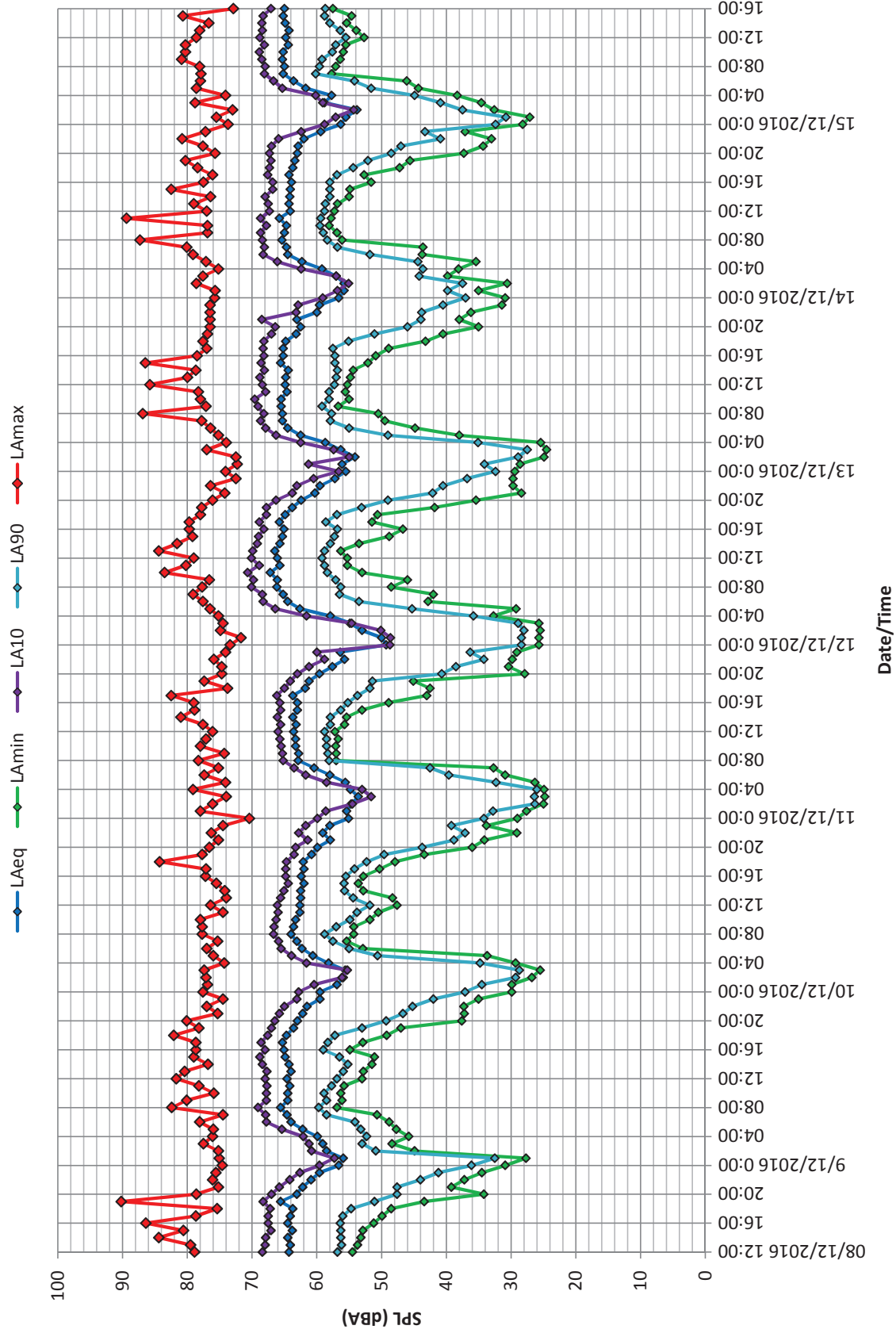


APPENDIX B

NOISE MONITORING RESULTS

LOT 1354 GNH - MONITORING LOCATION A (Adjacent to GNH)



Herring Storer Acoustics

Date : 12 January 2016

Job No : 16264

Document Set ID: 8334543

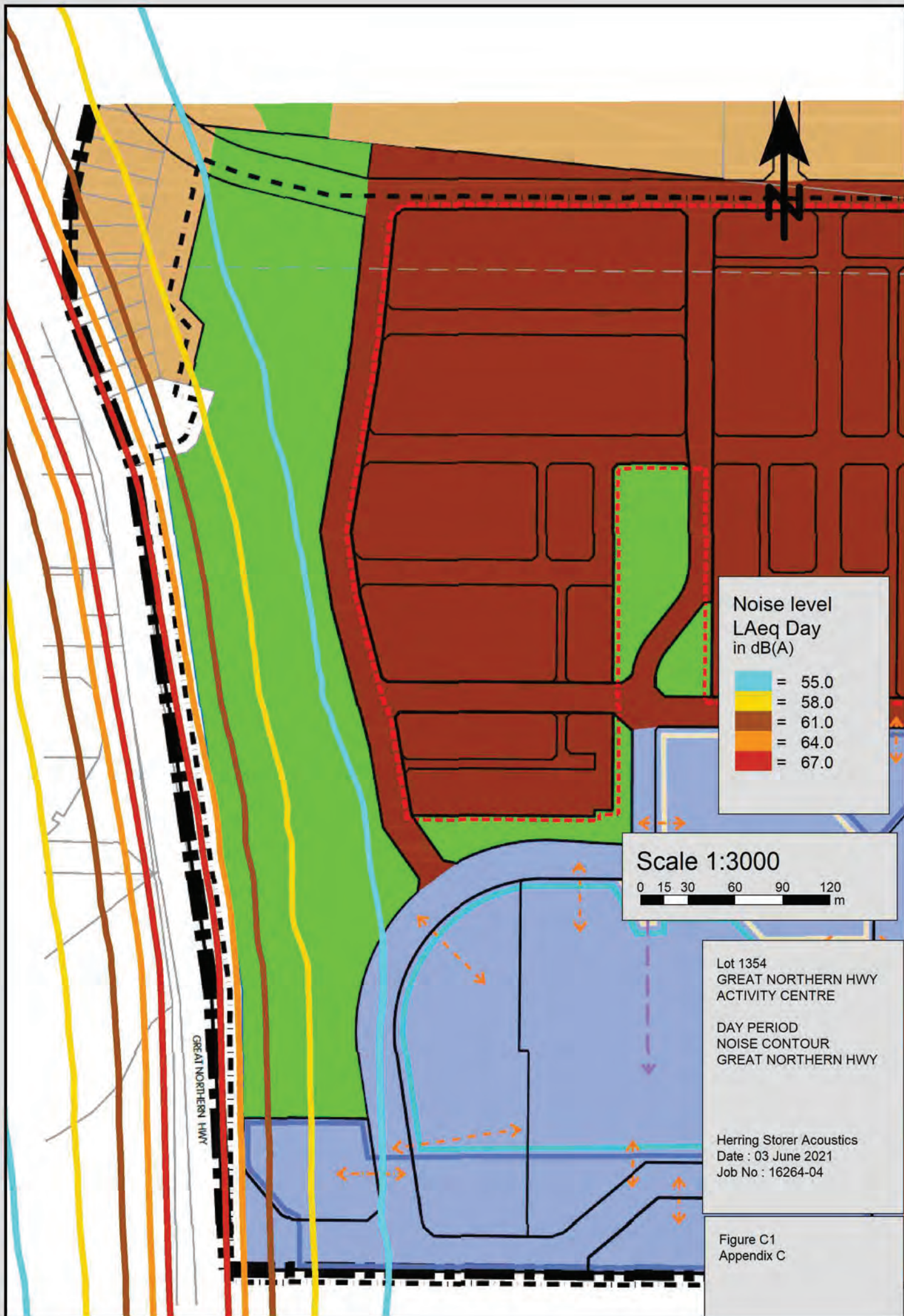
Version: 1, Version Date: 30/10/2024

Figure B1

Appendix B

APPENDIX C

$L_{Aeq(16hr)}$ DAY PERIOD NOISE CONTOURS



APPENDIX D

MRWA TRAFFIC DATA

2016 ROM24 Scenario - Link Volume Plot for Great Northern Hwy, Bullsbrook Noise Assessment

LAND USE SCENARIO: MLUFS Version 1.4

All Day

MODEL ASSUMPTIONS

NETWORK: 2016 ROM24 Network (20-Year Road Network Development Plan)

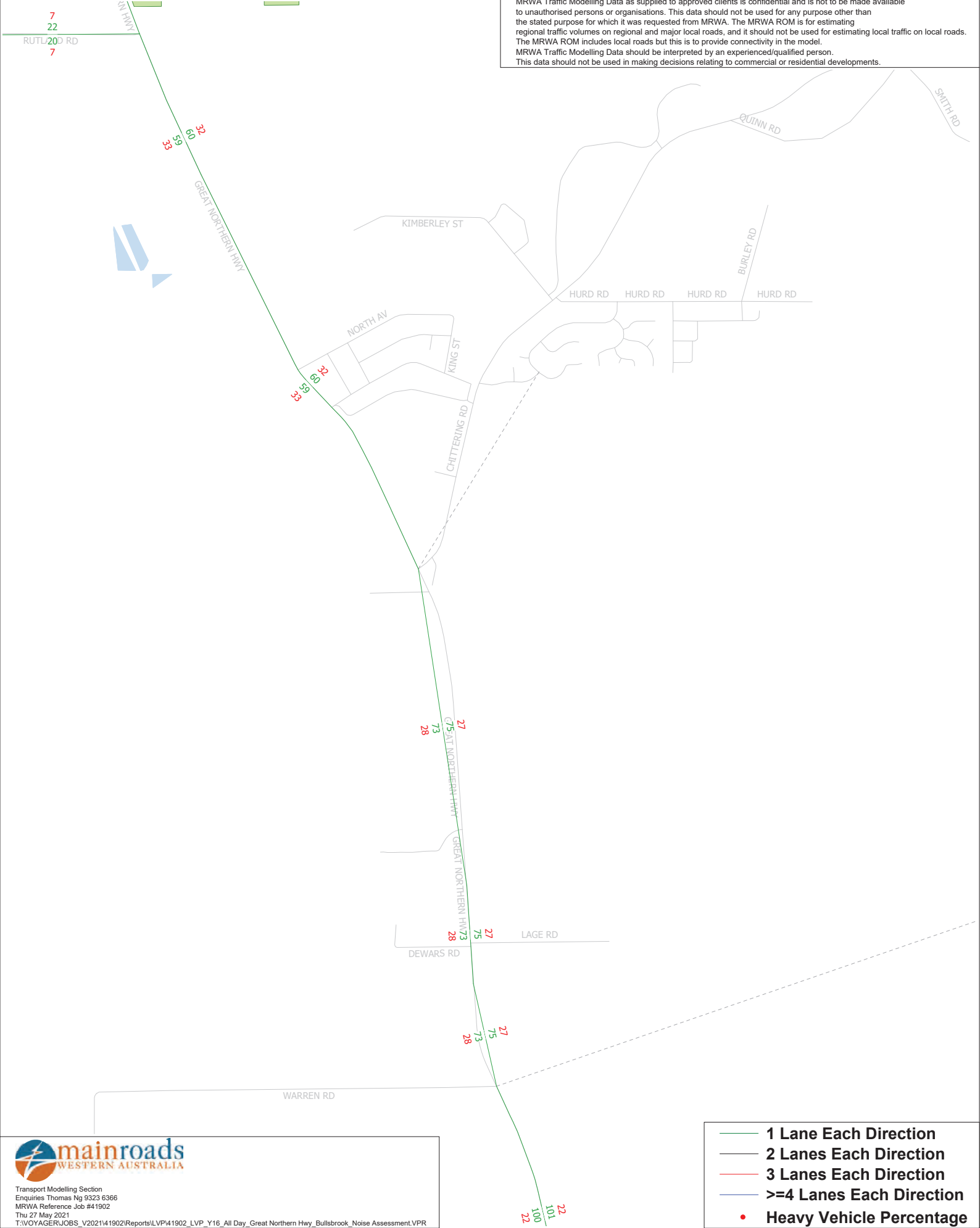
LAND USE: 2016 MLUFS Land Use (Version 1.4 - August 2018)

ROM24 Multi-Modal Model V4.40

24-Hour Traffic Volumes (Factor X 100)

Terms & Conditions :

MRWA Traffic Modelling Data as supplied to approved clients is confidential and is not to be made available to unauthorised persons or organisations. This data should not be used for any purpose other than the stated purpose for which it was requested from MRWA. The MRWA ROM is for estimating regional traffic volumes on regional and major local roads, and it should not be used for estimating local traffic on local roads. The MRWA ROM includes local roads but this is to provide connectivity in the model. MRWA Traffic Modelling Data should be interpreted by an experienced/qualified person. This data should not be used in making decisions relating to commercial or residential developments.



