Structure Plan

Lots 1 & 2 Gay Street
Dianella

PREPARED FOR GAY STREET PROPERTY HOLDINGS PTY LTD

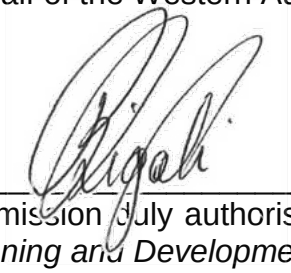
PREPARED BY ROBERTSDAY

OCTOBER 2020

This structure plan is prepared under the provisions of the City of Stirling Local Planning Scheme No. 3.

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON: **02 FEBRUARY 2021**

Signed for and on behalf of the Western Australian Planning Commission



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

_____ Witness

02 FEBRUARY 2021 Date

02 FEBRUARY 2031 Date of Expiry

TABLE OF MODIFICATIONS

Modification No.	Description of Modification	Endorsed by Council	Endorsed by WAPC

EXECUTIVE SUMMARY

This Structure Plan (SP) provides the statutory mechanism and supporting technical studies for the redevelopment and subdivision of Lots 1 (No. 2) and 2 (No. 10) Gay Street, Dianella (subject site). The SP will assist with fulfilling the State Government and City of Stirling's strategic direction in relation to housing supply and affordability. The SP is consistent with the City's strategic vision of a *"green leafy character dominated by trees, parks and bushland"* as outlined within the Dianella Local Area Plan.

The SP proposes a range of residential densities and provides for housing diversity to meet market and affordability demands. The SP also includes an east-west aligned public open space corridor providing direct connections to the surrounding areas.

The following Summary Table provides key planning outcomes of the SP:

Item	Data
Total area covered by the structure plan	5.08 ha
Area of each land use proposed: • Residential/Roads • Public Open Space/ Drainage • Balance Lot (Retained Vegetation)	 2.80 ha 0.73 ha 1.55 ha
Estimated lot yield:	37 Lots
Estimated number of dwellings	147 Dwellings
Estimated residential site density	40 Dwellings per site ha
Estimated population	426 people
Number of high schools	0
Number of primary schools	0
Estimated commercial floor space	0
Estimated number and % of public open space: • Local park	 0.713 ha (20.3%)
Estimated number and area of natural area and biodiversity assets	1.55 ha

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part one - statutory section

part two - explanatory section

appendices

01

part one: implementation

1.0 Structure Plan Area

This Structure Plan shall apply to Lots 1 (No. 2) and 2 (No. 10) Gay Street, Dianella being the land contained within the inner edge of the line denoting the structure plan boundary on the Structure Plan Map (Plan 1).

2.0 Operation

This structure plan shall come into operation on the date it is approved by the Western Australian Planning Commission (WAPC).

3.0 Staging

Staging of development will rely on key development parameters, primarily relating to the extension of available services from surrounding development.

4.0 Development and Subdivision

4.1 Land Use Permissibility

Land use permissibility within the Structure Plan area shall be in accordance with the corresponding zone or reserve under the Scheme.

4.2 Residential

4.2.1 Density

a. Plan 1 defines the broad residential density that applies to specific areas within the Structure Plan. Lot specific residential densities are to be subsequently assigned in accordance with a Residential Density Code Plan approved by the WAPC.

b. A residential Density Code Plan is to be submitted at the time of subdivision to the WAPC and shall indicate the Residential Density Coding applicable to each lot within the subdivision and shall be consistent with the Structure Plan, and the Residential Density Ranges identified on Plan 1.

c. The Residential Density Code Plan is to include a summary of the proposed dwelling yield of the subdivision.

d. Approval of the Residential Density Code Plan shall be undertaken at the time of determination of the subdivision application by the WAPC. The approved Residential Density Code Plan shall then form part of the Structure Plan and shall be used for the determination of future development applications. Variations to the residential Density Code Plan will require further approval of the WAPC.

e. Residential Density Code Plans are not required if the WAPC considers that the subdivision is for one or more of the following:

   i. The amalgamation of lots;

   ii. Consolidation of land for "super lot" purposes to facilitate land assembly for future development;

   iii. The purposes of facilitating the provision of access, services or infrastructure; or

   iv. Land which by virtue of its zoning or reservation under the Structure Plan cannot be developed for residential purposes.

4.3 Public Open Space

The provision of a minimum of 10 per cent public space being provided in accordance with the WAPC's Liveable Neighbourhoods. Public Open Space is to be provided generally in accordance with Plan 1, with an updated Public Open Space Schedule to be provided at the time of subdivision for determination by the WAPC, upon advice of the City of Stirling.

Table 1: Public Open Space

POS SITE	SIZE (HA)
POS 1	0.713ha

4.4 Movement Network

Access shall be provided generally in accordance with Local Road Reserves shown on the Structure Plan Map (Plan 1).

Where provided, pedestrian paths shall directly abut the property boundary.

4.5 Requirements Prior to Subdivision

Prior to the lodgement of subdivision applications to the WAPC, the following management plans are to be prepared, as applicable, to the satisfaction of the relevant authority and provided with the application for subdivision:

a. Public Open Space Schedule prepared in accordance with Liveable Neighbourhoods (City of Stirling & WAPC);

b. Residential Yield and Density Plan (City of Stirling & WAPC).

4.6 Conditions of Subdivision Approval

a. At the time of subdivision the following conditions may be recommended, as applicable, requiring the preparation and/or implementation of the following strategies:
   i. Geotechnical Report (City of Stirling); and
   ii. Landscaping and Drainage Management Plan (City of Stirling)
b. At the time of subdivision the City of Stirling shall recommend to the WAPC the implementation of the following strategy which has been prepared and approved as part of the Structure Plan as a condition of subdivision:
   i. Bushfire Management Plan.

4.7 Bushfire Management

This Structure Plan is supported by a Bushfire Management Plan (BMP). All development within the Structure Plan area shall have due regard to the requirements of the Bushfire Management Plan.

No future development should occur within areas classified as BAL-40 or BAL-FZ, in accordance with the Bushfire Management Plan.

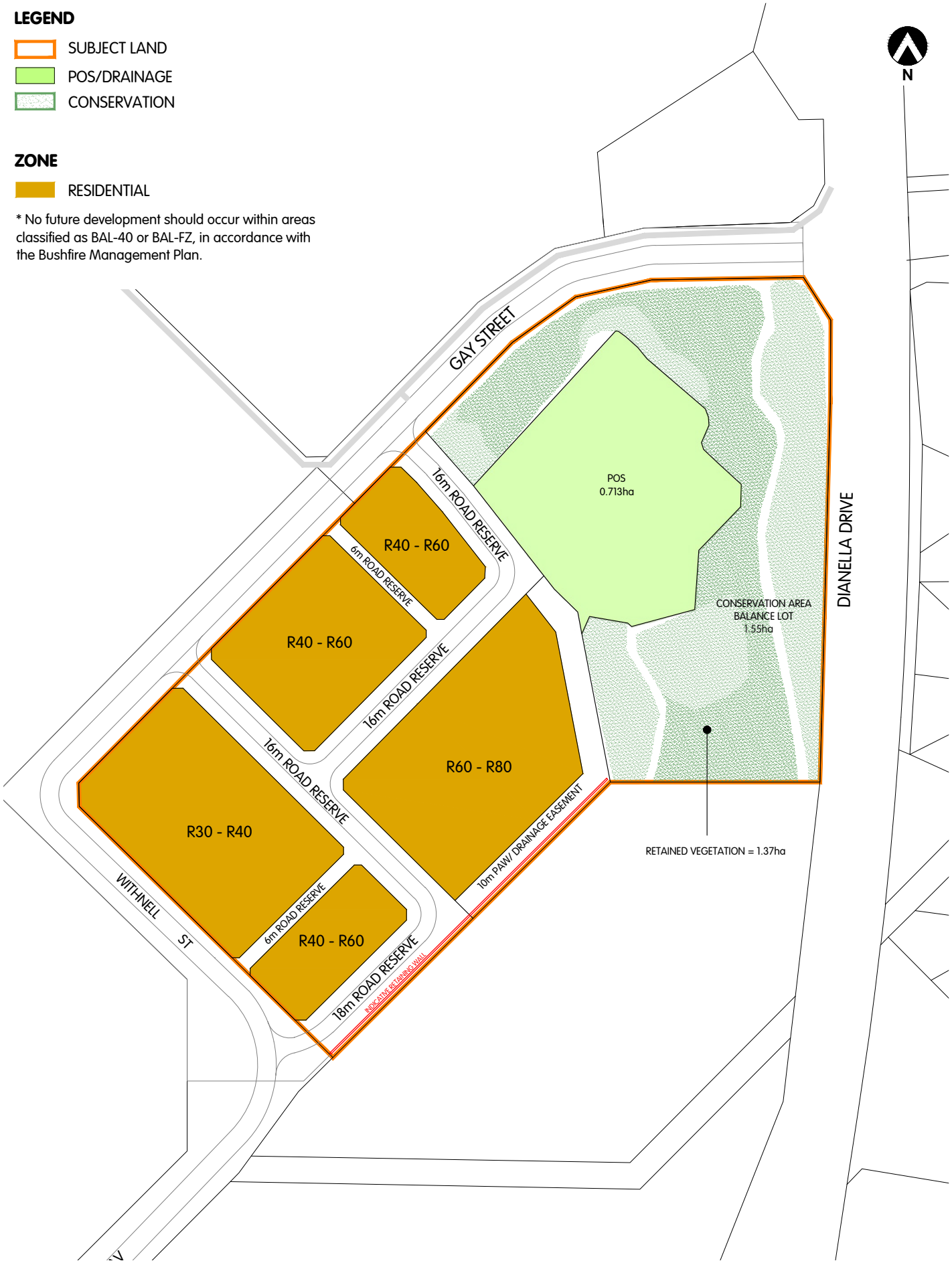
4.8 Local Development Plans

A Local Development Plan is to be prepared in accordance with Clause 47 of the Planning and Development (Local Planning Schemes) Regulations 2015, prior to any subdivision or development within the Structure Plan area, for lots affected by the following considerations:

a. Lots capable of accommodating grouped or multiple development
b. Lots with rear-loaded vehicle access;
c. Lots with direct boundary frontage (primary or secondary) to an area of Public Open Space; and
d. Lots subject to an APZ or otherwise deemed to be affected by a recognised Bushfire Hazard, as identified in the accompanying Bushfire Management Plan.

4.9 Conservation Lot

No development is permitted within the Conservation balance lot.



Plan 1: Structure Plan Map

great places

SIZE A4_1:2000

0 metres 20 40 60 80 100

LOCAL STRUCTURE PLAN

Lots 1 & 2 Gay Street, Dianella

City of Stirling

REF NO.	DRAW NO.	REV.
NIN DIA	**RD1 1024**	**F**

DISCLAIMER: ISSUED FOR DESIGN INTENT ONLY. ALL AREAS AND DIMENSIONS ARE SUBJECT TO DETAIL DESIGN AND SURVEY

02

part two:
explanatory report

01 Planning Background

1.1 Introduction and Purpose

This Structure Plan (SP) has been prepared by RobertsDay on behalf of Gay Street Property Holdings Pty Ltd, the legal proprietor of Lots 1 (No. 2) and 2 (No. 10) Gay Street, Dianella ('subject site').

The purpose of the SP is to facilitate the subdivision and development of the subject site for residential purposes.

1.2 Project Team

The Project Team consists of:

Consultant	Role
RobertsDay	Urban Design and Statutory Planning
Prichard Francis	Civil Engineering
RPS	Environmental
GTA	Traffic
Herring Storer Acoustics	Noise Assessment
Strategen JBS&G	Fire Management
PLAN E	Landscape Architecture

1.3 Land Description

1.3.1 History of the Site

The subject site forms part of the Dianella Media Precinct which previously contained the television studios and broadcasting infrastructure for Channels Seven, Nine and Ten.

Since early 2008, there has been increased interest in the relocation of the media businesses and redevelopment of the sites for residential purposes. Recognising this at the 10 November 2009 Council Meeting, the City of Stirling Council endorsed the Media Zones Development Procedure Statement. The statement is an advisory note which identifies a number of conditions and prerequisites for the rezoning and redevelopment of the precinct. In 2010 the Dianella Media Zones Precinct Plan (Draft) was released by the City of Stirling to provide more detailed analysis of the change in land use and detailed guidance on the rezoning and preparation of plans to cater for residential development, and associated open space and protection of environmental amenities.

In August 2011 the City of Stirling adopted Amendment No.3 to the Scheme to rezone the Channel Seven site to 'Residential' zone and introduced a 'Special Control Area' over the entire Media Precinct which requires future redevelopment within the Precinct to comply with the requirements of the Dianella Media Zones Precinct Plan. As outlined within this Plan, a prerequisite to the subdivision and development of the subject site was its rezoning to 'Development Zone' which was approved by the Stirling Council at its meeting on 19 February 2013 and forwarded to the Western Australian Planning Commission and granted final approval.

1.3.2 Location

The subject site is situated within the municipality of the City of Stirling, approximately 9.5 kilometres (km) north of central Perth and approximately 7kms east of the Stirling City Centre.

The subject site is approximately 1.2km south of Mirrabooka Square Shopping Centre. Direct access to the subject site is provided from Gay Street which extends along the northern boundary of Lot 1 and north-western boundary of Lot 2. Dianella Drive extends along the eastern boundary however no direct access is provided.

The Channel Seven site to the north-western side of Gay Street is zoned 'Residential' with a density of 'R30'. Lot 50 Gay Street to the north of the subject site is within a 'Parks and Recreation' Reserve and is earmarked as 'Bush Forever.' The Mount Yokine Reservoir to the west of the subject site is reserved 'Utility' whilst land immediately south of the subject site has been purchased by the State Government for bushland conservation.

The surrounding residential areas predominantly comprise of low density single dwellings. The Mirrabooka Senior High School and primary school are approximately 500m north-west of the subject site.

A major bus route extends along Dianella Drive from the Mirrabooka Regional Centre to the Perth Central Business District. A regional cycling route also extends along Dianella Drive. The intersection of Cottonwood Crescent and Dianella Drive to the immediate north of the subject site has been earmarked as a 'Proposed Light Rail Station' in the future.

Refer to Figure 1 – Location Plan.

Figure 1: Location Plan

1.3.3 Area and Land Use

Lot 1 is 2.23318ha and Lot 2 is 2.7404ha in size, resulting in a total area of 5.0787ha.

The subject site is currently vacant with some remnant vegetation, following the demolition of the television studio and administration buildings, transmission infrastructure and other fixtures associated with its previous use (refer to Figure 2).

1.3.4 Legal Description and Ownership

The SP area comprises Lots 1 and 2 Gay Street, Dianella. The subject site is legally described as follows:

- Lot 1 on Diagram 64079 of Certificate of Title Volume 1732 and Folio 194; and
- Lot 2 on Diagram 45395 of Certificate of Title Volume 1747 and Folio 409.

The 'Gay Street Property Holdings Pty Ltd' is the legal proprietor of the subject lots (refer to Appendix 1).

1.4 Planning Framework

1.4.1 Zoning and Reservations

In accordance with the provisions of the Metropolitan Region Scheme (MRS) the subject site is zoned 'Urban' (Figure 3).

In accordance with the City of Stirling Local Planning Scheme No.3 (LPS3), the subject site is zoned 'Development Zone' (Figure 4). The intent of the Development Zone is described as:

a. *"To provide for coordinated development through the application of a comprehensive structure plan to guide subdivision and development;*
b. *To avoid the development of land for purposes likely to compromise its future development for purposes, or in a manner likely to detract from the amenity or integrity of the area."*

The preparation of this SP is a prerequisite to the future development and subdivision of the subject site. The proposed SP is therefore consistent with the intent of the Development zone.

Figure 2: Aerial Plan (Nearmap August 2018)

Figure 3: MRS Zoning Plan

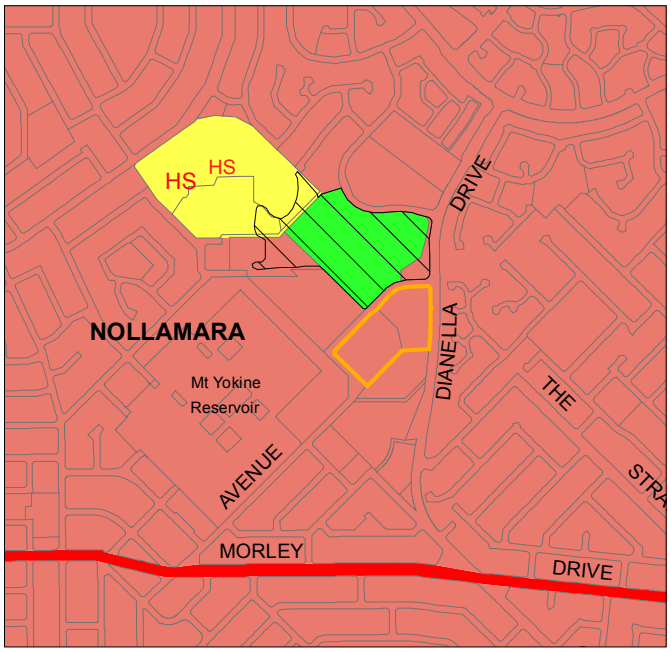
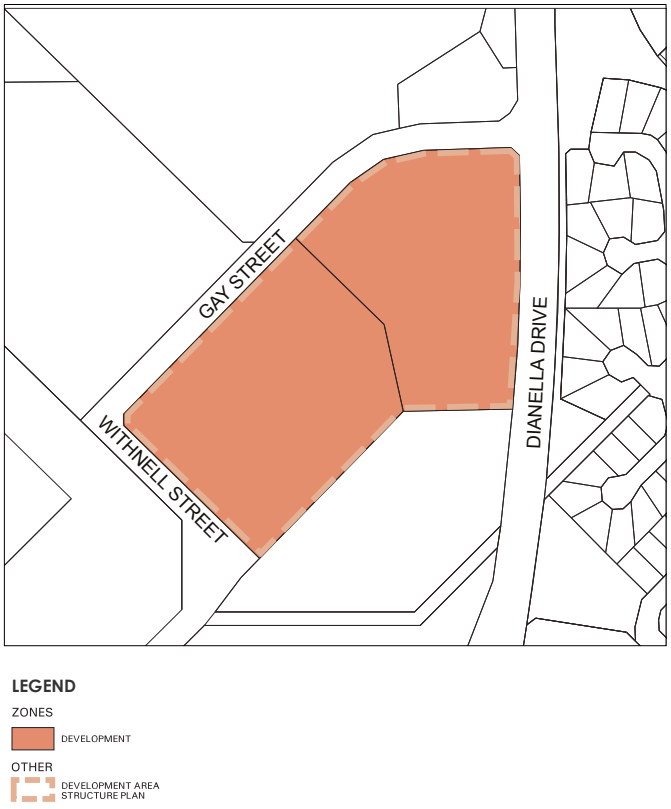


Figure 4: TPS Zoning Plan



1.4.2 Regional and Sub-Regional Structure Plan

1.4.2.1 Dianella Media Zones Precinct Plan and Redevelopment Procedure Statement

The Dianella Media Zones Precinct Plan ('Precinct Plan') was released in December 2010 to comply with the provisions of the Procedure Statement and provide guidance for the rezoning and planning for each site within the Precinct. The purpose of the Precinct Plan was to determine the extent and composition of urban development and outline bush protection areas, public open space, urban zones, development densities, built form guidelines and infrastructure provision.

The intent of the Precinct Plan is to:

- Facilitate development that is consistent with adopted state and local planning policies for the precinct;
- Promote conservation of environmentally significant areas;
- Deliver high quality sustainable outcomes in an integrated manner;
- Recognise the intentions and expectations of individual developer owners for their respective sites; and
- Ensure that community aspirations are appropriately considered.

The Precinct Plan proposes the redevelopment of the Media Zone predominantly for residential purposes. The Precinct Plan includes a preliminary Concept Plan over the site. Although the Precinct Plan provides only limited guidance on the future development of the site, the SP is consistent with the intent of the Plan and maintains similar connections to surrounding lots.

1.4.3 Planning Strategies

1.4.3.1 State Planning Strategy

The State Planning Strategy (1997) was prepared by the WAPC as a whole Government approach to guide sustainable land use planning throughout the State up until 2029. The Strategy is aimed at developing a land use planning system to help the State achieve a number of key goals. These include generating wealth, conserving and enhancing the environment, and building vibrant and safe communities for the enjoyment of current and subsequent generations of Western Australians.

1.4.3.2 Directions 2031 and Beyond – A Spatial Framework for Perth and Peel

Directions 2031 and Beyond provides the overarching strategic framework for the Perth and Peel Regions. A key element of Direction 2013 is the consolidation of existing urbanised areas to ensure efficient use of land and infrastructure.

The subject site is within the Central Sub-Region which is identified as requiring an additional 121,000 dwellings by 2031 in accordance with the 'connected city scenario'. Directions 2031 notes there is a need to introduce greater diversity in the new housing market to accommodate families. Directions 2031 seeks a 50% increase in the current average residential density to 15 dwellings per gross zoned hectare of land in new developments.

The SP proposes a density of 30 dwellings per gross zoned hectare and will contribute to meeting the forecast housing needs of the Central Sub-Region. Further to this, the SP will introduce much needed housing diversity to meet housing demand and accommodate more families.

1.4.3.3 Central Metropolitan Perth Sub-regional Strategy

The Central Metropolitan Perth Sub-regional Strategy ('CMPSRS') provides the strategic framework for the planning of urban growth consistent with Directions 2031. The City of Stirling is identified as requiring an additional 31,000 dwellings by 2031.

The CMPSRS identifies the 'Media Precinct' as having a projected dwelling yield of 700 dwellings representing an 85% take-up rate. Dianella is recognised as having potential densities of 10 dwellings per hectare and 19 persons per hectare.

The SP will facilitate the redevelopment of the subject site for residential purposes consistent with the CMPSRS and the need to meet the anticipated demand for housing by 2031.

1.4.3.4 City of Stirling Local Housing Strategy and Dianella Local Area Plan

The Local Housing Strategy acknowledges the growing shortage of both smaller and appropriately designed and priced dwellings within Perth and the City of Stirling. The Strategy identifies the need for statutory planning to facilitate the development of higher density dwellings in suitable locations close to activity centres and high frequency transit routes.

The Dianella Local Area Plan was prepared by the City of Stirling and notes the community vision for the area is a *"green leafy character dominated by trees, parks and bushland."*

Within the 'Dianella Local Area Future Opportunities' Plan the subject site is highlighted as 'Media Precinct: unique economic and conservation role.' Dianella Drive to the east of the subject site is shown as needing the installation of cycle lanes or dual use paths.

With regard to the subject site, it is identified as a desirable location for medium to high density residential development provided this is balanced with bushland conservation. The Plan notes that increased density would be desirable to allow more people access to community amenities, to meet sustainability objectives and to support larger commercial centres.

The proposed SP is consistent with the Strategy and will facilitate a range of housing types including small to medium sized single dwellings, grouped dwellings and multiple dwellings.

1.4.3.5 *City of Stirling Public Open Space Strategy*

The City's Public Open Space ('POS') Strategy provides guidance for the continued provision of POS to all residents within the City. It provides guidance for the location and accessibility of open space, recognising different categories of open space (passive, active, conservation). The objectives and principles of the POS Strategy have been considered during the design of the SP.

1.4.3.6 *Integrated Transport Strategy*

The City's Integrated Transport Strategy provides a strategic approach to transport by integrating land use and transport planning, pedestrian amenity, cyclist amenity, public transport, parking and demand management, policy and travel behaviour. The key objectives of the Strategy are:

- To encourage more sustainable transport of people and goods;
- To enable efficient movement of people and goods;
- To improve accessibility for pedestrians, cyclists and public transport users to a variety of destinations ;
- To equitably provide for transport needs throughout the community; and
- To encourage public transport modes over private transport modes.

The Mirrabooka Regional Centre is identified as a future Train Station under the City's Public Transport Wish List. The proposed SP will contribute to an increased number of housing stock, thus providing opportunities for increased public transport usage and resultant investment.

1.4.4 Policies

In assessing planning and development proposals, local and state government must have due regard for any relevant Statements of Planning Policy ('SPP') which are prepared and adopted by the WAPC or Local Planning Policies ('LPP') prepared by the City of Stirling. SPPs and LPPs relevant to the future subdivision and development of the subject site are provided below.

1.4.4.1 *Statement of Planning Policy 2.8 – Bushland Policy for the Perth Metropolitan Region*

Statement of Planning Policy 2.8: Bushland Policy for the Perth Metropolitan Region (SPP2.8) provides a policy and implementation framework to ensure bushland protection and management is appropriately addressed and integrated with broader land use planning and decision-making.

The subject site is immediately south of a 'Bush Forever Reserve' as recognised within SPP 2.8. The proposed development of the subject site is not considered to have an adverse impact on the Bush Forever Site. Provision has been made within the SP design for a POS and Public Access Way (PAW) to provide a suitable transition between development and Bush Forever areas.

1.4.4.2 *SPP No. 3 – Urban Growth and Settlement*

SPP 3 establishes the principles for urban growth in Western Australia to ensure that future development is undertaken in a sustainable manner including the provision of a variety of housing types and infrastructure to service the urban growth.

The subject site is located within an existing urban area and is within close proximity to the Mirrabooka District Shopping Centre, an important employment node, and the educational establishments of the Mirrabooka Primary and High Schools. There is good access to public transport as well as local and regional recreation facilities. The proposed SP accordingly meets the development criteria outlined within this Policy.

1.4.4.3 *SPP No. 3.1: Residential Design Codes*

The Residential Design Codes ('R-Codes') provide a comprehensive basis for the control of residential development throughout Western Australia. The SP proposes a range of densities at the subject site including R25, R30, R40, R50 and R60 in order to facilitate a variety of housing products and affordability options. Provision has been made for a mix of single, grouped and multiple dwellings at the subject site. Development provisions within the R-Codes will be adopted to guide development at the subject site except where it is otherwise specified within the SP or DAP.

2.1 Biodiversity and natural area assets

The subject site contains some remnant vegetation, mainly over the northern portion of the site. A Level 1 Flora and Vegetation Survey was undertaken by RPS on behalf of the landowner in October 2008 (refer to Appendix 2).

In accordance with an agreement reached with the Environmental Protection Authority, the Structure Plan retains a Threatened Ecological Community (TEC) in a 1.55ha conservation lot that will be retained in the ownership of Gay Street Property Holdings Pty Ltd.

2.2 Landforms and Soils

The subject site has a gentle slope form 65m AHD in the south-western corner to 57m and 60m AHD in the east and north-east respectively. Accordingly there is a level difference of approximately 6m between the subject site and Dianella Drive. The elevation of the subject site offers opportunities for views across surrounding neighbourhoods and to the Darling Scarp.

An analysis of services and civil engineering requirements to facilitate development was undertaken by Pritchard Francis (refer to Appendix 3). The report states that the majority of the site is low risk for Acid Sulfate Soils (ASS) and the site is not included on the Department of Environment Regulation (DoER) database of contaminated sites.

2.3 Groundwater and surface water

An analysis of the SP area confirms there are no wetlands identified on the DoER's Geomorphic Wetlands Swan Coastal Plain dataset as being located either on or adjacent to the site and groundwater is at a level of 24-25m AHD. Given there are no constraints relating to groundwater and surface water at the subject site, the Department of Water (DoW) has confirmed that water monitoring would not be necessary to progress development at the subject site. More specifically, the DoW confirmed that it would not be necessary to prepare a Local Water Management Strategy (LWMS) for the SP nor an Urban Water Management Plan (UWMP) as part of the subdivision of the subject site (refer to Appendix 4).

2.4 Heritage

A review of the Aboriginal Heritage Enquiry System and City of Stirling Heritage List confirmed there are no 'Registered Aboriginal Sites' or 'Other Heritage' sites within or surrounding the SP area.

03 Land use and subdivision requirements

3.1 Land use

The SP proposes to develop the site for predominantly residential purposes (refer to Plan 1 and Figure 5). A range of residential densities from R30 to R80 as well as housing typologies are proposed to meet market and affordability demands.

An open space corridor is proposed to extend through the centre of the site to provide direct connections with existing and future residential development, the bush forever site to the north-west as well as the public transport opportunities available along Dianella Drive to the east.

The internal street network is predominantly grid-like, following the existing curve of Gay Street. Two points of direct access are proposed from Gay Street and Withnell Street.

The proposed SP is consistent with the existing State and Local Government planning framework over the site and will contribute to meeting the forecast housing demand for the City of Stirling.

An overview of the SP and its key elements is provided in the table below:

Item	Data
Total area covered by the structure plan	5.08 ha
Area of each land use proposed: • Residential/Roads • Public Open Space/ Drainage • Balance Lot (Retained Vegetation)	 2.80 ha 0.73 ha 1.55 ha
Estimated lot yield:	37 Lots
Estimated number of dwellings	147 Dwellings
Estimated residential site density	40 Dwellings per site ha
Estimated population	426 people
Number of high schools	0
Number of primary schools	0
Estimated commercial floor space	0
Estimated number and % of public open space: • Local park	 0.713 ha (20.3%)
Estimated number and area of natural area and biodiversity assets	1.55 ha

Figure 5: Structure Plan Indicative Concept Plan

Legend

1. Landscaped internal street network with dense tree planting and reduced corner radii
2. Internal foothpaths set back from kerb aligned to property boundary
3. Retained boundary interface for drainage and servicing
4. POS incorporating drainage, central grassed area and planted buffer to conservation area
5. Landscaped Pedestrian Access Way with drainagage easement
6. Multiple dwelling development with direct unit entries at street level

3.2 Open Space

The proposed open space has been strategically located to provide opportunities for passive and active recreation, drainage and tree retention whilst integrating with areas of conservation vegetation. A significant amount of POS is provided, exceeding 20% of subdivisible area in addition to a significant conservation area.

The proposed POS within the conservation cell together with the landscaped Public Access Ways (PAW) fronting an existing Bush Forever reserve to the south of the site provide a functional and interconnected network of passive and active spaces for residents of the site and the surrounding neighbourhood.

Higher density (R60-R80) multiple dwellings are proposed to overlook the PAW to improve passive and active surveillance of the space for users.

As demonstrated within the following POS schedule, a total area of 0.713 ha is proposed to be retained for POS which is consistent with the minimum 10% POS provision as prescribed by Liveable Neighbourhoods.

Structure Plan Area				
Total Site Area				5.08 ha
Deductions				
Conservation Area			1.55 ha	
Dedicated Drainage (1:1)			0.017 ha	
Gross Subdivisible Area (GSA)				3.51 ha
Public Open Space @ 10% of GSA May Comprise :				
Minimum 80% unrestricted public open space Maximum 20% restricted use public open space			0.281 ha 0.07 ha	0.351 ha
Public Open Space Contribution				
	Total Area (ha)	Unrestricted (ha)	Restricted (ha)	Dedicated Drainage (ha)
POS 1	0.713	0.685	0.028	0.017
Total Open Space Provision				**0.713 ha (20.3%)**

Management of the POS will be the responsibility of the City of Stirling following a two year maintenance period by the developer. Further detailed design of the POS will be undertaken at the subdivision stage.

Figure 6: Landscape Concept Plan

3.3 Residential

The SP proposes a range of residential densities including R30, R40, R60 and R80 in order to facilitate diversity and accommodate a variety of demographics and housing typologies.

The SP proposes the following composition of lots:

- Lower density (R30-40) single dwelling lots in the southernmost corner of the site;
- Medium density (R40-R60) single residential terrace lots and the northern multiple dwelling site; and
- Higher density (R60-80) at the southern multiple dwelling site that will be screened from adjacent roads and residential areas by lower density development and existing vegetation.

Residential densities within the specified ranges will be determined at subdivision through the submission of a Residential Density Code Plan.

The SP proposes 40 dwellings per Urban zoned hectare which is consistent with the Perth and Peel @ 3.5 million target of 15 dwellings per Urban zoned hectare.

Lots are predominantly orientated to maximise views across POS and the existing Bush Forever Sites within the constraints of the existing road network and resultant SP design.

3.4 Movement Networks

3.4.1 Street Hierarchy and Network

The hierarchy of streets within and adjacent to the SP is based on the hierarchy defined within Liveable Neighbourhoods. The proposed design provides for a permeable, interconnected road network that provides ease of movement for pedestrians, cyclists and motorists within the SP area.

The proposed internal street network is consistent with the existing alignment of Gay and Withnell Streets. The street network will be developed with regular intersections to allow a high level of accessibility for pedestrians, cyclists and vehicles.

The provision of a Pedestrian Accessway along the southern site boundary provides the opportunity to strengthen the pedestrian network by connecting the footpaths along Gay Street and Hays Avenue and internal streets to the surrounding Bush Forever reserves.

Further detailed design of the local road network will be refined through the subdivision design process. The road design will be consistent with the City of Stirling's servicing requirements, particularly with regard to accommodating rubbish collection services whilst satisfying safety requirements.

3.4.2 Vehicle Access

Access to the site is proposed via intersections on Gay Street and Withnell Street. The latter intersection is proposed to be higher order with 18m road reserve designed to cater for carriageways intersecting Withnell Street and accommodate retaining. There is one laneway proposed to intersect with Withnell Street in the south-west corner of the site.

The Traffic Statement prepared by GTA Consultants in August 2019 (Appendix 5) confirms access arrangements are suitable from a traffic management perspective and indicates areas where embayed visitor parking may be located.

Parking is proposed to be provided on each lot for residential parking consistent with the Residential Design Codes. Visitor parking will be available within driveways of single front-loaded dwellings, on-street and adjoining the POS.

3.4.3 Traffic Volumes

The Traffic Assessment found that both Dianella Drive and Gay Street are expected to have traffic volumes that should not exceed the maximum traffic flows for similar roads of its type. The traffic volumes should be approximately half for roads of these types as a result of developing the subject site. Traffic on Dianella Drive is expected to increase by an insignificant amount. Traffic volumes on Gay Street are forecast to increase by approximately 900 vehicles per day which will not exceed the maximum traffic flow for Gay Street.

3.4.4 Public Transport

Dianella Drive currently accommodates high frequency Bus Routes 67 and 68, which run between Mirrabooka Bus Station and the Perth CBD every 10-15 minutes in peak periods. The nearest stops are located on Dianella Drive on the north side of Gay Street, with the first approximately 30m from the intersection, and the second approximately 200m south of Gay Street. These are approximately 250m to 100m respectively from the proposed development equating to 1-3 minute walking time via a combination of Gay Street, the POS and PAWs within the development.

3.4.5 Pedestrian and Cycle Access

Dianella Drive is currently serviced by a 2.4m wide shared path to the western side and a 1.2m wide footpath to the eastern side which are connected to other paths north and south of the subject site to provide access to established residential development (refer to Figure 7).

A new footpath has been constructed on Gay Street as part of the Seven Hills development which provides suitable connectivity to Dianella Drive (refer to Figure 7).

3.4.6 Service Vehicles

Service Vehicles are expected to enter the site from Gay Street and traverse through the site to then re-enter Gay Street in a forward gear. The type of vehicles expected to access the site would not exceed the size of an 12.5m long rubbish truck. Rubbish will be collected from the site by rubbish trucks servicing bins placed in front of each lot. There will be no need for trucks to undertake a three point turn.

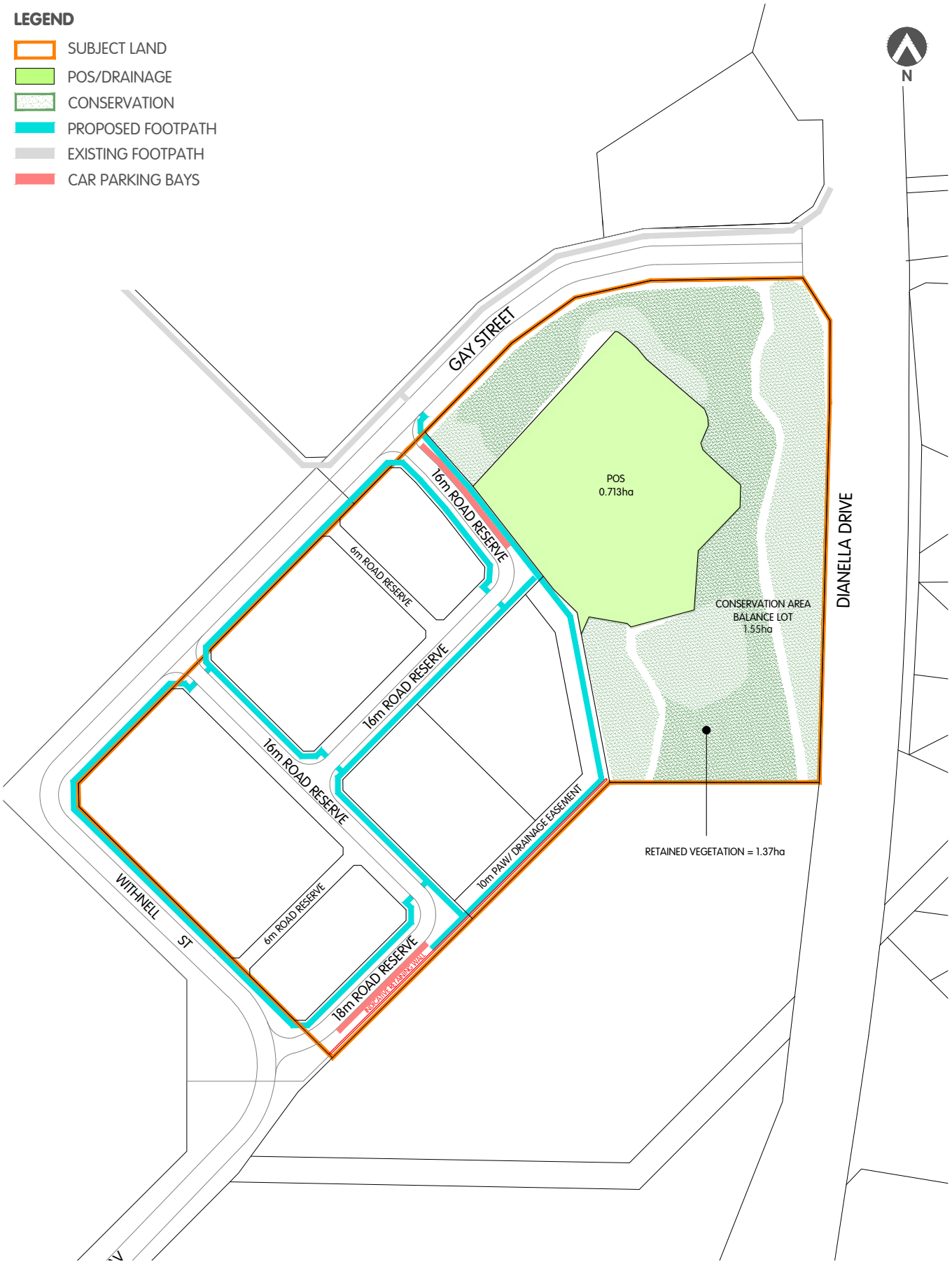


Figure 7: Cycle / Footpath Plan

3.5 Noise Management

A Noise Impact Assessment prepared by Herring Storer Acoustics (July 2019) has been prepared in support of the SP (refer to Appendix 6). The assessment confirms that noise received to the subject site would comply with State Planning Policy 5.4 and therefore no further action or noise mitigation through building design is required.

3.6 Bushfire Hazard

A Bushfire Management Plan has been prepared by Strategen JBS&G (October 2019) in accordance with 'Planning for Bush Fire Protection Guidelines Edition 2' (refer to Appendix 7), confirming the suitability of the site for development from a bushfire risk perspective.

The BMP demonstrates that proposed management measures achieve compliance with the bushfire protection criteria and in accordance with the Guidelines.

3.7 Water Management

In December 2012, the Department of Water confirmed that neither a Local Water Management Strategy nor an Urban Water Management Plan would be required to form part of the Structure Plan or a condition of subdivision respectively (refer to Appendix 4).

3.8 Education Facilities

The subject site is approximately 600m south-east of the existing Mirrabooka Senior High School.

3.9 Activity Centres and Employment

The subject site is 1km south of the Mirrabooka Square Shopping Centre which is classified as a 'Secondary Centre' within Statement of Planning Policy 4.2: Activity Centres for Perth and Peel (SPP4.2). The existing centre will provide essential services, community facilities and employment opportunities for future residents within the SP area.

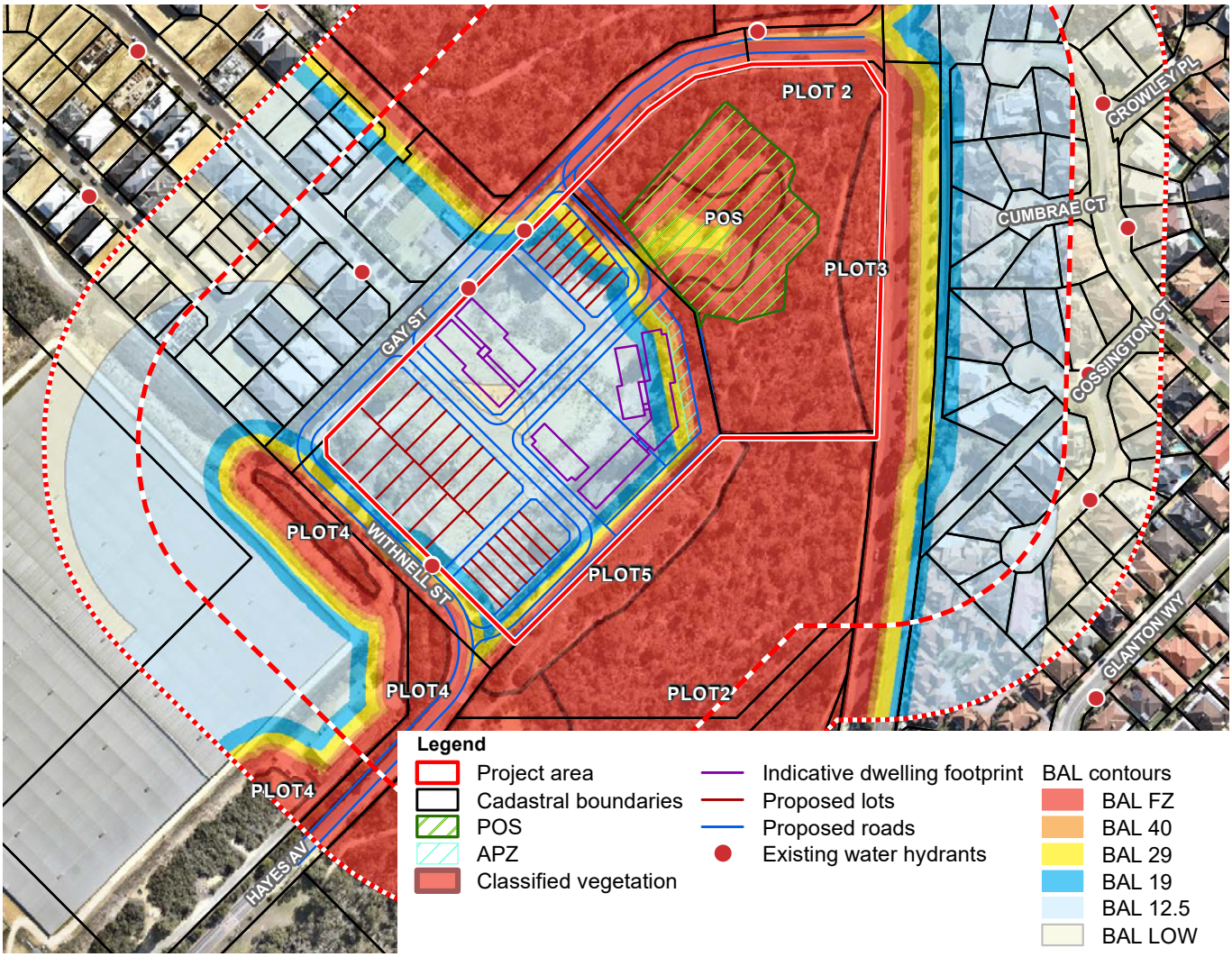


Figure 8: BAL Contour Plan

3.10 Infrastructure Coordination, Servicing and Staging

An Engineering Services Report prepared by Pritchard Francis (July 2019) has confirmed that there are no major impediments to the future development of the subject site (refer to Appendix 3). The report notes:

- Sewer: The Water Corporation has indicated that the development can be served from an existing system on the east of Dianella Drive. A 225mm diameter sewer main will need to be installed under Dianella Drive and connected to the existing system;
- Water Reticulation: The Water Corporation has indicated the development can be served by the existing infrastructure without any upgrading of the existing system;
- Electrical Reticulation: There is capacity to provide power to the site, subject to provision of necessary infrastructure within the subject site. The infrastructure required will depend on advice received from Western Power;
- Communications: Correspondence with NBN Co. indicated the site is located within the Fibre Footprint and that the development is eligible for fibre broadband infrastructure;
- Gas Supply: Correspondence with ATCO Gas Australia has confirmed the existing 100mm Gas Main in Dianella Drive has capacity to service the proposed development and therefore no upgrades are required;
- Stormwater: The report includes a Stormwater Drainage Strategy which notes that stormwater drainage will need to be managed in accordance with City of Stirling requirements. Existing drainage infrastructure for the site will be retained onsite where possible. More detail on the management of stormwater will be determined at time of subdivision.

The Engineering Services Report confirms the site is accessible and can be adequately serviced with electrical, water, sewer, gas, stormwater drainage and communications infrastructure.

appendix 01

Certificate Title

WESTERN AUSTRALIA

REGISTER NUMBER	
1/D64079	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
1	9/10/2013

VOLUME 1732 FOLIO 194

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 1 ON DIAGRAM 64079

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

GAY STREET PROPERTY HOLDINGS PTY LTD OF TELEVISION AVENUE, MOUNT SAINT THOMAS, NEW SOUTH WALES

(T M416299) REGISTERED 27/9/2013

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. THE RIGHT TO MINES OF COAL OR OTHER MINERALS BEING EXCLUDED FROM PORTION OF THE SAID LAND
2. THE LAND THE SUBJECT OF THIS CERTIFICATE OF TITLE EXCLUDES ALL PORTIONS OF THE LOT DESCRIBED ABOVE EXCEPT THAT PORTION SHOWN IN THE SKETCH OF THE SUPERSEDED PAPER VERSION OF THIS TITLE. VOL 1732 FOL 194.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	1732-194 (1/D64079)
PREVIOUS TITLE:	1647-637
PROPERTY STREET ADDRESS:	2 GAY ST, DIANELLA.
LOCAL GOVERNMENT AUTHORITY:	CITY OF STIRLING

LANDGATE COPY OF ORIGINAL NOT TO SCALE 14/11/2019 04:19 PM Request number: 60050060

Landgate
www.landgate.wa.gov.au

WESTERN AUSTRALIA

REGISTER NUMBER	
2/D45395	
DUPLICATE EDITION	DATE DUPLICATE ISSUED
1	9/10/2013

VOLUME 1747 FOLIO 409

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 2 ON DIAGRAM 45395

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

GAY STREET PROPERTY HOLDINGS PTY LTD OF TELEVISION AVENUE, MOUNT SAINT THOMAS, NEW SOUTH WALES

(T M416299) REGISTERED 27/9/2013

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. THE RIGHT TO MINES OF COAL OR OTHER MINERALS BEING EXCLUDED FROM PORTION OF THE SAID LAND
2. *H923088 CAVEAT BY OPTUS MOBILE PTY LTD AS TO PORTION ONLY. LODGED 9/11/2001.
3. *H923089 CAVEAT BY OPTUS MOBILE PTY LTD AS TO PORTION ONLY. LODGED 9/11/2001.
4. *H923090 CAVEAT BY OPTUS MOBILE PTY LTD AS TO PORTION ONLY. LODGED 9/11/2001.
5. *H923091 CAVEAT BY OPTUS MOBILE PTY LTD AS TO PORTION ONLY. LODGED 9/11/2001.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
* Any entries preceded by an asterisk may not appear on the current edition of the duplicate certificate of title.
Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: 1747-409 (2/D45395)
PREVIOUS TITLE: 1624-113
PROPERTY STREET ADDRESS: 10 GAY ST, DIANELLA.
LOCAL GOVERNMENT AUTHORITY: CITY OF STIRLING

NOTE 1: D360074 INCLUDES CLOSED ROAD LAND ACT 1933.

