07	3.12
	53 ♿	....	3.55	4.00	4.03	4.07	4.12
	52 ♿	4.54	....	....	5.04	5.07	5.12
	53 ♿	....	5.55	6.00	6.03	6.07	6.12
	52 ♿	6.54	....	....	7.04	7.07	7.12
	53 ♿	....	7.55	8.00	8.03	8.07	8.12

888 University - Hobart City

Service operates during University Semester only

		University Stop 12	Hobart City Franklin Sq	University (Medical) Campbell St
	map ref	D	G	H
	Look for bus numbers			
		Monday to Friday		
am	888	10.11	10.19	10.22
	888	10.26	10.34	10.37
	888	10.41	10.49	10.52
	888	10.56	11.04	11.07
	888	11.11	11.19	11.22
	888	11.26	11.34	11.37
	888	11.41	11.49	11.52
	888	11.56	12.04	12.07
pm	888	12.11	12.19	12.22
	888	12.26	12.34	12.37
	888	12.41	12.49	12.52
	888	12.56	1.04	1.07
	888	1.11	1.19	1.22
	888	1.26	1.34	1.37
	888	1.41	1.49	1.52
	888	1.56	2.04	2.07
	888	2.11	2.19	2.22
	888	2.26	2.34	2.37
	888	2.41	2.49	2.52
	888	2.56	3.04	3.07
	888	3.11	3.19	3.22
	888	3.26	3.34	3.37
	888	3.41	3.49	3.52
	888	3.56	4.04	4.07
	888	4.11	4.19	4.22
	888	4.26	4.34	4.37
	888	4.41	4.54	....
	888	4.56	5.09	....
	888	5.11	5.24	....

Explanations

- **C** Bus commences from Churchill Ave Stop 27 (south side) at this time.
- **F** Bus operates Fridays only.
- **S** Bus operates school days only.
- ♿ Wheelchair-accessible service.

Routes 51, 54, 55, 154 & 888 do not operate on Weekends or Public Holidays.

Metro Route Map 51–55, 154, 888

6. COMMITTEE ACTING AS PLANNING AUTHORITY

6.2 APPLICATIONS UNDER THE CITY OF HOBART PLANNING SCHEME 1982

6.2.1 25 COPLEY ROAD AND 22 CUTHBERTSON PLACE, LENAH VALLEY – SUBDIVISION (13 LOTS) – PLN-15-00371-01 – FILE REF: 7408105 & P/25/471

102x's

Attached are copies of reports and other additional information that support the content of the Officer's report contained in the agenda, referred at this item.

Attachment 1

25 Copley Rd – Lenah Valley

Flora Survey - 29th July 2013

Introduction

The owner Barry Marsh is proposing to subdivide approximately 3.5 Ha of land along the northern portion of 25 Copley Rd at Lenah Valley. As requested by the owner, North Barker Ecosystem Services (NBES) have been contracted to undertake a basic review of vegetation and fauna habitat within the subdivision area. This report documents the findings of a field survey undertaken on site.

Methods

During the afternoon of the 29th July, 2013, a single observer from NBES surveyed on foot the extent of the proposed subdivision. The survey collected a complete plant species list for the area, with particular emphasis given to areas of optimal habitat for threatened species. Field data from the present study were supplemented with data from the Tasmanian Natural Values Atlas (NVA)[1] Botanical nomenclature follows the current census of Tasmanian plants[2].

Limitations

The survey was undertaken in winter. There may be some herb, orchid and graminoid species present which flower at other times of the year that may have been overlooked during the survey. However, all threatened plant species known from the area have been considered in light of habitat suitability.

Results

The study area, occupying around 3.5 ha, is located at 210 to 230 m a.s.l. with north eastern to north western facing gentle slopes. To the immediate south is an old dump with a quarry to the southeast. The property overlooks Glenorchy and Hobart. In terms of the surrounding terrestrial environments, most of the land surrounding the property is utilised for high density urban living to the north and west and a mix of rural housing and quarries to the south. Knocklofty Park is to the south east with Mount Stuart to the east. The site is situated within the boundaries of the municipality of Hobart which is in the South East bioregion of Tasmania[3].

The sites predominate underlying geology is Jurassic dolerite, It is located within a dry sub-humid warm region and within the 500 to 600 mm annual

[1] Natural Values Report # 58621 (29th July 2013), DPIPWE
[2] Baker & de Salas (2012)
[3] IBRA5 - Peters & Thackway 1998

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rainfall zone. Current and past land use has seen some of the land possibly ploughed with clearing activities and weed invasion which has greatly impacted on the nature of the grassy woodland vegetation composition.

Vegetation

The field survey confirmed that the site contains the following vegetation community as shown on TASVEG (version 2.0)

- *Eucalyptus pulchella* forest and woodland (DPU)

This community occupies the majority of the subdivision apart from the western cleared portion. The vegetation has been highly disturbed in the past with regrowth trees reaching around 10 to 15m. The dominate species are *Eucalyptus pulchella* (white peppermint) and *Eucalyptus viminalis* (white gum) with very young *Eucalyptus ovata* (black gum) occurring largely to the eastern boundary. The small tree/large shrub layer is dominated by *Bursaria spinosa* (prickly box) with *Acacia mearnsii* (black wattle), *Acacia dealbata* (silver wattle), *Allocasuarina verticillata* (dropping sheoak) and *Exocarpos cupressiformis* (native cherry) also present. The grassy understory is heavily dominated by weed infestations of *Ulex europaeus* (gorse) and *Chrysanthemoides monilifera subsp. monilifera* (boneseed). Outside of these weeds, native grasses are dominated by *Austrostipa spp* (spear grass), *Poa labillardierei* (silver tussockgrass grass) and *Rytidosperma spp* (wallaby grass). Other species include *Deyeuxia spp* (bent grass) and *Pentapogon quadrifidus* (five-awned spear grass). Herb diversity was very low (also a reflection of the time of survey, browsing and weed infestations) and graminoids were dominated by *Lomandra longifolia* (sagg), *Gahnia grandis* (cutting grass), *Lepidosperma laterale* (variable swordsedge) and *Lepidosperma gunnii* (narrow swordsedge).

DPU is not a threatened community under the Tasmanian *Nature Conservation Act 2002.*

It was evident during the survey that a large number of regrowth trees and shrubs had died due to the extreme heat that was experienced the previous summer. This combined with the extensive nature of the weed infestations puts the regrowth vegetation present in very poor condition.

Threatened Species

Previous surveys within 500 m of the property have identified a variety of species of threatened flora variously listed under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (EPBCA) or the Tasmanian *Threatened Species Protection Act 1995* (TSPA); all of these threatened species are listed in Table 1 together with a description of their preferred habitat and an assessment of the likelihood of their occurrence on site.

Table 1: Threatened plant species observed on site during the spring survey

Species	Status[4] TSPA / EPBCA	Potential to occur on site	Observations and preferred habitat[5]
Lepidium pseudotasmanicum shade peppercress	Rare/ -	Low to moderate	There are a number of records within Knocklofty Park to the east. Occurs in shady sites on fertile soils, occupying disturbance niches. Suitable habitat present and this species is widespread in Hobart and Glenorchy. Not recorded although some potential for its occurrence tho reduced due to past disturbances to vegetation. However given the reservation status in Hobart any plants that may occur in study area are not likely to be significant.
Rytidosperma indutum tall wallaby grass	Rare/ -	Moderate	Occurs in grassy forest and woodland but appears to favour non dolerite soils. Known from foothills of Mt Wellington including Lenah Valley. Potentially could occur but specimens on site could not be identified to species level due to lack of fertile material during winter. Given the high number of records from vicinity the study area is not considered important for this species.
Velleia paradoxa spur velleia	Vulnerable/ -	Very Low	Species found in open forest, grassland and grassy woodlands. Often on stony soil. Intolerant of grazing. There is one known record 500m to the east within *Eucalyptus globulus* forest. Requires open ground to germinate and recruit, and the level of gorse and boneseed infestation along with past land use may have comprised any chance of this species persisting onsite. Survey occurred outside of flowering period.

Introduced Plants

The study area has extensive infestations of two declared weeds listed under the Tasmanian *Weed Management Act 1999*. The following declared weeds were recorded.

- Boneseed (*Chrysanthemoides monilifera*). There are frequent infestations of boneseed dominating the understorey of the DPU community and within the broader area.

[4] Tasmanian *Threatened Species Protection Act 1995,* Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

[5] Lazarus *et al.* 2003; Jones *et al.* 1999

- Gorse (*Ulex europaeus*). This species is present in very high numbers within the study area and surrounding landscape.

- Blackberry (*Rubus fruticosus*). Not as persistent as the above two weeds, with death evident due to extreme heat during the past summer.

A number of other environmental weeds are present including *Rosa rubiginosa* (sweet briar), *Cirsium vulgare* (spear thistle) and *Silybum marianum* (variegated thistle)

Gorse is present in very high numbers and is outcompeting the majority of native species

Boneseed is also present in high numbers and effectively outcompeting native species

The landholder is attempting to remove these weeds from the site, however the high numbers present and large seed source would require extensive weed management if the site was left as is.

Threatened fauna

No significant habitat is present for threatened fauna species. The site may be used occasional for foraging however no significant breeding/denning features are present. A small number of young *Eucalyptus ovata* (black gum) trees were recorded which are feeding trees for the endangered swift parrot, however these regrowth trees do not form significant habitat for this species. Extensive browsing was evident within the study area combined with a large number of Bennett's wallaby scats.

Recommendation

Any impact to threatened species will require a 'permit to take' from DPIPWE. There is a moderate chance of *Rytidosperma indutum* (tall wallaby grass) being present and it is recommended that as a condition of approval a summer survey is carried out to determine the presence/absence and numbers of this species if present in order to inform a 'permit to take' application. Given the high number of records of this species within the surrounding area, any locations on site are not likely to be significant.

Declared weeds are subject to Statutory Weed Management Plans under the WMA. Boneseed and gorse have widespread infestations in the Hobart municipality, which is classed as Zone B under the legislation for these species. Containment is the objective which includes prevention of spread from the municipality, spread to other properties and spread to properties containing threatened plant communities and threatened flora and fauna species.

The proposed subdivision allows an opportunity to tackle this weed issue and remove this seed source. The construction phase increases the risk of spreading and translocating weeds. A weed management plan should aim to limit the further spread of weeds and other requirements may include the wash down of earth moving machinery / tools after leaving weedy sites to prevent weeds being spread. Effective removal strategies should be included to remove these weeds.

References

Baker, M.L. & de Salas, M.F. (2012). *A Census of the Vascular Plants of Tasmania & Index to the Student's Flora of Tasmania and Flora of Tasmania Online*. Tasmanian Herbarium, Tasmanian Museum and Art Gallery.

Jones, D., Wapstra, H., Tonelli, P. and Harris, S. (1999). The Orchids of Tasmania. Melbourne University Press.

Lazarus, E., Lawrence, N. & Potts, W. (2003). Threatened Flora of Tasmania CD. Department of Primary Industries, Water & Environment, Hobart.

Peters, D. & Thackway, R. (1998) *A New Biogeographic Regionalisation for Tasmania.* Tasmanian Parks and Wildlife Service, Hobart.

Tasmanian State Government (1995). *Threatened Species Protection Act 1995*. No.83 of 1995. Government Printer, Hobart, Tasmania

Tasmanian State Government (1999). *Weed Management Act 1999*. No.105 of 1999. Government Printer, Hobart, Tasmania.

Appendix 1 - Vascular Plant Species List

Status codes:

ORIGIN	NATIONAL SCHEDULE	STATE SCHEDULE
	EPBC Act 1999	TSP Act 1995
i - introduced	CR - critically endangered	e - endangered
d - declared weed WM Act	EN - endangered	v - vulnerable
en - endemic to Tasmania	VU - vulnerable	r - rare
t - within Australia, occurs only in Tas.		

Name	Common name	Status
DICOTYLEDONAE		
ASTERACEAE		
Chrysanthemoides monilifera subsp. monilifera	boneseed	d
Cirsium vulgare	spear thistle	i
Hypochaeris radicata	rough catsear	i
Senecio linearifolius var. linearifolius	common fireweed groundsel	
Senecio sp.	groundsel	
Silybum marianum	variegated thistle	i
BRASSICACEAE		
Brassicaceae sp.		i
CASUARINACEAE		
Allocasuarina verticillata	drooping sheoak	
EPACRIDACEAE		
Astroloma humifusum	native cranberry	
Lissanthe strigosa	peach berry	
FABACEAE		
Ulex europaeus	gorse	d
MIMOSACEAE		
Acacia dealbata subsp. dealbata	silver wattle	
Acacia mearnsii	black wattle	
MYRTACEAE		
Eucalyptus ovata var. ovata	black gum	
Eucalyptus pulchella	white peppermint	en
Eucalyptus viminalis subsp. viminalis	white gum	
PITTOSPORACEAE		
Bursaria spinosa subsp. spinosa	prickly box	
PLANTAGINACEAE		
Plantago coronopus	buckshorn plantain	i
Plantago sp.	plantain	
PROTEACEAE		
Grevillea sp.	grevillea hybrid	i
RESEDACEAE		
Reseda luteola	weld	i

ROSACEAE

Cotoneaster pannosus	velvet cotoneaster	i
Rosa rubiginosa	sweet briar	i
Rubus fruticosus	blackberry	d

SANTALACEAE

Exocarpos cupressiformis	common native-cherry	

MONOCOTYLEDONAE

CYPERACEAE

Gahnia grandis	cutting grass	
Lepidosperma gunnii	narrow swordsedge	
Lepidosperma laterale	variable swordsedge	

POACEAE

Agrostis capillaris	brown top bent grass	i
Austrodanthonia sp.	wallabygrass	
Austrostipa sp.	speargrass	
Dactylis glomerata	cocksfoot	i
Deyeuxia sp.	bent grass	
Lolium sp.	ryegrass	i
Pentapogon quadrifidus	five-awned spear-grass	
Poa labillardierei	silver tussockgrass	
Themeda triandra	kangaroo grass	

XANTHORRHOEACEAE

Lomandra longifolia	sagg	

Attachment 2

22 CUTHBERTSON PLACE & 25 COPLEY ROAD

BUSHFIRE HAZARD MANAGEMENT PLAN AND REPORT

Date: 27 August 2015
Author: Jacqui Blowfield
Accreditation Number BFP – 102

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CONTENTS

1. INTRODUCTION

1.1 AUTHOR STATEMENT

I am an Accredited Person under Section 60B of the *Fire Services Act 1979* (Accreditation number BFP – 102) with the following scope of work:

- Certify a Bushfire Attack Level Assessment for Building Work.
- Certify an Exemption from a Bushfire Hazard Management Plan (Clause E1.4 of the Bushfire-Prone Areas Code).
- Certify a Bushfire Hazard Management Plan meets the Acceptable Solutions for Buildings or Extensions (Clauses E1.5, E1.6.2, E1.6.3, E1.6.4 and E1.6.5 of the Bushfire–Prone Areas Code).
- Certify a Bushfire Hazard Management Plan meets the Acceptable Solutions for subdivisions (Clauses E1.6.1 of the Bushfire–Prone Areas Code).

The assessment undertaken and opinions expressed within this Bushfire Hazard Management Plan and Report have been undertaken by the author, based on a site visit undertaken on 27 August 2015 and the additional desktop information and background reports available.

1.2 LIMITATIONS

The assessments within this report have been undertaken in accordance with the Provisions of *Australian Standard 3959-2009 Construction of buildings in bushfire-prone areas* and Planning Directive No. 5 Bushfire Prone-Areas Code. I have taken all reasonable steps to ensure that the information provided in this assessment is accurate and reflects the conditions on and around the site at the date of this report.

The Bushfire Attack Level assessment detailed within the Bushfire Hazard Management Report has been undertaken, in accordance with *Australian Standard 3959-2009 Construction of buildings in bushfire-prone areas*, this Standard provides as follows:

> *"This Standard is primarily concerned with improving the ability of buildings in designated bushfire-prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself.*
>
> *Improving the design and construction of buildings to minimize damage from the effects of bushfire is but one of several measures available to property owners and occupiers to address damage during bushfire....*
>
> *The measures set out in this Standard to improve construction, and thus better equip a building to withstand the effects from bushfire, may also be used as a guide for those who wish to voluntarily adopt such measures in situations where regulatory compliance is not mandated.*

> *...It should be borne in mind that the measures contained in this Standard cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the degree of vegetation management, the unpredictable nature and behaviour of fire, and extreme weather conditions."*[1]

The Bushfire Attack Level (BAL) Assessment undertaken is, in accordance with AS3959-2009[2], has utilised a Fire Danger Index (FDI) of 50. On days where the forecast Fire Danger Rating is Severe, Extreme or Catastrophic the FDI is predicted to exceed 50.

The assessment of vegetation within 100m of the site is based the qualities of the vegetation on the day of inspection and does not provide for changes in classification due to unanticipated growth or vegetation planting beyond the management areas described on the Bushfire Hazard Management Plan, or failure to maintain management areas described in a minimal fuel condition.

The Bushfire Hazard Management Plan is be read together with the entirety of this report. Copies of this report, in its entirety, should be provided to all current and future owners of the subject land.

[1] Forward, AS3959-2009
[2] Clause 2.2.2, AS3959-2009

2. BUSHFIRE HAZARD MANAGEMENT PLAN

2.1 SITE DETAILS

Address: **22 Cuthbertson Place & 25 Copley Road, Lenah Valley**

PID: **7640561 & 7408105**

Title Reference: **40622/16 & 30380/4**

Lot Area: **11.83ha**

The location of the subject site is described in the following figure:

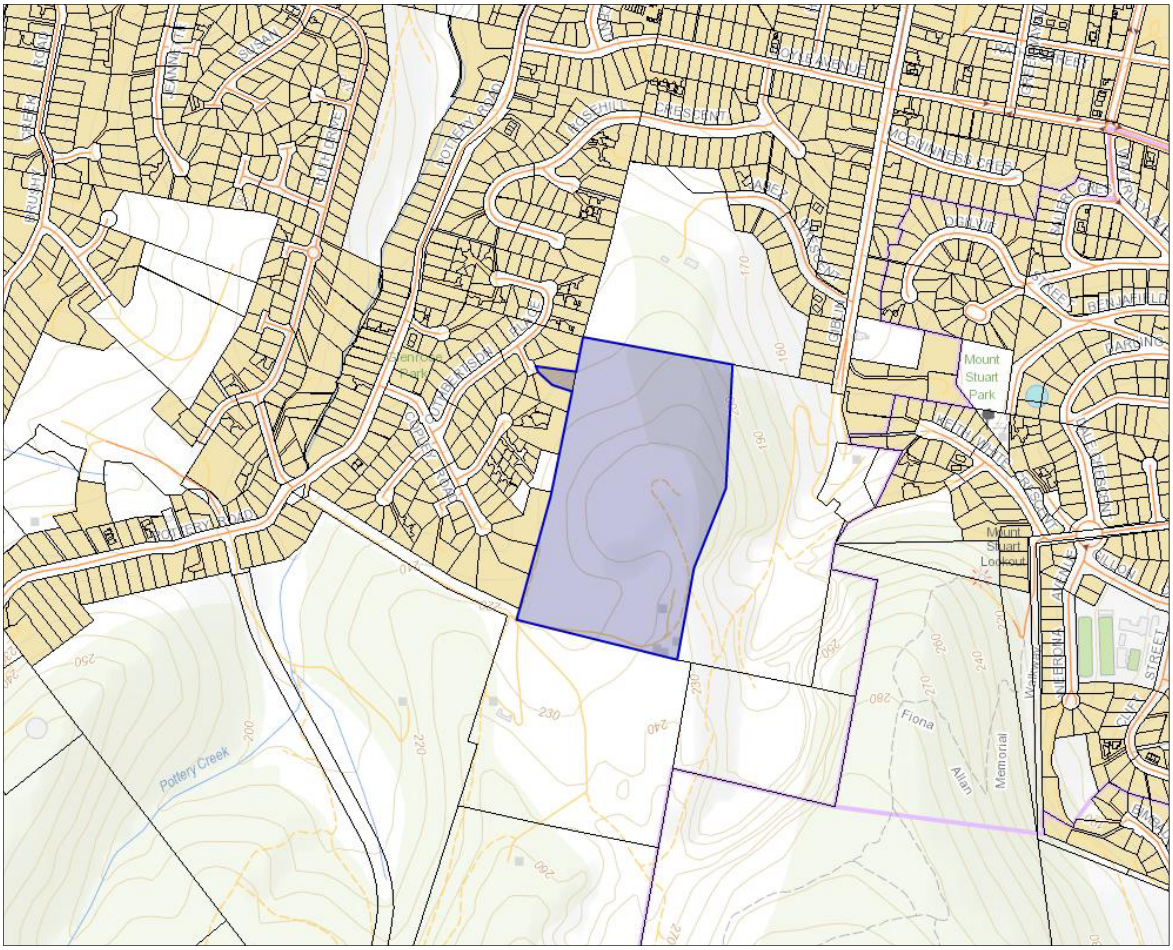


Figure 1: Locality Plan (The LIST)

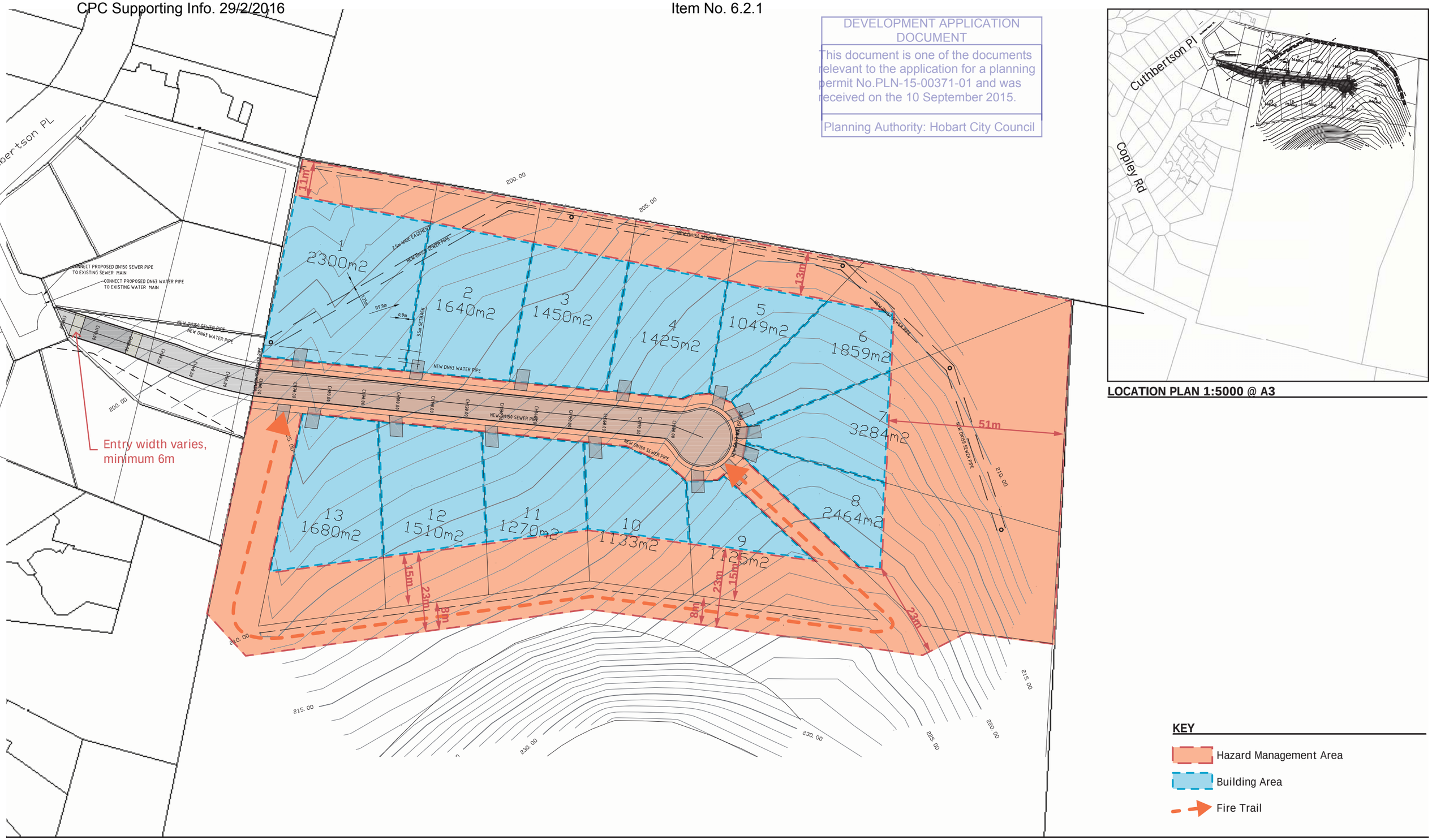
For additional detail on the site and surrounds refer to the Bushfire Hazard Management Report in Part 3.

2.2 PROPOSAL DESCRIPTION

The proposal is for subdivision and proposes the creation of 13 residential lots at the northern end of the land retaining a balance of some 8.1ha. There are 2 versions of the proposal being applied for with slightly different access arrangements, one including a small part of 20 Cuthbertson Place.

The plans detailing the proposal are included as Attachment 2.

2.3 THE PLAN



KEY

- Hazard Management Area
- Building Area
- Fire Trail

LOCATION PLAN 1:5000 @ A3

BUSHFIRE HAZARD MANAGEMENT PLAN
25 COPLEY RD & 20-22 CUTHBERTSON PL, LENAH VALLEY
DATE: 28 August 2015
PAGE: 1 OF 1
SCALE: 1:1000@A3 (WRITTEN DIMENSIONS TAKE PRECEDENCE)

ireneinc PLANNING

BHMP NOTES:

THIS PLAN SHOULD BE READ IN CONJUCTION WITH THE REPORT TITLED: *22 CUTHBERTSON & 25 COPLEY RD - BUSHFIRE HAZARD MANAGEMENT PLAN AND REPORT*, J. BLOWFIELD (IRENEINC PLANNING & URBAN DESIGN) ACCREDITATION NO. BFP-102, 28 AUG 2015.