Transport Modelling Section
Enquiries Thomas Ng 9323 6366
MRWA Reference Job #41902
Thu 27 May 2021
T:\VOYAGER\JOBS_V2021\41902\Reports\LVP\41902_LVP_Y16_All Day_Great Northern Hwy_Bullsbrook_Noise Assessment.VPR

MRWA ROM24 Base Network - Version 2014

MRWA Transport Modelling Data as supplied to approved clients is confidential and is not to be made available to unauthorised persons or organisations

2041 ROM24 Scenario - Link Volume Plot for Great Northern Hwy, Bullsbrook Noise Assessment

LAND USE SCENARIO: MLUFS Version 1.4

All Day

MODEL ASSUMPTIONS

NETWORK: 2041 ROM24 Network (20-Year Road Network Development Plan)

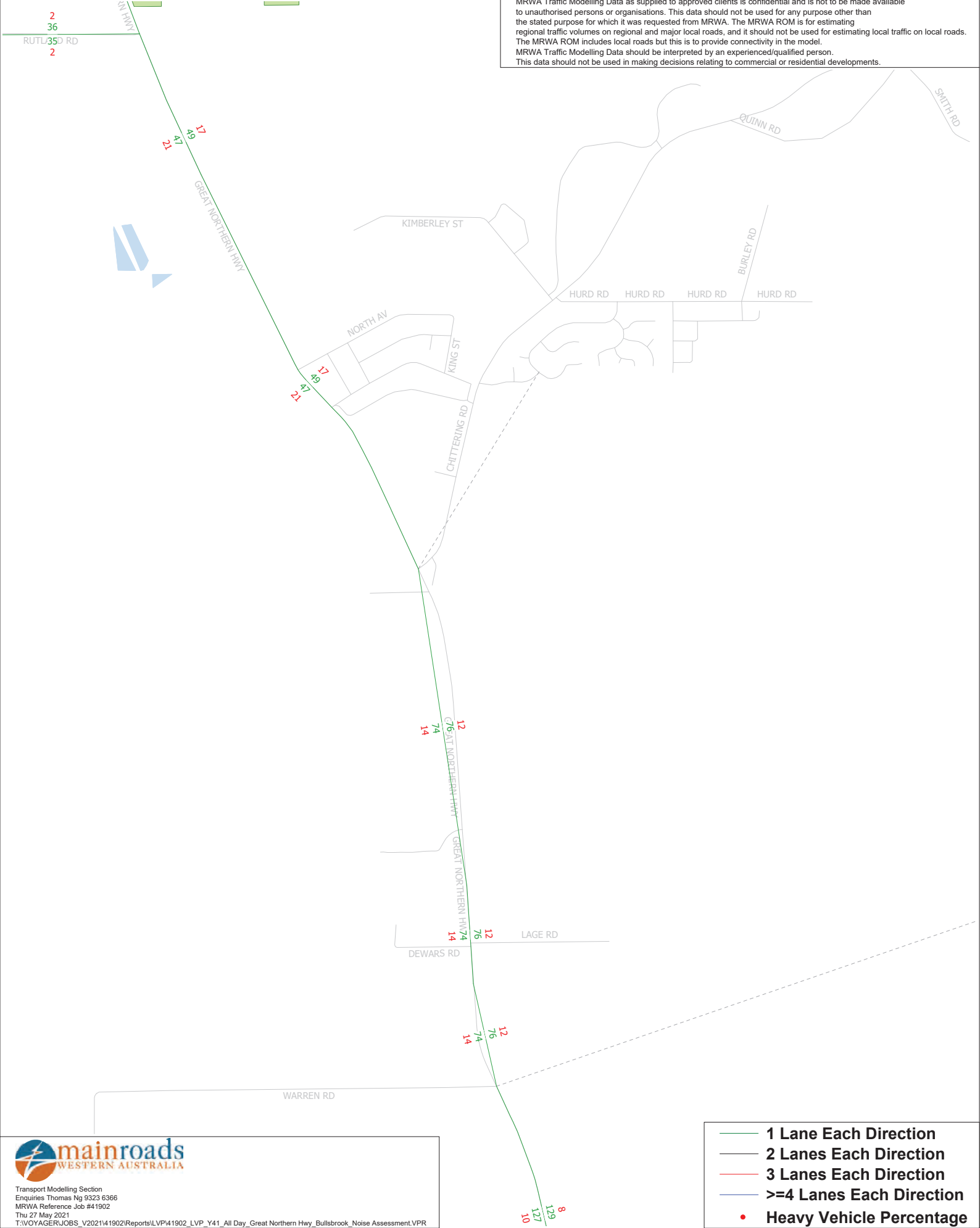
LAND USE: 2041 MLUFS Land Use (Version 1.4 - August 2018)

ROM24 Multi-Modal Model V4.40

24-Hour Traffic Volumes (Factor X 100)

Terms & Conditions :

MRWA Traffic Modelling Data as supplied to approved clients is confidential and is not to be made available to unauthorised persons or organisations. This data should not be used for any purpose other than the stated purpose for which it was requested from MRWA. The MRWA ROM is for estimating regional traffic volumes on regional and major local roads, and it should not be used for estimating local traffic on local roads. The MRWA ROM includes local roads but this is to provide connectivity in the model. MRWA Traffic Modelling Data should be interpreted by an experienced/qualified person. This data should not be used in making decisions relating to commercial or residential developments.



Transport Modelling Section
Enquiries Thomas Ng 9323 6366
MRWA Reference Job #41902
Thu 27 May 2021
T:\VOYAGER\JOBS_V2021\41902\Reports\LVP\41902_LVP_Y41_All Day_Great Northern Hwy_Bullsbrook_Noise Assessment.VPR

MRWA ROM24 Base Network - Version 2014

MRWA Transport Modelling Data as supplied to approved clients is confidential and is not to be made available to unauthorised persons or organisations

- 1 Lane Each Direction
- 2 Lanes Each Direction
- 3 Lanes Each Direction
- >=4 Lanes Each Direction
- Heavy Vehicle Percentage

APPENDIX F

Servicing Report

JDSI

Submission to Okeland Communities

SERVICING REPORT Bullsbrook Landholdings Revised Bullsbrook Central Structure Plan



JDS15920

Aug 2021

INTEGRITY

We are open, honest, and consistent in our principles and conduct, so we're able to build trusted relationships with our clients and partners.

RESPECT

We treat everyone with respect and dignity and develop relationships founded on understanding and trust.

ACCOUNTABILITY

We always assume responsibility for our actions and make decisions in line with our economic, social, and ethical obligations.

EXCELLENCE

We pursue excellence in everything we do, challenging ourselves to look beyond the obvious and ensure ongoing improvement.

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1 Introduction

The Bullsbrook Landholdings (the development) is located approximately 40km north east of the Perth CBD. The site is located between the existing RAAF Pearce Airbase and the Darling Scarp, delineated by Great Northern Highway and Chittering Road to the west and Taylor Road to the east.

Okeland owns approximately 269 hectares with a planned total development yield of 2500+ residential lots.

This report has been prepared by JDSi Consulting Engineers to assist Okeland Communities with the Revised Bullsbrook Central – Local Structure Plan. It summarises the results of a review of the civil engineering issues which have influenced the form of the concept plan and which are related to the future servicing of the residential development of the concept plan area.

The key objectives of this report are to highlight:

- ▶ Existing infrastructure assets.
- ▶ Advise on infrastructure requirements for the planned development.
- ▶ Demonstrate the development can be serviced in the short to medium term.
- ▶ Advise on the implementation of key infrastructure requirements.
- ▶ Existing road networks and planned road networks are capable of supporting residential development in the short to medium term.

It is proposed the site will be developed for residential and Town Centre purposes with the specific aim of delivering an estate that achieves housing density targets aligned with the WAPC strategic directions for the region, as outlined in the “Sub Regional Structure Plan” documents. This includes the provision of residential, transitional and residential rural lifestyle lots in conjunction with primary schools, commercial retail centres and district recreation facilities.

This report has been based on the civil engineering aspects of urban land uses. The report covers the engineering infrastructure requirements to service the proposed development. The engineering review has covered earthworks, roads, stormwater drainage and utility services with a particular emphasis on outlining how all major utility services will be available once the rezoning of the landholding has been completed. This report will outline completed studies or studies currently underway and show that utility services are not an impediment on the development.

The investigations and preparation of the report are largely based on preliminary advice from the various service authorities. The information is current as of August 2021 and is subject to change as development proceeds in the Perth north east corridor resulting in the extension of service infrastructure and the creation of new capacity.

2 The Study Area

The development Study Area has a total land area of approximately 254.6 hectares. This site is located to the east of Great Northern Highway and south of the existing Bullsbrook townsite.

The Study Area is predominantly cleared open pasture with confined areas of trees and vegetation. The KI-IT Brook flows from the east/Darling Scarp through the west side of the landholding and under the Great Northern Highway via a bridge.

2.1 Topography

The land is located at the foothills of the Darling Scarp and is generally steep in nature with contours ranging from RL45 to the west to RL110 to the east. The RL110 is along the boundary adjacent to the neighbouring land holdings.

2.2 Ground Conditions

The following is a summary of the investigative reporting provided by Galt Geotechnical Consultants and is an overview of the likely soil types that will be encountered and proposed remedial measures;

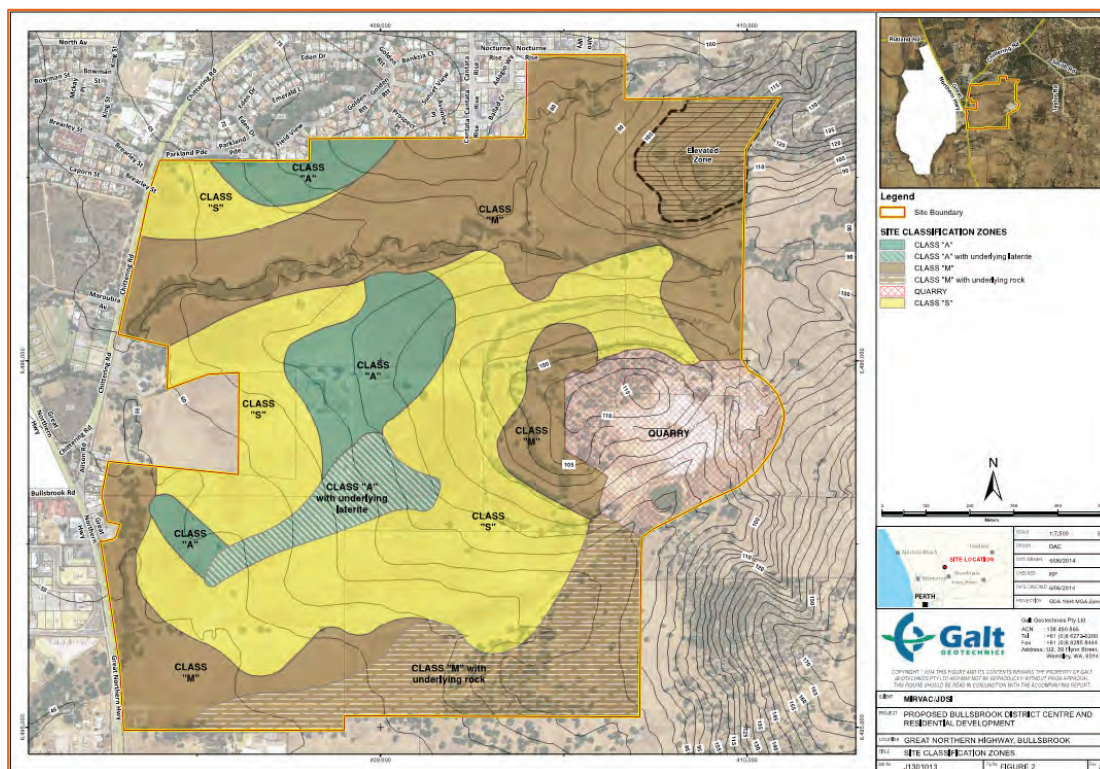
The Muchea sheet of the 1:50,000 scale Environmental Geology series of maps shows that the site is underlain by a variety of soil and rock types. The western part comprises mainly soil deposits while the eastern part of underlain by shallow rock and rock outcrop. The following notes are relevant:

1. Generally, soils over the western portion of the site are sandy overlaying clay/sandy clay. Test trenches were excavated to depths of 2.5m, typically with 0.5 to 1.0m of sand/gravelly sand cover.
2. Generally, soils over the eastern portion of the site are clays/clayey sand overlaying rock (siltstone/gravel/gneiss). Test trenches were refused at depths of 1.1 to 2.0m.
3. The soils are generally moderate to high reactive clay/clays soils with high percentage fines and low permeability.
4. The site is predominantly classed as M and S with some existing class A in the northern portion of the site.
5. The general remediation suggested is:
 - ▶ Strip 100mm topsoil and grub, remove deleterious material.
 - ▶ All excavated sand shall be reused as inert structural fill. The underlying clayey sand can be used for bulk fill (non structural) only.
 - ▶ Proof roll and lay inert clean structural fill with less than 5% fines at depths relevant to required classifications (>1.8m fill for class A, 1-1.8m fill for class S).
6. For areas where subgrade has >0.5m inert structural fill a CBR of 12 can be adopted for pavement design.
7. Drainage can be managed via infiltration only where clean sandy fill is present to a depth of 1.2m.

