KINGSFORD

TOWN CENTRE

PRECINCT STRUCTURE PLAN

SEPTEMBER 2024

HATCH | RobertsDay

KINGSFORD

Title	Kingsford Town Centre Precinct Plan	
Project	Bullsbrook, WA	
Prepared for	Okeland Communities	
Reference	AMX BUL	
Status	For Lodgement	
Version	F	
Date of Release	September 2024	
Author	T. Trefry	
Approved by	T. Trefry	
Project Team	Acoustic	Herring Storer
	Traffic and Transport	Transcore
	Servicing and Infrastructure	JDSi
	Surveyors	McMullen Nolan Group
	Landscape	Emerge Associates
	Environmental	RPS
	Aboriginal Heritage	Ethnosciences
	Retail Assessment	Taktiks4
	Bushfire	Strategen
	Hydrology	RPS
	Planning + Urban Design	Hatch RobertsDay

Revision	Comment	Author	Approved by	Date Issued
A	Draft for client review	TT	TT	August 2021
B	Final Version	TT	TT	September 2021
C	Final Version (A)	TT	TT	November 2021
D	WAPC Scheduled Modifications	TT	TT	August 2022
E	WAPC Scheduled Modifications	TT	TT	October 2022
F	WAPC Scheduled Modifications (Amendment No. 2)	TT	TT	September 2024

CONTENTS

PART 1 IMPLEMENTATION

PART 2 EXPLANATORY

APPENDICES

Endorsement Page

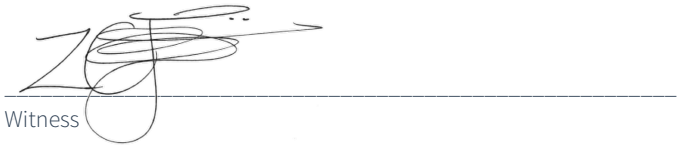
The Precinct Plan is prepared under the provisions of the City of Swan Local Planning Scheme No. 17.

It is certified that this Precinct Plan was approved by resolution of the Western Australian Planning Commission on:

08 November 2022

Signed for and behalf of the Western Australian Planning Commission:

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



Witness

09 November 2022

Date

09 November 2032

Date of Expiry

Table of Amendments

Amendment No.	Summary of the Amendment	Amendment Type	Date Approved by WAPC
1	Change the location of the Service Commercial lot and corresponding zoning from the centre of the cell adjacent Great Northern Highway to the northern boundary. Change the location of the Water Corporation lot and corresponding zoning from the northern boundary of the cell adjacent Great Northern Highway to the central site.	Standard	16 October 2024

EXECUTIVE SUMMARY

The Kingsford Precinct Plan (PP)will facilitate the development of the Kingsford Town Centre. The town centre will service the growing residential community at Kingsford and surrounding suburb of Bullsbrook and future South Bullsbrook residential area. Delivery of Kingsford is well underway with stage 1 roads and infrastructure completed. The Kingsford town centre has been contemplated and provided for in a number of higher order planning documents including:

- Bullsbrook Townsite District Structure Plan (2018)
- Bullsbrook Central Structure Plan (2019)

The Kingsford PP is made pursuant to Local Planning Scheme 17 and the deemed provisions for local planning schemes in the Planning and Development Regulations 2015.

As a new Town Centre, the Kingsford Town Centre will become the region's vibrant heart and social hub for the community. It will create a place for enterprise and socialisation and bring friends, family and visitors together. It is not intended to duplicate or compete with the existing facilities that exist within Bullsbrook, rather provide a range of additional commercial and civic uses to serve the broader needs of the wider locality.

The Town centre has been carefully planned as an urban village that ties the Kingsford development together. It plans to accommodate a balance of active community spaces and contemporary mix of shops including:

- A major supermarket
- Specialty stores
- Café
- Medical Services
- Recreation facilities
- Public Primary School
- Pedestrian focused Main Street
- Range of residential lots / dwellings
- Legible pedestrian linkages

The Kingsford PP / Town Centre will be developed over a number of years in multiple stages. The Town centre will provide a key employment and activity node for the wider Bullsbrook locality.

PART 1

IMPLEMENTATION

N

LEGEND

PRECINCT BOUNDARY

ZONES

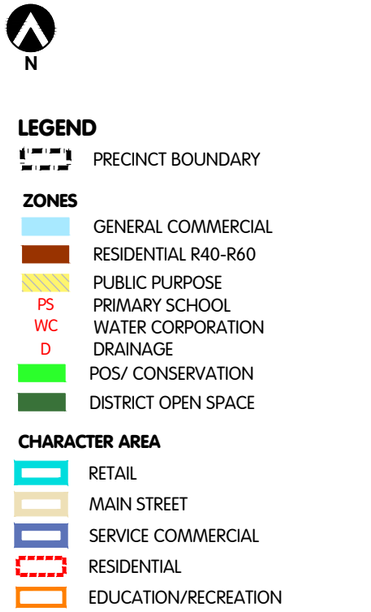
- GENERAL COMMERCIAL
- RESIDENTIAL R40-R60
- PUBLIC PURPOSE
  - PS PRIMARY SCHOOL
  - WC WATER CORPORATION
  - D DRAINAGE
- POS/ CONSERVATION
- DISTRICT OPEN SPACE

CHARACTER AREA

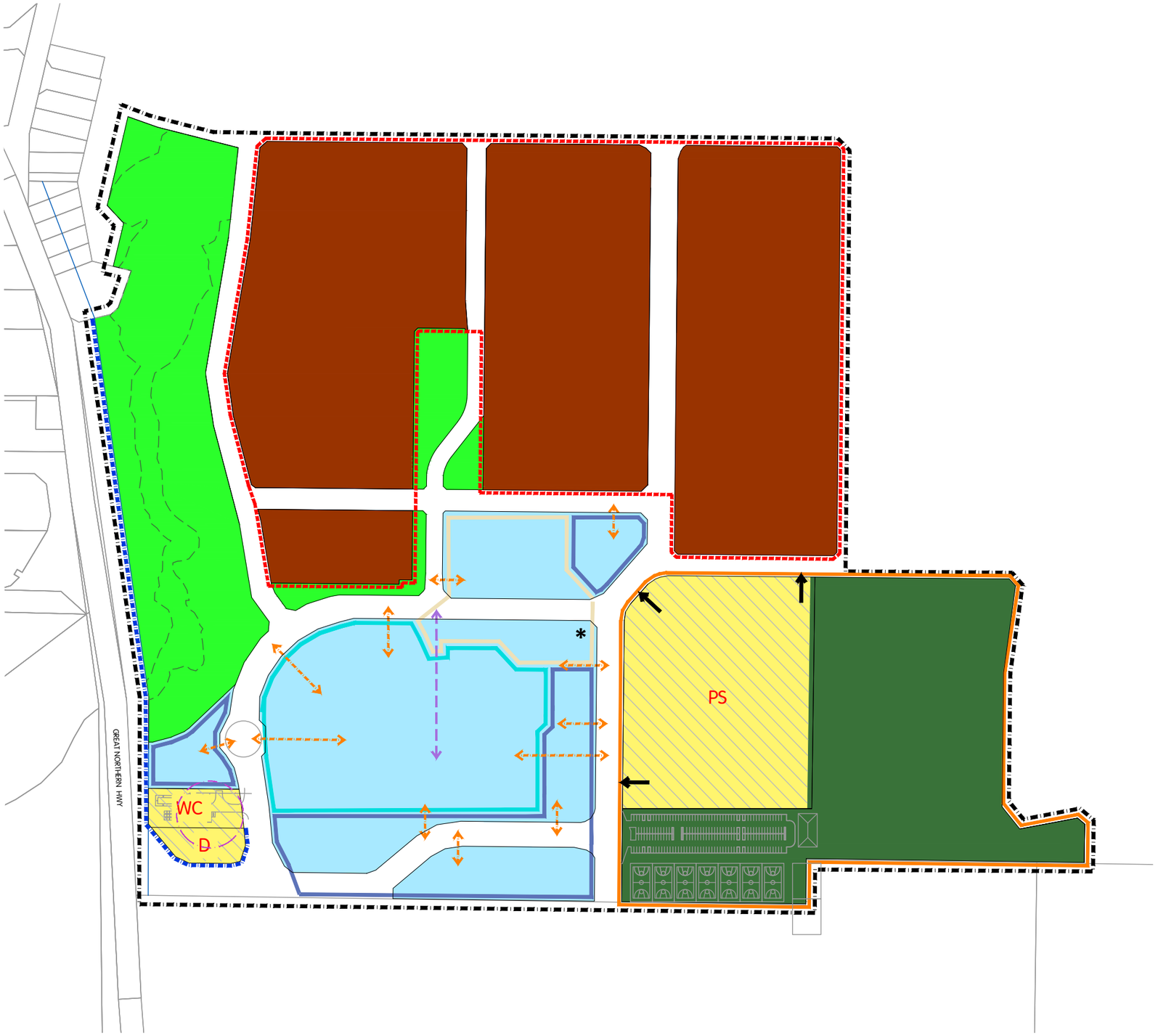
- RETAIL
- MAIN STREET
- SERVICE COMMERCIAL
- RESIDENTIAL
- EDUCATION/RECREATION

OTHER

- NO VEHICLE ACCESS IS PERMITTED
- PEDESTRIAN LINKAGES
- VEHICLE ACCESS
- LANDMARK BUILDING
- SAFE ROAD CROSSINGS



PUMP STATION SITE LOCATION SCALE 1-2000



okeland COMMUNITIES

PRE-CAL INFORMATION
SOURCE: MNG
YYMMDD: 231120
DWG REF: 97797lots-9999cf-PCG94
PROJECTION: PCG94
PUMP STATION INFORMATION
SOURCE: JDSI
YYMMDD: 230330
DWG REF: XSEW_JDS15920.TC01_[combined+kittmonger]

HATCH

SIZE A3_1:4000

0 metres 40 80 120 160 200

FIGURE 1: PRECINCT PLAN
Kingsford Town Centre - Bullsbrook
City of Swan

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

1.0 Precinct Plan Area

This Precinct Plan (PP)applies to the Kingsford Town Centre, being the land wholly contained within the inner edge of the line denoting the PP boundary on the Precinct Plan Map (Plan 1)

2.0 Operation

The date the PP comes into effect is the date the PP is approved by the Western Australian Planning Commission (WAPC)

3.0 Subdivision and Development Requirements

3.1 Objectives

The Town Centre will provide the focus for the retail, commercial, cultural and entertainment uses for Kingsford in either stand alone buildings or mixed use development. The key objectives being:

- Celebrate the public realm – to orchestrate a vibrant and prominent public realm with pedestrian friendly streets and parks and adjacent uses that activate these spaces and blur the definition between public and private spaces on key streets and locations
- Walkable – to foster an environment that is safe, stimulating and conducive to walking
- Sense of place – establish a strong sense of place through the use of local materials within the built form and public realm wherever possible
- Flexible and robust – to crate a robust and flexible urban structure and built form that is capable of responding to changing community needs well into the future
- For the community – to create a welcoming and active Town Centre where appropriate levels of civic infrastructure and opportunities for local employment are accommodated in the mix of uses
- Economic health – to become the focus for employment and economic development and a highly sought after location for commercial investment by Kingsford residents and the wider business community
- Commercial development – To ensure the Town Centre develops to service the commercial needs of the locality and surrounds

3.2 Character Areas – Vision and Guiding Principles

The PP is divided into five Character Areas (Refer Plan 1). In addition to the overall Activity Centre Objectives, development within each Character Area shall have regard for the following Guiding Principles;

A. Retail

Vision - The retail heart of the Town Centre and will accommodate a mix of retail uses in a shopping centre development and associated car parking

Guiding Principles

- Provides a welcoming and convenient district shopping centre environment for the Kingsford community
- Public community spaces that provides a safe and attractive environment for pedestrians
- Integration and synergy between Main Street and the shopping complex
- Shaded carparking areas

B. Main Street

Vision – The place to meet friends, shop, enjoy, work, wander and explore and somewhere to relax

Guiding Principles

- Provides a vibrant and animated element of the 'Public Domain'
- Activated during the day and night by cafes, shops and tavern
- Flexible building designs that have the ability to adapt to changing land use and intensification
- A pedestrian friendly streetscape with shade trees, outdoor seating + parallel parking
- Be able to tell the story of Kingsford though the use of public spaces, town square, public art and way finding objects.

C. Service Commercial

Vision – Enjoying a high level of vehicle access and located on the edge of the Town Centre, this area is ideally suited for land uses and development that have a greater reliance on car based access for their viability.

Guiding Principles

- To comprise service commercial, fast food + petrol station that services the local needs and provide local employment opportunities
- Quality buildings of various scale with engaging architectural form, detail, materials and colour
- Generous landscaping for shading car parking areas
- Signage integrated with buildings + pylon signage opportunity

D. Residential

Vision – A rich environment comprising residential housing (Apartments / Town houses) and commercial uses, all within walking distance of the retail area and Main Street.

Guiding Principles

- Medium density housing based upon an 'urban' and not 'suburban' form
- High standard of built form that contributes to attractive street frontages
- A pedestrian friendly streetscape with shade trees and parallel parking
- Contribute to the vitality and activation of the Town Centre through the creation of a local residential population.

E. Education / Recreation

Vision – This precinct will accommodate the public primary school and district playing fields. The co-location of education and recreation will create an active pedestrian environment to aid in the operation of the town centre.

Guiding Principles

- High standard of built form to identify community /civic buildings
- Pedestrian priority environment defined by a pathway network, quality landscaping , slow vehicle speeds and public art
- Good connectivity with the Town Centre
- Active and Passive recreational opportunities
- Adequate on-site visitor parking.

3.3 Retail Floor Space

The permissible retail floorspace within the PP area is limited to 20,000sqm NLA.

3.4 Land Use Permissibility

The PP area is allocated zones as defined in Local Planning Scheme 17. The PP shall have the same land use permissibility as those zones.

In addition to the uses permitted under LPS17, temporary land uses (including, but not limited to: sales office, car parking and cafe) which facilitate the sale of lots within the Structure Plan area are permissible land uses within the 'Residential Development' zone.

3.5 Development Standards

The following development standards apply to all development within the applicable Character Area.

A. MAIN STREET		
BUILDING HEIGHT	Maximum Height	3 Storeys
	Minimum Height	2 Storeys, or 1 Storey with equivalent 2 storey facade to Main Street
BUILDING SETBACKS	Front	Mandatory Nil setback to 50% of frontage
	Side	Minimum Nil
	Rear	Minimum Nil
BUILDING FRONTAGE	Primary Entrance	Tenancies with frontage to Main Street must provide an access to Main Street.
	Windows at Ground Level	Minimum glazing for 50% of front facade area
	Awnings	Minimum depth 2.4m for full building frontage to primary street
BUILT FORM		1. Articulate the street facade with some variation, using materials, detailing and legible entries 2. Deliver an architecture that responds to the climate of Bullsbrook where the hot and dry summers are dealt with via shade elements 3. To deliver a cohesive streetscape with materials and finishes of a high standard 4. Locate all delivery, stores, bin enclosures and other services or plant areas away from the entry (and visually screened from public view).
CAR PARKING / BICYCLE PARKING		1. Car Parking shall be provided of a rate of 4 car spaces per 100 sqm of NLA for non-residential uses. 2. For Office, Restaurant, and Lunch Bar car parking shall be provided of a rate of 2 car spaces per 100sqm NLA 3. Car Parking is to be provided in the form of off street reciprocal parking facilities and on-site whenever possible. 4. Appropriate shading (one (1) tree per four (4) car bays) shall be incorporated into carparking areas to provide shade or tree protection. 5. Bicycle parking and End of Trip Facilities to be provided to the satisfaction of the City of Swan.
LAND TENURE		The Main Street may be retained under private ownership providing a legal agreement is put in place to allow for public access at all times, with provision for temporary, short-term closures for events.

B. SERVICE COMMERCIAL			
BUILDING HEIGHT	Maximum Height	2 Storeys	
BUILDING SETBACKS	Front	Minimum Nil	
	Side	Minimum Nil	
	Rear	Minimum Nil	
BUILDING FRONTAGE	Primary Entrance	Entrance to primary street mandatory	
	Windows at Ground Level	Minimum glazing 50% of front facade area	
	Awnings	Minimum depth of 2.4m for full building frontage to primary street	
BUILT FORM		1. All elevations shall be well detailed and presentable where visible to the public 2. Articulation shall be provided to avoid large expanses of blank facade 3. Locate all delivery, stores, bin enclosures and other services or plant areas away from the entry (and visually screened from public view) 4. All entries shall be clearly defined and shall be accessed via legible pathways	

CAR PARKING / BICYCLE PARKING		1. Carparking shall be provided at a rate of 2.5 car spaces per 100sqm of NLA 2. Appropriate shading (one (1) tree per four (4) car bays) shall be incorporated into car parking areas to provide shade or tree protection. Shade structures are permitted within car parks. 3. Bicycle parking and End of Trip Facilities to be provided to the satisfaction of the City of Swan.	

C. RETAIL			
BUILDING HEIGHT	Maximum Height	10.5 metres (parapet height) above natural ground level is permitted Architectural features and minor projections may extend above the maximum height of the discretion of the responsible authority	
BUILDING SETBACKS	Front		Nil to 10m in order to accommodate landscaping vehicle access and circulation, but not vehicle parking.
	Side		
	Rear		
BUILDING FRONTAGE	Clear and legible Entry		
BUILT FORM	1. All elevations shall be well detailed and presentable where visible to the public 2. Articulation shall be provided to avoid large expanses of blank facade 3. Locate all delivery, stores, bin enclosures and other services or plant areas away from the entry (and visually screened from public view) 4. All entries shall be clearly defined and shall be accessed via legible pathways 5. The Architectural design across all buildings shall ensure variations in the built form including materials, colours and textures		
CAR PARKING / BICYCLE PARKING	1. Car parking shall be provided at a rate of 4 carspaces per 100sqm of NLA 2. Appropriate shading (one (1) tree per four (4) car bays) shall be incorporated into car parking areas to provide shade or tree protection. Shade structures are permitted within car parks. 3. Bicycle parking and End of Trip Facilities to be provided to the satisfaction of the City of Swan.		

D. RESIDENTIAL	
BUILDING HEIGHT	As per the R-Codes or as per approved Local Development Plan
BUILDING SETBACKS	As per the R-Codes or as per approved Local Development Plan
BUILDING FRONTAGE	As per the R-Codes or as per approved Local Development Plan
BUILT FORM	Given its strategic location and relationship with the Town Centre this precinct is designed to accommodate a wide range of quality medium to high density housing typologies suited to residents seeking the convenience of living within the Town Centre. The mix of housing may include apartments, studios and townhouses. • predominantly quality residential housing • townhouses, apartments and studio apartments • adaptable street blocks, laneways and built form • quality public realm incorporating canopy tree lined streets • high standard of built form that contributes to attractive frontage streets • permeable street network integrated with the wider network • Most streets oriented to terminate on parks • pedestrian priority environment
CAR PARKING	As per the R-Codes or as per approved Local Development Plan

3.6 Signage Requirements

- A single pylon/monolith sign no more than 15m in height shall be permitted for the purpose of providing a consolidated business sign for the Town Centre
- All other signs shall not exceed 12m in height and shall be compatible in scale and siting so as not to detract from the amenity of nearby development
- Signage must not be visually obtrusive or result in excessive visual clutter
- A single pylon sign to be provided within the central 'Retail lot'. The objective is to consolidate signage on the single pylon sign.
- Where possible a consolidation of signage is preferred for the Town Centre

3.7 Local Development Plans

A Local Development Plan shall be prepared for land within the Town Centre including lots that are designed to accommodate grouped or multiple development prior to development, addressing:

1. Built form considerations including lot boundary setbacks, overshadowing , visual privacy, building heights, building orientation and ancillary dwellings;-
2. Vehicle access and parking;
3. Interface of residential development with the adjacent retail site;
4. Lots that obtain acecss from a laneway or right of way;
5. Lots with an interface or outlook to POS; and
6. Mitigation of non-residential use impacts on residential amenity (i.e. aircraft and road transport noise)
7. Proposed signage detail & location.

Provisions of an LDP may augment and/or vary the development standards set at Section 3.5.

3.8 Additional Information

The following additional requirements are to be met in order to fulfill the objectives of the PP.

ADDITIONAL INFORMATION	APPROVAL STAGE	CONSULTATION REQUIRED
Density Plans (Residential Lots)	Subdivision application	WAPC City of Swan
Detailed Noise Management Plan	• Subdivision application / condition of subdivision for identified lots, or • Development application for identified lots.	City of Swan
Bushfire Attack Level Assessment	• Subdivision application / condition of subdivision for identified lots, or • Development application for identified lots	City of Swan Department of Fire and Emergency Services
Urban Water Management Plan	Condition of subdivision	City of Swan
Landscape Strategy Including details of the Main Street	Condition of subdivision or development	City of Swan
Public Open Space Schedule	Subdivision Application	City of Swan WAPC
Foreshore and Wetland Management Plan	Condition of Subdivision	City of Swan
Concept Design for Ki-It Monger Brook Public Open Space	Condition of Subdivision	Traditional Owers/Custodians

3.9 Defence (Area Control) Regulations

The Kingsford Town Centre is subject to building height controls that protect airspace (RAAF Base Pearce) to ensure the safety of aircraft on approach, departure and low flying manoeuvres. Any structure (man made or natural) higher than 15.0m require approval from the Department of Defence.

In addition, any sports grounds or drive in restaurants within 3 kms of the airport runways should include measures to manage waste disposal.

3.10 Landmark Building

- Landmark buildings shall be designed to be unique and memorable, representing a point of difference to other buildings in the Town Centre;
- Delineate and terminate vistas with landmark buildings, sculptural elements or well designed open space;
- Reinforce activity nodes and building landmarks to enable visual recognition from a distance by utilising materials, lighting and landscaping in association with the design of the built form.

3.11 Hazards and Speration Area's

Residential lots Identified as a Bushfire Prone Area in the Bushfire Management Plan (Appendix G) require a Bushfire Attack Level assessment and BAL Contour Plan to be prepared, In accordance with State Planning Policy 3.7, for an application of subdivision and/ or development.

Residential lots Identified within the Acoustic Report (Appendix E) require a Detailed Noise Assessment (customised noise mitigation measure to be Implemented), In accordance with State Planning Polley 5.4, lo be prepared and submitted with an application for subdivision and/ or development where noise limit Is likely to be exceeded.

3.12 Implementation and Staging

The Kingsford Precinct Plan (PP)is a statutory document prepared in accordance with the Deemed Provisions. The PP is the key statutory document to guide land use permissibility, built form and layout for the Town Centre.

Upon endorsement the PP will be the key document to inform future subdivision and development applications.

Development in the Town Centre will be implemented in multiple stages and dependent upon market demand (Refer Figure 1). Stage 1 is likely to compromise:

- Supermarket + specialty stores
- Tavern
- Child care
- Stage 2 will comprise the balance of the Town Centre
- Medical Centre
- Pad sites
- Northern Main Street tenancies
- Service Station

Stage 3 comprises the residential land that will be delivered in multiple stages once the town centre retail/food & beverage facilities are provided. Theres residential lots will accommodate an 'urban' not 'suburban' house design.

Figure 1: Staging Plan

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3.13 Residential Development

The Precinct Plan provides for a yield of approximately 385 lots/ dwellings. Based on Liveable Neighbourhoods 'Site Hectare' definition, the Structure Plan 'developable area' equates to 16.18ha to be developed for residential purposes and excludes non-residential uses including street, laneways and POS. Based on 385 dwelling, the Structure Plan estlmates 23.8 dwellings per site hectare, this complies with LN target of 22 dwellings per site hectare.

3.14 Notifications on Title

In respect of applications for the subdivision of land the City of Swan may recommend to the WAPC that a condition be imposed on the granting of subdivision approval for a notification to be placed on the Certificate(s) of Titles(s) to advise of the following:

a. The lot Is situated In the vicinity of the Great Northern Hwy transport corridor and Is currently affected, or may in the future be affected by transport noise, as per state Planning Policy 5.4 'Roads and Rail, Transportation Noise and Freight considerations in Land Use Planning'.
b. Building setbacks and construction standards to achieve a Bushfire Attack Level 29 or lower In accordance with Australian Standards (AS3959-2009): Construction of buildings In bushfire prone areas.

3.15 Developer Contributions

The Structure Plan area is subject to the requirements of Developer Contribution Plan Area No.7 - Bullsbrook Residential Townsite, as gazetted on the 15 December 2020.

3.16 Density Code Plans

The Structure Plan Map (Plan 1) defines the residential density ranges that apply to specific areas within the Precinct Plan area.

A Residential Density Code Plan is to be submitted at the time of subdivision to the WAPC and will indicate the residential density code applicable to each lot within the subdivision consisten with the residential density code ranges identified on the Precinct Plan (Plan 1) and location criteria contained in Clause 3.17.

Approval of the Density Code Plan is to be undertaken at the time of determination of the subdivision application by the WAPC. The approved Density Code Plan is to then form part of the Structure Plan and shall be used for the determination of future development applications.

Density Code Plans are not required if the WAPC considers that the subdivision is for one or more of the following;

a. The amalgamation of lots;
b. The purpose of facilitating the provision of access, services or infrastructure;
c. Land which by virtue of its zoning or reservation under the Structure Plan cannot be developed for residential purposes; or
d. Consolidation of land for 'superlot' puposes to facilitate land assembly for future development.

3.17 Locational Criteria

Residential densities applicable to the Precinct Plan area are those residential densities shown on the Precinct Plan (Plan 1).

The allocation of residential densities will generally be in accordance with the following location criteria:

Density Code	Locational Criteria
R40-60 Precinct	
R40-60	The R40 density code applies as the base code to all residential zoned lots. An R60 density code may apply to residential zoned lots where the lot is directly opposite/abutting public open space and is serviced by a rear laneway.

PART 2

EXPLANATORY

1.0 Planning Background

1.1 Purpose

The purpose of the Kingsford Precinct Plan (PP)is to facilitate the development of the Town Centre in Kingsford as set out in both state and local planning documents.

The PP is made pursuant to the requirements of State Planning Policy 4.2 and the Deemed Provisions of the Regulations.

The Town Centre will the focal point for the rapidly growing Kingsford Estate. The following outlines the relevant planning documents to the activity centre.

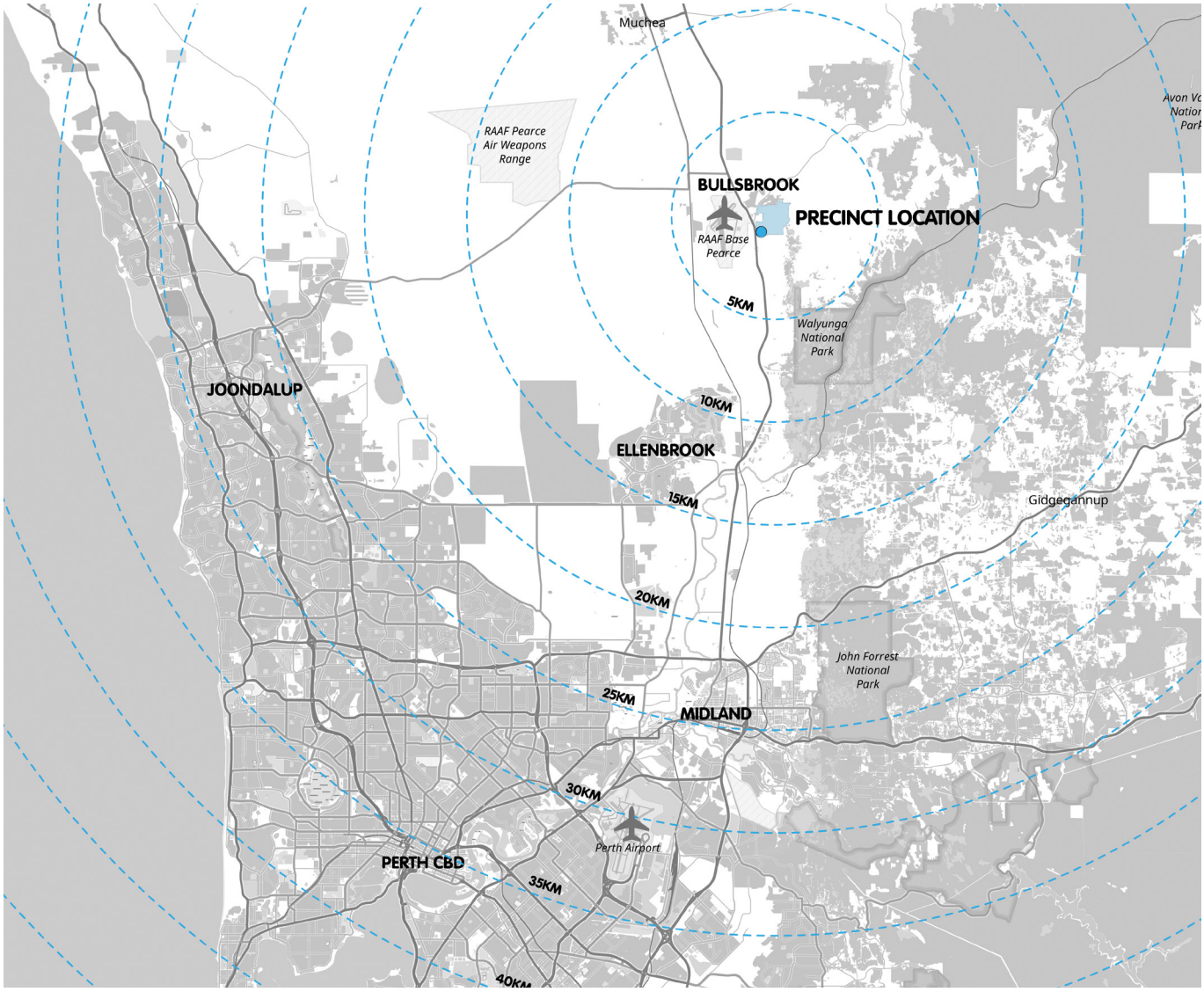
- District – Bullsbrook Townsite District Structure Plan
- Local – Bullsbrook Central Structure Plan
- Town Centre – Kingsford Precinct Plan
- Local Development Plans

1.2 Regional Context

The Kingsford Town Centre is the commercial and community heart of Kingsford Estate within Bullsbrook as shown in Figure 1. The District Structure Plan designates the Kingsford Town Centre a 'Town Centre' with a floorspace allocation of 20,000m2 NLA.

Kingsford Estates is situated approximately 40km north-east of the Perth CBD and 25km north of Midland. It is located adjacent the existing Bullsbrook townsite and the Royal Australian Air Force base – Pearce; on Great Northern Highway.

Figure 1: Regional Context



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1.3 Local Context

The Kingsford Town Centre is located in the Southern portion of the Kingsford Estate, adjacent the existing Bullsbrook townsite and the main access onto Great Northern Highway, as shown at Figure 2. The existing Bullsbrook townsite is in need of an upgrade with a limited range of commercial and retail outlets and facilities to service the needs of an increasing resident base.

The Kingsford Town Centre will ensure the delivery of a contemporary retail offering in concert with an active public realm while also providing an important employment generator for the locality.

The Kingsford Town Centre will service the existing Bullsbrook residents, several other smaller residential estates to the north and the future South Bullsbrook residential area and the surrounding rural lifestyle population.

The Town Centre area is located on the relatively flat landscape of the Swan Coastal Plain . The PP area ranges in elevation from approximately, 54m to 46m AHD to the South-West over 750m. This flat landscape to the SW corner of the landholding is ideally suited to the development of a Town Centre. (Refer Contour plan – Figure 3).

Figure 2: Local Context

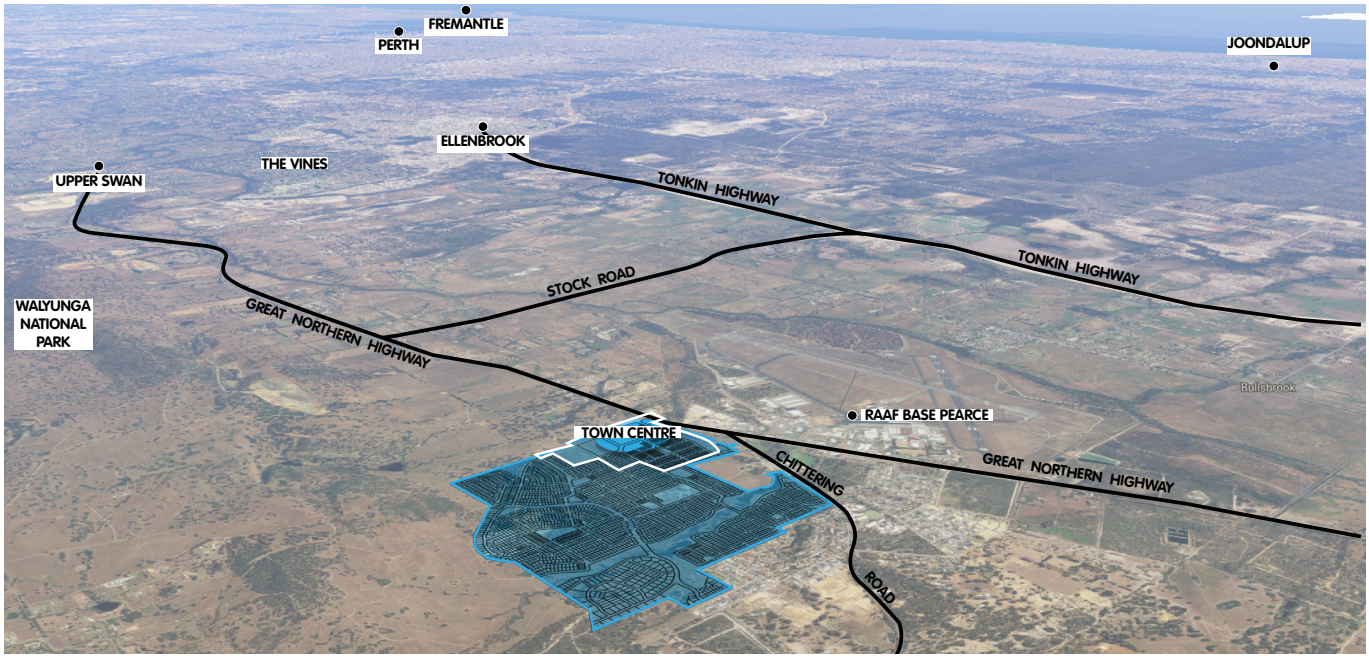
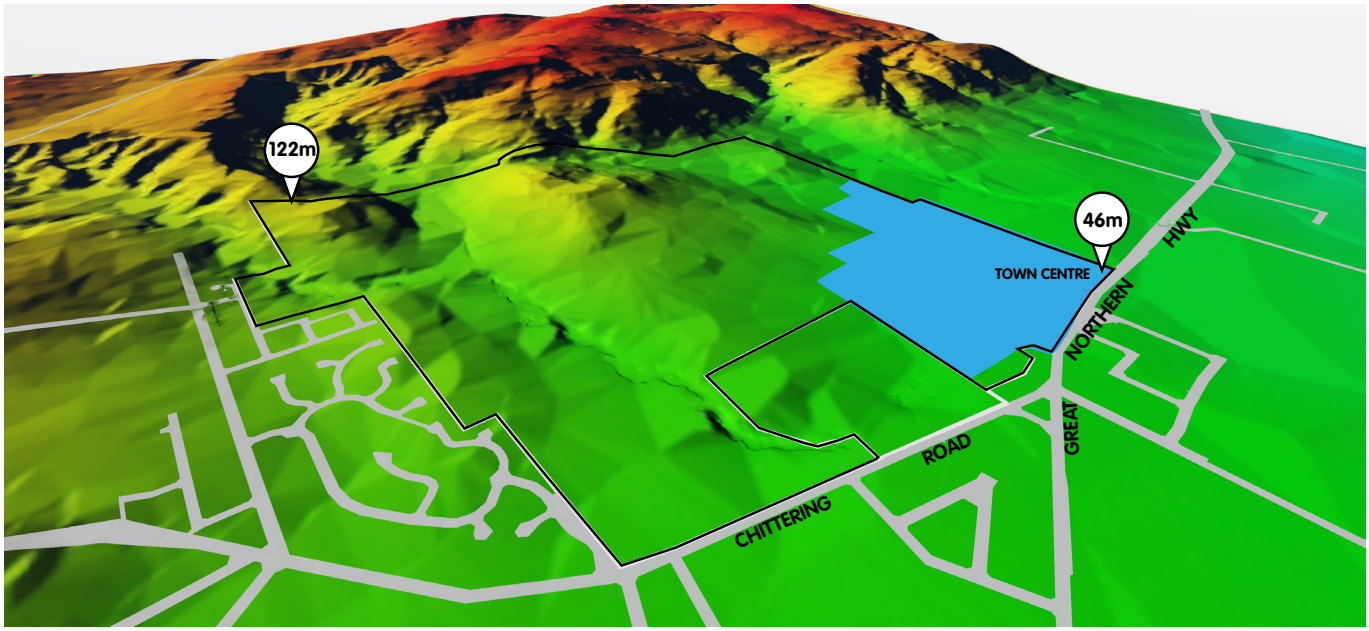


Figure 3: Colour Centre Tint



1.4 Legal Description and Ownership

The Kingsford Town Centre is comprised of the following lot;

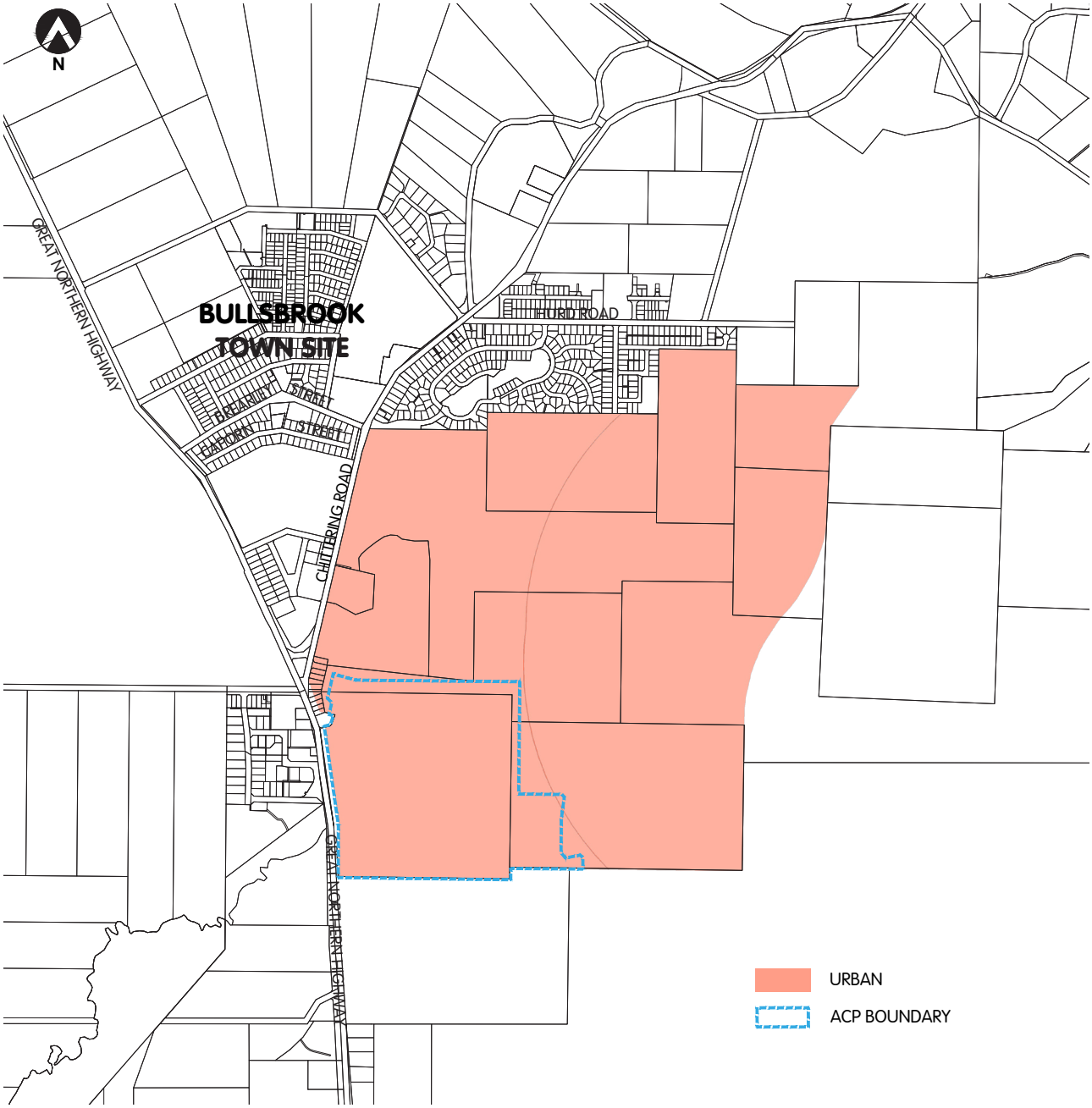
Lot Plan	Area (ha) Approx (Town Centre)	Owner
Pt Lot 1354 Great Northern Highway on DP 231314	39.16ha	Vispo Holding Pty Ltd
Pt Lot 1396 Great Northern Highway on DP249040	2.89ha	Vispo Holding Pty Ltd
Pt Lot 1314 Chittering Road on DP247991	5.23ha	Vispo Holding Pty Ltd

2.0 Planning Framework

2.1 Metropolitan Region Scheme

All of the Kingsford Town Centre is zoned 'Urban' under the Metropolitan Region Scheme (MRS Amendment 1324/41). Refer Figure 4.

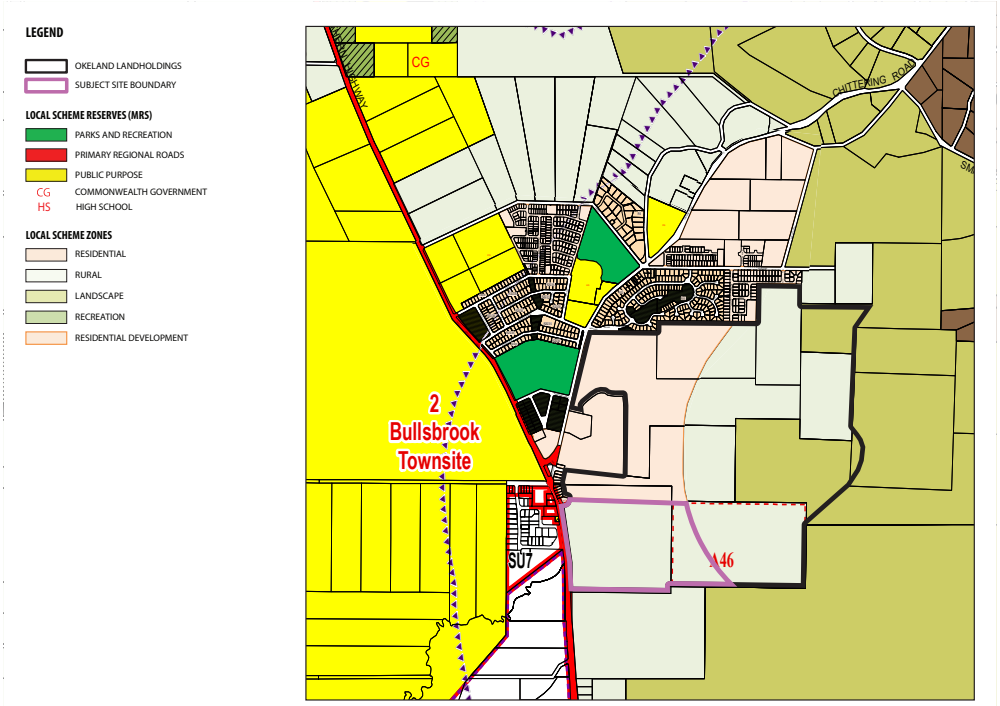
Figure 4: MRS Zoning Map



2.2 City of Swan Local Planning Scheme No. 17

The Kingsford Town Centre forms part of the City of Swan Local Planning Scheme No. 17 – Amendment No. 186, which zoned the land to 'Residential Development'. The Amendment was supported for final approval by the Swan Council at their meeting held on the 26 August 2020. The Amendmentwas approved by the Hon Minister for Planning and gazetted on the 9 February 2021. (Refer Figure 5)

Figure 5: Local Planning Scheme No.17 - Amendment No. 186



2.3 Regional and Sub – Regional Planning Context

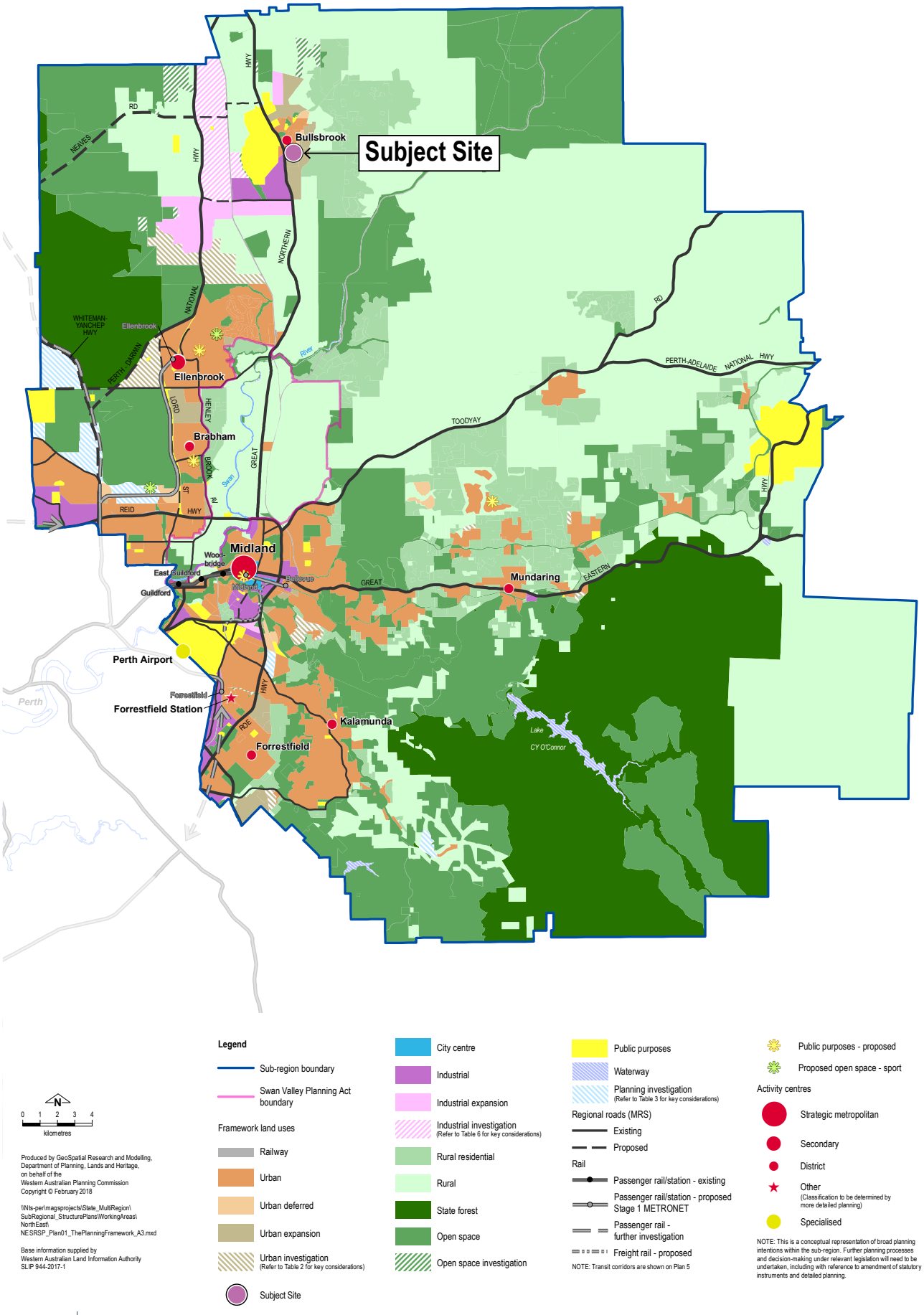
2.3.1 Directions 2031 and Beyond

Directions 2031 and Beyond, the WAPC's strategic planning framework document for Metropolitan Perth and Peel, is a high level strategic plan that establishes a vision for the future growth of the Perth and Peel region (Figure 6). It provides a framework to guide the detailed planning and delivery of housing, infrastructure and services necessary to accommodate that growth.

The Central Bullsbrook Precinct is identified within the 'North-East Sub-region', which is expected to grow by 69,000 people, to a total population of 258,000. Based on a 'Connected City' scenario, a growth target of 15 dwellings per gross urban zoned hectare is set by Directions 2031for the area.

The proposed Town Centre development is consistent with Directions 2031 and Beyond, as it will facilitate strategically significant urban development within the Bullsbrook town site Urban Expansion area.

Figure 6: Direction 2031 and Beyond - North-East Sub-regional Framework



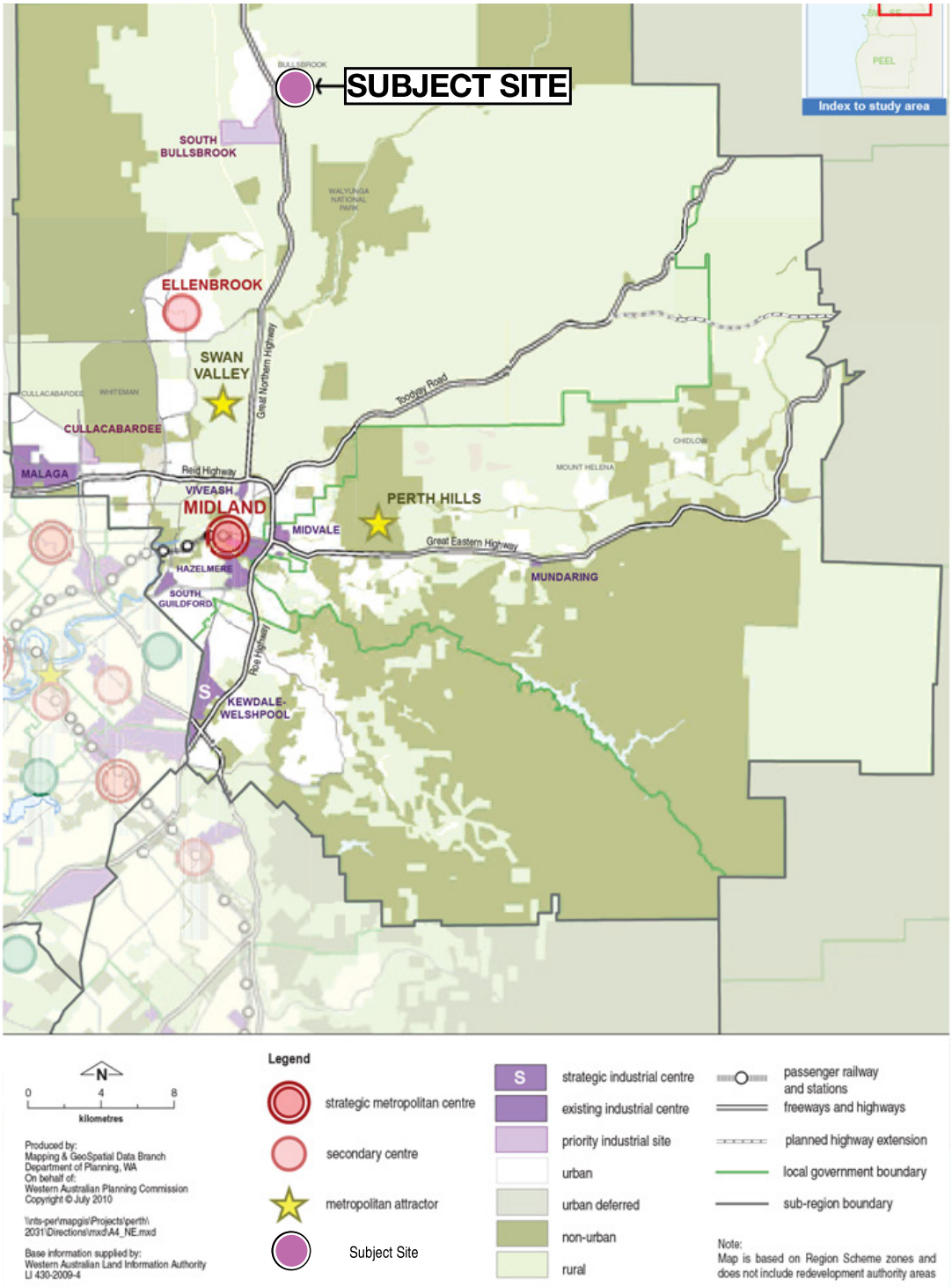
2.3.2 Perth and Peel @ 3.5 Million

Perth and Peel@3.5million report sets the context for the four sub-regional planning frameworks (Figure 7). The frameworks build upon the principles of Directions 2031 and provide guidance for future urban development and supporting infrastructure.

The Central Bullsbrook Precinct is located in the 'North-East Subregion' which is projected to grow to a population of 450,590 people by 2050. This will require approximately 187,986 jobs and 179,101 dwellings. The PP area is identified as a mix of 'Urban Deferred' and 'Urban Expansion' under the North East Sub-Regional Planning Framework.

The proposed Town Centre development will play a key role in achieving the growth and employment targets under Perth and Peel @3.5 million.