HAZARD MANAGEMENT AREAS:

1. Building areas and Hazard management areas described are to be established and maintained as low threat vegetation as grassland managed in a minimal fuel condition, maintained lawns or cultivated gardens. Trees may be retained within areas where they can be provided with both horizontal and vertical canopy separation.

NOTE: Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognisable as short-cropped grass for example, to a nominal height of 100mm).

2. Suitable covenants or Part 5 agreements are to be included on the titles of all lots, including the balance, to provide for ongoing maintenance of bushfire protection measures.

LOCATION OF BUILDINGS:

3. No habitable buildings, or non-habitable buildings located within 6m of a habitable building, are to be located outside of the building area.

ACCESS:

4. The fire trail is to be constructed to be:

- Not less than a modified 4C access road under ARRB Unsealed Roads Manual – Guidelines to Good Practice 3rd Edition as specified in the Building Code of Australia
- Vegetation must be maintained to retain clearance for a height of 4m, above the access carriageway, and 2m each side of the carriageway.

WATER SUPPLY

5. The subdivision is to include at least 1 fire hydrant with a minimum flow rate of 600 litres per minute and minimum pressure of 200 kPa in accordance with Table 2.2 and clause 2.3.3 of AS 2419.1 2005 - Fire hydrant installations. The hydrant/s are to be located so that all parts of all building areas are within reach of a 120m long hose (measured as a hose lay).

2.4 CONCLUSIONS AND RECOMMENDATIONS

The site and proposed development have been assessed against the requirements of *Australian Standard 3959-2009 Construction of buildings in bushfire-prone areas* and *Planning Directive No. 5 Bushfire Prone-Areas Code*.

As detailed within the Bushfire Hazard Management Report in Part 3 the lots have been assessed as being able to provide building areas of BAL 19 or lower.

As detailed in the Bushfire Hazard Management Report in Part 3 this Bushfire Hazard Management Plan is certified as meeting all the relevant Acceptable Solutions of the Bushfire-Prone Areas Code.

As detailed on the Plan in Part 2.3 the Bushfire Hazard Management Plan is subject to compliance with the conditions below.

2.4.1 CONDITIONS

Hazard Management Areas

1. Building areas and Hazard management areas described are to be established and maintained as low threat vegetation as grassland managed in a minimal fuel condition, maintained lawns or cultivated gardens. Trees may be retained within areas where they can be provided with both horizontal and vertical canopy separation.

   NOTE: Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognisable as short-cropped grass for example, to a nominal height of 100mm).

2. Suitable covenants or Part 5 agreements are to be included on the titles of all lots, including the balance, to provide for ongoing maintenance of bushfire protection measures.

Location of Buildings

3. No habitable buildings, or non-habitable buildings located within 6m of a habitable building, are to be located outside of the building area.

Access

4. The fire trail is to be constructed to be:

   - Not less than a modified 4C access road under ARRB Unsealed Roads Manual – Guidelines to Good Practice 3rd Edition as specified in the Building Code of Australia
   - Vegetation must be maintained to retain clearance for a height of 4m, above the access carriageway, and 2m each side of the carriageway.

Water Supply

5. The subdivision is to include at least 1 fire hydrant with a minimum flow rate of 600 litres per minute and minimum pressure of 200 kPa in accordance with Table 2.2 and clause 2.3.3 of *AS 2419.1 2005 - Fire hydrant installations.* The hydrant/s are to be located so that all parts of all building areas are within reach of a 120m long hose (measured as a hose lay).

3. BUSHFIRE HAZARD MANAGEMENT REPORT

3.1 SITE ANALYSIS

3.1.1 LOCALITY

The site is located on a ridge above existing residential areas, there is a Council owned lot to the east containing a quarry and undeveloped residential land to the north.

The aerial photo in the following diagram describes the site and surrounds.

Figure 2: Aerial (The LIST)

There is an existing dwelling located at the southern end of the property, this house is accessed separately from an access from Copley Road in the south west.

3.1.2 PLANNING

At the time the subdivision application was submitted to Council the land containing the proposed lots was zoned Residential 2 of the City of Hobart Planning Scheme 1982.

While the CHPS 1982 is relevant to Council's approval of the subdivision permit, the following figure, which describes the zoning under the Hobart Interim Planning Scheme 2015, is also relevant.

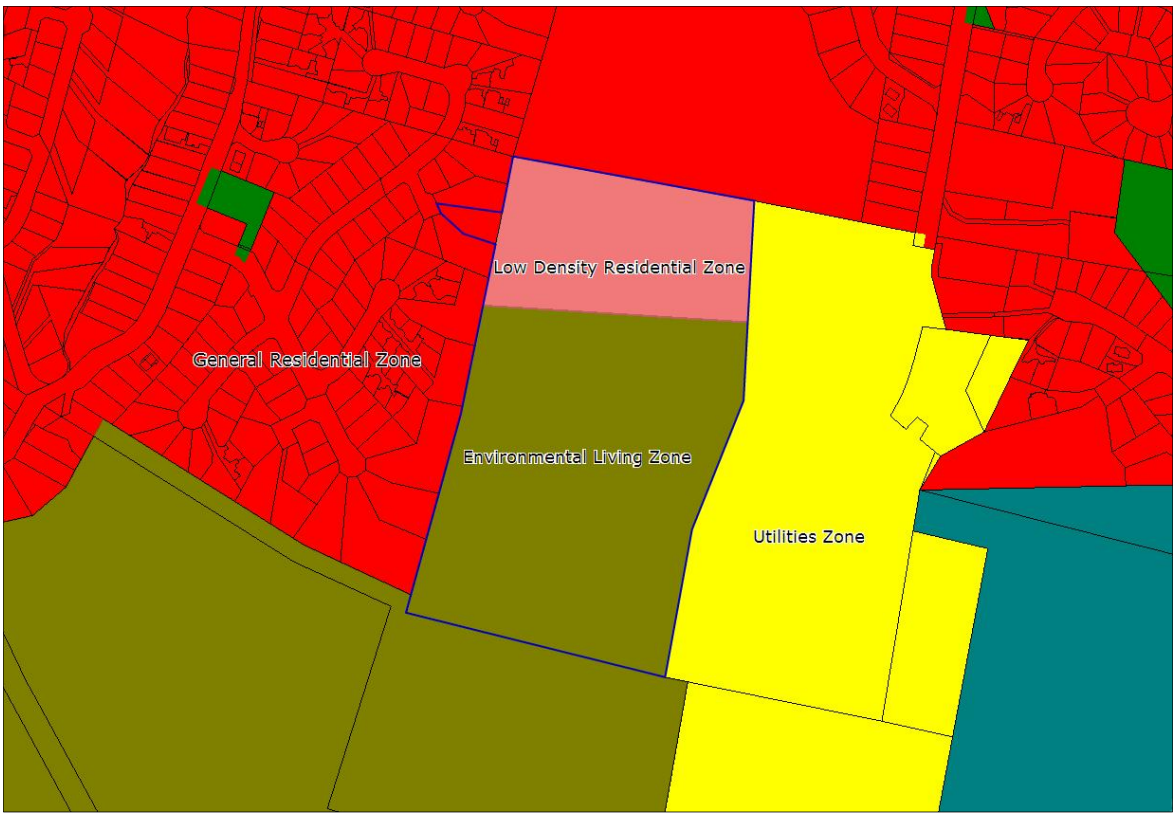


Figure 3: Hobart Interim Planning Scheme Zones (The LIST)

As can be seen in the above figure the land to the north and west of the land are zoned General Residential. The proposed residential lots are contained within the area zoned Low Density Residential.

Under Bushfire Prone Areas Advisory Note No 01 – 2014 issued by the Chief Officer the following applies:

Determination	*Having regard to the objectives of all of the applicable standards in the Bushfire-Prone Area Code, there is insufficient increase in risk to the development from bushfire to warrant any specific bushfire protection measures if:* *a) the risk arises from vegetation located on land zoned as inner residential, general residential or village; or* *b) the development is on land that is shown on a bushfire prone areas map, endorsed by the Tasmania Fire Service, as not being a bushfire prone area.*

3.1.3 TOPOGRAPHY AND ORIENTATION

The majority of the subject land is at a slope of 1:5 or less, with a steeper slope of 1:3 or more at the far east of the land along the eastern boundary, and also a small area of the land along the southern boundary.

The following figure describes the indicative 5m contours of the site and surrounds:

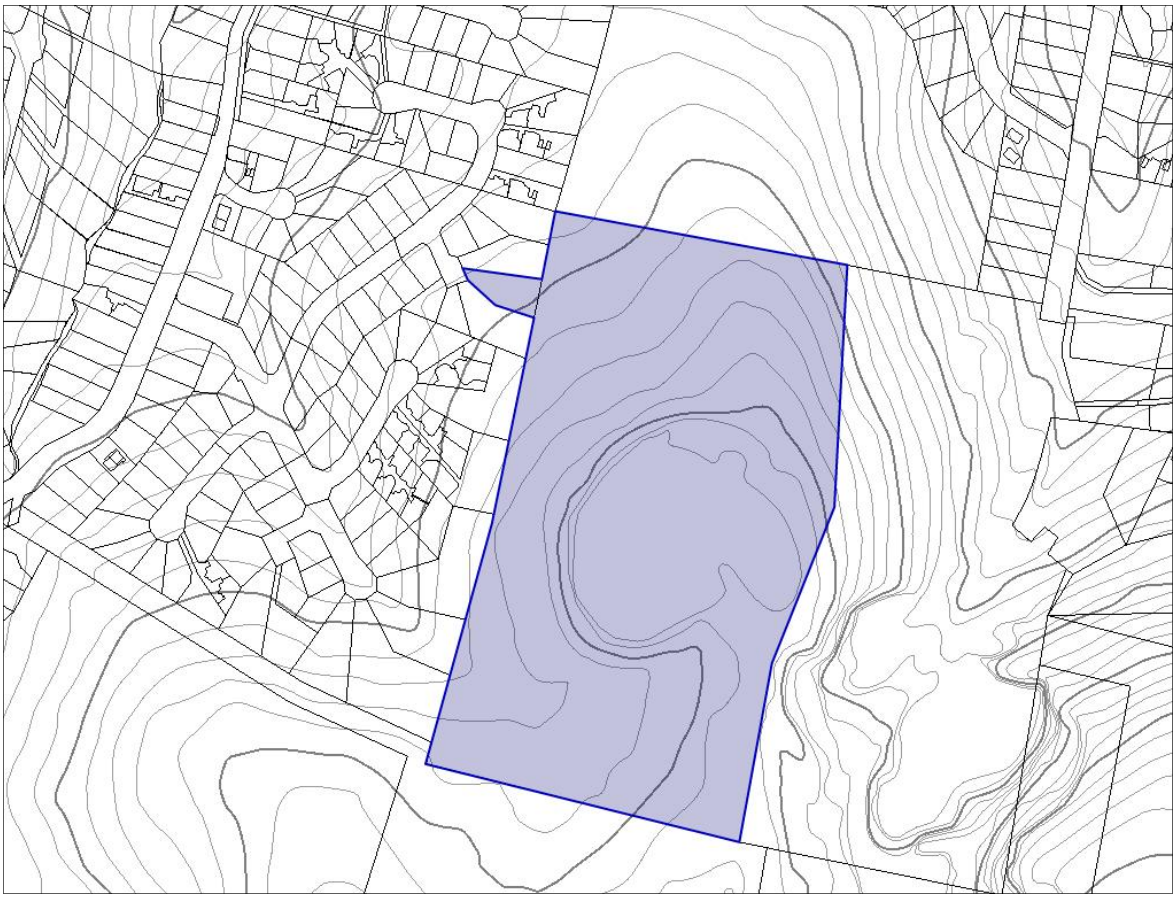


Figure 4: 5m Contours (The LIST)

3.1.4 VEGETATION DESCRIPTION

The property is partially cleared as can be seen in the aerial photograph on the previous page. A Flora Survey was undertaken by North Barker Ecosystem Services in late July 2013 in order to identify any significant values.

This report only identified one native community present on the site, *Eucalyptus pulchella* forest and woodland (DPU). DPU is not a threatened community under the *Tasmanian Nature Conservation Act 2002*.

No listed threatened species were positively identified during the survey.

3.1.5 SITE PHOTOS AND SITE ANALYSIS PLAN

The following images further describe the site and surrounds.

3.2 BUSHFIRE ATTACK LEVEL ASSESSMENT

3.2.1 TYPE OF DEVELOPMENT OR WORK ASSESSED

Subdivision of land assessed building areas

3.2.2 EXCLUSIONS – LOW THREAT VEGETATION AND NON-VEGETATED AREAS

In accordance with Clause 2.2.3.2 of AS 3959-2009:

The following the Bushfire Attack Level shall be classified as BAL-LOW where the vegetation is one or a combination of any 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 then 0.25ha in area and not within 20m of the site, or each other.

(d) Strips of vegetation less than 20m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of the length and not within 20m of the site, or each other.

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

(f) Low threat vegetation, including grassland managed in a minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks.

NOTE: Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognisable as short-cropped grass for example, to a nominal height of 100mm)

All the land within the proposed lots 1 – 13 are to be maintained as low threat vegetation. Additional area within the balance land it to also be established as a hazard management area and maintained as low threat vegetation.

Neighbouring land to the north and west is within the General Residential zone of the Hobart Interim Planning Scheme 2015 and therefore *Bushfire Prone Areas Advisory Note No 01 –2014* applies. The Advisory Note includes the following determination:

Determination Having regard to the objectives of all of the applicable standards in the Bushfire-Prone Area Code, there is insufficient increase in risk to the development from bushfire to warrant any specific bushfire protection measures if:

a) the risk arises from vegetation located on land zoned as inner residential, general residential or village; …

In relation to the land to the north (22 Jabez Court, Lenah Valley) while this property is zoned General Residential it is approximately 6.5ha in area and while it contains a dwelling and associated infrastructure is not sufficiently developed to be considered low threat. The character of the vegetation is however cleared and well maintained as largely grassland in character with scattered trees which are open and separated from the grass understorey.

3.2.3 ASSESSMENT TABLE – LOTS 1 - 5

VEGETATION WITHIN 100m				
Vegetation classification	**North**	**South**	**East**	**West**
	Northeast	Southwest	Southeast	Northwest
Group A - Forest		✓	✓	
Group B - Woodland				
Group C - Shrub-land				
Group D - Scrub				
Group E –Mallee / Mulga				
Group F - Rainforest				
Group G (FDI 50) - Grassland	✓	✓		
Exclusions (where applicable) from clause 2.2.3.2.				✓
DISTANCE OF THE SITE FROM CLASSIFIED VEGETATION (see clause 2.2.4)				
Distance to classified vegetation	Distances in metres			
	11-13	23	69	N/A
EFFECTIVE SLOPE OF LAND UNDER THE CLASSIFIED VEGETATION				
Slope under the classified vegetation	Upslope			
	Upslope/0°	Upslope/0° ✓	Upslope/0°	Upslope/0°
	Downslope			
	>0 to 5° ✓	>0 to 5°	>0 to 5°	>0 to 5°
	>5 to 10° ✓	>5 to 10°	>5 to 10°	>5 to 10° ✓
	>10 to 15°	>10 to 15°	>10 to 15°	>10 to 15°
	>15 to 20°	>15 to 20°	>15 to 20° ✓	>15 to 20°
BAL for each side	**19**	**19**	**12.5**	**LOW**

Notes: This assessment is based on a FDI of 50, on days where fire danger is classified as Severe, Extreme or Catastrophic the exceed FDI 50.

3.2.4 SITE ASSESSED BUSHFIRE ATTACK LEVEL

The lot building areas are assessed as **BAL 19**

3.2.5 ASSESSMENT TABLE – LOTS 6 - 8

VEGETATION WITHIN 100m				
Vegetation classification	**North**	**South**	**East**	**West**
	Northeast	**Southwest**	**Southeast**	**Northwest**
Group A - Forest		✓	✓	
Group B - Woodland				
Group C - Shrub-land				
Group D - Scrub				
Group E –Mallee / Mulga				
Group F - Rainforest				
Group G (FDI 50) - Grassland	✓	✓		
Exclusions (where applicable) from clause 2.2.3.2.				✓
DISTANCE OF THE SITE FROM CLASSIFIED VEGETATION (see clause 2.2.4)				
Distance to classified vegetation	Distances in metres			
	13 - 60	23 - 50	51	N/A
EFFECTIVE SLOPE OF LAND UNDER THE CLASSIFIED VEGETATION				
Slope under the classified vegetation	Upslope			
	Upslope/0°	Upslope/0° ✓	Upslope/0°	Upslope/0°
	Downslope			
	>0 to 5°	>0 to 5°	>0 to 5°	>0 to 5°
	>5 to 10° ✓	>5 to 10°	>5 to 10°	>5 to 10° ✓
	>10 to 15°	>10 to 15°	>10 to 15°	>10 to 15°
	>15 to 20°	>15 to 20°	>15 to 20°	>15 to 20 °
BAL for each side	**19 - LOW**	**19 - 12.5**	**19**	**LOW**

Notes: This assessment is based on a FDI of 50, on days where fire danger is classified as Severe, Extreme or Catastrophic the exceed FDI 50.

3.2.6 SITE ASSESSED BUSHFIRE ATTACK LEVEL

The lot building areas are assessed as **BAL 19**

3.2.7 ASSESSMENT TABLE – LOTS 9 - 13

VEGETATION WITHIN 100m				
Vegetation classification	**North**	**South**	**East**	**West**
	Northeast	**Southwest**	**Southeast**	**Northwest**
Group A - Forest		✓	✓	
Group B - Woodland				
Group C - Shrub-land				
Group D - Scrub				
Group E –Mallee / Mulga				
Group F - Rainforest				
Group G (FDI 50) - Grassland	✓	✓		
Exclusions (where applicable) from clause 2.2.3.2.				✓
DISTANCE OF THE SITE FROM CLASSIFIED VEGETATION (see clause 2.2.4)				
Distance to classified vegetation	Distances in metres			
EFFECTIVE SLOPE OF LAND UNDER THE CLASSIFIED VEGETATION				
Slope under the classified vegetation	Upslope			
	Upslope/0°	Upslope/0° ✓	Upslope/0° ✓	Upslope/0°
	Downslope			
	>0 to 5° ✓	>0 to 5°	>0 to 5°	>0 to 5°
	>5 to 10°	>5 to 10°	>5 to 10°	>5 to 10° ✓
	>10 to 15°	>10 to 15°	>10 to 15°	>10 to 15°
	>15 to 20°	>15 to 20°	>15 to 20° ✓	>15 to 20°
BAL for each side	**LOW**	**19**	**LOW - 19**	**LOW**

Notes: This assessment is based on a FDI of 50, on days where fire danger is classified as Severe, Extreme or Catastrophic the exceed FDI 50.

3.2.8 SITE ASSESSED BUSHFIRE ATTACK LEVEL

The lot building areas are assessed as **BAL 19**

3.3 BUSHFIRE-PRONE AREAS CODE

3.3.1 RELEVANT DEFINITIONS

Bushfire Prone Areas Code includes the following definitions specifically relevant to the following assessment:

BAL	*means the bushfire attack level as defined in AS3959 – 2009 Construction of Buildings in Bushfire Prone Areas 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 the basis for establishing the requirements for construction to improve protection of building elements from attack by bushfire'.*
bushfire hazard management plan	*means as defined in the Act.* Part 3.(1) of the *Land Use Planning Approvals Act 1993*, provides: *bushfire hazard management plan means a plan showing means of protection from bushfires in a form approved in writing by the Chief Officer*
bushfire protection measures	*means the measures that might be used to reduce the risk of bushfire attack and the threat to life and property in the event of bushfire.*
bushfire-prone area	*means:* *land that is within the boundary of a bushfire-prone area shown on an overlay on a planning scheme map; and* *where there is no overlay on a planning scheme map, or where the land is outside the boundary of a bushfire-prone area shown on an overlay on such a map, land that is within 100m of an area of bushfire-prone vegetation equal to or greater than 1 hectare*
bushfire-prone vegetation	*means contiguous vegetation including grasses and shrubs but not including maintained lawns, parks and gardens, nature strips, plant nurseries, golf courses, vineyards, orchards or vegetation on land that is used for horticultural purposes.*
contiguous	*means separated by less than 20m.*
hazard management area	*means the area, between a habitable building or building area and bushfire-prone vegetation, which provides access to a fire front for fire fighting, which is maintained in a minimal fuel condition and in which there are no other hazards present which will significantly contribute to the spread of a bushfire.*
hose lay	*means the distance between two points established by a fire hose laid out on the ground.*
Part 5 agreement	*means as defined in the Act.* An agreement under Part 5 of the *Land Use Planning Approvals Act 1993*, which provides: *71. Planning authority may enter into agreements* *(1) A planning authority may enter into an agreement with an owner of land in the area covered by a planning scheme or a special planning order.* *72. Form and contents of agreement* *(1) An agreement must be under seal and binds the owner to the covenants specified in the agreement.* *(2) An agreement may provide for any one or more of the*

	following matters: *(a) the prohibition, restriction or regulation of use or development;* *(b) the conditions subject to which a use or development may be undertaken;* *(c) any matter intended to achieve or advance –* *(i) the objectives listed in Schedule 1; or* *(ii) any State Policy or draft State Policy upon which a report has been submitted to the Minister in accordance with section 11 (1) of the* State Policies and Projects Act 1993*; or* *(iii) the objectives of the planning scheme or special planning order, a draft planning scheme which has been publicly exhibited under section 25 or any amendment to the planning scheme which has been publicly exhibited under section 38;* *(d) any matter incidental to any one or more of the matters referred to in paragraphs (a) to (c)* *78. Registration of agreements, &c.* *(1) A planning authority may lodge with the Recorder an executed copy of an agreement, together with particulars of title to the land to which the agreement relates ...*
pre-existing habitable building	*means a habitable building that exists, or in relation to which a permit was granted, when this Code commences as part of this planning scheme.*
pre-existing lot	*means a lot that is marked on a plan of subdivision that has been approved by the granting of a permit when this Code commences as part of this planning scheme.*
static water supply	*means water stored in a tank, swimming pool, dam, or lake, that is available for fire fighting purposes at all times.*

3.3.2 USE OR DEVELOPMENT EXEMPT FROM THIS CODE (E1.4)

The following development is exempt from this Code:

USE OR DEVELOPMENT EXEMPT
(a) any development that the TFS or an accredited person, having regard to the objective of all applicable standards in this Code, certifies there is an insufficient increase in risk to the development from bushfire to warrant any specific bushfire protection measures
(b) a structure, or building, which is not a habitable building
(c) extensions, to habitable buildings, not exceeding a 20m2 increase in gross floor area provided that: *i) the extension is located within a building area approved in accordance with this Code; or* *ii) the extension is located within a building area which has been approved by the TFS, before this Code commenced as part of the planning scheme, as complying with bushfire requirements, if:* *a. the extension is not within an area required as a hazard management area; and* *b. the water supply for fire fighting purposes is provided from a fire hydrant and all external parts of the extension that are at ground level are within reach of 120m long hose connected to the hydrant, measured as a hose lay;*

(d) extensions, to habitable buildings, not exceeding a 20m2 increase in gross floor area, where the habitable buildings are not within a defined building area for the purpose of bushfire protection, provided that no part of the extension extends towards the bushfire-prone vegetation
(e) demolition of buildings or structures not marked on a hazard management plan as being required for bushfire protection;
(f) habitable buildings that are integral to the agricultural use of the land and are not normally occupied;
(g) habitable buildings located on land reserved under Nature Conservation Act 2002, Crown Land Act 1976 or the Forestry Act 1920 where bushfire protection measures are included in a bushfire hazard management plan certified by the TFS or accredited person as being appropriate for the purpose and location of the use and development
(h) adjustment of a boundary in accordance with clause 9.2 of this planning scheme.

The development proposed is not exempt.

3.3.3 USE STANDARDS FOR VULNERABLE USES (E1.5.1)

These standards are not relevant to the development proposed.

3.3.4 USE STANDARDS FOR HAZARDOUS USES (E1.5.2)

These standards are not relevant to the development proposed.