We would recommend that an allowance is made to fill the class M areas of the site by either 0.7m or 1.5m respectively to achieve class S or A classifications in accordance AS2870-2011 "Residential Slabs and Footings". This is based on the conservative assumption there is an average of 300mm of sandy fill overlaying the site. Ultimately this will have to be confirmed by intrusive geotechnical investigations.

Furthermore, detailed geotechnical work will be required at the time of land subdivision to confirm the assumptions and resulting building site classifications.

Refer to Galt Geotechnics drawing J1301013 002 R Rev1 (05 October 2015) for Preliminary Site Classification.



3 Wastewater

The Water Corporation advised JDSi that the development is located within the current scheme planning and a connection to gravity sewer has been provisioned for. The following provides a summary of the current advice.

The existing Bullsbrook wastewater treatment plant (WWTP) currently only caters for the existing urban zoned land within the Bullsbrook area and is currently close to full capacity. The Water Corporation is monitoring flows to the WWTP.

The Water Corporation has recently advised that the WWTP will be converted into a major transfer station with the additional flows created by the landholdings being rezoned to be pumped from Bullsbrook to Ellenbrook via a major transfer pipeline. The Water Corporation has advised that this project should be completed by mid 2023.

The land which is the subject of this report will require a pump station which is currently being designed, to be located within the south west corner of the site, adjacent to the future town centre. At a recent meeting with the Water Corporation they confirmed this pump station is on their capital works program. JDSi has received the information pack from the Water Corporation and has begun the scoping report design of this pump station. It is anticipated this pump station will be commissioned by FY22 at the latest. JDSi can confirm that servicing the landholdings via gravity sewer is possible and is not an impediment to development.



4 Water Supply

The Water Corporation has advised JDSi that the development is located within the current scheme planning and a connection to water reticulation has been provisioned for under an upgrade of the existing infrastructure located within Great Northern Highway (GNH). The following provides a summary of the advice.

The WC have recently completed the planning study for the delivery of additional water services to the Bullsbrook area. This included supply to the residential area on the eastern side of Great Northern Highway and Chittering Road including the proposed development site. WC advised that supply to the project area would be via a new DN300 distribution main between Great Northern Highway and Hurd Road installed to the west of the site along Chittering Road.

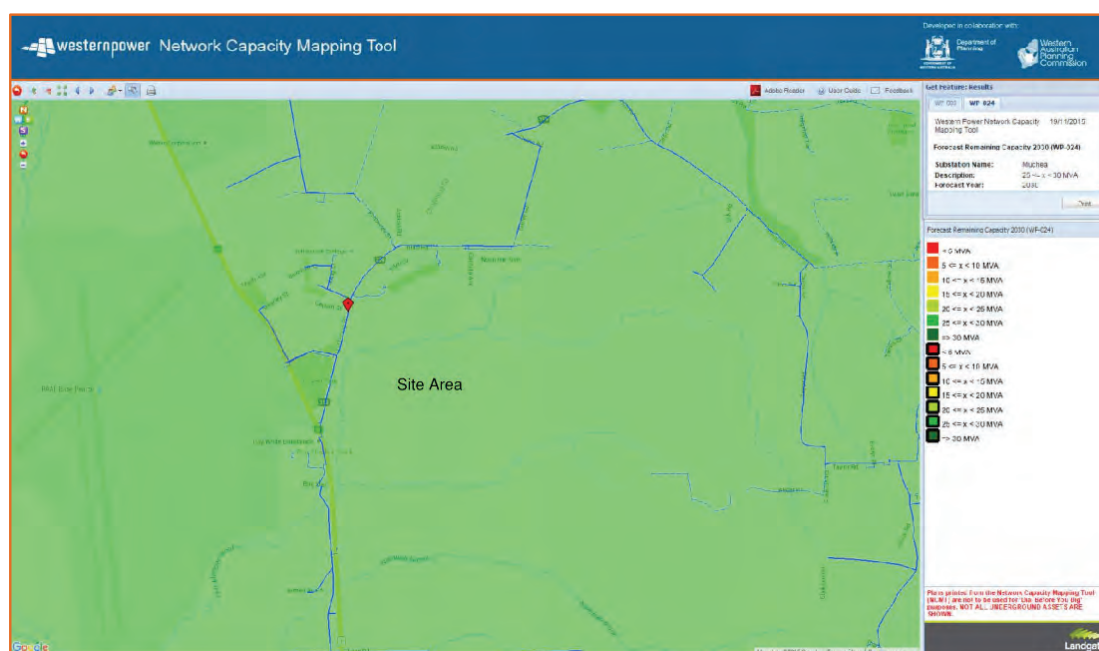
Provision of the new distribution main would include the installation of a new high level tank with 2km of DN300 inlet mains and associated pump station to convey the water from the existing Bullsbrook tank to a new tank and 2km of DN350 outlet mains to distribute the water back down to Chittering Road. JDSi can confirm that servicing the landholdings for water reticulation is possible and is not an impediment to development.

5 Power Supply

The Distribution network in this area currently provides power supply to mostly large rural lots. These lots are serviced by an existing three phase 22kV high voltage aerial network with small, lightly loaded pole top transformers. These feeders emanate from the Muchea substation. The development site is located approximately 20km south east of the Muchea 132kV / 22kV zone substation.

It will be a requirement that all existing aerial distribution lines are converted to underground cables within and bordering this development. Western Power's Network Capacity Mapping Tool indicates that there is enough capacity to feed the estimated ultimate 2500+ lots. JDSi can advise that a feasibility study was recently undertaken that indicates the remaining capacity on the existing 22kV feeder adjacent to the development was approximately 4MVA. Beyond the initial supply, reinforcement of the upstream 22kV feeder line, and voltage regulator may also be required. The development will also require a number of transformers, switchgear units and associated low voltage cable and pillar infrastructure to service the lots.

An extract below from Western Power Network Capacity Mapping Tool indicates that the forecast 2030 capacity for the area will be between 20 to 30 MVA.



6 Gas Supply

The Bullsbrook area currently has no reticulated gas network. Reticulated gas is not considered to be an essential service and as such is not required as a condition of subdivision. It is usual practice to install gas reticulation network for the subdivision within a common civil trench at no cost to the developer. If there is an extension required to connect to the nearest high pressure gas main the developer will be required to pay for the trenching to the gas main as a headworks cost.

The nearest high pressure mains are located some 13km away to the south in Ellenbrook and has recently been incorporated within ATCO's capital works programme. The timing for the gas main extension will coincide with the construction of Stock Road.

It is recommended consideration be given to the option of the developer funding the installation of a "dormant" internal gas network to the subdivision vested with ATCO Gas that could be connected into ATCO mains at some point in the future. ATCO have agreed in principle to assess such a proposal and ensure the design meets with ATCO standards.

JDSi recently contacted ATCO to obtain updated information. ATCO has advised that they have received construction costs of the new main from Ellenbrook to Bullsbrook and are confirming timing of portions of the main to begin construction in early 2022.



7 Telecommunications

JDSi has approached the national broadband installation initiative, NBN Co. to determine if the development site is located within the NBN rollout footprint. NBN Co. has advised that the development can be serviced from their existing infrastructure in the vicinity of the site. They have advised that they already have permanent equipment in the Bullsbrook exchange as well as a live network as part of the Bullsbrook Landing development.

As the development is close to the Bullsbrook exchange, NBN Co. has confirmed that there is no requirement for backhaul charges for the development.

The NBN standard process will apply to this development and therefore an application from the developer will be required prior to NBN Co commencing feasibility assessment process to provide early planning information and costing of any backhaul link.

After NBN connectivity for the development has been established at the boundary of the development, connections of subdivision lots to the network will thereafter be managed stage by stage. NBN deployment contribution fees of \$600 per premises for Single Dwelling Unit lots and \$400 per premises for Multi Dwelling Unit lots will apply.

8 Roads and Traffic

This site is located between the existing RAAF Pearce Airbase and the Darling Scarp, delineated by Great Northern Highway (GNH) and Chittering Road to the west and Taylor Road to the east. The site has excellent access to road transport infrastructure.

Chittering Road is the main connector to the local road network. It has direct access to the primary distributor for the area, the Great Northern Highway, and also acts as a district bypass providing northward connections to the regional suburbs of Western Australia between Bullsbrook and Chittering before reconnecting to GNH at Lake Chittering.

The Great Northern Highway provides the southwards road connection to the Perth Metropolitan Area. It also provides the northwards connection to the rest of Western Australia.

The Tonkin Highway extension / Perth Darwin National Highway (PDNH) has recently been completed and is the new long term transport route between the Perth Metropolitan Area and Northwest of Western Australia. This new road has reduced traffic loads on the Great Northern Highway. The new highway is located approximately 3.5km to the west of the development site.

The traffic movement patterns for the Bullsbrook area have changed substantially due to the construction of the new highway with most heavy vehicle traffic moving to PDNH from GNH. This change has reduced the movements of heavy vehicles adjacent to the development site, will promote improved traffic conditions for local vehicles and enhance the attraction of the development as the new residential townsite for Bullsbrook.

8.1 Existing Traffic Conditions

The site is bounded on two sides by existing roads, namely:

1. The Great Northern Highway lies on the western side of the development site and this road is classified as a primary distributor under the Perth metropolitan road hierarchy and is the national highway linking Perth and Darwin. The road is currently constructed as a two lane undivided paved highway with various passing lanes and turning pockets associated with intersections. The existing intersections are treated as intersections with low volume local roads.
2. Chittering Road lies on the western side of the development site and this road is classified as a district distributor B under the Perth metropolitan road hierarchy. The road is currently constructed as a two lane undivided paved road with various turning pockets associated with intersections. The existing intersections are treated as intersections with low volume local roads.

8.2 Road and Intersection Improvements

The existing roads will require improvements and upgrades which can be progressively completed to match the rate of development. As the development will be staged, the increase in traffic volumes on the GNH and Chittering Road can be managed. This will be achieved by implementing reduced speed zones, provision of controlled accesses along the frontage of the development with the GNH & Chittering Road. This will be achieved by complementing the existing GNH Access Strategy for the connections to GNH and will involve joint liaison with MRWA, the Client and relevant stakeholders.



The internal roads are proposed to be to the City of Swan's standards and are proposed to have 6.0m pavements in 16.0m road reserve for urban access roads, increasing to a 7m pavement within a 23m road reserve for Neighbourhood Connector type roads. Intersections, sweeps/corners, and roundabouts will be designed for vehicle turning movements defined in AUSTROADS design guidelines.

The subdivision roads within the development area will need to be constructed in accordance with the IPWEA Subdivision Guidelines and read in conjunction with the City of Swan's subdivisional "Guidelines and Standards". All internal roads are owned and maintained by the City of Swan.

9 Drainage

Urban Water Management (UWM) is now a key part of any development process incorporating principles of integrating water and land use planning, considering all water sources in water planning, integrating water use and natural water processes and a total catchment integration of natural resource use and management (Ref. Stormwater Management Manual for Western Australia, DOW, April 2004 the State Water Strategy 2003 and the State Water Plan 2007).

Stormwater drainage management is a major component of an overall UWM strategy for which achievement of the principals of the plan may be facilitated through the application of Water Sensitive Urban Design (WSUD) techniques during planning, design and construction of urban development projects. Objectives of WSUD include but are not limited to the following:

- ▶ Detention of stormwater rather than rapid conveyance to maintain pre development flows for quantity management;
- ▶ Use of vegetation for filtering purposes and nutrient stripping for quality management;
- ▶ Use of stormwater to conserve potable water; and
- ▶ Water efficient landscaping.