LANDGATE COPY OF ORIGINAL NOT TO SCALE 14/11/2019 04:19 PM Request number: 60050060

Landgate
www.landgate.wa.gov.au

appendix 02_

Flora & Vegetation Survey

Technical Note

Date: 29 October 2020
Our Ref: EEL16062.003
From: Steve Rolls
Pages: 2 inc. this page

Channel 9 Redevelopment – City of Stirling

Response to Western Australian Planning Commission (WAPC) Schedule of Modifications - Vegetation

Context

The Dianella Media Precinct Redevelopment incudes the former Channel 9 television broadcasting site, Lots 1 and 2 Gay Street, Dianella (the site). The WAPC has recently approved the Structure Plan for the site, subject to modifications.

The WAPC Schedule of Modifications Item 11 requires the Flora and Vegetation Survey (RPS 2009) to be updated via a Technical Note *"to acknowledge the occurrence of the Threatened Ecological Community on site and explain the process the structure plan has undergone to address that matter"*.

This Technical Memo addresses that requirement.

Background

In October 2008, RPS was commissioned by WIN Corporation (Gay Street Property Holdings Pty Ltd) to conduct a Level 1 Flora and Vegetation Survey of the site, consistent with the requirements of the Environmental Protection Authority (EPA) technical guidance at the time (EPA, 2004).

At that time, a Level 1 Flora and Vegetation Survey comprised of:

Background Research or Desktop Study

I. Gather together background information on the target area.

Reconnaissance Survey

I. Verify accuracy of the Desktop Study.
II. Delineate and characterise the flora and range of vegetation units present in the target area.
III. Identify potential impacts.

This involved selective, low intensity sampling of flora and vegetation to produce maps of vegetation units and vegetation condition at an appropriate scale. In conjunction, a targeted search for conservation significant species known for the region was undertaken.

Based on the Level 1 2008 survey, the resultant inferred analysis and report (RPS 2009) considered that:

- *The vegetation of the study area was analysed and is inferred to represent the Floristic Community Type (FCT) 23a – Central Banksia attenuata – B. menziesii woodlands. This FCT is well reserved with a low conservation risk (Gibson et al. 1994).*

Technical Note

Date: 29 October 2020

More Recent Research

Since the 2008 site investigation, a Level 2 flora and vegetation investigation was completed at the site in 2016 and was included in a referral by the Western Australian Planning Commission to the EPA under Section 38 of the *Environmental Protection Act, 1986* (EP Act), as the site was already appropriately zoned for the intended residential purpose. At the rezoning stage in 2012, the scheme amendment was deemed "Scheme Amendment Not Assessed" by the EPA.

The subsequent survey advice considered that the native vegetation at the site as being Floristic Community Type (FCT) 20a, *Banksia attenuata* woodlands over species-rich, dense shrublands. FCT20a is a State-listed Threatened Ecological Community (TEC). This conclusion was supported by the (then) Department of Parks and Wildlife, which considered this new occurrence as important, and that if the Structure Plan was implemented in its current form would have a significant effect on the environment, as it developed the majority of the site.

Regulatory Authority Liaison and Structure Plan Outcome

On the 17th May 2016, the EPA wrote to town planners for the project RobertsDay, seeking additional information regarding the site and Structure Plan (Attachment 1). The project team met with EPA officers to discuss development options.

Following direction from WIN, on 30th November 2016, RobertsDay wrote to the EPA advising of proposed changes to the Structure Plan. Based on the discussions with the EPA, the Structure Plan was modified to recognise the occurrence of FCT 20a, and place the FCT vegetation into a "balance title lot" of 1.55ha that cannot be developed.

On the 5th December, the EPA wrote to RobertsDay advising that the amended Structure Plan (Draw No. RD1 019 Rev A) adequately retains the occurrence of TEC 20a (Attachment 2). The EPA also supported the TEC being contained in a "balance title lot", provided a planning solution was applied ensuring that the lot cannot be developed at a future time.

On the 5th December 2016 the EPA also wrote to the WAPC, advising that based on the modified Structure Plan, it considered that the project did not represent a "significant proposal" as defined under the EP Act, and therefore did not warrant referral to the EPA, and therefore it did not accept the WAPC referral (Attachment 3).

Conclusion

The EPA Chairman acknowledged the significance of Gay Street Holdings Pty Ltd decision to change the Structure Plan and set aside the TEC in a "balance title lot", preserving the TEC and connectivity to an adjacent Bush Forever site, assisting to maintain the biological and genetic diversity, and integrity of the TEC into the future. This was on the basis that the 1.55ha "balance title lot" (and the site as a whole) was appropriately zoned for development and had previously been assessed by the EPA.

The "balance title lot" is not developable and is available for sale as an offset site, and/or for purchase as an addition to the State's conservation estate.

Attachments 1, 2, and 3 – EPA correspondences

GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

25 MAY 2016

SCANNED TO

Mr Tim Trefry
Director
Roberts Day
Level 2 442 Murray St
PERTH WA 6000

Our Ref: *CMS16115*
Enquiries: *Liesl Rohl, 6145 0858*
Email: *liesl.rohl@epa.wa.gov.au*

Dear Mr Trefry

PROPOSAL: **DRAFT STUCTURE PLAN LOTS 1 AND 2 GAY STREET, DIANELLA**
PROPONENT: **GAY STREET PROPERTY HOLDINGS PTY LTD**

The Western Australian Planning Commission (WAPC) has recently referred the above draft structure plan to the Environmental Protection Authority (EPA) under section 38 of the *Environmental Protection Act 1986* (EP Act).

This means that the EPA is required to:

a) determine the significance of the effect on the environment of the proposal, if implemented; and

b) make a decision on whether or not to assess the proposal and, if the decision is to assess, the level of assessment.

As part of the referral documentation the WAPC provided a level 2 flora and vegetation survey which identified the native vegetation within Lot 1 Gay Street as being floristic community type (FCT) 20a *Banksia attenuata* woodlands over species-rich dense shrublands. This FCT is a state listed threatened ecological community (TEC).

The EPA understands that the flora and vegetation survey was undertaken by Tauss & Associates Biodiversity Consultants without the consent of the landowner. Therefore the EPA is affording Gay Street Property Holdings Pty Ltd the opportunity to provide additional information or clarity on the results of the survey before making a decisions on the significance of the proposal and the appropriate level of assessment. In addition, the EPA has also sought additional information on the distribution of the aforementioned TEC from the Department of Parks and Wildlife.

Level 8, The Atrium, 168 St Georges Terrace, Perth, Western Australia 6000
Telephone 08 6145 0800 Facsimile 08 6145 0895 Email info@epa.wa.gov.au

Locked Bag 10, East Perth WA 6892

www.epa.wa.gov.au

It would be appreciated if you could advise by 30 May 2016 when Gay Street Property Holdings Pty Ltd will submit its response to the EPA.

Should you have any enquiries or wish to discuss this referral please contact the Ms Liesl Rohl on 6145 0858.

Yours sincerely

N. Arrowsmith

Naomi Arrowsmith
Director
Strategic Policy and Planning

Delegate of the Chairman of the Environmental Protection Authority
Under Notice of Delegation No. 33 published 17 December 2013

17 May 2016

Att: Letter to Department of Parks and Wildlife

GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

Mr Stefan De Haan
Swan Region Manager
Department of Parks and Wildlife
Locked Bag 104
BENTLEY WA 6000

Our Ref: *CMS 16115*
Enquiries: *Liesl Rohl, 6145 0858*
Email: *liesl.rohl@epa.wa.gov.au*

Dear Mr De Haan

NOTICE REQUIRING FURTHER INFORMATION
S38A of the *Environmental Protection Act 1986*

PROPOSAL: **DRAFT STUCTURE PLAN LOTS 1 AND 2 GAY STREET, DIANELLA**
PROPONENT: **ROBERTS DAY**

The above proposal has been referred to the Environmental Protection Authority (EPA) under section 38 of the *Environmental Protection Act 1986* (EP Act). I have enclosed a copy of the referral information.

Lots 1 and 2 Gay Street contains Floristic Community Type 20a - *Banksia attenuata* woodlands over species-rich dense shrublands.

The EPA considers that it does not have enough information about the proposal to enable it to make decisions on significance and appropriate level of assessment under Part IV of the EP Act.

As experts in biodiversity conservation the EPA requests that you provide the following information:

- The importance of this new occurrence;
- The significance of the proposed clearing (around 1.5 hectares) in the Structure Plan area (attached) on the local and regional viability of the TEC; and
- Any other relevant advice.

Level 8, The Atrium, 168 St Georges Terrace, Perth, Western Australia 6000
Telephone 08 6145 0800 Facsimile 08 6145 0895 Email info@epa.wa.gov.au

Locked Bag 10, East Perth WA 6892

www.epa.wa.gov.au

Your response to this request for additional information is required by 31 May 2016. Please respond with either:

a) the information requested, or

b) advice that further information is not available and/or cannot be obtained.

Your response should be sent by post to the Strategic Policy and Planning Division, Office of the EPA, Locked Bag 10, East Perth WA 6892, marked to the attention of Teresa Bryant. Please quote the above "Our ref" on any further correspondence.

Yours sincerely

N. Arrowsmith

Naomi Arrowsmith
A/Director
Strategic Policy and Planning Division

Delegate of the Chairman of the Environmental Protection Authority
Under Notice of Delegation No. 33 published 17 December 2013

12 May 2016

Att: Referral documentation

GOVERNMENT OF WESTERN AUSTRALIA

Environmental Protection Authority

14 DEC 2016

SCANNED TO TT

Mr Tim Trefry
Director
Roberts Day
Level 2, 442 Murray Street
PERTH WA 6000

Our Ref: *CMS16115*
Enquiries: *Teresa Bryant, 6145 0852*
Email: *teresa.bryant@epa.wa.gov.au*

Dear Mr Trefry

PROPOSAL: **PROPOSED STRUCTURE PLAN FOR LOTS 1 AND 2 GAY STREET, DIANELLA**
PROPONENT: **GAY STREET PROPERTY HOLDINGS PTY LTD**

Thank you for your letter dated 30 November 2016 advising of your client's proposed changes to above Structure Plan proposal.

The Environmental Protection Authority (EPA) advises the revised Structure Plan Draw No. RD1 019 Rev. A adequately retains the occurrence of the Threatened Ecological Community (TEC) floristic community type 20a *Banksia attenuata* woodlands over species–rich dense shrublands.

The EPA supports the TEC being contained in a 'balance title' lot with Gay Street Property Holdings Pty Ltd retaining ownership. Whilst it is your client's intention to retain ownership, there is potential the lot could be sold in the future with a buyer's expectation it can be developed. I expect there is a planning solution to address this issue and I have raised this in my letter to the Western Australian Planning Commission (attached).

I acknowledge the significance of your client's decision to change its development plans to set aside the TEC. Its retention not only preserves the TEC occurrence but importantly retains the linkage between the adjacent occurrences in Bush Forever site 43 and Lot 13. This will assist in maintaining the biological and genetic diversity, and ecological integrity of the entire area of the TEC into the future.

Please contact Liesl Rohl on 6145 0858 if you have any questions about this letter.

Yours sincerely

Dr Tom Hatton
CHAIRMAN

5 December 2016

Encl: Letter to WAPC

Level 8, The Atrium, 168 St Georges Terrace, Perth, Western Australia 6000
Telephone 08 6145 0800 Facsimile 08 6145 0895 Email info@epa.wa.gov.au

Locked Bag 10, East Perth WA 6892
www.epa.wa.gov.au

Government of **Western Australia**
Office of the **Environmental Protection Authority**

14 DEC 2016
14 DEC 2016
SCANNED TO
SCANNED TO TF

Mr Mat Selby
Director
Metropolitan Planning Central
Department of Planning
Locked Bag 2506
PERTH WA

Your Ref: *spn/0475*
Our Ref: *CMS 16115 ac01-2016-0033*
Enquiries: *Teresa Bryant 6145 0852*
Email: *teresa.bryant@epa.wa.gov.au*

Dear Mr Selby

PROPOSAL: **PROPOSED STRUCTURE PLAN FOR LOTS 1 AND 2 GAY STREET, DIANELLA**
PROPONENT: **GAY STREET PROPERTY HOLDINGS PTY LTD**

I refer to the Environmental Protection Authority's (EPA) letter dated 12 May 2016 regarding the above proposal.

The Department of Parks and Wildlife has advised the remnant vegetation occurring on Lots 1 and 2 is an occurrence of the Threatened Ecological Community (TEC) floristic community type 20a *Banksia attenuata* woodlands over species–rich dense shrublands. The new occurrence is important and the proposal, if implemented, would be considered to have a significant effect on the environment.

The Office of the Environmental Protection Authority sought additional information from the Proponent's consultants Roberts Day and met with them to discuss the significance of the TEC occurrence and explain the likely environmental impact assessment process.

Roberts Day has recently advised its client has agreed to modify the Structure Plan to retain the TEC in a 'balance title' lot with Gay Street Property Holdings Pty Ltd retaining ownership of the lot.

The EPA considers the revised Structure Plan Draw No. RD1 019 Rev. A (attached) an acceptable solution as the TEC will be retained. A potential issue the EPA is concerned about is possibility of the 'balance title' lot being sold in the future with a buyer's expectation the lot can be developed, even for single residence. I do not consider this a fatal flaw and expect there is an acceptable planning solution, such as a notification on title, which can be implemented to address this.

Subject to the above and the revised Structure Plan being acceptable to the Western Australian Planning Commission, it is the view of the EPA that the proposal is unlikely, if implemented, to have a significant effect on the environment. Therefore, the revised Structure Plan proposal does not represent a 'significant proposal' as defined under section 37B of the *Environmental Protection Act 1986* and therefore does not warrant referral to the EPA and the subsequent making of a decision on whether to assess the proposal.

Accordingly, the EPA is not required to accept a referral of a proposal which is not significant and will not be giving further consideration to your referral.

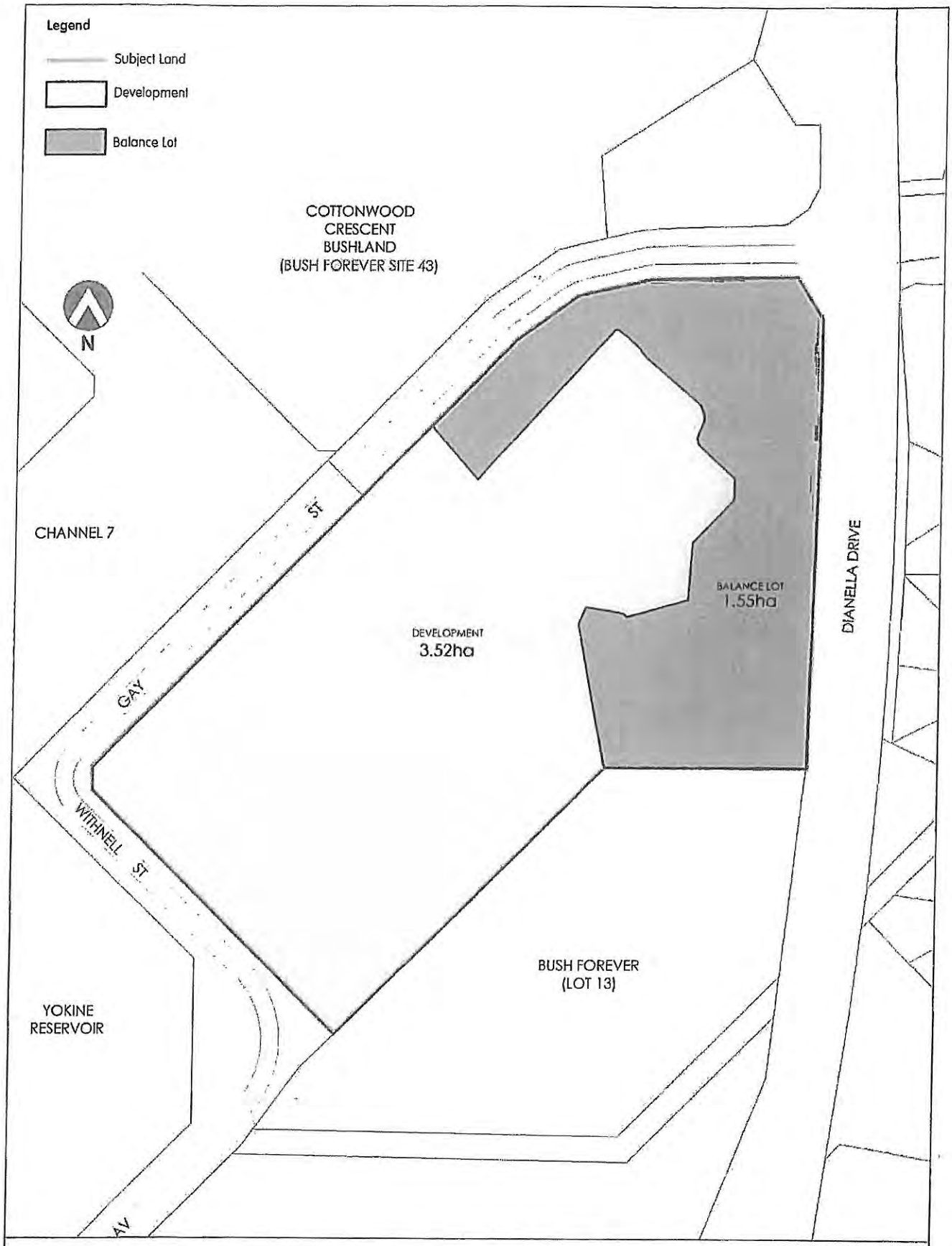
Should you have any enquires please contact Liesl Rohl on 6145 0882.

Yours sincerely

Dr Tom Hatton
CHAIRMAN

5 December 2016

Encl: Structure Plan Draw No. RD1 019 Rev. A



STRUCTURE PLAN

Lots 1 and 2 Gay Street, Dianella

City of Stirling

SIZE A4

1:2000 0 metres 20 40 60 80 100

REF NO.	DRAW NO.	REV.
NIN DIA	**RD1 019**	**A**

DISCLAIMER: ISSUED FOR DESIGN INTENT ONLY. ALL AREAS AND DIMENSIONS ARE SUBJECT TO DETAIL DESIGN AND SURVEY

LEVEL 1 FLORA AND VEGETATION SURVEY
CHANNEL 9 BUSHLAND

Gay Street, Dianella

Prepared by:

RPS

290 Churchill Avenue, SUBIACO WA 6008
PO Box 465, SUBIACO WA 6904

T: 618 9382 4744
F: 618 9382 1177
E: admin02@rpsgroup.com.au
W: www.rpsgroup.com.au

Report No: L08345
Version/Date: Rev 0, April 2009

Prepared for:

WIN CORPORATION

Television Avenue
MOUNT ST THOMAS NSW 2500

Document Status

Version	Purpose of Document	Orig	Review	Review Date	Format Review	RPS Release Approval	Issue Date
Draft A	Draft for Client Review	CarGil	AngMer/JohHal	17.02.09	DC 18.02.09		
Rev 0	Final for Issue		VanYeo	25.03.09	SN 26.03.09	S. Rolls	01.04.09

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SUMMARY

The findings of the Level 1 Flora and Vegetation survey conducted in October 2008 of Channel 9 Bushland, Gay St, Dianella, can be summarised as follows:

- Botanists recorded 89 plant taxa across the site.
- No Declared Rare Flora species, as listed under subsection (2) of Section 23F of the Western Australian *Wildlife Conservation Act 1950* or Priority Flora species as listed by the Department of Environment and Conservation (Atkins, 2008) were located within the study area.
- No species governed by *the Environment Protection and Biodiversity Conservation Act 1999* were located within the study area.
- No flora species of other conservation significance as stated in Guidance Statement No. 51 (EPA, 2004) or as listed in *Bush Forever* (WAPC, 2000) were recorded within the study area.
- Twenty six introduced flora (naturalised weeds and landscaping plants) were recorded from the survey site, which comprises 29% of the total flora recorded. Sixteen of these are listed in The Environmental Weeds Strategy for WA (EWSWA) (CALM, 1999) as High or Moderate, according to their invasiveness, distribution and environmental impact.
- There is one weed species found within the study area that is listed as a Declared Plant (in accordance with the *Agriculture and Related Resources Protection Act 1976*) for the whole of the state; *Asparagus asparagoides* (Bridal Creeper).
- The vegetation of the study area was analysed and is inferred to represent the Floristic Community Type (FCT) 23a – Central *Banksia attenuata – B. menziesii* woodlands. This FCT is well reserved with a low conservation risk (Gibson et al. 1994).
- The vegetation on site ranged from Very Good - Excellent to Completely Degraded. The north eastern half of the site consists largely of remnant native vegetation ranging from Very Good - Excellent to Good condition. Vegetation in the south western end consists of landscaped gardens of predominantly exotic species with some scattered remnant bushland species. Condition ranges from Degraded to Completely Degraded.
- According to the criteria stated in *Bush* Forever (Western Australian Planning Commission (WAPC, 2000), the survey area is not identified as Regionally Significant Bushland.
- According to this assessment the survey area is a Locally Significant Natural Area as it satisfies several ecological criteria. The ecological criteria for determining locally significant natural areas of the Swan Coastal Plain are listed in Table 8 and detailed in Section 4.5 of this report.

The fact that a natural area is confirmed as 'Locally Significant' does not necessarily mean that it must and can be protected (Del Marco et al. 2004). Del Marco et al. (2004) states that Local Governments, communities and developers must appreciate that *Bush Forever* excluded some sites of regional significance based on ecological value because of the social and economic constraints that existed at the time.

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(compiled at rear of report)

APPENDICES

1.0 BACKGROUND

In October 2008 RPS Environment and Planning was commissioned by WIN Corporation to conduct a Level 1 Flora and Vegetation Survey of Channel 9 Bushland, Gay Street, Dianella. The study area consists of intact native vegetation and landscaped gardens containing scattered remnant bushland species. The location of the site is shown in Figure 1.

1.1 Report Objectives

This report presents the findings of the Level 1 Flora and Vegetation Survey conducted in October 2008, of Channel 9 Bushland, Gay Street, Dianella, and is consistent with the requirements of the EPA for a Level 1 Flora and Vegetation Survey (EPA, 2004).

This report includes:

- A desktop review of available information.
- Vegetation mapping (inferred floristic community types and condition).
- A conservation significance assessment of flora and vegetation.

2.0 EXISTING INFORMATION

2.1 Declared Rare Flora and Priority Flora

State Legislation

Declared Rare Flora (DRF) are flora that have been adequately surveyed and are considered to be in danger of extinction, rare or otherwise in need of special protection within Western Australia. DRF are protected under the *Wildlife Conservation Act 1950* (as amended).

Additionally in Western Australia there are four categories of Priority Flora[1], which are not specifically covered under current legislation, but their conservation status warrants some protection. Three categories of Priority Flora are allocated to species that are poorly known (Priority 1 to 3). These require more information to be assessed for inclusion as DRF. The categories are arranged to give an indication of the priority for undertaking further surveys based on the number of known sites, and the degree of threat to those populations. A fourth category of priority (Priority 4) is included for those species that have been adequately surveyed and are considered to be rare but not currently threatened.

The Department of Environment and Conservation's (DEC) databases for Threatened (Declared Rare) Flora, the Western Australian Herbarium (WAH) Specimen and Declared Rare Flora were searched for known records within a 5 km radius of the project area. The search coordinates used were 310° 52' 50.13' S and 115° 51' 22.82' E. There were seven conservation significant species recorded from the area, one of which is DRF. However, none of these records are from the study area itself. The list of significant flora is provided in Table 1.

---

[1]R: Declared Rare Flora - Extant Taxa
Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.

P1: Priority One - Poorly known Taxa
Taxa which are known from one or a few (generally <5) populations which are under threat, either due to small population size, or being on lands under immediate threat, e.g. road verges, urban areas, farmland, active mineral leases, etc., or the plants are under threat, e.g. from disease, grazing by feral animals, etc. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

P2: Priority Two - Poorly Known Taxa
Taxa which are known from one or a few (generally <5) populations, at least some of which are not believed to be under immediate threat (i.e. not currently endangered). Such taxa are under consideration for declaration as 'rare flora', but are in urgent need of further survey.

P3: Priority Three - Poorly Known Taxa
Taxa which are known from several populations, and the taxa are not believed to be under immediate threat (i.e. not currently endangered), either due to the number of known populations (generally >5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as 'rare flora' but are in need of further survey.

P4: Priority Four - Rare Taxa
Taxa which are considered to have been adequately surveyed and which, whilst being rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5-10 years.[1]

Table 1: Declared Rare Flora (DRF) and Priority Species within a 5km Radius of Channel 9 Bushland, Gay Street, Dianella

Species	Conservation Code
Epiblema grandiflorum var. *cyaneum*	R
Lepidium pseudohyssopifolium	P1
Aotus cordifolia	P3
Cyathochaeta teretifolia	P3
Hibbertia spicata subsp. *leptotheca*	P3
Isopogon drummondii	P3
Jacksonia sericea	P4

Federal Legislation

Some flora species have additional protection under the *Environment Protection and Biodiversity Conservation Act (EPBC) 1999*. In Western Australia, this predominantly consists of DRF flora. These are defined as Threatened Flora Species under the *EPBC Act.* Penalties apply for any damage to individuals, populations or habitats of species protected.

Other Species of Conservation Significance

Environmental Protection Authority (EPA) Guidance Statement No. 51 (EPA, 2004) lists species other than DRF and Priority Flora as of conservation significance where a species has:

- A keystone role.
- Relictual status.
- Anomalous features indicating a potential new discovery.
- A representation of a species range (range extensions, extremes or an outlier population).
- Status as a restricted subspecies, variety, or naturally occurring hybrid.
- Poor reservation.
- Status as a local endemic or has a restricted distribution.

This document states that conservation significance includes these criteria, but is not limited to them. It may include flora that are poorly represented in WAH and short range endemic flora (those with a known range less than 200 km)

2.2 Vegetation

2.2.1 Vegetation Complexes

Vegetation complexes are groups of vegetation types that occur in patterns relating to soil and geomorphology (and water availability) of the substrate. A large part of the Swan Coastal Plain has been mapped for vegetation complexes by Heddle et al. (1980) and is largely related to the Dune Systems (Quindalup, Spearwood, Bassendean, Pinjarra Plain) and north-south changes in climate.

Heddle et al. (1980) has mapped the vegetation within the study area as Karrakatta Complex – Central and South. A description of this vegetation complex is given below:

- **Karrakatta – Central and South Complex** is predominantly Open Forest of *Eucalyptus gomphocephala*, *E. marginata, Corymbia calophylla* and woodland of *E. marginata* and *Banksia* species.

The conservation status of the Karrakatta – Central and South Complex within the Interim Biogeographic Regionalisation of Australia (IBRA) subregion Swan Coastal Plain (SCP) between Moore River and Dunsborough, occurring within the Perth Metropolitan Region (PMR) (Del Marco et al. 2004) is presented in Table 2. The remnant vegetation extent of the Karrakatta – Central and South Complex within the *Bush Forever* study area boundaries is presented in Table 3.

Table 2: Representation of Channel 9 Bushland, Dianella – Karrakatta – Central and South Complex Circa 1997 Remnant Vegetation Extent in the Swan Coastal Plain (Del Marco et al. 2004)

Vegetation Complex	Pre- European Extent (ha)	Present Extent (ha) Remaining	% of Present Extent Remaining	% of Present Extent In Secure Tenure#
Karrakatta – Central and South	51 620	14 811	28.7*	2.4

* Equivalent to < = 30% in 2004 based on the limitations of these statistics
# refers to National Parks, Nature Reserves, Conservation Parks and Reserves from CALM Managed Lands 2002 GIS database.

Table 3: Representation of Channel 9 Bushland, Dianella – Karrakatta – Central and South Complex Circa 1997 Remnant Vegetation Extent in *Bush Forever* Study Areas in the Swan Coastal Plain of the Perth Metropolitan Region (Del Marco et al. 2004)

Vegetation Complex	Pre-European Extent (ha)	Present Extent (ha) Remaining	% of Present Extent Remaining	% of Complex Proposed for Protection within *Bush Forever* Areas
Karrakatta – Central and South	34 532	6 275	18	8*

* Equivalent to 400ha or 10% or less (whichever is the greater) in 2004 based on the limitations of these statistics

It is important to keep in mind that the statistics for the percentage remaining of vegetation complexes is derived from dated aerial photography circa. 1997–1998 with limited ground-truthing. As a consequence the percentages of ecological communities remaining are generally an over-estimate of the native vegetation remaining at present.

It is noteworthy that the figures provided in Table 2 and 3 do not address the condition of the remaining vegetation.

2.2.2 Floristic Community Types

Floristic Community Types (FCTs) are based on a survey of the vegetation of the Swan Coastal Plain from Seabird to Dunsborough, completed by Gibson et al. (1994). The purpose of the Gibson et al. (1994) survey was to determine the number and type of vegetation communities present across the southern SCP and to then assess how much of each remained and whether they were protected within reserves. Each FCT defined as a result of Gibson et al. (1994) was given a Reservation Status and a Conservation Status (Tables 4 and 5).

Most of the Swan Coastal Plain TECs and/or Priority Ecological Communities protected under state and federal legislation (Section 2.2.3 to 2.2.5) are defined by their Floristic Community Type in Gibson et al. (1994).

Table 4: Reservation Status Categories (Gibson et al. 1994)

Reservation Status	Description
Well Reserved	Known from two or more A class National Parks or Nature Reserves
Poorly Reserved	Known from a single A class National Park or Nature Reserve
Unreserved	Not known to occur in any A class National Park or Nature Reserve.

Table 5: Conservation Status Categories (Gibson et al. 1994)

Conservation Status	Description
Presumed Destroyed	A community that is totally destroyed or so extensively modified that it is unlikely to re-establish ecosystem processes in the foreseeable future.
Critical	A community with most or all of its known occurrences facing severe modification or destruction in the immediate future.
Endangered	A community in danger of severe modification or destruction throughout its range, if causal factors continue operating.
Vulnerable	A community likely to move into the endangered category in the near future if the causal factors continue operating.
Susceptible	A community of concern because there is evidence that it can be modified or destroyed by human activities or would be vulnerable to new threatening process.
Low Risk	A community that does not qualify for one of the above categories
Insufficiently Known	A community for which there is inadequate data to assign to one of the above categories.

2.2.3 Threatened Ecological Communities

Within Western Australia, Threatened Ecological Communities (TECs) are defined by DEC as those which are found to fit into one of the categories in Table 6. The categories 'Data Deficient' and 'Lower Risk' can be used to provide a list of communities not classified as threatened, but that require more information. Within Western Australia, TECs have limited protection under the *Wildlife Conservation Act 1950* and the *Environmental Protection Act 1986* (as amended). TECs will be protected by the proposed Biodiversity Conservation Act (in preparation).

The *EPBC Act* provides protection for TECs under federal legislation, which are defined as those communities which are:

- **Critically Endangered** (if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future).

- **Endangered** (if, at that time, it is not critically endangered and is facing a very high risk of extinction in the wild in the near future).

- **Vulnerable** (if, at that time, it is not critically endangered or endangered, and is facing a high risk of extinction in the wild in the medium term future).

Table 6: Threatened Ecological Communities Category of Threat (English and Blyth, 1997)

Category	Definition
Presumed Totally Destroyed (PD)	An ecological community will be listed as presumed totally destroyed if there are no recent records of the community being extant and either of the following applies: A) Records within the last 50 years have not been confirmed despite thorough searches or known or likely habitats or B) All occurrences recorded within the last 50 years have since been destroyed.
Critically Endangered (CR)	An ecological community will be listed as **Critically Endangered** when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future. This will be determined on the basis of the best available information, by it meeting **any one or more** of the following criteria: A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 90% and **either or both** of the following apply: ▪ geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is imminent (within approximately 5 years) ▪ modification throughout its range is continuing such that in the immediate future (within approximately 5 years) the community is unlikely to be capable of being substantially rehabilitated. B) Current distribution is limited, and **one or more** of the following apply (i, ii or iii): ▪ geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the immediate future (within approximately 5 years) ▪ there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes ▪ there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes C) The ecological community exists only as highly modified occurrences which may be capable of being rehabilitated if such work begins in the immediate future (within approximately 5 years).

Category	Definition
Endangered (EN)	An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C): A) The estimated geographic range, and/or total area occupied, and/or number of discrete occurrences since European settlement have been reduced by at least 70% and either or both of the following apply (i or ii) ▪ geographic range, and/or total area occupied and/or number of discrete occurrences are continuing to decline such that total destruction of the community is likely in the short term (within approximately 10 years) ▪ modification throughout its range is continuing such that in the short term future (within approximately 10 years) the community is unlikely to be capable of being substantially restored or rehabilitated. B) Current distribution is limited, and one or more of the following apply (i, ii or iii): ▪ geographic range and/or number of discrete occurrences, and/or area occupied is highly restricted and the community is currently subject to known threatening processes which are likely to result in total destruction throughout its range in the short term future (within approximately 10 years) ▪ there are very few occurrences, each of which is small and/or isolated and extremely vulnerable to known threatening processes ▪ there may be many occurrences but total area is very small and each occurrence is small and/or isolated and extremely vulnerable to known threatening processes C) The ecological community exists only as highly modified occurrences which may be capable of being rehabilitated if such work begins in the short term future (within approximately 10 years).
Vulnerable (VU)	An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction in the medium to long term future. This will be determined on the basis of the best available information, by it meeting any one or more of the following criteria (A, B or C): A) The ecological community exists largely as modified occurrences which are likely to be capable of being substantially restored or rehabilitated. B) The ecological community can be modified or destroyed and would be vulnerable to threatening processes, is restricted in area and/or range and/or is only found at a few locations. C) The ecological community may still be widespread but is believed likely to move into a category of higher threat in the medium to long term future because of existing or impending threatening processes.
Data Deficient (DD)	An ecological community which has not been adequately evaluated with respect to status or where there is currently insufficient information to assign it to a particular category. (An ecological community with poorly known distribution or biology that is suspected to belong to any of the above categories. These ecological communities have a high priority for survey and/or research.)
Lower Risk (LR)	An ecological community that has been adequately surveyed and does not qualify for any of the above categories of threat and appears unlikely to be under threat of significant modification or destruction in the short to medium term future.

2.2.4 Threatened Ecological Communities Database

A search of the DEC Threatened Ecological Communities Database for known records of TECs and/or Priority Communities within 5 km of the Channel 9 Bushland, Dianella is presented below in Table 7. One TEC and no PECs were identified.

Table 7: Threatened Ecological Communities within a 5 km Radius of Channel 9 Bushland, Dianella

Code	Description	Status
SCP 20a	*Banksia attenuata* woodland over species rich dense shrublands	Endangered

2.2.5 Other Vegetation of Conservation Significance

Priority Ecological Communities

Possible TECs that do not meet survey criteria or have not been adequately defined are added to DEC's Priority Ecological Community List under Priorities 1, 2 and 3. These three categories are ranked in order of priority for survey and/or definition of the community, and evaluation of conservation status, so that consideration can be given to their declaration as TECs. Ecological communities that are adequately known and are rare, but not threatened or meet criteria for Near Threatened (P1, 2 or 3), or that have been recently removed from the threatened list, are placed in Priority 4. These ecological communities require regular monitoring. Conservation dependent ecological communities are placed in Priority 5.

2.2.6 Regionally Significant Bushland

Within the Swan Coastal Plain portion of the Perth Metropolitan Region, bushland of regional significance is identified by the criteria outlined in *Bush Forever* (WAPC, 2000). Regionally Significant Bushland is identified as any bushland of a vegetation complex, in the *Bush Forever* Study Area, with only 400 ha or 10% or less (whichever is the greater) remaining and that has basic vegetation structure intact (WAPC, 2000). Other natural areas of regional significance (e.g. wetlands, watercourses), have not yet been formally designated by the State Government within the *Bush Forever* Study Area.

2.2.7 Locally Significant Natural Areas

Locally Significant Natural Areas are Local Natural Areas that meet one or more ecological criteria of significance and have been verified in the field. The fact that a natural area is confirmed as 'locally significant' does not necessarily mean that it must and can be protected (Del Marco et al. 2004). Local Natural Areas refers to all natural areas, not just bushland, that exists outside of the DEC Managed Estates, regional parks and *Bush Forever* sites (Del Marco et al. 2004).

The ecological criteria for Locally Significant Natural Areas are listed in Table 8. Many of these criteria also have regional conservation value as they are directly based on the

criteria for regional significance in *Bush Forever*. Del Marco et al. (2004) states that Local Governments, communities and developers must appreciate that *Bush Forever* excluded some sites of regional significance based on ecological value because of the social and economic constraints that existed at the time.

These ecological criteria were established by the 'Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region' (Del Marco et al. 2004) and are directly based on an extension of the State Government's *Bush Forever* strategy (WAPC, 2000), along with the criteria proposed in the Urban Bushland Strategy (Government of Western Australia, 1995).

Table 8: Ecological Criteria for Use in Determining Locally Significant Natural Areas of the Swan Coastal Plain (Del Marco et al. 2004)

ECOLOGICAL CRITERIA
1. Representation
1a. Regional Representation
i) Any natural area with recognised International, National, State or Regional Conservation Value (outside *Bush Forever* Sites and Department of Conservation and Land Management [CALM] Managed Estate) that is not yet protected and/ or managed for conservation (Essential)
ii) Natural areas of an ecological community with only 1500 ha or 30% or less (whichever is greater) of their pre-European extent remaining in the Interim Biogeographically Regionalisation of Australia (IBRA) subregion (Essential – Jarrah Forest, Desirable – Swan Coastal Plain).
iii) Large (greater than 20 ha), viable natural area in good or better condition of an ecological community with over 30% of its pre-European extent remaining in the IBRA subregion (Desirable).
v) Natural area of an ecological community with only 400 ha or 10% or less (whichever is greater) protected for conservation in the *Bush Forever* Study Area (Essential).
1b. Local Representation
i) Natural area of an ecological community with 10% or less of its pre-European extent remaining within the Local Government area (Essential).
ii) Natural area of an ecological community with 30% or less of its pre-European extent remaining within the Local Government area (Essential – Jarrah Forest, Desirable SCP).
iii) Large (greater than 10 ha), viable natural areas in good or better condition of an ecological community with more than 30% of its pre-European extent remaining within the Local Government area (Desirable).
2. Diversity
i) Natural areas in good or better condition that contain both upland and wetland structural plant communities (Essential).
3. Rarity
i) Natural areas of an ecological community with only 1500 ha or 10% or less (whichever is the greater) of their pre-European extent remaining in the IBRA subregion (Essential).
ii) Natural areas of an ecological community with only 400 ha or 10% or less (whichever is the greater) of their pre- European extent remaining in the *Bush Forever* Study Area (Essential).
iii) Natural areas classified by CALM as containing Threatened Ecological Communities (TECs) (English & Blyth 1997, 1999; CALM TEC GIS database, undated) (Essential).
iv) Natural areas containing Declared Rare Flora (DRF), Specially Protected Fauna (SPF) or significant habitat for Specially Protected Fauna (Essential).

ECOLOGICAL CRITERIA
v) Natural areas containing Priority or other significant flora or fauna or significant habitat for these fauna (Essential).
4. Maintaining Ecological Processes or Natural Systems – Connectivity
i) Natural areas acting as stepping stones within a Regional Ecological Linkage (Essential).
ii) Natural areas acting as stepping stones within a within a local ecological linkage determined by a Local Government (Essential).
5. Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation
i) Wetlands meeting the criteria for listing as Conservation Category or Resource Enhancement Wetlands plus an appropriate buffer (minimum 50 m) in addition to the wetland dependant vegetation (Essential).
ii) Wetlands listed under the Environmental Protection (Swan Coastal Plain Lakes) Policy (EPP Lakes) plus an appropriate buffer (Essential).
iii) Riparian vegetation along rivers, creek lines and other channel wetlands plus an appropriate buffer (minimum 50 m) in addition to the riparian (wetland dependant) vegetation (Essential).
iv) Floodplains delineated on the basis of ecological and geomorphic features plus an appropriate buffer (minimum 50 m) in addition to the floodplain area (Essential).
v) Estuarine fringing vegetation plus an appropriate buffer (minimum 50 m) of non-estuarine vegetation (Essential).
vi) Coastal vegetation on the foredunes and secondary dunes (Essential).

3.0 METHODS

3.1 Field Survey

In October 2008, two botanists from RPS conducted a Level 1 Flora and Vegetation Survey at the Channel 9 Bushland site. Survey methodology was based on a Level 1 Flora and Vegetation Survey as outlined in Guidance Statement 51 (EPA, 2004).

A Level 1 Flora and Vegetation Survey comprises of:

Background Research or Desktop Study

I. Gather together background information on the target area.

Reconnaissance Survey

I. Verify accuracy of the Desktop Study.

II. Delineate and characterise the flora and range of vegetation units present in the target area.

III. Identify potential impacts.

This involves selective, low intensity sampling of flora and vegetation to produce maps of vegetation units and vegetation condition at an appropriate scale.

In conjunction, a targeted search for conservation significant species known for the region was undertaken (Table 1).

A species list was complied using the latest nomenclature and taxonomic references (*Florabase*, 2009 and Atkins, 2008).

Vegetation Sampling

Mapping of each vegetation unit was completed using aerial photographs and on-site surveying. Each vegetation unit was defined by the dominant plant species (>2% cover) throughout its extent, using the vegetation structure classes established under *Bush Forever* (WAPC, 2000) (Table 9).

Table 9: Vegetation Structure Classes
(WAPC, 2000)

Life Form/ Height Class	Canopy Cover (percentage)			
	100–70%	**70–30%**	**30–10%**	**10–2%**
Trees 10–30m Trees < 10m	Closed Forest Low Closed Forest	Open Forest Low Open Forest	Woodland Low Woodland	Open Woodland Low Open Woodland
Shrub Mallee	Closed Shrub Mallee	Shrub Mallee	Open Shrub Mallee	Very Open Shrub Mallee
Shrubs > 2m Shrubs 1-2m Shrubs <1m	Closed Tall Scrub Closed Heath Closed Low Heath	Tall Open Scrub Open Heath Open Low Heath	Tall Shrubland Shrubland Low Shrubland	Tall Open Shrubland Open Shrubland Low Open Shrubland
Grasses	Closed Grassland	Grassland	Open Grassland	Very Open Grassland
Herbs	Closed Herbland	Herbland	Open Herbland	Very Open Herbland
Sedges	Closed Sedgeland	Sedgeland	Open Sedgeland	Very Open Sedgeland

Vegetation Condition

The sites were traversed by vehicle and foot to assess the vegetation condition, employing the Vegetation Condition Scale (Keighery, 1994) recommended in *Bush Forever* (WAPC, 2000) (Table 10).

Table 10: Vegetation Condition Scale
(WAPC, 2000)

Condition		Definition
P	**Pristine**	No obvious signs of disturbance.
E	**Excellent**	Vegetation structure intact, disturbance affecting individual species; weeds are non-aggressive species
V	**Very Good**	Vegetation structure altered; obvious signs of disturbance
G	**Good**	Vegetation structure significantly altered by very obvious signs of multiple disturbance; basic vegetation structure or ability to regenerate it is retained
D	**Degraded**	Basic vegetation structure severely impacted by disturbance; scope for regeneration but not to a state approaching good (sic) condition without intensive management
C	**Completely Degraded**	Vegetation structure not intact; the area completely or almost completely without native species ('parkland cleared').

3.2 Floristic Community Types

An inferred Floristic Community Type (FCT) was assigned to the mapped vegetation unit of Channel 9 Bushland, Dianella. This was discerned by comparing the species

recorded with the species list per community type in Gibson et al. (1994), and additional FCTs listed in *Bush Forever* (WAPC, 2000). The species recorded by Gibson *et al.* (1994), which occur with frequencies of at least 50% in any one community type, were used for comparison with vegetation units at Dianella. Landforms on which each FCT occurs were also considered in the assignment.

The conservation significance of vegetation was assessed by consulting Gibson et al., (1994), EPA (2006), and the Threatened Ecological Community Database (2006). The Department of Environment and Water Resource's (DoEWR) Protected Matters database was searched for any local issues protected under the *EPBC Act* (DoEWR, 2009).

4.0 RESULTS

4.1 Flora

Botanists recorded 89 plant taxa across the site, 26 of which are exotic species; naturalised weeds and landscaping plants (detailed in Section 4.6). The list of species recorded across the site is presented in Appendix 1.

There were a number of taxa that could not be positively identified to species level due to inadequate fruiting or flowering material available at the time of the survey. These taxa are labelled with a '?'.

No Declared Rare Flora species, as listed under subsection (2) of Section 23F of the Western Australian *Wildlife Conservation Act 1950*, or Priority Flora species as listed by the Department of Environment and Conservation (Atkins, 2008) were located within the study area. No species or TECs governed by *the Environment Protection and Biodiversity Conservation Act 1999* were located within the study area.

No other flora species of other conservation significance as stated in Guidance Statement No. 51 (EPA, 2004) or as listed in *Bush Forever* (WAPC, 2000) were recorded within the study area.

4.2 Vegetation

4.2.1 Vegetation Units

Botanists defined and mapped one vegetation unit across the site, as shown in Figure 2. Photographs of this vegetation unit can be found in Appendix 2, and the species within it are listed in Appendix 1. A description of the vegetation unit for the survey area is as follows:

EmBa – Mixed Low Woodland of *Eucalyptus marginata* and *Banksia attenuata* over Tall Shrubland of *Chamelaucium uncinatum* over Low Open Shrubland of *Hibbertia hypericoides* over mixed Herbland and Grassland.