3.3.5 DEVELOPMENT STANDARDS FOR SUBDIVISION (E1.6.1)

E1.6.1.1 Subdivision: Provision of hazard management areas

Objective: Subdivision provides, where appropriate, for hazard management areas that:

- *facilitate an integrated approach between subdivision and subsequent building on a lot;*
- *provide for sufficient separation of building areas from bushfire-prone vegetation to reduce the radiant heat levels, direct flame attack and ember attack at the building site;*
- *provide protection for lots at any stage of a staged subdivision.*

CODE STANDARD	DEVELOPMENT RESPONSE
A1. (a) The TFS or an accredited person certifies, having regard to the objective, that there is an insufficient increase in risk from bushfire to warrant the provision of hazard management areas as part of a subdivision; or *(b) The proposed plan of subdivision-* *i) shows all lots that are within or partly within a bushfire-prone area, including those developed at each stage of a staged subdivisions; and* *ii) shows the building area for each lot; and* *iii) shows hazard management areas between bushfire-prone vegetation and each building area that have dimensions equal to, or greater than, the separation distances required for BAL 19 in Table 2.4.4 of AS 3959 – 2009 Construction of Buildings in Bushfire Prone Areas. The proposed plan of subdivision must be accompanied by a*	All lots on the BHMP are provided with Building Areas and hazard management areas equal to or greater than required for BAL 19. The development will therefore meet A1 (b).

bushfire hazard management plan certified by the TFS or accredited person demonstrating that hazard management areas can be provided ; and *iv) applications for subdivision requiring hazard management areas to be located on land that is external to the proposed subdivision must be accompanied by the written consent of the owner of that land to enter into a Part 5 agreement that will be registered on the title of the neighbouring property providing for the affected land to be managed in accordance with the bushfire hazard management plan.*	

E1.6.1.2 Subdivision: Public access

Objective: Access roads to, and the layout of roads, tracks and trails, in a subdivision:

- *allow safe access for occupants, fire fighters and emergency service personnel;*
- *provide access to the bushfire-prone vegetation that enables both property to be defended when under attack and hazard management procedures to be undertaken;*
- *are designed and constructed to allow for fire fighting vehicles to be manoeuvred;*
- *provide access to water supplies for fire-fighting vehicles; and*
- *are designed to allow connectivity, and where needed, offering multiple evacuation points.*

CODE STANDARD	DEVELOPMENT RESPONSE
A1.(a) The TFS or an accredited person certifies, having regard to the objective, that there is an insufficient increase in risk from bushfire to warrant specific measures for public access in subdivision for the purposes of fire fighting; or *(b) A proposed plan of subdivision showing the layout of roads and fire trails, and the location of private access to building areas, is included in a bushfire hazard management plan approved by the TFS or accredited person as being consistent with the objective; or* *(c) A proposed plan of subdivision:* *i) shows that, at any stage of a staged subdivision, all building areas are within 200m of a road that is a through road; and* *ii) shows a perimeter road, private access or fire trail between the lots and bushfire-prone vegetation, which road, access or trail is linked to an internal road system; and* *iii) shows all roads as through roads unless:* *a. they are not more than 200m in length and incorporate a minimum 12m outer radius turning area; or* *b. the road is located within an area of vegetation that is not bushfire-prone*	All part of the proposed building areas are not within 200m of a through road, however the building areas are all within 200m of an existing developed urban residential area and within a further 100m of being outside of a bushfire prone area. Additionally the subdivision layout and BHMP provide: • The proposed public access road including a cul-de-sac turning head diameter in excess of 12m; and • A fire trail to the rear of building areas for lots 8 – 13 combination of the public access road. The above combination of measures meet the Objectives of this Standard in Accordance with A1 (b).

vegetation; and *iv) shows vehicular access to any water supply point identified for fire fighting.*	
A2 Unless the development standards in the zone require a higher standard, construction of roads must meet the requirements of Table E3.	The proposed road will be required to meet municipal standards and therefore comply with this acceptable solution.

Standards for roads, private access and fire trails in bushfire-prone areas

ROAD TYPE	STANDARD
Roads	*Not less than a Class 4A or Class 4B road under Australian Road and Research Board (ARRB) Unsealed Roads Manual – Guidelines to Good Practice 3rd Edition*
Fire trails	*Not less than a modified 4C access road under ARRB Unsealed Roads Manual – Guidelines to Good Practice 3rd Edition as specified in the Building Code of Australia*

E1.6.1.3 Subdivision: Provision of water supply for fire fighting purposes

Objective: Adequate, accessible and reliable water supply for the purposes of fire fighting can be demonstrated at the subdivision stage and allow for the protection of life and property associated with the subsequent use and development of bushfire-prone areas.	
CODE STANDARD	**DEVELOPMENT RESPONSE**
A1. In areas serviced with reticulated water by a Regional Corporation: *(a) the TFS or an accredited person certifies that, having regard to the objective, there is an insufficient increase in risk from bushfire to warrant any specific water supply measures; or* *(b) a proposed plan of subdivision shows that all parts of a building area are within reach of a 120m long hose (measured as a hose lay) connected to a fire hydrant with a minimum flow rate of 600 litres per minute and minimum pressure of 200 kPa in accordance with Table 2.2 and clause 2.3.3 of AS 2419.1 2005 - Fire hydrant installations.*	The infrastructure associated with the subdivision will include hydrants in accordance with required standards. The location of hydrants within the road reservation can be within 120m of all parts of the building areas. The development will therefore meet the requirements of A1 (b).

3.3.6 DEVELOPMENT STANDARDS FOR HABITABLE BUILDINGS ON APPROVED LOTS (E1.6.2)

These standards are not relevant to the development proposed.

3.3.7 DEVELOPMENT STANDARDS FOR NEW HABITABLE BUILDINGS ON PRE-EXISTING LOTS (E1.6.3)

These standards are not relevant to the development proposed.

3.3.8 DEVELOPMENT STANDARDS FOR EXTENSIONS TO PRE-EXISTING HABITABLE BUILDINGS (E1.6.4)

These standards are not relevant to the development proposed.

3.3.9 DEVELOPMENT STANDARDS FOR VULNERABLE USES (E1.6.5)

These standards are not relevant to the development proposed.

ATTACHMENTS

BUSHFIRE-PRONE AREAS CODE CERTIFICATE: (ATTACHMENT 1)

PLANS: (ATTACHMENT 2)

ATTACHMENT 1: BUSHFIRE-PRONE AREAS CODE CERTIFICATE

Code E1 – Bushfire-prone Areas Code

Certificate under s51(2)(d) *Land Use Planning and Approvals Act 1993*

Office Use
Date Received
Permit Application No
PID

1. Land to which certificate applies

Name of planning scheme or instrument: City of Hobart Planning Scheme 1984 (The Scheme)

Use or Development Site Street Address:	**Certificate of Title / PID**
22 Cuthbertson Place & 25 Copley Road, Lenah Valley	40622/16 / 7640561 & 30380/4 / 7408105

Land that is not the Use or Development Site relied upon for bushfire hazard management or protection Street Address	**Certificate of Title / PID**
N/A	

2. Proposed Use or Development

13 Residential lots

❑	Vulnerable Use
❑	Hazardous Use
✓	Subdivision
❑	New Habitable Building on a lot on a plan of subdivision approved in accordance with Bushfire-prone Areas Code.
❑	New habitable on a lot on a pre-existing plan of subdivision
❑	Extension to an existing habitable building
❑	Habitable Building for a Vulnerable Use

3. Documents relied upon

Description of Use or Development (Proposal or Land Use Permit Application)
Documents, Plans and/or Specifications

Title: Plan of Subdivision

Author: Sugden & Gee

Date: 5 March 2015

Bushfire Report

Title: 22 Cuthbertson Place & 25 Copley Road, Lenah Valley – Bushfire Hazard Management Plan and Report

Author: Ireneinc Planning and Urban Design

Date: 5 June 2015

Bushfire Hazard Management Plan

Title: 22 Cuthbertson Place & 25 Copley Road, Lenah Valley – Bushfire Hazard Management Plan and Report

Author: Ireneinc Planning and Urban Design

Date: 5 June 2015

Other documents

Title: N/A

Author:

Date:

4. Nature of Certificate

Applicable Standard	Assessment Criteria	Compliance Test: Certificate of Insufficient Increase in Risk		Compliance Test: Certified Bushfire Hazard Management Plan		Reference to applicable Bushfire Risk Assessment or Bushfire Hazard Management Plan[3]
❑ *E1.4 – Use or development exempt from this code*						
E1.4. (identify which exemption applies)		No specific measures required because the use or development is consistent with the objective for each of the applicable standards identified in this Certificate	❑	Not Applicable		
❑ **E1.5.1 -** *Vulnerable Use*						
E1.5.1.1 – location on bushfire-prone land	A2	Not Applicable		Tolerable level of risk and provision for evacuation	❑	
❑ **E1.5.2 -** *Hazardous Use*						
E1.5.2.1 – location on bushfire-prone land	A2	Not Applicable		Tolerable level of risk from exposure to dangerous substances, ignition potential, and contribution to intensify fire	❑	
✓ *E1.6.1 - Subdivision*						
E1.6.1.1 - Hazard Management Area	A1	No specific measure for hazard management	❑	Provision for hazard management areas in accordance with BAL 19 Table 2.4.4 AS3959	✓	
E1.6.1.2 - Public Access	A1	No specific public access measure for fire fighting	❑	Layout of roads and access is consistent with objective	✓	

[3] Identify the Bushfire Risk Assessment report or Bushfire Hazard Management Plan that is relied upon to satisfy the compliance test

E1.6.1.3 - Water Supply	*A1 Reticulated water supply*	No specific water supply for fight fighting	❑	Not Applicable	❑	Reticulated supply with hydrants proposed ✓
	A2 Non-reticulated water supply	No specific water supply measure for fight fighting	❑	Water supply is consistent with objective	❑	

❑ **E1.6.2 -** *Habitable Building on lot on a plan of subdivision approved in accordance with Code*

E1.6.2.1 - Hazard Management Area	*A1*	No specific measure for hazard management	❑	Provision for hazard management areas in accordance with BAL 19 Table 2.4.4 AS3959 and managed consistent with objective	❑	
E1.6.2.2 – Private Access	*A1*	No specific private access for fire fighting	❑	Private access is consistent with objective	❑	
	A2	Not Applicable		Private access to static water supply is consistent with objective	❑	
E1.6.2.3 - Water Supply	*A1*	No specific water supply measure for fight fighting	❑	Water supply is consistent with objective	❑	

❑ *E1.6.3 - Habitable Building (pre-existing lot)*

E1.6.3.1 - Hazard Management Area	*A1*	No specific measure for hazard management	❑	Provision for hazard management is consistent with objective; or	❑	
				Provision for hazard management areas in accordance with BAL 29 Table 2.4.4 AS3959 and managed consistent with objective	❑ ❑	
E1.6.3.2 - Private Access	*A1*	No specific private access measure for fire fighting	❑	Private access is consistent with objective	❑	
	A2	Not applicable		Private access to static water supply is consistent with objective	❑	
E1.6.3.3 - Water Supply	*A1*	No specific water supply measure for fight fighting	❑	Water supply is consistent with objective	❑	

❑ **E1.6.4 -** *Extension to Habitable Building*					
E1.6.4.1 – hazard management	*A1*	No specific hazard management measure	❑	Provision for hazard management is consistent with objective; or	❑
				Provision for hazard management areas in accordance with BAL 12.5 Table 2.4.4 AS3959 and managed consistent with objective	❑ ❑
❑ *E1.6.5 – Habitable Building for Vulnerable Use*					
E1.6.5.1 – hazard management	*A1*	No specific measure for hazard management	❑	Bushfire hazard management consistent with objective; or Provision for hazard management areas in accordance with BAL 12.5 Table 2.4.4 AS3959 and managed consistent with objective	❑

5. Bushfire Hazard Practitioner – Accredited Person

Name	Jacqui Blowfield	**Phone No:** 6234 9281
Address:	49 Tasma Street, North Hobart	**Fax No:** 6231 2747
Email address:	jacqui@ireneinc.com.au	
Fire Service Act 1979 **Accreditation No:**	BFP-102	**Scope:** 1, 2, 3A, 3B and 3C

6. Certification

I, Jacqui Blowfield certify that in accordance with the authority given under the Part 4A of the Fire Service Act 1979 –

The use or development described in this certificate is exempt from application of Code E1 – Bushfire-Prone Areas in accordance with Clause E1.4(a) because there is an insufficient increase in risk to warrant specific measures for bushfire hazard management and/or bushfire protection in order to be consistent with the objective for all of the applicable standards identified in Section 4 of this Certificate

or

There is an insufficient increase in risk to warrant specific measures for bushfire hazard management and/or bushfire protection in order for the

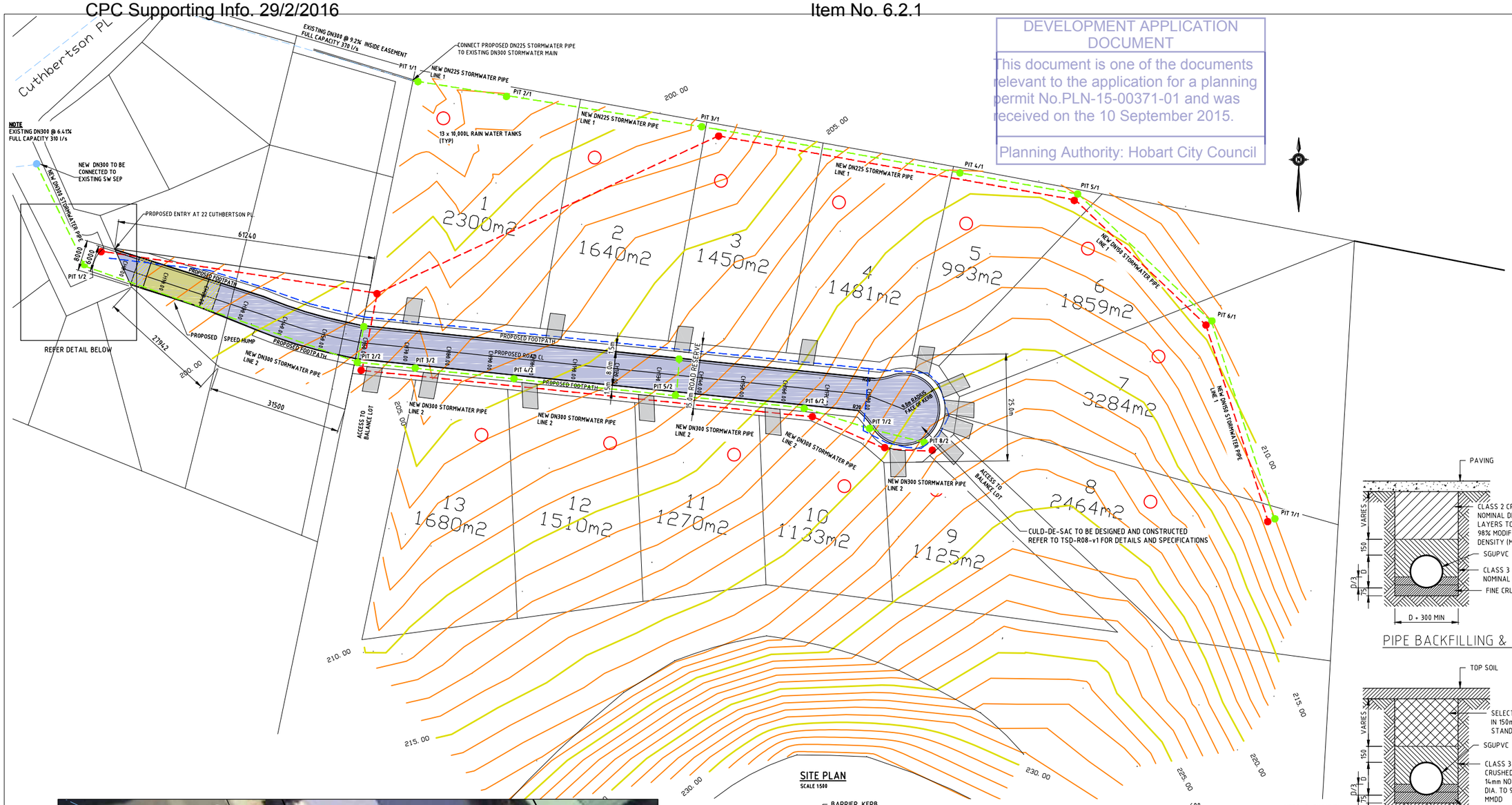
use or development described to be consistent with the objective for each of the applicable standards identified in Section 4 of this Certificate.	
and/or	
The Bushfire Hazard Management Plan/s identified in Section 4 of this certificate is/are in accordance with the Chief Officer's requirements and can deliver an outcome for the use or development described that is consistent with the objective and the relevant compliance test for each of the applicable standards identified in Section 4 of this Certificate	✓
Signed: 	**Date:** 27 August 2015

ATTACHMENT 2: PLANS

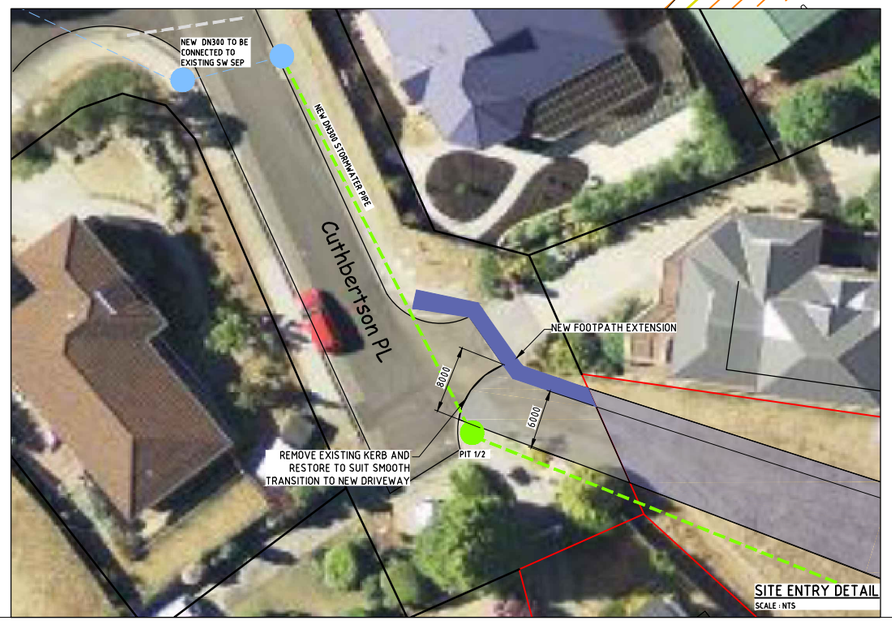
DEVELOPMENT APPLICATION DOCUMENT

This document is one of the documents relevant to the application for a planning permit No.PLN-15-00371-01 and was received on the 10 September 2015.

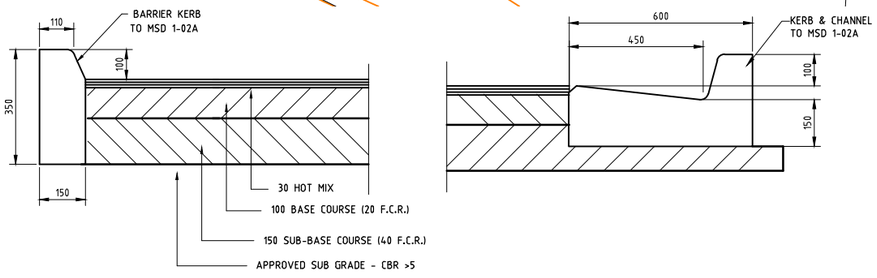
Planning Authority: Hobart City Council



SITE PLAN
SCALE 1:500

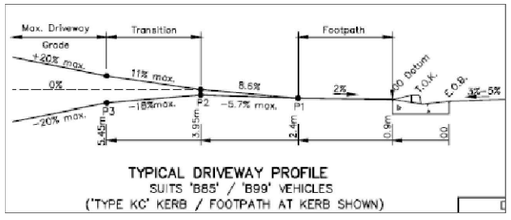


SITE ENTRY DETAIL
SCALE : NTS



TYPICAL HOT MIX PAVEMENT & KERB DETAILS

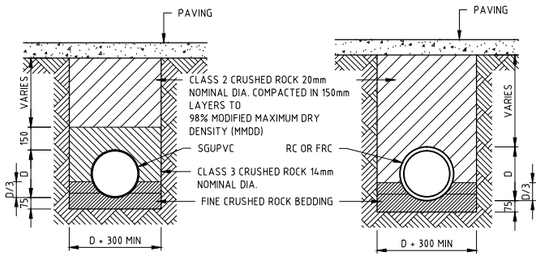
STANDARD DETAILS
SCALE : NTS



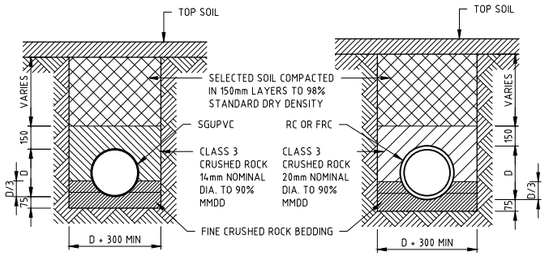
STANDARD DRIVEWAY DETAILS AS PER TSD-R09-v1
SCALE : NTS

LEGEND

- PROPOSED DRAINAGE PIT
- EXISTING DRAINAGE PIT
- PROPOSED DRAINAGE PIPE
- PROPOSED SEWER PIPE
- PROPOSED WATER PIPE
- EXISTING DRAINAGE PIPE
- EXISTING SEWER PIPE
- PROPOSED DRAINAGE TRENCH
- EXISTING DRAINAGE TRENCH
- PROPOSED AG DRAIN
- P100.00 PROPOSED SPOT LEVEL
- 100.00 EXISTING SPOT LEVEL
- P15.00 PROPOSED CONTOUR
- 15.0 EXISTING CONTOUR
- I.O. 150ø INSPECTION OPENING
- DP PROPOSED DOWN PIPE ADOPT 150ø UPVC 1:100 CONNECTION U.N.O.



PIPE BACKFILLING & BEDDING UNDER PAVING



PIPE BACKFILLING & BEDDING UNDER TOP SOIL

STANDARD DETAILS
SCALE 1:20

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

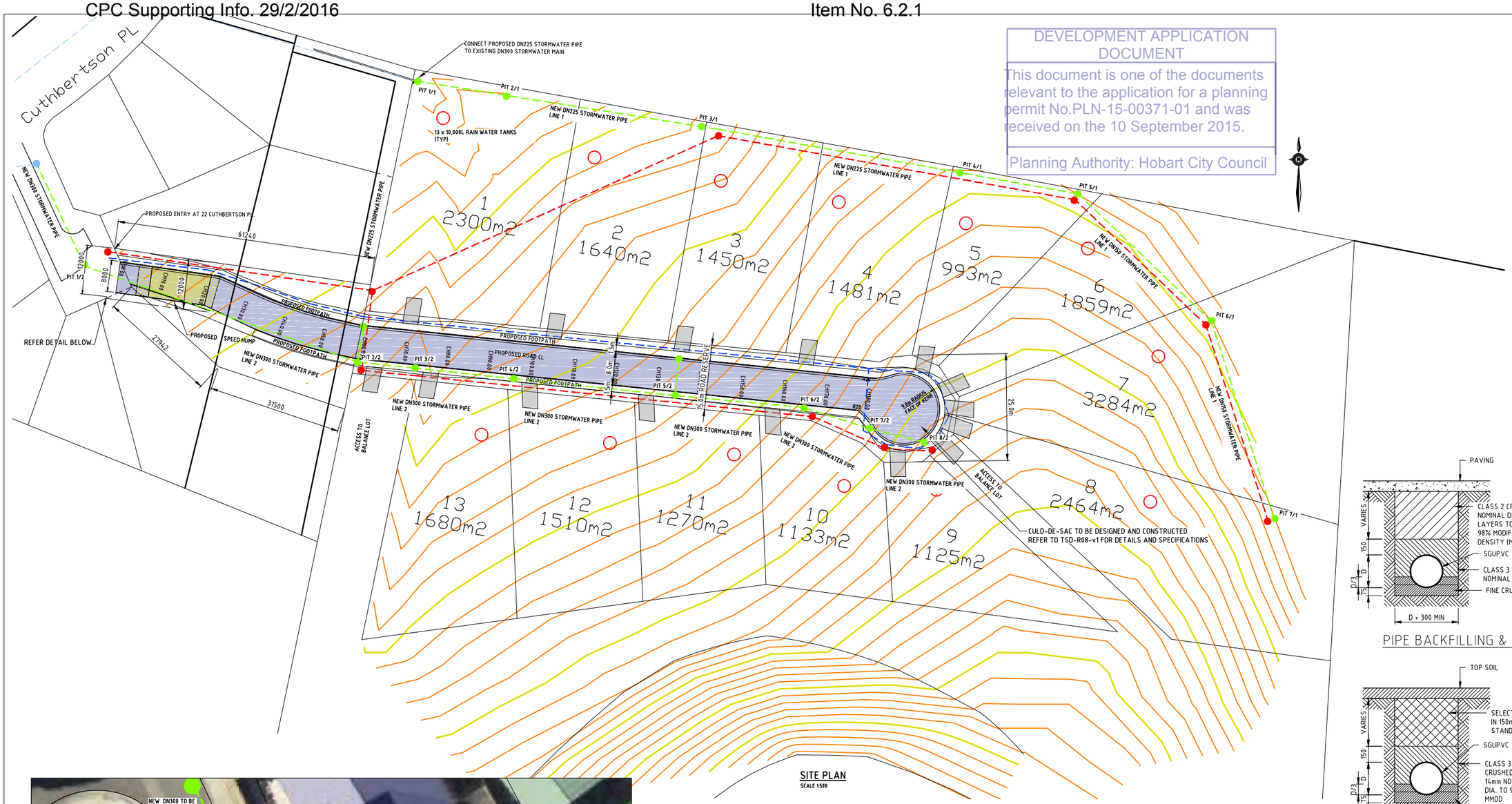
Sugden & Gee Ingenuity

CLIENT
BARRY MARSH & WENDY CORNELIUS

DRAWING
PROPOSED ROAD AND STORMWATER PLAN

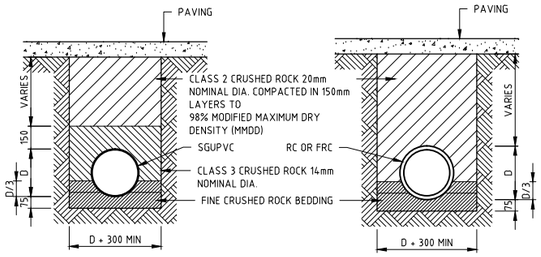
SCALE	SHEET	DATE
AS SHOWN	C101 OPTION A	05 MARCH 2015
DESIGNED		DRAWN
PG		CF
PROJECT NO.		AMEND. C
SG1427- 25 COPLEY ROAD		STORMWATER LINE 2 AMENDED

-WARNING-
BEWARE OF UNDERGROUND SERVICES
THE LOCATION OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THE EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL SERVICES ARE SHOWN.

