

**Lot 301 (No. 221) Barfield Road,
Hammond Park**

Standard Structure Plan

Project Ref: 1151

Prepared for

Blokk Property Australia
PO Box 137
MOUNT LAWLEY WA 6929

History and Status of this Document

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ENDORSEMENT PAGE

This structure plan is prepared under the provisions of the City of Cockburn Town Planning Scheme No. 3 District Zoning Scheme.

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

06 February 2024

Signed for and on behalf of the Western Australian Planning Commission



An officer of the Commission duly authorised by the Commission pursuant to section 24 of the Planning and Development Act 2005 for that purpose, in the presence of:

Witness:



Date: 13 February 2024

Date of Expiry: 13 February 2034

TABLE OF AMENDMENTS

| Amendment No. | Summary of the Amendment | Date Supported by Council | Date approved by WAPC |
|---------------|--------------------------|---------------------------|-----------------------|
| | | | |
| | | | |

Executive Summary

The Lot 301 (No. 221) Barfield Road Local Structure Plan comprises of 1.6897ha of land, being generally bound by Barfield Road, Rowley Road, Lot 41 Barfield Road and existing residential development.

The Structure Plan is zoned 'Urban' under the Metropolitan Region Scheme (MRS) and 'Development' under the City of Cockburn Town Planning Scheme No. 3 (TPS3). This Structure Plan has been lodged in accordance with TPS3 provisions that require a structure plan prior to development or subdivision of land.

The Structure Plan proposes residential development at a density of R30-R40 with the higher R40 present in close proximity to an area of proposed public open space. It is expected that the Structure Plan will accommodate a total of 32 dwellings and up to 82 residents which equates to 18.9 dwellings per hectare and 32.4 dwellings per site hectare exceeding the Liveable Neighbourhoods and Directions 2031 targets.

A permeable road network is proposed with one connection to the established road network in Barfield Road. Within the Structure Plan the road network will present as a loop road that will act as a buffer to the Planning Control Area associated with Rowley Road in the south and the bushfire threat on Lot 41 to the east.

All essential service infrastructure is located within proximity and is easily extended to the Structure Plan area.

The Structure Plan is supported by a number of technical reports which are provided as appendices and include:

- Ecological Report.
- Bushfire Management Plan.
- Traffic Impact Statement.
- Noise Assessment.

- Engineering and Servicing Report.
- Landscape Concept Plan.

Table 1 provides a land use summary of the Structure Plan.

| Item | Data | Reference |
|---|---|---------------|
| Total Structure Plan Area | 1.6897ha | Section 1.2.2 |
| Area of each land use zones: | | Section 3.2 |
| • Residential | 0.9881ha | |
| Area of reserves: | | |
| • Road Reserves | 0.5755ha | |
| • Public Open Space | 0.1261ha | |
| Estimated lot yield | 32 lots | Section 3.2 |
| Estimated dwellings | 32 dwellings | |
| Estimated density per site hectare | 32.4 dwellings | Section 3.3 |
| Estimated population | 82 residents @ 2.56 people per household. | Section 3.2 |
| Primary Schools | None | Section 3.2 |
| High Schools | None | |

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Part One - Implementation

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PART ONE – IMPLEMENTATION

1.0 Structure Plan Area and Operation

This Standard Structure Plan (Structure Plan) applies to the entirety of Lot 301 (No.221) Barfield Road, and a 14.2m wide portion of Lot 41 Barfield Road, being the land contained within the inner edge of the line denoting the Structure Plan Boundary on the Structure Plan Map (Refer to Plan 1 situated at the end of Part 1 of this Structure Plan Report). The plan is in effect from the date stated on the cover and for a period of 10 years.

2.0 Structure Plan Content

This Structure Plan comprises:

- a) Part One – Implementation Section
This section contains the structure plan map and outlines the intent of the structure plan.
- b) Part Two – Explanatory Section
This section contains the background and explanation of the structure plan, including design methodology, relevance and compliance with the planning framework at the State and Local levels

3.0 Staging

Given the size of the site, development within the Structure Plan area is intended to occur as a single stage.

4.0 Subdivision and Development Requirements

4.1 Land use zones and reserves

Zones

The Structure Plan Map (Plan 1) outlines land use, zones and reserves applicable within the Structure Plan area. The zones and reserves designated under this Structure Plan apply to the land within it as if the zones and reserves were incorporated into the City of Cockburn Town Planning Scheme No.3 (TPS3).

On this basis under TPS3, the ‘Development’ zoned portion will accommodate residential and public open space land uses. The ‘Special Use’ zoned portion will retain the infrastructure use, road reservation and potential overflow drainage, but no residential development.

Road Reserves

The proposed street network within the Structure Plan is consistent with an Access Street D classification in accordance with Liveable Neighbourhoods. These will consist of a 14.2m wide road reserve with the cross section depicted below.

There will also be one 12m wide road reserve abutting Planning Control 156. A cross section for this road is also depicted below.

There will be no access/egress to and from Rowley Road with the primary point of access to the existing road network occurring from Barfield Road.

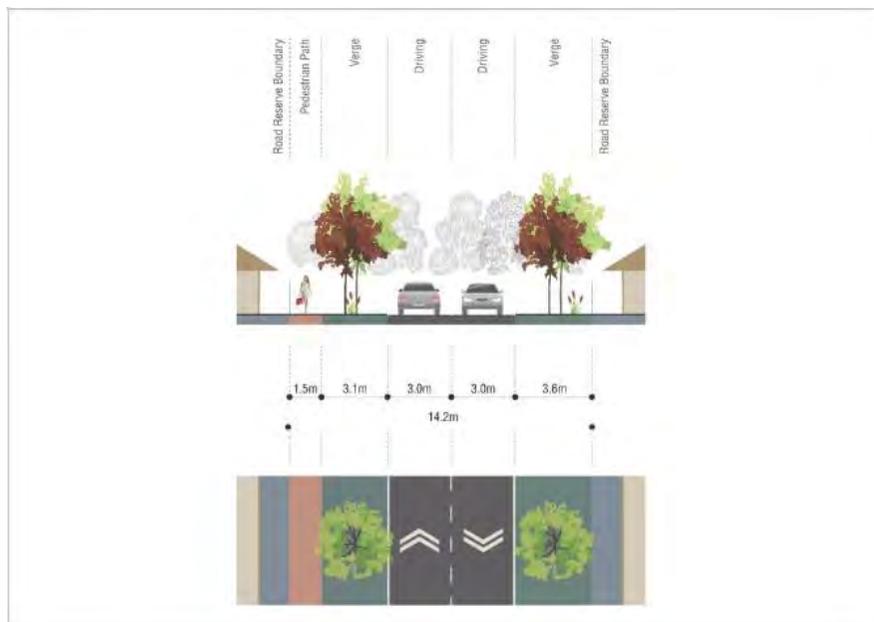


Figure 1 – 14.2m road cross section

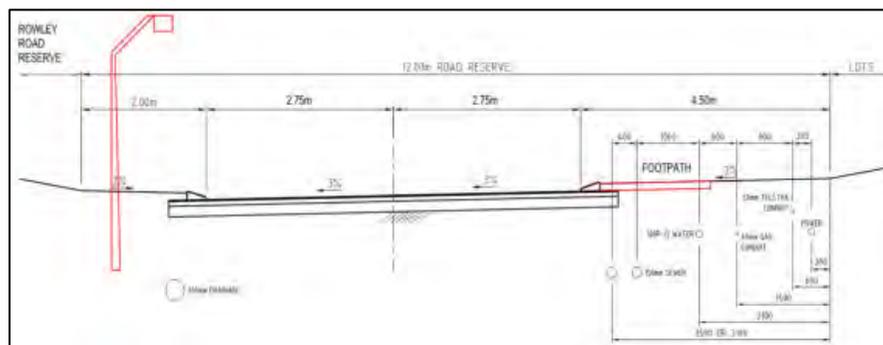


Figure 2 – 12m wide road cross section

Public Open Space

The function of the public open space (POS) will be consistent with a Local Park classification in accordance with Liveable Neighbourhoods. An indicated Landscape Concept Plan has been provided in Appendix 9 with the detailed design to be addressed as a condition of subdivision approval. The design should include:

- No areas of restricted public open space with an underground detention tank being provided for drainage.
- A site level for the POS at approximately 33 AHD which is slightly lower than the adjoining lot and road levels.
- A planting mix consistent with low threat vegetation with some turf, low height plants and trees.
- Irrigation through an available groundwater allocation.

The Structure Plan provides a total of 1,261sqm of POS which equates to a total of 8.4% of the total gross subdividable area. The minor shortfall of 1.6% will be paid via a cash in lieu contribution as a condition of subdivision approval. Table 2 below provides a schedule of POS within the Structure Plan Area.

| PUBLIC OPEN SPACE SCHEDULE | |
|---|-----------------|
| Structure Plan Site Area | 1.6897ha |
| Less | |
| - Environmental protection policy areas Wetlands to be ceded | n/a |
| - Protected bushland site | n/a |
| - Unrestricted public open space sites not included in public open space contribution | n/a |
| - Foreshore reserves to be ceded | n/a |
| Total | 0.00 ha |
| Net site area | 1.6897ha |
| DEDUCTIONS | |
| Primary School | n/a |
| Town Centre and commercial | n/a |

| | | |
|--|-----------|-------------------------|
| Dedicated drainage reserve | n/a | |
| Transmission corridors | 0.19525ha | |
| Road Widening | n/a | |
| Gross Subdivisible area | | 1.4945ha |
| Public open space @ 10 per cent | | 0.1494ha |
| Public open space contribution | | |
| May comprise: | | |
| - Minimum 80 per cent unrestricted public open space | 0.1195 ha | |
| - Minimum 20 per cent restricted use public open space | 0.0299 ha | |
| Unrestricted public open space sites | | |
| - POS | 0.1261 ha | 0.1261 ha (8.4%) |
| Restricted use public open space sites | | |
| Total restricted use public open space | 0.0ha | 0.0ha |
| Public Open Space provision | | 0.1261 ha (8.4%) |
| Note: Gross subdivisible area includes house lots, access roads, and any land incidental to the subdivision. The gross subdivisible area does not include areas for schools, shopping centres, infrastructure (e.g. land required for sewer pump stations), dedicated drainage sites not having a recreational function and land set aside for arterial roads and other non-residential uses. | | |

Table 2 – POS Schedule

4.2 Density and Development

Density and R-codes

The residential density codes applicable to the Structure Plan shall be in accordance with those shown on the Structure Plan Map (Plan 1).

In accordance with Liveable Neighbourhoods and Directions 2031 targets, the Structure Plan area shall provide for an average minimum of 22 dwellings per residential site hectare and 15 dwellings per gross urban hectare.

Local Development Plans

The WAPC may require, as a condition of subdivision approval, that a local development plan(s) be prepared in accordance with Part 6 of Schedule 2 of the Planning and Development (Local Planning Schemes) Regulations 2015, prior to the creation or development of lots:

- i. With an area less than 260m² or irregularly configured;
- ii. Abutting public open space;
- iii. Affected by road or rail noise exceeding targets set out in State Planning Policy 5.4: Road and Rail Noise and the associated implementation guidelines;
- iv. Where specific vehicle access and egress control is required.

4.3 Other requirements

Notifications on title

Notifications(s) is / are to be placed on titles of all affected lots to advise:

- i. That the lot is located near a transport corridor and higher construction standards may be required to reduce transport noise to acceptable levels in accordance with State Planning Policy 5.4: Road and Rail Noise;
- ii. That the lot is located within an area which has been declared bushfire prone and may be subject to a bushfire management plan and additional construction requirements may apply in accordance with Australian standard (AS3959) Construction of buildings in bushfire prone areas (as emended).

A BAL assessment and contour plan will be submitted with subdivision applications.

Restrictive covenant

A restrictive covenant may be required on titles of all affected lots that have been assessed as BAL-40 or BAL-Flame Zone, with notice of this restriction to be included on the diagram or plan of survey (deposited plan)

to advise that no habitable buildings are to be built within areas as BAL-40 of BAL-Flame Zone.

Bushfire protection

The Structure Plan is supported by a Bushfire Attack Level (BAL) Assessment and a Bushfire Management Plan (BMP). Regardless of whether the land has been formally designated as bushfire prone, any buildings to be erected on land identified as falling within 100 metres of a bushfire hazard shall comply with the requirements of Australian Standard (AS3959) Construction of buildings in Bushfire prone areas (as amended).

Noise management

The structure plan is affected by road and rail noise from Kwinana Freeway and Rowley Road in accordance with State Planning Policy 5.4: Road and Rail Noise (SPP5.4).

Prior to subdivision, an updated Transport Noise Assessment is to be provided. The updated assessment shall suitably address on-site noise monitoring to the specifications of main Roads and demonstrated compliance with SPP5.4. The Noise Management Plan is to be suitably updated to address the outcomes of the updated Transport Noise Assessment (if applicable).

Infrastructure arrangements

Earthworks – Site grading and remodelling will be kept to minimum limits wherever possible but will be required across the site to enable the construction of the proposed roads, building pads and facilitating the provision of services to each lot.

Water – Servicing the development with a potable water supply will be dependent on the progression of development in Vivente Estate. Through this development water mains will be provided along Barfield Road with sufficient capacity for the Structure Plan to access. All internal potable

water infrastructure will be designed to Water Corporation standards at the point of subdivision.

Sewer – Similar to the proposed water supply, the provision of a sewer will be dependent on the progression of development within the Vivente Estate. A future connection will be available along Barfield Road enabling the Structure Plan to connect to the gravity sewer reticulation network along Barfield Road which has sufficient capacity for the proposed development. All internal sewer infrastructure will be designed to Water Corporation standards at the point of subdivision.

Stormwater Drainage – The Structure Plan is punctuated by a high point approximately mid-block along its eastern boundary. The site will therefore require re-grading and stabilisation to ensure building sites are created and stormwater requirements are satisfied. Stormwater will be disposed of on-site via the use of soak wells or other infiltration facilities. It is proposed to provide below ground detention tank within the public open space and rain gardens within the selected areas of the road verges to accommodate the stormwater disposal from the road network.

Electrical –All lots will be serviced with underground power with the existing network having adequate capacity to service the proposed development.

Telecommunications – Telstra/NBNco and Optus networks are available to service the development. Headwork charges for Telstra/NBN service extensions are anticipated as part of the subdivision process.

Gas – The closest gas service to the Structure Plan Area is a D110 350kPa gas main located at Mokare Entrance approximately 300m west of the site. There are no obvious constraints to the extension of this network with sufficient capacity available to service the development if required.

Development Contributions

The Structure Plan Area is located within Development Contributions Areas 9 (Hammond Park) and 13 (community infrastructure) under the TPS3. Contributions costs are to be paid in accordance with the requirements of the Scheme at subdivision development stage.

Urban water management

Stormwater drainage will be consistent with the Russell Road Arterial Drainage Scheme from the City of Cockburn with all catchment up to and including the 1 in 100 year ARI event contained within the development area.

The site will be re-contoured to achieve the levels that carry the stormwater to an underground detention tank within the POS which will have a capacity of 212m³ with a footprint of 355m² which is sufficient to accommodate the 1 in 100-year ARI event. In addition, rain garden swales are able to be contemplated within selected road reserves.

Each lot will accommodate their own stormwater through soak wells or other infiltration facilities.

Ground water will be used for irrigation of the POS and vegetation within the road reserves. To facilitate this, a bore ground water license for irrigation purposes will be obtained prior to subdivision or development.

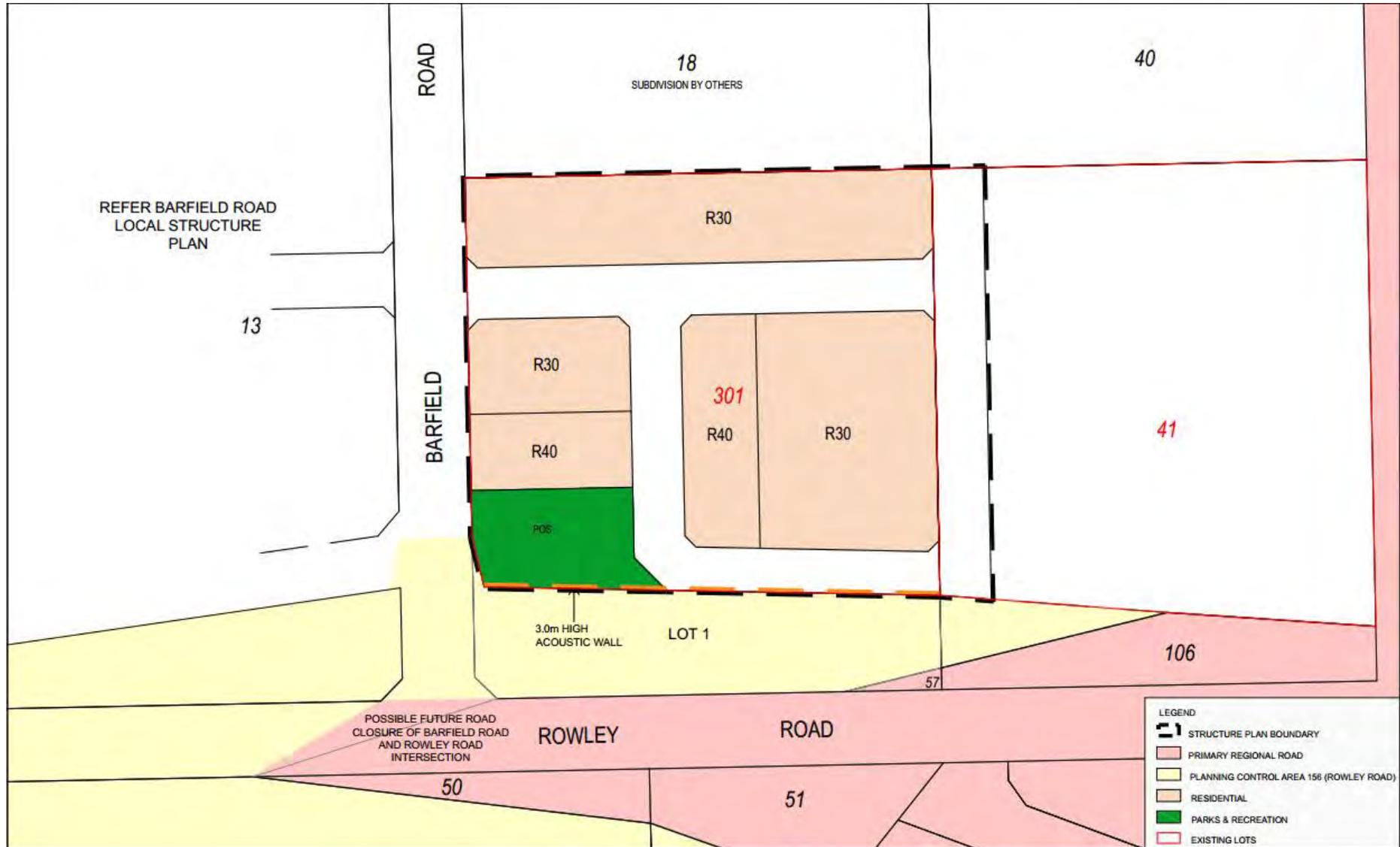
Environmental protection and management

A Landscape Management Plan is to be provided at the subdivision application stage, identifying any trees worthy for retention, where not affected by subdivision works.

Prior to the commencement of subdivisional works, a Fauna Survey and Relocation Management Plan is to be prepared and approved to ensure the protection and management of the site’s existing fauna, with satisfactory arrangements being made for the implementation of the approved plan.

5.0 Additional Details

| Additional Information | Approval Stage | Consultation Requirement |
|--|-------------------------|------------------------------------|
| Landscape Management Plan | Subdivision Application | City of Cockburn |
| Urban Water Management Plan | Subdivision Application | DWER and City of Cockburn |
| Fauna Survey and Relocation Management Plan. | Subdivision Application | DBCA and City of Cockburn |
| Bushfire Attack Level Assessment and Plan | Subdivision Application | DFES, DPLH and City of Cockburn |
| Acoustic Assessment | Subdivision Application | Main Roads WA and City of Cockburn |



Plan 1 – Structure Plan Map

Part Two – Explanatory Section

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PART TWO – EXPLANATORY SECTION

1.0 Planning Background

1.1 Introduction and Purpose

This report has been prepared on behalf of Blokk Property Pty Ltd in support of a Structure Plan for Lot 301 (No. 221) and a portion of Lot 41 Barfield Road, Hammond Park. The structure plan will provide for residential development and an associated complimentary portion of public open space. The purpose of the Structure Plan is as follows:

- To provide guidance on the use, subdivision and development of land to create a high quality urban environment.
- To achieve an optimum housing density and diversity with an emphasis on achieving consistency with the existing and future housing demand for the locality.
- Maximise the quality of living of future residents.

The Structure Plan provides densities that are consistent with the Southern Suburbs District Structure Plan and results in 18.9 dwellings per hectare and 32.4 dwellings per site hectare which exceeds the density targets noted in Perth and Peel @ 3.5 Million (15 dwellings per hectare) and Liveable Neighbourhoods (22 dwellings per site hectare).

The project team involved in delivering the Structure Plan includes:

- Dynamic Planning and Development – Town Planning;
- Peritas Group – Engineering;
- Strategen & JBS&G – Environmental and Bushfire
- KCTT – Traffic Engineering; and
- Herring Storer – Acoustics.

1.2 Land Description

1.2.1 Location

The Structure Plan is located within the suburb of Hammond Park, within the municipality of the City of Cockburn. The structure plan area is located approximately 38.0 kilometres south of the Perth Central Business District and 9.0 kilometres from the Indian Ocean. The nearest strategic metropolitan activity centre being Cockburn Gateway is located 5.8km to the north, the centre providing a range of services including retail, administrative, service, community and entertainment uses.

The closest train station to the Structure Plan is Auburn Grove which is 3.3km away. Servicing this train station is the 535 bus which is the closes bus route to the Structure Plan being some 800m away. Schools in the area include Hammond Park Secondary College (900m), Hammond Park Catholic Primary School (1.3km) and Hammond Park Primary School (2.2km).

Figures 3 and 4 below illustrates the structure plan’s local and regional context.

1.2.2 Area and Land Use

The structure plan area encompasses a total land area of approximately 1.6897ha and comprises of the entirety of Lot 301 (No. 221) Barfield Road and a 14.2m wide portion of Lot 41 Barfield Road. At present Lot 301 includes a single house and some associated outbuildings with Lot 41 including a 20m wide portion of cleared land and a Western Power high voltage power line easement.

Immediately to the south is an adjoining lot impacted by Planning Control Area 156 which is required for the purposes of the Rowley Road upgrade. Historically this lot was a part of the Lot 301 but was the subject of a subdivision application to establish a separate lot for acquisition by Main Roads. No access to and from the Planning Control Area or Rowley Road is proposed as part of the Structure plan. The surrounding locality is characterised by expanding urban /residential development associated with the Barfield Road Structure Plan.

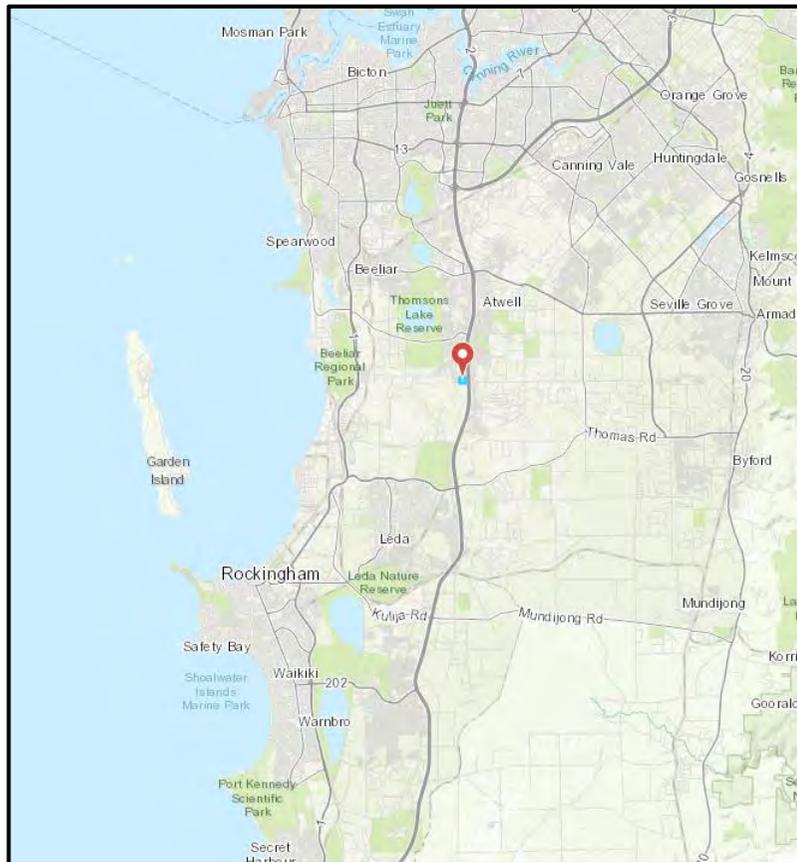


Figure 3 – Regional Context (Source: PlanWA)

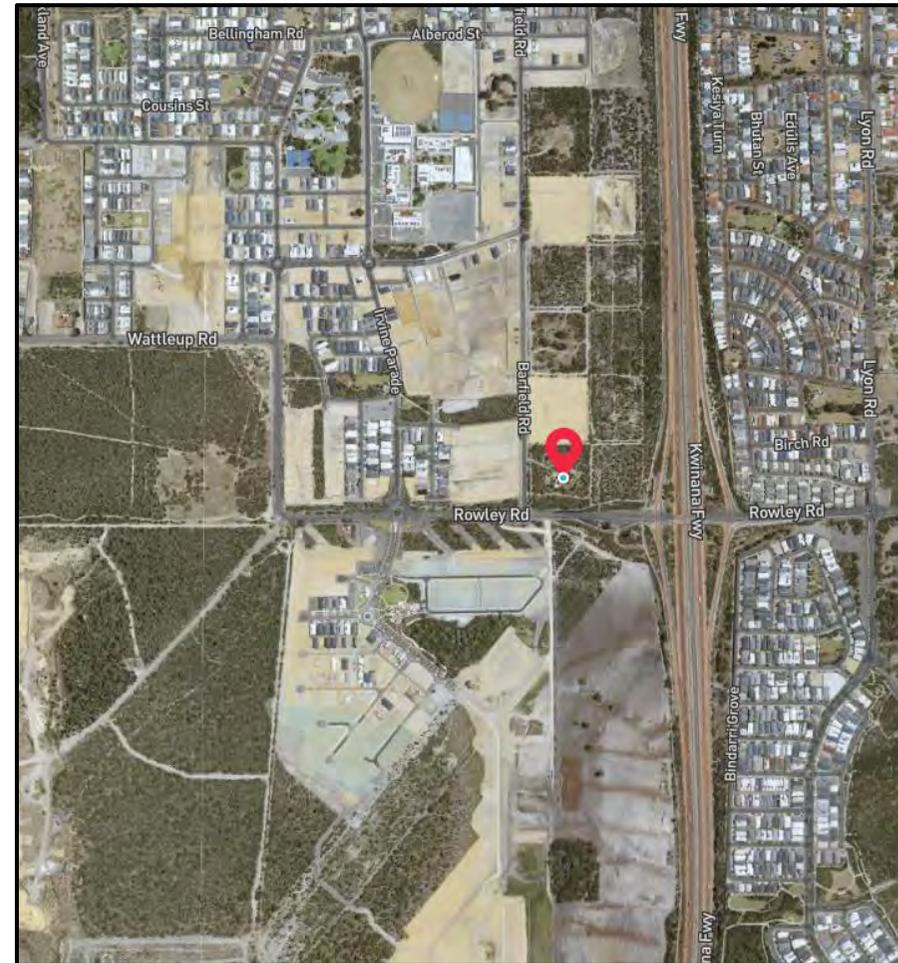


Figure 4 – Local Context (Source: MetroMap)

1.2.3 Legal Description and Land Ownership

The structure plan has a total area of 1.6897ha. The Certificate of Title & Property Details are detailed in Table 3 below.

| Lot | Street Address | Ownership | Vol / Folio | Lot Area |
|-----|-------------------|---------------------|-------------|-----------|
| 301 | 221 Barfield Road | Darren Blowes | 2863 / 830 | 1.4945 ha |
| 41 | Barfield Road | Sunmetro WA Pty Ltd | 1959 / 927 | 0.1952 ha |

Table 3 – Certificate of Title & Property details

A copy of the applicable Certificates of Title has been included in Appendix 1.

1.3 Planning Framework

1.3.1 Metropolitan Region Scheme

The structure plan area is zoned ‘Urban’ under the provisions of the Metropolitan Region Scheme (MRS). Figure 5 illustrates the applicable MRS zoning.

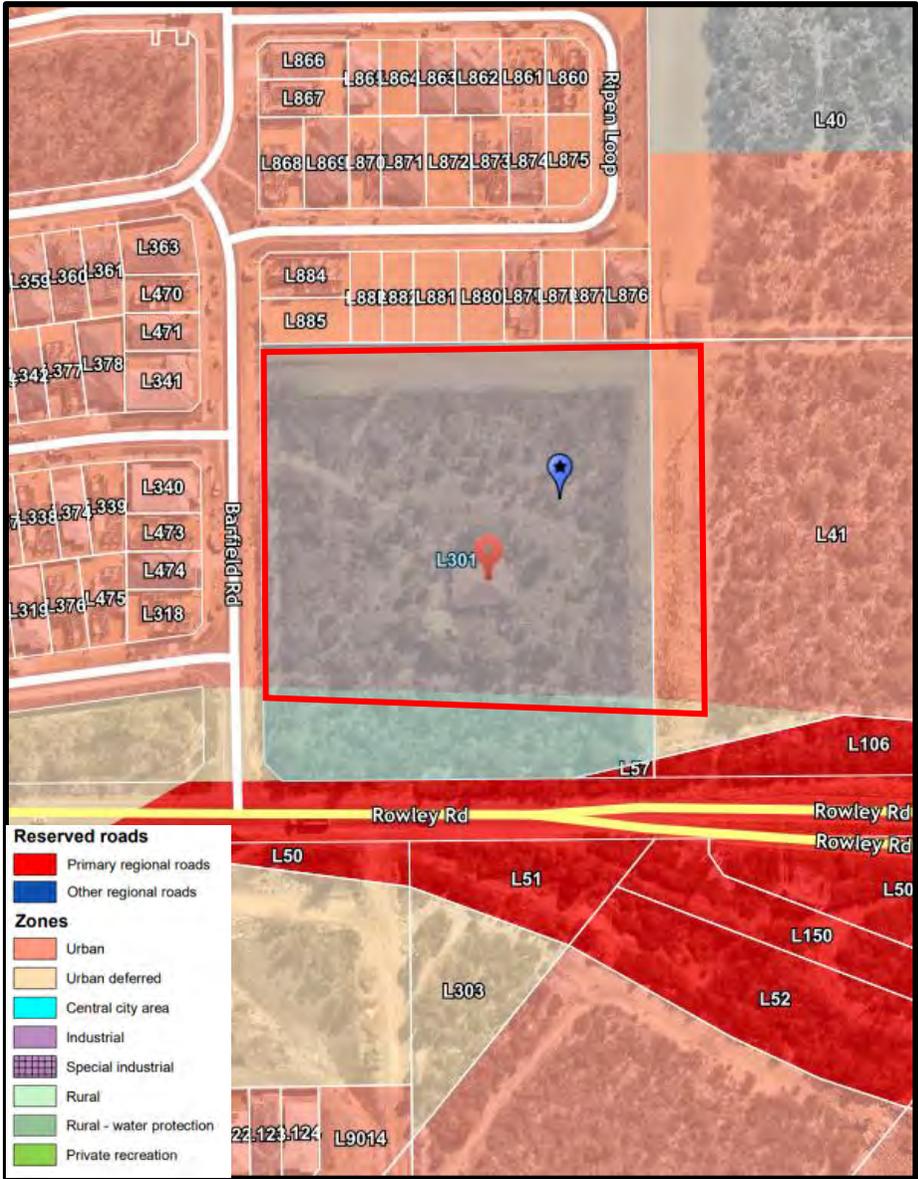


Figure 5 – Metropolitan Region Scheme Zoning and Reservation

1.3.2 City of Cockburn Town Planning Scheme No. 3

Under the provisions of the City of Cockburn Town Planning Scheme No. 3 (TPS3), the Structure Plan is zoned 'Development' (Development Area 26) and Special Use 23 as illustrated in Figure 6 below.

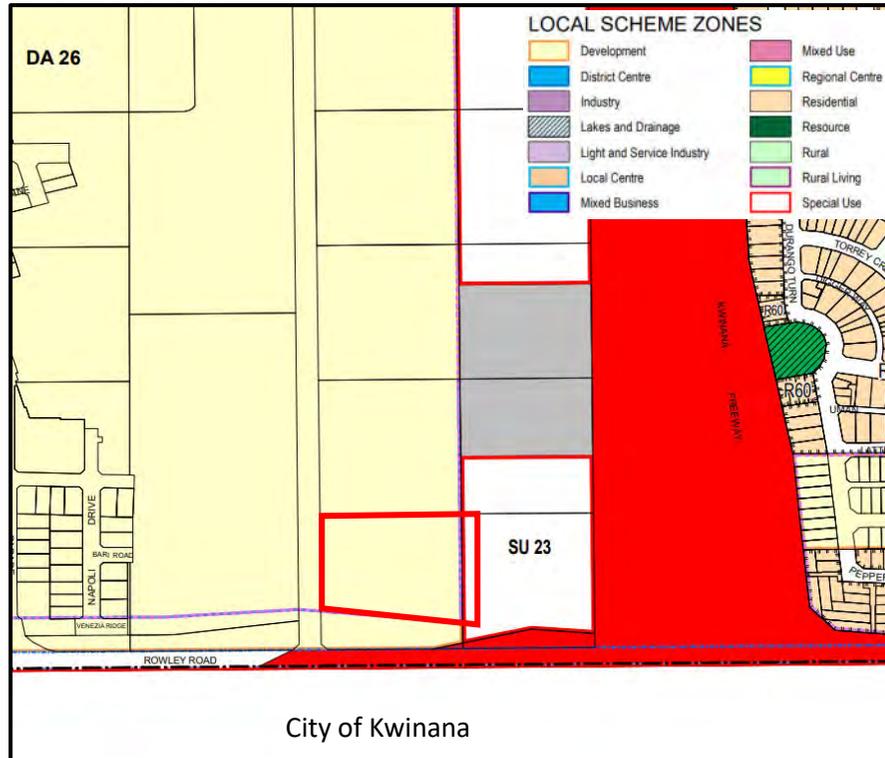


Figure 6 – City of Cockburn TPS No. 3 Zoning

In accordance with Clause 3.2.1, the relevant objective for the development zone is:

To provide for future residential, industrial or commercial development to be guided by a comprehensive Structure Plan prepared under the Scheme.

As a requirement for land zoned 'Development' in TPS3, a Structure Plan has to be prepared prior to Council providing comment on subdivision applications and determining development applications.

The 14.2m wide portion of Lot 41 included in the Structure Plan is zoned 'Special Use 23' which is intended to address lots impacted by the Western Power high voltage power lines easement. There are restrictions on the use of this land, however the construction of a road reserve is permitted and will not require separate planning approval.

1.3.3 Southern Suburbs District Structure Plan

The structure plan area is subject to the provisions of the Southern Suburbs District Structure Plan – Stage 3 (SSDSP) which was prepared by the City of Cockburn and adopted in September of 2012.

The SSDSP provides a framework for urban development to integrate seamlessly with the broader sub-regional context. Under the provisions of the SSDSP the structure plan area is intended for medium density residential development with a major shared path within the Rowley Road Planning Control Area. The structure plan is consistent with the SSDSP as the R40 residential development proposed by the structure plan around the designated public open space and R30 residential development beyond that is considered to constitute 'medium density residential development'.

The SSDSP also states that *'Future residential development shall not directly abut Rowley Road. Future local structure planning is to demonstrate a suitable interface treatment (e.g. enlarged service road design with fronting residential development as a minimum) being provided to the future Rowley Road freight access route'*. The Structure

Plan does not provide any residential lots abutting Rowley Road, instead there is a portion of POS and a 12m wide public road abutting Planning Control Area 156 which represents the proposed boundary of an upgraded Rowley Road.

The SSDSP also considered the future upgrade of Rowley Road, however since the adoption of the SSDSP, we understand that a grade separated pedestrian and vehicle access at the intersection of Rowley Road and Barfield Road is no longer being considered and instead Barfield Road will terminate at this point and be connected to Venezia Ridge. The Structure Plan has appropriately considered these road upgrades will all access to the Structure Plan occurring from Barfield Road.

1.3.4 State Policies

State Planning Strategy 2050

The State Planning Strategy 2050 was prepared by the WAPC and provides a strategic planning response to the challenges that Western Australia is likely to face. It contemplates a future in which high standards of living, improved public health and an excellent quality of life are enjoyed by present and future generations of Western Australians.

The Strategy proposes that diversity, liveability, connectedness and collaboration must be central to the vision of sustained growth and prosperity. It envisages that by 2050, Western Australia will double its current population and will have a diverse range of well-connected and vibrant communities of the highest quality in the world.

The structure plan will allow for the future development of under-utilised land for residential purposes which is largely consistent with the existing housing typology within the surrounding locality.

Perth and Peel @ 3.5 Million – South Metropolitan Peel Sub-Regional Planning Framework.

Perth and Peel @ 3.5 Million provides the overarching strategic framework for the Perth and Peel Regions. The structure plan area is located within the South Metropolitan Peel sub-regional planning framework which is intended to provide strategic guidance to government agencies and local governments on all aspects of land use and infrastructure provision within the region. The framework clearly identifies a focus on urban infill within areas with proximity to high-quality public transport routes or within activity centres and urban corridors. Specifically an infill development target of 47% by 2050 is identified relative to 2014 rates which reached only 28%.

In accordance with the South Metropolitan Peel sub-regional planning framework, the structure plan area is identified as undeveloped urban land that is earmarked for development in the short term (2015-2021). It is considered that the structure plan will facilitate residential subdivision and development on the subject land which is entirely consistent with what has been proposed in the South Metropolitan Peel sub-regional planning framework.

Liveable Neighbourhoods

Liveable Neighbourhoods is the primary policy used for the design and assessment of structure plans (regional, district and local) and subdivision and development applications for new urban areas. Its primary objective is to promote the design of walkable neighbourhoods, places that support community and a sense of place, mixed use and active streets, accessible and sustainable parking, energy efficient design, and housing choice.

The primary objectives are addressed in eight design elements, which if implemented appropriately are considered to fulfil the overall objectives of Liveable Neighbourhoods. These eight design elements are to be considered at the various levels of planning (structure planning and

subdivision) to ensure that development will occur in a thoughtful and sustainable manner.

Liveable Neighbourhoods was at the forefront when establishing the structure plan layout and it is considered that the resultant road network, public open space and proposed density will provide diversity in housing choice and residential development that is integrated seamlessly with the surrounding neighbourhood. A comprehensive justification of how the structure plan meets the requirements of Liveable Neighbourhoods is provided in Section 3.2 to 3.4 of this report.

State Planning Policy No. 1 – State Planning Framework

State Planning Policy No. 1 (SPP1) – State Planning Framework sets out the key principles relating to environment, community, economy, infrastructure and regional development which should guide the way in which future planning decisions are made. It brings together existing State and regional policies and plans which apply to land use and development in Western Australia into a State Planning Framework. It also restates and expands upon the key principles of the State Planning Strategy in planning for sustainable land use and development.

The structure plan is consistent with the primary aim of this overarching policy which seeks to provide for the sustainable use and development of land. Further consideration of the relevant instruments referred to under SPP1 will be carried out by the WAPC and the Local Government in the assessment of the structure plan and further planning proposals for the site.

State Planning Policy No. 3 – Urban Growth and Settlement

State Planning Policy No. 3 – Urban Growth and Settlement (SPP3) applies to all of Western Australia and seeks to promote sustainable and well planned settlement patterns. Various principles included in the broader

strategic planning framework (Perth and Peel @ 3.5 Million) and other State policies such as Liveable Neighbourhoods are included in SPP3.

SPP3 intends to encourage alternative development outcomes that aren't low density suburban growth which has been common throughout Perth in recent decades. It is considered that the structure plan will create a more consolidated urban form through the application of a medium density (R40) outcome in an area that is already well serviced through access to public transport, high quality public open space and a walkable community. This resultant development outcome, facilitated by the structure plan, meets the guiding principles of SPP3.

State Planning Policy 3.7 – Planning in Bushfire Prone Areas

State Planning Policy No 3.7 – Planning in Bushfire Prone Areas (SPP 3.7) applies to land identified and designated by the Fire and Emergency Services Commissioner under the *Fire and Emergency Services Act 1998 (as amended)*. Such areas are identified on the Map of Bush Fire Prone Areas. Designation of an area as being bushfire prone reflects the potential of bushfire to affect that site.

Under the provisions of SPP 3.7, strategic planning proposals are to be accompanied by the following information:

- a) *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*
- b) *Where the lot layout of the proposal is known, a BAL Contour Map to determine the indicative acceptable BAL ratings across the structure plan area, in accordance with the Guidelines. The BAL Contour Map should be prepared by an accredited Bushfire Planning Practitioner; and*

- c) *The identification of any bushfire hazard issues arising from the relevant assessment; and*
- d) *Clear demonstration that compliance with the bushfire protection criteria in the Guidelines can be achieved in subsequent planning stages.*

Further detail on bushfire planning for the structure plan is contained under Section 3.7 of this report.

State Planning Policy 5.4 – Road and Rail Transport Noise and Freight Considerations in Land Use Planning

State Planning Policy 5.4 – Road and Rail Transport Noise and Freight Considerations in Land Use Planning (SPP5.4) addresses and seeks to manage the impact of transport noise from major transport and freight corridors on sensitive land uses such as residential development. As residential development is being proposed within close proximity to an existing or proposed regional road and freight route, consideration of SPP5.4 as part of the structure plan process is warranted.

In considering the sites proximity to both Rowley Road and the Kwinana Freeway, the noise criteria discussed in SPP5.4 has been examined in detail by Herring Storer Acoustics. The outcome of their investigation and any required noise mitigation measures required to comply with SPP5.4 has been included in Section 3.8 of this report.

1.3.5 Local Government Planning Strategies and Policies

City of Cockburn Local Planning Strategy

The Local Planning Strategy (LPS) has been prepared to set out the long term planning directions for the City and to guide land use planning within the City over the next ten to fifteen years. The Local Planning Strategy outlines and applies the wide range of relevant State, regional and local

planning policies and strategies, and provides the rationale for the land use and development controls in Town Planning Scheme No. 3.

The Local Planning Strategy aims to address district and local issues including but not limited to:

- a description of the key characteristics of the municipality, its regional context and major planning issues;
- a Statement of Aims explaining the strategic land use directions which the City is seeking to pursue;
- land use or development opportunities and constraints which provide a context for local planning decisions;
- the links between strategic planning in the municipality, and the State and regional planning context;
- strategic policy statements about key issues such as housing, industry and business, open space and recreation, transport, infrastructure, environment, town sites and rural land;
- more detailed policies and proposals for particular areas or specific issues contained in the strategy;
- an outline of how the strategy will be implemented including reference to any Local Planning Policies and guidelines which may be required, planning scheme measures and proposals of the State and local government to facilitate development including capital works.

The SSDSP notes that the District Structure Plan is consistent with the following actions outlined in the City of Cockburn Local Planning Strategy:

- Promote higher density and mixed use developments to reduce car use and promote walking and public transport.
- Ensure there is an appropriate housing and density mix to fulfil existing and potential demand from various groups.
- Promote medium and high density housing in and near regional and district centres and near public transport facilities.

- Provide a range of housing opportunities; and
- Promote mixed land uses in community, especially through the location of housing in commercial centres.

The structure plan remains generally consistent with the SSDSP and as such is considered to be in accordance with the above actions within the structure plan.

Local Planning Policy 1.12 – Noise Attenuation

Local Planning Policy 1.12 (LPP1.12) is intended to outline when an acoustic report will be required at the various development stages. In addition it also seeks to provide details of the City's requirements in relation to the different types of acoustic reports.

In accordance with the provisions of LPP1.12, the structure plan has been accompanied by an acoustic report which examines the noise mitigation measures required to mitigate the impact of noise from Rowley Road and the Kwinana Freeway.

Local Planning Policy 5.1 – Public Open Space

Local Planning Policy 5.1 (LPP5.1) is intended to supplement the provisions of Liveable Neighbourhoods with the purpose of the policy to:

1. To specify land features that will not be accepted by the City as part of the public open space requirements.
2. To clarify how bushfire protection zones and hazard separation zones will be considered in relation to public open space.

It is commented that the public open space provision and associated schedule have been prepared with the provisions of LPP5.1 in mind.

Local Planning Policy 1.2 – Residential Design Guidelines

Local Planning Policy 1.2 (LPP1.2) aims to ensure that the 10 design principles of State Planning Policy 7.0 are implemented with regard to medium density development. This policy is to be considered as part of subdivision and residential dwelling design.

2.0 Site Conditions and Environment

2.1 Environmental assets and constraints

2.1.1 Flora and Fauna

A flora and fauna assessment of the structure plan area and the adjoining Lot 41 Barfield Road was undertaken by Strategen JPS&G in October of 2020. A copy of their report detailing their methodology and results has been included in Appendix 6. In summary the following was noted:

- Analysis of the subject area identified that, based on the habitat present, four threatened and priority species were considered to have the potential to occur. These included:
 1. *Caladenia huegelii* (Threatened [*Biodiversity Conservation Act 2016*]; Endangered [*Environmental Protection and Biodiversity Conservation Act 1999*])
 2. *Dodonea hackettiana* (Priority 4)
 3. *Drakaea micrantha* (Threatened [*Biodiversity Conservation Act 2016*]; Vulnerable [*Environmental Protection and Biodiversity Conservation Act 1999*])
 4. *Tripterococcus* sp. *Brachylobus* (A.S. George 14234) (Priority 4)
- One federal listed Threatened Ecological Communities (TECs), under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) and two listed as a TEC or Priority Ecological

Community (PEC), under the State *Biodiversity Conservation Act 2016* (BC Act) were identified within the subject area.

- No known black cockatoo breeding or roosting sites occur within the subject area. However, it is situated within the mapped buffers of multiple breeding sites.
- Black cockatoo foraging habitat within the subject area is considered to have lot to moderate habitat value for Carnaby's and Baudin's Black Cockatoo, and Negligible to Low foraging value for both Baudin's Black Cockatoo and Forest Red-tailed Black Cockatoo, based on the density of suitable foraging species.
- Vegetation within the Survey Area is comprised of Jarrah-Banksia-Allocastrum woodland over mixed shrubs and exotic grasses on sandy soils. No Threatened flora species as listed under section 178 of the EPBC Act or under the BC Act were recorded during targeted surveys within the Survey Area; however, one individual *Caladenia* sp. was recorded during the targeted survey. This single plant could not be identified beyond genus level as no identifiable characteristics (e.g. flowers) were present at the time of survey. The closest vouchered recording of *Caladenia huegelii* is 5.1 km to the north east, with an unvouchered record located within the Harry Waring Marsupial Reserve 2.1 km to the North West. As surveys were conducted during the known flowering period of *Caladenia huegelii* and known populations of the species were in flower immediately prior to the survey, it was considered unlikely that this was an individual of *C. huegelii*
- One native vegetation type was identified and mapped within the subject area and occupied around 70.1% of the site. The condition of this vegetation ranged from very good to completely degraded.

The primary implications for residential development on the subject site relates to the potential impact on the Black Cockatoo habitat and the Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community which are Matters of National Environmental Significance listed under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). With consideration of area thresholds for recent "Controlled Action" decisions related to black cockatoo habitat and the Banksia Woodlands TEC, it has been determined that referral of the action (clearing for development) is not warranted.

Further to the above, clearing of native vegetation associated with the future subdivision is expected to be exempt from requiring a native vegetation clearing permit under Part V Environment Protection Act 1986, through the application of an exemption under Schedule 6.

A Fauna Survey and Relocation Management Plan will be undertaken at the subdivision stage. In addition, a Landscape Management Plan will be prepared (at the subdivision stage), identifying any trees capable and worthy of retention.

2.2 Bushfire Hazard

A Bushfire Management Plan has been prepared to accompany the structure plan in order to address the requirements of SPP3.7 as the subject site is identified as being located within a bushfire prone area. Details on how the Bushfire Management Plan impacts the structure plan are addressed in Section 3.10 with the report included in Appendix 4.

2.3 Noise

An acoustic report has been prepared to accompany the structure plan in order to examine the impacts of transport noise in accordance with State Planning Policy 5.4 – Road and Rail Noise (SPP5.4) as the Structure Plan

Area is located within a designated trigger distance of Rowley Road which identified as a key freight link. Implications of the acoustic report on the structure plan are addressed in Section 3.11 below, with the report included in Appendix 5.

2.4 Context and Constraints Analysis

2.4.1 *Western Power Easement*

A portion of the Structure Plan Area (land within Lot 41 Barfield Road) is impacted by a Western Power easement. Development within the easement area is subject to the provisions of Special Use 23 which are outlined in Table 8 of the City of Cockburn Town Planning Scheme No. 3.

The only development within the easement area will be the construction of a road reserve which is capable of being accommodated within the easement area.

2.4.2 *Rowley Road*

Rowley Road borders the Structure Plan Area to the south and is considered a key future strategic freight route. To enable the delivery of this strategic freight route the WAPC have established a Planning Control Area that impacts a portion of the Structure Plan Area, as noted on the Structure Plan Map. It is understood that this Planning Control Area will facilitate the upgrade of Rowley Road to allow safe and efficient commercial vehicle movements on the strategic east-west freight route.

To maintain the viability of Rowley Road as a freight route and progress the development of the Structure Plan area, it is a requirement that the interface is treated appropriately (in accordance with SPP5.4 outlined in Section 1.3.4) The treatment of this interface is outlined in Section 3.4 below.

2.5 Acid Sulphate Soils & Contaminated Sites

The Structure Plan is identified as being subject to a moderate to low risk of acid sulphate soils, this may require a self assessment to be completed when carrying out subdivision works at the site.

The Structure Plan is not identified as a contaminated site on the DWER Contaminates sites database.

2.6 Ground and Surface Water

Surface water generally flows from the north east to the south west across the site. The groundwater levels across the development site vary from 22.4m AHD to 23.1m AHD in the same flow directions. The natural ground level generally ranges from 38m AHD to 31m AHD which indicates a substantial clearance to ground water with an 8.7m minimum and 14.9m maximum.

2.7 Aboriginal and European Heritage

The Structure Plan has not been identified as having any Aboriginal or European Heritage.

3.0 Structure Plan

3.1 General

In accordance with SSDSP the structure plan proposes medium density residential development (R30 and R40) with an associated portion of Public Open Space (POS). Whilst not required by the SSDSP, the proposed POS is considered to improve the amenity afforded to the future residents of the Structure Plan Area whilst also justifying the proposed R40 residential density.

Further to the above, the structure plan also notes a safe and efficient road network that will connect seamlessly to the established road network proposed by the Barfield Road Structure Plan.

3.2 Land Use

The structure plan proposes residential development on the subject site with the land use permissibility to be consistent with the ‘Residential’ zone under TPS3. The proposed residential density of R30 and R40 is considered to be ‘medium density’ in accordance with the SSDSP and is appropriate when considering access to POS, public transport and local schools.

A copy of the relevant structure plan is illustrated in Figure 7 below. An overview of the key elements is provided in Table 2 below.

| Item | |
|---|--|
| Total area covered by the structure plan | 1.6897Ha |
| Area of specified land use | Residential: 9,881sqm POS: 1,261sqm Road Reserve: 5,755sqm |
| Estimated Lot Yield | 32 |
| Estimate Number of Dwellings | 32 |
| Estimated Population | 82 |
| Number of high schools | n/a |
| Number of primary schools | n/a |
| Number and area of public open space | |
| District Parks | 0 |
| Neighbourhood Parks | 1,261sqm |

Table 4 – Structure Plan Summary



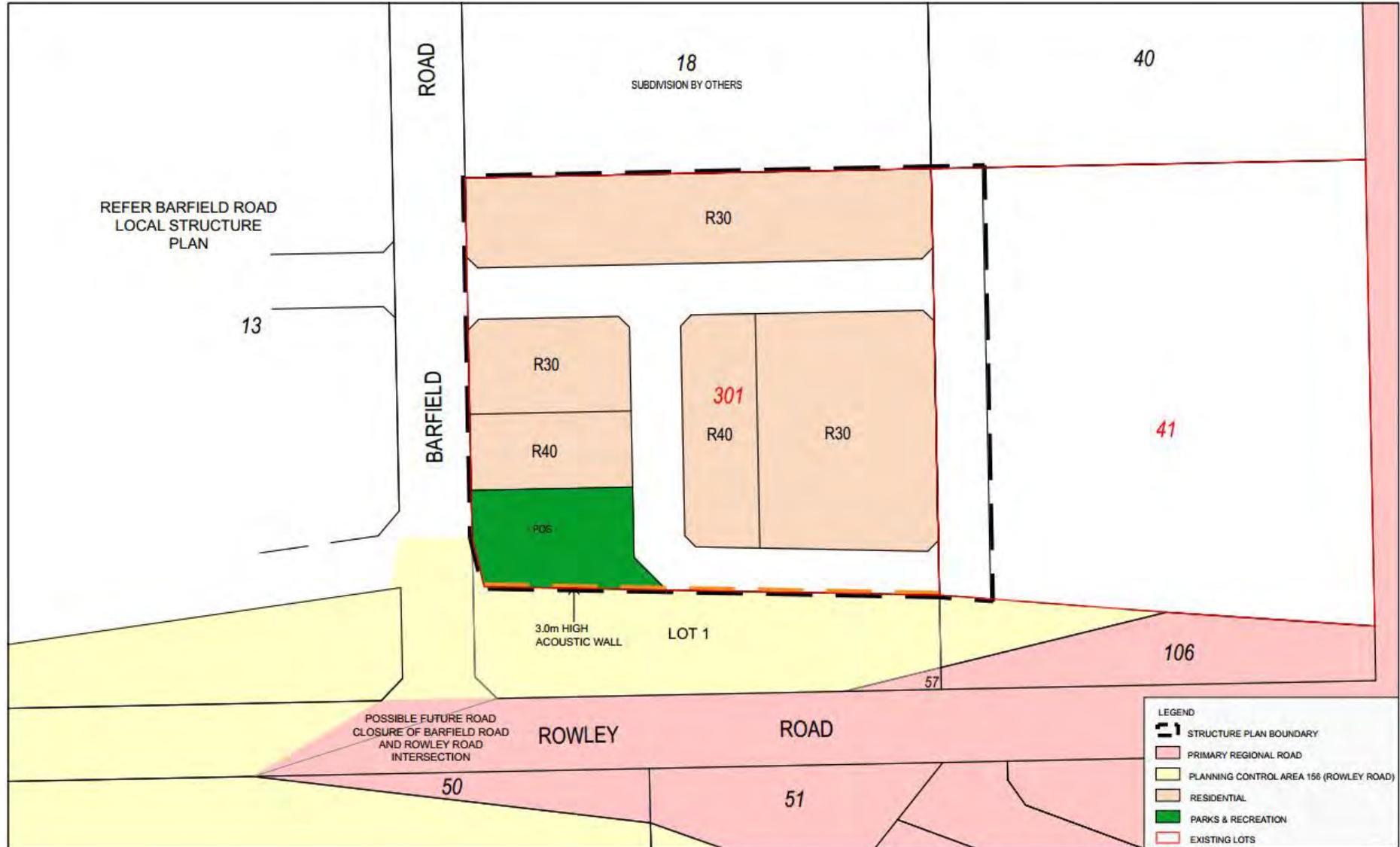


Figure 7 – Structure Plan

3.3 Residential

The residential densities proposed in the structure plan (R30 and R40) is considered to be entirely consistent with the medium density residential development planned for the site through the SSDSP. In accordance with the draft Medium Density Code¹, medium density development consists of single houses and grouped dwellings in areas coded R30 and above and multiple dwellings in areas coded R30 to R60.

The proposed R30 and 40 residential density is also considered to add a level of housing diversity to the area with the adjoining Barfield Road Structure Plan proposing limited R40 residential development and densities ranging from R25 to R60. Further, the Barfield Road Structure Plan has focused the higher densities around the areas of public open space. In considering the rationale for the density distribution in the Barfield Road Structure Plan together with the site’s access to public open space and the elevated topography, the proposed R30 and R40 density is entirely appropriate.

As development progresses in the area numerous facilities are being added to support the growing population. The facilities with close proximity to the Structure Plan Area include:

- Hammond Park Secondary College;
- Hammond Park Catholic Primary School;
- Bus routes along Irvine Parade and Gaebler Road as well as future bus routes along Barfield Road;
- Numerous child care centres include Nido Early Learning, Next Generation School of Early Learning, Great Beginnings Hammond Park; and
- Medical Centre and Café on Marquis Lane.

¹ <https://www.dplh.wa.gov.au/getmedia/86c57c2d-a7e2-4261-9cd7-1811ebc97e1a/DWA-Draft-Medium-Density-Code>

These facilities provide important services and amenity to the growing local community and will also be supported by further residential population in the area.

The R30 and R40 residential density will also assist in achieving the dwelling yield per hectare targets outlined in both Perth and Peel @ 3.5 Million and also Liveable Neighbourhoods. Table 5 below provides an assessment of the recommended and proposed dwelling yields.

| Planning Document | Density Target | Proposed |
|------------------------------|---|---------------------------------|
| Perth and Peel @ 3.5 Million | 15 dwellings per hectare (1.6897ha) | 18.9 dwellings per hectare |
| Liveable Neighbourhoods | 22 dwellings per site hectare (0.9881 ha) | 32.4 dwellings per site hectare |

Table 5 – Density Targets

3.4 Movement Network

The proposed street network within the structure plan area has been guided by the provisions of Liveable Neighbourhoods and is considered to provide a permeable road network that will facilitate ease of movement through the Structure Plan Area. There will be no access/egress to and from Rowley Road with the primary point of access to the existing road network occurring from Barfield Road.

By virtue of the structure plan location, there will be limited traffic through the area with the proposed road network only be accessed by residents of the Structure Plan Area and their visitors. All primary structure plan roads have been designed to be consistent with an Access Street D classification as per Liveable Neighbourhoods (see Figure 8 below).

All roads within the Structure Plan area will include pedestrian infrastructure to connect to the existing network beyond the Structure Plan area.

3.7 Public Open Space

The location and size of the proposed public open space (POS) is intended to service the residents of the Structure Plan Area and has been proposed in addition the POS required through the SSDSP. The function of the POS will be consistent with a Local Park classification in accordance with Liveable Neighbourhoods with the POS being within a 200m walkable catchment of all dwellings within the Structure Plan.

An indicative landscape concept plan for the proposed POS has been included in Appendix 9 with the detailed design of the POS to be addressed as a condition of subdivision approval. In considering this indicative concept plan the below is relevant to the proposed public open space:

- There will be no areas of restricted public open space with an underground detention tank being provided for drainage.
- The site level for the POS will be 33 AHD which is slightly lower than the adjoining lot and road levels.
- The planting mix will be consistent with low threat vegetation with some turf, low height plants and trees.
- The POS area will be irrigated through an available groundwater allocation.
- Lots abutting the POS should consider visually permeable fencing on the affected boundary with a major opening orientated toward the POS to ensure a level of passive surveillance is achieved.

The structure plan provides a total of 1,261sqm of POS which equates to a total of 8.4% of the total gross subdividable area. The minor shortfall of 1.6% will be paid via a cash in lieu contribution as a condition of subdivision

approval. Table 6 below provides a schedule of POS within the Structure Plan Area.

In line with Element 4, Requirement 42 of Liveable Neighbourhoods, the gross subdivisional area is exclusive of the road reserve within the Lot 41 Western Power Easement, which has been included as a deduction in the POS schedule below.

| PUBLIC OPEN SPACE SCHEDULE | | |
|---|-----------|-----------------|
| Structure Plan Site Area | | 1.6897ha |
| Less | | |
| - Environmental protection policy areas Wetlands to be ceded | n/a | |
| - Protected bushland site | n/a | |
| - Unrestricted public open space sites not included in public open space contribution | n/a | |
| - Foreshore reserves to be ceded | | |
| Total | | 0.00 ha |
| Net site area | | 1.6897ha |
| DEDUCTIONS | | |
| Primary School | n/a | |
| Town Centre and commercial | n/a | |
| Dedicated drainage reserve | n/a | |
| Transmission corridors | 0.19525ha | |
| Road Widening | n/a | |
| Gross Subdivisible area | | 1.4945ha |
| Public open space @ 10 per cent | | 0.1494ha |
| Public open space contribution | | |
| May comprise: | | |
| - Minimum 80 per cent unrestricted public open space | | 0.1195 ha |
| - Minimum 20 per cent restricted use public open space | | 0.0299 ha |
| Unrestricted public open space sites | | |

| | | |
|--|-----------|-----------------------------|
| - POS | 0.1261 ha | 0.1261 ha (8.4%) |
| Restricted use public open space sites | | |
| Total restricted use public open space | 0.0ha | 0.0ha |
| Public Open Space provision | | 0.1261 ha (8.4%) |
| Note: Gross subdivisible area includes house lots, access roads, and any land incidental to the subdivision. The gross subdivisible area does not include areas for schools, shopping centres, infrastructure (e.g. land required for sewer pump stations), dedicated drainage sites not having a recreational function and land set aside for arterial roads and other non-residential uses. | | |

Table 6 – Public Open Space Schedule

3.8 Water Management

Stormwater drainage will be consistent with the Russell Road Arterial Drainage Scheme from the City of Cockburn with all catchment up to and including the 1 in 100 year ARI event contained within the development area.

The site will be re-contoured to achieve the levels that carry the stormwater to an underground detention tank within the POS which will have a capacity of 212m³ with a footprint of 355m² which is sufficient to accommodate the 1 in 100-year ARI event. In addition, rain garden swales are able to be contemplated within selected road reserves.

Each lot will accommodate their own stormwater through soak wells or other infiltration facilities.

The capacity of the proposed stormwater drainage system is detailed below In Table 7 with Figure 10 illustrating a cross section of the POS and underground detention tank.

| Drainage Element | Catchment Area (m2) | First Flush Volume Required (15mm) m3 | Volume Provided allowing 150mm freeboard (m3) | Volume Required for 1 in 100yr event (m3) | Volume Available for 1 in 100yr event (m3) |
|----------------------|---------------------|---------------------------------------|---|---|--|
| Below Ground Storage | 5,123 | 30.5 | 30.5 | 208.5 | 212.2 |
| | | 30.5 | | | |
| TOTALS | 5,123 | 30.5 | Incorporated in below ground storage | 208.5 | 212.2 |

Table 7 – Stormwater Capacity

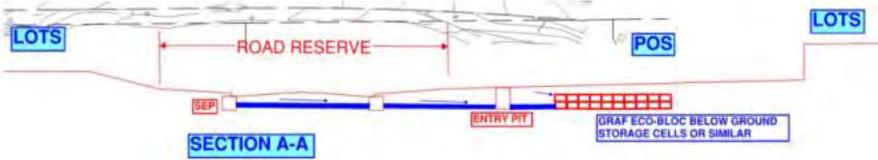


Figure 10 – POS Cross Section

3.9 Infrastructure Coordination and Servicing

An Engineering Servicing Report has been prepared by Peritas Group which details that the structure plan will have no servicing impediments to the future intended residential development. A copy of the Engineering Servicing Report is included in Appendix 7 with a summary of the findings below.

Earthworks

Site grading and remodelling will be kept to minimum limits wherever possible but will be required across the site to enable the construction of the proposed roads, building pads and facilitating the provision of services to each lot.

Water

Correspondence with Water Corporation indicates that servicing the development with a potable water supply will be dependent on the progression of development in Vivente Estate with subdivisional works already underway. Through this development water mains will be provided along Barfield Road with sufficient capacity for the structure plan to access. All internal potable water infrastructure will be designed to Water Corporation standards at the point of subdivision.

Groundwater

Ground water will be used for irrigation of the POS and vegetation within the road reserves. To facilitate this, a bore ground water license for irrigation purposes will be obtained prior to subdivision or development. The license will be to access the Superficial Swan Aquifer within the Jandakot area and the subarea of Success. Based on the area of the proposed public open space and road verges to be irrigated it is expected that a license for 2400 kilo litres will be required.

Sewer

Similar to the proposed water supply, the provision of a sewer service to the structure plan will be dependent on the progression of development within the Vivente Estate. A future connection will be available along Barfield Road enabling the Structure Plan Area to connect to the gravity sewer reticulation network along Barfield Road which has sufficient capacity for the proposed development. All internal sewer infrastructure will be designed to Water Corporation standards at the point of subdivision.

Electrical

Low Voltage cables are located within and adjacent to the western boundary of the site, immediately outside the south western corner of the site within the norther verge of Rowley Road and within the western verge of Barfield Road. All lot will be serviced with underground power with the existing network having adequate capacity to service the proposed

development. Within Lot 41 which is impacted by an easement associated with the High Voltage transmission lines it is proposed to provide a 14.2m road reserve for the purposes of access. The road reserve will extend to the north east corner of the site in close proximity to the existing tower. Whilst the reserve will be in close proximity to the tower the works proposed will simply be landscaping to a low threat state and will not impact the tower in any way.

Telecommunications

In accordance with the City's Local Planning Policy 5.19 – Telecommunications Infrastructure, Peritas Group has undertaken consultation with relevant telecommunications providers over a period of 9 months. A copy of the relevant correspondence is included in the Engineering Servicing Report in Appendix 7. The outcome of these liaisons demonstrates that the Telstra/NBNco and Optus networks are available to service the development.

Fortunately, there are a number of service extension options from the existing networks to service the site, any of which have the capacity to offer site connection for each of the development lots. Headwork charges for Telstra/NBN service extensions are anticipated as part of the subdivision process.

In addition to the work undertaken by Peritas, separate liaison has occurred with Vodaphone, Telstra and Optus in relation to network coverage and aboveground infrastructure in the area. All three (3) providers confirmed that the quality of service in the area is sufficient to accommodate the additional demand created by the structure plan and that there were no intentions to place above ground infrastructure within the Structure Plan Area.

Gas

The closest gas service to the Structure Plan Area is a D110 350kPa gas main located at Mokare Entrance approximately 300m west of the site.

There are no obvious constraints to the extension of this network with sufficient capacity available to service the development if required.

3.10 Bushfire Management

As the subject site is designated as a bushfire prone area, consideration of State Planning Policy 3.7 – Planning in Bushfire Prone Area (SPP3.7) is warranted. In accordance with SPP3.7, Strategen JPS&G have prepared a Bushfire Management Plan (BMP) to demonstrate how the ultimate development will comply with the provisions of SPP3.7. A copy of the relevant BMP is included in Appendix 4 with the findings relevant to the structure plan noted below:

- The applicable BAL ratings for the proposed residential lots is noted below in Figure 11 with the highest BAL rating being BAL-FZ.

| Method 1 BAL determination | | | | | | |
|----------------------------|--|-------------------|---|-------------------------------|--|-------------|
| Plot | Vegetation classification | Effective slope | Minimum separation distance to lot boundary | Highest BAL (to lot boundary) | APZ setback | Reduced BAL |
| 1 | Class D Scrub | Flat/upslope (0°) | 68 m | BAL-12.5 | N/A | N/A |
| 2 | Class D Scrub | Flat/upslope (0°) | 0 m | BAL-FZ | 13 m setback of northeast corner boundary for Lot 10 | N/A |
| 3 | Class D Scrub | Downslope >5–10° | >100 m | BAL-Low | N/A | N/A |
| 4 | Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f]) | N/A | N/A | N/A | N/A | N/A |
| 5 | Class D Scrub | Downslope >0–5° | 56 m | BAL-12.5 | N/A | N/A |
| 6 | Class D Scrub | Flat/upslope (0°) | 12 m | BAL-40 | 1 m setback off southern boundary for Lots 15–18 | BAL-29 |
| 7 | Excluded – Clause 2.2.3.2 [c] | N/A | N/A | N/A | N/A | N/A |
| 8 | Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f]) | N/A | N/A | N/A | N/A | N/A |

Figure 11 – BAL Ratings

- Whilst the proposed vegetation within the Planning Control Area will ultimately be removed when Rowley Road is upgraded, this has been included in the BAL assessment and assessed as if it will be retained in its current state.
- Separation to surrounding vegetation and the associated bushfire threat will be achieved by:
 - Providing a perimeter road as a buffer to the bushfire threat within the Planning Control Area and the adjoining Lot 41.
 - Management of the POS area to a low threat standard.
- The proposed development complies with the applicable bushfire protection criteria with an appropriate management response to each of the four elements outlined in Table 4 of the submitted BMP.
- Landscaping within the proposed public open space will need to be constructed and maintained to a low threat state.
- Other relevant management strategies that require implementation to ensure a compliant bushfire rating is achieved include:
 - POS landscaping to be managed by the developer until transfer to the City of Cockburn who will be responsible for the ongoing management;
 - Notifications on titles will be required for lots subject to a BAL12.5 rating or higher.
 - The residual area of road reserve proposed in the north east corner of the Structure Plan will be landscaped in a low threat state to be managed by the developer until such time as the reserve is handed over to the City of Cockburn.
 - A restrictive covenant placed on titles of all affected lots that have been assessed as BAL-40 or BAL-FZ.
- The responsibilities for the implementation and management of the bushfire measures are outlined in Table 5 of the submitted

BMP. Future planning stages are expected to be implemented in accordance with this table to ensure compliance with SPP3.7

Through the implementation of the BMP submitted by Strategen JPS&G, the future residential development will comply with the provisions of SPP3.7.

3.11 Noise Management

In accordance with State Planning Policy 5.4 – Road and Rail Noise (SPP5.4), the subject site is located within a trigger distance of a transport corridor (Rowley Road and Kwinana Freeway) and as such analysis of the noise impacts on the proposed residential land use is required. Herring Storer were engaged to model the likely noise impacts at the future residential lots and recommend noise mitigation measures to ensure noise levels comply with those permitted under SPP5.4. A copy of their report is included in Appendix 5 with the critical findings noted below.

- In order to comply with SPP5.4 the following measures are required:
 1. A 3m high noise wall along the boundary of the proposed road reserve and POS with the Planning Control Area; and
 2. Quiet House Design Package A and B being applicable for future residential development on various lots.
- Numerous lots will still exceed the recommended 55dBa noise levels and as such will require a notification on the Certificate of Title.

3.12 Development Contributions

The Structure Plan Area is located within an area already subject to two Development Contribution Areas (DCA) being DCA9 and DCA 13 which

specify the applicable development contributions to be paid when subdivision occurs.

3.13 Local Development Plans

It is expected that the WAPC may require, as a condition of subdivision approval, that a local development plan(s) be prepared in accordance with Part 6 of Schedule 2 of the Planning and Development (Local Planning Schemes) Regulations 2015, prior to the creation or development of lots:

- i. With an area less than 260m² or irregularly configured;
- ii. Abutting public open space;
- iii. Affected by road or rail noise exceeding targets set out in State Planning Policy 5.4: Road and Rail Noise and the associated implementation guidelines;
- iv. Where specific vehicle access and egress control is required.

The local development plan(s) should address:

- Fencing requirements.
- Dwelling orientation.
- Location of crossovers and garages.
- Specific quiet house design package requirements.

Appendices

APPENDIX 1

Certificates of Title

WESTERN



AUSTRALIA

| | |
|--------------------------------------|---|
| REGISTER NUMBER 301/D70219 | |
| DUPLICATE EDITION 2 | DATE DUPLICATE ISSUED 17/3/2006 |

RECORD OF CERTIFICATE OF TITLE
UNDER THE TRANSFER OF LAND ACT 1893

VOLUME 2014 FOLIO 621

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.

BGRoberts
REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 301 ON DIAGRAM 70219

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

DARREN RONALD BLOWES OF 40C QUEENS CRESCENT, MOUNT LAWLEY

(T M957718) REGISTERED 2/4/2015

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

1. 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 2014 FOL 621.
2. *M957719 MORTGAGE TO NATIONAL AUSTRALIA BANK LTD REGISTERED 2/4/2015.
3. *O165238 CAVEAT BY JAMES THOMAS BRADEN LODGED 5/6/2019.

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: 2014-621 (301/D70219)
PREVIOUS TITLE: 1737-427
PROPERTY STREET ADDRESS: 221 BARFIELD RD, HAMMOND PARK.
LOCAL GOVERNMENT AUTHORITY: CITY OF COCKBURN

NOTE 1: DUPLICATE CERTIFICATE OF TITLE NOT ISSUED AS REQUESTED BY DEALING M957719

WESTERN



AUSTRALIA

REGISTER NUMBER

41/P9781

DUPLICATE
EDITION

2

DATE DUPLICATE ISSUED

8/9/2021

RECORD OF CERTIFICATE OF TITLE
UNDER THE TRANSFER OF LAND ACT 1893

VOLUME
1959

FOLIO
927

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.

BGRoberts
REGISTRAR OF TITLES



LAND DESCRIPTION:

LOT 41 ON PLAN 9781

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

SUNMETRO WA PTY LTD OF 9 ABERDEEN TERRACE LANDSDALE WA 6065

(T O848345) REGISTERED 24/8/2021

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

1. O848347 EASEMENT TO ELECTRICITY NETWORKS CORPORATION FOR TRANSMISSION WORKS PURPOSES - SEE DEPOSITED PLAN 413624. REGISTERED 24/8/2021.

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.

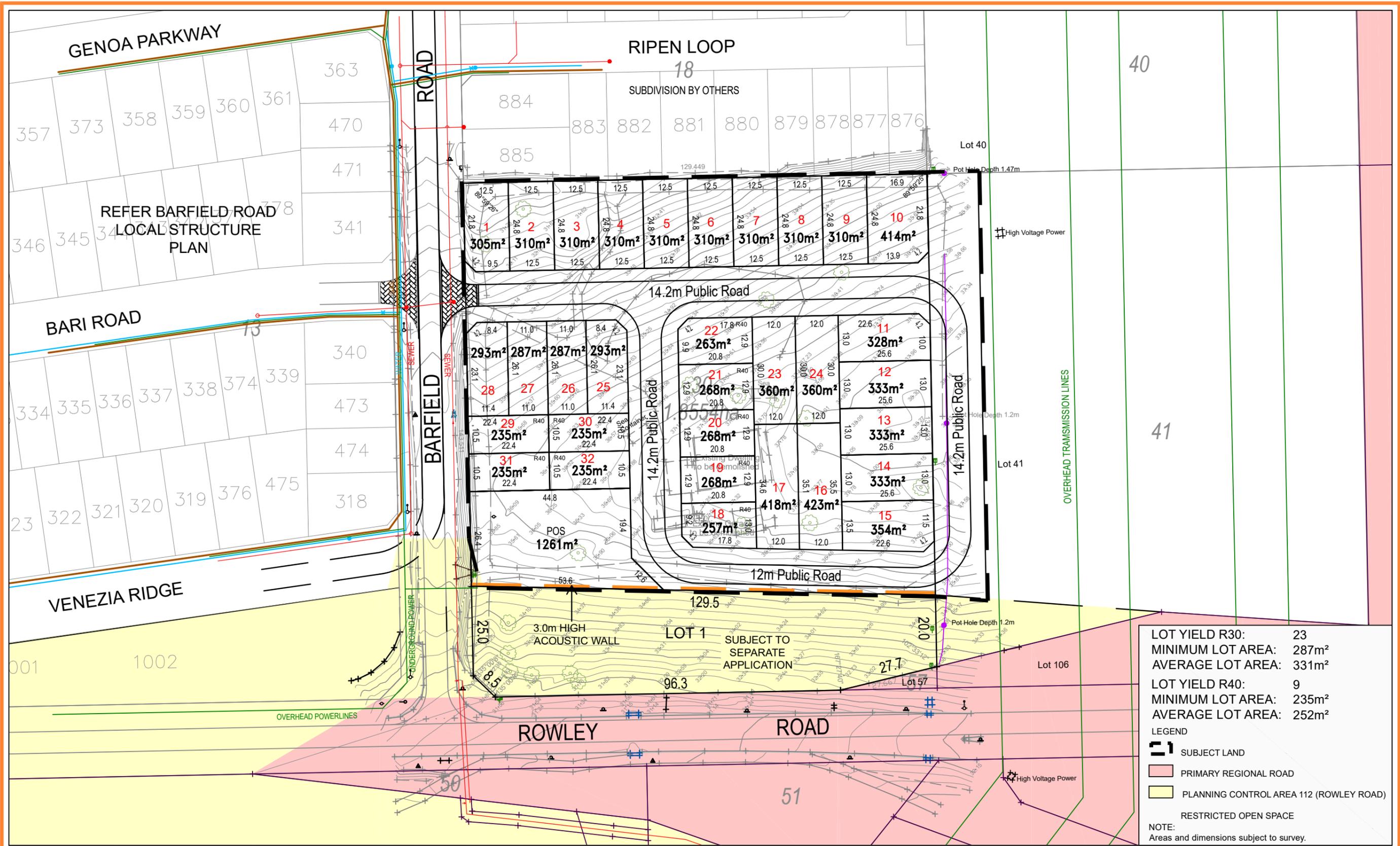
SKETCH OF LAND: P9781
PREVIOUS TITLE: 1913-37
PROPERTY STREET ADDRESS: LOT 41 BARFIELD RD, HAMMOND PARK.
LOCAL GOVERNMENT AUTHORITY: CITY OF COCKBURN

APPENDIX 2

Local Structure Plan

APPENDIX 3

Subdivision Concept Plan



| | |
|-------------------|-------------------|
| LOT YIELD R30: | 23 |
| MINIMUM LOT AREA: | 287m ² |
| AVERAGE LOT AREA: | 331m ² |
| LOT YIELD R40: | 9 |
| MINIMUM LOT AREA: | 235m ² |
| AVERAGE LOT AREA: | 252m ² |

LEGEND

- SUBJECT LAND
- PRIMARY REGIONAL ROAD
- PLANNING CONTROL AREA 112 (ROWLEY ROAD)
- RESTRICTED OPEN SPACE

NOTE:
Areas and dimensions subject to survey.

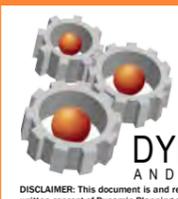
PROPOSED GREEN TITLE SUBDIVISION

LOT 301 (No. 221) & LOT 41 BARFIELD ROAD
HAMMOND PARK

COPYRIGHT RESERVED BASE PLAN COURTESY OF GRAY & LEWIS



SCALE: 1:1000 @ A3
DATE: 24th NOVEMBER 2023
FILE: 1151_24.11.2023.dwg
DRAW: - SB
CHECKED: -



e: admin@dynamicplanning.net.au
t: (08) 9275 4433
f: (08) 9275 4455
SUITE 15, 29 COLLIER ROAD
MORLEY WA 6062
ABN: 99 169 411 705



APPENDIX 4

Bushfire Management Plan

Bushfire management plan/Statement addressing the Bushfire Protection Criteria coversheet

Site address:

Site visit: Yes No

Date of site visit (if applicable): Day Month Year

Report author or reviewer:

WA BPAD accreditation level (please circle):

Not accredited Level 1 BAL assessor Level 2 practitioner Level 3 practitioner

If accredited please provide the following.

BPAD accreditation number: Accreditation expiry: Month Year

Bushfire management plan version number:

Bushfire management plan date: Day Month Year

Client/business name:

| | 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)? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| 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 bushfire protection criteria elements)? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

| Is the proposal any of the following (see SPP 3.7 for definitions)? | Yes | No |
|--|-------------------------------------|-------------------------------------|
| Unavoidable development (in BAL-40 or BAL-FZ) | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Strategic planning proposal (including rezoning applications) | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| High risk land-use | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Vulnerable land-use | <input type="checkbox"/> | <input checked="" type="checkbox"/> |

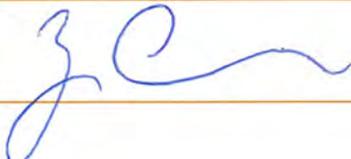
None of the above

Note: Only if one (or more) of the above answers in the tables is yes should the decision maker (e.g. local government or the WAPC) refer the proposal to DFES for comment.

Why has it been given one of the above listed classifications (E.g. Considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

The information provided within this bushfire management plan to the best of my knowledge is true and correct:

Signature of report author or reviewer



Date

Blokk Property Australia
Bushfire Management Plan (Local Structure Plan and
Subdivision Application)

Lots 301 and 41 Barfield Road, Hammond Park

16 January 2024

JBS&G59517/133400 Rev 8

JBS&G Australia Pty Ltd

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| Appendix C | Vegetation plot photos and descriptions |
| Appendix D | Vehicular access technical standards of the Guidelines |
| Appendix E | City of Cockburn Firebreak Notice |

1. Proposal details

1.1 Background

Blokk Property Australia (the proponent) is seeking to lodge a Local Structure Plan and subdivision application for proposed residential development within Lots 301 and 41 Barfield Road, Hammond Park (the Project Area), located in the City of Cockburn. The subdivision plan (Figure 1) identifies the following components, consistent with the Local Structure Plan provided in Appendix A:

- 32 proposed residential lots
- proposed internal public road layout
- proposed Public Open Space (POS).

1.2 Site description

The Project Area comprises approximately 1.85 ha and is surrounded by (see Figure 2):

- urban residential development to the north comprising Stage 9 Vivente Estate (currently being constructed by Richard Noble)
- urban residential development to the southwest and south opposite Rowley Road comprising Apsley Estate (currently being constructed by QUBE) and Florence Estate (currently being constructed by Satterley) respectively
- vegetated Planning Control Area (PCA) 156 and Rowley Road to the south
- powerline easement (undeveloped land) to the east and northeast, including:
 - Lot 41, owned by the proponent and part of the proposed development
 - Lot 40, owned by Western Australian Planning Commission (WAPC).
- Barfield Road and urban residential development to the west (existing stages of Vivente Estate).

The project area is wholly designated as bushfire prone on the *Map of Bush Fire Prone Areas* (DFES 2021; see Plate 1).

1.3 Purpose

This Bushfire Management Plan (BMP) has been prepared to accompany the Local Structure Plan and subdivision application to address requirements under Policy Measures 6.3 and 6.4 of *State Planning Policy 3.7 Planning in Bushfire-Prone Areas* (SPP 3.7; WAPC 2015) in accordance with Version 1.4 of *Guidelines for Planning in Bushfire-Prone Areas* (the Guidelines; WAPC 2021).

1.4 Other plans/reports

Other reports that have been prepared for the Project Area include:

- Strategen-JBS&G 2021a, *Flora, Vegetation and Black Cockatoo habitat assessment; Lot 301 Barfield Road, Hammond Park*
- Strategen-JBS&G 2021b, *Flora, Vegetation and Black Cockatoo habitat assessment; Lot 41 Barfield Road, Hammond Park.*

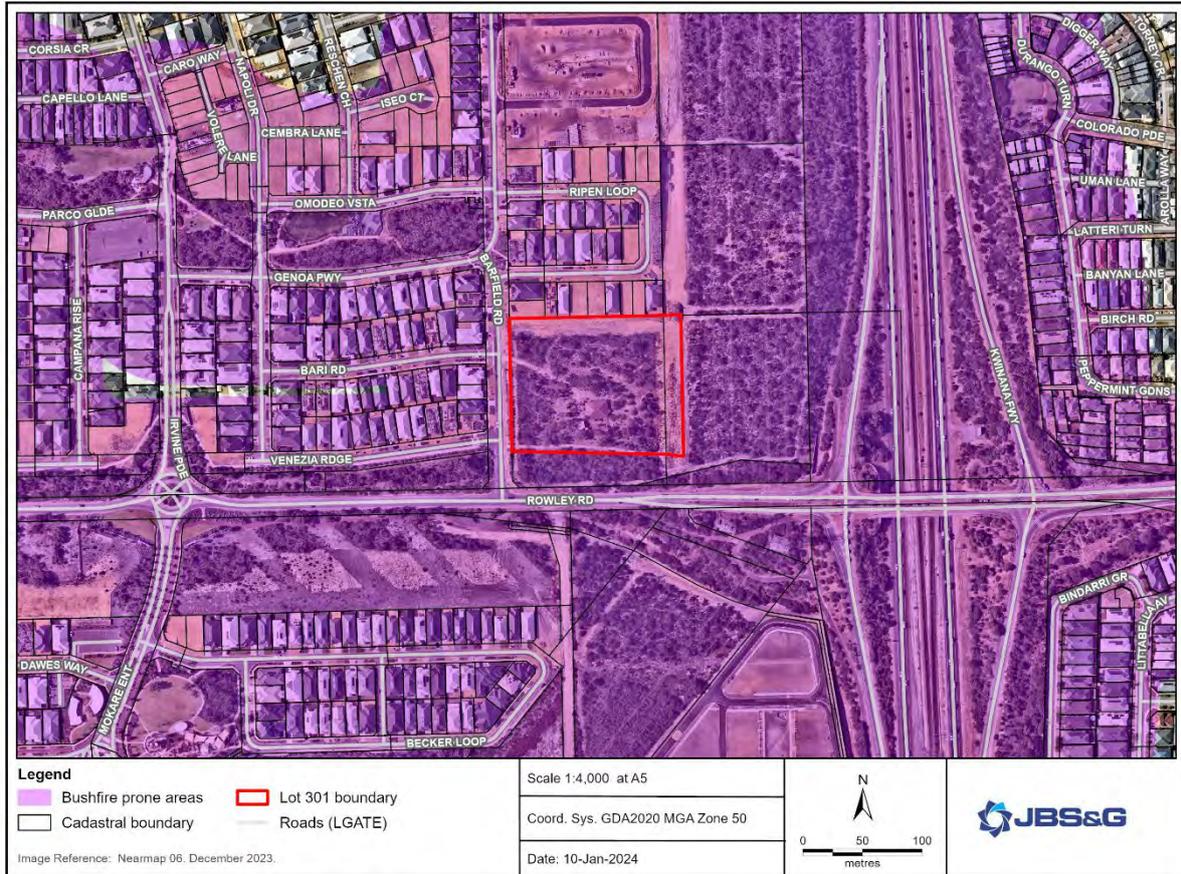
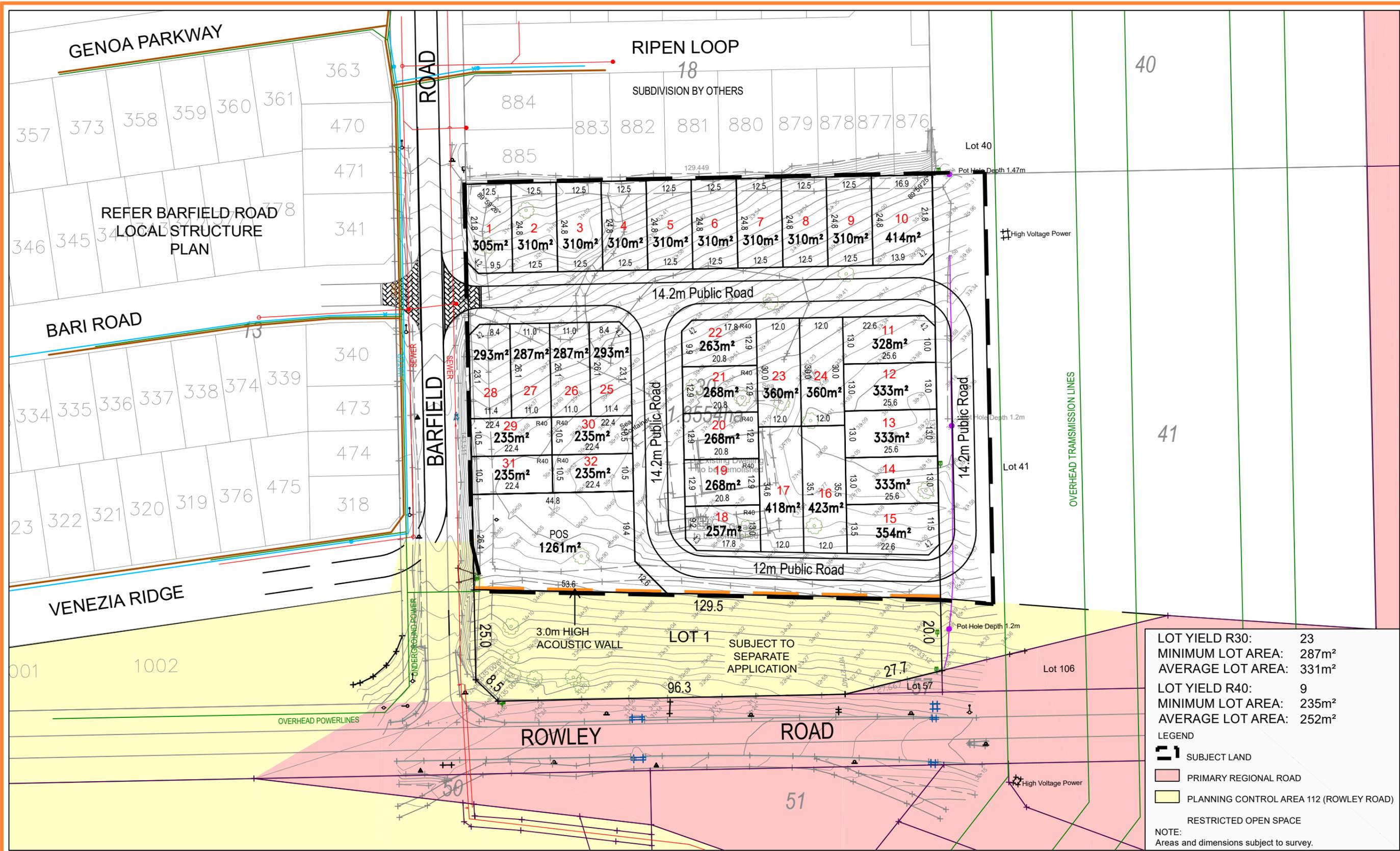


Plate 1: Map of Bush Fire Prone Areas (DFES 2021)



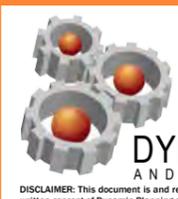
| | |
|--|---|
| LOT YIELD R30: | 23 |
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| AVERAGE LOT AREA: | 331m ² |
| LOT YIELD R40: | 9 |
| MINIMUM LOT AREA: | 235m ² |
| AVERAGE LOT AREA: | 252m ² |
| LEGEND | |
| | SUBJECT LAND |
| | PRIMARY REGIONAL ROAD |
| | PLANNING CONTROL AREA 112 (ROWLEY ROAD) |
| | RESTRICTED OPEN SPACE |
| NOTE: Areas and dimensions subject to survey. | |

PROPOSED GREEN TITLE SUBDIVISION
 LOT 301 (No. 221) & LOT 41 BARFIELD ROAD
 HAMMOND PARK

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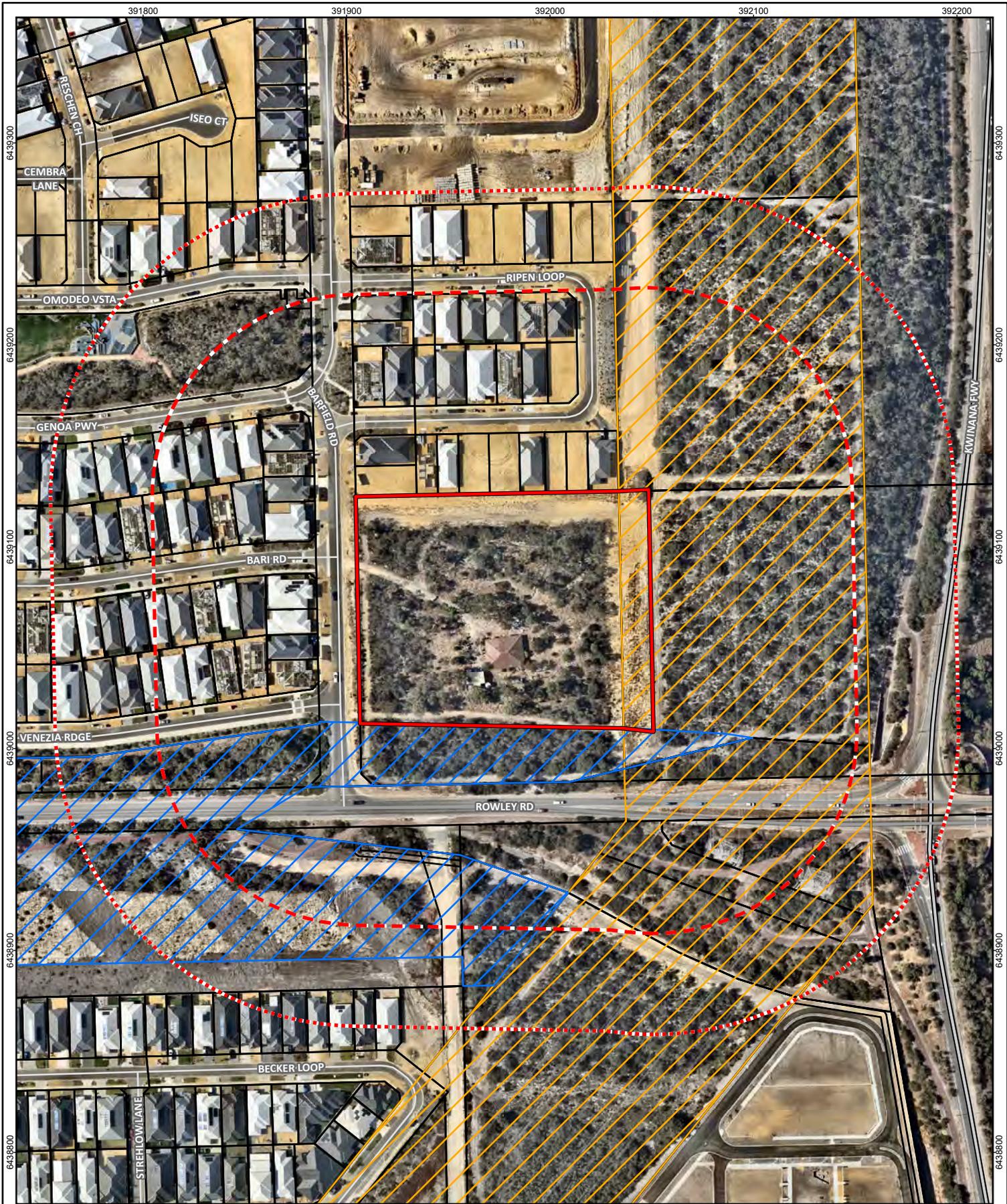


Planning Institute of Australia
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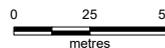




Legend

- Lot 301 boundary
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Planning control area
- Western Power transmission corridor
- Highway
- Major road
- Minor road

Scale: 1:2,500 at A4



Coord. Sys. GDA2020 MGA Zone 50



Job Number: 59517

Client: Blokk Property

Version: A

Date: 10-Jan-2024

Drawn By: droberts

Checked By: ZC

**Lot 301 (221) Barfield Road
Hammond Park, WA**

PROJECT AREA OVERVIEW

FIGURE 2



2. Environmental considerations

2.1 Native vegetation - modification and clearing

The entire project area will be modified to a non-vegetated and low threat managed state as part of proposed development and maintained in accordance with Clause 2.2.3.2 (e) and (f) of AS3959.