4.2.2 Floristic Community Type

The vegetation of the study area was analysed and is inferred to represent the Floristic Community Type (FCT) 23a Central *Banksia attenuata – B. menziesii* woodlands. This community type is restricted to the Bassendean system and is located between Bullsbrook and Woodman Point area. This community is well reserved with low conservation risk (Gibson et al. 1994).

Level 1 vegetation surveys do not include plot based analysis which is required for definitive Floristic Community Type (FCT) and Threatened Ecological Community identification; therefore, the FCT for the study area has only been inferred for this report.

4.3 Vegetation Condition

The vegetation on site ranged from Very Good - Excellent to Completely Degraded. The north eastern half of the site (excluding the car park area) consists largely of remnant native vegetation ranging from Very Good – Excellent to Good condition. Vegetation at the south western end, surrounding buildings and car park, consists of landscaped gardens of predominantly exotic species with some scattered remnant bushland species. Condition ranges from Degraded to Completely Degraded. The condition of the vegetation is represented in Figure 2.

4.4 Regionally Significant Bushland

The site is not identified as Regionally Significant Bushland. With 18% of the vegetation complex remaining in the *Bush Forever* study areas in the Swan Coastal Plain of the Perth Metropolitan Area (Table 3) it does not satisfy the criteria stated in *Bush Forever* (WAPC, 2000) for identification as Regionally Significant Bushland (400 ha or 10% or less remaining with basic structure intact), even taking into account an approximate overestimate of 5% in these figures. There are no DRF or TECs located within the survey area.

4.5 Locally Significant Natural Areas

The ecological criteria for determining locally significant natural areas of the Swan Coastal Plain (Table 8), in relation to the study area, have been addressed in Section 4.5.1 to 4.5.5. According to these criteria, the study area is a LNSA on the basis of meeting the 'Essential' criteria detailed in Sections 4.5.1, 4.5.3 and 4.5.4 (refer to Table 7 in Del Marco et al. 2004).

The fact that a natural area is confirmed as 'Locally Significant' does not necessarily mean that it must and can be protected (Del Marco et al. 2004). Del Marco et al. (2004) states that Local Governments, communities and developers must appreciate that *Bush Forever* excluded some sites of regional significance based on ecological value because of the social and economic constraints that existed at the time.

4.5.1 Representation

1a) i) Recognised for International, National, State or Regional conservation value.
No

A desktop search of: The Australian Heritage Database, Protected Matters Database, Directory of Important Wetlands in Australia and RAMSAR Sites revealed the Dianella study area is not currently formally recognised for International, National, State, or Regional Conservation Significance. No threatened flora or Threatened Ecological Communities (TECs) as defined by the *EPBC Act 1999* were recorded within the study area.

1a) ii) Community with <30% remaining within IBRA region.

Yes

According to Del Marco et al. (2004) 28.7% of the Karrakatta – Central and South Complex remains within the Swan Coastal Plain between Moore River and Dunsborough. Del Marco et al. (2004) states that there is an approximate over estimate of about 10% in these figures, which means that there may be as little as 18% remaining of the Karrakatta – Central and South Complex (Table 2).

1a) iii) Large viable (>20ha) conservation areas regionally in good or better condition and 1b) iii) locally.

No

The Channel 9 Bushland study area has less than 20 ha in good or better condition. There are small pockets of Very Good – Excellent condition vegetation at the north eastern end of the site (Figure 2).

1a) v) Ecological Community with <10% in Bush Forever Conservation.

Yes (Essential)

Approximately 8% of the pre-European Karrakatta – Central and South Complex is proposed for protection within *Bush Forever* areas.

1 b) i) Community with <10% remaining within local government area.

Yes (Essential)

This criterion requires a 10% minimum of pre-European extent remaining within the local government area. Approximately 5% of the pre-European Karrakatta – Central and South Complex remains within the City of Stirling Local Government area (Table 11).

Table 11: Representation of Karrakatta – Central and South Complex within the City of Stirling Local Government Area (Del Marco et al. 2004)

Community	Pre-European (ha)	Remaining extent of Pre European as of 2001	
		ha	%
Karrakatta – Central and South Complex	5463	292	5

1 b) ii) Community with <30% remaining within local government area.

Yes (Essential)

This criterion requires a 30% minimum of pre-European extent remaining within the local government area. Approximately 5% of the pre-European Karrakatta – Central and South Complex remains within the City of Stirling Local Government area (Table 14).

4.5.2 Diversity

2) i) Natural area containing upland and wetland communities in good or better condition.

No

Only one Floristic Community Type (FCT) was inferred for the site: FCT23a Central *Banksia attenuata – B. menziesii* woodlands. The vegetation condition ranged from Very Good - Excellent to Completely Degraded. This community type is considered well reserved a with low conservation risk (Gibson et al. 1994).

4.5.3 Rarity

3) i) Ecological community with <10% remaining within IBRA..

No

Approximately 28.7% of the pre-European extent of Karrakatta – Central and South Complex remains within the Swan Coastal Plain (Table 2). This figure may be reduced to 18% if we take into account an approximate 10% overestimate in the statistics (Del Marco et al. 2004).

3) ii) Ecological community with <10% in Bush Forever Conservation.

Yes (Essential)

Only 8% of the Karrakatta – Central and South Complex has been proposed for protection within *Bush Forever* areas (Table 3).

3) iii) Does the area contain TECs.

No

No TECs as defined by the *Wildlife Conservation Act 1950* or the *EPBC Act 1999* were located within the study area.

3) iv) Does the area contain DRF.

No

No Declared Rare Flora species, as listed under subsection (2) of Section 23F of the Western Australian *Wildlife Conservation Act 1950* as listed by the Department of Environment and Conservation (Atkins, 2008) were located within the study area. No Threatened Flora governed by the *EPBC Act 1999* were located within the study area.

3) v) Does the area contain Priority or significant flora.

No

No Priority or significant flora species as listed by the Department of Environment and Conservation (Atkins, 2008) were located within the study area.

4.5.4 Maintaining Ecological Processes or Natural Systems – Connectivity

4) i) Is the area part of a Regionally Significant Ecological Linkage.

No

The study area is not part of any Regionally Significant Ecological Linkages (WAPC, 2000).

4) ii) Is the area part of a Locally Significant Ecological Linkage.

Yes (Essential)

In the City of Stirling's *Green Plan 2* (2002), Dianella Drive (between Morley and Yirrigan Drives), bounding the eastern edge of the study area, has been identified as 'significant and strategic' in establishing ecological links. The green plan also identifies the bushland adjacent to the Channel 9 television station as being significant bushland.

4.5.5 Protection of Wetland, Streamline and Estuarine Fringing Vegetation and Coastal Vegetation

5) i) Conservation or Resource Enhancement Category Wetlands.

No

No Conservation Category or Resource Enhancement Wetlands were located within the study area.

5) ii) Environmental Protection Policy Lakes.

No

No wetlands as listed under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (EPP Lakes 1992) were located within the study area.

5) iii) Riparian vegetation.

No

There is no riparian vegetation within the study area.

5) iv) Floodplains.

No

No floodplains exist within the study area.

5) v) Estuarine vegetation.

No

No estuarine vegetation exists on site.

5) vi) Coastal vegetation on the foredunes and or secondary dunes.

No

No coastal vegetation exists on site.

4.6 Introduced Flora (Weeds)

Twenty six introduced flora (naturalised weeds and landscaping plants) were recorded from the survey site, which comprises 29% of the total flora recorded.

The Environmental Weeds Strategy for WA (EWSWA) (CALM, 1999), rated all the weeds known for Western Australia at the time of publication, according to invasiveness, distribution and environmental impact (Table 12). Weeds were classified into four categories; High, Moderate, Mild and Low. High rated species are those that all three criteria apply to (Table 12) and Moderate to which two criteria apply. The High and Moderate category weeds recorded in the survey area that should be prioritised for control or eradication are listed in Table 13.

Table 12: Criteria for Environmental Weeds Strategy Rating

Criteria	Description
Invasiveness	Ability to invade bushland in good to excellent condition or ability to invade waterways.
Distribution	Wide current or potential distribution including consideration of known history of wide spread distribution elsewhere in the world.
Environmental Impacts	Ability to change the structure, composition and function of ecosystems. In particular an ability to form a monoculture in a vegetation community.

Table 13: The EWSWA (CALM, 1999) Rating of Weeds at Channel 9 Bushland, Dianella

Weed		Rating	Weed		Rating
*	*Asparagus asparagoides*	High	*	*Gladiolus caryophyllaceus*	Moderate
*	*Ehrharta calycina*	High	*	*Hypochaeris glabra*	Moderate
*	*Leptospermum laevigatum*	High	*	*Pennisetum clandestinum*	Moderate
*	*Pelargonium capitatum*	High	*	*Pinus pinaster*	Moderate
*	*Aira cupaniana*	Moderate	*	*Pinus radiata*	Moderate
*	*Briza maxima*	Moderate	*	*Stenotaphrum secundatum*	Moderate
*	*Briza minor*	Moderate	*	*Ursinia anthemoides*	Moderate
*	*Disa bracteata*	Moderate	*	*Wahlenbergia capensis*	Moderate

4.6.1 Declared Weeds

The Agriculture Protection Board under the *Agriculture and Related Resources Protection Act 1976* can 'Declare' a plant that must be controlled or eradicated by landholders when it grows on their land. The control requirements of each plant species depends on the declaration status of the plant. There is one weed species found within the study area that is listed as a Declared Plant for the whole of the state; *Asparagus asparagoides* (Bridal Creeper). A description of this Declared Plant and its declaration status is given below. The control requirements for the declaration statuses are listed in Table 14.

Asparagus asparagoides (Bridal Creeper) – status P1

One of the state's worst environmental weeds, it was introduced as an ornamental plant and is extremely invasive. It is a perennial creeper with fleshy red berries that are spread by birds (Hussey et al. 2007).

Plate 1: Photo of *_Asparagus asparagoides_ by J.P. Pigott and R. Randall (Florabase, 2009)

Table 14: Control Requirements of Declared Plants

P1 **REQUIREMENTS** Prohibits movement	The movement of plants or their seeds is prohibited within the State. This prohibits the movement of contaminated machinery and produce including livestock and fodder.
P3 **REQUIREMENTS** Aims to control infestation by reducing area and/or density of infestation	The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set all plants:- ▪ within 100 metres inside of the boundaries of the infestation ▪ within 50 metres of roads and high water mark on waterways ▪ within 50 metres of sheds, stock yards and houses Treatment must be done prior to seed set each year. Of the remaining infested area:- Where plant density is 1-10 per hectare treat 100% of infestation. Where plant density is 11-100 per hectare treat 50% of infestation. Where plant density is 101-1000 per hectare treat 10% of infestation. Properties with less than 2 hectares of infestation must treat the entire infestation. Additional areas may be ordered to be treated.
P4 **REQUIREMENTS** Aims to prevent infestation spreading beyond existing boundaries of infestation.	The infested area must be managed in such a way that prevents the spread of seed or plant parts within and from the property on or in livestock, fodder, grain, vehicles and/or machinery. Treat to destroy and prevent seed set all plants:- ▪ within 100 metres inside of the boundaries of the infested property ▪ within 50 metres of roads and high water mark on waterways ▪ within 50 metres of sheds, stock yards and houses Treatment must be done prior to seed set each year. Properties with less than 2 hectares of infestation must treat the entire infestation. Additional areas may be ordered to be treated.
Special considerations	In the case of P4 infestations where they continue across property boundaries there is no requirement to treat the relevant part of the property boundaries as long as the boundaries of the infestation as a whole are treated. There must be agreement between neighbours in relation to the treatment of these areas .

5.0 RECOMMENDATIONS

The weed species and Declared Plants recorded within the study area, listed in Table 13 and detailed in Section 4.6 are known to be invasive and have a negative impact on the environment. Therefore, these weeds should be prioritised for control or eradication.

6.0 LIMITATIONS

- As with any biological survey, additional flora species including potential rare, priority or other conservation significant species may be detected in subsequent surveys. For example, ephemeral species such as orchids are not always present in each year/season or at the particular time a single botanical survey is conducted. This is a common to limitation to all botanical surveys.

- Approximately 10% of Western Australian flora species are undescribed, with new species found regularly. The flora identifications for this project were completed in line with the taxonomic resources and expertise available at the time.

- The statistics for percentage of vegetation complexes is derived from dated aerial photography circa 1997–1998 with limited ground-truthing. As a consequence the percentages of ecological communities remaining may be an overestimate of the native vegetation remaining at present. This limitation is common to all data analysis utilising regional vegetation complex information. Additionally, the percentage figures stated in Tables 2 and 3 as discussed throughout Sections 4.4 and 4.5, do not take into account the condition of the remaining vegetation.

- TECs, FCTs or conservation significant plant communities on site can not be positively confirmed without conducting a plot based survey.

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FIGURES

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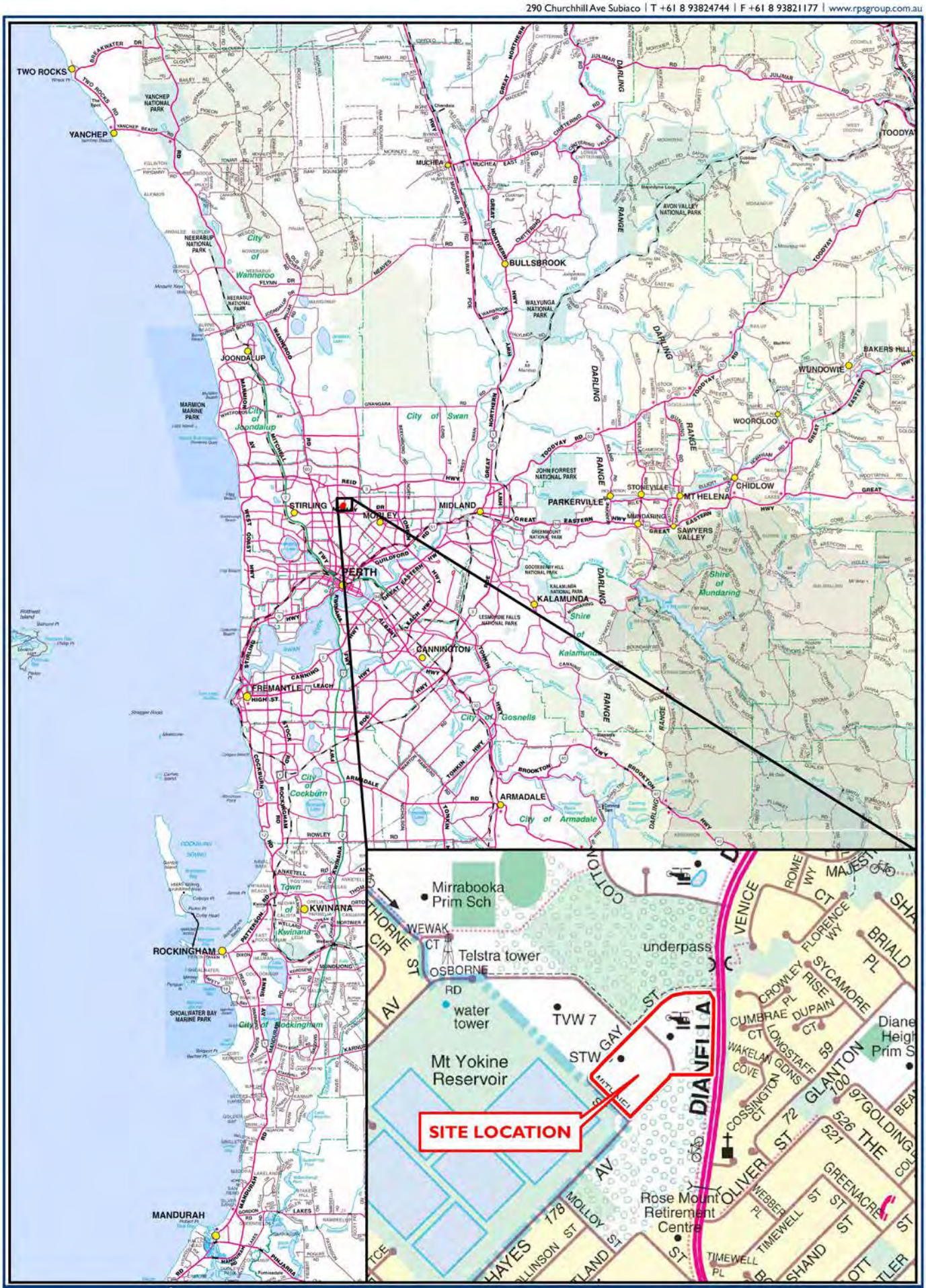

RPS

Job Number: L08345
Date: 12.01.09
Revision: A
Scale: 1:500000 @ A4
Drafted by: SC
Source: Landgate, 2008

Figure 1

Site Location

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LEGEND
- Site Boundary
- Cadastre
- Bush Forever Site 43
- Vegetation Unit Boundary

Vegetation Condition
- Very Good - Excellent
- Good - Very Good - Excellent
- Good - Very Good
- Good
- Degraded
- Completely Degraded

VEGETATION UNIT
EmBa – Mixed woodland.
Low Woodland of *Eucalyptus marginata* and *Banksia attenuata* over Tall Shrubland of *Chamelaucium uncinatum* over Low Open Shrubland of *Hibbertia hypericoides* over mixed Herbland and Grassland.

Bush Forever Site 43

NAME UNIDENTIFIED

EmBa

LONGSTAFF GDNS

CUMBRAE CT

WAKELAN COVE

BIANVELLA DR

COSSINGTON CT

GLANTON WY

WITHNELL ST

HAYES AV

RPS

Job Number: L08345
Date: 12.02.09
Revision: A
Scale: 1:1500 @ A3
Drafted by: SC
Source:

0 12.5 25 50 75 100 metres

Figure 2

Vegetation Units and Condition

RPS

APPENDIX I

Species List

APPENDIX 1: Species List

* Denotes a weed species P denotes a planted species

Family		Species
ZAMIACEAE (16A)		*Macrozamia fraseri*
PINACEAE (17A)	*	*Pinus pinaster*
	*	*Pinus radiata*
POACEAE (31)	*	*Aira cupaniana*
	*	*Briza maxima*
	*	*Briza minor*
	*	*Cortaderia selloana*
	*	*Ehrharta calycina*
		Neurachne alopecuroidea
	*	*Pennisetum clandestinum*
	*	*Stenotaphrum secundatum*
CYPERACEAE (32)		*Mesomelaena pseudostygia*
		Schoenus sp.
		Tetraria octandra
ARECACEAE (33)	*	*Phoenix dactylifera*
RESTIONACEAE (39)		*Alexgeorgea nitens*
		Desmocladus fasciculatus
ASPARAGACEAE (54B)	*	*Asparagus asparagoides*
DASYPOGONACEAE (54C)		*Calectasia narragara*
		Dasypogon bromeliifolius
XANTHORRHOEACEAE (54F)		*Xanthorrhoea brunonis*
		Xanthorrhoea preissii
ANTHERICACEAE (54J)		*Corynotheca* sp.
HAEMODORACEAE (55)		*Anigozanthos manglesii*
		Conostylis aculeata
		Conostylis candicans
		Haemodorum spicatum
IRIDACEAE (60)	*	*Gladiolus caryophyllaceus*
		Patersonia occidentalis
ORCHIDACEAE (66)	*	*Disa bracteata*
		Microtis media subsp. *media*
		Pyrorchis nigricans
CASUARINACEAE (70)		*Allocasuarina fraseriana*
		Allocasuarina humilis

Family		Species
PROTEACEAE (90)		*Banksia attenuata*
		Banksia menziesii
		Conospermum stoechadis subsp. *sclerophyllum*
	P	*Grevillea* sp.
		Hakea petiolaris
		Persoonia saccata
		Petrophile linearis
		Petrophile macrostachya
		Stirlingia latifolia
		Synaphea spinulosa
LORANTHACEAE (97)		*Nuytsia floribunda*
PITTOSPORACEAE (152)		*Pittosporum* sp.
MIMOSACEAE (163)	P	*Acacia dealbata*
	P	*Acacia iteaphylla*
	*	*Acacia longifolia* subsp. *longifolia*
		Acacia pulchella
		Acacia saligna
PAPILIONACEAE (165)		*Bossiaea eriocarpa*
		Daviesia divaricata
		Daviesia triflora
		Jacksonia floribunda
		Jacksonia furcellata
		Jacksonia sternbergiana
GERANIACEAE (167)	*	*Pelargonium capitatum*
RUTACEAE (175)		*Philotheca spicata*
DILLENIACEAE (226)		*Hibbertia huegelii*
		Hibbertia hypericoides
VIOLACEAE (243)		*Hybanthus calycinus*
MYRTACEAE (273)		*Agonis flexuosa*
	P	*Callistemon* sp.
		Calytrix angulata
		Chamelaucium uncinatum
		Eucalyptus marginata subsp. *marginata*
		Hypocalymma robustum
	*	*Leptospermum laevigatum*
		Melaleuca ? preissiana
	P	*Melaleuca quinquenervia*
		Melaleuca rhaphiophylla
		Scholtzia involucrata

Family		Species
ARALIACEAE (280)	P	*Schefflera actinophylla*
APIACEAE (281)		*Trachymene pilosa*
EPACRIDACEAE (288)		*Astroloma macrocalyx*
		Conostephium pendulum
LAMIACEAE (313)		*Hemiandra* sp.
RUBIACEAE (331)	P	*Coprosma repens*
		Opercularia vaginata
CAMPANULACEAE (339)	*	*Wahlenbergia capensis*
GOODENIACEAE (341)		*Dampiera linearis*
		Scaevola repens
STYLIDIACEAE (343)		*Stylidium brunonianum*
		Stylidium calcaratum
		Stylidium carnosum
ASTERACEAE (345)	*	*Hypochaeris glabra*
	*	*Ursinia anthemoides*
		Waitzia suaveolens var. *suaveolens*

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APPENDIX 2

Site Photographs

APPENDIX 2: Vegetation Unit

EmBa – Mixed Woodland

Low Woodland of *Eucalyptus marginata* and *Banksia attenuata* over Tall Shrubland of *Chamelauceum uncinatum* over Low Open Shrubland of *Hibbertia hypericoides* over mixed Herbland and Grassland.

appendix 03

Engineering Services Report

Lots 1 & 2 Gay Street, Dianella

Engineering Services Report

Project No: 11-131A

pritchard francis
civil and structural engineering consultants

Table of Contents

Revision	Description	Author	Date
0	Client Issue	Jamie De Palma	18 July 2019
1	Client Reissue	Jamie De Palma	24 July 2019

1 Introduction

At the request of Tim Trefry of Roberts Day, Pritchard Francis has prepared and updated this servicing report to identify existing services and upgrades required in order for the site to be subdivided to create a residential subdivision. Based on the latest plan, additional Local Authority requirements have been identified and addressed.

The report is based on the amended plan NIN DIA RD1 1024 rev D provided by Roberts Day, included within Appendix One. The amended plan has been amended since the previously received plan which has impacted the servicing and civil engineering design of the development.

The development site is located within the City of Stirling and is bounded by Withnell Street to the south, Gay Street to the west and north, Dianella Drive to the east and a future parks and recreation area to the southeast. Figure 1.1 shows an aerial photograph of the area, with the property outlined in red with the land area amounting to 5 hectares.

This report outlines the existing site conditions and expected water, sewer, electrical, gas infrastructure and local authority upgrades required to serve the proposed residential development.

Figure 1.1 – 2019 Aerial photograph of the site

2 Site Conditions

The site has been cleared of all buildings and structures with only the internal bitumen roads still remaining. The demolition and clearing work have been carried out since the previous report was prepared. It appears that no vegetation outside the building area has been removed or affect by the demolition works. As part of the new development plan, there is a significant area bounded by Gay Street and Dianella Drive that is an existing vegetation area that is shown to be retained.

2.1 Topography

In lieu of a site-specific feature survey, Pritchard Francis have utilised the natural surface contours provided in 1m increments from the Water Corporation. Due to the demolition work, it is unlikely that the site contours are correct but as the site is restricted and needs to match existing features, amended internal ground levels have no affect on information provided in this report.

The Water Corporation survey data indicates that the property grades as follows:

- South-west corner of approx. RL 65 AHD with a crest of RL 67 AHD along the mid-west boundary
- North-west corner of approx. RL 66 AHD
- North-east corner of approx. RL 57 AHD
- South-east corner of approx. RL 60 AHD

There is an approximate 6m level difference between the levels within the eastern boundary and Dianella Drive, but as this area is not being developed, but rather maintained as natural bushland, there will be no retaining walls required in this area.

2.2 Geology

A geotechnical investigation of the site is yet to be completed and in lieu, Pritchard Francis have assessed the 1:50,000 Geological Map Series.

The mapping indicates that the site is likely to consist of medium to coarse grained yellow sand of the Tamala Limestone formation. This soil type has medium permeability, can be easily excavated, low to medium bearing capacity and is suitable for urbanisation.

A detailed geotechnical investigation would need to be undertaken by a certified geotechnical engineer prior to construction to confirm site conditions and geological development constraints.

At completion of site work a final geotechnical inspection will be required and sign-off report produced in order for the local authority to provide clearances.

An extract of the Geological Map Series has been provided within Appendix Two.

2.3 Acid Sulphate Conditions

In lieu of a geotechnical investigation, Pritchard Francis has assessed the Planning Bulletin to determine the Acid Sulphate Soil risk of the site.

The mapping series indicates that the site has a low risk of Acid Sulphate Soils and Pritchard Francis do not anticipate that Acid Sulphates will impact the subdivisional works.

An extract of the Acid Sulphate Soils Risk Map is provided within Appendix Three.

2.4 Groundwater

The Perth Groundwater Atlas (2004) indicates that the water table is approximately 43m below ground level, and therefore it is not anticipated to impact on the development.

2.5 Survey

A full feature survey of the site will need to be undertaken prior to detailed design is carried out. The feature survey will need to include all critical site features including existing road reserves to facilitate the extension of new services.

2.6 Heritage Considerations

A search of the Aboriginal Heritage websites for this land did not reveal any heritage issues or ownership claims, other than a large heritage survey over the whole district.

3 Infrastructure

3.1 Earthworks and Retaining Walls

Pritchard Francis have prepared an earthwork and retaining wall scheme to verify that the proposed structure plan can be successfully implemented. The design can be summarised as follows:

- The majority of the internal road networks will grade towards the north-eastern POS for stormwater disposal. A small portion of the site along the south-eastern boundary will not be capable of grading out, and a localised stormwater solution (soakwells or underground storage) will need to be implemented.
- The road and lot levels will typically match in with the existing road reserve and Conservation Area levels.
- The eastern boundary of the 10m Drainage Easement will be up to 2m below the natural surface level of the Conservation Area. Terraced landscaping retaining walls within the Drainage Easement are required to blend out the design levels, whilst ensuring that the Conservation Area is not impacted by the works.
- Retaining walls will be implemented to all laneway lots which will raise the lot level above the front road reserve. Stair cases and gated access to the front of each lot will be required. The elevation of the lots will improve the front aspect of the properties and provide a view across to the POS area.
- The south-western lots fronting onto Withnell Street with be provided with pad levels equal to Withnell Street. A maximum retaining wall height of 4.5m will be required to raise the Withnell Street lots over the lots created within the bounds of the site. An alternative option may be to investigate the construction of two-storey dwellings where only a single storey fronting will be seen from Withnell Street, with the second storey being constructed at the rear of the lot at a lower level. This will significantly reduce the retaining wall heights but introduce additional costs within the residential build price. This will be addressed during the detailed design phase.

A plan of the proposed earthworks and retaining walls has been provided within Appendix Four.

3.2 Sewer Reticulation

The Water Corporation Esinet data obtained on 8 July 2019 indicates that the site is located adjacent to an existing Ø150mm sewer main within the northern verge of Gay Street which discharges into the greater sewer network within Dianella Drive.

The sewer network within Gay Street was constructed in early 2016 and therefore the previous advice received from the Water Corporation in 2014 is not entirely relevant, although the same principles and design intent remain the same.

Pritchard Francis anticipate that the new development would be serviced by new Ø150mm PVC reticulation pipes to service the proposed lots. Pritchard Francis have completed a schematic design which verifies that the sewer invert levels will be of sufficient depth in relation to the proposed earthwork pad levels to service the development.

Pritchard Francis lodged a new enquiry with the Water Corporation on 10 July 2019 to verify that the proposed pipe diameters and proposed connections into the existing infrastructure are suitable. A response was received on 23 July 2019 confirming that the Pritchard Francis sewer design is acceptable.

A plan of the existing infrastructure and sketch for the sewer supply to service the development is provided in Appendix Five.

3.3 Water Reticulation

The Water Corporation Esinet data obtained on 8 July 2019 indicates that the site is surrounded by the following water reticulation mains:

- Ø150mm water main within the northern verge of Gay Street north-east of the development.
- Ø150mm water main within the southern verge of Gay Street north-west of the development.
- Ø150mm water main within the northern verge of Withnell Street south-west of the development.
- Ø300mm water main within Dianella Drive.

The Water Corporation have previously indicated in 2014 that the development can be served by the existing infrastructure without any upgrading of the existing system required. The new development would likely comprise of a series of Ø100mm and Ø150mm PVC pipes to service the proposed lots.

Pritchard Francis lodged a new enquiry with the Water Corporation on 10 July 2019 to verify that the proposed pipe diameters and proposed connections into the existing infrastructure are suitable. A response was received on 23 July 2019 confirming that the Pritchard Francis water design is acceptable.

A plan of the existing infrastructure and an indicative sketch for the water supply to service the development is provided in Appendix Six.

3.4 Stormwater Drainage Strategy

3.4.1 City of Stirling Drainage Requirements

The City of Stirling has previously advised that the collection and detention of stormwater drainage must comply with the IPWEA Local Government Guidelines for Subdivisional Development, and the City of Stirling requirements. This shall include:

- The road drainage network shall be designed for a 20% AEP (5 ARI) event.
- The road drainage network shall direct the stormwater to the designated Public Open Space stormwater basin for detention and infiltration.
- Provide an overland flow path to direct a 1% AEP (100 ARI) storm event to the designated Public Open Space stormwater basin for detention and infiltration.
- Ensure that the post development annual discharge volumes and peak flows are maintained relative to pre-development conditions, in addition to protecting the built environment from flooding and water logging, and minimising public risk to the community.

3.4.2 City of Stirling Drainage Infrastructure

A Dial Before You Dig investigation has indicated that there are existing City of Stirling Drainage assets within the vicinity of the proposed development. The following drainage assets are located around the development site:

- Ø225mm stormwater pipe within Gay Street adjacent to Hayes Avenue, collecting stormwater from the crowned road and discharging to the north.
- Ø225mm stormwater pipe within Gay Street at the northern extent of the development, collecting stormwater from the crowned road and discharging to the north.

No drainage assets are located within Withnell Street.

3.4.3 Stormwater Drainage Plan

As noted within Earthworks, the majority of the internal road networks will grade towards the north-eastern Public Open Space for stormwater disposal. The exact dimensions and storage volume of the basin will be determined in due course once a Hydrologist has been appointed to the project to complete the Urban Water Management Plan.

An overland flow path will be implemented to ensure that the roads grade to the stormwater basin for events which exceed the 20% AEP. At least 300mm freeboard is required between the finished floor heights and the 1% AEP peak flood level which can be achieved in the proposed civil earthworks scheme.

As the existing level of the proposed Public Open Space is higher than the nominated road reserve levels, earthworks within the POS will be required. The landscaping plan provide by PlanE depicts the proposed arrangement of the POS, including drainage basin, pedestrian footpaths and activity spaces. The native vegetation surrounding the POS shall be protected and retained.

A small portion of the site along the south-eastern boundary will not be capable of grading out, and a localised stormwater solution will need to be implemented. Pritchard Francis propose that soakwells be utilised in this region to collect, detain and infiltrate the necessary stormwater event, although this method will require the approval from the City of Stirling.

The laneway lots shall be provided with stormwater lot connection pits given that the size of the lots shall be smaller than 300m2. The lot connection pits shall discharge the stormwater into the road reserve network, where the stormwater will be detained and infiltrated.

During the detailed design phase, the stormwater drainage design philosophy implemented for the proposed development has been completed in accordance with:

- Australian Rainfall and Runoff 2001.
- Better Urban Water Management 2008.
- Liveable Neighbourhoods.
- Local Government Guidelines for Subdivisional Development.
- City of Stirling requirements.

Please refer to Appendix Seven which contains a stormwater scheme depicting the anticipated drainage solution.

3.5 Pavements

The expected standard requirements for road networks will need to include the following:

- 6m wide pavement seal (kerbed).
- Maximum longitudinal grade of 10% and an absolute minimum of 0.6%.
- One way crossfall at 3% implemented throughout. Laneways shall grade towards the centreline at 3%.
- Verge grading should be +2% from the top of kerb to the property boundary, and access within lots should have a maximum grade of 10%.
- Minimum radius in residential areas is 6m, for lane ways and 12m other roads including those that connect to district distributor roads with no requirement for channelization.
- Intersection upgrades, islands and other traffic control measures may be required to suit traffic conditions.
- Parking bays need to be provided with at least one bay per two residential lots served by rear access laneways.
- Regulatory signs and pavement marking should be in accordance with Main Roads Western Australia standard requirements should they be required.
- All intersections should comply with Austroads – Guide to Traffic Engineering Practice Part 5 June 2005, Intersections at Grade".

All roads should be kerbed as per the following:

- Flush kerbing should be installed within laneways and adjacent to Public Open Spaces where water is to drain directly to the POS, on the edges of through carriageways abutting eyebrow and battle-axe driveway treatments, car parks between the through road and parking bay, access streets and laneways, median islands where WSUD is used.
- Mountable kerbing should be installed on all residential streets and neighbourhood connector roads. All mountable kerbing is to be keyed where radiuses are less than 40m.
- Semi-mountable kerbing should be installed on median islands in dual carriageways and intersection sweeps.
- Barrier kerbing should be installed on roads abutting Public Open Space (unless flush kerbing is installed for WSUD purposes), and roads in which future paths will be constructed adjacent to the kerb line.

Pavement thickness should be designed in accordance with the Local Government Guidelines for Subdivisional Development and City of Stirling requirements, with consideration to the following requirements:

- Granular pavement to have a minimum design life of 40 years, with a longer life attainable through maintenance of the wearing course.
- The minimum pavement for urban residential roads in sandy soil conditions similar to this site should comprise of:
  - 150mm limestone sub base course
  - 100mm rockbase base course
  - 5mm primer seal
  - 30mm (AC10) asphalt wearing coarse

In addition to the above requirements, all parking within the development are recommended to conform with:

- AS2890.1 2004 – Off street car parking.
- AS2890.2 2002 – Off street commercial vehicle facilities.
- AS2890.5 1993 – On street parking.
- AS2890.6 2009 – Off street parking for people with disabilities.

3.6 Gas Supply

A Dial Before You Dig investigation has indicated that there is existing gas infrastructure within the vicinity of the proposed development. The following gas mains are located around the development site:

- Ø100mm Medium Pressure gas main within the eastern verge of Dianella Drive.
- Ø100mm Medium Pressure gas main within the western verge of Dianella Drive north of Gay Street.
- Ø50mm Medium Pressure gas main within the southern verge of Gay Street east of Osborne Road
- Ø63mm Medium Pressure gas main within the southern verge of Gay Street. West of Osborne Road.

Correspondence with the Asset Management Team at ATCO Gas Australia previously confirmed in 2014 that the existing 100mm PVC gas main in Dianella Drive has the capacity to service the proposed development and therefore no upgrades are required.

Under current agreements if the developer provides a suitable trench, the gas provider will supply and install the required gas mains to service this development at their cost.

Pritchard Francis lodged a new enquiry with ATCO Gas Australia on 9 July 2019 to verify that the previous advice remains current, however a response is yet to be received.

A copy of the 2014 correspondence and Dial Before You Dig information has been provided within Appendix Eight.

3.7 Electrical Reticulation

A Dial Before You Dig investigation has indicated that there is existing Western Power infrastructure within the vicinity of the proposed development. The following Western Power assets are located around the development site:

- Existing High Voltage overhead cables within the southern verge of Gay Street for the length of the development.
- Existing High Voltage overhead cables within the southern verge of Withnell Street for the length of the development.
- Existing High Voltage underground cables within portions of the southern verge of Gay Street.
- Western Power fibre network within the southern verge of Gay Street for the length of the development.

The Dial Before You Dig data has been provided within Appendix Nine.

Pritchard Francis engaged with 3E Electrical to seek further electrical advice, with the following comments received:

Existing Power Infrastructure

Three phase HV and LV overhead and underground distribution infrastructure currently exists on the southern side of Gay Street. The HV meter connections to the old Channel 7 and Channel 9 appears to have been disconnected and therefore works to resupply this equipment are no longer required. The old Channel 7 site has been subdivided and is reticulated with Western Power underground infrastructure.

Information on the capacity of the local zone substation can be determined from Western Power's public Network Capacity Mapping Tool (NCMT). The zone substation that appears to supply the HV network adjacent to the subject site is the Yokine zone substation, which is located along Darch Street, Yokine (2.5km southwest as the crow flies). The NCMT currently shows there is 10MVA spare capacity at the zone substation indicating minimal risk for network capacity constraints at the zone substation. The spare capacity in the adjacent network however can only be confirmed via an official application to Western Power such as the Design Information Package request. The previous report and Design Information Package (DIP) however indicated that the site had originally been allocated approximately 513kVA and therefore this capacity should be available for the development and a case will be put to Western Power if this is argued otherwise.

Proposed Power Networks

Based on the lot yield of 34 residential lots, 3 group housing site (totalling 113 units) and 1 POS lot, at Western Power's standard load allocation, the development total's power load will be in the order of 515kVA. Given this, the proposed development will require new Western Power infrastructure to be installed as existing transformer sites in the area will not be able to service the entire load.

To service the proposed development would require tapping off the existing overhead HV network along Gay and Withnell Street and extend through development site via a new HV switchgear which will supply a new transformer to service the newly created residential lots. The transformer site would likely be placed in the POS to minimise impact to the size of the newly created lots. This location is also central to the larger power loads (i.e. Group Housing sites) and will provide a more efficient power reticulation design. The infrastructure arrangement will be subject to the final lot layout with HV sites subject to an earthing study/assessment. It should be specifically noted that a number of metallic pipeline exists in the vicinity of the site and that the Mt Yokine Reservoir is located across the road which may dictate the placement of the transformer site.

The assumption has been made that the group housing lots consists of typical residential units with no special loads and that the POS is not further developed with electrical communal services.

Overhead Removal / Undergrounding

The requirement to remove/underground the existing aerials will be subject to the WAPC conditions, Western Power requirements and Development Approval conditions of the Group Housing Sites. Western Power generally requires adjacent overhead aerial network to be removed/undergrounded where existing poles are situated on lot frontages less than 30m and where a number of relocations would be required to realign these poles to a common lot boundary. Given the potential number of relocations required, it is likely that the overhead aerials adjacent to

the site will need to be undergrounded from Withnell Street to the conservation area. The HV cable supplying the Channel 7 subdivision currently comes off this overhead HV network and will need to be rerouted to the new HV switchgear installed for this development.

3.8 Communications

A Dial Before You Dig investigation has indicated that there is existing communication infrastructure within the vicinity of the proposed development. The following communication assets are located around the development site:

- NBN Co assets located within the southern verge of Gay Street and northern verge of Withnell Street.
- NextGen assets located within the southern verge of Gay Street.
- Optus assets located within the southern verge of Gay Street.
- Telstra assets located within the southern verge of Gay Street and northern verge of Withnell Street.

The communications Dial Before You Dig data has been provided within Appendix Ten.

Pritchard Francis engaged with 3E Electrical to seek further communication advice, with the following comments received:

3E Communications Advice

The previous communications report provided limited information but did include an NBN application and an email from Telstra. Telstra indicated that they would not service the development, though note that their comment only applies to voice and broadband infrastructure. Telstra do have the Right of First Refusal to provide point to point fibre, under the Definite Agreements with NBN Co. The NBN Co infrastructure application (broadband and voice infra) has been withdrawn and there's no advice re Backhaul costs. NBN Co must accept Infrastructure Provider of Last Resort responsibility (IPoLR) for the development, if the Developer wishes to engage NBN Co, since it would most likely fall within the NBN Co Fixed Line Footprint, is surrounded by properties that have been converted to NBN Co broadband under the Brownfields Rollout and the yield is > 100 premises – 34 green titled and 113 strata titled lots. FTTP technology would most likely be delivered by NBN Co. However, since the original application, under the pre-March 2015 Fibre in New Developments (FIND) policy, has been withdrawn, the latest government policy, Telecommunications in New Developments (TIND), Policy would apply, along with its charges. Given that fibre infrastructure is likely to be within < 1km from the development it is unlikely that a Backhaul Charge would apply, however, Deployment Charges of $600/green titled lot and $400/strata lot would apply (includes GST). Note that NBN Co deliver fibre infrastructure approximately 18 weeks after the pit and pipe network is handed over to NBN Co and thus well after PC but usually before the first homes are completed.

Both 3G and 4G mobile coverage would be available to the proposed development site, with likely high download speeds, given the proximity of radio base stations – Telstra/Optus and Vodafone radio base stations on Laythorne St, Optus and Vodafone on Withnell St and Telstra on Cottonwood Cres.

Although there are a number of communications carriers fixed line networks within the area, it is possible that the development works would not affect the existing infrastructure on road verge, unless pits fell within new entry roads to the subdivision. If those networks were to be affected, then some relocations may be required – possible effect on WP and Optus networks but most likely not Telstra, NBN Co or Netxgen. See DBYD attached for Nextgen, Optus, Telstra, NBN Co and WP communications. Existing Telstra, Nextgen, Optus & WP fibre and Telstra copper on private property would have to be removed, if that has not already occurred under the demolition project. There appears to be no NBN Co assets on private property and this suggests Telstra assets have also been removed. It's likely that all communications assets were removed from private property, in conjunction with the demolition project but this should be confirmed. The microwave tower that was on site was removed, sometime between August and December 2017.

Under Federal legislation and policy, Developers have two obligations in relation to telecommunications, for new developments:

- To make the development fibre ready i.e. provide pit and pipe
- To provide telecommunications infrastructure to each lot i.e. provide cable (usually)

4 Conclusion

This report outlines the infrastructure likely to be required to serve the amended plan for the proposed development of Lots 1 and 2 Gay Street, Dianella, confirming that the site is accessible and can be served with roads, electrical, water, sewer, gas, stormwater drainage and communications infrastructure.