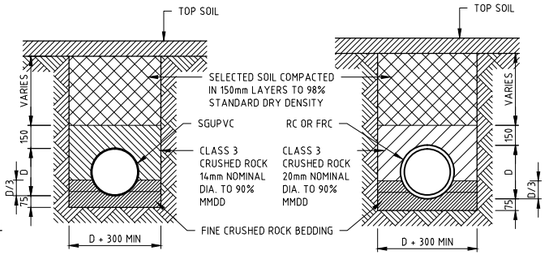


LEGEND

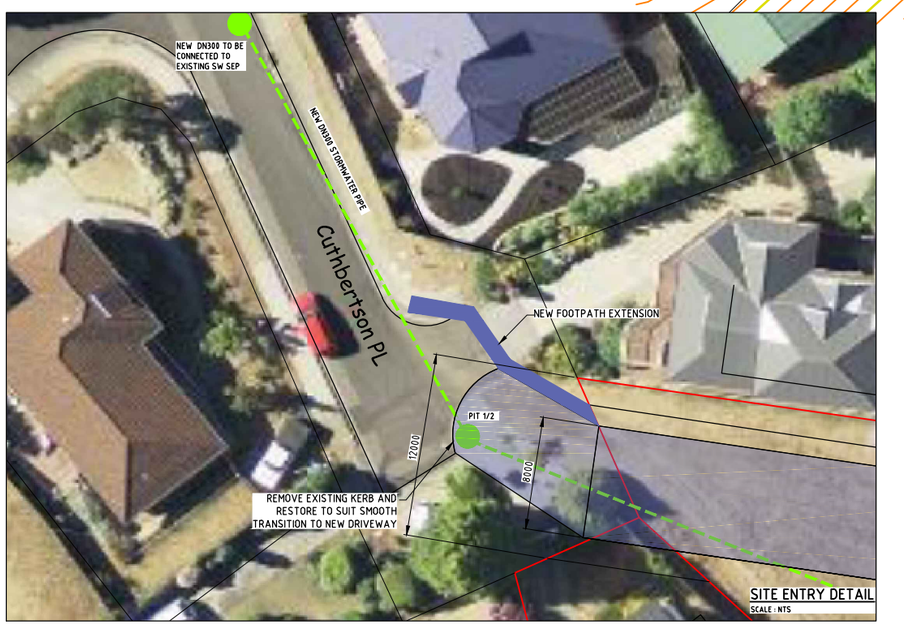
- PROPOSED DRAINAGE PIT
- EXISTING DRAINAGE PIT
- PROPOSED DRAINAGE PIPE
- PROPOSED SEWER PIPE
- PROPOSED WATER PIPE
- EXISTING DRAINAGE PIPE
- EXISTING SEWER PIPE
- PROPOSED DRAINAGE TRENCH
- EXISTING DRAINAGE TRENCH
- PROPOSED AG DRAIN
- P100.00 PROPOSED SPOT LEVEL
- +100.00 EXISTING SPOT LEVEL
- P15.00 PROPOSED CONTOUR
- - 15.0 - - EXISTING CONTOUR
- I.O. 150ϕ INSPECTION OPENING
- DP PROPOSED DOWN PIPE ADOPT 150ϕ UPVC 1:100 CONNECTION U.N.O.



PIPE BACKFILLING & BEDDING UNDER PAVING

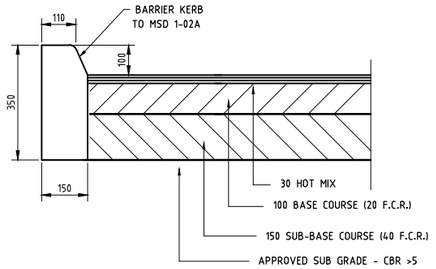


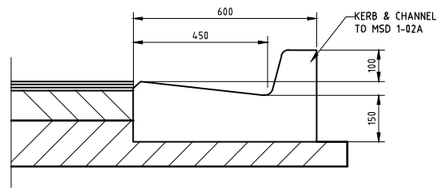
PIPE BACKFILLING & BEDDING UNDER TOP SOIL



SITE ENTRY DETAIL
SCALE : NTS

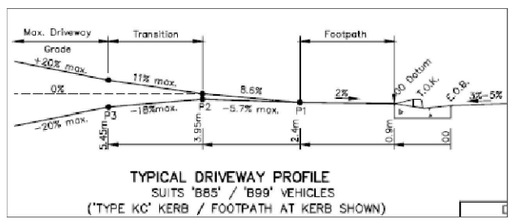
SITE PLAN
SCALE 1:500





TYPICAL HOT MIX PAVEMENT & KERB DETAILS

STANDARD DETAILS
SCALE : NTS



TYPICAL DRIVEWAY PROFILE
SUITS 'B85' / 'B99' VEHICLES
('TYPE KC' KERB / FOOTPATH AT KERB SHOWN)

STANDARD DRIVEWAY DETAILS AS PER TSD-R09-v1
SCALE : NTS

STANDARD DETAILS
SCALE 1:20

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Sugden & Gee Ingenuity

CLIENT	BARRY MARSH & WENDY CORNELIUS	
DRAWING	PROPOSED ROAD AND STORMWATER PLAN	
SCALE	SHEET	DATE
AS SHOWN	C101-OPTION B	17 MARCH 2015
DESIGNED	DRAWN	
PG	CF	
PROJECT NO.	AMEND.	C
SG1427- 25 COPLEY ROAD	STORMWATER LINE 2 AMENDED	

Attachment 3

MILAN PRODANOVIC B.E. PEng
TRAFFIC ENGINEERING & ROAD SAFETY

TRAFFIC IMPACT ASSESSMENT

PROPOSED

RESIDENTIAL SUBDIVISION DEVELOPMENT

25 COPLEY ROAD

LENAH VALLEY

DECEMBER 2015

MILAN PRODANOVIC B.E. PEng
TRAFFIC ENGINEERING & ROAD SAFETY

TRAFFIC IMPACT ASSESSMENT

PROPOSED

RESIDENTIAL SUBDIVISION DEVELOPMENT

25 COPLEY ROAD

LENAH VALLEY

DECEMBER 2015

32 RIVERWAY ROAD, MONTROSE TASMANIA 7010
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EMAIL: milglad@bigpond.net.au ABN: 51 345 664 433

CONTENTS

REFERENCES:

- Australian Standard AS 1742.2-2009 – Manual of uniform traffic control devices Part 2: Traffic control devices for general use
- AUSTROADS – Guide to Road Safety Part 6: Road Safety Audit (2009)
- Road Traffic Authority NSW – Guide to Traffic Generating Developments, 2002
- Road and Maritime Services (Transport) - Guide to Traffic Generating Developments; Updated traffic surveys (August 2013)
- AUSTROADS – Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (2009)
- AUSTROADS – Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings (2009)

1. INTRODUCTION

The owners of a large parcel of land located off a short cul-de-sac on the eastern side of Cuthbertson Place, Lenah Valley are proposing to construct a residential subdivision development consisting of 13 lots (plus remainder).

This traffic Impact Assessment (TIA) of the proposed residential subdivision development has been prepared to support the development application.

The TIA report considers the existing road and traffic characteristics along Cuthbertson Place and adjoining streets in the area of the development site. An assessment is made of the traffic activity that the residential subdivision development will generate and the effect that this traffic will have on the local street network to Pottery Road.

Consideration is given to the required subdivisional access street design to service the lots as well as ensure that existing affected driveways in the cul-de-sac can be redesigned to provide sufficient sight distance and turning movement for vehicles travelling along the street and into/out of driveways.

The report is based on the Department of State Growth (DSG) - Traffic Impact Assessment Guidelines.

The techniques used in the investigation and assessment incorporate best practice road safety, and traffic management principles.

2. SITE DESCRIPTION

Cuthbertson Place is a residential street which junctions with Copley Road which, in turn, junctions with Pottery Road.

The proposed development is to be located on land off the end of a very short cul-de-sac located a third of the way along the eastern side of Cuthbertson Place. The land generally lies midway between Pottery Road and Giblin Street as highlighted in Figure 2.1. It is located behind a vacant block of land which is positioned between existing dwellings. The vacant block will accommodate the subdivisional road through the development.

The land has recently been rezoned to residential use. Land use in the surrounding developed area is all residential.

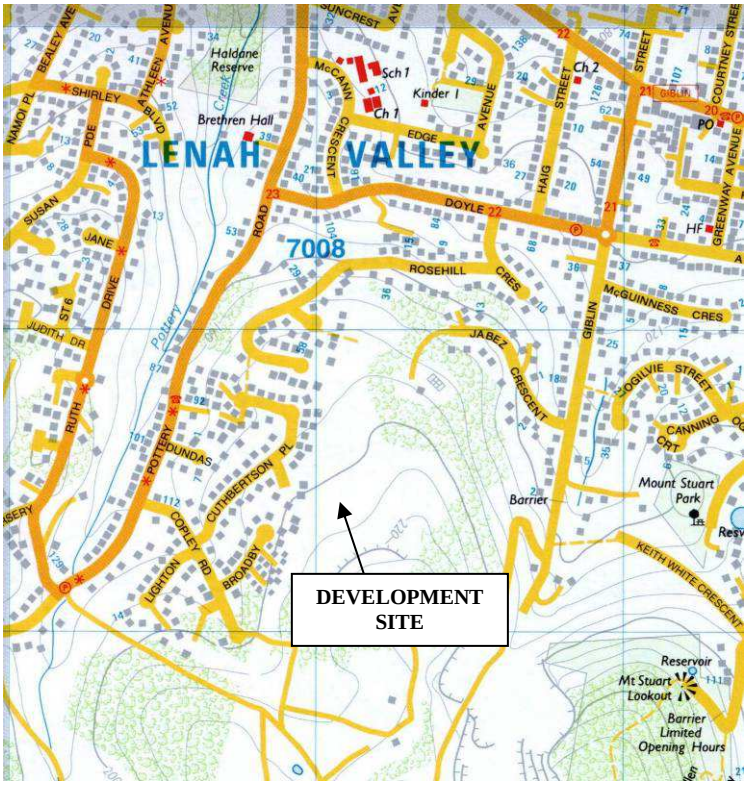


Figure 2.1: Extract from street atlas showing location of proposed subdivision development

3. DEVELOPMENT PROPOSAL

The owners of the land propose to subdivide a part of the parcel of land off the end of the cul-de-sac which is located partway along Cuthbertson Place into 13 residential lots.

The vehicular and pedestrian access to the development is to be gained via a roadway to be constructed off the end of the cul-de-sac and through Lot 22 as seen on Figure 3.1.

The lots will have areas ranging from 1,049m^2 to 3,284m^2 and there will be a balance lot consisting of the remaining land.

All of the lots will have direct frontage access to the subdivisional street which will be constructed as an extension to the existing cul-de-sac street. The initial 65m length of the new street will pass through the existing Lot 22 and have no property frontage to any building lot. Beyond this the new street will have a length of around 140m including the turning circle at its eastern end and will provide frontage access to all 13 residential lots.

The proposed layout of the subdivision lots is shown on the drawing included as Attachment A to this report.

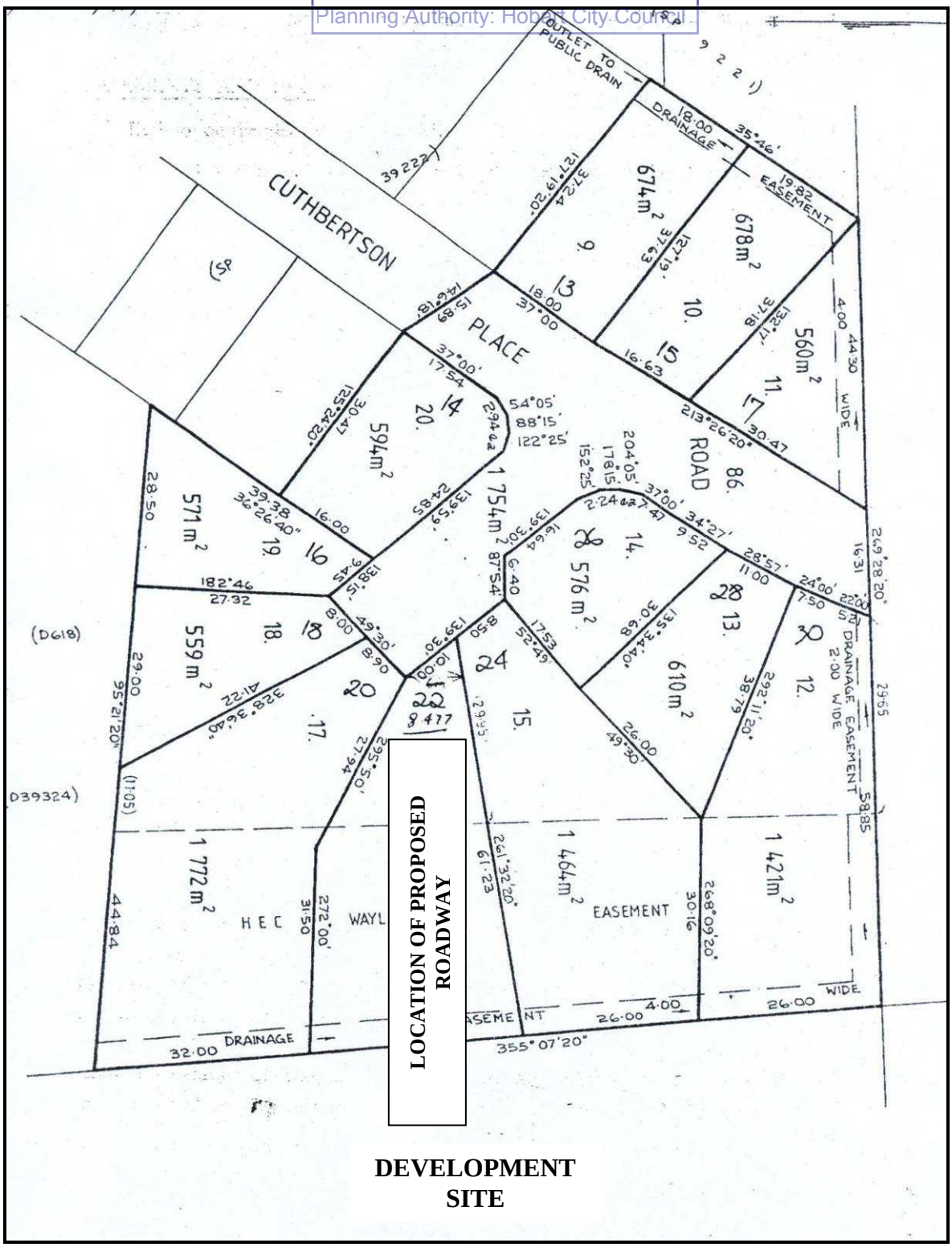


Figure 3.1: Drawing of proposed location of subdivision access road

4. EXISTING ROAD AND TRAFFIC ENVIRONMENT

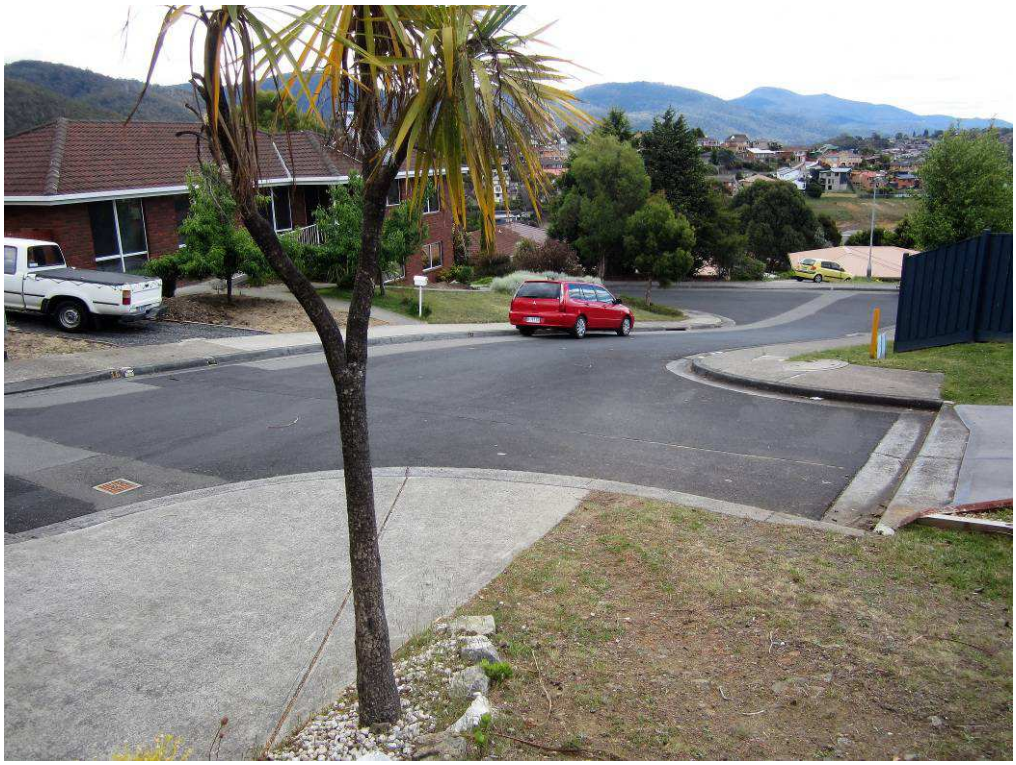
4.1 Road Network

Traffic generated by the development will use the cul-de-sac off Cuthbertson Place and then in turn Cuthbertson Place – Copley Road – Pottery Road to Augusta Road to gain access to and from the local collector road network.

Pottery Road has a role as a minor collector road for the area while Copley Road and Cuthbertson Place are local residential access streets.

The cul-de-sac off Cuthbertson Place which is to be extended into the proposed subdivision has a width of 6.0m and a length from the prolongation of the Cuthbertson Place kerb line of around 40m. Apart from the two corner properties, there are four other dwellings in the cul-de-sac.

A view along the cul-de-sac towards Cuthbertson Place and the junction of the cul-de-sac with Cuthbertson Place is seen in Photographs 4.1 and 4.2



Photograph 4.1: View to west along cul-de-sac from development site towards Cutherbertson Place

Photograph 4.2: View to south along Cutherbertson Place with junction cul-de-sac to development site ahead on left

Cuthbertson Place has a combined horizontal and crest vertical curved alignment along its overall length of about 370m. The street has a width between kerb faces of 8.5m.

Copley Road has similar road design characteristics to Cuthbertson Place but on a continuous upgrade to the east with a road width of 8.5m between kerb faces.

Pottery Road has a width of around 8.5m, widening to 10.0m north of the Doyle Avenue junction.

There are no traffic control devices at any of these junctions. Each junction has been well designed as a fairly square T-junction such that regulatory road rules provide adequate control of vehicle movement priorities.

4.2. Traffic Activity

Reference has been made to an automatic counter survey undertaken by the Hobart City Council of the traffic volume in early to mid February 2005 on Pottery Road between Dundas Court and Doyle Avenue.

The hourly two way traffic flow distribution at the site is seen in Figure 4.1. The graph displays the typical morning and afternoon peak traffic flows, with some additional activity representing the afternoon after school traffic peak. The weekday two way traffic flow at the survey site was 2,375 vehicles/day.

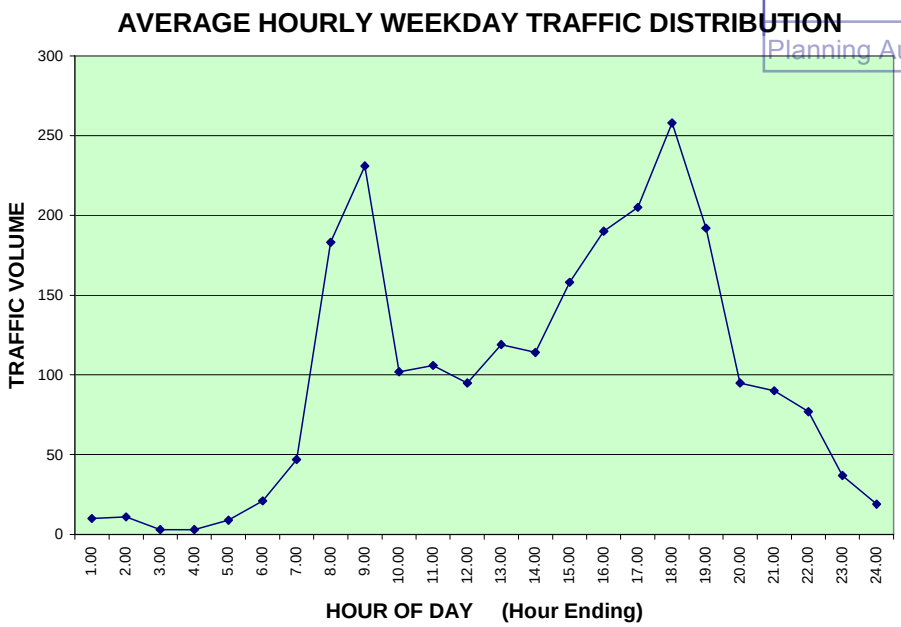


Figure 4.1: Average hourly weekday Traffic Distribution on Pottery Road north of Dundas Court

In order to know the level of traffic activity closer to the development area, reference has also been made to morning and afternoon peak period turning movement surveys which were undertaken at the junction of Copley Road and Pottery Road on 2005 when the development of the land in question was first raised.

The results from this survey are presented in Figures 4.2 and 4.3. The individual traffic flow movements are quite low and of no concern. A reason for undertaking the turning movement count at this location was for its relevance in regard to checking the traffic generation rate for this residential area.

As there has not been any significant increase in the level of residential development in the area and no change along Copley Road or Cuthbertson Place the traffic data is still representative of the traffic activity at the survey locations.

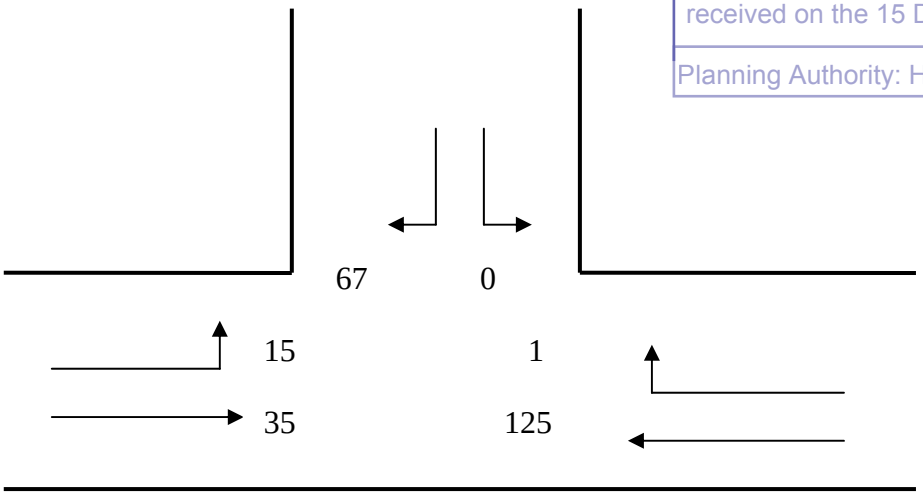


Figure 4.2: Turning traffic volumes at junction of Pottery Road/Copley Road – 8am to 9am

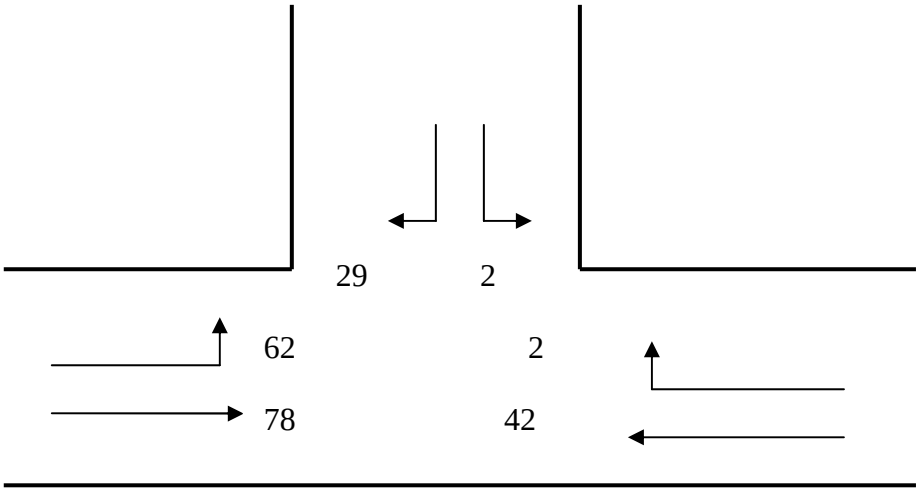


Figure 4.3: Turning traffic volumes at junction of Pottery Road/Copley Road – 4.30pm to 5.30pm

4.3 Crash Record

All crashes that result in personal injury are required to be reported to Tasmania Police. Tasmania Police record all crashes that they attend. Any crashes that result in property damage only which are reported to Tasmania Police are also recorded even though they may not visit the site.

Details of reported crashes are collated and recorded on a computerised database that is maintained by DSG.

Information was requested from DSG about any reported crashes along Cuthbertson Place, Copley Road and Pottery Road for the last five and three quarter years.

There have been no reported crashes along Cuthbertson Place over this period.

Two incidents on Copley Road on consecutive days in 2013 involved a parking manoeuvre collision and a hit animal with the latter resulting in first aid attention being required.

There have been only four reported crashes along Pottery Road between Copley Road and Augusta Road, not including the Augusta Road intersection.