Table 1 provides a summary of publicly available environmental data applicable to the Project Area, as well as findings from site specific studies (Strategen-JBS&G 2021a; 2021b).

Table 1: Summary of environmental values

| Environmental value | Not mapped as occurring within or adjacent to the Project Area | Mapped as occurring within or adjacent to the Project Area | | Description |
|--|--|--|----------|--|
| | | Within | Adjacent | |
| Environmentally Sensitive Area | | | ✓ | An ESA is located south of the Project Area, associated with the Gibbs Road Swamp system, a Nationally Important Wetland (NIW). Impacts to this NIW are not anticipated given the absence of surface water features. Additionally, dewatering is not proposed. |
| Swan Bioplan Regionally Significant Natural Area | ✓ | | | Not applicable. |
| Ecological linkages | ✓ | | | Not applicable. |
| Wetlands | ✓ | | | Not applicable. |
| Waterways | ✓ | | | Not applicable. |
| Threatened Ecological Communities listed under the EPBC Act | | ✓ | ✓ | 'Banksia Woodlands of the Swan Coastal Plain' TEC is present within the Project Area. |
| Threatened and priority flora | ✓ | | | No Threatened flora species as listed under section 178 of the EPBC Act and under the BC Act were recorded during targeted surveys within the Project Area. |
| Fauna habitat listed under the EPBC Act | | ✓ | ✓ | Foraging habitat for Carnaby's Black Cockatoo, Baudin's Black Cockatoo and Forest Red-tailed Black Cockatoo was identified within and adjacent to the Project Area. |
| Threatened and priority fauna habitat | | ✓ | | As above. Additionally, the Project Area may contain habitat for priority fauna, such as the Quenda (<i>Isoodon obesulus</i>). |
| Bush Forever Site | ✓ | | | Not applicable. |
| DBCA managed lands and waters (includes legislated lands and waters and lands of interest) | ✓ | | | Not applicable. |

Due to the small size of the Project Area, as well as drainage infrastructure requirements, there is little opportunity to retain native vegetation as part of the development.

The potential environmental impacts associated with clearing of native vegetation and habitat within the Project Area will be assessed during the subdivision process under the *Planning and Development Act 2005*, which provides an exemption from the requirement for a clearing permit under Part V of the *Environmental Protection Act 1986*.

The proponent understands their obligations under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) to refer significant impacts to matters of national environmental significance (MNES) to the Commonwealth Department of Climate Change, Energy, the Environment and Water.

2.2 Revegetation / Landscape Plans

No revegetation is proposed as part of the proposal. Any landscaping proposed within on-site POS and urban street verges will consist of low threat managed gardens and street scaping in accordance with AS3959 Clause 2.2.3.2 (f) and Schedule 1 of the Guidelines (refer to Appendix B). This includes the section of proposed residual road reserve in the northeast corner of the site, which will be landscaped to a low threat state.

3. Bushfire assessment results

3.1 Assessment inputs

3.1.1 Vegetation classification

Strategen-JBS&G assessed classified vegetation and exclusions within the 150 m assessment area through on-ground verification on 20 October 2020 and 21 January 2021 in accordance with AS 3959-2018 *Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2018) and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016). Georeferenced site photos and a description of the vegetation classifications and exclusions are contained in Appendix C and depicted in Figure 3. Results are summarised in Table 2.

Site observations confirm the predominant on-site and adjacent vegetation as being Class D scrub comprising a predominant banksia fuel profile, 2–6 m in height. Existing cleared, low threat managed areas are excluded from classification under Clauses 2.2.3.2 (e) and (f) of AS3959. All existing vegetation within the Project Area is proposed to be modified to a non-vegetated/low threat managed state as part of proposed development and will be excluded under Clauses 2.2.3.2 (e) and (f) of AS3959. Small pockets of retained vegetation within Apsley Estate to the southwest are excludable under Clauses 2.2.3.2 (c) of AS3959 as being less than 0.25 ha in size and not within 20 m of each other, the site of other areas of classified vegetation.

3.1.2 Effective slope

Strategen-JBS&G assessed effective slope under classified vegetation within the 150 m assessment area through on-ground verification on 20 October 2020 in accordance with AS 3959. Results were cross-referenced with DPIRD 2m contour data and are depicted in Figure 3 and summarised in Table 2.

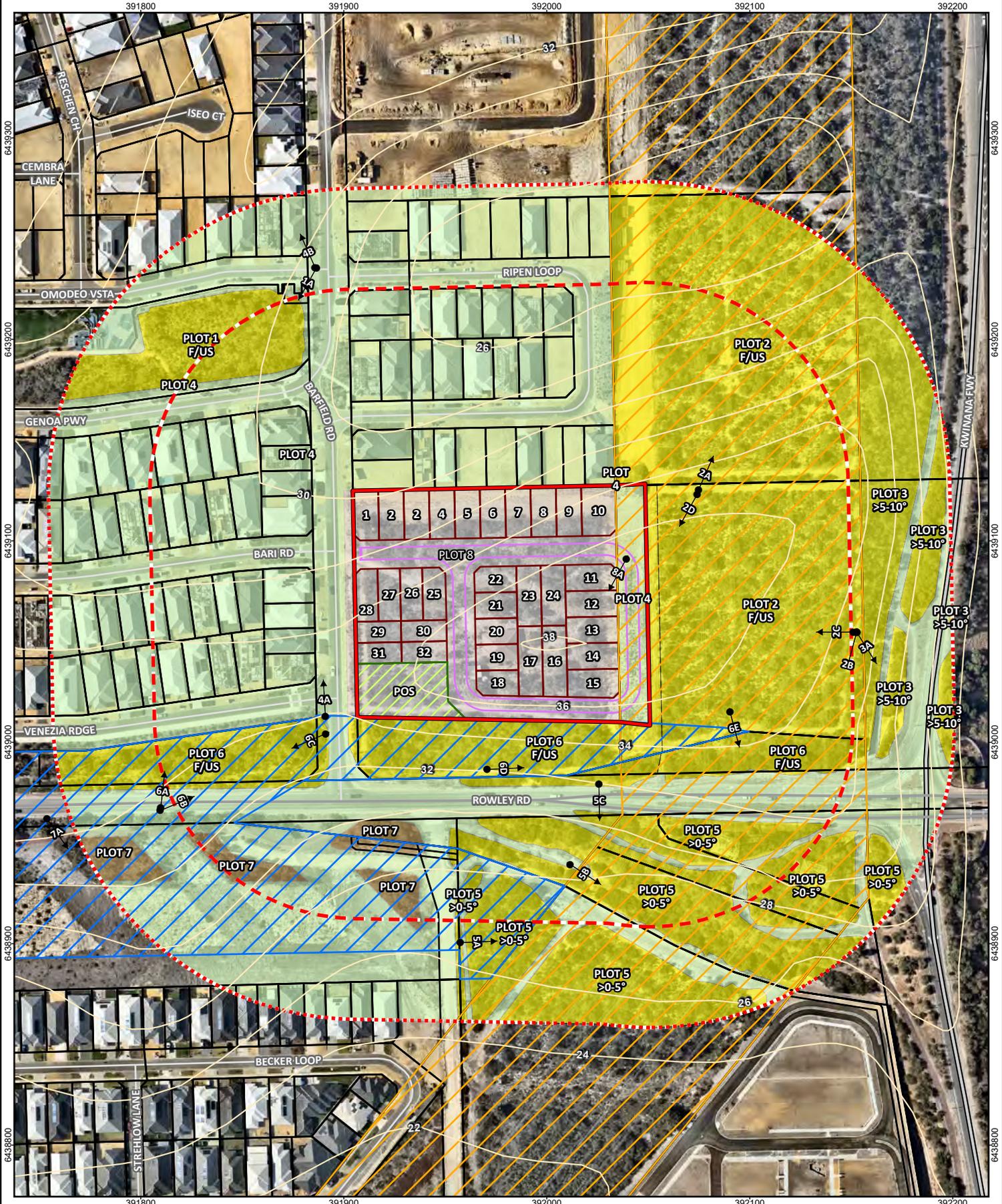
Site observations indicate that land to the east of the Project Area (fringing Kwinana Freeway) has an effective slope of 5–10° (downslope) in relation to the Project Area. Land to the south of the Project Area has an effective slope of 0–5° (downslope) in relation to the Project Area. The remaining land within 150 m of the Project Area is predominantly flat or upslope in relation to the Project Area.

3.1.3 Summary of inputs

Figure 3 illustrates the anticipated post-development vegetation classifications and exclusions following completion of subdivisional works. The post-development vegetation classifications, exclusions and effective slope are summarised in Table 2.

Table 2: Summary of post-development vegetation classifications, exclusions and effective slope

| Vegetation plot | Vegetation classification | Effective slope | Comments |
|-----------------|--|-------------------|---|
| 1 | Class D Scrub | Flat/upslope (0°) | Banksia dominated scrub, 2–6m in height. |
| 2 | Class D Scrub | Flat/upslope (0°) | |
| 3 | Class D Scrub | Downslope >5–10° | |
| 4 | Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f]) | N/A | Existing non-vegetated land (i.e. roads, buildings, footpaths, earthworked land, etc) and low threat managed vegetation (managed gardens, turf, POS, street verges, etc). |
| 5 | Class D Scrub | Downslope >0–5° | Banksia dominated scrub, 2–6m in height, including within the balance of Lot 41 not subject to proposed development. |
| 6 | Class D Scrub | Flat/upslope (0°) | |
| 7 | Excluded – Clause 2.2.3.2 [c] | N/A | Multiple pockets of vegetation within adjacent southwest Apsley Estate that are less than 0.25 ha in size and not within 20 m of the site, each other, or other areas of classified vegetation. |
| 8 | Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f]) | N/A | Areas within the project area to be modified to non-vegetated/low threat managed state as part of proposed development. |



Legend

- Lot 301 boundary
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Planning control area
- Western Power transmission corridor
- POS
- Proposed lots
- Carriageways
- Topographic contours (mAHD)

Vegetation classification

- Class D Scrub
- Clause 2.2.3.2 (c)
- Clause 2.2.3.2 (e) & (f)
- Area to be modified to non-vegetated and low threat state

Other symbols:

- Photo point directions
- Highway
- Major road
- Minor road

Scale: 1:2,500 at A4

Coord. Sys. GDA2020 MGA Zone 50

Job Number: 59517

Client: Blokk Property

Version: A

Drawn By: droberts

0 25 50 metres

↑

Lot 301 (221) Barfield Road Hammond Park, WA

POST-DEVELOPMENT VEGETATION CLASSIFICATION AND EFFECTIVE SLOPE

FIGURE 3

JBS&G

Date: 10-Jan-2024

Checked By: ZC

3.2 Assessment outputs

3.2.1 Bushfire Attack Level (BAL) contour assessment

Strategen-JBS&G has undertaken a BAL contour assessment in accordance with Method 1 of AS 3959 for the Project Area (Figure 4). The Method 1 procedure incorporates the following factors:

- state-adopted FDI 80 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 development and subsequently informs the standard of building construction and/or setbacks required for proposed habitable development to potentially withstand such impacts and/or deliver compliance with relevant bushfire protection criteria of the Guidelines.

The BAL contours are based on the vegetation classifications and effective slope observed at the time of inspection as well as consideration of any vegetation proposed to be modified as part of proposed development, resultant vegetation exclusions and separation distances achieved in line with the plan of subdivision (Figure 1), including:

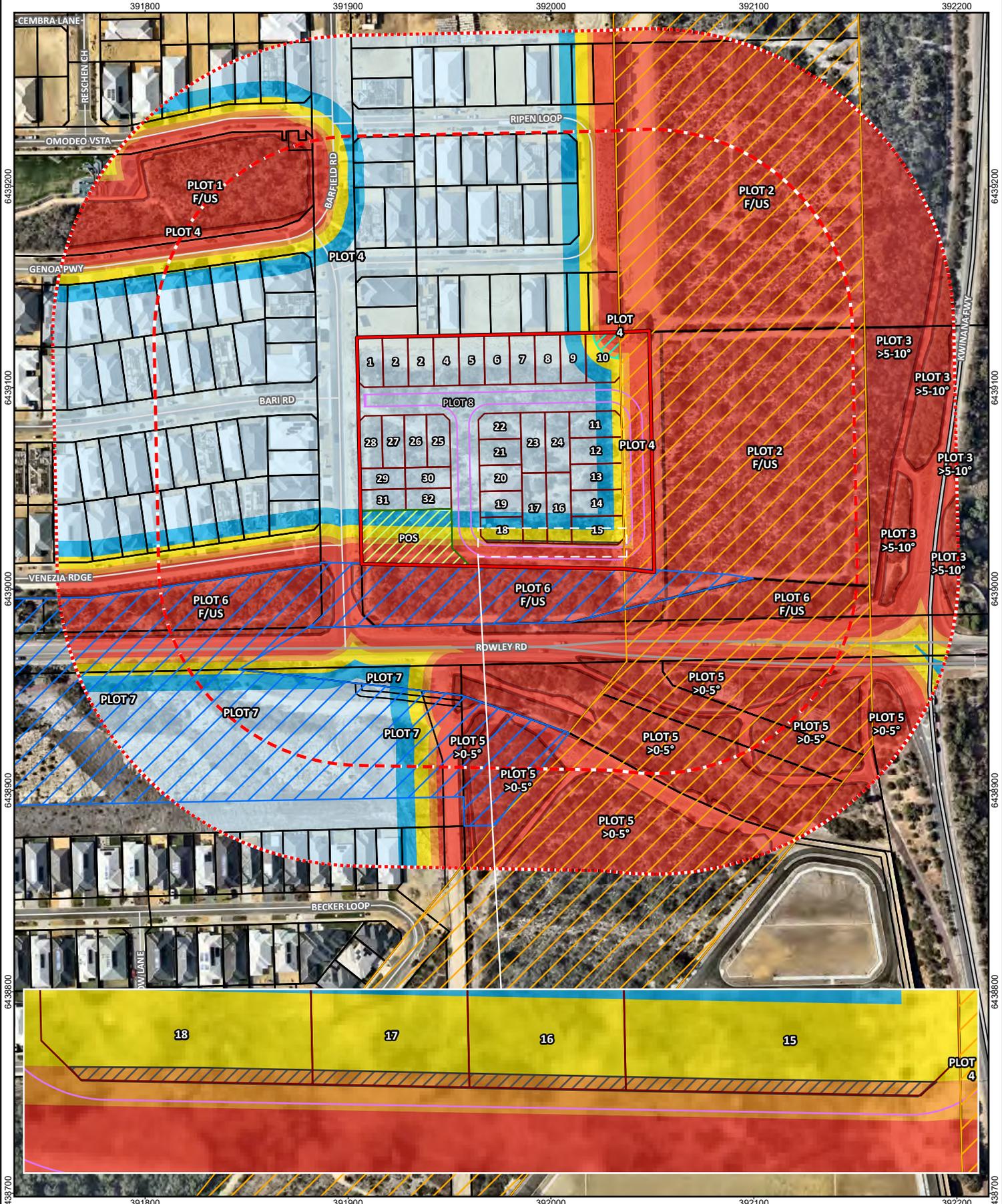
- clearing, earthworks and construction, landscaping and management of the Project Area to a non-vegetated/low threat managed state.

Results of the BAL contour assessment are detailed in Table 3 and illustrated in Figure 4. The highest BAL applicable to the external boundary of proposed residential lots is BAL-FZ. This applies only to proposed Lot 10, which will require a 13 m APZ setback to deliver BAL-29 or lower for a future dwelling enforced via restrictive covenant on title, or the lot can be temporarily quarantined from creation of title through appropriate condition of subdivision until such time that BAL-29 or lower can be demonstrated for the proposed lot.

Furthermore, proposed Lots 15–18 will require a 1 m APZ setback along their southern boundary, which will be enforced through R-Code primary and secondary street setbacks for these lots, as advised by Department of Planning, Lands and Heritage (DPLH). All other proposed lots can achieve a rating of BAL-29 or lower, as depicted in Figure 4.

Table 3: BAL contour assessment results

| Method 1 BAL determination | | | | | | |
|----------------------------|--|-------------------|---|-------------------------------|--|-------------|
| Plot | Vegetation classification | Effective slope | Minimum separation distance to lot boundary | Highest BAL (to lot boundary) | APZ setback | Reduced BAL |
| 1 | Class D Scrub | Flat/upslope (0°) | 68 m | BAL-12.5 | N/A | N/A |
| 2 | Class D Scrub | Flat/upslope (0°) | 0 m | BAL-FZ | 13 m setback of northeast corner boundary for Lot 10 | N/A |
| 3 | Class D Scrub | Downslope >5-10° | >100 m | BAL-Low | N/A | N/A |
| 4 | Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f]) | N/A | N/A | N/A | N/A | N/A |
| 5 | Class D Scrub | Downslope >0-5° | 56 m | BAL-12.5 | N/A | N/A |
| 6 | Class D Scrub | Flat/upslope (0°) | 12 m | BAL-40 | 1 m setback off southern boundary for Lots 15-18 | BAL-29 |
| 7 | Excluded – Clause 2.2.3.2 [c] | N/A | N/A | N/A | N/A | N/A |
| 8 | Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f]) | N/A | N/A | N/A | N/A | N/A |



- Legend**
- - - Lot 301 boundary
 - - - - 100m assessment area
 - 150m assessment area
 - Cadastral boundary
 - Planning control area
 - Western Power transmission corridor
 - POS
 - Proposed lots
 - 1m wide APZ setback
 - 13m wide APZ setback
 - Carriageways
 - Classified Vegetation
 - BAL contours
 - BAL FZ
 - BAL 40
 - BAL 29
 - BAL 19
 - BAL 12.5
 - BAL Low
 - Highway
 - Major road
 - Minor road

Scale: 1:2,500 at A4

Coord. Sys. GDA2020 MGA Zone 50

Job Number: 59517

Client: Blokk Property

Version: A

Drawn By: droberts

0 25 50 metres

↑

Date: 11-Jan-2024

Checked By: ZC

Lot 301 (221) Barfield Road Hammond Park, WA

BAL CONTOUR MAP

FIGURE 4

4. Identification of bushfire hazard issues

4.1 Bushfire context

The Project Area is situated in an area undergoing considerable urban development, including within the surrounding residential estates of Vivente (north and west), Florence (south) and Apsley (southwest). Upon completion of development, these will comprise substantial urban built out areas that will not pose a significant bushfire threat. The greatest bushfire threat to the project area will ultimately be from Class D Scrub situated south and east along Rowley Road and within the Western Power Transmission Corridor out to Kwinana Freeway. This vegetation comprises the following dominant species; *Banksia attenuata*, *Banksia menziesii*, *Kunzea glabrescens* and *Adenanthos cygnorum* at 2–6 m in height. Separation to this vegetation sufficient to achieve BAL-29 or lower will be provided through:

- a proposed 14.2 m wide perimeter road to the east, working in concert with a 13 m APZ setback for proposed Lot 10 (or alternative temporary lot quarantine)
- an interfacing low threat POS cell and proposed 12 m wide perimeter road to the south, working in concert with a 1 m APZ setback for proposed Lots 15–18.

4.2 Bushfire hazard issues

Examination of subdivision design in accordance with the plan of subdivision against the BAL contour assessment has identified the following bushfire hazard issues to be considered:

1. The Project Area is located within a bushfire prone area and is subject to a BAL rating above BAL-Low due to the surrounding bushfire hazards and therefore requires assessment against the bushfire protection criteria of the Guidelines in accordance with Policy Measure 6.2 of SPP 3.7.
2. The BAL Contour assessment in Figure 4 identifies that future habitable development within all proposed lots has capacity to achieve BAL-29 or lower, subject to:
 - a. a 13 m APZ setback for proposed Lot 10, enforced via restrictive covenant on title, or alternative temporary lot quarantine enforced via appropriate condition of subdivision
 - b. 1 m APZ setbacks for proposed Lots 15–18 enforced via R-Code primary and secondary street setbacks, as advised by DPLH.
3. Any landscaping proposed within on-site POS and urban street verges (including the residual road reserve in the northeast of the site) will need to consist of low threat managed gardens and street scaping in accordance with AS3959 Clause 2.2.3.2 (f) and Schedule 1 of the Guidelines (refer to Appendix B). A POS landscape plan will be required as a condition of subdivision to demonstrate these low threat outcomes.
4. The project area will be serviced by a no-through-road due to the landlocked nature of the site and there is no opportunity for a secondary access connection. However, the travel distance along the proposed internal loop road is less than 200 m in length when measured from the Barfield Road intersection to the furthest proposed lot, resulting in a compliant no-through-road. The loop road will be constructed in full and negates the need for a turn-around head.
5. The surrounding public road network provides all occupants with the option of travelling to at least two different suitable destinations north and south along Barfield Road. Perimeter roads have also been provided as part of subdivision design at all interfaces with the classified vegetation extent.
6. The proposed development will be connected to a reticulated water supply via extension of services from adjacent development areas in accordance with Water Corporations Design Standard 63 requirements.

Strategen-JBS&G considers the bushfire risk to the proposed development can be managed through standard application of acceptable solutions under the Guidelines, as well as through a direct bushfire suppression response if required. Bushfire mitigation strategies applicable to the proposed development are addressed in Section 5 of this BMP.

5. Assessment against bushfire protection criteria

5.1 Compliance with Elements 1–4

Compliance with Elements 1–4 of the bushfire protection criteria of the Guidelines (Version 1.4) is demonstrated by meeting the acceptable solutions, as detailed in Table 4.

Table 4: Compliance with the bushfire protection criteria of the Guidelines (Elements 1–4)

| Bushfire protection criteria | Performance Principle | Method of compliance | Statement of development compliance | Compliance achieved |
|-------------------------------------|---|---|---|---------------------|
| | | Acceptable solutions | | |
| Element 1: Location | <p>Performance Principle P1</p> <p>The strategic planning proposal, subdivision and development application is located in an area where the bushfire hazard assessment is or will, on completion, be moderate or low, or a BAL–29 or below, and the risk can be managed. For unavoidable development in areas where BAL–40 or BAL–FZ applies, demonstrating that the risk can be managed to the satisfaction of the decision-maker.</p> | <p>A1.1 Development location</p> <p>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.</p> | <p>The BAL contour assessment (see Table 3 and Figure 4) demonstrates that all future habitable development will be located within areas of BAL-29 or lower, subject to:</p> <ol style="list-style-type: none"> 13 m APZ setback for proposed Lot 10 (or alternative temporary lot quarantine) 1 m APZ setbacks for proposed Lots 15–18. | ✓ |
| Element 2: Siting and design | <p>Performance Principle P2</p> <p>The siting and design of the strategic planning proposal, subdivision or development application, including roads, paths and landscaping, is appropriate to the level of bushfire threat that applies to the site. The proposal incorporates a defensible space and significantly reduces the heat intensities at the building surface thereby minimising the bushfire risk to people, property and infrastructure, including compliance with AS 3959 if appropriate.</p> | <p>A2.1 Asset Protection Zone</p> <p>Every habitable building is surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the requirements set out in Schedule 1.</p> | <p>The BAL contour assessment (see Table 3 and Figure 4) indicates that proposed Lot 10 will require a 13 m APZ setback to ensure habitable development within the lot achieves BAL-29, or alternatively, if deemed more appropriate, the lot can be temporarily quarantined from creation of title until such time that BAL-29 or lower for the lot can be demonstrated. The 13 m APZ setback will be enforced via restrictive covenant on title, or alternatively, the temporary quarantining of Lot 10 can be enforced via appropriate condition of subdivision.</p> | ✓ |

| Bushfire protection criteria | Performance Principle | Method of compliance | Statement of development compliance | Compliance achieved |
|------------------------------------|---|---|--|---------------------|
| | | Acceptable solutions | | |
| | | | <p>Furthermore, proposed Lots 15–18 will require a 1 m APZ setback to ensure habitable development within each lot achieves BAL-29. The 1 m APZ setbacks for these lots will be enforced through R-Code primary and secondary street setbacks, as advised by DPLH.</p> <p>All APZs and areas of low threat vegetation are to be subject to ongoing management in accordance with APZ standards of the Guidelines (see Appendix B).</p> | |
| Element 3: Vehicular access | <p>Performance Principle P3i</p> <p>The design and capacity of vehicular access and egress is to provide for the community to evacuate to a suitable destination before a bushfire arrives at the site, allowing emergency services personnel to attend the site and/or hazard vegetation.</p> | <p>A3.1 Public roads</p> <p><i>The minimum requirements under this acceptable solution are applicable to all proposed and existing public roads.</i></p> <p>Public roads are to meet the minimum technical requirements in Table 6, Column 1.</p> <p>The trafficable (carriageway/pavement) width is to be in accordance with the relevant class of road in the Local Government Guidelines for Subdivisional Development (IPWEA Subdivision Guidelines), Liveable Neighbourhoods, Austroad standards and/or any applicable standards for the local government area.</p> | <p>All public roads will be constructed to the relevant technical requirements of the Guidelines (see Appendix D) and in accordance with relevant federal, State and local government requirements.</p> | ✓ |
| | | <p>A3.2a Multiple access routes</p> <p>Public road access is to be provided in two different directions to at least two different suitable destinations with an all-weather surface (two-way access).</p> <p>If the public road access to the subject site is via a no-through road which cannot be avoided due to demonstrated site constraints, the road access is to be a maximum of 200 metres from the subject lot(s) boundary to an intersection where two-way access is provided.</p> | | |

| Bushfire protection criteria | Performance Principle | Method of compliance | Statement of development compliance | Compliance achieved |
|------------------------------|-----------------------|---|--|---------------------|
| | | Acceptable solutions | | |
| | | <p>The no-through road may exceed 200 metres if it is demonstrated that an alternative access, including an emergency access way, cannot be provided due to site constraints and the following requirements are met:</p> <ul style="list-style-type: none"> the no-through road travels towards a suitable destination; and the balance of the no-through road, that is greater than 200 metres from the subject site, is wholly within BAL-LOW, or is within a residential built-out area – Figure 23. | <p>The surrounding public road network provides all occupants with the option of travelling to at least two different suitable destinations north and south along Barfield Road, as well as:</p> <ul style="list-style-type: none"> broader connection to Rowley Road providing the option of travelling east to Kwinana Freeway or west to Frankland Avenue broader connection to Bari Road providing the option of travelling west through Vivente Estate and subsequently to Irvine Parade/Rowley Road via the surrounding public road network. | |
| | | <p>A3.2b Emergency access way</p> <p><i>Where it is demonstrated that A3.2a cannot be achieved due to site constraints, or where an alternative design option does not exist, an emergency access way can be considered as an acceptable solution.</i></p> <p>An emergency access way is to meet all the following requirements:</p> <ul style="list-style-type: none"> requirements in Table 6, Column 2; provides a through connection to a public road; be no more than 500 metres in length; and must be signposted and if gated, gates must open the whole trafficable width and remain unlocked. | <p>N/A – proposed subdivision design does not require Emergency Access Ways (EAWs) to provide through access to a public road.</p> | N/A |

| Bushfire protection criteria | Performance Principle | Method of compliance | Statement of development compliance | Compliance achieved |
|------------------------------|--|---|---|---------------------|
| | | Acceptable solutions | | |
| | | <p>A3.3 Through-roads</p> <p>All public roads should be through-roads. No-through roads should be avoided and should only be considered as an acceptable solution where:</p> <ul style="list-style-type: none"> it is demonstrated that no alternative road layout exists due to site constraints; and the no-through road is a maximum length of 200 metres to an intersection providing two-way access, unless it satisfies the exemption provisions in A3.2a of this table. <p>A no-through road is to meet all the following requirements:</p> <ul style="list-style-type: none"> requirements of a public road (Table 6, Column 1); and turn-around area as shown in Figure 24. | <p>As previously stated, the project area will be serviced by a no-through-road due to the landlocked nature of the site and there is no opportunity for a secondary access connection. However, the travel distance along the proposed internal loop road is less than 200 m in length when measured from the Barfield Road intersection to the furthest proposed lot, resulting in a compliant no-through-road. The loop road will be constructed in full and negates the need for a turn-around head. The no-through-road will be constructed to the relevant technical requirements of the Guidelines (see Appendix D).</p> | ✓ |
| | <p>Performance Principle P3ii</p> <p>The design of vehicular access and egress provides:</p> <ul style="list-style-type: none"> access and egress for emergency service vehicles while allowing the community to evacuate; a defensible space for emergency services personnel on the interface between classified vegetation and development site; and hazard separation between classified vegetation and the subject site to reduce the potential radiant heat that may impact a lot(s). | <p>A3.4a Perimeter roads</p> <p>A perimeter road is a public road and should be provided for greenfield or infill development where 10 or more lots are being proposed (including as part of a staged subdivision) with the aim of:</p> <ul style="list-style-type: none"> separating areas of classified vegetation under AS3959, which adjoin the subject site, from the proposed lot(s); and removing the need for battle-axe lots that back onto areas of classified vegetation. <p>A perimeter road is to meet the requirements contained in Table 6, Column 1.</p> <p>A perimeter road may not be required where:</p> | <p>Perimeter roads have been provided as part of subdivision design at all interfaces with the classified vegetation extent, ensuring that sufficient emergency and firefighter access is available between proposed lots and the surrounding bushfire hazards.</p> | ✓ |

| Bushfire protection criteria | Performance Principle | Method of compliance | Statement of development compliance | Compliance achieved |
|------------------------------|--|--|--|---------------------|
| | | Acceptable solutions | | |
| | | <ul style="list-style-type: none"> the lots are zoned for rural living or equivalent; it is demonstrated that it cannot be provided due to site constraints; or all lots have frontage to an existing public road. | | |
| | <p>Performance Principle P3iii</p> <p>Vehicular access is provided which allows:</p> <ul style="list-style-type: none"> access and egress for emergency service vehicles; defendable space for emergency services personnel on the interface between classified vegetation and development; and hazard separation between classified vegetation and the site to reduce the potential radiant heat that may impact a lot(s). | <p>A3.4b Fire service access route</p> <p><i>Where proposed lots adjoin classified vegetation under AS3959, and a perimeter road is not required in accordance with A3.4a, a fire service access route can be considered as an acceptable solution to provide firefighter access, where access is not available, to the classified vegetation.</i></p> <p>A fire service access route is to meet all the following requirements:</p> <ul style="list-style-type: none"> requirements in Table 6, Column 3; be through-routes with no dead-ends; linked to the internal road system at regular intervals, every 500 metres; must be signposted; no further than 500 metres from a public road; if gated, gates must open the required horizontal clearance and can be locked by the local government and/or emergency services, if keys are provided for each gate; and turn-around areas designed to accommodate type 3.4 fire appliances and to enable them to turn around safely every 500 metres. | <p>N/A – the proposed development does not require fire service access routes (FSARs) to achieve access within and around the perimeter of the project area.</p> | N/A |

| Bushfire protection criteria | Performance Principle | Method of compliance | Statement of development compliance | Compliance achieved |
|------------------------------|---|---|---|---------------------|
| | | Acceptable solutions | | |
| | <p>Performance Principle P3iv</p> <p>Vehicular access is provided which allows emergency service vehicles to directly access all habitable buildings and water supplies and exit the lot without entrapment.</p> | <p>A3.5 Battle-axe access legs</p> <p><i>Where it is demonstrated that a battle-axe cannot be avoided due to site constraints, it can be considered as an acceptable solution.</i></p> <p>There are no battle-axe technical requirements where the point the battle-axe access leg joins the effective area of the lot, is less than 50 metres from a public road in a reticulated area.</p> <p>In circumstances where the above condition is not met, or the battle-axe is in a non-reticulated water area, the battle-axe is to meet all the following requirements:</p> <ul style="list-style-type: none"> • requirements in Table 6, Column 4; and • passing bays every 200 metres with a minimum length of 20 metres and a minimum additional trafficable width of two metres (i.e. the combined trafficable width of the passing bay and constructed private driveway to be a minimum six metres). | <p>No battle-axe lots are proposed as part of the subdivision and the project area is not serviced by an existing battle-axe.</p> | <p>N/A</p> |
| | | <p>A3.6 Private driveways</p> <p>There are no private driveway technical requirements where the private driveway is:</p> <ul style="list-style-type: none"> • within a lot serviced by reticulated water; • no greater than 70 metres in length between the most distant external part of the development site and the public road measured as a hose lay; and • accessed by a public road where the road speed limit is not greater than 70 km/h. <p>In circumstances where all of the above conditions are not met, or the private driveway is</p> | | |

| Bushfire protection criteria | Performance Principle | Method of compliance | Statement of development compliance | Compliance achieved |
|------------------------------|---|--|---|---------------------|
| | | Acceptable solutions | | |
| | | <p>in a non-reticulated water area, the private driveway is to meet all the following requirements:</p> <ul style="list-style-type: none"> requirements in Table 6, Column 4; passing bays every 200 metres with a minimum length of 20 metres and a minimum additional trafficable width of two metres (i.e. the combined trafficable width of the passing bay and constructed private driveway to be a minimum six metres); and turn-around area as shown in Figure 28 and within 30 metres of the habitable building. | | |
| Element 4: Water | No performance principle applies | <p>A4.1 Identification of future water supply</p> <p>Evidence that a reticulated or sufficient non-reticulated water supply for bushfire fighting can be provided at the subdivision and/or development application stage, in accordance with the specifications of the relevant water supply authority or the requirements of Schedule 2.</p> <p>Where the provision of a strategic water tank(s) is required a suitable area within a road reserve or a dedicated lot the location should be identified, should be identified on the structure plan, to the satisfaction of the local government.</p> | N/A – A4.1 is applicable to strategic planning applications only. | N/A |
| | <p>Performance Principle P4</p> <p>Provide a permanent water supply that is:</p> <ul style="list-style-type: none"> sufficient and available for firefighting purposes; | <p>A4.2 Provision of water for firefighting purposes</p> <p>Where a reticulated water supply is existing or proposed, hydrant connection(s) should be provided in accordance with the specifications of the relevant water supply authority. Where these</p> | The proposed development will be connected to a reticulated water supply via extension of services from adjacent development areas in accordance with Water Corporations Design Standard 63 requirements. | ✓ |

| Bushfire protection criteria | Performance Principle | Method of compliance | Statement of development compliance | Compliance achieved |
|------------------------------|--|--|-------------------------------------|---------------------|
| | | Acceptable solutions | | |
| | <ul style="list-style-type: none"> constructed from non-combustible materials (e.g. steel), or able to maintain its integrity throughout a bushfire; and accessible, with legal access for maintenance and re-filling by tankers and emergency service vehicles. | <p>specifications cannot be met, then the following applies:</p> <ul style="list-style-type: none"> The provision of a water tank(s), in accordance with the requirements of Schedule 2; and Where the provision of a strategic water tank(s) is applicable, then the following requirements apply: <ul style="list-style-type: none"> land to be ceded free of cost to the local government for the placement of the tank(s); the lot or road reserve where the tank is to be located is identified on the plan of subdivision; tank capacity, construction, and fittings, provided in accordance with the requirements of Schedule 2; and a strategic water tank is to be located no more than 10 minutes from the subject site (at legal road speeds). <p>Where a subdivision includes an existing habitable building(s) that is to be retained, a water supply should be provided to this existing habitable building(s), in accordance with the requirements listed above.</p> | | |

5.2 Compliance with Element 5

Element 5 relates specifically to vulnerable tourism land uses and is therefore not applicable to the proposed subdivision.

5.3 Additional management strategies

Strategen-JBS&G makes the following additional bushfire management recommendations to inform ongoing planning stages of the development and increase the level of bushfire risk mitigation across the site.

5.3.1 Fuel management within cleared vacant lots

Cleared vacant lots are to be managed on a regular and ongoing basis by the developer until sale of lots after which time landowners will be responsible for ongoing management. Maintenance is to be in accordance with Clause 2.2.3.2 (f) of AS 3959, Schedule 1 of the Guidelines (refer to Appendix B) and the City's annual firebreak notice (Appendix E) and will involve slashing/mowing of grassland and weeds to height of less than 50 mm.

5.3.2 Landscaping of POS

The BAL contours depicted in Figure 4 are contingent on landscaping within proposed on-site POS being implemented and maintained in a low threat state, consistent with Clause 2.2.3.2 (f) of AS3959 and Schedule 1 of the Guidelines.

On-site POS will be established in a low threat state by the developer and maintained as such until transferred to the City for ongoing maintenance.

5.3.3 Road reserve fuel management

Existing and proposed urban street verges that have been excluded as low-threat are to be established and maintained 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. Following handover, ongoing road verge management is the responsibility of the City in line with the current ongoing street verge management regime. This includes the portion of residual road reserve in the northeast of the site, which will be landscaped to a low threat state by the developer and maintained thereafter until handover to the City, after which the City will be responsible for ongoing management.

5.3.4 Notification on title

Notification is to be placed on the Title of proposed lots subject to BAL-12.5 or higher (either through condition of subdivision or other head of power) to ensure landowners/proponents and prospective purchasers are aware that their lot is subject to an approved BMP and BAL assessment.

5.3.5 Building construction standards

Future Class 1, 2, 3 and associated 10a buildings in areas subject to BAL-12.5 or higher are required to comply with the bushfire specific building construction requirements of AS 3959.

5.3.6 BMP compliance report

A BMP compliance report will be prepared prior to issue of title to validate and confirm that relevant management measures of this BMP have been implemented appropriately to achieve the intended bushfire management outcomes and compliance with bushfire protection criteria.

5.3.7 Compliance with annual firebreak notice

The developer/land manager and prospective land purchasers are to comply with the City's annual firebreak notice as amended (refer to Appendix E).

The City's Firebreak Notice requires all flammable materials such as dry grass and weeds to be slashed, mown or trimmed down to a maximum height of 50 mm across the entire property (vacant or developed land less than 4,047m²) and all dead vegetation must be removed.

6. Responsibilities for implementation and management of the bushfire measures

Implementation of the BMP applies to the developer, prospective landowners and the City to ensure bushfire management measures are adopted and implemented on an ongoing basis. A bushfire responsibilities table is provided in Table 5 to drive implementation of all bushfire management works associated with this BMP.

Table 5: Responsibilities for implementation and management of the bushfire measures

| Implementation/management table | |
|---|--|
| Developer – prior to issue of titles | |
| No. | Implementation action |
| 1 | Construct (or have works bonded) the proposed public roads and reticulated water supply to the standards stated in this BMP. |
| 2 | Prepare a detailed landscape plan to guide low threat landscaping outcomes within on-site POS and provide evidence that an irrigation source has been secured for the road verges and POS. |
| 3 | Establish the Project Area, including all residential lots, roads, APZ setbacks, streetscaping and POS (in accordance with the abovementioned landscape plan) to a non-vegetated/low threat managed state in accordance with AS3959 Clause 2.2.3.2 (e) and (f) and Schedule 1 of the Guidelines. |
| 4 | Apply the relevant setback controls and/or temporary quarantining for proposed Lots 10 and 15–18 (i.e. APZ setbacks depicted in Figure 4 enforced via restrictive covenant on title and/or R-codes; and temporary quarantining enforced via appropriate condition of subdivision). |
| 5 | Undertake BMP compliance assessment and reporting to facilitate subdivision clearances and lot title. |
| 6 | Comply with the City’s annual firebreak notice as amended. |
| Developer – until sale/transfer of lots | |
| No. | Implementation action |
| 1 | Maintain the Project Area, including all residential lots, roads, APZ setbacks, streetscaping and POS to a non-vegetated/low threat managed state in accordance with AS3959 Clause 2.2.3.2 (e) and (f) and Schedule 1 of the Guidelines. |
| 2 | Comply with the City’s annual firebreak notice as amended. |
| Landowner/occupier – prior to building construction and ongoing | |
| No. | Implementation action |
| 1 | Maintain cleared/vacant lots in a low threat state to achieve exclusion Clause 2.2.3.2 (f) of AS 3959, including slashing/mowing of grassland and weeds to height of less than 50 mm, until developed to a permanent low fuel state. |
| 2 | Comply with the City’s annual firebreak notice as amended. |
| Local government – ongoing management | |
| No. | Implementation action |
| 1 | Maintain urban road reserves and POS in a low threat minimal fuel condition as per Clause 2.2.3.2 (f) of AS 3959. |

7. References

Department of Fire and Emergency Services (DFES) 2021, *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from: <https://maps.slip.wa.gov.au/landgate/bushfireprone/>, [10/01/2024].

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

Standards Australia (SA) 2018, *Australian Standard AS 3959–2018 Construction of Buildings in Bushfire-prone Areas*, Standards Australia, Sydney.

Strategen-JBS&G 2021a, *Flora, Vegetation and Black Cockatoo habitat assessment; Lot 301 Barfield Road, Hammond Park*, unpublished report prepared for Blokk Property Group.

Strategen-JBS&G 2021b, *Flora, Vegetation and Black Cockatoo habitat assessment; Lot 41 Barfield Road, Hammond Park*, unpublished report prepared for Blokk Property Group.

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) 2021, *Guidelines for Planning in Bushfire Prone Areas*, Version 1.4 December 2021, Western Australian Planning Commission, Perth.

8. Limitations

Scope of services

This report ("the report") has been prepared by Strategen-JBS&G in accordance with the scope of services set out in the contract, or as otherwise agreed, between the Client and Strategen-JBS&G. 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-JBS&G 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-JBS&G 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-JBS&G has also not attempted to determine whether any material matter has been omitted from the data. Strategen-JBS&G 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-JBS&G. The making of any assumption does not imply that Strategen-JBS&G 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-JBS&G 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

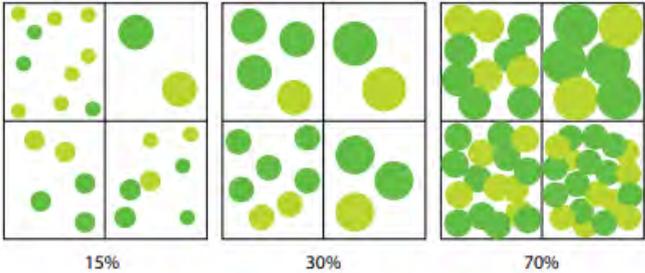
Within the limitations imposed by the scope of services, the preparation of this report has been undertaken and performed in a professional manner, in accordance with generally accepted environmental consulting practices. No other warranty, whether express or implied, is made.

The advice herein relates only to this project and all results conclusions and recommendations made should be reviewed by a competent person with experience in environmental investigations, before being used for any other purpose.

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Appendix A Local Structure Plan

Appendix B APZ standards (Schedule 1 of Guidelines)

| Schedule 1: Standards for Asset Protection Zones | |
|---|--|
| Object | Requirement |
| Fences within the APZ | <ul style="list-style-type: none"> Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959). |
| Fine fuel load (Combustible, dead vegetation matter <6 millimetres in thickness) | <ul style="list-style-type: none"> Should be managed and removed on a regular basis to maintain a low threat state. Should be maintained at <2 tonnes per hectare (on average). Mulches should be non-combustible such as stone, gravel or crushed mineral earth or wood mulch >6 millimetres in thickness. |
| Trees* (>6 metres in height) | <ul style="list-style-type: none"> Trunks at maturity should be a minimum distance of six metres from all elevations of the building. Branches at maturity should not touch or overhang a building or powerline. Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation. Canopy cover within the APZ should be <15 per cent of the total APZ area. Tree canopies at maturity should be at least five metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ. <p>Figure 19: Tree canopy cover – ranging from 15 to 70 per cent at maturity</p>  <p>The figure consists of three 2x2 grids of circles representing tree canopies. The first grid, labeled '15%', shows a sparse distribution of small green circles. The second grid, labeled '30%', shows a moderate density of medium-sized green circles. The third grid, labeled '70%', shows a high density of large green circles, with many overlapping, representing a continuous canopy.</p> |
| Shrub* and scrub* (0.5 metres to six metres in height). Shrub and scrub >6 metres in height are to be treated as trees. | <ul style="list-style-type: none"> Should not be located under trees or within three metres of buildings. Should not be planted in clumps >5 square metres in area. Clumps should be separated from each other and any exposed window or door by at least 10 metres. |
| Ground covers* (<0.5 metres in height. Ground covers >0.5 metres in height are to be treated as shrubs) | <ul style="list-style-type: none"> Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load' above. Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height. |
| Grass | <ul style="list-style-type: none"> Grass should be maintained at a height of 100 millimetres or less, at all times. Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation. |
| Defendable space | Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above. |

Schedule 1: Standards for Asset Protection Zones

| | |
|------------------|--|
| LP Gas Cylinders | <p>Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building.</p> <p>The pressure relief valve should point away from the house.</p> <p>No flammable material within six metres from the front of the valve.</p> <p>Must sit on a firm, level and non-combustible base and be secured to a solid structure.</p> |
|------------------|--|

* Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes

Source: Guidelines for Planning in Bushfire Prone Areas (WAPC 2021)

Element 2 Explanatory Notes

E2 Managing an Asset Protection Zone (APZ) to a low threat state

An APZ is a low fuel area maintained around a habitable building to increase the likelihood that it will survive a bushfire, by providing a defensible space and reducing the potential for direct flame contact, radiant heat exposure and ember attack.

Vegetation management within an APZ should provide defensible space and be maintained to a low threat state, in perpetuity, in accordance with the requirements outlined in Schedule 1.

The width of an APZ varies with slope and vegetation type, however it should only be as wide as needed to ensure the potential radiant heat impact of a bushfire does not exceed 29kW/m² (BAL-29), or 10kW/m² where a building is identified for use as an on-site shelter. An APZ is generally not required where a building or development site achieves 29kW/m² (BAL-29) or lower in its pre-development state (prior to any vegetation clearing or modification).

An APZ should include an area of defensible space immediately adjoining a building, that is kept free from combustible items and obstructions, within which firefighting operations can be undertaken to defend the structure. Where a lot contains a building envelope, it may not be necessary for the entire building envelope to achieve 29kW/m² (BAL-29) as this may result in significant unnecessary clearing. It is recommended that the BMP identifies that a sufficient APZ can be accommodated within the building envelope, with the development site and associated APZ to be determined at the development approval stage.

An APZ should be contained within the boundaries of the lot on which the building is situated, except in instances where it is demonstrated that the vegetation on the adjoining land is managed in a low threat state, as per cl. 2.2.3.2 of AS 3959, such as a road, managed park, rocky outcrop or a water body.

The siting of a habitable building and associated APZ should aim to minimise the clearing of vegetation. The BMP should demonstrate that the proposed APZ has minimised the unnecessary loss of vegetation or potential for conflict with landscape or environmental objectives; and complies with environmental approvals/exemptions (where necessary). A re-design or reduction in lot yield may be necessary to minimise the removal and modification of remnant vegetation.

It is recommended that development be located on flat areas or slopes less than 20 degrees (especially where classified vegetation is located downslope to a building) and away from ridge tops, crests or narrow gullies, as bushfire can spread rapidly in these areas. Circumstances where these locations may be suitable for development to occur include where the land is already cleared, and 29kW/m² (BAL-29) or lower can be achieved for the whole development site without the use of an APZ. To ensure soil stability within an APZ, vegetation removal on slopes exceeding 18 degrees is discouraged.

Fine fuel load should be maintained to less than two tonnes per hectare, however this is often a subjective assessment. Reducing fuel load levels does not necessarily require the removal of existing vegetation. A combination of methods can be utilised to reduce fuel load such as raking, weed removal, pruning, mulching and/or the removal of plant material.

A simple method to estimate fuel load is to roughly equate one tonne of fuel load per hectare as 100 grams per square metre. For example, two tonnes per hectare of leaf litter is roughly 200 grams of leaf litter per square metre and eight tonnes per hectare is roughly 800 grams. Eucalyptus leaf litter is approximately 100 grams per handful, so two handfuls of litter per square metre will roughly equate to two tonnes per hectare. Different types of fine fuel, like mulch or pine needles may be more or less than a handful, however the 100 grams per square metre rule of thumb can still be used.

The landowner or proponent is responsible for maintaining an APZ in accordance with Schedule 1 - Standards for Asset Protection Zones. Ongoing maintenance of an APZ is usually enforced through the local government firebreak notice issued under section 33 of the Bushfires Act 1954, and/or through a condition of a development approval, which requires the implementation of measures identified within a BMP.

A copy of the firebreak notice and Schedule 1 should be included in a BMP specifically as a how-to guide for the landowner, and to demonstrate to decision-makers that the measures outlined in the BMP to achieve the appropriate BAL rating through provision and ongoing management of an APZ, can be implemented.

Element 2 Explanatory Notes

E2 Landscaping and design of an Asset Protection Zone

Landscaping, design, and maintenance of an APZ in a bushfire prone area can significantly improve the bushfire resilience of a building. An APZ should not be seen as an area entirely cleared of vegetation, but as a strategically designed space that gives holistic consideration to how existing or proposed vegetation or non-combustible features interact with, or affect the building's bushfire resilience.

A well designed APZ provides a greater level of vegetation management within the first few metres of a building with, for example, less vegetation or inclusion of non-combustible materials. The vegetation within the remainder of an APZ can increase further away from the building with carefully considered plant selection and landscaping techniques.

Strategic landscaping measures can be applied, such as replacing weeds with low flammability vegetation (refer to E2 Plant Flammability) to create horizontal and vertical separations between the retained vegetation. The accumulation of fine fuel load from different plants is an important consideration for ongoing maintenance in accordance with Schedule 1. For example, when planting ground covers under deciduous trees within an APZ, the total fine fuel load prescribed in Schedule 1 will include any dead plant material from ground covers and leaf litter from the trees.

Plant density and final structure and form of mature vegetation should be considered in the initial landscaping stages. For example, clumps of sapling shrubs planted at a density without consideration of future growth, may increase the bushfire risk as a clump will quickly grow to exceed 5m². It should be noted that in some cases, a single shrub in a mature state may be so dense as to fill a 5m² clump alone.

The location of plants within an APZ is a key design technique. Separation of garden beds with areas of low fuel or non-combustible material, will break up fuel continuity and reduce the likelihood of a bushfire running through an APZ and subjecting a dwelling to radiant heat or direct flame contact. It is important to note, where mature trees are separated from a building by six metres, but the canopy has grown to extend or overhang a building, maintenance and pruning to remove the overhanging branches should be undertaken without the entirety of the tree being removed.

Mulches used within the APZ should be non-combustible. The use of stone, gravel, rock and crushed mineral earth is encouraged. Wood mulch >6mm in thickness may be used, however it is recommended that it is used in garden beds or areas where the moisture level is higher by regular irrigation. These materials could be sourced from non-toxic construction and demolition waste giving the added benefit of reducing the environmental impact of any 'hard landscaping' actions.

Combustible objects, plants, garden supplies such as mulches, fences made from combustible material, should be avoided within 10 metres of a building. Vines or climbing plants on pergolas, posts or beams, should be located away from vulnerable parts of the building, such as windows and doors. Non-flammable features can be used to provide hazard separation from classified vegetation, such as tennis courts, pools, lawns and driveways or paths that use inorganic mulches (gravel or crushed rock). Consider locating firewood stacks away from trees and habitable buildings.

Incorporation of landscaping features, such as masonry feature walls can provide habitable buildings with barriers to wind, radiant heat and embers. These features can include noise walls or wind breaks. Use of Appendix F of AS 3959 for bushfire resistant timber selection within areas of 29kW/m² (BAL-29) or below, or the use of non-combustible fencing materials such as iron, brick, limestone, metal post and wire is encouraged.

In addition to regular maintenance of an APZ, further bushfire protection can be provided at any time by:

- ensuring gutters are free from vegetation;
- installing gutter guards or plugs;
- regular cleaning of underfloor spaces, or enclosing them to prevent gaps;
- trimming and removing dead plants or leaf litter;
- pruning climbing vegetation (such as vines) on a trellis, to ensure it does not connect to a building, particularly near windows and doors;
- removing vegetation in close proximity to a water tank to ensure it is not touching the sides of a tank; and/or
- following the requirements of the relevant local government section 33 fire break notice, which may include additional provisions such as locating wood piles more than 10 metres from a building.

Preparation of a property prior to the bushfire season and/or in anticipation of a bushfire is beneficial even if your plan is to evacuate. As embers can travel up to several kilometres from a bushfire and fall into small spaces and crevices or land against the external walls of a building, best practice recommends that objects within the APZ are moved away from the building prior to any bushfire event. Objects may include, but are not limited to:

- door mats;
- outdoor furniture;
- potted plants;
- shade sails or umbrellas;
- plastic garbage bins;
- firewood stacks;
- flammable sculptures; and/or
- playground equipment and children's toys.

Element 2 Explanatory Notes

E2 Plant flammability

There are certain plant characteristics that are known to influence flammability, such as moisture or oil content and the presence and type of bark. Plants with lower flammability properties may still burn during a bushfire event, but may be more resistant to burning and some may regenerate faster post-bushfire.

There are many terms for plant flammability that should not be confused, including:

- Fire resistant – plant species that survive being burnt and will regrow after a bushfire and therefore may be highly flammable and inappropriate for a garden in areas of high bushfire risk.
- Fire retardant – plants that may not burn readily or may slow the passage of a bushfire.
- Fire wise – plants that have been identified and selected based on their flammability properties and linked to maintenance advice and planting location within a garden.

Although not a requirement of these Guidelines, local governments may develop their own list of fire wise or fire retardant plant species that suit the environmental characteristics of an area. When developing a recommended plant species list, local governments should consult with ecologists, land care officers or environmental authorities to ensure the plants do not present a risk to endangered ecological communities, threatened, or endangered species or their habitat.

When selecting plants, private landholders and developers should aim for plants within the APZ that have the following characteristics:

- grow in a predicted structure, shape and height;
- are open and loose branching with leaves that are thinly spread;
- have a coarse texture and low surface-area-to-volume ratio;
- will not drop large amounts of leaves or limbs, that require regular maintenance;
- have wide, flat, and thick or succulent leaves;
- trees that have bark attached tightly to their trunk or have smooth bark;
- have low amounts of oils, waxes, and resins (which will often have a strong scent when crushed);
- do not produce or hold large amounts of fine dead material in their crowns; and/or
- will not become a weed in the area.

Refer to the WAPC Bushfire and Vegetation Fact Sheet for further information on clearing and vegetation management and APZ landscaping, design and plant selection reference material.

Source: *Guidelines for Planning in Bushfire Prone Areas (WAPC 2021)*

Appendix C Vegetation plot photos and descriptions

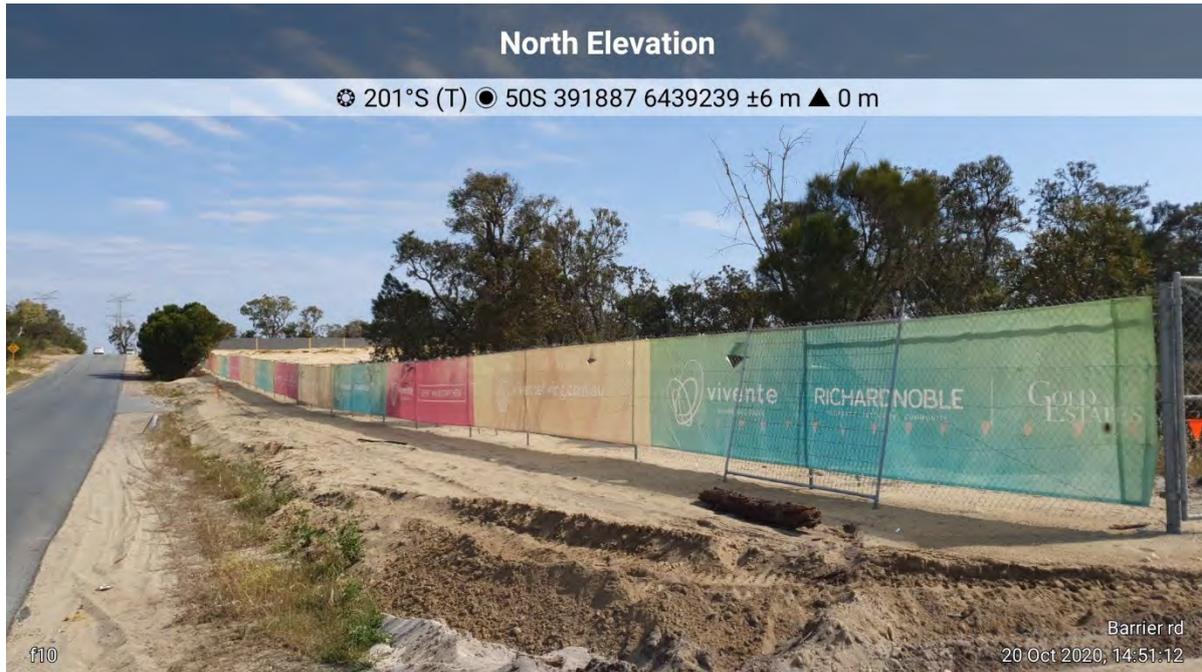


Photo ID: 1a (background)

| | | |
|------------------------------------|-------------------------|---|
| Plot number | | Plot 1 |
| Vegetation classification | Pre-development | Class D Scrub |
| | Post-development | Class D Scrub |
| Description / justification | | Banksia scrub vegetation with a continuous horizontal fuel profile between 2–6 m in height. |



Photo ID: 2a



Photo ID: 2b

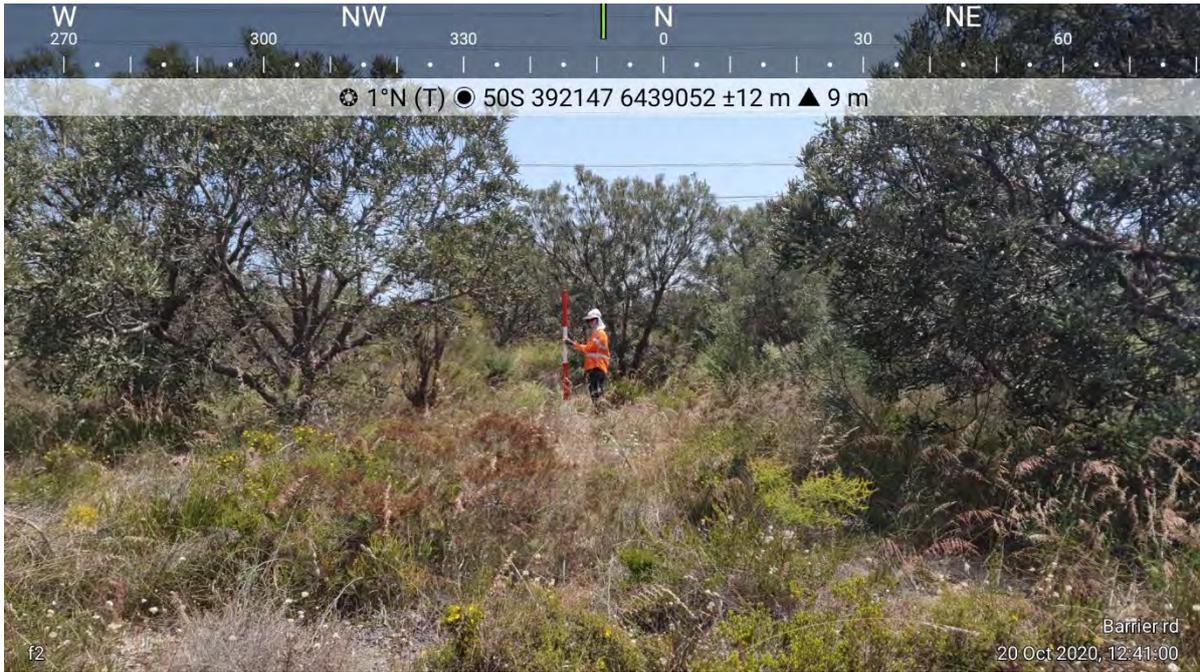
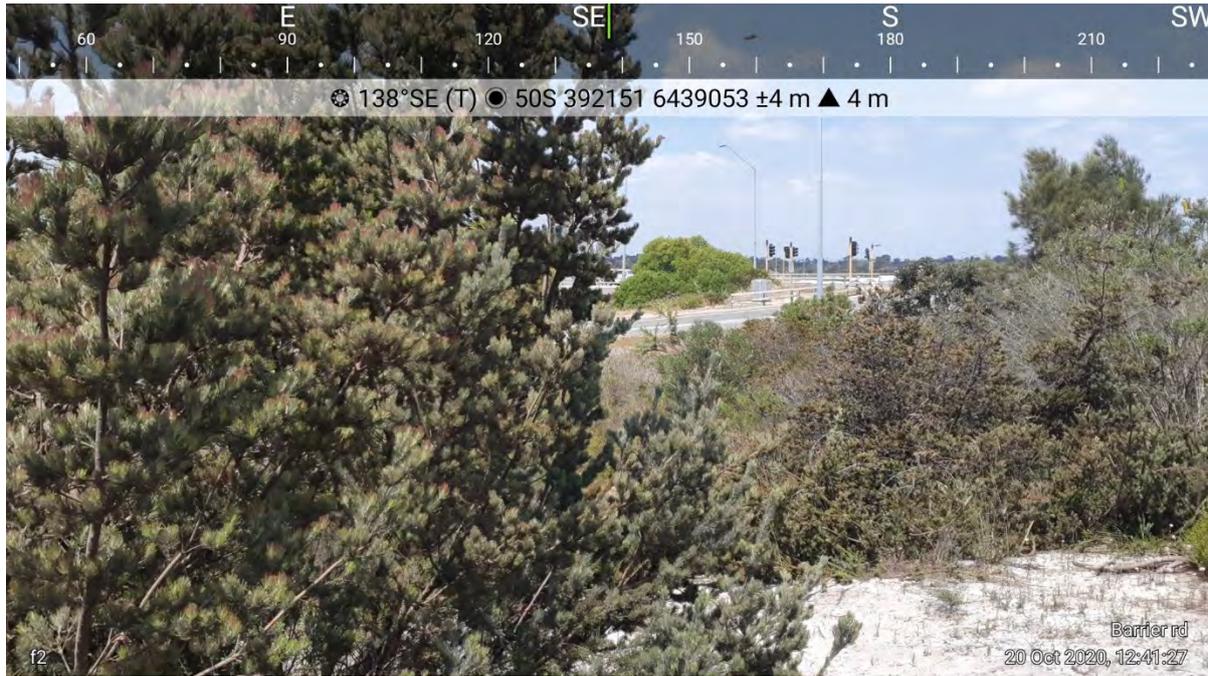


Photo ID: 2c



Photo ID: 2d

| | | |
|-----------------------------|------------------|---|
| Plot number | | Plot 2 |
| Vegetation classification | Pre-development | Class D Scrub |
| | Post-development | Class D Scrub |
| Description / justification | | Banksia scrub vegetation with a continuous horizontal fuel profile between 2–6 m in height. |



| | | |
|---|-------------------------|---------------|
| Photo ID: 3a | | |
| Plot number | Plot 3 | |
| Vegetation classification | Pre-development | Class D Scrub |
| | Post-development | Class D Scrub |
| Description / justification | | |
| Banksia scrub vegetation with a continuous horizontal fuel profile between 2–6 m in height. | | |

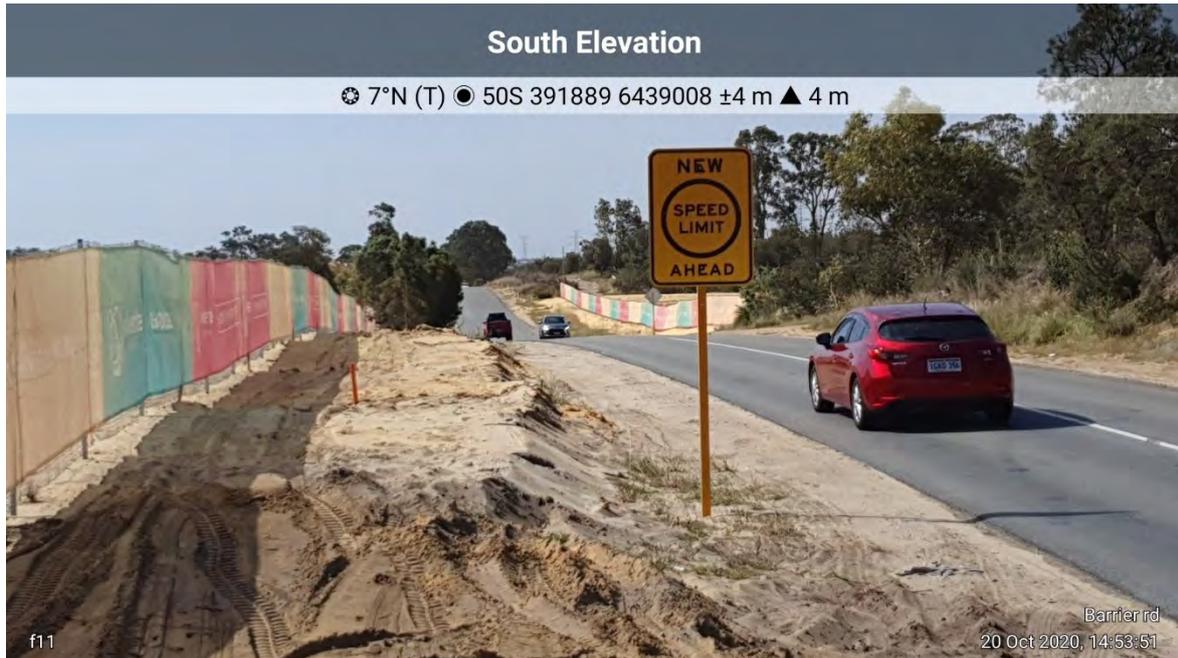


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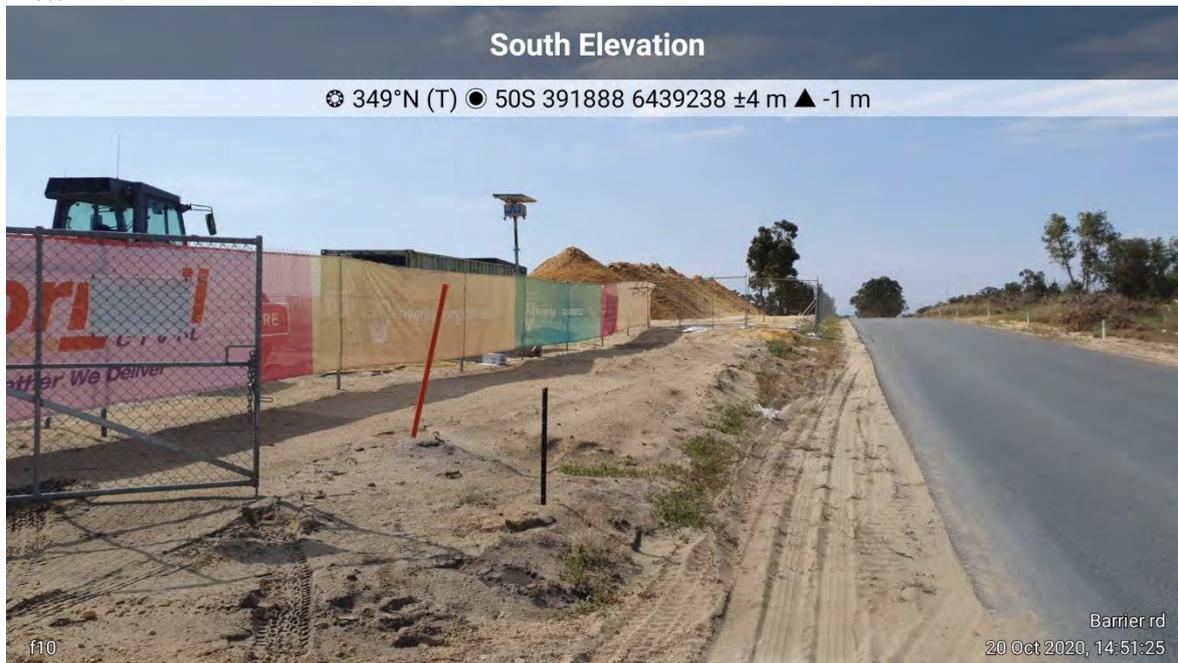


Photo ID: 4b

| | | |
|------------------------------------|--|--|
| Plot number | Plot 4 | |
| Vegetation classification | Pre-development | Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f]) |
| | Post-development | Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f]) |
| Description / justification | Low threat cultivated gardens and maintained lawns within surrounding properties and non-vegetated areas including roads, footpaths, driveways and building footprints | |



Photo ID: 5a



Photo ID: 5b



Photo ID: 5c (background)

| | | |
|------------------------------------|-------------------------|---|
| Plot number | | Plot 5 |
| Vegetation classification | Pre-development | Class D Scrub |
| | Post-development | Class D Scrub |
| Description / justification | | Banksia scrub vegetation with a continuous horizontal fuel profile between 2–6 m in height. |

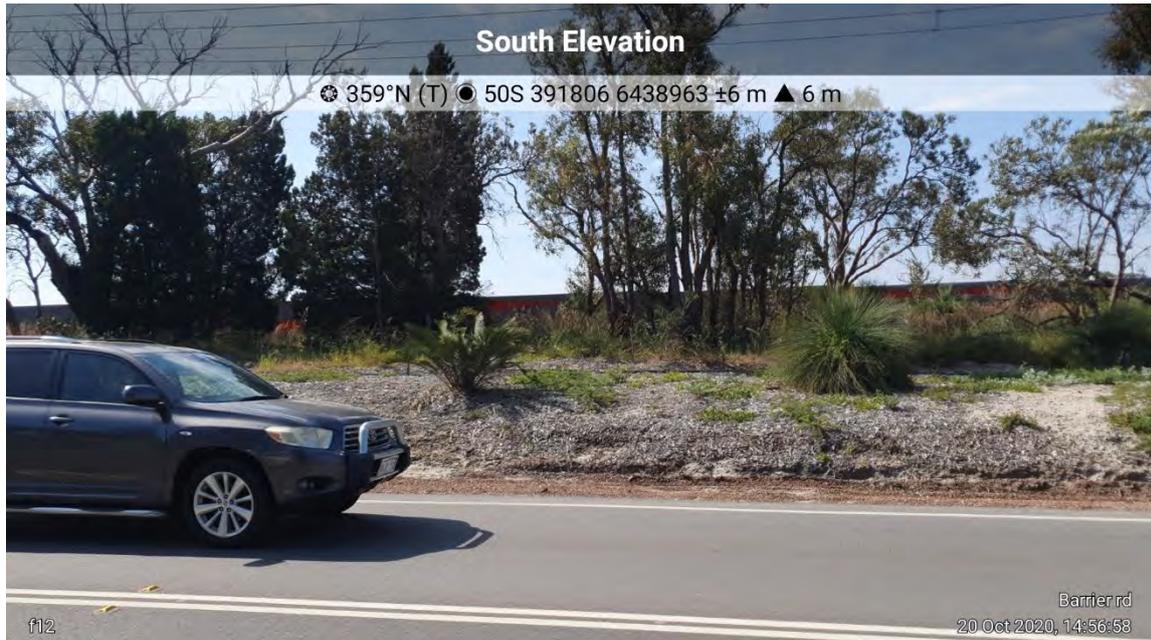


Photo ID: 6a (background)

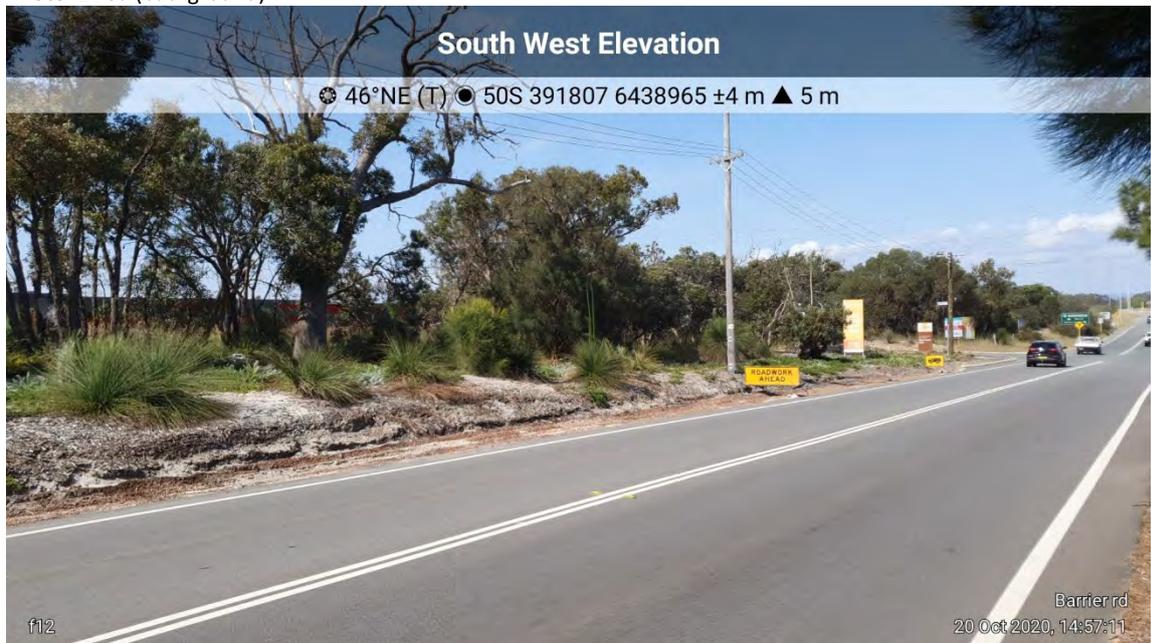


Photo ID: 6b (background)



Photo ID: 6c

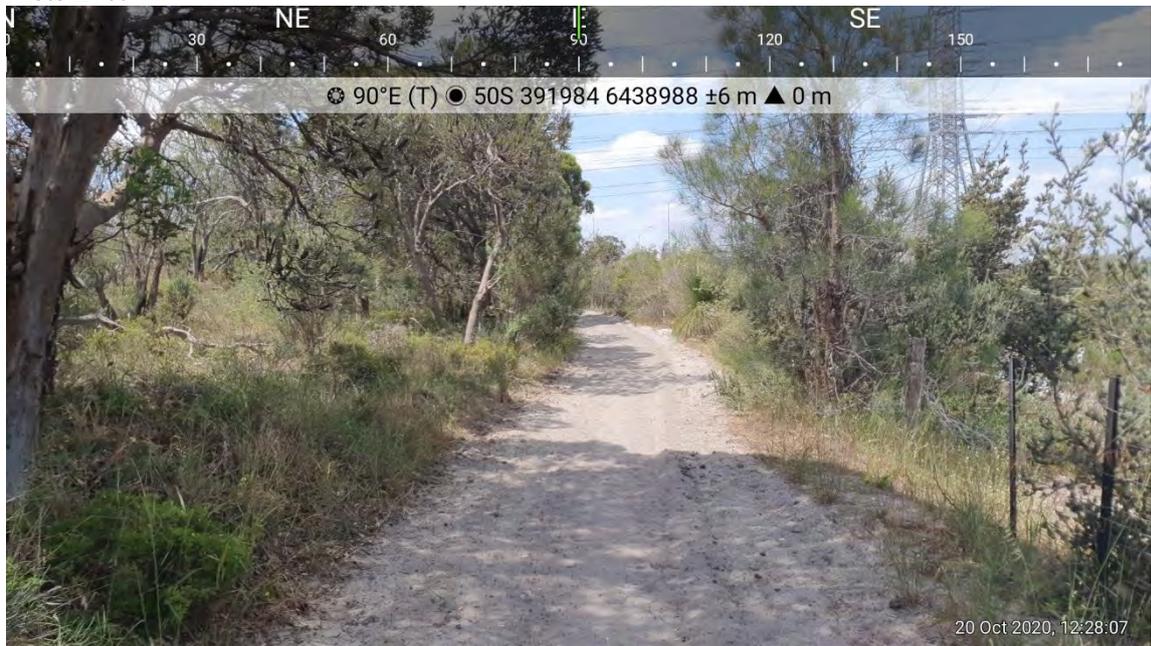


Photo ID: 6d

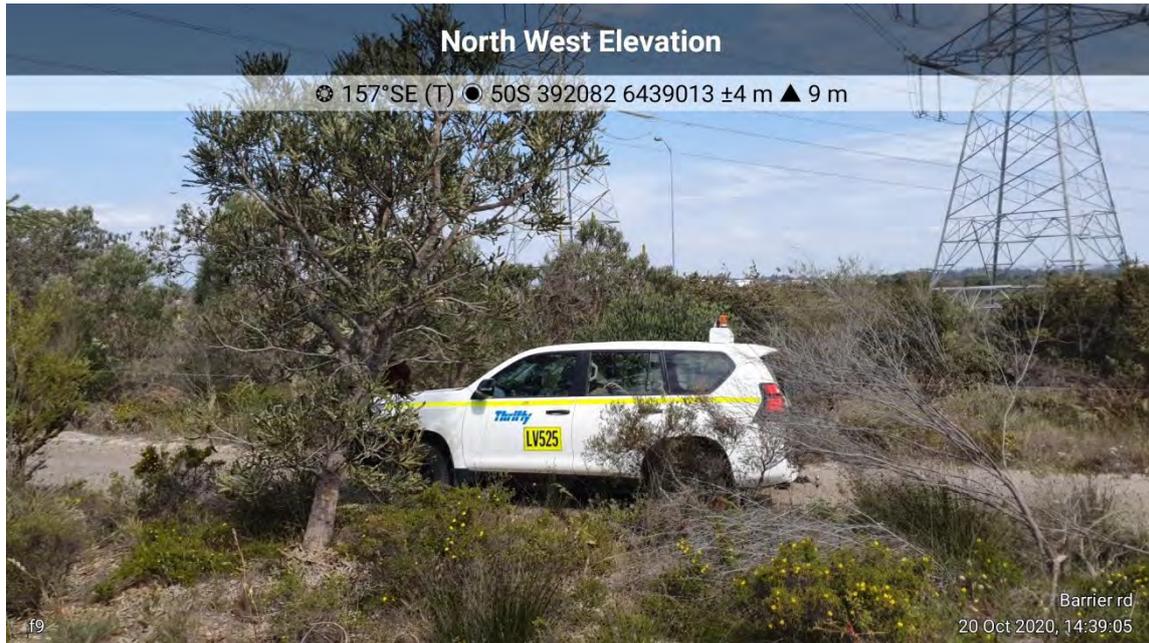


Photo ID: 6e

| | | |
|------------------------------------|-------------------------|---|
| Plot number | | Plot 6 |
| Vegetation classification | Pre-development | Class D Scrub |
| | Post-development | Class D Scrub |
| Description / justification | | Banksia scrub vegetation with a continuous horizontal fuel profile between 2–6 m in height. |



Photo ID: 7a

| | | |
|------------------------------------|---|-------------------------------|
| Plot number | | Plot 7 |
| Vegetation classification | Pre-development | Excluded – Clause 2.2.3.2 [c] |
| | Post-development | Excluded – Clause 2.2.3.2 [c] |
| Description / justification | Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other, or of other areas of vegetation being classified vegetation. | |

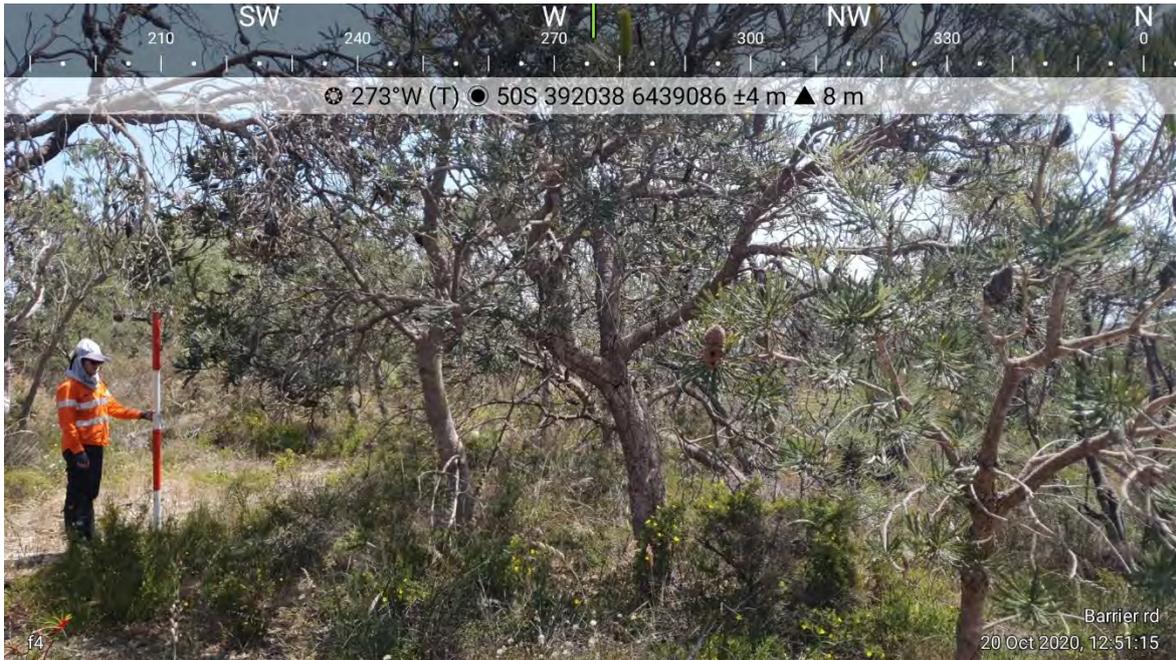


Photo ID: 8a

| | | |
|------------------------------------|-------------------------|--|
| Plot number | | Plot 8 |
| Vegetation classification | Pre-development | Class D Scrub |
| | Post-development | Modified to non-vegetated (exclusion 2.2.3.2 [e]) and/or low threat (exclusion 2.2.3.2 [f]) state |
| Description / justification | | Vegetation to be modified to a non-vegetated/low threat managed state as part of proposed development. |

Appendix D Vehicular access technical standards of the Guidelines

Acceptable Solution A3.1 – Public Roads

Explanatory Note E3.1

These Guidelines do not prescribe values for the trafficable (carriageway/pavement) width of public roads as they should be in accordance with the class of road as specified in the IPWEA Subdivision Guidelines, Liveable Neighbourhoods, Austroad Standards and/or any applicable standard in the local government area.

The IPWEA Subdivision Guidelines, Liveable Neighbourhoods, Austroad Standards do not prescribe a horizontal clearance. However, it is recommended that a traversable verge is provided to allow for emergency services vehicles to stop and operate on the side of the public road, specifically where the public road may traverse large areas of classified vegetation.

Where local government roads are proposed to be widened by the proponent, they must obtain approval from the local government.



Figure 20: Example of a public road

Source: *Guidelines for Planning in Bushfire Prone Areas (WAPC 2021)*

Acceptable Solution A3.2a – Multiple access routes

Explanatory Note E3.2a

Two-way public road access is public road access from a lot in at least two different directions to two suitable destinations, and provides residents and the community, as well as emergency services, with access and egress from both the subdivision and individual habitable buildings/development in the event of a bushfire emergency. A single road provides no alternative route if the access becomes congested or is unable to be traversed due to smoke and/or fallen trees during a bushfire.

Two-way public road access applies to access/egress routes leading into a subdivision, as well as those within a subdivision. A road that loops back onto itself does not constitute the option of two different directions.

Two-way public road access should always be the first option. Where the site is not able to achieve two-way access within 200 metres of the lot boundary, due to demonstrated site or environmental constraints, the proponent should identify options for an emergency access way from the subject site to a suitable destination. Where an emergency access way cannot be provided, the proponent should demonstrate compliance with the performance principle.

Subject sites or proposed lots greater than 200 metres from an intersection, which provides two-way access, do not satisfy the requirement for two-way access unless they meet the provisions which allow for no-through roads greater than 200 metres in A3.2a.

To demonstrate compliance with the performance principle for two-way access, the bushfire planning practitioner may have regard to:

- the extent of the bushfire hazard, location and vegetation classification, the likelihood, potential severity and impact of bushfire to the subject site and the road network;
- time between fire detection and the onset of conditions in comparison to travel time for the community to evacuate to a suitable destination;
- available access route(s) travelling towards a suitable destination; and
- turn-around area for a fire appliance for no-through roads.

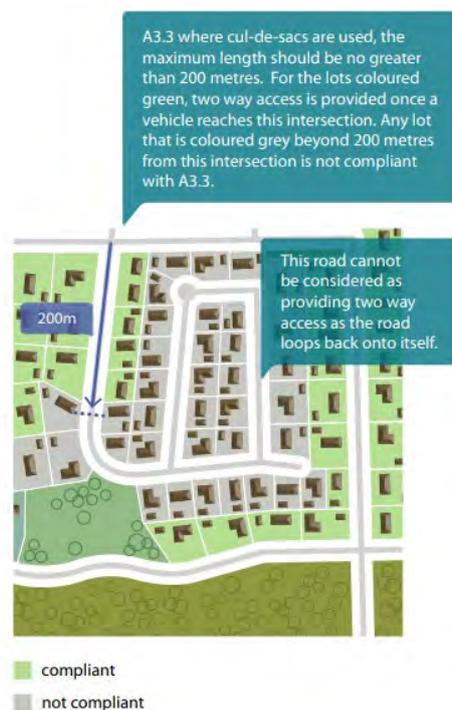


Figure 21: Example of compliant and non-compliant two-way

Source: *Guidelines for Planning in Bushfire Prone Areas (WAPC 2021)*

Acceptable Solution A3.3 – Through roads

Explanatory Note E3.3

In bushfire prone areas, a proposed structure plan or subdivision that incorporates no-through roads should be avoided because they do not provide a connected and legible design that allows for easy access and egress by the community, residents and emergency services in the event of a bushfire. No-through roads also reduce the options available for access and egress in the event of a bushfire emergency.

There will however be situations where a subject site is accessed via an existing or proposed no-through road and alternative access cannot be provided. In these situations, the proponent should demonstrate to the decision-maker, that all efforts have been made with the local government and/or adjoining landowners to secure alternative public road access or an emergency access way and that a redesign has been explored. The bushfire planning practitioner may need to develop a performance principle-based solution or address the non-compliance and demonstrate to the decisionmaker why discretion should be exercised in accordance with section 2.6 of these Guidelines.

No-through roads will only be considered an acceptable solution where it is demonstrated by the proponent, to the satisfaction of the decision maker, that a no through-road cannot be avoided due to site constraints. For example, the internal road design of a structure plan or subdivision where site constraints, such as a water body or Bush Forever, prevent the ability to create a through-road and a no through road may be a more appropriate road layout.

No-through roads should be a maximum of 200 metres from the lot(s) boundary to an intersection where two-way access is provided and may only exceed 200 metres if it meets the provisions which allow for no-through roads greater than 200 metres in A3.2a.