Appendices

Appendix One:	Conceptual Options (Roberts Day)
Appendix Two:	Geology
Appendix Three:	Acid Sulphate Soils Risk Map
Appendix Four:	Earthworks and Retaining Walls
Appendix Five:	Sewer Reticulation Infrastructure
Appendix Six:	Water Reticulation Infrastructure
Appendix Seven:	Stormwater Infrastructure
Appendix Eight:	Existing Gas Infrastructure
Appendix Nine:	Existing Electrical Infrastructure
Appendix Ten:	Existing Communication Infrastructure

Appendix One: Conceptual Options (Roberts Day)

LEGEND

- SUBJECT LAND
- DEVELOPMENT R30
- DEVELOPMENT R40
- DEVELOPMENT R60
- DEVELOPMENT R80
- POS
- INDICATIVE RETAINING WALL

INDICATIVE DWELLING YIELD

113 MULTIPLE DWELLINGS*
34 SINGLE RESIDENTIAL DWELLINGS

Important Note: Apartment yields are a 'best case' theoretical scenario in accordance with the maximum plot ratio permissable in the R-Codes (SPP 7.3 Apartments), and an average apartment size of 75m². The yields do not take site constraints into account (e.g lot configuration, site levels and parking requirements/ designs) which will likely result in a reduced dwelling yeild.

great places

SIZE A4_1:2000

0 metres 20 40 60 80 100

LOCAL STRUCTURE PLAN
Lots 1 & 2 Gay Street, Dianella
City of Stirling

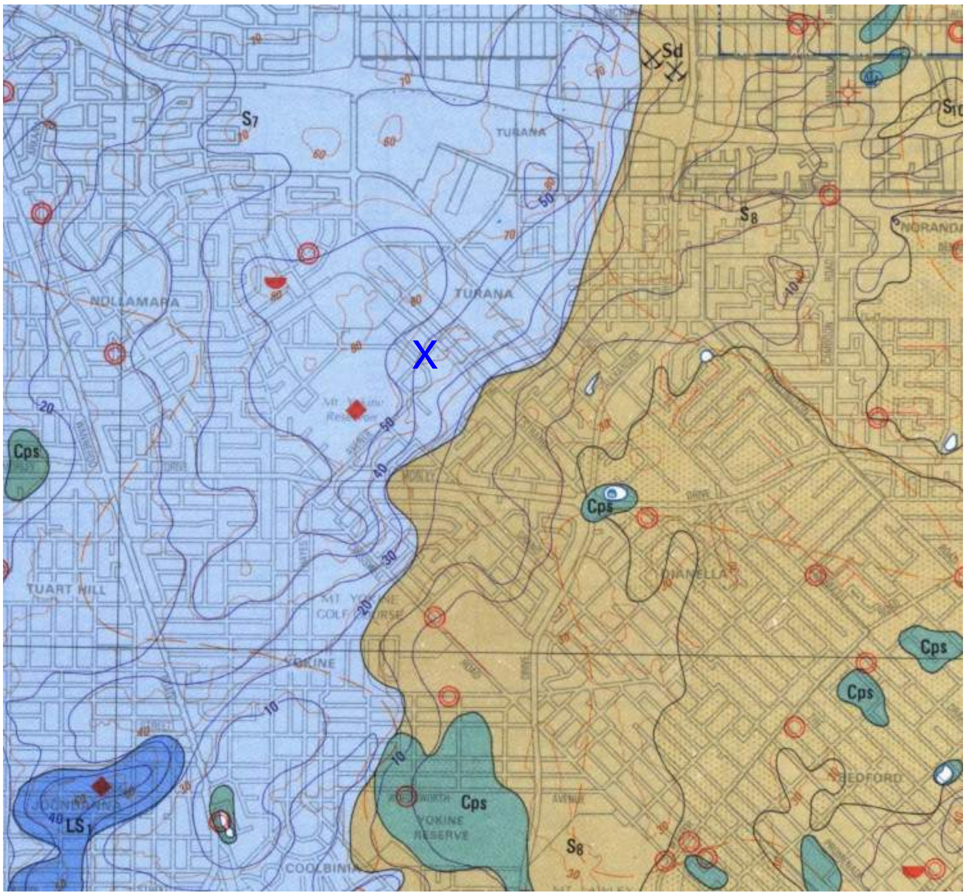
REF NO.	DRAW NO.	REV.
NIN DIA	**RD1 1024**	**D**

DISCLAIMER: ISSUED FOR DESIGN INTENT ONLY. ALL AREAS AND DIMENSIONS ARE SUBJECT TO DETAIL DESIGN AND SURVEY

Appendix Two: Geology

PERTH

GEOLOGICAL SURVEY OF WESTERN AUSTRALIA



SHEET 2034 II AND PART OF 2034 III AND 2134 III

Map Unit[1]: Unconsolidated Material[2]	Map Unit[1]: Rock[2]	GENERAL FEATURES: Description	Equivalent Unit on geological maps	Relief; Slope[4,5]	Rock-Mineral Resources	PHYSICAL PROPERTIES[6]: Permeability	Corrosion potential	Slope stability	Ease of excavation	Shrink-swell potential	Bearing capacity	SMEC[8]	CURRENT PROCESSES	SUITABILITY FOR SPECIFIED LAND USES[9]: waste disposal Solid	waste disposal Liquid	Septic tanks	roads	Urbanisation	Excavation	NOTES
Cps		PEATY CLAY – dark grey and black[3] with variable sand content of lacustrine origin	Swamp deposits (Qhw)	20–60 m;F	Peat, diatomite	L	M–H	L	H	M–H	L	OH–CH	Flooding	×	×	×	⊗	×	⁘	High water table, prone to flooding, organic and clayey soils of low bearing capacity
M₁		SILT – grey mottled yellowish brown, blocky, firm, variable clay content		20 m;F	Plastic clay for brick, pipe and tile manufacture	L	L–M	L–M	H	L–M	L–M	ML MH	Flooding	×	×	×	◆	○	◆	High water table, prone to flooding, variable bearing capacity, differential settlement of foundations may occur
P		PEAT – black, clayey in part, saturated fibrous organic soil		15 m;F	Peat	H	H	L	H	H	L	Pt	Flooding	×	×	×	×	×	◆	High water table, prone to flooding, low bearing capacity, differential settlement will occur, high compressibility
Sp		PEATY SAND – greyish brown, medium-grained quartz, moderately well sorted, variable organic content, of lacustrine origin		20–25 m;F	Sand; diatomite	M–H	L–M	L	H	L	L	SP–SW	Flooding	×	×	×	⊗	×	⁘	High water table, prone to flooding, variable under foundations
Spc		PEATY SAND – dark grey and black quartz sands with variable organic content and common peat lenses, variable clay content		10–15 m;F	Peat	H	M–H	L	H	L–M	L–M	SC, Pt		×	×	×	○	×	◆	High water table, may be prone to flooding, variable bearing capacity, differential settlement of foundations could occur
S₁		CALCAREOUS SAND – white, fine to medium-grained, sub-rounded quartz and shell debris, of eolian origin	Safety Bay Sand (Qhs)	0–20 m;M	Limesand	H	L–M	L	H	N/A	L	SP–SW	Wind transportation	×	●	◆	×	×	●	Active blowouts, and sand sheets, unvegetated, high lime content gives it considerable potential for fixing certain kinds of waste, and neutralising acids, low bearing capacity, settlement can be uneven
S₂		CALCAREOUS SAND – as S_1		0–60 m;M–S	Limesand	H	L–M	L	H	N/A	L	SP–SW	Wind transportation	◆	●	◆	◉	×	×	Prone to remobilisation where the sparse vegetation is removed, high lime content gives it potential for fixing certain kinds of waste, and neutralising acids, low bearing capacity, settlement can be uneven
	LS₄	LIMESTONE – pale yellowish brown, weakly cemented, friable, medium-grained, sub-rounded quartz and shell debris, of eolian origin		40–55 m;M–S	Limesand	H	L–M	M	H	N/A	L–M	SP–SW	Wind transportation	×	●	◆	◉	×	×	Generally linear features with moderate to steep slopes, susceptible to remobilisation, low bearing capacity
C₁		CLAY – mid to dark grey, soft, saturated, prominent 0.2 m thick oyster shell bed near surface of alluvial origin	Alluvium (Qha)	0–4 m;F		L	M–H	L–M	H	L	L	CL	Flooding, stream flow, sediment transport	×	×	×	○	×	⁘	Confined to Swan River floodplain, prone to flooding, differential settlement of foundations may occur, high water table
Cm₂		CLAY – dark strong brown, hard when dry, soft when moist, variable silt content, no sand, of alluvial origin		2–10 m;F	Clays for brick pipe and tile manufacture	L	L	M	H	L	L–M	CL	Flooding, stream flow, sediment transport	●	×	×	◆	×	◆	Confined to Helena River floodplain and Jane Brook, high water table, prone to flooding, bearing capacity dependent on clay mineralogy
Mc₁		CLAYEY SILT – yellow brown to strong brown, blocky, mottled, soft, with variable clay content, dispersive in part, of alluvial origin		2–10 m;F	Clays for brick pipe and tile manufacture	L	L	L–M	H	L	L–M	ML	Flooding, stream flow, sediment transport	×	×	×	◆	×	◆	Confined to Swan River floodplain and some tributaries, prone to flooding, high water table, some settlement under load can be expected
Ms₄		SANDY SILT – light yellow brown, blocky, mottled, some fine to medium-grained sand, soft when moist, variable clay content		1–5 m;F	Silts and clays for brick pipe and tile manufacture	L	L	M	H	L	M	ML	Flooding	○	×	×	◆	×	◆	Confined to Swan River floodplain, high water table, prone to flooding, some settlement of foundations may occur
S₁₄		SAND – pale grey to white, medium-grained sub-angular, quartz and feldspar, well sorted, abundant whole and broken bivalves and gastropod shells, of alluvial origin		0–5 m;F		H	L	L–M	H	N/A	L–M	SP	Potential for flooding	×	×	×	◆	○	⁘	Confined to Swan River estuary high water table, prone to flooding, some settlement of foundations may occur, bearing capacity is dependent on degree of consolidation of the material
Sm₁		SILTY SAND – strong brown, leached at surface, fine to medium-grained, quartz, variable silt content		5–10 m;F		M	L	L–M	H	L	M	SF silty		●	×	●	◆	◆	◆	Confined to Swan River floodplain, high water table, variable thickness, bearing capacity is dependent on the amount of silt in the material
M₂		SILT – strong brown, tough, hard, variable fine-grained quartz sand in matrix	Alluvium (Qa)	200–290 m;G		L	L	M	H	L	M	ML	Some solifluction, occasional, stream flow	○	×	●	◆	○	◆	Confined to valleys on the Darling Scarp, variable thickness, may become saturated during periods of water flow
Mgr₂		GRAVELLY SILT – strong brown, tough with common pebbles of fine to coarse-grained, sub-rounded granite, some dolerite and rare sandstone (SS) variable sand content	Colluvium (Qc)	40–100 m;G	Gravel, possibility of silts and clays for brick pipe and tile manufacture	L–M	L	M–H	H	L	M–H	ML	Some solifluction, some stream flow	◆	×	×	◆	○	◆	Variable value as a foundation, permanent cuts are unstable
Msg		SANDY SILT – strong brown, firm, friable, occasional pebbly horizons with little matrix containing quartzite, quartz, granite, laterite, of colluvial origin		20–60 m;G	Used in brick manufacture to impart body	L	L	M–H	H	L–M	M	ML–MI	Stream flow, some mass movement	◆	×	×	◆	○	◆	Variable value as a foundation, permanent cuts are unstable, dispersive in part
Ms₃		SANDY SILT – yellowish brown, tough, with variable sand content of fine to medium-grained quartz sand, some gravel in places.		20–75 m;G	Potential for gravel in part	L–M	L	L–M	H	L	M	ML	Stream flow, some mass movement	◆	×	×	◆	○	◆	Variable value as a foundation, permanent cuts are unstable
Smg		SILTY SAND – dark yellowish brown, tough silty, medium to coarse quartz sand, in places is abundant medium to coarse-grained pisolitic laterite (G_2) pebbles.		30 m;F	Gravel	M–H	L	L	H	L	L–M	SF silty		◆	×	○	◆	◆	◆	Restricted occurrence
S₇		SAND – pale and olive yellow, medium to coarse-grained, sub-angular to sub-rounded quartz, trace of feldspar, moderately sorted, of residual origin.	Sand derived from Tamala Limestone (Qts)	0–100 m;G	Specification sand	M	L	L–M	H	N/A	L–M	SP–SW	Groundwater recharge	●	×	●	◆	◆	◆	Few limitations, some settlement under foundations can be expected, some ability to attenuate pollutants due to small clay content, usually considerable depth to water table due to topography
	LS₁	LIMESTONE – light, yellowish brown, fine to coarse-grained, sub-angular to well rounded, quartz, trace of feldspar, shell debris, variably lithified, surface kankar, of eolian origin.	Tamala Limestone (Qtl)	0–85 m;F–G	Dimension stone, metallurgical, agricultural and construction grade limestone	H	L	M–H	M–H	N/A	V		Groundwater recharge	×	×	●	◆	◆	◆	Variable bearing capacity dependent on degree of cementation, solution cavities and fissures could lead to settlement under load and offer an easy path for pollutants down to the water table
	LS₂	LIMESTONE – as LS_1, abundant karstic phenomena including caves, swallows, dolines		30–40 m;G	As LS_1	H	L	M–H	M–H	N/A	V[7]		Groundwater recharge	×	◆	●	◉	◉	◆	As LS_1, high water table in places, extensive cave systems and other large scale karstic phenomena known
S₈		SAND – very light grey at surface, yellow at depth, fine to medium-grained, sub-rounded quartz, moderately well sorted of eolian origin	Bassendean Sand (Qpb)	15–90 m;F–G	Construction and glass sand	H	L	L	H	N/A	M–H	SP–SW	Groundwater recharge, some wind transportation	●	×	●	◆	◆	◆	Well drained, when dry and vegetation free it could be remobilised, drainage disposal is only a problem in areas of high water table
S₁₀		SAND – as S_8	Thin Bassendean Sand over Guildford formation (Qpb/Qpa)	10–55 m;F	Construction and glass sand	H	L	L	H	N/A	M–H	SP–SW	Groundwater recharge, some wind transportation	×	×	×	◆	◆	◆	Of variable thickness, the sands physical properties are modified by the underlying material, generally high water table.
Mgs₁		PEBBLY SILT – strong brown silt with common, fine to occasionally coarse-grained, sub-rounded laterite quartz, heavily weathered granite pebble, some fine to medium-grained quartz sand, of alluvial origin	Guildford Formation (Qpa)	5–30 m;F	Plastic clays for brick, pipe and tile manufacture	L	L	M–H	H	L	M–H	ML	Stream flow, flooding	×	◆	×	◆	○	◆	Near surface water table, prone to flooding, differential settlement of foundations may occur unless built on columns or concrete rafts above 1 m of compacted sand, dispersive in places
Ms₇		SANDY SILT – strong brown to mid grey, mottled, blocky, disseminated fine sand, hard when dry, variable clay content of alluvial origin.		2–5 m;F	Clays for brick, pipe and tile manufacture	L	L	M–L	H	L	M–H	ML	Flooding	×	◉	×	◆	○	◆	Confined to Swan River floodplain, susceptible to flooding, some settlement of foundations may occur, dispersive in places
S₁₁		SAND – light grey, medium-grained, sub-angular to rounded quartz and feldspar, moderately sorted of alluvial origin		5–15 m;F		H	L	L–M	H	N/A	L	SW	Stream flow, sediment transport	×	×	×	×	×	×	Restricted to fluvial channel with seasonal flow
S₁₂		SAND – yellow, fine to medium-grained, sub-angular to rounded quartz, with some feldspar, well sorted, variable silt content, of colluvial origin	Yoganup Formation (Qpr)	25–75 m;F–G	Construction sand	M–H	L	L–M	H	N/A	L–M	SW		◆	×	◆	◆	◆	◆	Settlement could occur under load, requires protection against erosion when exposed
	SS	SANDSTONE – light grey, hard, compact, moderately weathered, fine-grained silty sandstone, lateritisation has affected the rock in places	Ridge Hill Sandstone (Qph)	75–100 m;G		M	L	M–H	L–M	L	L–M			×	×	○	◆	◆	◆	Areally restricted, variable foundations
	LA₁	LATERITE – massive and cemented, occasionally vesicular, up to c. 4 m in thickness, overlies a zone of mottled and/or pallid clays and saprolite	Laterite (Ql)	235–335 m;F–G		L	L	M–H	L	L	H		Stream flow, sediment transport	×	×	○	◆	◆	◆	Can only be excavated by blasting, variable foundations and sub-surface drainage is a problem
G₂		GRAVEL – strong brown, coarse, sub-rounded to rounded lateritised granite pebbles in clay-silt mixture, moderately sorted, of colluvial origin		220–335 m;G	Gravel	H	L	L	H	L	L	GW	Stream flow, sediment transport	×	×	×	◆	◆	◆	Very loose, though occasionally weakly consolidated, needs protection against water erosion and fluctuations in moisture content, when compacted can withstand heavy loads
	DO	DOLERITE – quartz rich, fine-grained, melanocratic, 2 to 20 m wide dykes	Dolerite (d)	25–250 m;G–M	Crushed rock aggregate when fresh, soils may contain plastic clays	L		M	L	L	H			×	×	×	◆	◆	◆	Can be a good foundation when fresh but soils developed on dolerite (plastic clays) give poor foundations unless moisture content kept constant
M₃		SILT – yellowish brown mottled, overlying kaolinitic horizon, firm and tough when dry, soft when wet, very variable sand content	Even-grained Granite (Ae and Aes)	30–270 m;G		L	L	L–M	H	L–M	L–M	ML–MI	Solifluction, stream flow	×	×	×	×	○	◆	Foundation conditions variable and can be good providing requisite preparation conditions are carried out, tendency to be unstable on steep slopes, seepage is common
	GR	GRANITE – mesocratic, fine to coarse-grained, ranges in composition from granodiorite to granite, adamellite being commonest variety		20–270 m;G–S	Crushed rock aggregate, dimension stone	L	L	H	L	L	H		Stream flow	●	×	×	◆	◆	◆	Foundation conditions generally good, even when weathered providing requisite preparation conditions are carried out
	GR-GN	GRANITES and GNEISSES – intimate association of coarse-grained granites (GR) and gneisses and fine-grained dolerites (DO)	Migmatite (Am)	20–180 m;M–S		L	L	M–H	L	L	M–H		Stream flow	●	×	×	◆	◆	◆	Heterogeneous material, adequate foundations providing requisite preparations are followed for clayey soils, where present; unstable on steep slopes, shear zones are common

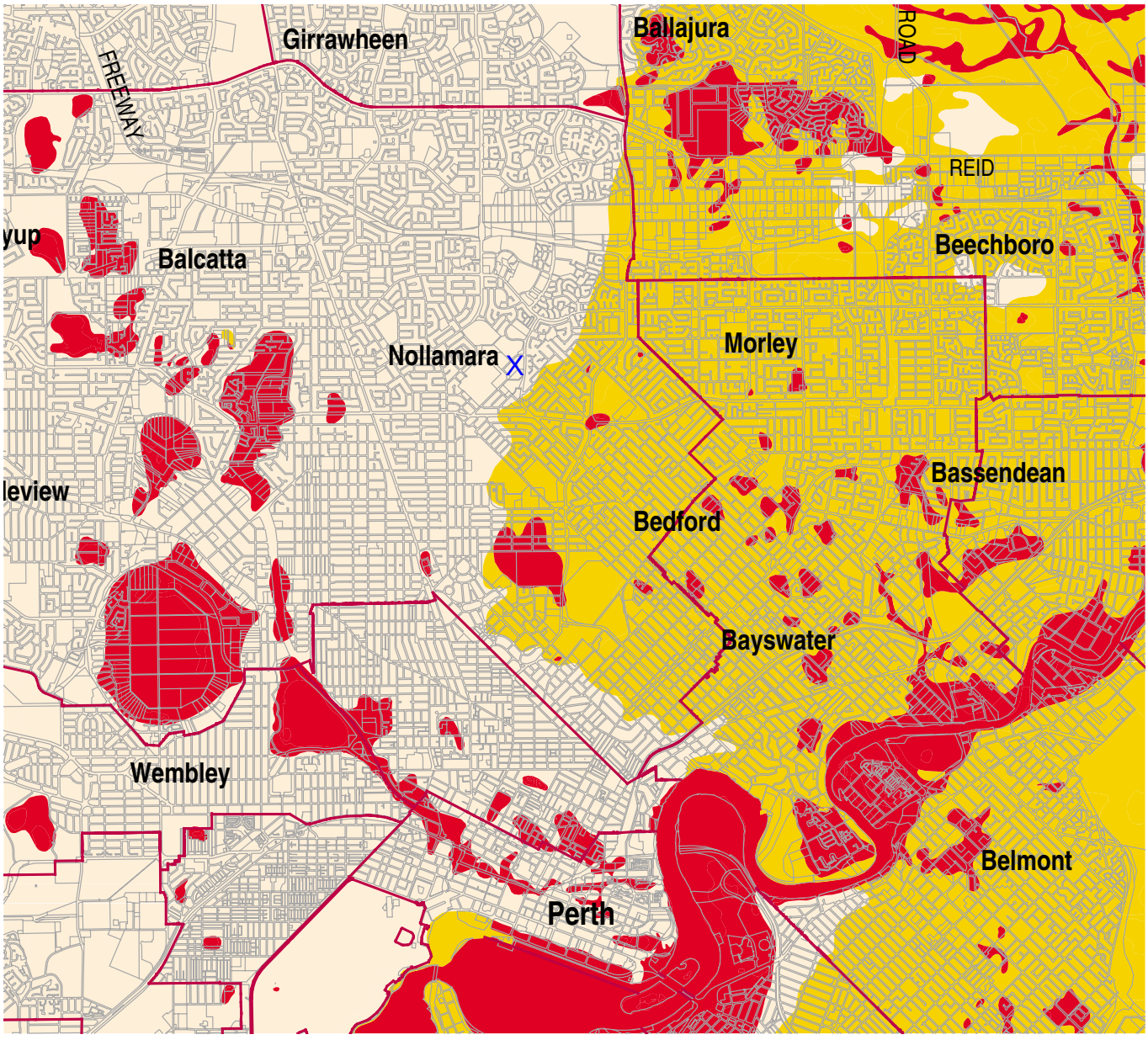
REFERENCES

1. See Lithological Classification
2. The terms unconsolidated material and rocks are used in the sense of the engineering terms "soil" and "rock".
3. Colours were derived from Standard Soil Colour Charts, notation omitted.
4. Maximum and minimum elevation of the unit with respect to Australian Height Datum.
5. Slopes expressed qualitatively in four terms, F–flat, G–gentle, M–moderate, S–steep, which correspond to $<3^\circ$, 3°–10°, 10°–20°, $>20^\circ$. The dominant slope of each unit is given.
6. H .... high; M .... moderate; L .... low; V .... variable; N/A .... not applicable. Properties vary with degree of weathering
7. Low over sinkholes and collapse features
8. Snowy Mountains Engineering Corporation Soil Classification which describes soils in terms of grain size, grading characteristics and compressibility. For rocks the symbols refer to the weathered products.
9. × activity undesirable for the environment; ⁘ environment unsuitable or hazardous for the activity; ● possible problems for the environment; ○ possible problems for the activity; ◆ activity compatible with unit

The data contained on this sheet are provided for preliminary studies and are not intended as a substitute for detailed on-site investigation

Appendix Three: Acid Sulphate Soils Risk Map

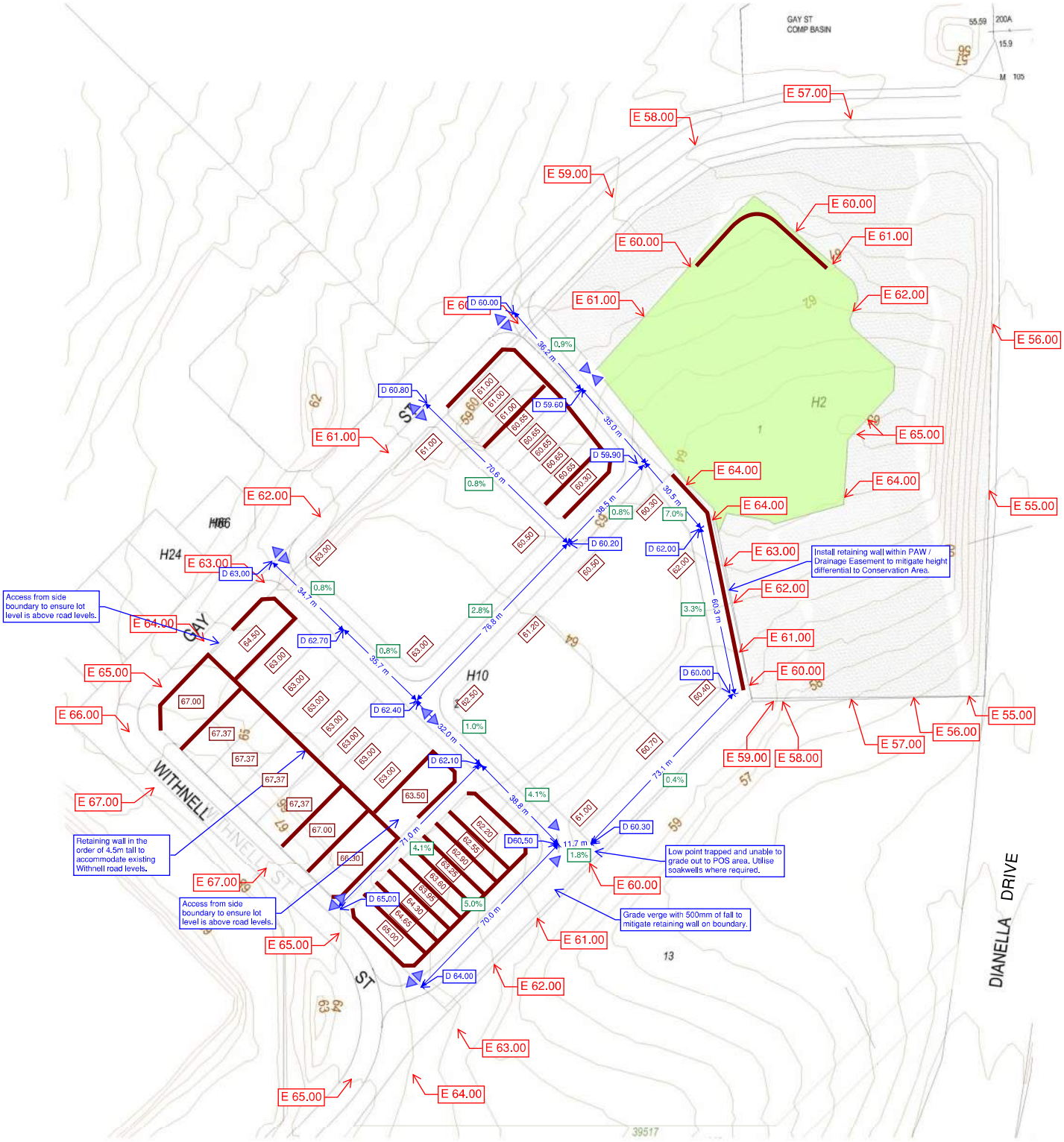
Figure 3: Central Metropolitan Region Scheme Acid Sulfate Soils



LEGEND

- High risk of actual acid sulfate soil (AASS) & potential acid sulfate soil (PASS) <3m from surface
- Moderate to low risk of AASS and PASS occuring generally at depths of >3m
- Low to no risk of AASS and PASS occuring generally at depths of >3m
- Local Government Boundary

Appendix Four: Earthworks and Retaining Walls



E 64.00 Existing Level

D 64.00 Proposed Level

65.00 Proposed Lot Level

High Point

Low Point

5.0% Pavement Grade

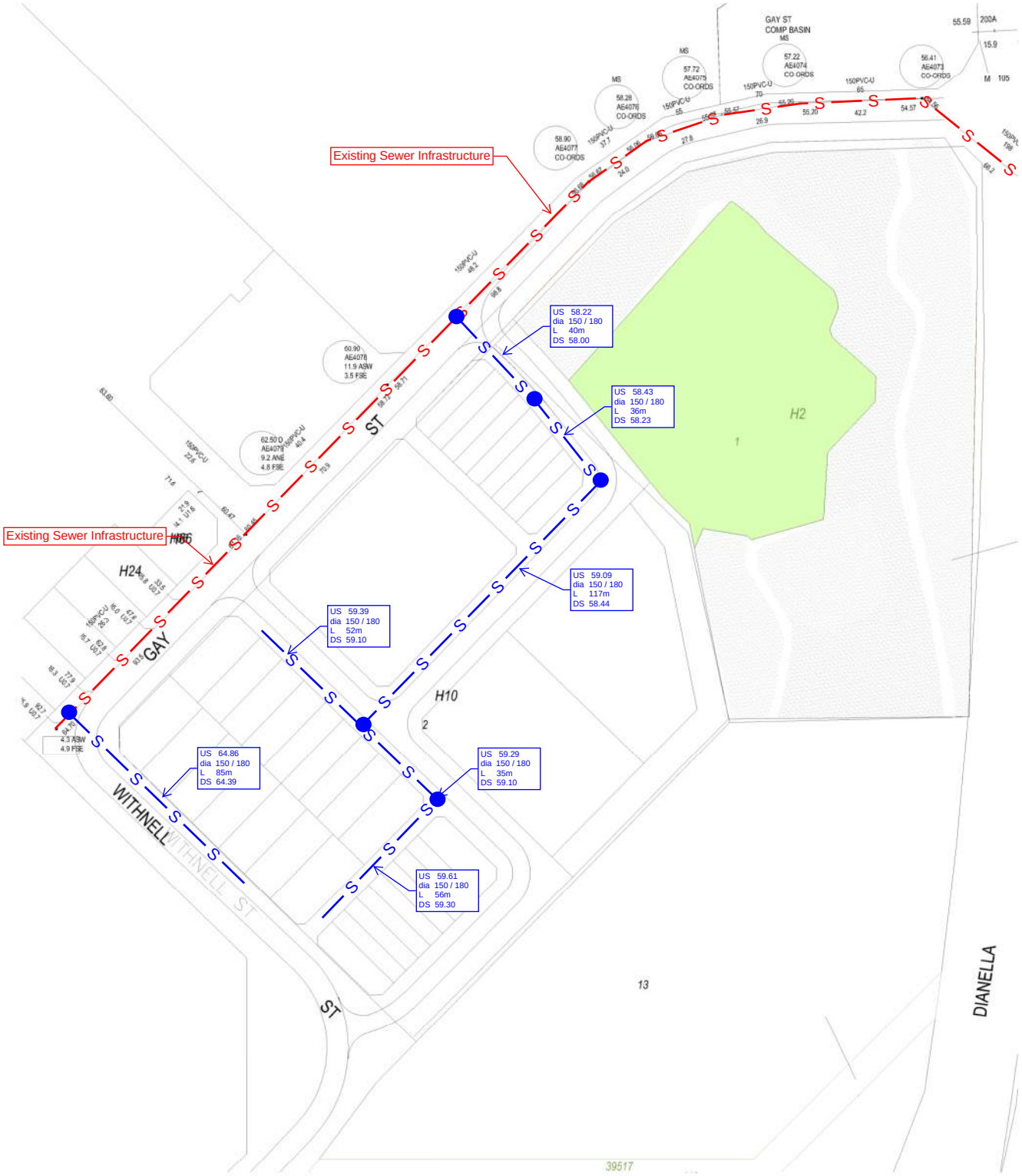
Retaining Wall

NORTH

DIAL BEFORE YOU DIG
www.1100.com.au
The Essential First Step.

Project:	Channel Nine
Client:	Roberts Day
Job No:	11-131
Drawing:	
Title:	Site Plan
Scale:	1:2000 @ A4
Engineer:	Jamie De Palma
Date:	17 July 2019

Appendix Five: Sewer Reticulation Infrastructure



NORTH

DIAL BEFORE YOU DIG
www.1100.com.au
The Essential First Step.

S Existing Sewer Infrastructure

S Proposed Sewer Infrastructure

Proposed Sewer Manhole

Project:	Channel Nine
Client:	Roberts Day
Job No:	11-131
Drawing:	
Title:	Sewer Reticulation
Scale:	1:2000 @ A4
Engineer:	Jamie De Palma
Date:	9 July 2019

Jamie De Palma

From: Ross Crockett <Ross.Crockett@watercorporation.com.au>
Sent: Tuesday, 23 July 2019 11:54 AM
To: Jamie De Palma
Subject: Planning Lots 1& 2 Gay Street Dianella
Attachments: Gay St Dianella Water Planning.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

Categories: Channel Nine

Hi Jamie

The Proposed Sewer layout you attached is suitable.

Please find attached the revised Water Planning for the Development.

Regards

Ross Crockett
Development Planner
Development Services

E: Ross.Crockett@watercorporation.com.au
T: (08) 9420 2013

Keep in touch **W:** watercorporation.com.au

Name:
Mr Jamie De Palma

Name:
Mr

Name:
Jamie De Palma

Company:
Pritchard Francis

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jamie.d@pfeng.com.au

Contact Number:
93825111

Lot Number/s:
1 and 2

House number:
10 and 2

Street name:
Gay Street

Suburb/Town:
Dianella

Are you or the client the owner of this land?:
Yes

Local authority:
STIRLING, CITY OF

WAPC subdivision reference (if known):

Purpose of Inquiry:
Verify previous advice for sewer and water planning received from Mark Busher in 2014.

Please provide a description of your proposal, or attach a PDF of your proposed plan below:
Conceptual sewer and water plans have been created by Pritchard Francis for review. Previous correspondence from 2014 can be provided to the Water Corporation should the Water Corporation need assistance.

Number of proposed lots:
40

Number of proposed dwellings:
113

Area of industrial/commercial development (square metres) (if applicable):

Please provide timeframes for this development:
August 2019

Is this land identified in any Department of Planning Urban Development Program (UDP)?:
No

If yes, please provide the UDP project location number:

Current Local Government Town Planning Scheme (TPS) land zoning:

Proposed land use:
Urban

Is the land subject to a Local Government Town Planning Scheme (TPS) rezoning proposal?:
No-proposed development conforms to current zoning

Is the land within an endorse District Structure Plan?:
No

Is the land subject to a proposed District Structure Plan?:
No

Is the land within an endorse Local Structure Plan/Outline Development Plan?:
No

Is the land subject to a proposed Local Structure Plan/Outline Development Plan?:
Yes - not yet lodged

Is the land within a current approved development application?:

No

Is the land within a current WAPC approved subdivision application?:
No

Is the land within a proposed WAPC subdivision application?:
No

Proposed water requirements, excluding fire services (litres per second):

Proposed wastewater flow (litres per second):

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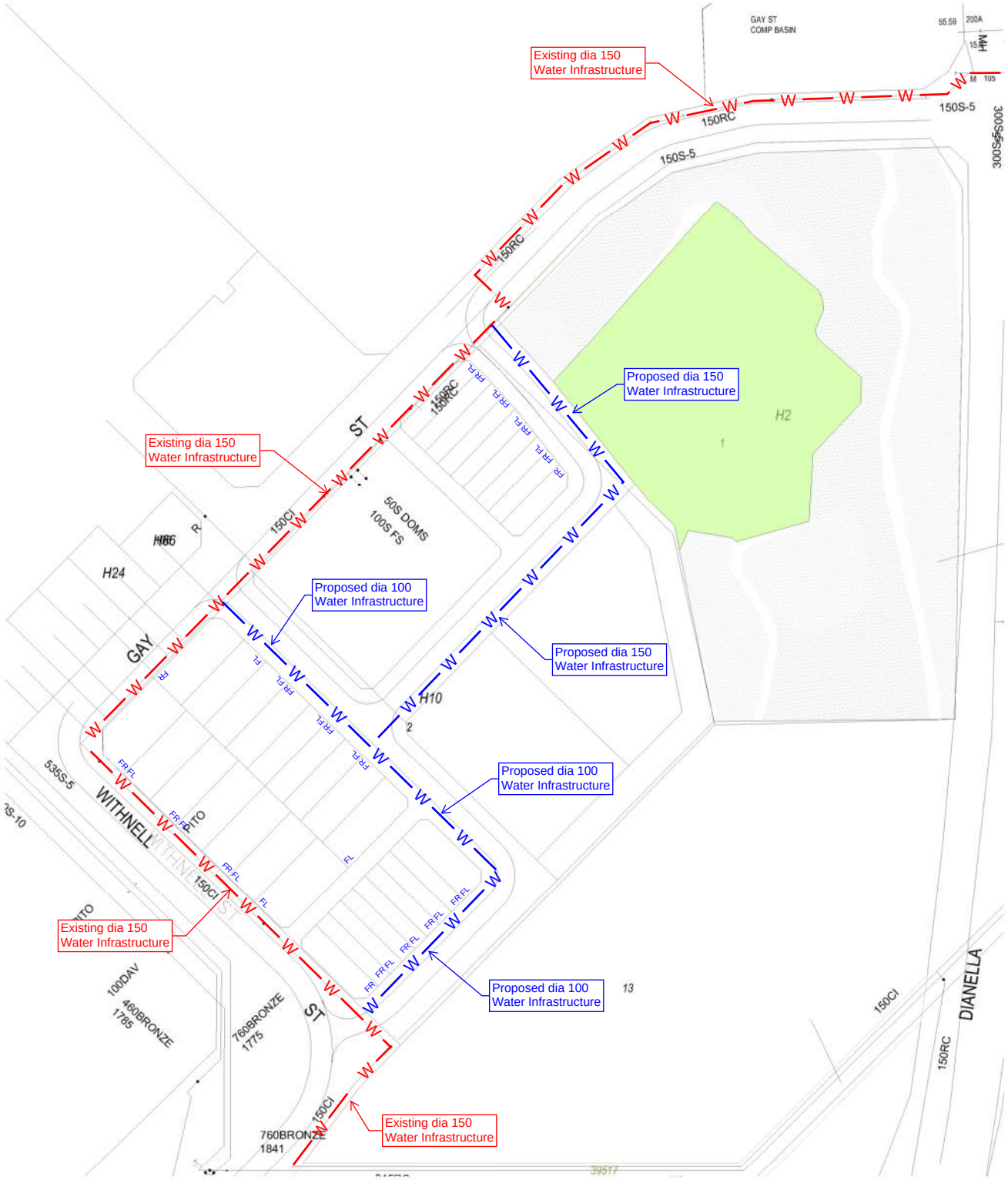
Appendix Six: Water Reticulation Infrastructure



NORTH

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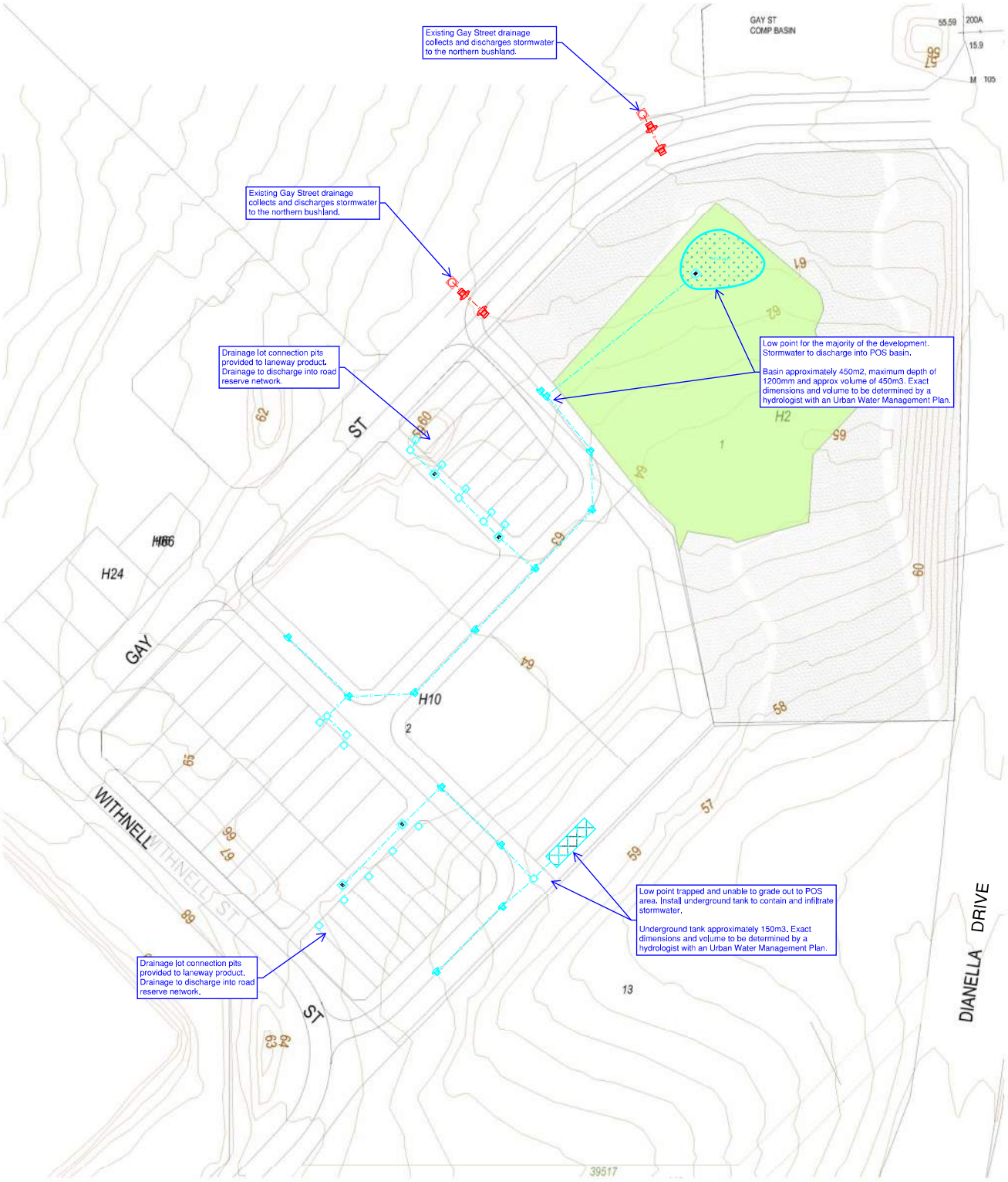
W Existing Water Infrastructure

W Proposed Water Infrastructure

Project:	Channel Nine
Client:	Roberts Day
Job No:	11-131
Drawing:	
Title:	Water Reticulation
Scale:	1:2000 @ A4
Engineer:	Jamie De Palma
Date:	9 July 2019

Appendix Seven: Stormwater Infrastructure



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- Proposed SEP
- Proposed Gully Pit
- Proposed Manhole
- 65.00 Proposed Lot Level
- Retaining Wall

Project:	Channel Nine
Client:	Roberts Day
Job No:	11-131
Drawing:	
Title:	Drainage Plan
Scale:	1:2000 @ A4
Engineer:	Jamie De Palma
Date:	9 July 2019

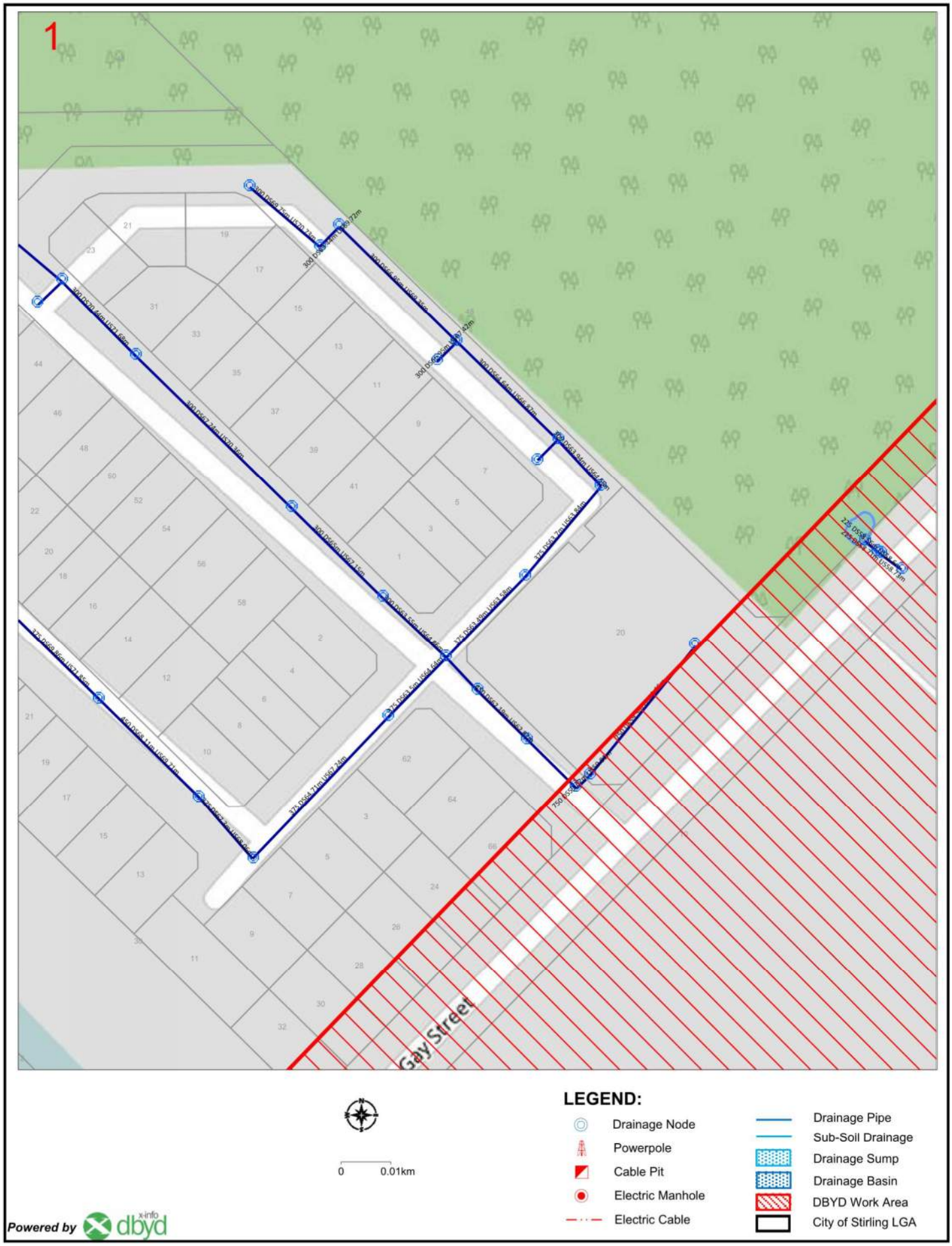
Enquiry Date: 08/07/2019

City of Stirling
City of Choice

Map 1

Sequence No: 85337581

Gay Street Huntingdale



Powered by dbyd x-info

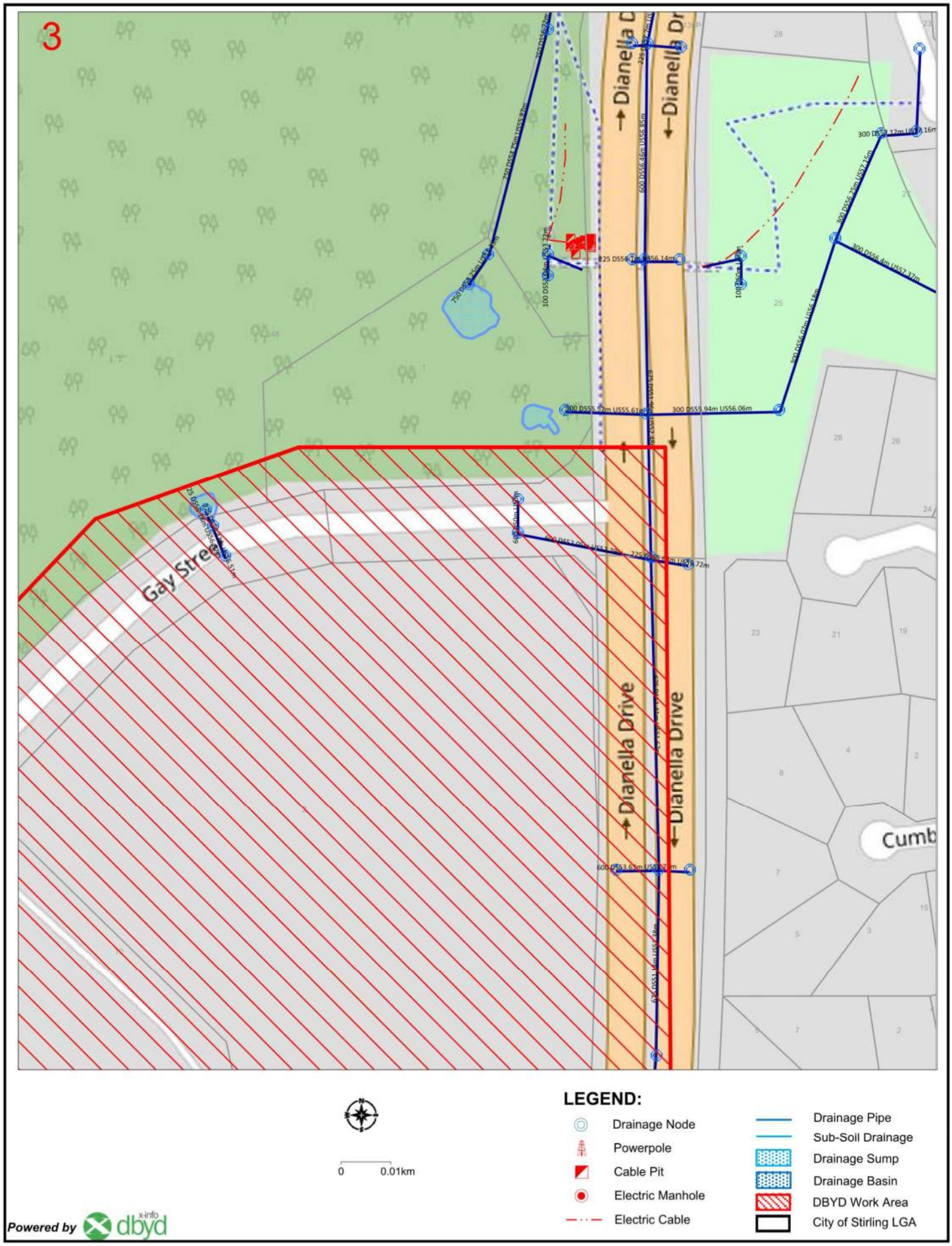
Enquiry Date: 08/07/2019

City of Stirling
City of Choice

Map 3

Sequence No: 85337581

Gay Street Huntingdale



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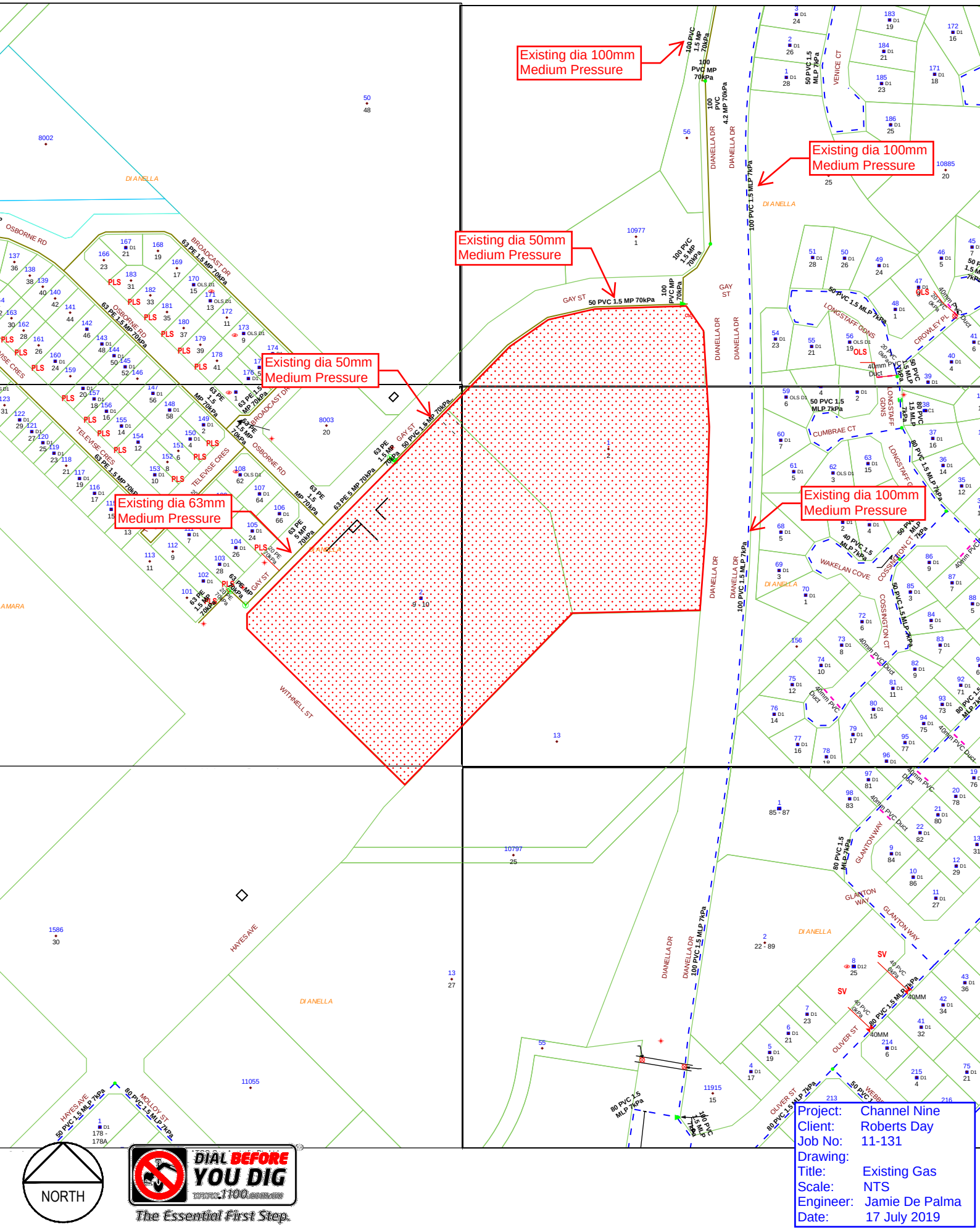
Appendix Eight: Existing Gas Infrastructure



Project:	Channel Nine
Client:	Roberts Day
Job No:	11-131
Drawing:	
Title:	Existing Gas
Scale:	NTS
Engineer:	Jamie De Palma
Date:	17 July 2019

Jamie De Palma

From: Stubbs, Marc <Marc.Stubbs@atcogas.com.au>
Sent: Tuesday, 25 March 2014 1:49 PM
To: Denise Hare
Subject: RE: 11-131.3 Connection Enquiry

Hi Denise

Modelling by our Asset Services Team confirms that our previous advice is still Valid.