Figure 7: Perth and Peel @3.5 Million- North-East Sub-region



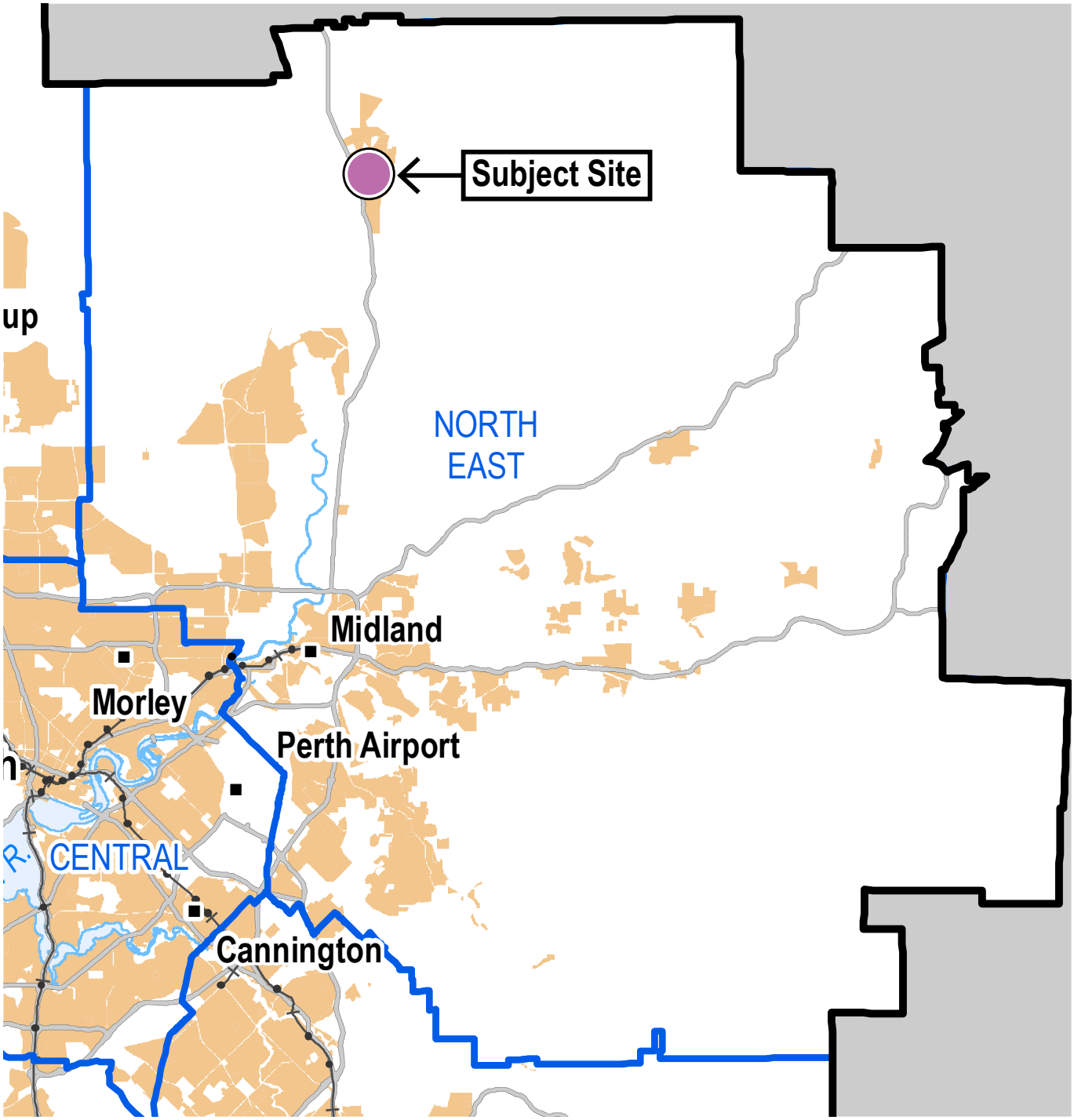
2.3.3 Perth and Peel Green Growth Plan for 3.5 Million

The Perth and Peel Green Growth Plan for 3.5 Million provides for the growth of the population to 3.5 million people while protecting the unique biodiversity and other environmental values of the regions (Figure 8). It sets out a framework which delivers improvements to the protection and management of state and national biodiversity and environment matters.

The Central Bullsbrook Precinct is identified as 'Urban Class of Action' under the Strategic Conservation Plan. This Class of Action provides for existing, new and proposed urban development. This includes residential land uses and associated functions such as employment, education, retail, civic facilities, light industry and open space.

The proposed PP and Town Centre development is consistent with the recommendations of the Draft Green Growth Plan.

Figure 8: Draft Perth and Peel Green Growth Plan for 3.5 Million



2.4 Local Planning Context

2.4.1 City of Swan Urban Housing Strategy

The Urban Housing Strategy addresses future housing needs within the City of Swan. It aims to ensure long term sustainable future residential development through the creation of an accessible, well connected and sustainable community where all demographic cohorts have access to varied housing options.

The Urban Housing Strategy comprises an Infill Strategy and a Greenfields Strategy which both respond to Directions 2031, and projects the need for an additional 35,510 dwellings in the locality.

The Greenfields Strategy applies to greenfield areas which are subject to current and future structure planning. The Greenfields Strategy identifies the Central Bullsbrook Precinct as a mix of 'Urban Deferred Zoned Undeveloped' and 'Urban Expansion Area 2011 – 2015'.

The PP and Town Centre plays a key role in achieving the objectives of the Urban Housing Strategy. Comprising most of the future R40-R60 land within the Precinct adjacent to the Town Centre, it will complete the diverse range of housing choices within Kingsford, within a high accessibility and amenity location.

2.4.2 Bullsbrook Townsite District Structure Plan

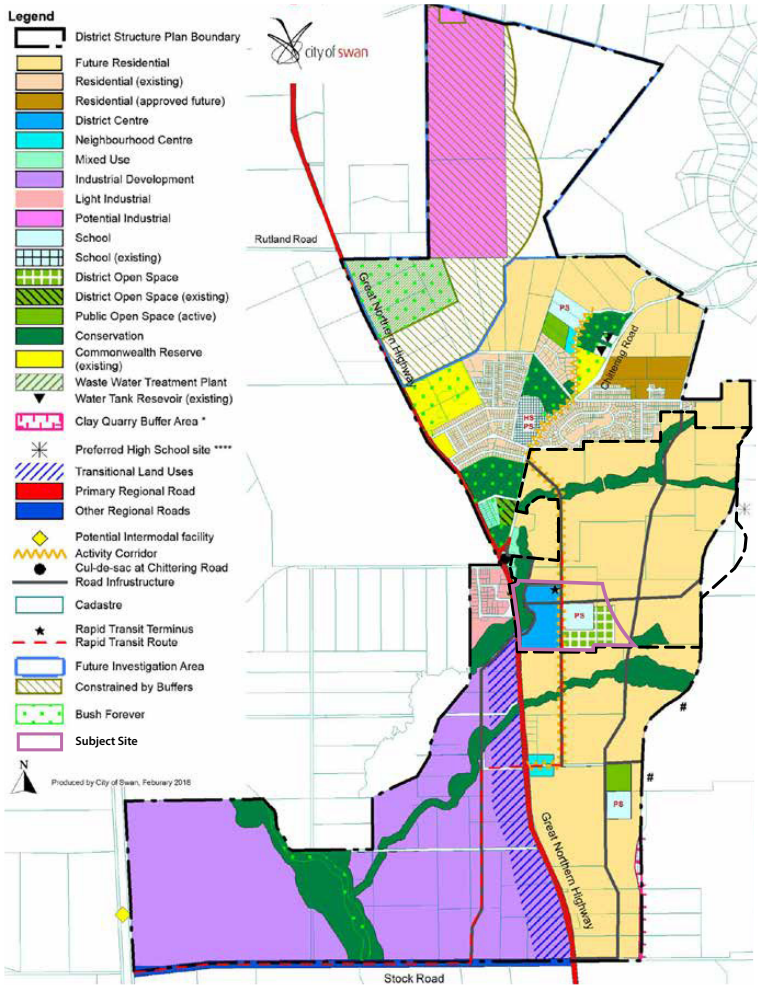
In the early planning stages of the District Structure Plan, the City of Swan recognised the need for an expanded retail / commercial centre in Bullsbrook and the limitation of the existing centre to allow expansion. It was determined that the most appropriate location for the new Town Centre would be directly east of the existing hub, across Great Northern Highway. That site being the Kingsford Town Centre (Refer Figure No. 9)

The proposed Kingsford Town Centre accords with the intent of the District Structure Plan as detailed below:

Town Centre

The proposed Town Centre is expected to commence expansion within its western edge to provide an early connection with the existing hub to the west, and to take advantage of the exposure to GNH. The proposed Town Centre is located along a north-south distributor road close to proposed community facilities, DOS and the district school in order to create a vibrant and connected centre with a diverse range of activities.

Figure 9: District Structure Plan



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2.4.3 Bullsbrook Central (Kingsford) Structure Plan

The Bullsbrook Central (Kingsford) Structure Plan (local structure plan) is consistent with the District Structure Plan and identifies a 'Future Activity Centre Structure Plan' over the area of the Kingsford Town Centre / Town Centre (Refer Figure 10).

The PP will fulfill the required planning framework to enable delivery of the Town Centre.

The Bullsbrook Central (Kingsford) Structure Plan defers land use permissibility and built form control of the town centre to the PP.

2.4.4 Pre-lodgement Consultations

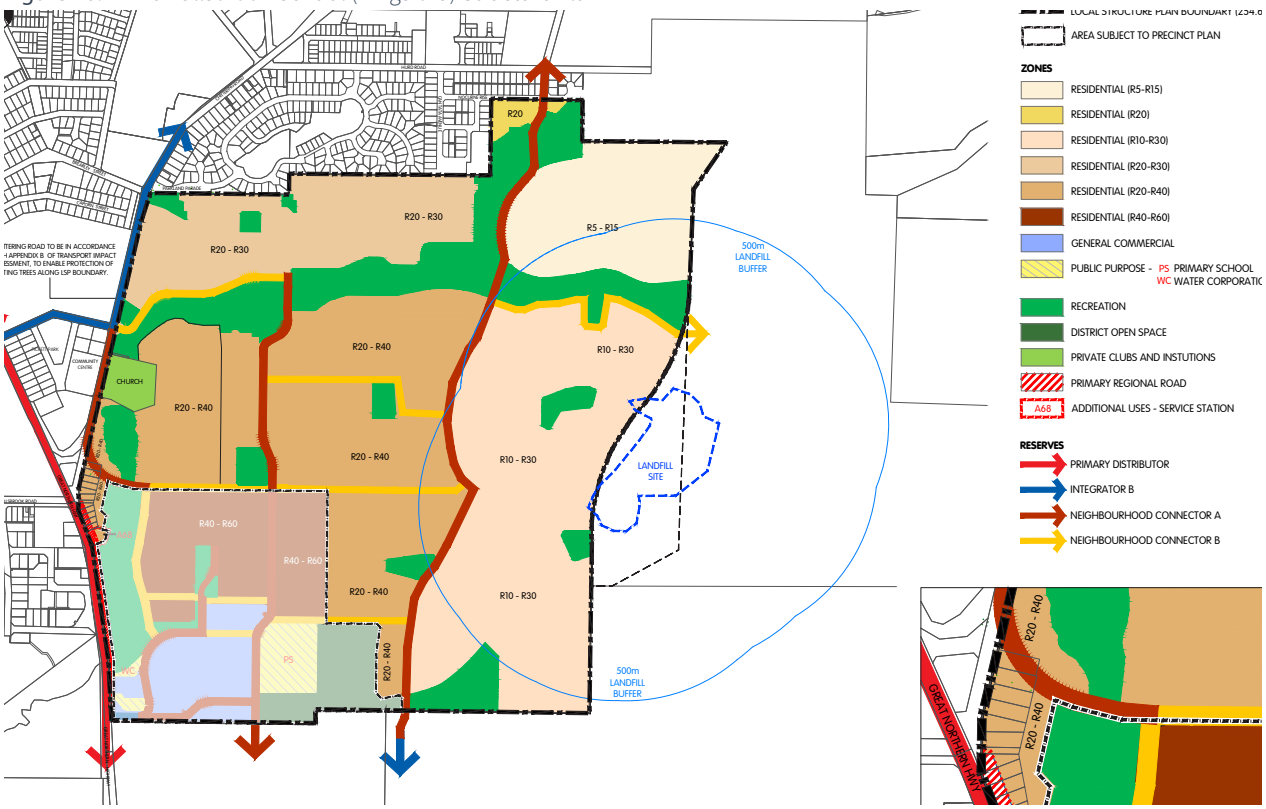
A series of engagements with local and state authorities have informed the development of this Precinct Plan, as summarised in the table below.

Consulted Party	Date	Description
Department of Planning, Lands and Heritage	5 November 2020	PP Content + Design
City of Swan	5 November 2020	PP Content + Design
City of Swan Executive	23 November 2020	Briefing on PP content and timing
Department of Education	23 November 2020	Primary School site + layout

2.5 Engagement Strategy

Scale / Impact of Precinct Planning	Proposal	Community Engagement	Facilitation
Low to Medium Impact	A Precinct Plan /PP that is consistent with the planning framework and result in a level of community impact ie. increased density and vehicle movements.	Statutory Advertising Community Information Open Sessions Community Resident Association Presentation Direct Engagement - Core existing Retailers in Bullsbrook Community Fair - Information Stand	City of Swan Okeland /Hatch RobertsDay Okeland /Hatch RobertsDay Okeland Okeland

Figure 10: The Bullsbrook Central (Kingsford) Structure Plan



3.0 Town Centre Vision

From the very beginning Kingsford has evolved from a strong vision and blueprint that has guided the design and decision-making, which has focused on the purposeful integration and respect for the existing townsite and geography of Bullsbrook.

As a new Town Centre, the Kingsford Town Centre will become the region's vibrant heart and the social hub for this community. It will create a place for enterprise and socialisation and will bring friends, family, and visitors together. It will offer places to explore and discover with a relaxed regional charm and modern conveniences. It is not intended to duplicate or compete with the existing facilities that exist within Bullsbrook, rather provide a range of additional commercial and civic uses to serve the broader needs of the whole locality.

The Town Centre has been carefully planned as an urban village that ties the whole development together. It plans to accommodate a balance of active community spaces and contemporary mix of shops, including a major supermarket, specialty stores, café, medical services, plus appropriate high-end sports, and community recreation facilities.

The vision statement and supporting place drivers developed for Kingsford are provided below. The vision is supported by a master plan and illustrative conceptual visualisations (at Figure 11) that depict the potential development outcome of the PP area at completion. These are for illustrative purposes only and is not intended to inform the interpretation of Part 1 provisions of this PP for the assessment of planning applications by relevant decision-makers.

Place Drivers

Progressive

Community wellbeing

Character rich

Inspired by nature

Figure 11: Masterplan (Vision)

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3.1 The Vision

Immersed in the captivating foothills, Kingsford is inspired by the past and built for the future; with strong foundations and pride, it is an authentic urban village that values its community.

3.2 Place Values

Health and Wellness

Fostering healthy living and wellbeing for its residents, Kingsford provides a unique lifestyle choice. Its tree-lined streets, Ki-It Monger Trail and integrated paths support modern active living.

The Town Centre is community-focused and offers a relaxed vibe, with spaces for people to unwind and socialise. Public spaces are low-key and full of texture, colour and intimacy.

Crafted for the Community

Thoughtfully planned as a multi-generational community, this is a place with seemingly small and subtle details that have a profound impact on how spaces are used.

Clever design, strategic investment and collaborative management of the Town Centre creates a new lively hub of activity for residents and visitors alike.

Immersed in the Landscape

Nestled within Perth's northern foothills, its streets, built form and landscaping is distinguishably Western Australian – both functional and striking during all seasons.

The retained trees, bushland parks and the Ki-It Monger Brook park act as place locators, adding to its character and identity.

Place of Discovery and Fun

Bullsbrook's rich heritage and local culture that has long been valued by its residents is proudly on display – creatively intertwined and playfully expressed throughout the landscape, parks and playgrounds, built form, and public places.

Full of surprises, it is a place residents are proud of and welcomely share with visitors.

Connected and Progressive

Highly regarded for its intuitive approach and sustainable way of life, there is a real sense of pride and opportunity in the air. Locals are working alongside the City and stakeholders to naturally connect this new village with the existing Bullsbrook community.

New technology supports the neighbourhood's activities and lifestyle, with fibre optic networks, solar and water technologies integrated throughout.

3.3 The Concept Masterplan

Compact, walkable and pedestrian orientated, Kingsford is designed as a destination in its own right. It will have animated streets and public spaces, together with a new Town Centre that is the nucleus of activity for residents and regional visitors.

The buildings and main street will exude a modern rural personality, and its well-planned design enables authentic and incidental interaction. With inherently 'rural Australian' character, Kingsford is cleverly planned to complement the undulating terrain, panoramic views, waterways and bushland.

Every day residents will be able to utilise the uninterrupted network of pathways that connect the neighbourhoods and outdoor experiences. It is a place designed to be enjoyed all year around – from the green winter months through to the warm summer evenings and hot summer days.

Urban design details:

- Streets aligned to capture views of the Darling Scarp and Brook.
- Sharing views of the scarp and creek from the Rocky Knoll Park and Lookout Park.
- Retains trees along streets and in various parks.
- Incorporates a green loop starting at Brook Park, which creates an uninterrupted network of trails and pathways through-out the neighbourhoods.
- Facilitates strong linkages with Pickett Park and existing Bullsbrook residential areas.
- Features a nature play space that will include a small café, BBQ, shade areas and toilets.
- Includes an identifiable Town Centre with functional design, retail and activity areas for people to meet and interact.
- Is centred by a realigned and meandering Chittering Road, slowing traffic and providing easy access north and south through the centre of town.

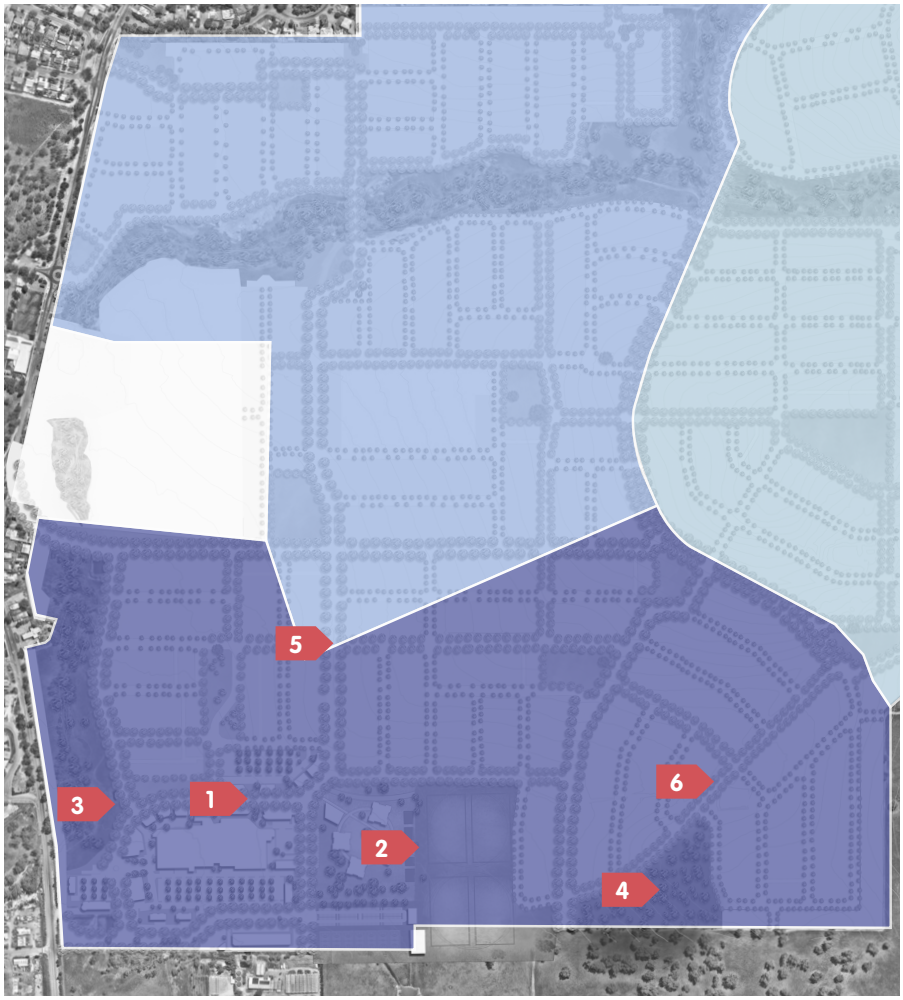
3.4 Strategies To Bring The Vision To Life

Town Centre

The Town Centre will become the nucleus of community activity, exude personality, and be commercially successful. Achieving these aspirations will require a combination of clever design, bold leadership and robust management. To achieve these aspirations, we will undertake the following strategies.

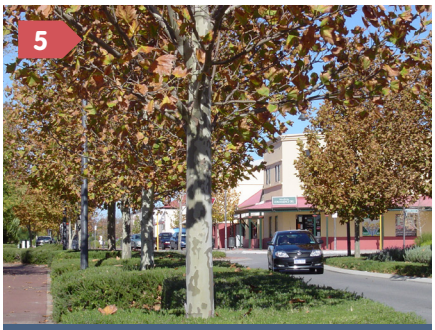
Strategy	Area of focus
Deliver a design that creates a contemporary main street environment, supported by comfortable and functional public domain.	• An attractive and vibrant main street shopping area characterised by a series of well-designed small shops • A mix of intimate and comfortable places for people that are fun, welcoming, attractive and functional • Ensure that the main supermarket is designed and located to align with main street design principles • Ideally all tenancies with a frontage to the main street (including the supermarket) will have direct access from the main street • Pedestrian priority by creating low-traffic speed environments in key areas • Locate majority of car parking at the rear of shops with easy access through to the main street
Prepare Design Guidelines and a Local Development Plan for the Town Centre, to reinforce the desired 'rural aesthetic' and design objectives.	The design objectives will be given priority, where possible, through all phases of project delivery, including design, sales contract negotiations, and development and tenancy agreements
Establish anchor tenants as early as possible, and focus on a curated tenancy mix in strategic locations.	• Secure a quality supermarket – early • Attract a quality and diverse range of 'boutique' local businesses • Lobby for early delivery of a primary school adjacent to the Village Centre • Include childcare facilities and health services in the Town Centre • Focus on attracting a diverse mix of retail, commercial and community services
Establish governance structures to achieve robust management outcomes.	This will include exploring the opportunity for 'shopping centre' style management agreements for all operators located in the Town Centre, and provision to raise levies to fund marketing campaigns and special events.
Work closely with adjacent property owners to ensure a cohesive and consistent approach.	Particularly the SACRI church and herb farm (to the south).

NEIGHBOURHOOD 2: HEART



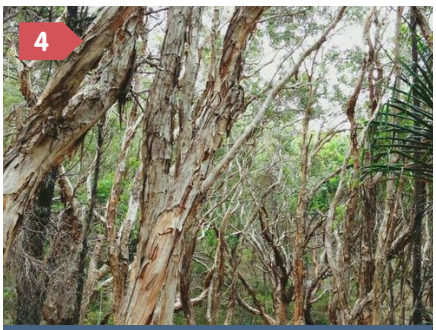
Active main street set amongst retained tree and with several meeting places

Village Green with the 'Old Bullsbrook' Well, a 'farm to table' restaurant/bar/ café, and themed playground



Chittering Boulevard and Hilltop Avenues

School and District Playing Fields



Forrest Field Park

Greenway

3.5 Place Elements

Country character Town Centre

- Entrance vista's reflect and enhance 'overall' vision and intent
- Tree lined, interactive main street
- Modern buildings, inspired by rural aesthetic
- Design philosophy supports main street principals
- Supermarkets to have main street entrances, with customers activating specialty stores as they walk between parking and the shops
- Ideally, all other tenancies have main street or public spaces entrances
- Majority of car parking is located at the rear of shops with easy access through to the main street
- Boutique local businesses
- Control provisions to deliver quality design and landscaping outcomes
- Mix of day and night uses activating the public realm, including retail, services, food and beverage, community and residential

Animated streets and community gathering places

- Intimate/flexible public realm
- Day/night focus
- All-age friendly

Village Green and 'Old Bullsbrook' Well

- The town is characterised by a balance of urban and nature connections
- Pays homage to Bullsbrook's history and the place connection to water
- Regional themed playground to attract families to use the town centre
- Simple farm to table' restaurant/bar/café fronting the playground/Village Green
- Recreation, civic and commercial anchors support and enliven the soft 'green' nature spaces which anchor the west side, including:
    - Farm themed restaurant
    - Regional playground
    - Green loop
    - Tourism businesses (mountain bike hire)

Built form / Housing

- Straighter urban grids
- Higher density housing around the Town Centre
- Narrower frontages (<15m) and conventional depths
- Wider and deeper lots in moderate sloping areas
- Appropriate design and lot size/types responses
- Innovative construction techniques to maintain elevation and rural feel
- Deeper and wider lots 'breaking the mold' of traditional offer
- Building areas of most lots to be flat

Streets

- Retaining walls installed only when required to achieve clearly defined flat/level building zones
- Combination of roads parallel and perpendicular to the land contours
- Tree-lined boulevards connect residents to other neighbourhoods

Place management focus

- Programmed activities
- Tiered governance frameworks
- Marketing levy built into sales contracts

Community Infrastructure

- Childcare centre
- School and Playing Fields with supporting youth/sporting infrastructure
- Innovative and accessible public transport that does not compromise the centre's amenity and urban qualities

Community Safety

The PP and concept plan has been assessed against the CPTED principles and performance criteria listed in the WAPC Design Out Crime Planning Guidelines (2006). Refer to Appendix C.

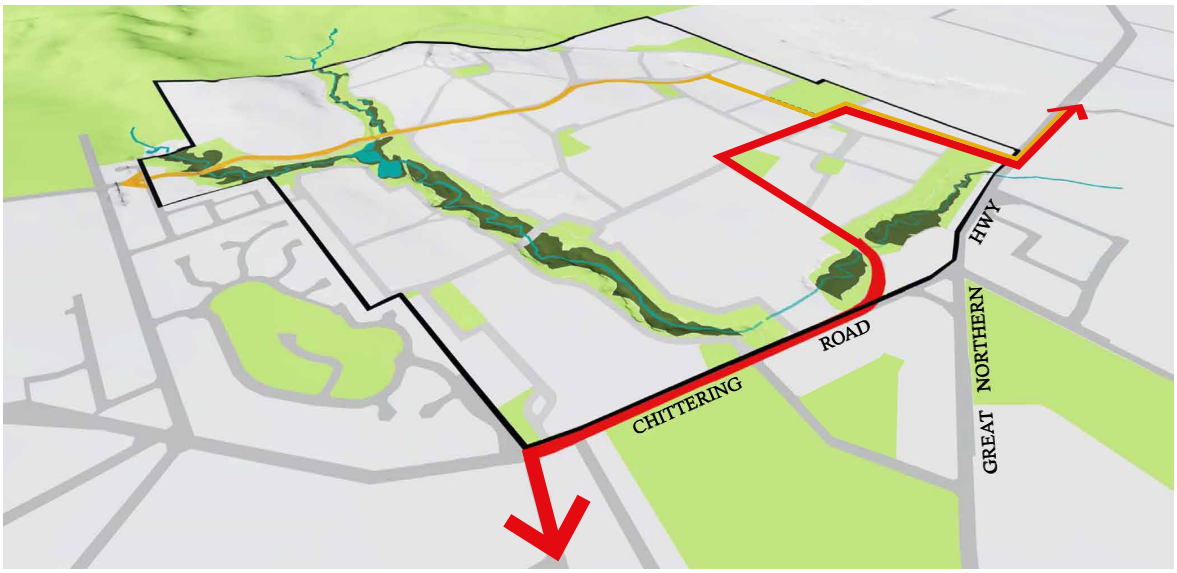
3.6 Connected By Nature

The Kingsford community will have strong connections with nature, particularly via a 'Green Loop' connecting the Brook to complete a 4.2km contiguous ecological system. The southern extent of the Green Loop is positioned on a meandering topographical low-point, reinforcing its natural qualities and culminating in the Town Centre where it takes on a more urban character before returning to nature.

Core creek area
Public open space

3.7 Transit Village

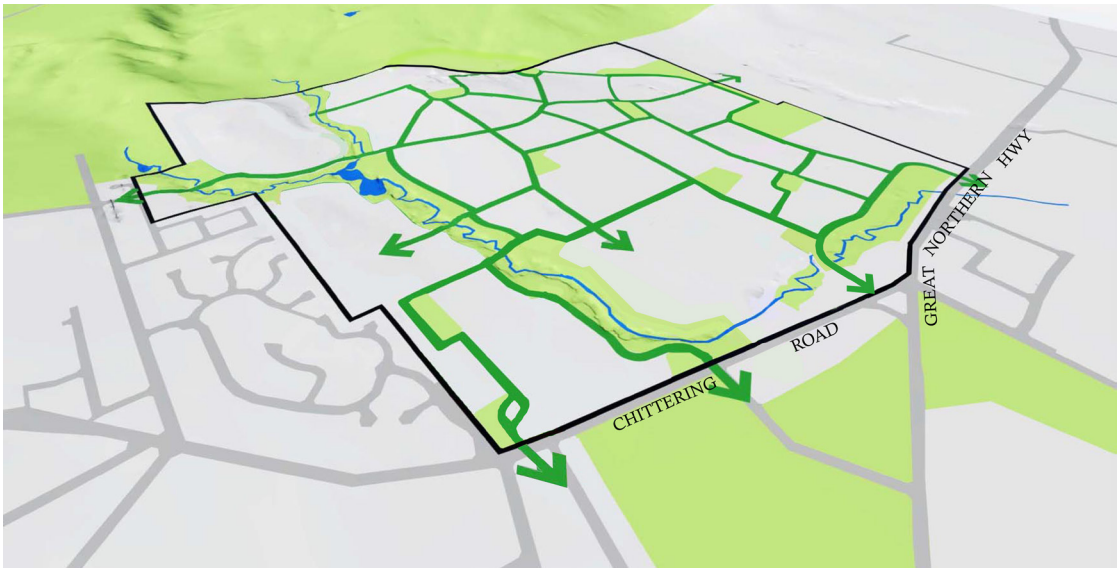
The Bullsbrook Town site will over time have good access to public transport via a Rapid Transit Service line which is intended to service the Swan Urban Growth Corridor and Ellenbrook. The Kingsford site will make a significant contribution to this, with an 'Activity Corridor' extending north-south through the site as a realignment of Chittering Road. It is proposed that a bus stop terminus would be located adjacent to the Town Centre consistent with the Land Use Master Plan.



Re-alignment of Existing 311 Route
Potential Extension of Existing 311 Route

3.8 Connected Open Space Network

Kingsford will consist of a contiguous network of open spaces, with the primary objective of connecting the community with the Ki-It Monger Brook, topographical points of interest and the Town Centre. The Green Loop will be the major open space connection, consisting of a series of local open spaces that punctuate the movement experience around the site. The open space network has been assessed against the Healthy Active by Design Principles (refer to Appendix D).

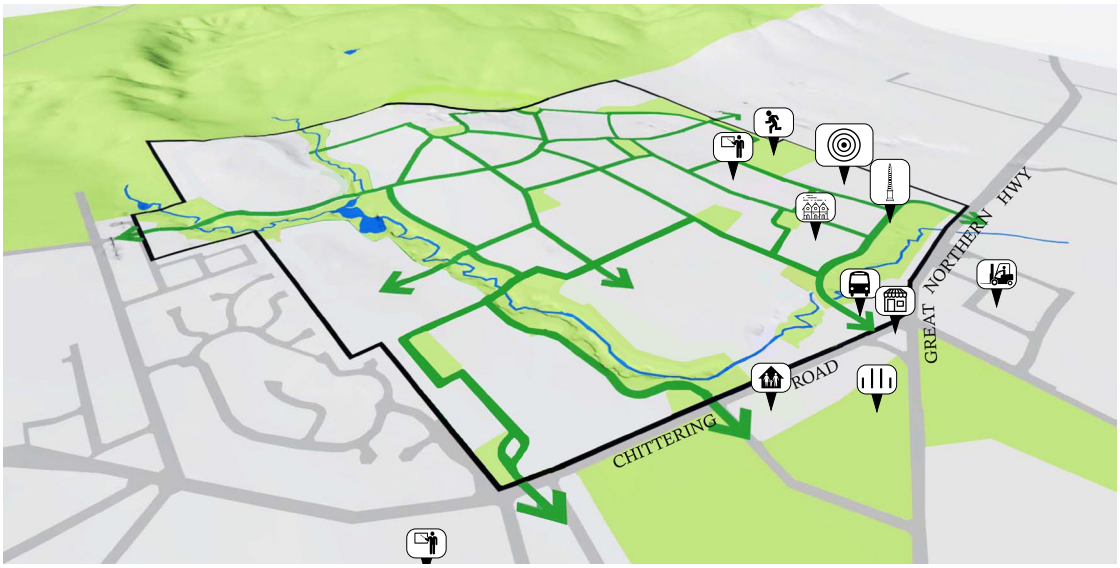


Public open space
Pedestrian / Cycle

3.9 Integrated Town Centre Heart

Being in the privileged position of the only landholding located next to the existing town, Kingsford master planning and placemaking will focus on integration with the existing town to optimise mutual benefits. The Town Centre will become the nexus between Bullsbrook and Kingsford.

Kingsford Town Centre will over time offer the existing and future community district level retail, education, a diversity of public spaces, services, lifestyle, transit, more urban living choices and, above all, a place for the entire community to come together.



Picket park
Light industrial
Signature public space
Core retail
Urban residential
Transit
District open space
Primary school
Existing community facilities
Existing Bullsbrook centre

4.0 Environmental and Heritage Considerations

An Environment and Hydrology Report was prepared by RPS as part of the approved LSP.

The Report shows that the PP area does not have any environmental constraints or attributes that will limit or preclude urban development. Relevant environmental considerations are summarised below.

4.1 Flora and Fauna

No Threatened Ecological Communities (TECs) were identified within the Bullsbrook Central Precinct.

The recent MRS amendment for the area was referred to the Environmental Protection Authority (EPA) for advice on whether an environmental assessment would be required. The EPA advised that the proposed amendment did not require formal assessment under Part IV of the Environmental Protection Act 1986.

The majority of the Bullsbrook Central Precinct has been cleared of natural vegetation for agricultural purposes. The Ki-It Monger Brook traverses the Precinct Plan area to the west and includes two wetlands.

The majority of the Guildford Complex is associated with the Ki-it Monger Brook. The remnant Guildford Complex is also located on the property adjoining the southern boundary of the PP area, with a small portion encroaching into the subject site (Lot 1314). This will predominantly be retained within Public Open Space as per the Indicative Structure Plan.

In relation to the two wetlands associated with Ki-It Monger Brook, one is classified as a Conservation Category Wetland (CCW) (UFI 12681) and the other a Multiple Use Wetland (MUW), which is likely to have few important ecological attributes and functions remaining.

A botanical assessment was conducted detailing the spatial extent and characteristics of the wetlands in particular the CCW (UFI 12681). There were no significant flora species recorded or likely to occur along Ki-it Monger Brook.

Both the CCW and MUW within Ki-it Monger Brook had vegetation condition rated as ‘Degraded’ with no or scattered native understorey plants, litter, high grazing levels and weed infestation.

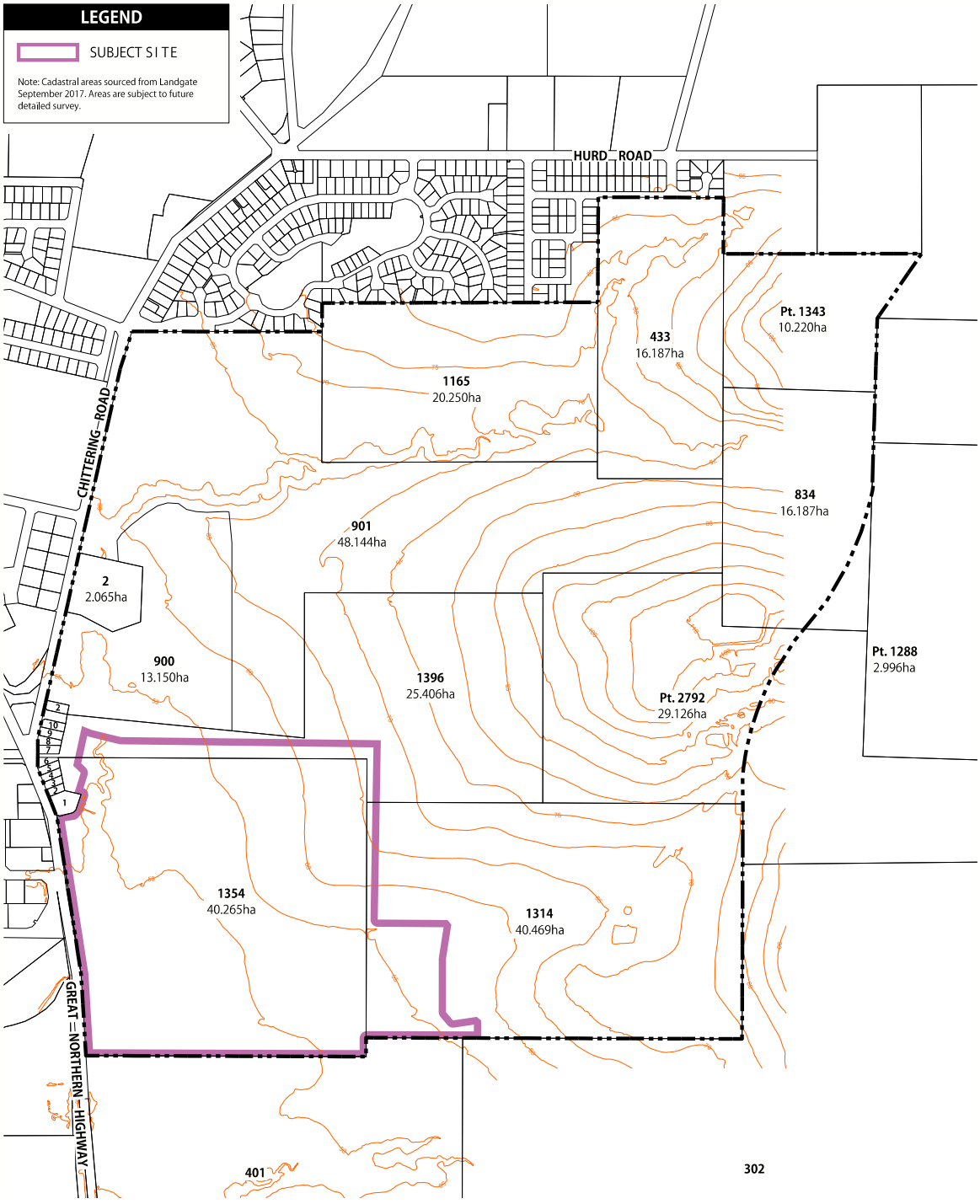
4.2 Land form and soils

The Central Bullsbrook Precinct is located at the foothills of the Darling Scarp and is generally of high relief. It ranges in elevation from approximately 120 metres Australian Height Datum (m AHD) in the east, where the foothills begin down to approximately 50m AHD to the south- west, where the relatively flat landscape of the Swan Coastal Plain commences (Figure 12).

The PP area predominantly consists of this relatively flat landscape. This is a major factor in co- locating the Town Centre, playing fields, primary school and higher density housing within this part of the Precinct.

The Department of Environment and Regulation (DWER) has compiled broad-scale mapping of the risk of acid sulphate soils for regions of Western Australia. The PP area has not been assigned an Acid Sulfate Soils (ASS) risk rating and it is assumed there is a “low to no” known risk of ASS occurring within 3m of the natural soil surface (or deeper).

Figure 12: Site Topography



4.3 Landfill Site

All waste acceptances at the premises ceased in November 2018 and all waste processing was completed by the end of December 2020. Oakland Communities engaged Strategen - JBS&G to work with DWER on the licence surrender / post-closure Management Plan. This process is on-going with DWER.

The landfill site is located on Lot 2792 which does not form part of the Precinct Plan.

4.4 Nursery Noise

A nursery is located adjacent to the Southern boundary of the proposed Town Centre. The generic separation distance required from a nursery is 100m (EPA 2015). The generic buffer is primarily based on potential noise impacts.

In regards to interface, management the Town Centre and playing fields are proposed adjacent to the nursery site to manage the long term interface. The design outcome ensures no sensitive land uses are located within 100m of the nursery.

It should also be noted that the land south of the Central Bullsbrook Precinct (including the nursery) has been identified as future residential land in the DSP.

4.5 Transport Noise

The PP / Town Centre area is located adjacent to a Primary Distributor in Great Northern Highway. As part of the approved LSP, a Transportation Noise Assessment was prepared by Herring Storer (Appendix E).

The assessment was undertaken in accordance with the WAPC's State Planning Policy 5.4 – Road and Rail Transportation Noise and Freight Considerations in Land Use Planning (SPP 5.4).

The acoustic assessment found that without mitigation, 'noise targets' set by SPP 5.4 would be exceeded for dwellings close to Great Northern Highway, as well as Chittering Road. In response, the report includes a series of specific noise mitigation requirements, which will ensure that the Northern portion of the PP area is suitable for residential development.

4.6 Heritage

A search of the Department of Indigenous Affairs (DIA) Aboriginal Heritage Inquiry System (AHIS) database identified one registered Aboriginal site of mythological significance within the Central Bullsbrook Precinct, being the Ki-It Monger Brook 2 (Site ID 3583). The desktop search also identified one 'Other Heritage Place' within the Precinct, being the Bullya Spring (Site ID 22669). Importantly, both of these sites are located outside the PP area.

A search of the Heritage Council's database resulted in no matches for European Heritage within the Precinct.

4.7 Bushfire Management

An updated Bushfire Management Plan (BMP) was prepared by Strategen in support of the Precinct Plan; prepared in accordance with the WAPC's Guidelines for Planning in Bushfire-Prone Areas 2015, and SPP 3.7: Planning in Bushfire Prone Areas, and the Australian Standard AS3959-2009 Construction of buildings in bushfire prone areas (AS3959) (Standards Australia 2009). The report confirms the suitability of the PP area for urban development from a bushfire hazard perspective, subject to appropriate management measures.

4.8 CPTED Assessment

An assessment of the Kingsford Town Centre PP using the CPTED principles and performance criteria listed in the WA Planning Commission 'Designing Out Crime Planning Guidelines' (2006) forms Appendix C.

4.9 POS - Healthy Active Design Assessment

An assessment of the Kingsford Town Centre PP in accordance with the Heart Foundation 'Healthy Active by Design' is located of Appendix D. The POS 400m and 800m 'Ped Shed' plan comprises Figure 13.

Figure 13: Healthy Active Design Assessment

4.10 POS Strategy

4.10.1 District POS / Playing Fields

BRIEF DESCRIPTION

- Landmark/destination for residents and community groups
- Opportunity to co-locate facilities (i.e. playing fields, junior ovals and hardcourts for future school and community)
- Provide shared amenities (i.e. shelters, BBQ areas, play and exercise nodes)
- Distinct active/passive zones amongst activities and age groups
- Promote accessibility and usage by community
- Pedestrian and cycle path along perimeter to connect into broader path network
- Playing fields with capacity for organised sporting and large scale community events
- Potential for grandstand for viewing
- Allow for drainage and stormwater flows
- Allowance for access and carparking provisions

SIZE (Excluding Verges) = 63,374 sq.m

FUNCTIONS

- Service diverse range of passive and active recreational activities
- Open area for informal/formal sports and events
- Predominantly irrigated turf for sporting fields
- Maximise shade trees
- Play elements for all ages
- Drainage
- Connection/Colocation with education facilities

ENVIRONMENTAL CONSIDERATIONS

- Planting design to be zoned according to irrigation requirement, with full irrigation requirements to the formal turf sporting fields
- Consider stormflows and drainage requirements
- Source local materials where possible
- Consider the long term maintenance requirements for all materials

4.10.2 Ki-it Monger Book

BRIEF DESCRIPTION

- Primary POS/link with development
- Existing vegetation along brook alignment to be retained
- Revegetate and rehabilitate
- Promote accessibility and usage by community
- Pedestrian and cycle paths along top of bank interconnecting with recreational nodes along linear route/network.
- Play spaces/boardwalks/interpretive/signage/ educational opportunities
- Allow for drainage and stormwater flows

SIZE (Excluding Verges) = 297,608 sq.m

FUNCTIONS

- Turf - informal kick-about, play spaces and picnic areas
- Native waterwise vegetation
- Maximise shade trees
- Picnic facilities for family/friend gatherings
- Play elements for all ages
- Path network connecting into broader path network
- Drainage
- Ecological function
- Habitat
- Education
- Connection

ENVIRONMENTAL CONSIDERATIONS

- Waterwise native planting
- Planting design to be zoned according to irrigation requirement, with full irrigation requirements to the informal turf playing areas
- Source local materials where possible
- Consider the long term maintenance requirements for all materials
- Consider stormflows and drainage requirements
- Rehabilitation/revegetation
- Respect geomorphology of existing and historic creekline

4.11 Tree Species Selection

NATIVE SPECIES

Agonis flexuosa
Willow Myrtle

Allocasuarina fraseriana

Callistemon 'Kings Park Special'

Casuarina obesa
Swamp Sheoak

Corymbia calophylla
Marri

Eucalyptus lane-poolei
Salmon White Gum

Eucalyptus marginata
Jarrah

Eucalyptus rudis
Flooded Gum

Eucalyptus todtiana
Prickly bark

Eucalyptus wandoo
White Gum

Melaleuca preissiana
Modong

Melaleuca rhaphiophylla
Swamp Paperbark

Nuytsia floribunda
WA Christmas Tree

Taxandria linearifolia

Xanthorrhoea preissii
Grasstree

5.0 Character Areas

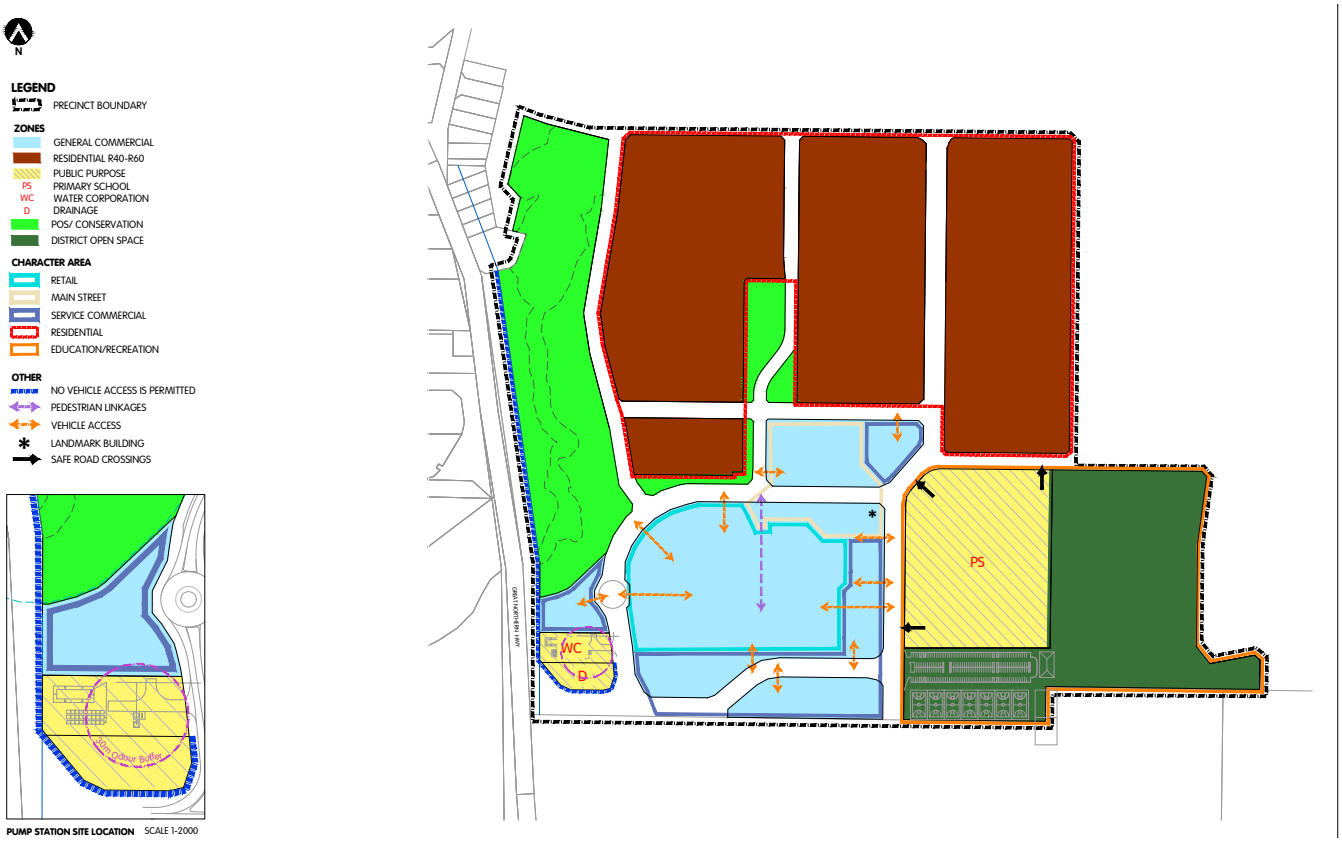
The Kingsford Town Centre is made up of five Character Areas based upon land use focus and built form as shown at Figure 14. The creation of these Character Areas will drive the success of the Town Centre.

Although the Character Areas will each perform a range of overlapping functions, the activity mix will aim to avoid conflict and maximise pedestrian activity between land uses. Each area will deliver a specific character, which will contribute to legibility and identify. The intensity of activity will vary between areas and at different times of the day.

In brief the Character Areas are:

- **Retail** – Incorporating the shopping complex being the nucleus for retail activity + car parking
- **Main Street** – The energy + activity on Main Street will be a focus for the Town Centre day and night. It is a place to enjoy, shop, meet friends, work, wander & explore and somewhere to relax. This area will deliver a high quality urban realm and public art, creating a place for public life to flourish.
- **Service Commercial** – enjoying a high level of access and situated towards the edge of the Town Centre, this area is ideally suited for land uses and development forms that have a greater reliance on car based access for viability.

Figure 14: Character Areas



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6.0 Retail Kingsford

The Kingsford Town Centre has been designed and will operate as a Town Centre. This is consistent with the approved strategic planning undertaken for the locality.

The development of the Town Centre will be undertaken in stages and in response to market demand.

The 'Retail Demand Analysis' (September 2019) as prepared by Macroplan (Appendix A) confirms a strong demand for retail floorspace as the residential development progresses at Kingsford. The Kingsford Town Centre will be the main food, grocery and convenience-orientated shopping destination for new residents of Kingsford estate as well as other residents in the surrounding area.

The Macroplan reports indicates that as early as 2023, a neighbourhood centre type is viable. The level of floorspace would be approximately 4900 sqm which would accommodate a full line supermarket (at least 3000 sqm) and supporting fresh food specialties such as: baker, butcher and fresh produce.

As the resident base continues to grow a full size supermarket will be accommodated along with a range of supporting specialty shops as outlined below:

- **Food catering** – takeaway food stores, cafes + restaurants
- **General Retail** – pharmacy + discount variety store
- **Retail Services** - optometrist, dry cleaner, hairdresser, barber + beauty salon
- **Non-retail** - fitness centre, small medical centre + real estate agent

6.1 Land Use Permissibility

A service station and tavern are uses actively seeking to develop in the Kingsford Town Centre. Both uses are to be delivered in stages 1 & 2 of the town centre as set out in Part One of the Precinct Plan (section 3.12 Implementation and Staging). These uses will be developed on-site prior to any residential lots / residents, which comprise stage 3 of the Town Centre development.

6.2 Trade Areas

The Kingsford Town Centre primary and secondary trade areas contain the Kingsford residential estate, established urban areas of Bullsbrook, RAAF base Pearce, land immediately to the south, urban parts of Muchea and the rural area of Lower Chittering. The proposed level of floorspace is sustainable and based upon sufficient demand. Importantly the Kingsford Town Centre will not impact; Ellenbrook Central, Ellenbrook Town Centre (Woolworths) or the Aveley Woolworths. Therefore, the development of the Kingsford Town Centre will not impact the established centre hierarchy within the NE corridor.

6.3 Local Employment

Based upon the proposed tenancies that will be developed in the Town Centre it is estimated the employment generated will total 715 direct jobs, for Kingsford and the surrounding Bullsbrook locality.

7.0 Built Form

The Kingsford Town Centre will service the emerging greenfield residential area located adjacent the Bullsbrook townsite. The intensity scale of development and built form will seek to integrate with the surrounding predominantly single storey residential development.

The built form will deliver an interesting street facade with a variation in materials and detailing. The architecture will respond to the climate of Bullsbrook where the hot and dry summers are addressed via shade elements.

A traditional / Bullsbrook vernacular will be delivered along Main Street with car-based uses located in the balance of the Town Centre.

7.1 Built Form Configuration

The Kingsford Town Centre is intended to accommodate a range of building forms including;

- Large format supermarket
- Retail shops
- Medical Centre
- Service commercial outlets
- Gym
- Service station
- Cafe
- Take away food operators
- Hairdresser
- Pharmacy

An indicative build out which incorporates the above building types into an integrated Town Centre is shown at Figure 15. This includes a pedestrian orientated Main Street to provide for day and evening lifestyle activities in concert with the more car orientated retail outlets and car parking/ servicing sleeved behind development.

The Town Centre will be visually different to other centres through the establishment of a 'town to country' built form which is unique to Kingsford. The general design considerations for the Town Centre are based on the following key aspirations.