Currently the main drainage system for the site consists of an existing creek (KI-IT Brook) that runs through the centre of the site and collects and distributes sheet flows from the Darling Scarp. The creek grades from east to west and contains a natural dam towards the centre providing detention and retardation of flows. At the western boundary of the site the creek changes direction and traverses in a north to south direction through a series of existing culverts of varying size beneath the Sacri Church land before being conveyed beneath GNH into the RAAF Pearce Airbase site.

Some of the proposed strategies that will be implemented on the site are:

- ▶ Managing runoff via a piped and pit system within road reserves with outfall into bioretention swales incorporated into POS areas adjacent the existing creek and wetlands/ponds.
- ▶ Lot runoff will be managed via onsite infiltration where it is possible to achieve 1.2m depth of clean permeable sandy soils.
- ▶ Bio retention swales will provide storage and infiltration for the 1 year 1 hour runoff volumes, with overflow into the creek for conveyance into the existing drainage system.
- ▶ Rehabilitation of the KI-IT Creek, including existing floodways / weirs, with upgrading as necessary.
- ▶ Given the natural groundwater level is some distance below existing ground level it is not expected management of a controlled ground water via subsoil drainage will be required.
- ▶ In development areas adjacent to the existing creek with perceived perched water table it is recommended at least 1.2m separation is achieved to finished earthwork levels.



10 Disclaimer

JDSi have undertaken this assessment based on limited information and subsequently assumptions have been made which, if incorrect, have potential to change costs. Major cost implications exist through factors which cannot be assured at this time including upgrading and provision of utility services, WAPC conditions of development, Local Authority Scheme Requirements, ground conditions, timing of adjacent developments, etc.

While JDSi has taken all care in the preparation of the likely development requirements and has noted key assumptions, JDSi accepts no responsibility for the accuracy of this report and provides it only as an indicative summary of engineering requirements.

If any further information is required or should you wish to clarify any issue, please contact our office.

APPENDIX G

Bushfire Management Plan

STRATEGEN JBS&G



Fire Protection
Association Australia
Life, Property, Environment.



Bushfire Management Plan Coversheet

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

Bushfire Management Plan and Site Details

Site Address / Plan Reference: Kingsford Residential Estate

Suburb: Bullsbrook

State: WA

P/code: 6084

Local government area: City of Swan

Description of the planning proposal: Structure Plan and Precinct Plan Application

BMP Plan / Reference Number: 60919/137,082

Version: R03 Rev 4

Date of Issue: 16/06/2021

Client / Business Name: Okeland Communities

Reason for referral to DFES

Yes No

Has the BAL been calculated by a method other than method 1 as outlined in AS3959 (tick no if AS3959 method 1 has been used to calculate the BAL)?

☐ X

Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the BPC elements)?

☐ X

Is the proposal any of the following special development types (see SPP 3.7 for definitions)?

Unavoidable development (in BAL-40 or BAL-FZ)

☐ X

Strategic planning proposal (including rezoning applications)

X ☐

Minor development (in BAL-40 or BAL-FZ)

☐ X

High risk land-use

☐ X

Vulnerable land-use

☐ X

If the development is a special development type as listed above, explain why the proposal is considered to be one of the above listed classifications (E.g. considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

The Structure Plan and Activity Centre Plan constitutes a strategic planning proposal

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

BPAD Accredited Practitioner Details and Declaration

Name

Zac Cockerill

Accreditation Level

Level 2

Accreditation No.

BPAD37803

Accreditation Expiry

31/08/2021

Company

Strategen-JBS&G

Contact No.

(08) 9792 4797

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

Signature of Practitioner

Date 16/06/2021

Okeland Communities
Bushfire Management Plan (Structure Plan and
Precinct Plan)

Kingsford Residential Estate, Bullsbrook

16 June 2021

60919/137,082 (Rev 4)

JBS&G Australia Pty Ltd T/A Strategen-JBS&G

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Appendices

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Appendix D	City of Swan Fire Hazard Reduction Notice (as amended)

1. Introduction

1.1 Background

Okeland Communities is developing Kingsford Residential Estate in Bullsbrook as part of an approved Structure Plan, subdivision and staged clearance process. This version of the strategic level Bushfire Management Plan that was prepared to guide ongoing urban residential development throughout the site (BMP Rev 4) has been updated to capture the proposed Precinct Plan (PP) detail situated in the southern portion of the approved Structure Plan area.

The project area applies to the following properties incorporated within the Structure Plan and PP boundaries:

- Lots 2, 3, 4, 5, 6 and 2510 Great Northern Highway
- Lots 2 (D061060), 2 (D024417) 7, 8, 9, 10, 1396, 900 and 901 Chittering Road
- Lot 1165 Hurd Road.

The Structure Plan (Figure 1) identifies areas for proposed residential development, Public Open Space (POS) and major roads, along with an indicative layout for adjacent areas subject to future MRS amendments. The PP (Figure 2) identifies areas for proposed retail, a main street, service commercial, residential, education/recreation and POS/conservation.

A portion of the project area is designated as bushfire prone on the WA *Map of Bushfire Prone Areas* (DFES 2019; Plate 1) due to the extent of on-site and adjacent vegetation. As a result, Strategen-JBS&G has prepared this BMP to inform strategic planning and fulfil the following key objective:

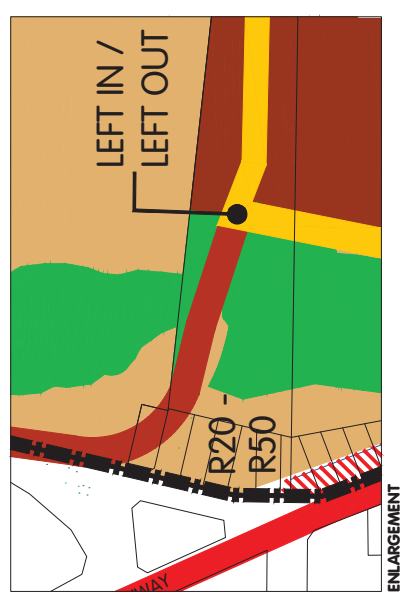
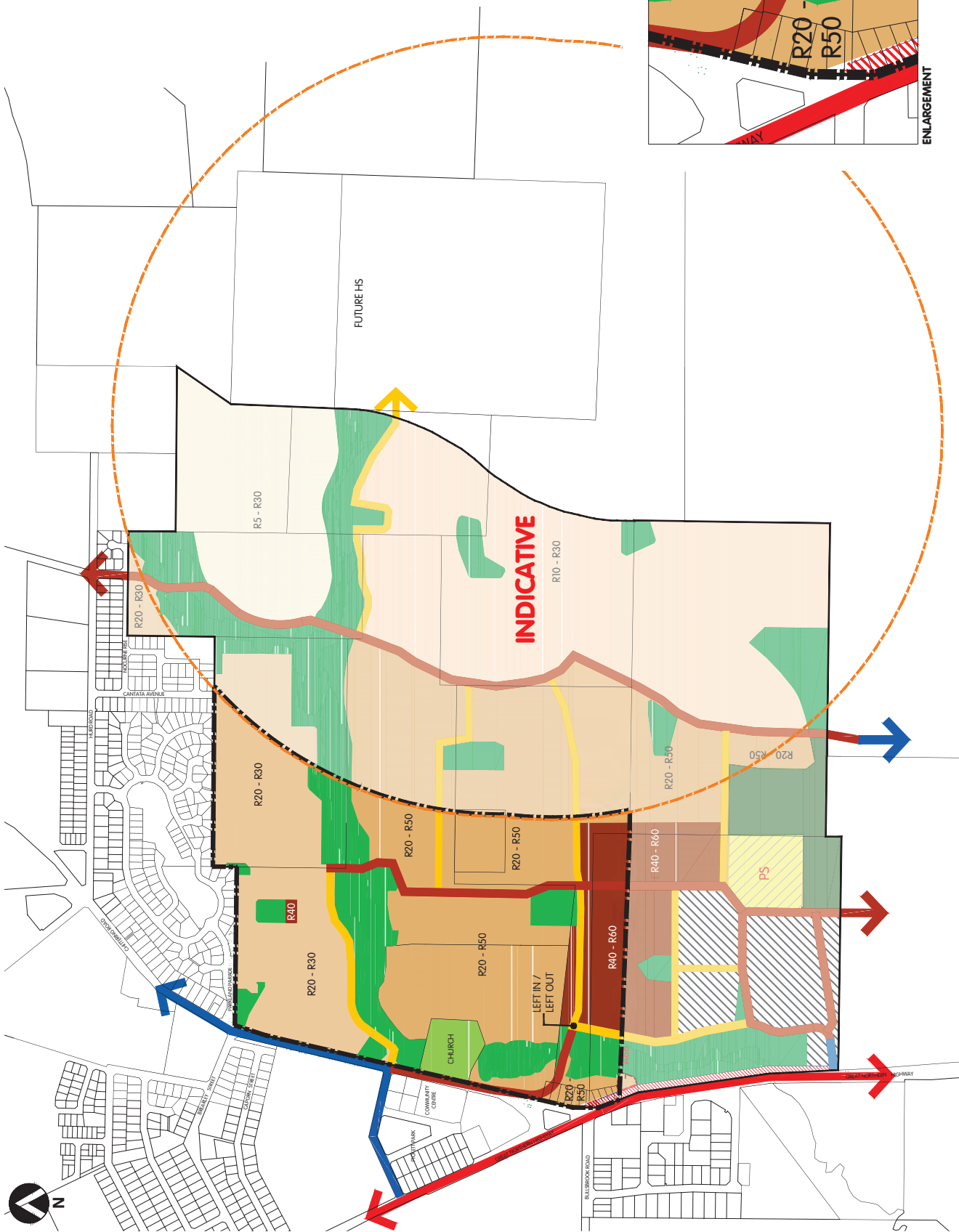
1. Accompany the Structure Plan and PP submission in order to meet planning requirements triggered under Policy Measure 6.3 of *State Planning Policy 3.7 Planning in Bushfire-Prone Areas* (SPP 3.7; WAPC 2015).

The following information is required as part of this BMP to accompany the Structure Plan and PP submission to address SPP 3.7 Policy Measure 6.3:

- results of a Bushfire Hazard Level (BHL) assessment determining the applicable hazard level(s) across the subject land in accordance with methodology set out in *Guidelines for Planning in Bushfire-Prone Areas* (the Guidelines; WAPC 2017) – refer to Section 2.3, Section 2.4, Figure 5 and Figure 6
- identification of any bushfire hazard issues arising from the relevant assessment – refer to Section 2.5
- clear demonstration that compliance with the bushfire protection criteria in the Guidelines can be achieved in subsequent planning stages – refer to Section 4 and Table 3

This BMP has been prepared in accordance with the Guidelines and addresses the above information requirements to satisfy SPP 3.7 specific to the strategic planning stage for this project. Strategen-JBS&G has also prepared a BMP for the adjoining site to the east and report findings/recommendations are compatible with this report.