I hope this is helpful, please contact me if you require further information.

Cheers
Marc

Marc Stubbs
Business Development

ATCO Gas AUSTRALIA | ATCO Gas Australia Pty Ltd
12-14 The Esplanade
Perth WA 6000
Telephone: (08) 6218 1746 Mobile: 0418 901 700

From: Denise Hare [mailto:denise.h@pfeng.com.au]
Sent: Tuesday, 25 March 2014 8:10 AM
To: Stubbs, Marc
Cc: Searle, Lewis
Subject: RE: 11-131.3 Connection Enquiry

Hi Marc,

Just wondering if you had a chance to look into this query?

Regards

Denise Hare
Engineer - Civil
BE (Hons) BA
Pritchard Francis
Telephone: (08) 9382 5111
Facsimile: (08) 9382 5199
Email: denise.h@pfeng.com.au
Website: www.pfeng.com.au
Level 1, 430 Roberts Road,
PO Box 2150, Subiaco 6904

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From: Denise Hare
Sent: Sunday, 23 March 2014 8:05 AM
To: Stubbs, Marc (MStubbs@wagasnetworks.com.au)
Cc: Searle, Lewis
Subject: 11-131.3 Connection Enquiry

Hi Marc,

Can you please tell me whether the advice below is still applicable for the proposed development?

Regards

Denise Hare
Engineer - Civil
BE (Hons) BA
Pritchard Francis
Telephone: (08) 9382 5111
Facsimile: (08) 9382 5199
Email: denise.h@pfeng.com.au
Website: www.pfeng.com.au
Level 1, 430 Roberts Road,
PO Box 2150, Subiaco 6904

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From: Stubbs, Marc [mailto:Marc.Stubbs@atcogas.com.au]
Sent: Tuesday, 4 October 2011 12:00 PM
To: Denise Hare
Cc: Lim, Sin Wei; Rizzi, Frank
Subject: RE: Connection Enquiry

Hi Denise

Our Asset Management Team has confirmed that the existing 100 mm PVC gas main in Dianella Drive has the capacity to service this proposed development.

I hope this is helpful.

Regards

Marc Stubbs
Market Development Executive
ATCO Gas AUSTRALIA | ATCO Gas Australia
12-14 The Esplanade
Perth WA 6000
Telephone: (08) 6218 1746 | Mobile: 0418 901 700

From: Denise Hare [mailto:denise.h@pfeng.com.au]
Sent: Tuesday, 27 September 2011 10:43 AM
To: Stubbs, Marc
Subject: RE: Connection Enquiry

Hi Marc,

Can you please tell me how my query is progressing?

Regards

Denise Hare
Civil Engineer
Pritchard Francis
Telephone: (08) 9382 5111
Facsimile: (08) 9382 5199

Email: denise.h@pfeng.com.au
Website: www.pfeng.com.au
Level 1, 430 Roberts Road,
PO Box 2150, Subiaco 6904

From: Stubbs, Marc [mailto:Marc.Stubbs@atcogas.com.au]
Sent: Tuesday, 13 September 2011 10:10 AM
To: Denise Hare
Subject: RE: Connection Enquiry

Hi Denise

Thank you for your message and attached plans.

I will ask our Asset Management Team to model the capacity of our existing network to service this proposed development, and will get back to you with the results when they become available.

Regards

Marc Stubbs
Market Development Executive
ATCO Gas AUSTRALIA | ATCO Gas Australia
12-14 The Esplanade
Perth WA 6000
Telephone: (08) 6218 1746 | Facsimile: (08) 6216 1703 | Mobile: 0418 901 700

From: Denise Hare [mailto:denise.h@pfeng.com.au]
Sent: Tuesday, 13 September 2011 9:48 AM
To: Stubbs, Marc
Subject: Connection Enquiry

Hi Marc,

Thank you for calling me this morning.

The proposed development is located at Lots 1 and 2 Gay Street, Dianella. Please find attached the proposed plan indicating the location. As part of the works, we have been engaged to undertake a feasibility study into the proposed subdivision. I write to enquire whether the existing gas infrastructure is capable of serving the development.

I have submitted a Dial before You Dig request for the region and have attached this for your information. Could you please advise whether the gas infrastructure in the vicinity of the proposed subdivision is capable of serving the development?

Thank you for your assistance.

Please don't hesitate to call me if you have any queries.

Regards

Denise Hare
Civil Engineer
Pritchard Francis
Telephone: (08) 9382 5111
Facsimile: (08) 9382 5199
Email: denise.h@pfeng.com.au
Website: www.pfeng.com.au
Level 1, 430 Roberts Road,
PO Box 2150, Subiaco 6904

2010 Overall Winner - Condor Tower

Category Winner - Infrastructure and Building

Category Winner - Innovation and Development

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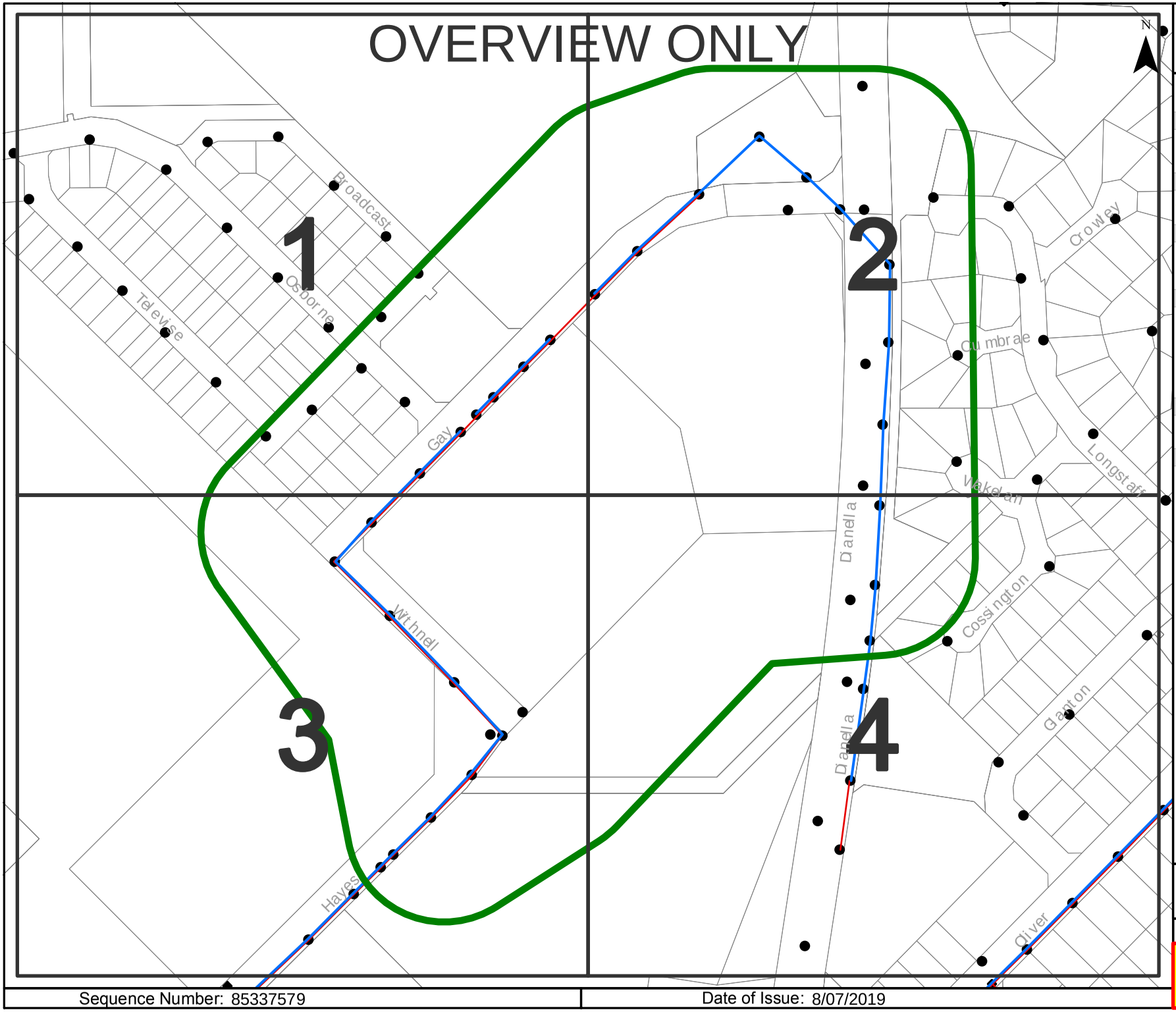
Appendix Nine: Existing Electrical Infrastructure



westernpower

OVERHEAD LEGEND

Structures

- Power Pole
- Transmission Poles

Transmission Overhead Powerline

- Transmission (33kV - 330kV)

Distribution Overhead Powerline

- High Voltage (1kV - 33kV)
- Low Voltage (< 1kV)

Proposed Construction Assets

- Design Area *
- High Voltage Overhead Powerline
- Low Voltage Overhead Powerline
- Power Pole

Communications Assets

- Overhead Pilot Cable

Feature

- Area of Interest

Project:	Channel Nine
Client:	Roberts Day
Job No:	11-131
Drawing:	
Title:	Existing Power
Scale:	NTS
Engineer:	Jamie De Palma
Date:	17 July 2019

*** Please refer to coversheet**

Privately owned cables NOT SHOWN (including house services)

This map is INDICATIVE ONLY. Check that you have enough clearance from the DANGER ZONES near overhead powerlines.

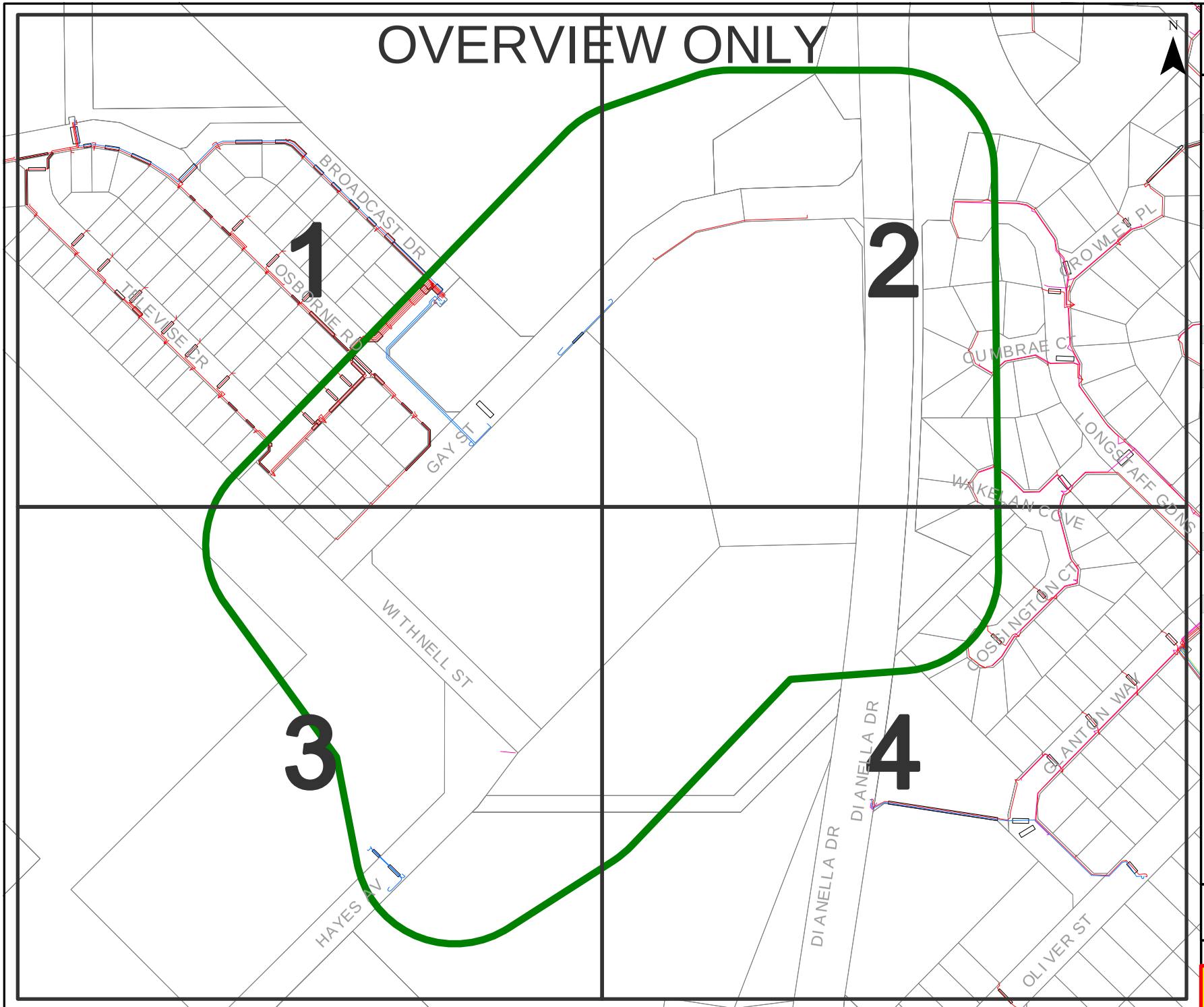
Telephone Support: 1300 769 345
Mon to Fri - 08:00 to 16:30

Information valid for 30 days from date of issue

A4 | Scale : 1:3075

WARNING! Look out for overhead power lines

Sequence Number: 85337579 | Date of Issue: 8/07/2019



westernpower

UNDERGROUND LEGEND

Structures

- Pillar
- Metal Pole
- Transformer Site
- UG Crossing *
- Ring Main Unit
- LV Distribution Frame

Distribution Cables

- High Voltage Cable (1kV - 33kV)
- Low Voltage Cable (< 1kV)
- Street Light Circuit (< 1kV)
- Street Light Pilot (< 1kV)
- Earth Wire

Cable Pole Terminations

- HV Termination
- LV Termination

Proposed Construction Assets

- Design Area *
- High Voltage Underground Cable
- Low Voltage Underground Cable
- Metal Pole
- Pillar
- Transformer site
- HV Termination
- LV Termination

State Underground Power Project

- CURRENT Work Area *
- COMPLETED Area *

Feature

- Area of Interest

*** Please refer to coversheet**

Privately owned cables NOT SHOWN (including house services)

This map is INDICATIVE ONLY. Hand exposure via pothole method is MANDATORY.

Telephone Support: 1300 769 345
Mon to Fri - 08:00 to 16:30

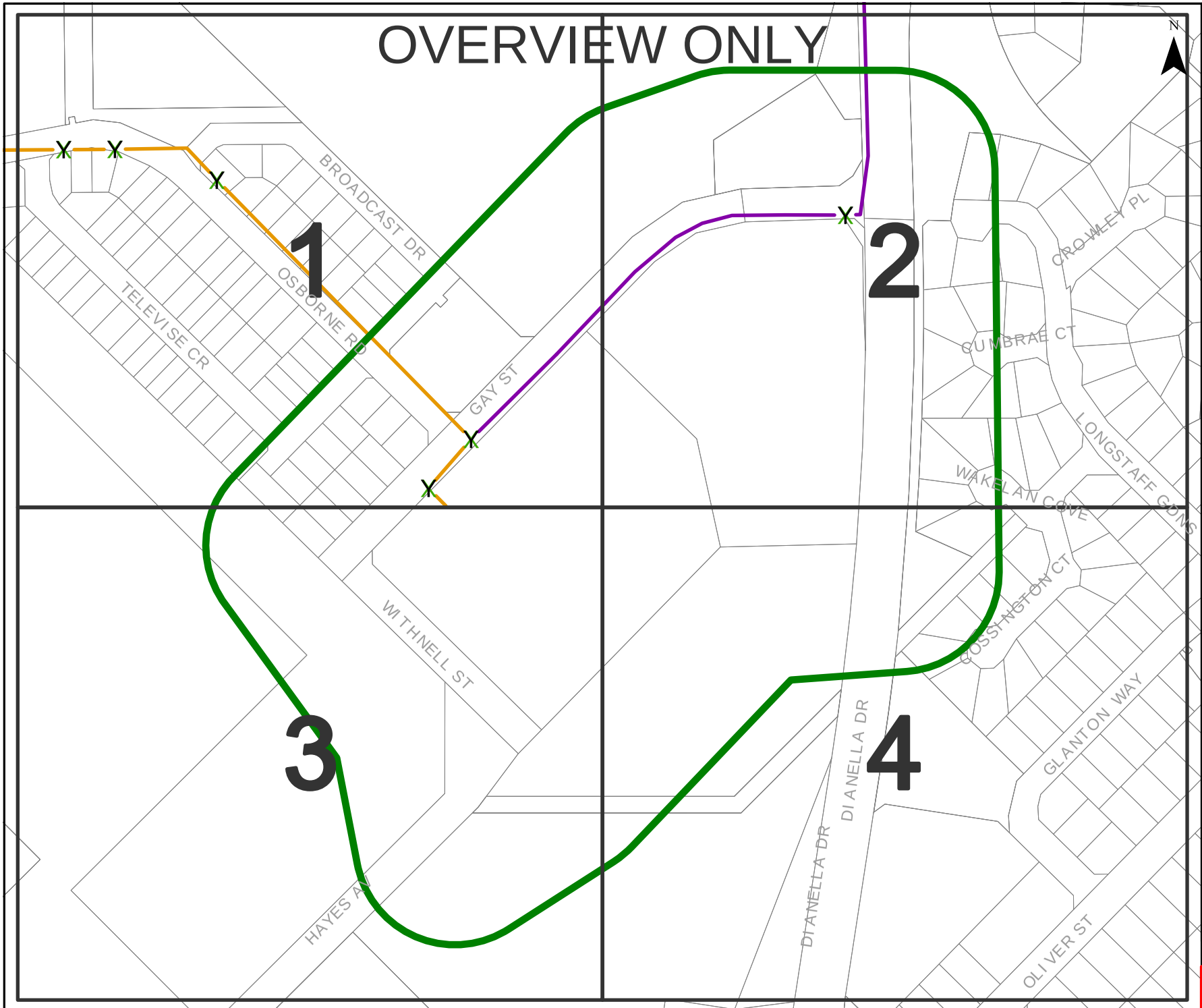
Information valid for 30 days from date of issue

A4 | Scale : 1:3075

WARNING! Look out for overhead power lines

Sequence Number: 85337579

Date of Issue: 8/07/2019



westernpower

FIBRE NETWORK LEGEND

Communications Assets

- Fibre Network Pits
- 32mm Conduit
- 50mm Conduit
- 63mm Conduit
- 80mm Conduit
- 90mm Conduit
- 100mm Conduit
- 110mm Conduit
- Direct Buried (Bare Cables)
- Cable in Unused Gas Main

Feature

- Area of Interest

*** Please refer to coversheet**

Privately owned cables NOT SHOWN (including house services)

This map is INDICATIVE ONLY. Hand exposure via pothole method is MANDATORY.

Network Management Centre
Telephone: 1800 752 075
Mon to Fri - 08:00 to 16:30

Information valid for 30 days from date of issue

A4	Scale : 1:3075

WARNING! Look out for overhead power lines

Sequence Number: 85337579

Date of Issue: 8/07/2019

Appendix Ten: Existing Communication Infrastructure

NORTH

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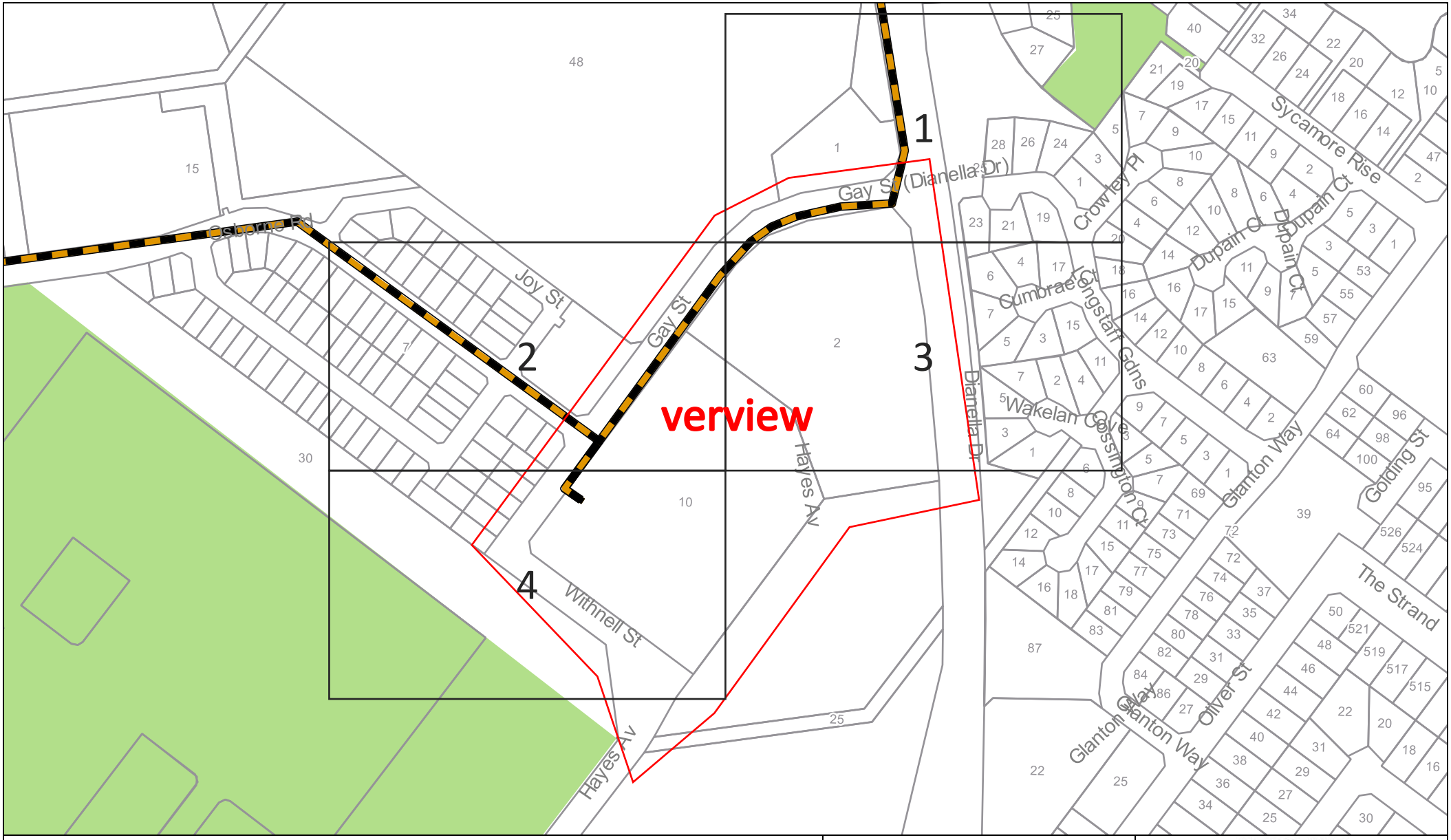
Project:	Channel Nine
Client:	Roberts Day
Job No:	11-131
Drawing:	
Title:	Existing Communications
Scale:	NTS
Engineer:	Jamie De Palma
Date:	17 July 2019



Sequence Number: 85337587

Date: 08/07/2019

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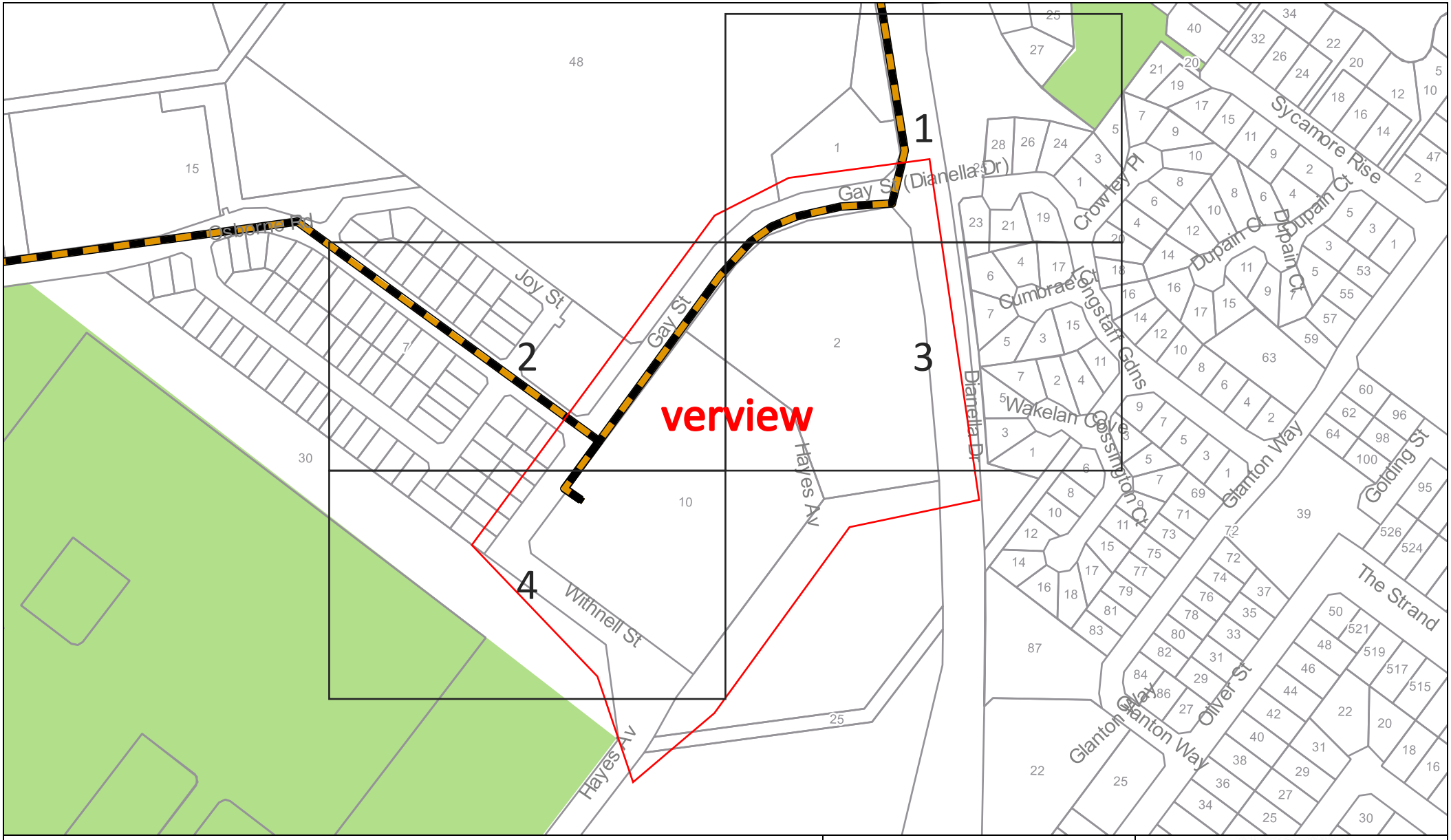
LEGEND

Digsite	Assets
Area	Cable
	3rd Party Duct
	Marker Post



Sequence Number: 85337587

Date: 08/07/2019

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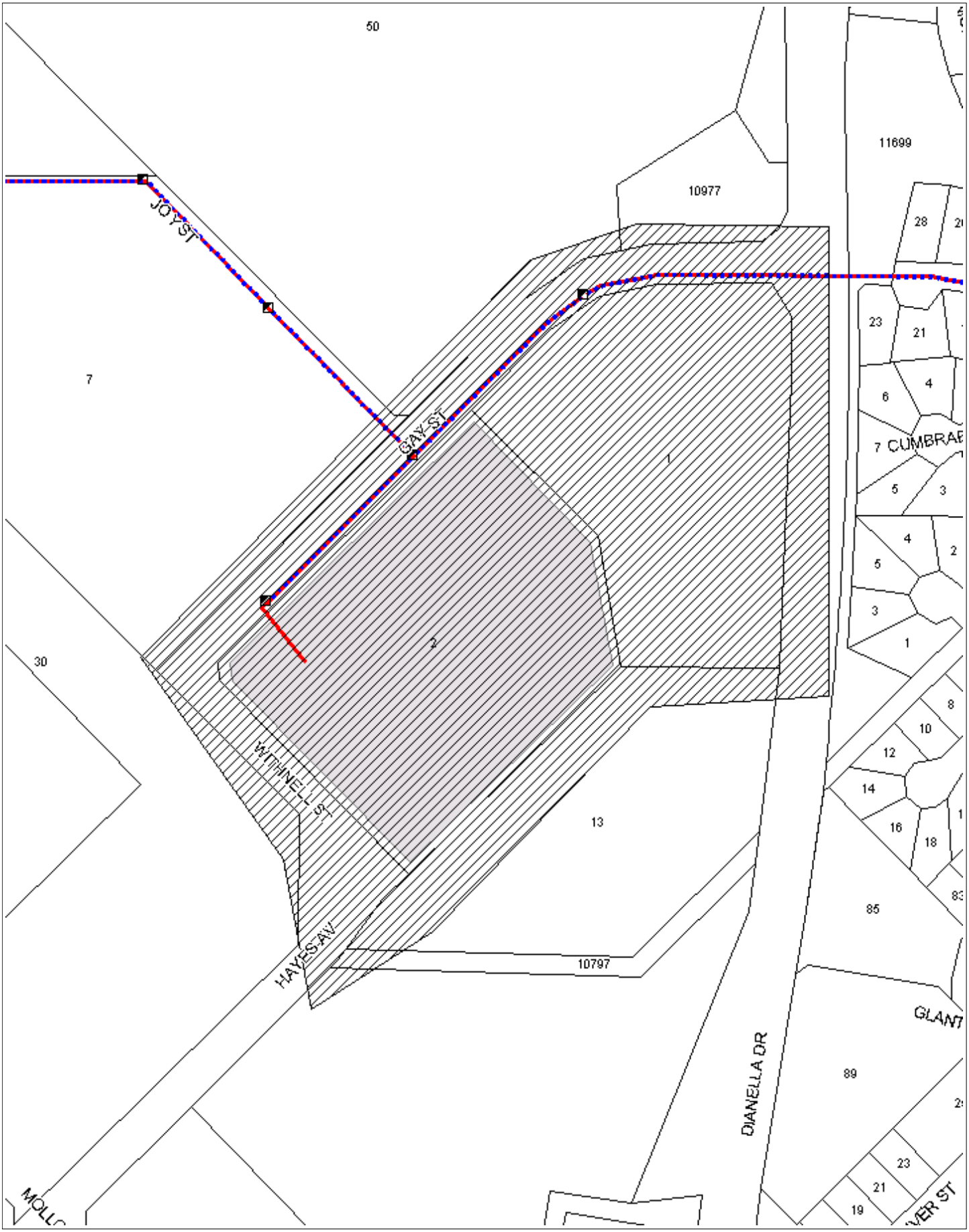
nextgen GROUP

LEGEND

Digsite	Assets
Area	Cable
	3rd Party Duct
	Marker Post



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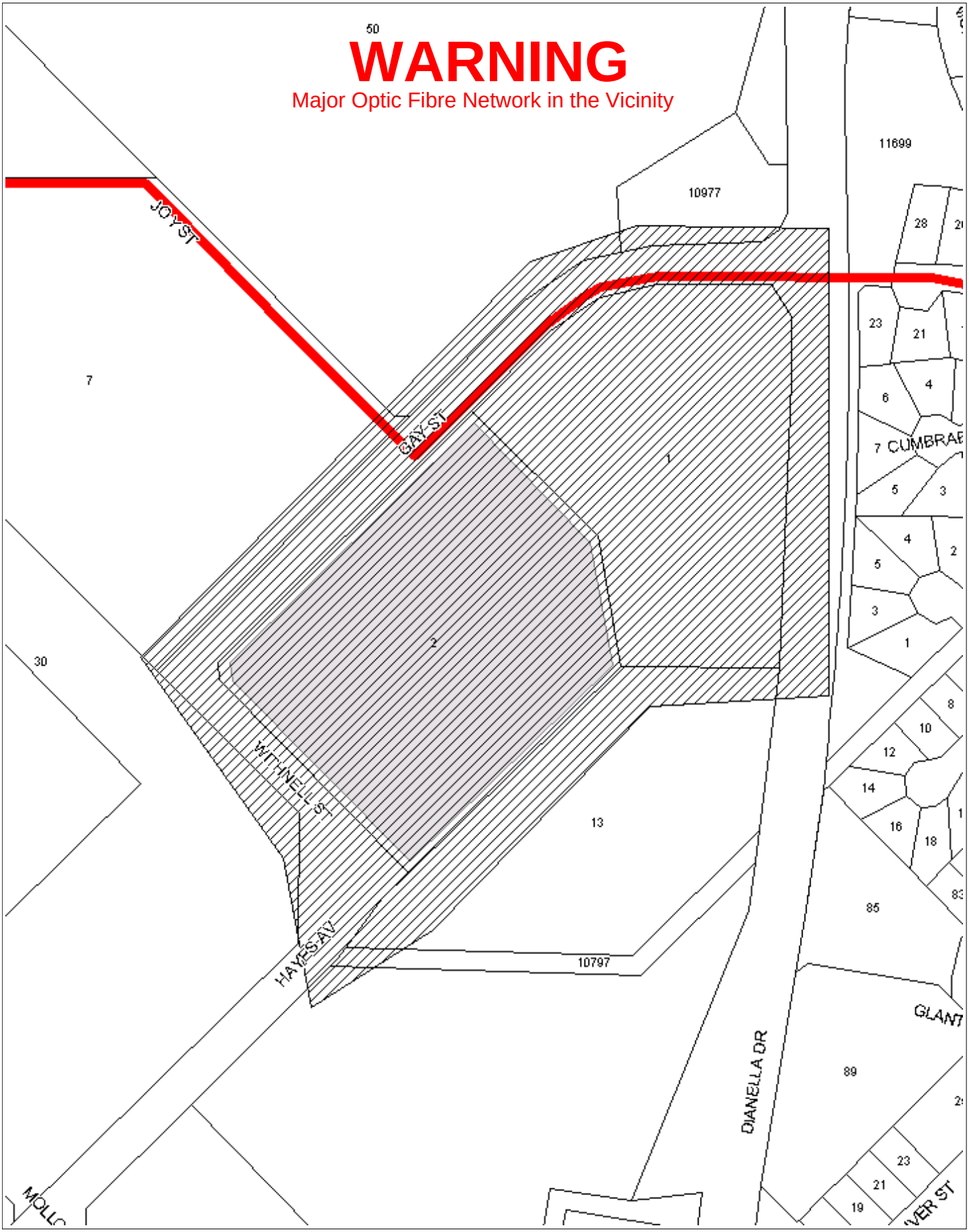
Sequence Number: 85337584

Date Generated: 08/07/2019

For all Optus DBYD plan enquiries –
Email: Fibre.Locations@optus.net.au
For urgent onsite assistance contact 1800 505 777
Optus Limited ACN 052 833 208

WARNING

Major Optic Fibre Network in the Vicinity



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For urgent onsite assistance contact 1800 505 777
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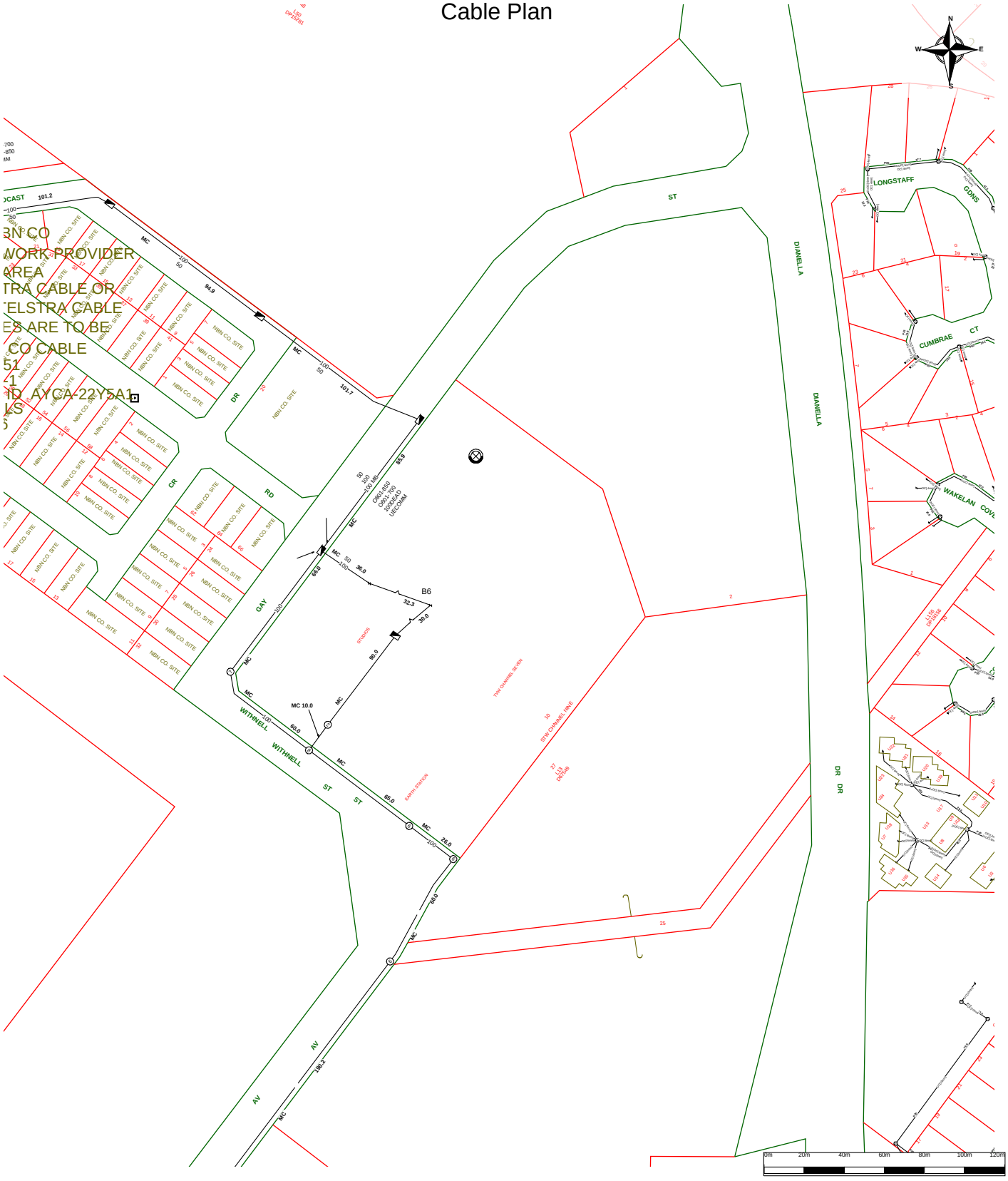
Cable Plan



Telstra

For all Telstra DBYD plan enquiries -
email - Telstra.Plans@team.telstra.com
For urgent onsite contact only - ph 1800 653 935 (bus hrs)

TELSTRA CORPORATION LIMITED A.C.N. 051 775 556

Generated On 08/07/2019 17:53:52

Sequence Number: 85337583

CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.

The above plan must be viewed in conjunction with the Mains Cable Plan on the following page

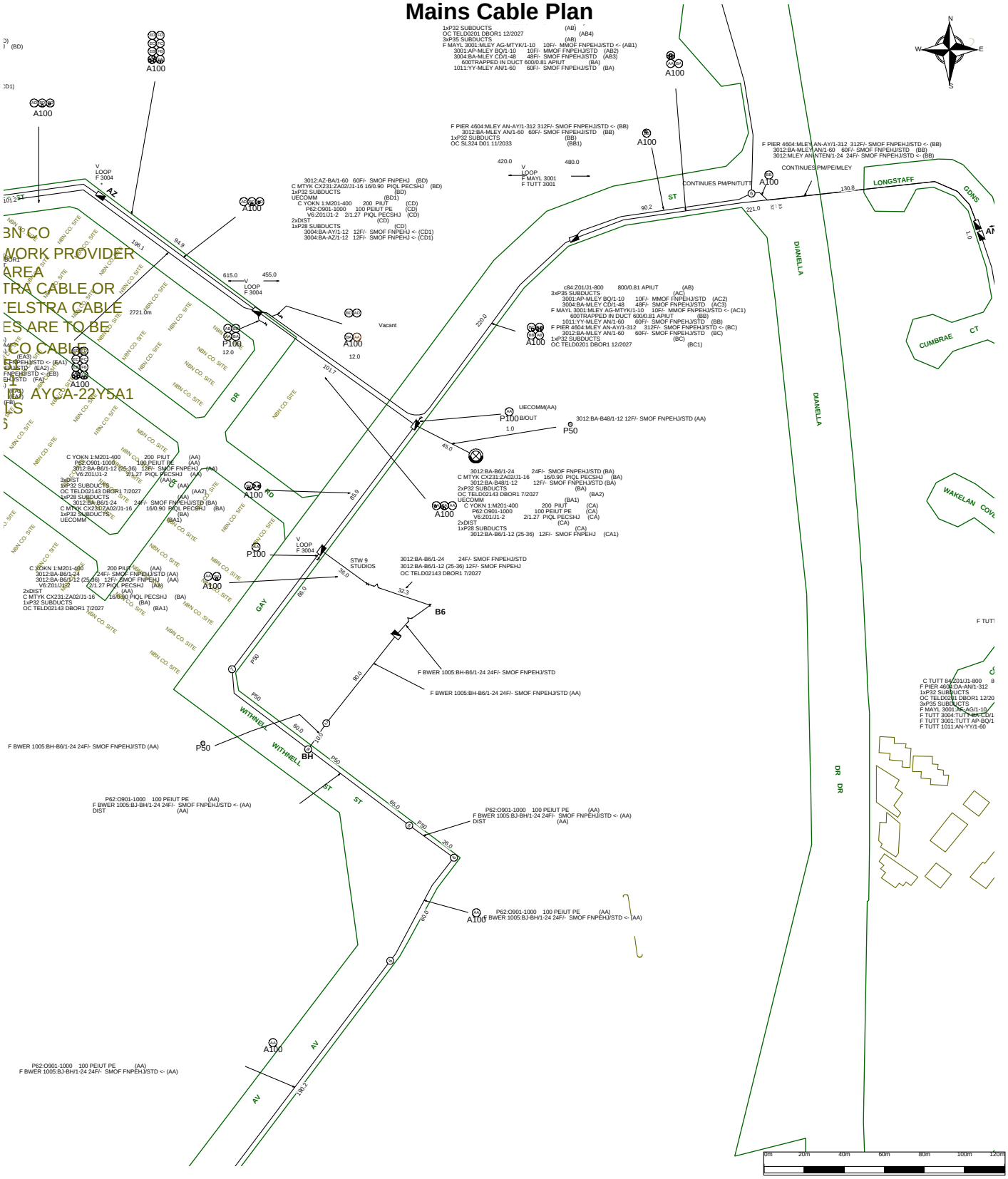
WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the precise location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information supplied can not be guaranteed as property boundaries, depths and other natural landscape features may change over time, and accordingly the plans are indicative only. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans.

It is your responsibility to locate Telstra's underground plant by careful hand pot-holing prior to any excavation in the vicinity and to exercise due care during that excavation.

Please read and understand the information supplied in the duty of care statement attached with the Telstra plans. TELSTRA WILL SEEK COMPENSATION FOR LOSS CAUSED BY DAMAGE TO ITS PLANT.

Telstra plans and information supplied are valid for 60 days from the date of issue. If this timeframe has elapsed, please reapply for plans.