- To maintain a vision of the town centre development over its establishment
- To ensure the built form and the public realm complement and support each other
- To seek consistency and quality in the built form
- To inject a character and relevance (through design) which is unique to Kingsford

7.2 Urban Elements

- Legible street network with integrated, but informal, public realm elements
- Medium scale-built form that imparts a country town feel, with built form 'civic gestures' at appropriate locations/junctions
- Defined focal point being both a town centre and a community space
- Pedestrian focussed main street, with 'accidental gaps', 'breezeways' and 'spaces for discovery'.
- The residential cells contained within the Precinct Plan will provide an 'Urban' housing option for the Town Centre. The Precinct Plan shows a lot yield of approximately 385 lots / dwellings with Terrace housing (rear laneway) predominantly located adjacent the major north-south road (Neighbourhood Connector A). The urban lot sizes range mainly from 180m2 to 350m^2. (R40 – R60)
- Based upon the delivery of approximately 385 lots the town centre will generate a resident population of 1116.

7.3 Design Principles

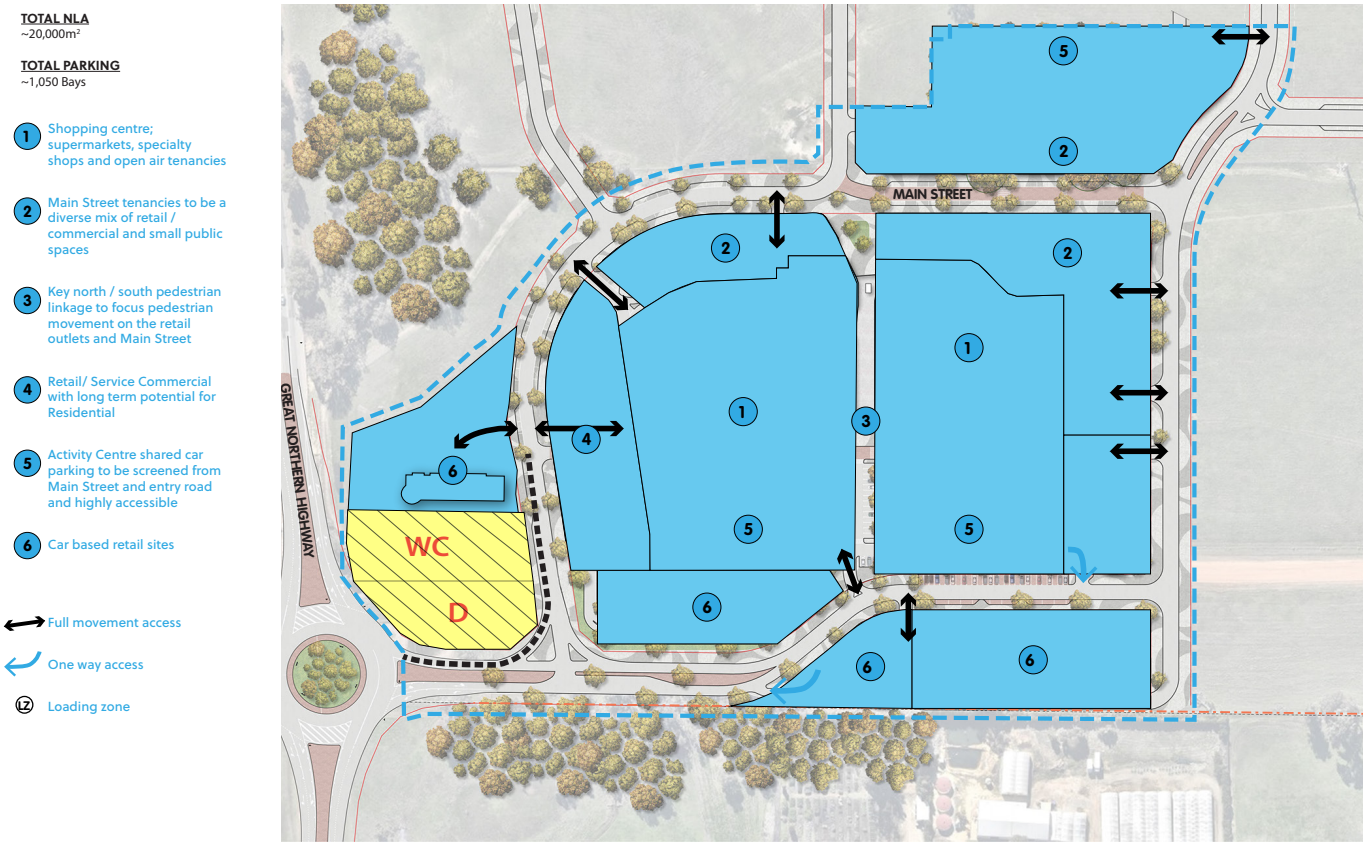
Building designs are suitable for a mix of (potentially interim) uses, with parking on street and within shady carparks.

- Streets oriented and sized for connectivity and socialisation
- High standards of built form that activate streets, 'pocket' spaces and 'breezeways'
- Quality pedestrian environment on all streets with trees + shade
- Quality 'civic gestures'/ built form terminating key vistas
- Varietal but authentic 'country town' materiality and roof forms.

7.4 Landscape Principles

- Broad canopy street trees (including potential for some retained mature trees) to provide suitable pedestrian and alfresco spaces
- Shaded and textured pavements to create a comfortable and interesting street environment

Figure 15: Built Form



HATCH | RobertsDay

8.0 Movement

The surrounding road network has been designed to direct car movements towards the Town Centre. The Bullsbrook Central Structure Plan established a North-South 'Activity Corridor' (Neighbourhood Connector) to provide a central spine for activity and movement within the town centre. In addition, the existing Chittering Road has been re-aligned to access the estate north of the Town Centre. As a result, the Town Centre will benefit from an interconnected and legible road network that has been designed to accommodate the projected traffic volumes.

The road network has been designed to accommodate all required users including pedestrians and cyclists.

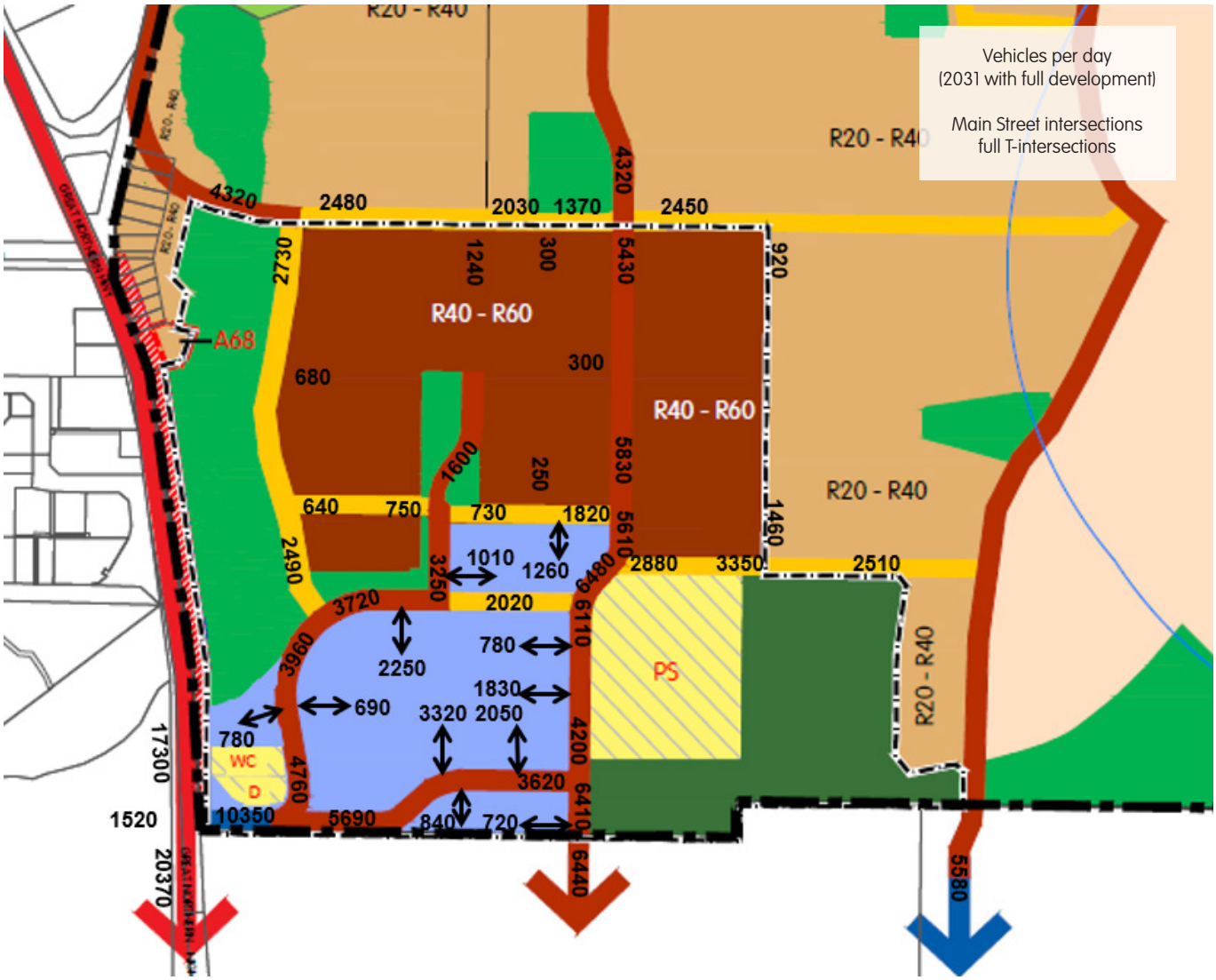
8.1 Vehicle Movement

The Town Centre will be serviced by three key roads being;

- Entry road from Great Northern Highway (Neighbourhood Connecter)
- North – South Activity Corridor Road (Neighbourhood Connector)
- Main Street

A Transport Impact Assessment Addendum - Kingsford Town Centre Precinct Plan (Transcore June 2021) Appendix B assessed the operation of the road network and intersections. This traffic assessment shows the proposed PP area has been designed to accommodate the projected traffic volumes via an interconnected road network. The distribution of traffic volumes corresponds to road hierarchy and will provide for a functional town centre that can deliver a quality public realm and Main Street and comercially viable retail sites. (Refer Figure 16 projected traffic volumes).

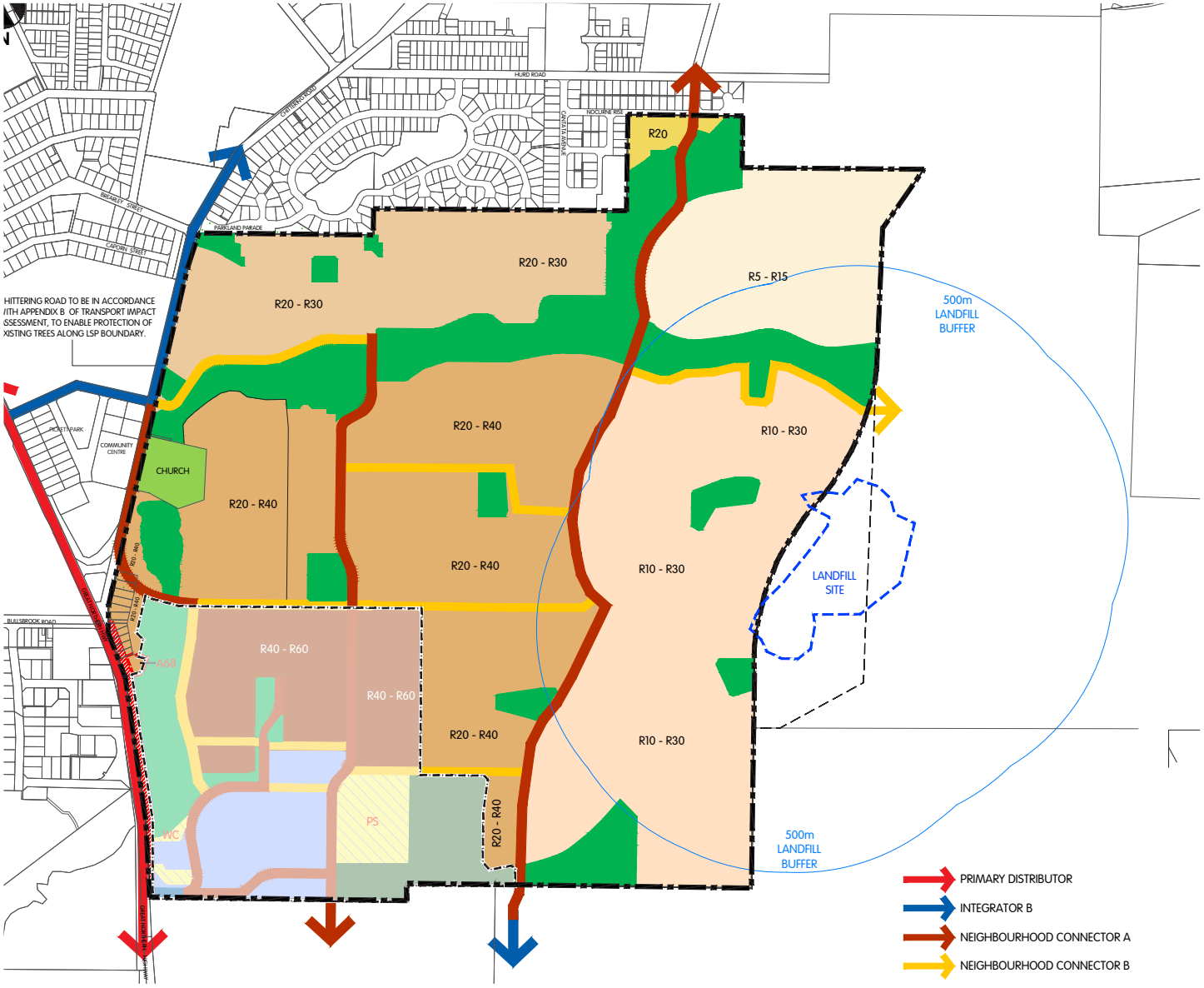
Figure 16: Projected Traffic Volumes



8.2 Road Hierarchy

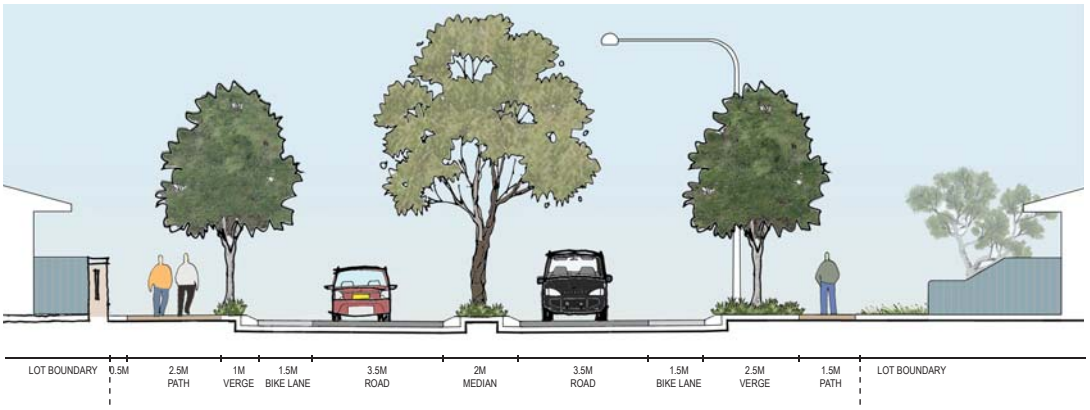
All roads and intersections have been planned in accordance with the principles of Liveable Neighbourhoods (Figure 17). A description on each of the proposed roads to service the Town Centre including a preferred cross section is provided below.

Figure 17: Road Hierarchy

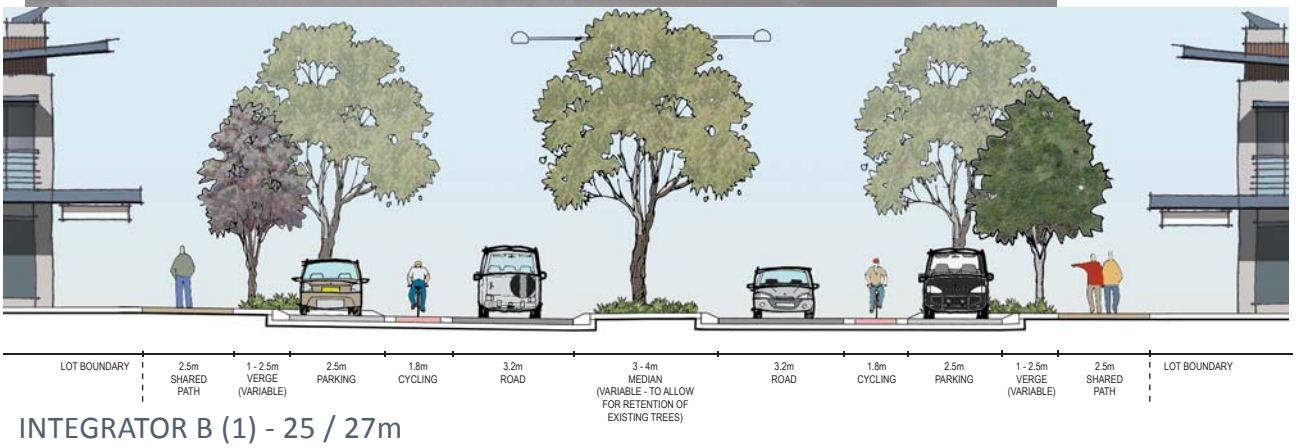


8.2.1 Integrator B

The Integrator B road will operate from the round-a-bout on Great Eastern Highway to the Town Centre, connecting to two Neighbourhood Connector roads. This road is expected to have a road design and width in accordance with Liveable Neighbourhoods. The design may consist of a cross-section between 25 -27m as shown below. The final cross-section may be reduced if parking is not provided both sides or is embayed. The final cross-section will be designed in consultation with the City of Swan.



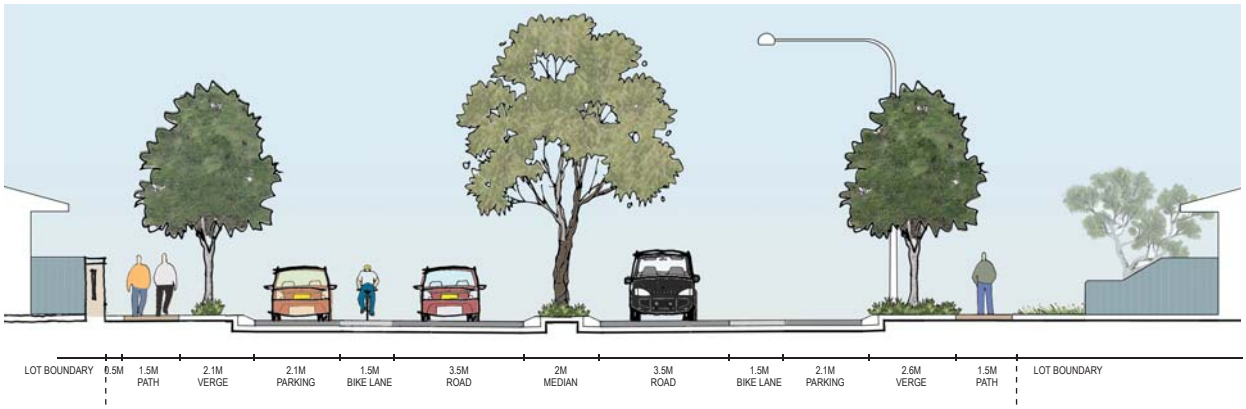
INTEGRATOR B (2) - 20m



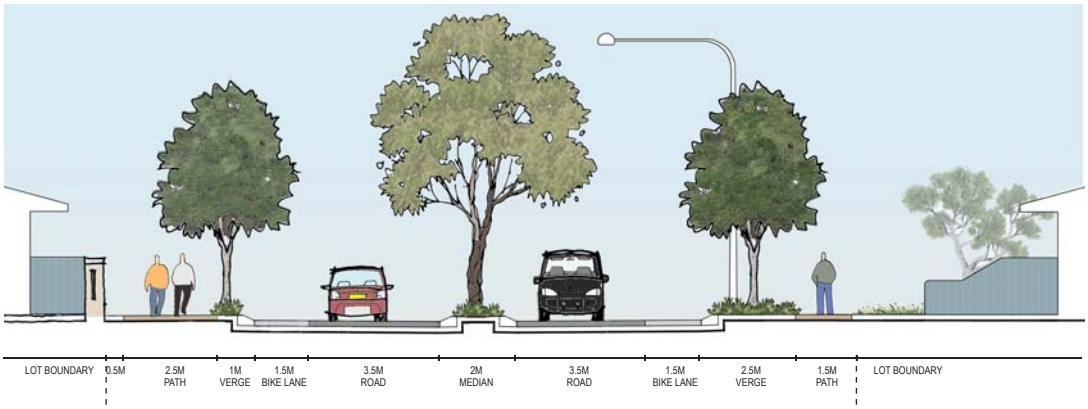
INTEGRATOR B (1) - 25 / 27m

8.2.2 Neighbourhood Connector A

The Neighbourhood Connector A roads will be located adjacent the core retail area / shopping centre and consist of a 7.1m carriageway which incorporates 2.1m on-street parking,a 1.5m cycle path and 3.5m trafficable pavement. A 4.1m verge is provided which may be reduced if parking is not provided both sides or if parking is embayed. This scenario may occur adjacent the POS on the western boundary and the north-south road located between the retail and primary school. These modifications would result in a 20m road reserve for the Neighbourhood Connector A. Both cross-sections are provided below. A final cross-section will be designed in consultation with the City of Swan.



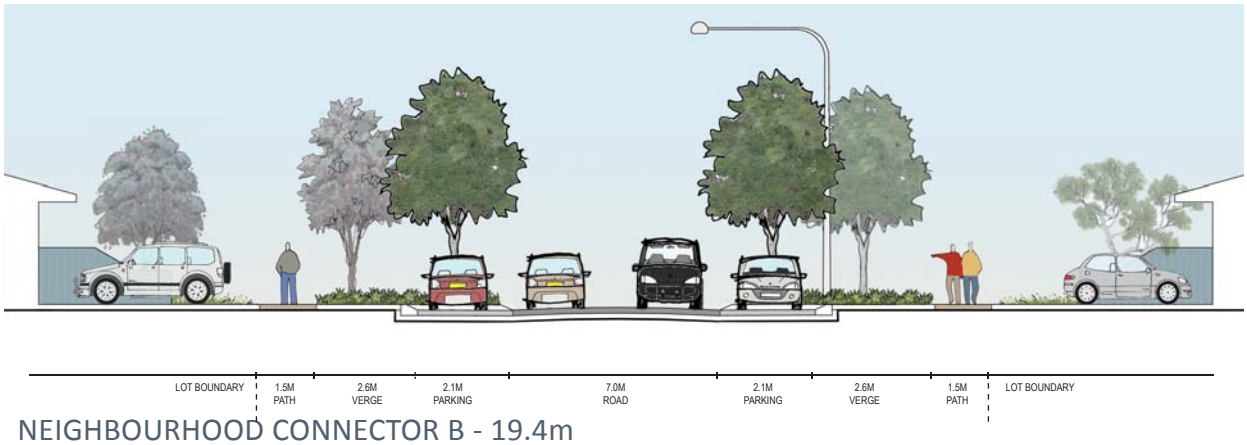
NEIGHBOURHOOD CONNECTOR A (2) - 24.4m



NEIGHBOURHOOD CONNECTOR A (1) - 20m

8.2.3 Neighbourhood Connector B

The Neighbourhood Connector B road comprises the east-west Main Street and key subdivisional roads within the residential cells in the Precinct Plan. The road design will generally incorporate a 19.4m cross-section which comprises a 7m wide trafficable pavement and 6.2m wide verges on both sides which incorporate on-street parking, footpath and landscaping. Alternatively, a reduced trafficable pavement width of 6m may be proposed and offset with a median strip and /or additional landscap;ing as well as footpaths on both sides of the street for the Main Street. The cross-sections is provided below. A final cross-section will be designed in consultation with the City of Swan.



NEIGHBOURHOOD CONNECTOR B - 19.4m

9.0 Servicing

A servicing report has been prepared by the project engineers JDSI in support of the Precinct Plan and confirms all services can be provided or extended to service the proposed development. (Refer Appendix F - JDSI Servicing Report).

10.0 Public Open Space

The Kingsford Town Centre is wholly contained within the Precinct Plan boundary which comprises an area of 47.28ha. Allowing for deductions of non-residential uses the Precinct Plan has a nett area of 27.06ha. The Precinct Plan proposes a total of 4.42ha of the POS. The breakdown calculation is provided below. The POS provided in the Precinct Plan exceeds the required minimum of 10% POS.

Gross Precinct Area	47.28ha
Deductions	
District Open Space	6.06ha
Primary School	3.50ha
Commercial / Retail	8.40ha
Conservation / Wetland	2.26ha
Total	**20.22ha**
Net Precinct Area	27.06ha
10% POS	2.71ha

POS Area	1:1 year drainage	1:5 drainage	Restricted POS	Unrestricted POS	Total	%
A	1,331m²	1,331m²	-	0.3969ha	0.53ha	
B	-	-	-	0.15ha	0.15ha	
C	240m²	260m²	20m²	0.346ha	0.37ha	
D	753m²	753m²	-	2.8647ha	2.94ha	
Total	**0.2324ha**	**0.2344ha**	**20m²**	**3.7576ha**	**3.99ha**	**14.7%**

Figure 18: POS Plan

APPENDIX A

Retail Demand Analysis

MACROPLAN (SEP 2019)

Kingsford Town Centre, Bullsbrook

Retail demand analysis – Summary report

PREPARED FOR **Okeland Communities**

September 2019

macroplan

Important Notice

Macroplan staff responsible for this report:

Ellis Davies, Principal Retail

Adam Zhong, Senior Consultant – Retail

Contact

Level 16
300 Collins Street
Melbourne VIC 3000
(03) 9600 0500
info@macroplan.com.au

macroplan

Table of contents

Executive summary

Context

Okeland Communities is developing the Kingsford residential estate, a masterplanned community located within Perth's north-east growth corridor at Bullsbrook, 35 km from of the CBD. As part of the estate, which is expected to yield 2,500 dwellings at capacity, the Kingsford Town Centre is planned be developed, the scale and timing of which is the subject of this report.

Trade area population

A trade area has been defined for the Kingsford Town Centre, which includes Bullsbrook and the surrounding area. The main trade area population is estimated at 8,680 residents at 2019, and is forecast to reach almost 22,000 residents at 2041, reflecting an average annual growth rate of 4.3% over the forecast period.

Retail expenditure

Retail spending within the trade area is expected to increase from an estimated $127 million currently to some $498 million by 2041, reflecting average annual growth of 6.4%.

Spending on food, liquor and groceries (FLG), the main expenditure category for supermarkets, is projected to increase from $59 million in 2019 to $237 million at 2041, reflecting an average annual growth rate of 6.5%.

Competition

There is a limited provision of retail facilities currently within in the surrounding area, which is commensurate with the generally outer metropolitan/rural population levels in the area. Bullsbrook SC, located opposite the Kingsford Town Centre site on the western side of the Great Northern Highway, is anchored by a small IGA supermarket of around 500 sq.m and contains a number of shops.

Ellenbrook Central is the closest sub-regional shopping centre to the Kingsford residential estate, located approximately 18 km to the south west. The centre is comprised of around 35,000 sq.m of retail floorspace and is anchored by a Big W discount department store as well as Woolworths, Coles and Aldi supermarkets. The centre would currently be serving the weekly food and grocery, as well as higher-order, shopping needs of trade area residents. The centre is currently being expanded to add a Kmart discount department store and 20 new shops.

Retail floorspace demand and centre potential

Our analysis indicates that as early as 2023, a neighbourhood centre type offer is supportable at the subject site, including a full-line supermarket (of at least 3,000 sq.m), as well as a small provision of supporting fresh food specialties and non-food convenience-oriented specialty stores. The supermarket would be well placed to serve future residents of the Kingsford residential estate as well as residents currently living in Bullsbrook. Consequently, our analysis suggests that there does not need to be significant development at the Kingsford estate before a neighbourhood centre type offer is supportable at the Kingsford Town Centre site. Rather, there is near sufficient demand from the existing residents in the area to support a full-line supermarket. It is likely that the development of the Kingsford Town Centre early on in the development timeline of the estate would act as an attractor of future residents.

The amount of supportable floorspace will substantially increase as the main trade area continues to be developed. The retail floorspace demand analysis indicates that the Kingsford Town Centre could support an expansion of around 1,500 sq.m – 2,000 sq.m in floorspace, at around 2028/29, some 5-6 years after a potential Stage 1 development. The supportable FLG floorspace at this date is estimated at around 5,500 sq.m, which is considered adequate to support a full-line supermarket, a large fresh food produce store and a range of supporting FLG specialty shops.

Overall, the subject site presents an excellent opportunity for a neighbourhood centre anchored by a full-line supermarket by 2023, supported by a range of retail shops and non-retail uses. As the population of the area continues to grow over the forecast period, the centre would be able to be expanded to serve the growing needs of the community.

Ultimate capacity and site requirements

Once the growth areas around Bullsbrook are well established in around 20-30 years, the Kingsford Town Centre could potentially accommodate an estimated 21,800 sq.m of total floorspace, including retail, non-retail, large format and external uses. At this scale, an estimated 5.5 - 6 hectares of land would be required to meet the requirements for centre floorspace, carparking and circulation spaces to create a modern, inviting and convenient shopping destination.

Introduction

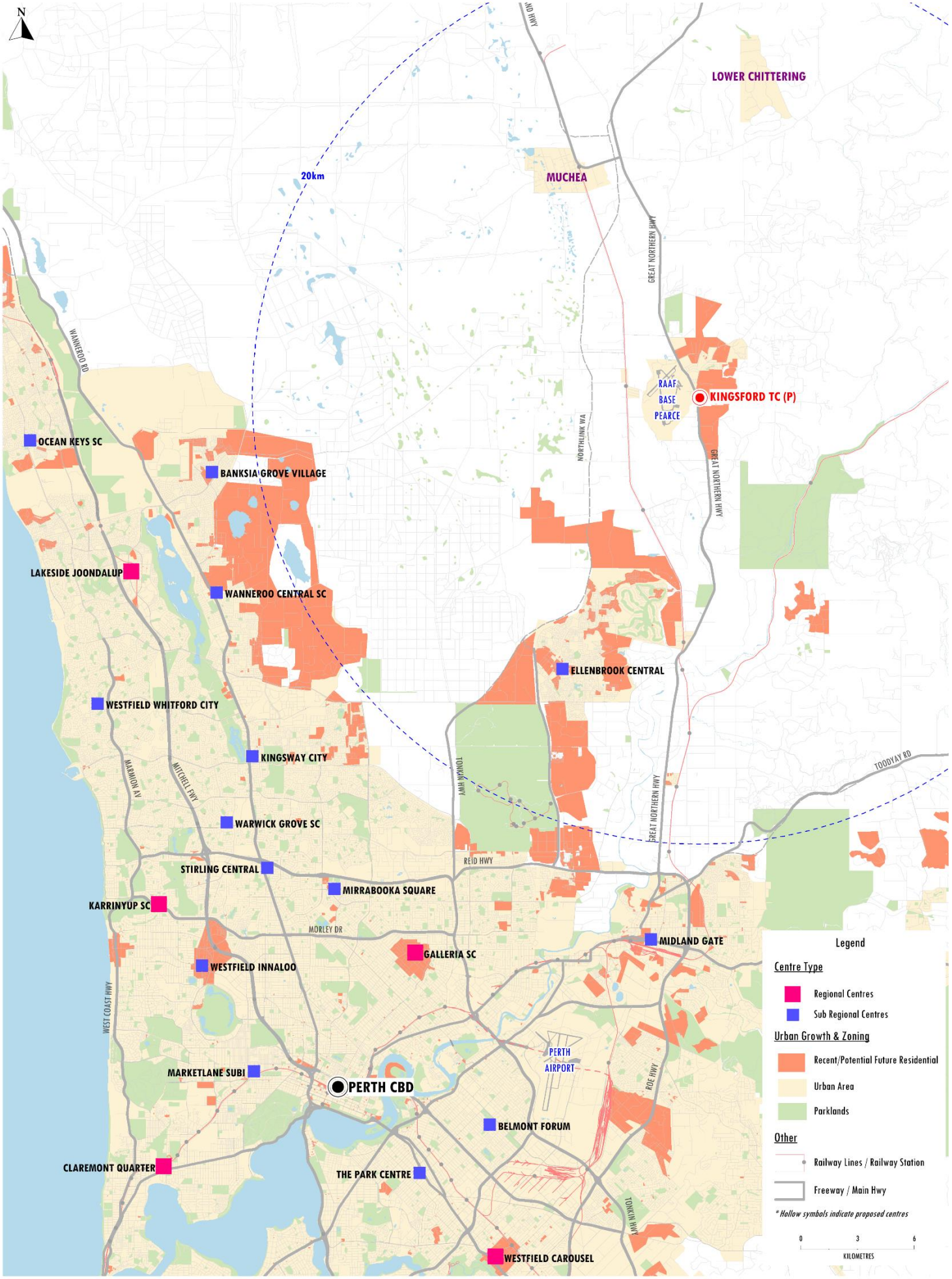
This is a summary report of a retail needs assessment prepared by this office for a future town centre development at the Kingsford residential estate, a masterplanned community located within Perth's north-east growth corridor, 35 km from of the CBD. The purpose of this assessment is to examine the potential scale and timing of a future Town Centre at the subject site.

The report has been prepared under instructions from Okeland Communities and presents an overview of the Kingsford Town Centre site, including its planning context, location and accessibility, and summarises the key facets of the Kingsford development.

Site location

Okeland Communities is developing the Kingsford residential estate, a masterplanned community located within Perth's north-east growth corridor at Bullsbrook, 35 km from of the CBD (refer Map 1.1). As part of the estate, which is expected to yield 2,500 dwellings at capacity (refer Figure 1.1), the Kingsford Town Centre is planned to be developed. The site is designated as a District Centre in the City of Swan Commercial and Local Activity Centres Strategy, and the Town Centre is expected to serve as the main food, groceries and convenience-oriented needs of residents in the surrounding area, as well as potentially contain some higher-order shopping facilities in the longer term. The scale and development timing of the future Kingsford Town Centre is the subject of this report.

The Kingsford Town Centre site is located on the eastern side of the Great Northern Highway (refer Map 1.2), opposite an existing provision of retail in Bullsbrook on the western side of the highway, which is anchored by a small IGA store. The Great Northern Highway provides access to the Perth CBD to the south-west (via the Great Eastern Freeway at Midland and Guildford Road) and the rural and remote areas of northern Western Australia to the north. Regional access to the Kingsford Town Centre site will be further improved by the completion of the northern section of NorthLink WA, which will connect Bullsbrook to Muchea to the north and to Ellenbrook to the south. The road has been in construction since early 2017 and is expected to be completed in late 2019, with an interchange provided at Bullsbrook on Neaves Road.



Map 1.1: Kingsford Town Centre, Bullsbrook

Regional context

macroplan

Figure 1.1

KINGSFORD

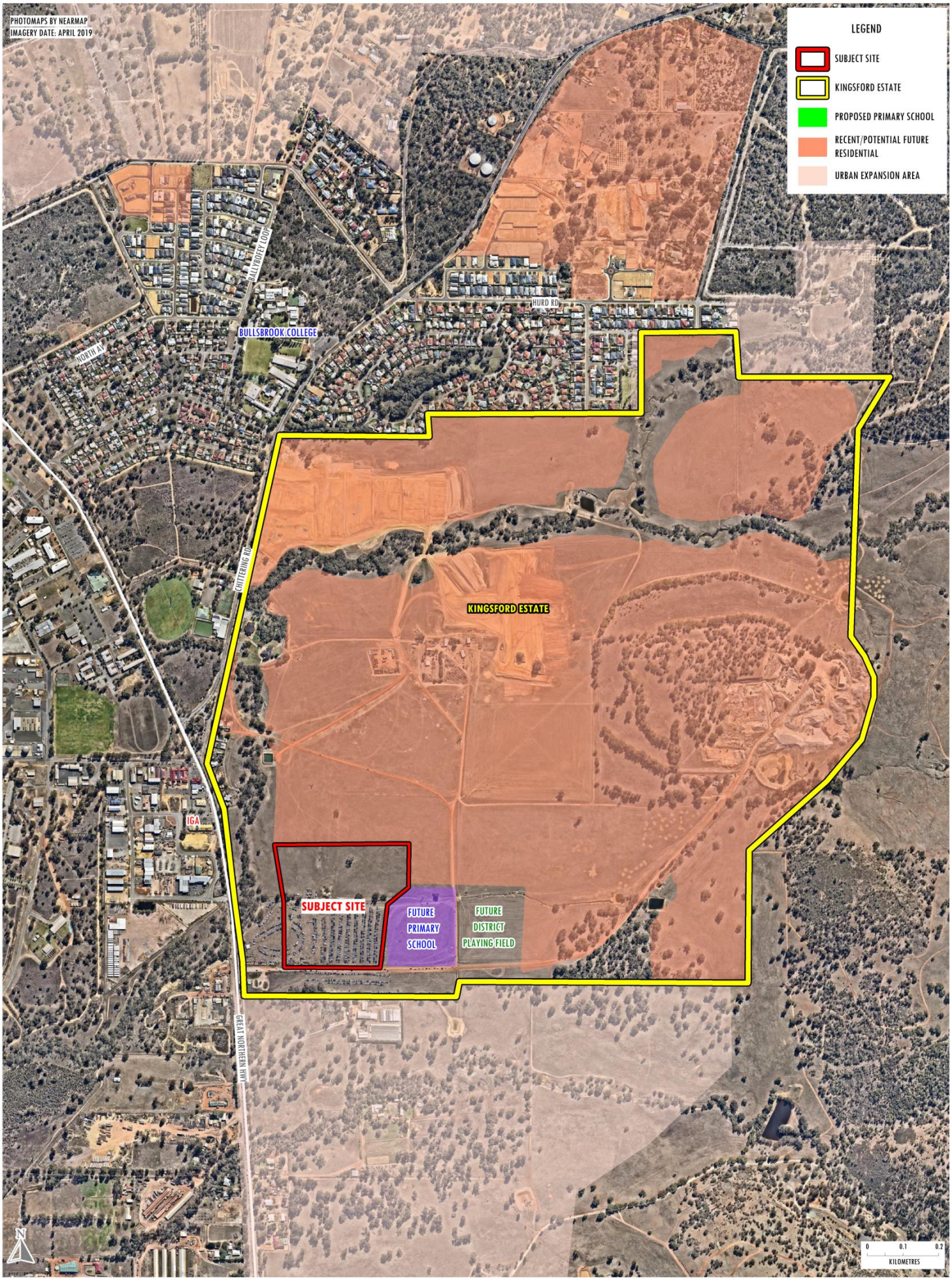
Masterplan

Kingsford at Bullsbrook was planned from the ground up to be a great place to live.

Nestled within the awe-inspiring beauty of the Darling Scarp foothills, Kingsford offers an idyllic life. The larger than average blocks, parklands and leafy streets create a real feeling of space. The established township of Bullsbrook already provides existing shops, school and services, plus the new town centre will bring a fresh 'urban village' vibrancy to the region. Kingsford is very well connected with The Swan Valley and Chittering Valley nearby, plus new roads connecting to Ellenbrook, Midland and Joondalup. Great Northern Highway and the new Northlink will also make trips to the city and airport hassle-free.

Features

- 2,500 homesites upon completion
- Average lot size in excess of 500sqm
- Over 41ha retained public open space, creek lines, and manicured parklands
- Future Town Centre including a major supermarket, specialty stores, cafés and medical centre
- New school planned to complement existing primary and secondary schools
- New district level playing fields



Map 1.2: Kingsford Town Centre, Bullsbrook

Site location

macroplan

Planning context

This sub-section reviews the relevant planning documents for the future Kingsford Town Centre, which are briefly discussed below.

Activity Centres Policy for Perth and Peel

The *Activity Centres Policy for Perth and Peel* (the Policy) is a state planning policy (SPP 4.2), released in August 2010, for the planning and development of activity centres throughout Perth and Peel, and supersedes the previous Metropolitan Centres Policy.

The purpose of the Policy is to provide broad policy guidance to local governments, state agencies and other stakeholders on matters such as:

- The preferred spatial distribution for retail and commercial use;
- The planning and development of new activity centres;
- The redevelopment and renewal of existing centres in Perth and Peel; and
- The urban design considerations for new activity centres, and the associated transport and infrastructure provision.

In order to achieve its objectives, the Policy provides for a hierarchy of activity centres, which differentiates such centres and their planning principles in terms of their roles and functions within the overall network; their indicative retail catchments; and their housing density and mix of land uses. The key activity centre designations are summarised as follows:

- The Perth Capital City is the largest and highest ranking of the activity centres, providing the largest concentration of development in the region, with the greatest range of services and employment facilities.
- Strategic Metropolitan Centres – 10 such centres are designated, at Yanchep, Joondalup, Stirling, Morley, Midland, Fremantle, Cannington, Armadale, Rockingham and Mandurah. The Strategic Metropolitan Centres are the main regional activity centres, providing a diverse mix of economic and community uses for their extensive catchments. The inner north-eastern Perth region is serviced by one Strategic Metropolitan Centre, at Morley; while the north-western Strategic Metropolitan Centre is located at Stirling. Strategic Metropolitan Centres typically contain department stores, discount department stores, supermarkets and a full range of specialty shops.
- Secondary Centres – The Policy identifies 19 Secondary Centres, which are generally evenly distributed across the Perth urban area. Secondary Centres, similar to Strategic Metropolitan Centres, also offer a diverse range of services and facilities, including community and employment opportunities. Like Strategic Metropolitan Centres, Secondary Centres should encompass the capacity to contain department stores, discount department stores, supermarkets and specialty shops, however to a lesser scale than Strategic Metropolitan Centres.

- District Centres – A network of District Centres is designated throughout the Perth urban area. These centres are expected to focus on servicing the daily and weekly needs of residents within their local respective catchments. District Centres typically contain discount department stores, supermarkets, convenience goods, small scale comparison shopping, personal services and some specialty shops and should possess the scale and retail composition to serve between 20,000 – 50,000 residents.

- Neighbourhood Centres – Such centres are expected to provide local community hubs to service the day-to-day and weekly shopping needs of the residents in the surrounding area. The Policy does not provide the locations of the neighbourhood centres, but emphasises their important roles, which should be recognised in local planning strategies and structure plans. This is the likely designation of the subject centre, given the expected population levels and typically contain supermarkets, convenience shops and personal services.

Figure 1.2

Source: State Planning Policy 4.2 – Activity Centre for Perth and Peel

City of Swan Commercial and Activity Centre Strategy

The *City of Swan Local Commercial and Activity Centres Strategy*, (adopted in September 2017), which was completed by Essential Economics, outlines the roles and functions of existing activity centres within the municipality, and also guides the planning of future activity centres. The strategy notes that '*development of urban growth areas between Caversham in the south and Bullsbrook to the north has been underway over the past decade. Rapid urban development is expected to continue over the next 20 years or so. A network of activity centres will be required to meet the needs of existing and future residents in these areas'.*

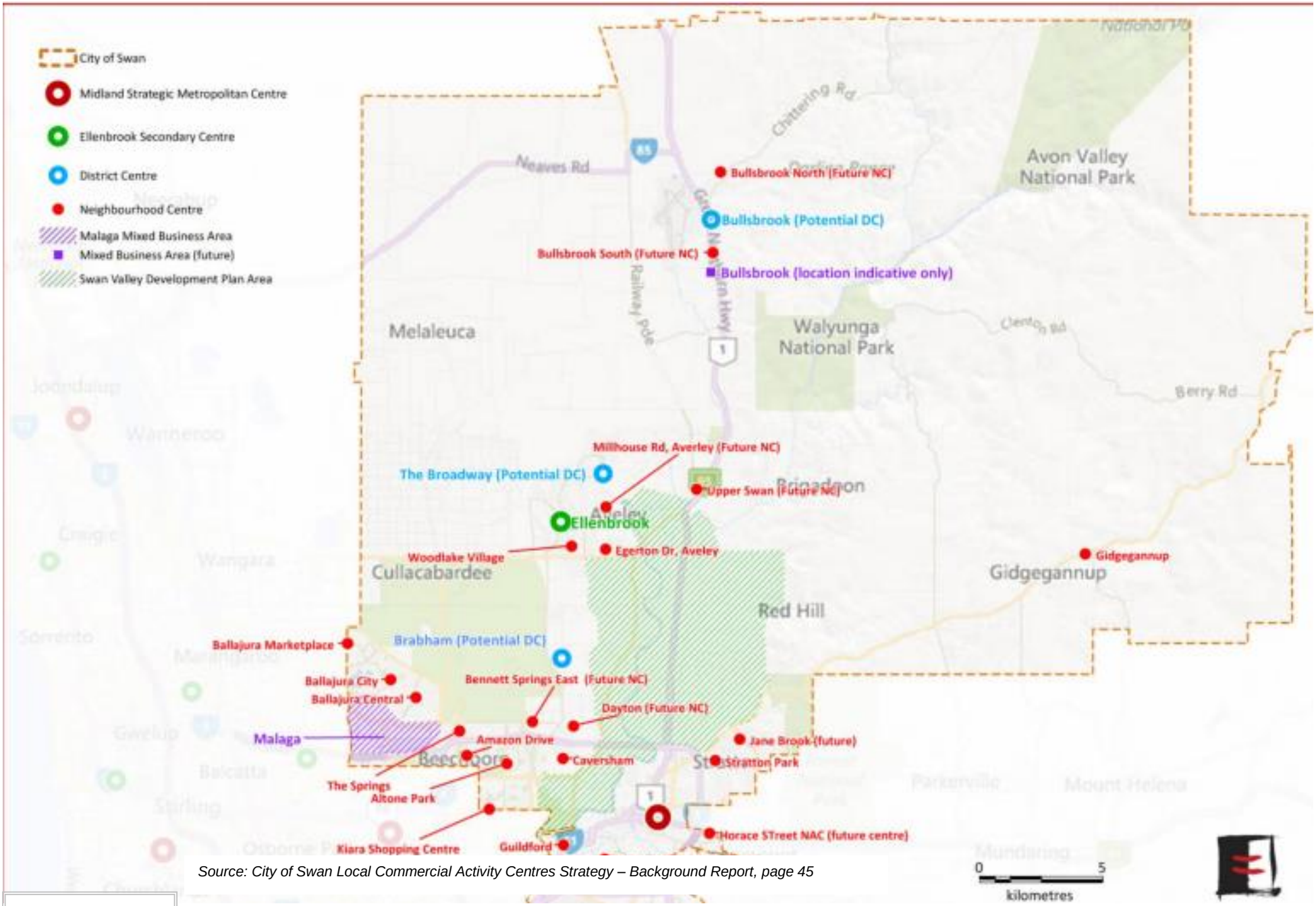
Figure 1.3 illustrates the existing and planned network of activity centres within the City of Swan. The subject Kingsford Town Centre site is designated as an 'emerging District Centre', and would therefore has the relevant planning authority to contain a discount department store, supermarket, convenience goods, small scale comparison shopping, personal services and specialty shops. The Activity Centres strategy tentatively notes that at 2031, the Bullsbrook emerging District Centre could support around 10,000 sq.m of retail floorspace,

Bullsbrook Townsite District Structure Plan

The Bullsbrook Townsite District Structure Plan (2018), is a strategy guiding the future development of Bullsbrook. The Bullsbrook local area is forecast to grow from a population of just over 6,000 in 2018 to over 16,000 at 2031 and 20,500 at 2036. The District Structure Plan therefore provides a framework to guide development to serve the growing community.

Figure 1.4 illustrates the areas of Bullsbrook designated for residential development, which combined are expected to yield around 6,600 new dwellings, accommodating an estimated 18,480 new residents over the long term.

A district centre and two supporting neighbourhood centres are planned to serve the population growth of Bullsbrook. The District Centre, the scale, composition and timing of which is the subject of this report, is expected to commence development within 'the western edge' to take advance of exposure to the Great Northern Highway and provide a connection to the existing hub on the western side of the Great Northern Highway.



Source: City of Swan Local Commercial Activity Centres Strategy – Background Report, page 45

Figure 1.3

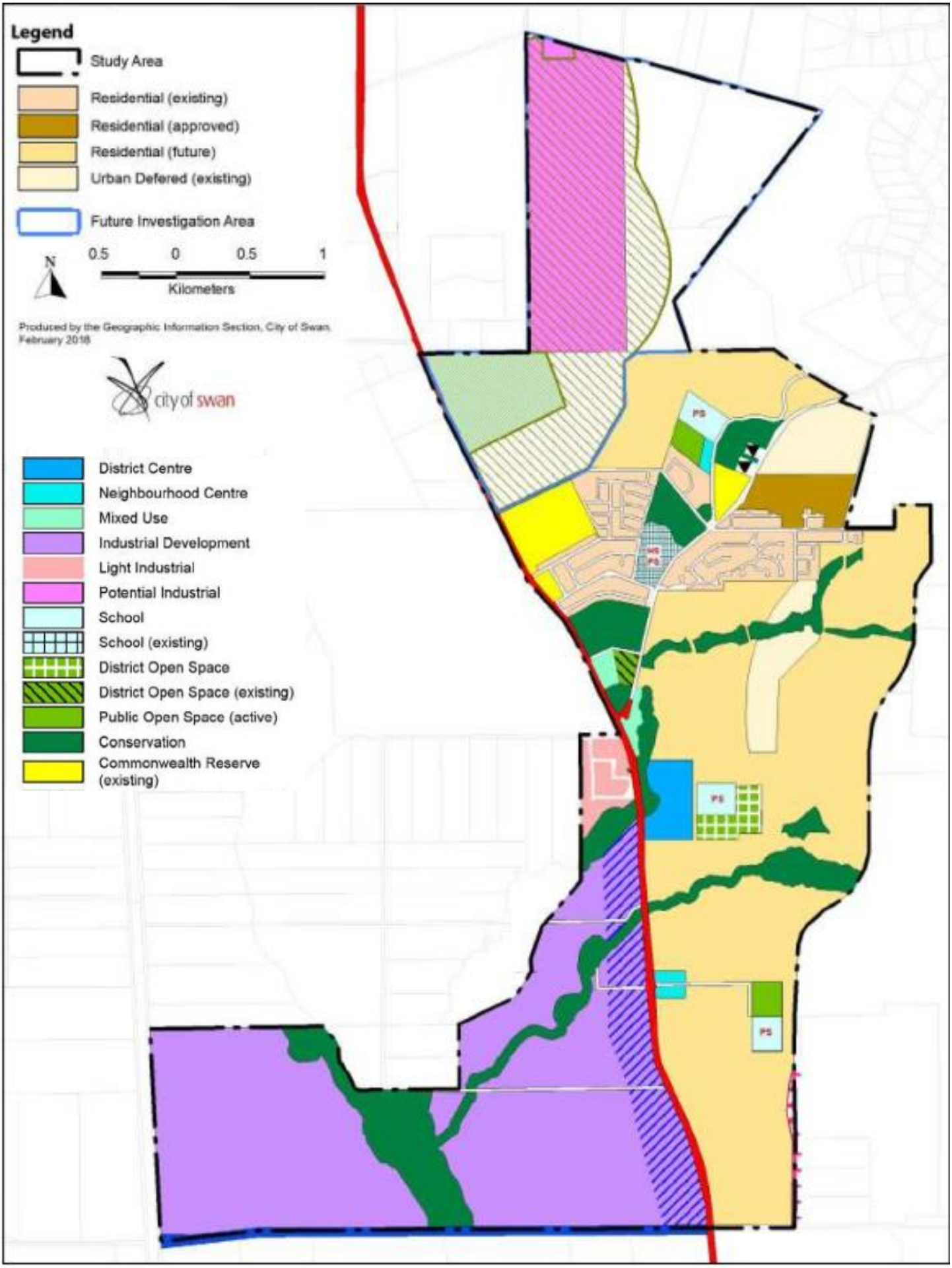


Figure 1.4 *Bullsbrook Townsite District Structure Plan*

MELBOURNE
(03) 9600 0500

SYDNEY
(02) 9221 5211

BRISBANE
(07) 3221 8166

PERTH
(08) 9225 7200

macroplan

APPENDIX B

Traffic Impact Assessment

TRANSCORE (JULY 2022)

Bullsbrook Local Structure Plan

Transport Impact Assessment Addendum – Kingsford Town Centre Precinct Plan

PREPARED FOR:
Okeland Communities

July 2022

Document history and status

Author	Revision	Approved by	Date	Revision type
R White	r02	B Bordbar	23/12/2020	
R White	r02a	B Bordbar	11/03/2021	Minor revision
R White	r02b	B Bordbar	28/04/2021	Minor revision
R White	r02c	B Bordbar	29/06/2021	Minor revision
R White	r02d	B Bordbar	27/07/2022	Minor revision

File name: t16274-rw-r02d.docx

Author: Robin White

Project manager: Behnam Bordbar

Client: Okeland Communities

Project: Bullsbrook LSP

Document revision: r02d

Project number: t16.274

TABLE OF CONTENTS

REPORT FIGURES

REPORT TABLES

1.0 Introduction

This Transport Impact Assessment Addendum has been prepared by Transcore on behalf of Okeland Communities with regard to the proposed Kingsford Town Centre Precinct Plan (PP) at Bullsbrook.

The proposed Kingsford Town Centre is located within a larger Kingsford Local Structure Plan (LSP) area at Bullsbrook in the City of Swan. Transcore prepared the Transport Impact Assessment (TIA) report for that LSP, which was last revised in February 2019. Therefore, this TIA Addendum provides revised and updated information for the overall LSP area in general and more detail in relation to the proposed Kingsford Town Centre PP.

The LSP area and PP area are located on the southeast side of the existing Bullsbrook townsite, as shown in Figure 1 in the context of existing Zones and Reservations in the Metropolitan Region Scheme.