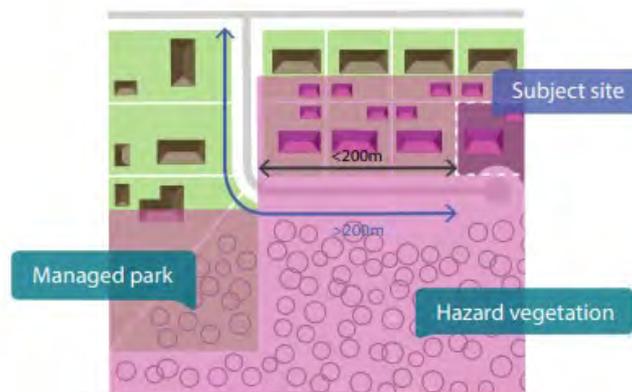


Figure 23: Example of a site on a no-through road greater than 200 metres from the intersection, but within 200 metres of BAL-LOW

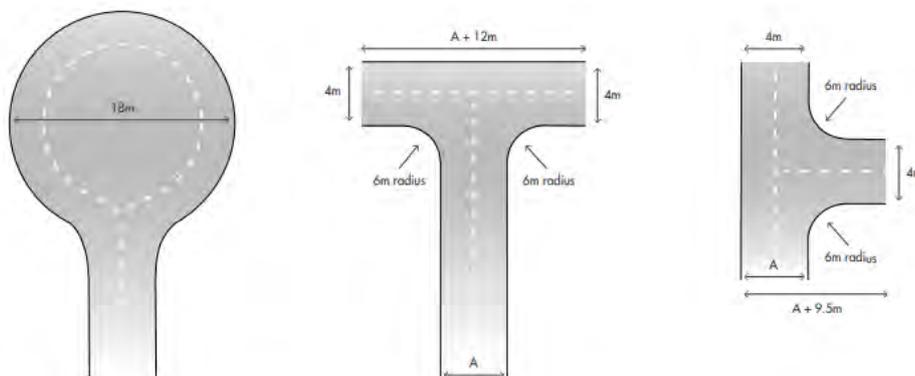


Figure 24: Turn-around area dimensions for a no-through road

Source: Guidelines for Planning in Bushfire Prone Areas (WAPC 2021)

Acceptable Solution A3.4a – Perimeter roads

Explanatory Note E3.4a

Where a planning proposal includes the creation of 10 or more lots adjacent to each other, which adjoin classified vegetation under AS 3959 with the exception of Class G Grassland, as part of a greenfield development or large urban infill site, hazard separation and defendable space should be provided in the form of a perimeter road. Greenfield is ‘undeveloped or minimally developed areas that have been identified for urban development’; and urban infill is ‘the redevelopment of existing urban areas at a higher density than currently exists’. The creation of 10 or more lots includes cumulative subdivision applications where the subdivision application may be part of a staged subdivision.

A perimeter road should be in accordance with the class of road as specified in the IPWEA Subdivision Guidelines, Liveable Neighbourhoods, Austroad Standards and/or any applicable standard in the local government area as per the requirements of a public road in Table 6, Column 1.

As the road is likely to function as a key neighbourhood distributor, or similar, consideration should be given to the provision of additional width to allow for emergency services vehicles to stop and operate on the side of the perimeter road, whilst simultaneously proving for the evacuation of the community (Figure 20).

When designing a strategic planning proposal and/or subdivision, creating a large setback between classified vegetation and proposed lots with a perimeter road, and orientating habitable buildings to front onto (rather than back onto) areas of vegetation has many benefits, including:

- passive surveillance;
- defendable space for firefighting and emergency management purposes;
- reducing the potential radiant heat that may impact a habitable building in a bushfire event;
- reducing the need for battle-axe lots; and
- unconstrained public access/egress for the community in the event of a bushfire.

In developments where no perimeter road exists, property defence in a bushfire event is difficult and can be impossible. Where proposed lots have frontage to an existing public road and abut the hazard at the rear or side, it may be an undesirable planning outcome to create lots which front the existing public road and back onto a perimeter road. In this instance, consideration should be given to a fire service access route. Refer to E3.4b below.

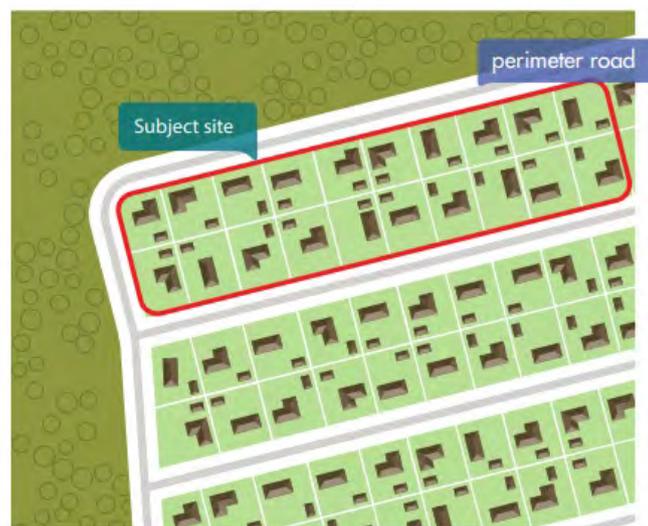


Figure 25: Example of a perimeter road

Source: *Guidelines for Planning in Bushfire Prone Areas (WAPC 2021)*

| Technical requirement | 1 | 2 | 3 | 4 |
|--|---|-----------------------------------|--|---|
| | Public road | Emergency access way ¹ | Fire service access route ¹ | Battle-axe and private driveways ² |
| Minimum trafficable surface (m) | In accordance with A3.1 | 6 | 6 | 4 |
| Minimum horizontal clearance (m) | N/A | 6 | 6 | 6 |
| Minimum vertical clearance (m) | 4.5 | 4.5 | 4.5 | 4.5 |
| Minimum weight capacity (t) | 15 | 15 | 15 | 15 |
| Maximum grade unsealed road ³ | As outlined in the IPWEA Subdivision Guidelines | 1:10 (10%, 6°) | 1:10 (10%, 6°) | 1:10 (10%, 6°) |
| Maximum grade sealed road ³ | | 1:7 (14.3%, 8°) | 1:7 (14.3%, 8°) | 1:7 (14.3%, 8°) |
| Maximum average grade sealed road | | 1:10 (10%, 6°) | 1:10 (10%, 6°) | 1:10 (10%, 6°) |
| Minimum inner radius of road curves (m) | | 8.5 | 8.5 | 8.5 |

¹ To have crossfalls between 3 and 6%

² Where driveways and battle-axe legs are not required to comply with the widths in A3.5 or A3.6, they are to comply with the Residential Design Codes and Development Control Policy 2.2 Residential Subdivision

³ Dips must have no more than a 1 in 8 (12.5% -7.1 degree) entry and exit angle.

Appendix E City of Cockburn Firebreak Notice



Aboriginal and Torres Strait Islander people are warned that this website may contain images and voices of deceased persons.

Firebreaks and Burning Off

Find on this page

Firebreaks

Maximum height of flammable materials

Burning off

Firebreaks

A firebreak is an area where flammable material (such as wood, leaves and grass) has been cleared to minimise the spread of fire and also provides vehicle access.

Firebreak requirements

Properties over 4,047m² require a firebreak under the City's Fire Control Order. Firebreaks must be put in place by 1 November each year and maintained to 15 April. Extensions will not be granted.

Important note: If you receive a letter from the City outlining works you need to undertake to reduce fire risks, you must comply with the advice before the due date or a contractor will be appointed by the City.

Need help with your firebreak? Visit the [Yellow Pages](#) for firebreak contractors.

Firebreak inspections by the City

Firebreak inspections of private property commenced in November 2019 and is ongoing. We have had high levels of compliance within the rural areas, which shows strong community understanding of the impending dangers from bushfires through summer. Since November 2019 the City has issued 48 infringements relating to failure to comply with our Fire Control Order. Most of these infringements were issued to owners of blocks within residential areas.

Fire Control Order Variations

If you cannot comply with the above requirements you can complete the online firebreak variation application form.

Firebreak Variation Application Form

Approved: You must comply with the conditions of the approved variation.

Not approved: You must comply with the requirements of the Fire Control Order.

Maximum height of flammable materials is 50mm

All flammable materials such as dry grass and weeds must be slashed, mown or trimmed down to a maximum height of 50mm across the entire property (vacant or developed land less than 4,047m²) and all dead vegetation must be removed. This must be put in place by 1 November each year and maintained to 15 April.

Burning off

No fire may be lit on a day when the fire danger is declared as very high, severe, extreme or catastrophic. You cannot undertake any activities that have the potential to start a fire during a total fire ban. Heavy penalties may apply. To determine the current fire danger level, ring 1196.

Burning vegetation on land that is being cleared for development is an offence under the *Environmental Protection Act 1986*. No burning permit will be issued and the vegetation must be disposed of by other means.

You are not permitted to burn at any time in areas not zoned rural.

In areas zoned as rural, the restricted burning period is between 1 April - 31 May and 1 October - 30 November. During this time, you will need to obtain a Permit to Set Fire to the Bush from the City of Cockburn before starting any burning. The unrestricted burning period is between 1 June - 30 September and you do not need a burning permit. Between 1 December - 31 March no burning is permitted unless declared otherwise by the Minister of Fire and Emergency Services or the City's Chief Bush Fire Control Officer.

Please note these periods can vary at Council's discretion.

Rural burning of bush and scrub no larger than 1m³

You can burn off tree branches and leaves without a permit during the restricted burning period.

The below rules apply:

- Light the fire between 6pm and 11pm and have it put out before midnight
- Notify your neighbours
- Have a clear area around the fire area of five metres
- Have equipment on hand to control the fire (i.e. a garden hose)

- One person remains onsite for the entire time the fire is lit
- The area to be lit up is no larger than 1m³ and does not contain materials such as plastics or wet lawn clippings that may produce offensive smoke.

If you cannot meet these requirements, you will need to dispose of the materials by other means or obtain a valid Permit to Set Fire to the Bush from a City of Cockburn Fire Control Officer.

Rural burning of bush or scrub larger than 1m³

You will need to obtain a Permit to Set Fire to the Bush.

Residents can obtain as many permits as required to conduct bushfire hazard reduction on their property. If you are unable to meet the requirements of the Permit to Set Fire to the Bush, you must discuss this with the fire control officer at the time of issue. You may receive a penalty if you fail to comply. If you are unable to meet the requirements of your fire permit, it is an offence to approach another fire control officer for a new permit.

More information and contact

Please contact the City's Fire and Emergency Management area for more information on firebreaks and burning permits on 08 9411 3444 or at customer@cockburn.wa.gov.au

Related Pages

Contacts for Fire and Emergencies

Building in Bushfire Prone Areas

Proposed Prescribed Burning Areas

Water Supplies for Fire Fighting

Fire Control Order

Home Emergency Plan

Cockburn Emergency Management Plans

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Document Status

| Report version | Rev No. | Purpose | Author | Reviewed and Approved for Issue | |
|----------------|---------|--|-------------------------------------|-------------------------------------|-------------------|
| | | | | Name | Date |
| Draft Report | Rev A | Draft for client review | Carli O'Brien | Linden Wears (BPAD 19809, Level 3) | 23 March 2021 |
| Final Report | Rev 0 | Final for submission | Carli O'Brien | Zac Cockerill (BPAD 37803, Level 2) | 14 May 2021 |
| Final Report | Rev 1 | Issued for use: to address revised subdivision design | Kaitlin Southgate | Zac Cockerill (BPAD 37803, Level 2) | 24 September 2021 |
| Final Report | Rev 2 | Issued for use: to address revised subdivision design | Kaitlin Southgate | Zac Cockerill (BPAD 37803, Level 2) | 7 December 2021 |
| Final Report | Rev 3 | Issued for use: to address revised subdivision design | Jasmin Culverwell | Zac Cockerill (BPAD 37803, Level 2) | 4 February 2022 |
| Final Report | Rev 4 | Issued for use: to address revised subdivision design and agency comments | Zac Cockerill (BPAD 37803, Level 2) | Zac Cockerill (BPAD 37803, Level 2) | 6 July 2022 |
| Final Report | Rev 5 | Issued for use: updated consistent with revised subdivision design and agency comments | Zac Cockerill (BPAD 37803, Level 2) | Zac Cockerill (BPAD 37803, Level 2) | 21 July 2023 |
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| Final Report | Rev 8 | Issued for use: updated to address final agency modifications | Zac Cockerill (BPAD 37803, Level 2) | Zac Cockerill (BPAD 37803, Level 2) | 16 January 2024 |

APPENDIX 5

Acoustic Report



**PROPOSED
SUBDIVISION PLAN
LOT 301 BARFIELD ROAD, HAMMOND PARK**

**ROAD TRAFFIC (SPP 5.4)
NOISE MANAGEMENT PLAN**

MARCH 2021

OUR REFERENCE: 27496-8-21040



DOCUMENT CONTROL PAGE

ACOUSTIC ASSESSMENT
PROPOSED SUBDIVISION PLAN
HAMMOND PARK

Job No: 21040

Document Reference: 27496-8-21040

FOR
BLOKK PROPERTY AUSTRALIA

DOCUMENT INFORMATION

| | | | |
|------------------------|---------------|--------------------|--------------|
| Author: | Paul Daly | Checked By: | Tim Reynolds |
| Date of Issue : | 31 March 2021 | | |

REVISION HISTORY

| Revision | Description | Date | Author | Checked |
|----------|-------------------------------|------------|--------|---------|
| 1 | Updated Plan | 14/05/2021 | PLD | |
| 2 | Revised Lot Layout | 16/08/2021 | PLD | |
| 3 | Client Comments | 27/08/2021 | PLD | |
| 4 | Revised Subdivision Plan | 08/12/2021 | PLD | |
| 5 | Amendment to Subdivision Plan | 03/02/2022 | PLD | |
| 6 | MRWA Comments addressed | 30/06/2022 | PLD | |
| 7 | Revised Subdivision Plan | 20/07/2023 | PLD | |

DOCUMENT DISTRIBUTION

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| 4. | MODELLING | 5 |
| 5. | TRAFFIC NOISE ASSESSMENT | 6 |

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| B | Noise Contour Plots |
| C | Quiet House Design Noise Contour Plot |
| D | “Quiet House” Design – General Information |
| E | Traffic Volumes |

EXECUTIVE SUMMARY

Herring Storer Acoustics were commissioned by Blokk Property Australia to carry out an acoustical assessment of noise received for the proposed Subdivision Plan of the development located at Lot 301 Barfield Road, Hammond Park.

Under the Western Australian Planning Commission (WAPC) Planning Policy 5.4 “Road and Rail Noise” (SPP 5.4), the appropriate criteria for assessment for this development are:

EXTERNAL

- L_{Aeq}(Day) of 55 dB(A);
- L_{Aeq}(Night) of 50 dB(A).

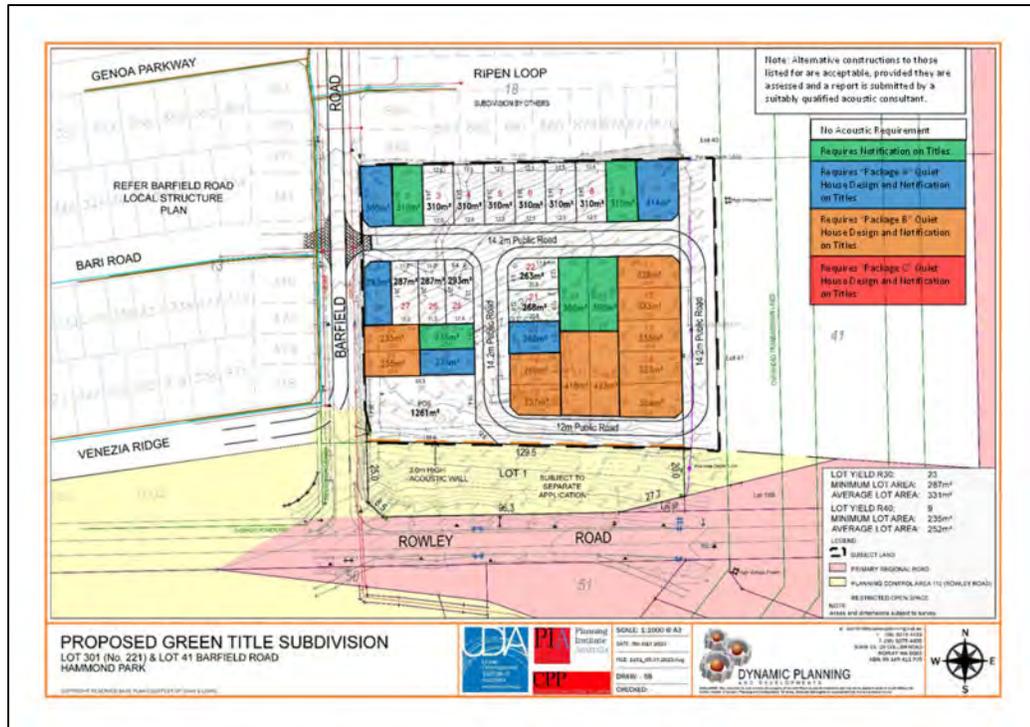
INTERNAL

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

Additional to the above, noise received at an outdoor living area should also be reduced as far as practicable, with an aim of achieving an L_{Aeq} of 50 dB(A) during the night period.

Therefore, to comply with the Policy, the following have been provided:

- Noise Wall, 3m High (minimum surface density of 15kg/m²)
- Quiet House Design Package A and B.



Any lots exceeding the 55 dB(A) day target criteria would require notification on Titles.

1. INTRODUCTION

Herring Storer Acoustics were commissioned by Blokk Property Australia to carry out an acoustical assessment of noise received for the proposed Subdivision Plan of the development located at Lot 301 Barfield Road, Hammond Park.

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

- Determine by noise modelling the noise that would be received at proposed residences within this subdivision from vehicles travelling on the roadways (Rowley Road and Kwinana Freeway) for the future, for both the current and possible future road alignment.
- Assess the predicted noise levels for compliance with the appropriate criteria.
- Provide detailed information as to noise control requirements such as quiet house design, noise walls and notification on titles in the form of this Noise Management Plan.

The proposed subdivision is shown in Figure 1.1 below.



FIGURE 1.1 - SUBDIVISION LOCATION PLAN

2. CRITERIA

2.1 ROAD TRAFFIC NOISE

The Western Australian Planning Commission (WAPC) released on 6th September 2019 State Planning Policy 5.4 “Road and Rail Noise”. The requirements of State Planning Policy 5.4 are outlined below.

POLICY APPLICATION (Section 4)

When and where it applies (Section 4.1)

SPP 5.4 applies to the preparation and assessment of planning instruments, including region and local planning schemes; planning strategies, structure plans; subdivision and development proposals in Western Australia, where there is proposed:

- a) noise-sensitive land-use within the policy’s trigger distance of a transport corridor as specified in **Table 1**;
- b) New or major upgrades of roads as specified in **Table 1** and maps (**Schedule 1,2 and 3**); or
- c) New railways or major upgrades of railways as specified in maps (**Schedule 1, 2 and 3**); or any other works that increase capacity for rail vehicle storage or movement and will result in an increased level of noise.

Policy trigger distances (Section 4.1.2)

Table 1 identifies the State’s transport corridors and the trigger distances to which the policy applies.

The designation of land within the trigger distances outlined in **Table 1** should not be interpreted to imply that land is affected by noise and/or that areas outside the trigger distances are un-affected by noise.

Where any part of the lot is within the specified trigger distance, an assessment against the policy is required to determine the likely level of transport noise and management/mitigation required. An initial screening assessment (**guidelines: Table 2: noise exposure forecast**) will determine if the lot is affected and to what extent.”

TABLE 1: TRANSPORT CORRIDOR CLASSIFICATION AND TRIGGER DISTANCES

| Transport corridor classification | Trigger distance | Distance measured from |
|---|-------------------------|---------------------------------|
| Roads | | |
| Strategic freight and major traffic routes Roads as defined by Perth and Peel Planning Frameworks and/or roads with either 500 or more Class 7 to 12 Austroads vehicles per day, and/or 50,000 per day traffic volume | 300 metres | Road carriageway edge |
| Other significant freight/traffic routes These are generally any State administered road and/or local government road identified as being a future State administered road (red road) and other roads that meet the criteria of either >=23,000 daily traffic count (averaged equivalent to 25,000 vehicles passenger car units under region schemes) | 200 metres | Road carriageway edge |
| Passenger railways | | |
| | 100 metres | Centreline of the closest track |
| Freight railways | | |
| | 200 metres | Centreline of the closest track |

Proponents are advised to consult with the decision making authority as site specific conditions (significant differences in ground levels, extreme noise levels) may influence the noise mitigation measures required, that may extend beyond the trigger distance.

POLICY MEASURES (Section 6)

The policy applies a performance-based approach to the management and mitigation of transport noise. The policy measures and resultant noise mitigation will be influenced by the function of the transport corridor and the type and intensity of the land-use proposed. Where there is risk of future land-use conflict in close proximity to strategic freight routes, a precautionary approach should be applied. Planning should also consider other broader planning policies. This is to ensure a balanced approach takes into consideration reasonable and practical considerations.

Noise Targets (Section 6.1)

Table 2 sets out noise targets that are to be achieved by proposals under which the policy applies. Where exceeded, an assessment is required to determine the likely level of transport noise and management/mitigation required.

In the application of the noise targets the objective is to achieve:

- *indoor noise levels as specified in **Table 2** in noise sensitive areas (for example, bedrooms and living rooms of houses, and school classrooms); and*
- *a reasonable degree of acoustic amenity for outdoor living areas on each residential lot. For non-residential noise-sensitive developments, for example schools and child care centres the design of outdoor areas should take into consideration the noise target.*

It is recognised that in some instances, it may not be reasonable and/or practicable to meet the outdoor noise targets. Where transport noise is above the noise targets, measures are expected to be implemented that balance reasonable and practicable considerations with the need to achieve acceptable noise protection outcomes.

TABLE 2: NOISE TARGETS

| Proposals | New/Upgrade | Noise Targets | | |
|---|--|--|--|---|
| | | Outdoor | | Indoor |
| | | Day (L _{Aeq} (Day) dB) (6 am-10 pm) | Night (L _{Aeq} (Night) dB) (10 pm-6 am) | (L _{Aeq} dB) |
| Noise-sensitive land-use and/or development | New noise sensitive land use and/or development within the trigger distance of an existing/proposed transport corridor | 55 | 50 | L _{Aeq} (Day) 40(Living and work areas) L _{Aeq} (Night) 35 (bedrooms) |
| Roads | New | 55 | 50 | N/A |
| | Upgrade | 60 | 55 | N/A |
| Railways | New | 55 | 50 | N/A |
| | Upgrade | 60 | 55 | N/A |

Notes:

- *The noise target is to be measured at one metre from the most exposed, habitable façade of the proposed building, which has the greatest exposure to the noise-source. A habitable room has the same meaning as defined in State Planning Policy 3.1 Residential Design Codes.*
- *For all noise-sensitive land-use and/or development, indoor noise targets for other room usages may be reasonably drawn from Table 1 of Australian Standard/New Zealand Standard AS/NZS 2107:2016 Acoustics – Recommended design sound levels and reverberation times for building interiors (as amended) for each relevant time period.*
- *The 5dB difference in the criteria between new and upgrade infrastructure proposals acknowledges the challenges in achieving noise level reduction where existing infrastructure is surrounded by existing noise-sensitive development.*
- *Outdoor targets are to be met at all outdoor areas as far as is reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines. For example, it is likely unreasonable for a transport infrastructure provider to achieve the outdoor targets at more than 1 or 2 floors of an adjacent development with direct line of sight to the traffic.*

Noise Exposure Forecast (Section 6.2)

*When it is determined that SPP 5.4 applies to a planning proposal as outlined in Section 4, proponents and/or decision makers are required to undertake a preliminary assessment using **Table 2**: noise exposure forecast in the guidelines. This will provide an estimate of the potential noise impacts on noise-sensitive land-use and/or development within the trigger distance of a specified transport corridor. The outcomes of the initial assessment will determine whether:*

- *no further measures is required;*
- *noise-sensitive land-use and/or development is acceptable subject to deemed-to-comply mitigation measures; or*
- *noise-sensitive land-use and/or development is not recommended. Any noise-sensitive land-use and/or development is subject to mitigation measures outlined in a noise management plan.”*

3. MONITORING

Noise monitoring of the current road system would not be representative of the future traffic flow and alignment. Therefore, other means of calibration for the predictive noise model were used, with these discussed further in the report.

4. MODELLING

To determine the requirements of any noise amelioration, acoustic modelling was carried out using the computer program ‘SoundPlan’. Acoustic modelling was carried out for road traffic flows 20 years in the future.

TABLE 5.1 - NOISE MODELLING INPUT DATA

| Parameter | Rowley Road | | Kwinana Freeway | |
|---------------------|----------------------------|-------------------------|----------------------------|-------------------------|
| | Current Count 2020/2021 | Future 2041 | Current Count 2020/2021 | Future 2041 |
| Traffic flows VPD | 9,450 | 25,858 | 91,042 | 130,000 |
| Heavy Vehicles (%) | 17.4% | 10.0% | 13.6% | 13.6 |
| Traffic Speed km/hr | 70 | 70 | 100 | 100 |
| Road Surface | Dense Graded Asphalt | Dense Graded Asphalt | Dense Graded Asphalt | Dense Graded Asphalt |
| Façade Correction | +2.5 | +2.5 | +2.5 | +2.5 |

Other input data for the model included:

- Traffic data from MRWA (<https://mrapps.mainroads.wa.gov.au/TrafficMap/>) Attached in Appendix E.
- Noise source heights for the three road source strings (Passenger Vehicles, Heavy Vehicles Engine and Heavy Vehicle Exhausts) are +0.5, +1.5 and +3.6m, with a noise correction of -0.8 and -8.0 applied to the heavy vehicles engine and exhaust noise sources.
- Topographical data, with the ground level within the development based on natural ground levels as per surveys conducted.
- A +2.5 dB adjustment to allow for façade reflection.
- Development receiver heights at 1.4m above ground level.
- Future buildings and noise walls located on the proposed development (assumed to be present for future road traffic volumes).

To determine the noise that would be received within the development from the surrounding road network, acoustic modelling was carried out using the computer program ‘SoundPlan’.

The following scenarios were modelled:

1. Future traffic volumes, without any noise amelioration.
2. Future traffic volumes, with a wall on the development boundary and future built-form housing, as outlined below.

To establish the height of the noise wall and the effect it had on the required quiet house design packages, for Scenario 2, a 3m wall was adopted. This is also consistent with adjoining Estates.

5. TRAFFIC NOISE ASSESSMENT

Under the WAPC State Planning Policy 5.4, for this development, the Noise Targets as listed in Table 2 are the appropriate noise levels to be achieved. Based on the noise monitoring, the difference between the $L_{Aeq(16hr)}$ and the $L_{Aeq(8hr)}$ would be greater than 5 dB(A). Therefore, the day period would be the critical period for compliance and if compliance with the day period noise limit is achieved, then compliance with the night period noise limits would also be achieved. The policy states that the outdoor criteria applies to the ground floor level only, however, it also states that noise mitigation measures should be implemented with a view to achieving the target levels in least one outdoor living area.

For residential premises, the Policy states that residence should be designed to meet the following acceptable internal noise levels:

| | |
|-----------------------|------------------------------|
| Living and Work Areas | $L_{Aeq(Day)}$ of 40 dB(A) |
| Bedrooms | $L_{Aeq(Night)}$ of 35 dB(A) |

The results of the acoustic assessment indicate that noise received at the ground floor level of residences located adjacent to Rowley Road, could exceed the above acoustic criteria. In the worst-case location, the level of exceedance would be approximately 17 dB(A). Table 5.1 details the noise level at the building envelop for each proposed development Lot and the "Quiet House" design package required to achieve compliance. Figure 5.1 showing the location map of the receivers.



FIGURE 5.1 - RECEIVER LOCATION PLAN

TABLE 5.1 – DEVELOPMENT NOISE LEVELS

| Location | Scenario 2 Future Traffic Volumes (Future Road Alignment) 3.0 High Noise Wall | Scenario 2 Package Requirements (Based on Concept Lot Design) |
|----------|---|---|
| | L _{AeqDay} | |
| Lot 1 | 56 | N,A |
| Lot 2 | 55 | N |
| Lot 3 | 54 | Nil |
| Lot 4 | 54 | Nil |
| Lot 5 | 54 | Nil |
| Lot 6 | 54 | Nil |
| Lot 7 | 54 | Nil |
| Lot 8 | 54 | Nil |
| Lot 9 | 55 | N |
| Lot 10 | 57 | N,A |
| Lot 11 | 60 | N,B |
| Lot 12 | 61 | N,B |
| Lot 13 | 62 | N,B |
| Lot 14 | 62 | N,B |
| Lot 15 | 62 | N,B |
| Lot 16 | 62 | N,B |
| Lot 17 | 62 | N,B |
| Lot 18 | 61 | N,B |
| Lot 19 | 60 | N,B |
| Lot 20 | 56 | N,A |
| Lot 21 | 54 | Nil |
| Lot 22 | 53 | Nil |
| Lot 23 | 55 | N |
| Lot 24 | 55 | N |
| Lot 25 | 54 | Nil |
| Lot 26 | 52 | Nil |
| Lot 27 | 52 | Nil |
| Lot 28 | 59 | N,A |
| Lot 29 | 62 | N,B |
| Lot 30 | 55 | N |
| Lot 31 | 62 | N,B |
| Lot 32 | 57 | N,A |

Nil No Requirements
 N Notification on Title
 A Package A Quiet House Design
 B Package B Quiet House Design
 C Package C Quiet House Design

Therefore, to comply with the Policy, the following have been provided:

- Noise Wall, 3m High (minimum surface density of 15kg/m²)
- Quiet House Design Package A and B.

Any lots exceeding the 55 dB(A) day target criteria would require notification on Titles.

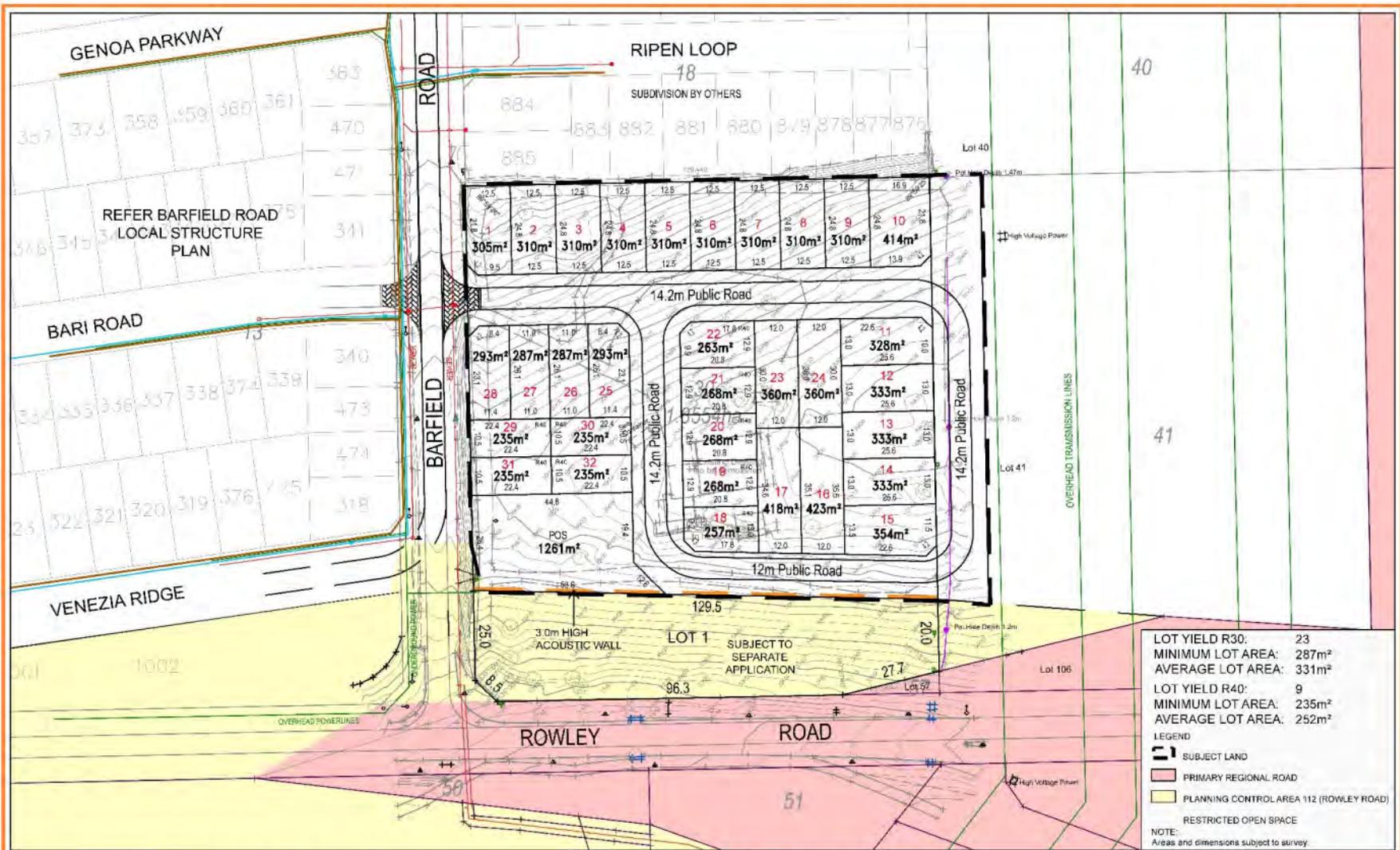
Information on the deemed to satisfy constructions for the various "Quiet House Design" packages are contained in Appendix D.

Notes:

- 1 Given the location of the development and the projected market, we understand that 2 storey residences are unlikely, hence the "Quiet House" Design packages stated are for single storey residence only. If double storey residences are proposed, then it is recommended that specialist acoustic advice be sought by the proponent.
- 2 We understand that the development is a Proposed Local Structure Plan stage, hence the information contained in Appendix C regarding areas requiring "Quiet House" design will need to be refined once the lots have been defined and final heights are established. Additionally, any modifications to the Structure Plan, would vary the noise mitigation requirements relating "Quiet House" design outlined in Appendix C.
- 3 The summary of the Quiet House Design Packages attached in Appendix C and D, are "Deemed to Satisfy" constructions. Alternative constructions would be acceptable, provided they are supported by an acoustic report prepared by a suitably qualified acoustic consultant.
- 4 Quiet House Design requirements are likely to lessen for residential premises set back from the highway, as the façade residences will barrier those behind.
- 5 Additionally, these residences also require Notifications on Titles.

APPENDIX A

PROPOSED SUBDIVISION PLAN

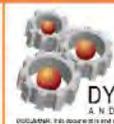
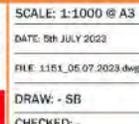


| | |
|---|---|
| LOT YIELD R30: | 23 |
| MINIMUM LOT AREA: | 287m ² |
| AVERAGE LOT AREA: | 331m ² |
| LOT YIELD R40: | 9 |
| MINIMUM LOT AREA: | 235m ² |
| AVERAGE LOT AREA: | 252m ² |
| LEGEND | |
| | SUBJECT LAND |
| | PRIMARY REGIONAL ROAD |
| | PLANNING CONTROL AREA 112 (ROWLEY ROAD) |
| | RESTRICTED OPEN SPACE |
| NOTE: Areas and dimensions subject to survey | |

PROPOSED GREEN TITLE SUBDIVISION

LOT 301 (No. 221) & LOT 41 BARFIELD ROAD
HAMMOND PARK

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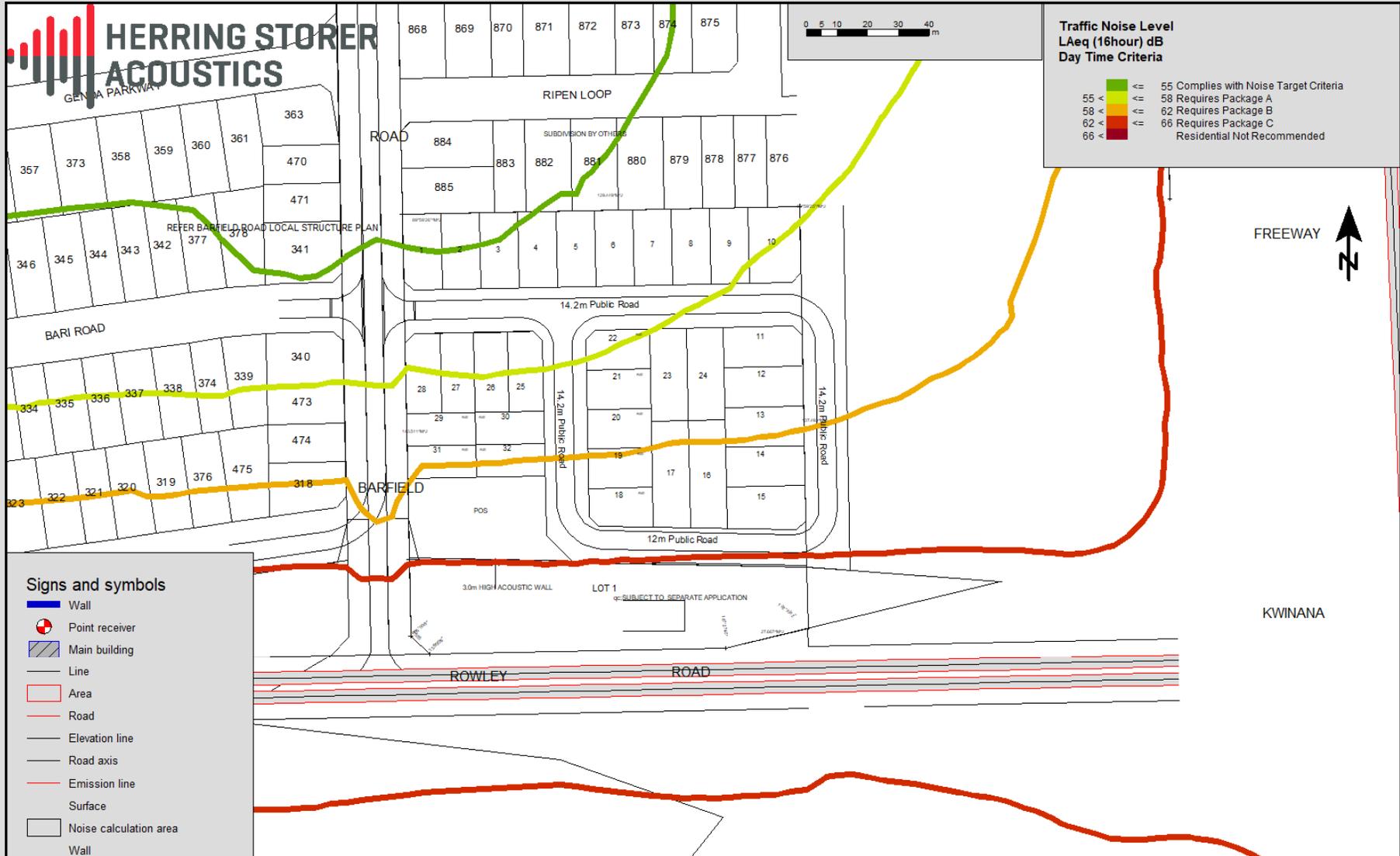
APPENDIX B

NOISE CONTOUR PLOTS



**Traffic Noise Level
LAeq (16hour) dB
Day Time Criteria**

| | | |
|------|---|--|
| 55 < | < | 55 Complies with Noise Target Criteria |
| 58 < | < | 58 Requires Package A |
| 62 < | < | 62 Requires Package B |
| 66 < | < | 66 Requires Package C |
| 66 < | < | Residential Not Recommended |

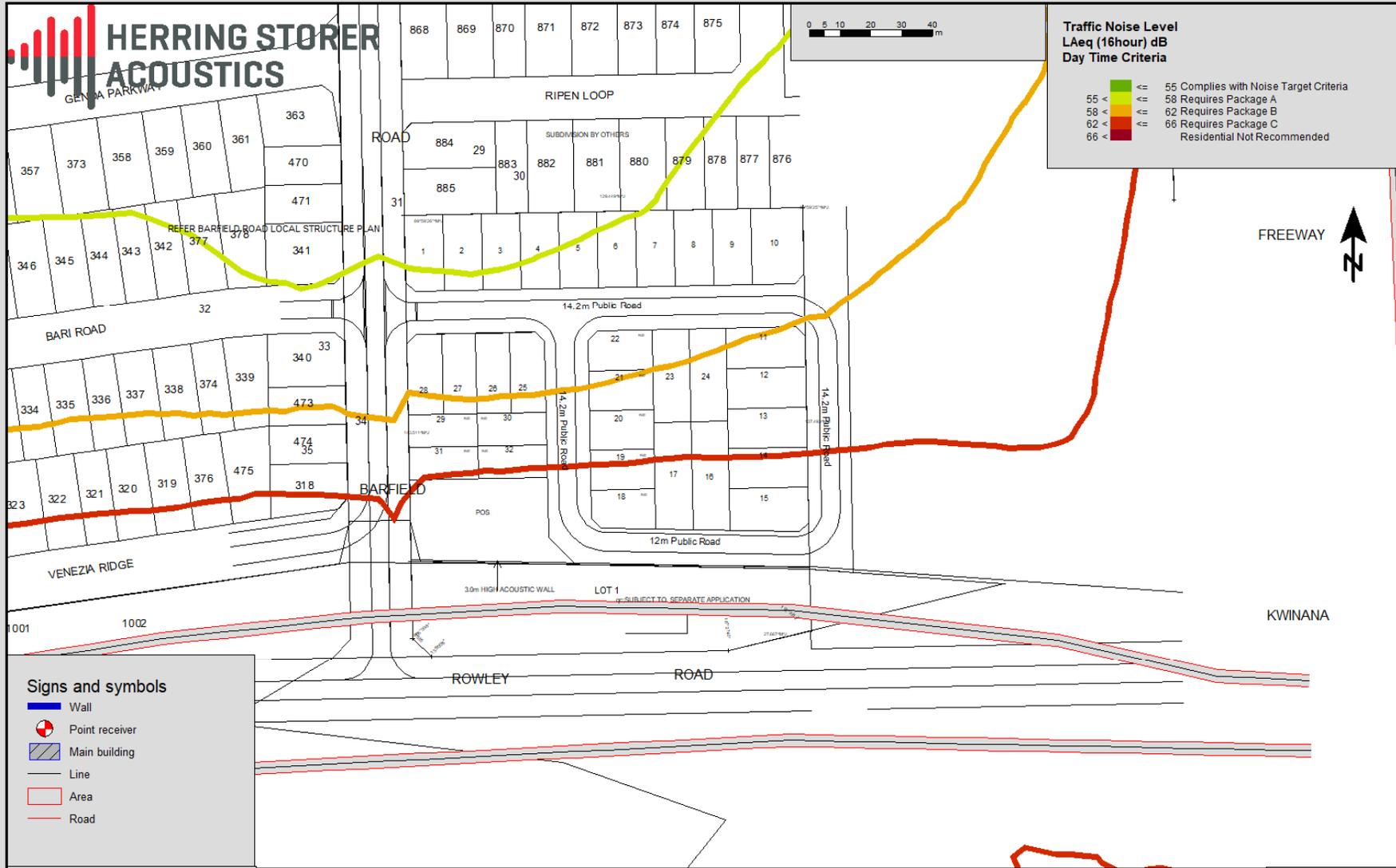


- Signs and symbols**
- Wall
 - Point receiver
 - Main building
 - Line
 - Area
 - Road
 - Elevation line
 - Road axis
 - Emission line
 - Surface
 - Noise calculation area
 - Wall

**Herring Storer Acoustics
Job No - 21040**

LOT 301 BARFIELD ROAD, HAMMOND PARK
 Current Traffic Volumes (Current Road Alignment) - Rowley Road and Kwinana Freeway
 LAeq (16hour) Day Noise Level Contour

**Figure 01
Ref # 002**



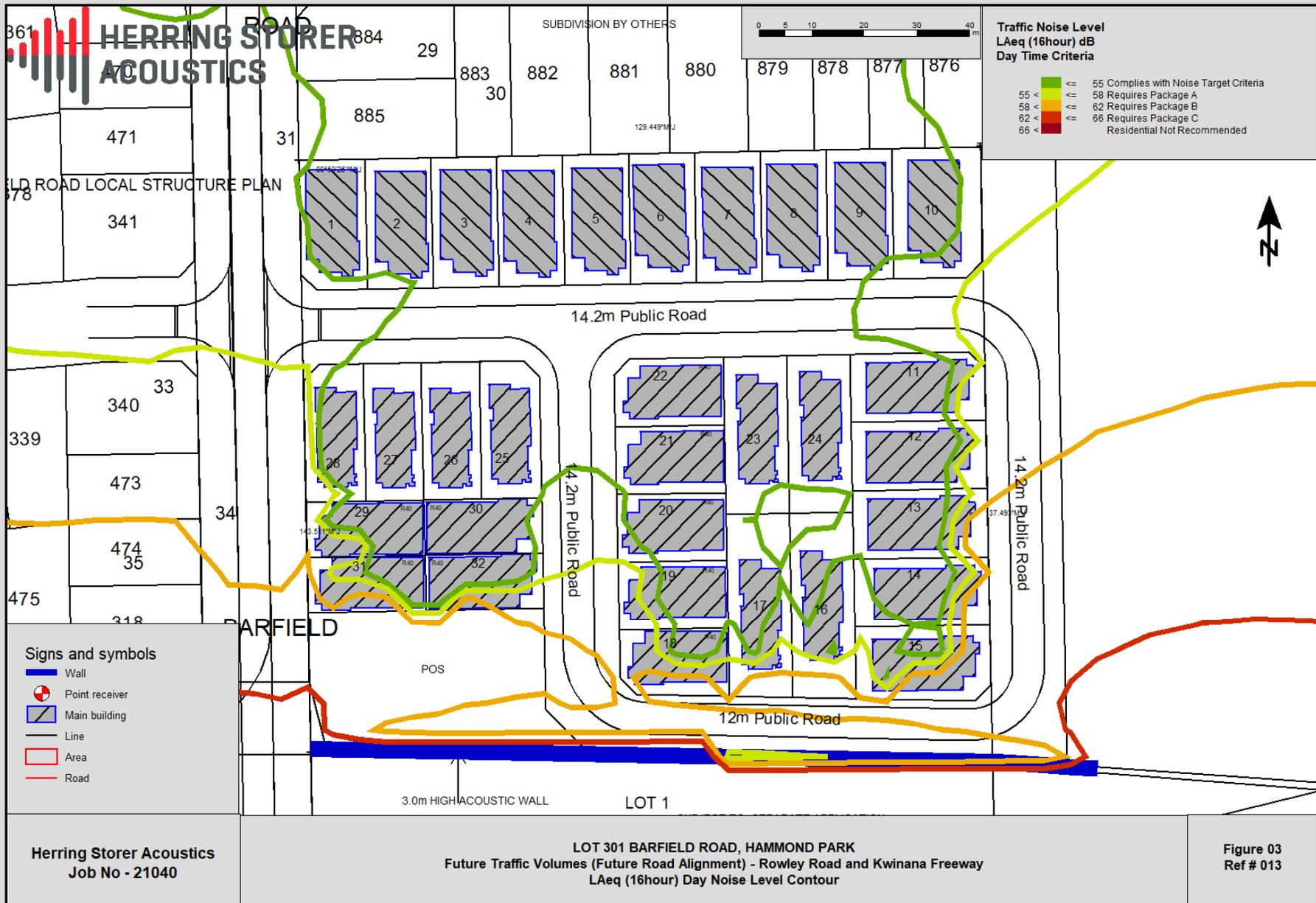
Signs and symbols

- Wall
- Point receiver
- Main building
- Line
- Area
- Road

Herring Storer Acoustics
Job No - 21040

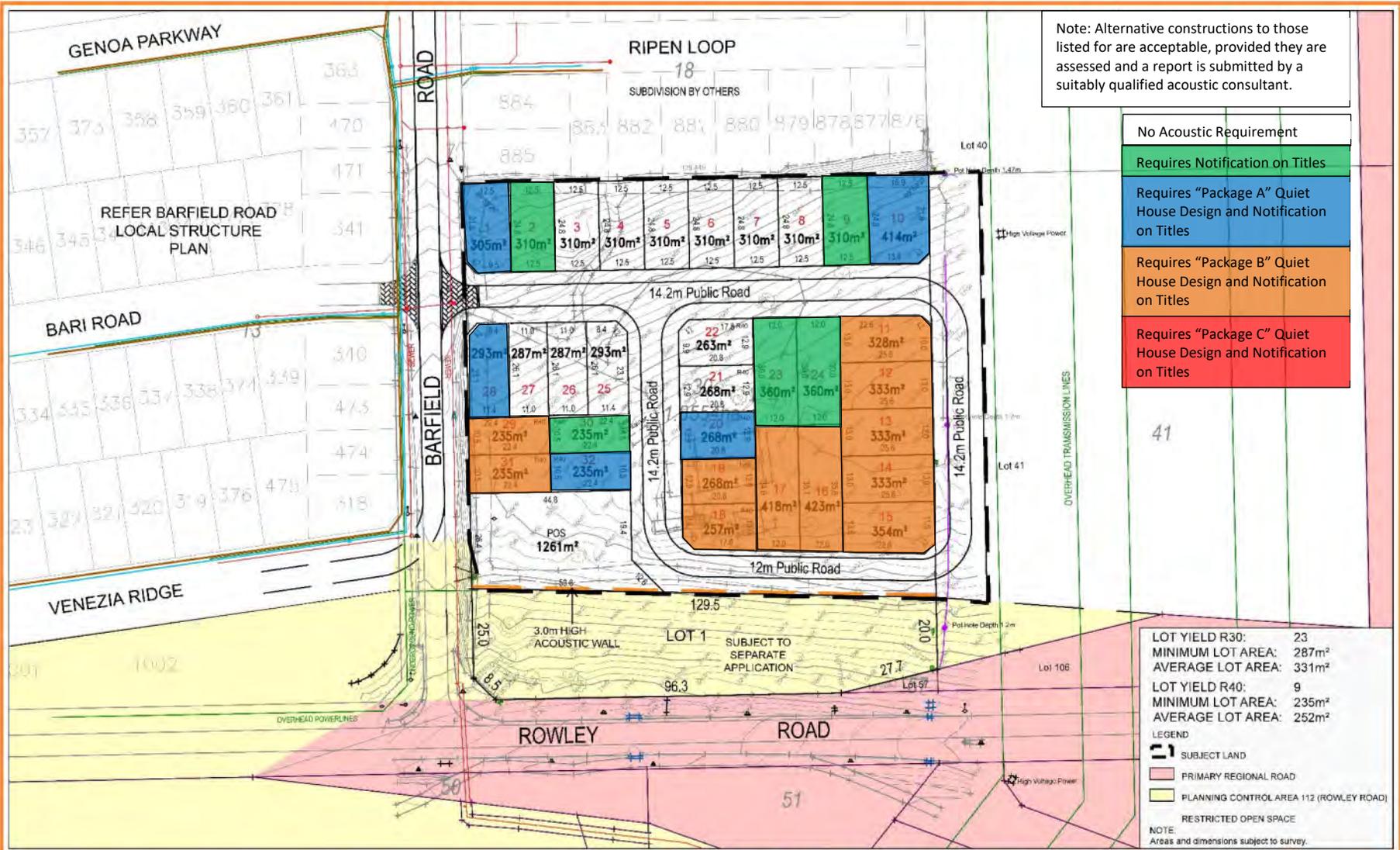
LOT 301 BARFIELD ROAD, HAMMOND PARK
Future Traffic Volumes (Future Road Alignment) - Rowley Road and Kwinana Freeway
LAeq (16hour) Day Noise Level Contour

Figure 02
Ref # 003



APPENDIX C

“QUIET HOUSE” DESIGN REQUIREMENTS



Note: Alternative constructions to those listed for are acceptable, provided they are assessed and a report is submitted by a suitably qualified acoustic consultant.

| |
|--|
| No Acoustic Requirement |
| Requires Notification on Titles |
| Requires "Package A" Quiet House Design and Notification on Titles |
| Requires "Package B" Quiet House Design and Notification on Titles |
| Requires "Package C" Quiet House Design and Notification on Titles |

| | |
|-------------------|-------|
| LOT YIELD R30: | 23 |
| MINIMUM LOT AREA: | 287m² |
| AVERAGE LOT AREA: | 331m² |
| LOT YIELD R40: | 9 |
| MINIMUM LOT AREA: | 235m² |
| AVERAGE LOT AREA: | 252m² |

- LEGEND
- SUBJECT LAND
 - PRIMARY REGIONAL ROAD
 - PLANNING CONTROL AREA 112 (ROWLEY ROAD)
 - RESTRICTED OPEN SPACE

NOTE:
Areas and dimensions subject to survey.

PROPOSED GREEN TITLE SUBDIVISION

LOT 301 (No. 221) & LOT 41 BARFIELD ROAD
HAMMOND PARK

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UDA Urban Development Institute of Australia
PIA Planning Institute Australia
CPP

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APPENDIX D

“QUIET HOUSE” DESIGN PACKAGES

**Road Traffic and Passenger Rail
Quiet House Requirements
(Based on Table 3 of State Planning Policy 5.4 2019)**

| Exposure Category | Orientation to corridor | Acoustic rating and example constructions | | | | Mechanical ventilation/air conditioning considerations | |
|---------------------------|-------------------------|---|---|--|---|--|---|
| | | Walls | External doors | Windows | Roofs and ceilings of highest floors | | Outdoor Living areas |
| A Quiet House A | Facing | <p>Bedroom and Indoor Living and work areas to $R_w + C_{tr}$ 45dB</p> <p>Stud Frame Walls</p> <ul style="list-style-type: none"> ➤ One row of 92mm studs at 60mm centres with: ➤ Resilient steel channels fixed to the outside of the studs; and ➤ 9.5mm hardboard or 9mm fibre cement weatherboards or one layer of 19mm board cladding fixed to the outside of the channels; and ➤ 75mm glass wool (11kg/m³) or 75mm polyester (14kg/m³) insulation, positioned between the studs; and ➤ -Two layers of 16mm fire-protective grade plasterboard fixed to the inside face of the studs. <p>Brick Walls</p> | <p>Bedrooms:</p> <ul style="list-style-type: none"> ➤ Fully glazed hinged door with certified $R_w + C_{tr}$ 28dB rated door and frame including seals and 6mm glass <p>Indoor Living and work areas:</p> <ul style="list-style-type: none"> ➤ 35mm solid core timber hinged door and frame system certified to R_w 28dB including seals: OR ➤ Glazed sliding door with 10 mm glass and weather seals | <p>Bedrooms:</p> <ul style="list-style-type: none"> ➤ Total external door and window system area up to 40% of room floor area: Sliding or double hung with minimum 10 mm single or 6mm-12mm-10mm double insulated glazing ($R_w + C_{tr}$ 28 dB). Sealed awning or casement windows may use 6 mm glazing instead: OR ➤ Up to 60% floor area: as per above but must be sealed awning or casement type windows ($R_w + C_{tr}$ 31dB). <p>Indoor Living and work areas</p> <ul style="list-style-type: none"> ➤ Up to 40% floor area: Sliding, awning, casement or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing ($R_w + C_{tr}$ 25dB): OR ➤ Up to 60% floor area: As per Bedrooms at up to 40% area ($R_w + C_{tr}$ 28 dB : OR ➤ Up to 80% floor area: As per Bedrooms at up to 60% area ($R_w + C_{tr}$ 31 dB). | <p>To $R_w + C_{tr}$ 35dB</p> <ul style="list-style-type: none"> ➤ Concrete or terracotta tile or metal sheet roof with sarking and at least 10mm plasterboard ceiling | <ul style="list-style-type: none"> ➤ At least one outdoor living area located on the opposite side of the building from the transport corridor and/or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum 2 metres height above ground level | <ul style="list-style-type: none"> ➤ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of Rw 40dB into sensitive spaces ➤ Evaporative systems require attenuated ceiling air vents to allow closed windows ➤ Refrigerant-based systems need to be designed to achieve National Construction Code fresh air ventilation requirements ➤ Openings such as eaves, vents and air inlets must be acoustically treated, closed or relocated to building sides facing away from the corridor where practicable |
| | Side On | <ul style="list-style-type: none"> ➤ Single leaf of 150mm brick masonry with 13mm cement render on each face: OR ➤ Double brick: two leaves of 90 mm clay brick masonry with a 20mm cavity between leaves. | <p>As per "Facing" above, except $R_w + C_{tr}$ values may be 3dB less, e.g. glazed sliding door with 10 mm glass and weather seals for bedrooms</p> | <p>As above, except $R_w + C_{tr}$ values may be 3dB less, or max % area increased by 20%</p> | | | |
| | Opposite | | No specific requirements | No specific requirements | | | |

**Road Traffic and Passenger Rail
Quiet House Requirements
(Based on Table 3 of State Planning Policy 5.4 2019)**

| Exposure Category | Orientation to corridor | Acoustic rating and example constructions | | | | | Mechanical ventilation/air conditioning considerations |
|---------------------------|-------------------------|---|---|---|---|--|---|
| | | Walls | External doors | Windows | Roofs and ceilings of highest floors | Outdoor Living areas | |
| B Quiet House B | Facing | <p>Bedroom and indoor living and work areas to R_w+C_{tr} 50dB</p> <p>Single leaf of 90 mm clay brick masonry with:</p> <ul style="list-style-type: none"> ➤ A row of 70 mm x 35 mm timber studs or 64 mm steel studs at 600 mm centres; ➤ A cavity of 25 mm between leaves; ➤ 50 mm glass wool or polyester cavity insulation (R2.0+) insulation between studs; and ➤ One layer of 10mm plasterboard fixed to the inside face ➤ Single leaf of 220mm brick masonry with 13mm cement render on each face ➤ 150mm thick unlined concrete panel or 200mm thick concrete panel with one layer of 13mm plasterboard or 13mm cement render on each face | <p>Bedrooms</p> <ul style="list-style-type: none"> ➤ Fully glazed hinged door with certified R_w+C_{tr} 31dB rated door and frame including seals and 10mm glass <p>Indoor Living and work areas</p> <ul style="list-style-type: none"> ➤ 35mm solid core timber hinged door and frame system certified to R_w 28dB including seals: OR ➤ Glazed sliding door with 10 mm glass and weather seals | <p>Bedrooms:</p> <ul style="list-style-type: none"> ➤ Total external door and window system area up to 40% of room floor areas: Fixed sash, awning or casement with minimum 6mm single or 6mm-12mm-6mm double insulated glazing (R_w+C_{tr} 31dB). ➤ Up to 60% floor area: as per above but must be minimum 10mm single or 6mm-12mm-10mm double insulated glazing (R_w+C_{tr} 34dB) <p>Indoor Living and work areas</p> <ul style="list-style-type: none"> ➤ Up to 40% floor area; Sliding or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing (R_w+C_{tr} 28dB). Sealed awning or casement windows may use 6mm glazing instead. : OR ➤ Up to 60% floor area: As per Bedrooms at up to 40% area (R_w+C_{tr} 31dB). : OR ➤ Up to 80% floor area: As per Bedrooms at up to 60% area (R_w+C_{tr} 34dB). | <p>To R_w+C_{tr} 35dB</p> <ul style="list-style-type: none"> ➤ Concrete or terracotta tile sarking and at least 10mm plasterboard ceiling, R3.0+ insulation OR ➤ Metal sheet roof, sarking and at least 10mm plasterboard ceiling, R3.0+ insulation | <ul style="list-style-type: none"> ➤ At least one outdoor living area located on the opposite side of the building from the corridor and/or at least one ground level outdoor living area screened using a solid continuous fence or other structure of minimum 2.4 metres height above ground level | <ul style="list-style-type: none"> ➤ Acoustically rated openings and ductwork to provide a minimum sound reduction performance of R_w 40dB into sensitive spaces ➤ Evaporative systems require attenuated ceiling air vents to allow closed windows ➤ Refrigerant-based systems need to be designed to achieve National Construction Code fresh air ventilation requirements ➤ Openings such as eaves, vents and air inlets must be acoustically treated, closed or relocated to building sides facing away from the corridor where practicable |
| | Side-On | <p>Double brick: two leaves of 90mm clay brick masonry with:</p> <ul style="list-style-type: none"> ➤ A 50mm cavity between leaves ➤ 50mm glass wool or polyester cavity insulation (R2.0+) ➤ Resilient ties where required to connect leaves <p>Double brick: two leaves of 110mm clay brick masonry with</p> <ul style="list-style-type: none"> ➤ 50mm cavity between leaves and R2.0+ cavity insulation | <p>Bedrooms:</p> <ul style="list-style-type: none"> ➤ Fully glazed hinged door with certified R_w+C_{tr} 28dB rated door and frame including seals and 6mm glass <p>Indoor Living and work areas:</p> <ul style="list-style-type: none"> ➤ 35mm solid core timber hinged door and frame system certified to R_w 28dB including seals: OR ➤ Glazed sliding door with 10 mm glass and weather seals | <p>Bedrooms:</p> <ul style="list-style-type: none"> ➤ Total external door and window system area up to 40% of room floor area: Sliding or double hung with minimum 10 mm single or 6mm-12mm-10mm double insulated glazing (R_w+C_{tr} 28 dB). Sealed awning or casement windows may use 6 mm glazing instead. : OR ➤ Up to 60% floor area: as per above but must be sealed awning or casement type windows (R_w+C_{tr} 31dB). <p>Indoor Living and work areas</p> <ul style="list-style-type: none"> ➤ Up to 40% floor area: Sliding, awning, casement or double hung with minimum 6mm single pane or 6mm-12mm-6mm double insulated glazing (R_w+C_{tr} 25dB). : OR ➤ Up to 60% floor area: As per Bedrooms at up to 40% area (R_w+C_{tr} 28 dB) : OR ➤ Up to 80% floor area: As per Bedrooms at up to 60% area (R_w+C_{tr} 31 dB). | | | |
| | Opposite | | As above, except R_w+C_{tr} values may be 3dB less, or max % area increased by 20% | As above, except R_w+C_{tr} values may be 3dB less, or max % area increased by 20% | | | |

APPENDIX E
MRWA TRAFFIC VOLUMES



Hourly Volume

Rowley Rd (1030019)

2020/21
Monday to Friday

West of Kwinana Fwy (SLK 0.79)

| | All Vehicles | | |
|--------------|--------------|-------------|-------------|
| | EB | WB | Both |
| 00:00 | 6 | 8 | 14 |
| 01:00 | 5 | 4 | 9 |
| 02:00 | 10 | 4 | 14 |
| 03:00 | 14 | 12 | 26 |
| 04:00 | 30 | 43 | 73 |
| 05:00 | 96 | 315 | 411 |
| 06:00 | 201 | 431 | 632 |
| 07:00 | 323 | 471 | 794 |
| 08:00 | 367 | 488 | 855 |
| 09:00 | 251 | 241 | 492 |
| 10:00 | 247 | 221 | 468 |
| 11:00 | 262 | 234 | 496 |
| 12:00 | 256 | 215 | 471 |
| 13:00 | 255 | 202 | 457 |
| 14:00 | 403 | 284 | 687 |
| 15:00 | 606 | 290 | 896 |
| 16:00 | 609 | 270 | 879 |
| 17:00 | 498 | 226 | 724 |
| 18:00 | 252 | 168 | 420 |
| 19:00 | 114 | 109 | 223 |
| 20:00 | 85 | 78 | 163 |
| 21:00 | 62 | 65 | 127 |
| 22:00 | 39 | 37 | 76 |
| 23:00 | 20 | 23 | 43 |
| TOTAL | 5011 | 4439 | 9450 |

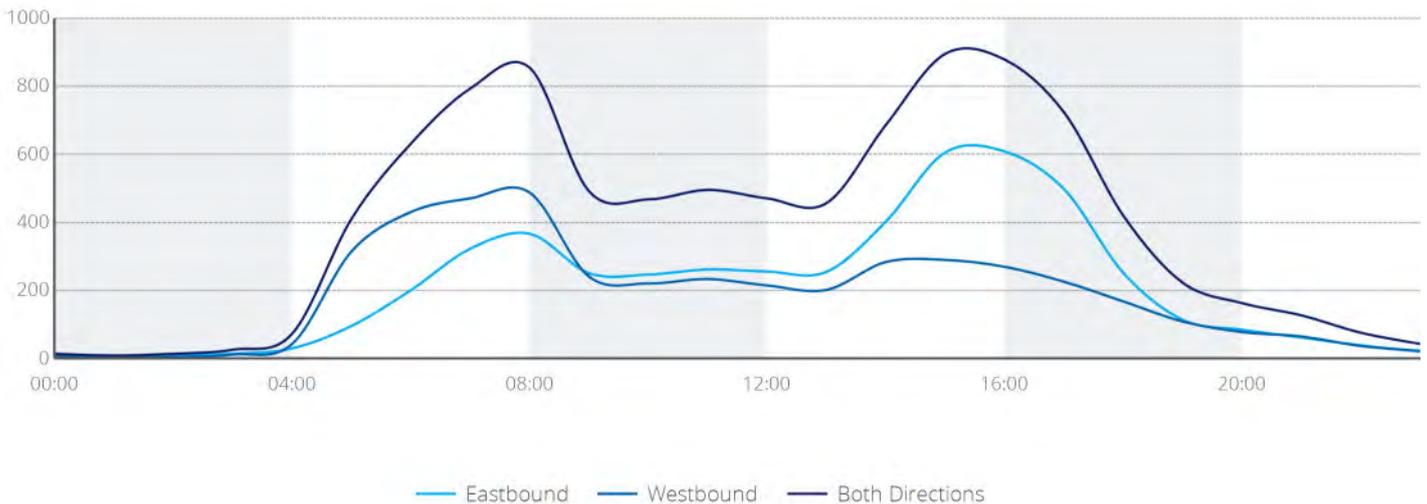
| | Heavy Vehicles | | | | % |
|--------------|----------------|------------|-------------|--|-------------|
| | EB | WB | Both | | |
| 00:00 | 0 | 1 | 1 | | 7.1 |
| 01:00 | 2 | 0 | 2 | | 22.2 |
| 02:00 | 0 | 1 | 1 | | 7.1 |
| 03:00 | 3 | 2 | 5 | | 19.2 |
| 04:00 | 7 | 2 | 9 | | 12.3 |
| 05:00 | 13 | 23 | 36 | | 8.8 |
| 06:00 | 58 | 56 | 114 | | 18.0 |
| 07:00 | 67 | 80 | 147 | | 18.5 |
| 08:00 | 77 | 82 | 159 | | 18.6 |
| 09:00 | 83 | 77 | 160 | | 32.5 |
| 10:00 | 86 | 84 | 170 | | 36.3 |
| 11:00 | 85 | 81 | 166 | | 33.5 |
| 12:00 | 78 | 83 | 161 | | 34.2 |
| 13:00 | 78 | 75 | 153 | | 33.5 |
| 14:00 | 86 | 65 | 151 | | 22.0 |
| 15:00 | 54 | 34 | 88 | | 9.8 |
| 16:00 | 37 | 16 | 53 | | 6.0 |
| 17:00 | 21 | 13 | 34 | | 4.7 |
| 18:00 | 8 | 7 | 15 | | 3.6 |
| 19:00 | 2 | 3 | 5 | | 2.2 |
| 20:00 | 2 | 0 | 2 | | 1.2 |
| 21:00 | 1 | 1 | 2 | | 1.6 |
| 22:00 | 2 | 2 | 4 | | 5.3 |
| 23:00 | 0 | 2 | 2 | | 4.7 |
| TOTAL | 850 | 790 | 1640 | | 17.4 |



Peak Statistics

| | | | | | | | |
|-----------|-------------|-------|-------|-------|-------|-------|-------|
| AM | TIME | 08:00 | 07:45 | 07:45 | 10:45 | 07:15 | 11:15 |
| | VOL | 367 | 504 | 855 | 87 | 88 | 171 |
| PM | TIME | 16:15 | 14:30 | 14:45 | 14:00 | 12:00 | 12:00 |
| | VOL | 617 | 320 | 910 | 86 | 83 | 161 |

Volume





Hourly Volume

Rowley Rd (1030019)

2020/21
Monday to Sunday

West of Kwinana Fwy (SLK 0.79)

| | All Vehicles | | |
|--------------|--------------|-------------|-------------|
| | EB | WB | Both |
| 00:00 | 11 | 11 | 22 |
| 01:00 | 9 | 7 | 16 |
| 02:00 | 10 | 4 | 14 |
| 03:00 | 11 | 11 | 22 |
| 04:00 | 26 | 39 | 65 |
| 05:00 | 83 | 254 | 337 |
| 06:00 | 167 | 341 | 508 |
| 07:00 | 264 | 372 | 636 |
| 08:00 | 316 | 393 | 709 |
| 09:00 | 238 | 236 | 474 |
| 10:00 | 243 | 212 | 455 |
| 11:00 | 259 | 222 | 481 |
| 12:00 | 258 | 209 | 467 |
| 13:00 | 244 | 194 | 438 |
| 14:00 | 348 | 247 | 595 |
| 15:00 | 496 | 253 | 749 |
| 16:00 | 496 | 249 | 745 |
| 17:00 | 417 | 214 | 631 |
| 18:00 | 231 | 158 | 389 |
| 19:00 | 126 | 111 | 237 |
| 20:00 | 87 | 76 | 163 |
| 21:00 | 69 | 66 | 135 |
| 22:00 | 51 | 39 | 90 |
| 23:00 | 31 | 29 | 60 |
| TOTAL | 4491 | 3947 | 8438 |

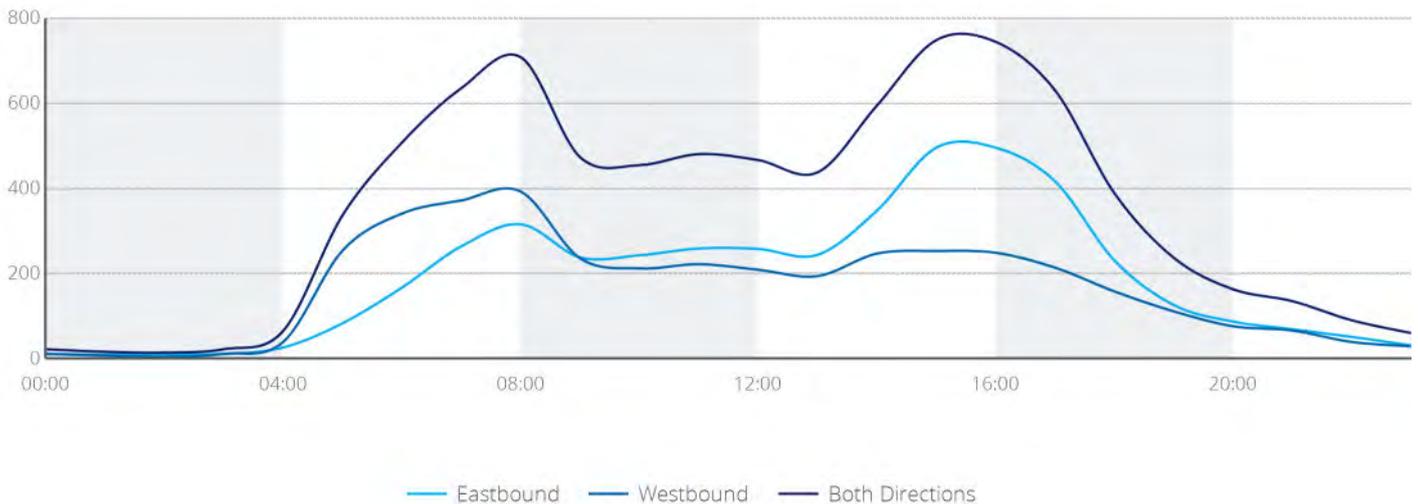
| | Heavy Vehicles | | | | % |
|--------------|----------------|------------|-------------|--|-------------|
| | EB | WB | Both | | |
| 00:00 | 0 | 1 | 1 | | 4.5 |
| 01:00 | 1 | 0 | 1 | | 6.3 |
| 02:00 | 0 | 1 | 1 | | 7.1 |
| 03:00 | 2 | 2 | 4 | | 18.2 |
| 04:00 | 6 | 2 | 8 | | 12.3 |
| 05:00 | 9 | 17 | 26 | | 7.7 |
| 06:00 | 46 | 46 | 92 | | 18.1 |
| 07:00 | 51 | 61 | 112 | | 17.6 |
| 08:00 | 59 | 63 | 122 | | 17.2 |
| 09:00 | 62 | 63 | 125 | | 26.4 |
| 10:00 | 67 | 63 | 130 | | 28.6 |
| 11:00 | 65 | 59 | 124 | | 25.8 |
| 12:00 | 60 | 59 | 119 | | 25.5 |
| 13:00 | 60 | 55 | 115 | | 26.3 |
| 14:00 | 61 | 46 | 107 | | 18.0 |
| 15:00 | 39 | 23 | 62 | | 8.3 |
| 16:00 | 26 | 10 | 36 | | 4.8 |
| 17:00 | 17 | 10 | 27 | | 4.3 |
| 18:00 | 7 | 5 | 12 | | 3.1 |
| 19:00 | 2 | 3 | 5 | | 2.1 |
| 20:00 | 2 | 0 | 2 | | 1.2 |
| 21:00 | 2 | 1 | 3 | | 2.2 |
| 22:00 | 1 | 0 | 1 | | 1.1 |
| 23:00 | 0 | 0 | 0 | | 0.0 |
| TOTAL | 645 | 590 | 1235 | | 14.6 |



Peak Statistics

| | | | | | | | |
|----|------|-------|-------|-------|-------|-------|-------|
| AM | TIME | 08:00 | 07:45 | 08:00 | 10:00 | 09:15 | 09:15 |
| | VOL | 316 | 402 | 709 | 67 | 69 | 131 |
| PM | TIME | 16:15 | 14:45 | 14:45 | 12:30 | 12:00 | 12:00 |
| | VOL | 506 | 271 | 754 | 62 | 59 | 119 |

Volume





Hourly Volume

Rowley Rd (1030019)

2020/21
Weekend

West of Kwinana Fwy (SLK 0.79)

| | All Vehicles | | |
|--------------|--------------|-------------|-------------|
| | EB | WB | Both |
| 00:00 | 26 | 19 | 45 |
| 01:00 | 20 | 15 | 35 |
| 02:00 | 11 | 6 | 17 |
| 03:00 | 3 | 5 | 8 |
| 04:00 | 15 | 27 | 42 |
| 05:00 | 54 | 95 | 149 |
| 06:00 | 84 | 100 | 184 |
| 07:00 | 117 | 116 | 233 |
| 08:00 | 188 | 140 | 328 |
| 09:00 | 221 | 224 | 445 |
| 10:00 | 245 | 204 | 449 |
| 11:00 | 262 | 201 | 463 |
| 12:00 | 271 | 208 | 479 |
| 13:00 | 224 | 179 | 403 |
| 14:00 | 212 | 158 | 370 |
| 15:00 | 206 | 166 | 372 |
| 16:00 | 200 | 205 | 405 |
| 17:00 | 198 | 186 | 384 |
| 18:00 | 176 | 137 | 313 |
| 19:00 | 159 | 122 | 281 |
| 20:00 | 97 | 72 | 169 |
| 21:00 | 84 | 67 | 151 |
| 22:00 | 86 | 51 | 137 |
| 23:00 | 61 | 53 | 114 |
| TOTAL | 3220 | 2756 | 5976 |

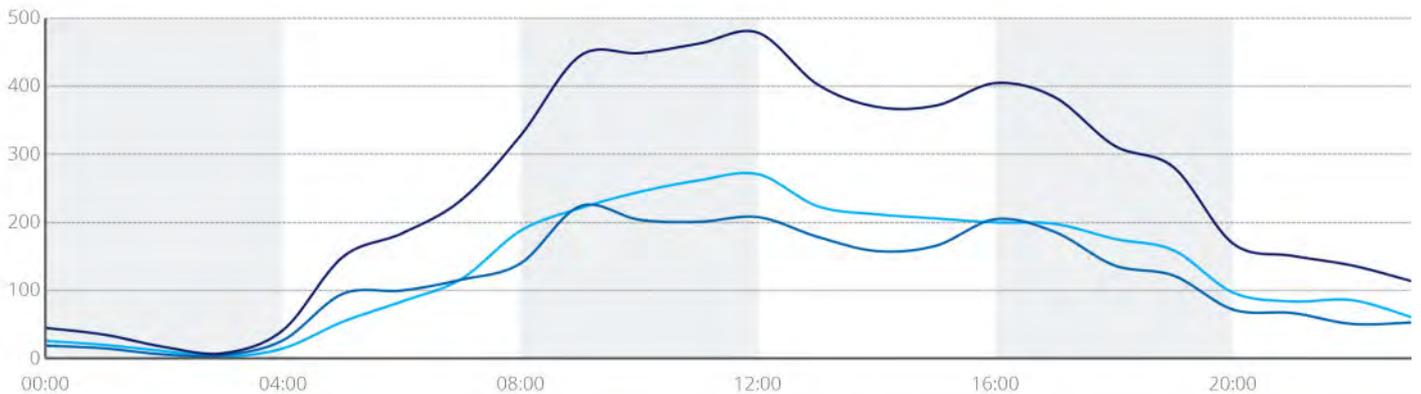
| | Heavy Vehicles | | | | % |
|--------------|----------------|------------|------------|------------|---|
| | EB | WB | Both | | |
| 00:00 | 0 | 1 | 1 | 2.2 | |
| 01:00 | 0 | 0 | 0 | 0.0 | |
| 02:00 | 1 | 1 | 2 | 11.8 | |
| 03:00 | 0 | 1 | 1 | 12.5 | |
| 04:00 | 1 | 0 | 1 | 2.4 | |
| 05:00 | 4 | 5 | 9 | 6.0 | |
| 06:00 | 22 | 19 | 41 | 22.3 | |
| 07:00 | 18 | 24 | 42 | 18.0 | |
| 08:00 | 23 | 14 | 37 | 11.3 | |
| 09:00 | 20 | 22 | 42 | 9.4 | |
| 10:00 | 21 | 20 | 41 | 9.1 | |
| 11:00 | 20 | 8 | 28 | 6.0 | |
| 12:00 | 13 | 7 | 20 | 4.2 | |
| 13:00 | 18 | 6 | 24 | 6.0 | |
| 14:00 | 3 | 4 | 7 | 1.9 | |
| 15:00 | 5 | 6 | 11 | 3.0 | |
| 16:00 | 5 | 3 | 8 | 2.0 | |
| 17:00 | 8 | 4 | 12 | 3.1 | |
| 18:00 | 5 | 2 | 7 | 2.2 | |
| 19:00 | 2 | 4 | 6 | 2.1 | |
| 20:00 | 3 | 1 | 4 | 2.4 | |
| 21:00 | 3 | 1 | 4 | 2.6 | |
| 22:00 | 0 | 0 | 0 | 0.0 | |
| 23:00 | 1 | 0 | 1 | 0.9 | |
| TOTAL | 196 | 153 | 349 | 5.8 | |



Peak Statistics

| | | | | | | | |
|----|------|-------|-------|-------|-------|-------|-------|
| AM | TIME | 11:15 | 09:00 | 11:15 | 06:15 | 06:45 | 06:45 |
| | VOL | 287 | 224 | 492 | 25 | 26 | 47 |
| PM | TIME | 12:00 | 12:00 | 12:00 | 13:00 | 12:30 | 12:30 |
| | VOL | 271 | 208 | 479 | 18 | 8 | 25 |

Volume



— Eastbound — Westbound — Both Directions



Hourly Volume

Kwinana Fwy (H015)

2020/21
Monday to Friday

SB At Bridge Under Rowley Rd (SLK 24.95)

| |  All Vehicles | | |  Heavy Vehicles | | |
|--------------|--|--|--|--|--|---|
| |  SB | | |  SB | |  % |
| 00:00 | 204 | | | 24 | | 11.8 |
| 01:00 | 163 | | | 32 | | 19.6 |
| 02:00 | 126 | | | 29 | | 23.0 |
| 03:00 | 134 | | | 42 | | 31.3 |
| 04:00 | 403 | | | 94 | | 23.3 |
| 05:00 | 1398 | | | 232 | | 16.6 |
| 06:00 | 2590 | | | 513 | | 19.8 |
| 07:00 | 2922 | | | 465 | | 15.9 |
| 08:00 | 2627 | | | 455 | | 17.3 |
| 09:00 | 2608 | | | 468 | | 17.9 |
| 10:00 | 2863 | | | 479 | | 16.7 |
| 11:00 | 2895 | | | 455 | | 15.7 |
| 12:00 | 3007 | | | 442 | | 14.7 |
| 13:00 | 3077 | | | 442 | | 14.4 |
| 14:00 | 3477 | | | 399 | | 11.5 |
| 15:00 | 3199 | | | 347 | | 10.8 |
| 16:00 | 2928 | | | 272 | | 9.3 |
| 17:00 | 2922 | | | 223 | | 7.6 |
| 18:00 | 2611 | | | 189 | | 7.2 |
| 19:00 | 1713 | | | 127 | | 7.4 |
| 20:00 | 1306 | | | 93 | | 7.1 |
| 21:00 | 1103 | | | 61 | | 5.5 |
| 22:00 | 869 | | | 51 | | 5.9 |
| 23:00 | 469 | | | 36 | | 7.7 |
| TOTAL | 45614 | | | 5970 | | |

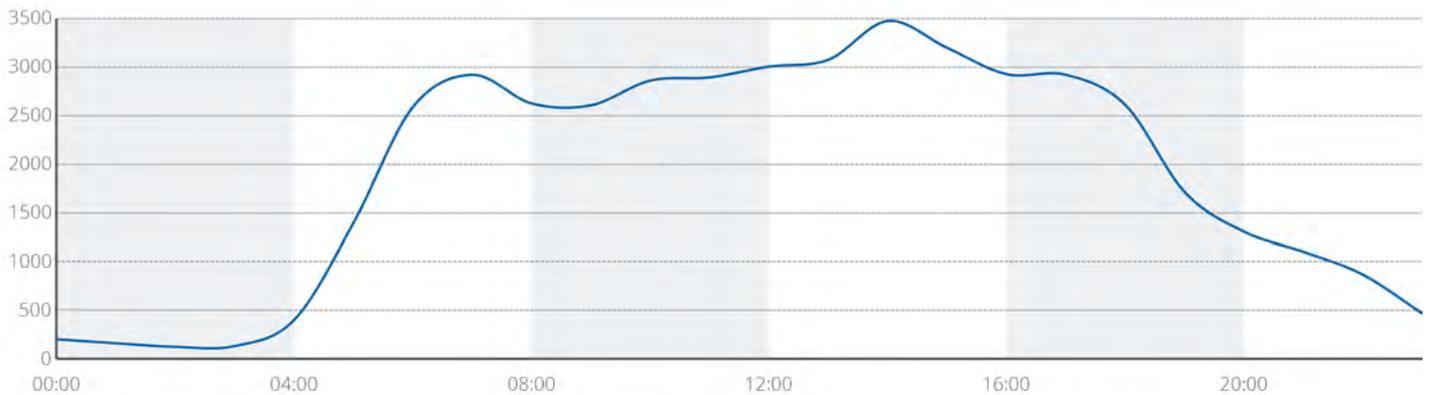


Peak Statistics

| | | | |
|----|------|-------|-------|
| AM | TIME | 07:15 | 06:15 |
| | VOL | 2986 | 533 |
| PM | TIME | 14:15 | 12:45 |
| | VOL | 3513 | 455 |

 Information Not Available

Volume



— Southbound



Hourly Volume

Kwinana Fwy (H015)

2020/21
Monday to Sunday

SB At Bridge Under Rowley Rd (SLK 24.95)

| | All Vehicles | | | Heavy Vehicles | | |
|-------|--------------|--|--|----------------|--|------|
| | SB | | | SB | | % |
| 00:00 | 339 | | | 26 | | 7.7 |
| 01:00 | 230 | | | 30 | | 13.0 |
| 02:00 | 178 | | | 22 | | 12.4 |
| 03:00 | 160 | | | 32 | | 20.0 |
| 04:00 | 341 | | | 64 | | 18.8 |
| 05:00 | 1020 | | | 153 | | 15.0 |
| 06:00 | 1899 | | | 338 | | 17.8 |
| 07:00 | 2302 | | | 313 | | 13.6 |
| 08:00 | 2435 | | | 325 | | 13.3 |
| 09:00 | 2786 | | | 354 | | 12.7 |
| 10:00 | 3199 | | | 362 | | 11.3 |
| 11:00 | 3204 | | | 343 | | 10.7 |
| 12:00 | 3167 | | | 330 | | 10.4 |
| 13:00 | 3178 | | | 329 | | 10.4 |
| 14:00 | 3374 | | | 295 | | 8.7 |
| 15:00 | 3182 | | | 273 | | 8.6 |
| 16:00 | 3005 | | | 222 | | 7.4 |
| 17:00 | 2846 | | | 177 | | 6.2 |
| 18:00 | 2264 | | | 144 | | 6.4 |
| 19:00 | 1548 | | | 103 | | 6.7 |
| 20:00 | 1200 | | | 74 | | 6.2 |
| 21:00 | 1044 | | | 55 | | 5.3 |
| 22:00 | 863 | | | 47 | | 5.4 |
| 23:00 | 515 | | | 36 | | 7.0 |
| TOTAL | 44279 | | | 4447 | | |

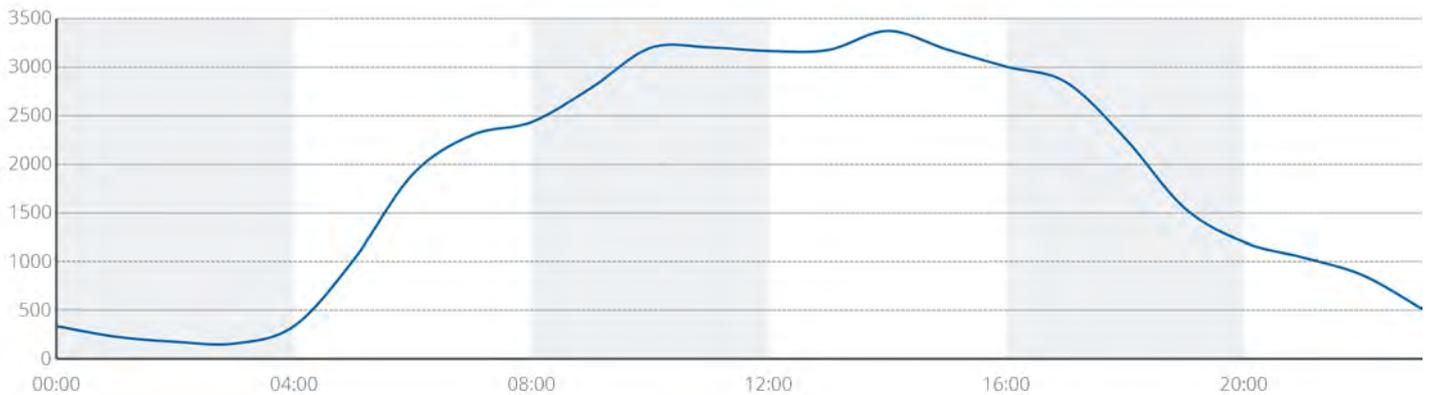


Peak Statistics

| | | | | | |
|----|------|-------|--|-------|--|
| AM | TIME | 10:45 | | 10:15 | |
| | VOL | 3235 | | 367 | |
| PM | TIME | 14:15 | | 12:30 | |
| | VOL | 3382 | | 339 | |

Information Not Available

Volume



— Southbound



Hourly Volume

Kwinana Fwy (H015)

2020/21
Weekend

SB At Bridge Under Rowley Rd (SLK 24.95)

| |  All Vehicles | | |  Heavy Vehicles | | |
|--------------|--|--|--|--|--|---|
| |  SB | | |  SB | |  % |
| 00:00 | 439 | | | 30 | | 6.8 |
| 01:00 | 273 | | | 26 | | 9.5 |
| 02:00 | 218 | | | 19 | | 8.7 |
| 03:00 | 175 | | | 24 | | 13.7 |
| 04:00 | 245 | | | 34 | | 13.9 |
| 05:00 | 523 | | | 70 | | 13.4 |
| 06:00 | 983 | | | 145 | | 14.8 |
| 07:00 | 1409 | | | 146 | | 10.4 |
| 08:00 | 1967 | | | 181 | | 9.2 |
| 09:00 | 2662 | | | 228 | | 8.6 |
| 10:00 | 3186 | | | 230 | | 7.2 |
| 11:00 | 3157 | | | 214 | | 6.8 |
| 12:00 | 2968 | | | 198 | | 6.7 |
| 13:00 | 2917 | | | 198 | | 6.8 |
| 14:00 | 2878 | | | 178 | | 6.2 |
| 15:00 | 2794 | | | 182 | | 6.5 |
| 16:00 | 2731 | | | 159 | | 5.8 |
| 17:00 | 2432 | | | 123 | | 5.1 |
| 18:00 | 1646 | | | 96 | | 5.8 |
| 19:00 | 1195 | | | 73 | | 6.1 |
| 20:00 | 951 | | | 54 | | 5.7 |
| 21:00 | 859 | | | 46 | | 5.4 |
| 22:00 | 757 | | | 41 | | 5.4 |
| 23:00 | 505 | | | 37 | | 7.3 |
| TOTAL | 37870 | | | 2732 | | |

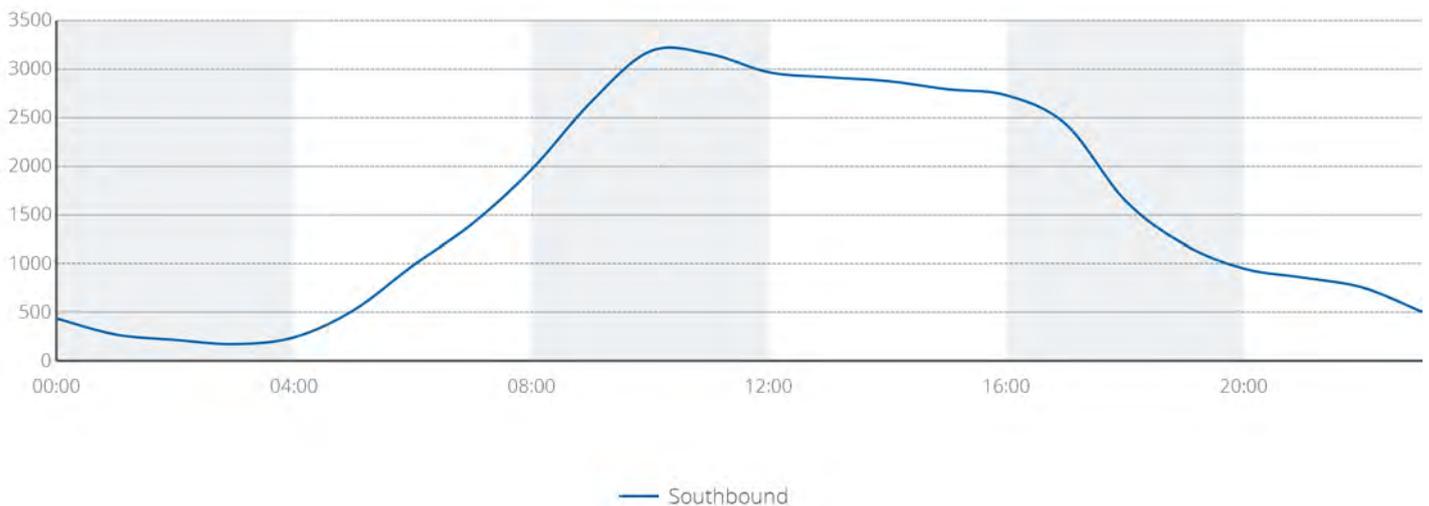


Peak Statistics

| | | | | | |
|----|------|-------|--|-------|--|
| AM | TIME | 10:15 | | 09:30 | |
| | VOL | 3200 | | 238 | |
| PM | TIME | 12:00 | | 12:30 | |
| | VOL | 2968 | | 203 | |

 Information Not Available

Volume





Hourly Volume

Kwinana Fwy (H015)

2020/21
Monday to Friday

NB At Bridge Under Rowley Rd (SLK 24.96)

| |  All Vehicles | | |  Heavy Vehicles | | |
|--------------|--|--|--|--|--|---|
| |  NB | | |  NB | |  % |
| 00:00 | 128 | | | 32 | | 25.0 |
| 01:00 | 91 | | | 16 | | 17.6 |
| 02:00 | 137 | | | 22 | | 16.1 |
| 03:00 | 417 | | | 62 | | 14.9 |
| 04:00 | 1133 | | | 177 | | 15.6 |
| 05:00 | 2883 | | | 440 | | 15.3 |
| 06:00 | 3503 | | | 509 | | 14.5 |
| 07:00 | 3314 | | | 394 | | 11.9 |
| 08:00 | 3140 | | | 381 | | 12.1 |
| 09:00 | 2827 | | | 402 | | 14.2 |
| 10:00 | 2720 | | | 441 | | 16.2 |
| 11:00 | 2767 | | | 468 | | 16.9 |
| 12:00 | 2741 | | | 458 | | 16.7 |
| 13:00 | 2666 | | | 461 | | 17.3 |
| 14:00 | 2816 | | | 467 | | 16.6 |
| 15:00 | 3043 | | | 427 | | 14.0 |
| 16:00 | 3140 | | | 339 | | 10.8 |
| 17:00 | 2697 | | | 230 | | 8.5 |
| 18:00 | 1947 | | | 174 | | 8.9 |
| 19:00 | 1155 | | | 98 | | 8.5 |
| 20:00 | 807 | | | 61 | | 7.6 |
| 21:00 | 645 | | | 45 | | 7.0 |
| 22:00 | 441 | | | 46 | | 10.4 |
| 23:00 | 270 | | | 30 | | 11.1 |
| TOTAL | 45428 | | | 6180 | | |

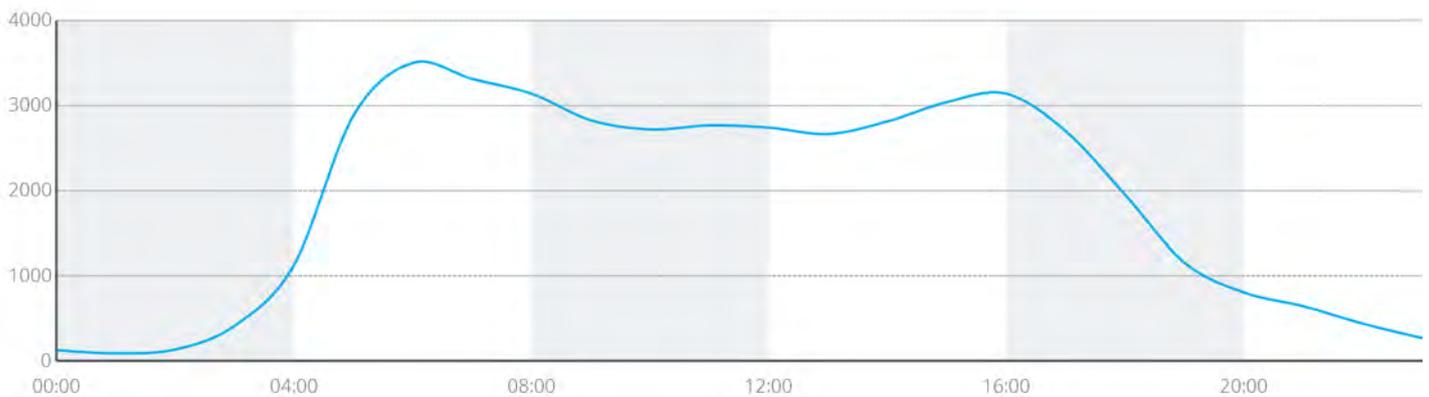


Peak Statistics

| | | | |
|----|------|-------|-------|
| AM | TIME | 06:00 | 05:45 |
| | VOL | 3503 | 514 |
| PM | TIME | 15:30 | 13:45 |
| | VOL | 3155 | 478 |

 Information Not Available

Volume



— Northbound



Hourly Volume

Kwinana Fwy (H015)

2020/21
Monday to Sunday

NB At Bridge Under Rowley Rd (SLK 24.96)

| |  All Vehicles | | |  Heavy Vehicles | | | |
|--------------|--|--|--|--|--|--|---|
| |  NB | | |  NB | | |  % |
| 00:00 | 154 | | | 31 | | | 20.1 |
| 01:00 | 108 | | | 15 | | | 13.9 |
| 02:00 | 130 | | | 20 | | | 15.4 |
| 03:00 | 329 | | | 50 | | | 15.2 |
| 04:00 | 875 | | | 132 | | | 15.1 |
| 05:00 | 2207 | | | 325 | | | 14.7 |
| 06:00 | 2742 | | | 377 | | | 13.7 |
| 07:00 | 2730 | | | 310 | | | 11.4 |
| 08:00 | 2862 | | | 310 | | | 10.8 |
| 09:00 | 2843 | | | 349 | | | 12.3 |
| 10:00 | 2844 | | | 368 | | | 12.9 |
| 11:00 | 2919 | | | 391 | | | 13.4 |
| 12:00 | 2820 | | | 373 | | | 13.2 |
| 13:00 | 2721 | | | 373 | | | 13.7 |
| 14:00 | 2819 | | | 382 | | | 13.6 |
| 15:00 | 2950 | | | 348 | | | 11.8 |
| 16:00 | 2966 | | | 275 | | | 9.3 |
| 17:00 | 2643 | | | 204 | | | 7.7 |
| 18:00 | 1922 | | | 149 | | | 7.8 |
| 19:00 | 1234 | | | 93 | | | 7.5 |
| 20:00 | 883 | | | 61 | | | 6.9 |
| 21:00 | 747 | | | 49 | | | 6.6 |
| 22:00 | 650 | | | 51 | | | 7.8 |
| 23:00 | 403 | | | 38 | | | 9.4 |
| TOTAL | 43501 | | | 5074 | | | |

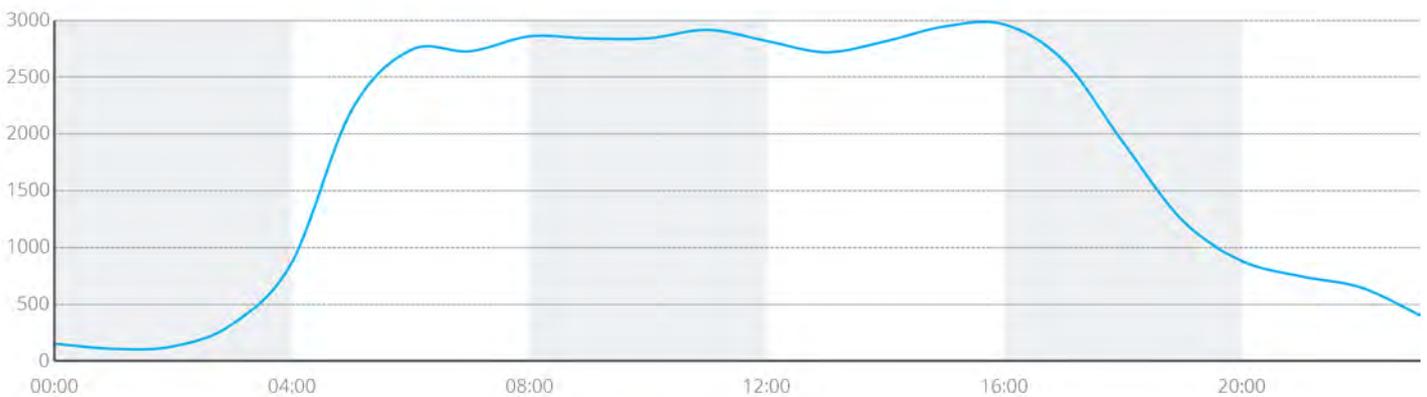


Peak Statistics

| | | | | | |
|----|------|-------|--|-------|--|
| AM | TIME | 11:00 | | 11:15 | |
| | VOL | 2919 | | 394 | |
| PM | TIME | 15:30 | | 13:45 | |
| | VOL | 3002 | | 386 | |

 Information Not Available

Volume



— Northbound



Hourly Volume

Kwinana Fwy (H015)

2020/21
Weekend

NB At Bridge Under Rowley Rd (SLK 24.96)

| |  All Vehicles | | |  Heavy Vehicles | | | |
|--------------|--|--|--|--|--|--|---|
| |  NB | | |  NB | | |  % |
| 00:00 | 200 | | | 35 | | | 17.5 |
| 01:00 | 138 | | | 14 | | | 10.1 |
| 02:00 | 113 | | | 18 | | | 15.9 |
| 03:00 | 141 | | | 26 | | | 18.4 |
| 04:00 | 341 | | | 49 | | | 14.4 |
| 05:00 | 802 | | | 108 | | | 13.5 |
| 06:00 | 1143 | | | 127 | | | 11.1 |
| 07:00 | 1465 | | | 150 | | | 10.2 |
| 08:00 | 2184 | | | 182 | | | 8.3 |
| 09:00 | 2725 | | | 248 | | | 9.1 |
| 10:00 | 2940 | | | 234 | | | 8.0 |
| 11:00 | 3068 | | | 251 | | | 8.2 |
| 12:00 | 2831 | | | 215 | | | 7.6 |
| 13:00 | 2686 | | | 206 | | | 7.7 |
| 14:00 | 2680 | | | 224 | | | 8.4 |
| 15:00 | 2616 | | | 198 | | | 7.6 |
| 16:00 | 2474 | | | 154 | | | 6.2 |
| 17:00 | 2393 | | | 154 | | | 6.4 |
| 18:00 | 1774 | | | 107 | | | 6.0 |
| 19:00 | 1321 | | | 86 | | | 6.5 |
| 20:00 | 983 | | | 66 | | | 6.7 |
| 21:00 | 900 | | | 56 | | | 6.2 |
| 22:00 | 1023 | | | 67 | | | 6.5 |
| 23:00 | 628 | | | 48 | | | 7.6 |
| TOTAL | 37569 | | | 3023 | | | |

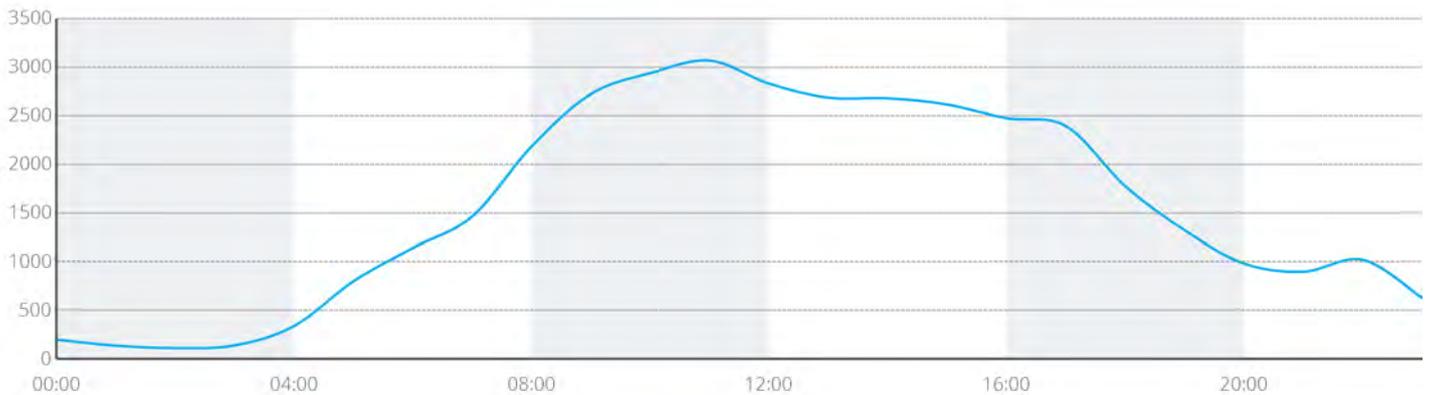


Peak Statistics

| | | | | | |
|----|------|-------|--|-------|--|
| AM | TIME | 11:00 | | 10:45 | |
| | VOL | 3068 | | 257 | |
| PM | TIME | 12:00 | | 14:00 | |
| | VOL | 2831 | | 224 | |

 Information Not Available

Volume



— Northbound

APPENDIX 6

Ecological Reports

2. Methods

2.1 Desktop survey

Databases including the *Protected Matters Search Tool* (DEE 2019a) and *Naturemap* (DPaW 2007-) were undertaken to generate a list of vascular flora previously recorded within, and nearby the Survey Area with an emphasis on species of conservation significance and introduced species and threatened or priority ecological communities (TEC/PEC) (Appendix A).