Mains Cable Plan



For all Telstra DBYD plan enquiries -
email - Telstra.Plans@team.telstra.com
For urgent onsite contact only - ph 1800 653 935 (bus hrs)

TELSTRA CORPORATION LIMITED A.C.N. 051 775 556

Generated On 08/07/2019 17:53:54

Sequence Number: 85337583

CAUTION: Fibre optic and/ or major network present in plot area. Please read the Duty of Care and contact Telstra Plan Services should you require any assistance.

WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the precise location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information supplied can not be guaranteed as property boundaries, depths and other natural landscape features may change over time, and accordingly the plans are indicative only. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans.

It is your responsibility to locate Telstra's underground plant by careful hand pot-holing prior to any excavation in the vicinity and to exercise due care during that excavation.

Please read and understand the information supplied in the duty of care statement attached with the Telstra plans. TELSTRA WILL SEEK COMPENSATION FOR LOSS CAUSED BY DAMAGE TO ITS PLANT.

Telstra plans and information supplied are valid for 60 days from the date of issue. If this timeframe has elapsed, please reapply for plans.

appendix 04_

Department of Water Advice

Rebecca Epworth

From: Liz Coulson
Sent: Monday, 10 December 2012 2:08 PM
To: Rebecca Epworth
Subject: FW: Lots 1 & 2 Gay Street, Dianella

From: MACKINTOSH James [mailto:James.MACKINTOSH@water.wa.gov.au]
Sent: Monday, 10 December 2012 2:01 PM
To: Liz Coulson
Subject: RE: Lots 1 & 2 Gay Street, Dianella

The Department of Water would like to provide the following advice regarding the above proposal:

No Local Water Management Strategy is required for the Structure Planning stage.

No Urban Water Management Plan is required as a condition of subdivision.

Please check with relevant local government for their requirements.

Regards

James Mackintosh

Department of Water

Program Manager

Land Use Planning

Swan Avon Region

T 08 6250 8043 |
E james.mackintosh@water.wa.gov.au
Visit our website www.water.wa.gov.au

From: Liz Coulson [mailto:liz.coulson@coterra.com.au]
Sent: Friday, 7 December 2012 10:26 AM
To: MACKINTOSH James
Cc: Rebecca Epworth
Subject: Lots 1 & 2 Gay Street, Dianella

Hi James,

Following on from some recent discussions we have had with yourself regarding LWMS requirements at particular sites, we were wondering if you could provide some advice on a site we have recently been commissioned for; Lots 1 and 2 Gay St, Dianella. In recent dealings you have advised where a site is infill, not hydrologically constrained and fairly straight forward from a drainage perspective, then DoW would not necessarily be requesting an LWMS condition for the site. With this in mind, we would appreciate if you could confirm the reporting requirements for this Dianella site.

The site/ planning details are as follows:

- The site is 5ha
- There are 66 lots, including Multiple dwellings (R50) and Grouped housing (R30)
- Geology: Sand
- Topography: 57 – 65mAHD (attached Figure 1)

- Maximum GW: 24 – 25mAHD (attached Figure 1)
- Therefore Separation Distance to GW: >32m
- No surface water features or wetlands
- An LSP (attached Figure 2) has recently been submitted to the City of Stirling
- An Engineering Services Report has been produced (Pritchard Francis, 2011) which outlines the Stormwater Drainage Strategy

In addition, notwithstanding the LWMS requirement, with regards to the groundwater monitoring requirements for the site; given the significant separation distance to groundwater, we would not be proposing to do any groundwater monitoring either pre or post development. Please could you confirm that this is acceptable.

Kind Regards,

Liz Coulson
Senior Scientist

COTERRA ENVIRONMENT

Ph: 9381 5513 | Fax: 9381 5514 | Mobile: 0488 440 271
2/460 Roberts Road, SUBIACO WA 6008 | www.coterra.com.au

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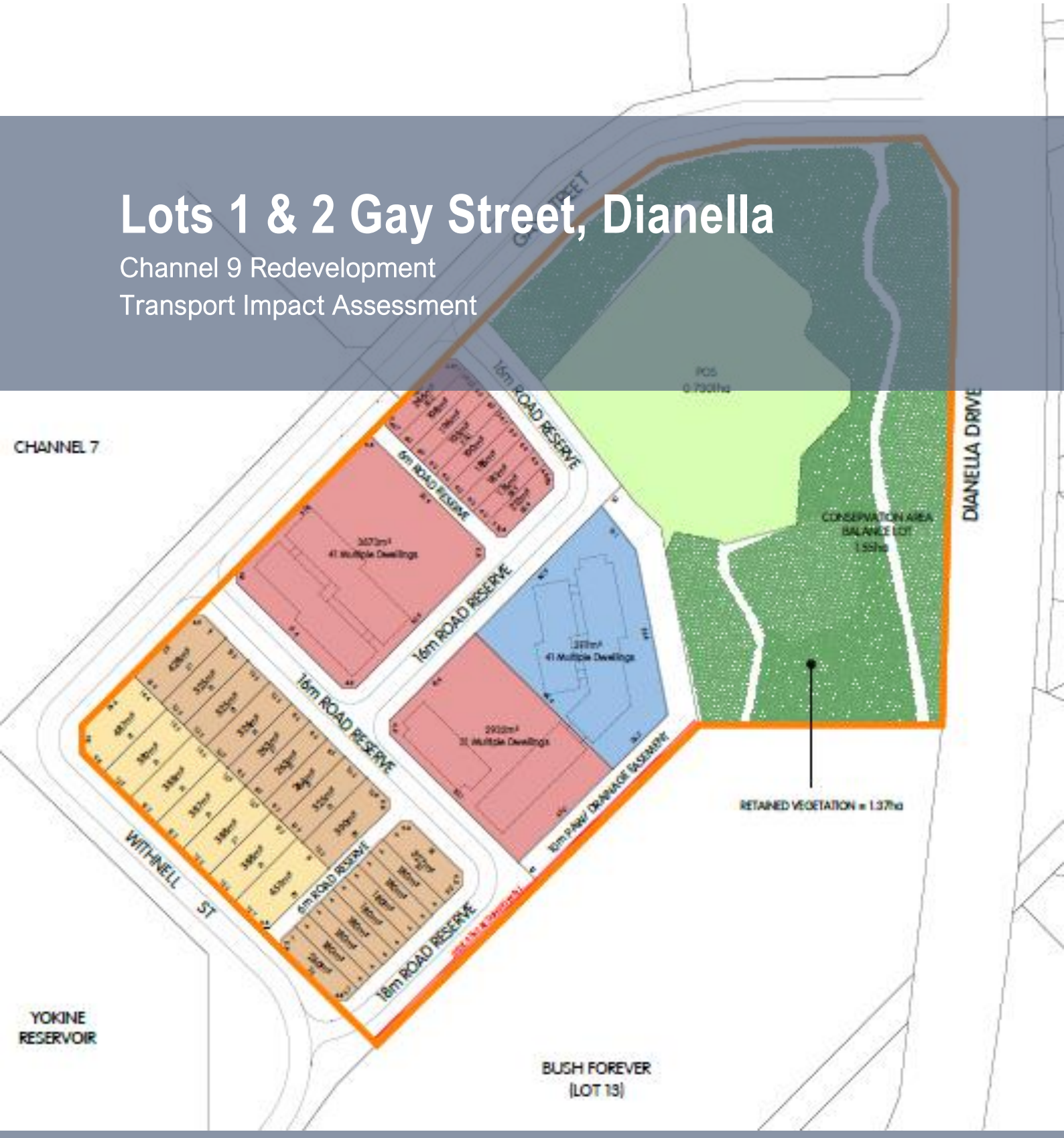
appendix 05_

Traffic Statement

Lots 1 & 2 Gay Street, Dianella

Channel 9 Redevelopment
Transport Impact Assessment



Prepared by: GTA Consultants (WA) Pty Ltd for Gay Street Property Holdings Pty Ltd

on 6/08/19

Reference: W175810

Issue #: B-F

GTAconsultants

Lots 1 & 2 Gay Street, Dianella

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Quality Record

Issue	Date	Description	Prepared By	Checked By	Approved By	Signed
A-Dr	19/07/19	Draft	RD	TJ		
A-F	31/07/19	Final	RD	TJ	TJ	
B-F	06/08/19	Final	RD	TJ	TJ	

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1. INTRODUCTION

1.1. Purpose of This Report

This report was commissioned by the Win Network on behalf of the client entity, Gay Street Property Holdings Pty Ltd to document a transport statement for the City of Stirling for the proposed redevelopment of the previous site of Channel 9 in Dianella at Lots 1 and 2 Gay Street, Dianella into a residential development.

As part of the approval processes a Transport Statement (due to the size of the development, a "moderate" impact is expected) is required to support the application approval by the City of Stirling.

1.2. Proposed Development

Lots 1 and 2 Gay Street, Dianella (totalling approximately 5.08Ha) is proposed to be developed into a residential estate with a combination of single residential (34 dwellings) and group housing (approximately 113 dwellings) with a total of 147 residences. In addition to these residences a "green belt" is proposed to be provided connecting Gay Street to Dianella Drive. Refer to Appendix A for plans showing the proposed development.

Access to the development is proposed to be via four intersections spaced along Gay Street and Withnell Street, all of them being T-junctions. The internal roads are proposed to range in reserve widths from 6m laneways to a combination of 16m and 18m wide roads. The carriageway widths are proposed to be nominally 6m.

Lots 1 and 2 were previously the site of Channel 9 operations in Perth, with the building and site now cleared. Adjacent to the site is predominantly future proposed parks and recreation, with the Channel 7 redevelopment lying north of the proposed site, on the north side of Gay Street. In the wider area the development is residential. The proposed development lies within the local catchments for both primary and high schools.

Refer to the locality plan in Appendix B.

2. VEHICLE ACCESS & PARKING

2.1. Access to Development

Access to the proposed development is proposed to be via four intersections on Gay Street. Three of these intersections are proposed to be higher order intersections with 16/18m reserve width roads intersecting with Gay Street. There is one laneway proposed to intersect with Withnell Street near the south west corner of the site. The sight lines to and from these intersections are typically acceptable based on the general 50km/h default urban speed limit. The only exception is the intersection at the south-west corner of the development. Bushes growing close to the road reduce the sight distance to approximately 65m to the south-west along Hayes Avenue. For a speed limit of 50km/h a sight distance of 80m should be provided. Given the two right angle bends, the observed speed for vehicles along this section of Withnell Street is approximately 40km/h. It is suggested that 40km/h advisory speed signs be installed for these bends, not as a means of reducing the vehicular speeds (which are of that order currently) but as a measure to advise motorists of the sharpness of these bends with more traffic attracted to the area with the new residential developments at Channel 7 and Channel 9. In addition, it is recommended to trim the vegetation growing close to the roadway. With a 40km/h speed limit a 60m sight distance would be required, thus not exceeding the available sight distance.

The 16m and 18m reserve width roads are proposed to cater for 6m wide carriageways, refer to **Figures 2.1 and 2.2**. Parking in front of properties is proposed to be on-road for visitors with the exception being the Grouped Dwellings and Laneway lots. The Grouped Dwellings are proposed to have all parking inclusive of visitors, provided on-site, whilst the Laneway lots are proposed to have embayed parking provided within the verge frontage, refer to the proposed locations in **Figure 2.3**. The embayed parking in front of each of the Laneway lots is expected to provide parking for approximately 4-6 cars each, for a total of 8-12 cars. With 9 laneway lots at each of these locations and providing 0.25 visitor bays per dwelling, there should only be the requirement to provide 2 bays in each location of no more than 4-6 bays in total. Thus, the proposed quantum of parking for the laneway lots will significantly exceed the required parking requirement. Sites with direct frontage on Gay Street (excepting the group housing sites) will have visitor parking on Gay Street provided on the driveways to garages for these properties fronting Gay Street. This is considered acceptable given the low 50km/h speed limit, low traffic volumes and the wider 7.2m pavement width. Internal traffic volumes are expected to be approximately 300 to 600 vehicles per day (vpd) on the 16/18m wide roads whilst laneways are expected to carry in the order of 50 to 100vpd. These expected traffic volumes fall within Liveable Neighbourhood guidelines of 1,000 (for roadways) and 300vpd (for laneways).

Figure 2.1 – 16m Road Cross Section

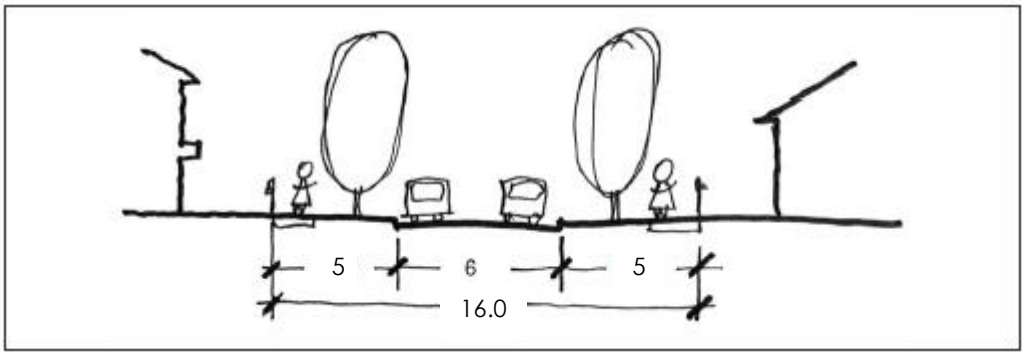


Figure 2.2 – 18m Road Cross Section

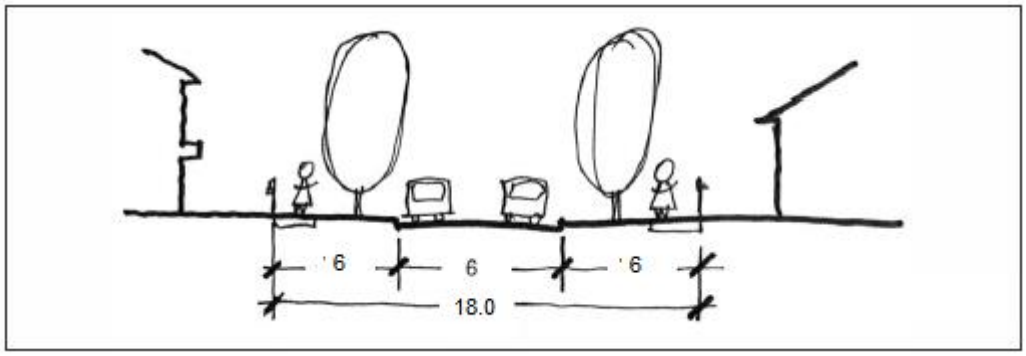
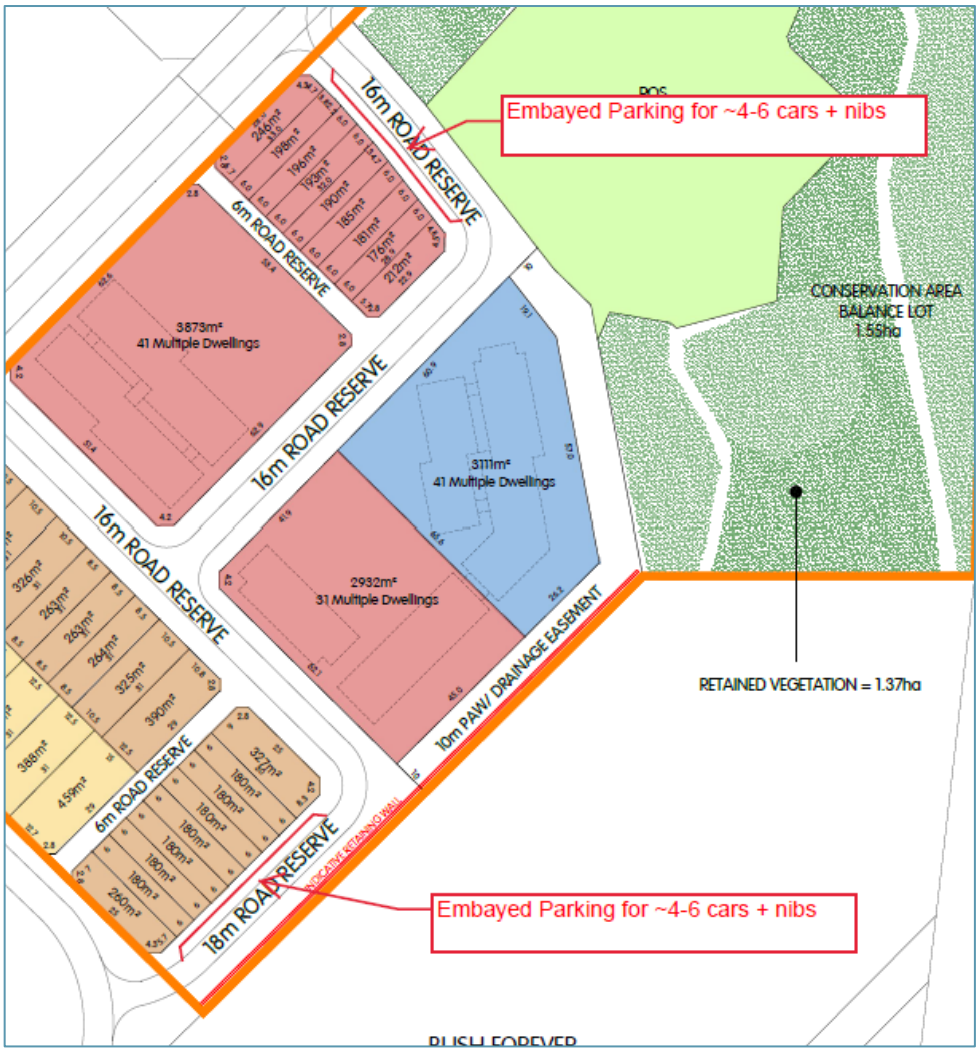


Figure 2.3 – Proposed Embayed Parking Locations for Laneway Lots



The 16m wide road running north-west to south-east and intersecting with Gay Street is proposed to be approximately 30m from the main entrance to the Channel 7 development site. This intersection is at the same location as the previous main entrance to Channel 9 with the 30m off-set exceeding the 20m minimum offset specified by Liveable Neighbourhoods for a Left/Right stagger on an Access Street.

The parking is proposed to be provided on each individual lot for resident's vehicles in line with the Residential Design Codes. Visitor vehicles will be able to park on the 6m wide roadways proposed throughout the development, with the exception being the Grouped Dwelling sites and Laneway lots as previously discussed.

The proposed internal road network makes provision for the group housing site fronting Gay Street to have vehicle access via the lane way or internal roadways as desired. Vehicle access for the grouped housing site is not proposed from Gay Street nor is any access for any internal site to have direct access from Dianella Drive.

2.2. Service Vehicles

Service vehicles accessing the site are expected to enter the site from Gay Street and traverse through the site, to then re-enter Gay Street in forward gear. The type of vehicles expected to access the site would not exceed the size of a 10m long rubbish truck sized vehicle. To allow this sized vehicle through the laneways, suitable truncations should be applied at laneway intersections. Apart from the above truncation, the standard 6m and 9m corner radii will be sufficient at other road intersections and road/laneway intersections in accordance with Liveable Neighbourhoods.

General rubbish is to be removed from the site in typical "wheelie" bins, with bins picked up from the front of each lot site. Given the nature of the street network, there is no need for rubbish trucks to undertake three-point turns.

3. DAILY TRAFFIC VOLUMES AND VEHICLE TYPES

3.1. Current Traffic

Spot surveys were undertaken for the current traffic flow on Gay Street at the intersection of Dianella Drive near the proposed development for the AM and PM peak periods, corresponding with the peak period flow. The resultant traffic flows were:

- 48 vehicular trips in the AM peak hour (vph); and,
- 88 vehicular trips in the PM peak hour.

With the development in the vicinity being mostly residential with some lesser commercial use (this being the Channel 7 and Channel 9 studios in operation at the time of the survey), it can be assumed that 7.5% of the daily flow occurs in the AM peak and 10% in the PM peak. These above flows correspond to daily flow of approximately 760vpd utilising this section of Gay Street. Traffic counts sourced from the City of Stirling undertaken in September 2015 indicate that 813vpd utilised Gay Street west of Dianella Drive whilst 689vpd utilised Hays Avenue east of Molloy Street (this is west of the development site). These counts were undertaken whilst Channel 9 was still operating but Channel 7 had ceased operations at their site and this suggests approximately 124vpd on Gay Street west of Dianella Drive was traffic related to the Channel 9 operations. With Channel 9 site now vacant and the Channel 7 now partially developed (with 42 dwellings constructed) it is expected that there would be approximately 925vpd on Gay Street (based on 690vpd on Hayes Avenue plus 70% of the traffic generated by the Channel 7 site at a rate of 8 trips per dwelling for the 42 constructed dwellings or approximately 235vpd)

Traffic flows on Dianella Drive were based on recorded data from Main Roads WA from counts undertaken in 2001/02, 2005/06, 2007/08, 2010/11, 2012/13, 2013/14, 2015/16 and 2017/18. These counts have shown a slight increase in traffic flows over this period with an average increase of approximately 166vpd every year to a traffic count of 17,833vpd recorded in 2017/18 equating to an annual increase of approximately 0.93% per annum. The directional flows and total flows are summarised below:

- 645vph northbound/1,060vph southbound in the AM peak hour;
- 930vph northbound/620vph southbound in the PM peak hour;
- 17,833vpd, both directions combined.

3.2. Trip Generation of Proposed Development

The traffic generation expected from the development was based on the publication Land Use Traffic Generation Guidelines, Director-General of Transport SA, 1987. The rates adopted for this assessment was for grouped housing (5 trips per unit) and single residence (8 trips per dwelling).

Using this rate, for the 113 grouped housing dwellings and 34 single residential dwellings the proposed development is expected to generate approximately 840 vehicular trips per day, consisting of approximately 65 in the AM peak and 85 in the PM peak.[1]

[1] Based of 7.5% of daily rips in the AM peak and 10% of daily trips in the PM peak

Vehicles accessing the site are expected to be all private motor vehicle sized cars with larger rubbish truck sized vehicles being the largest vehicle expected on site.

In addition to this, the Channel 7 site is also currently being redeveloped into 112 single residential lots. This development should also create approximately 900 trips per day with approximately 70 in the AM and 90 in the PM peak hours.[2]

3.3. Trip Distribution

It would be reasonable to assume that traffic would be attracted to the site on the roads where there is parking access provided, in this case being solely from Gay Street/Withnell Street.

Also, the expected traffic would approach the development predominantly from the direction of Dianella Drive, with 100% of traffic to and from the intersection of Dianella Drive and Gay Street, further divided into 75% to and from the south and 25% to and from the north on Dianella Drive. This proportion of traffic split applies to the traffic generated by the Channel 7 and Channel 9 site redevelopments and not on the current observed traffic flows. Resultant traffic flows are the sum of the current observed traffic flows with the proportioned development traffic flows added. For the Channel 7 site, the intersection of Dianella Drive and Gay Street is expected to cater for 70% of the development traffic. The remaining 30% is expected to head north/west towards Flinders Street/Nollamara Avenue via Osborne Road and Cobham Avenue/Hancock Street.

3.4. Traffic Impact of Development

Both Dianella Drive and Gay Street are expected to have traffic volumes that should not exceed the maximum traffic flows (sometimes referred to as the road's capacity, although not technically the theoretical capacity) for similar roads of its type. Dianella Drive is expected to be approximately 50% of its "capacity" whilst Gay Street is expected to be approximately 70% of its "capacity". These traffic flow increases are expected to be approximately a 6.1% increase in traffic on Dianella Drive and 200% increase in Gay Street and should be manageable for both Dianella Drive and Gay Street. Traffic in Dianella Drive is expected to increase by just above 6.1% which is considered insignificant in traffic flow increase terms as traffic flows can vary 5% above or below the average flow on a road from day to day. The comparisons to maximum flows that these roads should carry are shown below in Tables 3.1 and 3.2.

Table 3.1 – Current Daily Flows

Road	Indicative Maximum Daily Flow (two-way)	Actual Daily Flow (two-way)
Dianella Drive	35,000[3]	17,833
Gay Street	3,000[4]	690 (prior to C7 dev) 925 (current partial C7 dev)

Table 3.2 – Expected Daily Flows

Road	Indicative Maximum Daily Flow (two-way)	Expected Daily Flow (two-way)
Dianella Drive	35,000	18,933
Gay Street	3,000	2,160 (following full C7 & C9 dev)

[2] Based of 7.5% of daily rips in the AM peak and 10% of daily trips in the PM peak
[3] Volume based on Integrator Arterial A type road, Liveable Neighbourhoods
[4] Volume based on Access Street C type road, Liveable Neighbourhoods

It can be seen that traffic is expected to increase on Gay Street by about 1,470vpd (based on expected traffic flow with Channel 7 and Channel 9 developments less the traffic flow prior to Channel 7 commencing) as a result of the completed Channel 7 and Channel 9 developments from the traffic flows on Gay Street after Channel 9 had departed their site). This traffic increase will not exceed the maximum traffic flow for Gay Street.

With regards to the intersections and crossover, Table 2.4 from the Austroads publication, *Guide to Traffic Management Part 6 – Intersections, Interchanges and Crossings* provides advice as to intersection and crossover performance in peak flow conditions about possible further analysis. This is summarized in **Table 3.3**.

Table 3.3 – Austroads Guidelines

Major Road Type	Major Road Flow (vph, two-way)	Minor Road Flow (vph, two-way)
Two-lane	400	250
	500	200
	650	100
Four-lane	1000	100
	1500	50
	2000	25

Applying the rates from **Sections 3.1 and 3.2, Table 3.4** is derived.

Table 3.4 – Comparison to Austroads Guidelines

Intersection	Major Road Flow (vph, two-way)	Minor Road Flow (vph, two-way)
Main Entry/Gay Street	250	63
Gay Street/Dianella Drive	1,720	250

From the above it can be seen that the main entry and nearby intersection of Gay Street should be well below the above values given in **Table 3.3** and no further analysis is required. At this level of traffic volumes, the Level of Service would be expected to be A in peak periods and throughout the day. With regard to Dianella Drive, these flows exceed levels that should be examined for a four-lane road. This assessment of the intersection in more detail is shown in the following section.

3.5. Dianella Drive/Gay Street Intersection

This intersection was assessed as a full intersection, based on the current configuration and current/expected flows with the two proposed developments. The assessment utilised Sidra Intersection Version 8, a computer-based software package for the assessment of intersections and examined the busiest 30-minute peak flow period in the AM and PM peak period. Based on the current flows on Gay Street and current flows on Dianella Drive, the current AM and PM peak performance is summarised in **Tables 3.5 and 3.6** on the following page. The direction of traffic flows to and from the Channel 7 and Channel 9 development sites was based on accepted industry[5] directional splits:

- AM Peak 7.5% of daily traffic flows, with 75% exiting and 25% entering the site
- PM Peak 10% of daily traffic flows, with 33% exiting and 67% entering the site.

[5] Land Use Traffic Generation Guidelines, Director-General of Transport SA, 1987

Table 3.5 – Current AM Peak Performance

Mov ID	Turn	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total	HV				Vehicles	Distance				
		veh/h	%	v/c	sec		veh	m				km/h
South: Dianella Dr												
1	L2	11	1.0	0.006	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	59.4
2	T1	679	5.0	0.180	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
Approach		689	4.9	0.180	0.1	NA	0.0	0.0	0.00	0.01	0.00	69.8
North: Dianella Dr												
8	T1	1116	5.0	0.295	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
9	R2	17	1.0	0.040	12.4	LOS B	0.1	0.9	0.60	0.82	0.60	48.1
Approach		1133	4.9	0.295	0.2	NA	0.1	0.9	0.01	0.01	0.01	69.4
NorthWest: Median RT												
29a	R1	2	1.0	0.005	10.3	LOS B	0.0	0.1	0.67	1.03	0.67	48.4
Approach		2	1.0	0.005	10.3	LOS B	0.0	0.1	0.67	1.03	0.67	48.4
West: Gay St												
10	L2	21	1.0	0.045	12.2	LOS B	0.2	1.1	0.57	0.96	0.57	47.5
12	R2	2	1.0	0.045	13.8	LOS B	0.2	1.1	0.57	0.96	0.57	47.6
Approach		23	1.0	0.045	12.4	LOS B	0.2	1.1	0.57	0.96	0.57	47.5
All Vehicles		1847	4.9	0.295	0.3	NA	0.2	1.1	0.01	0.02	0.01	69.1

Table 3.6 – Current PM Peak Performance

Mov ID	Turn	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total	HV				Vehicles	Distance				
		veh/h	%	v/c	sec		veh	m				km/h
South: Dianella Dr												
1	L2	8	1.0	0.005	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	59.4
2	T1	979	5.0	0.259	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		987	5.0	0.259	0.1	NA	0.0	0.0	0.00	0.01	0.00	69.8
North: Dianella Dr												
8	T1	653	5.0	0.174	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	70.0
9	R2	27	1.0	0.104	18.1	LOS C	0.3	2.3	0.76	0.91	0.76	44.7
Approach		680	4.8	0.174	0.7	NA	0.3	2.3	0.03	0.04	0.03	68.4
NorthWest: Median RT												
29a	R1	15	1.0	0.021	8.8	LOS A	0.1	0.4	0.46	1.06	0.46	37.6
Approach		15	1.0	0.021	8.8	LOS A	0.1	0.4	0.46	1.06	0.46	37.6
West: Gay St												
10	L2	32	1.0	0.149	16.7	LOS C	0.5	3.4	0.76	1.00	0.76	44.6
12	R2	15	1.0	0.149	20.2	LOS C	0.5	3.4	0.76	1.00	0.76	44.6
Approach		46	1.0	0.149	17.8	LOS C	0.5	3.4	0.76	1.00	0.76	44.6
All Vehicles		1728	4.8	0.259	0.9	NA	0.5	3.4	0.04	0.05	0.04	67.7

As it can be seen, the intersection currently operates at a level of service B in the AM peak and A/C in the PM peak for the Gay Street approach, this being very good. The current delays for the critical right turns at this intersection are approximately 24s from Gay Street and 12s into Gay Street in the AM and 29s/18s respectively in the PM peak.

With the development of the Channel 7 and Channel 9 sites and with the modest traffic growth for Dianella Drive (approximately 0.93%pa) the additional traffic at this intersection with slightly smaller gaps in the traffic on Dianella Drive may increase delays and queues. To examine this, this intersection was assessed with the development traffic added to the current intersection flows (100% from the Channel 9 development and 70% from Channel 7) with a 10% increase in traffic on Dianella Drive, representing an increase in traffic over 10-years' time based on the current annual growth rate of approximately 0.93%. The effect of this is shown in Tables 3.7 and 3.8.

Table 3.7 – Expected AM Peak Performance in Approximately 10-Years' time (~2031)

Mov ID	Turn	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total	HV				Vehicles	Distance				
		veh/h	%	v/c	sec		veh	m				km/h
South: Dianella Dr												
1	L2	34	1.0	0.018	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	59.4
2	T1	747	5.0	0.198	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		781	4.8	0.198	0.3	NA	0.0	0.0	0.00	0.03	0.00	69.4
North: Dianella Dr												
8	T1	1227	5.0	0.328	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
9	R2	25	1.0	0.067	13.6	LOS B	0.2	1.4	0.65	0.87	0.65	47.3
Approach		1253	4.9	0.328	0.3	NA	0.2	1.4	0.01	0.02	0.01	69.2
NorthWest: Median RT												
29a	R1	69	1.0	0.184	12.5	LOS B	0.6	3.9	0.75	1.11	0.77	46.1
Approach		69	1.0	0.184	12.5	LOS B	0.6	3.9	0.75	1.11	0.77	46.1
West: Gay St												
10	L2	43	1.0	0.274	14.3	LOS B	1.1	7.4	0.69	1.03	0.79	45.7
12	R2	69	1.0	0.274	16.5	LOS C	1.1	7.4	0.69	1.03	0.79	45.8
Approach		113	1.0	0.274	15.6	LOS C	1.1	7.4	0.69	1.03	0.79	45.8
All Vehicles		2215	4.6	0.328	1.5	NA	1.1	7.4	0.07	0.11	0.07	67.0

Table 3.8 – Expected PM Peak Performance in Approximately 10-Years' time (~2031)

Mov ID	Turn	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total	HV				Vehicles	Distance				
		veh/h	%	v/c	sec		veh	m				km/h
South: Dianella Dr												
1	L2	87	1.0	0.047	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	59.4
2	T1	1077	5.0	0.285	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		1164	4.7	0.285	0.5	NA	0.0	0.0	0.00	0.05	0.00	69.0
North: Dianella Dr												
8	T1	718	5.0	0.191	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
9	R2	54	1.0	0.243	22.7	LOS C	0.8	5.6	0.83	0.95	0.91	42.3
Approach		772	4.7	0.243	1.6	NA	0.8	5.6	0.06	0.07	0.06	66.9
NorthWest: Median RT												
29a	R1	55	1.0	0.082	9.3	LOS A	0.2	1.7	0.50	1.11	0.50	37.5
Approach		55	1.0	0.082	9.3	LOS A	0.2	1.7	0.50	1.11	0.50	37.5
West: Gay St												
10	L2	44	1.0	0.386	21.4	LOS C	1.5	10.5	0.84	1.07	1.08	41.5
12	R2	55	1.0	0.386	26.4	LOS D	1.5	10.5	0.84	1.07	1.08	41.5
Approach		99	1.0	0.386	24.2	LOS C	1.5	10.5	0.84	1.07	1.08	41.5
All Vehicles		2089	4.4	0.386	2.3	NA	1.5	10.5	0.07	0.13	0.09	64.8

The intersection is still expected to operate with slightly higher delays with levels of service B/C in the AM peak and C/D in the PM peak compared to that currently experienced at the intersection. The average delays for the critical right turns are expected to be 29/14s in the AM peak and 36/23s in the PM peak. These average delays are less than the levels specified in the WAPC Transport Assessment Guidelines for Developments and is thus considered acceptable.

As a further test of this assessment's robustness, a sensitivity test was conducted on the intersection traffic flows. Traffic volumes on Dianella Drive were increased by a further 10% above the previous 10% increase whilst the development traffic flows were increase by 50% (effectively having a traffic generation of approximately 8 trips per grouped dwelling unit and 12 trips per single residential dwelling). The results are shown below in Tables 3.9 and 3.10.

Table 3.9 – Sensitivity Test AM Peak Performance

Mov ID	Turn	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total	HV				Vehicles	Distance				
		veh/h	%	v/c	sec		veh	m				km/h
South: Dianella Dr												
1	L2	51	1.0	0.027	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	59.4
2	T1	815	5.0	0.216	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		865	4.8	0.216	0.4	NA	0.0	0.0	0.00	0.04	0.00	69.2
North: Dianella Dr												
8	T1	1339	5.0	0.357	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
9	R2	38	1.0	0.115	15.3	LOS C	0.3	2.4	0.71	0.89	0.71	46.3
Approach		1377	4.9	0.357	0.5	NA	0.3	2.4	0.02	0.02	0.02	68.9
NorthWest: Median RT												
29a	R1	104	1.0	0.324	15.8	LOS C	1.1	7.6	0.81	1.15	0.98	42.9
Approach		104	1.0	0.324	15.8	LOS C	1.1	7.6	0.81	1.15	0.98	42.9
West: Gay St												
10	L2	65	1.0	0.464	17.8	LOS C	2.1	15.0	0.78	1.11	1.13	43.7
12	R2	104	1.0	0.464	20.8	LOS C	2.1	15.0	0.78	1.11	1.13	43.7
Approach		169	1.0	0.464	19.6	LOS C	2.1	15.0	0.78	1.11	1.13	43.7
All Vehicles		2515	4.4	0.464	2.4	NA	2.1	15.0	0.10	0.15	0.13	65.5

Table 3.10 – Sensitivity Test AM Peak Performance

Mov ID	Turn	Demand Flows		Deg. Satn	Average Delay	Level of Service	95% Back of Queue		Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed
		Total	HV				Vehicles	Distance				
		veh/h	%	v/c	sec		veh	m				km/h
South: Dianella Dr												
1	L2	131	1.0	0.071	6.4	LOS A	0.0	0.0	0.00	0.61	0.00	59.4
2	T1	1175	5.0	0.311	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
Approach		1306	4.6	0.311	0.7	NA	0.0	0.0	0.00	0.06	0.00	68.7
North: Dianella Dr												
8	T1	783	5.0	0.209	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	69.9
9	R2	81	1.0	0.460	32.6	LOS D	1.7	11.7	0.90	1.03	1.19	38.0
Approach		864	4.6	0.460	3.1	NA	1.7	11.7	0.08	0.10	0.11	64.8
NorthWest: Median RT												
29a	R1	82	1.0	0.132	9.9	LOS A	0.4	2.8	0.55	1.12	0.55	37.3
Approach		82	1.0	0.132	9.9	LOS A	0.4	2.8	0.55	1.12	0.55	37.3
West: Gay St												
10	L2	66	1.0	0.714	35.3	LOS E	3.6	25.1	0.94	1.25	1.78	35.3
12	R2	82	1.0	0.714	43.2	LOS E	3.6	25.1	0.94	1.25	1.78	35.4
Approach		148	1.0	0.714	39.7	LOS E	3.6	25.1	0.94	1.25	1.78	35.4
All Vehicles		2400	4.3	0.714	4.3	NA	3.6	25.1	0.11	0.18	0.17	62.0

With the arbitrary sensitivity increase in the traffic flows of the proposed development developments, this intersection is expected to operate satisfactorily (although approaching capacity) with the worst level of service

being E for the right turn from Gay Street into Dianella Drive in the PM peak. The corresponding delays for the critical right turns are expected to be 37/15s in the AM peak and 53/33s in the PM peak. However, the 95th percentile queues are expected to be contained within the median for right turn traffic from Gay Street and thus considered acceptable for a two-staged right turn through a median.

Based on the assessment of the intersection with the expected increase in traffic and the subsequent sensitivity tests, the operation of the Dianella Drive and Gay Street intersection is considered acceptable with the additional traffic due to the combination of the Channel 7 and Channel 9 developments.

3.6. Level of Service Concepts

The level of service concept describes the quality of traffic service in terms of six levels, designated A to F, with level of service A (LOS A) representing the best operating condition (i.e. at or close to free flow), and level of service F (LOS F) the worst (i.e. forced flow). More specifically:

- *LOS A*: Primarily free flow operations at average travel speeds, usually about 90% of the FFS (free flow speed) for the given street class. Vehicles are completely unimpeded in their ability to manoeuvre within the traffic stream. Control delay at signalised intersections is less than 10 seconds. At non-signalised movements at intersections the average control delay is less than 10 seconds;
- *LOS B*: Reasonably unimpeded operations at average travel speeds, usually about 70% of the FFS for the street class. The ability to manoeuvre within the traffic stream is only slightly restricted, and control delays at signalised intersections are between 10 and 20 seconds. At non-signalised movements at intersections the average control delay is between 10 and 15 seconds;
- *LOS C*: Stable operations; however, ability to manoeuvre and change lanes in mid-block locations may be more restricted than at LOS B, and longer queues, adverse signal coordination, or both may contribute to lower average travel speeds of about 50% of the FFS for the street class. Signalised intersection delays are between 20 and 35 seconds. At non-signalised movements at intersections the average control delay is between 15 and 25 seconds;
- *LOS D*: A range in which small increases in flow may cause substantial increases in delay and decreases in travel speed. LOS D may be due to adverse signal progression, inappropriate signal timing, high volumes, or a combination of these factors. Average travel speeds are about 40% of FFS. Signalised intersection delays are between 35 and 55 seconds. At non-signalised movements at intersections the average control delay is between 25 and 35 seconds;
- *LOS E:* Characterised by significant delays and average travel speeds of 33% of the FFS or less. Such operations are caused by a combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections (between 55 and 80 seconds), and inappropriate signal timing. At non-signalised movements at intersections the average control delay is between 35 and 50 seconds; and,
- *LOS F*: Characterised by urban street flow at extremely low speeds, typically 25% to 33% of the FFS. Intersection congestion is likely at critical signalised locations, with high delays (in excess of 80 seconds), high volumes, and extensive queuing. At non-signalised movements at intersections the average control delay is greater than 50 seconds.

In addition to the above:

- Average Delay: is the average of all travel time delays for vehicles through the intersection; and,
- Queue: is the queue length below which 95% of all observed queue lengths fall.

4. TRAFFIC MANAGEMENT ON THE FRONTAGE STREETS

4.1. Gay Street/Withnell Street

This road is a single carriageway undivided two-lane, two-way road and is classified as an Access Road under the WA Functional Road Hierarchy and is not classified under the Metropolitan Region Scheme. The pavement width is approximately 7.2m between kerbs and there is are no footpaths provided in a reserve width of approximately 20m. Traffic volumes are approximately 900 to 950vpd, and it is subject to the general built up area speed limit of 50km/h.

4.2. Dianella Road

This road is also classified as a District Distributor A in the functional road hierarchy (and is neither a "Red" or "Blue" road in the MRS) and carries in the order of 17,833vpd. It is a dual carriageway divided four-lane, two-way road with a pavement width of approximately 7.5m either side of a 6.0m wide raised median in a reserve width of approximately 30m. Dianella Drive is subject to the 70km/h posted speed limit. There is a 2.5m wide shared on the western side of Dianella Drive with a 1.5m wide footpath on the eastern side.

4.3. Intersection of Dianella Drive and Gay Street

This intersection is an unsignalised T-junction with gay Street the terminating road and Dianella Drive the priority road. There are right and left turn lanes in Dianella Drive and the median is wide enough to allow vehicles turning right from Gay Street to do so in two movements (Gay Street to median and then median into Dianella Drive southbound). The Gay Street approach has a traffic island separating eastbound and westbound traffic flows on Gay Street. There is enough road space to allow a single vehicle waiting to turn left turn to queue out of the way of a queue of vehicles waiting to turn right and vice versa.

4.4. Gay Street/Withnell Street

It is expected that appropriate tree plantings on the verge of the Channel 9 development in Gay Street will create a canopy over the road which will grow to maturity to join with the trees on the north side of Gay Street on the Channel 7 verge. This will create a type of "passive" traffic calming. In addition to this, with lots fronting Gay Street, there will be visitors parked on-street and these parked vehicles will act as "mobile" traffic calming devices. The impact of both of these calming measures will change the nature of Gay Street and reduce the likelihood of vehicular speeding. This is further encouraged with the two right angle bends in Withnell and Gay Streets.

5. PUBLIC TRANSPORT ACCESS

The nearest bus stops are located on Dianella Drive on the north side of Gay Street approximately 30m from the intersection and also, approximately 200m south of Gay Street. These are approximately 250 to 100m respectively from the proposed development site (or a one to three-minute walk) from the proposed development via a combination of Gay Street and POS within the proposed development. These stops are serviced by Routes 67 and 68 which runs between the Mirrabooka Bus Station and the Perth CBD about every 10-15 minutes in peak periods.

Dianella Drive was previously identified as part of the proposed light rail transit (LRT) network.

The impact of any proposed LRT station on the intersection of Dianella Drive and Gay Street has not been assessed as it is assumed that the impacts of the LRT station will be addressed at the time any proposed LRT station is built. The current status of the LRT is a State Government proposal with the Department of Transport currently restarting the assessment of LRT for Perth. There has been no final decision made on the LRT proposal in terms of timing or funding. The LRT may never proceed. Accordingly, a scenario with the LRT does not form part of the assessment.

6. PEDESTRIAN AND CYCLE ACCESS

As mentioned previously there is a 2.4m wide shared paths presently provided along the western side of Dianella Drive and a 1.2m wide footpath of the eastern side of Dianella Drive and these connect to other paths north and south of the proposed site to provide access to the nearby residential area and school east of Dianella Drive. Access from this footpath to the development is proposed to be via a public open space with direct connection to Dianella Drive.

A new footpath will be provided on Gay Street as part of the subdivisional works for the entire length of the development, to enable connectivity to Dianella Drive via a footpath network. This will also extend to the Withnell Street frontage of the site and connect into the Gay Street footpath.

Gay Street carries in the order of 750 vehicles per day (increasing to 1,650 with the proposed development) with a speed limit of 50km/h on a 7.2m wide pavement and this offers a relatively safe riding environment. As discussed above, a new footpath will be provided on Gay Street so that it can be used by younger children to ride to and from the proposed development and local schools east of Dianella Drive.

Dianella Drive, with a speed zone of 70km/h and with a high a traffic volume is not a cycle friendly road. The shared path on the western side of Dianella Drive provides a safer and high standard cycling facility.

7. SAFETY ISSUES

7.1. Intersection of Dianella Drive/Gay Street

The intersection of Dianella Drive and Gay Street was found to have had one (1) recorded crash in the five years up to 31/12/2018. This crash was a right-angle crash during the day when the road was dry. This represents a crash rate of approximately 0.03 crashes per million vehicles entering the intersection (MV). This is an acceptable safety record as it is significantly less than the critical crash rate of 1.05 crashes per MV entering the intersection and thus requires no further assessment. Overall this suggests that this intersection is safe and thus the small increase in traffic due to the proposed development should be acceptable and not lead to an increase in crashes. No modifications to this intersection are thus considered necessary due to the proposed development.

7.2. Gay Street/Withnell Street

The section of Gay Street/Withnell Street along the frontage of Lots 1 and 2 has had no recorded crashes in the five years up to 31/12/2018. The increase in traffic flows due to the development should not lead to any significant safety issues.

8. CONCLUSIONS

As a result of the traffic analysis undertaken for proposed redevelopment of the Channel 9 site at Lots 1 and 2 Gay Street in Dianella, the following findings are provided:

- The proposed development should not generate significant vehicular trips;
- The impacts of the traffic volumes associated with the development on the road network are considered acceptable;
- Reserve footpath should be provided on Gay Street/Withnell Street for the development frontage, connecting to Dianella Drive; and,
- Intersection controls and geometries are considered appropriate.
- Parking locations and provision are considered appropriate.

The required WAPC checklist for this transport statement is in Appendix C.