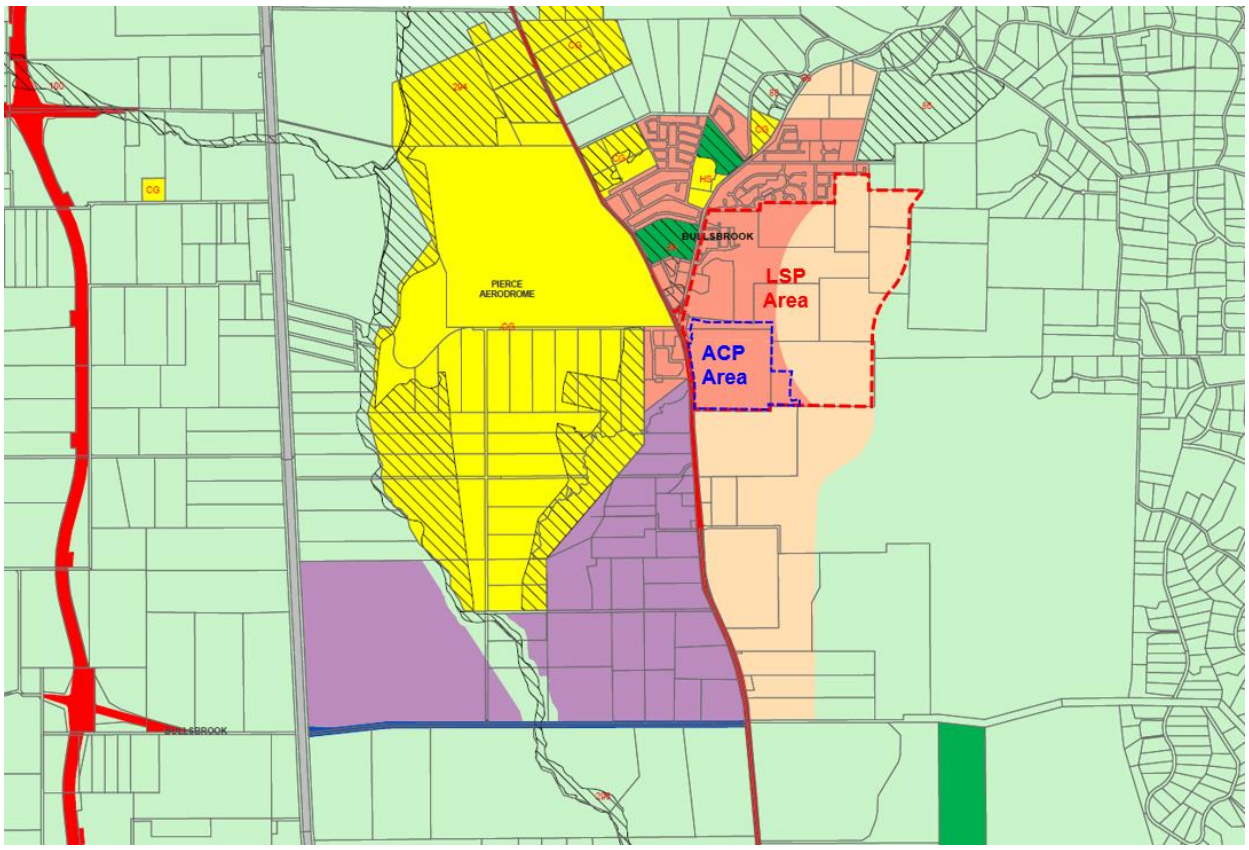


Figure 1: Site location

This report has been amended in July 2022 in accordance with the WAPC Schedule of Modifications for the Kingsford Town Centre Precinct Structure Plan dated 6 July 2022.

2.0 Proposed Precinct Plan

The proposed Kingsford Town Centre Precinct Plan (PP) and Kingsford Town Centre Conceptual Masterplan are included at Appendix A. The PP is also shown in Figure 2.

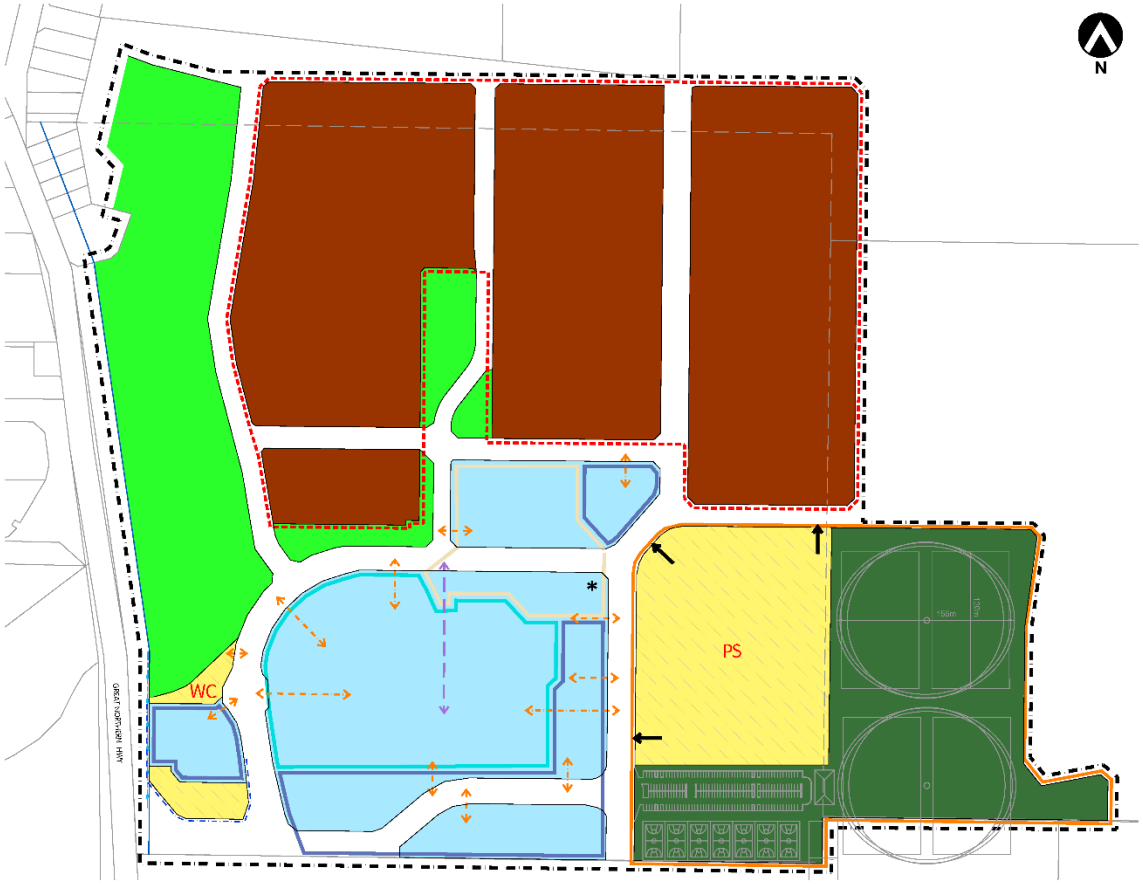


Figure 2: Kingsford Town Centre Precinct Plan

The PP incorporates the Kingsford Town Centre (blue), primary school site (yellow) and R40-R60 medium density residential land, as shown in Figure 2.

The Town Centre Masterplan allows for a centre of up to 20,000m^2 net lettable area of commercial floor space by 2031. The primary school has been modelled as up to 600 students and the R40-R60 residential zone is anticipated to accommodate 385 dwellings.

There are two north south spine road corridors proposed through the LSP area parallel to Great Northern Highway. One is an activity corridor on the eastern side of the Kingsford Town Centre, which would connect from Chittering Road in the north to Great Northern Highway at Lage Road. The other spine road is further east outside of the PP.

The PP includes an east west road connection through the proposed Kingston Town Centre from Great Northern Highway to the activity corridor on the eastern side of the Kingsford Town Centre. The intersection on Great Northern Highway is planned as a two-lane, 4-way roundabout, as detailed in the LSP TIA report.

3.0 Existing Situation

3.1 Existing Land Use

Existing land uses within the subject site are predominantly rural, plus a quarry on Lot 2792 accessed from Great Northern Highway, as shown in Figure 3. Residential subdivision development has commenced in the northwest corner of the LSP area with access from a new roundabout on Chittering Road.

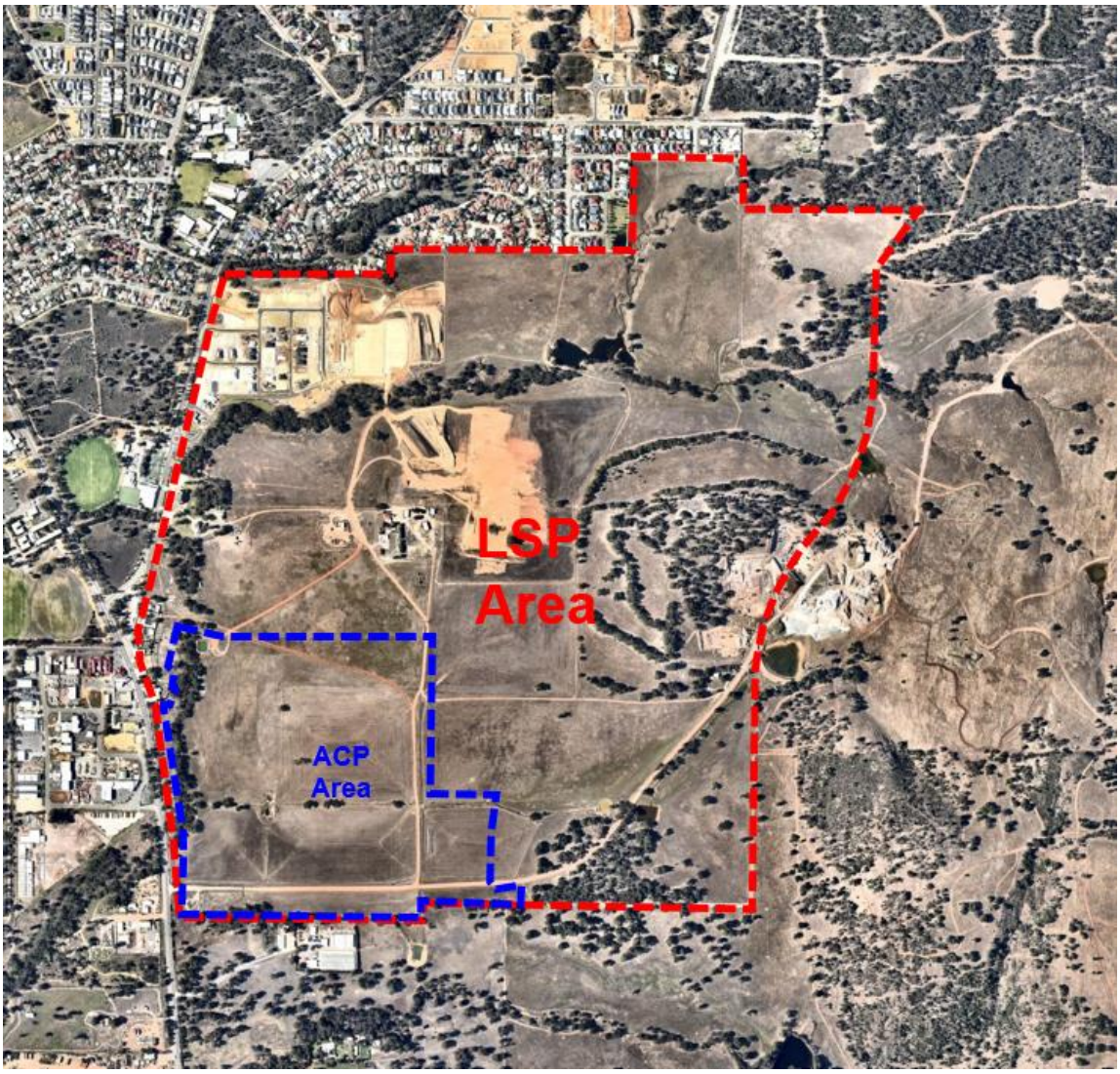


Figure 3: Existing land use

3.2 Existing Road Network

The existing road network and its classification in the Main Roads WA functional road hierarchy is illustrated in Figure 4.

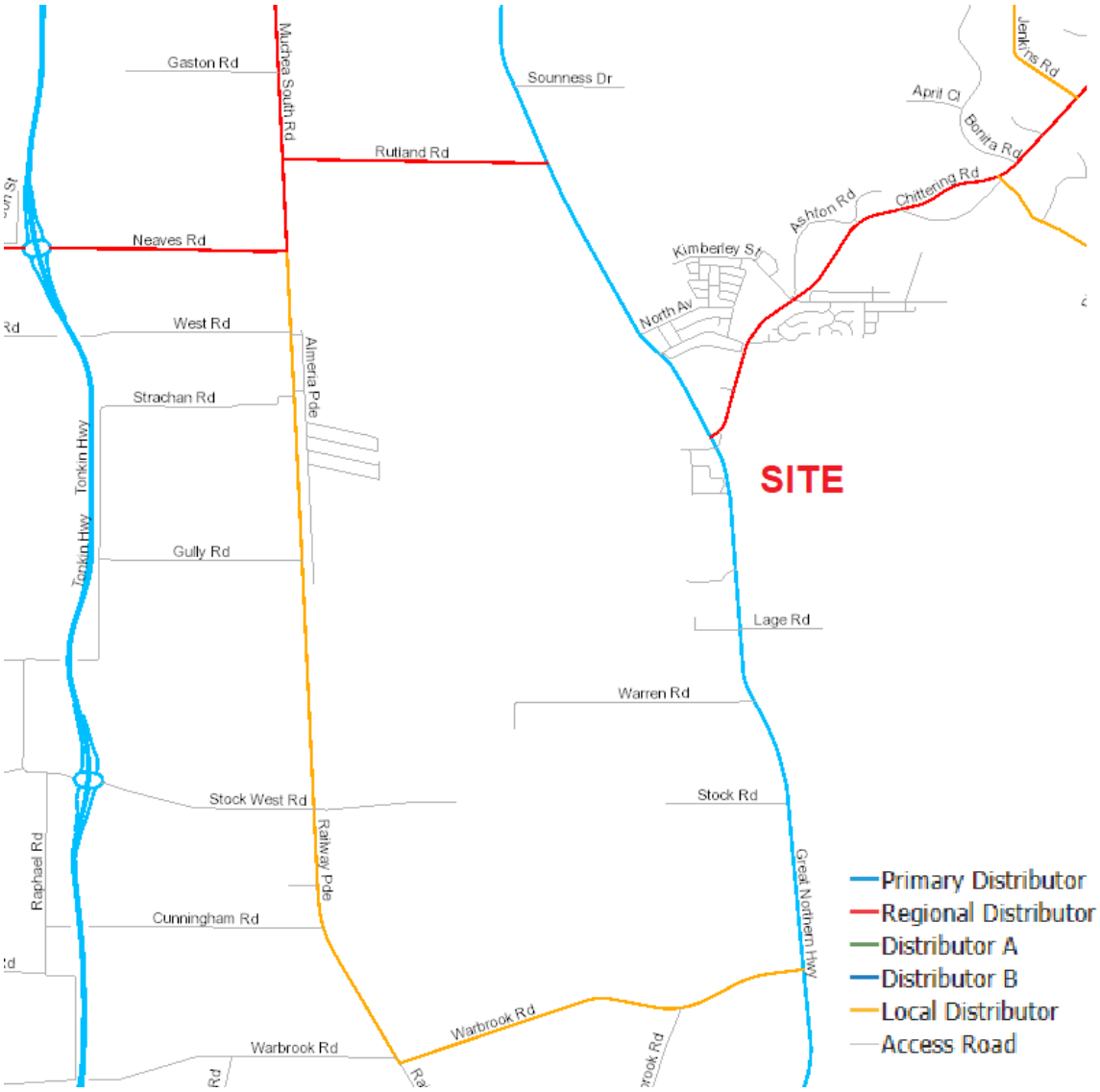


Figure 4: Existing road hierarchy

Great Northern Highway is constructed as a two-lane rural highway (without median) adjacent to the subject site. A painted median is added through the Bullsbrook town centre with traffic islands and right turn lanes at key intersections.

The posted speed limit on Great Northern Hwy is 60km/h through the Bullsbrook townsite and adjacent to the subject site but increases to 80km/h south of Butternab Road and 100km/h south of Lage Road, as shown in Figure 5.

Great Northern Highway is classified as a Primary Distributor in the Main Roads WA functional road hierarchy and is covered by a Primary Regional Roads reservation (a red road) in the MRS, as shown in Figure 1. It is a State road under the care and control of Main Roads WA.

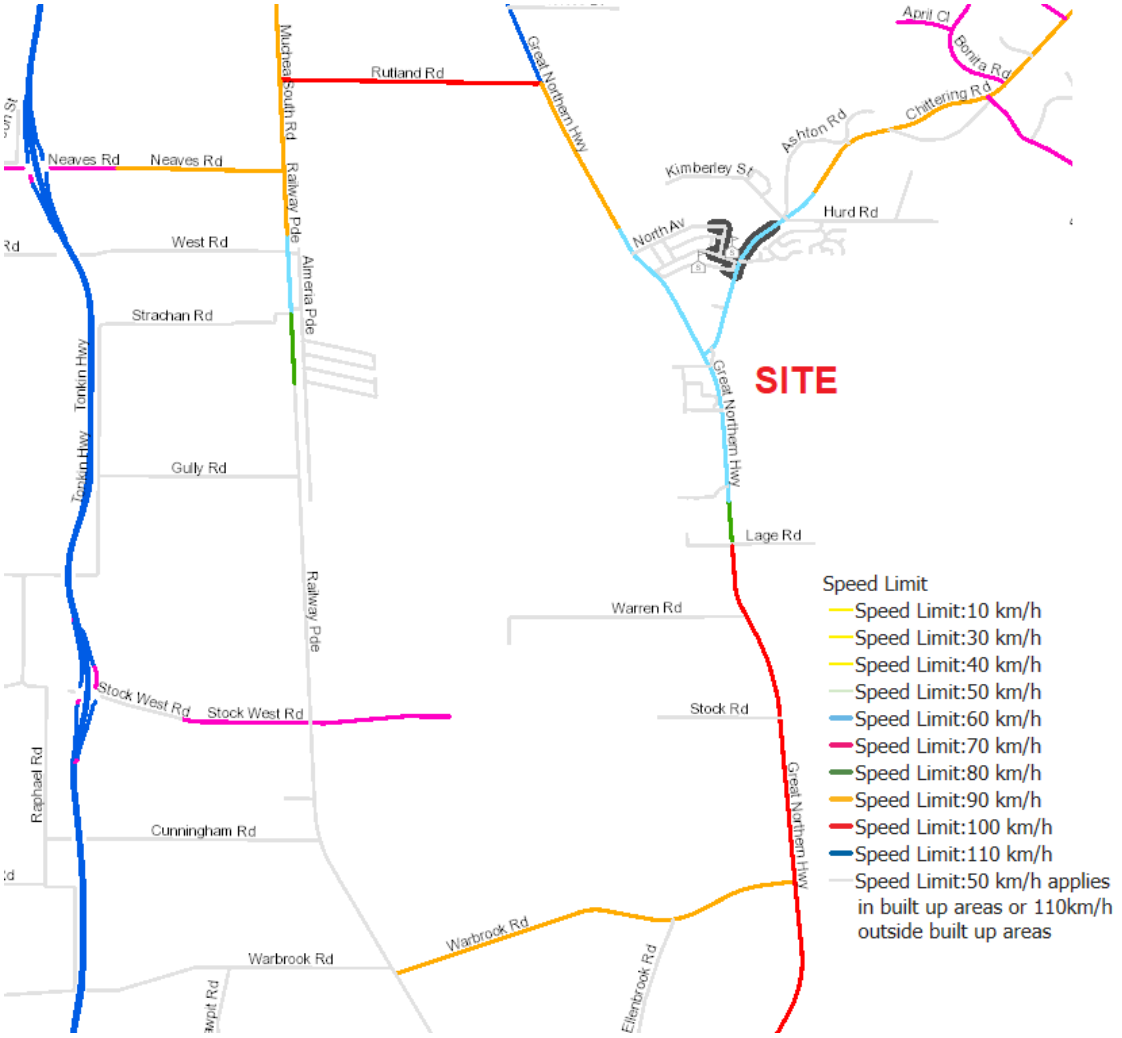


Figure 5: Existing speed limits

Chittering Road is constructed as a two-lane road 7.4m wide between kerbs within the Bullsbrook townsite and reverts to two-lane rural road standard northeast of Hurd Road.

It has a posted speed limit of 60km/h within the townsite and increases to 90km/h northeast of Hurd Road. A 40km/h school zone applies in the vicinity of the high school and primary school site before and after school hours on school days.

Chittering Road is classified as a Regional Distributor in the Main Roads WA functional road hierarchy. It is a local authority road under the care and control of the City of Swan.

A new 4-way roundabout has been constructed on Chittering Road to provide access to the new residential subdivision development within the LSP area. All other intersections along Great Northern Highway and Chittering Road in this area operate under priority control (i.e. Stop or Give Way control).

3.3 Existing Traffic Volumes

Existing average weekday traffic (AWT) volumes on the study area road network have been obtained from Main Roads WA and are summarised in Table 1. Traffic volumes on Great Northern Highway through Bullsbrook reduced significantly as a result of completion of the Tonkin Highway extension (NorthLink WA project) in April 2020.

Table 1: Existing Traffic Volumes

Road Name	Location	AWT (HV)	AM Peak	PM Peak	Date
Great Northern Hwy	North of Warbrook Rd	8,231 (15.2%)	636vph 0745-0845	760vph 1515-1615	2020/21
Great Northern Hwy	North of Rutland Rd	4,190 (20.9%)	329vph 0815-0915	405vph 1515-1615	2020/21
Chittering Rd	700m east of Great Northern Hwy	5,990 (13.6%)	522vph 0800-0900	585vph 1515-1615	2020/21

3.4 Heavy Vehicle Routes

Restricted Access Vehicle (RAV) Network routes are designated for access by large heavy vehicle combinations that require special permits for each trip. Main Roads WA manages the RAV Networks and the permits for trucks to use them. Figure 6 shows the roads that are permitted for use by RAV Networks 3, (light blue), 4 (dark blue), 5 (light green), 6 (dark green) and 7 (light purple) vehicles. RAV Networks 2, 3 and 4 permit access by a number of vehicle combinations up to 27.5m long and RAV Networks 5, 6 and 7 (which includes Great Northern Highway) extend this to vehicles up to 36.5m long including double road trains.

It should be noted that RAV Networks 2 to 7 on this section of Great Northern Highway now have the following condition imposed, since the Tonkin Highway extension (NorthLinkWA project) was opened in April 2020 and took over as the primary freight route in this corridor:

> "This section of road must not be used as a through route. This section of road may be used as access to pick-up goods, deliver goods, or garage vehicles to properties located on this section of road, or on roads only accessible via this section of road. Drivers must carry documentation as proof of local delivery, pickup or garaging address."

However, Great Northern Highway is still the high wide load route in this corridor, so even wider or higher vehicles and loads can be permitted.

Figure 6: Restricted Access Vehicles Network

3.5 Public Transport

The closest existing bus route to the subject site is Bus Route 311 (Midland Station – Bullsbrook), as shown in Figure 7.

Route 311 runs on Great Northern Highway adjacent to the subject site. It provides six bus services each way on weekdays and two on Saturdays, Sundays and public holidays.

Existing bus service times are primarily designed for journeys to and from work, school and other trips to and from Midland during business hours such as shopping or personal business trips.

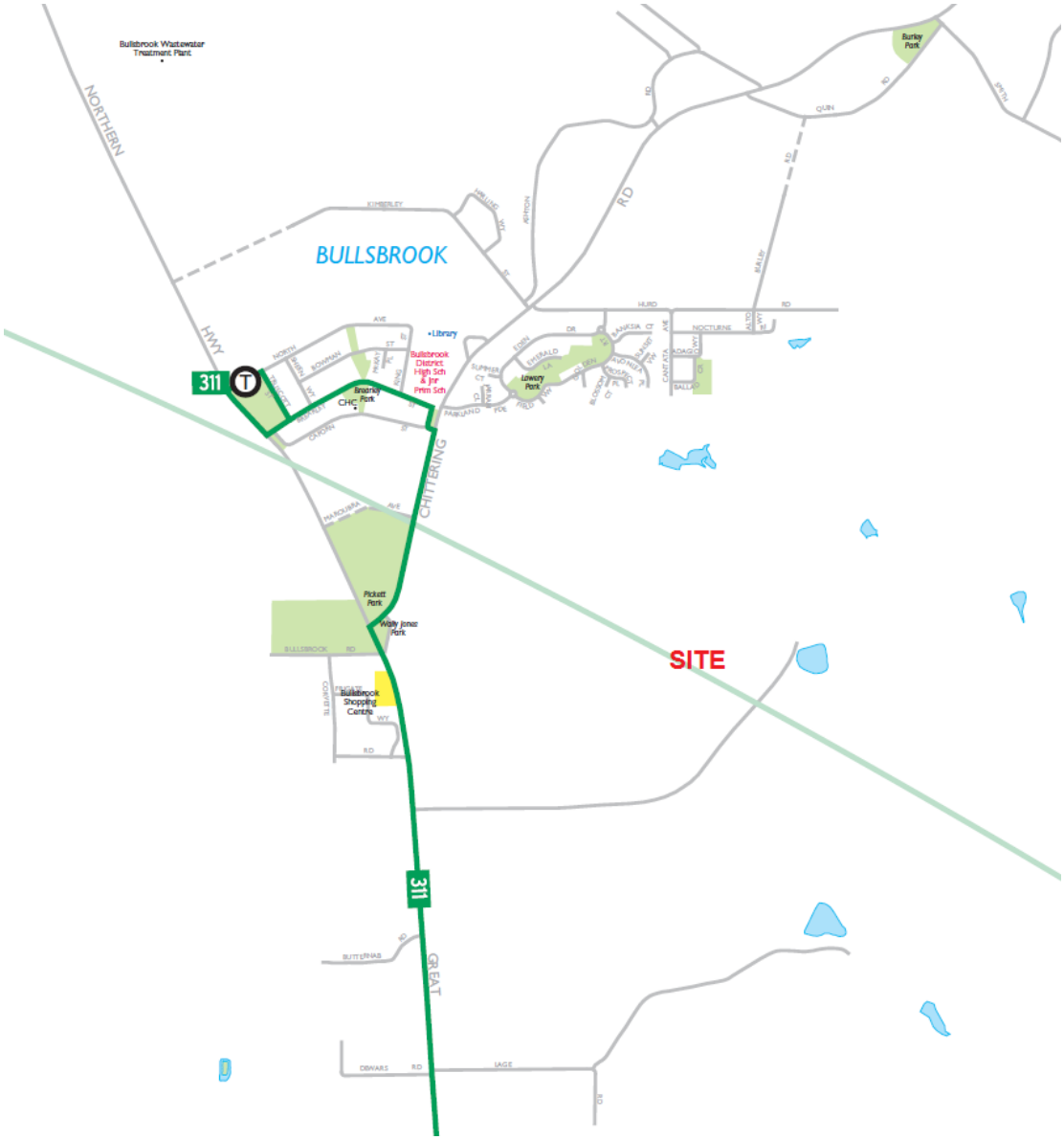


Figure 7: Existing bus routes

3.6 Pedestrian and Cyclist Facilities

A comprehensive path network is progressively being constructed as part of each stage of subdivision development within the LSP area.

There are no formal pedestrian or cyclist facilities on Great Northern Highway adjacent to the subject site although footpaths are provided through the existing Bullsbrook town centre.

Chittering Road has a 2m shared path on one side within the Bullsbrook townsite and on both sides in the vicinity of the existing high school and primary school site.

High-level future planning for cycling facilities is now set out in Western Australia's Long Term Cycle Network (LTCN), which identifies an aspirational blueprint to ensure State and local governments continue to work together towards the delivery of a continuous cycling network providing additional transport options, recreational

opportunities and support for tourism and commercial activity. The LTCN identifies the function of a route - primary, secondary or local - rather than the form it should take. Function considers the type of activities that take place along a route, and the level of demand (existing and potential). A route's built form is based on the characteristics of the environment, including space availability, topography, traffic conditions (speed, volumes), primary users, and so on.

The LTCN in the Bullsbrook area is illustrated in **Figure 8**, which shows a secondary route along Great Northern Highway and a local route parallel to the Highway through the LSP area, connecting from Lage Road (south of the LSP area) to Chittering Road (northern side of the LSP area)

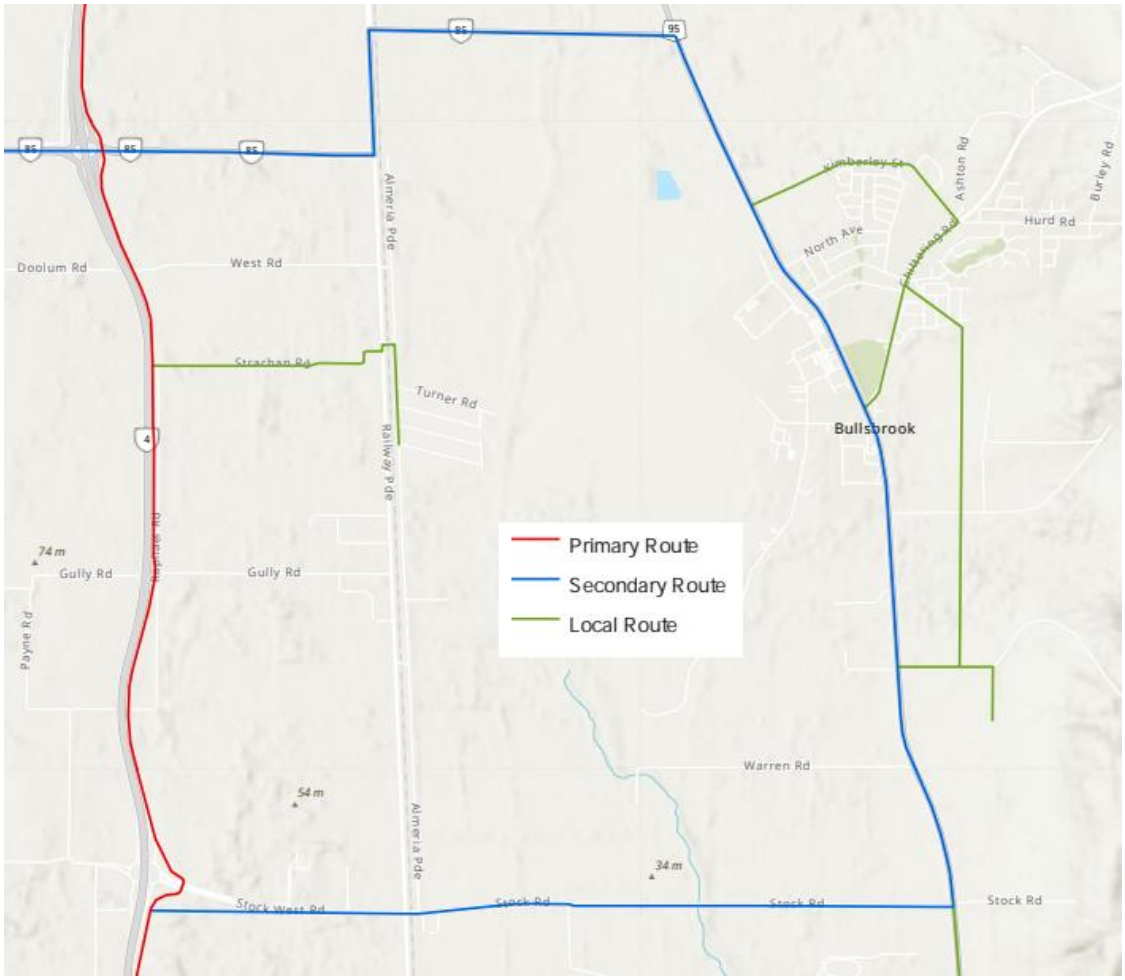


Figure 8: Long Term Cycle Network

3.7 Changes to Surrounding Road Network

The Tonkin Highway extension (NorthLink WA project) was completed in April 2020. Traffic volumes on Great Northern Highway through Bullsbrook and the proportion of heavy vehicles have both reduced significantly as a result of completion of that project.

For further discussion of future changes to the surrounding road network refer to the LSP TIA report.

4.0 Proposed Transport Network

4.1 Road Hierarchy

The proposed hierarchy of roads in and around the subject site is illustrated in Figure 9 using the road hierarchy defined in the Western Australian Planning Commission *Liveable Neighbourhoods* (LN) policy.

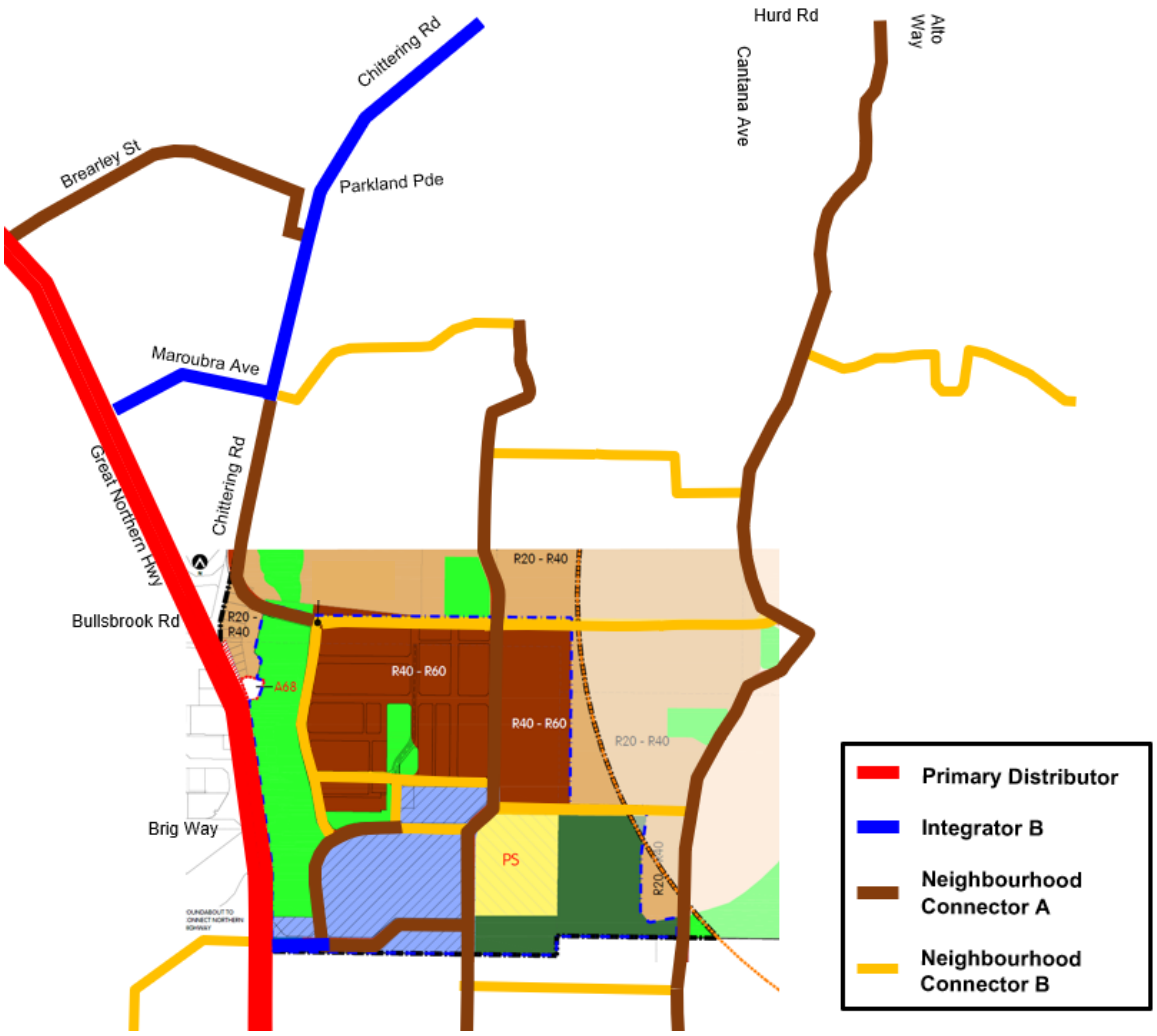


Figure 9: Road Hierarchy

The classification of roads in Figure 9 is based on preliminary analysis of future traffic flows at section 6.3 of this report. All of the roads identified on the LSP form sufficiently long and continuous routes to be classified as integrator arterials or neighbourhood connectors.

Integrator B roads are suitable for traffic flows up to 15,000vpd and can accommodate traffic flows up to 20,000vpd with suitable intersection treatments.

Neighbourhood Connector A roads are suitable for up to 7000vpd but some degree of flexibility with this upper limit may be appropriate in localised situations to avoid overdesigning some lengths of road. The main difference between Integrator B and Neighbourhood Connector A cross-sections is only the width of the median (6m versus 2m) and Liveable Neighbourhoods policy does allow for the median of an Integrator B to be reduced in width on sections that do not require right turn lanes in the median.

Neighbourhood Connector B roads are suitable for traffic flows up to 3000vpd but again some degree of flexibility with this upper limit should be considered appropriate in localised situations.

Typical cross-sections for these Integrator and Neighbourhood Connector roads are shown in Appendix B of the LSP TIA report.

One variation required is that the section of north south Neighbourhood Connector A spine road on the eastern side of the district activity centre, with the primary school site on its eastern side, is to have parking bays increased to 2.5m wide.

4.2 Public Transport

The existing bus service along Great Northern Hwy and Chittering Road adjacent to the site is noted in section 3.5 and the potential future rapid transit route along the north south activity corridor identified in the BTLUMP is noted in section 2.0 of the LSP TIA report.

All of the proposed neighbourhood connectors and integrator B roads shown on Figure 9 would be of suitable standard to accommodate bus services through this area, providing suitable options for one, two or three bus routes to service this area. This allows suitable flexibility for the Public Transport Authority to plan future bus routes within this area.

4.3 Pedestrian and Cyclist Facilities

All of the proposed neighbourhood connectors and integrator B roads shown on Figure 9 would have paths on both sides in accordance with Liveable Neighbourhoods guidelines, including a shared path on one side (or in the median amonst trees on one section of the eastern Neighbourhood Connector A spine road).

Paths would be required on at least one side of all roads in accordance with Liveable Neighbourhoods guidelines.

On-street cycle lanes are normally included only on Neighbourhood Connector A roads and above, due to traffic flows above 3000vpd on these categories of roads.

The resultant path network within the PP area is indicated in Figure 10 (refer LSP TIA report for the remainder of the LSP area). This also includes indicative location of

additional shared path (or dual use path) links on the local road network and along foreshore reserves (as previously advised by Emerge Associates). The standard and location of all paths would be subject to agreement with the City of Swan at subdivision stage.

The potential for provision of cycle lanes physically separated from motorised traffic will be investigated at subdivision stage in proximity to the primary school.

The western Neighbourhood Connector A spine road (east side of the Kingsford town centre / west of the primary school site) corresponds to the future Local Route shown on the Long Term Cycle Network plan for this area (refer section 3.6).

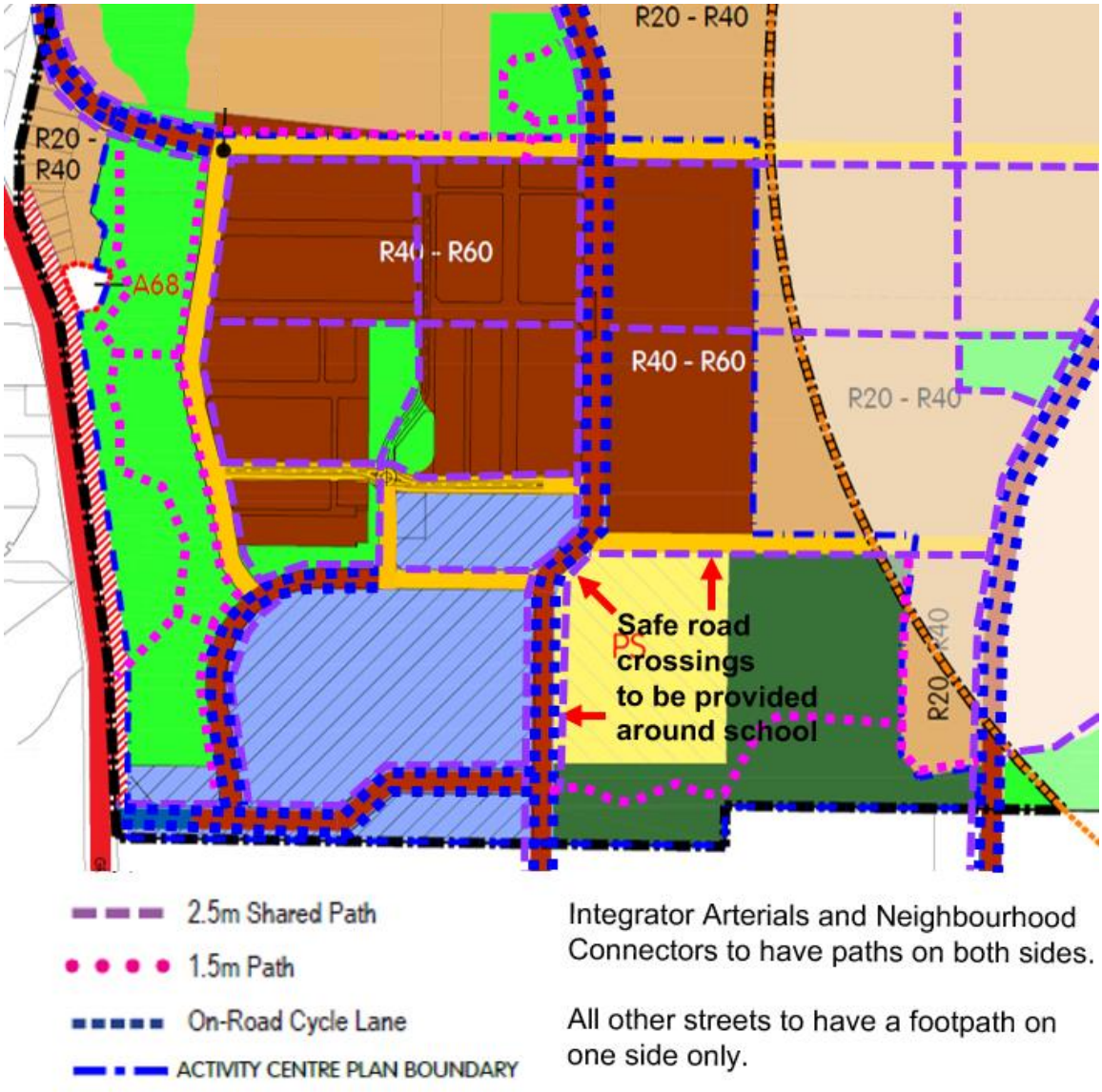


Figure 10: Pedestrian / Cycle Network

5.0 Integration with Surrounding Area

The Bullsbrook Townsite District Structure Plan (BTDSP, previously known as the Bullsbrook Townsite Land Use Master Plan, BTLUMP) provides an overall plan to ensure coordination of future development of the subject site and the surrounding area. The Kingsford local structure plan respects the principles and external connections of the BTDSP to ensure that good connectivity and integration with the surrounding area are achieved. The Kingsford Town Centre Precinct Plan fits within that LSP and is designed to integrate fully within that LSP area.

6.0 Analysis of the Transport Network

6.1 Assessment Period

The traffic assessment undertaken for the subject site is based on the 2031 ROM modelling undertaken for the BTLUMP, with full development of all land uses within the subject site taken into consideration, including ultimate full development of the Kingsford Town Centre.

6.2 Traffic generation

This Transport Impact Assessment Addendum utilises the traffic model developed for the Kingsford LSP area and the wider BTDSP / BTLUMP area for the LSP TIA report and for the BTDSP / BTLUMP TIA report for the City of Swan.

The daily traffic generation rate used in the LSP area is 8 vehicle trips per day (vpd) per dwelling, which corresponds to peak hour trip generation rates recommended in the Western Australian Planning Commission (WAPC) *Transport Impact Assessment Guidelines* (2016). The anticipated yield of approximately 2,500 dwellings of the LSP area will therefore generate approximately 20,000vpd, inclusive of 3,080vpd generated by the 385 dwellings anticipated in the PP area.

The current standard pattern primary school of 540 students would generate approximately 1080vpd but based on previous advice from City of Swan officers it has been modelled as 600 students (1200vpd) to reflect potential student numbers with the numbers of young families likely when the area is first established.

Trip rates published in the NSW *Guide to Traffic Generating Developments* indicate a 20,000m^2 shopping centre would generate traffic flows of approximately 15,600vpd on a busy weekday.

The traffic generation listed above for the LSP area is consistent with the LSP TIA report.

6.3 Traffic Flow Forecasts

Transcore's traffic model for the Bullsbrook townsite was revised for the *Bullsbrook Townsite Land Use Master Plan Precinct Traffic Contributions* (BTLUMP PTC) report (revised October 2019) on behalf of the City of Swan. The October 2019 revision of the BTLUMP PTC report takes into consideration the refusal of Metropolitan Region Scheme Amendment 1325/41 which would have rezoned land from Rural to Urban Deferred in the North Bullsbrook Precinct. The traffic model has now also been revised to reflect the localised changes in road network within the PP area and access arrangements proposed for the Kingsford Town Centre. Accordingly, there

will be some changes in the modelled traffic volumes compared to the LSP TIA report.

The revised total daily traffic flows on the modelled road network are shown in the EMME traffic volume diagram at Appendix B. (A more detailed, localised plot of modelled daily traffic in the PP area is also provided in Appendix B, including traffic flows on modelled connector links that each represent one or more driveways or local road connections within each traffic zone of the model.) A "selected links" plot is also included which only shows those traffic flows that are generated by or attracted to the land uses in the LSP area. Traffic flows in and adjacent to the LSP area are also shown in Figure 11.

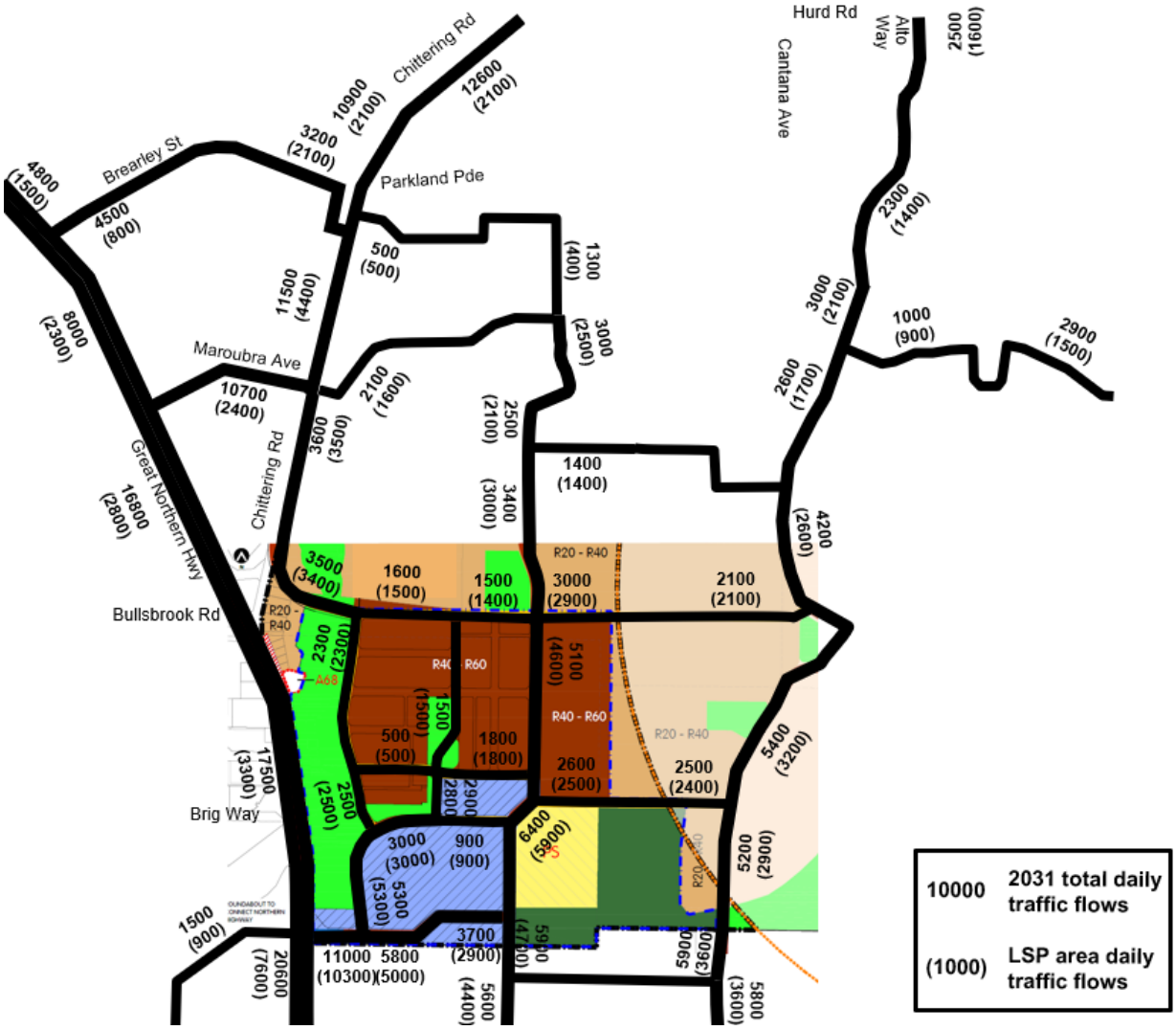


Figure 11: 2031traffic flows

6.4 *Roads and Intersections*

The anticipated future road network around the subject site has been detailed in section 4, including discussion of the proposed road hierarchy in section 4.1.

The key intersection for the proposed LSP area is the proposed 4-way intersection on Great Northern Highway near the district activity centre, which is planned as a dual lane roundabout, as currently advised by MRWA. A roundabout would need to be large enough to accommodate the largest size vehicle permitted on Great Northern Highway (36.5m B-double and dog trailer configuration and high wide load vehicles). It is understood this will require a central island diameter of 40m. This will require further detailed investigation to establish the land requirements at subdivision stage.

Another important intersection for the LSP area is the intersection of Chittering Road and Maroubra Avenue, which has been constructed as a 4-way roundabout for access into the first stages of subdivision development in the LSP area.

The intersection where the neighbourhood connector B road connects on the eastern side of Chittering Road in the vicinity of the existing Brearley Street intersection will be restricted to left in / left out only. The existing full-movement T-intersections at Parkland Pde and Brearley St on Chittering Road will be retained. A right turn lane on Chittering Road at the Brearley St intersection has recently been constructed.

The location of these key intersections roundabouts are shown on Figure 12.

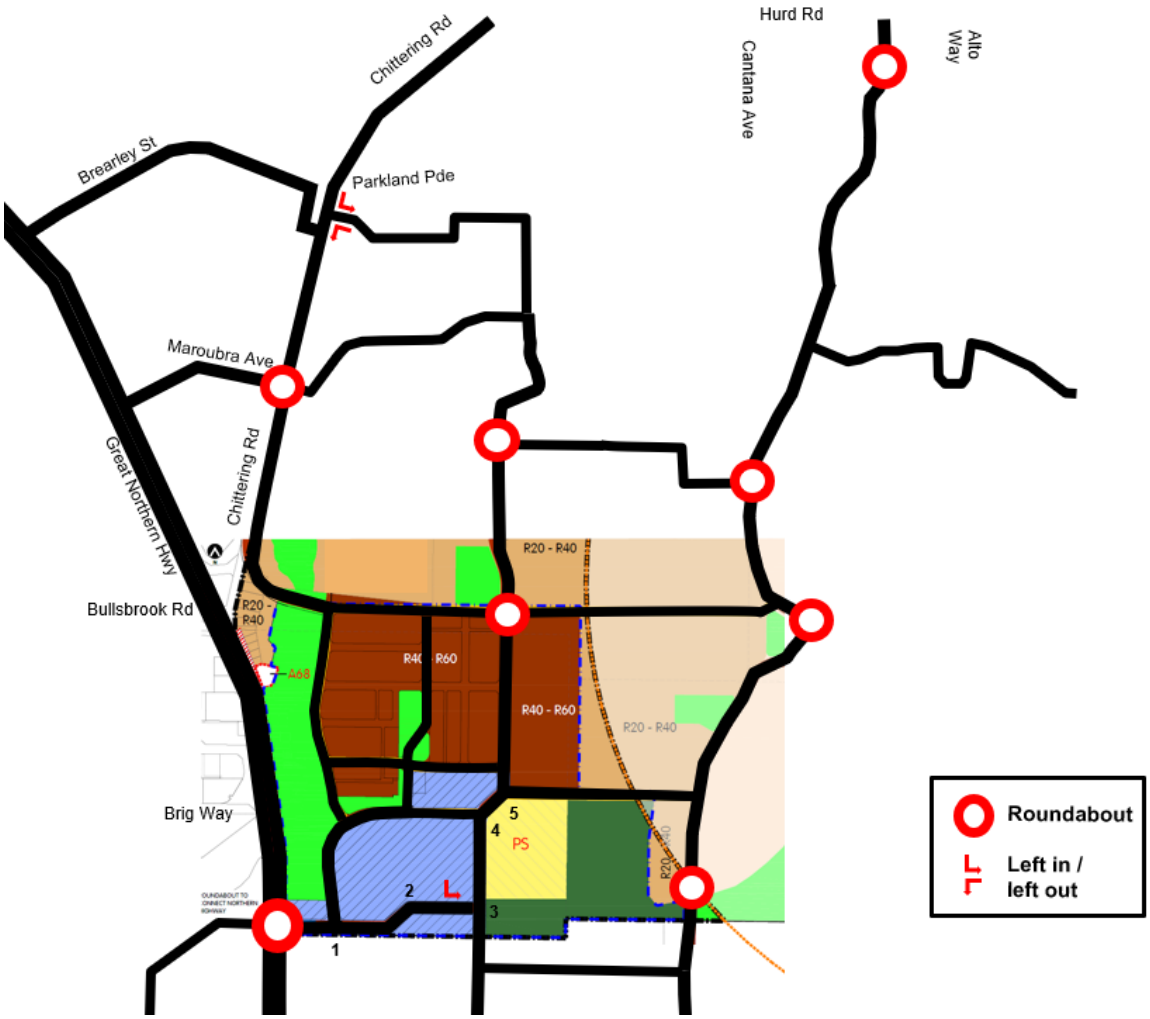


Figure 12: Key intersections

Other intersections within the LSP area will be relatively straightforward to determine at subdivision stage when the local road network is identified. Roundabouts or priority-controlled intersections will be appropriate within this area. Anticipated locations of some of the 4-way intersections that would be constructed as roundabouts are also illustrated in Figure 12.