A search of the LGmap Environmental Planning Tool (WALGA 2020) was undertaken to determine whether any known roosting or breeding sites for Carnaby's Black Cockatoo occurred within or near the Survey Area.

2.2 Field survey

A Senior Ecologist and an Ecologist from Strategen JBS&G visited the Survey Area on 23 October 2020. All plants collected were taken under flora collecting permit FB62000168, pursuant to the BAM Act 2007.

2.2.1 Flora

Three relevés were sampled to characterise vegetation types and condition and ensure appropriate representation of the flora and vegetation present.

At each relevé the following information was recorded:

- GPS co-ordinates (recorded in GDA94 UTM 50H)
- Photograph of the vegetation
- Vegetation condition
- Brief vegetation description
- Vascular flora taxa present (with average height and total percentage foliage cover of each taxon)
- Topography (landform type and aspect)
- Soil type and colour
- Geology (type, size and cover of any rocks, stones, gravel, or outcropping)
- Average percentage cover of leaf litter and bare ground
- Disturbance details including fire history (time since last fire), and physical disturbance including evidence of erosion, grazing, and weed invasion.

Any flora taxa observed opportunistically around relevés or while traversing on foot within the Survey Area were also recorded.

All plant specimens collected during the field surveys were identified using appropriate reference material or through comparisons with pressed specimens housed at the Western Australian Herbarium where necessary. Nomenclature of the species recorded is in accordance with Western Australian Herbarium (1998-).

2.2.1.1 Targeted surveys for Threatened and Priority Flora

Prior to the survey, a list of conservation significant flora with the potential to occur within the Survey Area was compiled. Field personnel familiarised themselves with photographs, reference samples and descriptions of these taxa before conducting the survey. Additionally, known

populations of *Caladenia huegelii* were checked for flowering prior to mobilising for the survey to ensure optimal survey timing for this species (Figure 2.1).

2.2.2 Vegetation

Vegetation condition was recorded at all quadrats, and also opportunistically within the Survey Area during the field assessment where required. Vegetation condition was described using the vegetation condition scale for the South West Botanical Province (EPA 2016). Vegetation condition polygon boundaries were developed using this information in conjunction with aerial photography interpretation, and were digitised as for vegetation type mapping polygon boundaries.

Table 2.1: Vegetation condition scale (EPA 2016)

| Condition rating | Description |
|-------------------------|--|
| Pristine (1) | Pristine or nearly so, no obvious sign of disturbance or damage caused by human activities since European settlement |
| Excellent (2) | Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks. |
| Very Good (3) | Vegetation structure altered obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing. |
| Good (4) | Vegetation structure significantly altered by obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback, grazing. |
| Degraded (5) | Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing. |
| Completely Degraded (6) | The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs. |

VT descriptions (though floristic in origin) have been adapted from the National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual Version 6.0 (ESCAVI 2003), a system of describing structural vegetation units (based on dominant taxa). This model follows nationally-agreed guidelines to describe and represent vegetation types, so that comparable and consistent data is produced nation-wide. For the purposes of this report, a VT is considered equivalent to a NVIS sub-association as described in ESCAVI (2003).

2.2.2.1 Threatened and Priority Ecological Communities

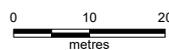
An assessment of the presence of the 'Banksia Woodlands of the Swan Coastal Plain' TEC listed under the EPBC Act was conducted against diagnostic criteria presented in the *Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community* (TSSC 2019).



Legend

- Survey area
- Cadastral boundary
- Survey tracks
- Main road
- Minor road

Scale 1:1,000 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59917

Client: Blokk Property

Version: A

Date: 19-Mar-2021

Drawn By: cthatcher

Checked By: JW

**221 Barfield Rd
Hammond Park**

**SURVEY LOCATION AND
TARGETED FLORA TRACKS**

FIGURE 2.1



2.2.3 Black cockatoo habitat assessment

The Survey Area was inspected on 23 October 2020 by one ecologist from Strategen JBS&G with relevant experience as specified by the *EPBC Act Referral guidelines for three threatened black cockatoo species* (DSEWPaC 2012).

2.2.3.1 Foraging habitat assessment

The Survey Area was traversed on foot to record any flora species with the potential to provide a food source for Black Cockatoos. Data was collected at three survey points to inform Black Cockatoo foraging habitat mapping. Following the assessment, vegetation units defined as part of the flora and vegetation survey were assigned a foraging value based on the presence and quantity of potential food species and any evidence of foraging by black cockatoos.

Habitat Scoring Method

The Department of Agriculture, Water and the Environment (DAWE) have recognised that the scoring tool to determine the value of Black Cockatoo habitat, contained in the 2017 *Revised draft referral guideline for three threatened black cockatoo species: Carnaby's Cockatoo (Endangered) Calyptorhynchus latirostris Baudin's Cockatoo (Vulnerable) Calyptorhynchus baudinii Forest Red-tailed Black Cockatoo (Vulnerable) Calyptorhynchus banksii naso* (DEE 2017), is flawed and as such have recommended against the use of this tool.

Bamford Consulting Ecologists (BCE 2018) have developed a Black Cockatoo foraging habitat scoring system, which has been previously accepted by the DAWE for projects subject to EPBC Act assessment. The BCE (2018) scoring system comprises of the following components to determine an overall score out of 10:

- Step 1: A score out of 6 for the vegetation composition, condition and structure. This represents the condition of the Survey Area in relation to the ecological requirements of the Threatened species and includes considerations of vegetation condition and structure and the density of foraging species present.
- Step 2: A score out 3 for the context of the Survey Area, where consideration is given to the extent of native vegetation remaining within 15km of the Project Area and the percentage of that extent that the Project Area represents, and if breeding is known/likely or unlikely to occur within 15km. This represents the relative importance to the Survey Area regarding its position in the landscape, including habitat connectivity needs of the Threatened species. This includes considerations of the proximity of the Survey Area in relation to breeding and roosting habitat, and the importance of the role the Survey Area may play in relation to the overall species population.

Site context scoring is applied as outlined below in Table 2.2.

Table 2.2: Site context scoring

| Site context score / 3 | Percentage of the existing native vegetation within the 'local' area that the study site represents | |
|------------------------|---|---------------------------------------|
| | Local (within 15km) breeding known/likely | Local (within 15km) breeding unlikely |
| 3 | >5% | >10% |
| 2 | 1-5% | 5-10% |
| 1 | 0.1-1% | 1-5% |
| 0 | <0.1% | <0.1% |

- Step 3: A species density score out of 1, where consideration is given to any sightings or foraging evidence recorded within the Project Area. If foraging evidence or sightings have been made within the Project Area, a score of 1 is assigned.

- Step 4: Determining the total score out of 10, which may require moderation where a score of 2 or lower has been ascribed at Step 1.

Where a raw foraging score of 2 or less out of 6 has been assigned, a site context score and species density score of 0 has been applied, so as not to overstate foraging value (Bamford Consulting Ecologists 2018).

This method was devised to achieve a score out of 10 to describe habitat quality when using the DAWE Offset Calculator. However, Step 1 alone has been used to inform Black Cockatoo habitat mapping of the Survey Area, as this step provides sufficient information to distinguish the habitat quality of each VT. Total scores were also calculated, should they be required for future reference.

2.2.3.2 Significant tree assessment

Significant trees are defined as trees of suitable species with a diameter at breast height (DBH) greater than 500 mm (> 300 mm for salmon gum and wandoo) (DSEWPac 2012). Tree species which are considered to be potential breeding or roosting trees are outlined in Table 2.3. Trees with a DBH greater than 500 mm (or >300 mm for salmon gum and wandoo) are large enough to potentially contain hollows suitable for nesting black cockatoos, or have the potential to develop suitable hollows over the next 50 years. Trees of this size may also be large enough to provide roosting habitat (i.e. trees which provide a roost or rest area for the birds). The locations of such trees within the Survey Area were recorded using a GPS. In addition to the location and DBH, the species, health and estimated DBH of each tree was also recorded, along with the presence of any hollows.

Table 2.3: Black cockatoo potential breeding and roosting tree species

| Scientific name | Common name | Breeding | Roosting |
|---------------------------------|-------------------------|----------|----------|
| <i>Corymbia calophylla</i> | Marri | Yes | Yes |
| <i>Corymbia maculata</i> | Spotted Gum | | Yes |
| <i>Eucalyptus accedens</i> | Powderbark | Yes | |
| <i>Eucalyptus camaldulensis</i> | River Red Gum | | Yes |
| <i>Eucalyptus citriodora</i> | Lemon Scented Gum | | Yes |
| <i>Eucalyptus diversicolor</i> | Karri | Yes | |
| <i>Eucalyptus globulus</i> | Tasmania Blue Gum | | Yes |
| <i>Eucalyptus gomphocephala</i> | Tuart | Yes | Yes |
| <i>Eucalyptus grandis</i> | Flooded Gum, Rose Gum | | Yes |
| <i>Eucalyptus longicornis</i> | Red Morrell | Yes | |
| <i>Eucalyptus loxophleba</i> | York Gum | Yes | |
| <i>Eucalyptus marginata</i> | Jarrah | Yes | Yes |
| <i>Eucalyptus megacarpa</i> | Bullich | Yes | Yes |
| <i>Eucalyptus occidentalis</i> | Swamp Yate | Yes | |
| <i>Eucalyptus patens</i> | Blackbutt | Yes | Yes |
| <i>Eucalyptus robusta</i> | Swamp Mahogany | | Yes |
| <i>Eucalyptus rudis</i> | Flooded Gum | Yes | Yes |
| <i>Eucalyptus salmonophloia</i> | Salmon Gum | Yes | |
| <i>Eucalyptus salubris</i> | Gimlet | Yes | |
| <i>Eucalyptus wandoo</i> | Wandoo | Yes | Yes |
| <i>Pinus pinaster</i> | Pinaster, Maritime Pine | | Yes |
| <i>Pinus radiata</i> | Monterey, Radiata Pine | | Yes |

Source: Groom 2011, DSEWPac 2012

3. Results

3.1 Desktop survey

3.1.1 Flora

A total of 17 flora taxa of conservation significance were identified by database searches as having been recorded within 5 km of the Survey Area (Appendix A, Appendix 2). These include seven listed as Threatened species under the Biodiversity Conservation Act 2016 (BC Act) and the Environment Protection and Conservation Act 1999 (EPBC Act), as well as 10 Priority species listed by the Western Australian Herbarium (1998-).

The potential for these plants to occur within the Survey Area was assessed based on general habitat requirements and distribution (Appendix B). Based on habitat present within the Survey Area, four species were considered to have the potential to occur, including:

- *Caladenia huegelii* (Threatened [BC Act]; Endangered [EPBC Act])
- *Dodonaea hackettiana* (Priority 4)
- *Drakaea micrantha* (Threatened [BC Act]; Vulnerable [EPBC Act])
- *Tripterococcus* sp. *Brachylobus* (A.S. George 14234) (Priority 4).

3.1.2 Vegetation

Vegetation within the area was mapped by Beard (1991) as; Vegetation Association 1001: medium very sparse woodland of jarrah with low woodland of *Banksia* and *Casuarina*, of which 22.05% remains within the Swan Coastal Plain (SCP) Region (GoWA 2019a). Hedde et al. 1980 mapped the area as the Cottesloe Central and South Vegetation Complex, which supports heaths on limestone outcrops, and a mosaic of tuart woodland and open forest of tuart-jarrah-marri on deeper sands (Hedde et al. 1980), of which 26.87% remains within the SCP (GoWA 2019b).

3.1.2.1 Threatened and Priority Ecological Communities

One federally listed Threatened Ecological Communities (TECs), under the EPBC Act and two listed as a TEC or Priority Ecological Community (PEC), under the State BC Act were identified in the Survey Area as follows:

- Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region (Endangered [EPBC Act]; Priority 3 [DBCAs])
- SCP20a - *Banksia attenuata* woodlands over species rich dense shrublands (Endangered [BC Act])
- SCP21c - Low lying *Banksia attenuata* woodlands or shrublands (Priority 3 [DBCAs]; Endangered [EPBC Act]).

3.1.3 Black cockatoo habitat

The Survey Area falls within the mapped distribution of the three Black Cockatoo species:

- *Calyptorhynchus baudinii* – Baudin's Cockatoo, White-tailed Black Cockatoo
- *Calyptorhynchus banksii naso* — Forest Red-tailed Black Cockatoo
- *Calyptorhynchus latirostris* — Carnaby's Cockatoo, Short-billed Black Cockatoo.

No known breeding or roosting sites for Black Cockatoos occur within the Survey Area; however, the Survey Area is situated within the mapped buffers of multiple breeding sites (WALGA 2020).

3.2 Field Survey

3.2.1 Flora

The survey site encompasses approximately 1.85 ha, of which 1.67 ha is comprised of native vegetation (Figure 2.1). Vegetation within the Survey Area is comprised of Jarrah-Banksia-Allocasuarina woodland over mixed shrubs and exotic grasses on sandy soils. The vegetation condition scale used is based on Keighery (1994).

A total of 48 flora taxa from 20 plant families were recorded within the Survey Area. The majority of taxa were recorded within the Fabaceae and Proteaceae families (Appendix 1).

No Threatened flora species as listed under section 178 of the EPBC Act or under the BC Act were recorded during targeted surveys within the Survey Area; however, one individual *Caladenia* sp. was recorded during the targeted survey. This single plant could not be identified beyond genus level as no identifiable characteristics (e.g. flowers) were present at the time of survey. The closest vouchered recording of *Caladenia huegelii* is 5.1 km to the north east, with an unvouchered record located within the Harry Waring Marsupial Reserve 2.1 km to the North West. As surveys were conducted during the known flowering period of *Caladenia huegelii* and known populations of the species were in flower immediately prior to the survey, it was considered unlikely that this was an individual of *C. huegelii*.

3.2.2 Introduced Taxa

The following eight introduced species were recorded in low densities throughout the Survey Area within the native vegetation.

- **Avena barbata*
- **Briza maxima*
- **Ehrharta calycina*
- **Gladiolus caryophyllaceus*
- **Hypochaeris glabra*
- **Pelargonium* sp.
- **Ursinia anthemoides*
- **Wahlenbergia capensis*.

In areas of disturbance such as adjacent the residence, or along firebreaks and tracks, high infestations of **Avena barbata*, **Briza maxima* and **Ehrharta calycina* were recorded.

3.2.3 Vegetation

One native vegetation type was defined and mapped within the Survey Area:

- VT 1 - *Banksia attenuata*, *Banksia menziesii* and *Adenanthos cygnorum* woodland over *Xanthorrhoea preissii*, *Leucopogon conostephioides*, *Mesomelaena pseudostygia* and *Hibbertia hypericoides* low shrubland over exotic grasses and herbs including **Ehrharta calycina* and **Gladiolus caryophyllaceus* on grey/white sand.

Cleared areas containing no native vegetation (i.e. fire breaks and roads) were also mapped in the Survey Area (Figure 3.1). The total coverage of native vegetation and cleared areas within are presented in Table 3.1.

Table 3.1: Vegetation type and coverage of Survey Area

| Vegetation Type | Area (ha) | Percentage of the Survey Area (%) |
|-----------------|-------------|-----------------------------------|
| VT1 | 1.43 | 70.1 |
| Cleared | 0.61 | 29.9 |
| TOTAL | 2.04 | 100 |

3.2.3.1 Vegetation condition

Vegetation condition within the Survey Area ranged from Completely Degraded to Very Good (EPA 2016). Large areas of the Survey Area (approx. 29 %) was cleared of native vegetation (Table 3.2). The proximity of public roads, nearby infrastructure (and associated firebreaks) as well as previous clearing for land development, has had an impact on the vegetation condition within the Survey Area, particularly evident by weed infestations where native vegetation has been cleared for access and firebreaks.

Table 3.2: Area (ha) covered by each vegetation condition category within the Survey Area

| Vegetation Condition | Area (ha) | Percentage of the Survey Area |
|----------------------|-------------|-------------------------------|
| Very Good | 1.12 | 54.9 |
| Good | 0.12 | 5.9 |
| Degraded | 0.20 | 9.8 |
| Completely Degraded | 0.60 | 29.4 |
| Total | 2.04 | 100 |

3.2.3.2 Threatened and Priority Ecological Communities

An assessment of the presence of the ‘Banksia Woodlands of the Swan Coastal Plain’ TEC listed under the EPBC Act is presented in Table 3.3. The assessment indicates that the Survey Area contains the ‘Banksia Woodlands of the Swan Coastal Plain’ TEC. This community is also listed as a Priority 3 Ecological Community by DBCA.

Table 3.3: Characteristics of the Banksia woodland within the Survey Area compared to the key diagnostic criteria

| Key diagnostic criteria (TSSC 2016) | Banksia woodlands within the Survey Area |
|--|--|
| Location: Occurs in the Swan Coastal Plain or Jarrah Forest IBRA bioregions. | Yes. Banksia woodlands within the Survey Area occur on the Swan Coastal Plain. |
| Soils and landform: Occurs on: well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands sandy colluviums and aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau transitional substrates and sandflats. | Yes. Banksia woodlands within the Survey Area occur on Bassendean Sands. |
| Structure: Low woodland to forest with: a distinctive upper sclerophyllous layer of low trees (occasionally large shrubs more than 2 m tall), typically dominated or co-dominated by one or more of the Banksia species identified below emergent trees of medium or tall (>10 m) height. <i>Eucalyptus</i> or <i>Allocasuarina</i> species may sometimes be present above the banksia canopy an often highly species-rich understorey. | Yes. VT1 represents a very open woodland structure. |
| Composition: Contains at least one of the following species: <i>Banksia attenuata</i> <i>Banksia menziesii</i> <i>Banksia prionotes</i> <i>Banksia ilicifolia</i> . | Yes. VT1 contains <i>Banksia</i> spp. including <i>Banksia attenuata</i> and <i>B. menziesii</i> . |

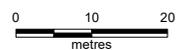
| Key diagnostic criteria (TSSC 2016) | Banksia woodlands within the Survey Area |
|--|---|
| <p><u>Condition (Keighery 1994):</u> 'Pristine': no minimum patch size 'Excellent': 0.5 ha 'Very Good': 1 ha 'Good': 2 ha.</p> | <p>Yes. Banksia woodland vegetation within the Survey Area is in Good – Very Good condition and covers 1.43 ha. Vegetation is connected with a broader patch of banksia woodland of minimum Good condition, bringing the overall patch size to >2 ha. This area of vegetation meets the minimum patch condition and size requirements and represents an occurrence of the Banksia woodlands TEC.</p> |



Legend

- Survey area
- Cadastral boundary
- Vegetation mapping**
- Cleared
- VT1
- Relevé
- Main road
- Minor road

Scale 1:1,000 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59917

Client: Blokk Property

Version: A

Date: 19-Mar-2021

Drawn By: cthatcher

Checked By: JW

**221 Barfield Rd
Hammond Park**

**VEGETATION TYPES
WITHIN THE SURVEY AREA**

FIGURE 3.1

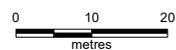




Legend

- Survey area
- Cadastral boundary
- Vegetation condition
- Very good
- Good
- Degraded
- Completely degraded
- Main road
- Minor road

Scale 1:1,000 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59917

Client: Blokk Property

Version: A

Date: 19-Mar-2021

Drawn By: cthatcher

Checked By: JW

**221 Barfield Rd
Hammond Park**

**VEGETATION CONDITION
WITHIN THE SURVEY AREA**

FIGURE 3.2



3.3 Black Cockatoo Assessment

3.3.1 Foraging habitat

Foraging habitat quality identified within the Survey Area is shown in Figure 3.3. outlines the vegetation types and associated foraging habitat value scores.

Vegetation within the Survey Area were considered to have Low to Moderate foraging habitat value for Carnaby’s and Baudin’s Black Cockatoo, and Negligible to Low foraging value for both Baudin’s Black Cockatoo and Forest Red-tailed Black Cockatoo, based on the density of suitable foraging species (Figure 3.3).

The site represents <0.1% of the existing native vegetation within the local area (15 km radius) and Carnaby’s Black Cockatoo breeding sites are known from within a 15 km radius. The site was therefore assigned a context score of 1.

Evidence of foraging in the way of chewed Banksia cones was recorded in the Survey Area, and therefore a score of 1 was assigned for species density.

Table 3.4: Carnaby’s Black Cockatoo foraging habitat quality within Survey Area

| Cockatoo species | Foraging species | Vegetation composition score | Area (ha) | Site Context score | Species density | Total score |
|----------------------------------|--|--------------------------------------|-----------|--------------------|-----------------|-------------|
| Carnaby’s Black Cockatoo | <i>Banksia attenuata</i> , <i>Banksia menziesii</i> , <i>Eucalyptus marginata</i> , <i>Jacksonia furcellata</i> , <i>Mesomelaena pseudostygia</i> , <i>Xanthorrhoea preissii</i> | 3 – Low to Moderate foraging value | 1.43 | 1 | 1 | 5 |
| Forest Red-tailed Black Cockatoo | <i>Eucalyptus marginata</i> | 1 – Negligible to Low foraging value | 1.43 | 1 | 1 | 0 |
| Baudin’s Black Cockatoo | <i>Eucalyptus marginata</i> , <i>Xanthorrhoea preissii</i> | 1 – Negligible to Low foraging value | 1.43 | 1 | 1 | 0 |

3.3.2 Breeding Habitat

No significant trees were identified within the Survey Area.

3.3.3 Roosting Habitat

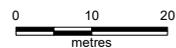
No potential roosting habitat was identified within the Survey Area.



Legend

- Survey area
- Cadastral boundary
- Black Cockatoo foraging habitat
 - Low to moderate
 - Baudin's Black Cockatoo and Forest Red-tailed Black Cockatoo Negligible to low foraging
- ▼ Relevé
- Main road
- Minor road

Scale 1:1,000 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 59917

Client: Blokk Property

Version: A

Date: 19-Mar-2021

Drawn By: cthatcher

Checked By: JW

**221 Barfield Rd
Hammond Park**

**BLACK COCKATOO FORAGING HABITAT
WITHIN THE SURVEY AREA**

FIGURE 3.3



Figure 3.3: Black Cockatoo habitat within the Survey Area

4. Discussion

A total of 48 native flora taxa and eight introduced flora taxa were recorded from relevés within the Survey Area. The native species diversity is consistent with the ecology of the region as describe by Gibson *et al.* (1994).

All native vegetation areas were traversed by botanists during the survey. There is a high degree of confidence that any Threatened or Priority Listed Flora would have been recorded.

Based on habitat present within the Survey Area, four species were considered to have the potential to occur, including:

- *Caladenia huegelii* (Threatened [BC Act]; Endangered [EPBC Act])
- *Dodonaea hackettiana* (Priority 4)
- *Drakaea micrantha* (Threatened [BC Act]; Vulnerable [EPBC Act])
- *Tripterococcus* sp. *Brachylobus* (A.S. George 14234) (Priority 4).

One individual, *Caladenia* sp., was recorded during the targeted survey; however, as this was not in flower, it could not be identified beyond genus level. As surveys were conducted during the known flowering period of *Caladenia huegelii* and known populations of the species were in flower immediately prior to the survey, it was considered unlikely that this was an individual of *C. huegelii*.

The survey was conducted at a suitable flowering time for both *Drakaea micrantha* (September – October) and *Dodonaea hackettiana*, which flowers between July and October and is identifiable to genus without flowers.

No Threatened flora species as listed under section 178 of the EPBC Act or BAM Act 2007, or Priority flora species as listed by Western Australian Herbarium (1998-) were recorded during targeted surveys within the Survey Area.

The vegetation within the Survey Area was assessed against the diagnostic criteria for the 'Banksia Woodlands of the Swan Coastal Plain' TEC listed under the EPBC Act (Table 3.3). The assessment indicated that the vegetation within VT1 is considered representative of the TEC. This community is also listed as a Priority 3 Ecological Community by DBCA. This TEC extends outside of the Survey Area to the north east and has a total area of approximately 8.4 ha.

Vegetation condition varied throughout the Survey Area. Most of the vegetation (1.24 ha) was rated in 'Good' and 'Very Good' condition. Areas cleared for residence, access tracks and fire breaks are rated as 'Completely Degraded' (Cleared) condition. Small areas of dense weed infestations within the native vegetation indicate that there has been localised disturbance at some point.

The previously mapped buffers of multiple known breeding sites for Carnaby's Black Cockatoo overlap the Survey Area, indicating suitable breeding habitat is present within the region. Both foraging trees and roosting trees were present within the Survey Area/ however no evidence of foraging was found, and no trees had hollows suitable for roosting/nesting.

The Survey Area has 1.43 ha of potential foraging habitat. This was rated as Low to Moderate for Carnaby's Black Cockatoo, based on a low percentage of foliage cover (10-20% cover of Carnaby's Black Cockatoo foraging habitat species), and Negligible to Low foraging value for Baudin's Black Cockatoo. No foraging habitat for Forest Red-tailed Black Cockatoo was recorded within the Survey Area.

5. Summary and conclusion

The key environmental values of the Survey Area are as follows:

- no conservation significant flora species
- 1.43 ha of the Threatened Ecological Community “Banksia Woodlands of the Swan Coastal Plain” as listed under the EPBC Act; however, based on the population of Banksia’s within the proposed development Survey Area, it unlikely that this would have a significant impact on the overall populations of Banksia Woodlands on the SCP
- 1.43 ha of Low to Moderate value foraging habitat for Carnaby’s Black Cockatoo
- 1.43 ha Negligible to Low value foraging habitat for Forest Red-tailed Black Cockatoo
- 1.43 ha Negligible to Low value foraging habitat for Baudin’s Black Cockatoo.

6. References

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Appendix B: Threatened and Priority flora potentially occurring within the proposed clearing area

| Species | Conservation status | | Description | Potential to occur |
|---------------------------------|---------------------|------------|---|---|
| | BC Act / DBCA | EPBC Act | | |
| <i>Andersonia gracilis</i> | T | Endangered | A slender, erect or open straggly shrub, 10 to 100 cm high. Flowers are white to pink to purple from September to November. Habitat for this species occurs in white/grey sand, sandy clay, gravelly loam within winter-wet areas and near swamps (Western Australian Herbarium 1998-). The species occurs in damp black, sandy clay flats near swamps in open low heath with <i>Calothamnus hirsutus</i> , <i>Verticordia densiflora</i> , <i>Kunzea 19ecurve</i> and <i>Banksia telmatiaea</i> over sedges (Western Australian Herbarium 1998-, DAWE 2020). | Unlikely due to absence of preferred habitat. |
| <i>Caladenia huegelii</i> | T | Endangered | A slender orchid from 30 to 50 cm tall. One or two striking flowers characterised by a greenish-cream lower petal with a maroon tip. Other petals are cream with red or pink suffusions. Habitat for this species occurs within well-drained, deep sandy soils in low mixed <i>Banksia</i> , <i>Allocasuarina</i> and Jarrah woodlands (Western Australian Herbarium 1998-, DAWE 2020). | Possible due to presence of preferred habitat. |
| <i>Cyathochaeta teretifolia</i> | P3 | NA | A rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2 m high and to 1.0 m wide. Flowers are brown. Habitat for this species includes grey sand or sandy clay within swamps or creek edges (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |
| <i>Diuris drummondii</i> | T | Vulnerable | Tuberous perennial orchid flowering yellow between November and December or January. Occurs in low-lying depressions or swamps (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |
| <i>Diuris micrantha</i> | T | Vulnerable | A slender orchid to 60 cm tall. Yellow flowers with reddish-brown markings measuring 1.3 cm across. Habitat for this species occurs within clay-loam substrates in winter-wet depressions or swamps (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |
| <i>Diuris purdiei</i> | T | Endangered | A slender orchid to 0.35 m tall. Flowers are yellow and visible from September to October. Habitat for this species is grey-black sand substrates in winter-wet swamps which have high moisture (Western Australian Herbarium 1998-). <i>Diuris purdiei</i> occurs from Perth south to near the Whicher Range, within the Swan (Western Australia) Natural Resource Management Region. It grows on sand to sandy clay soils, in areas subject to winter inundation, and amongst native sedges and | Unlikely due to absence of preferred habitat. |

| | | | | |
|-------------------------------|----|------------|---|---|
| | | | dense heath with scattered emergent <i>Melaleuca preissiana</i> , <i>Corymbia calophylla</i> , <i>E. marginata</i> and <i>Nuytsia floribunda</i> (DAWE 2020). | |
| <i>Dodonaea hackettiana</i> | P4 | NA | An erect shrub or tree, 100 to 500 cm tall. Flowers are yellow to green/red and occur mainly from July to October. Habitat for this species occurs in sand and outcropping limestone (Western Australian Herbarium 1998-). | Possible due to presence of preferred habitat. |
| <i>Drakaea elastica</i> | T | Endangered | A slender orchid to 30 cm tall with a prostrate, round to heart shaped leaf. Singular, bright green, glossy flower. The species grows on bare patches of sand within otherwise dense vegetation in low-lying areas alongside winter-wet swamps, typically in banksia (<i>Banksia menziesii</i> , <i>B. attenuata</i> and <i>B. ilicifolia</i>) woodland or spearwood (<i>Kunzea glabrescens</i>) thicket vegetation. <i>D. elastica</i> often occurs with other orchid species (DAWE 2020). | Unlikely due to absence of preferred habitat. |
| <i>Drakaea micrantha</i> | T | Vulnerable | A tuberous, terrestrial herb which has a diminutive red and yellow flower, 1.2–2.5 cm long, on a stem that grows to 30 cm. Flowering occurs from September to October. Its heart-shaped leaf, about 1.5 cm long, is silvery grey with prominent green veins. Habitat for this species occurs within cleared firebreaks or open sandy patches that have been disturbed, where competition from other plants has been removed (Western Australian Herbarium 1998-, DEE 2019b). | Possible due to presence of preferred habitat. |
| <i>Jacksonia gracillima</i> | P3 | NA | A spreading, compact shrub 100 cm tall and 100 cm wide. Flower buds are very angular and wings are orange with a darker orange keel. Habitat for this species occurs within winter wet Bassendean sands and littered, grey, peaty, loamy sand (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |
| <i>Kennedia beckxiana</i> | P4 | NA | Prostrate or twining shrub or climber, flowering red between September and December. Occurs on sand or loam on granite hills and outcrops (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |
| <i>Lepidosperma rostratum</i> | T | Endangered | A rhizomatous sedge to 30 cm in diameter. Stems are circular in cross section and flowers are spike-like and up to 4 cm long. Habitat for this species occurs in sandy soils among low heath comprised of <i>Banksia telmatiaea</i> and <i>Calothamnus hirsutus</i> in winter-wet swamps (Western Australian Herbarium 1998-, DEE 2019b). | Unlikely due to absence of preferred habitat. |
| <i>Pimelea calcicola</i> | P3 | NA | An erect to spreading shrub to 1 m tall. Flowers are pink and visible between September to November. Habitat for this species occurs in sand on coastal limestone ridges (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |

| | | | | |
|---|----|----|---|--|
| <i>Pithocarpa corymbulosa</i> | P3 | NA | Erect to scrambling perennial herb to 1 m high. Flowers white between January and April. Occurs on gravelly or sandy loam amongst granite outcrops (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |
| <i>Poranthera moorokatta</i> | P2 | NA | Erect annual to 47 mm high. Flowers pale pink between September and early November. Known from only two locations at Kings Park and Ellenbrook, occurring in <i>Banksia menziesii</i> – <i>B. attenuata</i> woodland on white silica sand in open spaces between shrubs (Barrett 2012). | Unlikely. While the species is known from <i>Banksia</i> woodland, its highly restricted distribution indicates it is unlikely to occur within the Survey Area. |
| <i>Stylidium paludicola</i> | P3 | NA | Reed-like perennial, herb, 35 to 100 cm tall. Leaves are tufted, linear or subulate or narrowly oblanceolate. Flowers are pink and occur in October to December. Habitat for this species occurs in peaty sand over clay and winter wet areas, often in Marri and Melaleuca woodland or Melaleuca shrubland (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |
| <i>Tripterococcus</i> sp. <i>Brachylobus</i> (A.S. George 14234) | P4 | NA | No habitat information available (Western Australian Herbarium 1998-). | Possible. As no habitat information is available for this species, it should be considered as potentially occurring. |
| <i>Verticordia lindleyi</i> subsp. <i>lindleyi</i> | P4 | NA | Erect shrub to 0.75 m high, flowering pink in May or November to December / January. Occurs on sand or sandy clay in winter-wet depressions (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |

Appendix B: Native flora taxa recorded within Survey Area

| Family | Species |
|------------------|---|
| Anarthriaceae | <i>Lyginia imberbis</i> |
| Araliaceae | <i>Trachymene pilosa</i> |
| Asparagaceae | <i>Laxmannia squarrosa</i> |
| | <i>Lomandra hermaphrodita</i> |
| Asteraceae | <i>Podolepis gracilis</i> |
| | <i>Siloxerus humifusus</i> |
| Casuarinaceae | <i>Allocasuarina humilis</i> |
| Colchicaceae | <i>Burchardia congesta</i> |
| Cyperaceae | <i>Lepidosperma calcicola</i> |
| | <i>Mesomelaena pseudostygia</i> |
| Dilleniaceae | <i>Hibbertia hypericoides</i> |
| Ericaceae | <i>Conostephium pendulum</i> |
| | <i>Leucopogon conostephioides</i> |
| Fabaceae | <i>Acacia applanata</i> |
| | <i>Acacia pulchella</i> |
| | <i>Acacia stenoptera</i> |
| | <i>Acacia applanata</i> |
| | <i>Bossiaea eriocarpa</i> |
| | <i>Daviesia nudiflora</i> |
| | <i>Daviesia triflora</i> |
| | <i>Gompholobium tomentosum</i> |
| | <i>Hovea trisperma</i> |
| | <i>Jacksonia sternbergiana</i> |
| | <i>Jacksonia furcellata</i> |
| Goodeniaceae | <i>Dampiera linearis</i> |
| | <i>Scaevola canescens</i> |
| Haemodoraceae | <i>Anigozanthos humilis</i> |
| | <i>Anigozanthos manglesii</i> |
| | <i>Conostylis aculeata</i> |
| | <i>Conostylis setigera</i> |
| Iridaceae | <i>Patersonia occidentalis</i> |
| Myrtaceae | <i>Hypocalymma robustum</i> |
| | <i>Melaleuca systema</i> |
| | <i>Kunzea glabrescens</i> |
| | <i>Eucalyptus marginata</i> |
| Orchidaceae | <i>Caladenia</i> sp. |
| Proteaceae | <i>Adenanthos cygnorum</i> |
| | <i>Banksia attenuata</i> |
| | <i>Banksia menziesii</i> |
| | <i>Persoonia saccata</i> |
| | <i>Petrophile linearis</i> |
| | <i>Stirlingia latifolia</i> |
| | <i>Synaphea spinulosa</i> subsp. <i>spinulosa</i> |
| Restionaceae | <i>Hypolaena exsulca</i> |
| Santalaceae | <i>Leptomeria empetriformis</i> |
| Stylidiaceae | <i>Levenhookia stipitata</i> |
| | <i>Stylidium brunonianum</i> |
| | <i>Stylidium repens</i> |
| Xanthorrhoeaceae | <i>Xanthorrhoea preissii</i> |
| | <i>Xanthorrhoea gracilis</i> |

2. Methods

2.1 Desktop survey

Databases including the *Protected Matters Search Tool* (DEE 2019a) and *Naturemap* (DPaW 2007-) were undertaken to generate a list of vascular flora previously recorded within, and nearby the Survey Area with an emphasis on species of conservation significance and introduced species (Appendix A). Database searches were conducted prior to the field survey in 2018 and updated in August 2020.

A search of the Environmental Planning Tool (WALGA 2020) was undertaken to determine whether any known roosting or breeding sites for Carnaby's Black Cockatoo occurred within or near the Survey Area.

2.2 Field survey

A Senior Ecologist and an Ecologist from Strategen visited the Survey Area on 23 October 2018. All plants collected were taken under flora collecting permit SL012341, pursuant to WC Act Section 23C and Section 23F.

2.2.1 Flora

Three quadrats were sampled to characterise vegetation types and condition, and ensure appropriate representation of the flora and vegetation present.

At each quadrat the following information was recorded:

- GPS co-ordinates (recorded in GDA94 UTM 50H)
- photograph of the vegetation
- vegetation condition
- brief vegetation description
- vascular flora taxa present (with average height and total percentage foliage cover of each taxon)
- topography (landform type and aspect)
- soil type and colour
- geology (type, size and cover of any rocks, stones, gravel or outcropping)
- average percentage cover of leaf litter and bare ground
- disturbance details including fire history (time since last fire), and physical disturbance including evidence of erosion, grazing and weed invasion.

Any flora taxa observed opportunistically around quadrats or while traversing on foot within the project area were also recorded.

All plant specimens collected during the field surveys were identified using appropriate reference material or through comparisons with pressed specimens housed at the Western Australian Herbarium where necessary. Nomenclature of the species recorded is in accordance with Western Australian Herbarium (1998-).

2.2.1.1 Targeted surveys for Threatened and Priority Flora

Prior to the survey, a list of conservation significant flora with the potential to occur within the Survey Area was compiled. Field personnel familiarised themselves with photographs, reference samples and descriptions of these taxa before conducting the survey. Additionally, known

populations of *Caladenia huegelii* were checked for flowering prior to mobilising for the survey to ensure optimal survey timing for this species.

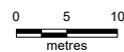
A targeted survey was conducted across the entire Survey Area, with two botanists walking in parallel transects approximately 10 m apart (Figure 2.1). One survey track is shown in Figure 2.1, and a second transect was walked in parallel between the tracks illustrated in the figure.



Legend

- ▭ Project area
- Cadastral boundary
- Survey track

Scale 1:750 at A4



**Barfield Road
Hammond Park**

Coord. Sys. GDA 1994 MGA Zone 50



**SURVEY AREA AND
TARGETED SURVEY TRACKS**

Job No: 56613

Client: Blokk Property

FIGURE 2.1

Version: A

Date: 19-Mar-2021

Drawn By: cthatcher

Checked By: RC



2.2.2 Vegetation

Vegetation condition was recorded at all quadrats, and also opportunistically within the Survey Area during the field assessment where required. Vegetation condition was described using the vegetation condition scale for the South West Botanical Province (EPA 2016). Vegetation condition polygon boundaries were developed using this information in conjunction with aerial photography interpretation, and were digitised as for vegetation type mapping polygon boundaries.

Table 2.1: Vegetation condition scale (EPA 2016)

| Condition rating | Description |
|-------------------------|--|
| Pristine (1) | Pristine or nearly so, no obvious sign of disturbance or damage caused by human activities since European settlement |
| Excellent (2) | Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks. |
| Very Good (3) | Vegetation structure altered obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing. |
| Good (4) | Vegetation structure significantly altered by obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback, grazing. |
| Degraded (5) | Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing. |
| Completely Degraded (6) | The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs. |

VT descriptions (though floristic in origin) have been adapted from the National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual Version 6.0 (ESCAVI 2003), a system of describing structural vegetation units (based on dominant taxa). This model follows nationally-agreed guidelines to describe and represent vegetation types, so that comparable and consistent data is produced nation-wide. For the purposes of this report, a VT is considered equivalent to a NVIS sub-association as described in ESCAVI (2003).

2.2.2.1 Threatened and Priority Ecological Communities

An assessment of the presence of the 'Banksia Woodlands of the Swan Coastal Plain' TEC listed under the EPBC Act was conducted against diagnostic criteria presented in the *Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community* (TSSC 2019).

2.2.3 Black cockatoo habitat

The Survey Area was inspected on 23 October 2018 by Strategen personnel with relevant experience as specified by the *EPBC Act Referral guidelines for three threatened black cockatoo species* (DSEWPac 2012). The inspection included:

- a vegetation assessment to identify vegetation communities and potential black cockatoo foraging species
- a significant tree assessment to identify any trees with the potential to be utilised by black cockatoos for breeding.

The Survey Area was traversed on foot to record any flora species with the potential to provide a food source for black cockatoos. Following the assessment, vegetation units defined as part of the

flora and vegetation survey were assigned a foraging value based on the presence and quantity of potential food species and any evidence of foraging by black cockatoos.

2.2.3.1 Foraging habitat assessment

The Survey Area was traversed on foot to record any flora species with the potential to provide a food source for Black Cockatoos. Data was collected at three survey points to inform Black Cockatoo foraging habitat mapping. Following the assessment, vegetation units defined as part of the flora and vegetation survey were assigned a foraging value based on the presence and quantity of potential food species and any evidence of foraging by black cockatoos.

Habitat Scoring Method

The Department of Agriculture, Water and the Environment (DAWE) have recognised that the scoring tool to determine the value of Black Cockatoo habitat, contained in the 2017 *Revised draft referral guideline for three threatened black cockatoo species: Carnaby’s Cockatoo (Endangered) Calyptorhynchus latirostris Baudin’s Cockatoo (Vulnerable) Calyptorhynchus baudinii Forest Red-tailed Black Cockatoo (Vulnerable) Calyptorhynchus banksii naso* (DEE 2017), is flawed and as such have recommended against the use of this tool.

Bamford Consulting Ecologists (BCE 2018) have developed a Black Cockatoo foraging habitat scoring system, which has been previously accepted by the DAWE for projects subject to EPBC Act assessment. The BCE (2018) scoring system comprises of the following components to determine an overall score out of 10:

- Step 1: A score out of 6 for the vegetation composition, condition and structure. This represents the condition of the Survey Area in relation to the ecological requirements of the Threatened species and includes considerations of vegetation condition and structure and the density of foraging species present.
- Step 2: A score out 3 for the context of the Survey Area, where consideration is given to the extent of native vegetation remaining within 15 km of the Project Area and the percentage of that extent that the Project Area represents, and if breeding is known/likely or unlikely to occur within 15km. This represents the relative importance to the Survey Area regarding its position in the landscape, including habitat connectivity needs of the Threatened species. This includes considerations of the proximity of the Survey Area in relation to breeding and roosting habitat, and the importance of the role the Survey Area may play in relation to the overall species population.

Site context scoring is applied as outlined below in Table 2.2.

Table 2.2: Site context scoring

| Site context score / 3 | Percentage of the existing native vegetation within the ‘local’ area that the study site represents | |
|------------------------|---|---------------------------------------|
| | Local (within 15km) breeding known/likely | Local (within 15km) breeding unlikely |
| 3 | >5% | >10% |
| 2 | 1-5% | 5-10% |
| 1 | 0.1-1% | 1-5% |
| 0 | <0.1% | <0.1% |

- Step 3: A species density score out of 1, where consideration is given to any sightings or foraging evidence recorded within the Project Area. If foraging evidence or sightings have been made within the Project Area, a score of 1 is assigned.
- Step 4: Determining the total score out of 10, which may require moderation where a score of 2 or lower has been ascribed at Step 1.

Where a raw foraging score of 2 or less out of 6 has been assigned, a site context score and species density score of 0 has been applied, so as not to overstate foraging value (Bamford Consulting Ecologists 2018).

This method was devised to achieve a score out of 10 to describe habitat quality when using the DAWE Offset Calculator. However, Step 1 alone has been used to inform Black Cockatoo habitat mapping of the Survey Area, as this step provides sufficient information to distinguish the habitat quality of each VT. Total scores were also calculated, should they be required for future reference.

2.2.3.2 Significant tree assessment

Significant trees are defined as trees of suitable species with a diameter at breast height (DBH) greater than 500 mm (> 300 mm for salmon gum and wandoo) (DSEWPac 2012). Tree species which are considered to be potential breeding or roosting trees are outlined in Table 2.3. Trees with a DBH greater than 500 mm (or >300 mm for salmon gum and wandoo) are large enough to potentially contain hollows suitable for nesting black cockatoos, or have the potential to develop suitable hollows over the next 50 years. Trees of this size may also be large enough to provide roosting habitat (i.e. trees which provide a roost or rest area for the birds). The locations of such trees within the Survey Area were recorded using a GPS. In addition to the location and DBH, the species, health and estimated DBH of each tree was also recorded, along with the presence of any hollows.

Table 2.3: Black cockatoo potential breeding and roosting tree species

| Scientific name | Common name | Breeding | Roosting |
|---------------------------------|-------------------------|----------|----------|
| <i>Corymbia calophylla</i> | Marri | Yes | Yes |
| <i>Corymbia maculata</i> | Spotted Gum | | Yes |
| <i>Eucalyptus accedens</i> | Powderbark | Yes | |
| <i>Eucalyptus camaldulensis</i> | River Red Gum | | Yes |
| <i>Eucalyptus citriodora</i> | Lemon Scented Gum | | Yes |
| <i>Eucalyptus diversicolor</i> | Karri | Yes | |
| <i>Eucalyptus globulus</i> | Tasmania Blue Gum | | Yes |
| <i>Eucalyptus gomphocephala</i> | Tuart | Yes | Yes |
| <i>Eucalyptus grandis</i> | Flooded Gum, Rose Gum | | Yes |
| <i>Eucalyptus longicornis</i> | Red Morrell | Yes | |
| <i>Eucalyptus loxophleba</i> | York Gum | Yes | |
| <i>Eucalyptus marginata</i> | Jarrah | Yes | Yes |
| <i>Eucalyptus megacarpa</i> | Bullich | Yes | Yes |
| <i>Eucalyptus occidentalis</i> | Swamp Yate | Yes | |
| <i>Eucalyptus patens</i> | Blackbutt | Yes | Yes |
| <i>Eucalyptus robusta</i> | Swamp Mahogany | | Yes |
| <i>Eucalyptus rudis</i> | Flooded Gum | Yes | Yes |
| <i>Eucalyptus salmonophloia</i> | Salmon Gum | Yes | |
| <i>Eucalyptus salubris</i> | Gimlet | Yes | |
| <i>Eucalyptus wandoo</i> | Wandoo | Yes | Yes |
| <i>Pinus pinaster</i> | Pinaster, Maritime Pine | | Yes |
| <i>Pinus radiata</i> | Monterey, Radiata Pine | | Yes |

Source: Groom 2011, DSEWPac 2012

3. Results

3.1 Desktop survey

3.1.1 Flora

A total of 17 flora taxa of conservation significance were identified by database searches as having been recorded within 5 km of the Survey Area (Appendix A, Appendix 2), including seven that are listed as Threatened species under the Biodiversity Conservation Act 2016 (BC Act) and the

Environment Protection and Conservation Act 1999 (EPBC Act), as well as 10 Priority species listed by the Western Australian Herbarium (1998-).

The potential for these plants to occur within the Survey Area was assessed based on general habitat requirements and distribution (Appendix B). Based on habitat present within the Survey Area, four species were considered to have the potential to occur, including:

- *Caladenia huegelii* (Threatened [BC Act]; Endangered [EPBC Act])
- *Dodonaea hackettiana* (Priority 4)
- *Drakaea micrantha* (Threatened [BC Act]; Vulnerable [EPBC Act])
- *Tripterococcus* sp. *Brachylobus* (A.S. George 14234) (Priority 4).

3.1.2 Vegetation

Vegetation within the rehabilitation area was mapped by Beard as Vegetation Association 1001: medium very sparse woodland of jarrah with low woodland of *Banksia* and *Casuarina*, of which 22.05% remains (GoWA 2019a). Heddle et al. 1980 mapped the area as the Cottesloe Central and South Vegetation Complex, which supports heaths on limestone outcrops, and a mosaic of tuart woodland and open forest of tuart-jarrah-marri on deeper sands (Heddle et al. 1980), of which 26.87% remains (GoWA 2019b).

3.1.2.1 Threatened and Priority Ecological Communities

One federally listed Threatened Ecological Communities (TECs), under the EPBC Act and two listed as a TEC or Priority Ecological Community (PEC), under the State BC Act were identified in the Survey Area as follows:

- Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region (Endangered [EPBC Act]; Priority 3 [DBCA])
- SCP20a - *Banksia attenuata* woodlands over species rich dense shrublands (Endangered [BC Act])
- SCP21c - Low lying *Banksia attenuata* woodlands or shrublands (Priority 3 [DBCA]; Endangered [EPBC Act]).

3.1.3 Black Cockatoo habitat

The Survey Area falls within the mapped distribution of the three Black Cockatoo species:

- *Calyptorhynchus baudinii* – Baudin's Cockatoo, White-tailed Black Cockatoo
- *Calyptorhynchus banksii naso* — Forest Red-tailed Black Cockatoo
- *Calyptorhynchus latirostris* — Carnaby's Cockatoo, Short-billed Black Cockatoo.

No known breeding or roosting sites for Carnaby's Black Cockatoo occur within the Survey Area; however, the Survey Area is situated within the mapped buffers of multiple breeding sites (WALGA 2020).

3.2 Field survey

3.2.1 Flora

A total of 53 flora taxa from 23 plant families were recorded from quadrats within the Survey Area. The majority of taxa were recorded within the Fabaceae and Proteaceae families (Appendix 1).

No Threatened flora species as listed under section 178 of the EPBC Act and under the BC Act were recorded during targeted surveys within the Survey Area; however, one individual *Caladenia* sp. was

recorded within Quadrat 1. This single plant could not be identified beyond genus level as no identifiable characteristics (e.g. flowers) were present at the time of survey. As surveys were conducted during the known flowering period of *Caladenia huegelii* and known populations of the species were in flower immediately prior to the survey, it was considered unlikely that this was an individual of *C. huegelii*.

3.2.2 Introduced Taxa

The following six introduced species were recorded in low densities throughout the Survey Area:

- **Avena barbata*
- **Briza maxima*
- **Ehrharta calycina*
- **Gladiolus caryophyllaceus*
- **Ursinia anthemoides*
- **Wahlenbergia capensis*.

3.2.3 Vegetation

One vegetation type was recorded within the Survey Area, as follows:

VT1 - Open shrubland of *Adenanthos cygnorum* and *Kunzea glabrescens* with emergent *Banksia attenuata* and *Banksia menziesii*, to open woodland of *Banksia attenuata* and *Banksia menziesii*, over shrubland of *Hibbertia hypericoides*, *Hypocalymma robustum* and *Acacia pulchella* over mixed native and introduced shrubs and herbs on grey sand.

Cleared areas containing no native vegetation (i.e. fire breaks and roads) were also mapped in the Survey Area (Figure 3.1). The total coverage of native vegetation and cleared areas within are presented in Table 3.2.

Table 3.1: Vegetation type and coverage of Survey Area

| Vegetation Type | Area (ha) | Percentage of the Survey Area (%) |
|-----------------|-------------|-----------------------------------|
| VT1 | 1.30 | 83.9 |
| Cleared | 0.25 | 16.1 |
| TOTAL | 1.55 | 100 |

3.2.3.1 Vegetation condition

Vegetation was rated in Good – Very Good condition throughout the Survey Area. Vegetation type and condition is illustrated in Figure 3.1. The total coverage of native vegetation and cleared areas within are presented in Table 3.2.

Table 3.2: Area (ha) covered by each vegetation condition category within the Survey Area

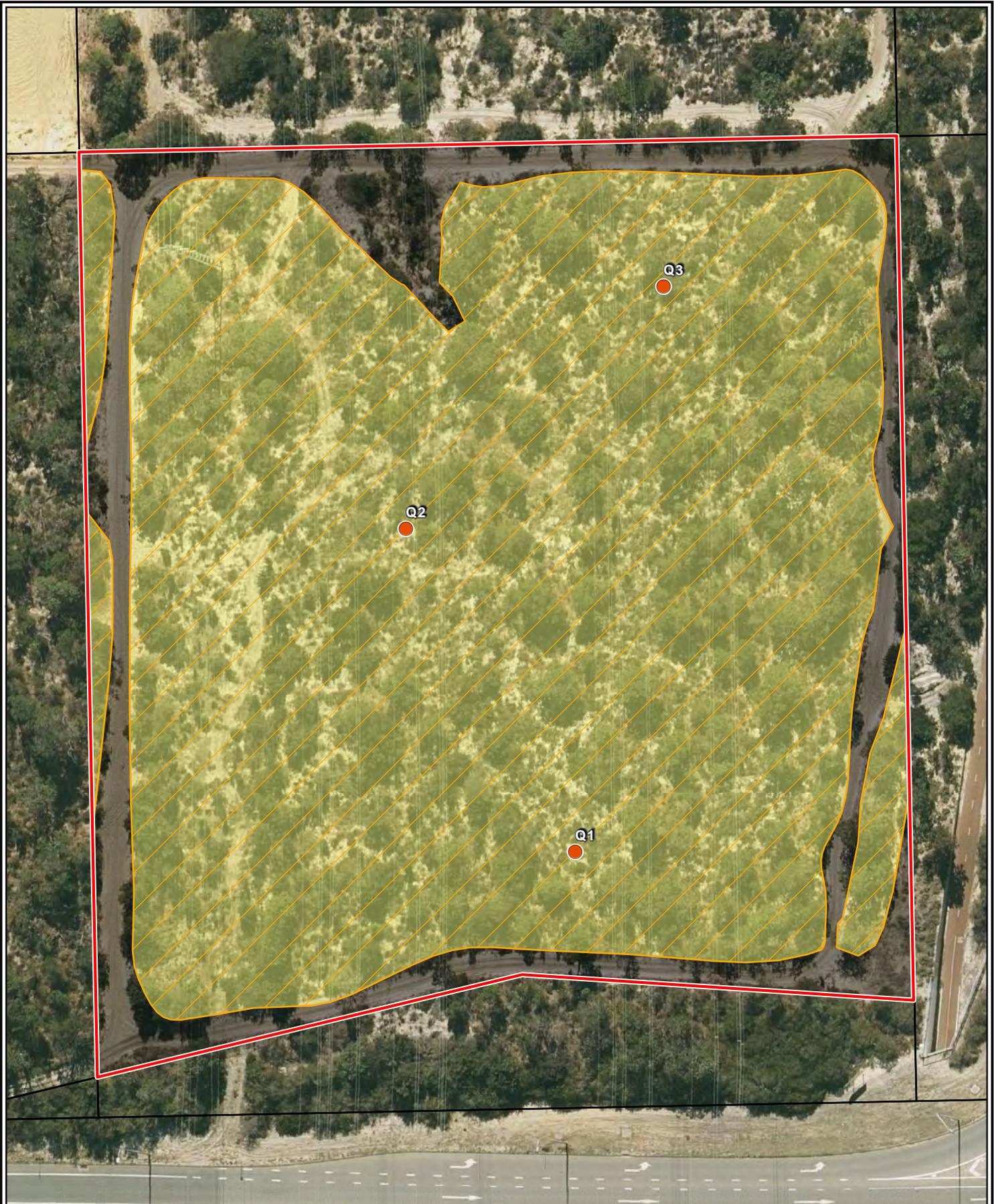
| Vegetation Condition | Area (ha) | Percentage of the Survey Area (%) |
|----------------------|-------------|-----------------------------------|
| Good – Very Good | 1.30 | 83.9 |
| Completely Degraded | 0.25 | 16.1 |
| TOTAL | 1.55 | 100 |

3.2.3.2 Threatened and Priority Ecological Communities

An assessment of the presence of the ‘Banksia Woodlands of the Swan Coastal Plain’ TEC listed under the EPBC Act is presented in Table 3.3. The assessment indicates that the Survey Area contains the ‘Banksia Woodlands of the Swan Coastal Plain’ TEC. This community is also listed as a Priority 3 Ecological Community by DBCA.

Table 3.3: Characteristics of the Banksia woodland within the survey area compared to the key diagnostic criteria

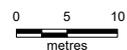
| Key diagnostic criteria (TSSC 2016) | Banksia woodlands within the survey area |
|--|--|
| <p>Location: Occurs in the Swan Coastal Plain or Jarrah Forest IBRA bioregions.</p> | <p>Yes. Banksia woodlands within the Survey Area occur on the Swan Coastal Plain.</p> |
| <p>Soils and landform: Occurs on: well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands sandy colluviums and aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau transitional substrates and sandflats.</p> | <p>Yes. Banksia woodlands within the Survey Area occur on Bassendean Sands.</p> |
| <p>Structure: Low woodland to forest with: a distinctive upper sclerophyllous layer of low trees (occasionally large shrubs more than 2 m tall), typically dominated or co-dominated by one or more of the banksia species identified below emergent trees of medium or tall (>10 m) height. <i>Eucalyptus</i> or <i>Allocasuarina</i> species may sometimes be present above the banksia canopy an often highly species-rich understorey.</p> | <p>Yes. VT1 represents a very open woodland structure.</p> |
| <p>Composition: Contains at least one of the following species: <i>Banksia attenuata</i> <i>Banksia menziesii</i> <i>Banksia prionotes</i> <i>Banksia ilicifolia</i>.</p> | <p>Yes. VT1 contains <i>Banksia</i> spp. including <i>Banksia attenuata</i> and <i>B. menziesii</i>.</p> |
| <p>Condition (Keighery 1994): 'Pristine': no minimum patch size 'Excellent': 0.5 ha 'Very Good': 1 ha 'Good': 2 ha.</p> | <p>Yes. Banksia woodland vegetation within the Survey Area is in Good – Very Good condition and covers 1.3 ha. Vegetation is connected with a broader patch of banksia woodland also in Very Good condition, bringing the overall patch size to >2 ha. This area of vegetation meets the minimum patch condition and size requirements and represents an occurrence of the Banksia woodlands TEC.</p> |



Legend

- Project area
 - Cadastral boundary
 - Banksia woodlands of the Swan Coastal Plain Threatened Ecological Community
- Vegetation type
- VT1: Good - very good condition (1.296 ha)
 - Completely degraded (0.253 ha)
 - Quadrats

Scale 1:750 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 56613

Client: Blokk Property

Version: A

Date: 19-Mar-2021

Drawn By: cthatcher

Checked By: RC

**Barfield Road
Hammond Park**

VEGETATION TYPES AND CONDITION

FIGURE 3.1



3.2.4 Black Cockatoo habitat

3.2.4.1 Foraging habitat

Foraging habitat quality identified within the Survey Area is shown in Figure 3.3. Table 3.4 outlines the vegetation types and associated foraging habitat value scores.

Vegetation within the Survey Area were considered to have low to moderate foraging habitat value for Carnaby’s and Baudin’s Black Cockatoo, and low foraging value for Forest Red-tailed Black Cockatoo, based on the density of suitable foraging species (Figure 3.2).

The site represents <0.1% of the existing native vegetation within the local area (15 km radius) and Carnaby’s Black Cockatoo breeding sites are known from within a 15 km radius. The site was therefore assigned a context score of 1.

While no physical evidence of Black Cockatoo activity was observed during the field survey, the Survey Area was assigned a score of 1 for species density, as the species is known to occur, evidenced by known breeding sites in the local area.

Table 3.4: Carnaby’s Black Cockatoo foraging habitat quality within Survey Area

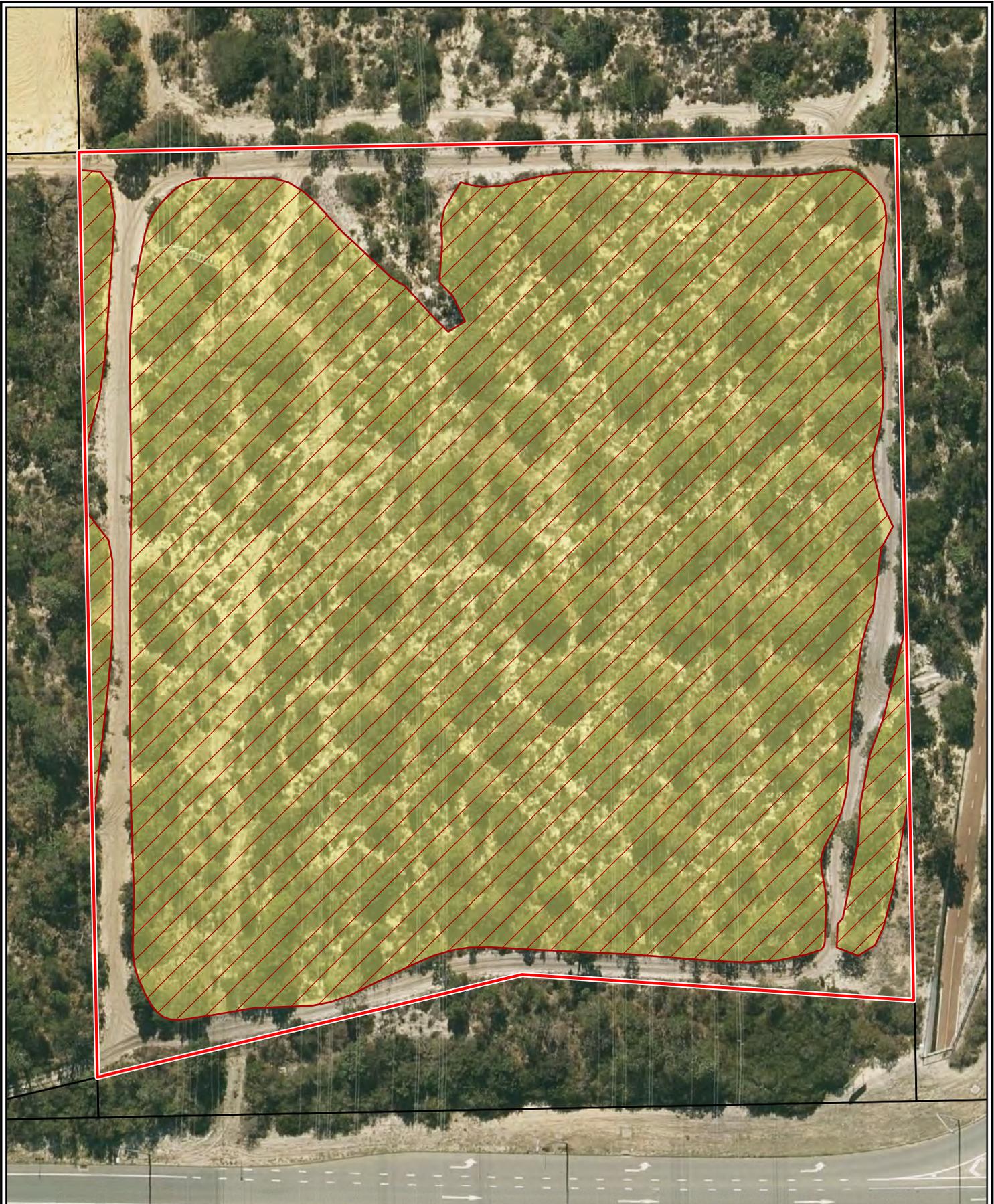
| Cockatoo species | Foraging species | Vegetation composition score | Area (ha) | Site Context score | Species density | Total score |
|----------------------------------|--|--------------------------------------|-----------|--------------------|-----------------|-------------|
| Carnaby’s Black Cockatoo | <i>Banksia attenuata</i> , <i>Banksia menziesii</i> , <i>Jacksonia furcellata</i> , <i>Mesomelaena pseudostygia</i> , <i>Xanthorrhoea preissii</i> | 2 – Low foraging value | 1.3 | 1 | 1 | 0 |
| Forest Red-tailed Black Cockatoo | Nil | 0 – No foraging value | 1.3 | 1 | 1 | 0 |
| Baudin’s Black Cockatoo | <i>Eucalyptus marginata</i> , <i>Xanthorrhoea preissii</i> | 1 – Negligible to Low foraging value | 1.3 | 1 | 1 | 0 |

3.2.5 Breeding Habitat

No significant trees were identified within the Survey Area.

3.2.6 Roosting Habitat

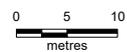
No potential roosting habitat was identified within the Survey Area.



Legend

- Project area
- Cadastral boundary
- Carnaby's Black Cockatoo
- Low foraging value
- Baudin's Black Cockatoo
- Negligible to low foraging

Scale 1:750 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 56613

Client: Blokk Property

Version: A

Date: 19-Mar-2021

Drawn By: cthatcher

Checked By: RC

**Barfield Road
Hammond Park**

**BLACK COCKATOO FORAGING HABITAT
WITHIN THE SURVEY AREA**

FIGURE 3.3



4. Discussion

A total of 53 native flora taxa and six introduced flora taxa were recorded from quadrats within the Survey Area.

All areas of native vegetation were traversed by botanists during the survey. There is a high degree of confidence that any Threatened or Priority Listed Flora would have been recorded.

Based on habitat present within the Survey Area, four species were considered to have the potential to occur, including:

- *Caladenia huegelii* (Threatened [BC Act]; Endangered [EPBC Act])
- *Dodonaea hackettiana* (Priority 4)
- *Drakaea micrantha* (Threatened [BC Act]; Vulnerable [EPBC Act])
- *Tripterococcus* sp. *Brachylobus* (A.S. George 14234) (Priority 4).

One individual *Caladenia* sp. was recorded within Quadrat 1; however, as this was not in flower, it could not be identified beyond genus level. As surveys were conducted during the known flowering period of *Caladenia huegelii*, and known populations of the species were in flower immediately prior to the survey, it was considered unlikely that this was an individual of *C. huegelii*. Only one individual of this genus and one other orchid species (*Thelymitra* sp.) were recorded during the survey.

The survey was conducted at a suitable flowering time for both *Drakaea micrantha* (September – October) and *Dodonaea hackettiana*, which flowers between July and October and is identifiable to genus without flowers.

No Threatened flora species as listed under section 178 of the EPBC Act or pursuant to Schedule 1 of the WC Act, or Priority flora species as listed by Western Australian Herbarium (1998-) were recorded during targeted surveys within the Survey Area.

One vegetation type was recorded within the Survey Area, as follows:

Open shrubland of *Adenanthos cygnorum* and *Kunzea glabrescens* with emergent *Banksia attenuata* and *Banksia menziesii*, to open woodland of *Banksia attenuata* and *Banksia menziesii*, over shrubland of *Hibbertia hypericoides*, *Hypocalymma robustum* and *Acacia pulchella* over mixed native and introduced shrubs and herbs on grey sand.

This vegetation type was assessed against diagnostic criteria for the 'Banksia Woodlands of the Swan Coastal Plain' TEC listed under the EPBC Act. The assessment indicated that the TEC was present within the Survey Area. This community is also listed as a Priority 3 Ecological Community by DBCA.

Vegetation condition varied throughout the Survey Area, with small patches appearing to have been disturbed (indicated by heavier localised weed infestations); however, the majority of vegetation (1.3 ha) was rated in Good – Very Good condition. Areas cleared for tracks and fire breaks rated in Completely Degraded condition.

The mapped buffers of multiple known breeding sites for Carnaby's Black Cockatoo overlap the Survey Area, indicating suitable breeding habitat is present within the locality. However, vegetation within the Survey Area was described as shrubland to woodland structure, with no tree canopy layer or emergent trees present. As such, no potential nesting habitat trees for Baudin's Black Cockatoo, Carnaby's Black Cockatoo or Forest Red-tailed Black Cockatoo were recorded within the Survey Area.

1.3 ha of potential foraging habitat was present within the Survey Area. This was rated as Low for Carnaby's Black Cockatoo and Negligible to Low for Baudin's Black Cockatoo, based on low percentage foliage cover of foraging species (< 10% projected foliage cover of Carnaby's Black

Cockatoo foraging habitat species and <1% cover of Baudin's Black Cockatoo foraging habitat species). No foraging habitat for Forest Red-tailed Black Cockatoo was recorded within the Survey Area.

5. Summary and conclusion

The key environmental values of the Survey Area are as follows:

- no conservation significant flora species
- 1.3 ha of the Threatened Ecological Community "Banksia Woodlands of the Swan Coastal Plain" as listed under the EPBC Act
- 1.3 ha of Low value foraging habitat for Carnaby's Black Cockatoo
- 1.3 ha of Negligible to Low value foraging habitat for Baudin's Black Cockatoo.

6. References

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- Western Australian Local Government Association (WALGA) 2020, *Environmental Planning Tool*, WALGA, West Leederville.

Appendix A: Database search results

Appendix B: Threatened and Priority flora potentially occurring within the proposed clearing area

| Species | Conservation status | | Description | Potential to occur |
|---------------------------------|---------------------|------------|---|---|
| | BC Act / DBCA | EPBC Act | | |
| <i>Andersonia gracilis</i> | T | Endangered | A slender, erect or open straggly shrub, 10 to 100 cm high. Flowers are white to pink to purple from September to November. Habitat for this species occurs in white/grey sand, sandy clay, gravelly loam within winter-wet areas and near swamps (Western Australian Herbarium 1998-). The species occurs in damp black, sandy clay flats near swamps in open low heath with <i>Calothamnus hirsutus</i> , <i>Verticordia densiflora</i> , <i>Kunzea 18ecurve</i> and <i>Banksia telmatiaea</i> over sedges (Western Australian Herbarium 1998-, DAWE 2020). | Unlikely due to absence of preferred habitat. |
| <i>Caladenia huegelii</i> | T | Endangered | A slender orchid from 30 to 50 cm tall. One or two striking flowers characterised by a greenish-cream lower petal with a maroon tip. Other petals are cream with red or pink suffusions. Habitat for this species occurs within well-drained, deep sandy soils in low mixed <i>Banksia</i> , <i>Allocasuarina</i> and Jarrah woodlands (Western Australian Herbarium 1998-, DAWE 2020). | Possible due to presence of preferred habitat. |
| <i>Cyathochaeta teretifolia</i> | P3 | NA | A rhizomatous, clumped, robust perennial, grass-like or herb (sedge), to 2 m high and to 1.0 m wide. Flowers are brown. Habitat for this species includes grey sand or sandy clay within swamps or creek edges (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |
| <i>Diuris drummondii</i> | T | Vulnerable | Tuberous perennial orchid flowering yellow between November and December or January. Occurs in low-lying depressions or swamps (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |
| <i>Diuris micrantha</i> | T | Vulnerable | A slender orchid to 60 cm tall. Yellow flowers with reddish-brown markings measuring 1.3 cm across. Habitat for this species occurs within clay-loam substrates in winter-wet depressions or swamps (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |
| <i>Diuris purdiei</i> | T | Endangered | A slender orchid to 0.35 m tall. Flowers are yellow and visible from September to October. Habitat for this species is grey-black sand substrates in winter-wet swamps which have high moisture (Western Australian Herbarium 1998-). <i>Diuris purdiei</i> occurs from Perth south to near the Whicher Range, within the Swan (Western Australia) Natural Resource Management Region. It grows on sand to sandy clay soils, in areas subject to winter inundation, and amongst native sedges and | Unlikely due to absence of preferred habitat. |

| | | | | |
|-------------------------------|----|------------|---|---|
| | | | dense heath with scattered emergent <i>Melaleuca preissiana</i> , <i>Corymbia calophylla</i> , <i>E. marginata</i> and <i>Nuytsia floribunda</i> (DAWE 2020). | |
| <i>Dodonaea hackettiana</i> | P4 | NA | An erect shrub or tree, 100 to 500 cm tall. Flowers are yellow to green/red and occur mainly from July to October. Habitat for this species occurs in sand and outcropping limestone (Western Australian Herbarium 1998-). | Possible due to presence of preferred habitat. |
| <i>Drakaea elastica</i> | T | Endangered | A slender orchid to 30 cm tall with a prostrate, round to heart shaped leaf. Singular, bright green, glossy flower. The species grows on bare patches of sand within otherwise dense vegetation in low-lying areas alongside winter-wet swamps, typically in banksia (<i>Banksia menziesii</i> , <i>B. attenuata</i> and <i>B. ilicifolia</i>) woodland or spearwood (<i>Kunzea glabrescens</i>) thicket vegetation. <i>D. elastica</i> often occurs with other orchid species (DAWE 2020). | Unlikely due to absence of preferred habitat. |
| <i>Drakaea micrantha</i> | T | Vulnerable | A tuberous, terrestrial herb which has a diminutive red and yellow flower, 1.2–2.5 cm long, on a stem that grows to 30 cm. Flowering occurs from September to October. Its heart-shaped leaf, about 1.5 cm long, is silvery grey with prominent green veins. Habitat for this species occurs within cleared firebreaks or open sandy patches that have been disturbed, where competition from other plants has been removed (Western Australian Herbarium 1998-, DEE 2019b). | Possible due to presence of preferred habitat. |
| <i>Jacksonia gracillima</i> | P3 | NA | A spreading, compact shrub 100 cm tall and 100 cm wide. Flower buds are very angular and wings are orange with a darker orange keel. Habitat for this species occurs within winter wet Bassendean sands and littered, grey, peaty, loamy sand (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |
| <i>Kennedia beckxiana</i> | P4 | NA | Prostrate or twining shrub or climber, flowering red between September and December. Occurs on sand or loam on granite hills and outcrops (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |
| <i>Lepidosperma rostratum</i> | T | Endangered | A rhizomatous sedge to 30 cm in diameter. Stems are circular in cross section and flowers are spike-like and up to 4 cm long. Habitat for this species occurs in sandy soils among low heath comprised of <i>Banksia telmatiaea</i> and <i>Calothamnus hirsutus</i> in winter-wet swamps (Western Australian Herbarium 1998-, DEE 2019b). | Unlikely due to absence of preferred habitat. |
| <i>Pimelea calcicola</i> | P3 | NA | An erect to spreading shrub to 1 m tall. Flowers are pink and visible between September to November. Habitat for this species occurs in sand on coastal limestone ridges (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |

| | | | | |
|---|----|----|---|---|
| <i>Pithocarpa corymbulosa</i> | P3 | NA | Erect to scrambling perennial herb to 1 m high. Flowers white between January and April. Occurs on gravelly or sandy loam amongst granite outcrops (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |
| <i>Poranthera moorokatta</i> | P2 | NA | Erect annual to 47 mm high. Flowers pale pink between September and early November. Known from only two locations at Kings Park and Ellenbrook, occurring in <i>Banksia menziesii</i> – <i>B. attenuata</i> woodland on white silica sand in open spaces between shrubs (Barrett 2012). | Unlikely. While the species is known from Banksia woodland, its highly restricted distribution indicates it is unlikely to occur within the Survey Area. |
| <i>Stylidium paludicola</i> | P3 | NA | Reed-like perennial, herb, 35 to 100 cm tall. Leaves are tufted, linear or subulate or narrowly oblanceolate. Flowers are pink and occur in October to December. Habitat for this species occurs in peaty sand over clay and winter wet areas, often in Marri and Melaleuca woodland or Melaleuca shrubland (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |
| <i>Tripterococcus</i> sp. <i>Brachylobus</i> (A.S. George 14234) | P4 | NA | No habitat information available (Western Australian Herbarium 1998-). | Possible. As no habitat information is available for this species, it should be considered as potentially occurring. |
| <i>Verticordia lindleyi</i> subsp. <i>lindleyi</i> | P4 | NA | Erect shrub to 0.75 m high, flowering pink in May or November to December / January. Occurs on sand or sandy clay in winter-wet depressions (Western Australian Herbarium 1998-). | Unlikely due to absence of preferred habitat. |

Appendix C: Native flora taxa recorded within Survey Area

| Family | Species |
|------------------|---|
| Araliaceae | <i>Trachymene pilosa</i> |
| Asparagaceae | <i>Laxmannia squarrosa</i> |
| | <i>Lomandra hermaphrodita</i> |
| Asteraceae | <i>Podolepis gracilis</i> |
| | <i>Siloxerus humifusus</i> |
| Casuarinaceae | <i>Allocasuarina humilis</i> |
| Colchicaceae | <i>Burchardia congesta</i> |
| Cyperaceae | <i>Lepidosperma calcicola</i> |
| Cyperaceae | <i>Mesomelaena pseudostygia</i> |
| Dilleniaceae | <i>Hibbertia hypericoides</i> |
| Droseraceae | <i>Drosera</i> sp. |
| Ericaceae | <i>Conostephium pendulum</i> |
| | <i>Leucopogon conostephioides</i> |
| Fabaceae | <i>Acacia applanata</i> |
| | <i>Acacia pulchella</i> |
| | <i>Acacia stenoptera</i> |
| | <i>Bossiaea eriocarpa</i> |
| | <i>Daviesia nudiflora</i> |
| | <i>Daviesia triflora</i> |
| | <i>Gompholobium tomentosum</i> |
| | <i>Hovea trisperma</i> |
| | <i>Jacksonia furcellata</i> |
| Goodeniaceae | <i>Dampiera linearis</i> |
| | <i>Scaevola canescens</i> |
| Haemodoraceae | <i>Anigozanthos humilis</i> |
| | <i>Anigozanthos manglesii</i> |
| | <i>Conostylis aculeata</i> |
| | <i>Conostylis setigera</i> |
| Iridaceae | <i>Patersonia occidentalis</i> |
| Myrtaceae | <i>Babingtonia camphorosmae</i> |
| | <i>Calytrix angulata</i> |
| | <i>Hypocalymma robustum</i> |
| | <i>Kunzea glabrescens</i> |
| | <i>Regelia inops</i> |
| Orchidaceae | <i>Caladenia</i> sp. |
| | <i>Thelymitra</i> sp. |
| Poaceae | <i>Austrostipa compressa</i> |
| | <i>Neurachne alopecuroidea</i> |
| Polygalaceae | <i>Comesperma virgatum</i> |
| Proteaceae | <i>Adenanthos cygnorum</i> |
| | <i>Banksia attenuata</i> |
| | <i>Banksia menziesii</i> |
| | <i>Persoonia saccata</i> |
| | <i>Petrophile linearis</i> |
| | <i>Stirlingia latifolia</i> |
| | <i>Synaphea spinulosa</i> subsp. <i>spinulosa</i> |
| Restionaceae | <i>Hypolaena exsulca</i> |
| Rubiaceae | <i>Opercularia vaginata</i> |
| Santalaceae | <i>Leptomeria empetrifomis</i> |
| Stylidiaceae | <i>Levenhookia stipitata</i> |
| | <i>Stylidium brunonianum</i> |
| | <i>Stylidium repens</i> |
| Xanthorrhoeaceae | <i>Xanthorrhoea preissii</i> |

APPENDIX 7

Engineering and Servicing Report

Report Name: Engineering Constraints Feasibility Assessment
Project: Lot 301 Barfield Road, Hammond Park
Project No: PC15026
Prepared For: BLOKK Property Australia Pty Ltd
Date: 10/02/2021



| | |
|--------------|---|
| Prepared by: | Andrew Grisinger |
| Position: | Civil Engineer |
| Signed: |  |
| Date: | 10/02/2021 |

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| Approved by: | Enzo Biagioni-Froudust |
| Position: | Civil Principal |
| Signed: |  |
| Date: | 10/02/2021 |

| Revision | Description | Author | Checked | Approved | Date |
|----------|---------------------------------|--------|---------|----------|------------|
| 0 | Draft Document | AG | EB | EB | 10/02/2021 |
| 1 | Updated Report | AG | EB | EB | 06/04/2021 |
| 2 | Updated Plan & Report | AG | EB | EB | 18/05/2021 |
| 3 | Updated Concept Plan | AG | EB | EB | 6/09/2021 |
| 4 | Updated Concept Plan | EBF | OO | EB | 30/12/2021 |
| 5 | Updated Concept Plan | EBF | OO | EB | 25/03/2022 |
| 6 | Updated Concept Plan | EBF | OO | EB | 07/07/2022 |
| 7 | Updated Concept Plan | EBF | OO | EB | 28/07/2023 |
| 8 | Updated Text – Council comments | EBF | OO | EB | 30/11/2023 |

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1. Introduction

Peritas Group Pty Ltd has been engaged by BLOKK Property Australia Pty Ltd to provide an assessment of site conditions and availability of services for the proposed residential subdivision of Lot 301 (221) Barfield Road Hammond Park in accordance with the proposed green title subdivision prepared by Dynamic Planning & Development.