- LEGEND**
- LOCAL STRUCTURE PLAN BOUNDARY
 - INDICATIVE AREA SUBJECT TO FUTURE ADDENDUMS TO APPROVED LSP
 - CRUSHING PLANT & NURSERY BUFFER
- ZONES**
- RESIDENTIAL (R5-R30)
 - RESIDENTIAL (R10-R30)
 - RESIDENTIAL (R20-R30)
 - RESIDENTIAL (R20-R50)
 - RESIDENTIAL (R40-R60)
 - AREA SUBJECT TO FUTURE ACTIVITY CENTRE STRUCTURE PLAN
 - PUBLIC PURPOSE - PRIMARY SCHOOL
 - RECREATION
 - DISTRICT OPEN SPACE
 - PRIVATE CLUBS AND INSTITUTIONS
 - PRIMARY REGIONAL ROAD
 - ADDITIONAL USES - SERVICE STATION
- RESERVES**
- PRIMARY DISTRIBUTOR
 - INTEGRATOR B
 - NEIGHBOURHOOD CONNECTOR A
 - NEIGHBOURHOOD CONNECTOR B



CADASTRAL INFORMATION

SOURCE: MNS

YMWDD: 181017

DWG REF: 97797de-006a

PROJECTION: PCG94

SIZE: A3

1:10,000

metres

0 100 200 300 400 500

robertsday.com.au

LOCAL STRUCTURE PLAN

Bullsbrook

City of Swan

REF NO. **AMX BUL**

DRAW NO. **RD1 107**

REV. **P**

REVISIONS

REV	DESCRIPTION	DATE	BY	APPD
1	INITIAL DESIGN	181017	AMX	AMX
2	REVISED DESIGN	181017	AMX	AMX
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Document Set ID: 8334543

Version: 1, Version Date: 30/10/2024

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

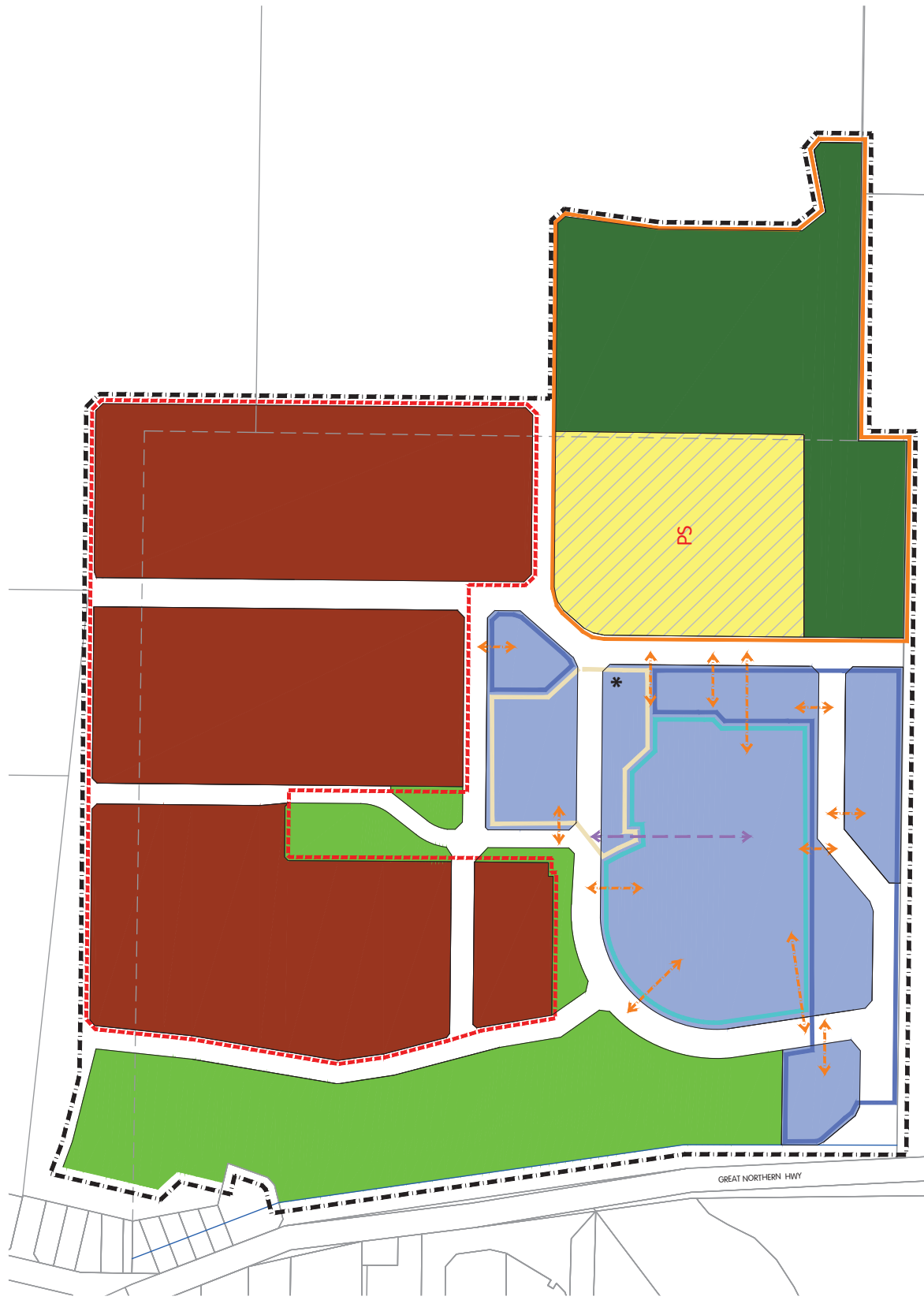


LEGEND

- ZONES**
- PRECINCT BOUNDARY
 - GENERAL COMMERCIAL
 - RESIDENTIAL R40-R60
 - PUBLIC PURPOSE PRIMARY SCHOOL
 - POS/ CONSERVATION
 - DISTRICT OPEN SPACE

CHARACTER AREA

- RETAIL
- MAIN STREET
- SERVICE COMMERCIAL
- RESIDENTIAL
- EDUCATION/RECREATION
- OTHER
- PEDESTRIAN LINKAGES
- VEHICLE ACCESS
- LANDMARK BUILDING



CADASTRAL INFORMATION
SOURCE: ROBERTSDAY
YYMMDD: 200407
DWG REF: RD1301A
PROJECTION: PCG94

AERIAL PHOTOGRAPHY
SOURCE: NA
YYMMDD: NA



PRECINCT PLAN
Kingsford Town Centre - Bullsbrook
City of Swan



REF NO. **AMX BUL**
DRAW NO. **RD1 240**
REV. **H**

2. Spatial consideration of bushfire threat

2.1 Existing site characteristics

2.1.1 Location

The project area (Structure Plan and PP) comprises the following lots in Bullsbrook, located in the City of Swan:

- Lots 2, 3, 4, 5, 6 and 2510 Great Northern Highway
- Lots 2 (D061060), 2 (D024417) 7, 8, 9, 10, 1396, 900 and 901 Chittering Road
- Lot 1165 Hurd Road.

The project area is bound by the following (Figure 3):

- North: existing urban residential development
- South: rural land subject to future MRS amendments
- East: rural land subject to future MRS amendments
- West: Chittering Road, existing urban residential development (northwest), various City-owned land/reserves including Bullsbrook Bush Fire Brigade, vegetated Lots 9003 and 201 (west) and existing light industry (southwest).

2.1.2 Zoning and land use

The project area is currently zoned 'Residential Development' under provisions of the City of Swan Local Planning Scheme No 17.

Undeveloped portions of the project area currently contain grassland used for the grazing of livestock, while the Bullsbrook landfill facility occupies an area east of the site.

2.1.3 Assets

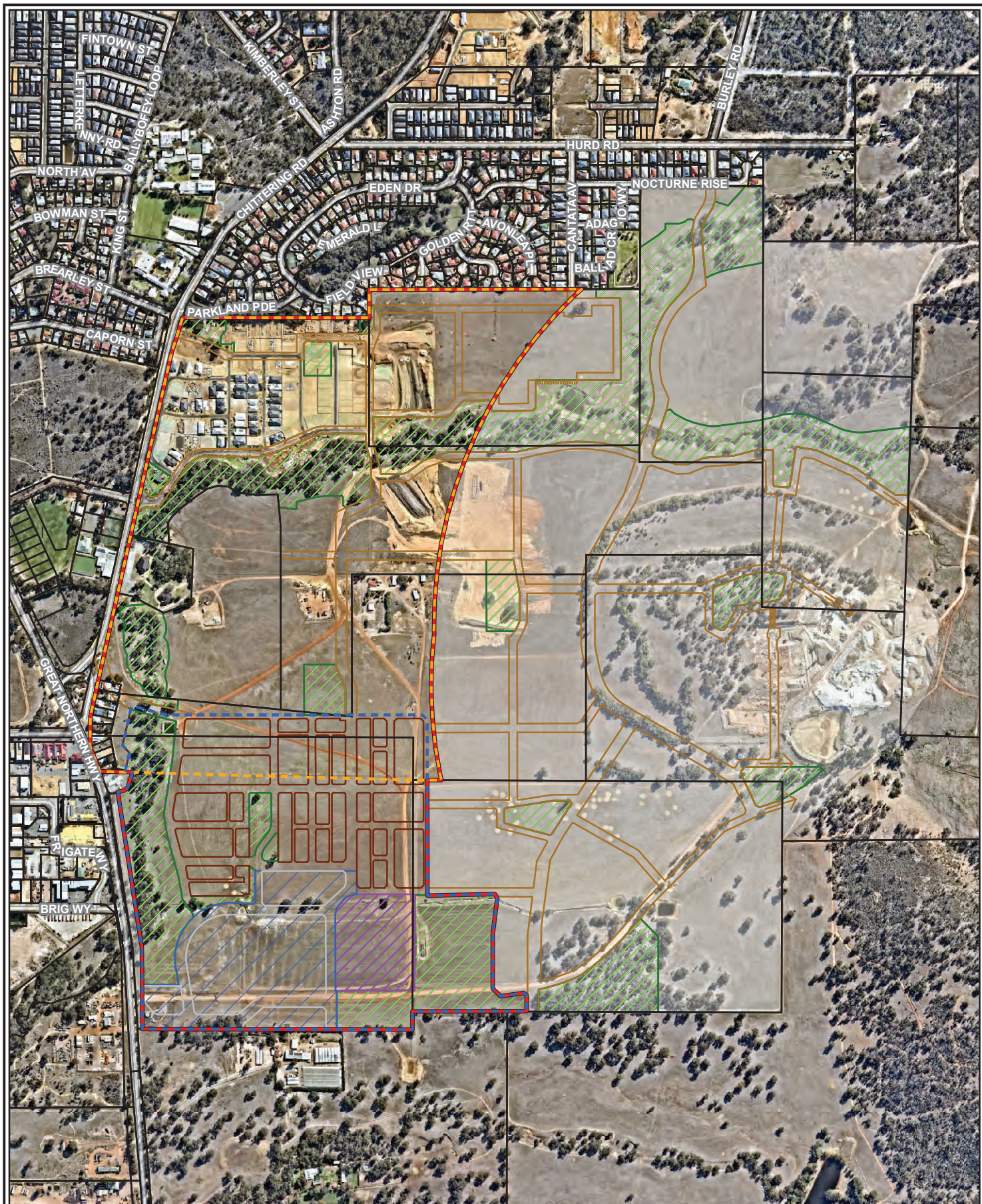
Aside from newly developed portions of the Stages 1 and 2 subdivision approval areas within the site, the project area contains limited property assets in the form of a farmhouse and associated outbuildings. Ongoing urban development will significantly increase these critical assets in that the number of residents, visitors and built assets will be intensified across the subject land.

2.1.4 Access

The project area is currently accessed via Chittering Road from the west and via numerous farm roads accessed from the driveway of the Bullsbrook landfill facility to the south and southeast. The driveway for the Bullsbrook landfill facility is accessed via Great Northern Highway (Figure 3). Aside from newly developed portions of the Stages 1 and 2 subdivision approval areas within the site, there are currently no bituminised access ways constructed within the project area, only a network of farm tracks and private driveways.

2.1.5 Water and power supply

Aside from newly developed portions of the Stages 1 and 2 subdivision approval areas within the site and the existing house within the project area (which are connected to the local power and reticulated water supply), the majority of the project area is not currently serviced by power or reticulated water.



Legend

- | | | | |
|--|--|--|---------------------|
| | Project area | | Proposed ACP layout |
| | Activity Centre Plan boundary | | Road reserve |
| | Structure Plan boundary | | Residential lots |
| | Cadastral boundary | | General commercial |
| | Indicative area subject to future MRS amendments | | POS |
| | Road reserve | | Primary School |
| | Roads (MRWA) | | |

Scale 1:11,000 at A4

0 100 200
metres

Coord. Sys. GDA 1994 MGA Zone 50



Job No: 60919

Client: Amex Bullsbrook Unit Trust

Version: A

Date: 04-Jun-2021

Drawn By: jcrute

Checked By: CT

**Kingsford Residential Estate,
Bullsbrook, WA**

SITE OVERVIEW

FIGURE 3



2.2 Existing fire environment

2.2.1 Classified vegetation

Pre-development vegetation classifications have been assessed for this site in accordance with methodology contained within *AS 3959–2018 Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2018). Strategen-JBS&G assessed vegetation classifications within the project area and adjacent 150 m through on-ground site investigation on 12 August 2016 and numerous additional assessments thereafter to support various stages of subdivision and clearance approval through to mid-2021. Strategen-JBS&G's assessments also included the broader indicative development area (subject to future MRS amendments) to the east and south.

A summary of vegetation within the project area is provided below and depicted in Figure 4:

- Class B woodland occurs in association within Ki-It Monger Brook, which bisects the project area in the north and aligns down the western boundary
- other small pockets of Class B woodland are scattered throughout the site where canopy cover over grass is more dense
- Class G grassland occurs on all land occupied by pasture grasses/weeds with minimal canopy cover
- non-vegetated areas occur where vegetation has been removed for the construction of tracks, roads, firebreaks and buildings, excluded from classification under Clause 2.2.3.2 (e)
- low threat managed land occurs throughout newly landscaped areas adjacent to Ki-It Monger Brook and landscaping around the existing residence, excluded from classification under Clause 2.2.3.2 (f).