There are also five key intersection locations numbered 1 to 5 around the Kingsford Town Centre on Figure 12. These five intersections are analysed in section 6.5 below.

6.5 Intersection Analysis

Intersection capacity analysis of the key intersections on Great Northern Highway and Chittering Road is documented in the LSP TIA report and is not repeated in this Addendum report. Traffic volumes have decreased slightly in this Addendum report, so the previous analysis still provides a robust analysis of those intersection requirements.

The five key intersections around the Kingsford Town Centre (numbered 1 to 5 on Figure 11) have been analysed for the school day 3-4PM peak hour flows (i.e. end of school pick-up period) that correspond to the modelled 2031 daily traffic flows in Figure 11. This period would be the critical peak hour of total traffic flows in this local area.

Capacity analysis of these intersections has been undertaken using the SIDRA computer software package. SIDRA is an intersection modelling tool commonly used by traffic engineers for all types of intersections. SIDRA outputs are presented in the form of Degree of Saturation, Level of Service, Average Delay and 95% Queue. These characteristics are defined as follows:

- Degree of Saturation is the ratio of the arrival traffic flow to the capacity of the approach during the same period. The Degree of Saturation ranges from close to zero for infrequent traffic flow up to one for saturated flow or capacity.
- Level of Service is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. In general, there are 6 levels of service, designated from A to F, with Level of Service A representing the best operating condition (i.e. free flow) and Level of Service F the worst (i.e. forced or breakdown flow).
- Average Delay is the average of all travel time delays for vehicles through the intersection.
- 95% Queue is the queue length below which 95% of all observed queue lengths fall.

The results of the SIDRA analysis are summarised in Appendix C and satisfactory intersection performance is shown for each of the intersections shown in Appendix C.

6.6 Access to Frontage Properties

The WAPC *Liveable Neighbourhoods* policy requires that "Development along integrator B and neighbourhood connector streets with ultimate vehicle volumes over 5,000 vehicles per day should be designed either so vehicles entering the street can do so travelling forward, or are provided with alternative forms of vehicle access."

This aspect is fully covered in the LSP TIA report and there are no changes to report on this aspect in this Addendum.

7.0 Conclusions

This Transport Impact Assessment Addendum relates to the proposed Kingsford Town Centre Precinct Plan (PP) within the approved Kingsford Local Structure Plan (LSP) area at Bullsbrook in the City of Swan.

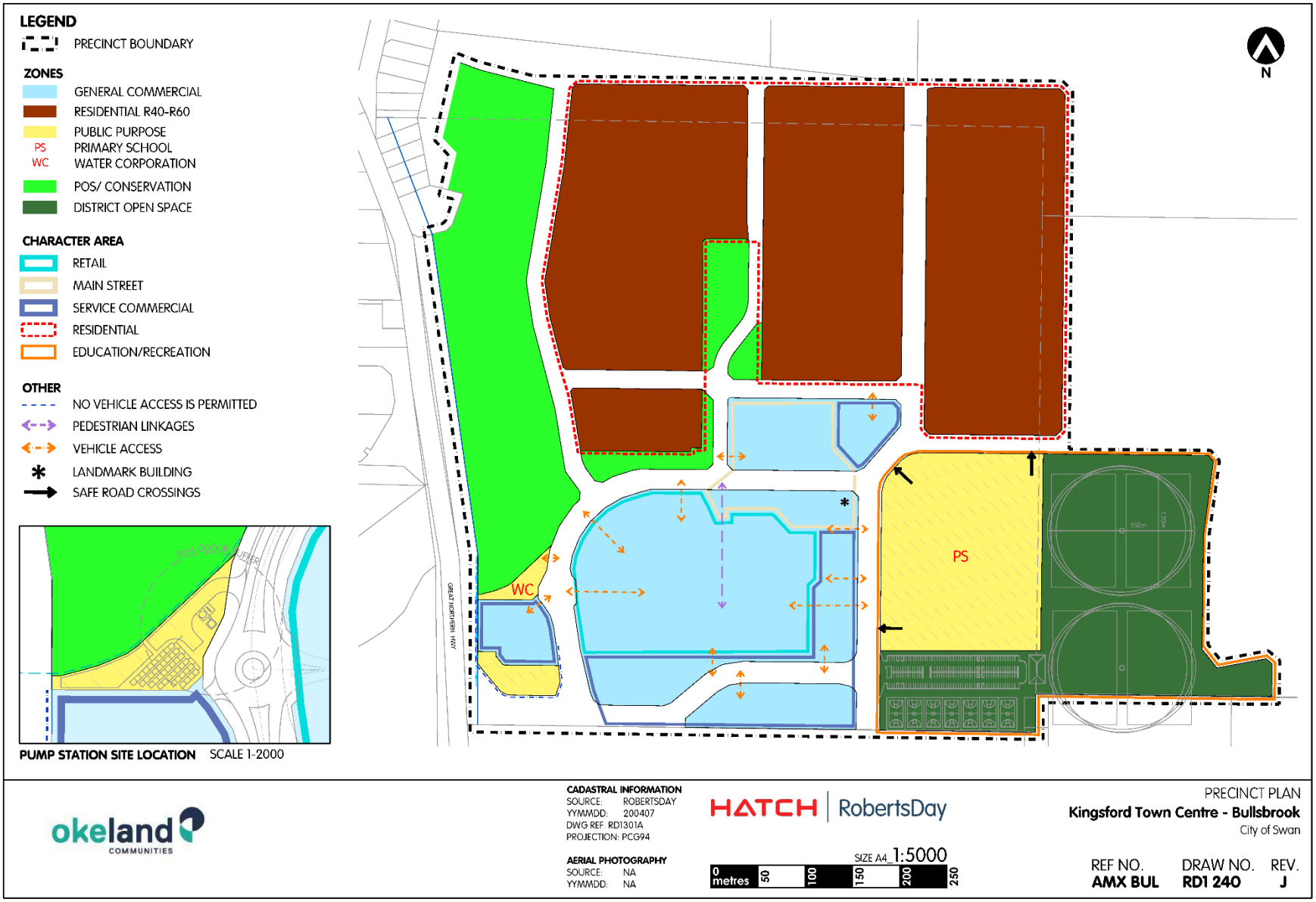
The LSP area will accommodate approximately 2,500 dwellings, a primary school site and the future district activity centre of up to 20,000m^2 net lettable area that will serve as the expanded town centre for the planned future growth of Bullsbrook townsite. That town centre, primary school and medium density residential development of approximately 385 dwellings is encompassed within the Kingsford Town Centre PP.

Traffic modelling of the LSP area and the surrounding Bullsbrook Townsite District Structure Plan (BTDSP) area has been updated for this TIA Addendum report.

The key intersections around the proposed Kingsford Town Centre have been assessed and intersection capacity analysis confirms that priority-controlled T-intersections (i.e. Give Way or Stop sign control) would be able to accommodate the projected 2031 traffic flows when this area is fully developed.

Appendix A

Precinct Plans

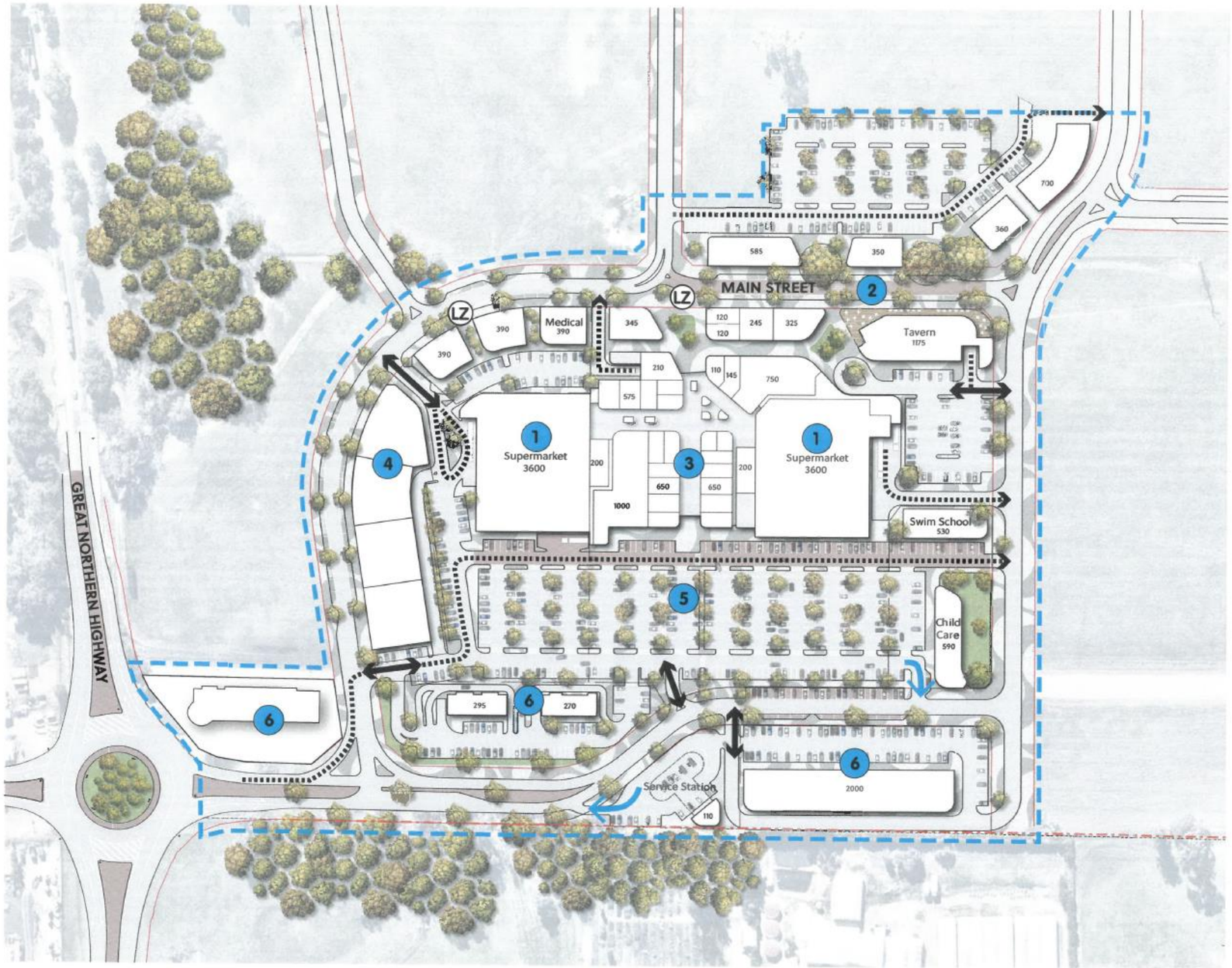

LEGEND
PRECINCT BOUNDARY
ZONES
GENERAL COMMERCIAL
RESIDENTIAL R40-R60
PUBLIC PURPOSE
PS PRIMARY SCHOOL
WC WATER CORPORATION
POS/ CONSERVATION
DISTRICT OPEN SPACE
CHARACTER AREA
RETAIL
MAIN STREET
SERVICE COMMERCIAL
RESIDENTIAL
EDUCATION/RECREATION
OTHER
NO VEHICLE ACCESS IS PERMITTED
PEDESTRIAN LINKAGES
VEHICLE ACCESS
LANDMARK BUILDING
SAFE ROAD CROSSINGS
PUMP STATION SITE LOCATION SCALE 1-2000
N
WC
PS
GREAT NORTHERN HWY
CADASTRAL INFORMATION
SOURCE: ROBERTSDAY
YYMMDD: 200407
DWG REF: RD1301A
PROJECTION: PCG94
AERIAL PHOTOGRAPHY
SOURCE: NA
YYMMDD: NA
HATCH | RobertsDay
SIZE A4_1:5000
0 metres 50 100 150 200 250
PRECINCT PLAN
Kingsford Town Centre - Bullsbrook
City of Swan
REF NO. AMX BUL
DRAW NO. RD1 240
REV. J
DISCLAIMER: ISSUED FOR DESIGN INTENT ONLY. ALL AREAS AND DIMENSIONS ARE SUBJECT TO DETAIL DESIGN AND SURVEY

TOTAL NLA
~20,000m²

TOTAL PARKING
~1,050 Bays

1. Shopping centre; supermarkets, specialty shops and open air tenancies
2. Main Street tenancies to be a diverse mix of retail / commercial and small public spaces
3. Key north / south pedestrian linkage to focus pedestrian movement on the retail outlets and Main Street
4. Retail/ Service Commercial with long term potential for Residential
5. Activity Centre shared car parking to be screened from Main Street and entry road and highly accessible
6. Car based retail sites

Full movement access
Truck access route
One way access
LZ Loading zone



Kingsford Town Centre
Conceptual Masterplan (Built Form and Access)

1:2000 @ A3
0 20 40 60 80 100

HATCH | RobertsDay

TAYLOR ROBINSON CHANEY BRODERICK

Appendix B

2031 Traffic Volumes


Scenario 37: 2031 Bullsbrook Town Centre ACP2
Date: 2020-12-22
3000
6000
9000
12000
15000


Scenario 37: 2031 Bullsbrook Town Centre ACP2
Date: 2020-12-22
30000
60000
90000
120000
150000

Traffic flows with trip origin and/or destination within the LSP area.

Appendix C

SIDRA Intersection Analysis

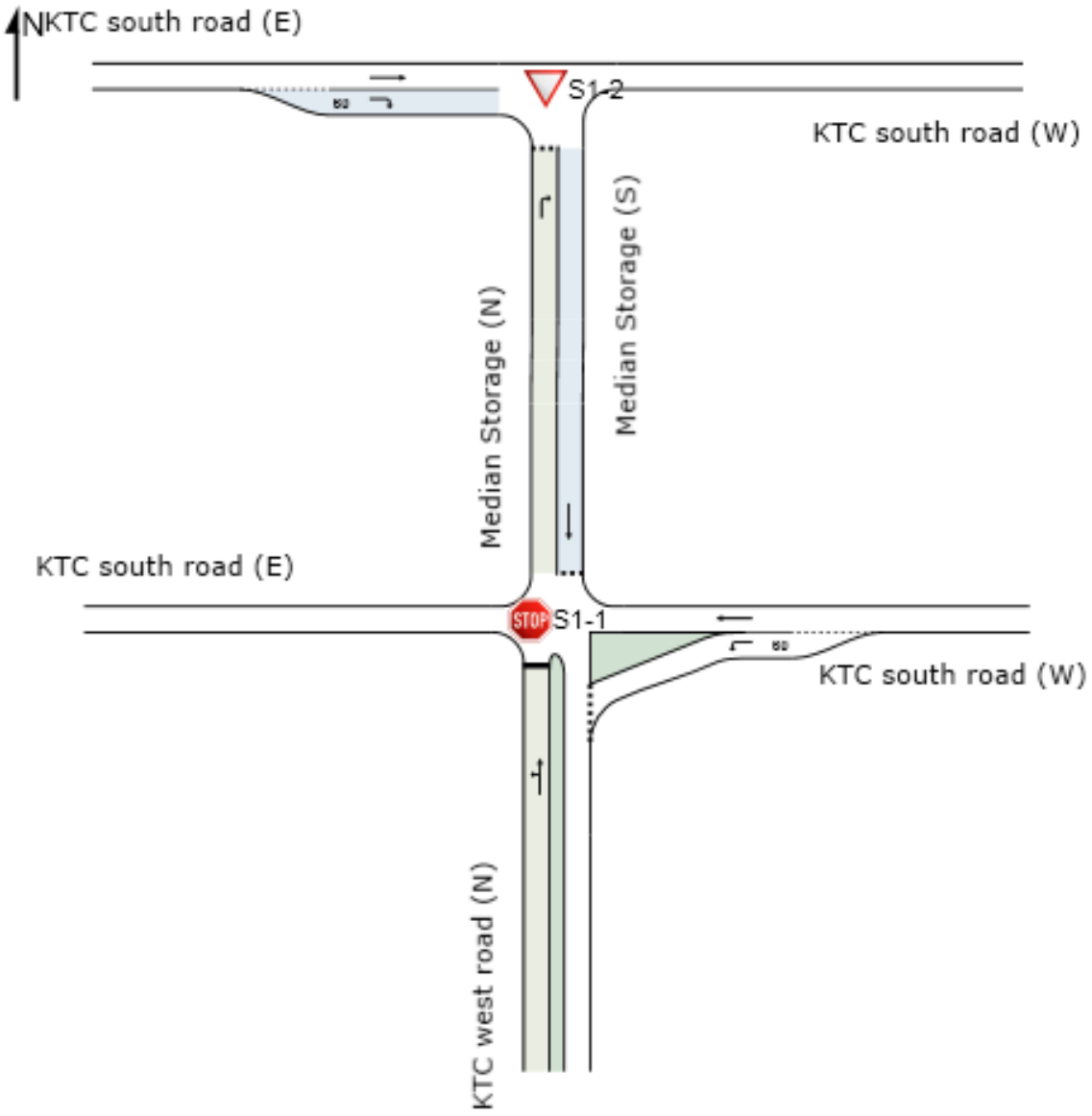


Figure C1. Kingsford Town Centre south road and west road T-intersection layout analysed in SIDRA

Note: This layout should be rotated 180 degrees to correctly represent the actual intersection orientation. (Currently not able to rotate this network template in SIDRA Intersection 9.0.)

The intersection is modelled in SIDRA Network analysis as two linked intersections to model the two stage right turn from the side road (first to the median and then turning right to the major road). The diagram is indicative only and not to scale. The modelled median width is 6 metres.

Table C1. SIDRA results – Kingsford Town Centre south road and west road T-intersection – 2031 weekday 3-4PM after-school peak with full development

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: KTC west road (N)														
1	L2	7	3.0	7	3.0	0.374	10.5	LOS B	2.2	17.4	0.60	1.06	0.73	35.7
2	T1	241	3.0	241	3.0	0.374	12.2	LOS B	2.2	17.4	0.60	1.06	0.73	31.6
Approach		248	3.0	248	3.0	0.374	12.1	LOS B	2.2	17.4	0.60	1.06	0.73	31.7
East: KTC south road (W)														
3	L2	329	3.0	329	3.0	0.235	4.6	LOS A	1.1	9.2	0.06	0.47	0.06	41.4
4	T1	351	3.3	351	3.3	0.184	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	49.9
Approach		680	3.2	680	3.2	0.235	2.2	LOS A	1.1	9.2	0.03	0.23	0.03	44.7
North: Median Storage (S)														
5	T1	11	3.0	11	3.0	0.010	1.2	LOS A	0.0	0.3	0.37	0.22	0.37	40.7
Approach		11	3.0	11	3.0	0.010	1.2	LOS A	0.0	0.3	0.37	0.22	0.37	40.7
All Vehicles		939	3.1	939	3.1	0.374	4.8	NA	2.2	17.4	0.19	0.45	0.22	40.7

Vehicle Movement Performance

Mov ID	Turn	DEMAND FLOWS [Total veh/h	HV] %	ARRIVAL FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Median Storage (N)														
1	R2	241	3.0	241	3.0	0.203	1.6	LOS A	0.5	4.3	0.32	0.42	0.32	28.7
Approach		241	3.0	241	3.0	0.203	1.6	LOS A	0.5	4.3	0.32	0.42	0.32	28.7
West: KTC south road (E)														
2	T1	239	3.3	239	3.3	0.126	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	50.0
3	R2	241	3.0	241	3.0	0.133	4.9	LOS A	0.0	0.0	0.00	0.59	0.00	35.2
Approach		480	3.1	480	3.1	0.133	2.4	NA	0.0	0.0	0.00	0.30	0.00	42.8
All Vehicles		721	3.1	721	3.1	0.203	2.2	NA	0.5	4.3	0.11	0.34	0.11	39.1

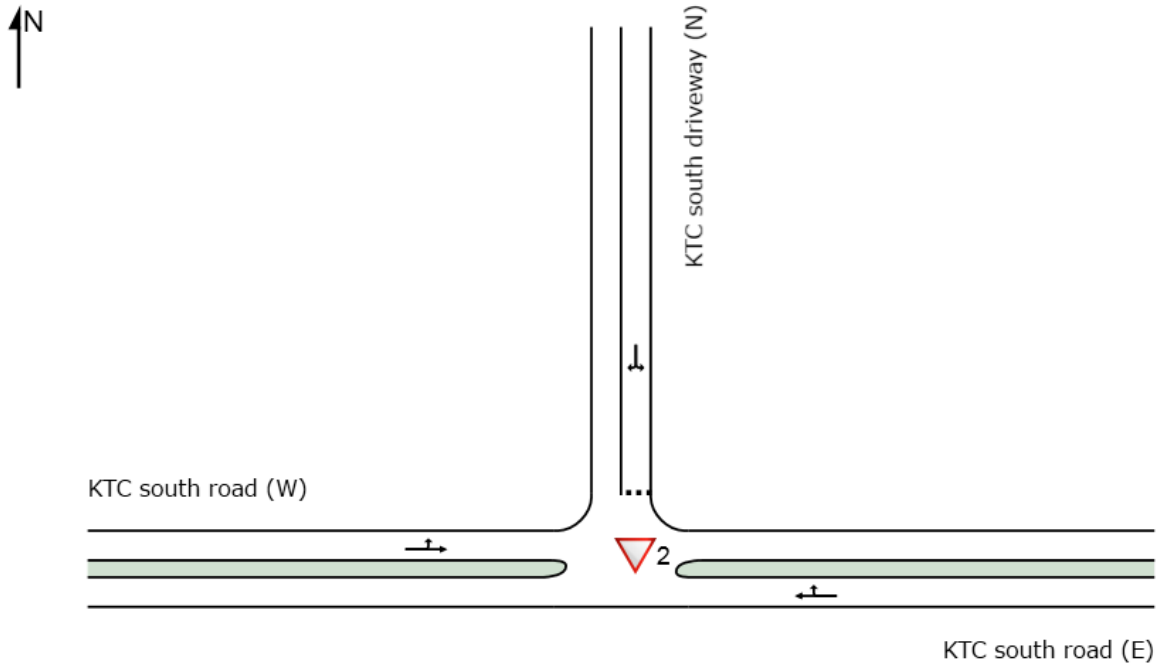


Figure C2. Kingsford Town Centre south road and Town Centre southern driveway T-intersection layout analysed in SIDRA

Table C2. SIDRA results – Kingsford Town Centre south road and southern driveway T-intersection – 2031 weekday 3-4PM after-school peak with full development

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: KTC south road (E)														
5	T1	100	3.3	105	3.3	0.127	0.6	LOS A	0.6	4.7	0.29	0.29	0.29	43.3
6	R2	100	0.0	105	0.0	0.127	5.3	LOS A	0.6	4.7	0.29	0.29	0.29	37.4
Approach		200	1.7	211	1.7	0.127	2.9	NA	0.6	4.7	0.29	0.29	0.29	40.6
North: KTC south driveway (N)														
1	L2	100	0.0	105	0.0	0.185	4.9	LOS A	0.7	5.7	0.25	0.57	0.25	36.3
2	R2	100	0.0	105	0.0	0.185	6.3	LOS A	0.7	5.7	0.25	0.57	0.25	35.4
Approach		200	0.0	211	0.0	0.185	5.6	LOS A	0.7	5.7	0.25	0.57	0.25	35.8
West: KTC south road (W)														
3	L2	100	0.0	105	0.0	0.111	4.6	LOS A	0.0	0.0	0.00	0.27	0.00	26.4
4	T1	100	3.3	105	3.3	0.111	0.0	LOS A	0.0	0.0	0.00	0.27	0.00	45.3
Approach		200	1.7	211	1.7	0.111	2.3	NA	0.0	0.0	0.00	0.27	0.00	34.7
All Vehicles		600	1.1	632	1.1	0.185	3.6	NA	0.7	5.7	0.18	0.37	0.18	36.9

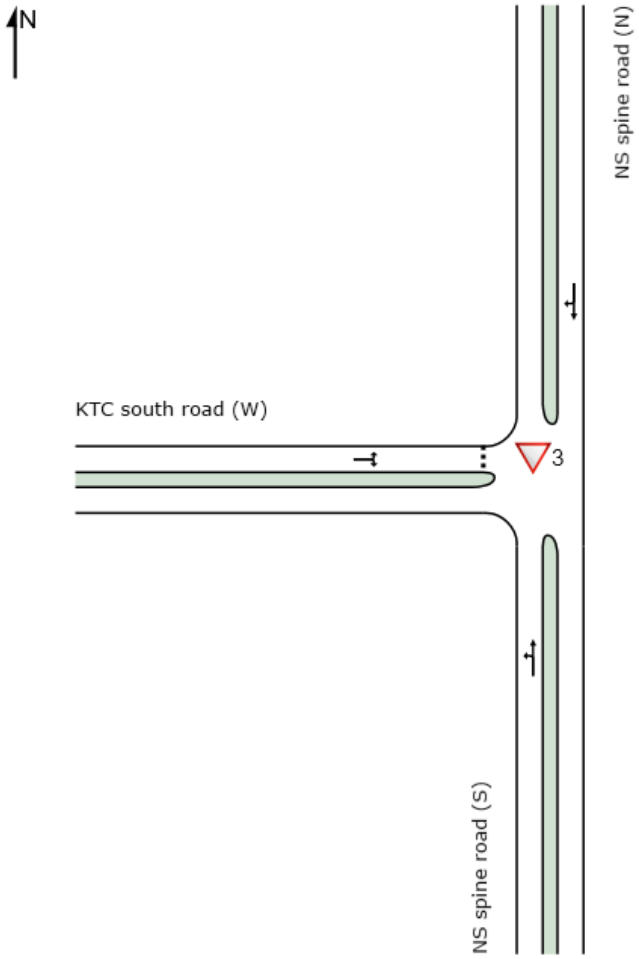


Figure C3. Kingsford Town Centre south road and north-south spine road T-intersection layout analysed in SIDRA

Table C3. SIDRA results – Kingsford Town Centre south road and north-south spine road T-intersection – 2031 weekday 3-4PM after-school peak with full development

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: NS spine road (S)														
3	L2	117	3.3	123	3.3	0.176	4.6	LOS A	0.0	0.0	0.00	0.20	0.00	44.4
4	T1	195	3.3	205	3.3	0.176	0.0	LOS A	0.0	0.0	0.00	0.20	0.00	47.2
Approach		312	3.3	328	3.3	0.176	1.7	NA	0.0	0.0	0.00	0.20	0.00	46.3
North: NS spine road (N)														
5	T1	121	3.3	127	3.3	0.100	0.5	LOS A	0.3	2.6	0.23	0.14	0.23	46.7
6	R2	39	3.3	41	3.3	0.100	5.9	LOS A	0.3	2.6	0.23	0.14	0.23	44.3
Approach		160	3.3	168	3.3	0.100	1.8	NA	0.3	2.6	0.23	0.14	0.23	46.1
West: KTC south road (W)														
1	L2	58	3.3	61	3.3	0.240	5.4	LOS A	0.9	7.4	0.41	0.67	0.41	40.1
2	R2	154	3.3	162	3.3	0.240	6.9	LOS A	0.9	7.4	0.41	0.67	0.41	36.7
Approach		212	3.3	223	3.3	0.240	6.5	LOS A	0.9	7.4	0.41	0.67	0.41	37.7
All Vehicles		684	3.3	720	3.3	0.240	3.2	NA	0.9	7.4	0.18	0.33	0.18	43.5

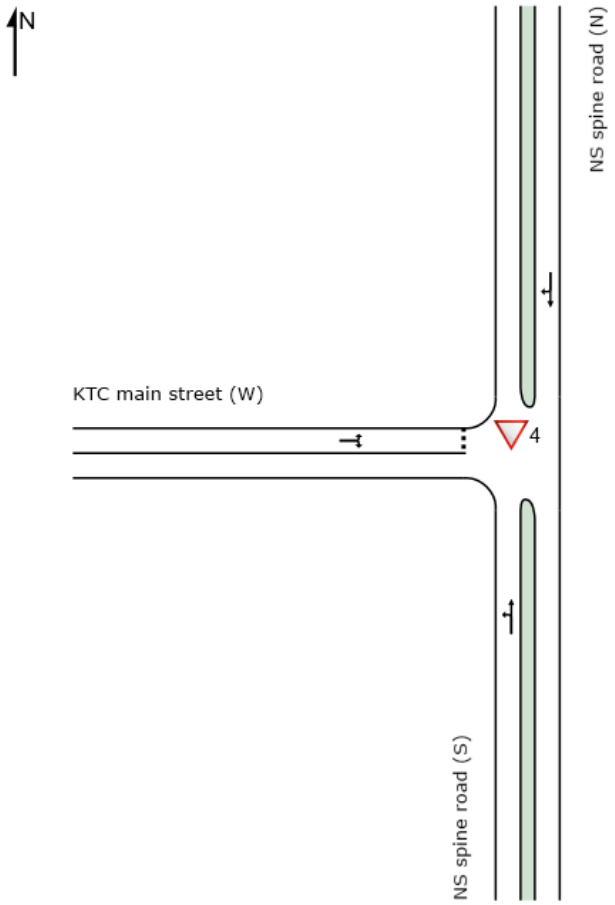


Figure C4. Kingsford Town Centre main street and north-south spine road T-intersection layout analysed in SIDRA

Table C4. SIDRA results – Kingsford Town Centre main street and north-south spine road T-intersection – 2031 weekday 3-4PM after-school peak with full development

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES DEMAND FLOWS [Total veh/h	HV] %	[Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: NS spine road (S)														
3	L2	41	3.0	43	3.0	0.212	4.6	LOS A	0.0	0.0	0.00	0.06	0.00	47.5
4	T1	341	3.3	359	3.3	0.212	0.0	LOS A	0.0	0.0	0.00	0.06	0.00	48.9
Approach		382	3.3	402	3.3	0.212	0.5	NA	0.0	0.0	0.00	0.06	0.00	48.7
North: NS spine road (N)														
5	T1	274	3.3	288	3.3	0.174	0.2	LOS A	0.3	2.1	0.10	0.05	0.10	48.4
6	R2	24	3.0	25	3.0	0.174	6.2	LOS A	0.3	2.1	0.10	0.05	0.10	43.5
Approach		298	3.3	314	3.3	0.174	0.7	NA	0.3	2.1	0.10	0.05	0.10	48.1
West: KTC main street (W)														
1	L2	22	3.0	23	3.0	0.075	5.9	LOS A	0.3	2.0	0.47	0.69	0.47	31.6
2	R2	32	3.0	34	3.0	0.075	8.3	LOS A	0.3	2.0	0.47	0.69	0.47	38.8
Approach		54	3.0	57	3.0	0.075	7.3	LOS A	0.3	2.0	0.47	0.69	0.47	36.5
All Vehicles		734	3.3	773	3.3	0.212	1.1	NA	0.3	2.1	0.08	0.10	0.08	47.2

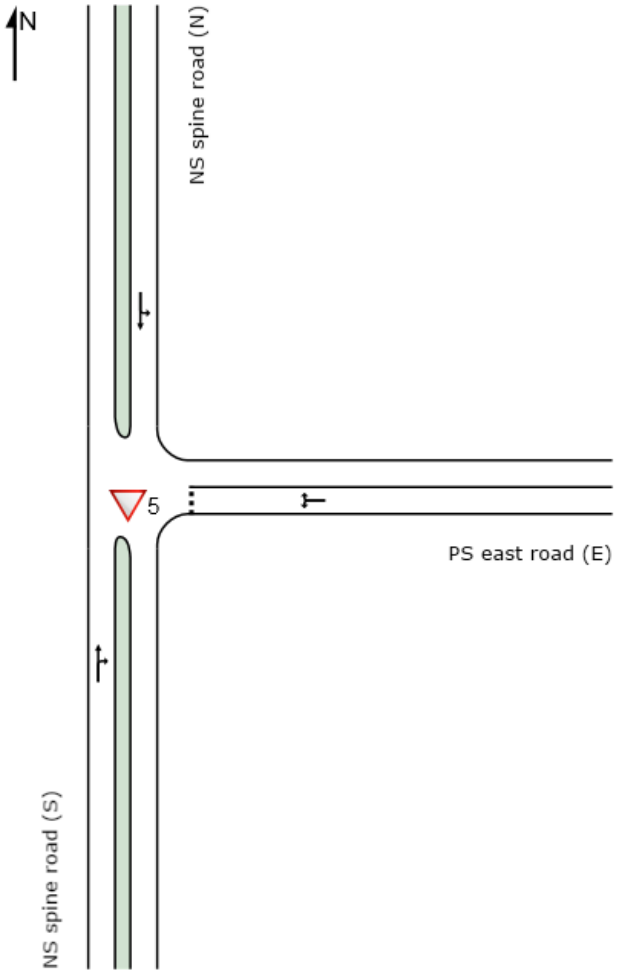


Figure C5. North-south spine road and primary school east road T-intersection layout analysed in SIDRA

Table C5. SIDRA results – North-south spine road and primary school east road T-intersection – 2031 weekday 3-4PM after-school peak with full development

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: NS spine road (S)														
5	T1	276	3.3	291	3.3	0.227	0.6	LOS A	0.8	6.6	0.26	0.15	0.26	47.1
6	R2	88	3.0	93	3.0	0.227	5.8	LOS A	0.8	6.6	0.26	0.15	0.26	40.4
Approach		364	3.2	383	3.2	0.227	1.9	NA	0.8	6.6	0.26	0.15	0.26	46.1
East: PS east road (E)														
1	L2	81	3.0	85	3.0	0.224	5.5	LOS A	0.8	6.7	0.42	0.67	0.42	32.0
2	R2	97	3.0	102	3.0	0.224	8.6	LOS A	0.8	6.7	0.42	0.67	0.42	41.2
Approach		178	3.0	187	3.0	0.224	7.2	LOS A	0.8	6.7	0.42	0.67	0.42	38.5
North: NS spine road (N)														
3	L2	99	3.0	104	3.0	0.177	4.6	LOS A	0.0	0.0	0.00	0.17	0.00	47.1
4	T1	216	3.3	227	3.3	0.177	0.0	LOS A	0.0	0.0	0.00	0.17	0.00	47.9
Approach		315	3.2	332	3.2	0.177	1.5	NA	0.0	0.0	0.00	0.17	0.00	47.6
All Vehicles		857	3.2	902	3.2	0.227	2.8	NA	0.8	6.7	0.20	0.26	0.20	45.0

APPENDIX C

CPTED Assessment Table

KINGSFORD TOWN CENTRE PRECINCT - CPTED ASSESSMENT TABLE

The following table is an assessment of the Kingsford Town Centre Precinct using the CPTED principles and performance criteria listed in the *Western Australian Planning Commissions Design Out Crime Planning Guidelines* (2006). This Assessment has been prepared to support the Kingsford Town Centre Precinct Plan in accordance with *State Planning Policy 7.2 Precinct Design Guidelines* (Draft August 2019).

Project developer, Okeland Communities, will work to ensure that they deliver on all the actions in its control and monitors and promotes the delivery of the actions outside its control.

STAGE

The following are the various stages of development for the project:

- Design – Local Structure Plan, subdivision, civil design and landscape drawings;
- Construction – Civil construction and landscaping undertaken by Okeland Communities;
- Development – Dwelling, commercial, retail, community and education building design and construction; and
- Post-Development – Development completed.

LOCATION

The following are the specific locations within the Kingsford Town Centre Precinct:

- Town Centre (Activity Centre);
- Residential Village;
- Educational and Community Facilities;
- Streets; and
- Public Open Space.

RESPONSIBILITY

The following are the stakeholders responsible for implementing the principles and performance criteria:

- Okeland Communities;
- Landscape Architect;
- Civil Engineer;
- Traffic Engineer;
- Urban Designer;
- City of Swan;
- State Government agency (e.g. Department of Education);
- Private developer (includes their architect); and
- Resident.

PERFORMANCE CRITERIA	STAGE	LOCATION	RESPONSIBILITY	KINGSFORD TOWN CENTRE PRECINCT ASSESSMENT
NATURAL SURVEILLANCE				
Blind corners and problem areas • Avoid blind corners in pathways, stairways, corridors, hallways, near toilets and car parks	Design Development	All All	Landscape Architect Civil Engineer Urban Designer Private developer State Government agency	The path network follows regular geometry and will be designed to ensure no blind corners.

• Avoid sudden changes of grade on pathways	Design	Streets Public Open Space	Landscape Architect Civil Engineer Urban Designer	The pathways will be designed to meet City of Swan standards.
• Ensure through visibility in tunnels and underpasses	Design	Streets Public Open Space	Landscape Architect Civil Engineer Urban Designer	Not applicable
• Avoid or minimise the effect of barriers on pathways	Design	Streets Public Open Space	Landscape Architect Civil Engineer Urban Designer	The use of barriers on pathways (e.g. bollards) will be in accordance with City of Swan standards and will primarily be utilised to prevent or limit vehicle access.
Communal or public areas				
• Provide natural surveillance from activity land uses and activity rooms for communal and public areas	Design Development	All All	Landscape Architect Urban Designer City of Swan State Government agency Private developer	Each street and public open space reserve will have either commercial/retail uses or dwellings fronting them and is serviced by footpaths. These will provide of activity and natural surveillance. External malls and public circulation areas in the Town Centre will have passive surveillance provided by active trading edges and the street via access ways and breaks in built form.
• Establish community focal points at locations where surveillance is essential	Design Development	All All	Landscape Architect Urban Designer City of Swan State Government agency Private developer	Community focal points will be located along the Ki-It Brook open space to prove amenity for residents and visitors and to provide for passive surveillance. Regular seating and lingering spaces will be provided on the streets around the Town Centre.
• Ensure public shelters do not impede surveillance	Development	All	Landscape Architect City of Swan State Government agency	Not applicable at this stage
• Co-locate movement systems to encourage surveillance in public areas	Design Development	All All	Landscape Architect Civil Engineer Traffic Engineer Urban Designer City of Swan State Government agency Private developer	The Hike and Bike Network correlates with the road and public open space layout. This allows drivers, pedestrians and cyclists to provide surveillance in these areas.
• Encourage mixed uses to extend hours of surveillance, ensuring compatible uses and avoiding conflicting uses	Design Development	Town Centre (Activity Centre)	Urban Designer City of Swan Private developer	The Town Centre will include a range of land uses that will open at varied times, including: • Supermarkets and retail; • Child care centre;

				• Bulk goods retails; • Medical; • Service station; • Fast food outlets; and • Food and beverage.
Entrances • Provide entries which are clearly visible.	Development	Town Centre (Activity Centre) Residential Village Educational and Community Facilities	City of Swan State Government agency Private developer	Not applicable. These will be determined at the Development Application stage. Refer to Part One Section 3.5 Development Standards of the Kingsford Precinct Plan
Fencing • Fence design should maximise natural surveillance from the street to the building, building to the street and minimise opportunities for intruders to hide.	Design Development Post-Development	All All Town Centre (Activity Centre) Residential Village	Landscape Architect Urban Designer City of Swan State Government agency Private developer Private developer Resident	No front fencing is permitted. Fencing abutting public open space will be permeable.
Landscaping • Avoid landscaping which obstructs surveillance, serves as a barrier to unimpeded views and allows intruders to hide.	Design Development	All All	Landscape Architect City of Swan State Government agency Private developer	Maintaining adequate surveillance is a pre-requisite for all landscaping designs.
URBAN STRUCTURE				
Local context • Scale, siting, orientation and connections should take into account the local context of local topography, other land uses, actual and perceived crime risk and specific project requirements	Design	All	Urban Designer	The design is based on a walkable neighbourhood structure with a permeable street network and opportunities to capture Darling Scarp and Ki-It Brook open space views. All lots are located at or above the road pavement. Dwellings and retail /commercial uses front the public open space.
Street layout and land division • Consider crime reduction measures in the early stages of design	Design	All	Urban Designer Civil Engineer Traffic Engineer	The design has taken crime reduction measures into consideration via the provision of a legible street and open

				space network.
• Define ownership and use of space	Design	All	Urban Designer	The design clearly demarcates the private and public realm.
• Avoid ambiguous space and connections	Design	All	Urban Designer Civil Engineer Traffic Engineer	Each of the proposed connections serves a purpose and has a clear function.
• Promote legibility and orientation	Design	All	Urban Designer Civil Engineer Traffic Engineer	The design is based on a walkable neighbourhood structure with a permeable and legible street network. The roads generally follow the cardinal.
• Buildings should be oriented towards the main street frontage and other areas of public realm	Design	Town Centre (Activity Centre)	Architect	The concept plan for the Town Centre indicates tenancies fronting the main street and other publicly accessible areas. Refer to Part One Section 3.5 Development Standards of the Kingsford Precinct Plan
	Development	Town Centre (Activity Centre)	Private developer	
• Street furniture should facilitate surveillance and discourage inappropriate use	Design	Streets	Landscape Architect	Not applicable. This will be addressed at the detailed design phase
• Cul-de-sacs should be short and straight, allow visibility from one end to the other and not be joined by networks of footpaths that are irregularly used and likely to foster criminal activity	Design	Streets	Urban Designer Traffic Engineer	Not applicable as there are no cul-de-sacs proposed.
• Avoid the establishment of small, unusable pockets of land and open space as they are difficult to maintain and do not facilitate recreation	Design	Residential Village	Urban Designer	Each public open space reserve serves a function, including active and passive recreation, conservation or drainage.
Movement network				
• Maximise surveillance of entry and exit points	Design	Town Centre (Activity Centre) Streets	Urban Designer Civil Engineer Traffic Engineer	The entry and access points to the Town Centre are legible from the streets.
	Development	Streets	City of Swan Private Developer	The design is based on a walkable neighbourhood structure with a permeable street network. The roads generally follow the cardinal.
• Based upon primary routes and shared spaces	Design	Streets	Urban Designer Civil Engineer Traffic Engineer	The movement network has a clear hierarchy, ranging from integrator roads to a main street to laneways. The major roads include provision for cyclists and pedestrians, including shared paths and on-street cycle lanes.

• Minimise confusion about priorities of use on shared paths and access ways	Design	Streets Public Open Space	Urban Designer Civil Engineer Traffic Engineer Landscape Architect	Shared paths and access ways will be appropriately designed and signposted to reduce the potential for confusion.
• Minimise underused and unnecessarily segregated streets and footpaths	Design	Streets Public Open Space	Urban Designer Civil Engineer Traffic Engineer Landscape Architect	Each street and footpath has been designed to serve a function.
• Avoid routes which can become entrapment spots	Design	Streets Public Open Space	Urban Designer Civil Engineer Traffic Engineer Landscape Architect	The street and path network is permeable with multiple routs of access and egress.
• Provide direct and clearly signed pedestrian, cycle and vehicular links to nearby destinations	Design	Streets Public Open Space	Urban Designer Civil Engineer Traffic Engineer Landscape Architect City of Swan	The hike and bike network will be appropriately signposted with destinations.
• Pathways and cycleways to facilitate surveillance	Design	Streets Public Open Space	Urban Designer Civil Engineer Traffic Engineer Landscape Architect	Each road and public open space reserve will have pathways or shared path
• Maximise legibility, sightlines and comfort to encourage use	Design	Streets Public Open Space	Urban Designer Civil Engineer Traffic Engineer Landscape Architect	The design is based on a walkable neighbourhood structure with a permeable street network. The roads generally follow the cardinal.
Location of land uses				
• Minimise opportunities for conflict, especially in mixed use development	Design Development	All All	Urban Designer City of Swan Private Developer State Government Agency	The main street, including food and beverage uses, fast foods outlets and service station are located away from residential areas to reduce the potential for land use conflict.
• Provide active frontages of overlooked streets	Design Development	All All	Urban Designer City of Swan Private Developer State Government Agency	Each street has commercia/retail land uses or dwellings fronting them to allow for passive surveillance
• Minimise blank walls and sides of buildings onto public open space and public realm	Design Development	All All	Urban Designer City of Swan Private Developer State Government Agency	Each street and public open space reserve has dwellings fronting them and is serviced by footpaths. These will provide of activity and natural surveillance. The Town Centre buildings will be designed to minimise blank walls and sides of buildings onto public open space and public realm. Refer to Part One Section 3.5 Development Standards of the Kingsford Precinct Plan
Regeneration and remodeling				

• Minimise dereliction, under utilised and under maintained spaces and places.	Post-Development	All	City of Swan	Not applicable
• All open space should be well defined and purposeful	Design	Public Open Space	Urban Designer Landscape Architect	The open space areas will be designed as a hierarchy with specific purposes and uses (e.g. conservation, passive or active recreation).
• Vulnerable public spaces should become more liveable or be removed from public ownership	Post-Development	All	City of Swan	Not applicable
LAND USE MIX				
Land use layout • Encourage mixes that promote activity, surveillance and legitimate contact between people	Design	Town Centre (Activity Centre) Residential Village Educational and Community Facilities	Urban Designer Private Developer Department of Education	The Town Centre will include a range of land uses that will open at varied times, including: • Supermarkets and retail; • Child care centre; • Bulk goods retails; • Medical; • Service station; • Fast food outlets; • Food and beverage; • Recreation (swim school); • Childcare; and • Education.
• Avoid strict separation of compatible land uses that may result in isolation of buildings or spaces	Development and Design	Town Centre (Activity Centre) Educational and Community Facilities	Urban Designer Private Developer	The buildings in the Town Centre will be integrated in a coordinated manner to ensure that they are not isolated.
• Encourage land use mixes which are compatible in scale and neighbouring uses, particularly in isolated areas	Development and Design	All	Urban Designer Private Developer	The buildings in the Town Centre will be of a similar scale.
Access • Encourage pedestrian passage through or activity at ground level to promote surveillance	Design Development	All All	Urban Designer Landscape Architect City of Swan Private Developer	Footpaths are provided on every street and public open space reserve
ACTIVITY GENERATORS				
Land use layout • Locate around active edges or fringes of space to create surveillance opportunities	Design	Town Centre (Activity Centre) Educational and Community Facilities	Urban Designer	The Town Centre and school will be designed with buildings on the street edge to ensure activation and associated surveillance.

Access • Encourage movement networks which provide surveillance without creating barriers	Design	All	Urban Designer Civil Engineer Traffic Engineer Landscape Architect	The hike and bike network will be integrated with the streets.
Activity mix • Balance activities which may be crime generators such as bars, night time uses, restaurants and entertainment venues in terms of scale, size and local context	Development	Town Centre (Activity Centre)	City of Swan Private Developer	The food and beverage uses will be located on the main street and will be of a scale to cater for local residents.
BUILDING DESIGN, INCLUDING BOUNDARY DEFINITION				
Building entrances • Ensure entrances are oriented to face open or active spaces • Ensure entrances are clearly defined, distinguishable form public walkways, secure and well lit • Design lobbies to be visible from the exterior so that entry and exits spaces can be seen • Avoid creating entrapment spots or places where intruders may loiter or be concealed • Avoid locating ramped and elevator entrances and lifts in isolated locations • Secure non pedestrian entrances from illegal entry • Ensure staff entrances are well lit and allow maximum surveillance and sightlines	Development	All	Private Developer City of Swan State Government Agency	Refer to Part One Section 3.5 Development Standards of the Kingsford Precinct Plan
Building design • Consider crime reduction measures in the early stages of design • Minimise blank walls overlooking parks, car parks and other public areas • Minimise features or structures that can be used as natural ladders to gain access to higher levels, windows or doors • Optimise the variety of building design to create interesting built environments • Provide windows to overlook public areas	Design Development	All All	Urban Designer Private Developer City of Swan State Government Agency	Each street and public open space reserve has either commercial/retail uses or dwellings fronting them and is serviced by footpaths. These will provide of activity and natural surveillance
Materials and fixtures				

• Avoid materials and exterior fixtures which might encourage crime • Use transparent and materials in doors and walls at major entry points	Development	All	Private Developer City of Swan State Government Agency	Will be addressed at development application stage
Storage areas • Ensure surveillance and illumination of loading and storage areas • Locate delivery hatches, bins and other service facilities in a manner which does not create natural ladders or entrapment spaces	Development	All	Private Developer City of Swan State Government Agency	Will be addressed at development application stage. Refer to Part One Section 3.5 Development Standards of the Kingsford Precinct Plan
Retail commercial frontages • Promote after hours uses in frontage locations where public buildings front public spaces	Development	All	Private Developer City of Swan	The Town Centre will include a range of land uses that will open at varied times, including: • Supermarkets and retail; • Child care centre; • Bulk goods retails; • Medical; • Service station; • Fast food outlets; and • Food and beverage.
Sightlines • Provide clear sightlines	Development	All	Private Developer City of Swan State Government Agency	Will be addressed at development application stage
Lighting • Illuminate entries so that access and egress visibility is maximised • Facilitate good interior to exterior surveillance through illumination	Development	All	Private Developer City of Swan State Government Agency	Will be addressed at development application stage
Employee carparking • Ensure safe and secure parking for employees near the building entry • Provide surveillance of car parking	Development	All	Private Developer City of Swan State Government Agency	Will be addressed at development application stage
Landscaping • Ensure landscape design will not provide concealment or entrapment areas	Development	All	Private Developer City of Swan State Government Agency	Will be addressed at development application stage

• Optimise the variety of landscape to create interesting built environments				
Building security • Secure all windows, particularly at street level but ensure that security devices do not create a "fortress like" appearance	Development	All	Private Developer City of Swan State Government Agency	Will be addressed at development application stage
LIGHTING				
Situational lighting • Ensure lighting is an early consideration in site planning and design • Select lighting appropriate to local context • Ensure inset spaces, access, egress and signage are well lit • Provide adequate lighting for directional signage	Design Development	All All	Urban Designer Civil Engineer Landscape Architect Private Developer City of Swan State Government Agency	Streets and public open reserves will be appropriately lit. Building curtilages and car parks will be appropriately lit.
Consistency of lighting • Maximise opportunities for natural light penetration • Provide consistent levels of lighting to reduce contrast and shadow • Ensure lighting supports visibility • Consider energy use	Design Development	All All	Urban Designer Civil Engineer Landscape Architect Private Developer City of Swan State Government Agency	Refer to Part One Section 3.5 Development Standards of the Kingsford Precinct Plan
Placement of lighting • Select and light safe routes and spaces • Avoid placement in areas shielded by vegetation, awnings and other physical barriers • Avoid unshielded lighting at eye level • Consider light pollution • Ensure lighting falls upon the subject matter • Avoid lighting areas not intended for night time use • Consider lighting in terms of vulnerable groups, elderly, people with disabilities, children, women,	Design Development	All All	Urban Designer Civil Engineer Landscape Architect Private Developer City of Swan State Government Agency	Streets and public open reserves will be appropriately lit.

night staff • Avoid creating natural ladders with lighting fixtures				
Types of lighting • Install vandal resistant lighting • Avoid dependence on bollard lighting as the only light source • Combine lighting along footpaths with entrance lighting wherever possible	Design Development	All All	Urban Designer Civil Engineer Landscape Architect Private Developer City of Swan State Government Agency	Will be addressed at development application stage
Maintenance • Ensure light fixtures are routinely and rapidly maintained • Consider public notices regarding maintenance contact details	Post-Development	All	Private Developer City of Swan State Government Agency	Not applicable
LANDSCAPE				
Footpath planting • Should improve amenity • Ensure shrubbery and planting is low to medium level and does not impede sightlines, surveillance, security and way finding of • Non concealing trees for selected locations should not encourage climbing and should be placed to avoid clumping • Avoid planting screening signage and lighting	Design	All	Urban Designer Civil Engineer Landscape Architect	Landscaping will be in accordance with City of Swan requirements and will be cognisant of CPTED requirements.
Wall planting • Grade planting with taller plants next to walls	Design Development	All All	Urban Designer Civil Engineer Landscape Architect Private Developer City of Swan State Government Agency Resident	Will be addressed at development application stage
Entrance planting • Avoid planting screening doorways, entrances and windows	Design Development	All All	Urban Designer Civil Engineer Landscape Architect Private Developer City of Swan State Government Agency	Will be addressed at development application stage

			Resident	
Maintenance • Carefully locate climbing plants to deter graffiti and vandalism • Specify high quality plants for long, low maintenance life	Design Development	All All	Urban Designer Civil Engineer Landscape Architect Private Developer City of Swan State Government Agency Resident	Will be addressed at development application stage
Hard landscaping • Select low maintenance, long life materials appropriate to the local context, level and type of use • Use details to identify public and private space and access ways for pedestrian, cycle and vehicular movement	Design Development	All All	Urban Designer Civil Engineer Landscape Architect Private Developer City of Swan State Government Agency Resident	Will be addressed at development application stage
MANAGEMENT & MAINTENANCE				
Maintenance • Identify emergency contacts for maintenance in public locations • Promptly repair damage • Consider preventative maintenance	Post-Development	All	Okeland Communities Private Developer City of Swan State Government Agency	Not applicable at this stage
Materials • Use secure and enclosed service points • Specify materials that can withstand normal hard use and be easily replaced • Provide protective heavy duty coatings in public areas and vulnerable hot spots • Avoid the use of highly vulnerable and flimsy materials and fittings which can be easily vandalised or removed in open locations • Avoid extensive and prolonged use of problem materials such as heavy duty mesh, cyclone fencing and grilles which may encourage wilful damage • Avoid long expanses of non-permeable walls unless there is	Design Development	All All	Urban Designer Civil Engineer Landscape Architect Private Developer City of Swan State Government Agency	Will be addressed at development application stage

extensive public surveillance				
SIGHTLINES & WAY FINDING				
Sightlines • Avoid the use of gradients or changes in direction which impede sightlines, especially on pathways, stairs or enclosed spaces • Avoid landscape materials acting as a screen or barrier to unimpeded views of pathways • Ensure that pedestrians have a clear view ahead • Improve the sightlines in established areas through a reconsideration of routes, times of access and additional hardware such as appropriate security mirrors	Design Development	All All	Urban Designer Civil Engineer Landscape Architect Private Developer City of Swan State Government Agency	Each street and public open space reserve has commercial/retails uses or dwellings fronting them and is serviced by footpaths. The streets are designed to allow for sightlines. These will provide of activity and natural surveillance.
Way finding • Signage should identify where assistance and key areas can be located such as taxi ranks, toilets, public transport and telephones • Signage should be visible, concise and easily maintained • Use environmental cues such as changes in footpath materials, levels of lighting and appropriate changes in grade or elevation • Use appropriate physical barriers (permeable fences) and symbolic barriers (low vegetation) to define use and ownership	Design Development	All All	Urban Designer Civil Engineer Landscape Architect Private Developer City of Swan State Government Agency	The hike and bike network will be appropriately signposted with destinations
SIGNAGE				
Provision of signage • Prepare a signage plan focussing on safe routes, destinations, facilities and amenities en route • Ensure signage is easily legible at all hours • Locate signage strategically, at crossing points, junctions, activity places and other common areas	Design Development	All All	Urban Designer Civil Engineer Landscape Architect Private Developer City of Swan State Government Agency	The hike and bike network will be appropriately signposted with destinations

• Indicate where to go for assistance • Provide maps in large public open spaces and orientate maps to be consistent with the viewers direction				
Maintenance • Ensure key public signage is not obscured by mature landscape, awnings, poor lighting, too many commercial signs and vandalism • Consider reporting contacts and the process for emergency maintenance	Design Development	All All	Urban Designer Civil Engineer Landscape Architect Private Developer City of Swan State Government Agency	Not applicable
PREDICTABLE ROUTES & SPACES SAFE FROM ENTRAPMENT				
Entrapment spots adjacent to pedestrian and cycle routes • Avoid creating entrapment spots adjacent to a main pedestrian and or cycle route, a predictable and or unchangeable path or a private dead end alleyway • In established areas consider additional facilities such as lighting, improved maintenance or uses such as a kiosk or vendors to make spaces safer • Consider appropriate target hardening of storage areas, loading docks or other potential entrapment spots after hours in order to limit access • Arrange for regular security or police patrols	Design Development	All All	Urban Designer Civil Engineer Landscape Architect Lend Lease/LandCorp Private Developer City of Swan State Government Agency	No dead ends or cul-de-sacs are proposed. Refer to Part One Section 3.5 Development Standards of the Kingsford Precinct Plan
Location of facilities • Locate entrances to automatic teller machines and other facilities within direct view of pedestrian paths • Locate car parking away from potential entrapment spaces • Ensure signs do not create entrapment spots	Development	Town Centre (Activity Centre)	Private Developer City of Swan State Government Agency	Will be addressed at development application stage

APPENDIX D

POS

HEALTHY ACTIVE DESIGN ASSESSMENT

PUBLIC OPEN SPACE
KINGSFORD ACP

Objective:
PROVIDE A RANGE OF PUBLIC OPEN SPACES THAT CONTRIBUTE TO THE RECREATIONAL, PHYSICAL AND SOCIAL NEEDS OF ALL MEMBERS OF THE COMMUNITY.