A yield of 32 dwellings/lots is proposed for Lot 301 (221) Barfield Road which is located in the suburb of Hammond Park within the City of Cockburn (CoC). Lot 301 (221) Barfield Rd is bounded by Rowley Road to the South and Barfield Road to the West and is currently occupied by a 4-bedroom house that was built in 1987. The total land of the area is 1.8554 Ha as measured from the Landgate Database.

This report identifies the opportunities, constraints, existing and required site services for the proposed development as detailed in **Section 3**.

A detailed scope of works has been undertaken as part of this report, which is listed in **Section 2**.

Refer to **Figure 1** below for an aerial image of the subject site (outlined by red dashed boundaries).



Figure 1 Aerial View of the Site (2021 Photography)

It is noted that the subject site is currently zoned as a Development Area (DA 26) under the City of Cockburn Town Planning Scheme 3 (TPS3). The site is currently subject to the following Provisions under the CoC TPS3:

- 1. An approved Structure Plan together with all approved amendments shall be given due regard in the assessment of applications for subdivision, land use and development in accordance with clause 27(1) of the Deemed Provisions.
- 2. To provide for residential development and compatible land uses.

The zoning map of the subject site can be found in **Figure 2** below.

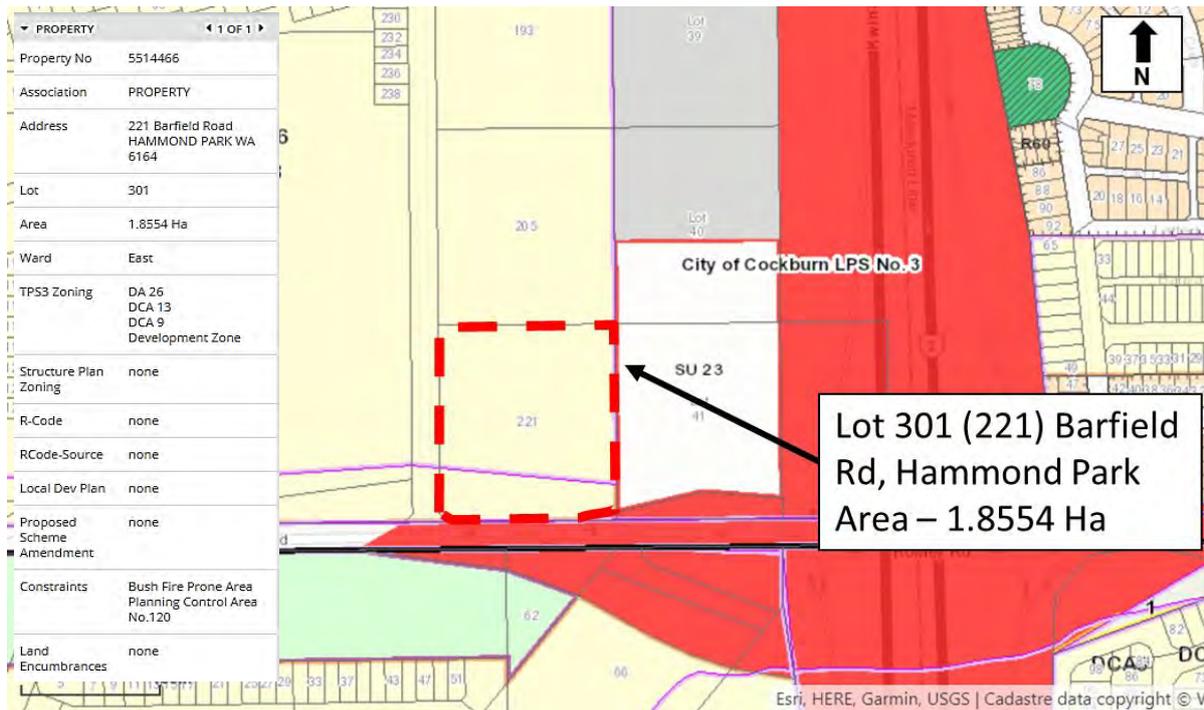


Figure 2 Local Planning Scheme

2. Investigation Scope

This report has been undertaken in accordance with the scope of services detailed below.

A preliminary assessment of the site's developability has been completed within this Feasibility Study, focusing on risks and the scope of further investigations required.

Subsequent to the findings of the preliminary risk assessment, detailed site investigation of the following scope has been completed:

- Introduction
 - Background of project;
 - Aerial Photograph figure;
 - Site zoning and locality figure;
 - Proposed Development figure and description;
- Investigation of existing services and constraints (based on Dial Before You Dig Plans, authority correspondence/databases and engineering experience), including:
 - Driveway and pedestrian access;
 - Road network and traffic conditions;
 - Easements and setbacks;
 - Potable Water;
 - Sewer;
 - Stormwater Infrastructure;
 - Stormwater Catchment and Overland Flows;
 - Electrical and Streetlighting;
 - Telecommunications;
 - Gas;
 - Flood risk;
 - Bushfire risk;
 - Heritage constraints;
 - Geotechnical Review including local topography, site geology, groundwater and contamination search;
- Proposed / future site servicing strategy, including:
 - Potential access points;
 - Estimated future demands on service infrastructure based on proposed development;
 - Recommendation on service infrastructure upgrades to suit the proposed development;
 - Authority correspondence based on proposed development and services.
- Recommendations on design requirements, required works and reporting.

3. Proposed Development

The following appreciation of the proposed development is based on the proposed green title subdivision (R40) prepared by Dynamic Planning & Development dated 15/11/2021.

It is understood that Dynamic Planning & Development propose a Green Title subdivision (R40) for Lot 301 Barfield Rd, which details a yield of 41 dwellings and an area of 1,477 m² for Public Open Space and an area 3,589 m² for the purposes of widening Rowley Road.

The proposed development assessed within this report currently complies with the CoC Town Planning Scheme No 3 (TPS3). However, review of these provisions and constraints should be undertaken upon confirmation of the ultimate proposed development to ensure that the development fully complies with the requirements of the TPS and LPS.

Refer **Figure 3** below and **Appendix B** for the proposed development assessed in this report.

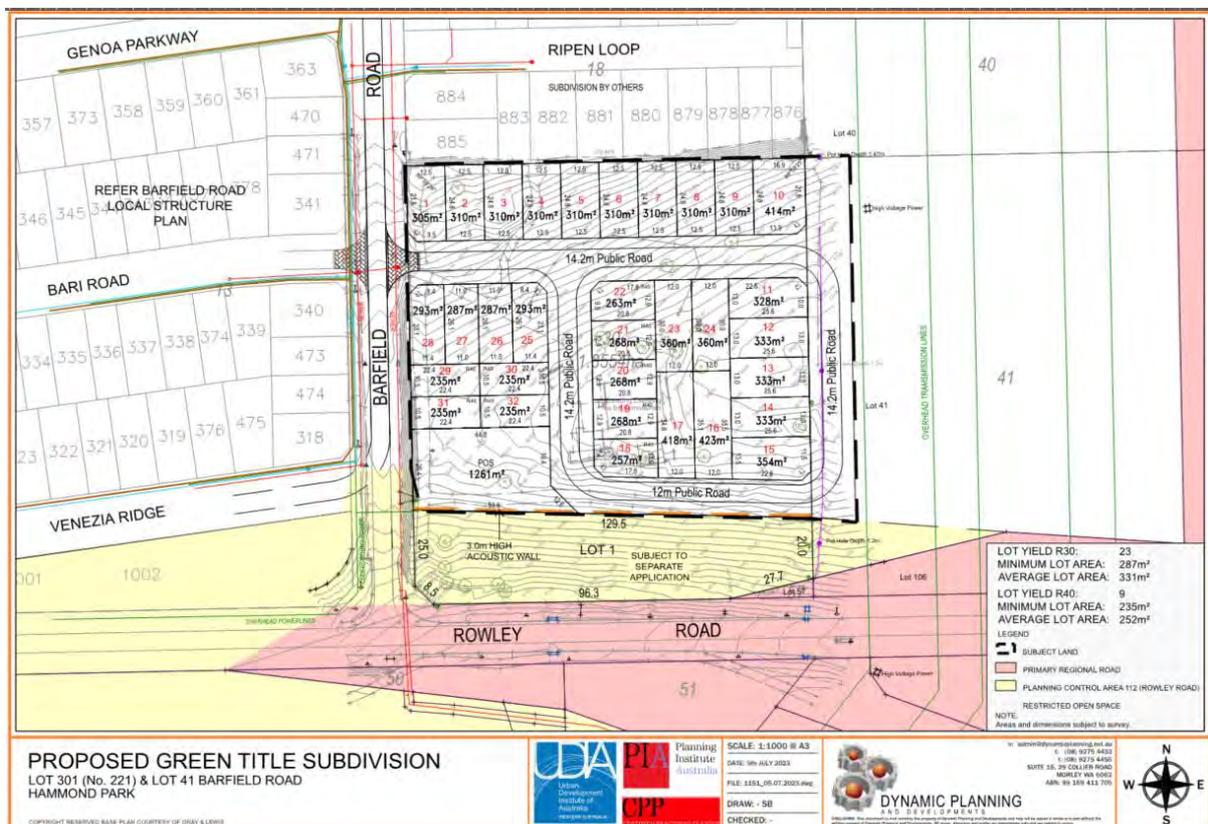


Figure 3 Proposed Green Title Subdivision of Lot 301 (221) Barfield Rd, Hammond Park WA.

4. Existing Services and Constraints

4.1 General

Within this section, a detailed summary of the existing services and constraints information has been compiled and summarised for the subject site. The detailed analysis includes Dial Before You Dig (DBYD) information, Landgate, DPLH Database, Water Corporation records and correspondence and data obtained from service authorities.

4.2 Vehicular and Pedestrian Access

As shown in **Figure 4** and **Figure 5** below, Lot 301 (221) Barfield Rd, Hammond Park currently obtains vehicular access to the western boundary of the site via an existing gravel lined driveway to Barfield Road.



Figure 4: Streetview photo of the existing driveway to Lot 301 (221) Barfield Rd, Hammond Park (captured

The above driveway is the main vehicle access point to the site. This driveway leads to a number of internal unpaved access roads both within the site and to the neighbouring Lot 41 Development site and Lot 18 Development site.

An existing 2.0 m shared path network is located adjacent the Rowley Rd and Kwinana Fwy interchange. The shared paths continue away from the site along the Kwinana Fwy and the southern verge of Rowley Rd and the Kwinana Fwy.

Investigation and liaison with the CoC as to the potential access roads & driveways and allowable locations will be required upon realisation of the proposed development layout and access points.

Refer to **Figure 5** on the following page for the existing vehicular and pedestrian site access locations.



Figure 5 Existing Vehicular and Pedestrian Access

4.3 Road Network & Traffic Conditions

Barfield Rd and Rowley Rd provide the principal access to the study area. Both are local access roads with indicative capacity up to 3000 vpd based on Liveable Neighbourhoods road classification.

It is envisaged that Barfield Rd will receive 100% of the additional traffic generated by the proposed development. Refer to **Figure 6** below for the immediate road network near the subject site.



Figure 6 Local Road Network (Landgate, 2021)

4.4 Potable Water

The following existing potable water service information has been compiled from Dial Before You Dig information and initial data & advice from Water Corporation:

- Lot 301 (221) Barfield Road, Hammond Park is not currently serviced by a potable water service, however, recent development of the adjacent landholdings to the west has provided new watermain along Barfield Road on the western side of the road reserve.
- The closest potable water service is therefore a DN100 water reticulation main located west of the site within Barfield Rd continuing to the opposite and western road networks in Bari Road, Venezia Ridge and Genoa Parkway.
- A DN150 reticulation water main is also located within the southern verge of Genoa Parkway. This is distance of approximately 70 m northwest from the site.
- The closest fire hydrants are located approximately 40 m Northwest and southwest of the site at the abovementioned watermains.

Reference is made to the DBYD and the WC Plan within **Appendix D**, detailing the existing potable water services in close proximity to the subject site.

4.5 Sewerage

The following existing sewer service information has been compiled from Dial Before You Dig information and initial advice from Water Corporation:

- Lot 301(221) Barfield Road, Hammond Park is not currently shown as being connected by a sewer service, however, recent development of the adjacent landholdings to the west has provided a reticulated sewerage network to the western side of the road reserve and has provided a sewer crossing at an appropriate location for the Lot 301 to connect to.
- A DN150 pressure sewer main is located immediately outside the subject site within the eastern verge of Barfield Road. At the intersection of Barfield Road and Rowley road this connects to a DN319 high density polyethylene (HDPE) pipe with concrete encasement (DN450) which crosses under Rowley Road to the DN250 PVC pipe located within Lot 7999 Barfield Road.

Reference is made to the DBYD and the WC Plan within **Appendix D**, detailing the existing sewer services in close proximity to the subject site.

4.6 Stormwater Infrastructure

The following existing sewer service information has been compiled from Dial Before You Dig information and initial advice from the City of Cockburn:

- Lot 301(221) Barfield Road, Hammond Park does not currently have any stormwater infrastructure within the site area.
- An underground Drainage system is available directly adjacent to the site within the northern and southern verges of Barfield Road.
- The Barfield Road Drainage adjacent the site currently consists of minimum DN225 pipe network with (x2) double side entry drainage pits on both sides of Barfield Road as well as (x2) single side entry drainage pits adjacent the south-eastern corner of the site.

Refer **Figure 7** below for the City of Cockburn’s Stormwater Infrastructure in close proximity to the subject site.

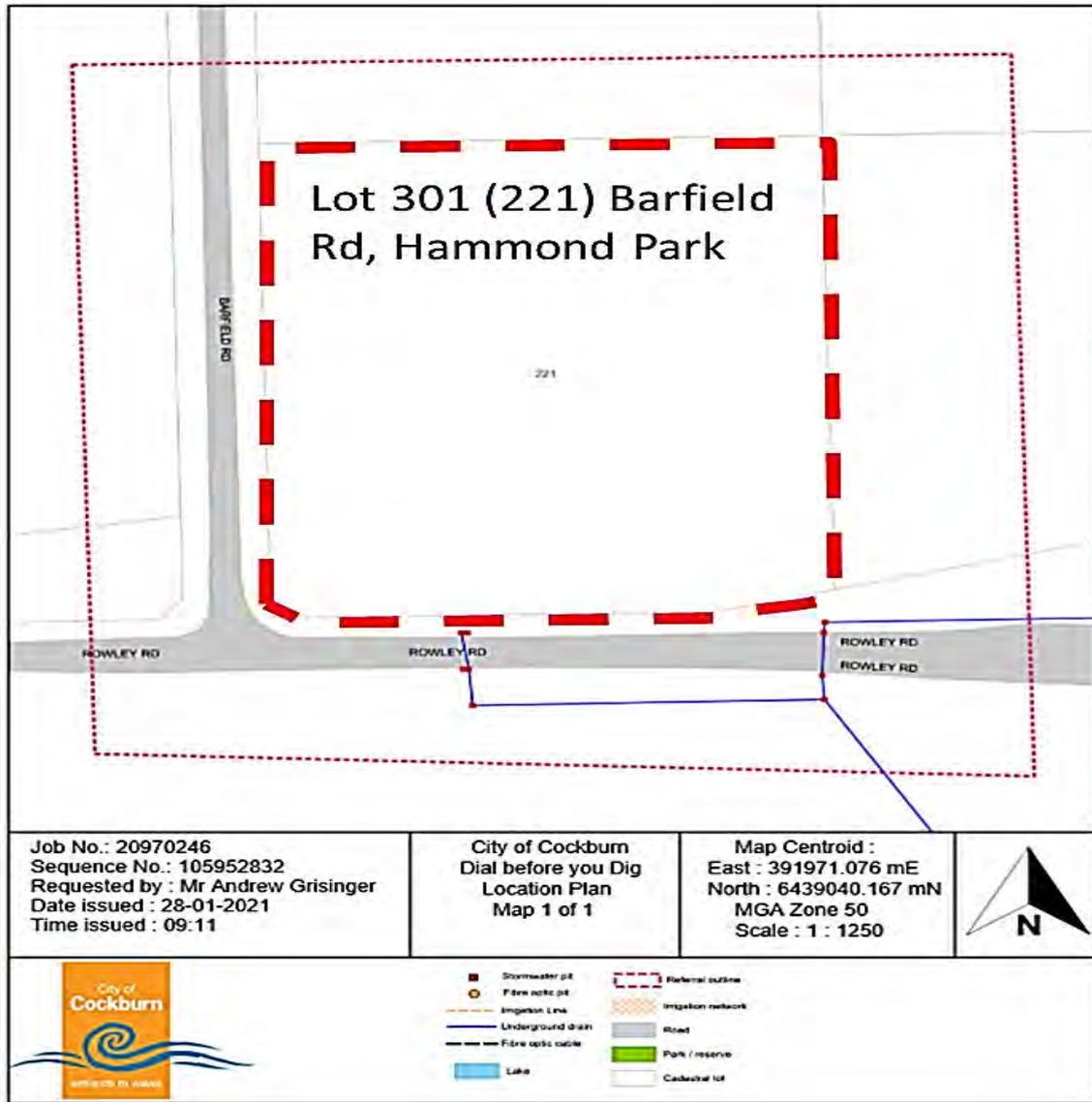


Figure 7 Existing Stormwater Infrastructure at Lot 301 (221) Barfield Road, Hammond Park

4.7 Stormwater Catchment and Overland Flows

Based on a site inspection and contours available from Water Corporation Lot 301 (221) Barfield Road, Hammond Park is graded such that the area of the site is contained in two separate catchments areas. Catchment 1 is approximately 10,450 m² and generally slopes in a north-westerly direction at an average grade of 7.8%. Catchment 2 is approximately 8,105 m² and generally slopes in a southerly direction at an average grade of 10%. Current low points are therefore located at the north western corner of the site adjacent Barfield Road and along the southern boundary (along Rowley Road).

Refer to **Figure 8** below for the existing stormwater catchment plan for the site showing the existing overland and flows within and near the site.

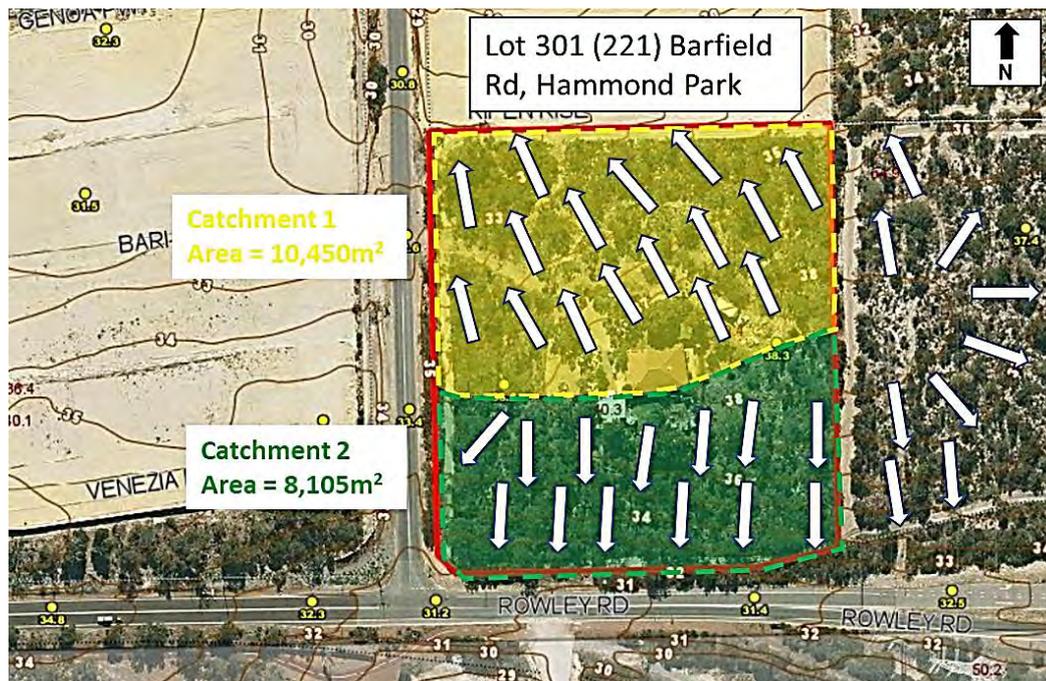


Figure 8 Stormwater Catchment Plan

4.8 Electrical and Streetlighting

The following electrical and streetlighting infrastructure information was compiled from DBYD information and initial advice from Western Power.

- Lot 301 (221) Hammond Park is currently shown to be serviced by an underground LV Electrical Cable from the eastern verge of Barfield Road.
- LV power poles are shown to be located within the western boundary of the site and immediately outside the southwestern site boundary within the northern verge of Rowley Road.
- Underground LV electrical cables are located within the western verge of Barfield Road.
- Several Overhead HV transmission lines (33 – 330 kv) are located east of the site within the neighbouring Lot 41 Barfield Road.
- There is no streetlight network in close proximity to the subject site. The closest streetlight infrastructure is on Rowley Road approximately 200 m west of the site.

Reference is made to the DBYD within **Appendix D**, detailing the existing electrical services in close proximity to the subject site.

4.9 Telecommunications

The following telecommunication service infrastructure information has been compiled from Dial Before You Dig (DBYD) information and initial advice from relevant service providers.

4.9.1 Telstra

- A Telstra conduit is currently located within Lot 201 (221) Hammond Park.
- Telstra cables are currently located within the trenches along the eastern verge of Barfield Road and northern verge of Rowley Road.
- Two cable jointing pits are located outside the site at the intersection of Barfield Road and Rowley Road.
- A Telecommunications access chamber is also located adjacent the site within the northern verge of Rowley Road where the Telstra conduit crosses to the southern verge of Rowley Road.

4.9.2 Optus

- A major Optus owned fibre network is located immediately outside the western boundary of the site within the neighbouring Lot 41 Barfield Road. This runs in a north-south direction across Rowley Road and adjacent lots.

4.9.3 NBNetCo

- An NBN service connection is currently located within Lot 301 (221) Barfield Road, Hammond Park.
- NBN conduits are currently located within the cable trenches along the eastern verge of Barfield Road and northern verge of Rowley Road.
- Two cable jointing pits are located outside the site at the intersection of Barfield Road and Rowley Road.
- A Telecommunications access chamber is also located adjacent the site within the northern verge of Rowley Road where the Telstra conduit crosses to the southern verge of Rowley Road.

Refer to **Appendix D & Appendix G** for extensive liaison undertaken with the communications services providers over the past 9 months.

4.10 Gas

The following gas service infrastructure information has been compiled from Dial Before You Dig (DBYD) information and initial advice from Atco.

- Lot 301 (221) Barfield Road, Hammond Park is not currently shown to be connected to a gas service.
- The closest Gas service is a DN110 350kPa gas main located at Mokare Entrance approximately 300 m west of the site.

4.11 Flood Risk

- Lot 301 (221) Barfield Rd, Hammond Park is not within or in close proximity to flood prone areas listed on the DWER floodplain mapping database.

4.12 Bushfire Risk

- The current online bushfire mapping listed on the Department of Fire & Emergency Services (DFES) website demonstrates that the subject site is within a Bushfire Prone Area. Additional planning and building requirements may apply to the residential subdivision development, in accordance with Schedule 2 Part 10A of the Planning and Development (Local Planning Schemes) Regulations 2015, SPP-3.7, the Guidelines, and the Building Code of Australia.

Refer to **Figure 9** on the following page for locations of Bushfire Prone near the subject site.



Figure 9 Bushfire Prone Areas near Lot 301 (221) Barfield Rd, Hammond Park

4.13 Heritage Constraints

The current heritage mapping listed on DPLH website indicates that the subject site is not within or in close proximity to areas of heritage significance.

4.14 Geotechnical Review

4.14.1 Topography

There is a substantial level variation in the north south direction, ranging from 31.1 m AHD to 38.35 m AHD. The average slope of the land is approximately 10%. The centre of the Site has a ridge, grading down north and south. The contour lines run approximately parallel to the east west lot boundary for the bulk of the site, identifying a lesser degree of elevation variation.

Refer to Figure 10 below for the Level and Feature survey of the subject site.

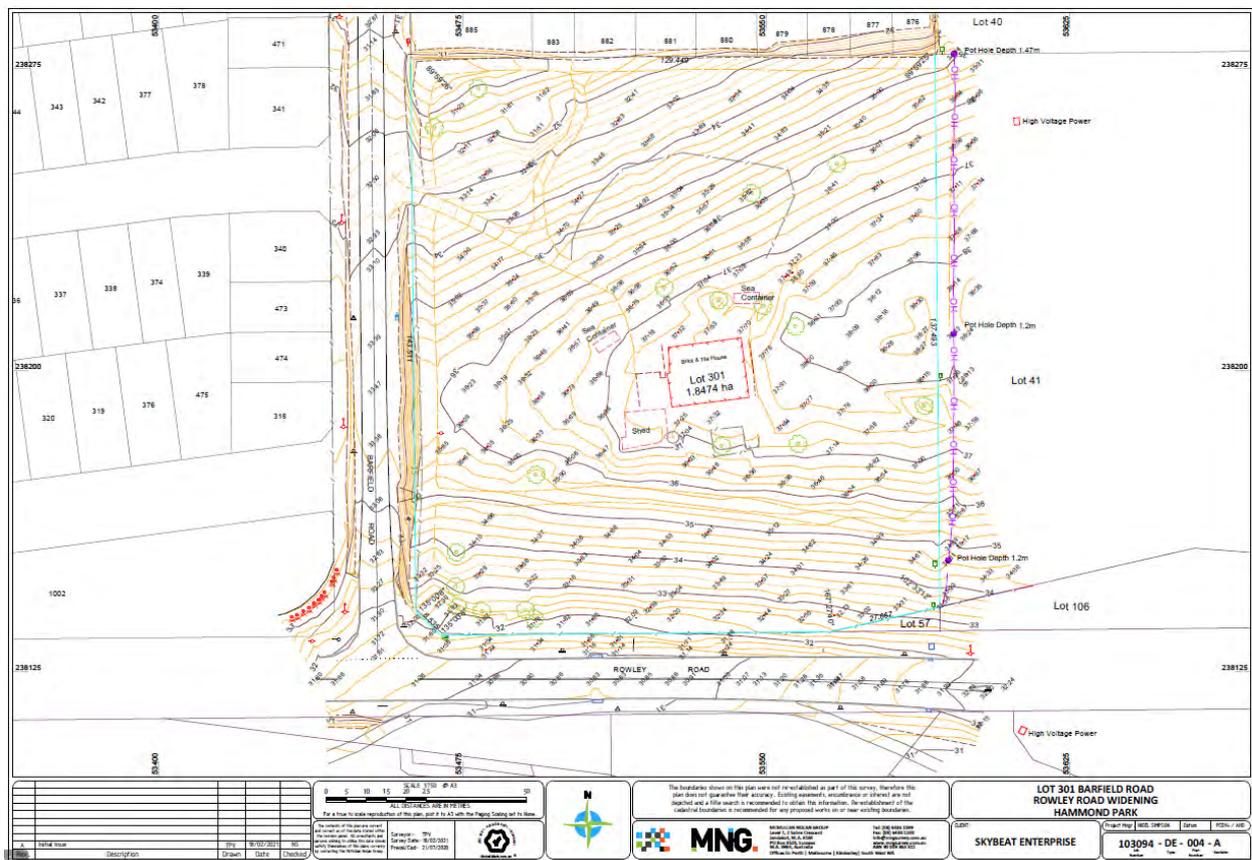


Figure 10 Level and Feature Survey (MNG Feb 2021)

4.14.2 Site Geology

A formal Geotechnical investigation has not been undertaken on the site. The Geological Survey of Western Australia 1:50,000 map indicated the study area is within a zone of Perth Coastal, Bassendean Sand: Quartz Sand (dunes). There does not appear to be any problematic soils from site observations however a formal Geotechnical investigation will be required to be undertaken prior to detail design phase of the development.

4.14.3 Groundwater

Based on information from the Department of Water & Environmental Regulation, the groundwater generally flows from the north east to the south west across the site. The groundwater levels across the development site vary from RL 22.4 m AHD to 23.1 m AHD in the same flow directions. The natural ground level generally ranges from 38 m AHD to 31 m AHD which indicates a substantial freeboard/ clearance to groundwater levels across the site (8.7 m minimum to 14.9 m at the maximum). The landform has medium gradients which dictates that bulk earthworks will be required to regrade the site. Refer to **Section 5.3** for further details on the recommended earthworks required.

Refer **Figure 11** below for the DWER Groundwater map of the site. Subject site shown in red boundary.

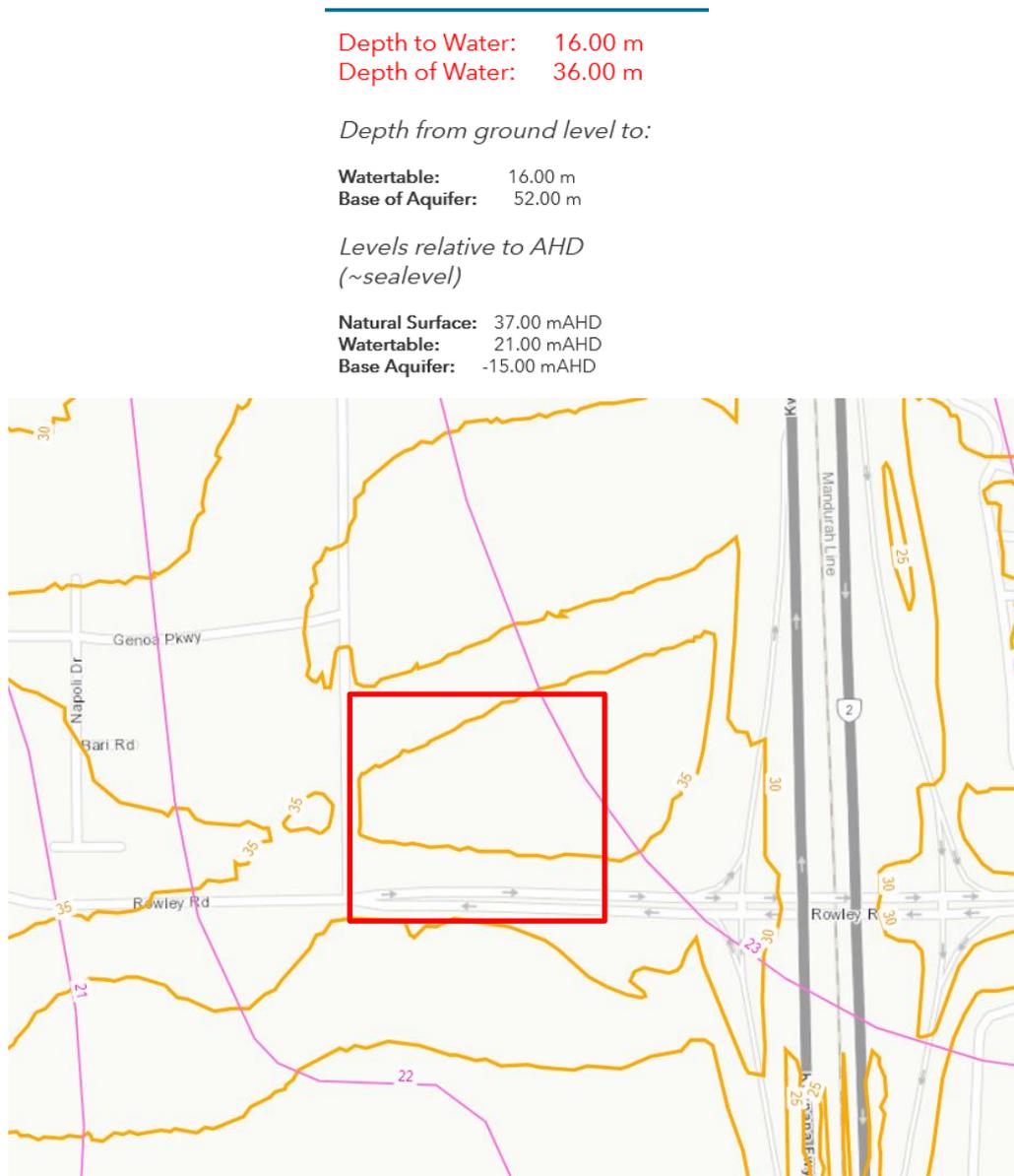


Figure 11 DWER Groundwater Map (Groundwater Atlas)

4.15 Contamination Search

A search on the DWER contaminated land database indicates that the site is not within or in close proximity to any known contaminated sites.

5. Proposed Site Infrastructure and Servicing

5.1 Vehicular and Pedestrian Access

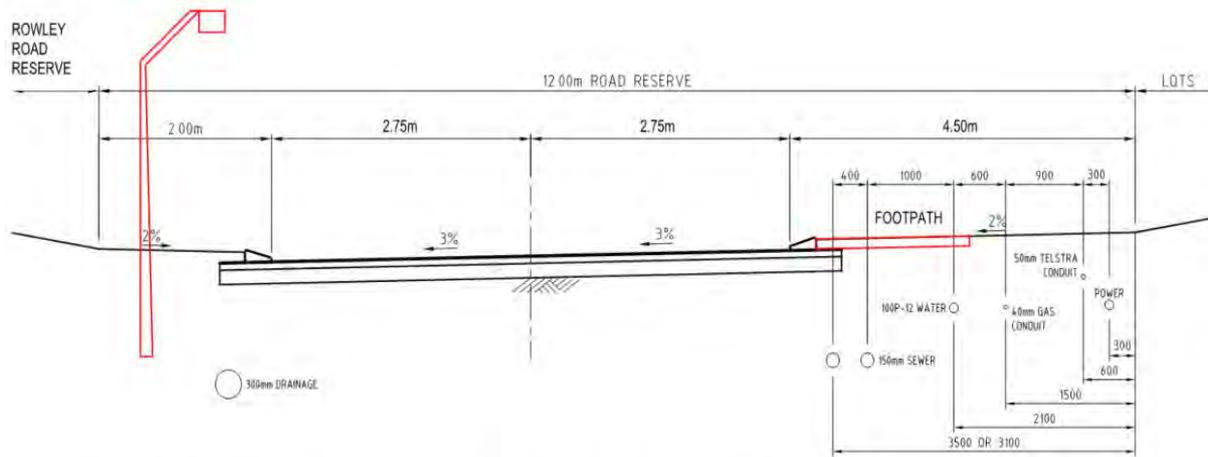
Currently, Lot 301 (221) Barfield Rd, Hammond Park obtains vehicular access from Rowley Rd.

Subdivision works on the opposite (west) landholdings have been completed and included the upgrading of the Barfield Road frontage and interface with Lot 301.

The proposed development of Lot 301 will tie in to the existing levels along Barfield Road and extend the road network internally to the development.

The internal road network includes a road reserve that is 12m wide along the southern boundary interfacing with the Rowley Road reserve. A typical section for this road can be seen in **Figure 12**. We can confirm that this width reserve at that location can accommodate all council and servicing authority requirements including:

- A minimum 5.5m carriageway
- Footpath on one side
- Street lighting
- Street trees and servicing infrastructure.



TYPICAL ROAD CROSS SECTION - 12m ROAD RESERVE (LOTS ONE SIDE)

SCALE 1:50

Figure 12 – 12m Road Section

Any existing pedestrian paths are expected to be retained in their current location and not affected by the proposed development.

Investigation and liaison with the CoC as to the potential access roads & driveways and allowable locations will be required upon realisation of the ultimate subdivision layout and access points.

In accordance with Local Government Act 1995, maintenance of the existing crossover is the sole responsibility of the adjacent property owner to ensure it remains in a safe and trafficable condition once constructed.

The CoC may grant contributions where crossovers are constructed to the CoC specifications and approved by the City's Inspector.

5.2 Bulk Earthworks

Site grading and remodelling will be kept to minimum limits wherever possible but will be required to form roadworks, building pads for future development and associated works within the following parameters: (See **Appendix B** for existing contour levels across the site).

- Creation of residential building sites.
- Contouring of land to suit servicing requirements for development, sewerage and stormwater drainage requirements.
- Creation of sufficient variation in the grading to allow the natural landform to be followed and in conjunction with adjacent developments and interfaces with public open space areas.

Site grading will generally be determined by the servicing requirements and environmental and geotechnical constraints of the site, in order to ensure sustainable as well as economic development of the infrastructure. The subject land contains minimal vegetation cover, although every effort will be made to maintain existing significant trees by careful design within the planning constraints and controlling the clearing operations during the earthworks and site grading works.

Whilst land gradients are not excessive, steeper cross-gradients within road and residential precincts will require re-grading and stabilisation to ensure building sites are created to take advantage of aspect and location as well as facilitate ease of construction and access.

Preparatory works prior to earthworking should be limited to the following:

- Removal of fencing and other improvements, as necessary.
- Stripping and grubbing of areas to be earthworked with due regards to vegetation preservation in selected areas.
- Strip and stockpiling topsoil.
- Cut to fill operations and imported fill to selected areas to improve geotechnical parameters for development.
- Stabilisation of any areas to be landscaped or where topsoil has not been respread on verges and embankments.

Site levels shall be set in accordance with the following constraints:

- Geotechnical and soil parameters to ensure that the site achieves appropriate site classification for its purpose generally Class 'A' for residential purposes.
- Fill levels to provide minimum required clearance to groundwater (AAMGL and as prescribed by authority approvals).
- Building pad levels to be designed to ensure that floor levels maintain a clearance of a minimum of 0.5m to the regional 1:100-year flood levels. (Not an issue on this site).

Peritas Group notes the following are required to be completed for bulk earthworks.

- Design - A design level(s) for the site to be established.
- Earthworks
 - Clearing of site, earthworks to design level and compaction of facilities area.
- Reporting
 - A site classification over the area of the proposed facilities within the site is required.
 - A geotechnical assessment prior to and post earthworks is to be undertaken.

5.3 Potable Water Supply

Lot 301 (221) Barfield Road, Hammond Park is not currently directly serviced by a potable water service, however, recent development of the landholdings to the west of Barfield Road have provided a new water supply network in close proximity to the site that is capable of being extended to the subject site (Lot 301). This also has sufficient capacity to service the subject land. Refer to **Figure 13** below and **Appendix D** for details of the Water Corporation water supply network near the development precinct.

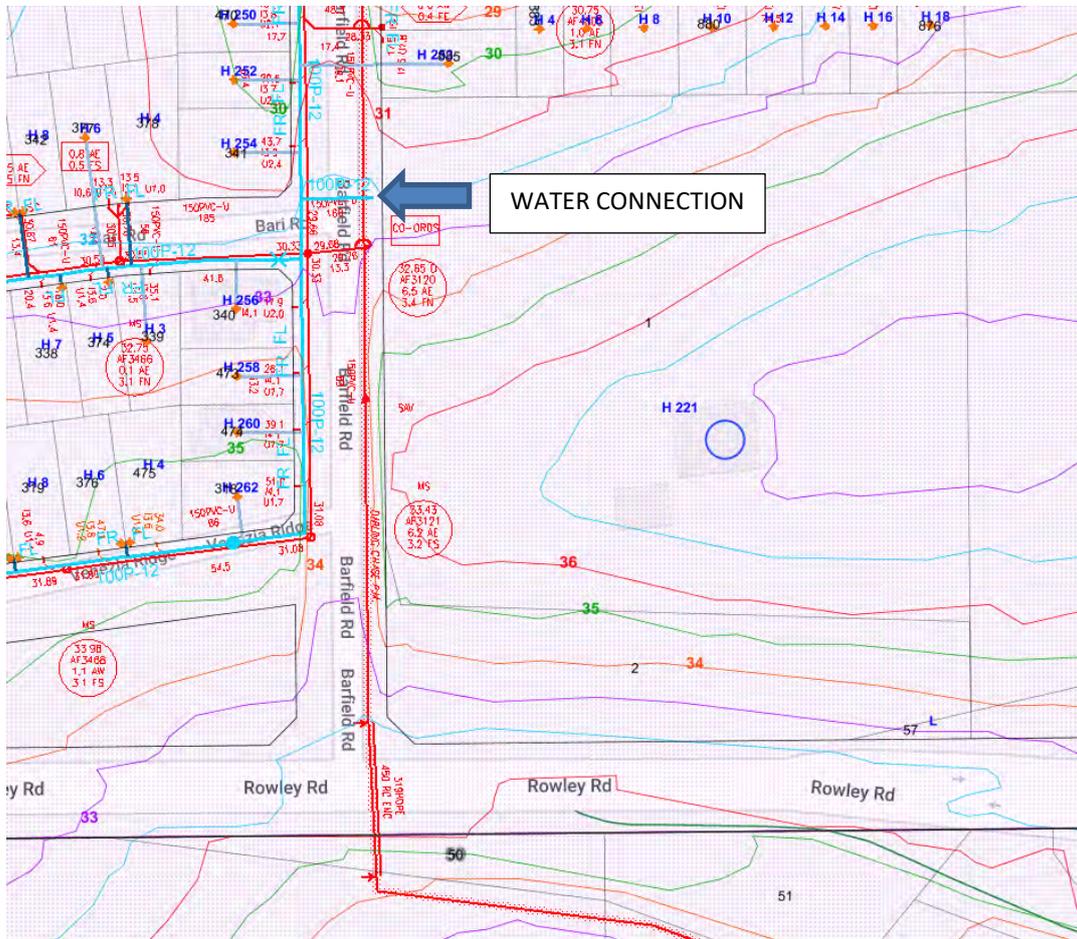


Figure 13 Water Corporation Water Supply Network Map (WC, 2021)

Each green title lot will require access to its own potable water service and all internal plumbing must be contained within the each of the new lot boundaries created.

All internal potable water reticulation pipework will be designed and constructed to the standards and requirements of the Water Corporation of Western Australia. Standard Water Corporation water headwork charges will apply.

Verification with the Water Corporation will also be required to confirm serviceability of the site based on the ultimate design of the subdivision and constructed wastewater infrastructure by Vivente Estate Development

Refer **Appendix D** for the advice provided by the Water Corporation and **Appendix E** for the proposed wastewater servicing concept plan for the development as an indication.

5.4 Wastewater Disposal

Preliminary information from the WA Water Corporation indicates that there is a reticulated sewer service network in the area. A DN150 pressure sewer main is located immediately outside the subject site within the eastern verge of Barfield Road. At the intersection of Barfield Road and Rowley Road this connects to a DN319 high density polyethylene (HDPE) pipe with concrete encasement (DN450) which crosses under Rowley Road to the DN250 PVC pipe located within Lot 7999 Barfield Road.

Refer to **Figure 14** below showing the Water Corporation sewerage network within the development precinct.

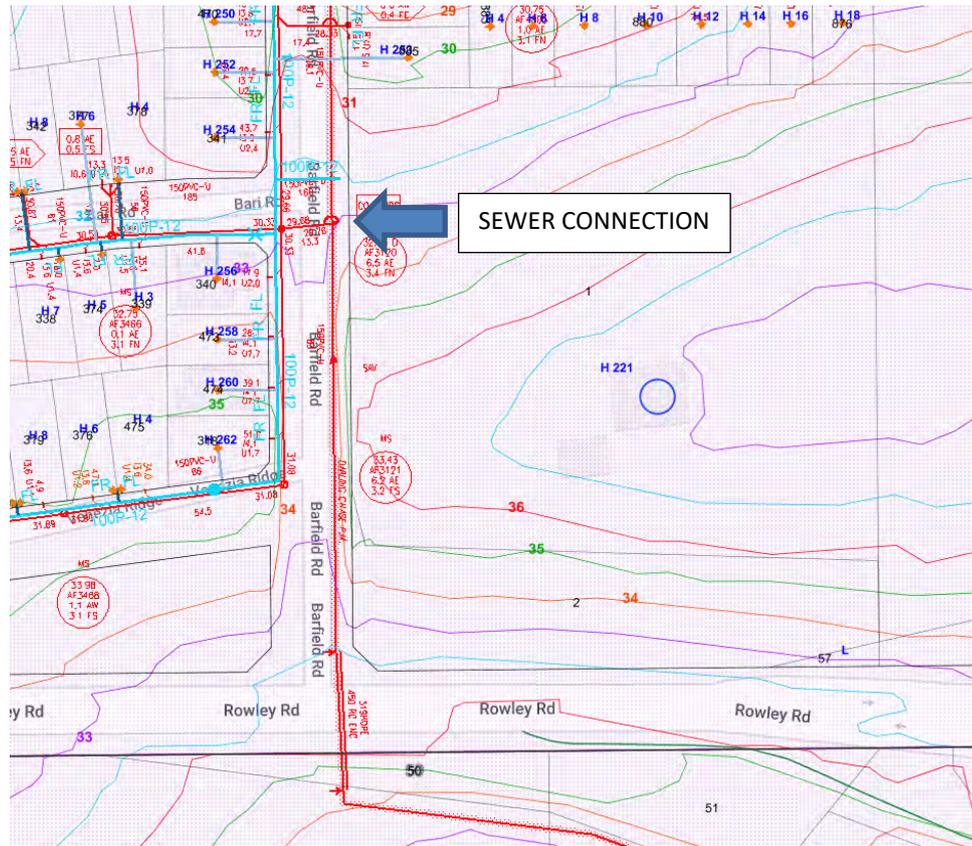


Figure 14 Water Corporation Sewer Network Map

Each green title lot will require access to its own wastewater service and all internal plumbing must be contained within the each of the new lot boundaries created.

Correspondence with Water Corporation indicates that servicing of the development is reliant on wastewater infrastructure constructed by the Vivente Estate development. The proposed connection point is at Barfield Rd.

Subdivision Works are underway to the immediate west of the subject land and include works along Barfield Road with associated infrastructure. Based on discussions with the adjacent developers sewer reticulation along Barfield Road has been completed in the vicinity of lot 301 and the required connection has already been provided as part of the infrastructure works. This infrastructure is already handed over to the Water Corporation and can be extended to service the subject land.

All internal sewer reticulation pipework will be designed and constructed to the standards and requirements of the Water Corporation of Western Australia. Standard Water Corporation water headwork charges will apply.

Refer **Appendix D** for the advice provided by the Water Corporation and **Appendix E** for the proposed wastewater servicing concept plan for the development as an indication.

5.5 Stormwater Drainage

5.5.1 City of Cockburn Russell Road Arterial Drainage Scheme - Report for Cockburn Coast District Structure Plan (LandCorp, May 2011)

Russell Road Arterial Drainage Scheme from City of Cockburn indicates the following criteria for stormwater management apply for any development within the City.

- All catchment runoff up to and including the 1 in 100 year ARI event within the development area.
- Infiltration testing should be carried out in conjunction with geotechnical investigations at a localised level to confirm areas that are suitable for the proposed infiltration methods and to identify appropriate infiltration rates to enable further refinement of modelling at subsequent stages of development.
- Event Runoff from events up to the **1 in 1 year ARI** event will be retained as close to source as possible within raingardens and bioretention areas integrated into the urban form.
- Runoff from all residential lots will be captured and disposed of on site via the use of soakwells or other infiltration facilities. For high density lots where retention and infiltration within the boundary of the lot is not possible retention and infiltration areas will be located within local public open space areas as close to source as possible. The use of permeable paving will be maximised to provide opportunities for infiltration at source.
- Event Road runoff from events greater than 1 in 1 year ARI and **up to 1 in 5 year ARI** will be conveyed in an underground pipe system designed to maximise infiltration through the use of bottomless pits and permeable joints, to low point infiltration areas integrated into public open space areas.
- Roads and public open spaces will be designed to cater for the surface overflow for more severe storms with habitable floors at least 300 millimetres above the **1 in 100 year ARI** flood or storage level at any location. Low point infiltration areas will be sized to store and infiltrate the 100 year ARI flood event on site.

5.5.2 City of Cockburn Guidelines and Standards for the Design, Construction and Handover of Subdivision within the Municipality - Stormwater Drainage (CoC, July 2019)

Stormwater Drainage Guidelines from City of Cockburn Guidelines and Standards for the Design, Construction and Handover of Subdivision indicates the following criteria for stormwater management for any development within the City.

5.5.3 Proposed Stormwater Strategy

As discussed in **Section 4.7**, Lot 301 (221) Barfield Road is punctuated by a high point approximately mid-block along its eastern boundary. The site will therefore require re-grading and stabilisation to ensure building sites are created and stormwater requirements are satisfied.

In accordance with City of Cockburn requirements stormwater will be disposed on-site via the use of soakwells or other infiltration facilities. Infiltration testing is to be carried out in conjunction with geotechnical investigations at the localised level to confirm areas that are suitable for the proposed infiltration methods and to identify appropriate infiltration rates to enable further refinement of modelling at subsequent stages of development. Site grading will be governed by the stormwater disposal strategy identified below. There is considerable scope to re-contour the site to achieve the desired levels to accommodate the stormwater and other servicing requirements of the site as highlighted in other sections of this report.

It is proposed to provide below ground storage cells within the POS area and potentially rain garden swales within selected areas of the road verges to accommodate the stormwater disposal from the road network.

Refer to **Figure 15**, **Figure 16** and **Appendix F** below for stormwater drainage concept collection and disposal strategy.

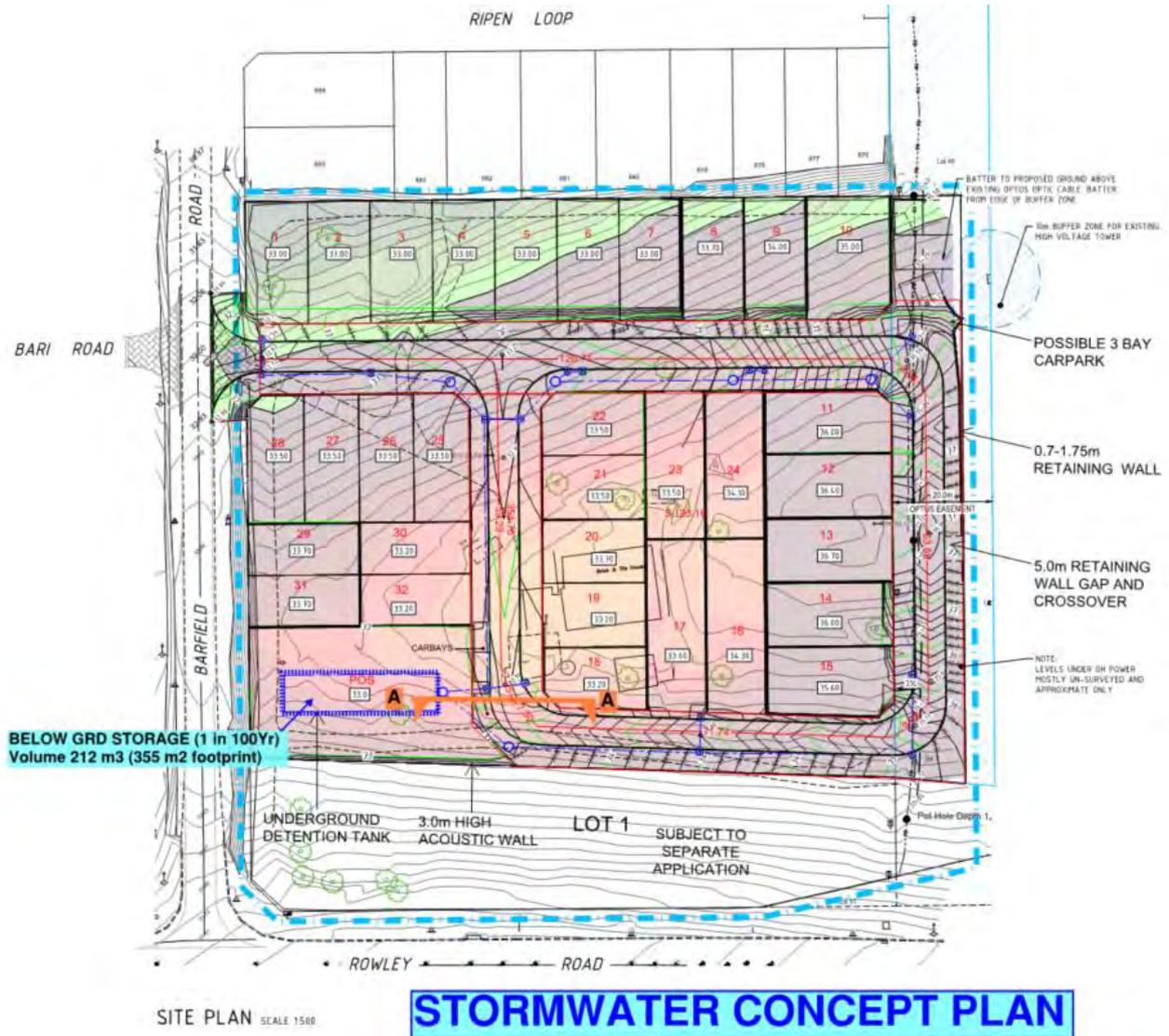
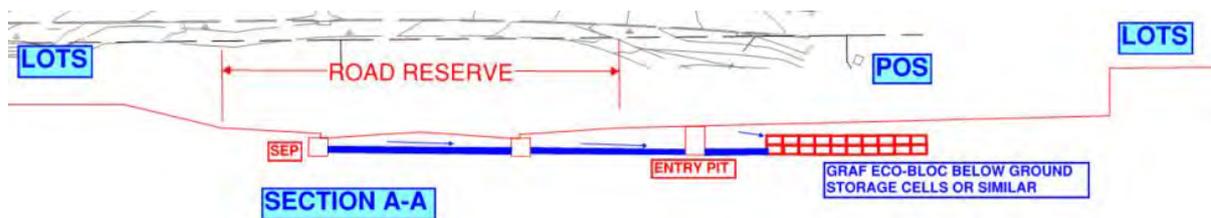


Figure 15 Stormwater Drainage Concept Plan

Detailed design will be undertaken to determine final sizes of the various storage elements, however, Table 5.1 below provides the concept design volumes shown in **Figure 15** above and calculations are provided in **Appendix F**.

Table 5.1 – Storage Requirements and Available Storage

| Drainage Element | Catchment Area (m ²) | First Flush Volume Required (15mm) m ³ | Volume Provided allowing 150mm freeboard (m ³) | Volume Required for 1 in 100yr event (m ³) | Volume Available for 1 in 100yr event (m ³) |
|----------------------|----------------------------------|---|--|--|---|
| Below Ground Storage | 5,123 | 30.5 | 30.5 | 208.5 | 212.2 |
| | | | 30.5 | | |
| TOTALS | 5,123 | 30.5 | Incorporated in below ground storage | 208.5 | 212.2 |


Figure 16 Typical Section through POS and underground storage

5.6 Electrical

Dial Before You Dig (DBYD) information (**Appendix D**) indicates that LV cables are shown to be located within and adjacent the western boundary of the site, immediately outside the southwestern corner of the site within the northern verge of Rowley Road and within the western verge of Barfield Road.

It is anticipated that all lots within the proposed development will be served with underground power from the existing overhead/underground network mentioned above. Standard Western Power development conditions will apply and it is anticipated that the network has adequate capacity for the site power requirements which needs to be verified with Western Power once the ultimate development details are known. The cost of this work will need to be met in full by the developer.

It is likely that various pad mount sites will be required in selected locations within the development. However, due to the range of sizes of lots proposed within the development, it is envisaged that there will not be a problem in strategically locating the infrastructure to meet both Western Power design requirements and the requirements of the developer.

An application for a new connection will be required at the time of detailed design for each lot. The developer will fund any new connection, removal and/or relocation of any Western Power assets, as per Western Power's network connection policy.

Extracts from the 2026 and 2031 Western Power Network Capacity Forecast are shown in **Figure 17** below. The forecast indicates that up to 30MVA remaining capacity is available in the 2021 forecast however only 5MVA remaining capacity is available in the 2031 forecast.

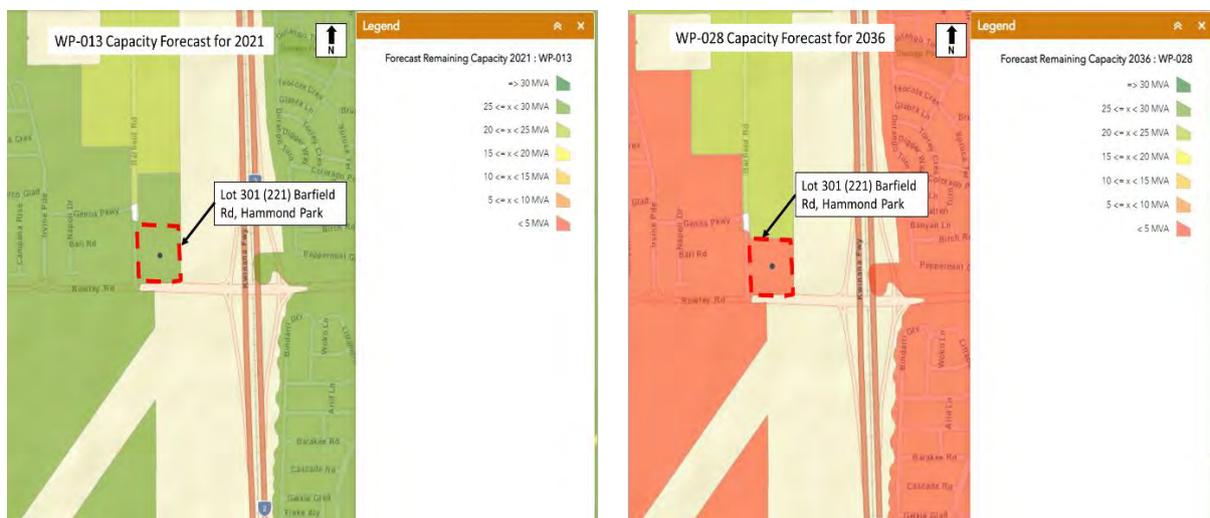


Figure 17 Western Power Remaining Capacity Forecast

In accordance with the Western Power UDS Manual, for an overhead transmission power line that is adjacent to a development, an Easement in Gross is to be provided for the power line at the proponent's cost. The power line is to be considered adjacent to the development if the development is within the prescribed safety clearance zone (the easement) applicable to the particular transmission line. This is determined in accordance AS/NZS 7000 Overhead line design – Detailed procedures. There may be circumstances where it is impractical for the overhead transmission power line to remain in situ. Each case will be dealt with on its merits.

Refer to **Appendix D** for existing power distribution network details.

5.7 Telecommunications

Extensive negotiations and liaison has been undertaken on behalf of the proponent over a period of 9 months. Based on initial Information from TELSTRA/NBNco and Optus the service network within the area is available to the development. It is anticipated that all lots within the proposed development will be served with Telecommunication services.

Design applications have been made to NBNCo and designs are underway to serve the landholdings. The communications provider will design and provide details for the installation of a pit and pipe network at the cost of the developer the new telecommunication network facilities to the proposed lots. Alternatively, where cable routes match Western Power underground power supply routes, Telstra will wherever possible use the Western Power trenches in lieu of the developer providing additional trenching.

Telstra or other communications providers will cable the development once housing has commenced in the area and applications are made by individual owners for communications services to their lots. Headwork charges for Telstra services extensions are anticipated.

Lot 301 (42) Barfield Road, Hammond Park is also currently shown to be serviced by a NBNCo conduit from the western verge of Cumberland Road.

There are also additional fibre cables adjacent to the site. Extensive liaison with Optus has resulted in some early Infrastructure works being undertaken in early 2022 to relocate fibre optic cable services to suit the needs of the estate (refer the **Appendix G** for further details).

There are a number of service extension options from the existing networks to service the site, any of which have the capacity to offer site connection for each of the development lots. Headwork charges for Telstra/NBN services extensions are therefore anticipated.

Refer to the DBYD information within **Appendix D** and **Appendix G** for more details on existing telecommunications service infrastructure.

5.8 Gas

DBYD information provided by Atco indicates that Lot 301 (221) Barfield Road is not currently shown to be connected to a gas service. The closest Gas service is a DN110 350kPa gas main located at Mokare Entrance approximately 300 m west of the site.

ATCo Gas has advised that reticulated gas services are available in the surrounding area. It is anticipated that this network will have sufficient capacity to service the development with reticulated gas services by extension of two existing mains.

The gas connection strategy will be dependent on the ultimate design and layout of the subdivision. There are no obvious constraints for an extension of the existing gas main to be provided such that new property connections can be established to each lot if required.

Reference is made to DBYD information within **Appendix D** detailing existing gas service infrastructure in close proximity to the subject site.

6. CONCLUSIONS & RECOMMENDATIONS

The site is capable of being serviced with all essential services, has no identifiable problematic soil conditions based on preliminary inspection of the site and with careful considered design would result in a high-quality development.

It is recommended that additional detailed work be undertaken in conjunction with the regulatory authorities and service provider to determine the land requirements associated with the necessary infrastructure as envisaged by the Water Corporation, Western Power and other service authorities, and to ensure that major works are incorporated on Water Corporation capital works program that will assist in the timely delivery of the major infrastructure items detailed in this report.

Peritas Group does not envisage any major servicing constraints for the proposed development based on a stand-alone green title lot subdivision of the subject land.

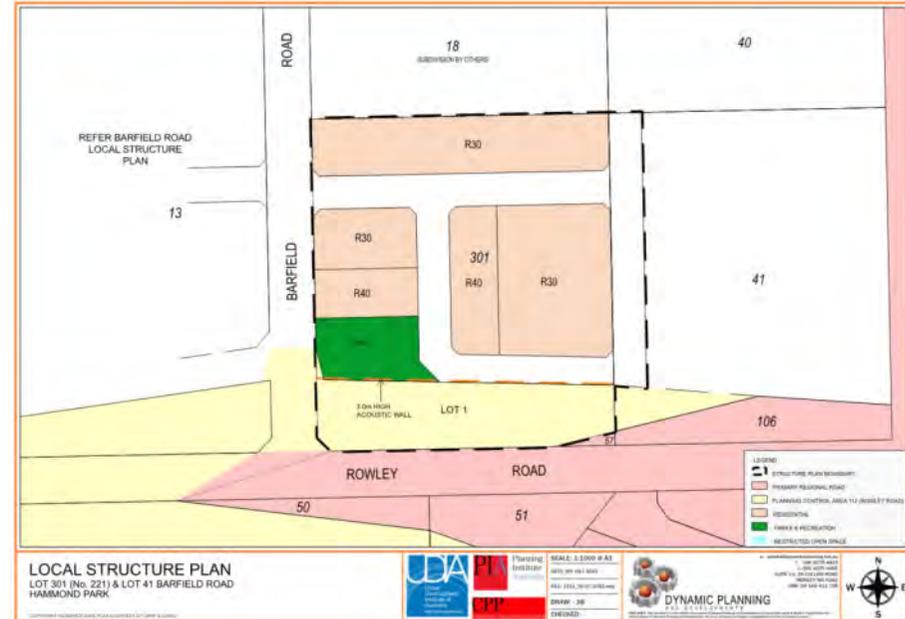
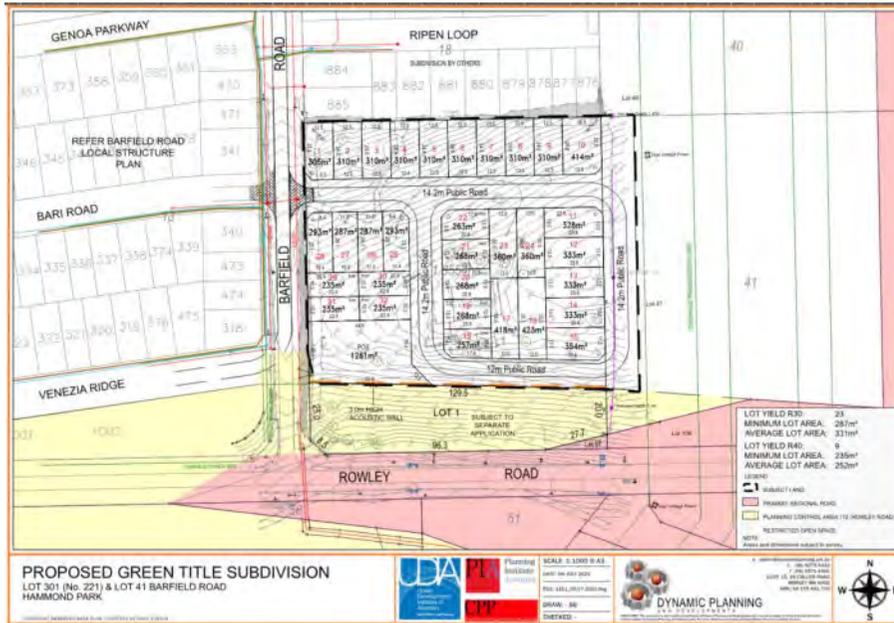
Appendices

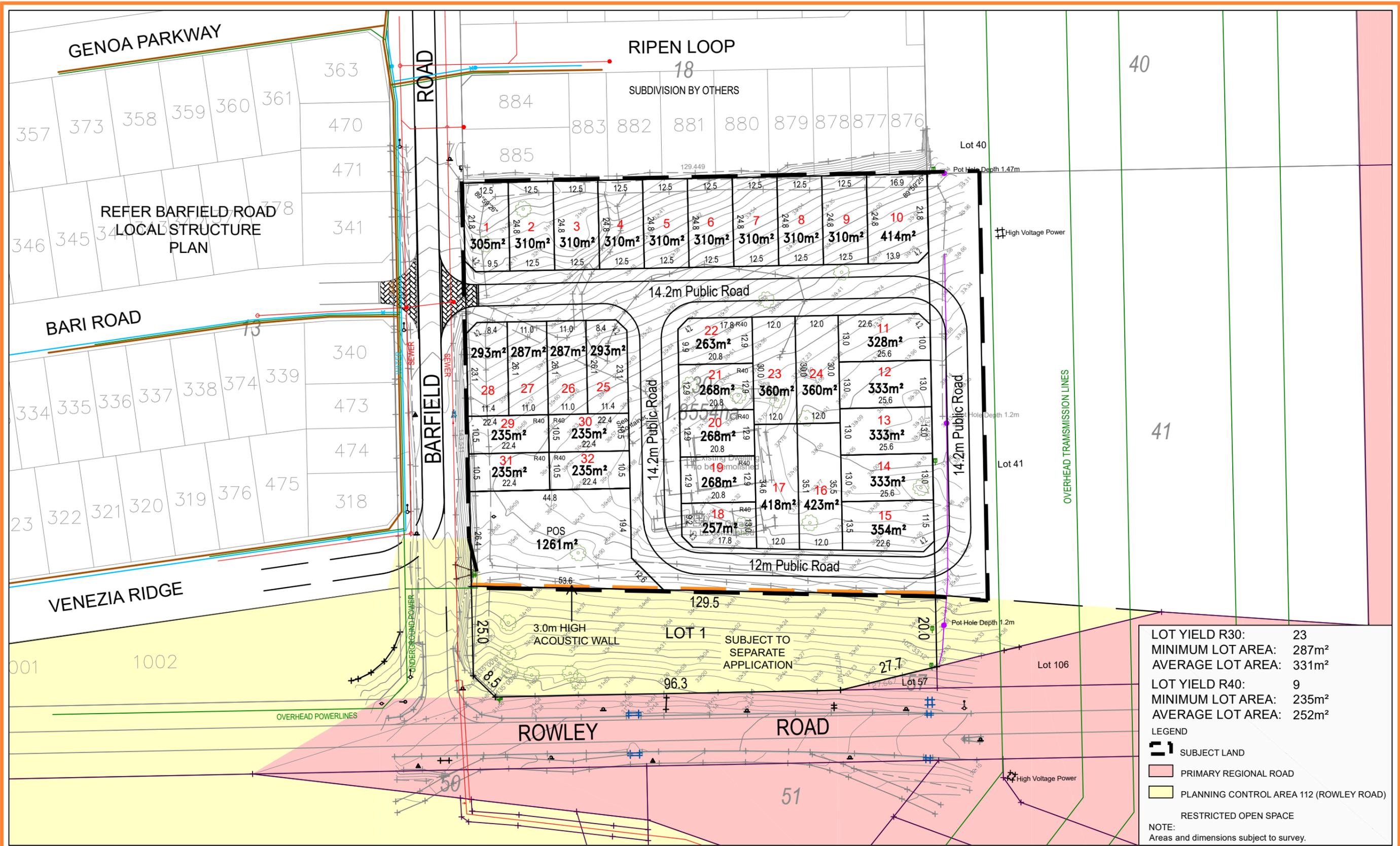
| Appendix | Title |
|------------|--|
| Appendix A | Locality Plan |
| Appendix B | Proposed Subdivision Layout & Local Structure Plan |
| Appendix C | LPS Zoning |
| Appendix D | DBYD and Authority Correspondence |
| Appendix E | Proposed potable water and wastewater servicing concept plan |
| Appendix F | Stormwater Drainage Concept Plan |
| Appendix G | Telecommunications Liaison |

Appendix A – Locality Plan



Appendix B – Proposed Subdivision Layout & Local Structure Plan





PROPOSED GREEN TITLE SUBDIVISION

LOT 301 (No. 221) & LOT 41 BARFIELD ROAD
HAMMOND PARK

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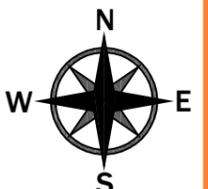
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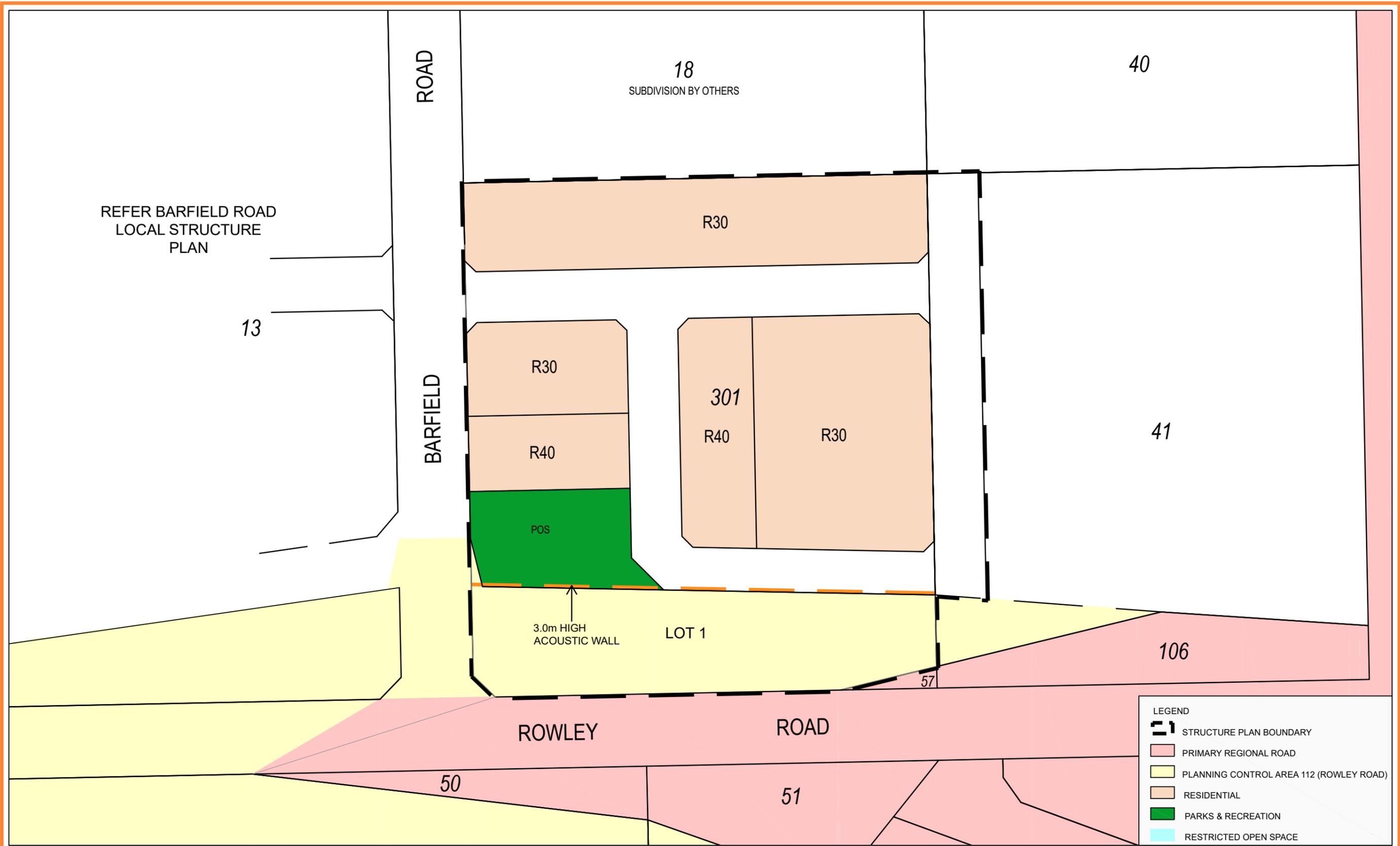


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 f: (08) 9275 4455
 SUITE 15, 29 COLLIER ROAD
 MORLEY WA 6062
 ABN: 99 169 411 705





REFER BARFIELD ROAD
LOCAL STRUCTURE
PLAN

13

ROAD

18
SUBDIVISION BY OTHERS

40

BARFIELD

R30

R30

R40

301

R40

R30

POS

41

3.0m HIGH
ACOUSTIC WALL

LOT 1

57

106

ROWLEY

ROAD

50

51

LEGEND

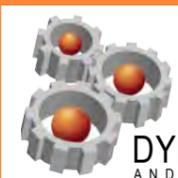
- STRUCTURE PLAN BOUNDARY
- PRIMARY REGIONAL ROAD
- PLANNING CONTROL AREA 112 (ROWLEY ROAD)
- RESIDENTIAL
- PARKS & RECREATION
- RESTRICTED OPEN SPACE

LOCAL STRUCTURE PLAN
LOT 301 (No. 221) & LOT 41 BARFIELD ROAD
HAMMOND PARK

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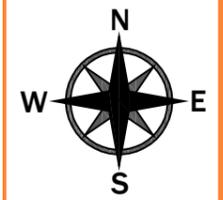
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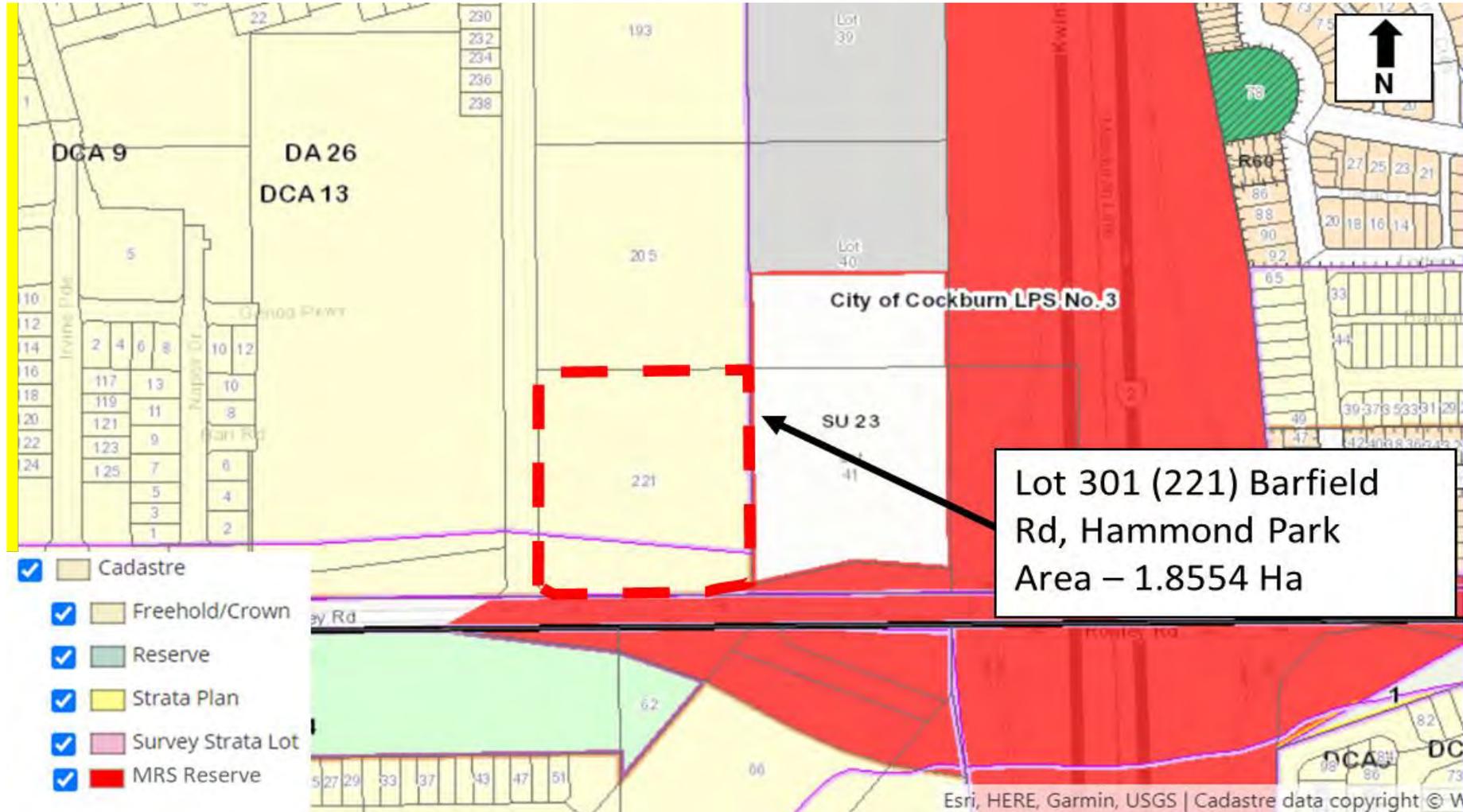
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MORLEY WA 6062
ABN: 99 169 411 705



Appendix C – LPS Zoning





Job No 20970246

Phone: 1100
www.1100.com.au

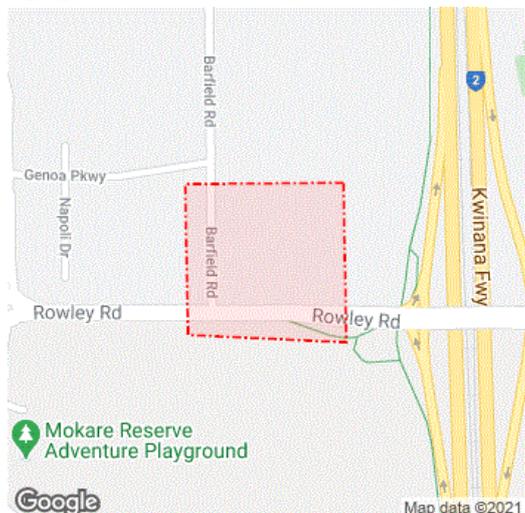
Caller Details

Contact: Mr Andrew Grisinger
Company: Peritas Group
Address: 74 Goodwood Pde.
Burswood WA 6100

Caller Id: 2319778
Phone: 0863369299
Mobile: 0488375355
Fax: Not Supplied
Email: agrisinger@peritasgroup.com.au

Dig Site and Enquiry Details

WARNING: The map below only displays the location of the proposed dig site and does not display any asset owners' pipe or cables. The area highlighted has been used only to identify the participating asset owners, who will send information to you directly.



User Reference: Lot 301 Barfield Rd, Hammond Park
Working on Behalf of: Private
Enquiry Date: 28/01/2021
Start Date: 19/02/2021
End Date: 11/06/2021

Address:
Barfield Road
Hammond Park WA 6164

Job Purpose:
Excavation

Location of Workplace:
Private Property

Onsite Activity:
Manual Excavation
Location in Road:
Not Supplied

- Check the location of the dig site is correct. If not submit a new enquiry.
- If the scope of works change, or plan validity dates expire, resubmit your enquiry.
- Do NOT dig without plans. Safe excavation is your responsibility. If you do not understand the plans or how to proceed safely, please contact the relevant asset owners.

Notes/Description of Works:

Your Responsibilities and Duty of Care

- The lodgement of an enquiry does not authorise the project to commence. You must obtain all necessary information from any and all likely impacted asset owners prior to excavation.
- If plans are not received within 2 working days, contact the asset owners directly & quote their Sequence No.
- ALWAYS perform an onsite inspection for the presence of assets. Should you require an onsite location, contact the asset owners directly. Please remember, plans do not detail the exact location of assets.
- Pothole to establish the exact location of all underground assets using a hand shovel, before using heavy machinery.
- Ensure you adhere to any State legislative requirements regarding Duty of Care and safe digging requirements.
- If you damage an underground asset you MUST advise the asset owner immediately.
- By using this service, you agree to Privacy Policy and the terms and disclaimers set out at www.1100.com.au
- For more information on safe excavation practices, visit www.1100.com.au

Asset Owner Details

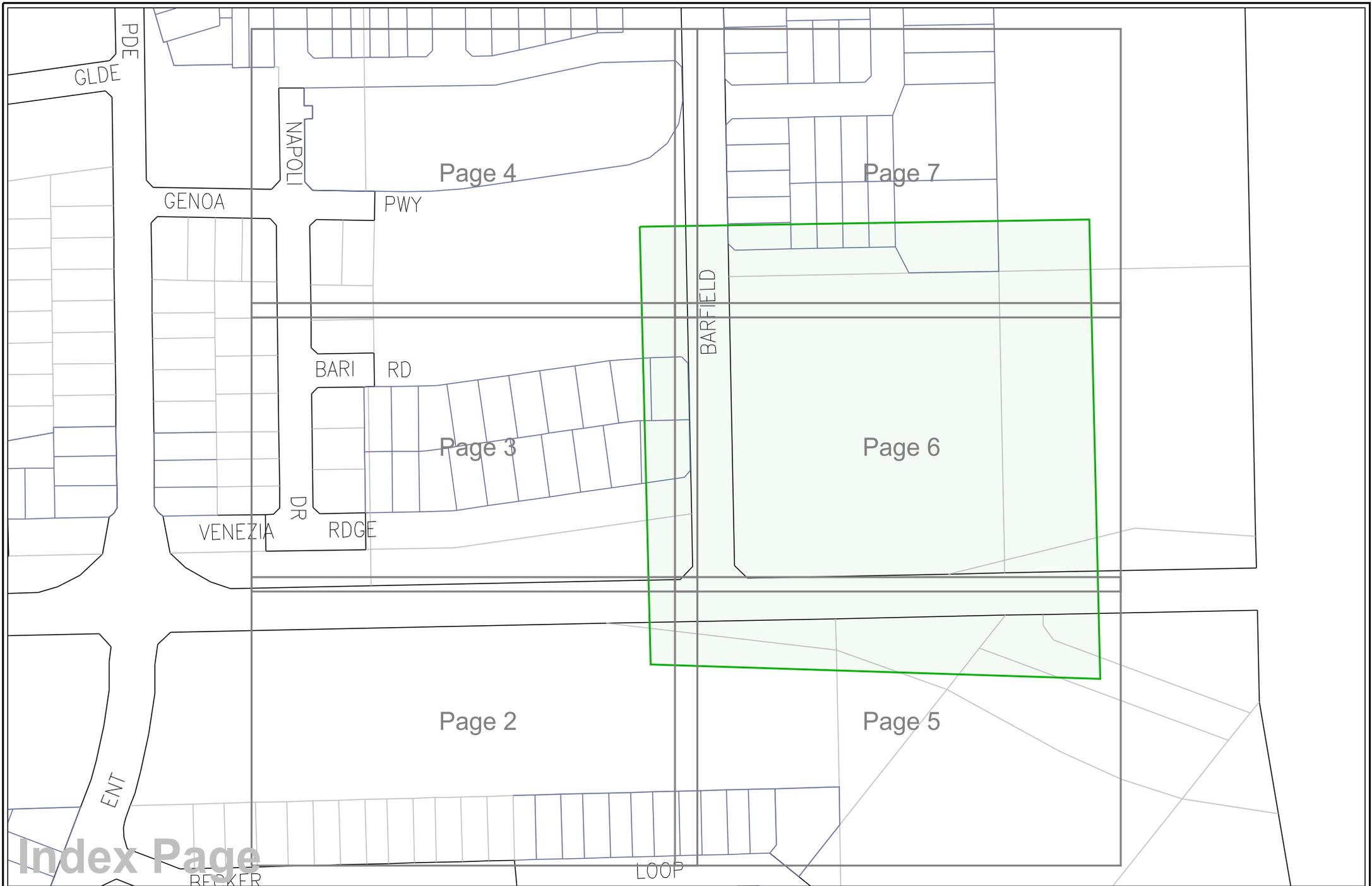
The assets owners listed below have been requested to contact you with information about their asset locations within 2 working days. Additional time should be allowed for information issued by post. It is **your responsibility** to identify the presence of any underground assets in and around your proposed dig site. Please be aware, that not all asset owners are registered with the Dial Before You Dig service, so it is **your responsibility** to identify and contact any asset owners not listed here directly.