Table 4.1 summarises the reported crash data, including the type of crash and crash severity, for Pottery Road between Augusta Road and Copley Road.

Apart from the junction collision at Doyle Avenue, three of the other four crashes have been frontage activity type collisions, two involved parking manoeuvres, the other a vehicle turning into property. The number and nature of the crashes does not give cause for concern about the safety of this road.

The crashes occurred in 2010, 2011, 2012 and 2015. Two of the crashes were loss of control incidents, one was a head on collision and the fourth involved a parking incident. Only the crash this year resulted in injury.

Overall the above crash record is not of concern with respect to the possible impacts from the proposed development

4.4 Road Safety Audit

As part of this assessment, a road safety audit of Cuthbertson Place, Copley Road and Pottery Road in the vicinity of Copley Road was undertaken.

The audit is a necessary part of the development assessment as safety problems can arise on existing streets resulting from additional traffic being generated by new developments.

In this case there were no issues of significance identified on these streets that needed to be raised in this report.

5. TRAFFIC GENERATION BY THE PROPOSED SUBDIVISON DEVELOPMENT

As outlined earlier in this report the development proposal consists of a subdivision of land to create 13 residential lots on land to be accessed from a cul-de-sac off Cuthbertson Place.

In considering the traffic activity that each dwelling on the lots will generate when occupied, guidance is normally sought from the New South Wales, Road Traffic Authority document – Guide to Traffic Generating Developments. The RTA guide is a nationally well accepted document that provides advice on trip generation rates and vehicle parking requirements for new developments.

The updated 'Technical Direction' to the Guide dated August 2013 advises that the trip generation for residential dwellings in regional areas of New South Wales is 7.4 trips/dwelling/day.

This is consistent with findings by this consultant for dwellings in Tasmania. Surveys in the built up areas of Tasmania over a number of years have found that typically this figure is 8.0 trips/dwelling/day with smaller residential units generating around 4 trips/unit/day and larger units generating around 6 trip/unit/day.

A traffic generation rate of 8 vehicles/hour/day would apply to the proposed development. As some of the proposed lots are capable of having multiple units a traffic generation rate of 8.65 trips/lot/day will be assumed. This is based on 25% of the lots being developed with multiple two-bedroom residential units, 90 % of these lots with two units and 10% with three units with the units generating 5 vehicles/unit/day.

On this basis the proposed subdivision development will generate around 110 vehicles/day or 11 vehicles/hour.

6. TRAFFIC ASSESSMENT AND IMPACT

The key issues to be considered with respect to the proposed development are the ongoing safe and efficient flow of traffic along the existing local streets to and from Pottery Road once the subdivision is completed and fully occupied. There is also a need to ensure that any changes to the cul-de-sac are designed so as not to create any safety issues for other existing access driveways.

6.1 Operational Impact of Increased Traffic Activity

As determined in Section 5 of this report, residential subdivision development is expected to generate around 110 vehicles/day or around 11 vehicles/hour in peak times of the day when all dwellings on the lots are occupied.

The addition of 11 vehicles/ hour along Cuthbertson Place and Copley Road as well as Pottery Road will not have a significant impact on the efficiency of traffic flow along these streets.

The daily traffic volumes on Copley Road near Pottery Road will remain at no more than 1,000 vehicles/day and well less than this along Copley Road to the east of Cuthbertson Place as well as along Cuthbertson Place. 1,000 vehicles/day is the maximum desirable traffic volume for a residential street.

The traffic conflicts at any of the affected intersections in this area will be not more than around 250 vehicles/hour.

Traffic volumes up to 1,500 vehicles/hour can generally be accommodated between conflicting traffic streams at intersections or junctions before traffic problems can begin to arise. The conflicting traffic volume at the above intersections in 10 years time will be less than 20% of this maximum volume.

Therefore traffic will experience minimal delay and negligible queueing with traffic operating at Level of service A.

6.2 Subdivisional Road Design

The new subdivisional road will form an extension to the cul-de-sac off Cuthbertson Place, as described previously.

In supporting the proposed subdivision development from its beginning, it has been envisaged that the subdivisional road from the existing cul-de-sac and through the Lot 22 would be constructed with the minimum width between kerb lines for two way traffic and a footpath along the northern side of the street to achieve necessary traffic outcomes.

This was seen as necessary not only due to the constraint in the available width between properties at the eastern end of Lot 22, which tapers down to a width of 8m, but also to ensure driver behaviour in the street will be consistent

with good residential amenity and safety for residents using driveways in the existing cul-de-sac.

It is therefore proposed the street have a width between kerb faces of 6.0m with a footpath width of 1.8m along the northern side of the street.

The proposed design of the street within the area of the subdivision development is seen in Attachment A.

While current IPWEA standards drawings indicate a 6.9m wide street for cul-de-sac streets serving less than 16 dwellings, there is no good reason in this situation to require the subdivisional road to be any wider than the 6.0m, which is the same as the existing cul-de-sac.

There is a need to, in particular, ensure that existing access driveways in the cul-de-sac will have adequate sight distances to approaching vehicles on the downgrade from the east. This can be achieved for all the driveways only if approach vehicle speeds are quite low. Apart from the horizontal curve in the road the only available design element to reduce speeds is to limit the width of the road.

Having a greater road width will not provide any residential benefits but vehicle speeds will be higher along the street.

The development should not be seen as the construction of a new subdivisional road but rather an extension of an existing local cul-de-sac with the design needing to fit the situation. It is most likely the applicable IPWEA standards for cul-de-sac street designs at the time of approval of the existing Cuthbertson Place subdivision development was for 6.0m widths and therefore it is quite appropriate to extend the street to the same design standard.

Generally a road at this width would ensure vehicle speeds will be no more than around 35-40km/h. The combination of having a 6.0m width and a section of the street having a reduced reservation width together with the curved alignment at the start of the subdivision will ensure vehicle speeds through this section of the street will be further reduced. It is estimated the speeds through this curved section of the street will be nearer 30km/h (based on experience but also through assessment of streets, including recently constructed streets, with similar street widths).

A redesign of the current end of the cul-de-sac will be necessary to provide a continuing street into the subdivision as well as allow the construction of convenient access driveways for the existing four dwellings in the cul-de-sac.

The street design, as detailed on the drawings in Attachment B, is considered quite adequate and appropriate for this situation. It will be more than sufficient to allow for B99 car turning manoeuvres to access/egress the driveways.

Photograph 6.1: View to east at end of the cul-de-sac off Cuthbertson Place with access to development site between dwellings

Photograph 6.2: View to west from development site to the cul-de-sac off Cuthbertson Place

6.3 Sight Distance Considerations

Consideration has been given to the adequacy of available sight distances at affected intersections as well as at the existing access driveway in the cul-de-sac which will be extended into the proposed subdivision.

Sight distances for motorists entering Cuthbertson Place from the cul-de-sac are at least 80m in each direction (greater when on street parking is absent). This is quite adequate for the estimated travel speeds along Cuthbertson Place of around 40-45 km/h. Views of the sight lines are seen in Photographs 6.3 and 6.4.

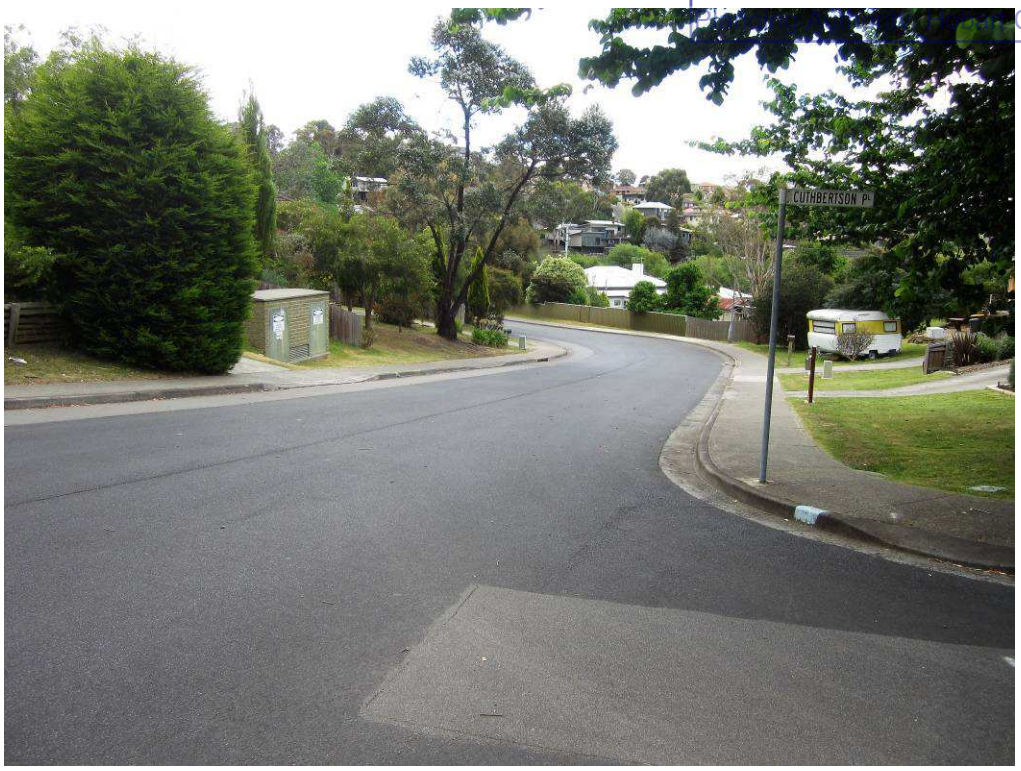
Sight distances at the Cuthbertson Place/Copley Road junction are again adequate for the estimated vehicle speeds on Copley Road of around 45 km/h. The sight lines, seen in Photographs 6.5 and 6.6, are around 150m to the east and around 90m to the west.

The other junction, which is considered relevant for the traffic generated by the proposed development, is Pottery Road/Copley Road junction. Sight lines at this junction, seen in Photographs 6.7 and 6.8, are around 100m to the south and over 200m to the north and quite sufficient for traffic speeds of around 50km/h on Pottery Road.

Photograph 6.3: View to south along Cuthbertson Place from cul-de-sac to development site

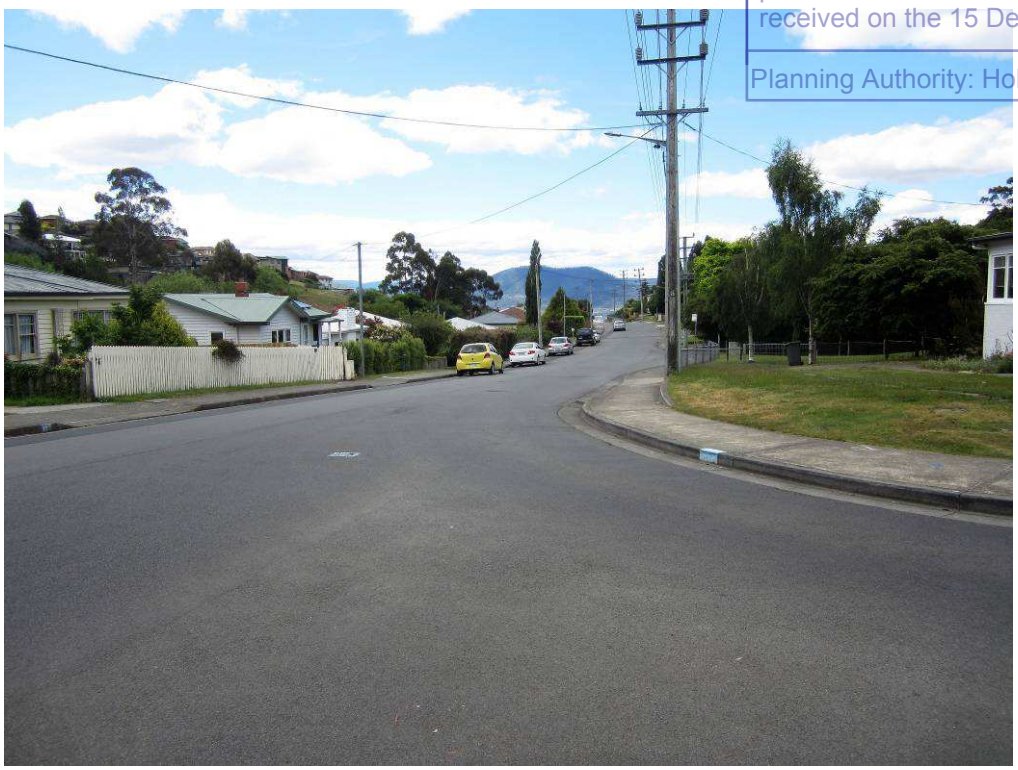
Photograph 6.4: View to north along Cuthbertson Place from Cul-de-sac to development site

Photograph 6.5: View to east along Copley Road from Cuthbertson Place



Photograph 6.6: View to west along Copley Road from Cuthbertson Place

Photograph 6.7: View to south along Pottery Road from Copley Road



Photograph 6.8: View to north along Pottery Road from Copley Road

Sight distances at existing driveways in cul-de-sac at start of subdivision

In considering the development application for the proposed subdivision, the Hobart City Council has specifically requested that it be shown '*the road alignment and driveways can be designed with sufficient sight distance and turning movement for vehicles travelling along the road and into/out of driveways*'.

The adequacy of the design for car turning movements has been addressed in the previous subsection of this report where it was also outlined the expected vehicle speeds along this part of the street will be near 30km/h.

The required sight distance for an approach vehicle speed of 30-35km/h based on the current planning scheme is 40-49m. However the planning scheme also recognises the requirements of Australian Standard 2890.1.

This standard requires that the required sight distances for domestic driveways with approach speeds of 30-35km/h are 20-25m (by extrapolating the figures in the table).

Sketch drawings have been prepared to show access driveway arrangements for the existing properties at the current end of the cul-de-sac and are included with this report as Attachment C.

Two options have been prepared. Option 1 allows for all accesses to be used in the conventional way of forward entry and reverse turnaround exit

manoeuvre onto the street for each driveway. The preferred Option 2 is similar but provides for an exit and turnaround manoeuvre from residence No.20 to be undertaken off-street within the street reserve and then forward entry to the street.

The Option 2 design will ensure sight distances for the driveway to the properties on the southern side will be well in excess of 50m, which is significantly greater than required by AS2890.1 and meet the scheme requirements for approach speeds of 35km/h.

In regard to the driveway to the property on the northern side, the sight distance has been measured on the drawing to be at least 30m, which is greater than required by AS2890.1.

With a very minor adjustment to the fence height at the corner of property No.24 (if not refinement to the design) the required sights distance to meet the scheme requirements for approach speeds of 35km/h could be achieved.

7. SUMMARY AND RECOMMENDATIONS

This Traffic Impact Assessment has been prepared in support of the development application to the Hobart City Council for the construction of 13 residential lots at 25 Copley Road.

The assessment has reviewed the existing road and traffic environment in the area of the development site. No issues have been identified with traffic operations and safety in the area. The only works which will be required on the existing road network are in the cul-de-sac where the access street to the development site is proposed to be located.

Weekday two way traffic volumes on Pottery Road between Dundas Court and Doyle Avenue are around 2,375 vehicles/day and significantly less on Copley Road and Cuthbertson Place.

Over the last five and three quarter years there have been no reported crashes along Cuthbertson Place. Two incidents on Copley Road on consecutive days in 2013 involved a parking manoeuvre collision and a hit animal. There have been only four reported crashes along Pottery Road between Copley Road and Augusta Road.

Overall the above crash record is not of concern with respect to the possible impacts from the proposed development.

The proposed 13 lot residential subdivision development will generate around 110 vehicles/day or 11 vehicles/hour. The addition of 11 vehicles/ hour along Cuthbertson Place and Copley Road as well as Pottery Road will not have a significant impact on the efficiency of the traffic flow along these streets.

In supporting the proposed subdivision development it is recognised the subdivisional road from the existing cul-de-sac needs to be constructed with the minimum width between kerb lines for two way traffic and a footpath along the northern side of the street to achieve necessary traffic outcomes.

This is to ensure that existing access driveways in the cul-de-sac will have adequate sight distances to approaching vehicles on the downgrade from the east. This can be achieved for all the driveways only if approach vehicle speeds are quite low. Apart from having the horizontal curve in the road the only available design element to reduce speeds is to limit the width of the road.

It is therefore proposed the street have a width between kerb faces of 6.0m with a footpath width of 1.8m along the northern side of the street.

A redesign of the current end of the cul-de-sac will be necessary to provide a continuing street into the subdivision as well as allow the construction of convenient access driveways for the existing four dwellings in the cul-de-sac.

Consideration has been given to the adequacy of available sight distances at affected intersections as well as at the existing access driveway in the cul-de-sac which will be extended into the proposed subdivision.

Investigations have determined the sight distances for motorists at all of the affected intersection will be more than required.

In regard to providing the required sight distances for the existing driveways at the end of the current cul-de-sac, the preferred access driveway design is as detailed on Option 2 sketch layout in Attachment C.

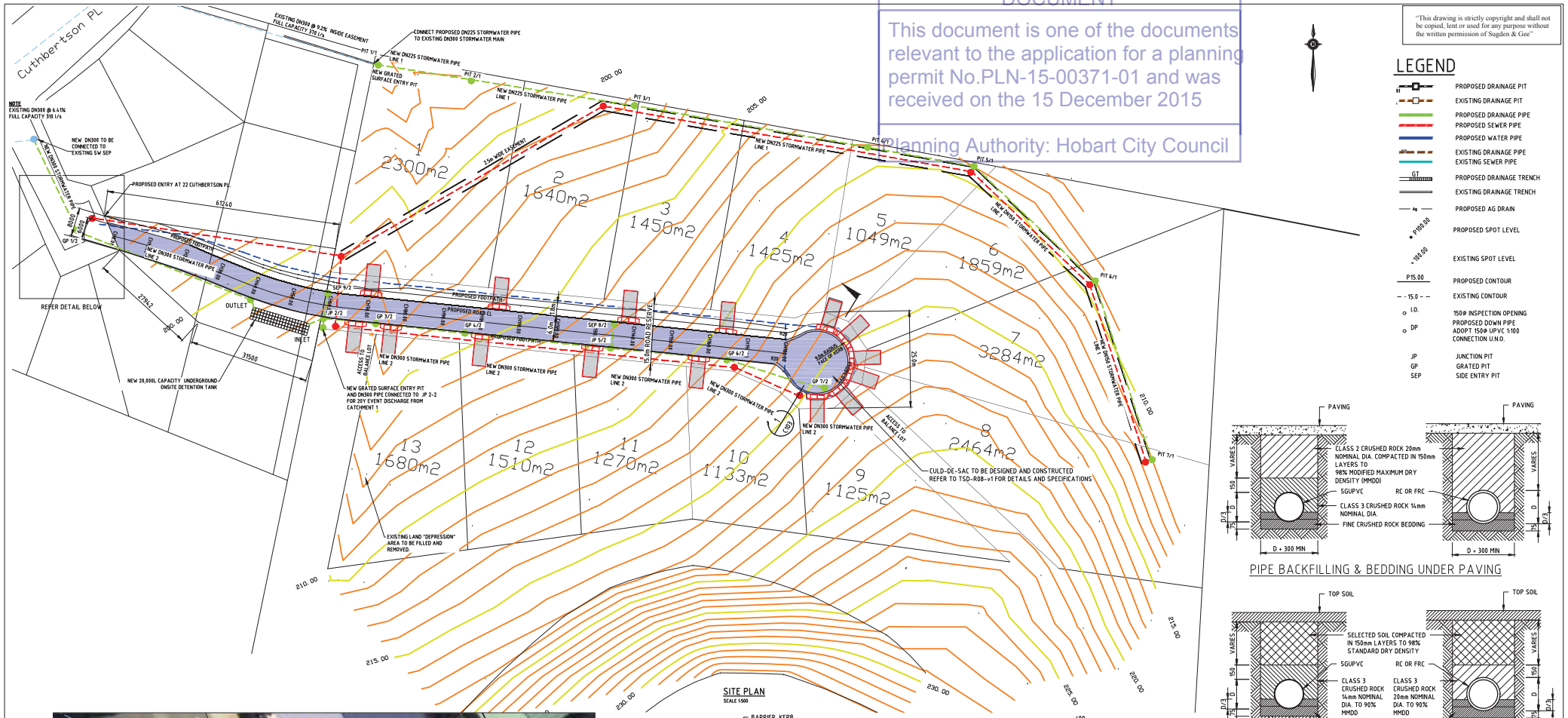
This design will ensure sight distances for the driveway to the properties on the southern side will be well in excess of 50m, which is significantly greater than required by AS2890.1 and meet the scheme requirements for approach speeds of 35km/h.

In regard to the driveway to the property on the northern side, the sight distance has been measured on the drawing to be at least 30m, which is greater than required by AS2890.1.

With a very minor adjustment to the fence height at the corner of property No.24 (if not refinement to the design) the required sights distance to meet the scheme requirements for approach speeds of 35km/h could be achieved.

ATTACHMENT A

Drawing of proposed subdivision layout



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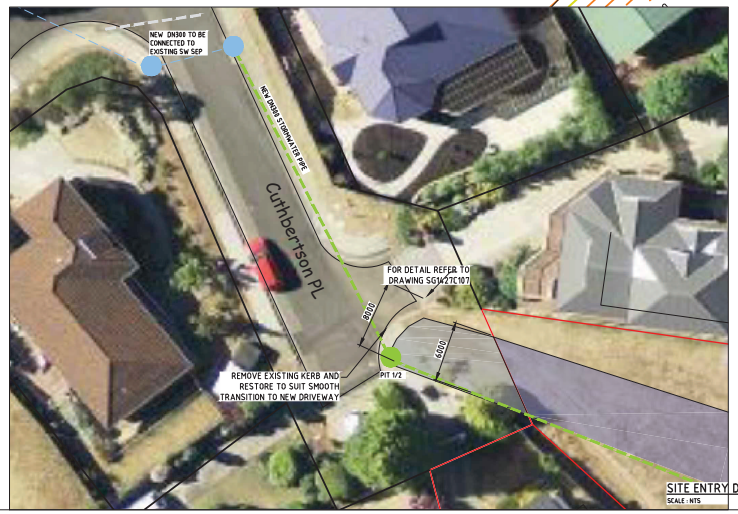

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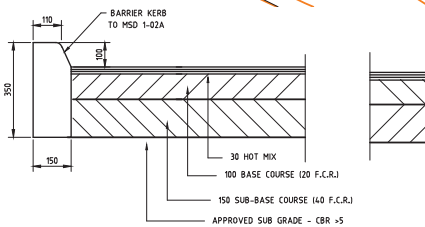
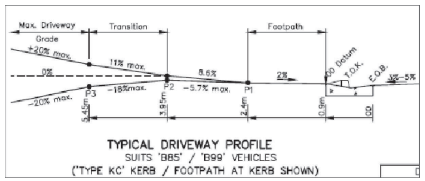


TYPICAL HOT MIX PAVEMENT & KERB DETAILS
STANDARD DETAILS
SCALE : NTS



STANDARD DRIVEWAY DETAILS AS PER TSD-R09-v1
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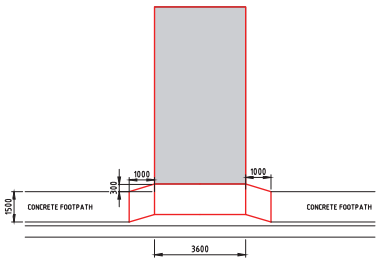
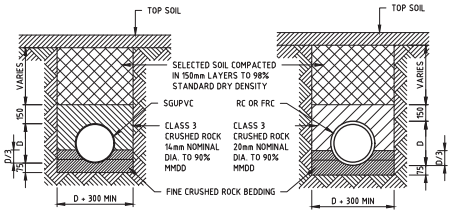


DRIVEWAY DETAILS AS PER TSD-R09-v1
SCALE : 1:100

PIPE BACKFILLING & BEDDING UNDER PAVING



PIPE BACKFILLING & BEDDING UNDER TOP SOIL

STANDARD DETAILS
SCALE 1:20

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PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Sugden & Gee Ingenuity

CLIENT
BARRY MARSH & WENDY CORNELIUS

DRAWING
PROPOSED ROAD AND STORMWATER PLAN

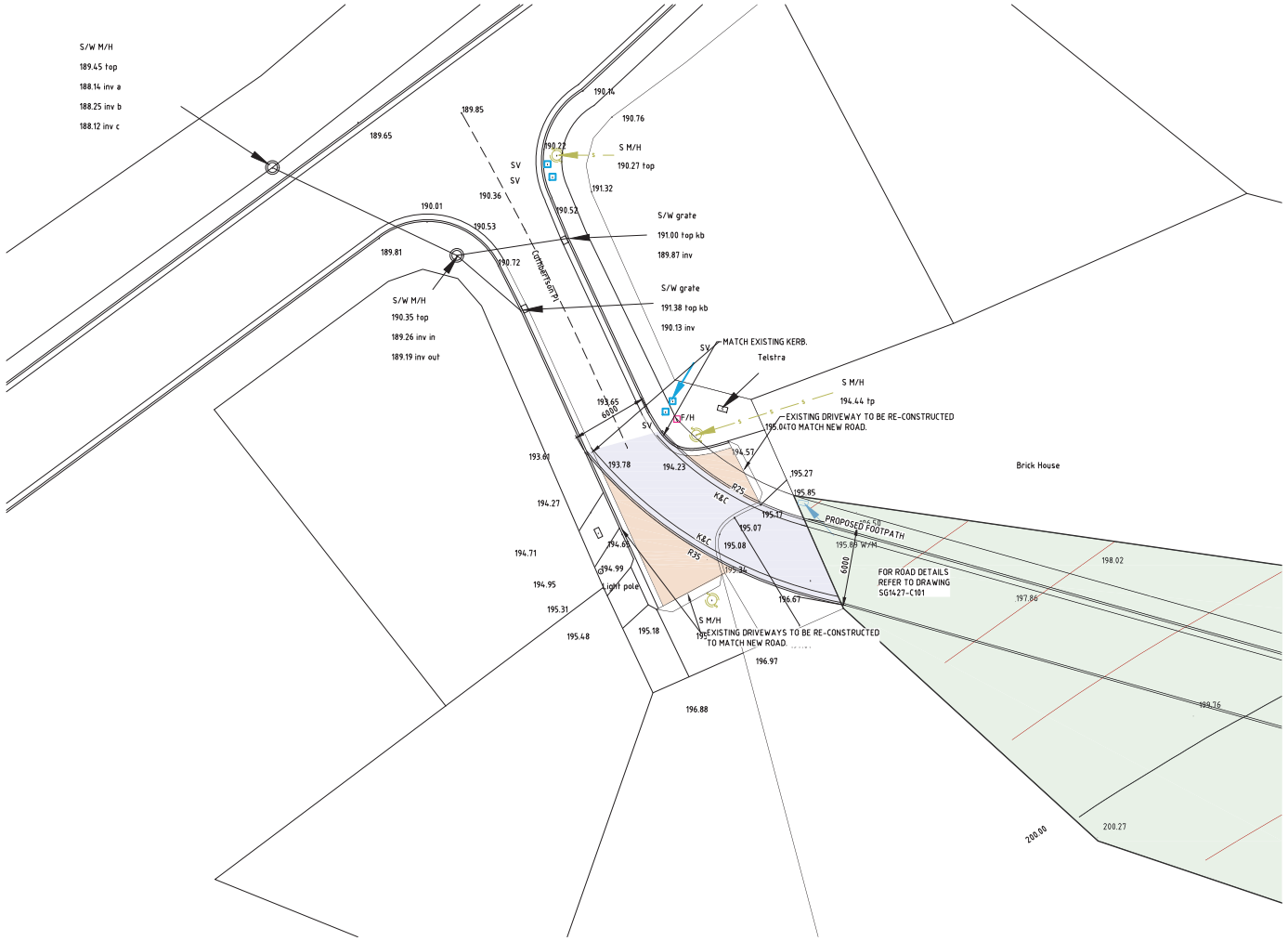
SCALE	SHEET	DATE
AS SHOWN	C101 OPTION A	05 MARCH 2015
DESIGNED		DRAWN
PG		CF

PROJECT NO. SG1427- 25 COPLEY ROAD
AMEND. H ROAD WIDTH AMENDED

WARNING:
BEWARE OF UNDERGROUND SERVICES
THE LOCATION OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THE EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL SERVICES ARE SHOWN.