Principle	Considerations	Strength of evidence		Yes	No	N/A
Access: Public use of open spaces can be improved by ensuring that they are easily accessible to, and by, all members of the community	Do all community members have at least one open space within a 400m - 800m walk?	Refer to Healthy Active By Design Plan		X		
	Are there clear pedestrian and cycle routes, designated crossings, and suitable ramps to, and within, the open space?	Refer to Healthy Active By Design Plan		X		
	Are the public open spaces accessible to people of all ages, genders and cultures, including those with disabilities and limited mobility?	Refer to POS Concept Plans		X		
Function: Open spaces assist in meeting the physical, recreational and social needs of a community.	Have the open spaces been designed to meet the diverse needs of the community? How were those needs identified?	Refer to POS Concept Plans		X		
	Are there a range of uses that promote physical activity and community interactions? How do these uses generate activity throughout the week and day and night?	Refer to POS Concept Plans		X		
	How are the open spaces and supporting infrastructure managed and maintained?	Developer maintained for 2 years and then maintained by City		X		
Design: Open space designs that respond to their surrounds can enable a strong connection to the community and the environment.	Does the open space reflect the cultural heritage and identity of the site, and the character of the surrounding community?	Refer to POS Concept Plans		X		
	How well do the surrounds contribute to safety? Do nearby buildings and streets overlook the space? Is there adequate lighting within the space?	Refer to CPTED Table		X		
	How does the open space respond to existing environmental conditions such as drainage, slopes and retaining trees?	Refer to POS Concept Plans		X		

Process considerations:
Establish linear connections and access along the coast, public foreshores, wetlands and waterbodies to enhance opportunities for physical activity.
Undertake a community needs assessment to identify open space needs. Consider roles and functions within public open spaces holistically to resolve needs across the open space network.

APPENDIX E
Acoustic Report
HERRING STORER

LOT 1354
GREAT NORTHERN HIGHWAY
BULLSBROOK

STATE PLANNING POLICY 5.4 ACOUSTIC ASSESSMENT

JUNE 2021

OUR REFERENCE: 27868-1-16264-04

Rochdale Holdings Pty Ltd A.B.N. 85 009 049 067 trading as:
HERRING STORER ACOUSTICS
P.O. Box 219, Como, W.A. 6952
(08) 9367 6200
hsa@hsacoustics.com.au

DOCUMENT CONTROL PAGE

SPP 5.4 NMP

KINGSFORD TOWN CENTRE; BULLSBROOK

Job No: 16264-04

Document Reference: 27868-1-16264-04

FOR

HATCH ROBERTSDAY

DOCUMENT INFORMATION			
Author:	Tim Reynolds	**Checked By:**	Paul Daly
Date of Issue :	03 June 2021		

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

DOCUMENT DISTRIBUTION				
Copy No.	**Version No.**	**Destination**	**Hard Copy**	**Electronic Copy**
1	1	Hatch RobertsDay Attn : Tim Trefry Email : tim.trefry@hatch.com		✓

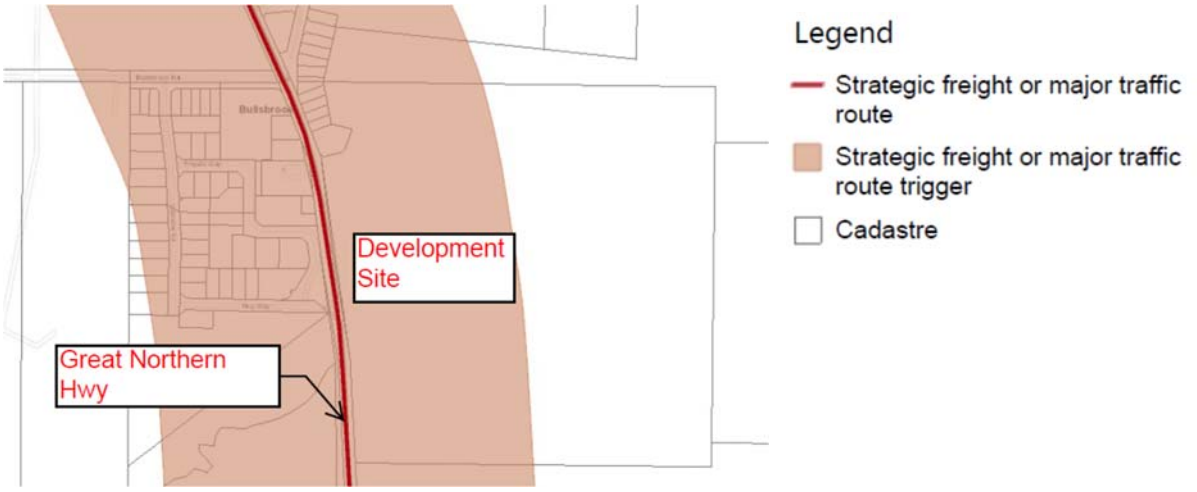
CONTENTS

APPENDICIES

1. INTRODUCTION

Herring Storer Acoustics was commissioned to update the noise assessment undertaken for the proposed Activity Centre to be located at Lot 1354 Great Northern Highway, Bullsbrook from vehicles travelling along both the Great Northern Highway. This update has been undertaken to take into account the revised LSP and updates to State Planning Policy 5.4.

As shown on Figure 1.1, the Activity Centre is located on the Great Northern Highway, which is within the assessment buffer zones for traffic noise associated with the Great Northern Highway.



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

- Determine by modelling, the noise that would be received at residences within the residential development from vehicles travelling along Great Northern Highway, based on previous noise monitoring.
- Assess the predicted noise levels for compliance with the appropriate criteria.
- If exceedances are predicted, comment on possible noise amelioration options for compliance with the appropriate criteria.

For information, a locality plan is attached in Appendix A. Also attached in appendix A is the proposed realignment of northern section of Chittering Road.

2. SUMMARY

Under the WAPC State Planning Policy 5.4, for this development, the appropriate "Noise Targets" to be achieved under SPP 5.4, external to a residence are:

External

Day	Maximum of 55 dB(A) L_{Aeq}
Night	Maximum of 50 dB(A) L_{Aeq}

The policy states that the "outdoor targets are to be met at all outdoor areas as far as reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines". The Policy also states, under Section 6 – Policy Measures that "a reasonable degree of acoustic amenity for living areas on each residential lot". The policy recognises that "it may not be practicable to meet the outdoor noise targets".

The Policy states the following acceptable internal noise levels:

Internal

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

For this development, compliance with the requirements of SPP 5.4, noise modelling and assessment are based on the day period for residence located adjacent to the Great Northern Highway.

Based on the noise modelling and assessment undertaken, noise received at residences within the Activity Centre would comply with the acoustic criteria as outlined in State Planning Policy 5.4. Thus, no further action is required.

3. CRITERIA

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.*

<u>Noise Exposure Forecast (Section 6.2)</u>

*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."*

4. NOISE MONITORING

Noise logging was undertaken on the site to determine the existing noise received from vehicles travelling on the Great Northern Highway. Monitoring was previously carried out for the Great Northern Highway between Friday 9th December 2016 and Thursday 15th December 2016.

We note that 2016 was the year that MRWA provided road traffic numbers for the existing traffic flows on Great Northern Highway. Thus, 2016 noise monitoring would be appropriate for the calibration of the noise model.

For information, the logger location is shown on the aerial photograph below, as Figure 4.1.

FIGURE 4.1 – NOISE MONITORING LOCATION

The results for the noise logging are summarised in Table 4.1.

TABLE 4.1 - SUMMARY OF LOGGED NOISE LEVELS GREAT NORTHERN HIGHWAY

Parameter	Measured Level dB(A)*	Difference between $L_{10(18hour)}$ and $L_{Aeq(parameter)}$ dB(A)
$L_{A10\ (18\ hour)}$	67.6	N/A
$L_{Aeq,\ day\ (6am\ to\ 10pm)}$	64.7	= $L_{A10\ (18\ hour)}$ – 2.9
$L_{Aeq,\ night\ (10pm\ to\ 6am)}$	58.8	= $L_{Aeq\ (Day)}$ – 5.9

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

The above parameters are :

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

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

5. MODELLING

To determine the noise received within the Activity Centre from the Great Northern Highway, acoustic modelling was carried out using SoundPlan, using the Calculation of Road Traffic Noise (CoRTN) algorithms. Noise modelling was undertaken in accordance with the "Implementation Guidelines" for the State Planning Policy 5.4.

The input data for the model included:

- Traffic data as listed in Table 5.1; and
- A +2.5 dB adjustment to allow for façade reflection.

TABLE 5.1 - NOISE MODELLING INPUT DATA
GREAT NORTHERN HIGHWAY

Parameter	Value	
	Current	Future
Current Traffic Flow (vpd)	14800	15000
Speed (km/hr)	60	60
Heavy Vehicles (%)	28	14
Percentage traffic 0600 – 2400 hours	94	94
Other		
Receiver Level (m)	+1.5 above ground	+1.5 above ground
Façade Correction	+ 2.5 dB(A)	+ 2.5 dB(A)
Road Surface	Chip seal	Chip seal

Future traffic flows, being as provided by MRWA transport modelling section (Job No : 41902). For reference, the traffic flows are attached in Appendix D.

Other input data for the model included:

- 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 vehicle engines and exhaust noise sources.
- Traffic data from MRWA (https://mrapps.mainroads.wa.gov.au/TrafficMap/)
- Topographical data, with the ground level within the development based on natural ground levels as per Google Earth.
- Development receiver heights at 1.4m above ground level.
- Future buildings located on the Lots (assumed to be present for future road traffic volumes).

As shown in Table 4.1, the difference between the $L_{Aeq\ (Day)}$ and the $L_{Aeq\ (Night)}$ for the Great Northern Highway was 5.9 dB. Thus, noting that the under the Policy, the difference between the Day and night criteria are 5 dB, with the differences between the $L_{Aeq\ (Day)}$ and the $L_{Aeq\ (Night)}$ being greater than 5 dB(A), achieving compliance with the day period criteria would also achieve compliance with the night period criteria. Therefore, noise modelling was only undertaken for the day period and the results are shown on Figure C1 in Appendix C.

6. DISCUSSION / RECOMMENDATIONS

Under the WAPC State Planning Policy 5.4, for this development, the appropriate "Noise Targets" to be achieved under SPP 5.4, external to a residence are:

External

Day	Maximum of 55 dB(A) L_{Aeq}
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The policy states that the "outdoor targets are to be met at all outdoor areas as far as reasonable and practical to do so using the various noise mitigation measures outlined in the guidelines". The Policy also states, under Section 6 – Policy Measures that "a reasonable degree of acoustic amenity for living areas on each residential lot". The policy recognises that "it may not be practicable to meet the outdoor noise targets".

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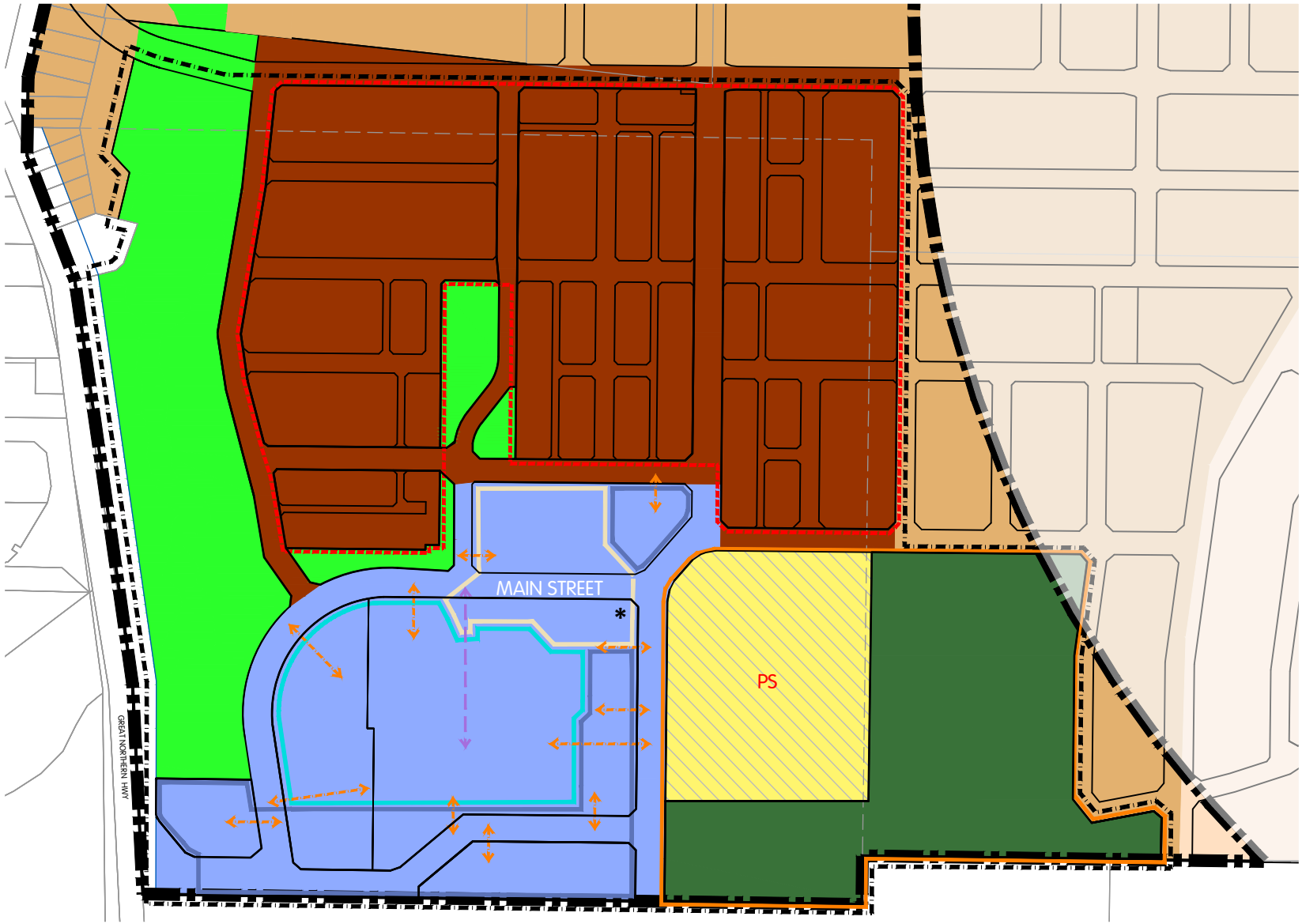
For this development, compliance with the requirements of SPP 5.4, noise modelling and assessment are based on the day period for residence located adjacent the Great Northern Highway.

Based on the noise modelling and assessment undertaken, noise received at residences within the Activity Centre would comply with the acoustic criteria as outlined in State Planning Policy 5.4. Thus, no further action is required.

APPENDIX A

STRUCTURE PLAN



okeland COMMUNITIES

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

AERIAL PHOTOGRAPHY
SOURCE: NA
YYMMDD: NA

HATCH | RobertsDay

SIZE A4_1:5000

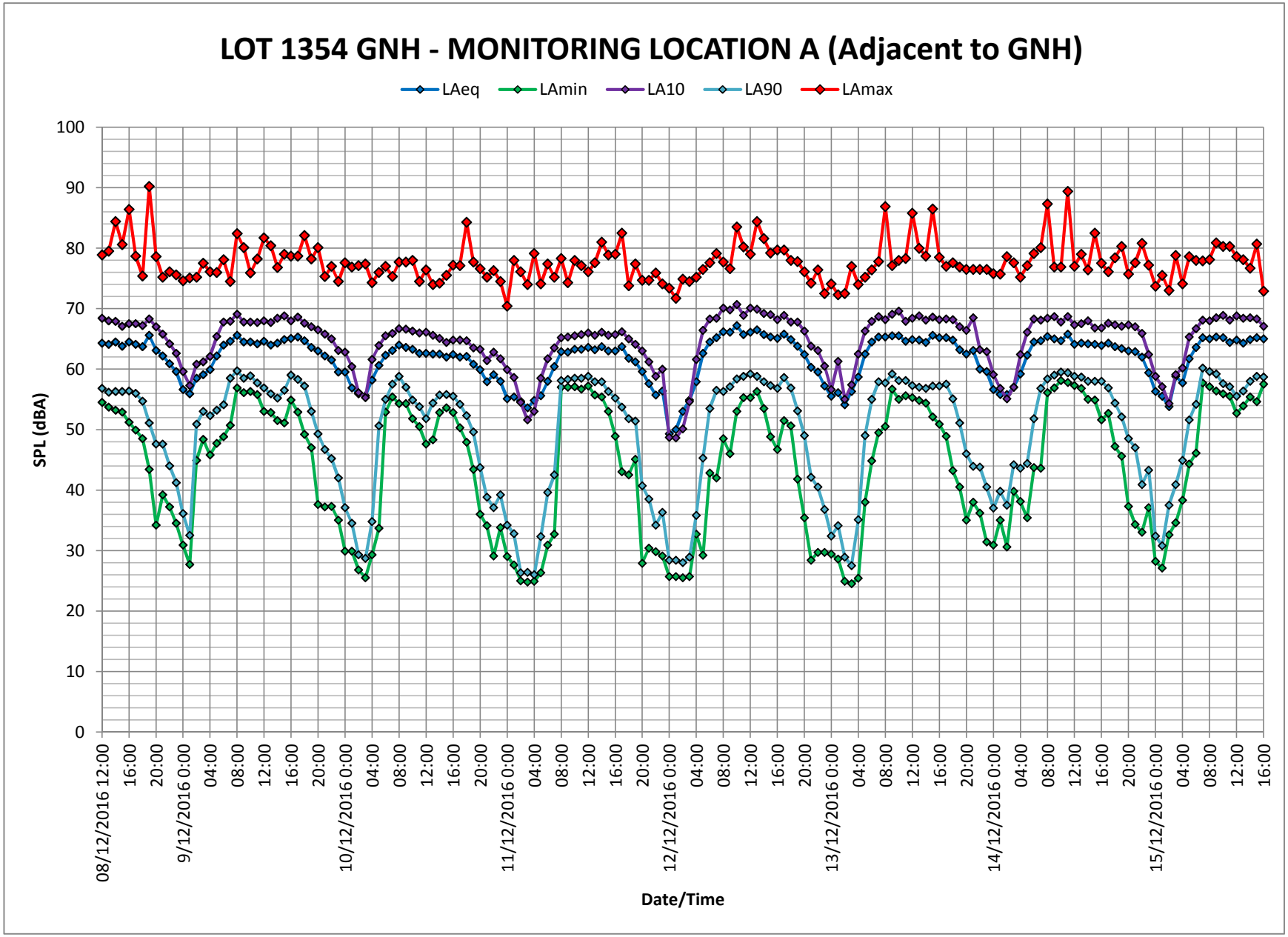
0 metres 50 100 150 200 250

ACTIVITY CENTRE PLAN
Kingsford Town Centre - Bullsbrook
City of Swan

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

APPENDIX B

NOISE MONITORING RESULTS



Herring Storer Acoustics
Date : 12 January 2016
Job No : 16264

Figure B1
Appendix B

APPENDIX C

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

Noise level
LAeq Day
in dB(A)

= 55.0
= 58.0
= 61.0
= 64.0
= 67.0

Scale 1:3000

0 15 30 60 90 120
m

GREAT NORTHERN HWY

Lot 1354
GREAT NORTHERN HWY
ACTIVITY CENTRE

DAY PERIOD
NOISE CONTOUR
GREAT NORTHERN HWY

Herring Storer Acoustics
Date : 03 June 2021
Job No : 16264-04

Figure C1
Appendix C

APPENDIX D

MRWA TRAFFIC DATA

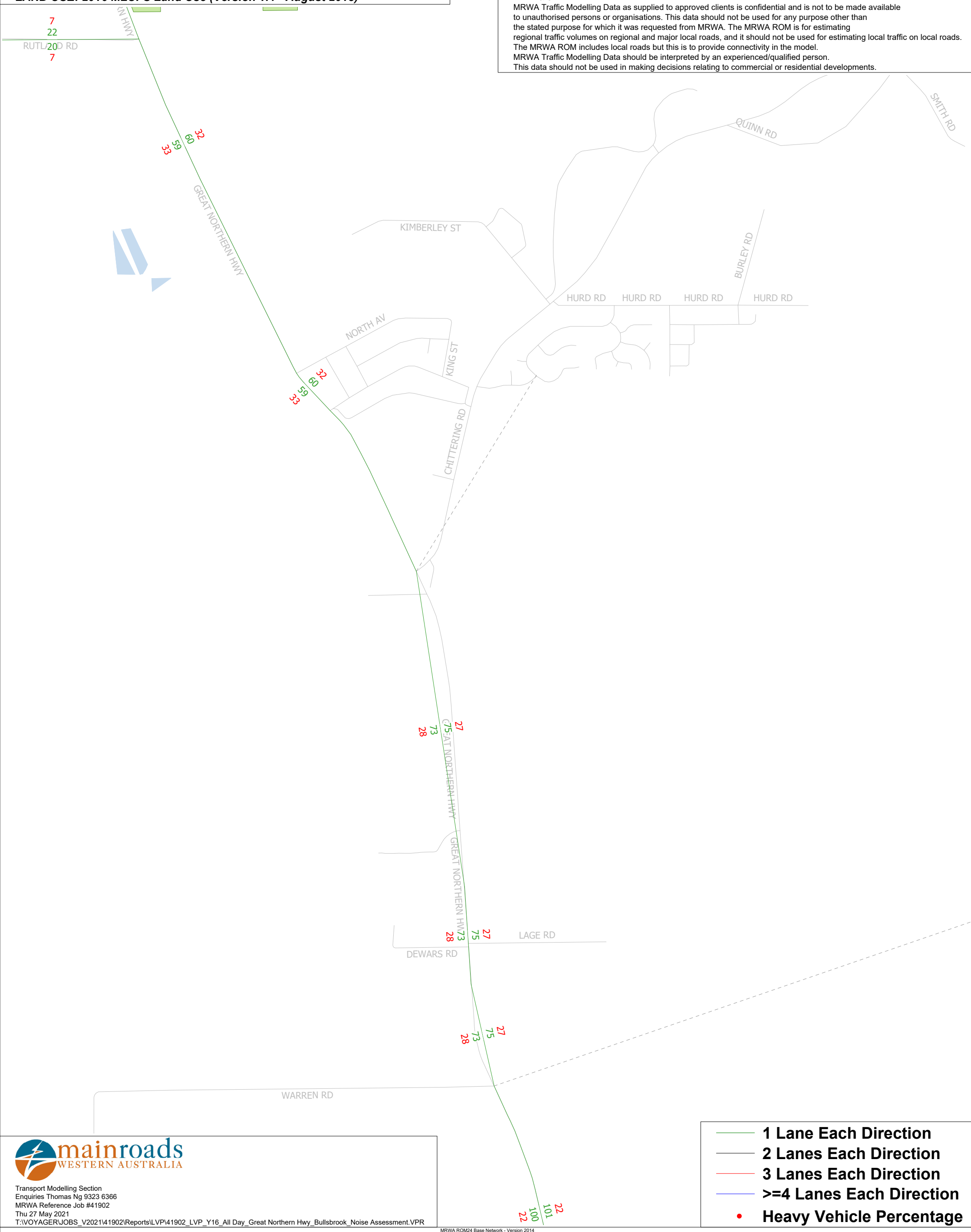
2016 ROM24 Scenario - Link Volume Plot for Great Northern Hwy, Bullsbrook Noise Assessment
LAND USE SCENARIO: MLUFS Version 1.4
All Day

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.



mainroads WESTERN AUSTRALIA

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

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)

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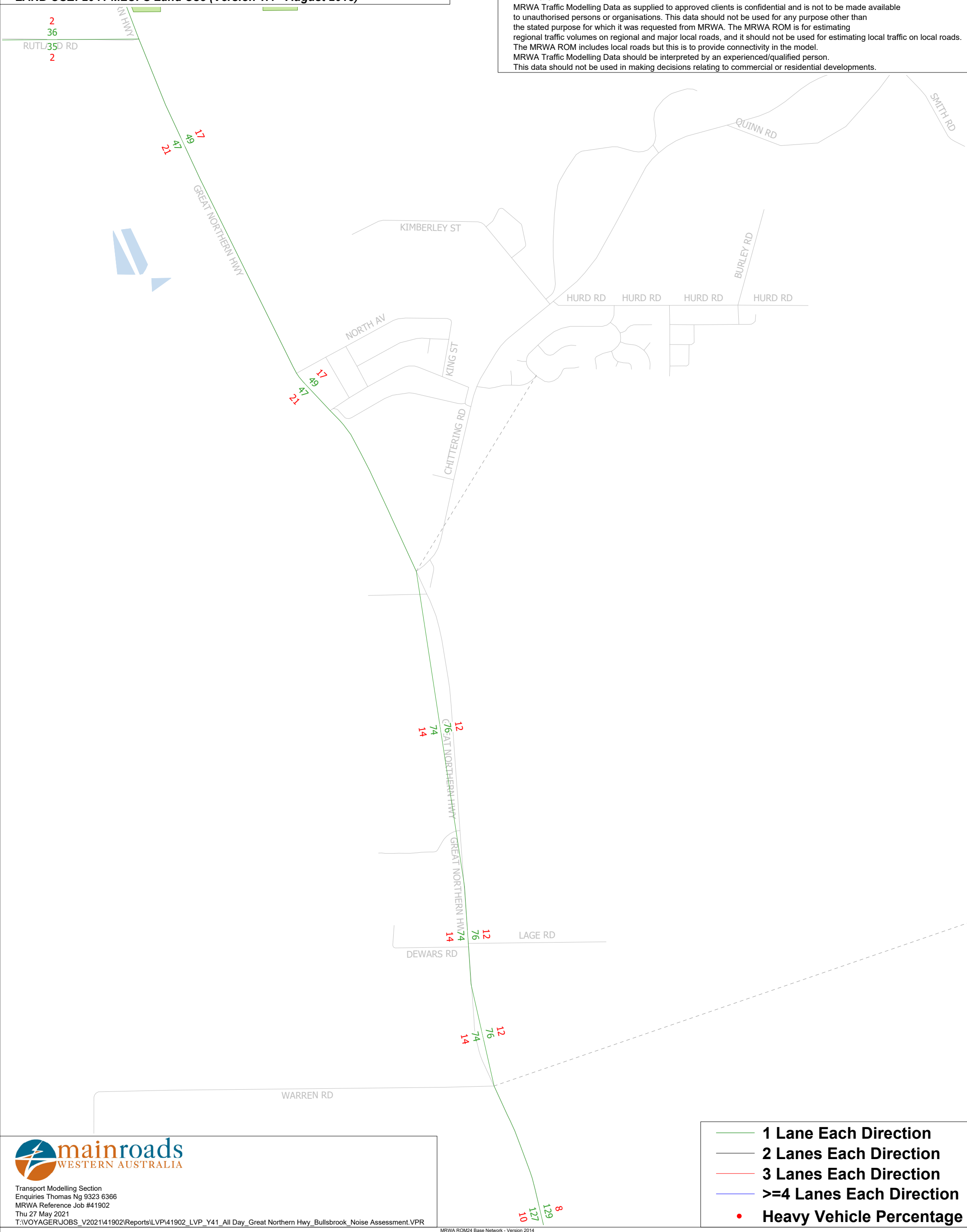

mainroads WESTERN AUSTRALIA

Transport Modelling Section
Enquiries Thomas Ng 9323 6366
MRWA Reference Job #41902
Thu 27 May 2021
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- 1 Lane Each Direction
- 2 Lanes Each Direction
- 3 Lanes Each Direction
- >=4 Lanes Each Direction
- Heavy Vehicle Percentage

APPENDIX F
Servicing Report
JDSI

JDSi
CONSULTING ENGINEERS

P: 08 9227 0595
F: 08 9227 8617

Level 6, 1 Nash St
Perth WA 6000

PO Box 8523
Perth BC WA 8649

jdsi.com.au

Submission to Okeland Communities

SERVICING REPORT
Bullsbrook Landholdings
Revised Bullsbrook Central Structure Plan

JDS15920
Aug 2021

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Table of Contents

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 cable 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;

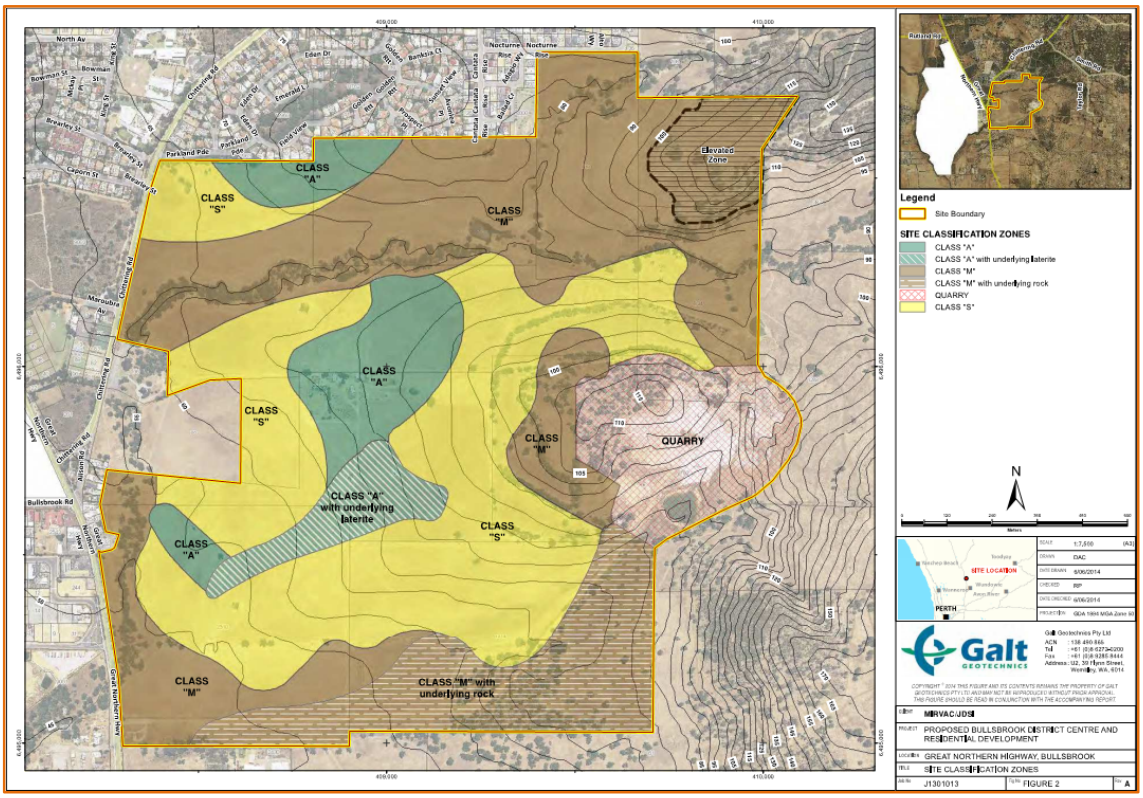
The Muchea sheet of the 1:50,000 scale Environmental Geology series of maps shows that the site is underlain by a variety of soil and rock types. The western part comprises mainly soil deposits while the eastern part of underlain by shallow rock and rock outcrop. The following notes are relevant:

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.

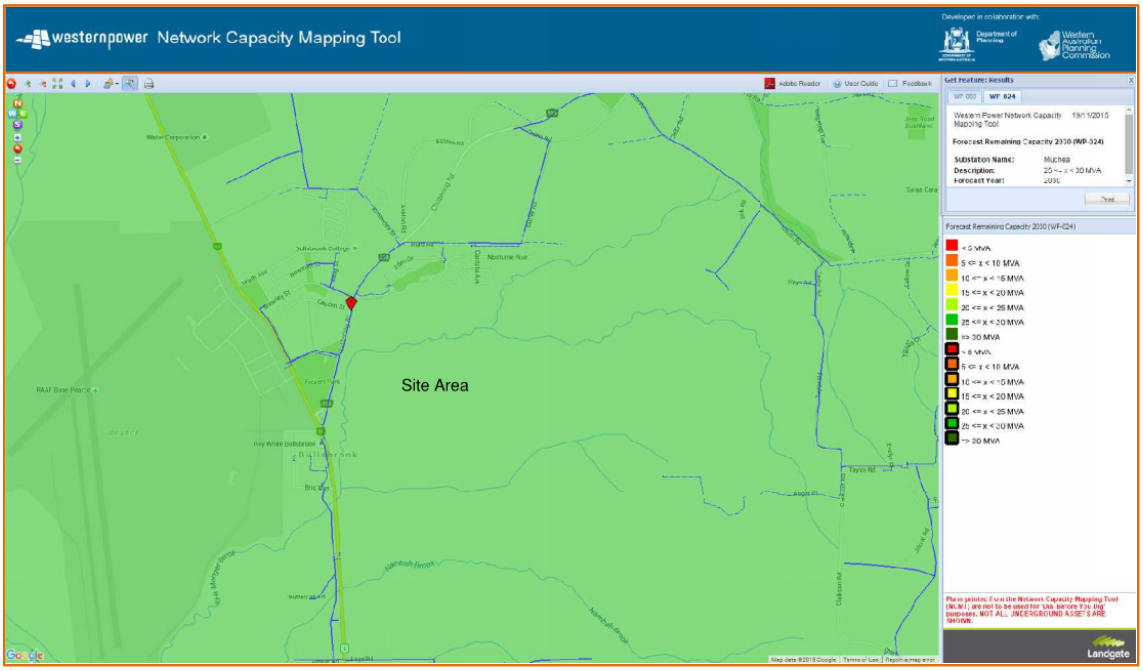
Provision of the new distribution main would include the installation of a new high level tank with 2km of DN300 inlet mains and associated pump station to convey the water from the existing Bullsbrook tank to a new tank and 2km of DN350 outlet mains to distribute the water back down to Chittering Road. 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 with 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 distributer 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

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

BPAD Bushfire Planning & Design

Bushfire Management Plan Coversheet

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

Bushfire Management Plan and Site Details

Site Address / Plan Reference: 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

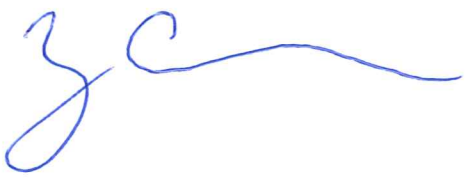
If the development is a special development type as listed above, explain why the proposal is considered to be one of the above listed classifications (E.g. considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?
The Structure Plan and Activity Centre Plan constitutes 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	Accreditation Level	Accreditation No.	Accreditation Expiry
Zac Cockerill	Level 2	BPAD37803	31/08/2021
Company		**Contact No.**	
Strategen-JBS&G		(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

www.jbsg.com.au

Table of Contents

List of Tables

List of Figures

Appendices

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.

1.2 Purpose and application of the plan

The purpose of this BMP is to provide strategic level guidance on how to plan for and manage the bushfire risk to future assets of the project area by demonstrating a commitment from the developer to implement a range of bushfire management measures at future planning stages. The BMP outlines how future on-site assets can be protected during the summer months when the threat from bushfire is at its peak. This is particularly relevant when existing fire appliances in the area may be unable to offer an immediate emergency suppression response; therefore, development planning and design should aim to provide mitigation strategies that protect future life and property from bushfire as a priority.

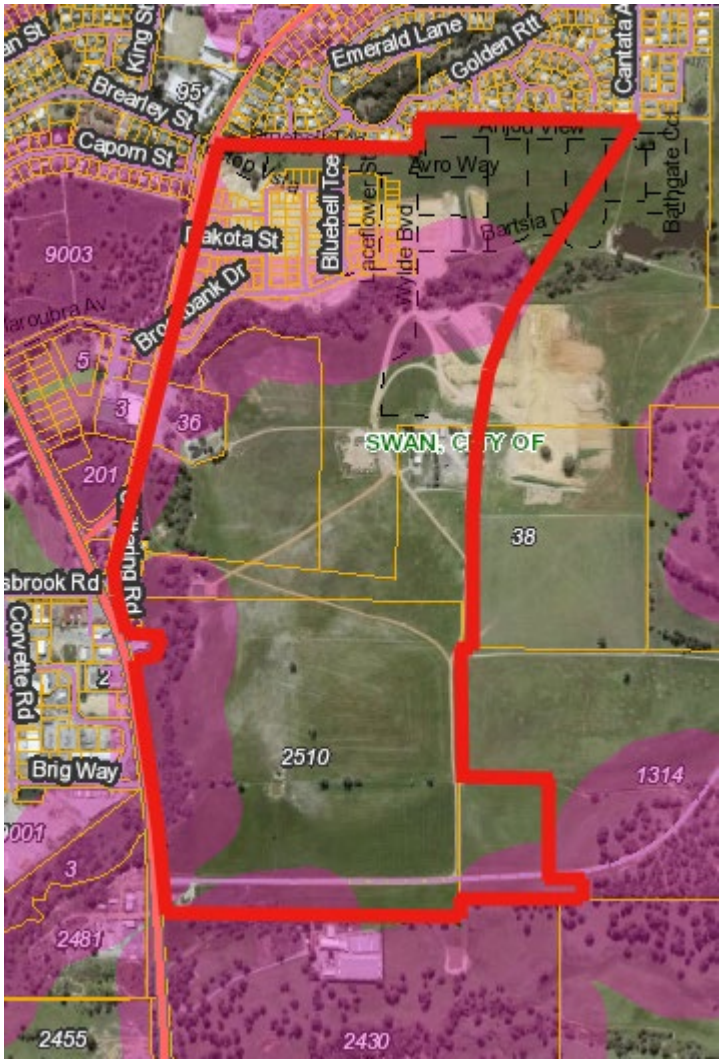
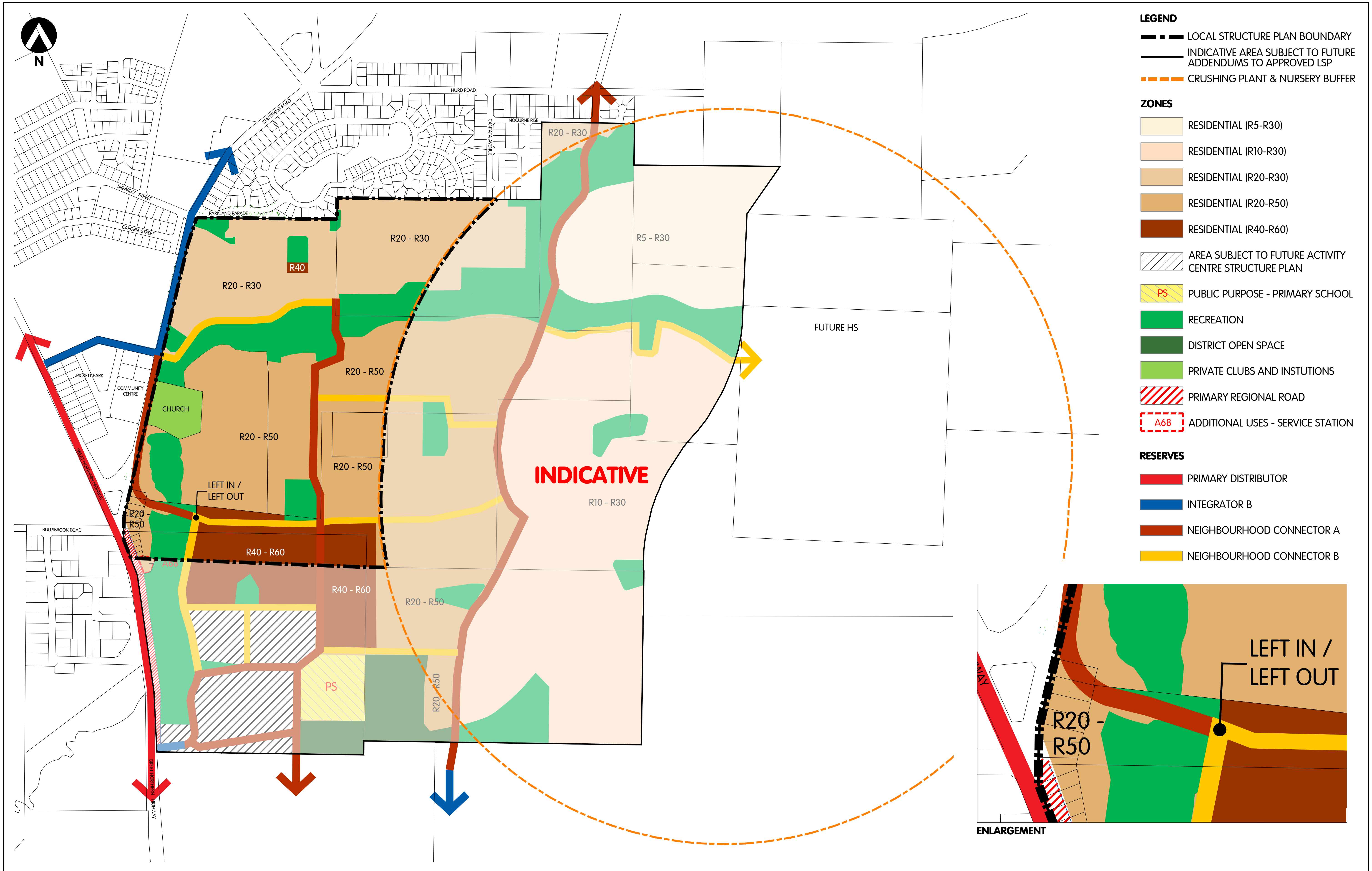


Plate 1: WA Map of Bushfire Prone Areas (DFES 2019)



N
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
PS
PUBLIC PURPOSE - PRIMARY SCHOOL
RECREATION
DISTRICT OPEN SPACE
PRIVATE CLUBS AND INSTUTIONS
PRIMARY REGIONAL ROAD
A68
ADDITIONAL USES - SERVICE STATION
RESERVES
PRIMARY DISTRIBUTOR
INTEGRATOR B
NEIGHBOURHOOD CONNECTOR A
NEIGHBOURHOOD CONNECTOR B
HURD ROAD
NOCURNE RISE
CANTATA AVENUE
CHITTERING ROAD
BRERLEY STREET
PARKLAND PARADE
CAPORN STREET
PICKETT PARK
COMMUNITY CENTRE
CHURCH
BULLSBROOK ROAD
GREAT NORTHERN HIGHWAY
R20 - R30
R40
R5 - R30
R20 - R50
FUTURE HS
LEFT IN / LEFT OUT
INDICATIVE
R10 - R30
R40 - R60
PS
ENLARGEMENT

CADASTRAL INFORMATION
SOURCE: MNG
YYMMDD: 161017
DWG REF: 97797de-006a
PROJECTION: PCG94

robertsday.com.au

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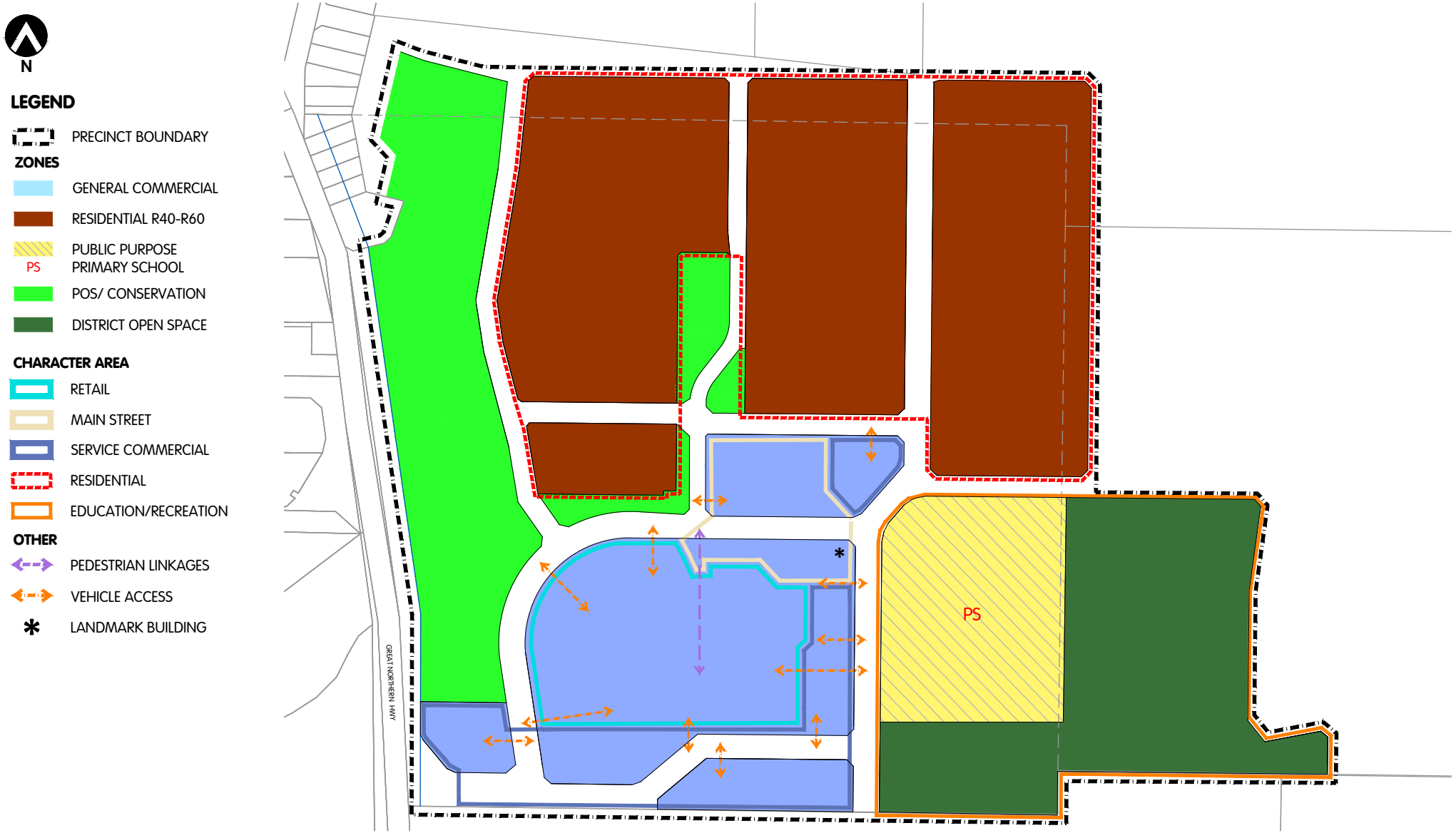
O	POS & LSP BOUNDARY UPDATE	181218	HH	AB
N	VARIOUS UPDATES	181031	HH	AB
M	UPDATED R40 CODE AREA	180917	HH	TT
L	UPDATED CONNECTORS	180809	HH	AB

LOCAL STRUCTURE PLAN
Bullsbrook
City of Swan

REF NO. **AMX BUL**
DRAW NO. **RD1 107**
REV. **P**

AMEX CORPORATION PTY LTD

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



okeland COMMUNITIES

CADASTRAL INFORMATION
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DWG REF: RD1301A
PROJECTION: PCG94

AERIAL PHOTOGRAPHY
SOURCE: NA
YYMMDD: NA

HATCH | RobertsDay

SIZE A4_1:5000

0 metres 50 100 150 200 250

PRECINCT PLAN
Kingsford Town Centre - Bullsbrook
City of Swan

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

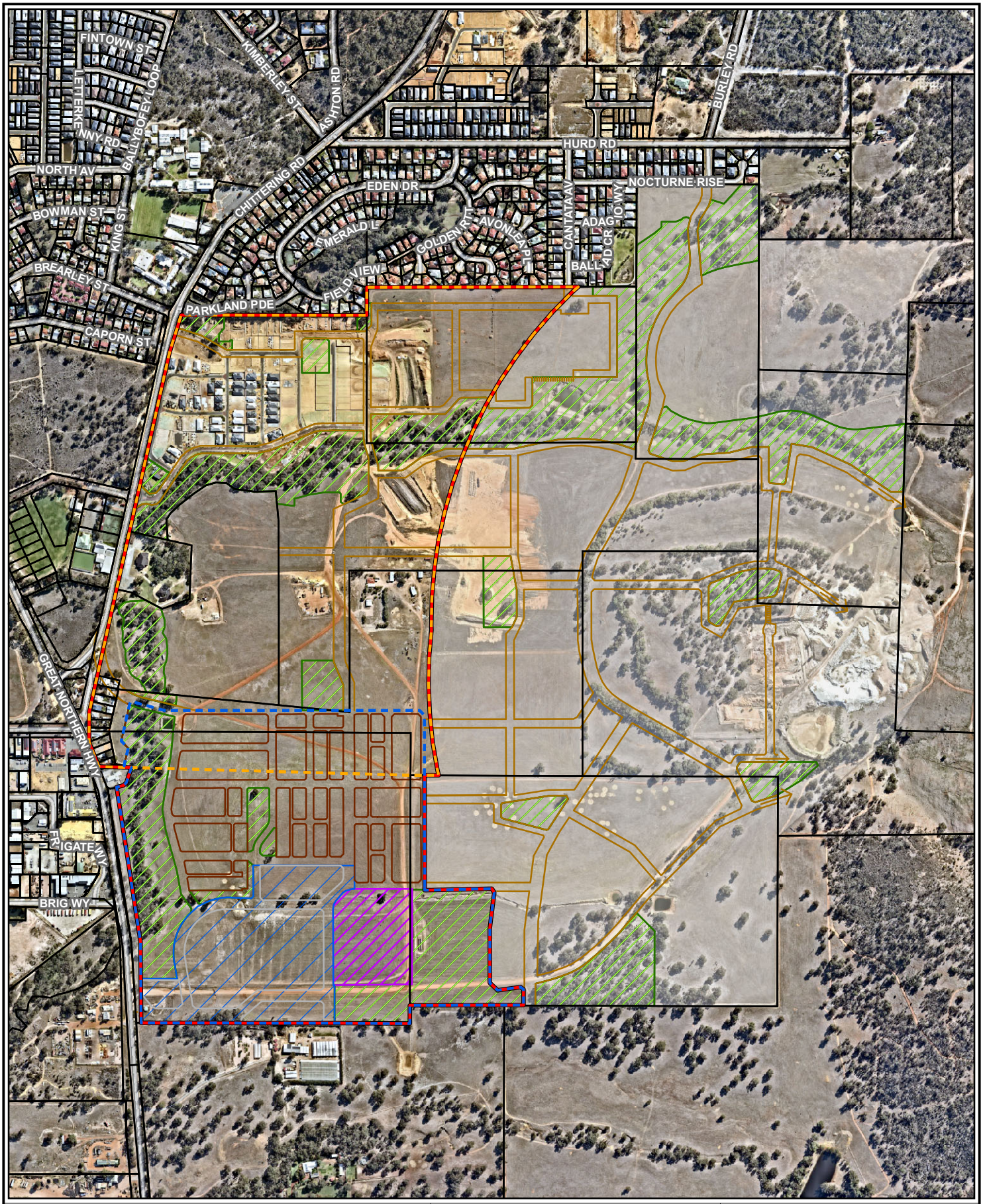
Aside from newly developed portions of the Stages 1 and 2 subdivision approval areas within the site, the project area contains limited property assets in the form of a farmhouse and associated outbuildings. Ongoing urban development will significantly increase these critical assets in that the number 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
- Activity Centre Plan boundary
- Structure Plan boundary
- Cadastral boundary
- Indicative area subject to future MRS amendments
- Road reserve
- Roads (MRWA)

Proposed ACP layout

- Road reserve
- Residential lots
- General commercial
- POS
- Primary School

Scale 1:11,000 at A4 (0 100 200 metres)	**Kingsford Residential Estate, Bullsbrook, WA**
Coord. Sys. GDA 1994 MGA Zone 50	**SITE OVERVIEW**
Job No: 60919	
Client: Amex Bullsbrook Unit Trust	**FIGURE 3**
Version: A / Date: 04-Jun-2021	strategen JBS&G
Drawn By: jcrute / Checked By: CT	

File Name: W:\Projects\1)Open\Amex Bullsbrook Unit Trust\60919 Kingsford Bullsbrook Town Centre BMP addendum\GIS\Maps\R01_Rev_A\60919_03_SiteOverview.mxd
Image Reference: www.nearmap.com© - Imagery Date: 25. April 2021.