A. PROPOSED DEVELOPMENT PLANS

A

great places

SIZE A4_1:2000

0 metres 20 40 60 80 100

LOCAL STRUCTURE PLAN

Lots 1 & 2 Gay Street, Dianella

City of Stirling

REF NO.	DRAW NO.	REV.
NIN DIA	**RD1 1024**	**D**

DISCLAIMER: ISSUED FOR DESIGN INTENT ONLY. ALL AREAS AND DIMENSIONS ARE SUBJECT TO DETAIL DESIGN AND SURVEY

B. LOCALITY PLAN

B


NOLLAMARA
DIANELLA

C. WAPC CHECKLIST

C

hecklist for hannel Dianella

tem	Status	omments Proposals
Proposed development		
proposed land uses	✓	Section 1.2
existing land uses	✓	Section 1.2
context with surrounds	✓	Section 1.2
ehicular access and parking		
access arrangements	✓	Section 2.1
public, private, disabled parking set down / pick up	✓	Section 2.1
Service vehicles non residential		
access arrangements	✓	NA as Residential
on/off-site loading facilities	✓	NA as Residential
Service vehicles residential		
rubbish collection and emergency vehicle access	N/A	Section 2.2
ours of operation non residential onl	✓	NA as Residential
Traffic volumes		
daily or peak traffic volumes	✓	Section 3.1 to 3.7
type of vehicles (eg cars, trucks)	✓	Section 2
Traffic management on frontage streets	✓	Sections 4.1 to 4.5
Public transport access		
nearest bus/train routes	✓	Section 5
nearest bus stops/train stations	✓	Section 5
pedestrian/cycle links to bus stops/train station	✓	Section 5
Pedestrian access facilities		
existing pedestrian facilities within the development (if any)	✓	Section 6
proposed pedestrian facilities within development	✓	Section 6
existing pedestrian facilities on surrounding roads	✓	Section 6
proposals to improve pedestrian access	✓	Section 6
cle access facilities		
existing cycle facilities within the development (if any)	✓	Section 6
proposed cycle facilities within development	✓	Section 6
existing cycle facilities on surrounding roads	✓	Section 6
proposals to improve cycle access	✓	Section 6

Site specific issues	✓	None specifically
Safet issues		
identify issues	✓	Section 7
remedial measures	N/A	No safety issues identified requiring remediation

Proponent's name	**ompan**	**Signature**	**Date**
Rodney Ding	GTA Consultants		19/07/2019
Transport assessor's name	**ompan**	**Signature**	**Date**

GTAconsultants

www.gta.com.au

appendix 06_

Traffic Noise Assessment

PROPOSED RESIDENTIAL DEVELOPMENT

LOTS 1 & 2 GAY STREET
DIANELLA

SPP 5.4 NOISE ASSESSMENT

JULY 2019

OUR REFERENCE: 24577-1-12181-02

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DOCUMENT CONTROL PAGE

NOISE ASSESSMENT

DIANELLA

Job No: 12181-02

Document Reference: 24577-1-12181-02

FOR

ROBERTS DAY

DOCUMENT INFORMATION			
Author:	Tim Reynolds	**Checked By:**	Paul Daly
Date of Issue :	19 July 2019		

REVISION HISTORY				
Revision	**Description**	**Date**	**Author**	**Checked**

DOCUMENT DISTRIBUTION				
Copy No.	**Version No.**	**Destination**	**Hard Copy**	**Electronic Copy**
1	1	Roberts Day Attn: Tim Trefry Email: Tim.Trefry@robertsday.com.au		✓

CONTENTS

APPENDICES

1. INTRODUCTION

Herring Storer Acoustics was commissioned by Roberts Day to undertake a road traffic noise assessment for the proposed development located at Lots 1 and 2 Gay Street, Dianella.

The purpose of this assessment was to assess noise received within the development from vehicles travelling along Dianella Drive and if exceedance with the stated criteria were determined, to establish the required attenuation measures to control noise intrusion to acceptable levels. The traffic noise assessment has been carried out in accordance with the WAPC State Planning Policy 5.4 *"Road and Rail Transportation Noise and Freight Consideration in Land Use Planning"*.

As part of the study, the following was carried out:

- Monitor existing noise received from vehicles travelling along Dianella Drive.
- For future traffic flows, determine noise that would be received at residences within the development from vehicles travelling on Dianella Drive.
- Assess the predicted noise levels for compliance with the appropriate criteria.
- If exceedances are predicted, comment on possible noise amelioration options for compliance with the appropriate criteria.

For information, the development plan is attached in Appendix A.

2. SUMMARY

Under the Western Australian Planning Commission (WAPC) Planning Policy 5.4 *"Road and Rail Transport Noise and Freight Considerations in Land Use Planning"* (SPP5.4), we believe that the appropriate criteria for assessment for this development are as listed below for "Noise Limits".

EXTERNAL (NOISE LIMITS)

$L_{Aeq(Day)}$ of 60 dB(A); and
$L_{Aeq(Night)}$ of 55 dB(A).

INTERNAL

$L_{Aeq(Day)}$ of 40 dB(A) in living and work areas; and
$L_{Aeq(Night)}$ of 35 dB(A) in bedrooms.

From the assessment undertaken, noise received at Lots 1 and 2 Gay Street, Dianella would comply with the "Noise Target" and as outlined in State Planning Policy 5.4, therefore, no further action or noise mitigation by way of upgraded construction, is required for this location.

3. ACOUSTIC CRITERIA

3.1 WAPC PLANNING POLICY

The Western Australian Planning Commission (WAPC) released on 22 September 2009 State Planning Policy 5.4 *"Road and Rail Transport Noise and Freight Considerations In Land Use Planning"*. Section 5.3 – Noise Criteria, which outlines the acoustic criteria, states:

"5.3 - NOISE CRITERIA

Table 1 sets out the outdoor noise criteria that apply to proposals for new noise-sensitive development or new major roads and railways assessed under this policy.

These criteria do not apply to –

- *proposals for redevelopment of existing major roads or railways, which are dealt with by a separate approach as described in section 5.4.1; and*
- *proposals for new freight handling facilities, for which a separate approach is described in section 5.4.2.*

The outdoor noise criteria set out in Table 1 apply to the emission of road and rail transport noise as received at a noise-sensitive land use. These noise levels apply at the following locations—

- *for new road or rail infrastructure proposals, at 1 m from the most exposed, habitable façade of the building receiving the noise, at ground floor level only; and*
- *for new noise-sensitive development proposals, at 1 m from the most exposed, habitable façade of the proposed building, at each floor level, and within at least one outdoor living area on each residential lot.*

Further information is provided in the guidelines.

TABLE 1 - OUTDOOR NOISE CRITERIA

Time of day	*Noise Target*	*Noise Limit*
Day (6 am–10 pm)	$L_{Aeq(Day)}$ *= 55 dB(A)*	$L_{Aeq(Day)}$ *= 60 dB(A)*
Night (10 pm–6 am)	$L_{Aeq(Night)}$ *= 50 dB(A)*	$L_{Aeq(Night)}$ *= 55 dB(A)*

The 5 dB difference between the outdoor noise target and the outdoor noise limit, as prescribed in Table 1, represents an acceptable margin for compliance. In most situations in which either the noise-sensitive land use or the major road or railway already exists, it should be practicable to achieve outdoor noise levels within this acceptable margin. In relation to greenfield sites, however, there is an expectation that the design of the proposal will be consistent with the target ultimately being achieved.

Because the range of noise amelioration measures available for implementation is dependent upon the type of proposal being considered, the application of the noise criteria will vary slightly for each different type. Policy interpretation of the criteria for each type of proposal is outlined in sections 5.3.1 and 5.3.2.

The noise criteria were developed after consideration of road and rail transport noise criteria in Australia and overseas, and after a series of case studies to assess whether the levels were practicable. The noise criteria take into account the considerable body of research into the effects of noise on humans, particularly community annoyance, sleep disturbance, long-term effects on cardiovascular health, effects on children's learning performance, and impacts on vulnerable groups such as children and the elderly. Reference is made to the World Health Organization (WHO) recommendations for noise policies in their publications on community noise and the Night Noise Guidelines for Europe. See the policy guidelines for suggested further reading.

5.3.1 Interpretation and application for noise-sensitive development proposals

In the application of these outdoor noise criteria to new noise-sensitive developments, the objective of this policy is to achieve –

- *acceptable indoor noise levels in noise-sensitive areas (for example, bedrooms and living rooms of houses, and school classrooms); and*
- *a reasonable degree of acoustic amenity in at least one outdoor living area on each residential lot[1].*

If a noise-sensitive development takes place in an area where outdoor noise levels will meet the noise target, no further measures are required under this policy.

In areas where the noise target is likely to be exceeded, but noise levels are likely to be within the 5dB margin, mitigation measures should be implemented by the developer with a view to achieving the target levels in a least one outdoor living area on each residential lot[1]. Where indoor spaces are planned to be facing any outdoor area in the margin, noise mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces. In this case, compliance with this policy can be achieved for residential buildings through implementation of the deemed-to-comply measures detailed in the guidelines.

In areas where the outdoor noise limit is likely to be exceeded (i.e. above $L_{Aeq(Day)}$ of 60 dB(A) or $L_{Aeq(Night)}$ of 55 dB(A)), a detailed noise assessment in accordance with the guidelines should be undertaken by the developer. Customised noise mitigation measures should be implemented with a view to achieving the noise target in at least one outdoor living or recreation area on each noise-sensitive lot or, if this is not practicable, within the margin. Where indoor spaces will face outdoor areas that are above the noise limit, mitigation measures should be implemented to achieve acceptable indoor noise levels in those spaces, as specified in the following paragraphs.

For residential buildings, acceptable indoor noise levels are $L_{Aeq(Day)}$ of 40 dB(A) in living and work areas and $L_{Aeq(Night)}$ of 35 dB(A) in bedrooms[2]. For all other noise-sensitive buildings, acceptable indoor noise levels under this policy comprise noise levels that meet the recommended design sound levels in Table 1 of Australian Standard AS 2107:2000 Acoustics—Recommended design sound levels and reverberation times for building interiors.

1 For non residential noise-sensitive developments, (e.g. schools and child care centres) consideration should be given to providing a suitable outdoor area that achieves the noise target, where this is appropriate to the type of use.
2 For residential buildings, indoor noise levels are not set for utility spaces such as bathrooms. This policy encourages effective "quiet house" design, which positions these non-sensitive spaces to shield the more sensitive spaces from transport noise (see guidelines for further information).

These requirements also apply in the case of new noise-sensitive developments in the vicinity of a major transport corridor where there is no existing railway or major road (bearing in mind the policy's 15-20 year planning horizon). In these instances, the developer should engage in dialogue with the relevant infrastructure provider to develop a noise management plan to ascertain individual responsibilities, cost sharing arrangements and construction time frame.

If the policy objectives for noise-sensitive developments are not achievable, best practicable measures should be implemented, having regard to section 5.8 and the guidelines."

3.2 APPROPRIATE CRITERIA

Based on the above, the following criteria are proposed for this development:

EXTERNAL (NOISE LIMITS)

Day	Maximum of 60 dB(A) L_{Aeq}
Night	Maximum of 55 dB(A) L_{Aeq}
Outdoor Living Areas*	Maximum of 50 dB(A) $L_{Aeq\ (night\ period)}$

INTERNAL

Sleeping Areas	35 dB(A) $L_{Aeq(night)}$
Living Areas	40 dB(A) $L_{Aeq(day)}$

*This is a suggested noise level; noise is to be reduced as far as practicably possible.

Under section 5.3.1 of the Policy, it is also noted that if noise received at a residence in the future complies with the "Noise Targets" then no further action is required.

4. MONITORING

To determine the noise that would be received at the proposed developments from vehicles travelling along Dianella Drive, noise monitoring was undertaken, from Monday 03 December 2012 to Friday 07 December 2012 (inclusive). It is noted that rain occurred on Wednesday 05 December and the data for this day was excluded.

The automatic noise data logger records sound pressure levels in accordance with Australian Standard 2702-1984: Acoustics - Method For Measurement of Road Traffic Noise. The logger used records statistical noise level data, of which the L_{A10}, L_{Aeq} and L_{A90} levels are reported. These are defined below:

L_{A10} The noise level exceeded for 10% of the time (in this instance, the noise level exceeded for 6 minutes in each 1-hour period).

L_{Aeq} The energy equivalent noise level for the 1-hour period. A single number value that expresses the time-varying sound level for the 1-hour period as though it were a constant sound level with the same total sound energy as the time-varying level.

L_{A90} The noise level exceeded for 90% of the time (in this instance, the noise level exceeded for 54 minutes in each 1-hour period).

The logger was located as shown on the site plan attached in Appendix A.

The results of the noise logging are summarised in Table 4.1. The results are also shown graphically on Figure B1, attached in Appendix B.

TABLE 4.1 - SUMMARY OF MEASURED NOISE LEVELS

$L_{A10\ (18\ hour)}$	$L_{Aeq,Day\ (6am\ to\ 10pm)}$	$L_{Aeq,Night\ (10pm\ to\ 6am)}$
66.8	64.1	58.1

Note: It is normal practice to quote decibels to the nearest whole number.
Fractions are retained here to minimise any cumulative rounding error.

Based on the above measured noise levels, the relationships between the L_{A10} noise level and the $L_{Aeq(Day)}$; and $L_{Aeq(Night)}$ were determined, as listed in Table 4.2.

TABLE 4.2 – RELATIONSHIP BETWEEN MEASURED NOISE LEVELS

$L_{A10(18\ hour)} - L_{Aeq,Day}$	$L_{A10(18\ hour)} - L_{Aeq,Night}$	$L_{Aeq,Day} - L_{Aeq,Night}$
-2.7	-8.7	-6.0

Note: It is normal practice to quote decibels to the nearest whole number.
Fractions are retained here to minimise any cumulative rounding error.

Based on the above monitoring results, for this project, the difference between the $L_{A10,18hr}$ and the $L_{Aeq,8hr}$ and the $L_{Aeq,16hr}$ has been taken to be those listed in Table 4.2. It was assumed that these differences would apply in the future.

We note that with the difference between the $L_{Aeq,8hr}$ and the $L_{Aeq,16hr}$ being greater than 5 dB(A), achieving compliance with the day period criteria will also achieve compliance with the night period criteria. Thus, only noise contour plots for the day period have been shown.

5. MODELLING

Modelling of noise received within the subdivision from Dianella Drive was carried out using SoundPlan, using the Calculation of Road Traffic Noise (CoRTN) algorithms. The input data for the model included:

- Local Cadastral Data.
- Traffic data for calibration of noise model obtained from the MRWA Metropolitan Traffic Digest, as listed in Table 5.1.
- Increase in traffic volume, based on 2% growth.
- A +2.5 dB(A) adjustment to allow for façade reflection.

TABLE 5.1 - NOISE MODELLING INPUT DATA

Parameter	Calibration	Future (2039)
Traffic Volumes	15540 vpd	26000 vpd
Heavy Vehicles (%)	5.3%	5.3%
Speed (km/hr)	70km/hr	70km/hr

Using the data contained in Table 5.1, the noise model was calibrated to the monitored day period noise level. The SoundPlan model for the site has been set up for the 2039 scenario as defined in Table 5.1. The following assumptions have been made:

- 18 hour traffic count will be 94% of daily figures; and
- The same diurnal relationship will exist in the future between the $L_{A10\ (18\ hour)}$ and the L_{Aeq} parameters.

We note that with the difference between the $L_{Aeq,16hr}$ and the $L_{Aeq,8hr}$ being greater than 5 dB(A), achieving compliance with the day period criteria will also result in achieving compliance with the night period criteria.

Noise modelling was undertaken for the following scenarios for 2039 traffic flow.

The noise contour plot for the day period is attached in Appendix C.

6. ASSESSMENT

In accordance with the WAPC Planning Policy 5.4, an assessment of the noise that would be received at Lots 1 and 2 Gay Street, Dianella from vehicles travelling on Dianella Drive has been undertaken.

In accordance with the Policy, the following would be the acoustic criteria applicable to this project:

EXTERNAL (NOISE LIMITS)

Day	Maximum of 60 dB(A) L_{Aeq}
Night	Maximum of 55 dB(A) L_{Aeq}

INTERNAL

Sleeping Areas	35 dB(A) $L_{Aeq(night)}$
Living Areas	40 dB(A) $L_{Aeq(day)}$

Under section 5.3.1 of the Policy, it is also noted that if noise received at a residence in the future complies with the “Noise Targets” then no further action is required.

From the assessment undertaken, noise received at this lot would comply with the “Noise Targets”. Therefore, no further action or mitigation by way of “Quiet House” Design, is required.

APPENDIX A

DEVELOPMENT PLAN

great places

SIZE A4_1:2000

0 metres 20 40 60 80 100

LOCAL STRUCTURE PLAN

Lots 1 & 2 Gay Street, Dianella

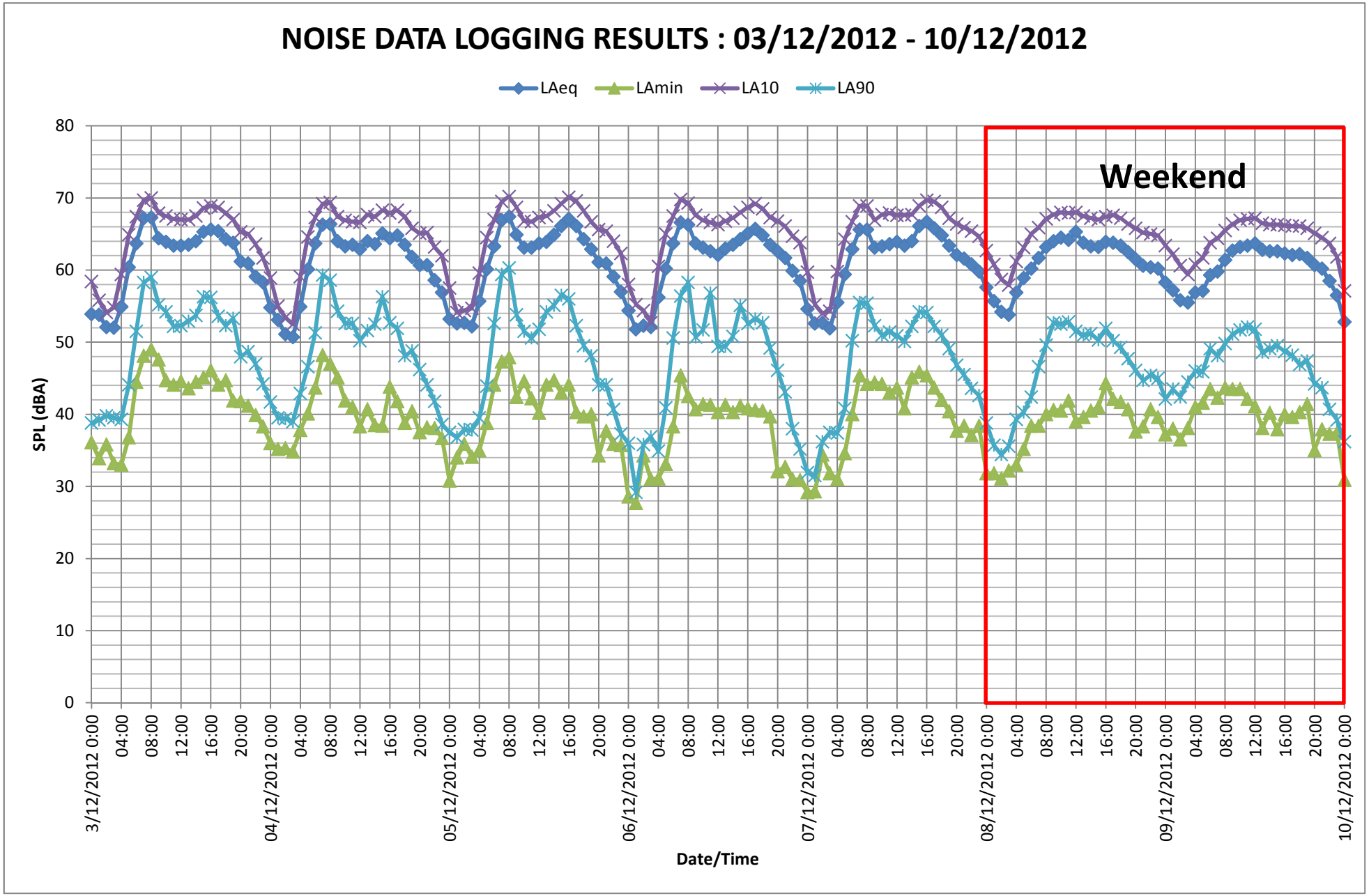
City of Stirling

REF NO.	DRAW NO.	REV.
NIN DIA	**RD1 1024**	**D**

DISCLAIMER: ISSUED FOR DESIGN INTENT ONLY. ALL AREAS AND DIMENSIONS ARE SUBJECT TO DETAIL DESIGN AND SURVEY

APPENDIX B

NOISE MONITORING

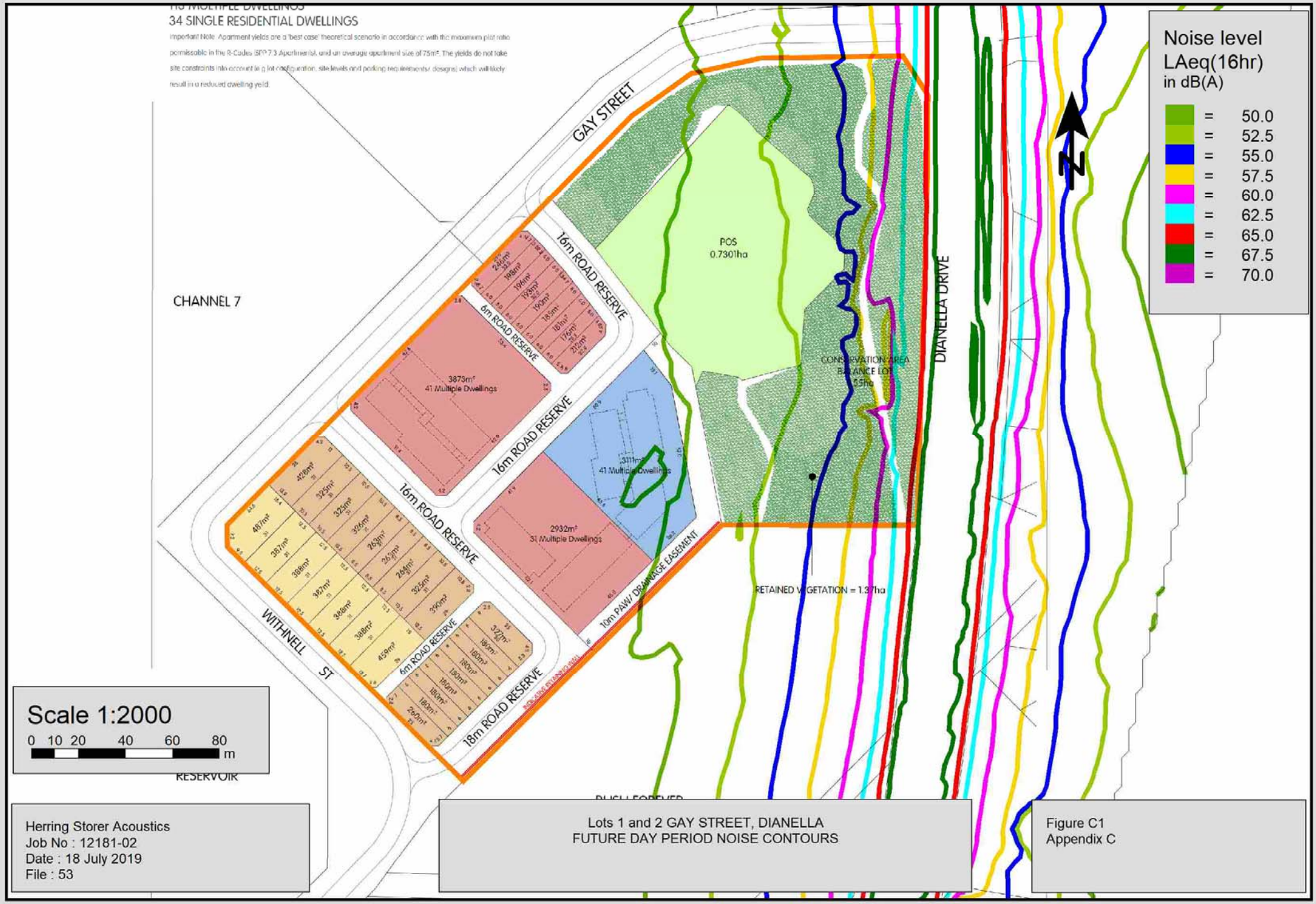


Herring Storer Acoustics
Job No : 12181-02
Date : 13 March 2013

Figure B1
Appendix B

APPENDIX C

DAY PERIOD NOISE CONTOUR PLOT



Herring Storer Acoustics
Job No : 12181-02
Date : 18 July 2019
File : 53

Lots 1 and 2 GAY STREET, DIANELLA
FUTURE DAY PERIOD NOISE CONTOURS

Figure C1
Appendix C

appendix 07

Bushfire Management Plan

FPA AUSTRALIA | Fire Protection Association Australia | Life. Property. Environment.

BPAD Bushfire Planning & Design

Bushfire Management Plan Coversheet

This Coversheet and accompanying Bushfire Management Plan has been prepared and issued by a person accredited by Fire Protection Association Australia under the Bushfire Planning and Design (BPAD) Accreditation Scheme.

Bushfire Management Plan and Site Details

Site Address / Plan Reference: Lots 1 and 2 Gay Street

Suburb: Dianella **State:** WA **P/code:** 6059

Local government area: City of Stirling

Description of the planning proposal: Local Structure Plan

BMP Plan / Reference Number: RDP17443_01 **Version:** R001 Rev 2 **Date of Issue:** 31/10/2019

Client / Business Name: RobertsDay Planning Pty Ltd

Reason for referral to DFES	Yes	No
Has the BAL been calculated by a method other than method 1 as outlined in AS3959 (tick no if AS3959 method 1 has been used to calculate the BAL)?	☐	☑
Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the BPC elements)?	☐	☑
Is the proposal any of the following special development types (see SPP 3.7 for definitions)?		
Unavoidable development (in BAL-40 or BAL-FZ)	☐	☑
Strategic planning proposal (including rezoning applications)	☑	☐
Minor development (in BAL-40 or BAL-FZ)	☐	☑
High risk land-use	☐	☑
Vulnerable land-use	☐	☑

If the development is a special development type as listed above, explain why the proposal is considered to be one of the above listed classifications (E.g. considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?
The proposal is a strategic planning proposal (i.e. Local Structure Plan submission)

Note: The decision maker (e.g. local government or the WAPC) should only refer the proposal to DFES for comment if one (or more) of the above answers are ticked "Yes".

BPAD Accredited Practitioner Details and Declaration

Name	Accreditation Level	Accreditation No.	Accreditation Expiry
Zac Cockerill	Level 2	37803	31/08/2020
Company		**Contact No.**	
Strategen-JBS&G		9792 4797	

I declare that the information provided within this bushfire management plan is to the best of my knowledge true and correct

Signature of Practitioner  **Date** 31/10/2019

intelligent outcomes | respected experience

Bushfire Management Plan

Lots 1 and 2 Gay Street, Dianella

Prepared for
Roberts Day
by Strategen

October 2019

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

strategen ENVIRONMENTAL

Bushfire Management Plan

Lots 1 and 2 Gay Street, Dianella

Strategen is a trading name of
Strategen Environmental Consultants Pty Ltd
Level 1, 50 Subiaco Square Road Subiaco WA 6008
ACN: 056 190 419

October 2019

Limitations

Scope of services

This report ("the report") has been prepared by Strategen Environmental Consultants Pty Ltd (Strategen) in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Strategen. In some circumstances, a range of factors such as time, budget, access and/or site disturbance constraints may have limited the scope of services. This report is strictly limited to the matters stated in it and is not to be read as extending, by implication, to any other matter in connection with the matters addressed in it.

Reliance on data

In preparing the report, Strategen has relied upon data and other information provided by the Client and other individuals and organisations, most of which are referred to in the report ("the data"). Except as otherwise expressly stated in the report, Strategen has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report ("conclusions") are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. Strategen has also not attempted to determine whether any material matter has been omitted from the data. Strategen will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to Strategen. The making of any assumption does not imply that Strategen has made any enquiry to verify the correctness of that assumption.

The report is based on conditions encountered and information received at the time of preparation of this report or the time that site investigations were carried out. Strategen disclaims responsibility for any changes that may have occurred after this time. This report and any legal issues arising from it are governed by and construed in accordance with the law of Western Australia as at the date of this report.

Environmental conclusions

Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

Client: Roberts Day

Report Version	Revision No.	Purpose	Strategen author/reviewer	Submitted to Client	
				Form	Date
Draft Report	Rev A	For client review	A Ennis / Z Cockerill (BPAD 37803)	Electronic (email)	7/09/2017
Final Report	Rev 0	Issued for use: to accompany Structure Plan	A Ennis / Z Cockerill (BPAD 37803)	Electronic (email)	13/09/2017
Final Report	Rev 1	Issued for use: to address WAPC comments	Z Cockerill (BPAD 37803)	Electronic (email)	02/08/2018
Final Report	**Rev**	**ssued for use: to address agenc comments and design modifications**	**Mastrangelo PAD ockerill PAD**	**Electronic email**	

Filename: RDP17443_01 R001 Rev 2 - 31 October 2019

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1. Introduction

1.1 Background

Roberts Day is seeking to lodge a Local Structure Plan (LSP) to guide residential development of Lots 1 and 2 Gay Street, Dianella (the project area) in the City of Stirling. The LSP identifies areas of residential development, Public Open Space (POS), road layout and conservation vegetation (Figure 1).

Portions of the project area are designated as bushfire prone on the WA *Map of Bush Fire Prone Areas* (DFES 2019, see Plate 1). Strategen has prepared this Bushfire Management Plan (BMP) to address the following information requirements triggered by a Structure Plan under *State Planning Policy 3.7 Planning in Bushfire Prone Areas* (SPP 3.7; WAPC 2015) in accordance with Policy Measure 6.3:

- where lot layout is known, a Bushfire Attack Level (BAL) contour map to determine the indicative acceptable BAL ratings across the project area, in accordance with *Guidelines for Planning in Bushfire Prone Areas* (the Guidelines; WAPC 2017) – refer to Section 2.3 and Figure 4
- identification of any bushfire hazard issues arising from the BAL contour assessment – refer to Section 2.4
- clear demonstration that compliance with the bushfire protection criteria in the Guidelines can be achieved in subsequent planning stages – refer to Section 3 and Table 2.

This BMP has been prepared in accordance with the Guidelines and addresses the above information requirements to satisfy SPP 3.7.

1.2 Purpose and application of the plan

The purpose of this BMP is to provide guidance on how to plan for and manage the bushfire risk to future assets of the project area through implementation of a range of bushfire management measures. The BMP outlines how future on-site assets can be protected from potential bushfire threat.

Plate 1: WA Map of Bush Fire Prone Areas (DFES 2019)

Source: RobertsDay 2019

Figure 1: Local Structure Plan

2. Spatial consideration of bushfire threat

2.1 Existing site characteristics

2.1.1 Location

The project area comprises approximately 5 ha consisting of Lots 1 (2) and 2 (10) Gay Street, Dianella, located in the City of Stirling, and is bound by the following as depicted in Figure 2:

- Gay Street, former Channel 7 site subject to urban residential development and Crown Reserve 49875 (Bush Forever Site 43) to the north
- Hayes Avenue and Bush Forever Site (Lot 13) to the south
- Dianella Drive and existing urban residential development to the east
- Withnell Street and Yokine Reservoir to the west.

2.1.2 Zoning and land use

The project area is currently zoned 'Development' under provisions of the City of Stirling Local Planning Scheme No 3.

Previous land use of the site consisted of Channel 9 operations (Lot 2) and an associated helipad (Lot 1).

2.1.3 Assets

The project area contains limited property assets associated with the previous land use as the former Channel 9 site, comprising a private driveway.

Proposed residential development will add critical assets in that the number of residents, visitors and built assets will be increased within the site.

On-site environmental assets include banksia woodland within Lot 1, which will be predominantly retained within on-site conservation POS, given the majority of clearing and urban development will be focussed within the already cleared/degraded Lot 2.

With regards to adjacent environmental assets, Bush Forever sites containing banksia woodland exist both north and south of the project area (Cottonwood Crescent Bush Forever Site 43 and Lot 13 Bush Forever Site respectively), which are mapped as Banksia Woodlands of the Swan Coastal Plain TEC. In addition, these Bush Forever sites are mapped as possibly breeding areas, known roosting areas and potential foraging habitat for Carnaby's Black Cockatoo, as well as potential Quenda habitat.

Strategen understands that all relevant environmental approvals have/will be sought for the proposal prior to commencement of works.

2.1.4 Access

The project area is currently accessed via Gay Street in the north and Withnell Street in the west.

2.1.5 Water and power supply

Reticulated water and underground power supply infrastructure and services are available to the project area from adjacent areas of residential development.

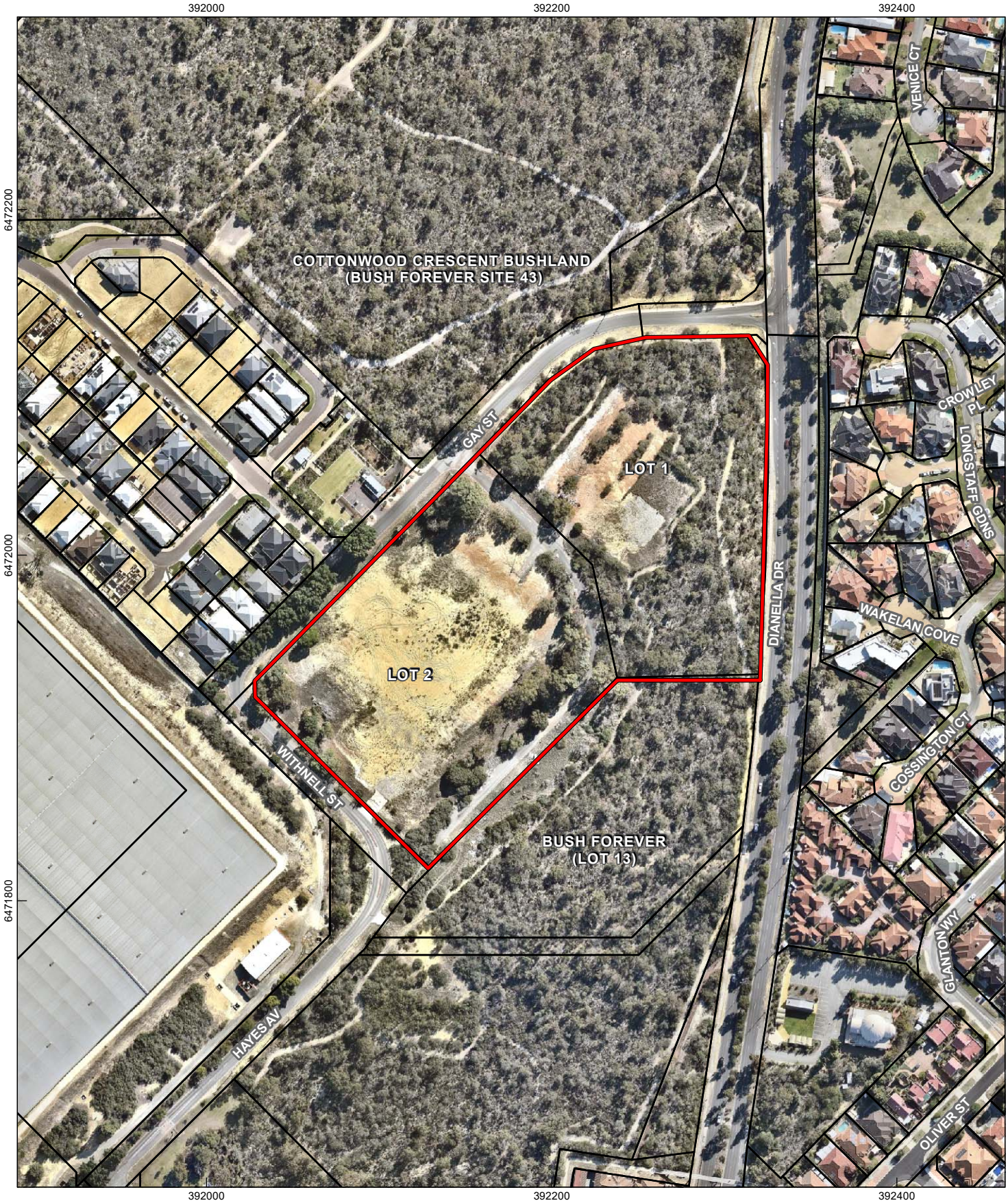

Figure 2: Site overview

N

Scale 1:3,000 at A4

0 25 50 m

Coordinate System:
GDA 1994 MGA Zone 50

Date: 24/07/2019

Legend

- Project area
- Cadastral boundaries

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2.2 Post-development fire environment

2.2.1 Vegetation classifications and exclusions

Post-development vegetation classifications and exclusions were assessed in accordance with the *Visual guide for bushfire risk assessment in* Western Australia (DoP 2016) and *Australian Standard 3959-2018 Construction of Buildings in Bushfire Prone Areas* (AS3959: SA 2018). This assessment involved on-ground verification of vegetation classifications and any areas excluded from classification within the project area and adjacent 150 m as per conditions at time of assessment on 30 August 2017. Review of site conditions since this time via desktop assessment has confirmed that the extent of classified vegetation and exclusions within 150 m of the site have not material changed.

Proposed urban residential development will be based primarily within the already cleared and degraded western portion of the site (i.e. Lot 2), to be modified to a low threat state. POS will be based primarily within the eastern portion of the site (i.e. Lot 1), comprising a combination of active recreation areas and a Public Access Way (to be cleared/modified to a low threat state), drainage areas (assumed to be landscaped to deliver drainage outcomes and replanted to an indicative Class B woodland status; however, this will be confirmed as part of a BMP compliance audit) and retained conservation bushland (Class B woodland) in recognition of the inherent environmental values of the site. A Landscape Concept Plan has been included in Appendix 1, which details the various POS components and has been factored in to the post-development assessment of classified vegetation and exclusions accordingly.

A combination of Class B woodland (typical banksia woodland fuel profile), Class D scrub (closed heath vegetation greater than 2 m in height) and Class G grassland (unmanaged grasses/weeds greater than 100 mm in height) were assessed to occur in the surrounding 150 m of land, including the adjacent Bush Forever site and road verges.

Remaining portions of the 150 m assessment area were assessed to be excluded as non-vegetated areas (i.e. built form/infrastructure, roads, footpaths, cleared land, etc) or low threat managed vegetation (i.e. managed road verges, managed gardens, turfed POS, etc) in accordance with Clauses (e) and (f) of AS3959.

Vegetation classifications and exclusions are depicted in Figure 3 along with the location and direction of georeferenced site photographs (refer to Appendix 2 for site photographs). A summary of the plots identified as part of the vegetation assessment is as follows:

- Plots 1–3: Class B woodland retained within Lot 1 (Photo 1, Photo 2, Photo 3, Photo 4 and Photo 5) and south and north of the project area within the respective Bush Forever sites (Photo 6, Photo 7, Photo 8, Photo 9, Photo 10, Photo 11 and Photo 12)
- Plot 4: Class D scrub retained to the south, southwest and west of the project area (Photo 13, Photo 14 and Photo 15)
- Plot 5: Class G grassland south of the project area (Photo 16)
- Plot 6: non-vegetated areas (e.g. roads and buildings) or low threat managed grassland and vegetation excluded from classification under Clauses 2.2.3.2 (e) and (f) of AS 3959 (Photo 17, Photo 18 and Photo 19)
- Plot 7: portions of the project area proposed to be modified to a low threat state to facilitate the intended development footprint.

This information has been used to inform a BAL contour assessment for the project area (refer to Section 2.3).

Given the conceptual nature of the Landscape Concept Plan in Appendix 1, should the post-development vegetation classification within on-site POS result in a reduced classification compared to the current Class B woodland following review of detailed landscaping planning at the subdivision/clearance stage stage (i.e. reduction to Class C shrubland or Class D scrub), the subsequent reduction in BAL impact will be identified and reassessed as part of BMP compliance auditing at the relevant clearance stage.

2.2.2 Effective slope

Strategen has assessed site topography and effective slope under classified vegetation within the development area and adjacent 150 m through on-ground verification in accordance with AS 3959 methodology (Figure 3).

Lot 2 occurs on predominantly flat land at an elevation of around 65 mAHD (Australian Height Datum). Elevation of Lot 1 ranges from around 54 mAHD in the southeast to 65 mAHD in the centre of the lot and is down-slope at a range of >0–5 degrees and >10–15 degrees in relation to proposed development.

Bushland to the north of the project area (located within Bush Forever Site 43) has an elevation ranging from 55 mAHD in the southeast to more than 72 mAHD in the northwest. The associated slope in this area is up-slope from proposed development.

Bushland to the south of the project area (located within Lot 13 Bush Forever Site) has an elevation ranging from 50 mAHD in the southeast to 65 mAHD in the northwest. The associated slope in this area is down-slope >0-5 degrees from proposed development.

This information has been used to inform a BAL contour assessment for the project area (refer to Section 2.3).

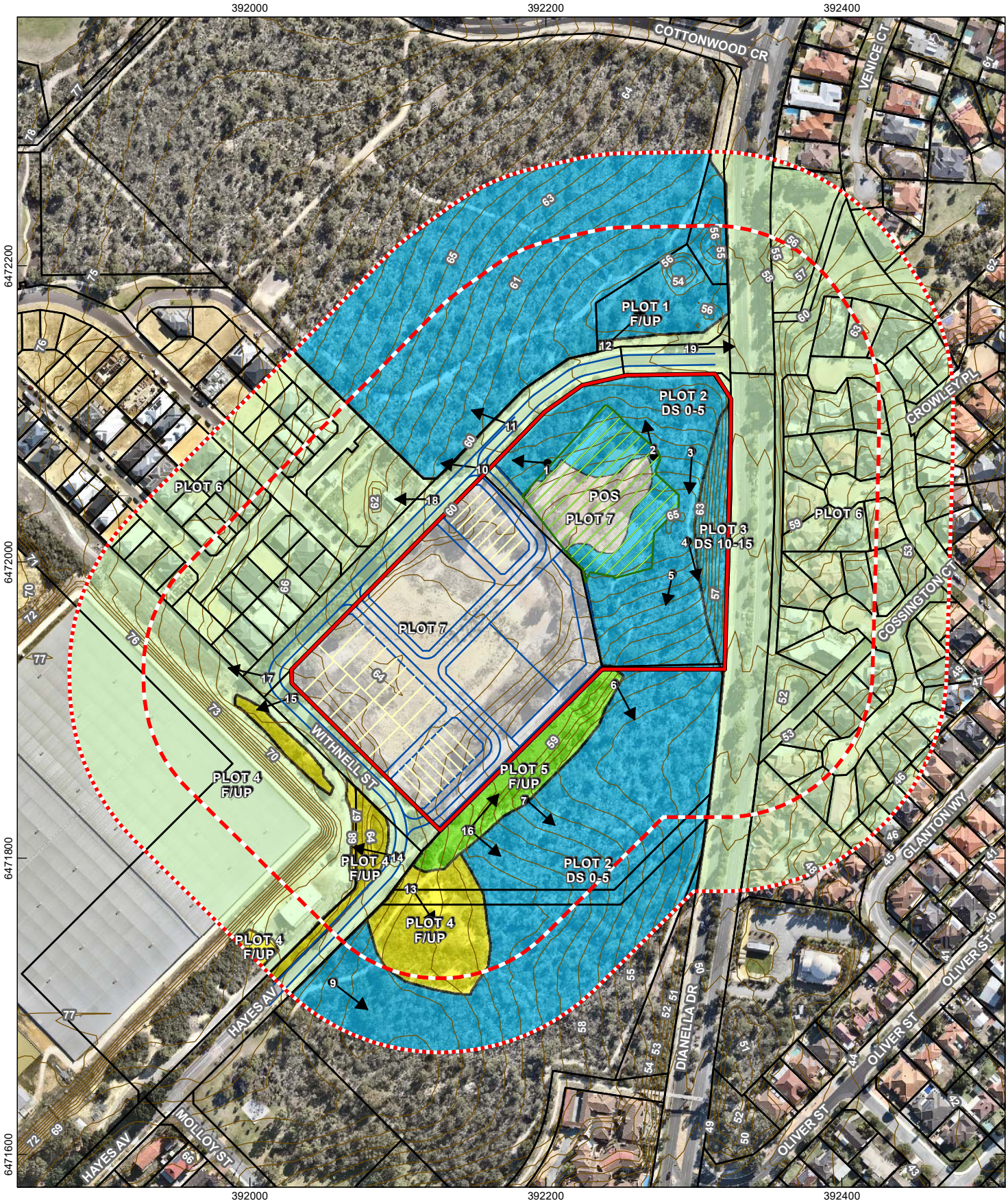

Figure 3: Vegetation classification and effective slope

Legend

- Project area
- 100m assessment area
- 150m assessment area
- Cadastral boundaries
- POS
- Proposed lots
- Proposed roads
- Surface elevation (mAHD)
- Photo point

Vegetation classification

- Class B Woodland
- Class D Scrub
- Class G Grassland
- Excluded under Clauses 2.2.3.2 (e) & (f)
- Area to be modified to a low threat state

N

Scale 1:3,500 at A4

0 25 50 m

Coordinate System: GDA 1994 MGA Zone 50

Date: 30/10/2019

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2.3 BAL contour assessment

Any proposed habitable development that cannot achieve a full 100 m wide low fuel separation distance to post development classified vegetation will require application of AS 3959 to determine appropriate location and siting of development and potential increased building construction standards in response to the assessed BAL.

Strategen has undertaken a BAL contour assessment in accordance with Method 1 of AS 3959 for proposed development areas (Table 1). The BAL contour assessment is based on post-development conditions on and adjacent to the site. The Method 1 procedure for calculating the BAL (as outlined in AS 3959) incorporates the following factors:

- state-adopted FDI rating
- vegetation classification
- effective slope
- distance maintained between proposed development areas and the classified vegetation.

The BAL rating gives an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by proposed lots and subsequently informs the standard of building construction required for proposed lots to potentially withstand such impacts.

The assessed BAL contours are depicted in Figure 4, with detailed BAL contour information and Asset Protection Zone (APZ) setback requirements for the northernmost residential R-60 cell and R-80 multiple dwellings cell depicted in Figure 5.

BAL contours are based on post-development conditions and take into consideration the proposed clearing extent, vegetation retention, landscaping and management of POS, resultant vegetation exclusions and separation distances achieved in line with the LSP.

Table 1: Method 1 BAL calculation

Plot	Classified vegetation	Effective slope	Separation distance	BAL rating	Comment
1	Class B woodland (off-site to the north)	All up-slope and flat land (0 degrees)	<10 m	BAL–FZ	No development is proposed in this area
			10–<14 m	BAL–40	No development is proposed in this area
			14–<20 m	BAL–29	No development is proposed in this area
			20–<29 m	BAL–19	Development will occur in this area
			29–<100 m	BAL–12.5	Development will occur in this area
2	Class B woodland (on and off-site to the east and south)	Down-slope >0-5 degrees	<13 m	BAL–FZ	No development is proposed in this area
			13–<17 m	BAL–40	No development is proposed in this area
			17–<25 m	BAL–29	Development will occur in this area
			25–<35 m	BAL–19	Development will occur in this area
			35–<100 m	BAL–12.5	Development will occur in this area
3	Class B woodland (off-site to the east)	Down-slope >10-15 degrees	<21 m	BAL–FZ	No development is proposed in this area
			21–<28 m	BAL–40	No development is proposed in this area
			28–<39 m	BAL–29	No development is proposed in this area
			39–<53 m	BAL–19	No development is proposed in this area
			53–<100 m	BAL–12.5	Development will occur in this area
4	Class D scrub (off-site to the south and southwest)	All up-slope and flat land (0 degrees)	<10 m	BAL–FZ	No development is proposed in this area
			10–<13 m	BAL–40	No development is proposed in this area
			13–<19 m	BAL–29	No development is proposed in this area
			19–<27 m	BAL–19	Development will occur in this area
			27–<100 m	BAL–12.5	Development will occur in this area
5	Class G grassland (off-site to the southeast)	All up-slope and flat land (0 degrees)	<6 m	BAL–FZ	No development is proposed in this area
			6–<8 m	BAL–40	No development is proposed in this area
			8–<12 m	BAL–29	No development is proposed in this area
			12–<17 m	BAL–19	No development is proposed in this area
			17–<50 m	BAL–12.5	Development will occur in this area

2.4 Identification of bushfire hazard issues

The bushfire risk or fire run through dense vegetation adjacent to development areas is limited to bushland within Bush Forever Sites to the north and south and on-site vegetation being retained within Lot 1. Strategen therefore considers a fire front approaching the development area from the south or north to be the worst-case bushfire scenarios due to the presence of intact bushfire fuels in these directions.