** Asset owners highlighted by asterisks ** require that you visit their offices to collect plans.

Asset owners highlighted with a hash require that you call them to discuss your enquiry or to obtain plans.

| Seq. No. | Authority Name | Phone | Status |
|-----------|-------------------------|------------|----------|
| 105952835 | ATCO Gas Australia | 131352 | NOTIFIED |
| 105952832 | City of Cockburn | | NOTIFIED |
| 105952837 | NBN Co, Wa | 1800626329 | NOTIFIED |
| 105952834 | Optus and/or Uecomm, WA | 1800505777 | NOTIFIED |
| 105952833 | Telstra, WA | 1800653935 | NOTIFIED |
| 105952836 | Water Corporation WA | 0894248115 | NOTIFIED |
| 105952831 | Western Power | 1300769345 | NOTIFIED |

END OF UTILITIES LIST



Index Page



Scale: 1:2284

Sequence No: 105952836

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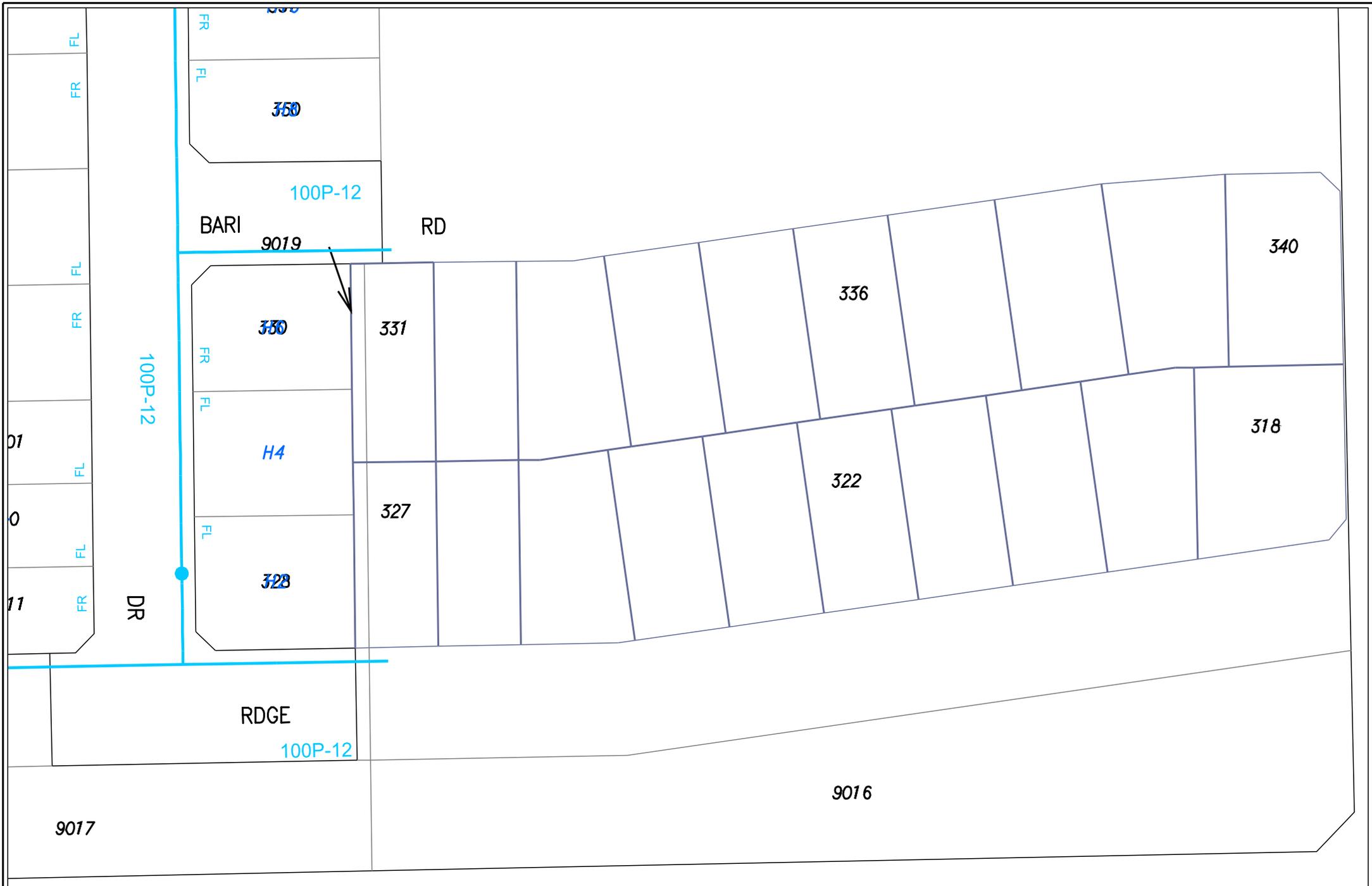
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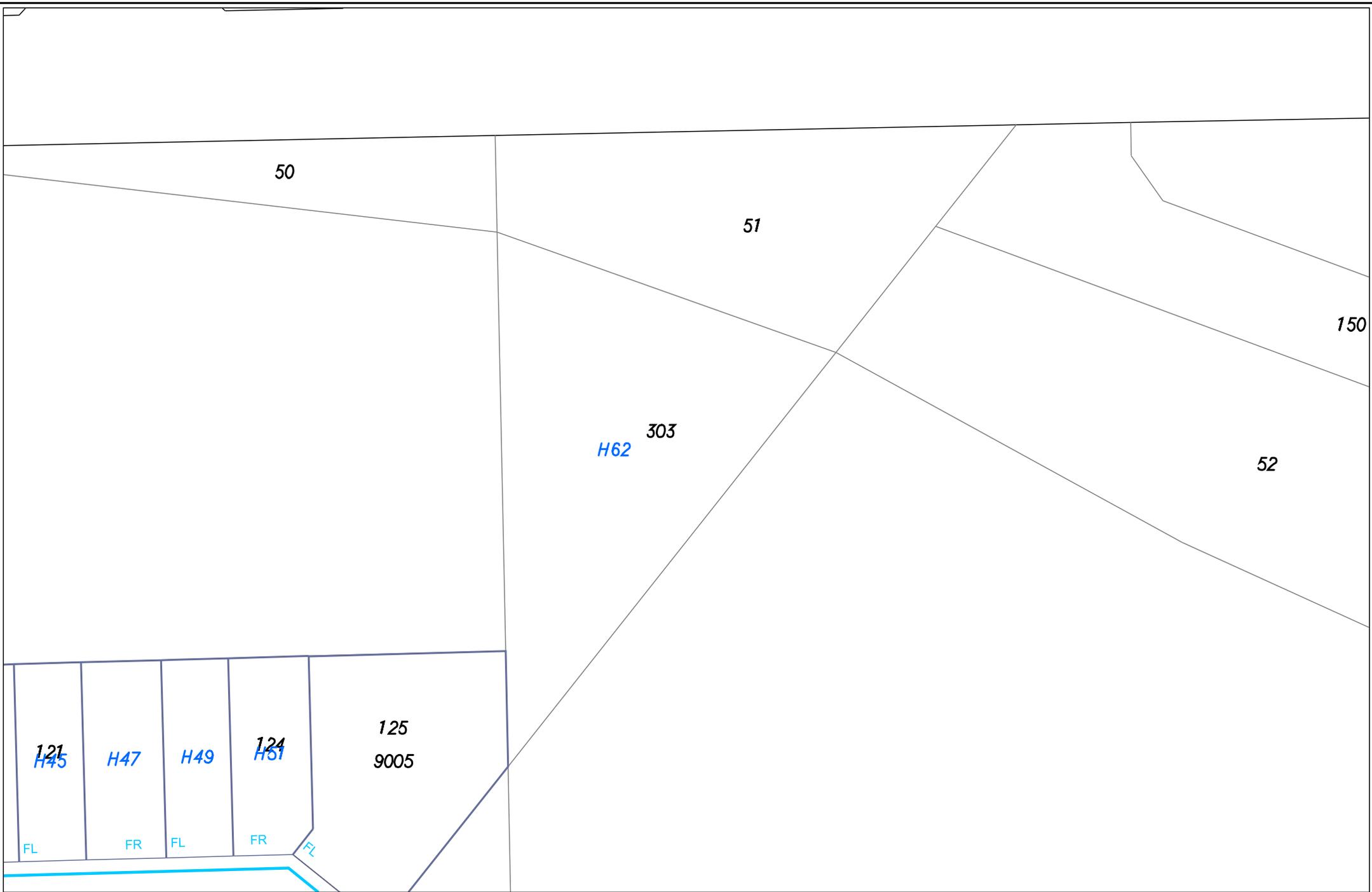
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BARFIELD

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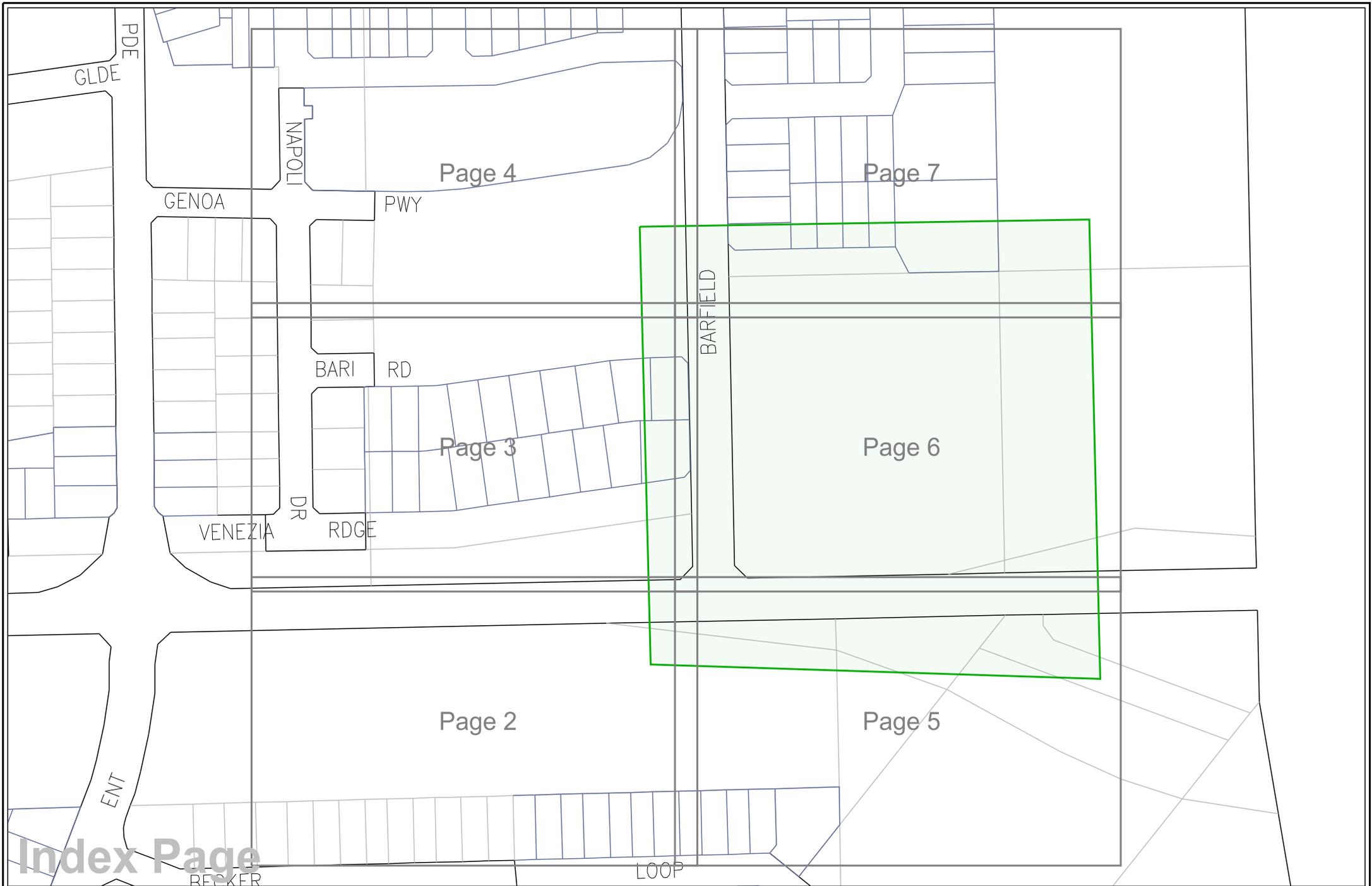
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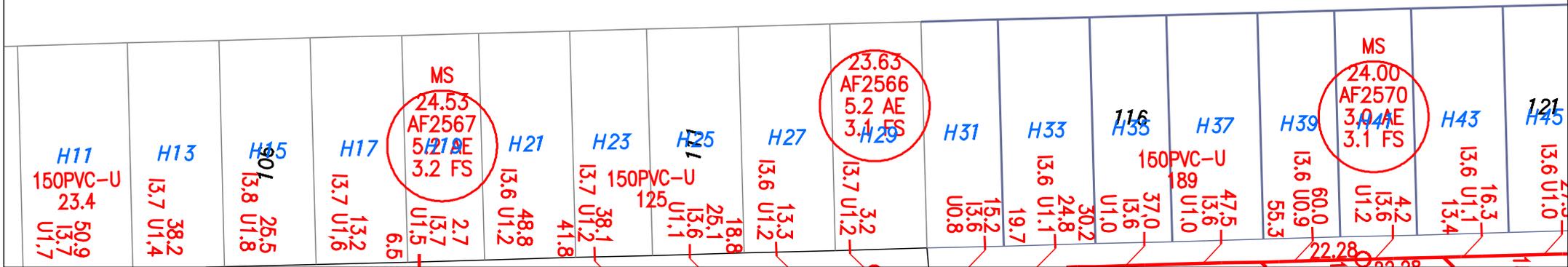
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WARNING - CRITICAL PIPELINE
 Refer to *Information Brochure Damage Prevention and Legend* for details

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7999

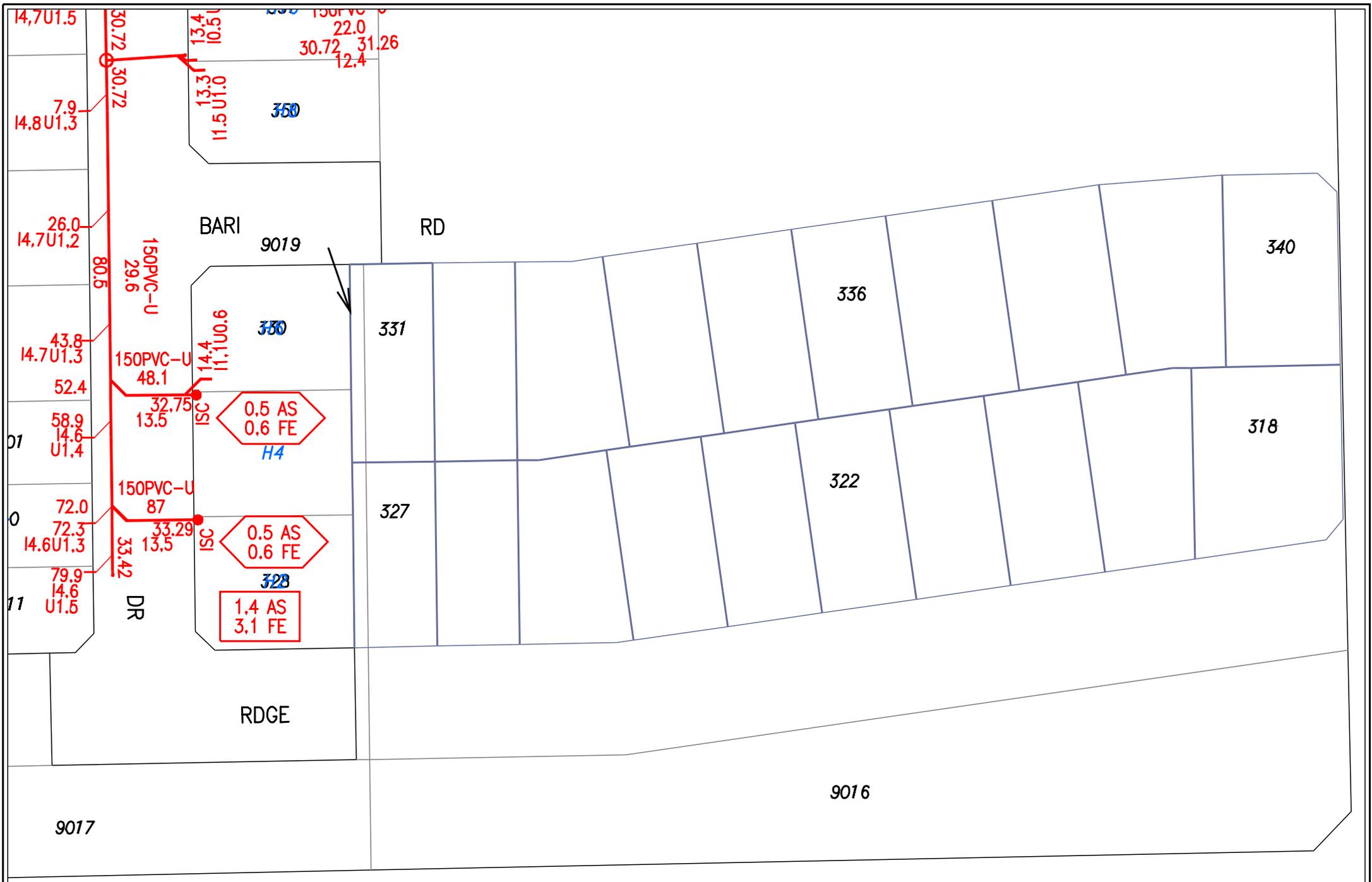


Scale: 1:750 Centre Point: 115.852°, -32.181°
Sequence No: 105952836
Print Date: 28/01/2021 Page: 2 of 7



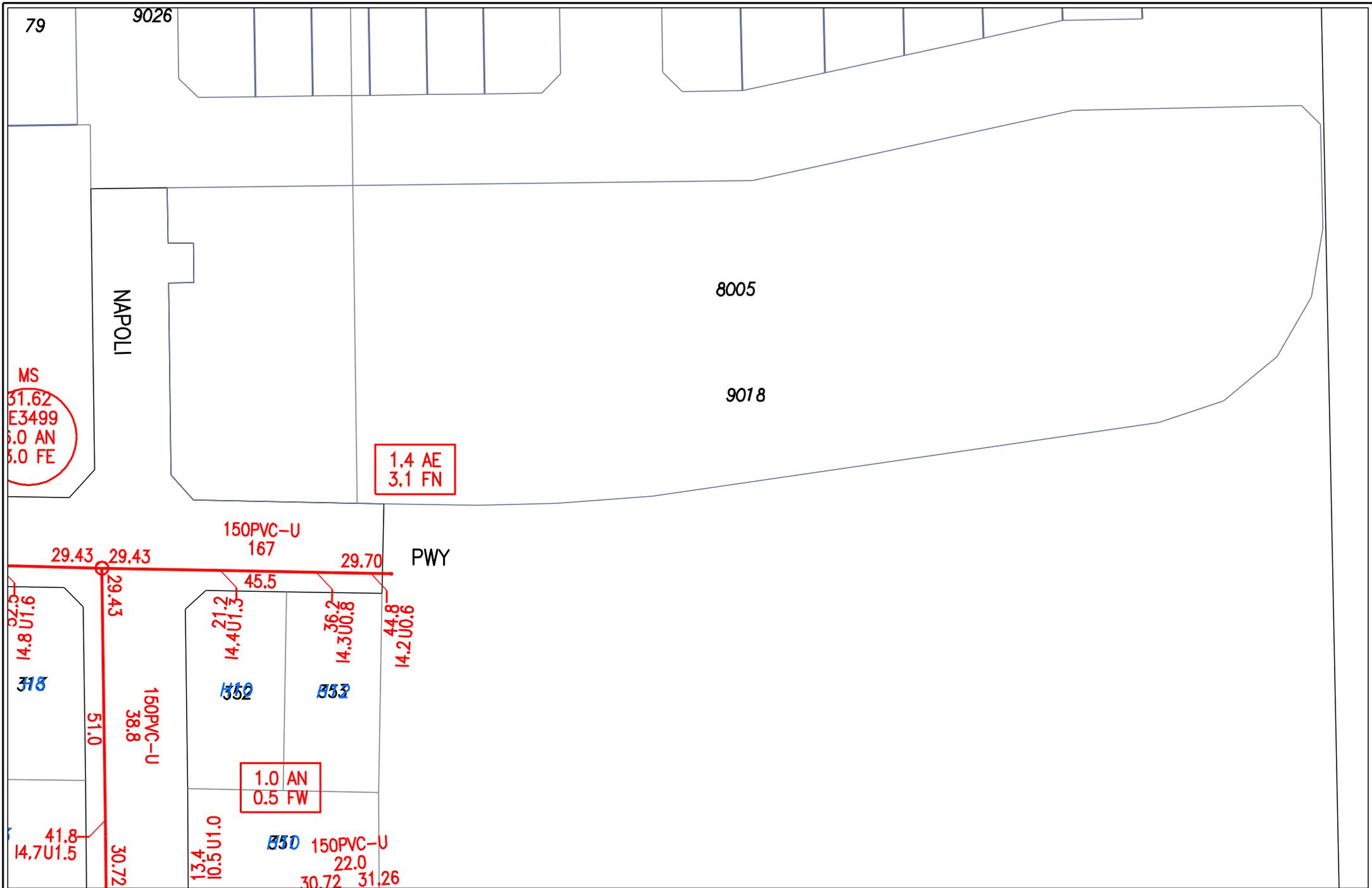
WARNING - CRITICAL PIPELINE
Refer to *Information Brochure Damage Prevention and Legend* for details

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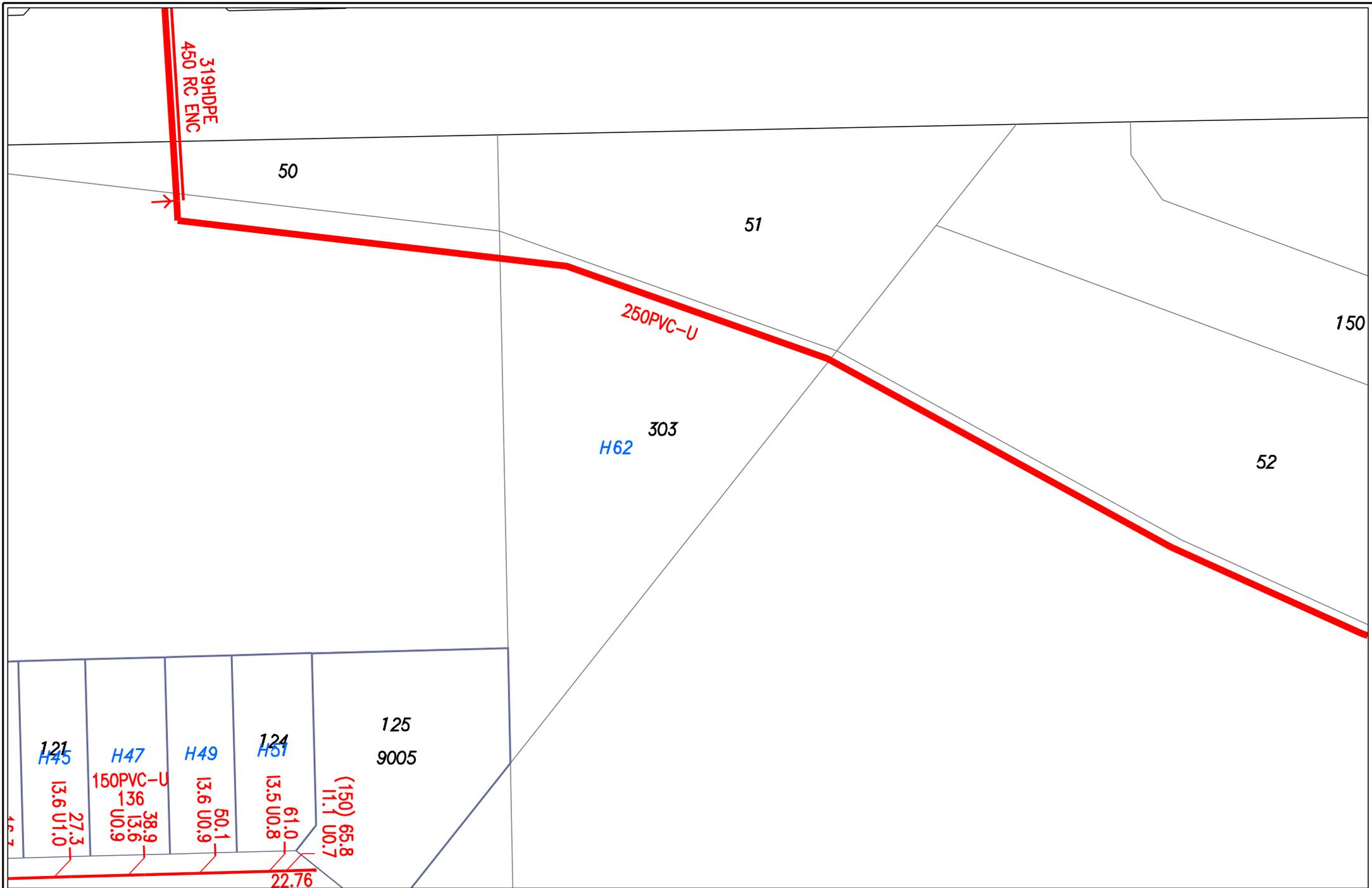
WARNING - CRITICAL PIPELINE
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Scale: 1:750 Centre Point: 115.854°, -32.181°
 Sequence No: 105952836
 Print Date: 28/01/2021 Page: 5 of 7



WARNING - CRITICAL PIPELINE
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BARFIELD

SAV

H201

57 L



Scale: 1:750

Centre Point: 115.854°, -32.180°

Sequence No: 105952836

Print Date: 28/01/2021 Page: 6 of 7



Sewer

WARNING - CRITICAL PIPELINE
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250PVC-U



WARNING - CRITICAL PIPELINE
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Plan Legend (summary)

INFORMATION BROCHURE



This legend is provided to [Dial Before You Dig](#) users to assist with interpreting Water Corporation plans. A more detailed colour version can be downloaded from www.watercorporation.com.au. (Your business > Working near pipelines > Downloads)

WARNING - Plans may not show all pipes or associated equipment at a site, or their accurate location. Pothole by hand to verify asset location before using powered machinery.

| | |
|--|---|
| | <p>WATER, SEWERAGE AND DRAINAGE PIPELINES</p> <p>CRITICAL PIPELINE (thick line) EXTRA CAUTION REQUIRED A risk assessment may be required if working near this pipe. Refer to your Dial Before You Dig information or call 131375.</p> <p>Pipes are not always labelled on plans as shown here – assume all pipes are significant and pothole to prove location and depth.</p> <p>P.M. pressure main M.S. main sewer R rising main (i.e. drainage pressure main)</p> <p>Common material abbreviations:</p> <p>AC asbestos cement e.g. 100AC NOTE: AC is brittle and is easily damaged. CI cast iron GRP glass reinforced plastic P PVC - class follows pipe material (e.g.100P-12) RC reinforced concrete S steel VC vitrified clay</p> |
| | <p>NON-STANDARD ALIGNMENT</p> <p>Pipes are not always located on standard alignments due to local conditions. (i.e. Other than 2.1 m for reticulation mains and 4.5 m for distribution mains.)</p> |
| | <p>OTHER PIPE SYMBOLS</p> <p>Other numbers or codes shown on pipes are not physical attributes. These are Water Corporation use only.</p> |
| | <p>CONCRETE ENCASEMENT, SLEEVING AND TUNNELS</p> <p>May be in different forms: steel, poured concrete, box sections, slabs.</p> |
| | <p>CHANGE INDICATOR ARROW</p> <p>Indicates a change in pipe type or size. e.g. 150mm diameter PVC to 150mm diameter asbestos cement (AC).</p> |
| | <p>PIPE OVERPASS</p> <p>The overpass symbol indicates the shallower of the two pipes.</p> |
| | <p>VALVES</p> <p>Many different valve types are in use. Valve may be in a pit or have a visible valve cover. There may be no surface indication.</p> <p>Valves may be shallower than the main or offset from it. e.g. A scour valve (SC) may have a pipe coming away from main pipeline on the opposite side to that indicated on the plan.</p> |



100P-DOMS



100S FS

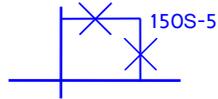
FIRE SERVICES

100 mm polythene domestic (DOMS) service

FS Fire service

FHS Fire hydrant service

Hydrant may be visible external to the building. Even if not visible a substantial fire service may still be present.



PIPE BYPASS

Bypass will not be on the same alignment as the main pipeline.



CATHODIC PROTECTION (CP)

Buried CP equipment may be located some distance from the pipeline being protected interconnected by buried cable. All CP fittings may not be visible.

A buried anode – various sizes and configurations

TP test point - may be visible on a post or in-ground

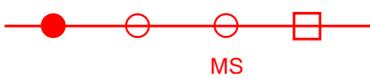
TR transformer rectifier



ACCESS TEE OR MANHOLE OR SERVICE ACCESS PIT

NOTE: Opening any manhole or pit is dangerous and is prohibited.

Below ground. May not be any visible signs at ground level or may be located in a pit.



WASTEWATER ACCESS CHAMBERS (MANHOLES)

-- Manhole (shown not labelled)

-- Tee or maintenance shaft (shown not labelled)

MS maintenance shaft (labelled)

WARNING: Opening any manhole or pit is dangerous and is prohibited.

26.24
V1234
7.0 ASE
2.0 FSW

4.01
0438
4.2 FE
1.0 FN

WASTEWATER MANHOLE INFORMATION BOXES

Square non-trafficable Do not drive vehicles over or place loads.

Round trafficable

In general if not located in the road treat as if non-trafficable.



HAZARDOUS MANHOLE

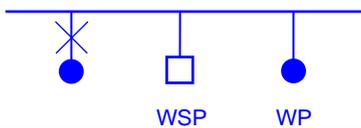
Indicates a potential health hazard from risk of exposure to toxic waste.

WARNING: Opening any manhole is dangerous and is prohibited.



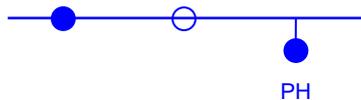
FLOWMETER

Various types of flow meters located in a pit. May be labelled with identifier. (e.g. 50 MFM, 50MM)



STANDPIPE, WATER SAMPLING POINT (WSP), WATER SUPPLY POINT (WP)

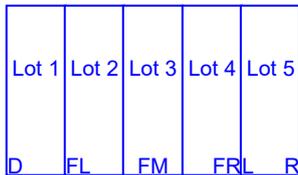
May be located adjacent to mains. Usually there will be some visible indication.



Hydrant May not be visible.

Hydrant Tee May not be visible.

Pillar hydrant Visible



PRE-LAID SERVICES

D Deferred

FL Fully Pre-laid Left

FM Fully Pre-laid Front Middle

FR Fully Pre-laid Right

L Left

R Right

Code indicates on which side of a lot the water service is located:

May be no visible indication at site.

SOUTH PERTH PS1



SEWER OR DRAINAGE PUMP STATION

Several pipes and a pressurised main will be in the vicinity.

3.9 1:2.7



OPEN CHANNEL

OA Landscaped

OE Normal Open Earth

OF Open channel with flood levee

OH Half Pipe

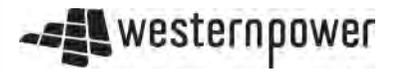
OL Lined Channel

OS Swale-Shallow Depression

OW Natural Water Course

Drainage structures, even if dry, must be kept clear of any obstruction such as sand stockpiles.

OVERVIEW ONLY



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**.

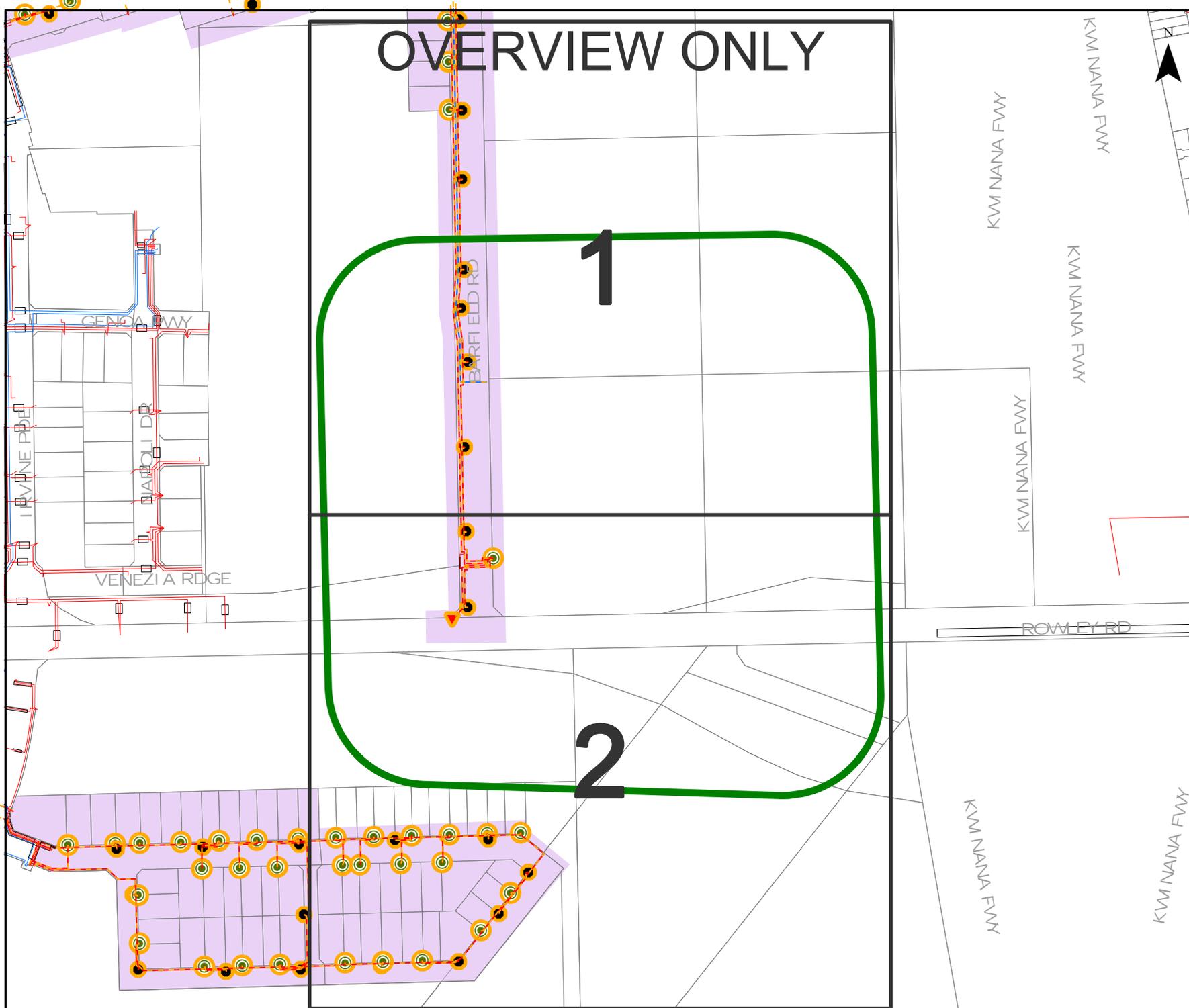
Telephone Support: 1300 769 345
Mon to Fri - 08:00 to 16:30

Information valid for 30 days from date of issue

A4

Scale : 1:3075

WARNING! Look out for overhead power lines





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

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- ▲ HV Termination
 - ▼ LV Termination

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 - Metal Pole
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 - ▼ LV Termination

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 - COMPLETED Area *

- Feature**
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A4 | Scale : 1:1500

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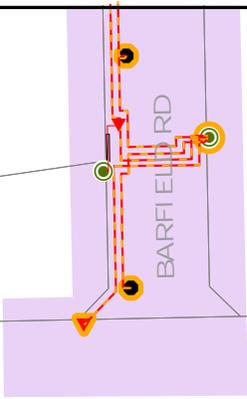
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A4

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OVERVIEW ONLY



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

* 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.

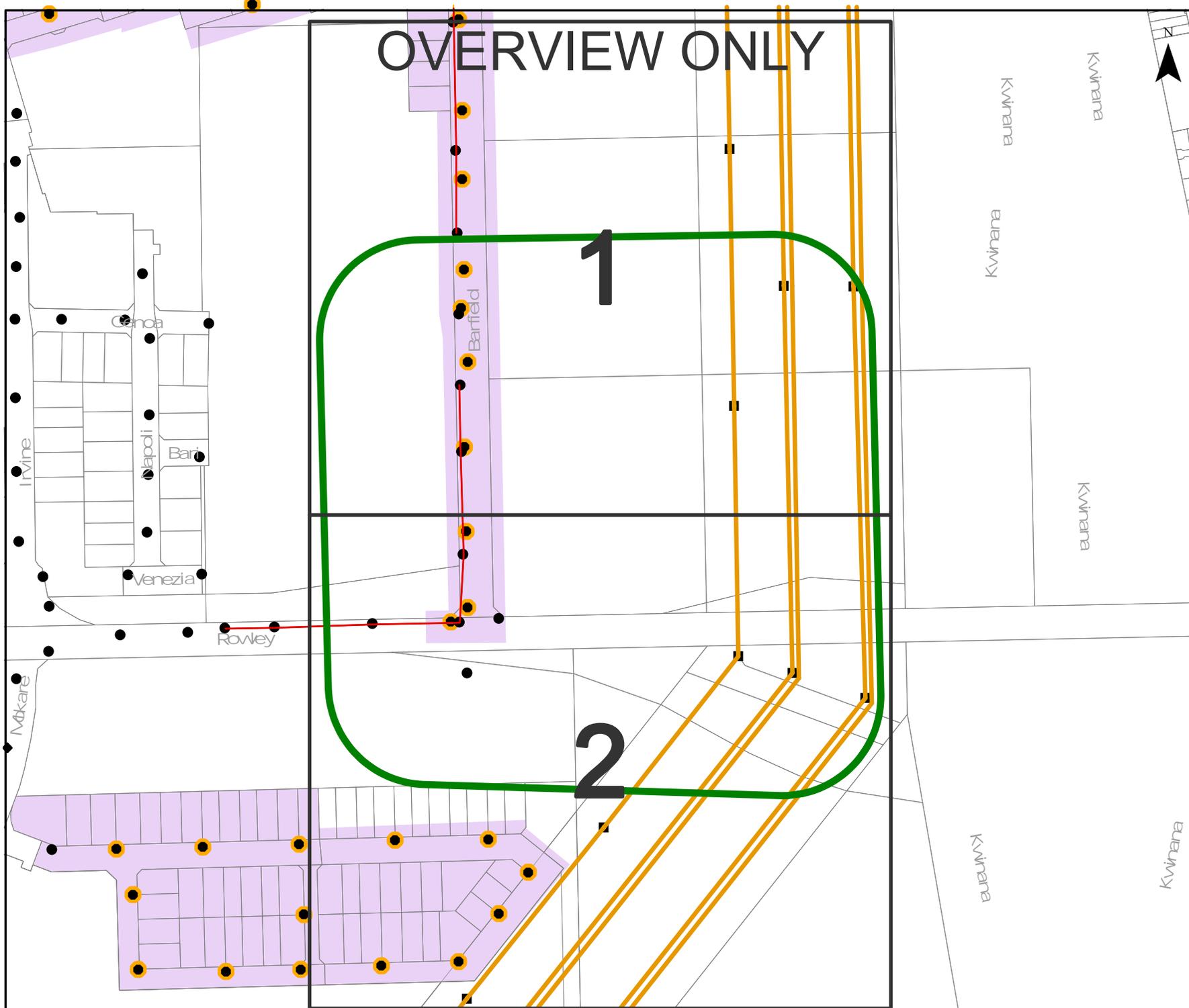
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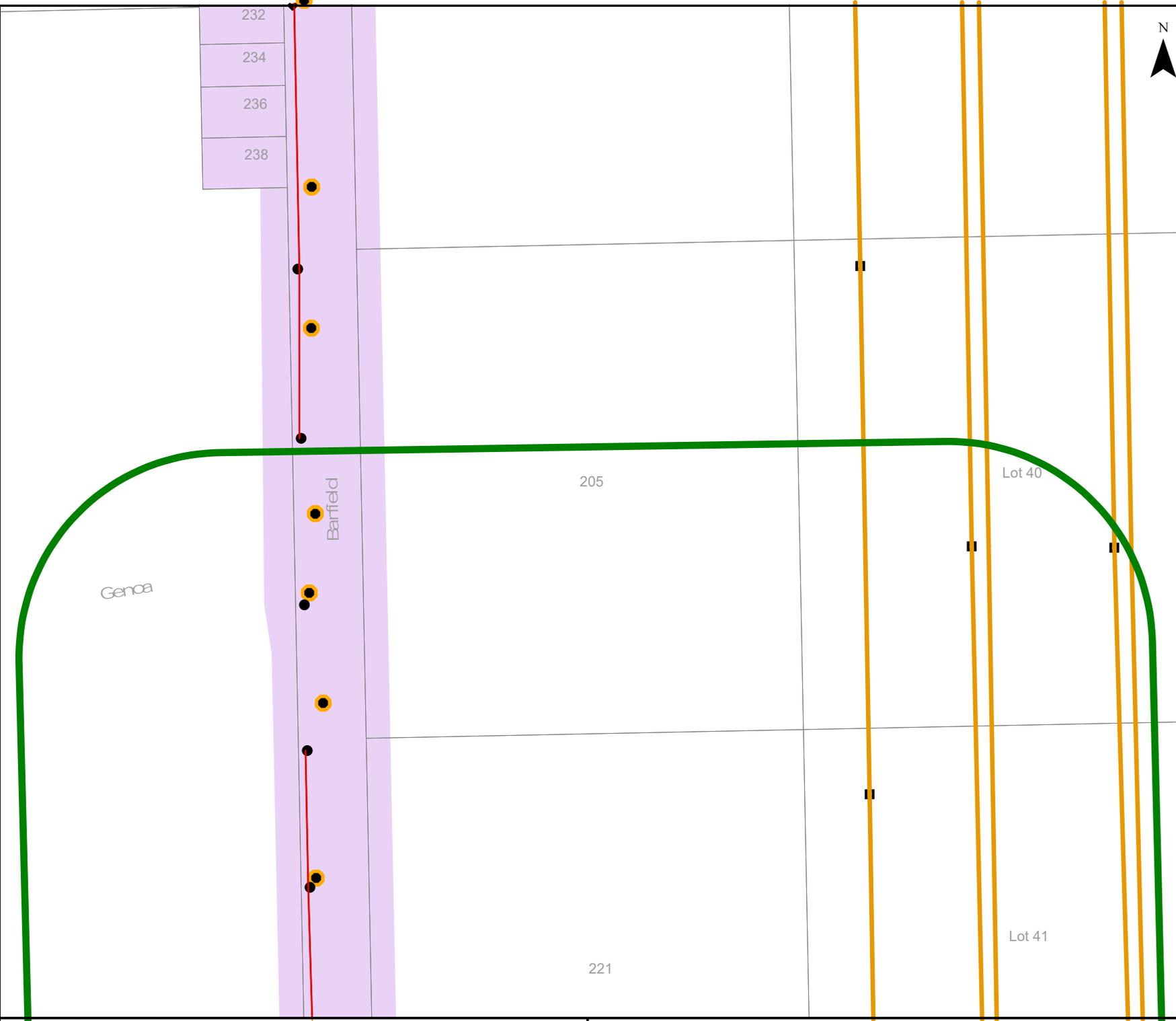
Information valid for 30 days from date of issue

A4

Scale : 1:3075

WARNING! Look out for overhead power lines





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

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A4 Scale : 1:1500

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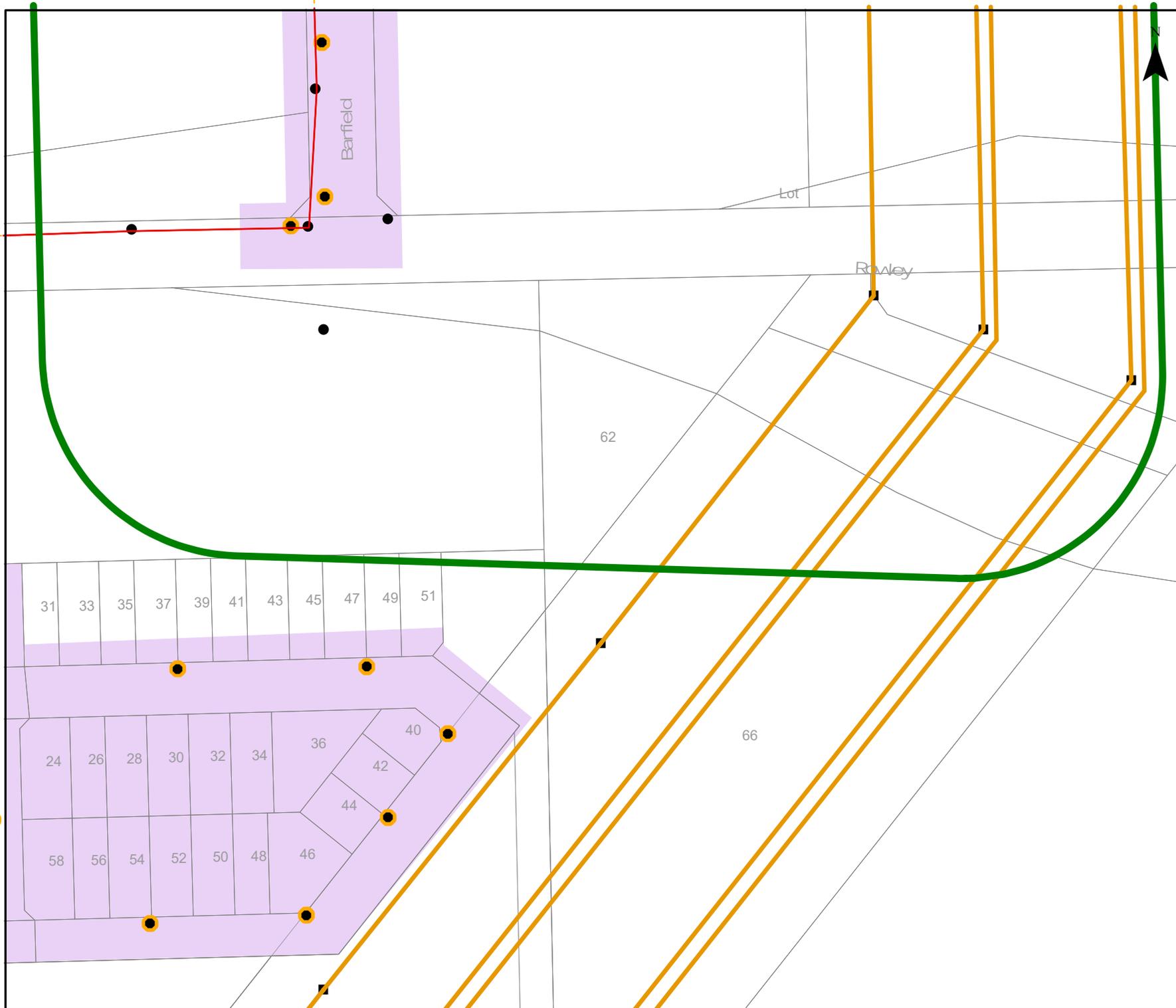
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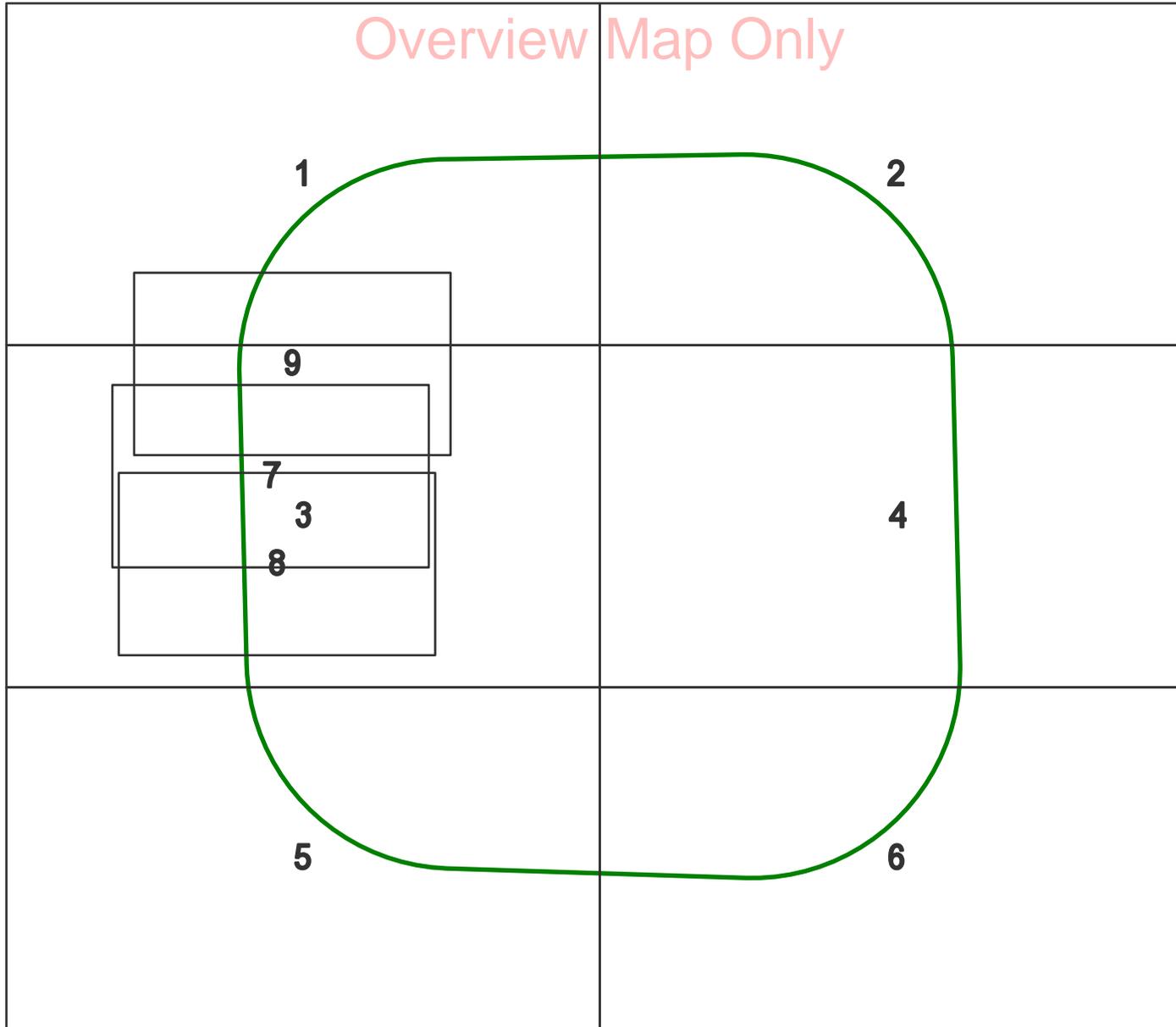
A4

Scale : 1:1500

**WARNING! Look out for
overhead power lines**



Overview Map Only



Sequence No: 105952835

Map Tile:

Scale: 1:4612

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Job No: 20970246

Date: 28/01/2021

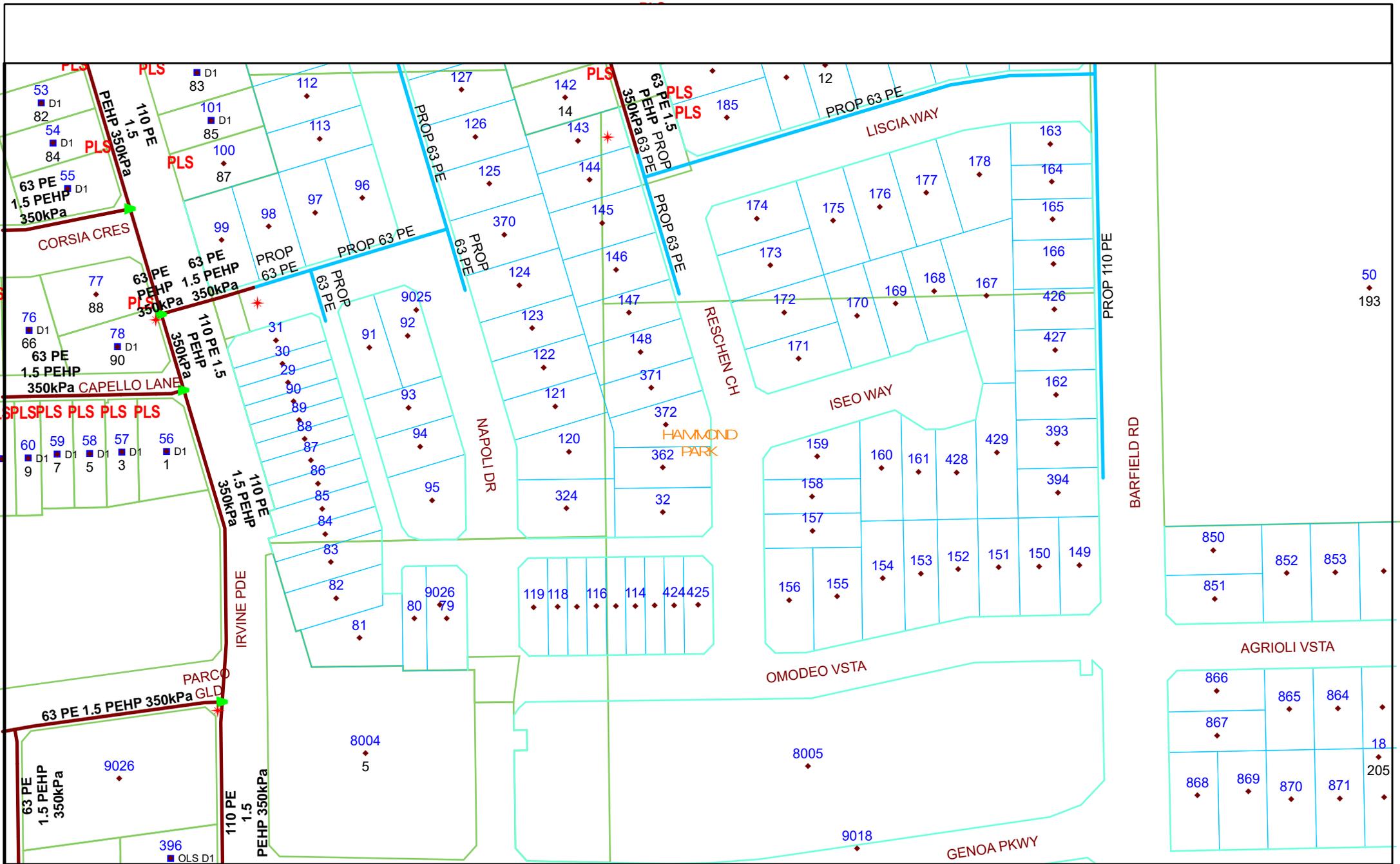
Location: Barfield Road, Hammond Park 6164

ABN 90 089 531 975



Please read all **warnings**, conditions and information on the attached "Underground Asset Details" information sheet. This plan is issued subject to that information and those conditions and **warnings** (including, but not limited to, the "NO HOT WORKS" warning). Plans are current for only **30 days** from date of request, indicative only and not warranted to be accurate. It is your responsibility to carefully locate underground assets and follow safe work practises and procedures (eg pot-holing). ATCO Gas Australia will seek compensation for damage caused to assets.

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Sequence No: 105952835

Map Tile: 1

Scale: 1:1500

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Job No: 20970246

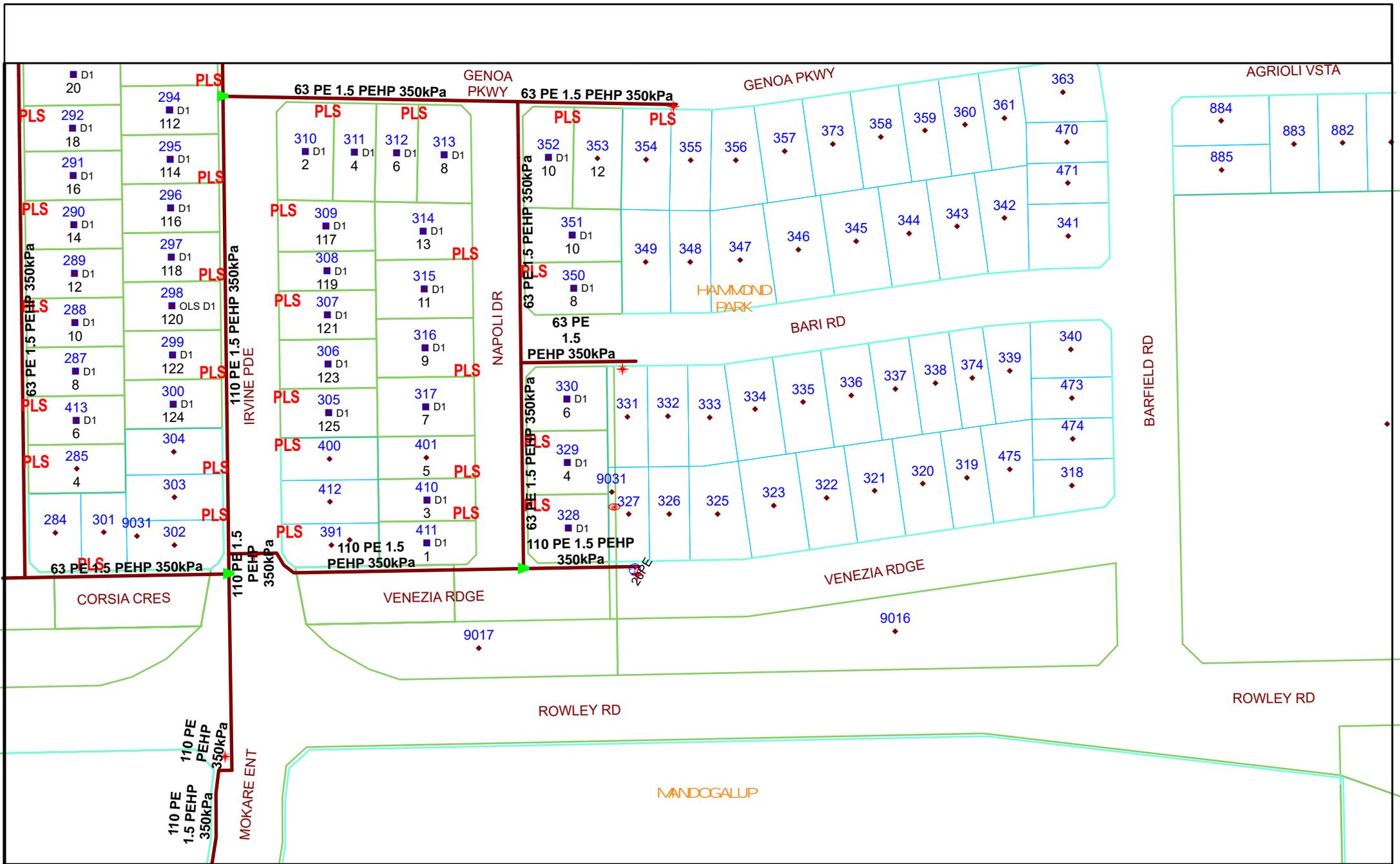
Date: 28/01/2021

Location: Barfield Road, Hammond Park 6164



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Sequence No: 105952835

Map Tile: 3

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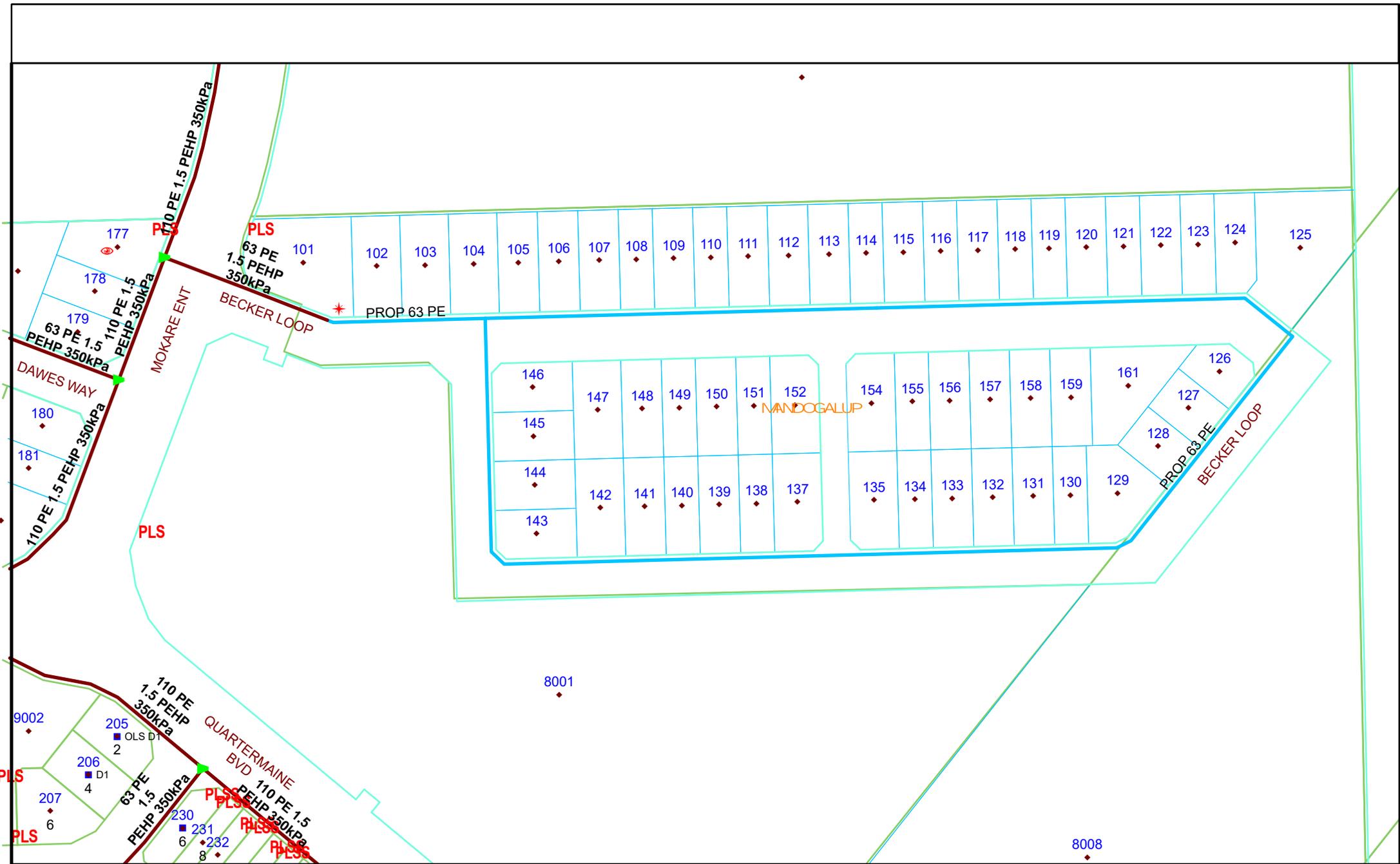
Date: 28/01/2021

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Sequence No: 105952835

Map Tile: 5

Scale: 1:1500

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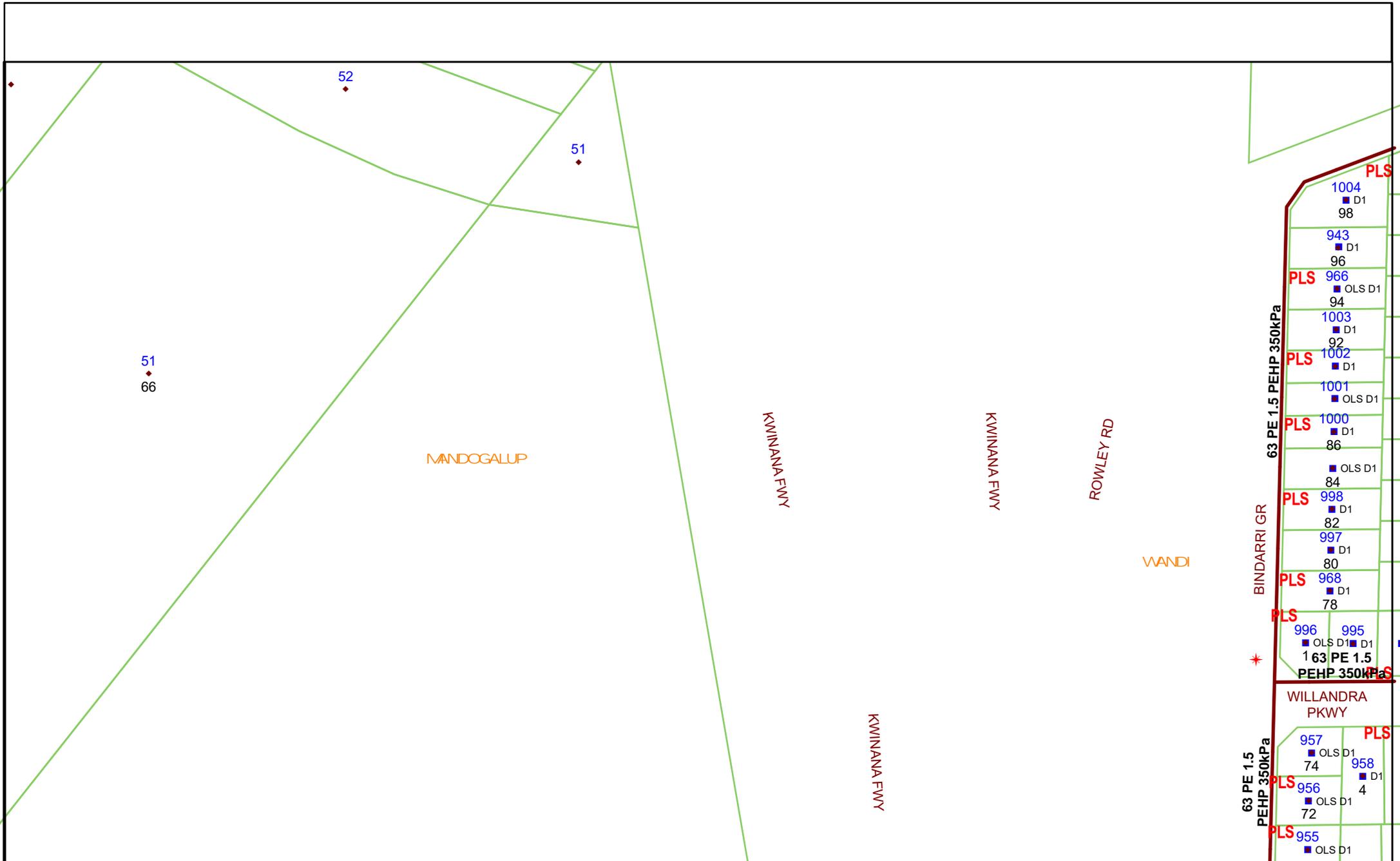
Date: 28/01/2021

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Sequence No: 105952835

Map Tile: 6

Scale: 1:1500

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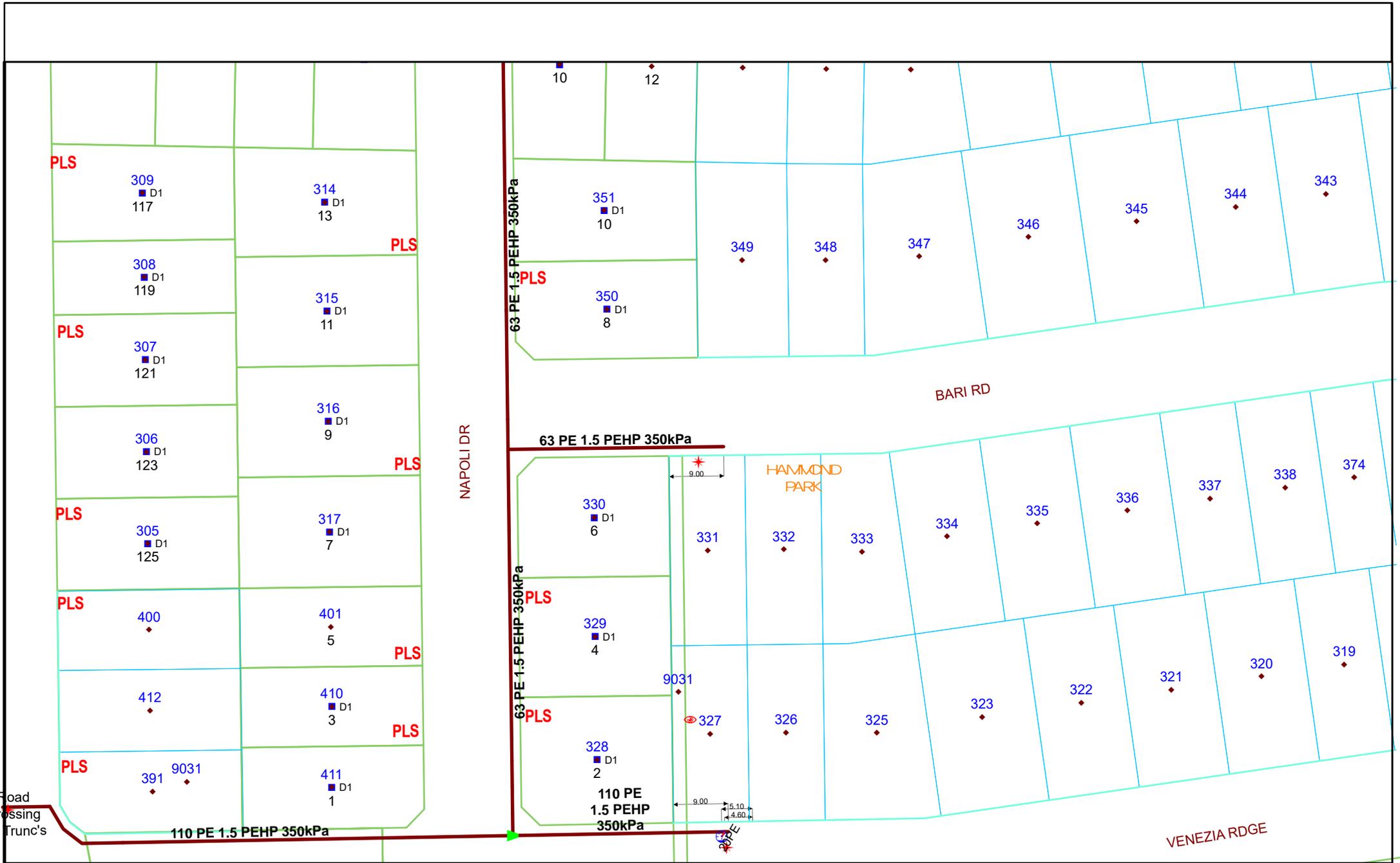
Date: 28/01/2021

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Sequence No: 105952835

Map Tile: 7

Scale: 1:800

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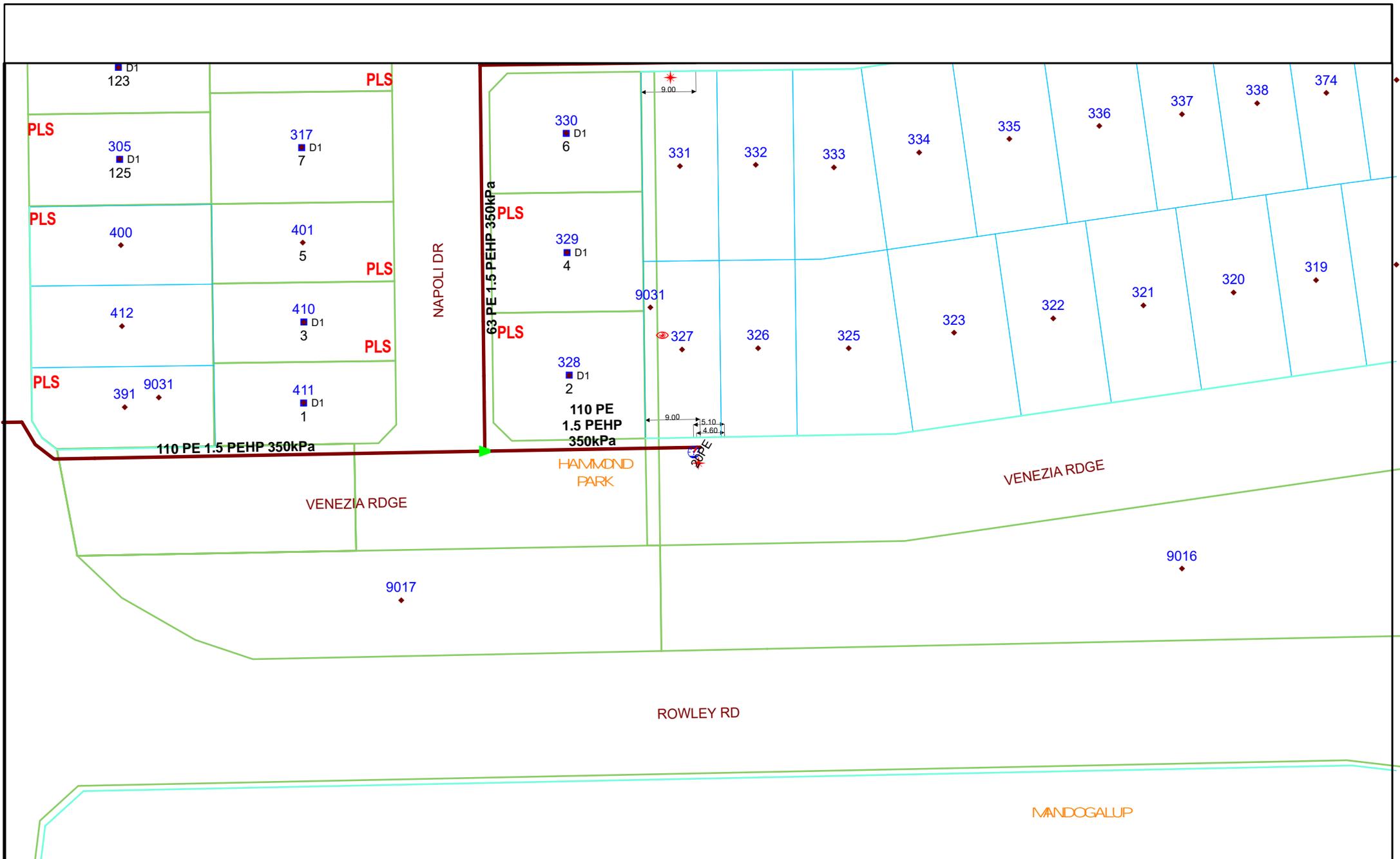
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Sequence No: 105952835

Map Tile: 8

Scale: 1:800

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Job No: 20970246

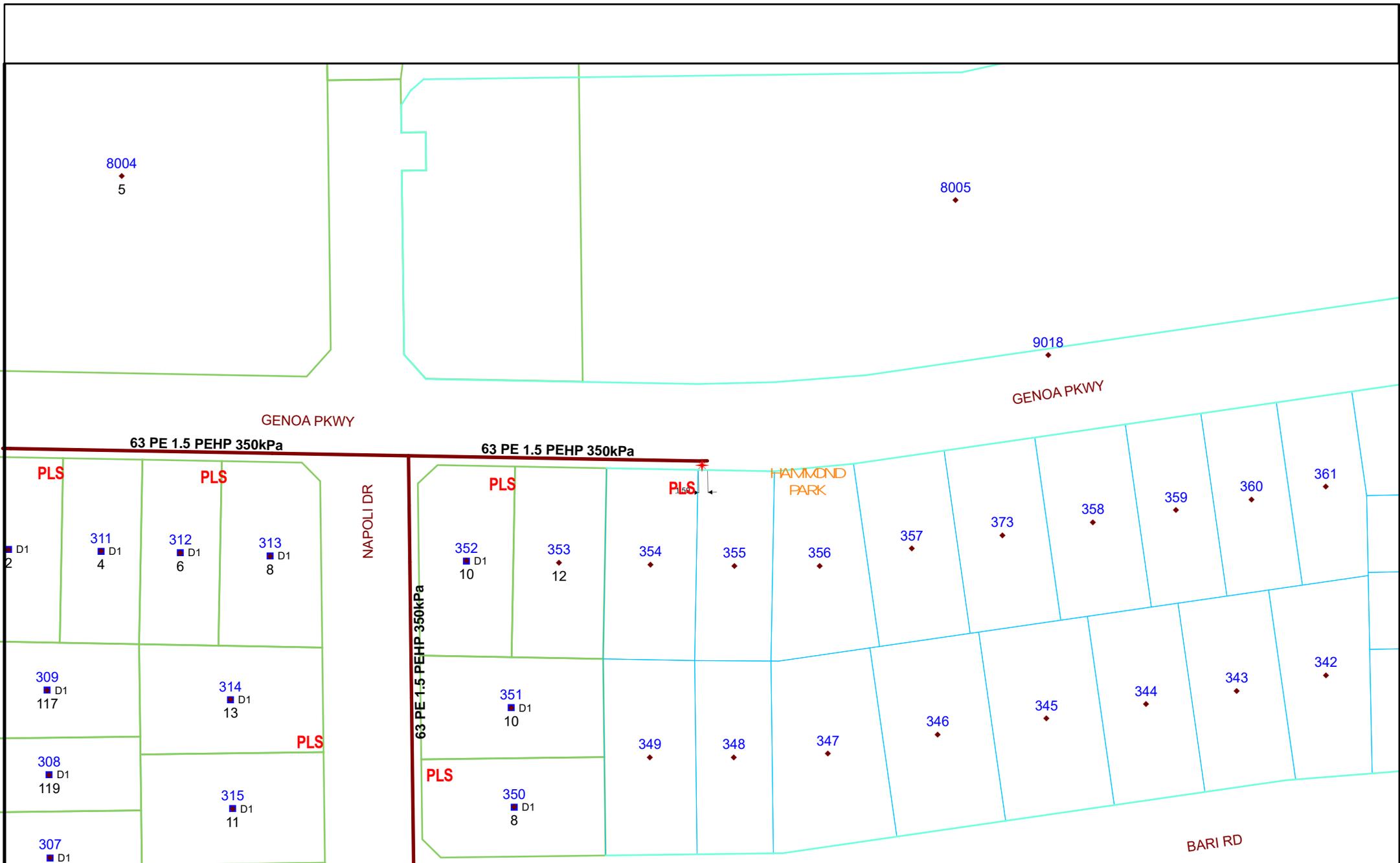
Date: 28/01/2021

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Sequence No: 105952835

Map Tile: 9

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Job No: 20970246

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Location: Barfield Road, Hammond Park 6164



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EXISTING GAS NETWORK

- High Pressure
- Polyethylene High Pressure
- City High Pressure
- Medium Pressure
- Albany Medium Pressure
- Medium Low Pressure
- Low Pressure
- Not Gassed
- Service
- High Pressure Service

ASSOCIATED INFRASTRUCTURE

- Associated Asset

PROPOSED GAS NETWORK

- Proposed Main

ABANDONED GAS NETWORK

- Abandoned Gas Main
- Abandoned Gas Main Sold
- Abandoned Valve
- Abandoned Fitting

DUCTS AND SLEEVES

- Duct
- Horizontal Boring
- Sleeve
- Road Crossing
- Concrete Slab

TOPOGRAPHY

- ATCO Easement
- Fence
- Building
- Kerb
- Water Boundary
- Contour Line
- Elevation Point

FEATURE LINES

- Miscellaneous Line
- Reference Line
- Gas Indicator Line
- Gas Pit
- Arrow Pointer with Text

VALVES

- High Pressure
- High Pressure Service
- Main
- Service
- Isolation

GATE STATIONS

- Gate Station
- Pressure Reducing Station
- L.P.G. Tank

REGULATOR SETS

- Distribution Regulator
- Boundary Regulator

TELEMETRY MONITORING DEVICE

- Non Billing Meter
- Pressure Monitoring Device

DELIVERY POINTS

- Service Point
- Meter
- Interval Meter
- Meter Set

FEATURE POINTS

- SC** Side Elevation
- Obstacle
- See Details
- NC** Not Connected
- SV** Gas Service
- Sign
- OLS** Offline Service
- Linked Reference Document
- PLS** Pre-Laid Service
- PLSS** Pre-Laid Service Stairs
- PLST** Pre-Laid Service Tee
- BL** Asset ends on Building / Property Line
- CoD** Asset ends on Direction Peg

PROTECTION DEVICES

- Test Point
- Potential Monitoring
- Odorant Test Point
- Earthing
- Bond Wire
- Bond Junction
- Rectifier
- Insulation Joint
- Anode
- Ground Bed
- Earth with Mitigation
- Foreign Structure Monitoring
- Insulation Joint with Mitigation

FITTINGS

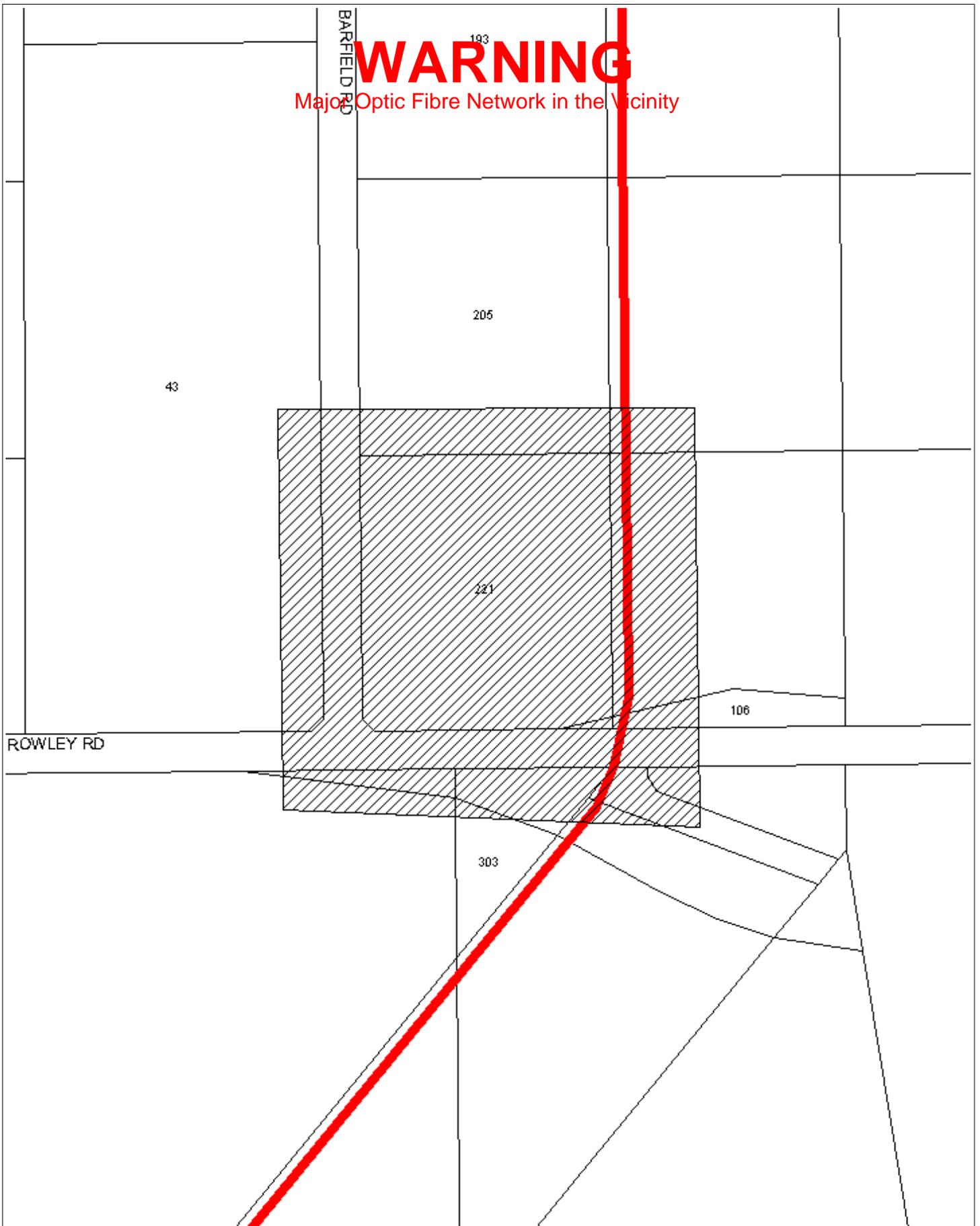
- Syphon
- Coupling
- Expansion Joint
- Main Cross
- Reducer
- Stopple
- Flange
- Change Node
- Thredolet
- Tapping Band
- Bend
- Elbow
- Monolithic Joint
- End Cap
- Tee
- Transition
- Three-Way Tee
- Short Stop
- Weldolet
- Socket
- Spherical Tee
- Tapping Tee
- Barrier
- Squeeze Off

FEATURE POLYGONS

- Hard Digging
- Licence Area
- Suburb
- Proving Gas Location
- Not Gassed
- Local Government Authority
- Pressure Upgrade

WARNING

Major Optic Fibre Network in the Vicinity



WARNING: This document is confidential and may also be privileged. Confidentiality nor privilege is not waived or destroyed by virtue of it being transmitted to an incorrect addressee. Unauthorised use of the contents is therefore strictly prohibited. Any information contained in this document that has been extracted from our records is believed to be accurate, but no responsibility is assumed for any error or omission. Optus Plans and information supplied are valid for 30 days from the date of issue. If this timeline has elapsed please raise a new enquiry.

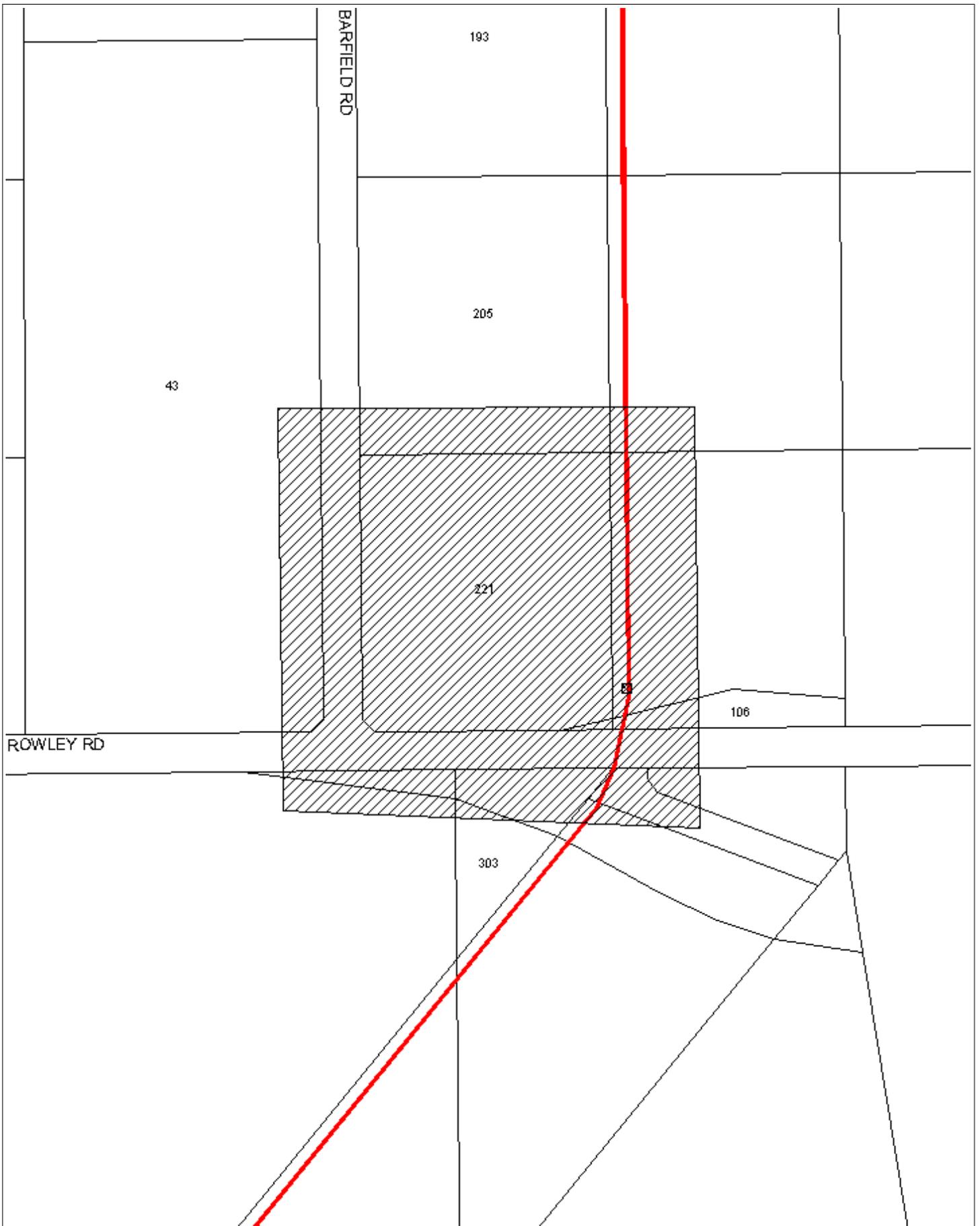
Sequence Number: 105952834

Date Generated: 28/01/2021



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: This document is confidential and may also be privileged. Confidentiality nor privilege is not waived or destroyed by virtue of it being transmitted to an incorrect addressee. Unauthorised use of the contents is therefore strictly prohibited. Any information contained in this document that has been extracted from our records is believed to be accurate, but no responsibility is assumed for any error or omission. Optus Plans and information supplied are valid for 30 days from the date of issue. If this timeline has elapsed please raise a new enquiry.

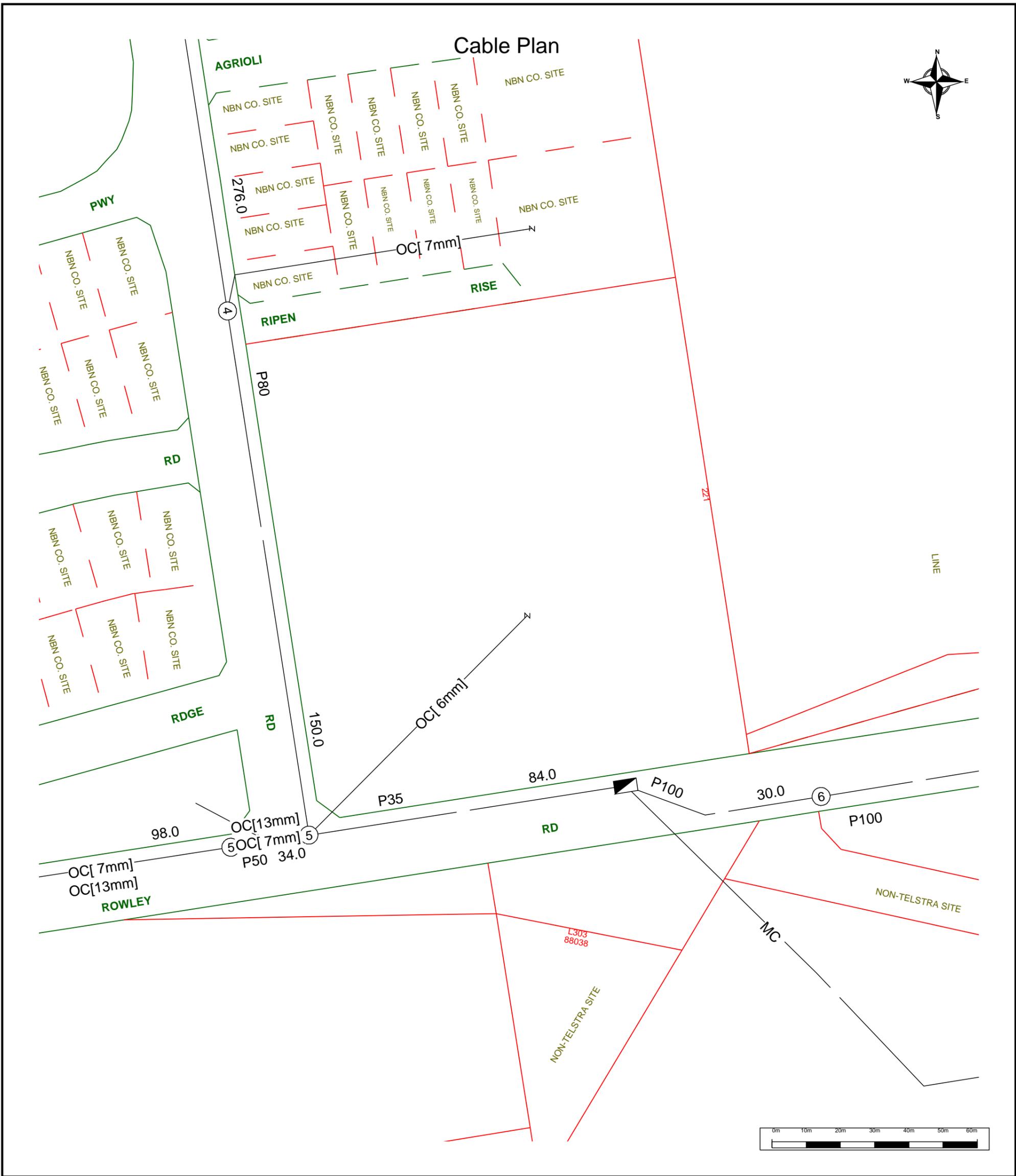
Sequence Number: 105952834

Date Generated: 28/01/2021



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





| | | |
|---|--|--|
|  | <p>For all Telstra DBYD plan enquiries - email - Telstra.Plans@team.telstra.com For urgent onsite contact only - ph 1800 653 935 (bus hrs)</p> | <p>Sequence Number: 105952833</p> |
| <p>TELSTRA CORPORATION LIMITED A.C.N. 051 775 556</p> | | <p>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.</p> |
| <p>Generated On 28/01/2021 12:10:19</p> | | |

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

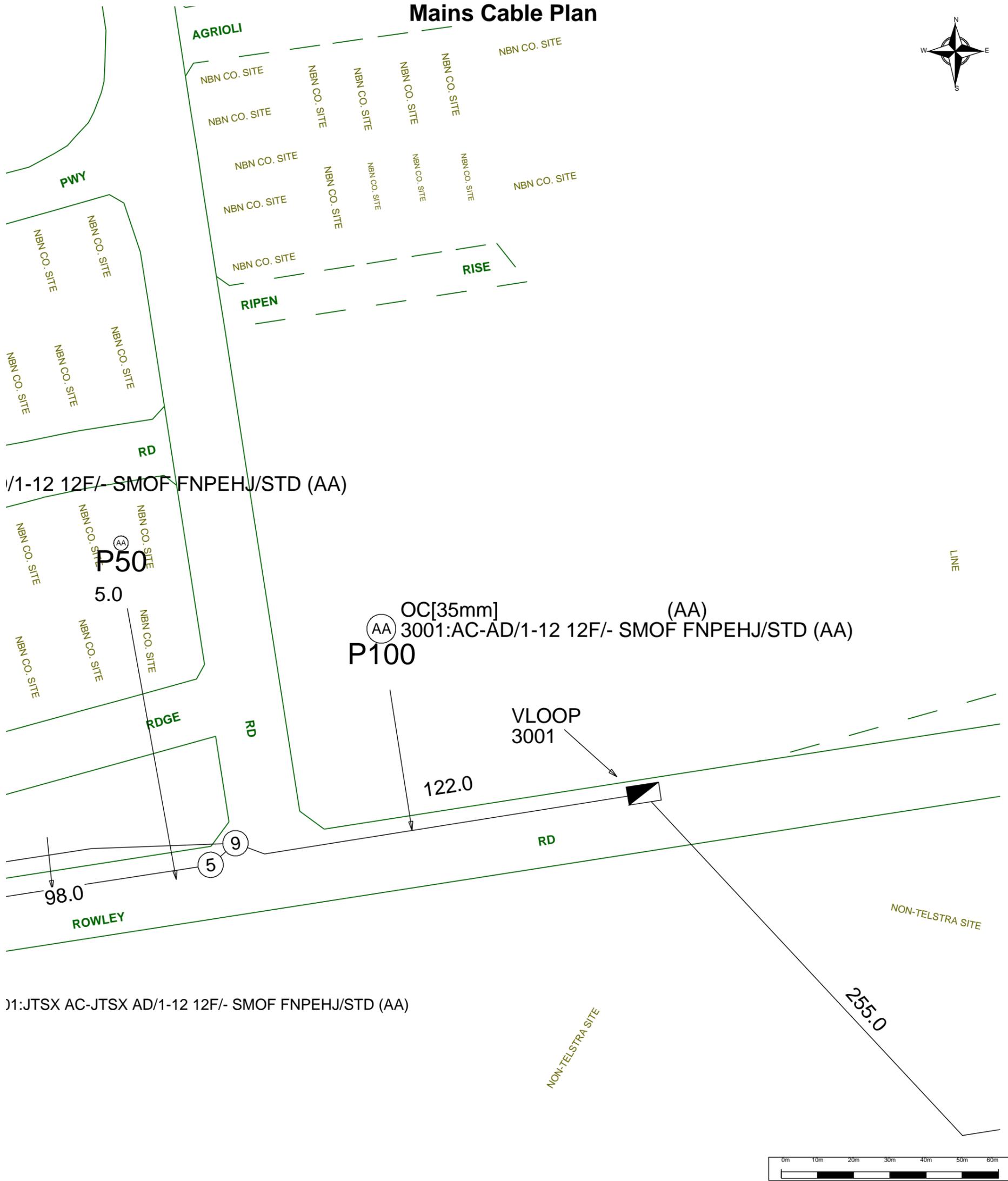
WARNING - Due to the nature of Telstra underground plant and the age of some cables and records, it is impossible to ascertain the precise location of all Telstra plant from Telstra's plans. The accuracy and/or completeness of the information supplied can not be guaranteed as property boundaries, depths 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)

Sequence Number: 105952833

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.