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

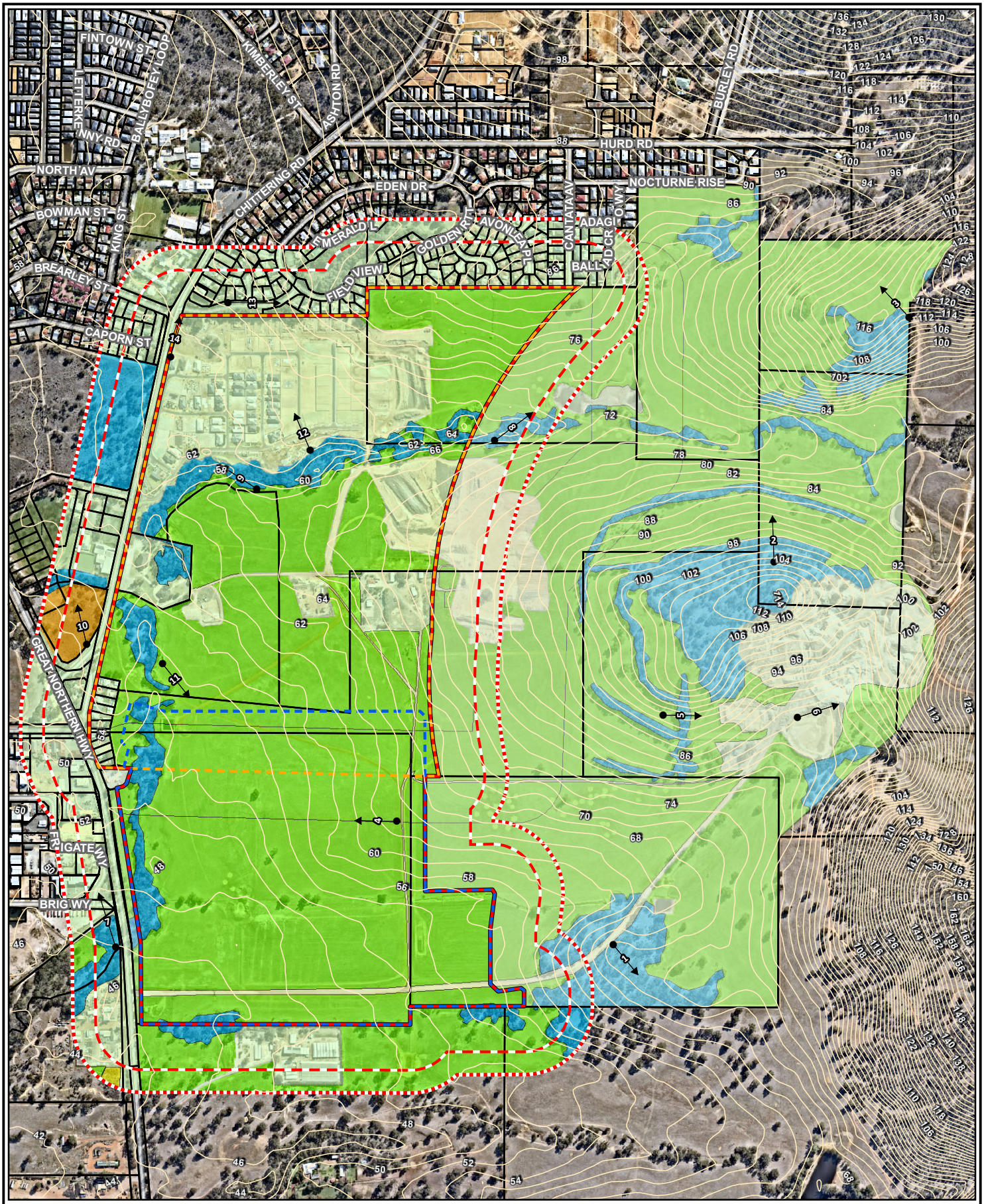
Bushfire history in the project area is infrequent and there is a lack of recent fire evidence over most of the project area; however, recent bushfires in the Perth Hills in 2011, Stoneville/Parkerville in 2013 and Wooroloo in 2021 have highlighted the need to consider bushfire planning for future developments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

PRE-DEVELOPMENT VEGETATION CLASS AND EFFECTIVE SLOPE

FIGURE 4

strategen JBS&G

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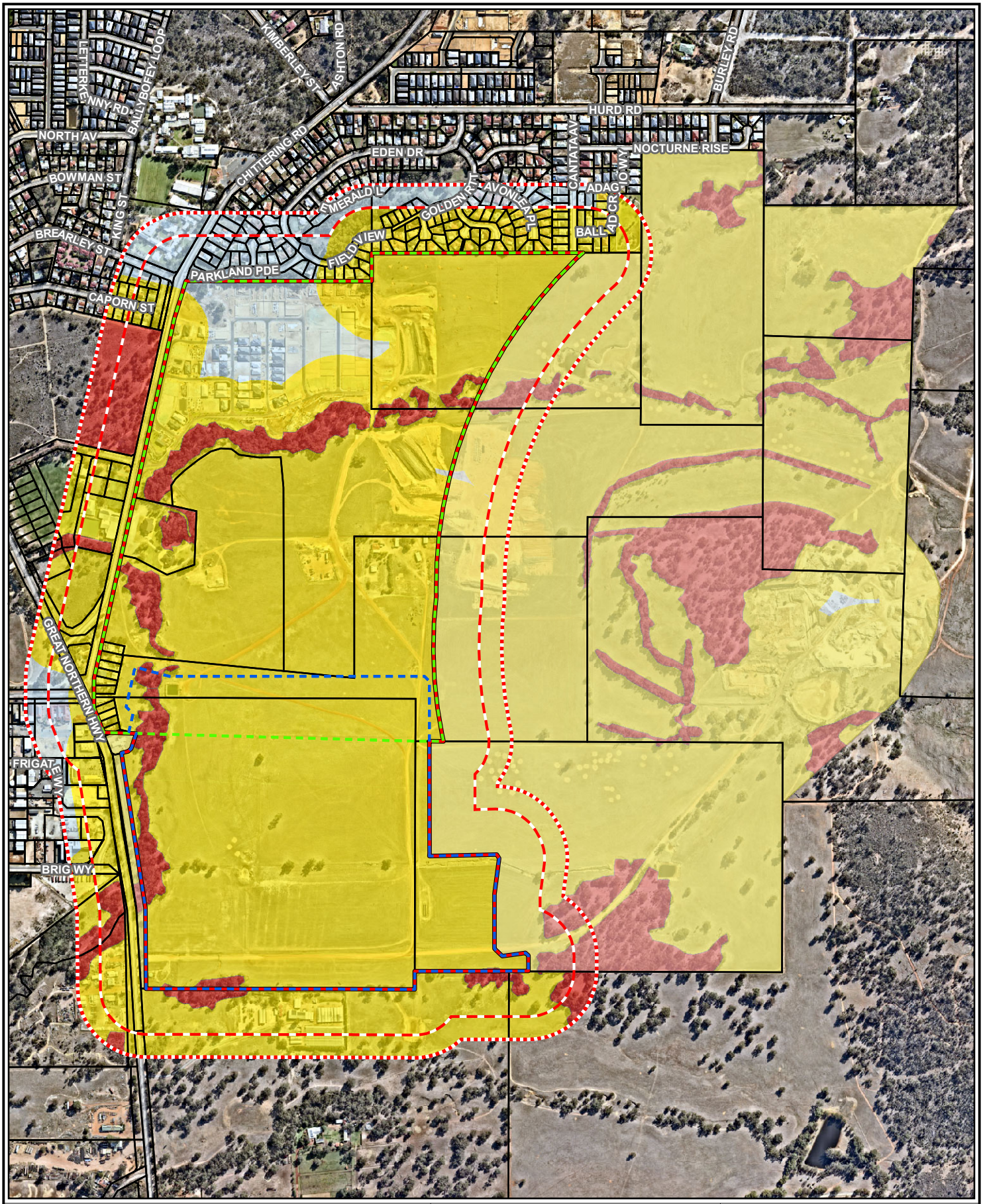
2.3 Pre-development bushfire hazard level assessment

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 (0 100 200 metres)	**Kingsford Residential Estate, Bullsbrook, WA**
Coord. Sys. GDA 1994 MGA Zone 50	**PRE-DEVELOPMENT BUSHFIRE HAZARD LEVELS**
Job No: 60919	
Client: Amex Bullsbrook Unit Trust	**FIGURE 5**
Version: A / Date: 04-Jun-2021	strategen JBS&G
Drawn By: jcrute / Checked By: CT	

File Name: W:\Projects\1)Open\Amex Bullsbrook Unit Trust\60919 Kingsford Bullsbrook Town Centre BMP addendum\GIS\Maps\R01_Rev_A\60919_05_PreDevBHLs.mxd
Image Reference: www.nearmap.com© - Imagery Date: 25. April 2021.

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 m^2) 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

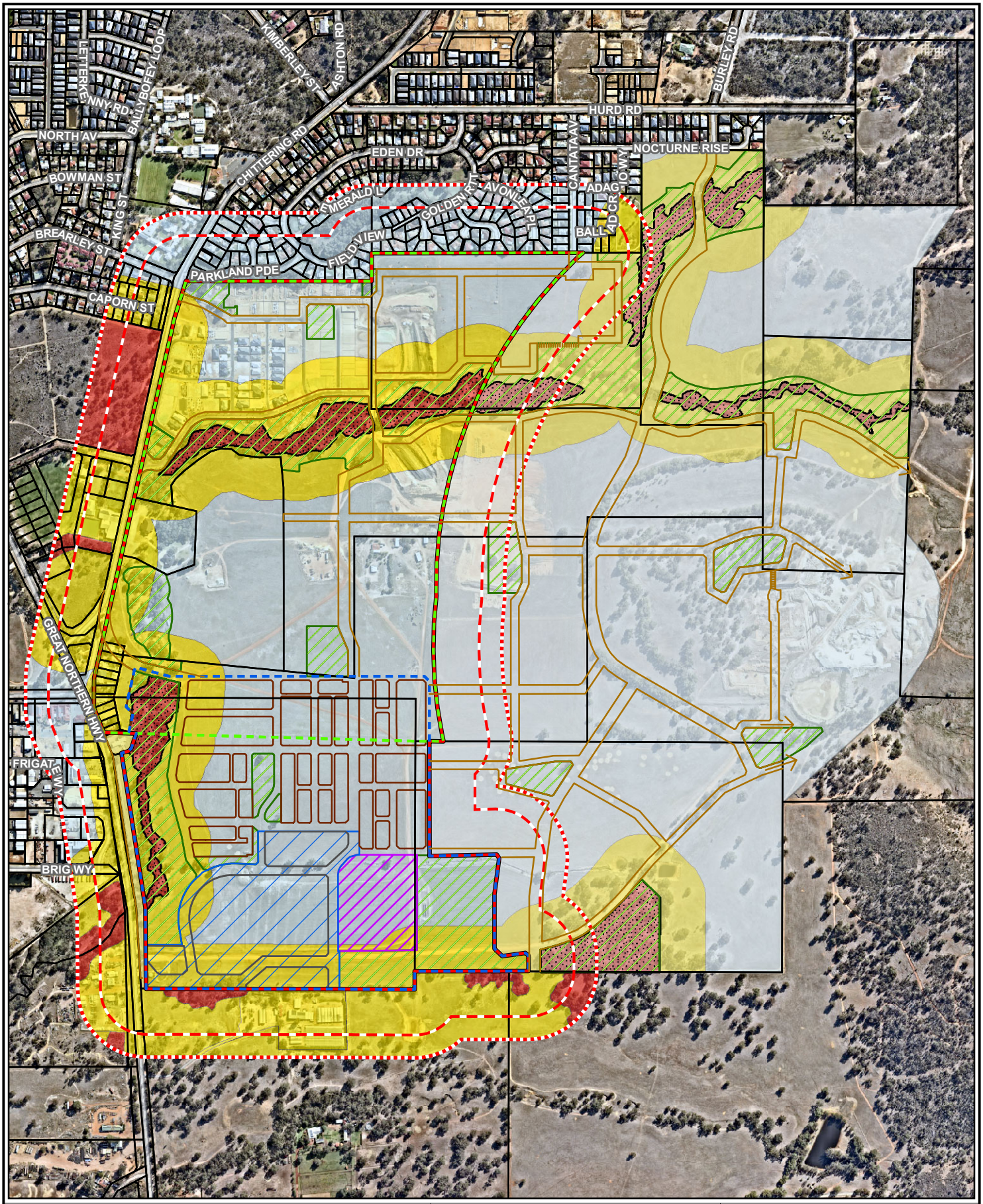
Strategen-JBS&G considers a fire front approaching the site from the northeast to be the worst-case bushfire scenario. This is due to the long bushfire run through woodland vegetation within Burley Park northeast of the project area (approximately 1.5 km in length and within spotting distance from longer 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 — 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

POST-DEVELOPMENT BUSHFIRE HAZARD LEVELS

FIGURE 6

strategen JBS&G

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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 defendable 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.

2. BMP addendum or revised BMP: this BMP has been prepared at a strategic level to demonstrate development compliance will be met at future planning stages. Once further development detail is available, which is expected to be at the subdivision stage, a brief addendum to this BMP or revised BMP containing the necessary development and bushfire planning detail will need to be lodged with the subdivision application/s.

3. Compliance with current City of Swan annual firebreak notice: the developer/land manager and prospective land purchasers are to comply with the current City of Swan annual firebreak notice as outlined in Appendix 4 as amended.

4. Vulnerable land uses: Bushfire Emergency Evacuation Plans (BEEPs) will need to be prepared for any vulnerable land uses (such as primary schools, childcare facilities and aged care facilities) that are located in areas subject to BAL–12.5 to BAL–29 to address requirements of SPP 3.7 Policy Measure 6.6.1. This is to be completed at the development application or building permit stage once an adequate level of detail is available to inform such planning.

5. High risk land uses: Bushfire Risk Management Plans (BRMPs) will need to be prepared for any high risk land uses (such as service stations or land uses containing proposed storage of on-site flammable materials) that are located in areas subject to BAL–12.5 to BAL–29 to address requirements of SPP 3.7 Policy Measure 6.6.1. This is to be completed at the development application or building permit stage once an adequate level of detail is available to inform such planning.

4. Proposal compliance and justification

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

6.2 Strategic planning proposals, subdivision and development applications

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

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

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

6.3 Information to accompany strategic planning proposals

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

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

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

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

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

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

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

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

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

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

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

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

Table 3: Acceptable solutions assessment against bushfire protection criteria

Bushfire protection criteria	Intent	Acceptable solutions	Proposed bushfire management measures	Compliance statement
Element 1: Location	To ensure that strategic planning proposals, subdivision and development applications are located in areas with the least possible risk of bushfire to facilitate the protection of people, property and infrastructure	A1.1 Development location The strategic planning proposal, subdivision and development application is located in an area that is or will, on completion, be subject to either a moderate or low bushfire hazard level, or BAL–29 or below.	Refer to Sections 3.1 and 3.2, which demonstrate that development will only occur in areas of BAL–29 or lower. No development will occur in BAL–FZ or BAL–40 areas. Refer to Sections 2.3 and 2.4, which demonstrate that development will be located within areas of low or moderate bushfire hazard. This will be further confirmed as part of a BMP addendum or revised BMP to accompany future subdivision applications where appropriate.	The measures proposed are considered to comply and meet the intent of Element 1 Location.
Element 2: Siting and design of development	To ensure that the siting and design of development minimises the level of bushfire impact	A2.1 Asset Protection Zone Every building is surrounded by an APZ, depicted on submitted plans, which meets detailed requirements (refer to the Guidelines for detailed APZ requirements).	Refer to Section 3.1, which demonstrates that minimum width APZs (or other sufficient separation) will be provided at all development-vegetation interfaces. This will be further confirmed as part of a BMP addendum or revised BMP to accompany future subdivision applications where appropriate.	The measures proposed are considered to comply and meet the intent of Element 2 Siting and design of development
Element 3: Vehicular access	To ensure that the vehicular access serving a subdivision/development is available and safe during a bushfire event	A3.1 Two access routes Two different vehicular access routes are provided, both of which connect to the public road network, provide safe access and egress to two different destinations and are available to all residents/the public at all times and under all weather conditions.	Refer to Section 3.3, which demonstrates that a minimum of two different vehicular access routes will be provided for the proposed development at all times via the internal road network. This will be further confirmed as part of a BMP addendum or revised BMP to accompany future subdivision applications where appropriate.	The measures proposed are considered to comply and meet the intent of Element 3 Vehicular access

		A3.2 Public road A public road is to meet the requirements in Table 4 Column 1 of the Guidelines.	Refer to Section 3.3, which demonstrates that all proposed public roads will meet requirements of the Guidelines (refer to Table 2). This will be further confirmed as part of a BMP addendum or revised BMP to accompany future subdivision applications where appropriate.	
		A3.3 Cul-de-sac (including a dead-end-road) A cul-de-sac and/or a dead-end road should be avoided in bushfire prone areas. Where no alternative exists (i.e. the lot layout already exists and/or will need to be demonstrated by the proponent), detailed requirements will need to be achieved as per Table 4 Column 2 of the Guidelines.	Refer to Section 3.3, which demonstrates that cul-de-sacs will be avoided where possible as part of subdivision design. If unavoidable, cul-de-sacs will comply with technical requirements of the Guidelines (refer to Table 2). This will be further confirmed as part of a BMP addendum or revised BMP to accompany future subdivision applications where appropriate.	
		A3.4 Battle-axe Battle-axe access legs should be avoided in bushfire prone areas. Where no alternative exists, (this will need to be demonstrated by the proponent) detailed requirements will need to be achieved as per Table 4 Column 3 of the Guidelines.	Refer to Section 3.3, which demonstrates that battle-axe legs will be avoided where possible as part of subdivision design. If unavoidable, battle-axe legs will comply with technical requirements of the Guidelines (refer to Table 2). This will be further confirmed as part of a BMP addendum or revised BMP to accompany future subdivision applications where appropriate.	
		A3.5 Private driveway longer than 50 m A private driveway is to meet detailed requirements as per Table 4 Column 3 of the Guidelines.	Refer to Section 3.3, which demonstrates that any private driveways longer than 50 m will meet requirements of the Guidelines (refer to Table 2). This will be further confirmed as part of a BMP addendum or revised BMP to accompany future subdivision applications where appropriate.	

		A3.6 Emergency access way An access way that does not provide through access to a public road is to be avoided in bushfire prone areas. Where no alternative exists (this will need to be demonstrated by the proponent), an emergency access way is to be provided as an alternative link to a public road during emergencies. An emergency access way is to meet detailed requirements as per Table 4 Column 4 of the Guidelines.	Refer to Section 3.3, which demonstrates that any temporary EAWs will meet requirements of the Guidelines (refer to Table 2). This will be further confirmed as part of a BMP addendum to accompany future subdivision applications where appropriate.	
		A3.7 Fire service access routes (perimeter roads) Fire service access routes are to be established to provide access within and around the edge of the subdivision and related development to provide direct access to bushfire prone areas for fire fighters and link between public road networks for firefighting purposes. Fire service access routes are to meet detailed requirements as per Table 4 Column 5 of the Guidelines.	N/A It is not anticipated that FSARs will be required as part of development.	
		A3.8 Firebreak width Lots greater than 0.5 hectares must have an internal perimeter firebreak of a minimum width of three metres or to the level as prescribed in the local firebreak notice issued by the local government	Refer to Section 3.3, which demonstrates that no firebreaks will be required for individual residential lots. However, should any firebreaks be required for larger lots (such as POS) these will meet requirements of the Guidelines and the City of Swan annual firebreak notice. This will be further confirmed as part of a BMP addendum or revised BMP to accompany future subdivision applications where appropriate.	

Element 4: Water	To ensure that water is available to the subdivision, development or land use to enable people, property and infrastructure to be defended from bushfire.	A4.1 Reticulated areas The subdivision, development or land use is provided with a reticulated water supply in accordance with the specifications of the relevant water supply authority and Department of Fire and Emergency Services.	Refer to Section 3.4, which demonstrates that all proposed lots will be provided a reticulated water supply and network of hydrants in accordance with local water authority, City and DFES requirements.	The measures proposed are considered to comply and meet the intent of Element 4 Water

5. Implementation, enforcement and review

This BMP has been prepared at a strategic level to demonstrate how development compliance will be delivered at future planning stages in accordance with the Guidelines. In this respect, the management measures documented in Section 3, where applicable, will be incorporated into development design as early as possible and confirmed at the subdivision stage. Therefore, aside from preparation of a BMP addendum or revised BMP to accompany future subdivision applications where appropriate, there are no further items to implement, enforce or review at this stage of the planning process. Any BMP addendum/s or revised BMPs prepared to accompany future subdivision application/s will need to meet the relevant commitments outlined in this strategic level BMP, address the relevant requirements of SPP 3.7 (i.e. Policy Measure 6.4) and demonstrate in detail how the proposed development will incorporate the relevant acceptable solutions to meet the performance requirements of the Guidelines. The BMP addendum/s will be required to include the following detailed information:

- proposed lot layout
- post development vegetation classifications, effective slope and separation distances
- post development BAL application requirements through preparation of a BAL contour map demonstrating that proposed development areas will achieve a rating of BAL–29 or lower
- width and alignment of compliant APZs (or other sufficient separation)
- confirmation of how bushfire management will be addressed during development staging and any specific staging measures (i.e. low threat buffers, temporary EAWs, etc)
- confirmation of how bushfire management will be addressed with regards to bushfire hazards on adjacent landholdings
- fuel management or AS 3959 application in response to on-site POS (if and where required)
- vehicular access provisions, including demonstration that a minimum of two access routes will be achieved for each stage of subdivision in accordance with acceptable solution A3.1
- water supply provisions with regards to reticulated water
- future requirements for any identified vulnerable land uses, such as provision of a Bushfire Emergency Evacuation Plan at the development application or building permit stage
- future requirements for any identified high risk land uses, such as provision of a Bushfire Risk Management Plan at the development application or building permit stage
- provisions for Notification on Title as a subdivision condition
- compliance requirements with the current City of Swan annual firebreak notice
- acceptable solutions assessment against the bushfire protection criteria
- proposed works program outlining all measures requiring implementation and the appropriate timing and responsibilities for implementation.

Based on the information contained in this BMP, Strategen-JBS&G considers the bushfire hazards within and adjacent to the project area and the associated bushfire risk is readily manageable through standard, acceptable management responses outlined in the Guidelines and AS 3959. Strategen-JBS&G considers that on implementation of the proposed management measures, 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.

6. 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.

Strategen-JBS&G accepts no liability for use or interpretation by any person or body other than the client who commissioned the works. This report should not be reproduced without prior approval by the client, or amended in any way without prior approval by Strategen-JBS&G, and should not be relied upon by other parties, who should make their own enquiries.

7. References

Department of Fire and Emergency Services (DFES) 2019, *Map of Bush Fire Prone Areas*, [Online], Government of Western Australia, available from: http://www.dfes.wa.gov.au/regulationandcompliance/bushfireproneareas/Pages/default.aspx, [Accessed: 04/07/2020].

City of Swan (CoS) 2021, *City of Swan Fire Hazard Reduction Notice,* [Online], City of Swan, available from https://www.swan.wa.gov.au/Services-support/Emergency-management/Fire/Fire-breaks-hazard-reduction [Accessed 14/06/2021]

Commonwealth Science and Industrial Research Organisation (CSIRO) 1999, *Fire Danger and Fire Spread Calculator*, Commonwealth Science and Industrial Research Organisation, Perth.

Emerge Associates (Emerge) 2019, *Bullsbrook for Amex Local Structure Plan – Landscape and Irrigation Strategy,* report prepared for Amex, February 2019.

McCaw L and Hanstrum B 2003, 'Fire environment of Mediterranean south-west Western Australia', in *Fire in Ecosystems of South-West Western Australia: Impacts and Management*, eds I Abbott & ND Burrows, Backhuys Publishers, Leiden, Netherlands, pp. 171–188.

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

Western Australian Planning Commission (WAPC) 2015, *State Planning Policy 3.7 Planning in Bushfire-Prone Areas*, Western Australian Planning Commission, Perth.

Western Australian Planning Commission (WAPC) 2017, *Guidelines for Planning in Bushfire-Prone Areas*, Western Australian Planning Commission, Perth.

Appendix A Georeferenced site photographs

Photo 1: Class B woodland to the south of the project area

Photo 2: Class B woodland to the east of the project area

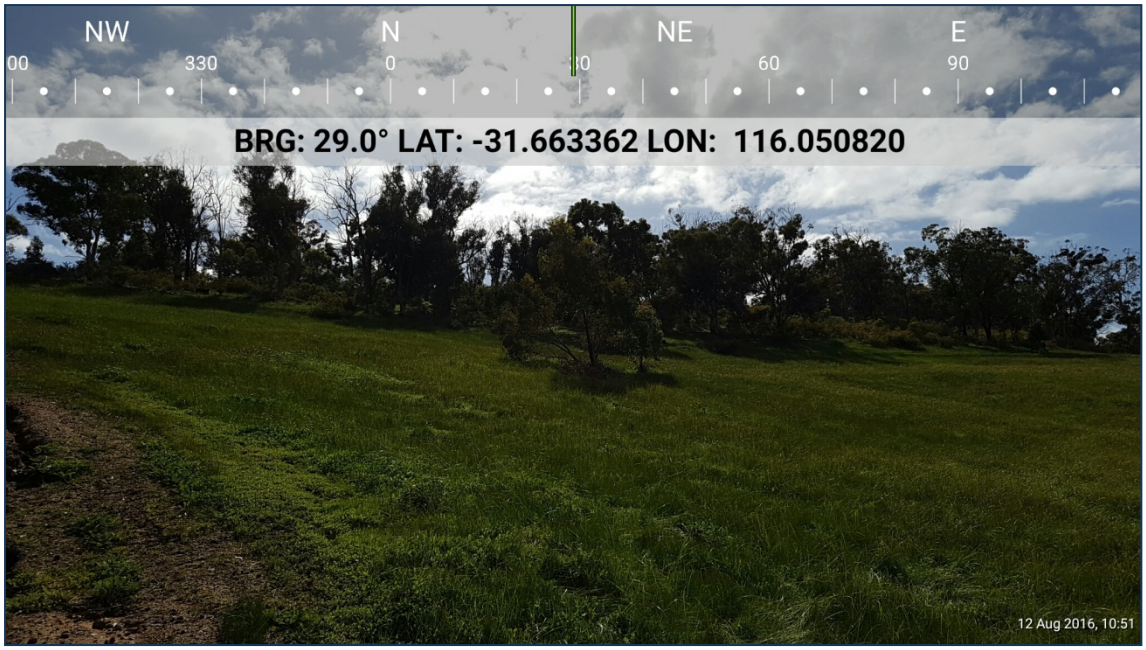


Photo 3: Class B Woodland to the northeast of the project area

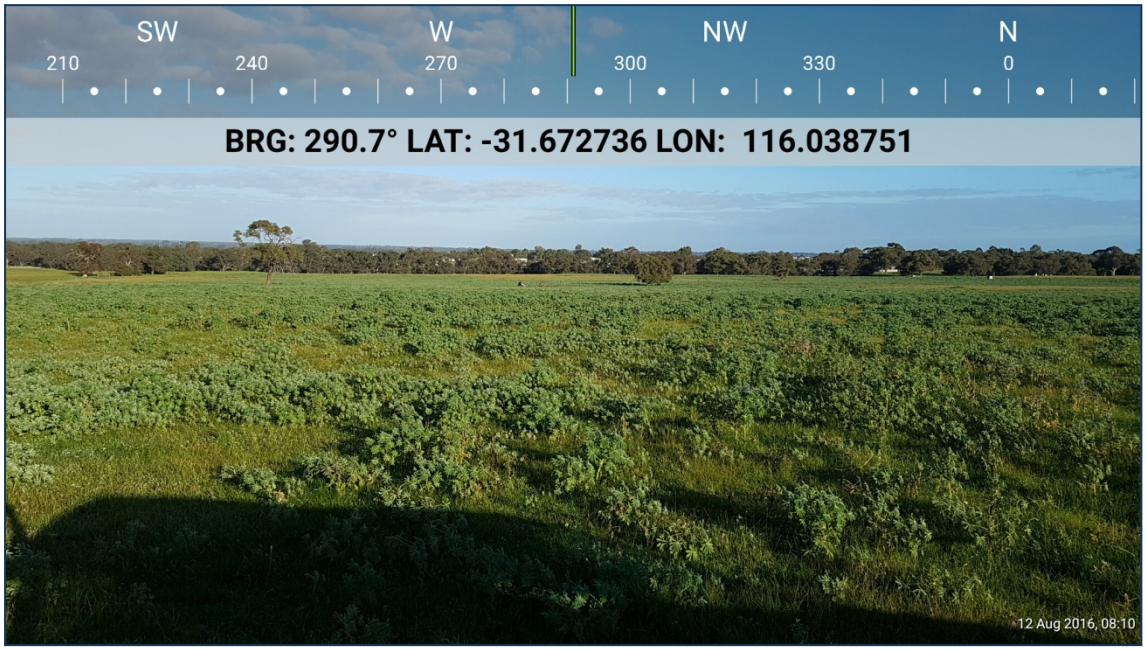


Photo 4: Class G grassland to the south of the project area

Photo 5: Class G grassland to the east of the project area (Class B woodland in background)

Photo 6: Non-vegetated area excluded under Clause 2.2.3.2 (e) to the east of the project area

Photo 7: Non-vegetated areas and low threat managed vegetation excluded under Clauses 2.2.3.2 (e) and (f) to the west of the project area

Photo 8: Class B woodland within the project area

Photo 9: Class B woodland within proposed conservation POS in the west of the project area

Photo 10: Class C shrubland (background) to the west of the project area

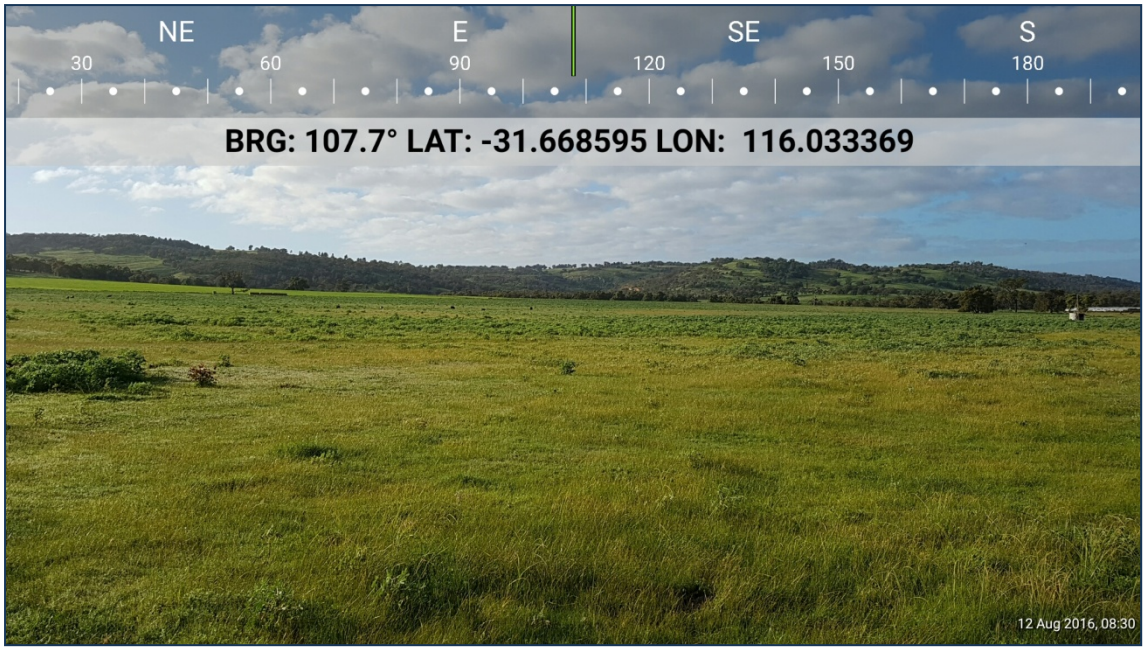


Photo 11: Class G grassland in the southwest of the project area

Photo 12: Class G grassland vegetation in the northwest of the project area

Photo 13: Non-vegetated areas and low threat managed vegetation excluded under Clauses 2.2.3.2 (e) and (f) to the north of the project area

Photo 14: Non-vegetated areas and low threat managed vegetation excluded under Clauses 2.2.3.2 (e) and (f) to the northwest of the project area

Appendix B Summer wind profiles for Pearce RAAF weather station

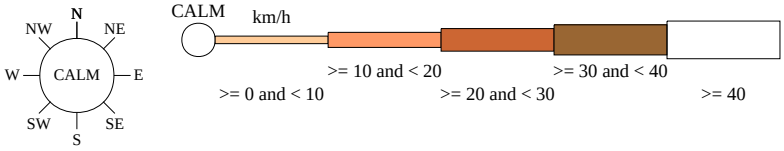
Rose of Wind direction versus Wind speed in km/h (02 Nov 1940 to 31 Oct 2011)

Custom times selected, refer to attached note for details

PEARCE RAAF

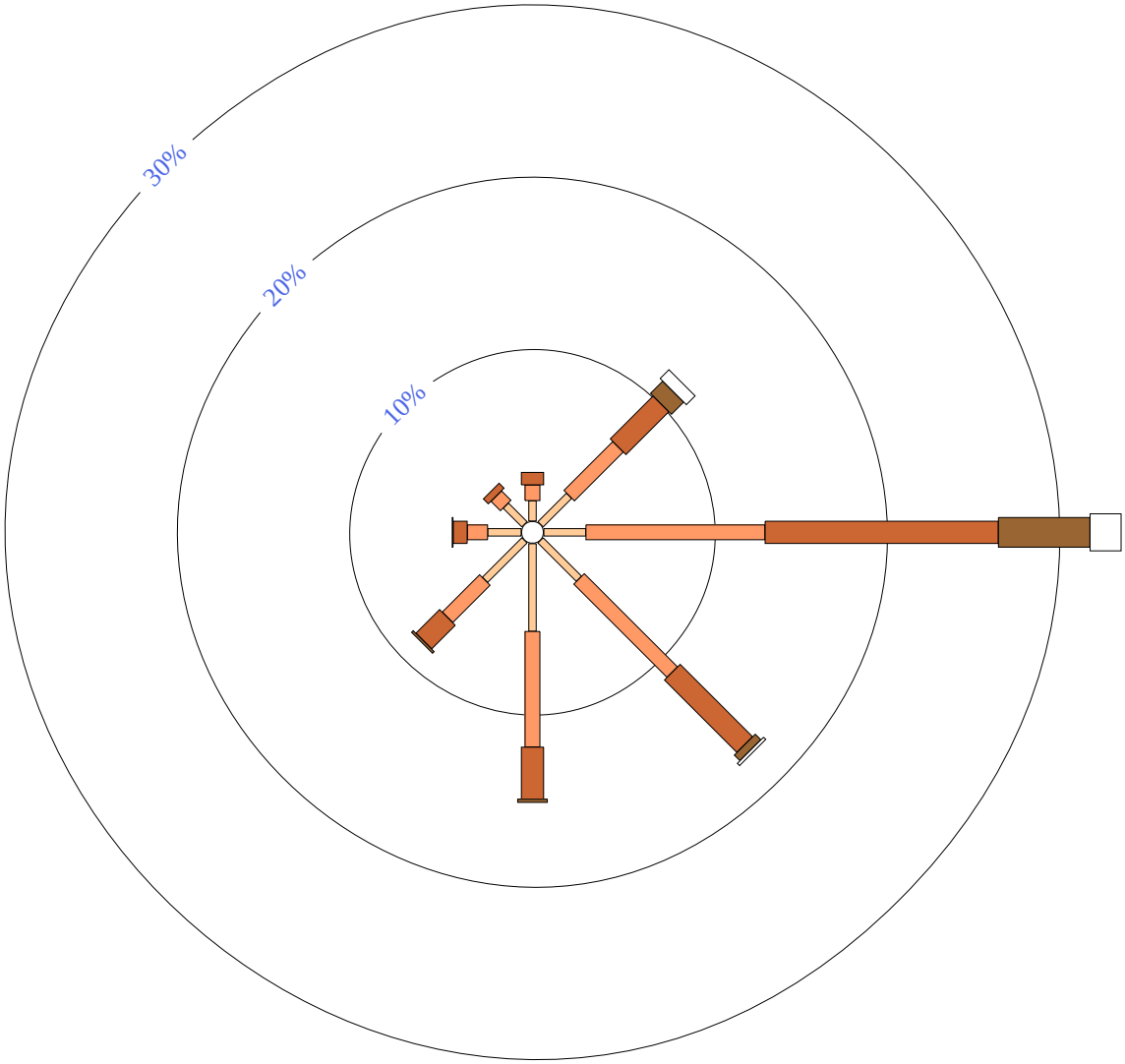
Site No: 009053 • Opened Jan 1937 • Still Open • Latitude: -31.6669° • Longitude: 116.0189° • Elevation 40m

An asterisk (*) indicates that calm is less than 0.5%.
Other important info about this analysis is available in the accompanying notes.



9 am Jan
1093 Total Observations

Calm 3%



Rose of Wind direction versus Wind speed in km/h (02 Nov 1940 to 31 Oct 2011)

Custom times selected, refer to attached note for details

PEARCE RAAF

Site No: 009053 • Opened Jan 1937 • Still Open • Latitude: -31.6669° • Longitude: 116.0189° • Elevation 40m

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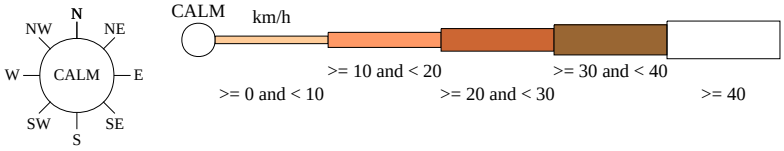
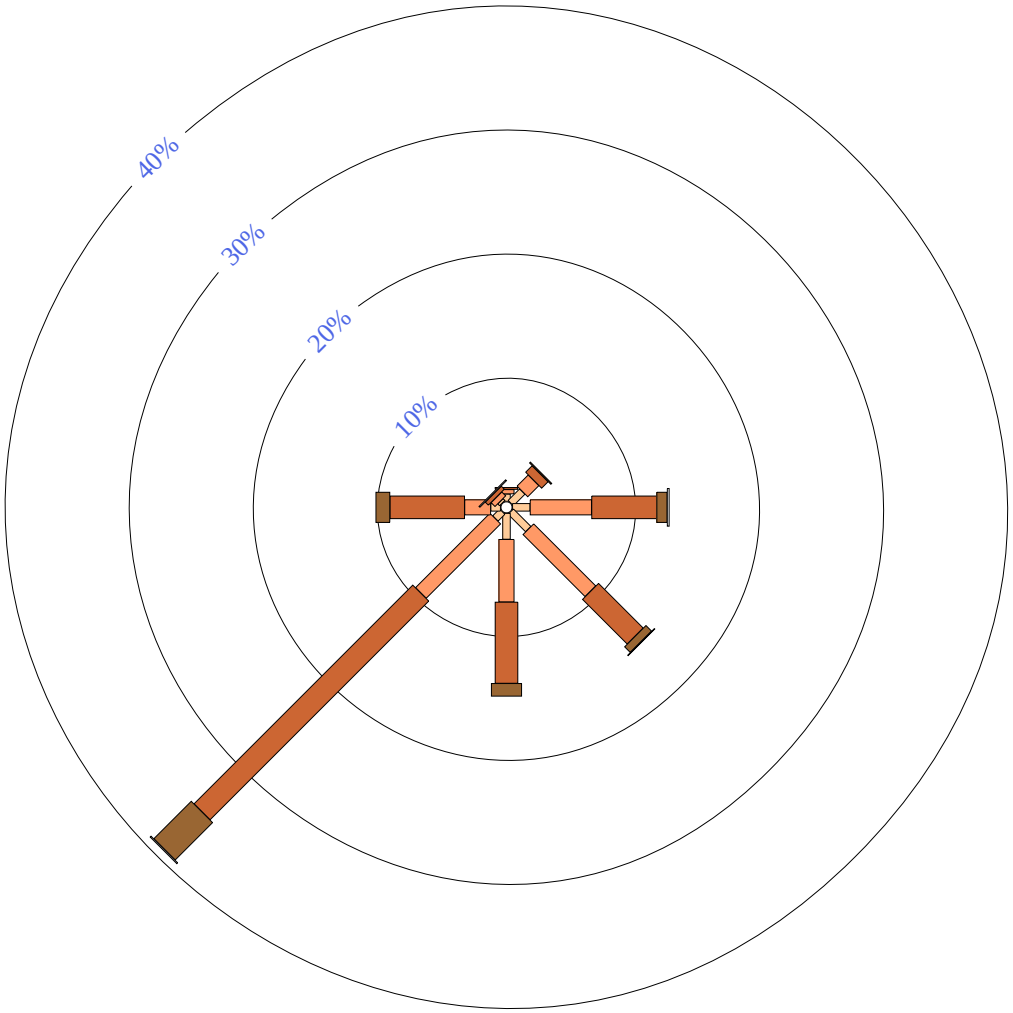
Other important info about this analysis is available in the accompanying notes.



3 pm Jan
1015 Total Observations

Calm 2%



Appendix C Landscape Masterplan (Emerge 2019)

4. APPENDIX A LANDSCAPE MASTERPLAN

LEGEND

- Site Boundary
- POS
- Indicative 1:1 ARI Drainage
- Existing Dam
- Existing Vegetation
- Neighbourhood POS/Recreation nodes (high order)
- Neighbourhood POS/Recreation nodes (low order)
- Entry Statements
- Green Streets
- Town Centre
- 400m Ped Shed
- 800m Ped Shed

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

Bush Fires Act 1954

City of Swan

Fire Hazard Reduction Notice (Firebreak Notice)

Notice to Owners and/or Occupiers of land situated within the City of Swan.

To assist in the control of bush fires, and pursuant to Section 33 of the Bush Fires Act 1954, all owners and occupiers of land within the City of Swan are required on or before the 1st day of November, 2020, or within 14 days of becoming an owner or occupier of land after that date, must meet the fire hazard reduction conditions described in this notice and maintain these conditions up to and including the 30th day of April, 2021.

1. All land up to 5,000m^2 (0.5 Hectares or 1.2 Acres)

1) Install and maintain an asset protection zone in accordance with the requirements specified in clause 13 of this notice.
2) Maintain all grass to a height of no greater than 10cm.
3) Areas of natural vegetation to be maintained at or below 8 tonnes per hectare.
4) Where a property is affected by an approved bushfire management plan, property owners must still comply with all requirements in this notice and with any additional requirements outlined within that plan.

2. All land between 5,000m2 and 25,000m2 (0.5 - 2.5 Hectares) or (1.2 - 6.2 Acres)

1) Install and maintain an asset protection zone in accordance with the requirements specified in clause 13 of this notice.
2) Install firebreaks immediately inside and adjacent to all external property boundaries. Firebreaks need to be 3 metres wide with a 4 metre vertical height clearance free from flammable materials and overhanging branches (see section 10 in this notice for further details).
3) Maintain all grass to a height of no greater than 10cm.
   a) If the land is stocked, the grass must be reduced and maintained to a height of no greater than 10cm by the 1st day of December.
4) Natural vegetation within 100 metres of buildings including attached and adjacent structures and essential infrastructure shall be maintained at or below 8 tonnes per hectare, by passive methods of fuel reduction that does not permanently remove or reduce the quantity or occurrence of the native plants, shrubs and trees within the subject area.
5) Where a property is affected by an approved bushfire management plan, property owners must still comply with all requirements in this notice and with any additional requirements outlined within that plan.

3. All land with an area greater than 25,000m^2 (2.5 Hectares or 6.2 Acres)

1) Install and maintain an asset protection zone in accordance with the requirements specified in clause 13 of this notice.
2) Install firebreaks immediately inside and adjacent to all external property boundaries. Firebreaks need to be 3 metres wide with a 4 metre vertical height clearance free from flammable materials and overhanging branches (see section 10 in this notice for further details).
   a) Properties over 100 hectares require additional firebreaks to divide the land into areas not exceeding 100 hectares.
3) Slash or mow grass to a height no greater than 10cm immediately adjacent to firebreaks to a minimum width of 3 metres.
   a) If the land is stocked, this grass must be reduced and maintained to a height of no greater than 10cm by the 1st day of December.
4) Natural vegetation within 100 metres of buildings including attached and adjacent structures and essential infrastructure shall be maintained at or below 8 tonnes per hectare, by passive methods of fuel reduction that does not permanently remove or reduce the quantity or occurrence of the native plants, shrubs and trees within the subject area.
5) Where a property is affected by an approved bushfire management plan, property owners must still comply with all requirements in this notice and with any additional requirements outlined within that plan.

4. Plantations

1) Install and maintain external and internal firebreaks, firebreaks that form compartments (cells), firebreaks and hazard reduction measures that protect neighbouring communities and essential infrastructure in accordance with the requirements of a fire management plan approved in writing by the City; or
2) Where no such approved fire management plan exists,
   a) Unless the City approves an alternative plan in writing in accordance with clause 4(2)(b), install and maintain external and internal firebreaks and firebreaks that form compartments (cells), and carry out all other firebreaks and hazard reduction measures which are required in accordance with the requirements and specifications within the Department of Fire & Emergency Services 'Guidelines for Plantation Fire Protection' 2011 publication; or
   b) If it is considered impractical for any reason to carry out the plantation requirements outlined above in clause 4 (2)(a), plantation owners and managers may apply in writing to the City to implement an alternative plan or measures in accordance with clause 4 of this notice. A Fire Management Plan may be required to be developed and submitted as part of the application.

5. Application to Vary Firebreak and Hazard Reduction Requirements

1) If it is considered impractical for any reason to clear firebreaks in a manner or location required by this notice, or to carry any fire hazard reduction work or measures required by this notice, you may apply in writing on or before the 15th day of October, for approval to provide firebreaks in alternative positions or to take alternative measures to abate fire hazards on the land. Alternative firebreak application forms can be downloaded from the City of Swan website.
2) If permission is not granted in writing by the City prior to the 1st day of November, you shall comply with the requirements of this notice.
3) When permission for alternative firebreaks or fire hazard reduction measures has been granted, you shall comply with all conditions on the endorsed permit and maintain the land to the required standard throughout the period specified by this notice.
   a) Where a property is affected by an approved bushfire management plan, property owners must comply with any additional requirements and responsibilities outlined within that plan.

6. Fuel Dumps and Depots

Remove all flammable material within 10 metres of fuel dumps, fuel ramps or where fuel drums, whether containing fuel or not, are stored.

7. Hay Stacks

Clear and maintain a firebreak completely surrounding any haystack on the land, within 60 metres of the haystack.

8. Fire Service Access (Strategic Firebreaks)

1) Where under a written agreement with the City, or where depicted on an approved bushfire management plan Fire Service Access (Strategic Firebreaks) are required on the land, you are required to clear and maintain the Fire Service Access (Strategic Firebreaks) a minimum of 6 metres wide along the agreed alignment to provide restricted vehicular access to emergency services and authorised vehicles.
2) Fire Service Access (Strategic Firebreaks) must be free from flammable material and unimpeded by obstructions including boundary fences and gates unless approved in writing by the City.
3) Gates may only be secured with City of Swan Fire Service padlock.
4) Fire Service Access (Strategic Firebreaks) shall be graded to provide a continuous 4 wheel drive trafficable surface a minimum of 4 metres wide with a 1 metre shoulder on either side.
5) All branches must be pruned and obstacles removed to maintain a 4 metre vertical height clearance above the full 6 metre width of the trafficable surface.

9. Emergency Access Ways

1) Where under a written agreement with the City, or where depicted on an approved bushfire management plan, Emergency Access Ways are required on private land, you are required to clear and maintain a vehicular access way to a minimum of 6 metres wide along the agreed alignment.
2) Emergency access ways must be free from flammable material and unimpeded by obstructions including boundary fences and gates unless approved in writing by the City.
3) Gates on Emergency Access Ways must remain unlocked at all times.
4) Emergency Access Ways shall be graded and have suitable drainage to provide a minimum 6 metre wide continuous trafficable surface suitable for all types of 2 wheel drive vehicles.

5) All branches must be pruned and obstacles removed to maintain a 4 metre vertical height clearance above the full 6 metre width of the trafficable surface.

10. Firebreak Construction

1) Firebreaks are to be developed and maintained clear of all obstacles and flammable materials to create a minimum of 3 metres wide trafficable surface suitable for 4 wheel drive vehicles.
2) Overhanging branches must be pruned to provide a 4 metre vertical clearance above the full width of the firebreak surface.
3) Boundary firebreaks must be aligned immediately inside and adjacent to the external property boundaries.
4) Alternative Firebreaks that are approved in writing by the City, or as depicted within a bushfire management plan approved in writing by the City, are to be constructed to the same standard as general firebreaks and must be constructed along the specified alignment.
5) Firebreaks must not terminate in a dead end.
6) Firebreaks may be constructed by ploughing, grading, raking, burning, chemical spraying or any other approved method that achieves the required standard.

11. Driveways

Where building sites are situated more than 50 metres from a public road,

1) Driveways must be maintained clear of all permanent obstacles and flammable materials to create a minimum 3 metre wide trafficable surface suitable for all types of 2 wheel drive vehicles.
2) Overhanging branches must be pruned to provide a 4 metre vertical clearance above the driveway.

12. Fuel Reduction – Natural Vegetation

1) Available bushfire fuels must be maintained at or below:
   a) Asset Protection Zones - 2 tonnes per hectare
   b) Hazard Separation Zones - 8 tonnes per hectare

      *This requirement only applies where HSZs are depicted within a Fire Management Plan approved in writing by the City.

   c) Natural Vegetation - 8 tonnes per hectare for areas of natural vegetation within 100 metres of buildings, attached and adjacent structures and essential infrastructure
2) Passive Fuel Reduction within natural vegetation may be achieved by burning, raking, pruning, weed management, removal of dead materials and any other approved method.
3) Permanent removal or partial clearing of natural vegetation including individual or groups of native grasses, shrubs or trees may only be carried out to meet the minimum requirements of this notice.
4) Permanent clearing of natural vegetation structures including individual plants, shrubs or trees, that exceeds the requirements of this notice or the specifications outlined within a bushfire management plan approved in writing by the City, is only permitted in accordance with the provisions and exemptions outlined within the Environmental Protection Act 1986, or with the approval of the Department of Water and Environmental Regulation and the City of Swan.

   Note: Advice and resources on how to measure and manage native vegetation fuel loads are available from the Department of Fire and Emergency Services or the City of Swan.

13. Asset Protection Zones Specification

Asset protection zones for habitable buildings and other assets must meet the following requirements:

1) Extend 20 metres out from any external walls of the building, attached structures, or adjacent structures within 6 metres of the habitable building, unless varied under an approved bushfire management plan.
2) On sloping ground the asset protection zone distance shall increase with 1 metre for every degree in slope on the sides of the building/ structure that are exposed to down slope natural vegetation.
3) Asset protection zone requirements only apply within the boundaries of the lot on which the asset is located and cannot be enforced across boundaries.
4) Recommendation Only - Asset protection zones predominantly consist of non-flammable managed vegetation, reticulated lawns and gardens and other non-flammable features.
5) All grass is maintained to or under 10cm.
6) Fuel loads must be reduced and maintained at 2 tonnes per hectare or lower.
7) The crowns of trees are to be separated where possible to create a clear separation distance between adjoining or nearby tree crowns. The separation distance between tree crowns is not required to exceed 10 metres. Clearing or thinning existing trees to create distances greater than 10 metres separation between tree crowns within an asset protection zone is not required or supported by this notice and requires approval from the Department of Water and Environmental Regulation and the City of Swan.