A summary of existing vegetation on land adjacent to the project area is provided below and depicted in Figure 4:

- Class B woodland occurs:
 - * along the continuation of Ki-It Monger Brook to the southwest and east
 - * throughout numerous small remnants and linear arrangements to the south and east, including around the existing landfill facility and the broader indicative development area subject to future MRS amendments
 - * opposite Chittering Road to the west within vegetated Lot 9003
- Class C shrubland occurs opposite Chittering Road to the west within vegetated Lot 201
- Class D scrub occurs opposite Great Northern Highway to the southwest
- non-vegetated areas to the north, west and south occur where vegetation has been removed for the construction of roads, residential development and the Bullsbrook townsite and these are excluded from classification under Clause 2.2.3.2 (e)
- areas where the vegetation is managed in a low threat, minimal fuel condition such as road verges and managed landscaping are excluded from classification under Clause 2.2.3.2 (f).

Strategen-JBS&G has compiled geo-referenced photographs taken during on-ground site investigation, which are contained in Appendix A and demonstrate the location, direction and class of the pre-development vegetation extent observed.

Strategen-JBS&G emphasises that the vegetation extent discussed above and mapped in Figure 4 demonstrates pre-development (current) site conditions and does not consider any vegetation modification that will occur as part of proposed development.

2.2.2 Site topography

Strategen-JBS&G assessed pre-development site topography within the project area and adjacent land through a review of topographic contours and on-ground verification (Figure 4). Topographic elevation on site ranges from approximately 135 mAHD (Australian Height Datum) in the east and 55 mAHD in the west of the project area.

Aside from vegetation within Ki-It Monger Brook, vegetation within the project area is upslope or on flat land relative to proposed development. Ki-It Monger Brook is situated within a narrow, steep-sided gully, with slopes ranging from 4–14 degrees. However, an average down-slope of >0–5 degrees provides a more appropriate reflection of the effective slope under the vegetation with respect to potential bushfire behaviour for the purposes of BAL assessment in recognition that the short, sharp slope variations associated with the banks of Ki-It Monger Brook would not contribute significantly to predominant fire behaviour characteristics for this bushfire scenario.

Classified vegetation identified opposite Chittering Road and Great Northern Highway to the west of the project area was confirmed to be subject to a slight down-slope of >0–5 degrees in relation to proposed development.

2.2.3 Bushfire weather conditions

Worst case bushfire weather conditions

Southwest Western Australia generally experiences a cool to mild growing season in the months of August through to November of each year, followed by four months of summer drought conditions, which is when the potential for bushfire occurrence is at its peak. Worst case (adverse) bushfire weather conditions can occur during this dry period when a low-pressure trough forms off the west coast and strong winds develop from the north or northeast. These conditions are sometimes associated with 'Extreme' or 'Catastrophic' fire dangers, which are consistent with very high temperatures, low relative humidity and very strong winds. Based on the predominant summer climatic conditions of the local area, 'Extreme' and 'Catastrophic' fire dangers normally occur less than 5% of the time during the designated bushfire season, which equates to around six days between December and March (McCaw & Hanstrum 2003).

Predominant bushfire weather conditions

Predominant bushfire weather conditions are those that occur 95% of the time during the designated bushfire season. For Bullsbrook, these generally correlate with average January climatic conditions.

Mean January 9:00 am and 3:00 pm wind profiles for Pearce RAAF weather station (approximately 1 km west of the project area) are contained in Appendix B. These illustrate that the predominant winds during the designated bushfire season are from the east in the morning averaging around 17.9 km/h and from the southwest in the afternoon averaging around 20.4 km/h (BoM 2016).

Mean January 9:00 am and 3:00 pm relative humidity for Pearce RAAF weather station is approximately 48% and 30% respectively, with the January mean maximum temperature peaking at around 33.5°C (BoM 2016).

The predominant bushfire weather conditions discussed above correlate with an average Fire Danger Index (FDI) rating of 'High', as determined using the Commonwealth Science and Industrial Research Organisation (CSIRO) Fire Danger and Fire Spread Calculator (CSIRO 1999).

2.2.4 Bushfire history, fuel age, risk of ignition and potential ignition source

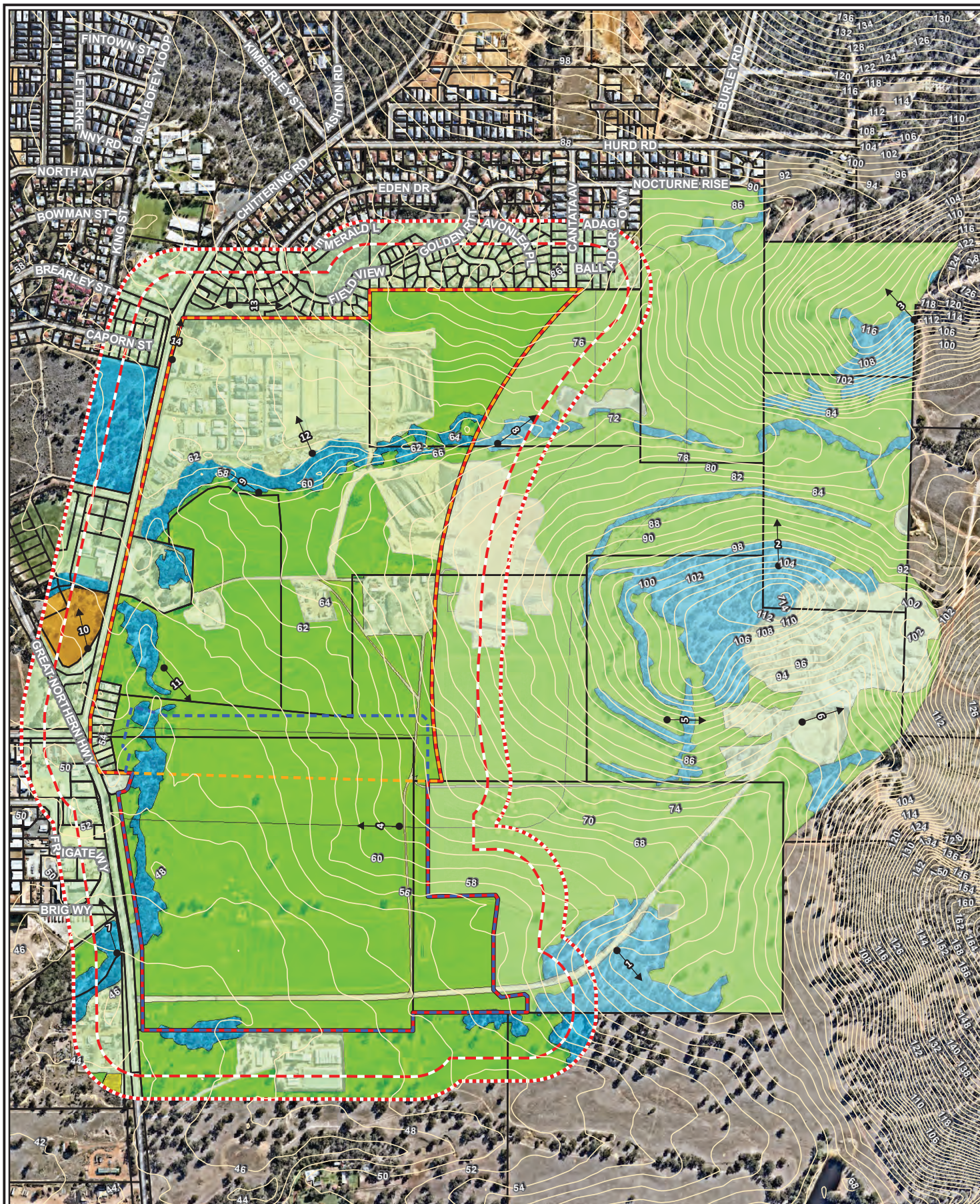
Bushfire history in the project area is infrequent and there is a lack of recent fire evidence over most of the project area; however, recent bushfires in the Perth Hills in 2011, Stoneville/Parkerville in 2013 and Wooroloo in 2021 have highlighted the need to consider bushfire planning for future developments in the area.

Available fuel loads within native vegetation areas are patchy and inconsistent due to variations in vegetation density, litter depth, trash height and the fragmented nature of the vegetation. Rural land to the south, east and west of the project area is a combination of unmanaged grassland, managed low fuels and woodland vegetation.

Since most bushfires are ignited by people, the current ignition risk is low due to the low levels of residency, public access and visitation throughout the site and surrounding rural landholdings. However, Strategen-JBS&G considers that the ignition risk, particularly within the project area, may increase following development intensification and increased levels of public access and resident occupancy at the bushland interface.

The potential sources of ignition in the area are expected to be from:

- deliberately lit fire (i.e. arson)
- lightning strike
- accidental causes, such as vehicle accidents and sparks from vehicle exhausts/machinery
- escapes from fuel hazard reduction burning
- pole-top fires
- incorrect disposal of cigarettes.



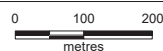
Legend

- Project area
- 100m assessment area
- 150m assessment area
- Activity Centre Plan boundary
- Structure Plan boundary
- Cadastral boundary
- Photo point directions

Vegetation classification

- Class B Woodland
- Class C Shrubland
- Class D Scrub
- Class G Grassland
- Clause 2.2.3.2 (e) & (f)
- Topographic contours (mAHD)
- Roads (MRWA)

Scale 1:11,000 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 60919

Client: Amex Bullsbrook Unit Trust

Version: A

Date: 04-Jun-2021

Drawn By: jcrute

Checked By: CT

**Kingsford Residential Estate,
Bullsbrook, WA**

**PRE-DEVELOPMENT
VEGETATION CLASS
AND EFFECTIVE SLOPE**

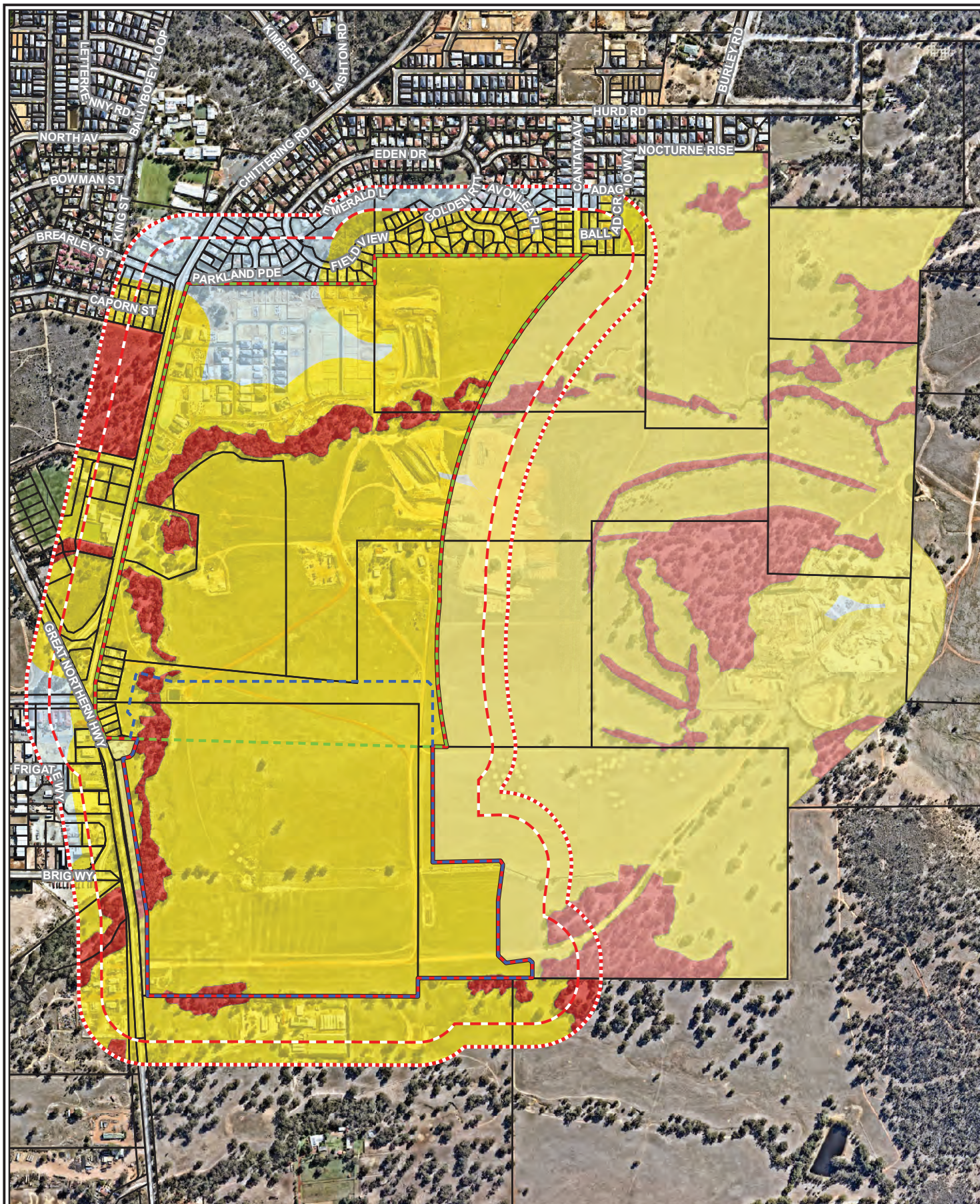
FIGURE 4



2.3 Pre-development bushfire hazard level assessment

Pre-development bushfire hazard levels have been assessed for this site in accordance with methodology contained within the Guidelines, as per assessment results provided in Section 2.2. Strategen-JBS&G has mapped the existing bushfire hazard levels within the project area and adjacent land to indicate location and severity of pre-development bushfire risk and to enable the comparison between pre-and post-development risk. A summary of results is provided below and depicted in Figure 5:

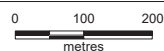
1. All areas of Class B woodland have been assigned an 'Extreme' bushfire hazard level. These include:
 - (a) existing overstorey vegetation along Ki-It Monger Brook
 - (b) existing overstorey vegetation retained in pockets and linear arrangements throughout the broader landscape east and south of the site
 - (c) existing overstorey and scrub vegetation adjacent west of Chittering Road and Great Northern Highway.
2. All areas of Class C shrubland have been assigned a 'Moderate' bushfire hazard level. This includes existing vegetation within Lot 201 adjacent west of Chittering Road.
3. All areas of Class G grassland have been assigned a 'Moderate' bushfire hazard level. This includes the predominate rural extent within and adjacent south and east of the project area comprising pasture grasses.
4. All areas within 100 m of 'Extreme' and 'Moderate' hazards have been assigned a 'Moderate' bushfire hazard level.
5. All remaining areas that are currently excluded from classification under Clauses 2.2.3.2 (e) and (f) of AS 3959 have been assigned a 'Low' bushfire hazard level. This includes a portion of the existing approved and developed subdivisional area within the site and a small portion of land internal to the landfill facility east of the site.



Legend

- Project area
- 100m assessment area
- 150m assessment area
- Activity Centre Plan boundary
- Structure Plan boundary
- Cadastral boundary
- Indicative area subject to future MRS amendments
- Hazard level
- Extreme
- Moderate
- Low
- Roads (MRWA)

Scale 1:11,000 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 60919

Client: Amex Bullsbrook Unit Trust

Version: A

Date: 04-Jun-2021

Drawn By: jcrute

Checked By: CT

**Kingsford Residential Estate,
Bullsbrook, WA**

**PRE-DEVELOPMENT
BUSHFIRE HAZARD LEVELS**

FIGURE 5



2.4 Post development bushfire hazard level assessment

2.4.1 Proposed development cells

The approved Structure Plan (Figure 1) and PP (Figure 2) depicts urban development cells throughout the project area and adjacent land subject to future MRS amendments. Unless shown specifically as POS for conservation purposes, the majority of urban development cells will be modified from their current grassland/woodland state to reflect broad-scale non-vegetated and low threat managed areas, which will be excluded from classification under Clauses 2.2.3.2 (e) and (f). On this basis, these areas in a post-development state will comprise a low bushfire hazard level, or a moderate bushfire hazard level if situated within 100 m of moderate or extreme bushfire hazard level vegetation.

2.4.2 Proposed public open space

The approved Structure Plan (Figure 1), PP (Figure 2) and approved amended Landscape and Irrigation Strategy depicts numerous POS areas throughout the site and adjacent land subject to future MRS amendments (refer to Appendix C for Landscape Masterplan). POS areas proposed throughout the site are also shown spatially in Figure 3. The proposed POS typologies include:

- Linear POS: open spaces which provide a connection between smaller recreational nodes (neighbourhood POS) and specifically allows an integration/connection with the Ki-It Monger Brook. Provides legibility and sense of place for local residents. Also enables retention of existing trees and allows for low level drainage conveyance through the site.
- Neighbourhood POS: located throughout the development (3000–5000 m²) and provides local residents with areas of turf and planting for informal kick-about play and passive uses. Also provides seating areas under shelter/shade and are typically within 400 m of most dwellings. Are able to service approximately 600 dwellings within the surrounding area.
- District POS/Playing Fields: approximately 2.5–7 ha and notionally able to serve three neighbourhoods. Provides local residents and community with an open area capable for servicing district sports, events and gatherings. Caters for the combination of passive (including informal play areas) and active recreation and are generally within 1 km of most dwellings. Natural and human made changes in elevation need to be considered in context to district POS as they also serve a drainage function to the development.
- Civic POS: provision for a main street and town/village square within Bullsbrook development. Predominantly hard paved and located at the conjunction of major thoroughfares and town/village centre in order to provide a landmark for community gatherings and events.
- Conservation and Buffer Areas: as the proposed development area includes the Ki-It Monger Brook, conservation and buffer zones are designed to rehabilitate/protect the natural assets of the site to the benefit of the environment and greater community. These areas will provide opportunities for passive recreation (walking trails) and serve a critical role in drainage detention.
- Ki-It Monger Brook: the Ki-It Monger Brook will become the primary POS and ecological corridor of the development. It represents a unique asset which serves a critical ecological role. Sensitive design will ensure existing vegetation will be retained and rehabilitated. This objective will be achieved by designating nodes for recreational/educational opportunities, allowing for vegetated areas to be retained and protected along the existing Brook corridor. Continuous pedestrian/cycling paths will link these interspersed nodes, which include amenities in the form of play spaces, boardwalks and interpretative signage.

Based on the above descriptions and conceptual information contained in the approved amended Landscape and Irrigation Strategy, it is likely that only Conservation/Buffer Areas and Ki-It Monger Brook will comprise post-development classified vegetation in the form of retained/rehabilitated Class B woodland. As such, Strategen-JBS&G's post-development bushfire hazard level assessment depicts these post-development hazards.

Strategen-JBS&G has analysed proposed drainage areas and notes that the majority of these occur in isolated areas of POS that will likely be excludable under one or a combination of Clauses (b), (c), (d) and/or (f) of AS3959. In addition, proposed revegetation of the Ki-It Monger Brook and mapped wetlands is to be in accordance with an approved Foreshore and/or Wetland Management Plan.

As planning stages progress and greater levels of landscaping detail become available, the spatial areas of post-development classified vegetation throughout POS will be accurately mapped to ensure appropriate bushfire responses are incorporated into subdivision design.

2.4.3 Post-development bushfire hazard level assessment

A summary of the post-development bushfire hazard levels are provided below and depicted in Figure 6:

1. Class B woodland associated with proposed Conservation POS areas (as per the approved amended Landscape and Irrigation Strategy) has been assigned an 'Extreme' bushfire hazard level. This includes the conservation component of Ki-It Monger Brook and additional conservation areas to the south and northeast.
2. Class B woodland and Class D scrub adjacent west of Chittering Road and Great Northern Highway has been assigned an 'Extreme' bushfire hazard level.
3. Class C shrubland adjacent west of Chittering Road has been assigned a 'Moderate' bushfire hazard level.
4. All areas within 100 m of 'Extreme' and 'Moderate' hazards have been assigned a 'Moderate' bushfire hazard level.
5. All remaining areas that are currently or proposed to be excluded from classification under Clauses 2.2.3.2 (e) and (f) of AS 3959 have been assigned a 'Low' bushfire hazard level. This includes the majority of the internal development footprint, future low threat POS areas and adjacent urban development areas to the north and west.

2.5 Identification of bushfire hazard issues

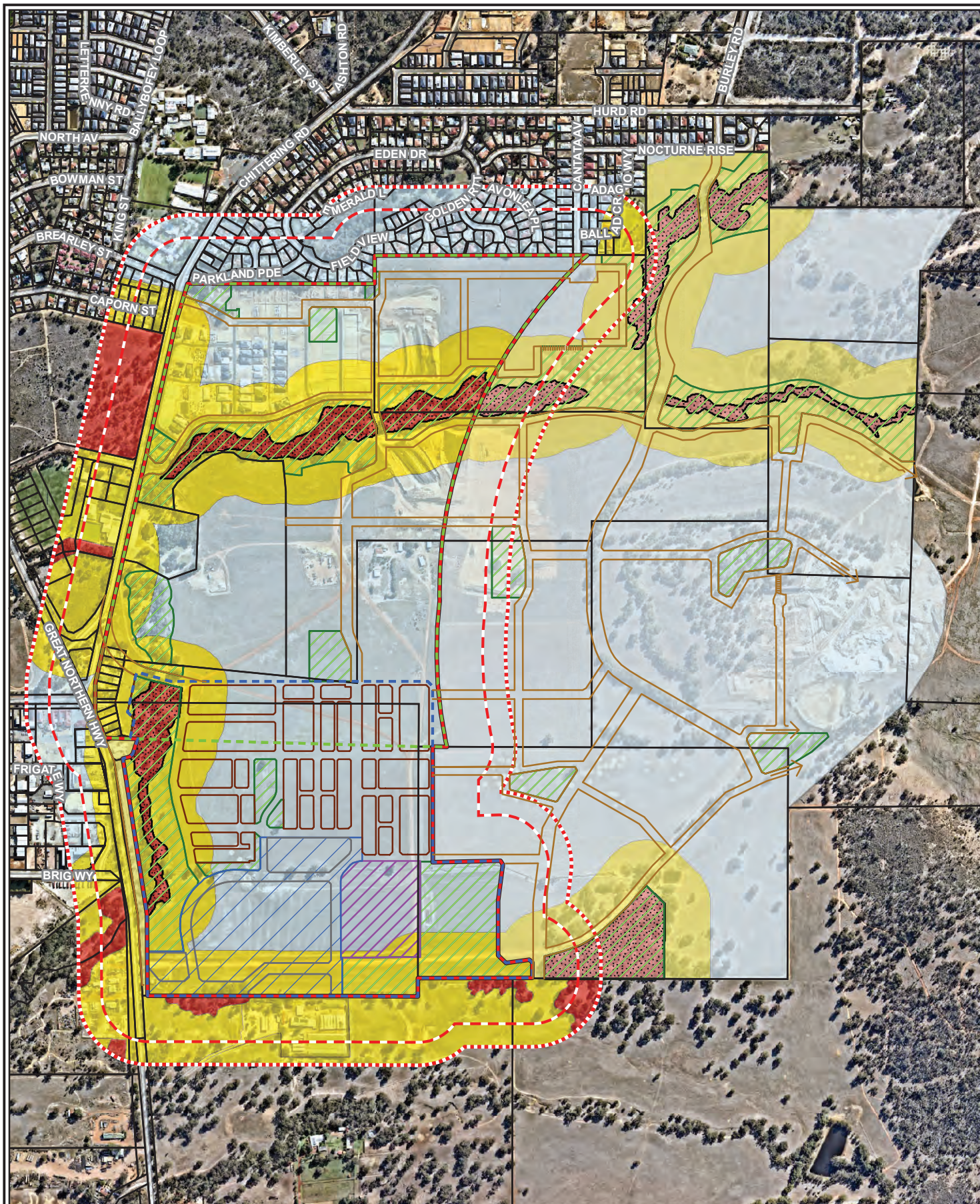
Strategen-JBS&G considers a fire front approaching the site from the northeast to be the worst-case bushfire scenario. This is due to the long bushfire run through woodland vegetation within Burley Park northeast of the project area (approximately 1.5 km in length and within spotting distance from longer bushfire runs to the northeast). Under standard morning weather conditions in summer, the likely prevailing winds from the east may be capable of directing a bushfire towards the project area and the resulting fire behaviour has the potential to escalate over this time and contribute significantly elevated levels of radiant heat and ember attack on the proposed development. However, the proposed clearing and intensification of development on this site will result in a lower overall bushfire hazard level than currently exists. The construction of roads throughout the project area will also enable direct fire suppression at the road and vegetation interfaces.

A similar issue occurs to the southwest during standard afternoon conditions. This is due to the bushfire run through woodland vegetation associated with Ki-it Monger Brook vegetation that exits southwest of the project area (approximately 2.0 km in length). Under standard afternoon conditions in summer, the likely prevailing winds from the southwest may be capable of directing a bushfire towards the project area and the resulting fire behaviour has the potential to escalate over this time and contribute moderate to elevated levels of radiant heat and ember attack on the proposed development.