Fire runs in these directions are limited (approximately 350 m). Bushfire impacts are likely to be greatest under predominant afternoon summer weather conditions, where the likely prevailing winds from the southwest have the potential to direct a bushfire towards the site and the resulting fire behaviour is likely to escalate over this time and contribute moderate to high levels of radiant heat and ember attack on the proposed development.

The bushfire risks to proposed development posed by these hazards can be managed through standard application of acceptable solutions under the Guidelines, including provision for and implementation of APZs working in concert with BAL rated dwelling construction where applicable, provision of adequate emergency water supply and vehicular access, as well as through a direct bushfire suppression response if required. Defendable space will be provided at all development interfaces through existing roads, proposed roads and the proposed PAW.

On this basis, Strategen considers the bushfire hazards within and adjacent to the development area and the associated bushfire risks are readily manageable through standard acceptable solution responses outlined in the Guidelines and AS 3959. These responses will be factored in to proposed development early in the planning process to ensure a suitable, compliant and effective bushfire management outcome is achieved for protection of future life and property assets.

3. Bushfire management measures

Strategen has identified a range of bushfire management measures that on implementation will enable all proposed lots to be developed with a manageable level of bushfire risk and full compliance with the Guidelines. The management actions recommended are directly referred to in the bushfire compliance table outlined in Table 3 to assist with implementation, enforcement and auditing of all relevant works.

3.1 Asset Protection Zones (APZs)

The BAL contours identified in Figure 4, along with the APZ setback requirements depicted in Figure 5, demonstrate that all proposed residential development areas have capacity to achieve BAL-29 or lower in accordance with acceptable solutions A1.1 and A2.1.

With regards to the northernmost residential R-60 cell, the identified APZ front building setback off the street is approximately 1 m at its widest point (see Figure 5), which is deemed readily achievable and enforceable via standard R-code building setback requirements, and/or specific Local Development Plan (LDP) provisions and/or via restrictive covenant on title.

With regards to the R-80 multiple dwellings cell, the identified APZ building setback off the eastern boundary is approximately 7 m, and, based on indicative siting of habitable development within this cell depicted in Figure 5, is shown as not inhibiting proposed habitable development. As above, these APZ setback requirements can be enforced via specific LDP provisions and/or restrictive covenant on title at the clearance stage.

All APZs and low threat POS areas are required to be managed on a regular and ongoing basis to achieve a low threat minimal fuel condition in accordance with Appendix 4.

3.1.1 On-site fuel management

The developer will be responsible for maintaining any cleared vacant lots and APZ setbacks in a low threat state in accordance with Clause 2.2.3.2 (f) of AS 3959 and Schedule 1 of the Guidelines until such time that the land is sold, after which the fuel management responsibility will be transferred to the respective landowners.

Management Action BMP 1a
Cleared vacant lots and APZ setbacks will be established and maintained on a regular and ongoing basis by the developer until sale of land after which time the respective landowners will be responsible for ongoing management.

3.1.2 POS fuel management

The developer will be responsible for maintaining any low threat POS within the project area in a low threat state in accordance with Clause 2.2.3.2 (f) of AS 3959 and Schedule 1 of the Guidelines until such time that the POS is transferred/ceded, after which time the relevant authority will be responsible for ongoing management.

Management Action BMP 1b
Proposed low threat POS areas will be established and maintained on a regular and ongoing basis by the developer until transfer of land after which time the relevant authority will be responsible for ongoing management.

3.1.3 Road reserve fuel management

Proposed internal roads will be established in a non-vegetated state following construction; however, road verges will need to be managed to ensure surface fuels are kept in a low threat, minimal fuel condition in accordance with Clause 2.2.3.2 (f) of AS 3959. Existing road reserves currently excluded from classification will also need to be managed in accordance with the current maintenance regime to ensure that fuels are maintained in a low threat, minimal fuel condition. Following transfer of land, ongoing road verge management will be the responsibility of the City.

Management Action BMP 1c
Road verges will need to be managed to ensure the understorey and surface fuels remain in a low threat, minimal fuel condition in accordance with Clause 2.2.3.2 (f) of AS 3959. Ongoing road verge management will be the responsibility of the City.

3.1.4 On-site staging buffers

The BAL contour assessment depicted in Figure 4 is based on all proposed vegetation clearing and modification within the project area being completed in one stage.

Management Action BMP 1d
If development (and therefore clearing) is to occur on a staged basis, clearing in advance will need to occur to ensure building construction is not inhibited by a temporary vegetation extent located within adjacent development stages yet to be cleared. This can be achieved by ensuring that each approved stage subject to construction is surrounded by a 100 m wide, on-site cleared or low threat buffer prior to development (not including vegetation proposed to be retained). Once the buffers are created, they will need to be maintained on a regular and ongoing basis at a fuel load less than 2 t/ha to achieve a low threat minimal fuel condition all year round until such time that the buffer area is developed as part of the next development stage.

3.2 BMP compliance and building construction

Strategen has assigned BAL contours for the development areas as depicted in Figure 4. On the basis of the LSP layout and management measures documented in this BMP, proposed development can be located in BAL–29 areas or lower, with no development occurring in areas of BAL–FZ or BAL–40, in accordance with acceptable solution A1.1.

BMP compliance will be required for each clearance stage to address subdivision approval conditions and demonstrate that all relevant measures in the BMP have been complied with to deliver the intended outcomes. A site audit of post subdivision conditions will be undertaken to determine final BAL impact across the site and BAL certificates can prepared at this time in accordance with the final BAL assessment/contour map. Future buildings will need to be constructed in accordance with the assessed BAL rating where required in accordance with AS3959.

Management Action BMP 2a
BMP compliance reporting will be required for each stage of subdivision clearance and all dwellings will be constructed to the assessed BALs.

3.3 Vehicular access

3.3.1 Public and internal access

As all of the proposed residential lots within the project area will directly front the proposed or existing access network, all lots will have at least two different points of vehicular access at all times given the multiple connections provided to the surrounding public road network in Gay Street and Withnell Street to the northeast and southwest respectively. No cul-de-sacs, battle-axes, private driveways longer than 50 m, emergency access ways or fire service access routes are proposed or required as part of this BMP. Therefore, acceptable solutions A3.3, A3.4, A3.5, A3.6 and A3.7 are not applicable in this instance.

Proposed public roads will need to meet technical requirements outlined in Appendix 5.

Management Action BMP 3a
All public roads constructed as part of the development will comply with technical requirements of the Guidelines in accordance with A3.2 (refer to Appendix 5).

3.3.2 Individual lot firebreaks

The City of Stirling annual firebreak notice (Appendix 3) requires 3 m wide lot boundary firebreaks on land 2000 m² or greater. Properties less than 2000 m² are required to have all grass maintained to no greater than 5 cm in height and all flammable material removed. Firebreaks will not be required throughout the urban residential component of proposed development since these lots will be of a size that will be completely cleared; however, firebreaks may be required for larger lots (such as the proposed vegetated balance lot and POS) in accordance with acceptable solution A3.8 and the City of Stirling annual firebreak notice.

Management Action BMP 3b
All parties are to comply with relevant requirements of the City's annual firebreak notice (Appendix 3).

3.4 Reticulated water supply

Management Action BMP 4a
Proposed development areas will be provided a reticulated water supply. The reticulated system will ensure an all year round supply of water is provided for each lot to meet minimum domestic and emergency water supply requirements.

A network of hydrants will also be provided along the internal road network at locations which meet relevant water supply authority and DFES requirements, in particular the Water Corporation Design Standard DS 63 'Water Reticulation Standard Design and Construction Requirements for Water Reticulation Systems up to DN250' and A4.1 of the Guidelines (see Appendix 6). This standard will guide construction of the internal reticulated water supply system and fire hydrant network, including spacing and positioning of fire hydrants so that the maximum distance between a hydrant and the rear of a building envelope (or in the absence of a building envelope, the rear of the lot) shall be 120 m and the hydrants shall be no more than 200 m apart.

3.5 Notification on Title

Standard subdivision conditions will specify the requirement for bushfire notification on title.

Management Action BMP 5a:
Where relevant, a notification pursuant to Section 165 of the *Planning and Development Act 2005* is to be placed on the certificates of title of proposed lots with a BAL rating of 12.5 or above, advising of the existence of a hazard or other factor. The notification is to state as follows:

This land is subject to a Bushfire Management Plan. Additional planning and building requirements may apply to development on this land.

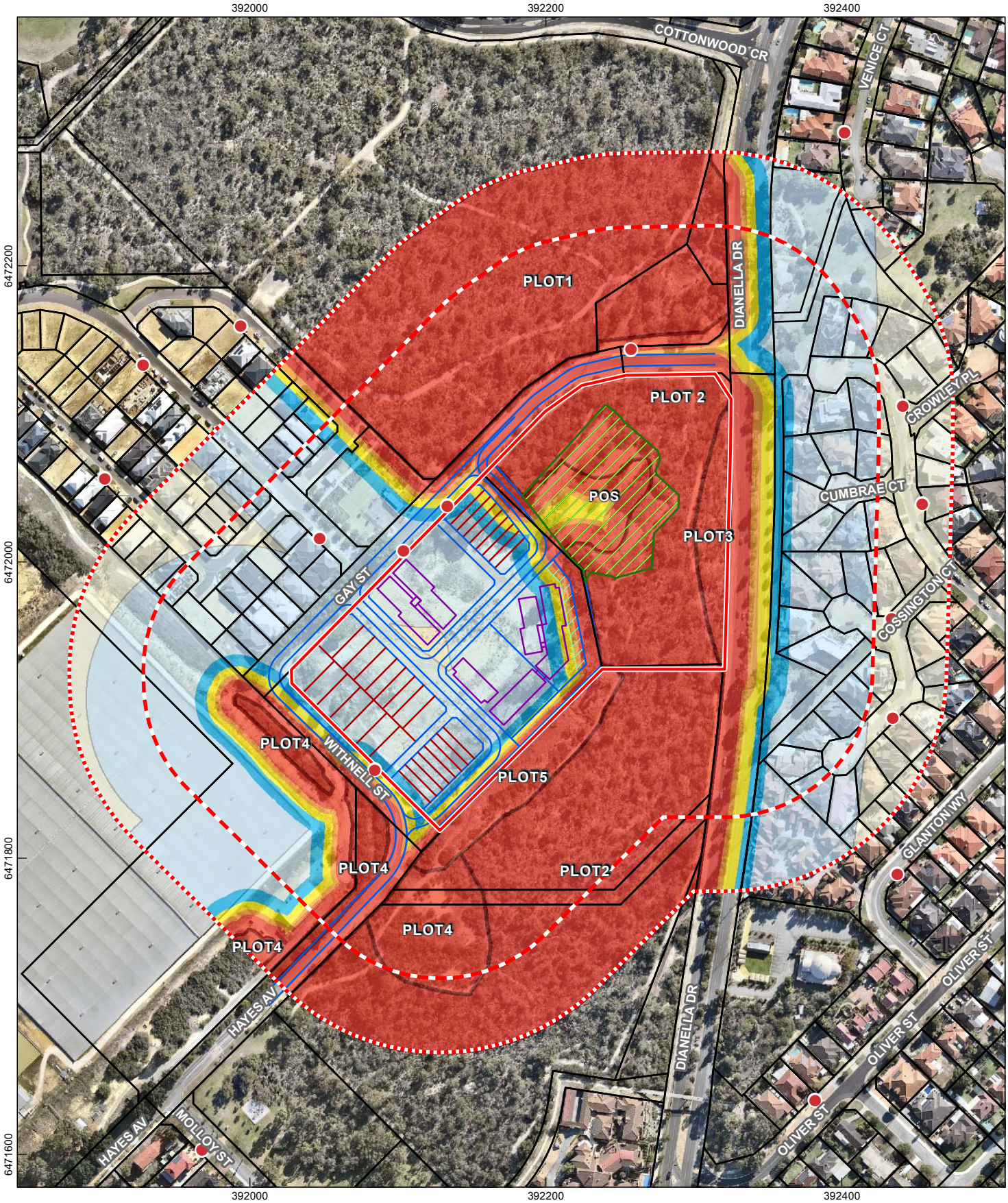

Figure 4: BAL contour assessment: Lots 1 and 2 Gay Street, Dianella

N

Scale 1:3,500 at A4

0 25 50 m

Coordinate System:
GDA 1994 MGA Zone 50

Date: 25/07/2019

Legend

- Project area
- Cadastral boundaries
- POS
- APZ
- Classified vegetation
- Indicative dwelling footprint
- Proposed lots
- Proposed roads
- Existing water hydrants

BAL contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL LOW

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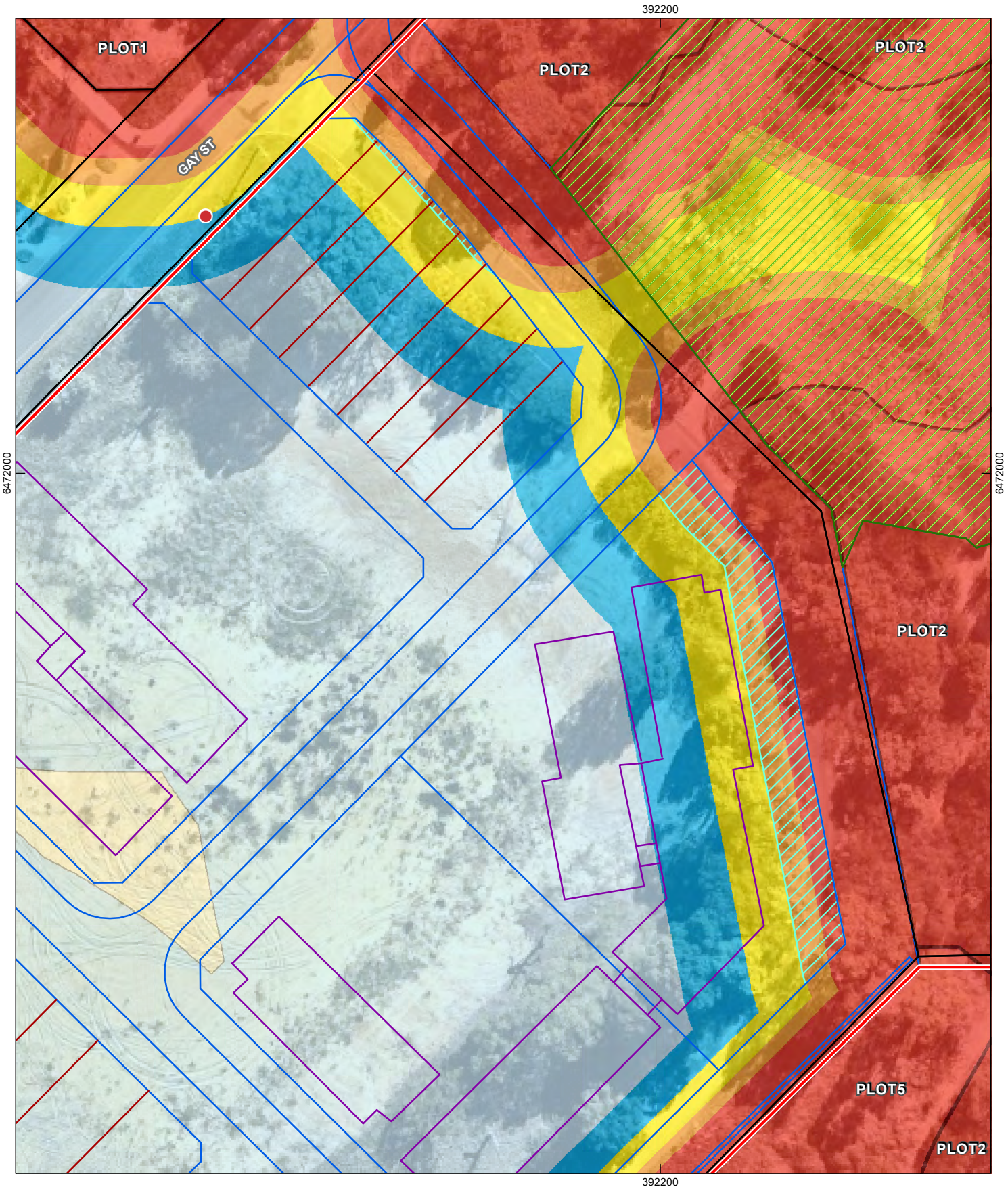

Figure 5: APZ setback requirements

N

Scale 1:750 at A4

0 10 20 m

Coordinate System:
GDA 1994 MGA Zone 50

Date: 30/10/2019

Legend

- Project area
- Cadastral boundaries
- POS
- APZ
- Classified vegetation
- Indicative dwelling footprint
- Proposed lots
- Proposed roads
- Existing water hydrants

BAL contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL LOW

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4. Proposal compliance and justification

Proposed development within the project area is required to comply with SPP 3.7 under the following policy measures:

6.2 Strategic planning proposals, subdivision and development applications

a Strategic planning proposals, subdivision and development applications within designated bushfire prone areas relating to land that has or will have a Bushfire Hazard Level (BHL) above low and/or where a Bushfire Attack Level (BAL) rating above BAL-LOW apply, are to comply with these policy measures.

b Any strategic planning proposal, subdivision or development application in an area to which policy measure 6.2 a) applies, that has or will, on completion, have a moderate BHL and/or where BAL-12.5 to BAL-29 applies, may be considered for approval where it can be undertaken in accordance with policy measures 6.3, 6.4 or 6.5.

c This policy also applies where an area is not yet designated as a bushfire prone area but is proposed to be developed in a way that introduces a bushfire hazard, as outlined in the Guidelines.

6.3 Information to accompany strategic planning proposals

Any strategic planning proposal to which policy measure 6.2 applies is to be accompanied by the following information prepared in accordance with the Guidelines:

a i the results of a BHL assessment determining the applicable hazard level(s) across the subject land, in accordance with the methodology set out in the Guidelines. BHL assessments should be prepared by an accredited Bushfire Planning Practitioner; or

a ii where the lot layout of the proposal is known, a BAL Contour Map to determine the indicative acceptable BAL ratings across the subject site, in accordance with the Guidelines. The BAL Contour Map should be prepared by an accredited Bushfire Planning Practitioner; and

b the identification of any bushfire hazard issues arising from the relevant assessment; and

c clear demonstration that compliance with the bushfire protection criteria in the Guidelines can be achieved in subsequent planning stages.

This information can be provided in the form of a Bushfire Management Plan or an amended Bushfire Management Plan where one has been previously endorsed.

Implementation of this BMP is expected to meet the following objectives of SPP 3.7:

Avoid any increase in the threat of bushfire to people, property and infrastructure. The preservation of life and the management of bushfire impact are paramount.

Reduce vulnerability to bushfire through the identification and consideration of bushfire risks in decision-making at all stages of the planning and development process.

Ensure that higher order strategic planning documents, strategic planning proposals, subdivision and development applications take into account bushfire protection requirements and include specified bushfire protection measures.

Achieve an appropriate balance between bushfire risk management measures and, biodiversity conservation values, environmental protection and biodiversity management and landscape amenity, with consideration of the potential impacts of climate change.

In response to the above requirements of SPP 3.7, bushfire management measures, as outlined in Section 3, have been devised for the proposed development in accordance with acceptable solutions of the Guidelines to meet compliance with bushfire protection criteria. An ‘acceptable solutions’ assessment is provided in Table 2 to assess the proposed bushfire management measures against each bushfire protection criteria in accordance with the Guidelines and demonstrate that the measures proposed meet the intent of each element of the bushfire protection criteria.

Table 2: Acceptable solutions assessment against bushfire protection criteria

Bushfire protection criteria	Intent	Acceptable solutions	Proposed bushfire management measures	Compliance statement
Element : Location	To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure	A1.1 Development location The strategic planning proposal, subdivision and development application is located in an area that is or will, on completion, be subject to either a moderate or low bushfire hazard level, or BAL–29 or below.	Refer to Section 3.2, Figure 4 and Figure 5, which demonstrate that all new habitable development will only occur in areas of BAL-29 or lower. No development will occur in BAL-40 or BAL-FZ areas.	The measures proposed are considered to comply and meet the intent of Element 1 Location.
Element : Siting and design of development	To ensure that the siting and design of development minimises the level of bushfire impact	A2.1 Asset Protection Zone Every building is surrounded by an APZ, depicted on submitted plans, which meets detailed requirements (refer to the Guidelines for detailed APZ requirements).	Refer to Section 3.1, Figure 4 and Figure 5, which demonstrate that all lots have capacity to achieve minimum APZ requirements to achieve a rating of BAL-29 or lower. All APZs will be implemented in accordance with the technical standards of the Guidelines (see Appendix 4)	The measures proposed are considered to comply and meet the intent of Element 2 Siting and design of development
Element : ehicular access	To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event	A3.1 Two access routes Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents/the public at all times and under all weather conditions.	Refer to Section 3.3.1, which demonstrates that two access routes will be achieved for all proposed lots	The measures proposed are considered to comply and meet the intent of Element 3 Vehicular access
		A3.2 Public road A public road is to meet the requirements in Table 4 Column 1 of the Guidelines.	Refer to Section 3.3.1, which demonstrates that all proposed public roads will meet minimum technical requirements of the Guidelines contained in Appendix 5.	
		A3.3 Cul-de-sac (including a dead-end-road) A cul-de-sac and/or a dead end road should be avoided in bushfire prone areas. Where no alternative exists (i.e. the lot layout already exists and/or will need to be demonstrated by the proponent), detailed requirements will need to be achieved as per Table 4 Column 2 of the Guidelines.	N/A. No cul-de-sacs are proposed as part of the development.	
		A3.4 Battle-axe Battle-axe access legs should be avoided in bushfire prone areas. Where no alternative exists, (this will need to be demonstrated by the proponent) detailed requirements will need to be achieved as per Table 4 Column 3 of the Guidelines.	N/A. No battle-axe lots are proposed as part of the development.	
		A3.5 Private driveway longer than 50 m A private driveway is to meet detailed requirements as per Table 4 Column 3 of the Guidelines.	N/A. No private driveways longer than 50 m will be required.	

		A3.6 Emergency access way An access way that does not provide through access to a public road is to be avoided in bushfire prone areas. Where no alternative exists (this will need to be demonstrated by the proponent), an emergency access way is to be provided as an alternative link to a public road during emergencies. An emergency access way is to meet detailed requirements as per Table 4 Column 4 of the Guidelines.	N/A. No emergency access ways are required as part of the development.	
		A3.7 Fire service access routes (perimeter roads) Fire service access routes are to be established to provide access within and around the edge of the subdivision and related development to provide direct access to bushfire prone areas for fire fighters and link between public road networks for firefighting purposes. Fire service access routes are to meet detailed requirements as per Table 4 Column 5 of the Guidelines.	N/A. No fire service access routes are required as part of the development.	
		A3.8 Firebreak width Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three metres or to the level as prescribed in the local firebreak notice issued by the local government	Refer to Section 3.3.2, which demonstrates that no firebreaks will be required for single residential lots. However, should any firebreaks be required for larger lots (such as the proposed balance lot and POS) these will meet requirements of the Guidelines and the City of Stirling annual firebreak notice (see Appendix 3).	
Element : Water	To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.	A4.1 Reticulated areas The subdivision, development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and Department of Fire and Emergency Services.	Refer to Section 3.4, which demonstrates that all proposed lots will be provided a reticulated water supply and network of hydrants in accordance with local water authority, City and DFES requirements (see Appendix 6).	The measures proposed are considered to comply and meet the intent of Element 4 Water
		A4.2 Non-reticulated areas Water tanks for firefighting purposes with a hydrant or standpipe are provided and meet detailed requirements (refer to the Guidelines for detailed requirements for non-reticulated areas)	N/A. The proposed development will not occur within a non-reticulated area.	
		A4.3 Individual lots within non-reticulated areas (only for use if creating 1 additional lot and cannot be applied cumulatively) Single lots above 500 square metres need a dedicated static water supply on the lot that has the effective capacity of 10 000 litres.	N/A. The proposed development will not occur within a non-reticulated area.	

5. Implementation and enforcement

Implementation of the BMP applies to the developer, landowners and the City to ensure bushfire management measures are adopted and implemented on an ongoing basis. A bushfire compliance table is provided in Table 3 to drive implementation of all bushfire management works associated with this BMP.

Table 3: Bushfire compliance table

Reference	Action	Timing	Responsibility
BMP 1a (refer to Section 3.1.1)	Establish and maintain bushfire fuels within all cleared vacant lots and any APZ setbacks to achieve exclusion Clause 2.2.3.2 (f) of AS 3959	Ongoing, all year round	Establishment – developer Maintenance - developer until land is sold, landowners thereafter
BMP 1b (refer to Section 3.1.2)	Establish and maintain proposed low threat POS areas in a low threat state to achieve exclusion Clause 2.2.3.2 (f) of AS 3959	During subdivisional works, ongoing thereafter (all year round)	Establishment – developer Maintenance - developer until transfer of land, City thereafter
BMP 1c (refer to Section 3.1.3)	Maintain areas of existing excluded roads reserves and new road verges in a low threat state to achieve exclusion Clause 2.2.3.2 (f) of AS 3959	Ongoing, all year round	Existing road reserves – City New road reserves – developer until transfer of land, City thereafter
BMP 1d (refer to Section 3.1.4)	Where development is staged, implement and maintain low threat staging buffers to achieve exclusion Clause 2.2.3.2 (f) of AS 3959	During subdivisional works, ongoing thereafter (all year round)	Developer
BMP 2a (refer to Section 3.2)	Prepare BMP compliance report and construct buildings in accordance with AS 3959 where applicable	At subdivision clearance and building construction	Developer and prospective landowners / builders
BMP 3a (refer to Section 3.3.1)	Construct public roads in accordance with subdivision approval and relevant technical requirements of the Guidelines (Appendix 5)	During subdivisional works	Developer
BMP 3b (refer to Section 3.3.2)	Comply with the City's annual firebreak notice including fuel management on individual lots and firebreak construction (Appendix 3)	At all times	All landowners
BMP 4a (refer to Section 3.4)	Construct reticulated water supply and network of hydrants in accordance with subdivision approval and water authority, DFES and City technical requirements (see Appendix 6)	During subdivisional works	Developer
BMP 5a (refer to Section 3.5)	Place notification on the Certificates of Title of all proposed lots with a BAL rating of 12.5 or above	At creation of Title	Relevant authority

6. References

Department of Fire and Emergency Services (DFES) 2019, *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from: *http://www.dfes.wa.gov.au/regulationandcompliance/bushfireproneareas/Pages/default.aspx*, [29/08/2017].

Department of Planning (DoP) 2016, *Visual guide for bushfire risk assessment in Western Australia*, Department of Planning, Perth, WA.

Standards Australia (SA) 2018, *Australian Standard AS 3959–2018 Construction of Buildings in Bushfire-prone Areas*, Standards Australia, Sydney.

Western Australian Planning Commission (WAPC) 2015, *State Planning Policy 3.7 Planning in Bushfire-Prone Areas*, Western Australian Planning Commission, Perth.

Western Australian Planning Commission (WAPC) 2017, *Guidelines for Planning in Bushfire-Prone Areas*, Version 1.2 August 2017, Western Australian Planning Commission, Perth.

Appendix 1
Landscape concept plan

NATIVE VEGETATION AND LEVELS TO BE MAINTAINED EXTERNAL TO POS

NATURE PLAY AREA

SHELTER

PATH

TERRACED RETAINING WALLS (MAX HEIGHT 700MM EACH) PLANTED WITH NATIVE GROUNDCOVERS

PATH MEANDERS THROUGH PAW

IRRIGATED TURF

SCATTERED PLANTING OF NATIVE TREES

UNDERGROUND STORMWATER DRAINAGE TANK (EXACT DIMENSIONS AND VOLUME TO BE DETERMINED BY HYDROLOGIST IN CONJUNCTION WITH CIVIL ENGINEER)

TOP OF BUND 60.3

BOARDWALK AND VIEWING DECK

DRAINAGE BASIN PLANTED WITH DAMPLAND VEGETATION (TOLERATES SUMMER DRY AND WINTER WET CONDITIONS) - EXACT DIMENSIONS AND VOLUME TO BE DETERMINED BY HYDROLOGIST IN CONJUNCTION WITH CIVIL ENGINEER

STORMWATER STORAGE TWL 59.8

RETAINING WALL ALONG PATH (HEIGHT VARIES, MAX HEIGHT 700MM)

UNIVERSAL ACCESS PATH, MAX GRADE 1:20

IRRIGATED LAWN

PAVED VIEWING AREA WITH SHELTER AND SEATS

GARDEN BED PLANTED WITH LOW NATIVE SHRUBS AND GROUNDCOVERS

NATIVE VEGETATION AND LEVELS TO BE MAINTAINED EXTERNAL TO PAW

FENCING TO CONSERVATION RESERVE BOUNDARY

CHANNEL 9 SITE
PRELIMINARY POS LANDSCAPE CONCEPT PLAN

JULY 2019

JOB NO. 1212903 C1.101 REV B

1:500 @ A1

0 5 10 20 30 50m

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PLAN E
LANDSCAPE ARCHITECTS
414 ROKEBY RD SUBIACO WA 6008
T: (08) 9388 9566 E: mail@plane.com.au

Appendix 2
Site photos

Photo 1: On-site Class B woodland

Photo 2: On-site Class B woodland

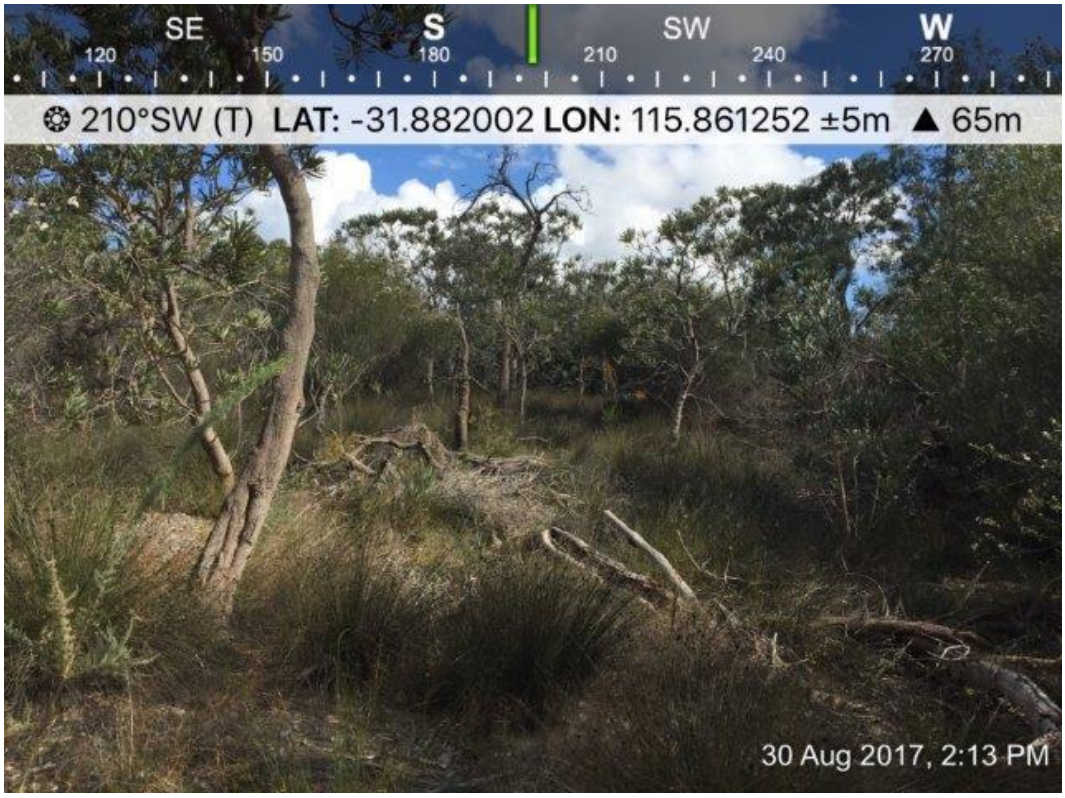


Photo 3: On-site Class B woodland

Photo 4: On-site Class B woodland

Photo 5: On-site Class B woodland

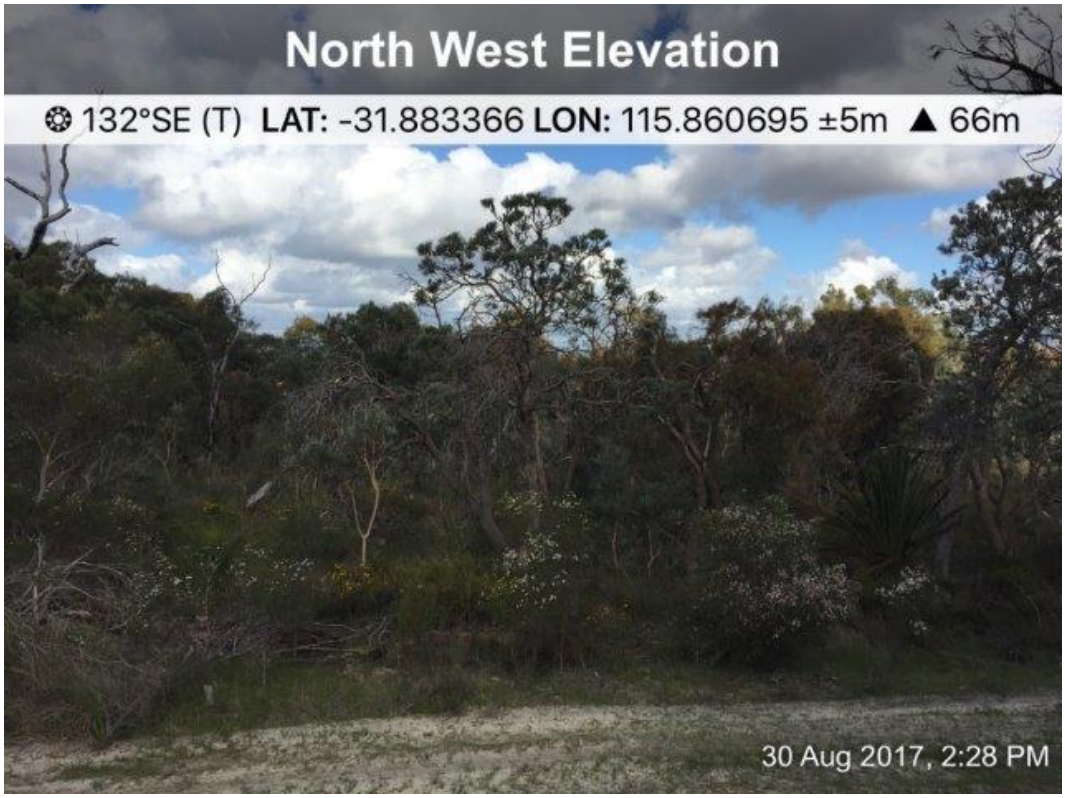


Photo 6: Off-site Class B woodland south of project area

Photo 7: Off-site Class B woodland south of project area

Photo 8: Off-site Class B woodland south of project area

Photo 9: Off-site Class B woodland south of project area

Photo 10: Off-site Class B woodland north of project area

Photo 11: Class B woodland north of project area

Photo 12: Class B woodland north of project area

Photo 13: Off-site Class D scrub south of project area

Photo 14: Off-site Class D scrub southwest of project area

Photo 15: Off-site Class D scrub west of project area

Photo 16: Class G grassland south of project area

Photo 17: Off-site excluded areas (Clause 2.2.3.2 e and f)

Photo 18: Off-site excluded areas (Clause 2.2.3.2 e and f)

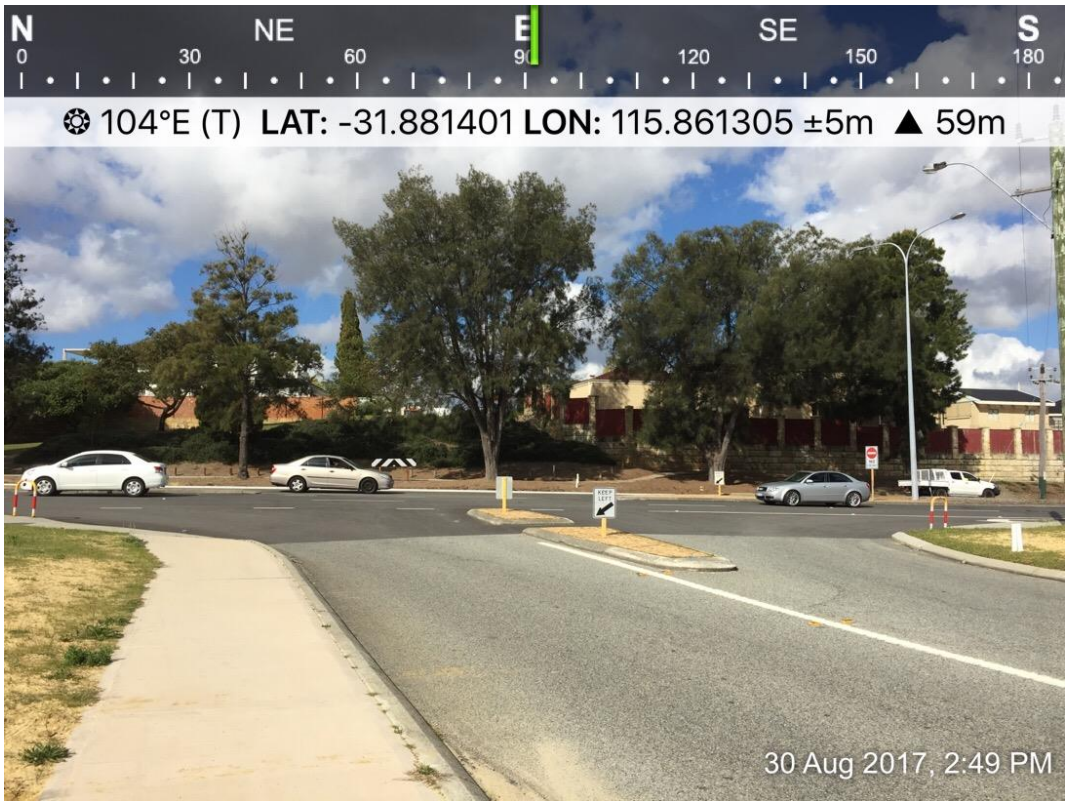


Photo 19: Off-site excluded areas (Clause 2.2.3.2 e and f)

Appendix 3
City of Stirling annual firebreak requirements

Penalties

The penalty for failing to comply with the annual firebreak requirements is a $250 fine. In addition to the fine, the City will also arrange for the required work to be conducted and will recover those costs from the owner/occupier of the land.

Fire Preparedness Tips:

- Prepare your property as required by 30 November and maintain that standard until 31 March the following year
- Prune vegetation, remove rubbish and combustible material from around all buildings
- Check that the roofs, gutters and walls of all buildings are free of flammable material
- Ensure mains powered smoke alarms have been installed at your home and check the batteries annually
- Review your insurance cover
- Discuss fire prevention and preparedness with your family and neighbours
- Protect your house from ember attack by fitting wire screens or shutters to windows, gutters, and evaporative air conditioners
- Develop an emergency action plan and ensure all family members know important contact numbers and your emergency action plan - don't forget to include your pets in your plan!
- Prepare a survival kit and keep it handy
- The Australian Red Cross website has some great resources that will assist you to prepare for an emergency.

Life-threatening Emergency	000
Department of Fire and Emergency Services Information Line	133 337
Bureau of Meteorology	(08) 9263 2222
City of Stirling Security Services	1300 365 356
Western Power	131 351
State Emergency Service	132 500
Total Fire Ban Information	1800 709 355
Australian Red Cross	1800 733 276

City of Stirling
City of Choice

Administration Centre 25 Cedric Street Stirling WA 6021
Telephone (08) 9205 8555 | **Email** stirling@stirling.wa.gov.au
Web www.stirling.wa.gov.au | /citystirlingwa

This information is available in alternative formats on request. Please contact the Stirling Customer Contact Centre on (08) 9205 8555

City of Stirling
City of Choice

Fire Preparedness and Firebreak Requirements

ComSafety_Firebreak_DL_OCT_18

Fire Preparedness and Firebreak Requirements

Land owners and residents in the City of Stirling are required to prepare their property from **30 November** until **31 March** annually to reduce the risk of fire in the community.

Land owners and occupiers of blocks less than 2000 square metres must:

- slash/mow all grass to a height of no more than five centimetres and remove all flammable vegetation

Land owners and occupiers of blocks greater than 2000 square metres must:

- install a continuous three metre wide firebreak around all structures on the property and immediately inside all external boundaries of the land.

All land owners and residents must ensure:

- the roofs, gutters and walls of all buildings are free of flammable materials which can catch fire and burn
- trees and shrubs are pruned
- flammable materials are not stored within three metres of a structure or fence line.

'Flammable material' includes any mineral, vegetable, substance, object, thing or matter that may, or is likely to, catch fire and burn. It does not include green standing trees, growing bushes, and plants in gardens and/or lawns - unless deemed otherwise by the City.

Installing Firebreaks

The following preferred methods can be used to install firebreaks:

Mowing/Slashing – vegetation must be cut to ground level ensuring stubble and grasses are no more than 25 millimetres from soil level. All debris must be removed from the firebreak. The best option is to slash or mow the entire block and remove all debris.

Ploughing/Cultivating – apply mechanical or manual methods to ensure no combustible material remain within the firebreak area.

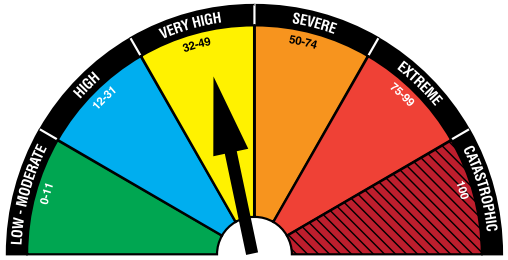
Alternative Action

If the owner or occupier considers installing a firebreak or removing flammable material to be impractical, they must seek written permission from the City prior to 14 November to take alternate action.

Restrictions

Backyard Burning – backyard burning, burning off, and the use of incinerators are banned at all times within the City of Stirling.

Barbeques – solid fuel BBQs (wood stoves etc) must only be used for the purpose of cooking. This cannot be done on days between **Very High** to **Catastrophic** temperatures.



Total Fire Bans – may be declared by the Department of Fire and Emergency Services (DFES). Total Fire Bans will be advertised in local media, press, radio and television.

No fires are permitted when a Total Fire Ban is in place.

Please be aware that infringements may be issued or prosecution may commence as a result.

Remember

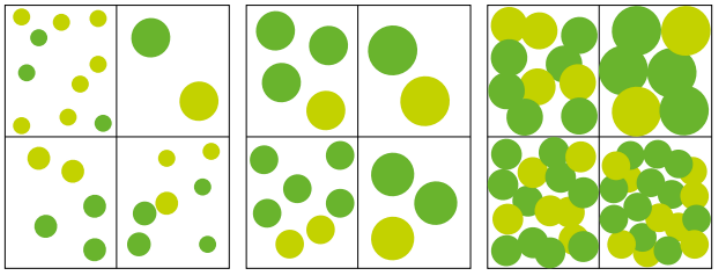
Firebreaks must be cleared by 30 November and kept clear until 31 March each year.

Where firebreaks are not cleared or maintained, an on-the-spot fine of $250 may be issued. The City will also organise for a contractor to undertake the works required and will recover those costs from the property owner.

Appendix 4
APZ standards (Schedule 1 of the Guidelines)

Schedule 1: Standards for Asset Protection Zones

- **Fences:** within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.
- **bjects:** within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.
- **Fine Fuel load:** combustible dead vegetation matter less than 6 millimetres in thickness reduced to and maintained at an average of two tonnes per hectare.
- **Trees metres in height :** trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy.



- **Shrubs metres to metres in height :** should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m^2 in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.
- **round covers metres in height :** can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 millimetres in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.
- **rass:** should be managed to maintain a height of 100 millimetres or less.

Appendix 5
Vehicular access technical standards of the Guidelines

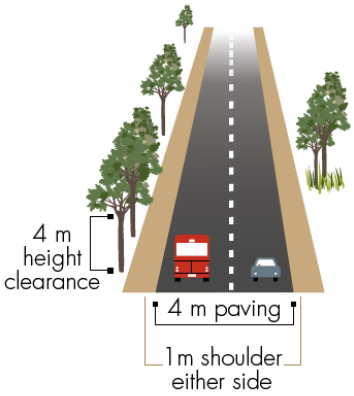
Public roads	
Acceptable solution A3.2	A public road is to meet the requirements in Table 1, Column 1.
Explanatory note E3.2	Trafficable surface: Widths quoted for access routes refer to the width of the trafficable surface. A six metre trafficable surface does not necessarily mean paving width. It could, for example, include four metre wide paving one metre wide constructed road shoulders. In special circumstances, where eight lots or less are being serviced, a public road with a minimum trafficable surface of four metres for a maximum distance of 90 metres may be provided subject to the approval of both the local government and Department of Fire and Emergency Services. Public road design: All roads should allow for two-way traffic to allow conventional two-wheel drive vehicles and fire appliances to travel safely on them. 

Table 1: Vehicular access technical requirements

Technical requirement		2	3	4	5
	Public road	Cul-de-sac	Private driveway longer than 50 m	Emergency access way	Fire service access routes
Minimum trafficable surface (m)		6	4	6*	6*
Horizontal distance (m)		6	6	6	6
Vertical clearance (m)		N/A	4.5	4.5	4.5
Maximum grade <50 m	**in**	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)		15	15	15	15
Maximum crossfall	**in**	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius		8.5	8.5	8.5	8.5

* Refer to E3.2 Public roads: Trafficable surface

Appendix 6
Water technical standards of the Guidelines

Reticulated areas	
Acceptable solution A4.1	The subdivision, development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and Department of Fire and Emergency Services.
Explanatory note E4.1	Water supply authorities in Western Australia include the Water Corporation, Aqwest and the Busselton Water Board. The Water Corporation's 'No. 63 Water Reticulation Standard' is deemed to be the baseline criterion for developments and should be applied unless local water supply authorities' conditions apply.

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