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

Generated On 28/01/2021 12:10:20

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.

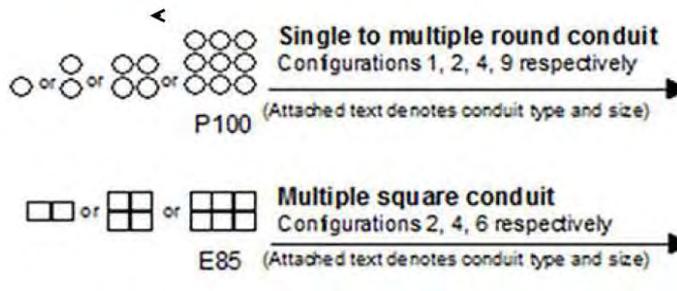
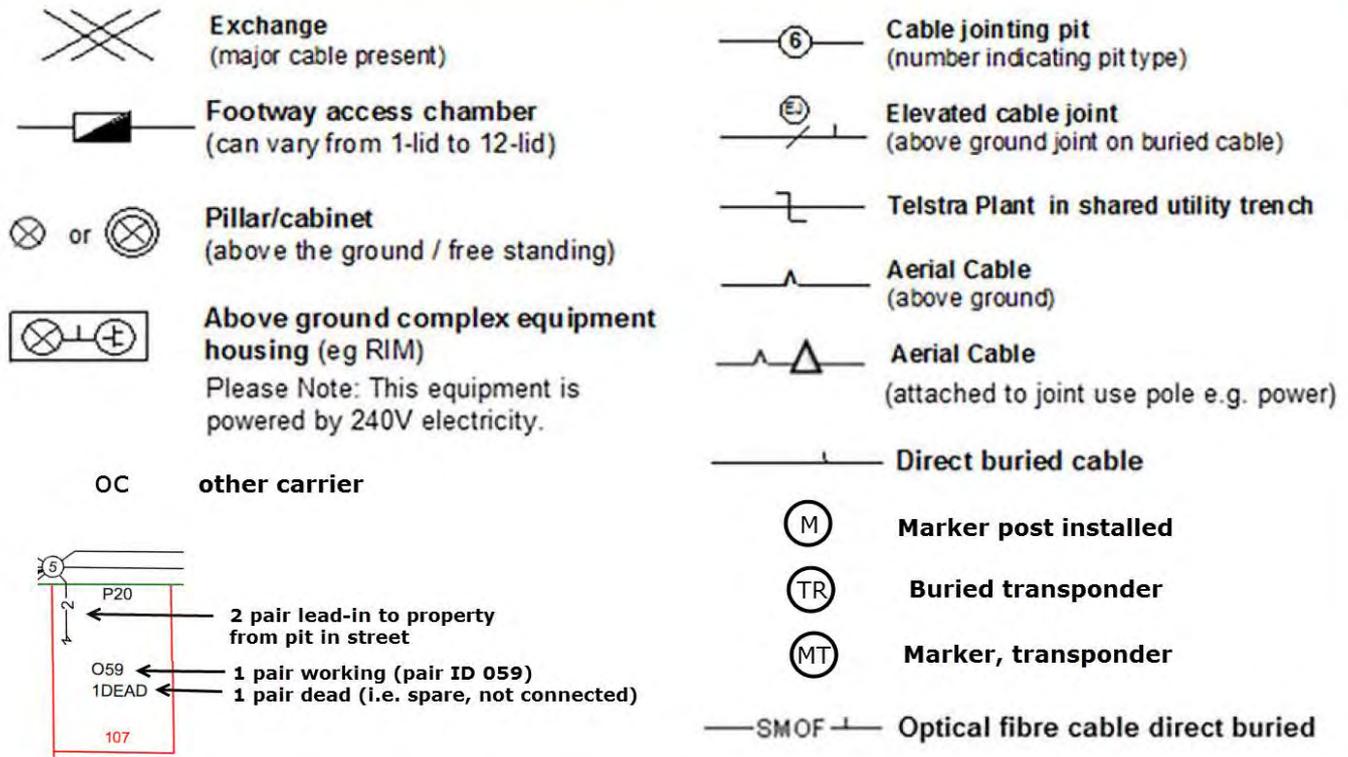
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Telstra plans and information supplied are valid for 60 days from the date of issue. If this timeframe has elapsed, please reapply for plans.



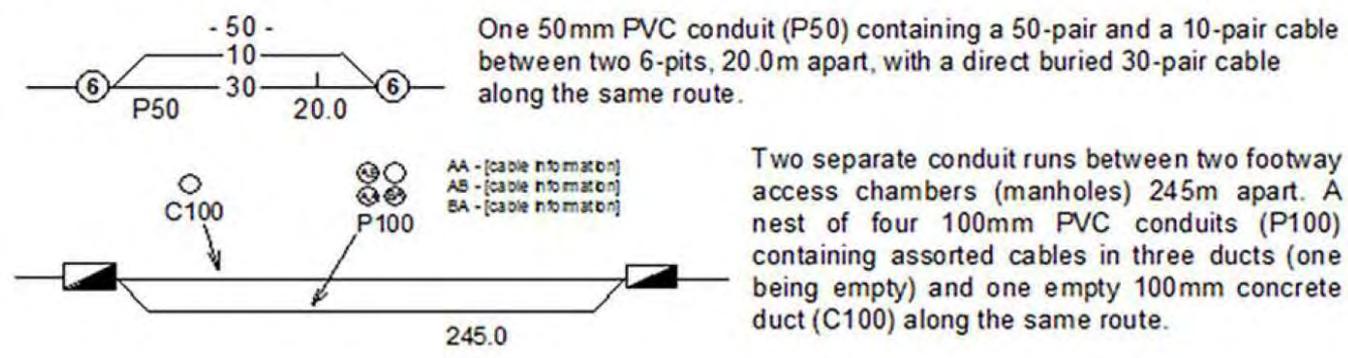
For more info contact a Telstra Accredited Locator or Telstra Plan Services 1800 653 935



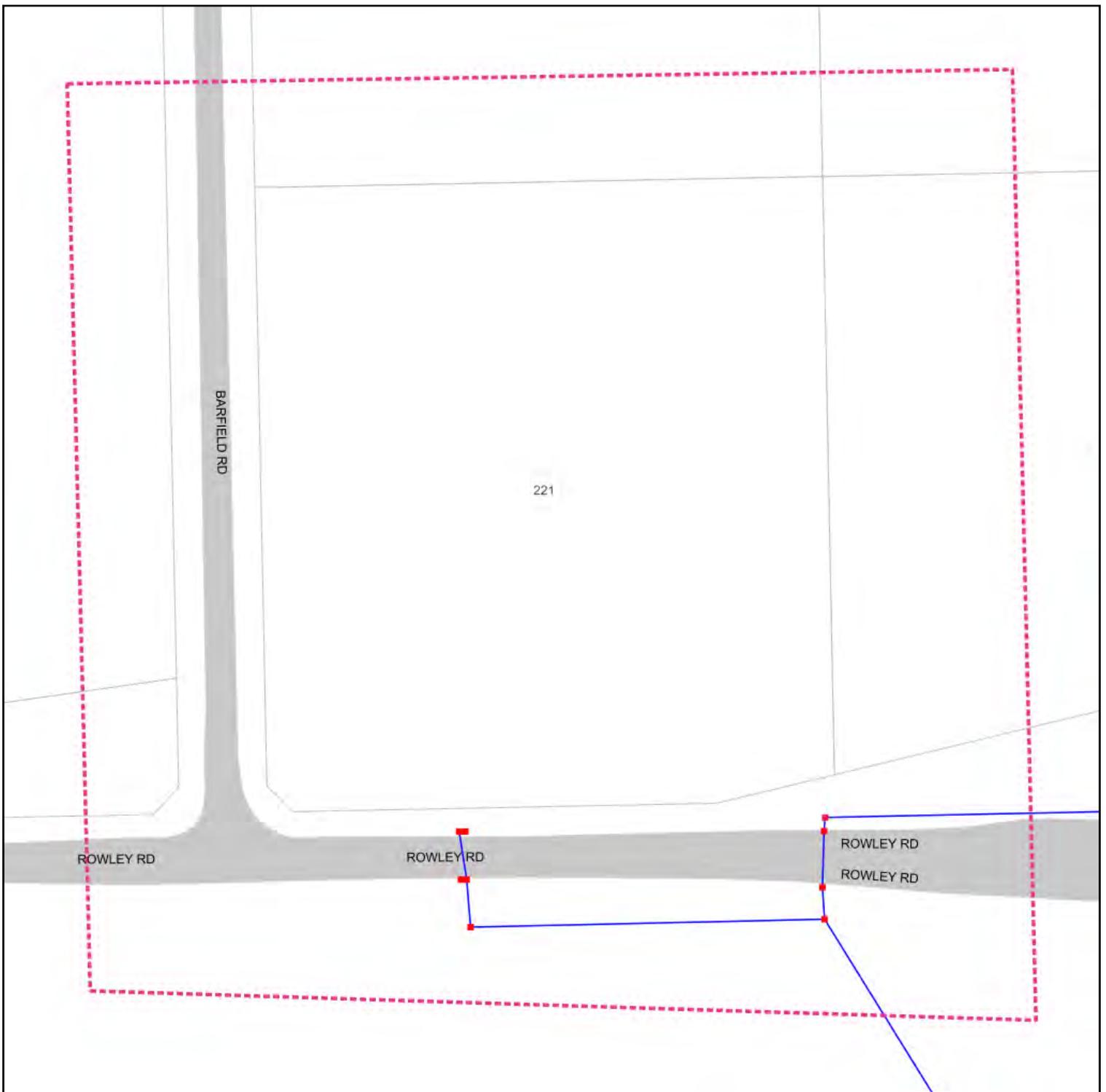
Some examples of conduit type and size:
A - Asbestos cement, P - PVC / plastic, C - Concrete, GI - Galvanised iron, E - Earthenware.
Conduit sizes *nominally* range from 20mm to 100mm.

| | |
|------|---------------------------------|
| P50 | 50mm PVC conduit |
| P100 | 100mm PVC conduit |
| A100 | 100mm asbestos cement conduit |
| E 85 | 85mm square earthenware conduit |

Some examples of how to read Telstra plans:



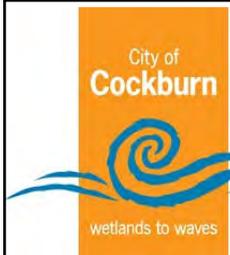
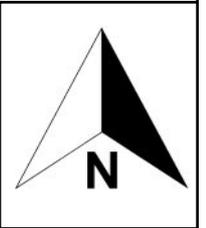
WARNING: Telstra plans and location information conform to Quality Level 'D' of the Australian Standard AS 5488 - Classification of Subsurface Utility Information. As such, Telstra supplied location information is indicative only. Spatial accuracy is not applicable to Quality Level D. Refer to AS 5488 for further details. Telstra does not warrant or hold out that its plans are accurate and accepts no responsibility for any inaccuracy shown on the plans. **FURTHER ON SITE INVESTIGATION IS REQUIRED TO VALIDATE THE EXACT LOCATION OF TELSTRA PLANT PRIOR TO COMMENCING CONSTRUCTION WORK.** A plant location service is an essential part of the process to validate the exact location of Telstra assets and to ensure the asset is protected during construction works. The exact position of Telstra assets can only be validated by physically exposing it. Telstra will seek compensation for damages caused to its property and losses caused to Telstra and its customers.



Job No.: 20970246
 Sequence No.: 105952832
 Requested by : Mr Andrew Grisinger
 Date issued : 28-01-2021
 Time issued : 09:11

City of Cockburn
 Dial before you Dig
 Location Plan
 Map 1 of 1

Map Centroid :
 East : 391971.076 mE
 North : 6439040.167 mN
 MGA Zone 50
 Scale : 1 : 1250



- | | |
|-------------------|--------------------|
| Stormwater pit | Referral outline |
| Fibre optic pit | Irrigation network |
| Irrigation Line | Road |
| Underground drain | Park / reserve |
| Fibre optic cable | Cadastral lot |
| Lake | |

While due care has been taken in the preparation of this map, the City of Cockburn does not take responsibility for any inaccuracies or discrepancies found. This plan should not be altered without the permission of the City of Cockburn and should only be used within the guidelines set in out in the accompanying letter. This plan is current for 30 days from the time of printing.



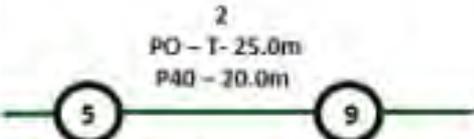
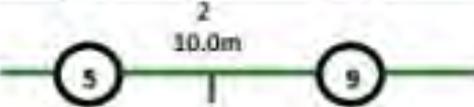
Indicative Plans

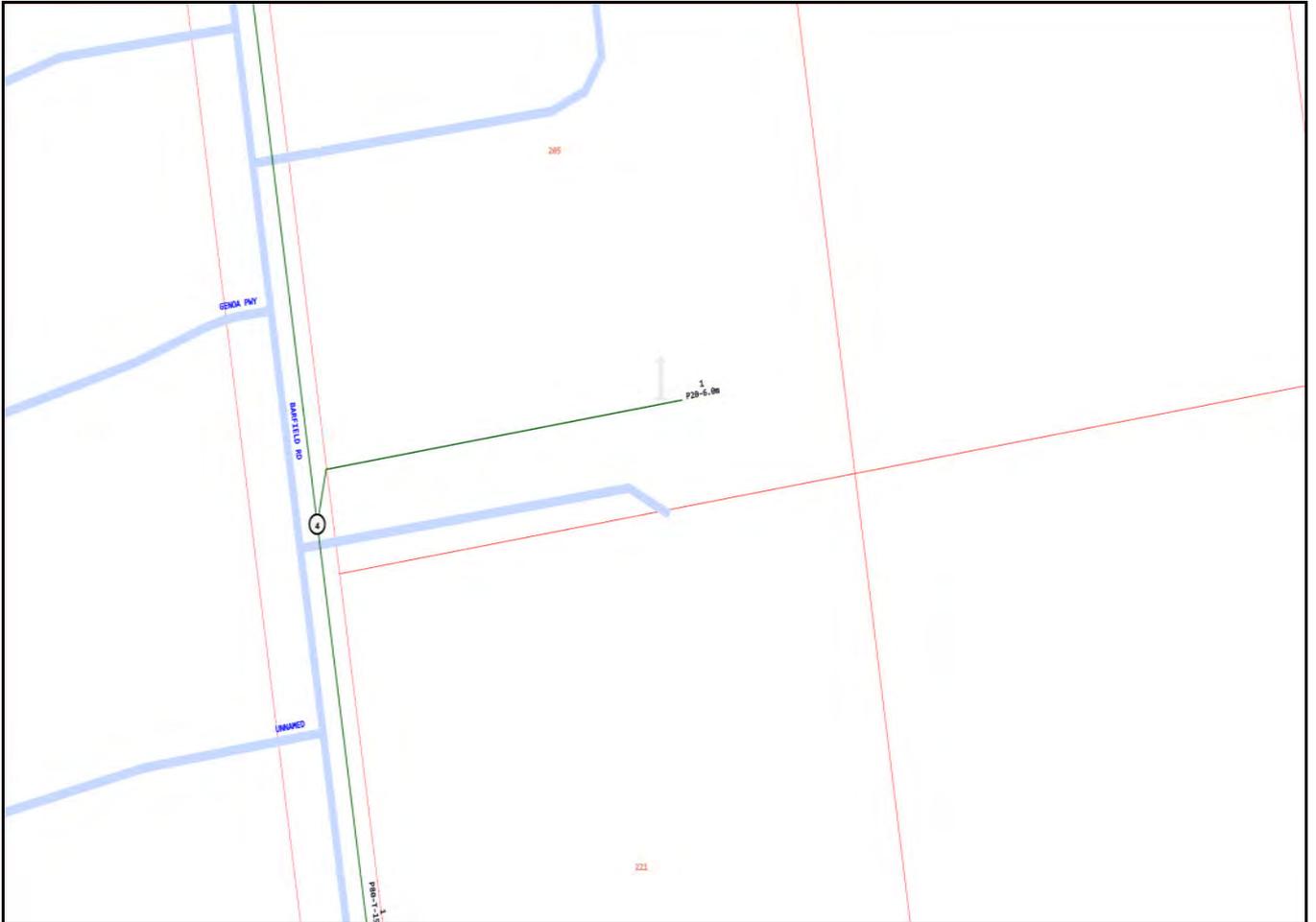
| | | |
|--------------------|--|---|
| Issue Date: | 28/01/2021 |  The logo features a red circle with a black border containing a white silhouette of a hand holding a shovel. To the right of the circle, the text 'DIAL BEFORE YOU DIG' is written in bold, black, uppercase letters, with 'DIAL' and 'YOU' in red. Below this text is the website address 'www.1100.com.au' in a smaller black font. |
| Location: | Barfield Road , Hammond Park , WA , 6164 | |

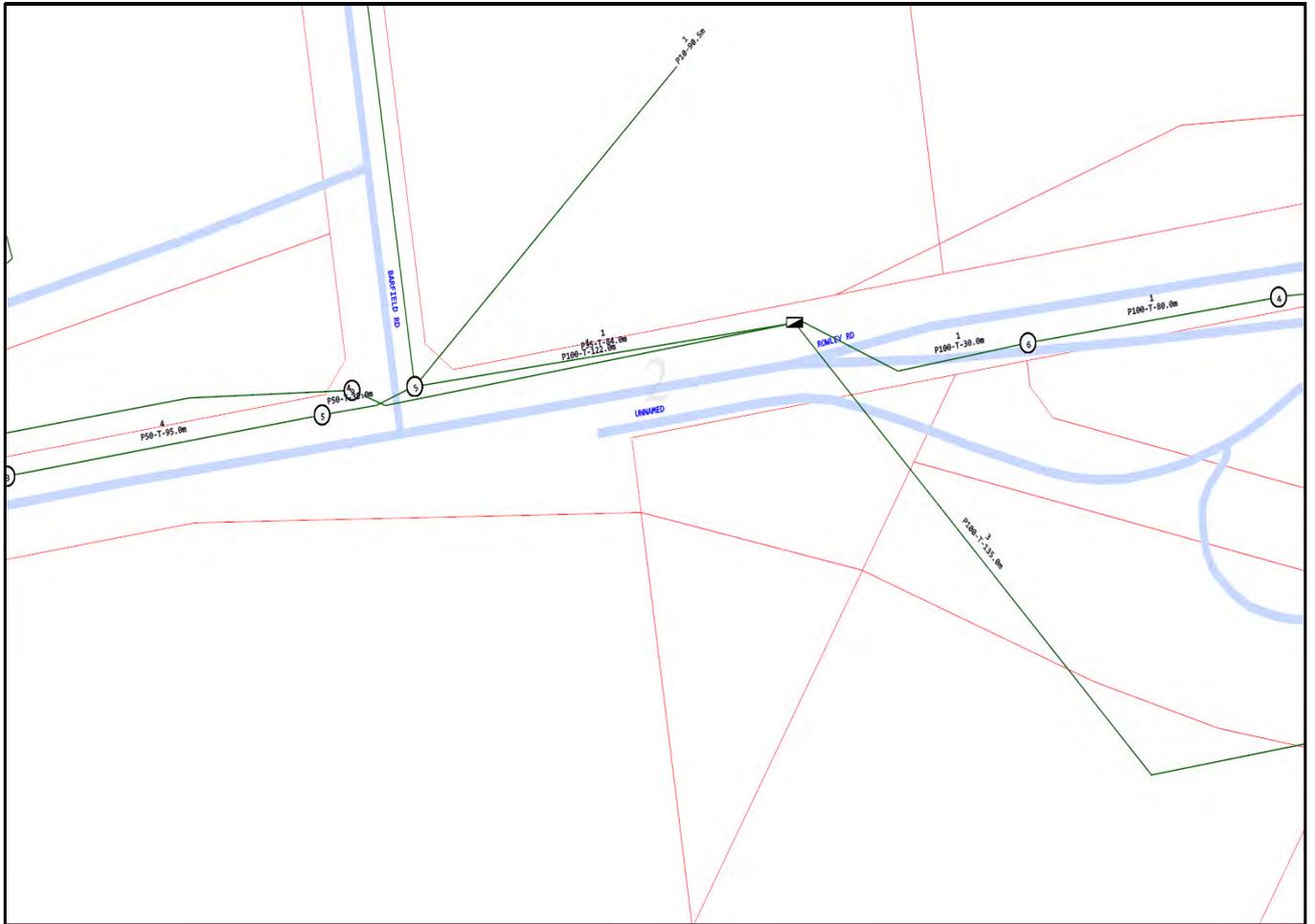




LEGEND

| | |
|---|---|
|  | Parcel and the location |
|  | Pit with size "5" |
|  | Power Pit with size "2E". Valid PIT Size: e.g. 2E, 5E, 6E, 8E, 9E, E, null. |
|  | Manhole |
|  | Pillar |
|  | Cable count of trench is 2. One "Other size" PVC conduit (PO) owned by Telstra (-T-), between pits of sizes, "5" and "9" are 25.0m apart. One 40mm PVC conduit (P40) owned by NBN, between pits of sizes, "5" and "9" are 20.0m apart. |
|  | 2 Direct buried cables between pits of sizes, "5" and "9" are 10.0m apart. |
|  | Trench containing any INSERVICE/CONSTRUCTED (Copper/RF/Fibre) cables. |
|  | Trench containing only DESIGNED/PLANNED (Copper/RF/Fibre/Power) cables. |
|  | Trench containing any INSERVICE/CONSTRUCTED (Power) cables. |
|  | Road and the street name "Broadway ST" |
| <p>Scale</p> | <p>0 20 40 60 Meters</p> <p>1:2000</p> <p>1 cm equals 20 m</p>  |





Emergency Contacts

You must immediately report any damage to **nbn™** network that you are/become aware of. Notification may be by telephone - 1800 626 329.

Appendix E – Proposed potable water and wastewater servicing concept plan

Your Ref: SF0008981
Our Ref: 63200832
Enquiries: Clay Ullrich
Telephone: 6330 6731
Email: Land.servicing@watercorporation.com.au

05 February 2021

Peritas Civil Group Pty Ltd
PO BOX 134
BURSWOOD WA 6100

Attention: Andrew Grisinger

FEASIBILITY REF: SF0008981
PROPOSED SITE LOCATION: 301, 221, BARFIELD ROAD, HAMMOND PARK

Thank you for your enquiry,

Servicing of the proposed location is reliant on both water and wastewater infrastructure currently being constructed by the Vivente Estate development.

Connection point for both will be off Barfield Rd, attached in a clip of the wastewater servicing concept plan for the development as an indication.

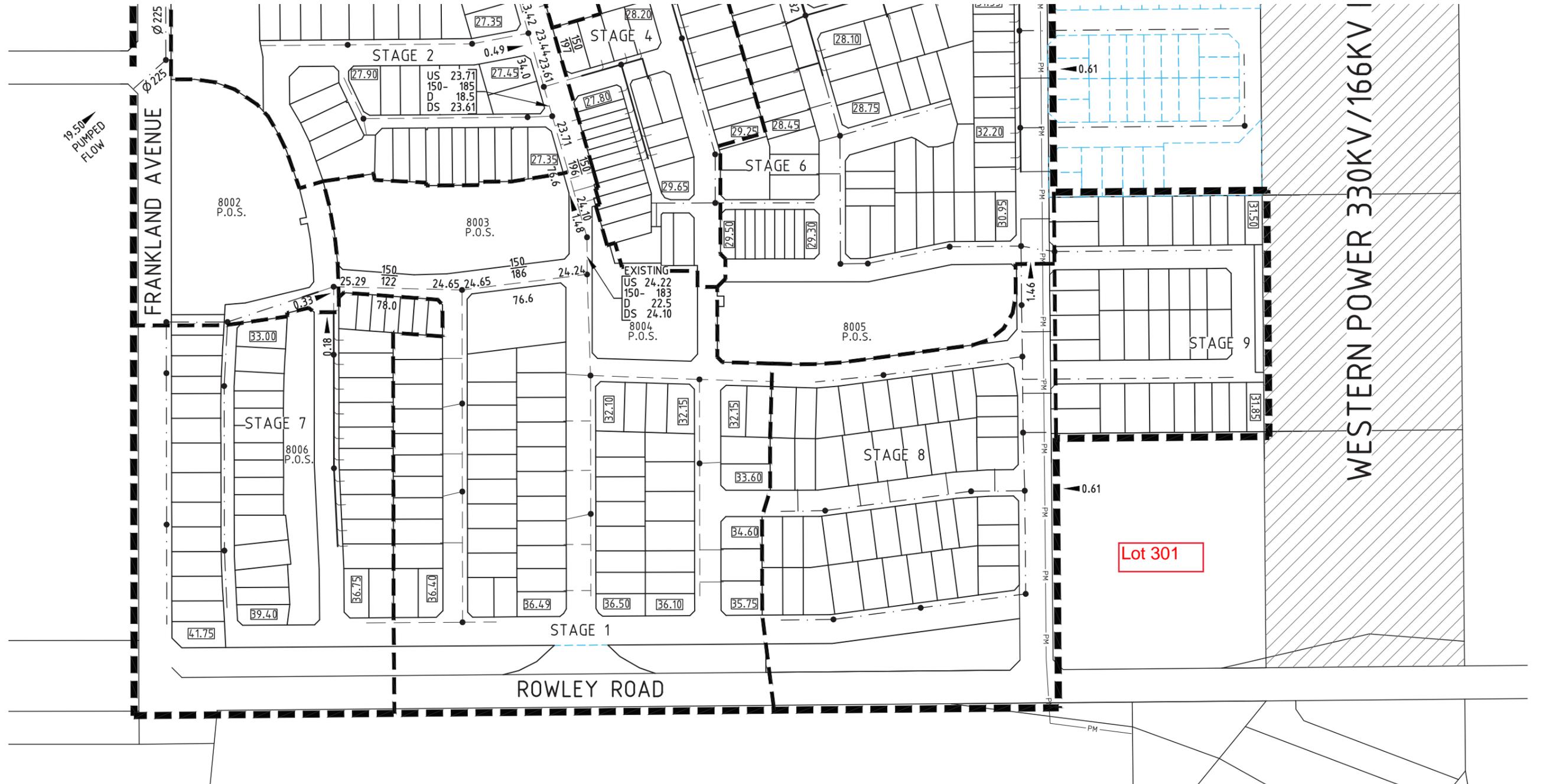
Timing for when the infrastructure will be available is not known by the Water Corporation at this stage, suggest contacting Project Managers / Consulting Eng – The Civil Group WA Pty Ltd.

Should you have any queries, please contact the enquiries officer Clay Ullrich on 6330 6731.



Clay Ullrich
Land Servicing Advisor
DEVELOPMENT SERVICES

BARFIEL
 19.50
 PUMPED
 FLOW



CONCEPT PLAN
 1:2000

- LEGEND**
- PROPOSED GRAVITY SEWERS WITH VACUUM ACCESS CHAMBERS.
 - EXISTING SEWERS. (WITH ACCESS CHAMBER)
 - FUTURE SEWERS. (WITH ACCESS CHAMBER)
 - PM— EXISTING PRESSURE MAIN

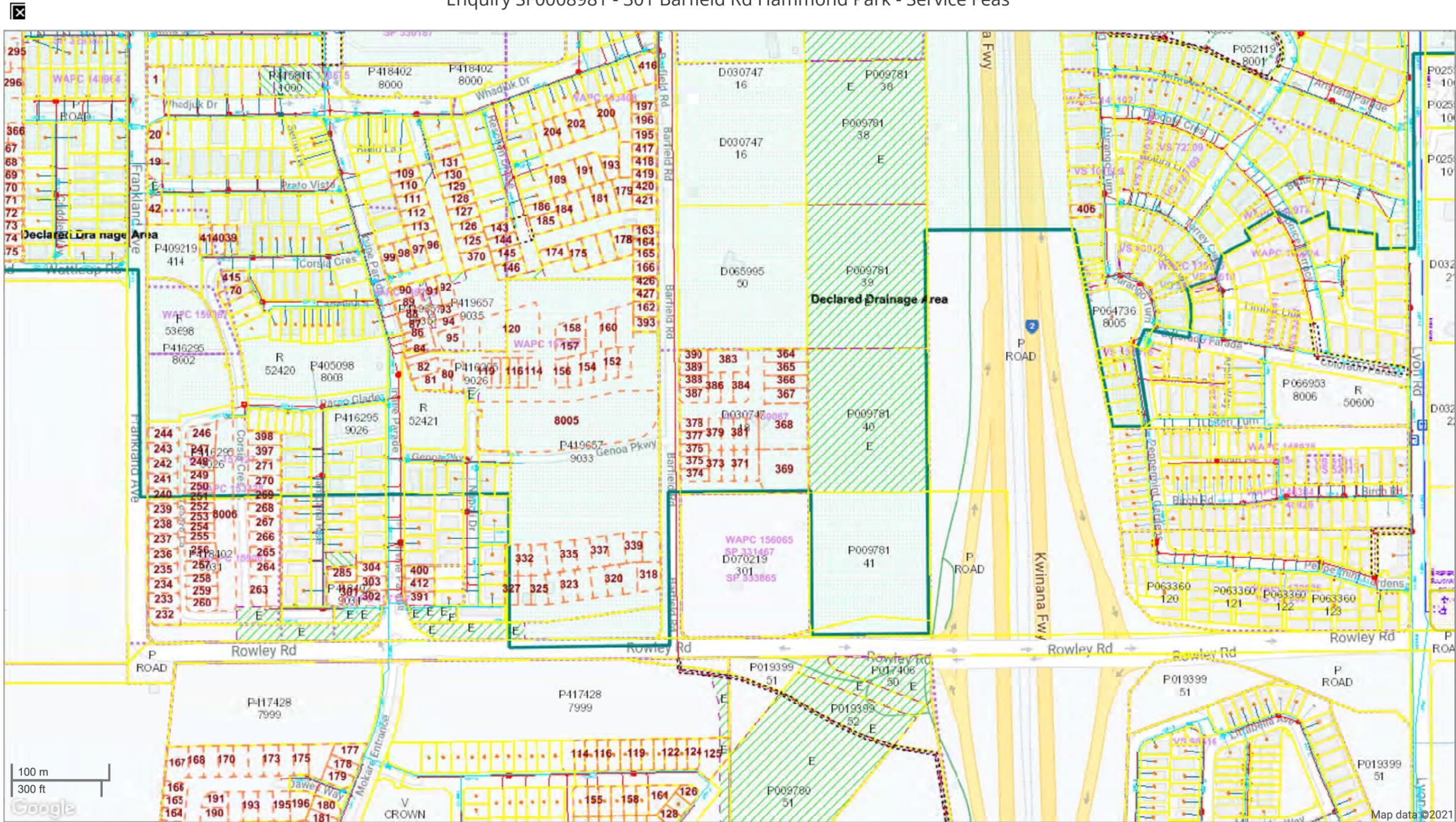


LOCAL AUTHORITY: CITY OF COCKBURN
 GROUND CONDITIONS CONSIDERED DRY

LOCAL AUTHORITY CITY OF COCKBURN
 THE PLAN IS ACCEPTED AS COMPLYING WITH THE OVERALL WATER CORPORATION PLANNING COMPLIANCE WITH WATER CORPORATION MANUALS STANDARDS HAVE NOT BEEN CHECKED AND REMAINS THE RESPONSIBILITY OF THE CONSULTING ENGINEER.

D
 E
 F
 G

Enquiry SF0008981 - 301 Barfield Rd Hammond Park - Service Feas



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The Water Corporation has taken due care in the preparation of the data comprised on this map but accepts no responsibility for any inaccuracy of facility, cadastral or other information provided nor inappropriate use of this information. The user is reminded that under no circumstances can the information herewith displayed be copied, altered, modified or otherwise published in any form including the Internet without express permission of the Water Corporation. The Water Corporation should be advised of any intention to carry out any physical activities within proximity to facilities displayed on this map. If any inaccuracies are found with this information please contact the Help Desk on (08) 9420 3090.

Appendix F – Stormwater Drainage Concept Plan & Calculations

Results of Storage Calculations shown below. Refer to Table 5.1.

Storage Soakage Calculator Catchment Area Description: Lot 301 Barfield Rd - Full Road Reserves Project Name: Lot 301 Barfield Road Date: 28/07/2023

Location: Jandakot Soil Type: Medium Sand Catchment Area: 5,123 m² Critical Time: at 3 hr

Storm Event: 100 year Soakage Rate: 0.0 m/s Run-off Coeff: 0.90 Soakage Area: 366.9 m²

Rate Override: 2E-05 m/s 15mm Vol = 30.6 Volume Required: 208.5 m³

Other Outlet: 0.000 m³/s Sub - Total Volume: 212.2 m³

Difference: -3.8 m³

Less Pavement Ponding: 0.0 m³ 225 Pipe Diam (mm)

Less Pipe Storage: 0.0 m³ 0 Pipe Length (m)

Total Volume Provided: 212.2 m³

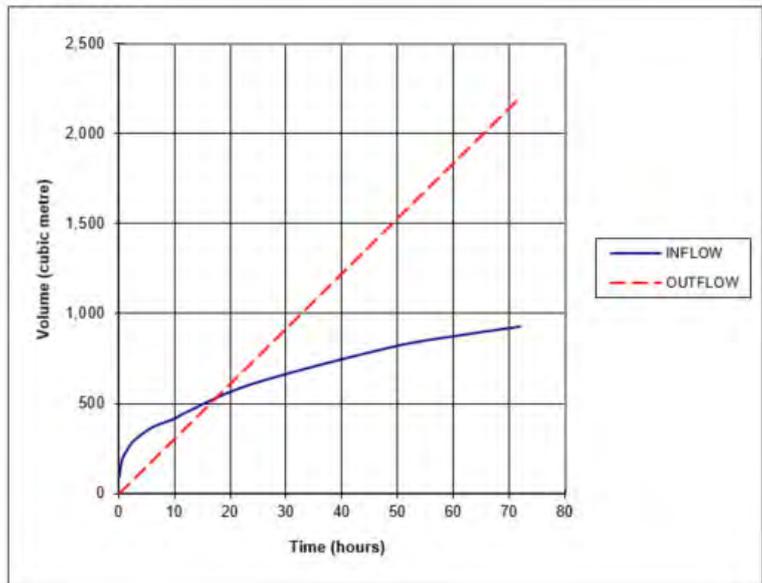
| SOAKWELL | SIZE 1 | SIZE 2 | SIZE 3 | BASIN 1 | BASIN 2 | Graf EcoBloc Flex | STORMTECH SC-310 |
|-------------------|--------------------|--------------------|---------------------|--------------------------------------|--------------------------------------|-------------------|------------------|
| Diameter | 1.8 m | 1.20 m | 1.1 m | Base Area 0 m ² | Base Area 0 m ² | Units High 2 | Rows 0 |
| Depth | 1.8 m | 0.9 m | 1.8 m | Side Slope (1 in _) 6.0 | Side Slope (1 in _) 3.0 | Units Wide 12 | Units per Row 0 |
| Number | 0 | 0 | 1 | Storage Depth 0.000 m | Storage Depth 0.000 m | Units Long 39 | Stone Cover 0.15 |
| Stone Wrap | 0.15 m | 0.15 m | 0.15 m | Infiltration Area 0.0 m ² | Infiltration Area 0.0 m ² | 355.2 m | Stone Voids 0.40 |
| Stone Voids | 0.40 | 0.40 | 0.00 | Storage Volume 0.0 m ³ | Storage Volume 0.0 m ³ | 210.6 m | ration Area 0.0 |
| Infiltration Area | 0.0 m ² | 0.0 m ² | 11.7 m ² | | | | ge Volume 0.0 |
| Storage Volume | 0.0 m ³ | 0.0 m ³ | 1.6 m ³ | | | | |

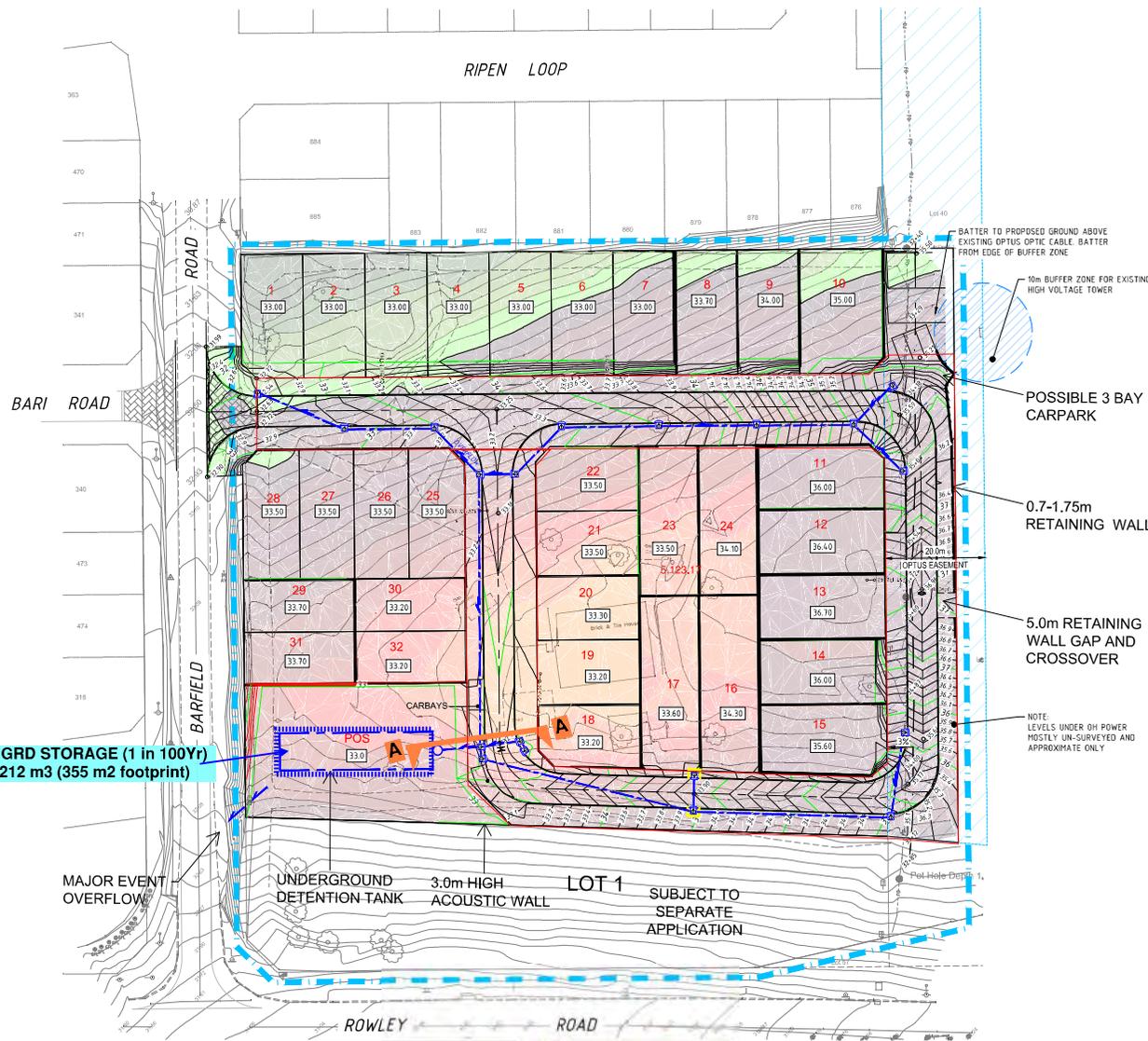
Calculations

| | SIZE 1 | SIZE 2 | SIZE 3 | | | | | |
|---------------------|--------|--------|--------|--|----------------|--------|----------------|------|
| Diameter with stone | 2.25 | 1.65 | 1.5 | | Storage Length | 31.20 | Storage Length | 1.01 |
| Depth with stone | 2.1 | 1.2 | 2.1 | | Storage Width | 9.60 | Storage Width | 0.45 |
| Volume of stone | 2.5 | 1.1 | 1.5 | | Storage Height | 0.78 | Storage Height | 0.71 |
| Area with stone | 18.8 | 8.4 | 11.7 | | Stone Volume | 597.17 | Stone Volume | 0.32 |

CATCHMENT AREA: Lot 301 Barfield Rd - Full Road Reserves

| TIME | INFLOW m ³ | OUTFLOW | | STORAGE m ³ |
|----------|--------------------------|---------------------------------------|------------------------------------|---------------------------|
| | | Ground Infiltration m ³ | Allowable Outlet m ³ | |
| 6 min. | 91 | 3 | 0 | 88 |
| 9 min. | 112 | 5 | 0 | 107 |
| 12 min. | 127 | 6 | 0 | 121 |
| 15 min. | 139 | 8 | 0 | 132 |
| 20 min. | 155 | 10 | 0 | 145 |
| 30 min. | 178 | 15 | 0 | 162 |
| 45 min. | 200 | 23 | 0 | 177 |
| 1 hour | 215 | 31 | 0 | 185 |
| 2 hours | 267 | 61 | 0 | 206 |
| 3 hours | 300 | 92 | 0 | 209 |
| 6 hours | 367 | 183 | 0 | 183 |
| 10 hours | 414 | 306 | 0 | 109 |
| 12 hours | 449 | 367 | 0 | 82 |
| 24 hours | 609 | 734 | 0 | -125 |
| 48 hours | 806 | 1,468 | 0 | -661 |
| 60 hours | 873 | 1,834 | 0 | -961 |
| 72 hours | 927 | 2,201 | 0 | -1,274 |





SITE PLAN SCALE 1500

STORMWATER CONCEPT PLAN

| DESCRIPTION | SYMBOL |
|---|--------|
| LIMIT OF WORKS BOUNDARY | |
| FINISHED SURFACE CONTOUR (0.25m INTERVAL) | |
| EXISTING SURFACE CONTOUR (0.25m INTERVAL) | |
| FINISHED LOT PAD LEVEL | |
| EXISTING LOT PAD LEVEL | |
| FINISHED LOT SPOT LEVEL (ABOVE EXISTING OPTUS FIBRES) | |
| EXISTING SPOT LEVEL | |
| PROPOSED RETAINING WALL | |
| BUILDING SETBACK LINE | |
| TOP OF EXISTING OPTUS CABLE | |

| Number | Color | Minimum Elevation (m) | Maximum Elevation (m) | 2D Area (m ²) | Volume (m ³) |
|--------|-------|-----------------------|-----------------------|---------------------------|--------------------------|
| 1 | | -0.000 | -0.000 | 723 | 1.3 |
| 2 | | -0.100 | -0.000 | 1026.6 | 102.2 |
| 3 | | -0.200 | -0.000 | 1062.2 | 204.2 |
| 4 | | -0.300 | -0.000 | 1046.3 | 310.3 |
| 5 | | -0.400 | -0.000 | 1023.3 | 416.3 |
| 6 | | -0.500 | -0.000 | 1002.2 | 518.2 |
| 7 | | -0.600 | -0.000 | 982.2 | 616.2 |
| 8 | | -0.700 | -0.000 | 963.2 | 710.2 |
| 9 | | -0.800 | -0.000 | 945.2 | 800.2 |
| 10 | | -0.900 | -0.000 | 928.2 | 886.2 |
| 11 | | -1.000 | -0.000 | 912.2 | 968.2 |
| 12 | | -1.100 | -0.000 | 897.2 | 1046.2 |
| 13 | | -1.200 | -0.000 | 883.2 | 1120.2 |
| 14 | | -1.300 | -0.000 | 870.2 | 1190.2 |
| 15 | | -1.400 | -0.000 | 858.2 | 1256.2 |
| 16 | | -1.500 | -0.000 | 847.2 | 1318.2 |
| 17 | | -1.600 | -0.000 | 837.2 | 1376.2 |
| 18 | | -1.700 | -0.000 | 828.2 | 1430.2 |
| 19 | | -1.800 | -0.000 | 820.2 | 1480.2 |
| 20 | | -1.900 | -0.000 | 813.2 | 1526.2 |
| 21 | | -2.000 | -0.000 | 807.2 | 1568.2 |
| 22 | | -2.100 | -0.000 | 802.2 | 1606.2 |
| 23 | | -2.200 | -0.000 | 798.2 | 1640.2 |
| 24 | | -2.300 | -0.000 | 795.2 | 1670.2 |
| 25 | | -2.400 | -0.000 | 793.2 | 1696.2 |
| 26 | | -2.500 | -0.000 | 792.2 | 1718.2 |
| 27 | | -2.600 | -0.000 | 792.2 | 1736.2 |
| 28 | | -2.700 | -0.000 | 793.2 | 1750.2 |
| 29 | | -2.800 | -0.000 | 795.2 | 1760.2 |
| 30 | | -2.900 | -0.000 | 798.2 | 1766.2 |
| 31 | | -3.000 | -0.000 | 803.2 | 1768.2 |
| 32 | | -3.100 | -0.000 | 810.2 | 1766.2 |

| Name | Type | Color | Area (m ²) | Volume (m ³) | Fill | Net |
|-----------|-----------|-------|------------------------|--------------------------|---------|------|
| Retention | Retention | Blue | 1000.00 | 1000.00 | 1000.00 | 0.00 |
| Storage | Storage | Green | 355.00 | 212.00 | 212.00 | 0.00 |
| Acoustic | Acoustic | Red | 1000.00 | 1000.00 | 1000.00 | 0.00 |
| Other | Other | Grey | 1000.00 | 1000.00 | 1000.00 | 0.00 |



ISSUED FOR REVIEW

| REVISION | DESCRIPTION | ISSUED | DATE |
|----------|---------------------------|--------|----------|
| A | ISSUED FOR INFORMATION | RFH | 21/07/23 |
| B | RE-ISSUED FOR INFORMATION | RFH | 26/07/23 |



PERITAS
 PERTH: 45 635 9291
 A: 74 GOODWOOD RD, BARKERDRAKE WA 6150
 E: ENQUIRY@PERITASGROUP.COM.AU
 MELBOURNE: 03 957 6292
 A: 1 QUEENS ROAD, MELBOURNE, VIC 3004
 E: ENQUIRY@PERITASGROUP.COM.AU

CLIENT: H & H DEVELOPMENTS (WA) PTY. LTD.

| DESIGNED | CHECKED |
|---|---------------|
| RFH | EBF |
| SURVEY DATUM: WAGB 86 | SCALE: |
| PCG94 | AS SHOWN @ A1 |
| DATE OF NOT FOR CONSTRUCTION UNLESS SHOWN BELOW | DATE CREATED |
| | 21/07/23 |

PROJECT: PROPOSED GREEN TITLE SUBDIVISION
 LOT 301 BARFIELD ROAD
 HAMMOND PARK

TITLE: DESIGN OPTION 3
 PRELIMINARY EARTHWORK PLAN

| PROJECT NUMBER | REV |
|----------------|---------|
| PC15026 | CI-SK05 |
| | B |

Appendix G – Telecommunications Liaison

Extensive communication with the available telecommunication services providers (NBNCO & Optus) have been underway for **over 12 months**. The relevant email chain is provided below resulting in the following commitments:

Provision of Telecommunications to the development.

Lowering of the Optus Cable located in the Western Power easement to the east of the property so that earthworks can be undertaken to minimise lot levels and better interface with adjacent landholdings. This infrastructure is also available to the development from the Rowley Road end.

TELECOMMUNICATIONS ORIGINAL DESIGN APPLICATIONS TO SERVICE PROVIDERS

RE: UPD 9311 - LOT 301 BARFIELD ROAD - Status



Bill Carmody <bill@upd.com.au>

To:  Darren Blowes

Cc:  Enzo Biagioni-Froudist;  9311;  Eugene Choh



7/09/2021

Darren,

The quote from **Optus** is expected this week.

I've been in touch and the advice is "early this week".

I will forward as soon as received.

Power

The DIP has been received.

To proceed with power design please provide the base plans and precal.

Comms

NBN Development Application has been submitted

As per above for design.

Regards

Bill

Bill Carmody

Level 2, Suite 4, 47 Havelock Street,

WEST PERTH WA 6005

Ph: +61 (0)8 9212 8777, Fax: (08) 9212 8799, Mob: +61 (0) 402 110 209

Email: bill@upd.com.au

Website: www.upd.com.au



Hi Emil

or the record so everyone is on the same page.
Job is locked in for 20-28 Jan.
Please confirm latest date the invoice can be paid?
And is there anything else you need from us?
Regards



Darren Blowes

DIRECTOR ACQUISITIONS + DEVELOPMENT

DARREN@BLOKK.COM.AU
0412 945 251

PO BOX 137 MT LAWLEY WA 6929
BLOKK.COM.AU

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From: Emil Viskovich <Emil.Viskovich@optus.com.au>
Sent: Friday, 19 November 2021 12:16 PM
To: Darren Blowes <darren@blokk.com.au>
Cc: enzo@peritasgroup.com.au
Subject: Re: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

Ok

From: Darren Blowes <darren@blokk.com.au>
Sent: Friday, November 19, 2021 10:53:11 AM
To: Emil Viskovich <Emil.Viskovich@optus.com.au>
Cc: enzo@peritasgroup.com.au <enzo@peritasgroup.com.au>
Subject: RE: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

[External email] Please be cautious when clicking on any links or attachments.

That date I believe can work, let's try and lock it in at your end and I'll then look to sort payment and any other paperwork required by the due date.

Thanks



Darren Blowes

DIRECTOR ACQUISITIONS + DEVELOPMENT

DARREN@BLOKK.COM.AU
0412 945 251

PO BOX 137 MT LAWLEY WA 6929
BLOKK.COM.AU

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From: Emil Viskovich <Emil.Viskovich@optus.com.au>
Sent: Friday, 19 November 2021 10:02 AM
To: Darren Blowes <darren@blokk.com.au>
Cc: enzo@peritasgroup.com.au
Subject: Re: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

Hi,

Sorry I have been working nights.

My preferred subcon can start after the 20th and be done by 28th.

One of my other guys was looking at their Jan schedule but have not yet got back to me.

I was waiting to hear from them by yesterday but didn't.

I will chase them again.

Rgds

Emil

From: Darren Blowes <darren@blokk.com.au>
Sent: Friday, November 19, 2021 7:52:05 AM
To: Emil Viskovich <Emil.Viskovich@optus.com.au>
Cc: enzo@peritasgroup.com.au <enzo@peritasgroup.com.au>
Subject: FW: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

Hi Emil

Just following up the email below I sent on Wednesday to try and lock in the works?

Regards



Darren Blowes

DIRECTOR ACQUISITIONS + DEVELOPMENT

DARREN@BLOKK.COM.AU
[0412 945 251](tel:0412945251)

PO BOX 137 MT LAWLEY WA 6929
BLOKK.COM.AU

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From: Darren Blowes
Sent: Wednesday, 17 November 2021 12:24 PM
To: Emil Viskovich <Emil.Viskovich@optus.com.au>; Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>
Cc: Bill Carmody <bill@upd.com.au>
Subject: RE: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

Hi Emil

Just to clarify, are you saying I can have the contractor you planned to use on 20 Jan or are you saying there is an embargo on then?

If there is can we use someone else on say Jan 10?

The difficulty with February is the neighbouring developer will be putting packed roadbase over the area we need to dig for bushfire management reasons.

Regards



Darren Blowes

DIRECTOR ACQUISITIONS + DEVELOPMENT

DARREN@BLOKK.COM.AU
[0412 945 251](tel:0412945251)

PO BOX 137 MT LAWLEY WA 6929
BLOKK.COM.AU

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From: Emil Viskovich <Emil.Viskovich@optus.com.au>
Sent: Wednesday, 17 November 2021 11:26 AM
To: Darren Blowes <darren@blokk.com.au>; Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>
Cc: Bill Carmody <bill@upd.com.au>
Subject: RE: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

Darren,

I am trying to plan works in January and fit your request in.

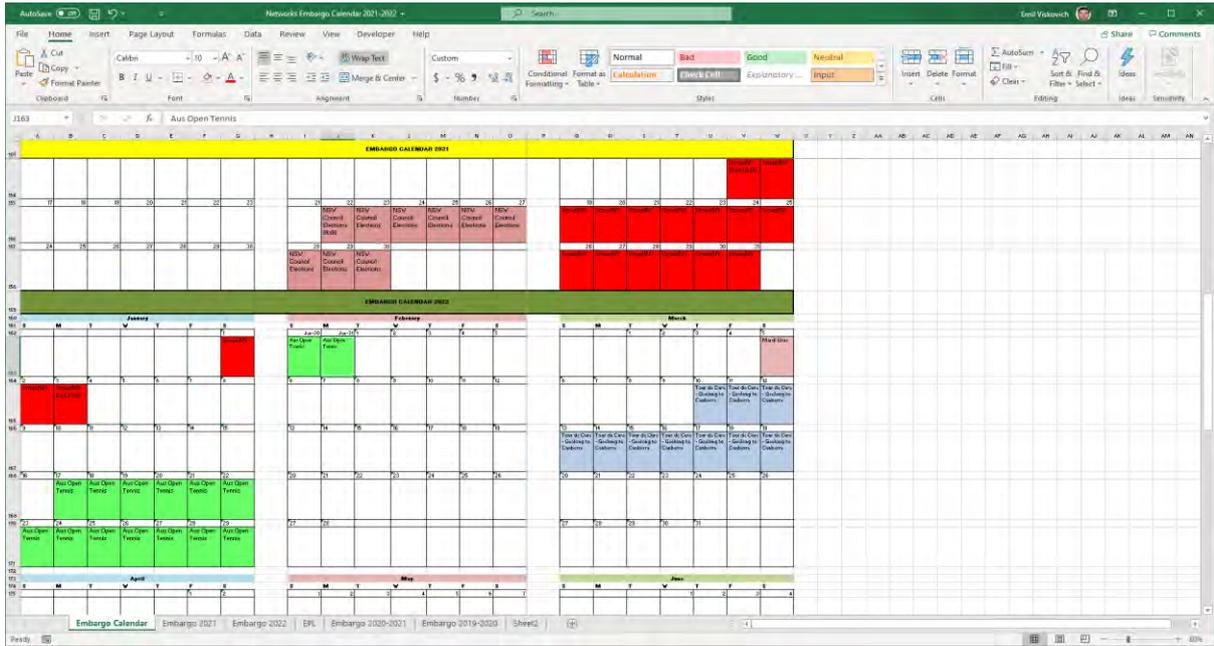
The subcon I wanted to use is unavailable before the 20th Jan.

I have other Subcons we can use, however it is possible that between the dates of 17th Jan to 31st Jan I may be prevented on performing works on this cable due to the embargo imposed by Optus during events such as this.

What dates are you needing us to perform these works?

What are the implications if we have to do the works in February?

Unfortunately we cannot get these works done before Christmas as most of our guys are now booked.



Regards
Emil

From: Darren Blowes <darren@blokk.com.au>
Sent: Tuesday, 16 November 2021 9:09 AM
To: Emil Viskovich <Emil.Viskovich@optus.com.au>; Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>
Cc: Bill Carmody <bill@upd.com.au>
Subject: RE: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

[External email] Please be cautious when clicking on any links or attachments.
 No problems, just following up to stay on top of things and keep the contractor locked in to complete the works.



Darren Blowes

DIRECTOR ACQUISITIONS + DEVELOPMENT

DARREN@BLOKK.COM.AU
 0412 945 251

PO BOX 137 MT LAWLEY WA 6929
BLOKK.COM.AU

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From: Emil Viskovich <Emil.Viskovich@optus.com.au>
Sent: Tuesday, 16 November 2021 9:05 AM
To: Darren Blowes <darren@blokk.com.au>; Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>
Cc: Bill Carmody <bill@upd.com.au>
Subject: RE: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

Hi Darren,

I will get it done later this afternoon, I have been on night faults this week and need to get some sleep.

Any thing I type now will not make much sense, I have been awake way to long.

Rgds

Emil

Emil Viskovich

Senior Network Engineer | WA Infrastructure Deployment & Maintenance

08 6188 5004

0413 413 941

Optus Exchange, 76 Altone Road, Kiara, 6054. Western Australia

Emil.Viskovich@optus.com.au

The Optus logo, consisting of the word "OPTUS" in a bold, uppercase, sans-serif font.

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Please think of the environment before printing this email.

From: Darren Blowes <darren@blokk.com.au>

Sent: Tuesday, 16 November 2021 8:49 AM

To: Emil Viskovich <Emil.Viskovich@optus.com.au>; Enzo Biagioni-Froudish <enzo@peritasgroup.com.au>

Cc: Bill Carmody <bill@upd.com.au>

Subject: RE: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

[External email] Please be cautious when clicking on any links or attachments.

Hi Emil

Are you able to send me over the extension paperwork as Enzo is way this week.

Regards



Darren Blowes

DIRECTOR ACQUISITIONS + DEVELOPMENT

DARREN@BLOKK.COM.AU
[0412 945 251](tel:0412945251)

PO BOX 137 MT LAWLEY WA 6929
BLOKK.COM.AU

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From: Emil Viskovich <Emil.Viskovich@optus.com.au>
Sent: Saturday, 13 November 2021 9:47 AM
To: Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>
Cc: Bill Carmody <bill@upd.com.au>; Darren Blowes <darren@blokk.com.au>
Subject: Re: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

OK will do first thing Monday.

Apologies I missed this email yesterday.

Regards

Emil

From: Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>
Sent: Friday, November 12, 2021 7:24:09 PM
To: Emil Viskovich <Emil.Viskovich@optus.com.au>
Cc: Bill Carmody <bill@upd.com.au>; Darren Blowes <darren@blokk.com.au>
Subject: RE: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

[External email] Please be cautious when clicking on any links or attachments.

Hi Emil

If you could resend the new quote letter providing a 60 day time period to pay from now that's should be good.

Regards

Enzo Biagioni-Froudist

CIVIL PRINCIPAL

Peritas Consulting Pty Ltd



[Perth](#) | [Melbourne](#)

E: enzo@peritasgroup.com.au

M: 0403 463 594

L: [Perth](#) | [Melbourne](#) | [Brisbane](#)

From: Emil Viskovich <Emil.Viskovich@optus.com.au>
Sent: Thursday, 11 November 2021 12:43 PM
To: Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>
Cc: Bill Carmody <bill@upd.com.au>
Subject: RE: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

Enzo,

The quote was dated the 18th of Oct and is valid for 60 days. So that puts its validity to 13th of Jan by my reckoning.

We would honour that price till that date, So payment would need to be made by 13th Jan if you needed works to start in January.

I have checked with our subcon and they are happy to extend their quote to me so I could produce a new quote for the same amount and with today's date.

This way your quote would be valid till about 11th Feb 2022. Which would align with construction to occur in mid to late Feb or early March.

Our construction schedules may be more constrained at that time due to the expected road widening project at Thomas road due around the same time, but should not impact your project.

Upon reading the Optus terms in the quote it mentions signing and paying prior to work, and then a 2 week delay by Optus regarding scheduling or construction.

It does not say that the acceptance and payment are to be made together so I assume it can be made before the quotation expiry date.

In closing if the new quote is created and you submit the funds before the expiry date of 60 days (I am assuming working days ie 12 weeks) you should be good.

Does this help?

Regards

Emil

Emil Viskovich

Senior Network Engineer | WA Infrastructure Deployment & Maintenance

08 6188 5004

0413 413 941

Optus Exchange, 76 Altone Road, Kiara, 6054. Western Australia

Emil.Viskovich@optus.com.au

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Please think of the environment before printing this email.

From: Enzo Biagioni-Froudish <enzo@peritasgroup.com.au>

Sent: Thursday, 11 November 2021 11:53 AM

To: Emil Viskovich <Emil.Viskovich@optus.com.au>

Cc: Bill Carmody <bill@upd.com.au>

Subject: FW: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

[External email] Please be cautious when clicking on any links or attachments.

Hi Emil

As discussed, our client is looking to accept the quotation for the lower cable depth option (i.e. lowering to 2.5m) but requests a payment timeline closer to the proposed scheduling of construction. If that date is after the Christmas break that would be acceptable and he would sign the acceptance form immediately to secure the construction dates for the new year.

Please advise Optus's protocols for payment and scheduling in this instance. Many thanks.

Regards

Enzo Biagioni-Froudish

CIVIL PRINCIPAL

Perias Consulting Pty Ltd



[Perth](#) | [Melbourne](#)

E: enzo@peritasgroup.com.au

M: 0403 463 594

L: [Perth](#) | [Melbourne](#) | [Brisbane](#)

P: +61863369299 | +61386579292 | +61730740157

From: Bill Carmody <bill@upd.com.au>

Sent: Tuesday, 19 October 2021 12:59 PM

To: Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>

Cc: Darren Blowes <darren@blokk.com.au>; 9311 <9311@upd.com.au>

Subject: FW: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

Enzo,

Please see the quote to lower to 2.5m below current depth.

Darren – how do you wish to proceed?

Thank you

Regards

Bill

Bill Carmody

Level 2, Suite 4, 47 Havelock Street,
WEST PERTH WA 6005

Ph: +61 (0)8 9212 8777, Fax: (08) 9212 8799, Mob: +61 (0) 402 110 209

Email: bill@upd.com.au

Website: www.upd.com.au



From: Emil Viskovich [<mailto:Emil.Viskovich@optus.com.au>]
Sent: Tuesday, 19 October 2021 12:43 PM
To: Bill Carmody <bill@upd.com.au>
Cc: 9311 <9311@upd.com.au>; Eugene Choh <Eugene@upd.com.au>
Subject: RE: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

Hi Bill,

I have received our updated quotations from our subcontractors and I can now provide the amended quotation for the lowering of the Optus cable.

You will recall that **Optus Quoted \$29 792.73 to lower the existing Buried cable a further 1-1.5 m below its existing depth** and install some maintenance duct along the length of the cable where it would be impacted by your earthworks.

After consulting with our subcontractors and yourself I have asked them to provide a new price to lower it a further 2.5 m below its existing depth which has been identified in the attached survey supplied by yourself earlier. Because of the deeper excavation this would mean larger equipment and larger battering and benching of the work area.

Optus quotation for the cable to be lowered 2.5m below its current depth would be \$45 538.10 and the quotation is attached.

I will leave the option with you to decide. However if you decide only on 1-1.5m he will not be able to go deeper when onsite as he will not have the correct equipment or safety plans in place to go deeper.

Please read terms and sign page 7 and send back as directed and make payment as directed on the quotation pdf.

Regards

Emil

Emil Viskovich

Senior Network Engineer | WA Infrastructure Deployment & Maintenance

08 6188 5004 0413 413 941

Optus Exchange, 76 Altone Road, Kiara, 6054. Western Australia

Emil.Viskovich@optus.com.au

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Please think of the environment before printing this email.

From: Bill Carmody <bill@upd.com.au>
Sent: Friday, 8 October 2021 11:32 AM
To: Emil Viskovich <Emil.Viskovich@optus.com.au>
Cc: Jamie White <jamie.white@telwest.net.au>; 9311 <9311@upd.com.au>; Zac Taylor <ztaylor@peritasgroup.com.au>; Eugene Choh <Eugene@upd.com.au>; Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>; Darren Blowes <darren@blokk.com.au>
Subject: RE: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

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Emil,

Can you please provide the quote/variation for the excavation to 2.5m depth.

Thank you

Regards

Bill

Bill Carmody

Level 2, Suite 4, 47 Havelock Street,
WEST PERTH WA 6005

Ph: +61 (0)8 9212 8777, Fax: (08) 9212 8799, Mob: +61 (0) 402 110 209

Email: bill@upd.com.au

Website: www.upd.com.au



From: Bill Carmody
Sent: Friday, 1 October 2021 9:15 AM
To: 'Emil Viskovich' <Emil.Viskovich@optus.com.au>
Cc: Jamie White <jamie.white@telwest.net.au>; 9311 <9311@upd.com.au>; Zac Taylor <ztaylor@peritasgroup.com.au>; Eugene Choh <Eugene@upd.com.au>
Subject: FW: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

Emil.

Please see the responses below from Peritas.

Thank you

Regards

Bill

Bill Carmody

Level 2, Suite 4, 47 Havelock Street,

WEST PERTH WA 6005

Ph: +61 (0)8 9212 8777, Fax: (08) 9212 8799, Mob: +61 (0) 402 110 209

Email: bill@upd.com.au

Website: www.upd.com.au



From: Zac Taylor [<mailto:ztaylor@peritasgroup.com.au>]

Sent: Thursday, 30 September 2021 4:28 PM

To: Bill Carmody <bill@upd.com.au>; Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>

Cc: Darren Blowes <darren@blokk.com.au>; 9311 <9311@upd.com.au>

Subject: RE: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

Hi Bill, please see my comments below.

Regards,

Zac Taylor

SITE SUPERVISOR



Peritas Consulting Pty Ltd

Perth | Melbourne | Brisbane

E: ztaylor@peritasgroup.com.au

M: 0467 555 373

P: + 61 8 6336 9299 |

From: Bill Carmody

Sent: Thursday, 30 September 2021 4:12 PM

To: 'Emil Viskovich' <Emil.Viskovich@optus.com.au>; Jamie White <jamie.white@telwest.net.au>

Cc: 9311 <9311@upd.com.au>

Subject: RE: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

From: Emil Viskovich [<mailto:Emil.Viskovich@optus.com.au>]

Sent: Thursday, 30 September 2021 3:58 PM

To: Bill Carmody <bill@upd.com.au>; Jamie White <jamie.white@telwest.net.au>

Subject: RE: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Thanks Bill.

Some points to include.

Spelling of my Name (Viskovich) is with a K not a C. I wont get emails if name is spelt wrong, so best fix now.

Jamie and myself walked the path again. The "Concrete Encasement" would have been the buried Pit So I doubt that it would be a problem.

The vegetation would need to be removed prior to Optus lowering the cable, But no limestone should be added until the final finish levels are in place, we do not wish to remove limestone and have not allowed for it.

We would need to be able to access the site, is it possible to use property driveway rather than try and unload plant on the side of Rowley Road.

If permits have been issued for firebreak under power lines with plant, can our subcons also work under this permit?

We would endeavour to get the cable as low as we can , we are confident we can lower the cable 1.5 m below its existing depth and have quoted accordingly.

Our Subcon will assess the possibility of getting a larger excavator to get the cable lower. However I cannot guarantee anything at this time.

How deep does the cable need to be at each end of the property? Will the 1.5m depth suffice at each end, with the majority of depth to be in the middle of the property at the highest point of the fibre path.

No works can commence until optus is paid the full amount of the quotation to perform works. Unfortunately this is beyond my control and is an Optus policy made above my pay grade.

I will need time to raise the Optus works permits and need to allow a week or two before commencement of works.

Regards

Emil

From: Bill Carmody <bill@upd.com.au>

Sent: Thursday, 30 September 2021 1:59 PM

To: Emil Viskovich <Emil.Viskovich@optus.com.au>; Jamie White <jamie.white@telwest.net.au>

Cc: Enzo Biagioni-Froudust <enzo@peritasgroup.com.au>; Darren Blowes <darren@blokk.com.au>; 9311 <9311@upd.com.au>; Eugene Choh <Eugene@upd.com.au>

Subject: RE: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

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Emil/Enzo,

Meeting notes for your comment and correction as required.

Thank you

Regards

Bill

Bill Carmody

Level 2, Suite 4, 47 Havelock Street,
WEST PERTH WA 6005

Ph: +61 (0)8 9212 8777, Fax: (08) 9212 8799, Mob: +61 (0) 402 110 209

Email: bill@upd.com.au

Website: www.upd.com.au



From: Bill Carmody

Sent: Tuesday, 28 September 2021 2:43 PM

To: Jamie White <jamie.white@telwest.net.au>; Emil Viskovich <Emil.Viskovich@optus.com.au>

Cc: Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>; Darren Blowes <darren@blokk.com.au>; 9311 <9311@upd.com.au>

Subject: RE: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Meeting location – Barfield Road – 150m. north of Rowley Road



From: Jamie White [<mailto:jamie.white@telwest.net.au>]

Sent: Tuesday, 28 September 2021 2:33 PM

To: Bill Carmody <bill@upd.com.au>; Emil Viskovich <Emil.Viskovich@optus.com.au>

Cc: Enzo Biagioni-Froudust <enzo@peritasgroup.com.au>; Darren Blowes <darren@blokk.com.au>; 9311 <9311@upd.com.au>

Subject: Re: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Hi Bill,

11am is fine. Does this work for you

Emil.

That location will we be meeting at.

Thanks

Jamie

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From: Bill Carmody <bill@upd.com.au>

Sent: Tuesday, September 28, 2021 2:28:08 PM

To: Jamie White <jamie.white@telwest.net.au>; Emil Viskovich <Emil.Viskovich@optus.com.au>

Cc: Enzo Biagioni-Froudust <enzo@peritasgroup.com.au>; Darren Blowes <darren@blokk.com.au>; 9311 <9311@upd.com.au>

Subject: RE: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Jamie,
Thank you.
I have a morning meeting – would 11am suit you?
Regards
Bill

Bill Carmody

Level 2, Suite 4, 47 Havelock Street,
WEST PERTH WA 6005
Ph: +61 (0)8 9212 8777, Fax: (08) 9212 8799, Mob: +61 (0) 402 110 209
Email: bill@upd.com.au
Website: www.upd.com.au



From: Jamie White [<mailto:jamie.white@telwest.net.au>]
Sent: Tuesday, 28 September 2021 1:32 PM
To: Bill Carmody <bill@upd.com.au>; Emil Viskovich <Emil.Viskovich@optus.com.au>
Cc: Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>; Darren Blowes <darren@blokk.com.au>; 9311 <9311@upd.com.au>
Subject: Re: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Hi Bill,

I will be available any time Thursday.

Preferably in the morning but can do arvo if needed.

Thanks

Jamie

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From: Bill Carmody <bill@upd.com.au>
Sent: Tuesday, September 28, 2021 1:09:43 PM
To: Emil Viskovich <Emil.Viskovich@optus.com.au>
Cc: Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>; Darren Blowes <darren@blokk.com.au>;

9311 <9311@upd.com.au>; Jamie White <jamie.white@telwest.net.au>

Subject: RE: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Emil.

Apologies for not responding earlier – when can your contractor be available.

Regards

Bill

Bill Carmody

Level 2, Suite 4, 47 Havelock Street,

WEST PERTH WA 6005

Ph: +61 (0)8 9212 8777, Fax: (08) 9212 8799, Mob: +61 (0) 402 110 209

Email: bill@upd.com.au

Website: www.upd.com.au



From: Emil Viskovich [<mailto:Emil.Viskovich@optus.com.au>]

Sent: Thursday, 16 September 2021 2:59 PM

To: Bill Carmody <bill@upd.com.au>

Cc: Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>; Darren Blowes <darren@blokk.com.au>; 9311 <9311@upd.com.au>; Jamie White <jamie.white@telwest.net.au>

Subject: RE: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Bill,

Next week is not looking good for our Contractor ,

Can we do one day the following week?

Tue 28th onwards?

I have looped in our contractor Telwest who would be assisting us with this job, they have performed this cable lowering task before.

Regards

Emil

Emil Viskovich

Senior Network Engineer | WA Infrastructure Deployment & Maintenance

08 6188 5004 0413 413 941

Optus Exchange, 76 Altone Road, Kiara, 6054. Western Australia

Emil.Viskovich@optus.com.au

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From: Bill Carmody <bill@upd.com.au>
Sent: Wednesday, 15 September 2021 11:05 AM
To: Emil Viskovich <Emil.Viskovich@optus.com.au>
Cc: Enzo Biagioni-Froudust <enzo@peritasgroup.com.au>; Darren Blowes <darren@blokk.com.au>; 9311 <9311@upd.com.au>
Subject: RE: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

[External email] Please be cautious when clicking on any links or attachments.
Emil,

Please see availability for the Consultant Engineer and myself.

Tuesday 21 Sept. PM, 1 pm onwards
Wednesday 22 Sept. PM, 1 pm onwards
Friday 24 Sept. PM, 1 pm onwards
We can meet at UPD or Peritas.
Regards

Bill
Bill Carmody
Level 2, Suite 4, 47 Havelock Street,
WEST PERTH WA 6005
Ph: +61 (0)8 9212 8777, Fax: (08) 9212 8799, Mob: +61 (0) 402 110 209
Email: bill@upd.com.au
Website: www.upd.com.au



From: Emil Viskovich [<mailto:Emil.Viskovich@optus.com.au>]
Sent: Wednesday, 15 September 2021 9:34 AM
To: Bill Carmody <bill@upd.com.au>
Subject: RE: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Hi Bill,

Let me see when our contactor is available and get back to you.

If next week then times I am free next week are

Tue PM,

Wednesday AM or PM,

Thur PM

Friday PM

I will see what works with our contractor.

Regard
Emil

Emil Viskovich

Senior Network Engineer | WA Infrastructure Deployment & Maintenance

08 6188 5004

0413 413 941

Optus Exchange, 76 Altone Road, Kiara, 6054. Western Australia

Emil.Viskovich@optus.com.au

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From: Bill Carmody <bill@upd.com.au>

Sent: Tuesday, 14 September 2021 1:13 PM

To: Emil Viskovich <Emil.Viskovich@optus.com.au>

Cc: 9311 <9311@upd.com.au>; Enzo Biagioni-Froudish <enzo@peritasgroup.com.au>; Darren Blowes <darren@blokk.com.au>; Zac Taylor <ztaylor@peritasgroup.com.au>

Subject: FW: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Emil,

Thank you for the quote.

Before the client can accept the quote, can a meeting be held with you and/or the contractor to ensure both parties are fully aware of the scope and responsibilities.

Please call me if you wish to discuss.

Thank you

Regards

Bill

Bill Carmody

Level 2, Suite 4, 47 Havelock Street,
WEST PERTH WA 6005

Ph: +61 (0)8 9212 8777, Fax: (08) 9212 8799, Mob: +61 (0) 402 110 209

Email: bill@upd.com.au

Website: www.upd.com.au



From: Enzo Biagioni-Froudist [<mailto:enzo@peritasgroup.com.au>]

Sent: Friday, 10 September 2021 4:25 PM

To: Bill Carmody <bill@upd.com.au>; Darren Blowes <darren@blokk.com.au>

Cc: 9311 <9311@upd.com.au>; Zac Taylor <ztaylor@peritasgroup.com.au>

Subject: RE: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Thanks Bill

Can you please pursue the additional information. Darren is keen to proceed on the basis of this general work scope and cost.

Regards

Enzo Biagioni-Froudist

CIVIL PRINCIPAL

Peritas Consulting Pty Ltd



[Perth](#) | [Melbourne](#)

E: enzo@peritasgroup.com.au

M: 0403 463 594

L: [Perth](#) | [Melbourne](#) | [Brisbane](#)

COVID-19
message

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P: +61863369299 | +61386579292 | +61730740157

From: Bill Carmody <bill@upd.com.au>

Sent: Wednesday, 8 September 2021 12:16 PM

To: Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>; Darren Blowes <darren@blokk.com.au>
Cc: 9311 <9311@upd.com.au>; Zac Taylor <ztaylor@peritasgroup.com.au>
Subject: RE: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Enzo,

I would request a discussion/meeting with the Optus contractor to confirm the proposed depth(s), backfill compaction etc. before accepting the quote.

Note surveying is excluded from the scope, so an as-con will be the developer responsibility.

Thank you

Regards

Bill

Bill Carmody

Level 2, Suite 4, 47 Havelock Street,
WEST PERTH WA 6005

Ph: +61 (0)8 9212 8777, Fax: (08) 9212 8799, Mob: +61 (0) 402 110 209

Email: bill@upd.com.au

Website: www.upd.com.au



From: Enzo Biagioni-Froudist [<mailto:enzo@peritasgroup.com.au>]
Sent: Wednesday, 8 September 2021 12:06 PM
To: Bill Carmody <bill@upd.com.au>; Darren Blowes <darren@blokk.com.au>
Cc: 9311 <9311@upd.com.au>; Zac Taylor <ztaylor@peritasgroup.com.au>
Subject: RE: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Hi Bill

Can we assume then that the quote will cover lowering up to 2m. Also will they provide an as-con or do we need to arrange to have a surveyor pick up as they lower. It would obviously be an advantage to pick it up progressively so we have the full long section of the area for our further records.

Regards

Enzo Biagioni-Froudist

CIVIL PRINCIPAL

Peritas Consulting Pty Ltd



Perth | Melbourne

E: enzo@peritasgroup.com.au

M: 0403 463 594

L: Perth | Melbourne | Brisbane

P: +61863369299 | +61386579292 | +61730740157

From: Bill Carmody <bill@upd.com.au>

Sent: Wednesday, 8 September 2021 10:13 AM

To: Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>; Darren Blowes <darren@blokk.com.au>

Cc: 9311 <9311@upd.com.au>; Zac Taylor <ztaylor@peritasgroup.com.au>

Subject: RE: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Enzo,

The attached email summarises the Optus process with this application – note Points 5 & 6.

It would appear 2m. is the maximum.

Regards

Bill

Bill Carmody

Level 2, Suite 4, 47 Havelock Street,

WEST PERTH WA 6005

Ph: +61 (0)8 9212 8777, Fax: (08) 9212 8799, Mob: +61 (0) 402 110 209

Email: bill@upd.com.au

Website: www.upd.com.au



From: Enzo Biagioni-Froudist [<mailto:enzo@peritasgroup.com.au>]

Sent: Tuesday, 7 September 2021 6:47 PM

To: Bill Carmody <bill@upd.com.au>; Darren Blowes <darren@blokk.com.au>

Cc: 9311 <9311@upd.com.au>; Zac Taylor <ztaylor@peritasgroup.com.au>

Subject: RE: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Hi Bill

Did they confirm that this is the deepest they could lower the cable?

Regards

Enzo Biagioni-Froudist

CIVIL PRINCIPAL

Peritas Consulting Pty Ltd



Perth | Melbourne

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L: Perth | Melbourne | Brisbane

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From: Bill Carmody <bill@upd.com.au>

Sent: Tuesday, 7 September 2021 2:55 PM

To: Darren Blowes <darren@blokk.com.au>

Cc: Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>; 9311 <9311@upd.com.au>

Subject: UPD9311 FW: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Darren,

Please find attached the quote from Optus.

Please advise how you wish to proceed, and if UPD can be of further assistance.

Thank you

Regards

Bill

Bill Carmody

Level 2, Suite 4, 47 Havelock Street,

WEST PERTH WA 6005

Ph: +61 (0)8 9212 8777, Fax: (08) 9212 8799, Mob: +61 (0) 402 110 209

Email: bill@upd.com.au

Website: www.upd.com.au



From: Emil Viskovich [<mailto:Emil.Viskovich@optus.com.au>]

Sent: Tuesday, 7 September 2021 2:41 PM

To: Eugene Choh <Eugene@upd.com.au>

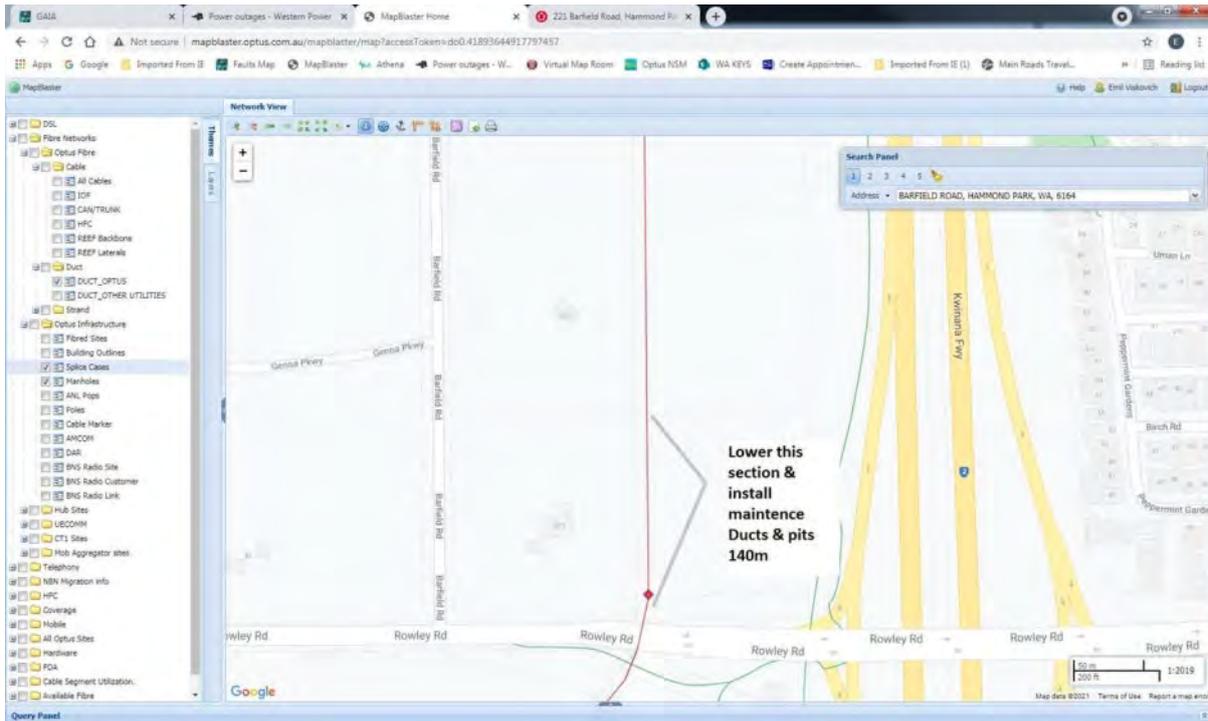
Cc: Bill Carmody <bill@upd.com.au>; Cam Brennan <Cam.Brennan@optus.com.au>

Subject: Optus Quotation for Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156

Eugene,

Here is the Optus quotation to perform the required Civil works at Barfield road to lower the Optus Cable in the area of concern as discussed previously.

The scope of works is as per detailed below in diagram and your attached specifications.



Regards

Emil

Emil Viskovich

Senior Network Engineer | WA Infrastructure Deployment & Maintenance

08 6188 5004

0413 413 941

Optus Exchange, 76 Altone Road, Kiara, 6054. Western Australia

Emil.Viskovich@optus.com.au

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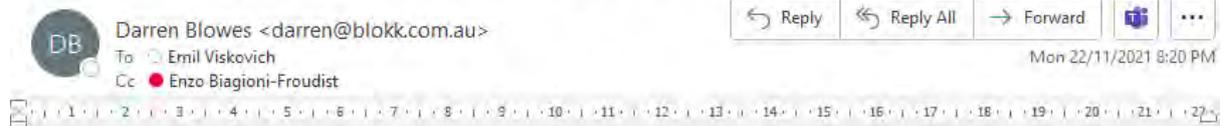


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OPTUS WORKS PROGRAMMED FOR LATE JANUARY 2022

RE: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments



Hi Emil

For the record so everyone is on the same page.
Job is locked in for 20-28 Jan.
Please confirm latest date the invoice can be paid?
And is there anything else you need from us?

Regards



Darren Blowes
DIRECTOR ACQUISITIONS + DEVELOPMENT

DARREN@BLOKK.COM.AU
0412 945 251
PO BOX 137 MT LAWLEY WA 6029
BLOKK.COM.AU

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From: Emil Viskovich <Emil.Viskovich@optus.com.au>
Sent: Friday, 19 November 2021 12:16 PM
To: Darren Blowes <darren@blokk.com.au>
Cc: enzo@peritasgroup.com.au
Subject: Re: UPD9311 Lot301 Barfield Road, Hammond Park. Fibre relocate REF Q24156 - Optus comments

Ok

OPTUS WORKS UNDERWAY ON SITE

Re: Lowering of Optus Cable at Barfield Rd development site.



Emil Viskovich <Emil.Viskovich@optus.com.au>

To Enzo Biagioni-Froudist; Darren Blowes

Cc Bill Carmody; Cam Brennan

Reply

Reply All

Forward



Mon 17/01/2022 7:43 AM

You forwarded this message on 17/01/2022 1:34 PM.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

Good morning Enzo and Darren,

Our Subcon wanted to visit the site today to determine where he could unload the excavator and access the work area.

Can you advise if you have a site office setup yet or if there are any requirements we need to be aware of prior to entering the site.

Thanks

Emil

From: Enzo Biagioni-Froudist <enzo@peritasgroup.com.au>

Sent: Tuesday, 30 November 2021, 10:41 pm

To: Emil Viskovich; Darren Blowes

Cc: Bill Carmody; Cam Brennan

Subject: RE: Lowering of Optus Cable at Barfield Rd development site.

[External email] Please be cautious when clicking on any links or attachments.

Hi Emil

You are looking on the wrong side of the boundary. The Cables are within the cleared area.

Regards

Enzo Biagioni-Froudist

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Peritas Consulting Pty Ltd

OPTUS WORKS COMPLETED ON SITE- AS-CON SURVEY BELOW.

survey for Optus cable relocation


From: Emil Viskovich <Emil.Viskovich@optus.com.au>
To: Enzo Biagioni-Froudust
Date: Mon 31/01/2022 11:39 AM
Attachments: BMS-PR-AC-DG-0001_0.pdf (629 KB), pipe pickup.dxf (2 MB)

Hi Enzo,
Here is the survey for the cable relocation at Barfield Road site
Please check and advise if it is satisfactory.

Rgds
Emil

Emil Viskovich
Senior Network Engineer | WA Infrastructure Deployment & Maintenance
08 6188 5004
0413 413 941
Optus Exchange, 76 Allone Road, Kiara, 6054, Western Australia
Emil.Viskovich@optus.com.au

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APPENDIX 8

Traffic Impact Statement

TRANSPORT IMPACT STATEMENT

Lot 301 Barfield Road,
Hammond Park

July 2023

Rev F

The logo for Kcett features the word "Kcett" in a bold, dark red, sans-serif font. The letter "K" is stylized with three parallel diagonal lines above its top left corner. The letters "c" and "t" are lowercase, while "e" and "t" are lowercase. The logo is positioned in the lower half of the page, above a solid orange horizontal bar that spans the entire width of the page.

Kcett

Transport Impact Statement

KC01356.000 Lot 301 (No 221) Barfield Road, Hammond Park

HISTORY AND STATUS OF THE DOCUMENT

| Revision | Date issued | Reviewed by | Approved by | Date approved | Revision type |
|-------------|-------------|-------------|-------------|---------------|-------------------------|
| Rev A Draft | 14.09.2021 | M Kleyweg | M Kleyweg | 15.09.2021 | Issued for Review |
| Rev A | 17.09.2021 | M Kleyweg | M Kleyweg | 17.09.2021 | Issued for Review |
| Rev B | 22.09.2021 | M Kleyweg | M Kleyweg | 22.09.2021 | Proposed layout amended |
| Rev C | 7.12.2021 | M Kleyweg | M Kleyweg | 7.12.2021 | Proposed layout amended |
| Rev D | 4.02.2022 | M Kleyweg | M Kleyweg | 4.02.2022 | Proposed layout amended |
| Rev E | 27.06.2022 | M Kleyweg | M Kleyweg | 27.06.2022 | Proposed layout amended |
| Rev F | 5.07.2023 | M Kleyweg | M Kleyweg | 5.07.2023 | Proposed layout amended |

DISTRIBUTION OF COPIES

| Revision | Date of issue | Quantity | Issued to |
|-------------|---------------|----------|--------------------------------|
| Rev A Draft | 15.08.2021 | 1 (PDF) | Darren Blowes (Blokk Property) |
| Rev A | 17.08.2021 | 1 (PDF) | Darren Blowes (Blokk Property) |
| Rev B | 22.08.2021 | 1 (PDF) | Darren Blowes (Blokk Property) |
| Rev C | 8.12.2021 | 1 (PDF) | Darren Blowes (Blokk Property) |
| Rev D | 4.02.2022 | 1 (PDF) | Reegan Cake (Dynamic Planning) |
| Rev E | 27.06.2022 | 1 (PDF) | Reegan Cake (Dynamic Planning) |
| Rev F | 6.07.2023 | 1 (PDF) | Reegan Cake (Dynamic Planning) |

| | |
|------------------------------------|---|
| Document Printed | 7/07/2023 11:31 AM |
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| Author of the Report | Jelena Simic / Nemanja Marijanovic |
| Project Team | Ana Marijanovic |
| Project Director / Project Manager | Marina Kleyweg |
| Name of Project | KC01356.000 Lot 301 Barfield Road, Hammond Park |
| Name of the Document | KC01356.000 Lot 301 Barfield Road, Hammond Park - Transport Impact Statement |
| Document Version | KC01356.000_R01_ Rev F |

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Appendices

Appendix 1 - The layout of the proposed development

Appendix 2 - Transport Planning and Traffic Plans

Appendix 3 - Vehicle Turning Circle Plans

1. Executive Summary

Site Context

The subject lot is fronting Barfield Road to the west, Rowley Road to the south and neighbouring lots to the north and east. The existing lot features one Residential dwelling with an ancillary facility. Currently, it has 1 unsealed crossover onto Barfield Road.

The proposed development is a green title subdivision comprising 32 residential units, Public Open Space and a proposed circular road connecting to Barfield Road. The southern portion of the subject land, with an area of 3,589m², is set aside as a Planning Control Area 95 (Rowley Road).