ATTACHMENT B

Drawing of Proposed Subdivisional Road Connection to Existing Road



ENTRY ROAD DETAILS
SCALE - 1:200

LEGEND:

- PROPOSED ROAD EXTENSION
- PROPOSED DRIVEWAYS EXTENSION
- SUBDIVISION PROPERTY

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PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Sugden & Gee Ingenuity

CLIENT
BARRY MARSH & WENDY CORNELIUS

DRAWING
PROPOSED ENTRY ROAD

SCALE	SHEET	DATE
AS SHOWN	C107 OPTION A	10 JULY 2015

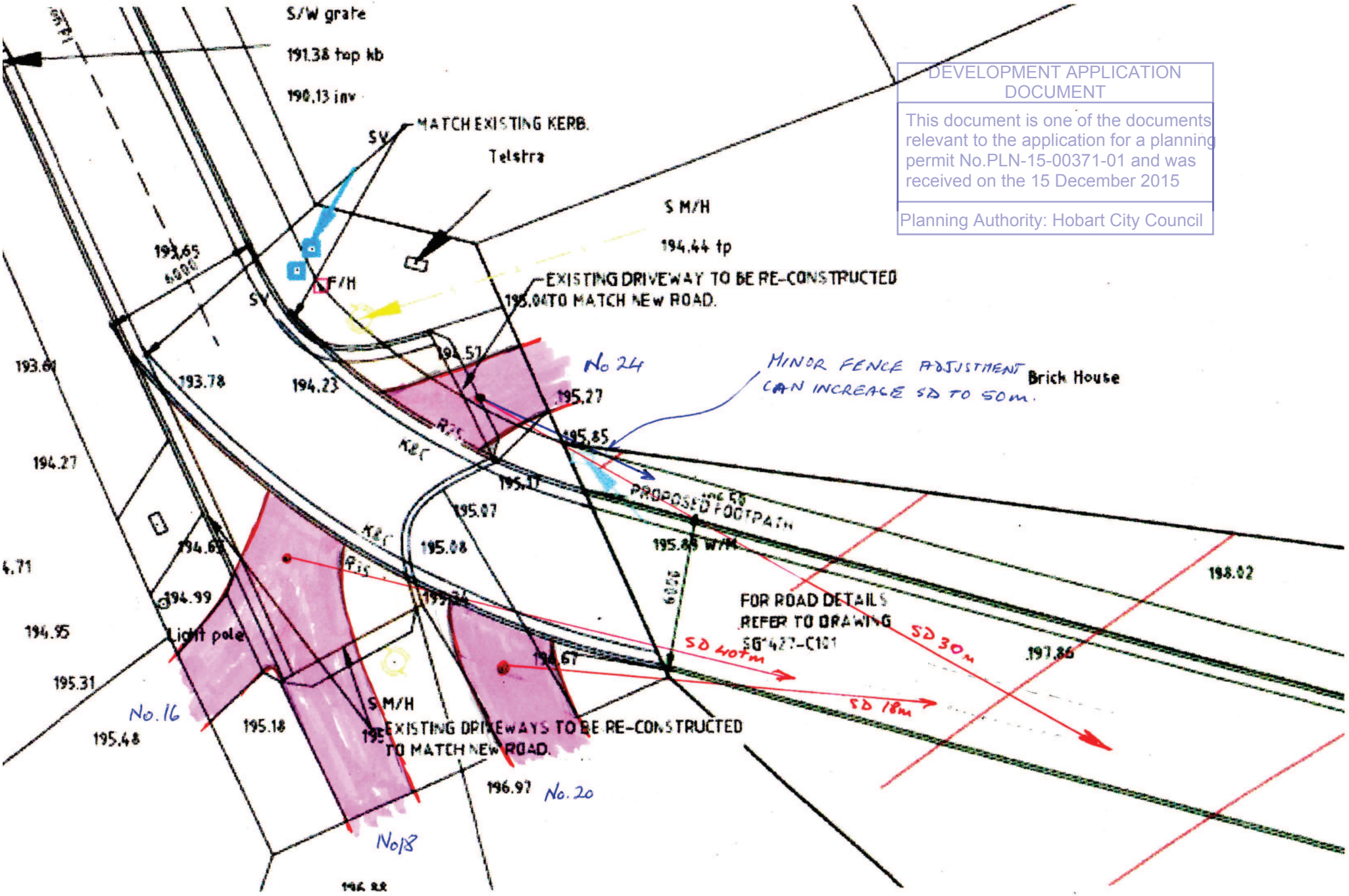
DESIGNED	DRAWN
PG	CF

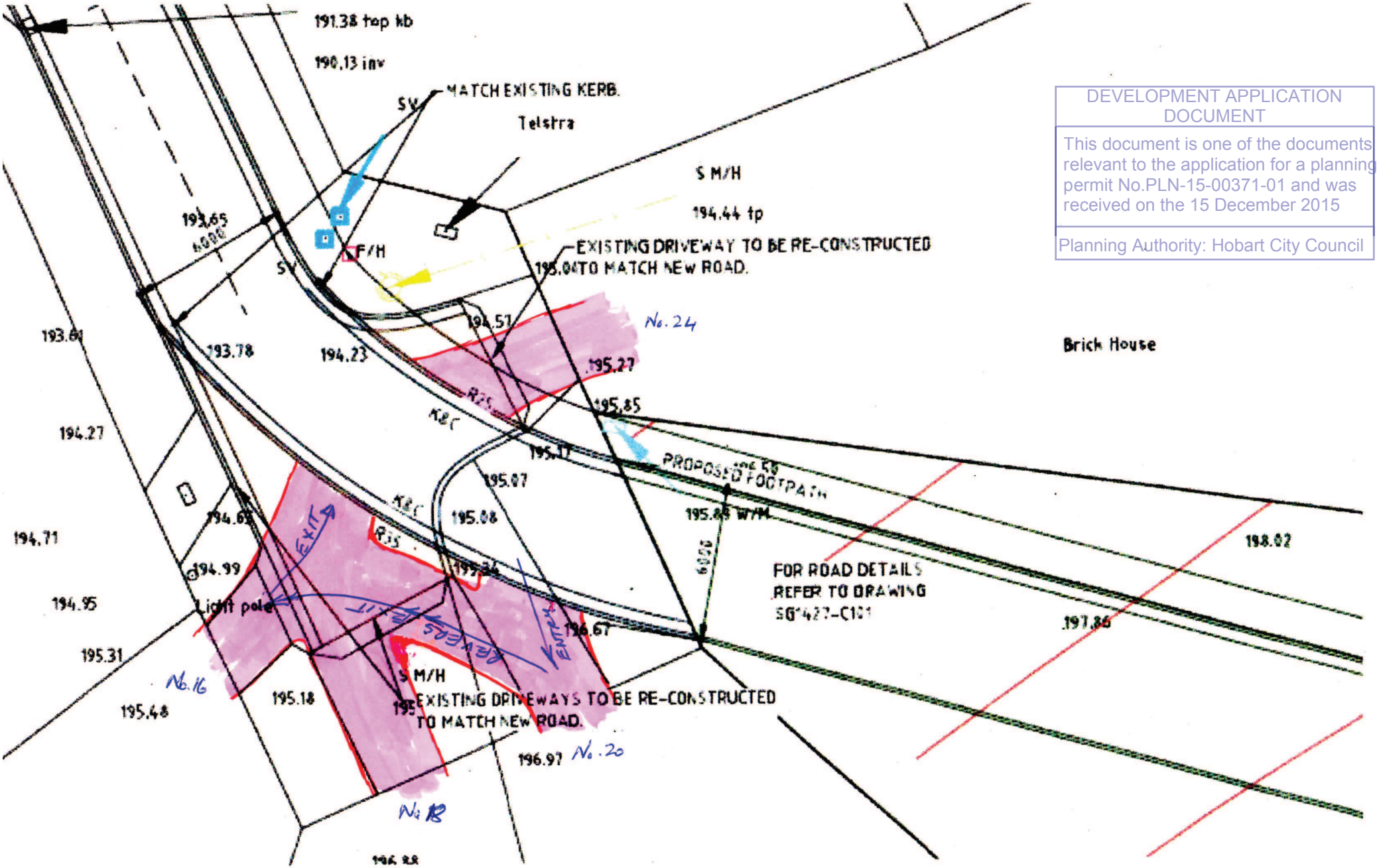
PROJECT NO. SG1427- 25 COPLEY ROAD
AMEND. A
ENTRY ROAD AMENDED

-WARNING-
BEWARE OF UNDERGROUND SERVICES
THE LOCATION OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THE EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL SERVICES ARE SHOWN.

ATTACHMENT C

Sketch Plans of Proposed Existing Access Driveway Layout and Sight Distances





DEVELOPMENT APPLICATION DOCUMENT

This document is one of the documents relevant to the application for a planning permit No.PLN-15-00371-01 and was received on the 15 December 2015

Planning Authority: Hobart City Council

PROPOSED ACCESS ARRANGEMENTS
OPTION 2 - PREFERRED

25 Copley Road – Proposed Subdivision

Engineering Services Report for Development Application PLN-15-00371-01

Prepared for:	**Barry Marsh and Wendy Cornelius**
Date:	**16 October 2015**

Sugden & Gee Ingenuity

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Email: info@suggee.com.au
ABN 57 159 898 11

Contents

Attachment A HCC correspondence ref. no. 7408105 P/25/471
Attachment B TasWater correspondence ref. no. RAI TWDA 2015-00867 & 868-HCC

Prepared by: **Phil Gee** **Date:** **16 October 2015**

Revision History					
Rev No.	**Description**	**Prepared by**	**Reviewed by**	**Authorised by**	**Date**
01	HCC items 3, 4 & 5	PG		PG	14/10/15

1. Introduction

This engineering services report is provided in support of a Development Application at 25 Copley Road, Lenah Valley. The report addresses issues raised in correspondence from the Hobart City Council (HCC) and TasWater (Attachments A and B):

- 27 April 2015 reference no. 7408105 P/25/471 (from HCC)
- 9 June 2015 reference RAI TWDA 2015-00867 & 868-HCC (from TasWater)
- 15 June 2015 reference no. 7408105 P/25/471 (from HCC)
- 16 July 2015 reference RAI TWDA 2015-00867 & 868-HCC (from TasWater)
- 24 September 2015 reference no. 7408105 P25/471 (from HCC)

The reference items in this report refer to those in the letters of 27 April and 15 June from HCC.

This report must be read in conjunction with the following drawings:

SG1427-N101 – General Notes & Drawing Register – REV-C
SG1427-C101 – OPTION A - Proposed Road and Stormwater Plan – REV-F
SG1427-C102 – Proposed Road Cross Sections
SG1427-C103 – Proposed Road Long Section
SG1427-C104 – Proposed Stormwater Line 1 Long Section – REV-A
SG1427-C105 – Proposed Stormwater Line 2 Long Section – REV-A
Sg1427-C106 – Proposed Driveway Long Sections – REV-A
SG1427-C107_OPT A – Proposed Entry Road
SG1427-H101_OPT A - Proposed Sewer and Water Plan Rev-C
SG1427 – SK1 – Stormwater Catchment Areas and Analysis and Flow Paths – REV-B

2. Options A & B

Two options for the access through 22 Cuthbertson Place have been prepared and are being presented in two separate development applications. Apart from localised dimensions of the roadway at the access to 22 Cuthbertson Place the engineering services for both applications are identical.

Option A assumes existing boundaries and therefore, at the access point to 22 Cuthbertson Place, the localised narrowing of the road is an 8m wide easement with a 6m wide road pavement as shown on drawing SG1427-C101-OPTION A.

Option B assumes that a small triangle of land can be acquired from 20 Cuthbertson Place to enable a localised narrowing of 12m at the access with an 8m wide road pavement as shown on drawing SG1427-C101-OPTION B.

This report is for the development application for Option A.

3. Receiving capacity of stormwater infrastructure (ref. item 3)

Drawing SG1427 – SK1 shows a calculation summary for three catchments within the proposed subdivision. To avoid directing all impervious area stormwater flow to the existing drain in the easement at the bottom corner of 25 Copley Rd (NW corner) the drainage system has been divided into three catchments. The 20y ARI rainfall is relevant to the proposed impervious areas of catchments 2 and 3:

- Catchment 2, which captures water from Lots 9 -13 and the road, drains via SW Line 2 to Cuthbertson Place via 22 Cuthbertson Place.
- Catchment 3, which drains Lots 1 – 8 via SW Line1 to Cuthbertson Place via the existing drain in the easement through 30 Cuthbertson Place.
- There is no additional flow from Catchment 1 and overland flow may be intercepted the new road and stormwater system or maintain existing natural overland flow to the east.

The capacity of the council's existing infrastructure is limited by the existing DN300 pipeline in the street between 13 and 17 Cuthbertson Place which based on a 1% grade has a capacity of 120 l/s. The capacity of the pipeline between 5 and 13 Cuthbertson Place is 385 l/s based on a 10.2% grade. The existing drainage infrastructure in Cuthbertson Place therefore does not have the capacity to carry the existing 20r ARI flow of 457 l/s or the reduced flow of 162 l/s from the proposed Catchment 3.

It is proposed to manage the 20yr ARI flows by providing on-site (OSD) detention rainwater tanks for each lot as well as building retention into the pits and manholes in the street drainage to provide the required storage for a 20yr ARI event.

3.1 Lot OSD Rainwater Tank size and location

The proposed OSD tank for each allotment is sized on the following basis:

- An impervious area of house of 250 m2 per allotment.
- An impervious area of a driveway (Lots 1 -7 only) of 60m2 – The driveways for Lots 8-13 will drain to the street.
- Impervious factor 0.9
- Outflow from the tank is not taken into account
- A 20yr ARI detention storage volume is based on using the following scenarios requested by Council:

Return period (min)	rainfall intensity (mm/hr)*	Roof area (m2)	Roof + drive area (m2)	Roof flow (l/s)	Roof + drive flow (l/s)	Volume roof (l)	Volume roof + drive (l)
5	101	250	310	6.32	7.83	1,895.27	2,350.13
10	73	250	310	4.57	5.66	2,739.69	3,397.22
30	38	250	310	2.38	2.95	4,278.42	5,305.24
60	23.8	250	310	1.49	1.85	5,359.28	6,645.51
120	16.14	250	310	1.01	1.25	7,268.81	9,013.32
180	13.2	250	310	0.83	1.02	8,917.13	11,057.24

* from Australian Rainfall & Runoff

It is proposed that a tank sized to take a 60min 20yr ARI storm, which is a minimum volume of 6,645L on the basis that:

- With a 60min intensity of 23.8mm/hr the flow from Catchment 3 will be reduced from the existing 162 l/s to 57 l/s which is less than half the limiting capacity of 120 l/s of the pipeline between 13 and 17 Cuthbertson Place.
- With a 60min intensity of 23.8 mm/hr the combined flow from Catchments 1 and 2 is 100 l/s which is less than one third of the limiting capacity of 310 l/s of the pipeline draining into Cuthbertson Place.

The proposed location for the above ground OSD rainwater tank is at the rear of the house and connected to a stormwater pipe at either the rear of the house (figure 1) or the front of the house as house (figure 2) depending on the slope of the land.

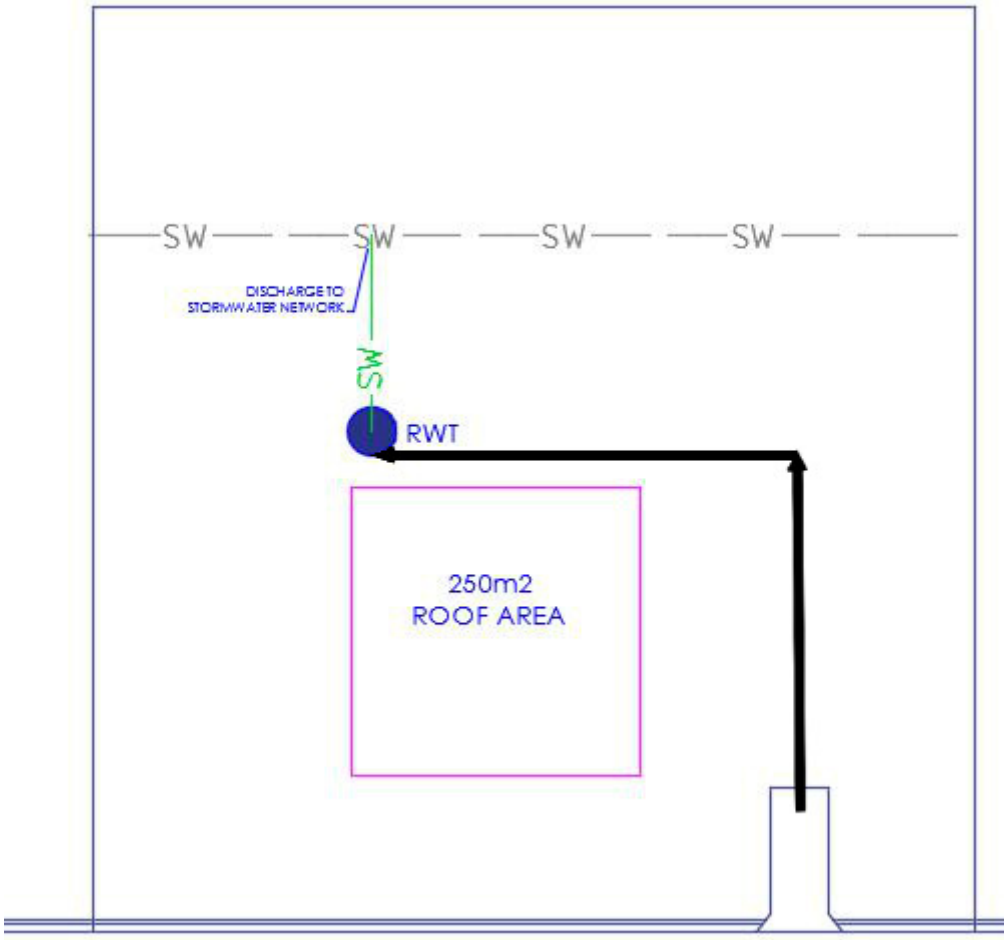


Figure 1 – Stormwater pipe at the rear of the house also drains the driveway

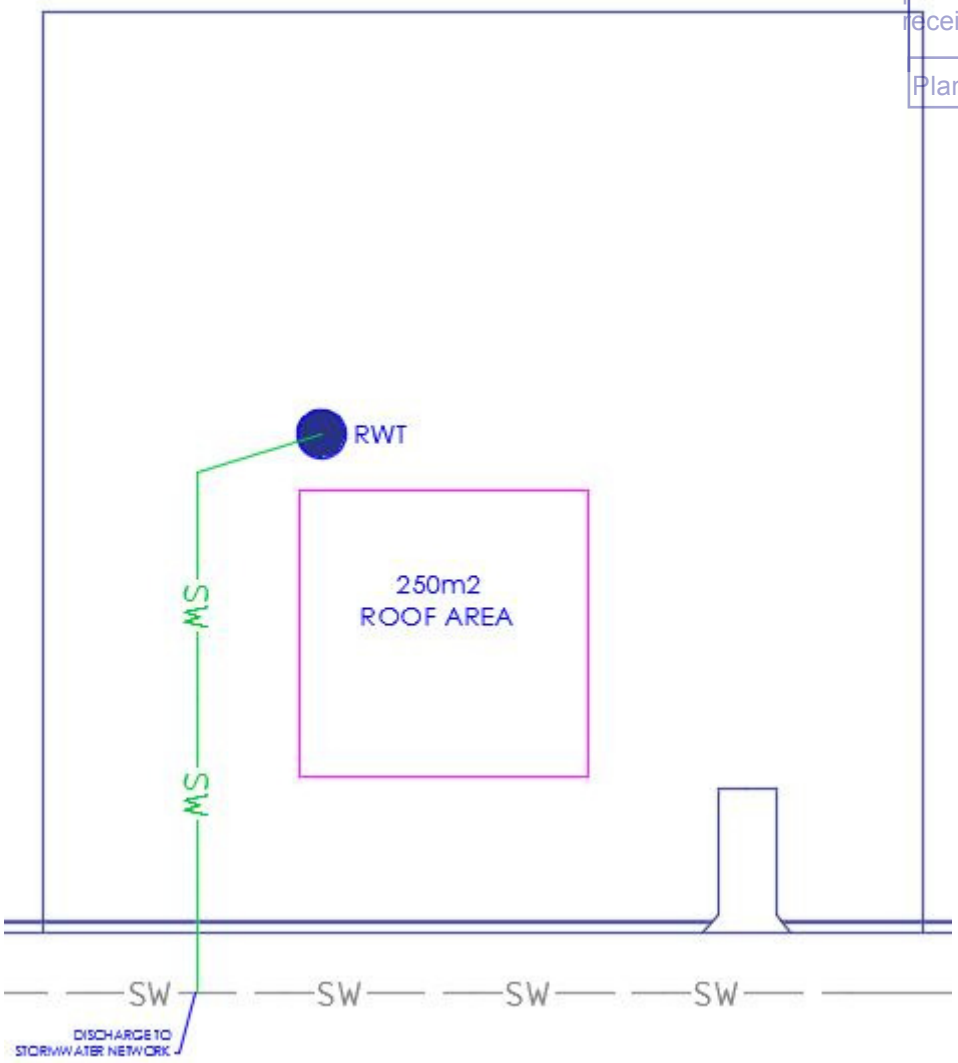


Figure 2 – Stormwater discharges to a pipe at the front of the house

Retaining the peak discharge in the proposed OSD Rainwater tank will provide a significant benefit in reduce the volume of surface runoff discharging from each allotment. Whilst the OSD solution does not reduce stormwater runoff volume it provides detention storage that reduces peak flow during storm events and provides opportunity for rainwater re-use by households.

3.2 Road and driveway detention volume

The proposed detention tank for the road and driveways (Lots 7-13) is sized on the following basis:

- An impervious area of the road and footpaths of 2,326m2
- An impervious area of each driveway of 60m2 – The driveways for Lots 8-13 will drain to the street plus access to the balance of lot giving a total area of 420m2.
- Impervious factor 0.9
- Outflow from the tank is not taken into account
- 5min 20yr ARI rainfall intensity of 101mm/hr (Australian Rainfall and Runoff)

These parameters give a flow of 69.4 l/s and a storage requirement of 20,819 litres.

4. Overland flow (ref. item 4)

In line with standard practice, the Council's requirement is for the stormwater system to be designed to take a 20yr ARI flow from impervious areas of the development and for flooding the 100yr ARI flow is to be managed on the road.

The overland flow paths are shown on drawing SG1427- SK1. Currently, much of the 100yr ARI flow is concentrated on the lower corner of 25 Copley Road and directed into a Council stormwater system through 30 Cuthbertson Place. This existing stormwater system has a capacity of 0.370 m3/s, which is less than the current 100yr ARI flow of 0.715 m3/s. A small portion of the overland flow is dispersed around the hillside to the north and east.