The majority of on-site vegetation is proposed to be cleared to enable development of a significant urban built footprint amongst areas of landscaped/managed POS and interfacing roads to conservation areas. Therefore, for the purposes of strategic level planning to guide the Structure Plan and PP process, Strategen-JBS&G does not consider the current on-site vegetation extent to be an unmanageable bushfire hazard issue since these hazards will be managed through a staged clearing process and ongoing fuel management that will be undertaken in and around individual development stages.

Based on the above information, Strategen-JBS&G considers that the bushfire hazards within and adjacent to the project area and the associated bushfire risk is readily manageable through standard management responses and compliance with acceptable solutions outlined in the Guidelines and AS 3959. These management measures will need to be factored in to subdivision design as early as possible to ensure a suitable, compliant and effective bushfire management outcome is achieved to ensure protection of future life and property assets.

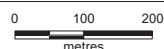
Demonstration of compliance with the relevant requirements of SPP 3.7, the Guidelines and AS 3959 at future planning stages will predominantly depend on Okeland Communities' ability to coordinate the timing and staging of clearing and development works within the project area in the aim of avoiding bushfire impacts from temporary vegetation.



Legend

- Project area
- 100m assessment area
- 150m assessment area
- Activity Centre Plan boundary
- Structure Plan boundary
- Cadastral boundary
- Indicative area subject to future MRS amendments
- Proposed ACP layout
- Road reserve
- Residential lots
- General commercial
- POS
- Primary School
- Road reserve
- Conservation area
- Hazard level
- Extreme
- Moderate
- Low
- Road reserve
- Roads (MRWA)

Scale 1:11,000 at A4



Coord. Sys. GDA 1994 MGA Zone 50



Job No: 60919

Client: Amex Bullsbrook Unit Trust

Version: A

Date: 04-Jun-2021

Drawn By: jcrute

Checked By: CT

**Kingsford Residential Estate,
Bullsbrook, WA**

**POST-DEVELOPMENT
BUSHFIRE HAZARD LEVELS**

FIGURE 6



3. Bushfire management measures

This BMP has been prepared as a strategic guide to demonstrate how development compliance will be delivered at future planning stages in accordance with the Guidelines. In this respect, Strategen-JBS&G has outlined a range of bushfire management measures that Okeland Communities will need to commit to implementing at future planning stages once an adequate level of detail is available to confirm the location and design of such measures.

Strategen-JBS&G considers that on implementation of the proposed management measures outlined in the following subsections, the project area will be able to be developed with a manageable level of bushfire risk whilst maintaining full compliance with the Guidelines and AS 3959.

3.1 Separation distances and fuel management

The post-development bushfire hazard levels depicted in Figure 6 demonstrate that all future habitable development within the site will, on completion, be located in areas subject to 'moderate' or 'low' bushfire hazard levels. In addition, future BMPs prepared to accompany the subdivision/development application stages will be required to demonstrate that all future habitable development will, on completion, be subject to a rating of BAL-29 or lower. This will be achieved through implementation of Asset Protection Zones (APZs), staging buffers and fuel management within on-site POS, as detailed in Sections 3.1.1, 3.1.2 and 3.1.3.

3.1.1 Asset Protection Zones (APZs)

APZs (or other forms of low threat separation) will be implemented at all interfaces where proposed development abuts classified vegetation to ensure future assets are afforded an appropriate level of low fuel defensible space and to prevent development in high risk areas such as Bushfire Attack Level (BAL)-40/FZ.

The width of APZs is required to provide sufficient separation distance for proposed development areas to achieve a BAL of BAL-29 or lower, which will meet compliance with acceptable solutions A1.1 and A2.1. The potential range of APZ widths relevant to the project area are provided in Table 1 and the final alignment and width of APZs will depend on the classification and effective slope of the interfacing vegetation.

Table 1: Potential range of APZ widths relevant to the project area

Vegetation class	Effective slope	Minimum APZ width to achieve BAL-29 or lower
Class B woodland	Up-slope and flat land	14 m
	Down-slope >0-5 degrees	17 m
Class D scrub	Down-slope >0-5 degrees	15 m
Class C shrubland	Up-slope and flat land	9 m
Class G grassland	Up-slope and flat land	8 m
	Down-slope >0-5 degrees	9 m

The fuel load throughout the APZ is required to be maintained at less than 2 tonnes per hectare on a regular and ongoing basis (e.g. through regular slashing and weed control). Individual trees can be retained within the APZ; however, a minimum of 10 m separation between tree canopies is generally required. APZs are required to meet the criteria for low threat vegetation managed in a minimal fuel condition in accordance with Schedule 1 APZ standards of the Guidelines and Clause 2.2.3.2 (f) of AS 3959 and this can be achieved most effectively using one or a combination of the following:

- existing/proposed sealed roads and managed road verges (roads can be most effective for use within an APZ as they also provide public and emergency access at the vegetation interface)
- regularly managed/landscaped lawns, gardens or POS
- other sealed areas including driveways and car parks
- building setbacks.

No buildings are permitted within the APZ. Indicative alignment and width of APZs for this site will be determined once proposed lot layout is confirmed at the subdivision stage. This is to be documented in a brief addendum to this BMP or in a revised BMP to accompany future subdivision applications where appropriate. APZs/sufficient low threat separation are to be implemented around each stage of subdivision prior to the clearance of subdivision conditions and are to be wholly contained within the lot subject to the subdivision.

3.1.2 On-site staging buffers

Vegetation clearing will occur throughout the project area on a staged basis and in advance where necessary to ensure building construction is not inhibited by a temporary vegetation extent located on a future development stage that is yet to be cleared/managed. This can be achieved by ensuring each approved stage subject to construction is surrounded by a low threat staging buffer of sufficient width prior to building construction. Once the buffers are created, they will need to be maintained on a regular and ongoing basis at a fuel load less than 2 t/ha to achieve a low threat minimal fuel condition all year round until such time that the buffer area is developed as part of the next development stage. Where staging buffers cannot be wholly contained within the lot subject to the subdivision, APZs are to be implemented around each stage of subdivision prior to the clearance of subdivision conditions, and are to be wholly contained within the lot subject to the subdivision. This will manage the bushfire risk from on-site temporary vegetation during development staging. This measure will be confirmed following confirmation of proposed lot layout and development staging provisions and will be documented in a brief addendum to this BMP or a revised BMP to accompany future subdivision applications where appropriate.

3.1.3 Fuel management within on-site POS

As outlined in Section 2.4.2, clearing and fuel management within on-site POS will be undertaken to ensure these areas do not result in the introduction of bushfire hazards. The required works may include slashing of understorey grasses and weed control on a regular and ongoing basis to maintain fuel loads at less than 2 t/ha and achieve a low threat minimal fuel condition all year round.

Should any POS result in retention or introduction of bushfire hazards, then these areas may trigger application of AS3959 and require the provision of APZs and increased building construction standards for adjacent development areas. This is not considered to be a planning or compliance issue since adequate separation will be established between proposed development areas and each POS area.

A more detailed concept for on-site POS areas will be determined at the subdivision stage in concert with proposed lot layout. Any subsequent bushfire management measures that need to be implemented in response to the proposed POS concepts will be documented in a brief addendum to this BMP or a revised BMP to accompany future subdivision applications where appropriate.

3.2 BAL assessment and increased building construction standards

The majority of on-site vegetation, except for conservation POS, is proposed to be cleared to enable development of a significant urban built footprint amongst areas of POS. Therefore, the predominant BAL impact to future assets will be around the perimeter the project area and adjacent to conservation POS areas. Measures will need to be put in place (such as those outlined in

Section 3.1) to ensure all habitable development is avoided in areas of BAL–40/FZ so that a rating of BAL–29 or lower can be achieved with provision of a suitable APZs where required.

Once proposed lot layout is confirmed at the subdivision stage, as well as a suitable approach to manage the risk from adjacent bushfire hazard areas, BAL contours will need to be assessed to inform the indicative BAL impact over the site, as well as the necessary APZ separation requirements for proposed development areas. This process will inform those lots that require increased building construction standards.

The development design process will ensure a rating of BAL 29 or lower is achieved by incorporating the necessary APZs discussed in Section 3.1.1, which will meet the necessary acceptable solutions and performance criteria of Element 1 and Element 2 of the Guidelines. BAL contours and APZs will be depicted in a brief addendum to this BMP or a revised BMP to accompany future subdivision applications where appropriate.

3.3 Vehicular access

3.3.1 Public roads

The indicative public road network outlined in the Structure Plan and PP is appropriate for the purposes of satisfying the intent of Element 3 of the Guidelines at this strategic planning stage in that multiple access routes to the surrounding public road network are proposed, no non-compliant dead-ends have been identified and suitable linkages are proposed with future development on adjacent landholdings.

Subsequently, members of the public and emergency services will be able to move safely throughout the development at all times. This will be confirmed as part of subdivision design whereby a minimum of two different vehicular access routes will be provided for all stages of development, both of which connect to the surrounding public road network, provide safe access and egress to two different destinations and are available to all residents/the public at all times and under all weather conditions. This will meet the criteria of acceptable solution A3.1. Additionally, two vehicular access routes are to be provided for each internal stage of subdivision prior to the clearance of subdivision conditions. Should temporary vehicular access to a second access route be required, particularly in the early stages of development, then compliant Emergency Access Ways (EAWs) will need to be considered to achieve this.

Strategen-JBS&G advises that cul-de-sacs, battle-axe blocks and private driveways longer than 50 m should be avoided as part of future subdivision design. Should any permanent cul-de-sacs be proposed, acceptable solution A3.3 will be met to ensure the cul-de-sacs are unavoidable, restricted to a maximum length of 200 m and the cul-de-sac head/s meet a minimum 17.5 m diameter. Should any battle-axe lots be proposed, acceptable solution A3.4 will be met to ensure battle-axe legs are unavoidable, are a maximum length of 600 m and a minimum width of 6 m. Should any private driveways longer than 50 m be proposed, acceptable solution A3.5 will be met to ensure compliance with requirements of the Guidelines. Should any temporary EAWs be required, acceptable solutions A3.6 will be met to ensure compliance with requirements of the Guidelines. It is not anticipated that Fire Service Access Routes (FSARs) will be required as part of this development.

Firebreaks will not be required throughout the residential lot component of proposed development since these lots will be of a size that will not trigger firebreak requirements; however, firebreaks may be required for larger lots (such as POS) in accordance with acceptable solution A3.8 and the City of Swan annual firebreak notice as amended (Appendix D).

Technical requirements for vehicular access components that may form part of proposed development will be met in accordance with Table 2. Vehicular access components of proposed development will be confirmed as part of subdivision design and demonstration of compliance with the relevant acceptable solutions for Element 3 of the Guidelines will be documented in a brief addendum to this BMP or revised BMP to accompany future subdivision applications where appropriate.

Table 2: Vehicular access technical requirements

Technical requirement	Public road	Cul-de-sac	Battle-axe legs and private driveways longer than 50 m	Emergency access ways	Fire service access routes
Minimum trafficable surface (m)	6*	6	4	6*	6*
Horizontal distance (m)	6	6	6	6	6
Vertical clearance (m)	4.5	N/A	4.5	4.5	4.5
Maximum grade <50 m	1 in 10	1 in 10	1 in 10	1 in 10	1 in 10
Minimum weight capacity (t)	15	15	15	15	15
Maximum crossfall	1 in 33	1 in 33	1 in 33	1 in 33	1 in 33
Curves minimum inner radius	8.5	8.5	8.5	8.5	8.5
* Refer to E3.2 Public roads: Trafficable surface					

3.4 Reticulated water supply

All proposed development areas will be provided a reticulated water supply through extension of adjacent services. The reticulated system will ensure an all year-round supply of water is provided for each lot to meet minimum domestic and emergency water supply requirements. This will thereby meet the intent of Element 4 of the Guidelines through compliance with acceptable solution A4.1.

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

3.5 Additional measures

Strategen-JBS&G makes the following additional recommendations to inform ongoing development stages:

1. **Notification on Title:** notification on Title may be lodged on all lots with a rating of BAL-12.5 or higher (either through condition of subdivision or other head of power) to ensure all landowners/proponents and prospective purchasers are aware that their lot is currently in a designated bushfire prone area and that increased building construction standards may apply to future buildings as determined by future BAL contour mapping or BAL assessment. The notification on title is also to include that the site is subject to a Bushfire Management Plan.