Technical Findings

- The proposed development will generate up to 256 vehicular trips per day and 26 vehicular trips per hour; which equates to additional 246 vehicular trips per day and 25 vehicular trips per hour in both peak hours having in mind that there is an existing traffic generation.
- According to the WAPC Guidelines, the new development will have a moderate impact on the surrounding network.
- Three major routes are expected to be utilised for accessing and egressing the proposed development:
 - Via Barfield Road >> Rowley Road towards east
 - Via Barfield Road >> Rowley Road towards west
 - Via Barfield Road towards north

A negligible portion of this traffic will be discharged on surrounding roads such as Bari Road, Genoa Parkway etc., as all traffic attractors are accessible via 3 main routes noted above and further via Kwinana Freeway, Irvine Parade, Frankland Avenue etc. For more detailed plans of the estimated vehicular traffic volumes and distribution, please refer to the plans provided - S06 and S07 in Appendix 2.

*Note: The above distribution will change after closure of Barfield Road / Rowley Road intersection as a part of Rowley Road upgrade to a significant freight route. However, given the unknown timeframe of this upgrade, KCTT have not provided detailed breakdown of the distribution after the intersection closure. The proposed subdivision is in line with the approved structure plan and the traffic generation is quite low. It is not anticipated that this subdivision will cause any congestion on the network upon the closure of the intersection.

- The proposed internal road and associated intersection are designed to accommodate the manoeuvring of a suitable waste collection vehicle 8.8m, as confirmed by the conducted swept path analysis. The plan is enclosed in Appendix 3.

Relationship with Policies

- As this is an early stage of planning, the exact number of parking bays is unknown. The area should be provided between 32 to 64 parking bays within the entire subdivision, depending on the final yields.
- As the proposed use is residential, it is expected that all residences will comply with R-Codes by providing a garage for each dwelling. KCTT believes the owner will use the garage while the visitors are likely to park in the driveway. On-street parking could be considered in the area surrounding Public Open Space.

- KCTT's opinion is that there is no need for additional bicycle parking or showering facilities as residential properties can accommodate the resident's bicycle parking requirements.

Conclusion

- The proponent is seeking to develop a residential subdivision comprising 32 residential dwellings and accompanying Public Open Space.
- The proposed development will generate up to additional 256 vehicular trips per day and 26 vehicular trips per hour in the peak hour.
- Barfield Road is classified as a Local Distributor, with a maximum desirable volume of up to 6,000 VPD. Currently, Barfield Road is approximately 3,100 VPD 650m north of Rowley Road. It is assumed that the subdivision will become fully operational (all houses constructed and occupied) by 2025 at the latest. KCTT used 3% as traffic growth between 2023 and 2025, given that the current housing market is strong. Once this subdivision is constructed, it is expected that developable land impacting Barfield Road will become limited; hence, a 2% growth rate for passing traffic was used for 2025-2035. Having those assumptions in mind, KCTT determined the total traffic flow on Barfield Road as approximately 4,300 VPD in 2035, inclusive of subject subdivision generated traffic. Therefore, with the added traffic from the subject site, the Barfield Road would remain within the capacity for the Local Distributor.
- Barfield Road is expected to be downgraded after closure of Rowley Road / Barfield Road intersection. The traffic volumes will be even lower after this change to the surrounding road network. However, the timeframe is currently unknown.
- In summary, the proposed development's traffic will be successfully absorbed by the surrounding road network.

2. Transport Impact Statement

2.1 Proposal

Dynamic Planning / Blokk Property engaged KCTT to prepare a TIS for the proposed Residential Subdivision on Lot 301 Barfield Road, Hammond Park.

The proposed development comprises of 32 residential dwellings and POS.

The subject development will include a construction of an internal road connecting to Barfield Road.

This report will primarily address the level of traffic impact of the proposed development and the requirements for integration of the proposed development with the surroundings, namely the existing and planned immediate road network.

2.2 Location

| | |
|---------------------|---|
| Lot Number | 301 |
| Street Number | 221 |
| Road Name | Barfield Road |
| Suburb | Hammond Park |
| Description of Site | The subject lot is fronting Barfield Road to the west, Rowley Road to the south and neighbouring lots to the north and east. The existing lot is occupied by one Residential dwelling with an ancillary facility. Currently, it features 1 unsealed crossover onto Barfield Road. |

The proposed development is a green title subdivision comprising 32 residential units, Public Open Space and a proposed circular road connecting the units to Barfield Road. The southern portion of the subject land, with an area of 3,589m² is set aside as a Planning Control Area 95 (Rowley Road).

2.3 Technical Literature Used

| | |
|---|---|
| Local Government Authority | City of Cockburn |
| Type of Development | Residential |
| Are the R-Codes referenced? | YES |
| <i>If YES, nominate which:</i> | State Planning Policy 7.3 Residential Design Codes Volume 1 - 2023 R-Codes |
| Is the NSW RTA Guide to Traffic Generating Developments Version 2.2 October 2002 (referenced to determine trip generation/attraction rates for various land uses) referenced? | YES |
| Which WAPC Transport Impact Assessment Guideline should be referenced? | Volume 3 - Subdivision Volume 5 - Technical Guidance |
| Are there applicable LGA schemes or plans for this type of development? | YES |
| <i>If YES, Nominate:</i> | |
| Name and Number of Scheme / Name of the Plan | Town Planning Scheme No. 3 |
| Are Austroads documents referenced? | YES |
| Is the Perth Transport Plan for 3.5 million and Beyond referenced? | YES |

Transport Impact Statement

KC01356.000 Lot 301 (No 221) Barfield Road, Hammond Park

2.4 Land Uses

Are there any existing Land Uses

YES

If *YES*, Nominate:

Residential dwelling with ancillary facility

Proposed Land Uses

How many types of land uses are proposed?

One (1) - Residential

Nominate land use type and yield

- Residential– R30*
– 23 residential units
(min Lot Area = 287m² / Average Lot Area=331m²)
- Residential– R40*
– 9 residential units
(min Lot Area = 235m² / Average Lot Area=252m²)
- POS = 1,261m²

Are the proposed land uses complementary with the surrounding land-uses?

YES

2.5 Local Road Network Information

How many roads front the subject site?

Two (2)

Name of Roads Fronting Subject Site / Road Classification and Description:

| | |
|-----------------------------------|---|
| Road Name | Barfield Road |
| Number of Lanes | two way, one lane each direction, undivided |
| Road Reservation Width | App. 20m |
| Road Pavement Width | 6m |
| Classification | Local Distributor |
| Speed Limit | 50kph or State Limit |
| Bus Route | NO |
| <i>If YES Nominate Bus Routes</i> | - |
| On-street parking | NO |

| | |
|---|---|
| Road Name | Rowley Road |
| Number of Lanes | two way, one lane each direction, undivided |
| Road Reservation Width | App. 20m |
| Road Pavement Width | App. 7m |
| Classification | Primary Distributor |
| Speed Limit | 70kph |
| Bus Route | NO |
| <i>If YES Nominate Bus Routes</i> | - |
| On-street parking | NO |
| How many roads are within 400m of the subject site? | One (1) |

Name of Roads Fronting Subject Site / Road Classification and Description:

| | |
|------------------------|---|
| Road Name | Kwinana Freeway |
| Number of Lanes | two way, two lanes per direction, divided |
| Road Reservation Width | 130m and above |
| Road Pavement Width | App. 2x15m |
| Classification | Primary Distributor |

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| | |
|-----------------------------------|--------|
| Speed Limit | 100kph |
| Bus Route | YES |
| <i>If YES Nominate Bus Routes</i> | |
| On-street parking | NO |

2.6 Traffic Volumes

| Road Name | Location of Traffic Count | Vehicles Per Day (VPD) | Vehicles per Peak Hour (VPH) | | | | Heavy Vehicle % <i>If HV count is Not Available, are HV likely to be in higher volumes than generally expected?</i> | Year | |
|------------------|--|------------------------|------------------------------|-------------|---------------|-------------|--|-----------------------|--|
| | | | AM Peak Time | AM Peak VPH | PM Peak Time | PM Peak VPH | | Date of Traffic Count | <i>If older than 3 years multiply with a growth rate to the current year</i> |
| Barfield Road | 650m north of Rowley Road* | 2,562 | 08:00 - 236 | | 17:00 - 284 | | 3,4% | Nov 2019 | - |
| | 150m South of Gaebler Road* | 2,506 | 07:00 - 234 | | 17:00 - 293 | | 4,5% | Jun 2019 | - |
| Frankland Avenue | 60m south of Woodrow Avenue* | 1,311 | 08:00 - 159 | | 15:00 - 166 | | 7.1% | Mar 2017 | - |
| | 160m south of Wattleup Road* | 5,329 | 07:00 - 430 | | 16:00 - 516 | | 14,2% | Jun 2020 | - |
| Kwinana Freeway | Northbound South of Rowley Road (SLK 26.61) | 45,891 | 05:30 - 3,616 | | 16:00 - 3,230 | | 13.4% | 2020/21 | - |
| | Southbound South of Rowley Road (SLK 26.54) | 48,852 | 07:15 - 3,325 | | 14:15 - 3,732 | | 8.5% | 2020/21 | - |
| | (Northbound) off to Rowley Road - Northbound South of Rowley Road (SLK 0.33) | 2,644 | 08:00 - 203 | | 16:00 - 317 | | 0.0% | 2020/21 | - |
| Kwinana Freeway | Southbound South of Russell Road (SLK 23.70) | 49,803 | 07:15 - 3,254 | | 14:15 - 3,756 | | 7.0% | 2020/21 | - |
| | SB At Bridge Under Rowley Road (SLK 24.95) | 45,614 | 07:15 - 2,986 | | 14:15 - 3,513 | | 7.7% | 2020/21 | - |
| | Northbound South of Russell Road (SLK 23.70) | 50,773 | 06:00 - 3,875 | | 15:30 - 3,510 | | 11.6% | 2020/21 | - |
| | NB At Bridge Under Rowley Road (SLK 24.96) | 45,428 | 06:00 - 3,503 | | 15:30 - 3,155 | | 11.1% | 2020/21 | - |
| Rowley Road | East of Kwinana Fwy (SLK 0.97) | 15,896 | 07:45 - 1,294 | | 16:15 - 1,337 | | 9.6% | 2020/21 | - |
| | West of Kwinana Fwy (SLK 0.79) | 9,450 | 07:45 - 855 | | 14:45 - 910 | | 17.4% | 2020/21 | - |
| Wattleup Road | 300m west of Frankland Avenue* | 5,227 | 07:00 - 499 | | 16:00 - 487 | | 15,2% | Nov 2019 | - |

Note* - These traffic counts have been obtained from the City of Cockburn's Intramaps

2.7 Vehicular Crash Information

| | |
|---|---|
| Is Crash Data Available on Main Roads WA website? | YES |
| Location 1 | Barfield Road [SLK 1.75 to 2.36] – no data |
| Location 2 | Intersection of Barfield Road & Rowley Road |
| Period of crash data collection | 01/01/2018 - 31/12/2022 |

| Road / Intersection Name | SLK | Road Hierarchy | Speed Limit | Crash Statistics | | | |
|--|----------------------|---|------------------------------|--|---------------------------------|-------------------------|-------------------------|
| | | | | No of KSI Crashes | No of Medical Attention Crashes | No of PDO Major Crashes | No of PDO Minor Crashes |
| Barfield Road & Rowley Road | N/A | Local Distributor / Primary Distributor | 50kph or State Limit / 70kph | 0 | 0 | 1 | 0 |
| MR Type | Involving Overtaking | Involving Parking | Involving Animal | Involving Pedestrian | Entering / Leaving Driveway | Other / Unknown | |
| Count | 0 | 0 | 0 | 0 | 0 | 1 | |
| No of MVKT Travelled at Location | | | | approximately 13,000 VPD * 365 * 5 years * 0.3 km = 7.12 MVKT | | | |
| KSI Crash Rate | | | | No KSI crashes | | | |
| All Crash Rate | | | | 1 crashes / 7.12 MVKT = 0.14 crashes/MVKT | | | |
| Comparison with Crash Density and Crash Rate Statistics | | | | <p>The subject intersection shows significantly lower averages than the state network average of 0.85 crashes/MVKT.</p> <p>Most of the proposed units will access Bruce Road via the proposed roads instead of having direct access, which is considered as an additional safety measure.</p> | | | |

The following tables shows crash rates and crash densities in Perth Metropolitan area on local roads and state roads for the period from 2017 to 2022, as obtained from Main Roads WA on the 31st May 2022 by email request:

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| Crash Density and Crash Rate on Metropolitan Local Roads Network only | | | | |
|---|---|--|---|--|
| | All Crashes | | Serious Injury Crashes (Fatal+Hospital) | |
| | Average Annual Crash Density (All Crashes/KM) | Average Annual Crash Rate (All Crashes/MVKT) | Average Annual Crash Density (Ser. Inj. Crashes/KM) | Average Annual Crash Rate (Ser. Inj. Crashes/MVKT) |
| Metro Local Roads - Midblock | 2.51 | 0.95 | 0.12 | 0.05 |
| Metro Local Roads - All | 5.23 | 1.98 | 0.24 | 0.09 |

Note: Based on 5-years data for the period 2017 to 2021.

| Crash Density and Crash Rate on Metropolitan State Roads Network only | | | | |
|---|---|--|---|--|
| | All Crashes | | Serious Injury Crashes (Fatal+Hospital) | |
| | Average Annual Crash Density (All Crashes/KM) | Average Annual Crash Rate (All Crashes/MVKT) | Average Annual Crash Density (Ser. Inj. Crashes/KM) | Average Annual Crash Rate (Ser. Inj. Crashes/MVKT) |
| Metro State Roads - Midblock | 20.12 | 0.37 | 0.89 | 0.02 |
| Metro State Roads - All | 46.28 | 0.85 | 1.80 | 0.03 |

Note: Based on 5-years data for the period 2017 to 2021.

2.8 Public Transport Accessibility

How many bus routes are within 400 metres of the subject site? None

How many rail routes are within 800 metres of the subject site? None

Walk Score Rating for Accessibility to Public Transport.

27 | Some Transit. A few nearby public transportation options.

Is the development in a Greenfields area? NO

2.9 Pedestrian Infrastructure

Describe existing local pedestrian infrastructure within a 400m radius of the site:

| Classification | Road Name |
|--|---|
| "Principal Shared Path (PSP)" Pedestrian Path | Kwinana Freeway, Rowley Road Most of the roads within a 400m radius have a pedestrian path on one or both sides of the road reservation. |

Does the site have existing pedestrian facilities? NO

Does the site propose to improve pedestrian facilities? YES

If YES, describe the measures proposed.

The proposed internal road network includes pedestrian paths.

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What is the Walk Score Rating?

3 | Car-Dependent. Almost all errands require a car.

2.10 Cyclist Infrastructure

Are there any PBN Routes within an 800m radius of the subject site? YES

If YES, describe:

| Classification | Road Name |
|--|---|
| "Principal Shared Path (PSP)" | Kwinana Freeway, Rowley Road |
| "Perth Bicycle Network (PBN) - Continuous Signed Routes" | Barfield Road, Rowley Road, Frankland Avenue, Wattleup Road |
| "Bicycle Lanes or Sealed Shoulder Either Side" | Rowley Road |

Are there any PBN Routes within a 400m radius of the subject site? YES

If YES, describe:

| Classification | Road Name |
|--|------------------------------|
| "Principal Shared Path (PSP)" | Kwinana Freeway, Rowley Road |
| "Perth Bicycle Network (PBN) - Continuous Signed Routes" | Barfield Road, Rowley Road |
| "Bicycle Lanes or Sealed Shoulder Either Side" | Rowley Road |

Does the site have existing cyclist facilities? NO

Does the site propose to improve cyclist facilities? NO

2.11 Vehicular Parking

Local Government City of Cockburn

Local Government Document Utilised Town Planning Scheme No. 3.
State Planning Policy 7.3 Residential Design Codes Volume 1 - 2023

Description of Parking Requirements in accordance with Scheme:

Town Planning Scheme No. 3:

Residential dwellings: As prescribed in the Residential Design Codes

R-Codes (State Planning Policy 7.3 Residential Design Codes Volume 1):

C3.1 The following minimum number of on-site car parking spaces is to be provided for each single house, grouped dwelling and special purpose dwelling comprising the following number of bedrooms:

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| Type of dwelling | Car parking spaces | |
|------------------------|--------------------|------------|
| | Location A | Location B |
| 1 bedroom dwelling | 1 | 1 |
| 2 + bedroom dwelling | 1 | 2 |
| Aged persons' dwelling | 1 | 1 |
| Ancillary dwelling | nil | 1 |

A = within:

– 800m of a train station on a high frequency rail route, measured in a straight line from the pedestrian entry to the train station platform to any part of a lot; or

– 250m of a high frequency bus route, measured in a straight line from along any part of the bus route to any part of a lot.

B = not within the distances outlined in A above.

C3.2 On-site visitors car parking spaces for grouped and multiple dwelling developments provided at a rate of one space for each four dwellings, or part thereof in excess of four dwellings, served by a common access

Calculation of Parking

| Land Use | Requirements | Yield | Total Parking |
|--|--------------------------|---------------------|----------------------|
| Residential Lots | 1 or 2 bays per dwelling | 32 residential lots | From 32 to 64 bays |
| Total Car Parking Requirement | | | 32 to 64 bays |
| Total Volume of Parking Provided by Proponent | | | N/A |

Justification

As this is an early stage of planning, the exact number of parking bays is unknown. Depending on the final yields, there should be between 32 to 64 parking bays within the entire subdivision.

As the proposed use is residential, it is expected that all residences will comply with R-Codes by providing a garage for each dwelling. KCTT believes the owner will use the garage while the visitors are likely to park in the driveway. On-street parking could be considered in the area surrounding Public Open Space.

Have Vehicle Swept Paths been checked for the proposed internal road network? NO

If YES, provide a description of the performance:

Navigability of each of the proposed lots is not applicable for this stage of development. It should be checked at the engineering works approvals.

Conducted swept path analysis though the proposed subdivision area confirms that the proposed intersection of the proposed 14.2 Public Road and Barfield Road and an internal circular road suit the turning circle requirements of 8.8m service vehicles. The turning template plan is enclosed in Appendix 3 for clarity.

2.12 Bicycle Parking

Local Government

City of Cockburn

Reference Document Utilised

City of Cockburn Local Planning Scheme No. 3

Description of Parking Requirements:

City of Cockburn does not stipulate requirements for the provision of bicycle parking for single dwellings.

Justification

KCTT's opinion is that there is no need for additional bicycle parking or showering facilities as residential properties can accommodate the resident's bicycle parking requirements.
It is most likely that the utilisation of bicycles within the subject site area will be viable and attractive to residents.

2.13 ACROD Parking

| | |
|--|--|
| Class of Building | Class 1a - a detached house or one of a group of two or more dwellings separated by a fire resisting wall, including a row house, terrace house, town house or villa unit. |
| Reference Document Utilised | Building Code of Australia |
| Does this building class require specific provision of ACROD Parking? | NO - Given that there are no accessible units planned, there is no specific requirement for the provision of ACROD bays |

2.14 Delivery and Service Vehicles

| | |
|---|--|
| Guideline Document used as reference Requirements | NSW RTA Guide to Traffic Generating Developments |
| <i>Residential flat buildings (50% of spaces adequate for trucks): < 200 flats or home units = 1 space per 50 flats or home units;</i> | |

Justification

It is expected that delivery and service vehicles (such as waste removal vehicles) servicing the residential area will not require designated parking spaces, given that they can operate safely within the road reserve. No other permanent service vehicle parking is required for the operation of the development. Proposed intersection and internal circular road are designed to accommodate the turning circle requirements of 8.8m service vehicles. This is confirmed by the conducted swept path analysis enclosed in Appendix 3 for clarity.

2.15 Calculation of Development Generated / Attracted Trips

| | |
|---|--|
| What are the likely hours of operation? | N/A for residential land use |
| What are the likely peak hours of operation? | AM 07:00 to 08:00 PM 17:00 to 18:00 |
| Guideline Document Used | WAPC Transport Assessment Guidelines for Developments - Volume 5 |
| <i>Rates from above document:</i> | Residential - 0.8 vehicle trips per dwelling for the AM and PM peak hours. A 25% IN / 75% OUT split has been adopted for the AM peak and a 67% IN / 33% OUT split for the PM peak hour. |
| Guideline Document Used | NSW RTA Guide to Traffic Generating Developments |

Rates from above document:

Residential - The NSW RTA Guide to Traffic Generating Developments suggests developments of this type in Sydney tend to generate between 4 and 5 vehicular trips per dwelling for medium to high-density developments. In Perth, the Department of Planning and Infrastructure conducted a series of studies in the late 1990's / early 2000's which showed that higher density dwellings tended to average closer to 5.5 vehicle trips per day. These studies assumed that anywhere between 50% and 70% of commuters were travelling to the work by car as a driver. KCTT propose to use a more conservative average of 8 vehicular trips per day per residence.

| Land Use Type | Rate above | Yield | Daily Traffic Generation | Peak Hour Traffic Generation |
|--|---|---|--------------------------|------------------------------|
| Residential | 8 vehicular trips per dwelling; 0.8 vehicular trips per dwelling per hour | 32 lots | 256 | 26 |
| Total - The Proposed Development | | | 256 VPD | 26 VPH |
| Does the site have existing trip generation/attraction? | | YES A residential dwelling occupies the existing lot. Given the size of the dwelling, KCTT believes that traffic generated by the dwelling will be at the higher end of the spectrum. Therefore, for the purposes of this report, we will assume 10 VPD and 1 VPH. Total existing traffic: 10 VPD; 1 VPH | | |
| What is the total impact of the new proposed development? | | The proposed development will generate an additional 246 VPD and 25 VPH to the surrounding network. According to the WAPC Guidelines, the proposed development will have a moderate impact on the surrounding network. | | |

2.16 Trip Purposes

Determine the likely percentage share for different trip purposes based on the land usage.

| Land Use Type | Employment | Shopping | Education | Social / Recreational |
|---------------|------------|----------|-----------|-----------------------|
| Residential | 40% | 17.5% | 25% | 17.5% |

2.17 Expected Origin / Destination

Name the closest existing major residential generators and non-residential attractors of traffic and the distance from the boundaries of the Structure Plan Area.

| | | |
|--------------------|-------------------------|---|
| Residential | Employment (profile.id) | The majority of employment trips is expected to be external to the proposed Subdivision Plan Area. The ID website on the City of Cockburn's webpage suggests the following breakdown for employment destinations for residents of the City of Cockburn: <ul style="list-style-type: none"> • Cockburn (C) - 28.1% • Melville (C) - 11.1% • Perth (C) - 10.8% |
|--------------------|-------------------------|---|

- Fremantle (C) - 9.6%
- Canning (C) - 5.8%
- No Fixed Address (WA) - 4.4%
- Others – less than 3.0%

The City Cockburn i.d. site shows that up to 71.6% of all work trips are undertaken using a vehicle (i.e. vehicle as driver plus vehicle as a passenger).

Given the predominant transport mode and distribution of destinations, which excluding working from home, shows that there is no source of employment within the Subdivision plan area, the following roads in KCTT's opinion will be predominantly used for access/egress to the site: -

- Barfield Road
- Rowley Road
- Irvin Parade
- Kwinana Highway

Shopping A shopping centre is not proposed within the Subdivision plan area. Also, there are no major shopping centres within 2km radius of the subdivision.

Education There are no schools proposed within the Subdivision plan area. Schools located in close vicinity are as follows:

- Hammond Park Catholic Primary School is within 800m radius to the northwest of the Subdivision plan area,
- Aubin Grove Primary School is located within a 900m radius to the northeast.
- Hammond Park Primary School is approximately 2km to the northwest of the Subdivision plan area,

Social / It is deemed that a minimum of 80% of the trips for social and
Recreational the recreational purpose will be external.

2.18 Traffic Flow Distribution onto External Road Networks

How many routes are available for access/egress to the site? 3 as listed below

Route 1

| | |
|--|---|
| Provide details for Route No 1 | Via Barfield Road >> Rowley Road towards east |
| Percentage of Vehicular Movements via Route No 1 | 35% |

Route 2

| | |
|--|---|
| Provide details for Route No 2 | Via Barfield Road >> Rowley Road towards west |
| Percentage of Vehicular Movements via Route No 2 | 40% |

Route 3

| | |
|--|---------------------------------|
| Provide details for Route No 3 | Via Barfield Road towards north |
| Percentage of Vehicular Movements via Route No 3 | 25% |

*Note - The traffic from the subdivision is not likely to be discharged in a noticeable percentage on surrounding roads such as Bari Road, Genoa Parkway, etc. All traffic attractors are accessible via 3 main routes noted above and further Kwinana Freeway, Irvine Parade, Frankland Avenue etc. For more detailed plans of the estimated vehicular traffic volumes and distribution, please refer to the plans provided - S06 and S07 in Appendix 2.

**Note: The above distribution will change after the closure of Barfield Road / Rowley Road intersection as a part of Rowley Road upgrade to a significant freight route. However, given the unknown timeframe of this upgrade, KCTT have not provided detailed breakdown of the distribution after the intersection closure.

2.19 Road Safety

Are sight distances adequate at proposed intersections? YES

Justification

The proposed road is to form a four-way intersection with Bari Road and Barfield Road, not dissimilar to intersections of Bari Road/Napoli Drive and Napoli Drive/ Barfield Road/ Ripen Loop which are located in immediate vicinity of the subject site. Given these intersections have been obviously recently approved, the intersection of Proposed Road 01 and Barfield Road should be deemed as safe as the abovementioned intersections.

Bari Road is already designed and constructed with raised platform as a clear visual cue that Barfield Road has the priority of movement. Proposed Road 01 will be designed in a similar manner.

We are of the view that the staggering of the intersection will not bring any tangible benefits to this development. According to Liveable Neighbourhoods, the stagger between two Access Streets should be minimum 20m. Although this stagger may offer opportunity to increase depth of lots 1-12, it will be detrimental to lots 13, 14, 34, 35, 36 and 37 and it will result in loss of the proposed POS space and associated drainage space.

Traffic anticipated at this intersection is quite low, therefore any tangible road safety benefits are likely to be insubstantial as conflicting manoeuvres are likely to occur infrequently.

If the City's concern is the perception of continuity, we believe this can be easily addressed through design, signage and line marking, particularly given that Bari Road is already constructed in a similar manner.

2.20 Road Cross-Section Requirements

Guideline Document used as reference

Liveable Neighbourhoods

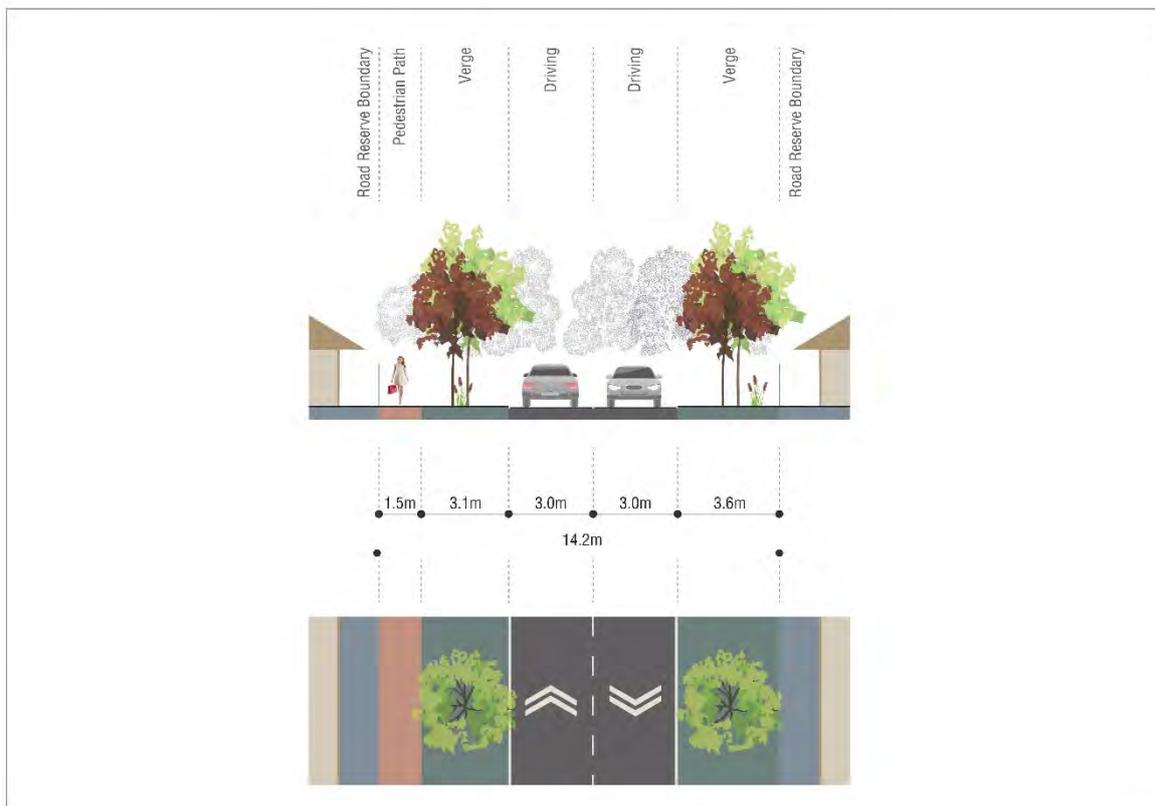
Does this development propose the construction of new roads?

YES - The proposed layout indicates 1 new circular road within the subject subdivision area as shown on a plan enclosed in Appendix 1. Please note that the following cross-sections are reflective of Liveable Neighbourhood requirements. Road names are taken from the Proposed Green Title Subdivision drawing.

Road

| | |
|---|---------------------------|
| Name | 14.2m Public Road |
| Projected Traffic Volumes | <1,000 VPD |
| Proposed Number of Lanes | 2 lanes |
| Proposed Road Reservation Width | 14.2m |
| Proposed Road Pavement Width | 6m |
| Proposed Pedestrian / Cyclist / Shared Path Width | 1.5m wide pedestrian path |
| Proposed Classification | Access Street D |
| Proposed Speed Limit | 30kph |
| Proposed Bus Route Extension / Introduction | NO |
| Proposed On-street parking | NO |

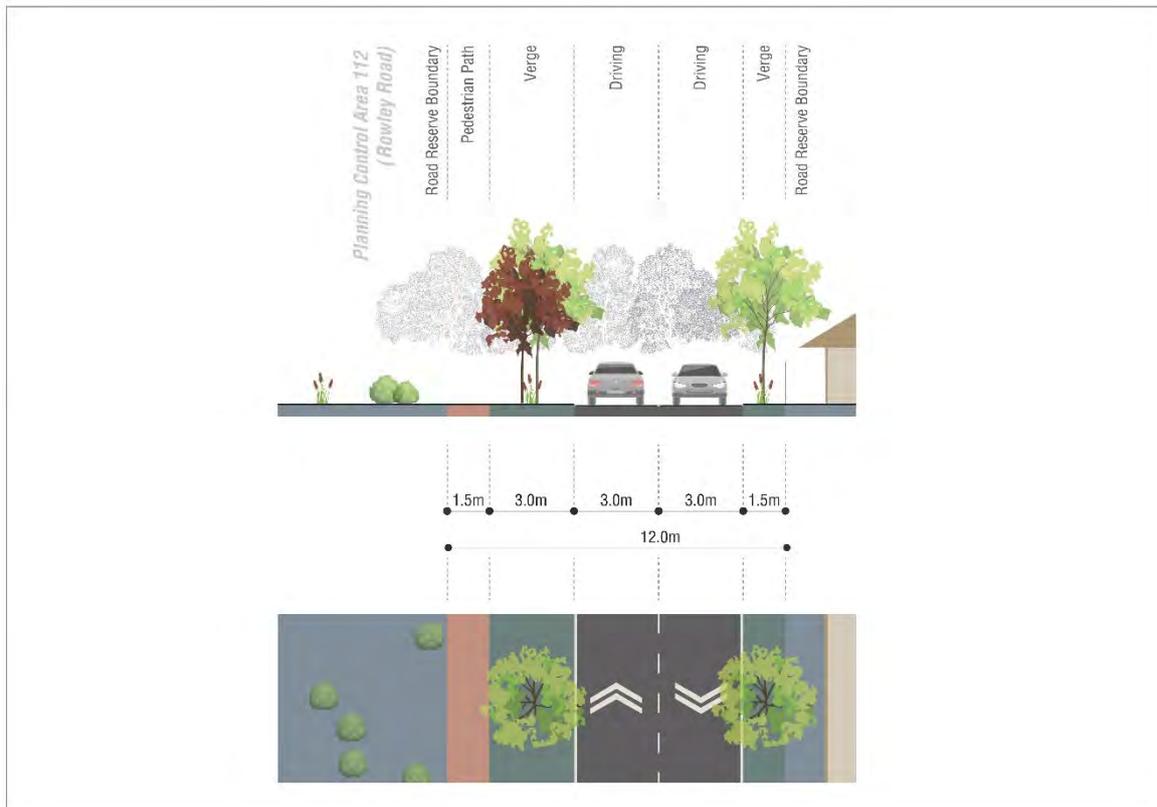
Provide graphics of the proposed internal road cross-section within the Subdivision Plan Area



Road

| | |
|---|------------------------|
| Name | 12m Public Road |
| Projected Traffic Volumes | <1,000 VPD |
| Proposed Number of Lanes | 2 lanes |
| Proposed Road Reservation Width | 12m |
| Proposed Road Pavement Width | 6m |
| Proposed Pedestrian / Cyclist / Shared Path Width | 1.5m |
| Proposed Classification | Access Street D (12m) |
| Proposed Speed Limit | 30kph |
| Proposed Bus Route Extension / Introduction | NO |
| Proposed On-street parking | NO |

Provide graphics of the proposed internal road cross section within the Subdivision Plan Area



2.21 Proposed Intersection Controls

All the intersections are designed to have full unrestricted movement of vehicles to/from and within the Subdivision Plan Area. Due to low traffic volumes, intersections can be priority controlled.

This subdivision proposes the creation of the following intersections:

- Barfield Road/ 14.2m Public Road,
- Internal intersection of two 14.2m Public Road sections.

2.22 Proposed Internal Transport Networks

Are there any changes/additions to the existing road network?

If YES, nominate:

YES

The proposed subdivision layout indicates 1 new circular road with variable road reserve width. This road connects the proposed subdivision area with Barfield Road to the west. Please refer to Appendices 1 for the proposed subdivision plan and proposed road layout.

Were there any discussions/agreements with MRWA regarding intersections with direct access onto roads under their jurisdiction?

If YES, nominate:

NO

Note - Not at the date of submission of this report. No roads within the subdivision area are under the jurisdiction of MRWA.

Are there any pedestrian/cycle networks and crossing facilities proposed for the roads within the Subdivision Plan Area?

If YES, nominate:

YES

The Subdivision Plan proposes constructing a network of pedestrian paths to cater to pedestrian needs in the area. Most streets in the area will have pedestrian paths on one side of the road.

Were there any discussions/agreements with the local authority over local road networks and pedestrian and cycle facilities?

If YES, nominate:

NO

Note - Not at the date of submission of this report.

Were there any discussions/agreements with PTA / Transperth on new bus services or extensions/alterations to existing bus services to serve the Subdivision Plan Area?

If YES, nominate:

NO

Note - Not at the date of submission of this report.

2.23 Changes to External Transport Networks

Are there any proposed changes to the road network? YES

Rowley Road has been identified as a primary freight route to the Naval Base / Kwinana Beach industrial areas. It will be constructed to four lanes and divided in accordance with Main Roads WA standards. However, timing for these upgrades are unknown at this stage (Perth and Peel @3.5 million - Road Network Plan).

Are there any proposed changes to the intersection controls? YES

The abovementioned Rowley Road upgrade will include the closure of the Rowley Road / Barfield Road intersection. This would affect the traffic distribution from the proposed development. However, since there is no definitive timeframe, KCTT have not provided a detailed breakdown of the future traffic distribution after these upgrades.

Are there any proposed changes to the pedestrian/cycle networks and crossing facilities? NO*

Note:* Changes in pedestrian/cycle network are planned internal to the Subdivision plan area or at its boundary. However, Crossing facilities in the form of pram ramps could be considered for pedestrians and cyclists crossing Barfield Road adjacent to the Structure Plan area.

Are there any proposed changes to the public transport services? YES

Existing public transportation is available within a 800m radius of the proposed subdivision. Existing bus routes 525 and 526 terminate within approximately 1,200m radius from the proposed subdivision. KCTT previously contacted the Public Transport Authority of Western Australia to provide us with information regarding bus service planning to suit the neighbouring proposed Structure Plan Area. The following points were confirmed by email: -

- Bus route 525 is planned to be extended along Barfield Road.
- Bus route 526 is planned to be extended along the future Hammond Road and / or Frankland Road.

There is potential that the bus routes will provide connection to the proposed Mandogalup Railway Station in the future. Mandogalup Railway Station is proposed on the south-western corner of the intersection of Rowley Road and Kwinana Freeway.

2.24 Integration with Surrounding Area

Are there any existing major residential generators of traffic within a minimum of 800 metres from the boundaries of the Subdivision Plan Area? YES:

If YES, nominate:

- The residential area west of the subject subdivision area

Are there any existing major non-residential attractors of traffic within a minimum of 800 metres from the boundaries of the Subdivision Plan Area? YES

If YES, nominate:

Hammond Park Catholic Primary School and Hammond Park Secondary College are within 800m radius from the Subdivision plan area to the northwest

Identify any proposals for major changes to the land uses within 800 metres of the boundaries of the Subdivision Plan Area. A large residential area is directly adjacent to the proposed subdivision area to the west.

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What are the main desire lines between the Subdivision plan land uses and these external attractors/generators?

- Barfield Road
- Rowley Road
- Irvin Parade
- Kwinana Highway

Will the existing transport networks, plus any proposed changes, adequately match these desired lines, particularly for pedestrians, cyclist and public transport users?

Subdivision Plan Area is well connected to the metropolitan road network with connectivity to Rowley Road and Kwinana Freeway for major external trips.

Propose remedial measures to address these deficiencies.

n/a

2.25 Analysis of Transport Networks

Determine the year(s) for assessment and the time period(s) for the traffic flow analysis.

2025 - Estimated Year of Completion the Subject Subdivision Area

Determine Subdivision plan generated traffic.

The proposed Subdivision will generate up to 256 vehicular movements per day and 26 vehicular movements in the peak hour.

Determine the base, i.e. without a Subdivision plan, flows on the surrounding road network. These are to be factored up to the Subdivision plan assessment year(s).

| Road Name | Location of Traffic Count | Existing Traffic Volumes (VPD)- (Year) | Estimated Traffic Volumes Year 2025 (VPD) (with 3% growth) | Estimated Traffic Volumes + Subject Subdivision Plan Generated Traffic - Year 2025 (VPD) |
|---------------|--------------------------------|--|--|--|
| Barfield Road | 650m north of Rowley Road* | 2,562 (2019) | 3,059 | 3,123 |
| | 150m South of Gaebler Road* | 2,506 (2019) | 2,992 | 3,056 |
| Rowley Road | West of Kwinana Fwy (SLK 0.79) | 9,450 (2020) | 10,955 | 11,045 |

It is assumed that the subdivision will become fully operational (all houses constructed and occupied) by 2025 at the latest. We used 3% as traffic growth between the traffic count year and 2025, given that the current housing market is strong. Once this subdivision is constructed, developable land impacting Barfield Road will become limited; hence, a 2% growth rate for passing traffic was used for 2025-2035.

Determine the total traffic flows on the external road network by adding the Subdivision plan generated traffic to the above base flows.

| Road Name | Location of Traffic Count | Estimated Traffic Volumes Year 2035 (VPD) (with 2% growth) | Estimated Traffic Volumes + Subject Subdivision Plan Generated Traffic - Year 2035 (VPD) |
|---------------|--------------------------------|--|--|
| Barfield Road | 650m north of Rowley Road* | 4,216 | 4,294 |
| | 150m South of Gaebler Road* | 4,126 | 4,204 |
| Rowley Road | West of Kwinana Fwy (SLK 0.79) | 13,354 | 13,444 |

The table above shows that the traffic on the existing local roads will not exceed the threshold for a Local Distributor by 2035 (inclusive of the subject subdivisions).

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Identify all schools within the Subdivision plan area and those within 800 metres of the Subdivision plan area.

The closest school is Hammond Park Catholic Primary School, approximately 800m northwest of the subdivision. There is a continuous pedestrian connection from Barfield Road, Genoa Parkway, Whadjuk Drive, Irvine Parade; however, the distance may be prohibitive for children below 10.

Identify the most likely walk and cycle routes to each school from the catchment areas.

Via pedestrian paths on the proposed road within the subdivision area and further along numerous pedestrian and shared paths as noted on Plans S02 and S04 in Appendix 2.

2.26 Site-Specific Issues and Proposed Remedial Measures

How many site-specific issues need to be discussed? As below:

Site-Specific Issue No 1

Proximity to schools

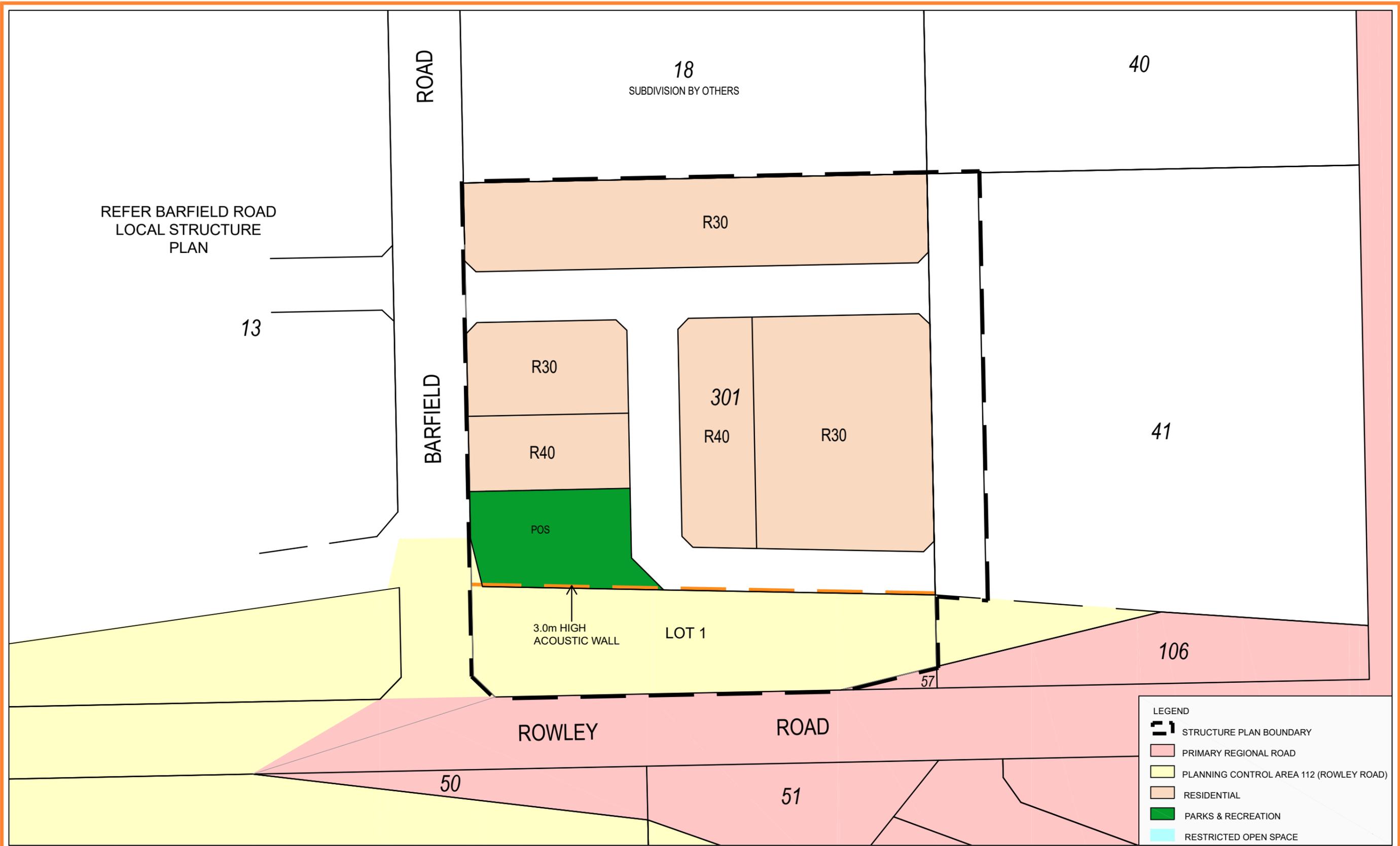
The walkable distance to the closest school in the surrounding is currently surpassing the standard 10-minute walking distance from the proposed development.

Site-Specific Issue No 2

Based on the comparative analysis, KCTT believes that this location does not exhibit outstanding safety concerns. The use of the site is appropriate and complementary to the surroundings. The adjoining road network has sufficient spare capacity to cater for the proposed development.

Appendix 1

The Layout of the Proposed Development



REFER BARFIELD ROAD
LOCAL STRUCTURE
PLAN

13

ROAD

18
SUBDIVISION BY OTHERS

40

BARFIELD

R30

R30

R40

301

R40

R30

41

POS

3.0m HIGH
ACOUSTIC WALL

LOT 1

57

106

ROWLEY

ROAD

50

51

LEGEND

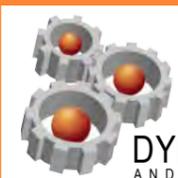
-  STRUCTURE PLAN BOUNDARY
-  PRIMARY REGIONAL ROAD
-  PLANNING CONTROL AREA 112 (ROWLEY ROAD)
-  RESIDENTIAL
-  PARKS & RECREATION
-  RESTRICTED OPEN SPACE

LOCAL STRUCTURE PLAN
LOT 301 (No. 221) & LOT 41 BARFIELD ROAD
HAMMOND PARK

COPYRIGHT RESERVED BASE PLAN COURTESY OF GRAY & LEWIS



SCALE: 1:1000 @ A3
DATE: 5th JULY 2023
FILE: 1151_05.07.2022.dwg
DRAW: - SB
CHECKED: -

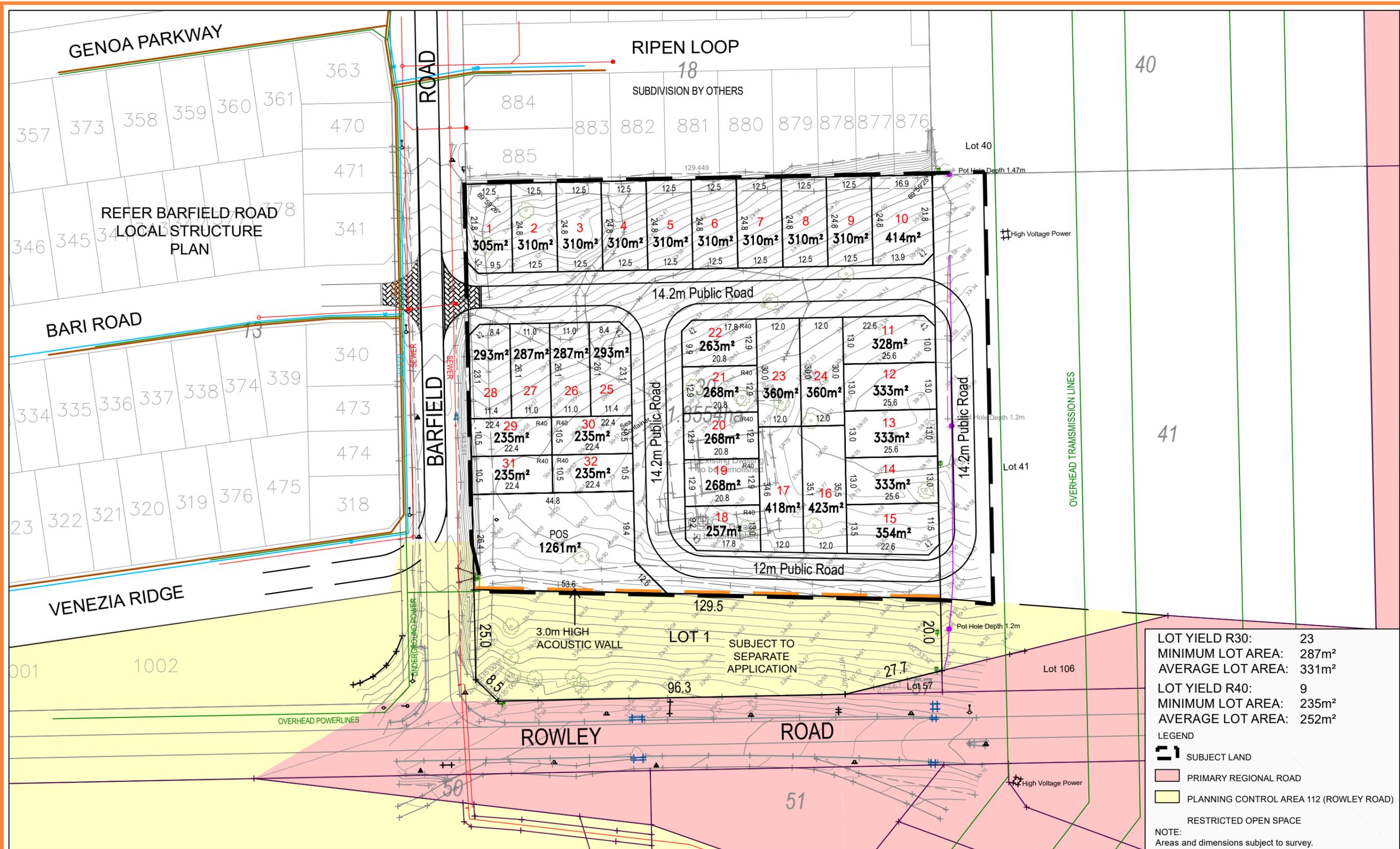


DYNAMIC PLANNING
AND DEVELOPMENTS

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SUITE 15, 29 COLLIER ROAD
MORLEY WA 6062
ABN: 99 169 411 705





PROPOSED GREEN TITLE SUBDIVISION

LOT 301 (No. 221) & LOT 41 BARFIELD ROAD
HAMMOND PARK

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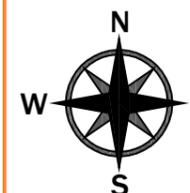
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DYNAMIC PLANNING
AND DEVELOPMENTS

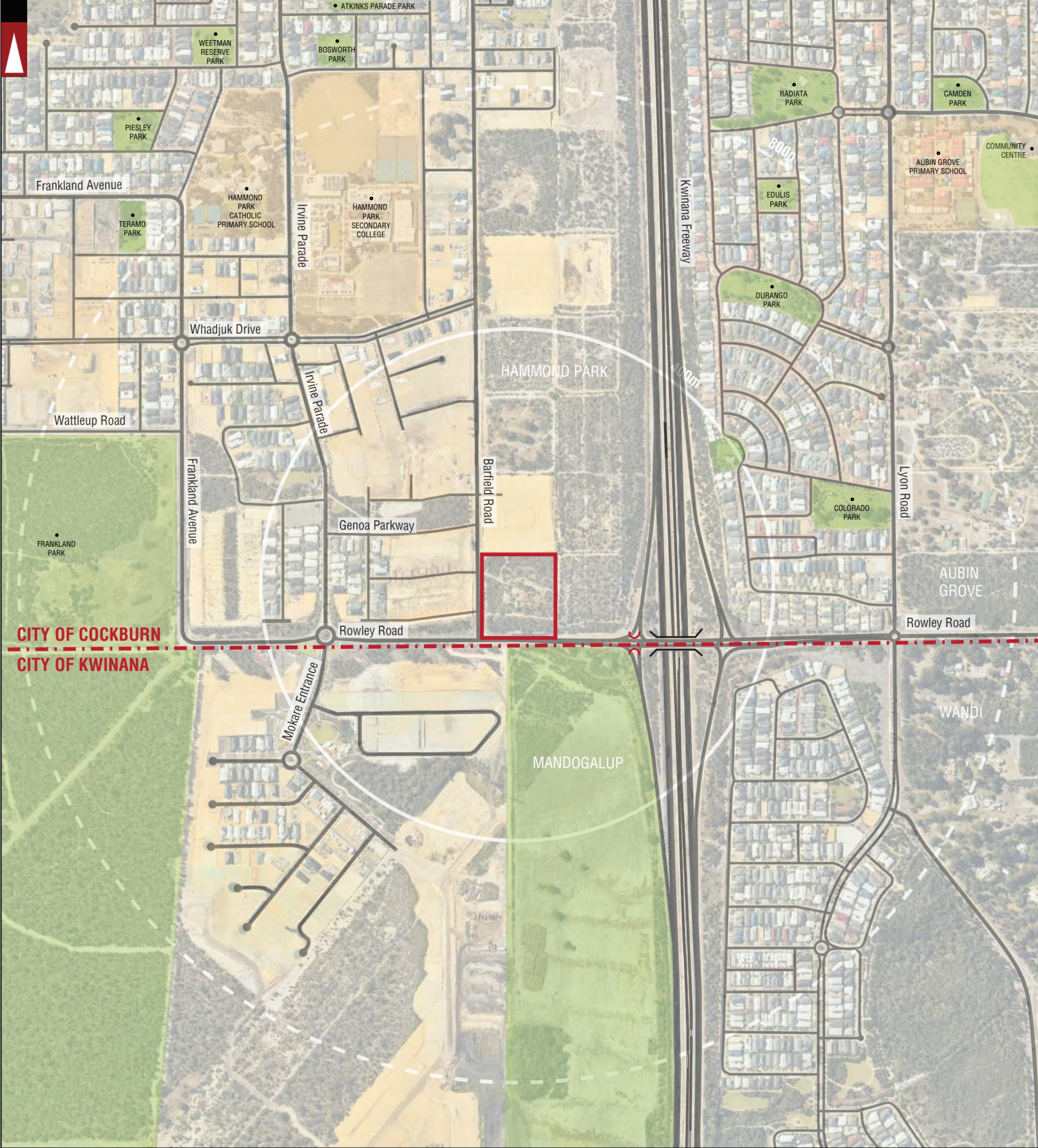
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e: admin@dynamicplanning.net.au
 t: (08) 9275 4433
 f: (08) 9275 4455
 SUITE 15, 29 COLLIER ROAD
 MORLEY WA 6062
 ABN: 99 169 411 705



Appendix 2

Transport Planning and Traffic Plans



| | | | |
|--|------------------------|--|--------------------------|
| | PARKS AND RECREATION | | LOCATION BOUNDARY |
| | PUBLIC PURPOSE | | DISTANCE FROM LOCATION |
| | ROAD | | LOCAL GOVERNMENT NAME |
| | STREET NAME | | LOCAL AUTHORITY BOUNDARY |
| | RAILWAY | | HAMMOND PARK SUBURB |
| | ROAD BRIDGE, UNDERPASS | | |

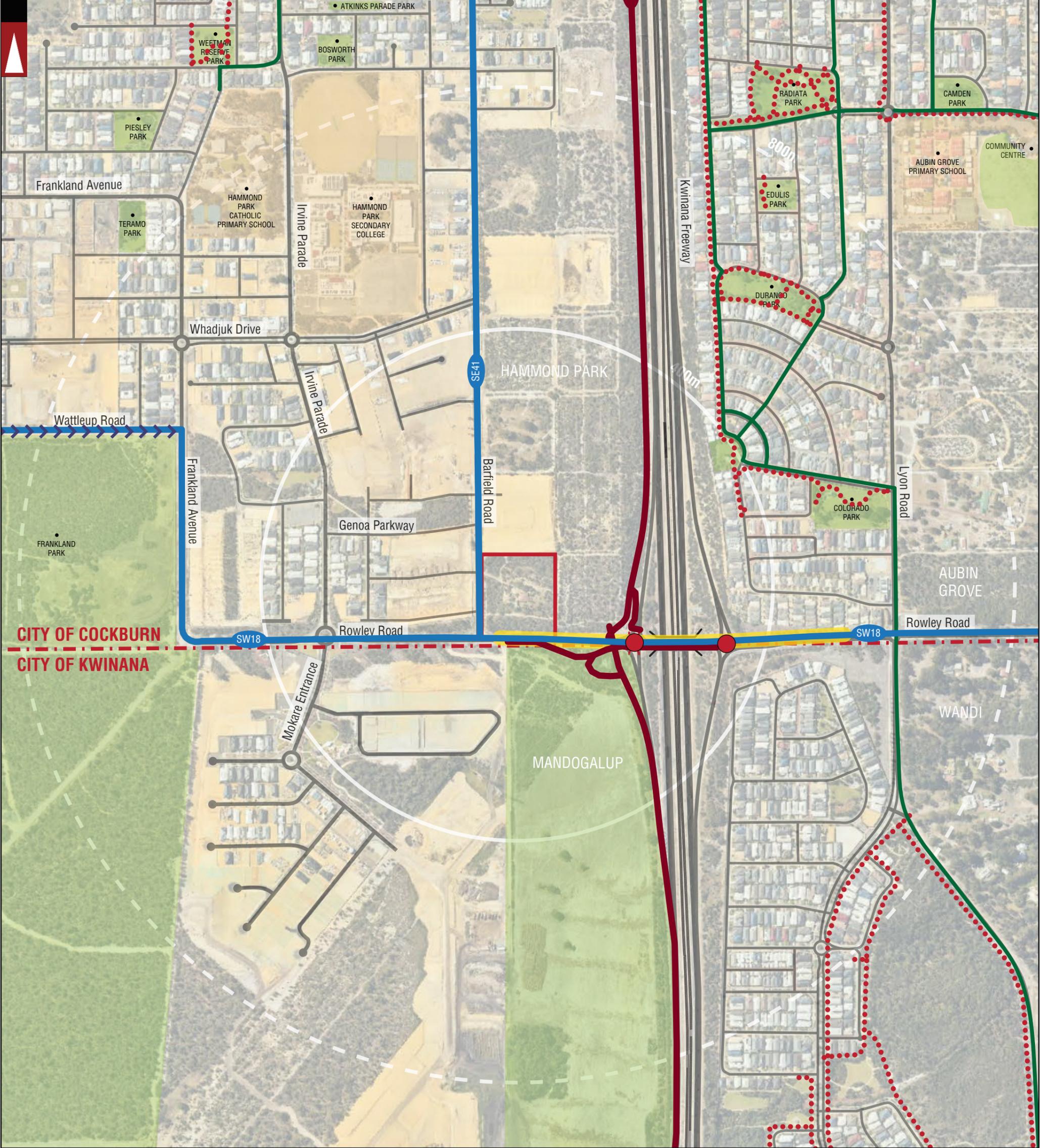
LEGEND

Drawn by: **Civil & Traffic Engineering Consultants KCTT** (Trading as KC Traffic and Transport Pty Ltd)
 PO Box 1456 Scarborough WA 6922

PH: 08 9441 2700
 WEB: www.kctt.com.au

| | | | | | |
|-----------------|------------|---------------------|--|--|--|
| PROJECT: | | | LOT 301 (NO 221) BARFIELD ROAD, HAMMOND PARK | | |
| TITLE: | | | LOCALITY PLAN - 800M RADIUS | | |
| DRAWING NUMBER: | | | KC01356.000_S01 | | |
| No | DATE | AMENDMENT | | | |
| B | 05-07-2023 | INFORMATION UPDATED | | | |
| A | 13-09-2021 | ISSUED FOR REVIEW | | | |





| | | | | | | | | |
|--|------------------------|--|--------------------------|--|-----|--|--|----------------|
| | PARKS AND RECREATION | | LOCATION BOUNDARY | | PSP | PRINCIPAL SHARED PATH (PSP) | | GRADIENT ARROW |
| | PUBLIC PURPOSE | | DISTANCE FROM LOCATION | | | OTHER SHARED PATH (SHARED BY PEDESTRIANS & CYCLISTS) | | TRAFFIC LIGHT |
| | ROAD | | LOCAL GOVERNMENT NAME | | | GOOD ROAD RIDING ENVIRONMENT | | |
| | STREET NAME | | LOCAL AUTHORITY BOUNDARY | | | PERTH BICYCLE NETWORK (PBN) - CONTINUOUS SIGNED ROUTES | | |
| | RAILWAY | | HAMMOND PARK SUBURB | | | BICYCLE LANES OR SEALED SHOULDER EITHER SIDE | | |
| | ROAD BRIDGE, UNDERPASS | | | | | | | |

LEGEND

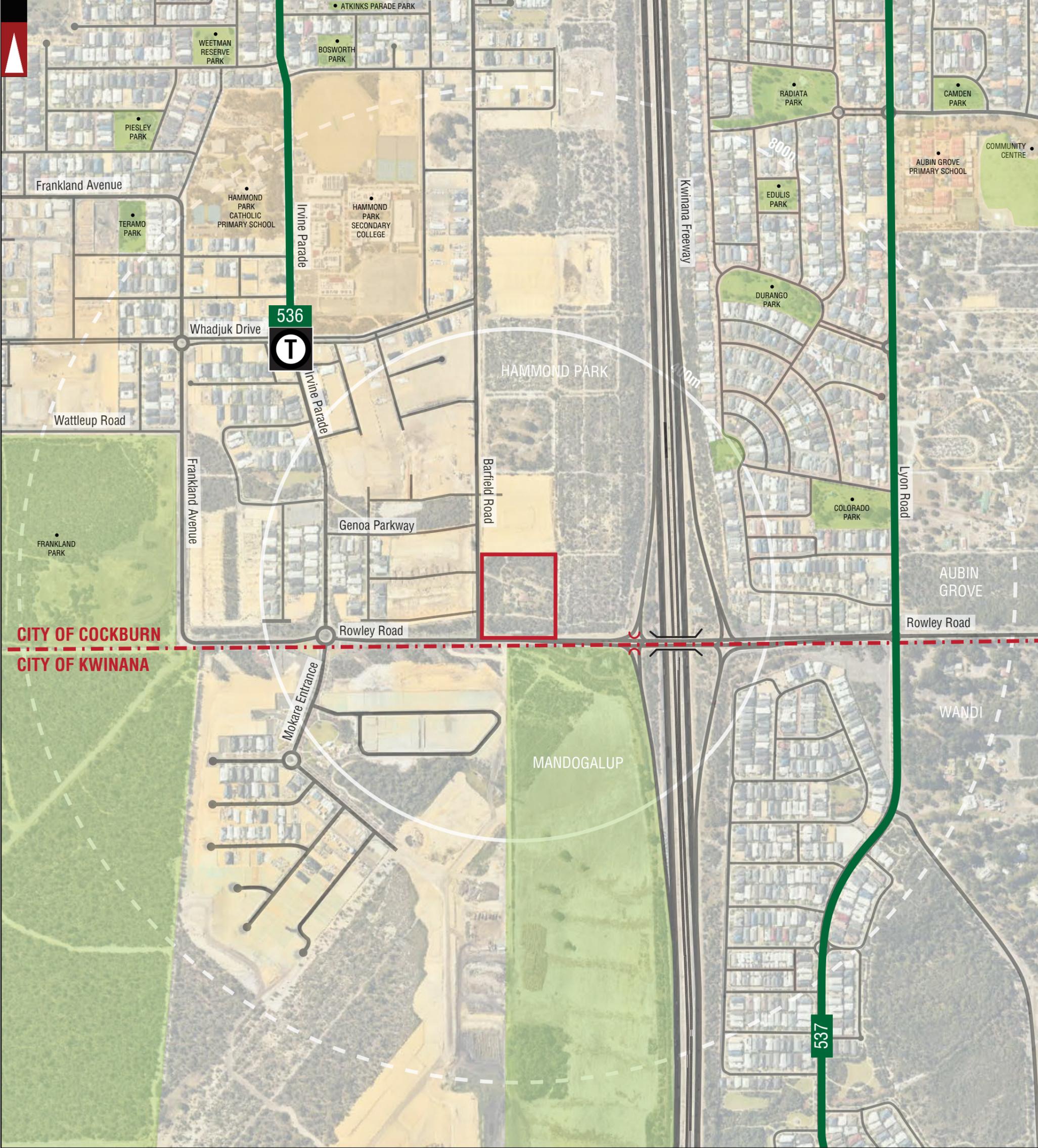
Drawn by: **Civil & Traffic Engineering Consultants KCTT** (Trading as KC Traffic and Transport Pty Ltd)
 PO Box 1456 Scarborough WA 6922

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 WEB: www.kctt.com.au

| No | DATE | AMENDMENT |
|----|------------|---------------------|
| B | 05-07-2023 | INFORMATION UPDATED |
| A | 13-09-2021 | ISSUED FOR REVIEW |

| | |
|-----------------|--|
| PROJECT: | LOT 301 (NO 221) BARFIELD ROAD, HAMMOND PARK |
| TITLE: | BICYCLE NETWORK PLAN - 800M RADIUS |
| DRAWING NUMBER: | KC01356.000_S02 |

DRAWN BY: J.S.



| | | | | | |
|--|------------------------|--|--------------------------|--|------------------|
| | PARKS AND RECREATION | | LOCATION BOUNDARY | | BUS ROUTES |
| | PUBLIC PURPOSE | | DISTANCE FROM LOCATION | | BUS ROUTE NUMBER |
| | ROAD | | LOCAL GOVERNMENT NAME | | BUS TERMINUS |
| | STREET NAME | | LOCAL AUTHORITY BOUNDARY | | |
| | RAILWAY | | HAMMOND PARK SUBURB | | |
| | ROAD BRIDGE, UNDERPASS | | | | |

NOTE : FOR MORE INFORMATION REGARDING THE DESCRIPTION OF BUS ROUTES AND THEIR INDICATIVE PEAK AND OFF-PEAK FREQUENCIES REFER TO THE TIS REPORT.

LEGEND

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 PO Box 1456 Scarborough WA 6922

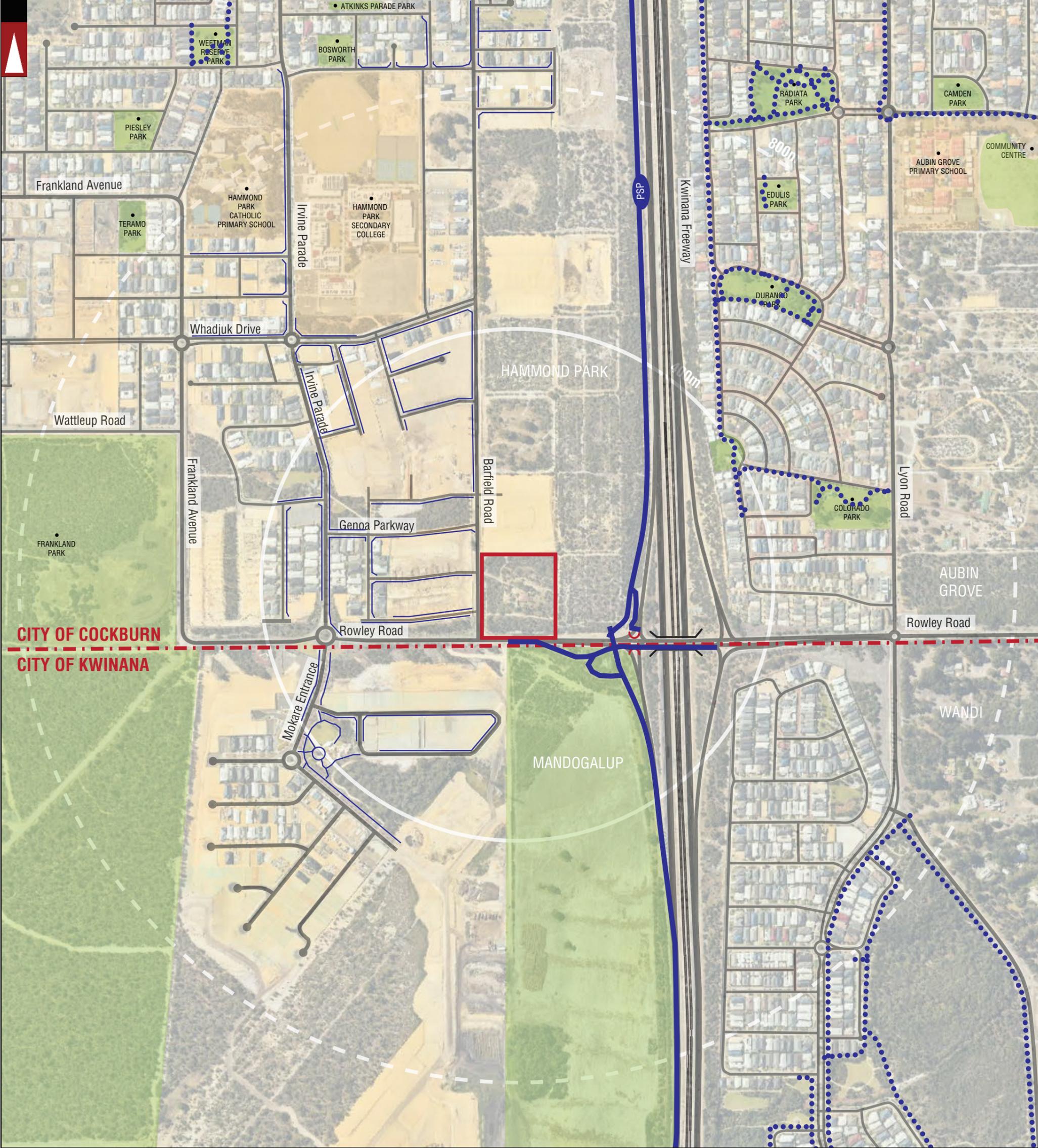
J.S.

PH: 08 9441 2700
 WEB: www.kctt.com.au

| No | DATE | AMENDMENT |
|----|------------|---------------------|
| B | 05-07-2023 | INFORMATION UPDATED |
| A | 13-09-2021 | ISSUED FOR REVIEW |

| | |
|-----------------|--|
| PROJECT: | LOT 301 (NO 221) BARFIELD ROAD, HAMMOND PARK |
| TITLE: | PUBLIC TRANSPORT PLAN - 800M RADIUS |
| DRAWING NUMBER: | KC01356.000_S03 |





| | | | | | |
|--|------------------------|--|--------------------------|--|--|
| | PARKS AND RECREATION | | LOCATION BOUNDARY | | HIGH QUALITY SHARED PATH |
| | PUBLIC PURPOSE | | DISTANCE FROM LOCATION | | OTHER SHARED PATH (SHARED BY PEDESTRIANS & CYCLISTS) |
| | ROAD | | LOCAL GOVERNMENT NAME | | PEDESTRIAN PATH |
| | STREET NAME | | CITY OF COCKBURN | | |
| | RAILWAY | | LOCAL AUTHORITY BOUNDARY | | |
| | ROAD BRIDGE, UNDERPASS | | HAMMOND PARK SUBURB | | |

LEGEND

DRAWN BY: **Civil & Traffic Engineering Consultants KCTT** (Trading as KC Traffic and Transport Pty Ltd)
 PO Box 1456 Scarborough WA 6922

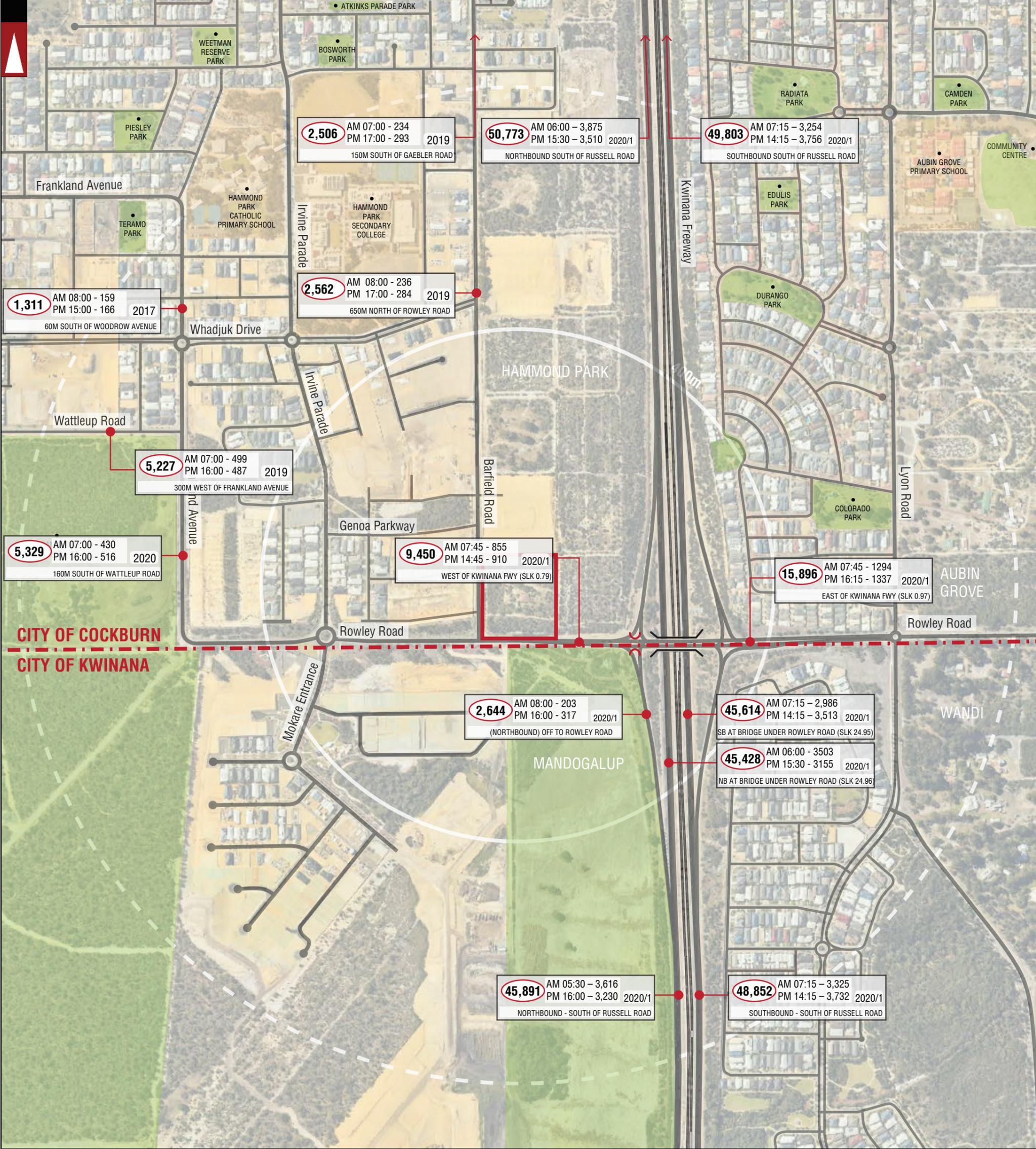
J.S.

PH: 08 9441 2700
 WEB: www.kctt.com.au

| No | DATE | AMENDMENT |
|----|------------|---------------------|
| B | 05-07-2023 | INFORMATION UPDATED |
| A | 13-09-2021 | ISSUED FOR REVIEW |

| | |
|-----------------|--|
| PROJECT: | LOT 301 (NO 221) BARFIELD ROAD, HAMMOND PARK |
| TITLE: | PEDESTRIAN PATHS PLAN - 800M RADIUS |
| DRAWING NUMBER: | KC01356.000_S04 |





| | | | | | |
|--|------------------------|--|--------------------------|--|-------------------------------------|
| | PARKS AND RECREATION | | LOCATION BOUNDARY | | NUMBER OF VEHICLES PER DAY |
| | PUBLIC PURPOSE | | DISTANCE FROM LOCATION | | NUMBER OF VEHICLES PER AM PEAK HOUR |
| | ROAD | | LOCAL GOVERNMENT NAME | | NUMBER OF VEHICLES PER PM PEAK HOUR |
| | STREET NAME | | CITY OF COCKBURN | | YEAR |
| | RAILWAY | | LOCAL AUTHORITY BOUNDARY | | LOCATION |
| | ROAD BRIDGE, UNDERPASS | | HAMMOND PARK SUBURB | | |

LEGEND

Drawn by: **Civil & Traffic Engineering Consultants KCTT** (Trading as KC Traffic and Transport Pty Ltd)
 PO Box 1456 Scarborough WA 6922

J.S.

PH: 08 9441 2700
 WEB: www.kctt.com.au

| No | DATE | AMENDMENT |
|----|------------|---------------------|
| B | 05-07-2023 | INFORMATION UPDATED |
| A | 13-09-2021 | ISSUED FOR REVIEW |

| | |
|-----------------|--|
| PROJECT: | LOT 301 (NO 221) BARFIELD ROAD, HAMMOND PARK |
| TITLE: | EXISTING TRAFFIC COUNTS - 800M RADIUS |
| DRAWING NUMBER: | KC01356.000_S05 |

PROJECT: LOT 301 (NO 221) BARFIELD ROAD, HAMMOND PARK

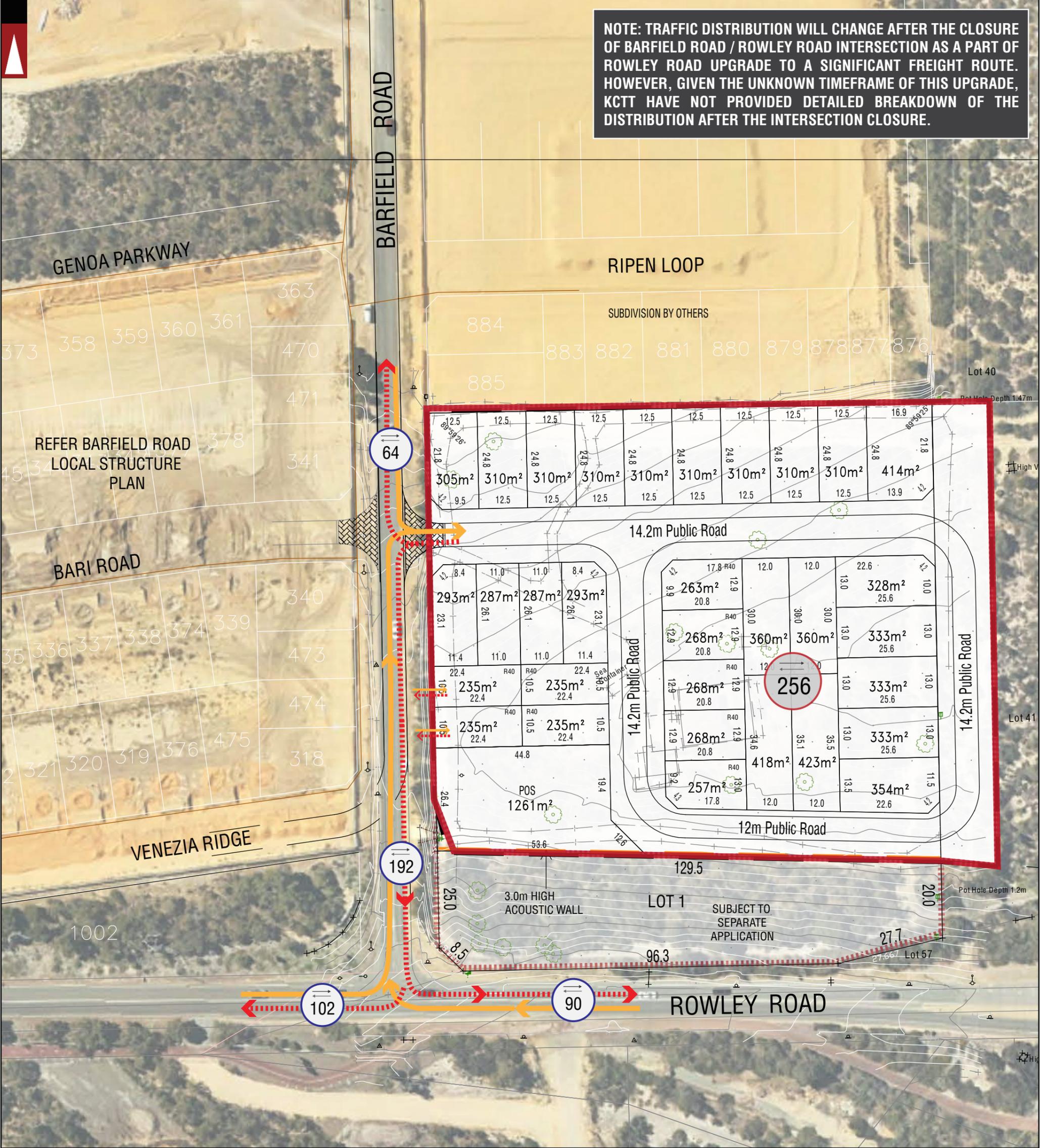
TITLE: EXISTING TRAFFIC COUNTS - 800M RADIUS

DRAWING NUMBER: KC01356.000_S05

DRAWN BY: J.S.

PH: 08 9441 2700
 WEB: www.kctt.com.au

NOTE: TRAFFIC DISTRIBUTION WILL CHANGE AFTER THE CLOSURE OF BARFIELD ROAD / ROWLEY ROAD INTERSECTION AS A PART OF ROWLEY ROAD UPGRADE TO A SIGNIFICANT FREIGHT ROUTE. HOWEVER, GIVEN THE UNKNOWN TIMEFRAME OF THIS UPGRADE, KCTT HAVE NOT PROVIDED DETAILED BREAKDOWN OF THE DISTRIBUTION AFTER THE INTERSECTION CLOSURE.



| | | | | | |
|--|---------------------------|---|--|---|----------------------------|
|  | STRUCTURE PLAN BOUNDARY |  | Total Expected Traffic Generation from the proposed development |  | Traffic Flow IN Direction |
|  | SUBJECT LOCATION BOUNDARY |  | Total Expected Traffic Generation from Subject Site on the specific section of road - IN and OUT direction |  | Traffic Flow OUT Direction |
|  | ROWLEY ROAD | | ROAD NAME | | |

NOTE: THE PLAN IS COURTESY OF DYNAMIC PLANNING

LEGEND

Civil & Traffic Engineering Consultants
KCTT (Trading as KC Traffic and Transport Pty Ltd)
 PO Box 1456 Scarborough WA 6922

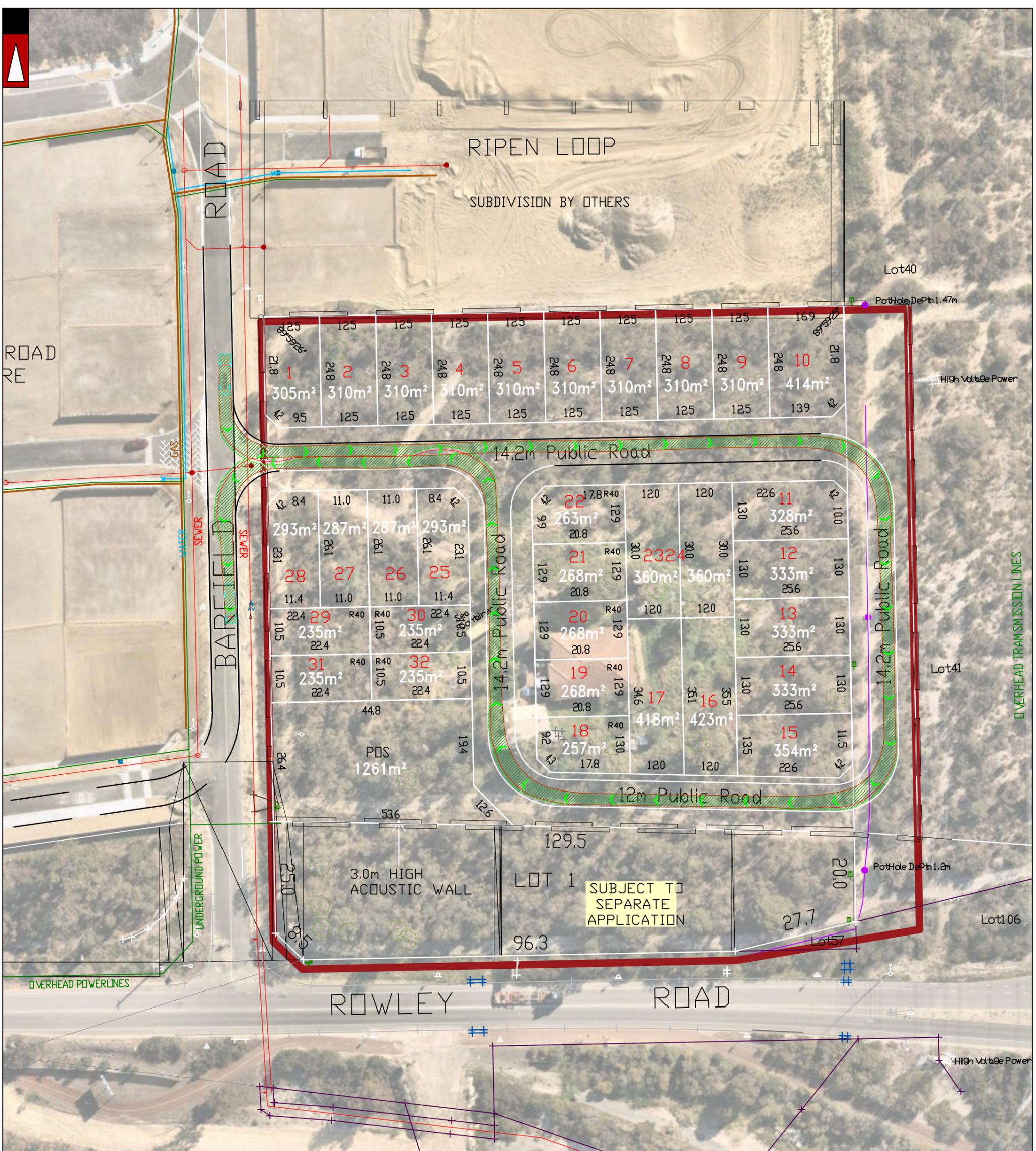
PH: 08 9441 2700
 WEB: www.kctt.com.au



| | | | | | | |
|----|------------|-------------------------|-----------------|--|-----------|--|
| F | 05-07-2023 | PROPOSED LAYOUT AMENDED | PROJECT: | LOT 301 (NO 221) BARFIELD ROAD, HAMMOND PARK | DRAWN BY: | Civil & Traffic Engineering Consultants KCTT (Trading as KC Traffic and Transport Pty Ltd) PO Box 1456 Scarborough WA 6922 |
| E | 27-06-2022 | PROPOSED LAYOUT AMENDED | TITLE: | | | |
| D | 04-02-2022 | PROPOSED LAYOUT AMENDED | DRAWING NUMBER: | KC01356.000_ S06 | | |
| C | 07-12-2021 | PROPOSED LAYOUT AMENDED | | | | |
| No | DATE | AMENDMENT | | | | |

Appendix 3

Vehicle Turning Circle Plan



| | | | | |
|-----------------------------|-------------------------|--------|-----|---|
| | Service Vehicle (8.8 m) | | | |
| | Overall Length | 8.800m | --- | Lot boundary |
| Overall Width | 2.500m | --- | --- | Wheel Path (Forward Vehicle Motion) |
| Overall Body Height | 4.300m | --- | --- | Vehicle Chassis Envelope (Forward Vehicle Motion) |
| Min Body Ground Clearance | 0.427m | --- | --- | Wheel Path (Reverse Vehicle Motion) |
| Track Width | 2.500m | --- | --- | Vehicle Chassis Envelope (Reverse Vehicle Motion) |
| Lock to Lock Time | 4.00s | | | |
| Kerb to Kerb Turning Radius | 12.500m | | | |

MANAGEMENT SYSTEMS REGISTERED TO ISO 9001

| | | | PROJECT: | DRAWN BY: |
|----|------|-----------|--|--|
| | | | Lot 301 (No 221) Barfield Road, Hammond Park | Civil & Traffic Engineering Consultants Suite 7 No 10 Whipple Street Balcatta WA 6021 |
| | | | TITLE: | N.M. |
| | | | Vehicle Turning Circle Plan - Service Vehicle (8.8m) | |
| | | | DRAWING NUMBER: | |
| NO | DATE | AMENDMENT | KC01356.000_S20 | PH: 08 9441 2700 WEB: www.kctt.com.au |



APPENDIX 9

Landscape Concept Plan

NOTES
 ALL DRAWINGS TO BE READ IN COLOUR.
 ALL COMPLETED WORKS TO BE PROTECTED AND MAKE GOOD ANY DAMAGE TO EXISTING WORKS CAUSED AS PART OF THIS CONTRACT. ALL WORK WITHIN DRIP LINES OF EXISTING TREES IS TO BE DONE BY HAND.
 WHERE MIXED PLANTING IS PROPOSED PLANT IN GROUPS OF 3, 5 OR 7 OF THE SAME SPECIES.
 ALL LANDSCAPE PLANTING IS TO BE IRRIGATED AND MANAGED AS 'LOW THREAT' IN ACCORDANCE WITH BUSHFIRE MANAGEMENT PLAN REQUIREMENTS.

- EXTENT OF WORKS
- ⊕ PROPOSED TREE
- ▨ PLANT MIX 1
- ▩ PLANT MIX 2
- ⊕⊕ PLANT MIX 3
- ▽ TURF
- ◻ CONCRETE PAVING
- MOWING EDGE
- ▭ SHADE SHELTER WITH PICNIC SETTING

Plant Schedule

| Symbol | Botanical Name | Pot Size |
|--------------------|---------------------------------|-----------------|
| TREES | | |
| Ema | <i>Eucalyptus marginata</i> | 45L |
| Bat | <i>Bankisia attenuata</i> | 45L |
| Eer | <i>Eucalyptus erythrocorys</i> | 45L |
| PLANT MIX 1 | | |
| Hpu | <i>Hemiandra pungens</i> | Forrestry Tubes |
| Ahu | <i>Anigozanthos humilis</i> | Forrestry Tubes |
| Bni | <i>Bankisia nivea</i> | Forrestry Tubes |
| PLANT MIX 2 | | |
| Hco | <i>Hardenbergia comptoniana</i> | Forrestry Tubes |
| Cca | <i>Conostylis candicans</i> | Forrestry Tubes |
| Dli | <i>Dampiera linearis</i> | Forrestry Tubes |
| PLANT MIX 3 | | |
| Kpr | <i>Kennedia prostrata</i> | Forrestry Tubes |
| Tmu | <i>Thysanotus multiflorus</i> | Forrestry Tubes |
| Hra | <i>Hibbertia racemosa</i> | Forrestry Tubes |

NOT FOR CONSTRUCTION

| | | |
|---|------------|------------------|
| C | 27/11/2023 | ISSUE FOR REVIEW |
| B | 29/09/2023 | ISSUE FOR REVIEW |
| A | 21/09/2023 | ISSUE FOR REVIEW |


NORTH
↑

PROJECT: LOT 301 BARFIELD ROAD
 CLIENT: BLOKK PROPERTY
 PROJECT STAGE: CONCEPT

| | | | | |
|--------------|-----------|-------------|---------------------|----------------|
| DESIGNED: SN | DRAWN: SN | CHECKED: PJ | PROJECT No: 4864-23 | ORIG. SIZE: A1 |
|--------------|-----------|-------------|---------------------|----------------|

DRAWING TITLE: **LANDSCAPE PLAN**

SCALE: 1:250 @ A1

L1-1




BARFIELD ROAD

ACOUSTIC WALL