The proposed development has been divided into three catchments and the 20yr and 100yr ARI flows for each catchment are shown on the drawing. The existing 100yr ARI overland flow into the Council's stormwater system at 30 Cuthbertson Place will be considerably reduced by:

1. the construction of the proposed road which will direct much of the flow from Catchment 1 (the hillside above the development) and house and driveway drainage within Catchment 2 (Lots 8-13) down to Cuthbertson Place via 22 Cuthbertson Place.
2. House and driveway drainage within each Lot (Lots 1-7) within Catchment 3.

The Council has advised that they do not want cut-off drains that concentrate overland. This means that some overland flow that is not captured by either household, driveway or roadway impervious areas within Catchment 1 will continue to flow across property boundaries to the north. These flows will also be much reduced by the removal of overland flow from Catchments 1 and 2.

It should be noted that the rear of Lots 6, 7 and 8 and have a natural drain to the east. Any impervious surfaces will need to drain to the new stormwater system so as not to increase overland flow in this direction.

The following table provides a summary of the 100yr ARI flows:

Current 100yr ARI flow (Catchment's 1, 2 & 3)	0.715 m3/s
Development 100yr ARI flow (Catchment 3)	0.384 m3/s
Development 100yr ARI flow that will be diverted via the proposed road and new stormwater system into Cuthbertson Place (Catchment's 1 & 2)	0.715 m3/s

The council has requested two grated surface pits to collect any accumulated overland flow:

1. Located in the bottom (NW) corner of lot 1 that will drain into the existing SW system.
2. Located in the bottom corner (NW) of the access to balance of lot between Lot 13 and 22 Cuthbertson place that will drain to the proposed SW system in the new road.

5. Runoff from quarry spoil (ref. item 5)

The Council has advised that they do not want a cut-off drain along the toe of the quarry spoil mound as it will concentrate overland flow and present an ongoing maintenance problem. The runoff discharge from catchment 1 will remain unchanged and the runoff from the rock spoil contained within catchment 1 will be dispersed across the width of the mound. The Council has

agreed that this runoff will flow across the individual lots and will ultimately be either intercepted by the individual lot drainage system or make its way to the new roadway.

6. Drainage of first section of road (ref. item 6)

It is proposed to extend stormwater Line 2 from an existing pipeline in Cuthbertson Place. Stormwater will be collected in kerb and channel in the first section, directed into gully pits that drain into this line.

The proposed stormwater Line 2 and general arrangement is shown on the inset on drawings SG1427-C101 (both Option A and Option B) and drawing SG1427-C105, stormwater long section of Line2. The detail design for construction will require survey of the exit through 22 Cuthbertson Place and the adjacent roadway.

7. Stormwater long section (ref. item 7)

Stormwater long sections are shown on drawings SG1427-C104 and C105.

8. Width of road reservation (ref. item 8)

The road reservation width of 15m s shown on drawing SG1427-C101 for both Option A and Option B.

9. Cul-de-sac dimensions (ref. item 9)

The cul-de-sac dimensions are shown on SG1427-C101 for both Option A and Option B and are in accordance with IPWEA standard drawing TSD-R06-01.

10. Access to balance of lot (ref. item 10)

The area between lots 8 and 9 and between lot 13 and the Transend wayleave easement is for access to the balance of the lot. Private driveways have been shown at these locations as shown on drawing SG1427-C101 for both Options A and B.

11. Location of driveways (ref. item 11)

The location of driveways are shown on drawing SG1427-C101 for both Options A and B. The driveways have been designed to comply with IPWEA-TSD-R09, and in particular, the separation between driveway crossovers of 500mm is maintained.

12. Driveway long sections (ref. item 12)

All driveways will be designed and constructed to the typical driveway profile in IPWEA standard drawing TSD-R09-v1 as shown on drawing SG1427-C101 for both options A and B. Centreline long sections for each driveway are provided in drawing SG1427-C106.

It was agreed in discussion with Council officers that long sections of the worst case driveways (note: long sections for all driveways have been provided) would be enough to show that construction of the driveways is feasible and that cross section on each driveway was an unnecessary detail for development application.

13. Road long and cross sections (ref. item 13)

A proposed long section (including the cul-de-sac) is shown in drawing SG1427-C103 and cross sections are shown on SG1427-C102. A cross section of the cul-de-sac is shown on the long section drawing SG1427-C103 and shows the cross fall to be 3.2%, which is between 3% and 5% as required.

14. Retaining structures (ref. item 14)

The cross sections shown in SG1427-C102 show that the roadway can built without retaining structures in the public road reservation.

15. Access off Cuthbertson Place (ref. item 15)

A detailed plan of the access from Cuthbertson Place arrangements of driveway alternations is shown on drawing SG1427-C107_OPT-A.

16. Public or private easements (ref. item 16)

Drainage easements will be created over stormwater and sewerage pipelines where they are constructed through the proposed lots.

17. Stormwater cut-off drain (ref. items 17 & 18)

There are two stormwater cut-off drains shown on drawing SG1427-C101:

- A cut-off drain behind lots 9-13 which collects runoff from Catchment 1 and diverts it to the stormwater system at JP2/2.
- A cut-off drain below lots 1-8 which collects stormwater runoff from Catchment 3 and diverts it to the existing Council stormwater system at pit 1/1

18. TasWater Requirements

Reference is made to the two Request for Additional Information (RAI) from TasWater dated 9 June and 16 July 2015.

With respect to the RAI of 9 June, the only relevant item is Item 3 requesting plans which demonstrate a dwelling located outside the required 2.5m pipeline easement containing the proposed DN150 sewer main on Lot 1, and outside of any planning scheme setbacks, can discharge sewer via gravity to the proposed sewer. A 9m circle representing a potential dwelling location is inscribed within Lot1 on drawing SG1427-C101 and this clearly shows a dwelling can be located outside the pipeline easement and any required setbacks.

With respect to the RAI of 16 July items 1 - 3:

1. Drawing SG1427-H101 shows a new DN100 water main as requested.
2. Drawing SG1427-H101 shows that a dwelling can be located outside the sewer easement and any boundary setbacks, and, is uphill from the proposed sewer so it can discharge sewage via gravity to the proposed sewer.
3. Private dwelling sewage lift pumps are not required.

Attachment A

HCC Letters Ref. no. 7408105 P/25/4721
24 April 2015

HCC Letters Ref. no. 7408105 P/25/4721
15 June 2015

Attachment B

TasWater Reference TWDA 2015/00867 - HCC
Date of response 9/6/2015

TasWater Reference TWDA 2015/00867 - HCC
Date of response 16/7/2015

GES

GEO-ENVIRONMENTAL

SOLUTIONS

GEOTECHNICAL ASSESSMENT

25 Copley Road Lenah Valley

July 2011

Geo-Environmental Solutions P/L 86 Queen Street Sandy Bay 7005. Ph 6223 1839 Fax 6223 4539

Introduction

Client: Barry Marsh

Date of inspection: 27/04/12

Location: 25 Copley Road Lenah Valley

Land description: Approx. 11ha, approx 200m asl

Building type: Proposed new dwelling

Investigation: Excavator pits – 5t kubota

Inspected by: J P Cumming

Background information

Map: Mineral Resources Tasmania, Hobart sheet 1:25 000

Rock type: Jurassic Dolerite (with manmade quarry spoil deposits)

Soil depth: Approx. 0.60-0.90m

Landslide zoning: None known

Local meteorology: Annual rainfall approx 550 mm

Local services: Fully serviced

Site conditions

Slope and aspect: Gentle 10-20% slope to the north

Site drainage: Good fall, imperfect subsoil drainage

Vegetation: Sparse native scrub and pasture species

Weather conditions: Fine, approx 5mm rainfall received in preceding 7 days.

Ground surface: Moist clay surface conditions with common dolerite rocks

Investigation

A number of excavations were completed to identify the distribution of, and variation in soil materials on the site. Two representative excavations from within the development area were chosen for classification of soil and geological materials on the site (see profile summary).

Profile summary

Depth (m)	Depth (m)	Horizon	Description
0 – 0.20	0 – 0.15	A1	Dark Brownish Grey (10 YR 4/2) **CLAYEY SAND (SC**), loam fabric, 50% fine to medium sand with approx. 5 to 10% clay, moderately developed polyhedral structure, moist loose consistency, trace dolerite stones and rocks, gradual boundary to
0.20 – 0.50	0.20 – 0.60	B21	Dark Brown (10 YR 3/4) **SANDY CLAY (CH**), approx. 30% fine to medium sand, high plasticity, moist stiff consistency, moderately developed angular blocky structure, trace of dolerite stones and rocks, clear boundary to
0.50-0.65	0.60-0.90	C	Light Olive Brown (2.5 YR 5/4) **SANDY/CLAYEY GRAVELS (GP)**, sub-angular dolerite gravels, approx. 30-40% medium sand with approx. 10-20% clay, moist very dense consistency, near refusal in weathered dolerite bedrock

Soil profile notes

The profile summary shows a typical residual soil developing on Jurassic Dolerite with considerable clay content, high plasticity, and an estimated design movement (Y_s) of up to 40 mm (AS2870-2011 Class M). The proposed development area is predominantly covered with residual soils, and appears stable in its present form, with no evidence of potential instability due to unconsolidated sediments/boulders. The area upslope of the development area is however underlain by a deep deposit of quarry spoil and reference is made to the spoil deposits in the risk assessment for the site.

AS2870 Site Classification

According to AS2870-2011 for construction the natural soils are classified as **Class M**, which is moderately reactive clays with an estimated design movement (Ys) of up to 40mm.

Geotechnical Assessment of site stability

Site and published geological information was integrated to complete a detailed geotechnical assessment of the site according to the principles outlined in AS1726-1993 *Geotechnical Site Investigations* and the *Australian Geomechanics Society* (2007).

Site location and context

The proposed development site is located on Jurassic aged dolerite, in a mid-upper slope position (see figure 1). The site has a moderate slope of 10-20%, and the slope morphology shows no visible signs of past land instability. The site is not in a declared landslip zone, but is close to an area mapped by Mineral Resources Tasmania as having possible geological hazards – manmade quaternary deposits of quarry spoil (see figure 2). Therefore, in accordance with local government requirements a thorough investigation of each of the possible land instability hazards has been undertaken in the following sections.

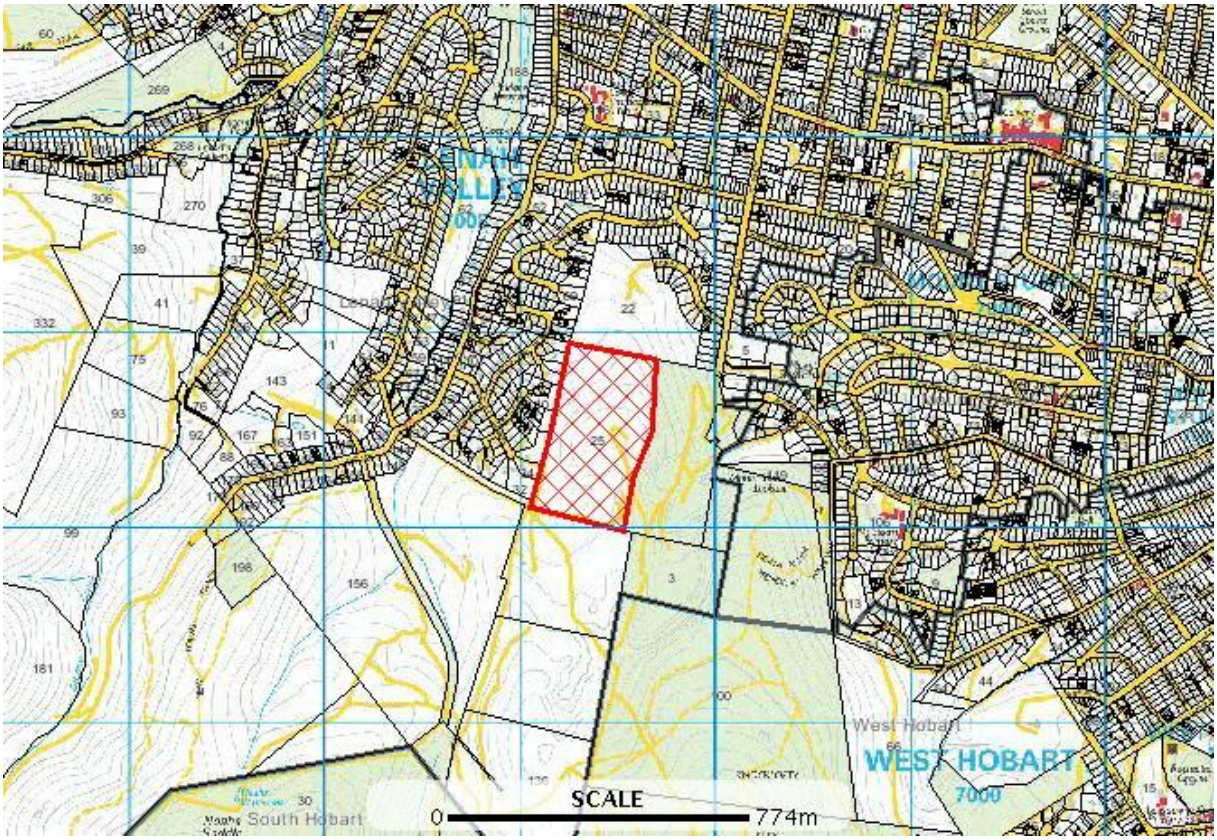


Figure 1 – Site location

Geological setting

The site is underlain by competent dolerite bedrock. The surface of the rock is slightly to moderately weathered, but the blocky structure and weathering zones should allow for excavation for construction. The excavated profiles examined in the current development area appear to be stable in their present state. Therefore the local geology confirms the general stable nature that Jurassic dolerite is renowned for. Sites developing on Jurassic dolerite on North and East facing slopes generally feature shallow residual soils less than 1m in depth with medium to high reactivity, therefore the parent material generally imparts a

low geological hazard to a site. However, where deeper weathered soils or colluvial deposits overly the bedrock, then localised slope stability may be an issue as some of the dolerite soils can be prone to soil creek. The soils examined in site appear to be largely residual in their nature and the profiles are generally less than 1m in depth, therefore the risk posed by the underlying geology of the site is rated as low.

The manmade deposits on site of a large deposit of quarry spoil (mapped as Qhm) are the accumulated spoil from the dolerite quarry operated by Hobart City Council and Hobart Quarries Pty Ltd on adjacent land in Giblin street between 1948 and approximately 1984. The spoil mound is clearly visible on the aerial photo of the site (figure 6), and the risk from the spoil largely relates to possible rock falls from loose material on the face of the existing batter slopes. The risk posed by the spoil is discussed in further detail in the rock fall hazard section.

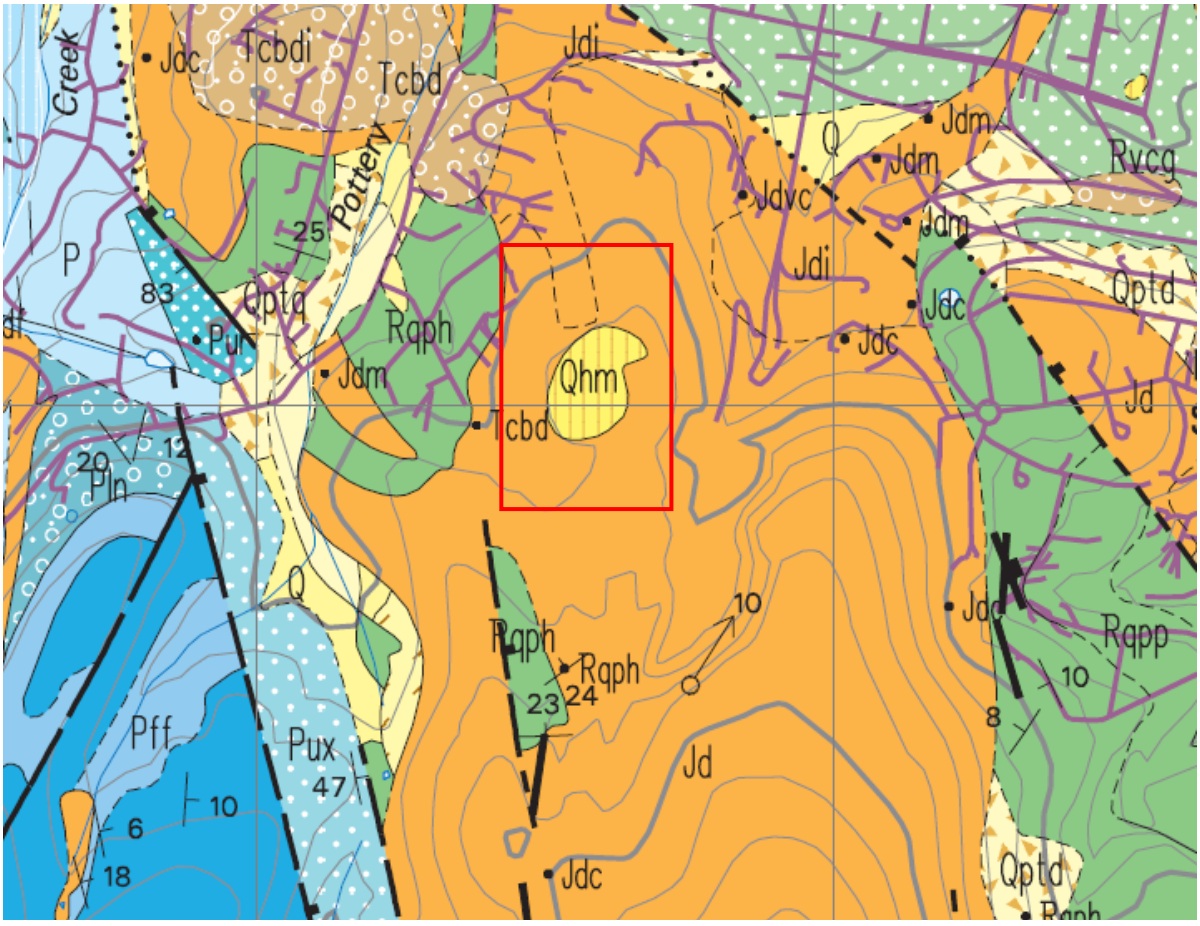


Figure 2 – Extract from Mineral Resources Tasmania 1:25000 Geological Sheet

Potential for landslip

The site has a moderate north to north west facing slope of approximately 10-20%, with vegetative cover of mixed pasture/scrub and sparse tree species (see figure 3). The excavations on site revealed Jurassic dolerite overlain by well consolidated natural soils. The slope angle in the construction area is generally less than 20%, and the slope is less than the modelled instability threshold for dolerite in the MRT hazard analysis (Mazengarb 2004). Previous geotechnical report for the former quarry spoil (MRT 1982) concluded that there was "no evidence of slope instability" in the soil dump.

There was no evidence of landslip or soil creep, notably those trees still present adjacent to the site on the slope were growing straight and vertical. Further, the ground surface showed no hummocks, terracing or patterns from past slips or soil creep. The site therefore appears stable in its present state, and there is little evidence of movement of soil materials on site – with the obvious exception of the quarry soil batters which have a number of loose rocks. The assessment of possible land instability has three possible risk classes; debris slide, deep seated movement, and rock fall hazard.

Figure 3 – View of gentle slopes in the development area close to Cuthbertson Place

Deep seated instability

The local area is not listed as a possible deep seated instability hazard due to the geology and slope angles utilised in the modelling of Mazengarb (2004) – see figure 4. Based upon field inspection of the Jurassic dolerite in the local area (exposed in the test pits completed) the sediments have undergone variable/deep weathering, and the exposed rock has a strong structure. Hence the risk of possible instability in the local area from exceptional conditions such as extreme rainfall/groundwater flows has been identified as low.

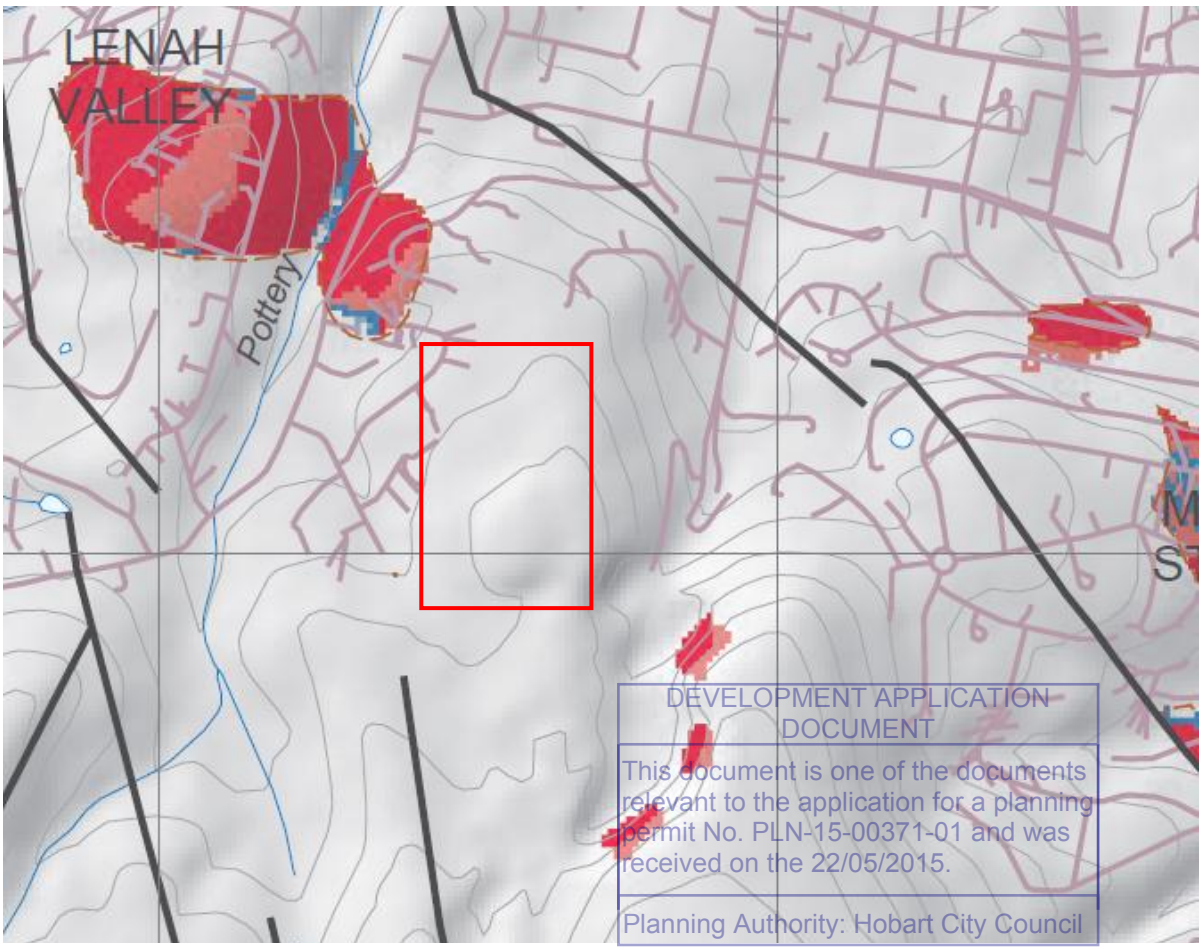


Figure 4 – Extract from deep seated landslide hazard map (Mazengarb 2004)

Debris Flow hazard

The possibility of a debris flow in the highly weathered upper layer of the Jurassic dolerite in the local area has been modelled due to the moderate slope (see figure 5). In particular where excavation and filling has occurred there is a small possibility of shallow seated instability if the ground cover conditions altered. Field inspection on the subject site revealed predominantly shallow residual soils overlying weathered Jurassic dolerite with an inherent low potential for slope movement. Therefore any shallow surface instability would only have

some chance of occurring where deep and poorly placed fill is present – or where material is liberated from the quarry spoil batter slopes. Therefore the proposed construction of access for future residential dwellings is likely to result in minimal disturbance to the site in its present state, and no increase in the apparent risk of slope instability provided adequate setbacks from the batter slopes are adhered to.

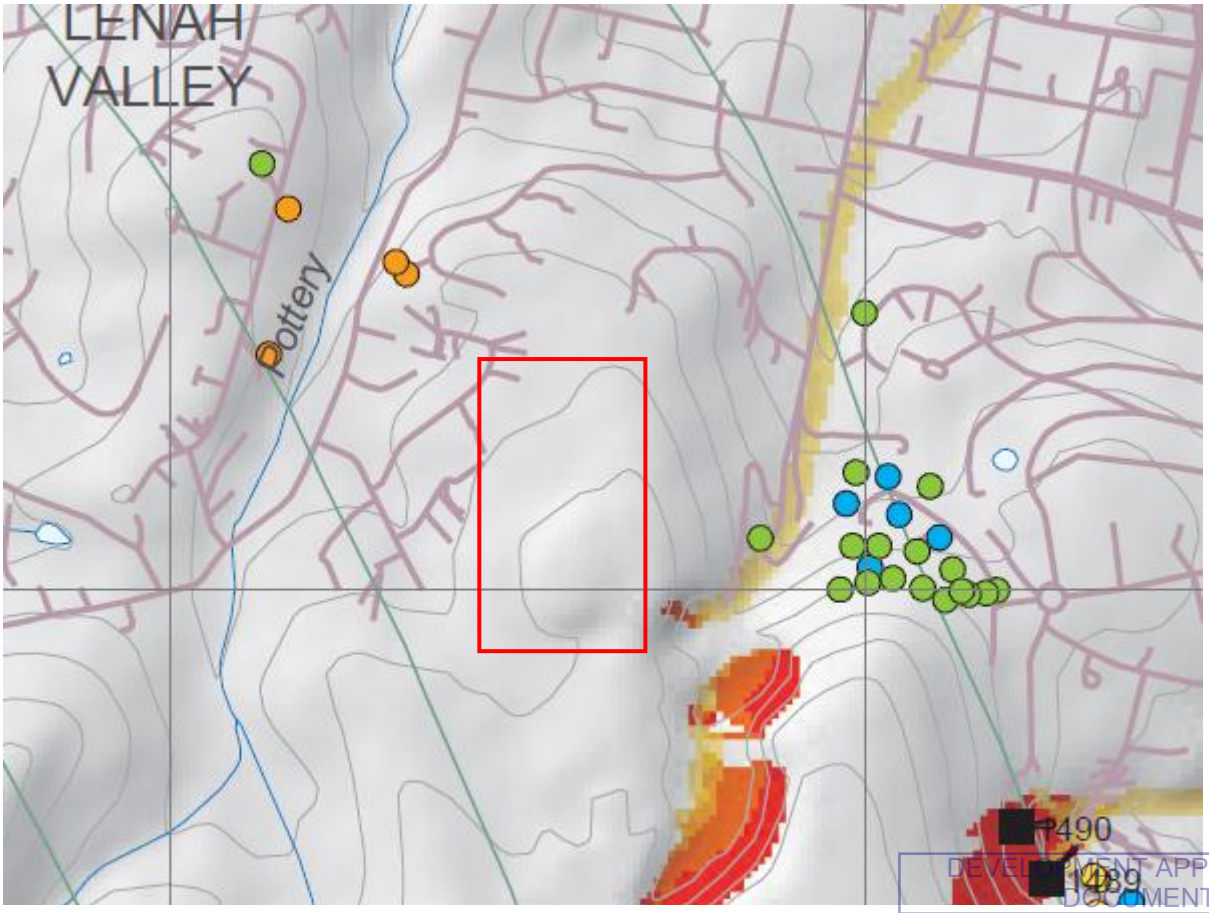


Figure 5 – Extract from debris flow hazard map (Mazengarb 2004)

Rock fall hazard

The site has been mapped as a potential rock fall hazard area on the western side of the quarry spoil deposits (see figure 6 & 7). Given the age of the spoil deposit (>30 years), the established vegetation, and lack of evidence of recent mass movement, there is a low risk associated with construction down slope of the spoil provided adequate management measures are implemented (see appendix 3). In particular, specific care should be taken to ensure the possible risk from liberated boulders is addressed. Site management should address adequate setbacks from the base of the batter slope to any development, the maintenance of the existing arrestor bed at the base of the slope, the provision of fencing to exclude access and catch loose rock and vegetation management to maintain slope stability.

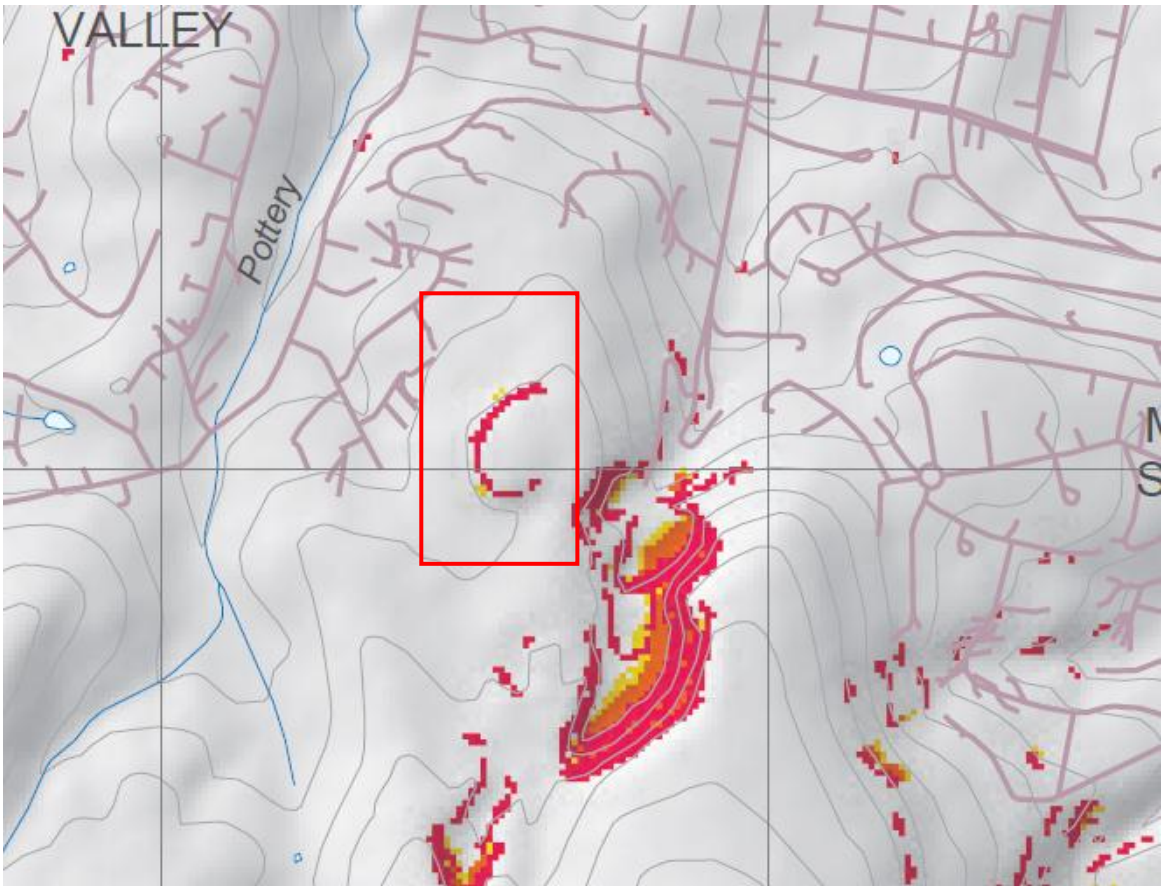


Figure 6 – Extract from rock fall hazard map (Mazengarb 2004)

Figure 7 – View of the slope of the quarry spoil deposits with established vegetation

Potential for foundation movement

The moderate slope and presence of high reactivity clay subsoils must be considered in the design of the footings, but both factors do not preclude the design of serviceable footings. In particular, the depth (maximum 0.7m) and low plasticity of the underlying weathered gravels impart a low risk of significant ground surface movement from moisture variation on the site. Given the slope morphology of the site careful attention should be paid to surface drainage, with upslope drainage of any construction area recommended. Therefore, provided that footings are designed in accordance with recommendations for clay sites in AS2870-2011 the geotechnical risk relating to potential foundation movement is low and acceptable. I do however stress that attention should be paid to suitable backfill surrounding footings, articulation in the buildings, and drainage to avoid water accumulation in the foundation area (in line with recommendations in AS2870-2011 and CSIRO BTF-18).

Figure 7 – Excavation of typical soils on site – note shallow depth to weathered dolerite

Potential for vegetation removal to cause instability & erosion

There are sparse scrub/trees present on site, the removal of which is likely to have a small effect upon surface soil stability. Therefore, the risk of site instability and erosion from vegetation removal is low and acceptable. However, the risk of soil erosion should not be ignored either, such that I recommend standard Soil and Water Management Planning (SWMP) is undertaken prior to any earthworks.

Potential for runoff/flooding to cause instability

Given the sloping nature of the site there is a small potential for excess water flow onto the site to cause shallow seated instability if the construction does not make allowance for appropriate drainage. At present there are no formal drainage structures in place to divert surface water flows from the access or the driveway should the need arise in extreme weather events. Therefore consideration should be given to drainage controls during the detailed design phase of the project prior to building/plumbing approvals.

Geotechnical Risk Assessment

The following quantitative risk assessment is based upon the Australian Geomechanics Society Sub-committee report (March 2007) Landslide Risk Management Concepts and Guidelines. The risk assessment has been undertaken for the most limiting hazard identified for the site – potential for rock fall on the batter slopes of the quarry spoil.

Landslide Risk Management Model

Adapted from AGS Sub-committee (March 2007) Landslide Risk Management Concepts and Guidelines.

Date 25/07/2011
Site 25 Copley Road, Lenah Valley
Project Proposed residential dwelling
Scoping Residential dwelling on Jurassic dolerite with slope angle 5-10^{o}
Hypothetical Shallow (<2m deep) rock slide develops in the batter slope of quarry spoil
Hazard and risk to be quantified.

1. **Hazard Identification**
   - **a. Type of potential instability** — Rock/debris slide or fall
   - **b. Location** — Up-slope of proposed dwellings
   - **c. Estimated area affected(m^2)** — 50 (5m across and 10 m downslope)
   - **d. Estimated volume (m^3)** — 50 (surface of rock slope 1 m deep)
   - **e. Initiating event(s)** — Extreme heavy/prolonged rainfall
   - **f. Estimated velocity of movement** — Fast (5 x 10^{-1} mm/sec)
   - **g. Estimated travel distance** — 10m

2. **Frequency Analysis**
   - **a. Estimated frequency of event (P_H)** — 0.005 (1 in 200 yr event)
   - **b. Justification of frequency** — Stability of sediments on site & batter slopes

3. **Consequence Analysis**
   - **a. Element at risk** — Property, services & occupants
   - **b. Value at risk (E)** — $300 000 (dwelling)
   - **c. Temporal probability ($P_{T:S}$)** — 0.5 (probability of occupation)
   - **d. Property vulnerability ($V_{P:S}$)** — 0.10 (proportion of property value lost)
   - **e. Probability of effect ($P_{S:H}$)** — 0.10 (probability of debris affecting building)
   - **f. Human vulnerability ($V_{D:T}$)** — 0.001 (probability of loss of life)

4. **Quantitative Risk Calculation**
   - **a. Property [$Rprop = (P_H) \times (P_{S:H}) \times (V_{P:S}) \times (E)$]** = $15 (annual loss of dollar value)
   - **b. Loss of life [$R_{DI} = (P_H) \times (P_{S:H}) \times (P_{T:S}) \times (V_{D:T})$]** = 2.5 x 10^{-7}

5. **Semi-quantitative risk estimation for property**
   - **a. Likelihood of event** — Level D- Unlikely (v. adverse conditions req)
   - **b. Consequence to property** — Level 4 – Minor (limited damage)
   - **c. Combined level of risk** — Low – risk acceptable

6. **Sensitivity Analysis**
   Most uncertainty surrounds frequency of event (item 2a)

7. **Risk Evaluation (should the risk be accepted, reduced, avoided or rejected?)**
   From the assessment in 4a&4b the risk to life and property is acceptable

8. **Risk Treatment**
   - **a. Options**
     - **Accept risk** — Recommended
     - **Avoid risk**
     - **Reduce likelihood** — Yes – Rock Fall Management Plan
     - **Reduce consequences** — Yes – Arrestor Bed at base of batter slope
     - **Transfer**
   - **b. Treatment Plan**
     Appropriately setback of any construction from the batter slope
     Installation of appropriate arrestor bed at base of batter slope
     Stormwater and wastewater correctly connected to council services
     Any site cuts to be adequately retained and fill minimised
   - **c. Implement Plan**
     Yes
   - **d. Monitoring**
     Project monitoring required – professional supervision of sensitive earthworks recommended

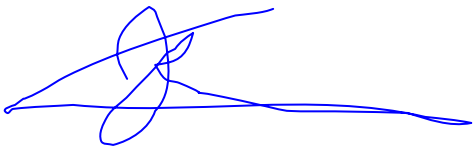
Conclusions

The geotechnical risk associated with residential development on the site is classified as **Low** according to *Australian Geomechanics Society* Guidelines and **minor** according to *AS1726-1993 Geotechnical Site Investigations.*

- The development is not expected to have any significant effect upon land stability on the subject or neighbouring properties.
- The risk of foundation instability is moderately low, but footing designs should ensure placement of foundations into competent underlying gravels/rock
- Specific care should be taken to ensure the possible risk from liberated boulders in the quarry spoil is addressed with site management of the existing vegetation, existing arrestor bed, and the installation of adequate fencing
- All earthworks on site must comply with AS3798-2007 and sediment and a sediment and erosion control plan should be implemented on site during and after construction

It is my opinion that the risk of land instability will not increase substantially as a result of the proposed development provided that current best practice for construction on sloping sites and soil and water management practices are followed.

I do however recommend that during construction that I and/or the design engineer be notified of any major variation to the foundation conditions as predicted in this report.



Dr John Paul Cumming B.Agr.Sc (hons) PhD CPSS GAICD
Environmental and Engineering Soil Scientist

Appendix 1 – Geotechnical risk assessment terminology

Geotechnical Risk Assessment – Example of Qualitative Terminology
Adapted from AGS Sub-committee (March 2007) Landslide Risk Management Concepts and Guidelines.

Qualitative Measures of Likelihood

Level	Descriptor	Description	Indicative Annual Probability
A	Almost Certain	The event is expected to occur	$> \sim 10^{-1}$
B	Likely	The event will probably occur under adverse conditions	$\sim 10^{-2}$
C	Possible	The event could occur under adverse conditions	$\sim 10^{-3}$
D	Unlikely	The event might occur under very adverse circumstances	$\sim 10^{-4}$
E	Rare	The event is conceivable only under exceptional circumstances	$\sim 10^{-5}$
F	Barely Credible	The event is inconceivable or fanciful	$\sim 10^{-6}$

Note: "~" means approximate

Qualitative Measures of Consequences to Property/Element at risk

Level	Descriptor	Description
1	Catastrophic	Structure completely destroyed or large scale damage requiring major engineering works for stabilization.
2	Major	Extensive damage to most of structure, or extending beyond site boundaries requiring significant stabilization works.
3	Medium	Moderate damage to some of structure, or significant part of site requiring large remedial works.
4	Minor	Limited damage to part of structure or part of sire requiring some reinstatement or remedial works.
5	Insignificant	Little damage or effect.

Note: The "Description" may be edited to suit a particular case.

Qualitative Risk Analysis Matrix – Level of Risk to Property/Element at Risk

Likelihood	Consequences to Property				
	1: Catastrophic	2: Major	3: Medium	4: Minor	5: Insignificant
A – Almost Certain	VH	VH	VH	H	M or L
B – Likely	VH	VH	H	M	L
C – Possible	VH	H	M	M	VL
D – Unlikely	H	M	L	L	VL
E – Rare	M	L	L	VL	VL
F – Not Credible	L	VL	VL	VL	VL

Risk Level Implications

Risk Level		Example Implications
VH	Very High Risk	Extensive detailed investigation and research, planning and implementation of treatment options essential to reduce risk to acceptable levels; may be too expensive and not practical
H	High Risk	Detailed investigation, planning and implementation of treatment option required to reduce risk to acceptable levels
M	Moderate Risk	Tolerable provided treatment plan is implemented to maintain or reduce risks. May be acceptable. May require investigation and planning of treatment options.
L	Low Risk	Usually acceptable. Treatment requirements and responsibility to be defined to maintain or reduce risks.
VL	Very Low Risk	Acceptable. Manage by normal site maintenance procedures.

Notes: (1) The implications for a particular situation are to be determined by all parties to the risk assessment; these are only given as a general guide.
(2) Judicious use of dual descriptors for likelihood, Consequence and Risk to reflect the uncertainty of the estimate may be appropriate in some cases

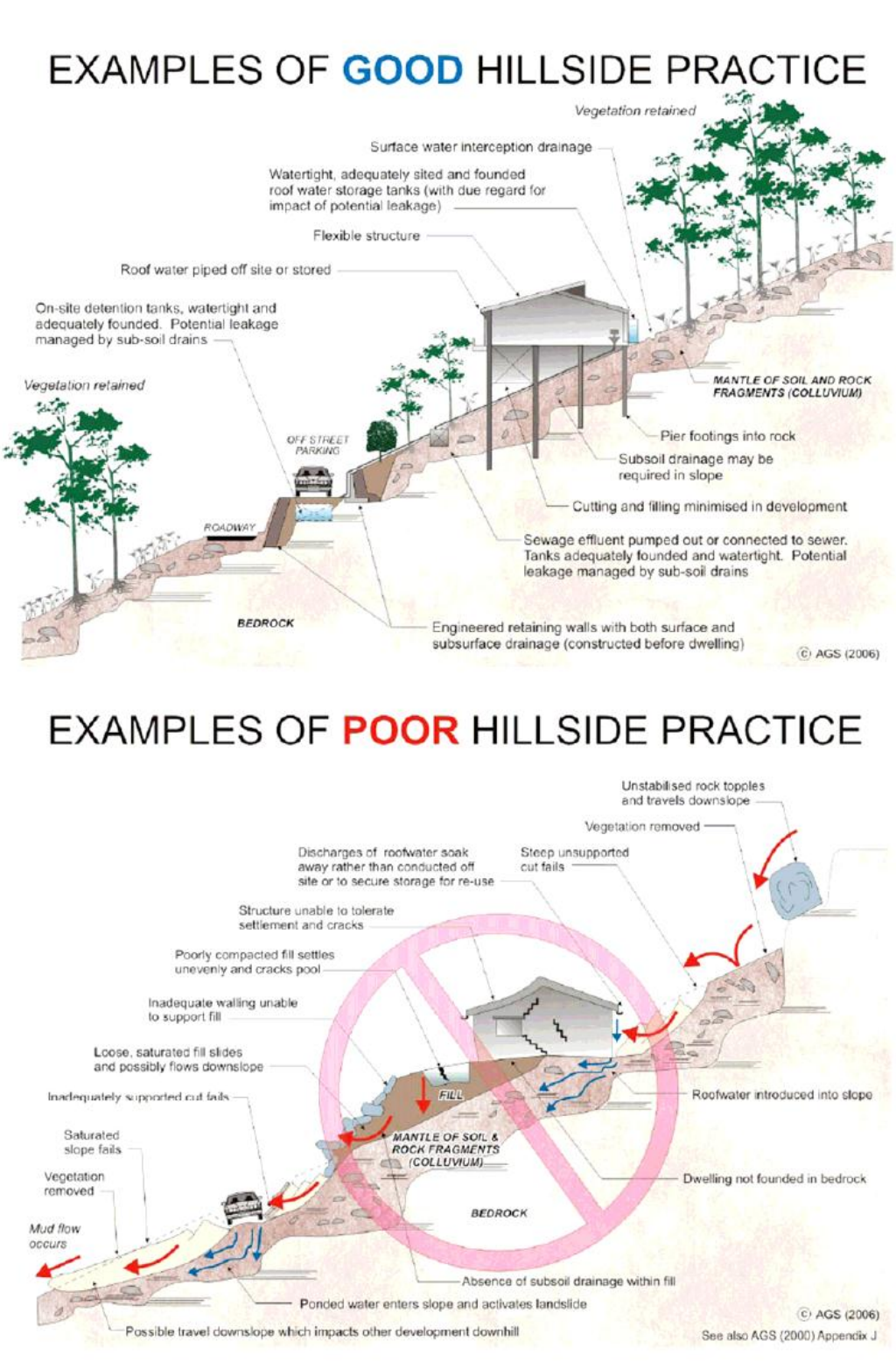
Appendix 2 – Guidelines for Hillside Construction

PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007

APPENDIX G - SOME GUIDELINES FOR HILLSIDE CONSTRUCTION

	GOOD ENGINEERING PRACTICE	*POOR ENGINEERING PRACTICE*
ADVICE		
GEOTECHNICAL ASSESSMENT	Obtain advice from a qualified, experienced geotechnical practitioner at early stage of planning and before site works.	Prepare detailed plan and start site works before geotechnical advice.
PLANNING		
SITE PLANNING	Having obtained geotechnical advice, plan the development with the risk arising from the identified hazards and consequences in mind.	Plan development without regard for the Risk.
DESIGN AND CONSTRUCTION		
HOUSE DESIGN	Use flexible structures which incorporate properly designed brickwork, timber or steel frames, timber or panel cladding. Consider use of split levels. Use decks for recreational areas where appropriate.	Floor plans which require extensive cutting and filling. Movement intolerant structures.
SITE CLEARING	Retain natural vegetation wherever practicable.	Indiscriminately clear the site.
ACCESS & DRIVEWAYS	Satisfy requirements below for cuts, fills, retaining walls and drainage. Council specifications for grades may need to be modified. Driveways and parking areas may need to be fully supported on piers.	Excavate and fill for site access before geotechnical advice.
EARTHWORKS	Retain natural contours wherever possible.	Indiscriminatory bulk earthworks.
CUTS	Minimise depth. Support with engineered retaining walls or batter to appropriate slope. Provide drainage measures and erosion control.	Large scale cuts and benching. Unsupported cuts. Ignore drainage requirements
FILLS	Minimise height. Strip vegetation and topsoil and key into natural slopes prior to filling. Use clean fill materials and compact to engineering standards. Batter to appropriate slope or support with engineered retaining wall. Provide surface drainage and appropriate subsurface drainage.	Loose or poorly compacted fill, which if it fails, may flow a considerable distance including onto property below. Block natural drainage lines. Fill over existing vegetation and topsoil. Include stumps, trees, vegetation, topsoil, boulders, building rubble etc in fill.
ROCK OUTCROPS & BOULDERS	Remove or stabilise boulders which may have unacceptable risk. Support rock faces where necessary.	Disturb or undercut detached blocks or boulders.
RETAINING WALLS	Engineer design to resist applied soil and water forces. Found on rock where practicable. Provide subsurface drainage within wall backfill and surface drainage on slope above. Construct wall as soon as possible after cut/fill operation.	Construct a structurally inadequate wall such as sandstone flagging, brick or unreinforced blockwork. Lack of subsurface drains and weepholes.
FOOTINGS	Found within rock where practicable. Use rows of piers or strip footings oriented up and down slope. Design for lateral creep pressures if necessary. Backfill footing excavations to exclude ingress of surface water.	Found on topsoil, loose fill, detached boulders or undercut cliffs.
SWIMMING POOLS	Engineer designed. Support on piers to rock where practicable. Provide with under-drainage and gravity drain outlet where practicable. Design for high soil pressures which may develop on uphill side whilst there may be little or no lateral support on downhill side.	
DRAINAGE		
SURFACE	Provide at tops of cut and fill slopes. Discharge to street drainage or natural water courses. Provide general falls to prevent blockage by siltation and incorporate silt traps. Line to minimise infiltration and make flexible where possible. Special structures to dissipate energy at changes of slope and/or direction.	Discharge at top of fills and cuts. Allow water to pond on bench areas.
SUBSURFACE	Provide filter around subsurface drain. Provide drain behind retaining walls. Use flexible pipelines with access for maintenance. Prevent inflow of surface water.	Discharge roof runoff into absorption trenches.
SEPTIC & SULLAGE	Usually requires pump-out or mains sewer systems; absorption trenches may be possible in some areas if risk is acceptable. Storage tanks should be water-tight and adequately founded.	Discharge sullage directly onto and into slopes. Use absorption trenches without consideration of landslide risk.
EROSION CONTROL & LANDSCAPING	Control erosion as this may lead to instability. Revegetate cleared area.	Failure to observe earthworks and drainage recommendations when landscaping.
DRAWINGS AND SITE VISITS DURING CONSTRUCTION		
DRAWINGS	Building Application drawings should be viewed by geotechnical consultant	
SITE VISITS	Site Visits by consultant may be appropriate during construction/	
INSPECTION AND MAINTENANCE BY OWNER		
OWNER'S RESPONSIBILITY	Clean drainage systems; repair broken joints in drains and leaks in supply pipes. Where structural distress is evident see advice. If seepage observed, determine causes or seek advice on consequences.	

PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007



Appendix 3 – Assessment of quarry spoil slope & rockfall hazard

GES
GEO-ENVIRONMENTAL
SOLUTIONS

Barry Marsh
25 Copley Road
Lenah Valley, 7008
11/07/2011

RE: Quarry Spoil Stability Assessment - 27 Cuthbertson Place, Lenah Valley

The above property was inspected on the 07/07/2011 to address any slope stability issues associate with the quarry spoil embankment.

The following observations were made:

- The dolerite fill comprises of mixed grain sizes from clay through to boulders. Based on the surficial inspection, is apparent that the dominant grain size is gravel, and the boulders and cobbles have separated to the margins when the material was emplaced.
- The cobbles and boulders are dominantly sub angular to subrounded in shape, however there are some rounded boulders apparent on the slope (Plate 1)
- Some of the boulders and cobbles have now been distributed along the toe of the slope to a height of up to 1.0 m, forming an arrester bed for any rock travel
- Shallow drainage channels have been incised along the sides of the rock fill deposit
- There is some minor rilling cutting the surface of the slope, with some localised gravel and fine sediment transport. Holes have formed within the slopes which are infilling with sediment and debris (Plate 2).
- The slope is largely vegetated with native shrubs a eucalypt species which are at least 30 years old.
- There is evidence of some recent rockslides where the vegetation is absent

The following conclusions were made:

- The pile is anticipated to have undergone the majority of its settlement.
- The rate of offsite rock movement is anticipated to have significantly reduced.
- Although there are no signs of rocks downhill of the slope since the arrester bed was put in place, it is anticipated that localised soil erosion will continue, which may increase the risk of rocks becoming dislodged from the slope.
- It is anticipated that the arrester bed alone may not be sufficient in stopping the momentum of large spherical rocks from migrating downslope.
- It is expected that localised rock topples and rockslides will continue to occur during high rainfall events when soil is scoured from the surface of the slope from overland flow.
- It recommended that additional measures be put in place to ensure that cobbles and boulders are captured before they migrate down the slope.

In order to stop continual rockfall, GES recommend the following:

- It is recommended that wire mesh or ring lock fencing is constructed at the base of the slope to arrest any rock boulders from downslope travel. The fencing should be erected at least 1.5 m high and at least 5 m downslope of the boulder arrester bed at the toe of the slope. The buffer zone is expected to populate with vines which will also be effective in reducing rock travel. Alternatively, native vegetation from the local area can be populated in the buffer zone.

Kind regards,

Kris Taylor B.Sc (hons)

Engineering Geologist

Plate 1 Localised soil erosion exposing rocks on the surface of the slope

Plate 2 Mix of angular to subrounded boulders on the slope