8) A small group of trees within close proximity to one another may be treated as one crown provided the combined crowns do not exceed the area of a large or mature crown size for that species.
9) Trees are to be low pruned (or under pruned) to at least a height of 2 metres from ground.
10) No tree, or shrub over 2 metres high is planted within 2 metres of a building, especially adjacent to windows.
11) There are no tree crowns or branches hanging over buildings.
12) Clear and prune scrub to reduce to a sparse density (able to walk through vegetation with relative ease with minimal deviation around trees and shrubs).
13) Install paths or clear flammable or dry vegetation, debris and materials immediately adjacent to the building.
14) Wood piles and flammable materials stored a safe distance from buildings.

14. Burning

All burning must be carried out in accordance with the relevant provisions of this notice and the Bush Fires Act 1954, Health Act 1911 and the City's Consolidated Local Laws 2005.

Prohibited Period: All burning, including garden refuse and camping fires are prohibited.

Restricted Period: All burning requires a permit except for the burning of garden refuse and camping fires which are subject to the following conditions:

1) The fire must not be lit if the Fire Danger Rating is Very High or above, or if a Total Fire Ban or a Harvest and Vehicle Movement Ban is declared.
2) Only one fire is allowed at any time and it does not exceed 1 cubic metre in size.
3) No flammable material within 5 m of the fire.
4) The fire is only lit between 6 pm and 11 pm and completely extinguished by midnight.
5) At least one person capable of controlling the fire is in attendance at all times with adequate means of extinguishing the fire.

15. Cooking Fires

Fires for the purpose of cooking are exempt from burning period restrictions subject to the following conditions:

1) The fire must not be lit if the Fire Danger Rating is Very High or above, or if a Total Fire Ban or a Harvest and Vehicle Movement Ban is declared.
2) The fire is contained in a purpose built appliance and
   a) at a person's home; or
   b) an area is set aside for that purpose by the State Authority or City of Swan
3) No flammable material within 5 m of the fire.
4) At least one person capable of controlling the fire is in attendance at all times with adequate means of extinguishing the fire.

16. Compliance

1) In addition to the requirements of this notice, further works which are considered necessary by an Authorised Officer of the City may be required as specified in writing in a subsequent notice addressed to the land owner.
2) Where the owner or occupier of the land fails or neglects to comply with the requirements of this notice or a subsequent notice addressed to the land owner, the City of Swan may enter onto the land with workmen, contractors, vehicles and machinery to carry out the requisitions of the notice at the expense of the land owner.
3) Failure to comply with this notice and subsequent written notices may result in a penalty not exceeding $5,000, or the issue of a $250 infringement notice and liability for any costs incurred by the City in relation to works undertaken on behalf of the land owner
4) Where a property is affected by an approved bushfire management plan, property owners must still comply with all requirements in this notice and with any additional requirements outlined within that plan.

17. Definitions

'**Alternative Firebreak**' is a firebreak that is in an alternative position or alignment to the external boundaries of a property.

'**Alternative Firebreak Application**' is an application that may be made by a land owner to install firebreaks in an alternative position, or to carry out an alternative measures in lieu of general firebreaks.

'**Available Fuel**' is the bush fuel consisting of live and dead vegetation such as stubble, mulch, leaf litter, twigs, trash, scrub and other vegetation less than 6mm in diameter capable of carrying a running fire and will actually burn under prevailing conditions.

'**City**' means the City of Swan.

'**Buildings, Attached and Adjacent Structures**' means habitable buildings that are used as a dwelling, workplace, place of gathering or assembly, a building that is a car park, or a building used for the storage

or display of goods or produce for sale by whole sale in accordance with classes 1-9 of the Building Code of Australia. The term building includes attached and adjacent structures like garages, carports verandas or similar roofed structure(s) that are attached to, or within 6 metres of the dwelling or primary building.

'**Asset Protection Zone (APZ)**' is a low fuel area that is reduced of flammable vegetation and materials surrounding buildings and essential infrastructure to minimise the likelihood and impact that direct flame contact, radiant heat or ember attack may have on buildings and assets in the event of a bushfire. This area must extend out from the external walls of a building or asset a minimum of 20 metres.

'**Bushfire Management Plan**' or 'Fire Management Plan' is a comprehensive plan that may be placed on the certificate of title(s) of land that has been developed as a condition of development or subdivision. Bushfire Management Plans may become out dated and it's the responsibility of the property owner to review and keep them current. Where a property is affected by an approved bushfire management plan, property owners must still comply with all requirements in the Annual Fire Hazard Reduction Notice and with any additional requirements outlined within that plan.

'**Emergency Access Way**' is a two wheel drive trafficable, 6 metre wide access route to provide local residents, general public and emergency services alternative links to road networks at the end of cul- de-sacs or areas where access is limited during an emergency incident.

'**Essential Infrastructure**' or '**Critical Infrastructure**' means assets, infrastructure, systems and networks that provide essential services necessary for social and economic wellbeing and is typically public infrastructure. Assets and infrastructure, usually of a public nature, that generate or distribute electricity, water supply, telecommunications, gas and dams are typical assets that are essential to society and are often located in, or traverse areas that are prone to bushfires.

'**Firebreak**' is an area of land cleared of flammable material (see available fuel above) to minimise the spread of a bushfire and to provide access for firefighting services. For the purpose of this notice the term firebreak is a strip of land at minimum 3 metres with a 4 metres vertical clearance, constructed to provide a 4 wheel drive trafficable surface for access by emergency and authorised vehicles. Boundary firebreaks are installed immediately adjacent the external boundaries of a property.

'**Fire Hazard**' means accumulated fuel (living or dead) such as leaf litter, twigs, trash, bush, dead trees and scrub capable of carrying a running fire, but excludes standing living trees and isolated shrubs.

'**Hazard Separation Zone (HSZ)**' means an area extending out from an asset protection zone a distance of 80 metres unless otherwise specified, to create a graduated fuel reduction and separation from natural vegetation.

'**Natural Vegetation**' means natural areas of forest, woodland, shrubland, scrub, mallee or mulga.

'**Passive Fuel Reduction**' means lowering the amount of available fuel that will burn under prevailing conditions by means that will not permanently reduce or modify the structure or life cycle of plant, shrub, scrub or tree communities within an treated area. This is typically achieved by undertaking a cool, controlled burn of an area during cooler, damper months, or by physical removal of built up leaf litter, dead materials, weeds and slashing long dry grasses without damaging live native plants within the area.

'**Plantation**' is any area of native or exotic planted trees that exceeds three hectares in a gazetted town site, or elsewhere a stand of trees of 10 hectares or larger that has been planted and managed intensively for their commercial and environmental value. A plantation includes roads, firebreaks and small areas of native vegetation.

'**Fire Service Access (Strategic Firebreaks)**' is a firebreak that is 6 metres wide established to provide strategic access and links to road networks whilst providing a wider control/ containment line to protect town sites, estates and similar exposures during bushfire operations.

By order of the Council,

MJ Foley

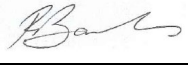
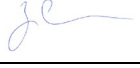
Chief Executive Officer

City of Swan

Document Distribution

Rev No.	Copies	Recipient	Date
Rev 4	**1**	**Craig Graham (Okeland Communities)**	**14/06/2021**

Document Status

Rev No.	Author	Reviewer	Approved for Issue		
		Name	Name	Signature	Date
Rev A	P Molinari	R Banks (BPAD36857)	R Banks		9/1/2017
Rev B	P Molinari (BPAD39183)	R Banks (BPAD36857)	R Banks		7/07/2017
Rev 0	P Molinari (BPAD39183)	R Banks (BPAD36857)	R Banks		18/07/2017
Rev 1	P Molinari (BPAD39183)	R Banks (BPAD36857)	R Banks		26/09/2017
Rev 2	P Molinari (BPAD39183)	R Banks (BPAD36857)	R Banks		27/11/2017
Rev 3	B Mastrangelo (BPAD45985)	Z Cockerill (BPAD37803)	Z Cockerill		15/03/2019
Rev 4	**Z Cockerill (BPAD37803)**	**Z Cockerill (BPAD37803)**	**Z Cockerill**		**16/06/2021**

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APPENDIX H

Local Water Management Strategy

RPS

MEMO

Date: 30 June 2021
Pages: 17 inc. this page
Regarding: Kingsford town centre - Bullsbrook

Addendum to the Bullsbrook landholding local water management strategy

1 INTRODUCTION

An approved Local Water Management Strategy (LWMS) was previously prepared by RPS (2018) to support the Local Structure Plan (LSP) for the Bullsbrook Landholding, now referred to as the Kingsford development. Hatch is lodging a Precinct Plan for the Kingsford town centre which constitutes a modification to the layout shown in the approved LSP. This LWMS addendum has been prepared to support the proposed modification of the town centre layout and addresses the implications to the drainage strategy.

2 TOWN CENTRE PRECINCT PLAN

A plan of the proposed Kingsford town centre is shown in Appendix A. The town centre includes general commercial, residential and public open space/conservation zonings, as well as a primary school and co-located district open space.

The current estimate for residential lot yield within the town centre is 385 lots:

- 180 lots between 180 m^2 and 299 m^2
- 205 lots greater than 300 m^2.

The distribution of the different-sized lots that was assumed for the stormwater modelling is shown in Figure B (noting that lots smaller than 300 m^2 were modelled as having direct stormwater connections in line with City of Swan requirements).

3 STORMWATER MANAGEMENT

3.1 Drainage strategy

The drainage strategy for the Kingsford town centre is consistent with the strategy outlined in the LWMS (RPS 2018). The design criteria are summarised in Table 1.

Table 1: Stormwater management design criteria

Objective	Design criteria
Retention / treatment (15 mm event)	• 1 year ARI - 1 hour (15 mm) storm event to be retained on site as close to source as possible through lot soakwells and biofiltration areas. • Construction of bioretention areas sized at a minimum 2% of connected impervious catchment areas to retain and treat the 15 mm event. • Other water sensitive urban design (WSUD) features such as tree pits, rain gardens and roadside swales will also be investigated and incorporated into the drainage system where practical during detailed design.
Conveyance (5 year ARI event)	• A pit and pipe system will convey up to and including the 5 year ARI event to the biofiltration basins. Biofiltration areas located adjacent to the Ki-it Monger Brook will discharge into the brook. • Road drainage system to be designed so that roads will be passable in the 5 year ARI event. • Overland conveyance systems (e.g. vegetated swales) will be incorporated where appropriate during detailed design to increase treatment area and reduce reliance on piped systems.
Flood protection (100 year ARI event)	• Development will not occur in the floodway of the Ki-It Monger Brook, and habitable floor levels will be at least 0.5 m above the top water level of the 100 year ARI flood event. • Finished lot levels will be at least 0.3 m above the 100 year ARI top water level of local drainage systems. • Flood storage areas will also be incorporated in POS areas throughout the development to ensure that peak post-development flow rates are maintained relative to pre-development flow rates for the Ki-it Monger Brook. • Flood conveyance pathways (including the road reserve) will be provided for safe passage of flows through the development during the 100 year ARI event. • Attenuated flood flows will be conveyed to the Ki-it Monger Brook and discharge from the site as per pre-development conditions.
Nutrient management	• Any imported fill used beneath drainage areas will have a sufficient PRI (>10) to reduce phosphorus export via soil leaching. • Biofiltration areas will be designed to retain nutrients through the use of amended soil and appropriate plant species selection. • Amended soil will also be used throughout other POS areas.

A preliminary plan showing proposed earthwork contours and drainage alignments within the main town centre area is shown in Appendix C.

3.1.1 Residential lots

As per City of Swan (2013) guidelines, residential lots greater than 300 m^2 are to provide soakwells sized for the first 15 mm of rainfall. Lots less than 300 m^2 may be connected directly to the City's drainage system as long as the downstream drainage infrastructure and stormwater treatment areas are designed accordingly. Soakwells are to be located at the front of lots where possible and should be a minimum of 1.8 m from the building footings or property boundary.

3.1.2 Commercial lots

Commercial lots are to provide interconnected soakwells with an overflow connection to the City's drainage system. Whilst a Class S geotechnical soil profile may be considered for the commercial areas, it is anticipated that the lots will be constructed with at least a portion of the lot area having >1.5 m of imported sand fill to facilitate retention and infiltration of the 15 mm event within soakwells. Where there is <1.5 m of imported sand fill available for soakwells, alternative infiltration devices such as tree pits, rain gardens and rainwater tanks may be utilised to retain the 15 mm event.

There may be additional opportunity identified during the detailed design where commercial lots are able to manage larger rainfall events on-site. This will be investigated at UWMP stage to reduce the load on the final drainage basins.

3.1.3 Primary school drainage

The primary school will manage its own drainage up to the 100 year ARI event on-site. The drainage infrastructure within the development has not made allowance for run-off generated from the school site.

3.2 Changes to catchments and discharge rates

Due to the proposed LSP layout modification, the boundaries of the town centre catchments have changed. Table 2 summarises the changes to the town centre catchments and the land use breakdown. The contributing catchment area of the town centre has increased from the LWMS (RPS 2018). The stormwater catchment plan showing both the LWMS catchments and revised catchments is shown in Figure A.

Table 2: Town centre catchment areas (ha)

Catchment	9	10	15	16	Total
Residential lots >300 m^2	2.72	2.48	0.21	7.18	**12.59**
Residential lots <300 m^2	-	2.56	0.57	1.34	**4.48**
Road reserve	3.49	3.87	3.56	3.43	**14.34**
POS / DOS	-	0.68	0.79	5.77	**7.24**
Commercial	-	-	8.40	-	**8.40**
School	-	-	-	3.52	**3.52**
Total area (ha) in LWMS addendum	6.21	9.59	13.53	21.23	**50.57**
Area (ha) in LWMS (RPS 2018)	5.24	6.36	13.98	20.30	**45.88**

Increases in catchment area has been highlighted in blue; decreases in catchment area has been highlighted in green.

As per the LWMS (RPS 2018), Catchments 9 to 18 discharge to the Ki-it Monger Brook via the town centre. The total area of these ten catchments was 146.21 ha, with a combined peak discharge rate of 4.31 m^3/s in the 100 year ARI - 6 hour storm (the critical duration for flows within the Ki-it Monger Brook). The pro rata discharge rate is 0.03 $m^3/s/ha$.

Changes to the town centre catchment boundaries have a flow-on effect on the adjacent catchment boundaries. Outside the town centre, indicative catchment areas have been revised based on the current draft masterplan shown in Appendix B (this draft master plan differs from the LSP and is not statutory yet). Catchment 14 previously discharged via Catchment 9, however due to the town centre catchment boundary changes, it has now been diverted through Catchment 15.

Modelling and refinement of drainage areas within the affected catchment areas outside of the Kingsford Town Activity Centre will be undertaken during the relevant detailed design stages. Changes to catchment areas and estimates of the allowable peak discharge based on the pro rata rate is shown in Table 3. There is flexibility for individual catchments to discharge more or less than the estimated discharge rates in response to space availability for drainage infrastructure, however the LSP area should meet the overall LWMS discharge criteria of 12 m^3/s at the Great Northern Highway.

Table 3: Estimated allowable peak discharge rate in the 100 year ARI - 6 hour storm

Catchment	Area (ha) in LWMS (RPS 2018)	Area (ha) in LWMS addendum	Estimated allowable peak discharge (m^3/s)
9	5.24	6.21	
10	6.36	9.59	
11	23.25	13.52	
12	10.00	14.86	
13	12.81	10.38	
Total (discharge via Catchment 9)	**57.66**	**54.56**	**1.64**
14	5.39	11.40	
15	13.98	13.53	
16	20.30	21.23	
17	22.80	26.63	
18	14.48	15.30	
Total (discharge via Catchment 15)	**76.95**	**88.09**	**2.64**

Increases in catchment area has been highlighted in blue; decreases in catchment area has been highlighted in green.

3.3 Drainage modelling

The XP-SWMM flood model developed for the LWMS has been updated with the town centre layout modifications. The breakdown of the different catchment types modelled has been summarised in Table 4. Direct connected catchment was defined as impervious catchment areas which are connected to the drainage network. This includes the impervious surfaces of road reserves and lot areas that are serviced by a direct drainage connection. The indirect connected catchment refers to areas that are not directly connected to the drainage system and includes pervious areas and impervious lot areas which drain to on-site soakwells.

Table 4: Modelled catchment type areas (ha)

Catchment type	9	10	15	16	Total
Direct connected impervious	2.44	4.50	2.89	3.34	**13.17**
Indirect connected	3.77	4.41	1.45	8.61	**18.24**
Commercial	-	-	8.40	-	**8.40**
POS/DOS	-	0.68	0.79	5.77	**7.25**

3.3.1 Stormwater storage

The stormwater management plan, including drainage areas and flow directions, is shown in Figure B. Due to space restrictions within Catchment 15, stormwater storage for this catchment is proposed to be split across a rain garden, storage in the median strip and two interconnected basins. All lots <300 m^2 in Catchment 15 are proposed to be directly connected to the rain garden, which will be sized to retain the 15 mm event run-off from these lots. Run-off from other areas will be directed towards the median strip storage and basins downstream. Storage in the Catchment 15 median strip may take the form of a median swale or underground storage cells, or a combination of the two to achieve the required detention volumes.

The estimated bioretention volumes required for retention of the 15 mm rainfall event is shown in Table 5. These bioretention volumes account for some infiltration (20-40 mm/hr) within the biofiltration areas. All biofiltration areas are at least 3% of the connected impervious area.

Table 5: Bioretention (minor event) stormwater volumes

Catchment	Bioretention volume (m^3)	Max water depth (m)	Indicative biofiltration area (m^2)
9	295	0.5	753
10	540	0.5	1331
15 (rain garden)	46.2	0.3	240
15 (median strip storage)	29.5	0.3	-
15 (interconnected basins)	375	0.55	963
15 total	451	-	-
16	408	0.25	1750

Flood detention storages are required to limit discharge rates from the site into the Ki-it Monger Brook so as to maintain pre-development flow rates within the brook. The modelled flood storage volumes are presented in Table 6 and indicative inundation areas are shown in Figure B. As per the LWMS (RPS 2018), Catchments 9 and 10 are only required to retain the 15 mm rainfall event within a biofiltration basin. Flows exceeding this may discharge into the Ki-it Monger Brook without further flood storage.

Table 6: Flood storage (major events) stormwater volumes

Catchment	5 year ARI			100 year ARI		
	Volume (m^3)	Depth (m)	Inundation area (m^2)	Volume (m^3)	Depth (m)	Inundation area (m^2)
9	295	0.5	753	295	0.5	753
10	540	0.5	1331	540	0.5	1331
15 (rain garden)	55	0.33	260	65	0.37	284
15 (median strip)	81	0.37	-	126	0.42	-
15 (interconnected basins)	550	0.72	1152	1184	1.16	1734
15 total	686	-	-	1375	-	-
16	1114	0.62	2144	6376	1.20	12785

All basins have been assumed to have 1:6 side slopes, except for the Catchment 15 basins due to space restrictions and the requirement for all drainage infrastructure to be located outside the Conservation Category Wetland (CCW) buffer. Engineering plans for the proposed Catchment 15 basins are shown in Appendix C. The basins are proposed to be walled on one side adjacent to the sewer pump station (where public access is limited) and have 1:4 side slopes on the remaining sides. Due to the depth of the basin and steeper sides, balustrading may be required around the basins and it is anticipated that a water safety audit will be required following final design and construction of these basins.

The basin for Catchment 16 has been sized as a rectangular basin that is 0.65 m deep with 1:6 batters to contain up to the 5 year ARI event to maximise usability of the District Open Space. Events greater than the 5 year ARI will overtop the basin and inundate a much larger area comprised of the sporting fields proposed for that location. The larger flood area has been modelled at 1:20 batters with a maximum water depth of 0.55 m (resulting in a maximum water depth of 1.2 m within the basin area). However, this aspect of the design will be further refined at detailed design stage to optimise POS useability (e.g. the 100 year inundation area could be increased to reduce water depth).

Drainage areas will be integrated into POS. A landscape concept plan for the town centre is shown in Appendix D.

3.3.2 Discharge rates

The modelled peak discharge rates at key locations are shown in Table 7. Flow hydrographs at the LSPs final discharge point – the culvert under the Great Northern Highway – are presented in Figure 1 and show that the peak post-development discharge from the LSP site has been attenuated to pre-development conditions.

Table 7: Discharge rates at key locations

Discharge location	100 yr ARI 6 hr storm – peak discharge rate (m^3/s)
Catchment 9	1.76
Catchment 15	2.67
Great Northern Highway	11.89

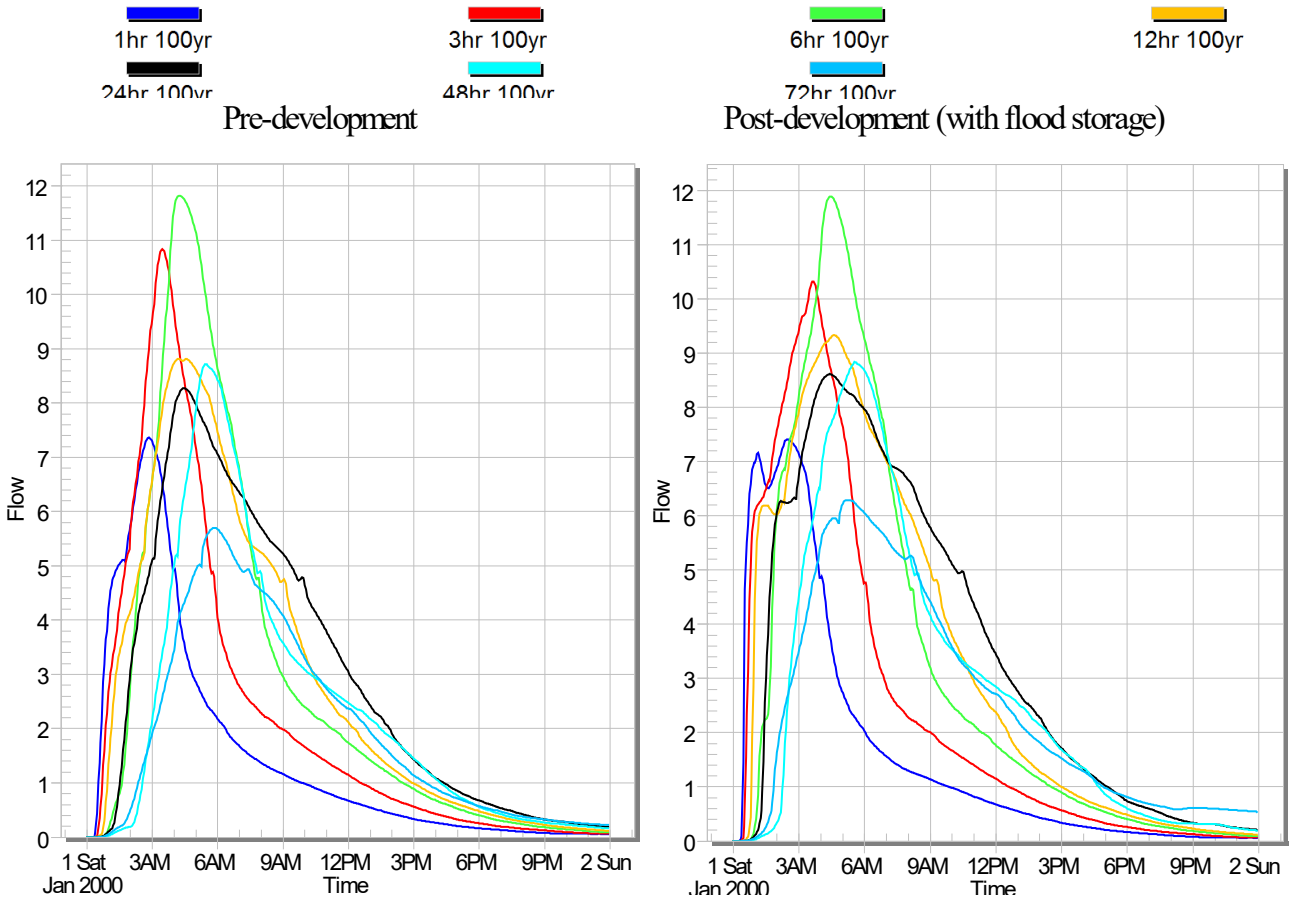

Figure 1: Great Northern Highway culvert – flow (m^3/s)

4 CONCLUDING REMARKS

The Precinct Plan for the Kingsford Town Activity Centre proposes some changes to the layout that was modelled as part of the Local Structure Plan and Local Water Management Strategy. The changes result in some modifications to stormwater catchment boundaries and the breakdown of land uses and lot types. In terms of the proposed drainage design, the key change is the distribution of stormwater storage volumes within Catchment 15 which is now more spatially constrained due to a combination of the layout changes, the location of a sewer pump station within the POS area that was previously designated as drainage, and Conservation Category Wetland (CCW) buffer area constraints.

As detailed herein, the LWMS stormwater model has been updated with focus on the town centre catchments and drainage areas. Critical discharge points from the town centre have been modelled to achieve the overall LWMS drainage strategy and criteria, and drainage requirements within the Town Activity Centra have been defined. Due to the dynamic nature and uncertainty in the subdivision layout of the upstream catchments outside the town centre, drainage areas within those catchments have not been re-sized as part of this exercise. However, guidance has been provided within this addendum on estimated upstream catchment areas and area-based discharge rates. Design of the drainage areas within upstream catchments will be refined during detailed design once the proposed subdivision layout and catchment boundaries are confirmed.

5 REFERENCES

City of Swan 2013, *Stormwater Drainage Plan – Customer Checklist*, Planning Application, last updated 06 May 2013.

RPS 2018, *Local water management strategy: Bullsbrook Landholding*, prepared for Amex Corporation Pty Ltd, report ref. EWP13024.007 Rev 4, 2 May 2018.

MEMO

Date: 30 June 2021
Regarding: Kingsford town centre - Bullsbrook

Figures

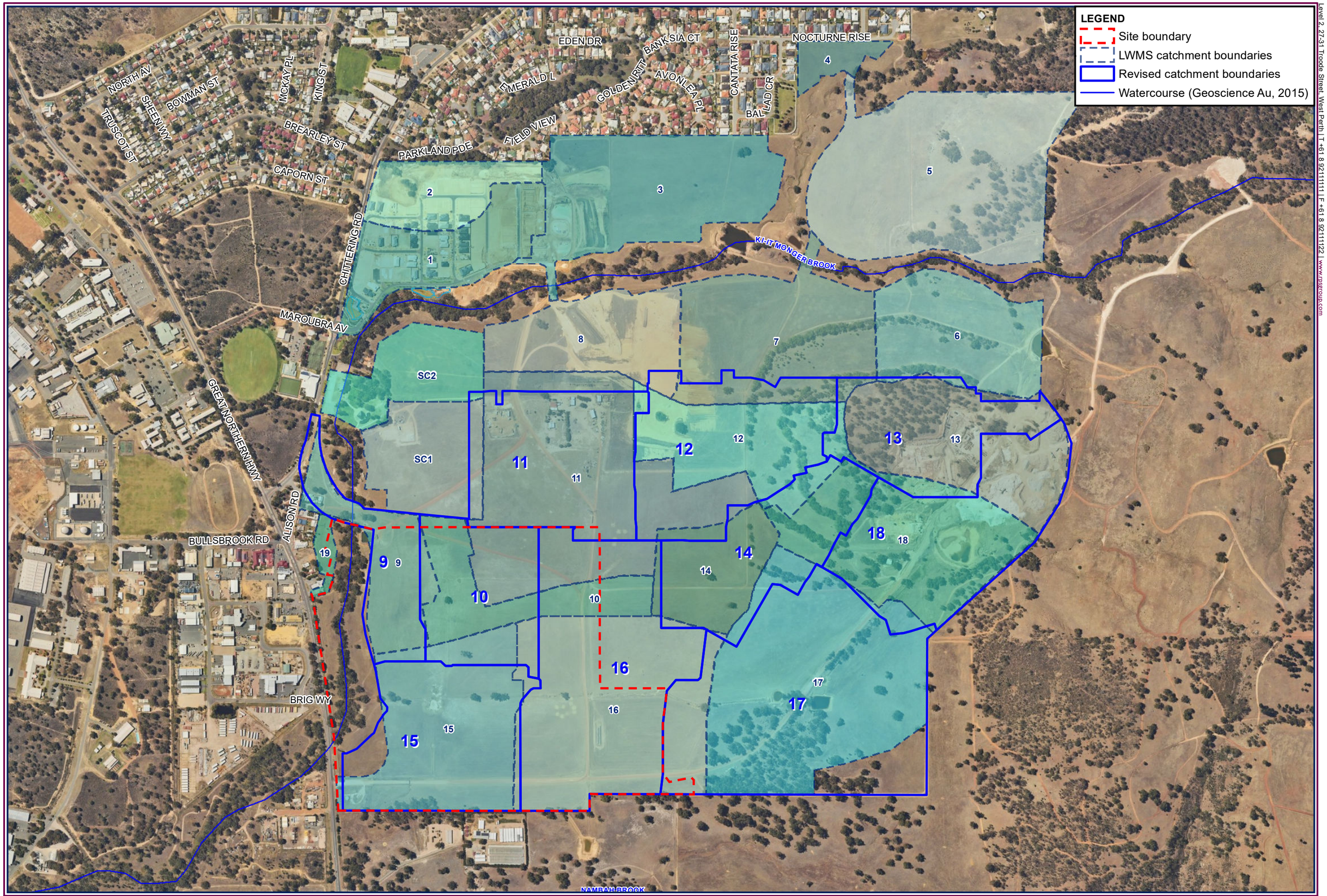

Figure A

Stormwater catchment plan

GDA 1994 MGA Zone 50

0 100 200 400 m

Project Number: EWP13024.017
Date: 22.06.2021
Scale: 1:8,000 @ A3
Created by: JS
Source: Orthophoto - Nearmap, February 2021

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Document Path: G:\Jobs\D Jobs\D13024 - Bullsbrook Due Dilligence\ArcGIS\Figures EWP13024-017\EWP13024.017_G_Fig A_Catchment Plan_20210622.mxd

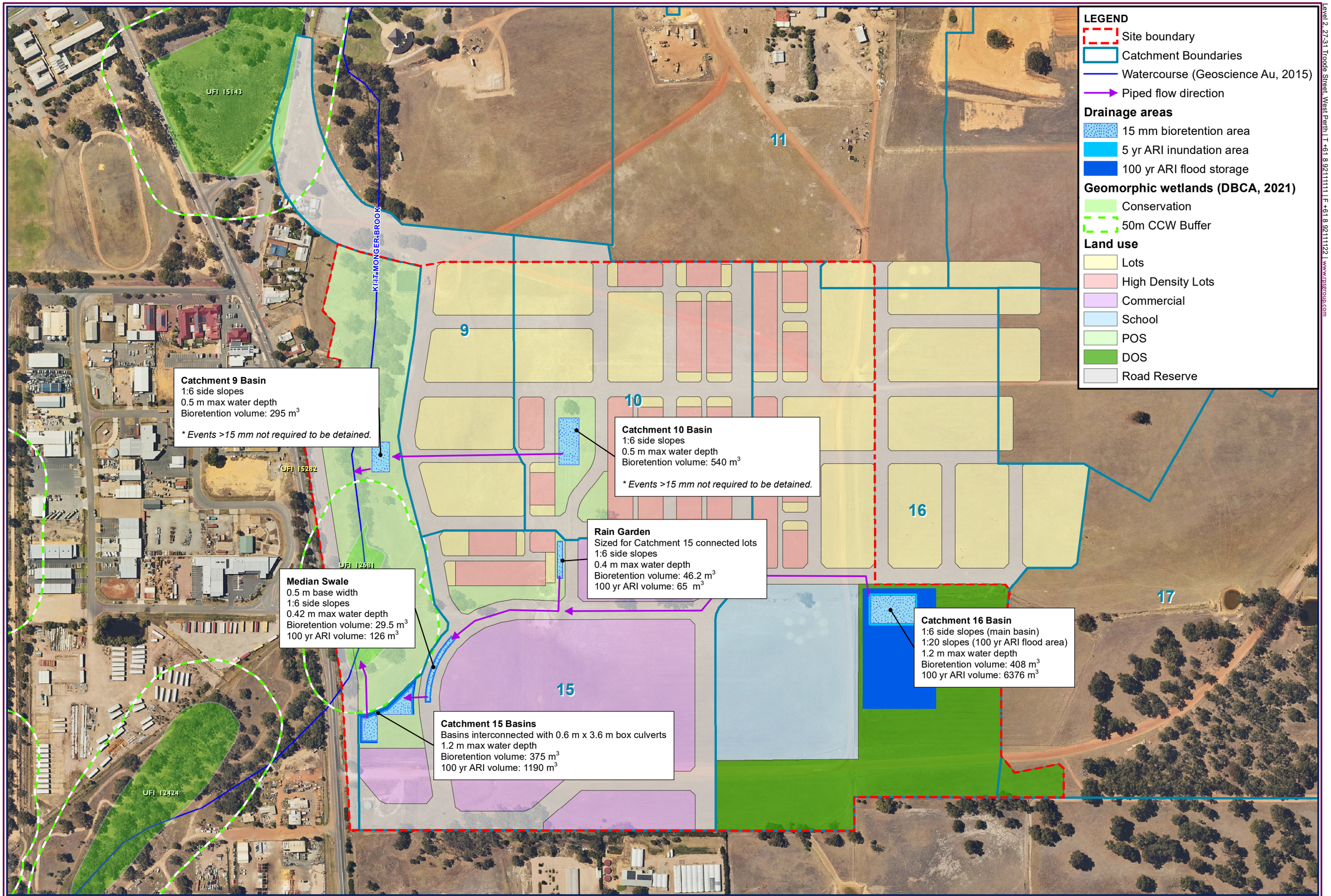

Figure B

Stormwater management plan

GDA 1994 MGA Zone 50

0 50 100 200 m

Project Number: EWP13024.017
Date: 22.06.28
Scale: 1:4,000 @ A3
Created by: JS
Source: Orthophoto - Nearmap, February 2021

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MEMO

Date: 30 June 2021
Regarding: Kingsford town centre - Bullsbrook

Appendix A
Kingsford town centre plan

N

LEGEND

ACTIVITY CENTRE BOUNDARY

ZONES

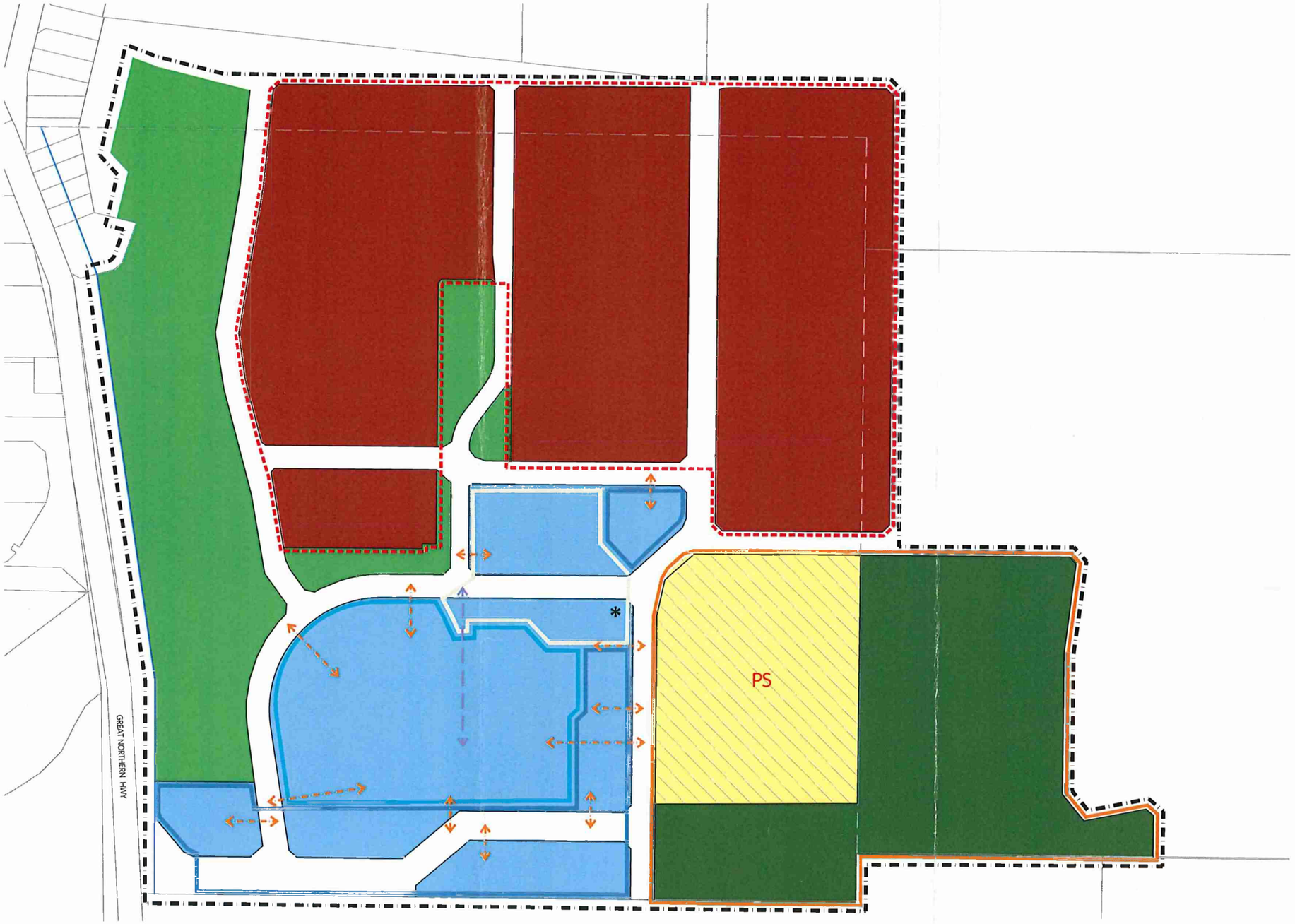
- GENERAL COMMERCIAL
- RESIDENTIAL R40-R60
- PS — PUBLIC PURPOSE PRIMARY SCHOOL
- POS/ CONSERVATION
- DISTRICT OPEN SPACE

CHARACTER AREA

- RETAIL
- MAIN STREET
- SERVICE COMMERCIAL
- RESIDENTIAL
- EDUCATION/RECREATION

OTHER

- R-CODE R80
- PEDESTRIAN LINKAGES
- VEHICLE ACCESS
- * LANDMARK BUILDING



okeland COMMUNITIES

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DWG REF: RD1301A
PROJECTION: PCG94

AERIAL PHOTOGRAPHY
SOURCE: NA
YYMMDD: NA

HATCH | RobertsDay

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ACTIVITY CENTRE PLAN
Kingsford Town Centre - Bullsbrook
City of Swan

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

MEMO

Date: 30 June 2021
Regarding: Kingsford town centre - Bullsbrook

Appendix B
Kingsford masterplan (draft)

STAGE	LOTS	DEVELOPABLE AREA (m²)	AVERAGE LOT AREA (m²)	LOTS > 500	% LOTS > 500
1	68	37025	544.5	37	54.41%
2a	3	1826	608.7	3	100.00%
2b	11	5140	467.3	3	27.27%
2c	25	11492	459.7	7	28.00%
3, 4	43	21903	509.4	17	39.53%
5a	15	8357	557.1	5	33.33%
5b	24	12388	516.2	10	41.67%
6	33	17318	524.8	17	51.52%
7	53	27553	519.9	26	49.06%
8	28	12100	432.1	6	21.43%
9	38	18356	483.1	12	31.58%
10	35	17744	507.0	14	40.00%
11a	51	26011	510.0	24	47.06%
11b	64	22860	357.2	16	25.00%
11c	54	19036	352.5	10	18.52%
12a	61	29894	490.1	29	47.54%
12b	32	12901	403.2	4	12.50%
13	36	16308	453.0	14	38.89%
14	53	28136	530.9	33	62.26%
15	38	19965	525.4	20	52.63%
16	42	22417	533.7	29	69.05%
17	49	24863	507.4	27	55.10%
18	39	18088	463.8	17	43.59%
19	51	24737	485.0	28	54.90%
20	42	21766	518.2	22	52.38%
21	14	19310	1379.3	14	100.00%
22	59	26250	444.9	26	44.07%
23	54	25225	467.1	29	53.70%
24	49	25061	511.4	31	63.27%
25	35	18089	516.8	19	54.29%
26	16	20214	1263.4	16	100.00%
27	50	26023	520.5	29	58.00%
28	35	17273	493.5	18	51.43%
29	61	30598	501.6	30	49.18%
30	73	39749	544.5	55	75.34%
31	15	17683	1178.9	15	100.00%
32	57	29695	521.0	33	57.89%
33	31	14791	477.1	18	58.06%
34	52	26196	503.8	31	59.62%
35	77	40794	529.8	51	66.23%
36	16	20918	1307.4	16	100.00%
37	33	19661	595.8	17	51.52%
38	58	24372	420.2	28	48.28%
39	68	28878	424.7	31	45.59%
40	66	29843	452.2	32	48.48%
41	13	20137	1549.0	13	100.00%
42	51	24318	476.8	24	47.06%
43	23	15390	669.1	21	91.30%
44	26	18979	730.0	20	76.92%
45	53	30235	570.5	42	79.25%
46	15	26577	1771.8	15	100.00%
47	50	27966	559.3	27	54.00%
48	46	18167	394.9	1	2.17%
49	56	19415	346.7	0	0.00%
50	46	14230	309.3	1	2.17%
51	22	34374	1562.5	22	100.00%
52	39	11949	306.4	0	0.00%
53	42	12365	294.4	1	2.38%
54	52	13581	261.2	0	0.00%
TOTAL	**2441**	**1266490**		**1156**	

LEGEND

45% FADE

▨	RESIDENTIAL GROUPED HOUSING
▨	RESIDENTIAL
▨	LIFESTYLE
▨	RESIDENTIAL TOWN CENTRE

DEVELOPMENT SUMMARY

RESIDENTIAL (NET)	126.6490ha

GROSS POS

RESERVE FOR RECREATION	26.3740ha
PLAYING FIELD	6.0076ha
CONSERVATION	12.3286ha

NOTE: RESERVE FOR RECREATON REQUIRES SEPARATE REVIEW

LOT TYPE	LOTS	AREA (HA)	AVE LOT SIZE	DWELLINGS
RESIDENTIAL GH	2	0.5480	2740m²	28
RESIDENTIAL	1897	94.0720	496m²	1897
LIFESTYLE	144	19.2840	1339m²	144
RESIDENTIAL TOWN CENTRE	398	12.7450	320m²	398
TOTALS	**2441**	**126.6490**	**519m²**	**2467**

LEGEND

▭	SUBJECT LAND
▭	LOT BOUNDARY PROPOSED
🟩	RECREATION (POS)
▨	ROAD RESERVE OPEN SPACE / DRAINAGE
↔	GREEN LOOP
▨	GENERAL COMMERCIAL
🟨	PUBLIC PURPOSE (PRIMARY SCHOOL) CORE
- - -	CONSERVATION BUFFER
🟥	ROAD WIDENING
●	EXISTING TREE (VALUE - LOW)
●	EXISTING TREE (VALUE - MEDIUM)
●	EXISTING TREE (VALUE - HIGH)
⬚	SACRI LAND SWAP - SUBJECT TO FINALISATION

okeland COMMUNITIES

AERIAL PHOTOGRAPHY
SOURCE: NEARMAPS
YYMMDD: 170827

CADASTRAL INFORMATION
SOURCE: MNG
YYMMDD: 161017
DWG REF: 97797de-006a
PROJECTION: PCG94

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SIZE A0_1:2500
0 metres 25 50 75 100 125

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
G	REVISE TWN CNTRE AND CALCS	210311	SB	AB
F	MODS TO NTH OF BROOK + TC	210305	SB	AB
E	INCREASE GEN COM SITE AT ENTRY	210215	SB	TT
D	REVISED CONCEPT DESIGN/CALCS.	210209	SB	AB
C	TC, 11C,23,37,41,44 & 47 UPDATED	200911	SB	DRAFT
B	INCLUDE ALL OTHER CALCS	200903	SB	DRAFT
A	BASE PLAN	200827	SB	AB

DRAFT

MASTERPLAN
Bullsbrook
City of Swan

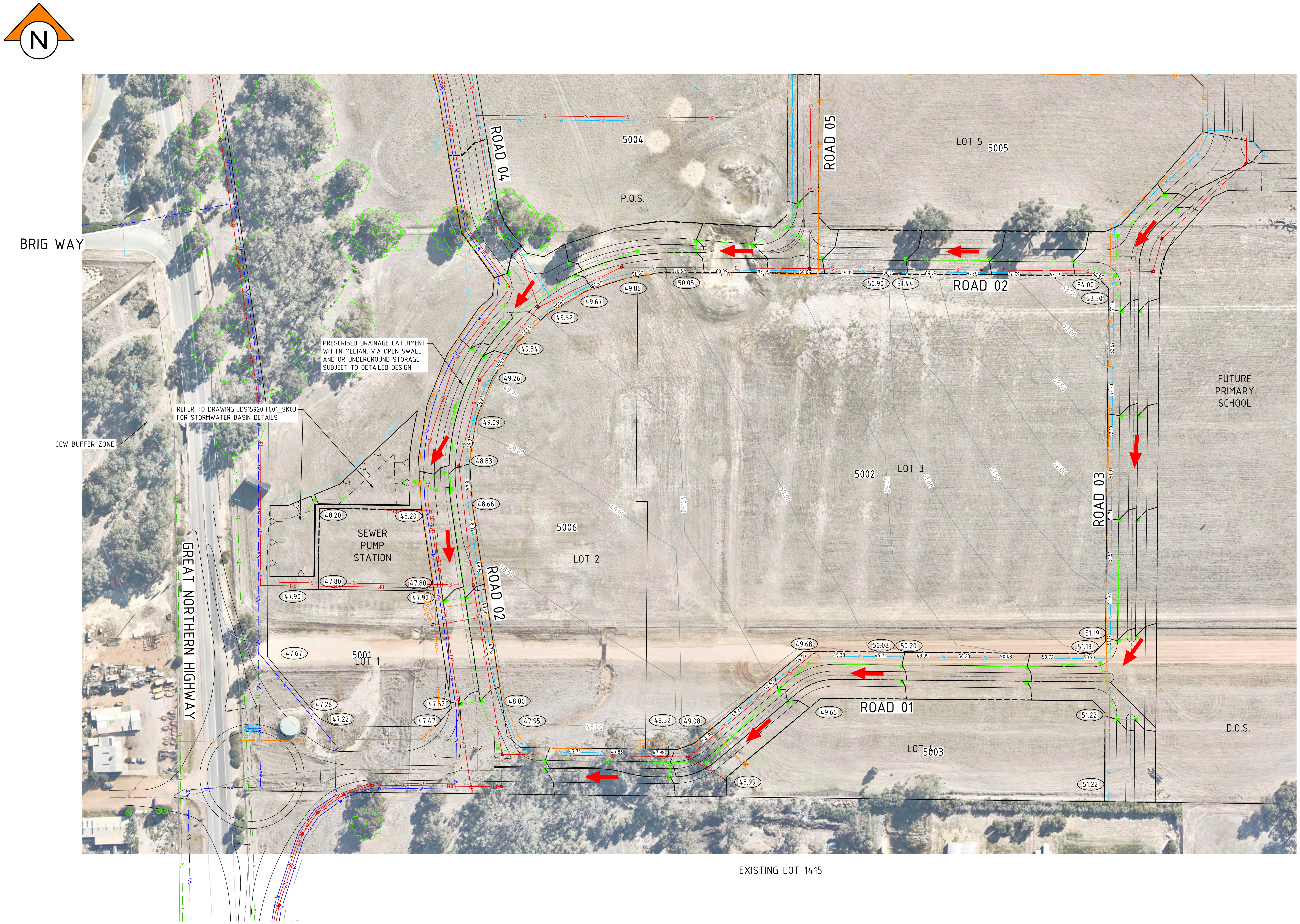
REF NO.	DRAW NO.	REV.
AMX BUL	**RD1 193**	**G**

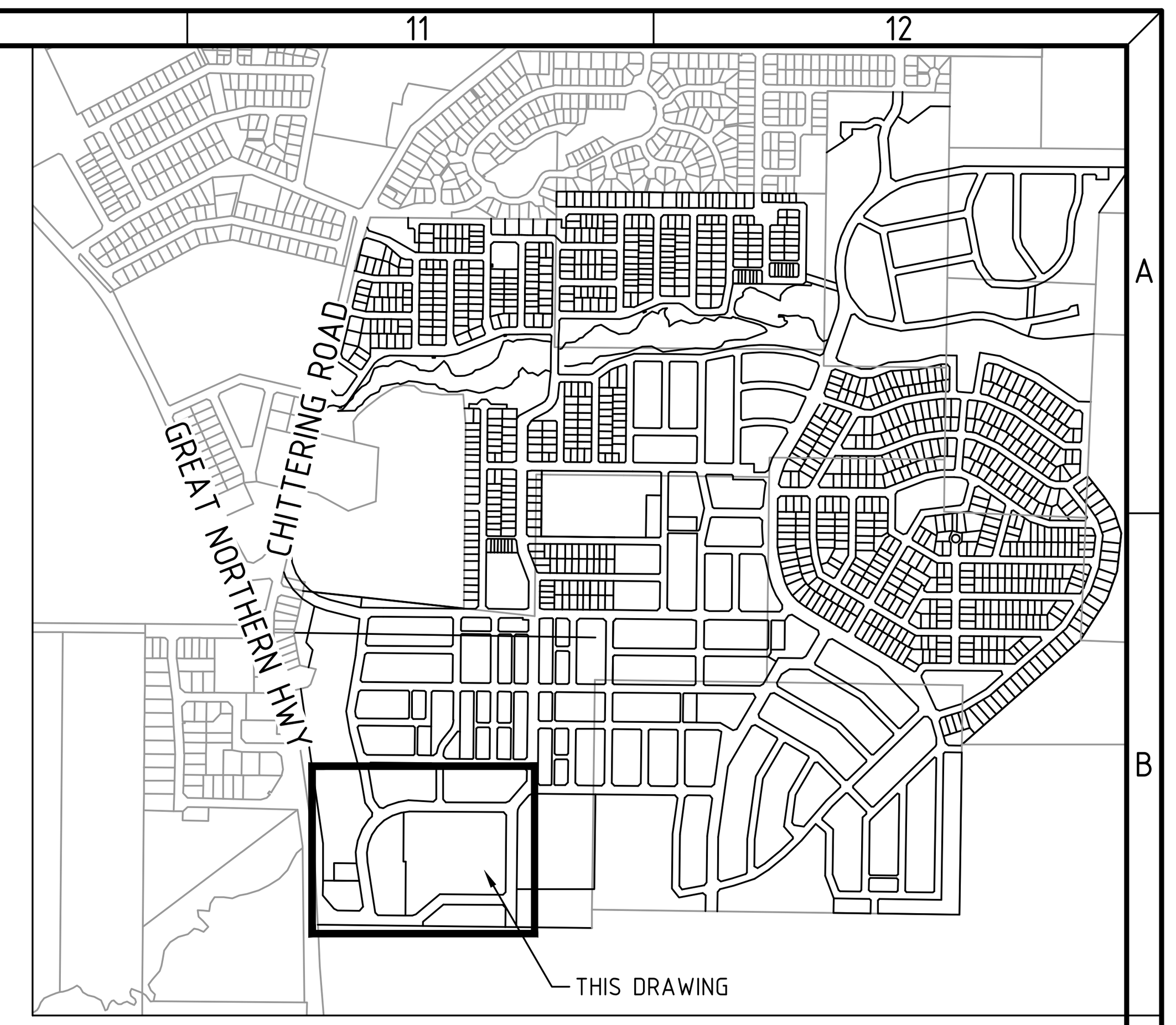
DISCLAIMER: ISSUED FOR DESIGN INTENT ONLY. ALL AREAS AND DIMENSIONS ARE SUBJECT TO DETAIL DESIGN AND SURVEY

MEMO

Date: 30 June 2021
Regarding: Kingsford town centre - Bullsbrook

Appendix C
Engineering plans





LOCALITY PLAN
SCALE: NTS

LEGEND

- PROPOSED ROAD
- PROPOSED/FUTURE SEWER
- PROPOSED SEWER RISING MAIN
- PROPOSED/FUTURE WATER
- PROPOSED DISTRIBUTION WATER MAIN
- EXISTING DISTRIBUTION WATER MAIN
- PROPOSED DRAINAGE PIT AND PIPE
- EXISTING TELSTRA
- PROPOSED HV ELECTRICAL CABLE
- EXISTING TREE TO BE PROTECTED
- PROPOSED VERGE SPOT HEIGHT
- PROPOSED FINISHED LOT SPOT LEVEL
- PROPOSED CONTOURS (0.5m INTERVAL)
- PROPOSED TRANSFORMER AND SWITCHGEAR
- PROPOSED POWER PILLAR
- OVERLAND/CATCHMENT FLOW ARROWS

WARNING
BEWARE OF UNDERGROUND SERVICES
DIAL 1100 BEFORE YOU DIG

SCALE 1:1000 @ ORIGINAL SHEET SIZE A1

REV	DATE	DRAWN	CHECKED	APPROVED	
D	30.06.21	AP			DRAINAGE ARRANGEMENT AND BASINS UPDATED.
C	30.04.21	AP			HV POWER CONCEPT UPDATED
B	27.04.21	AP			SEWER LOT CONNECTIONS, HV POWER AND CONTOURS ADDED TO DRAWING
A	22.04.21	AP			ISSUED FOR INFORMATION

NOTE
This drawing shall be preliminary only until it is issued for Construction.

JDSi CONSULTING ENGINEERS
Level 1, 432 MURRAY STREET, Perth WA 6000
P: (08) 9227 0595 F: (08) 9227 8617

CLIENT: okeland COMMUNITIES

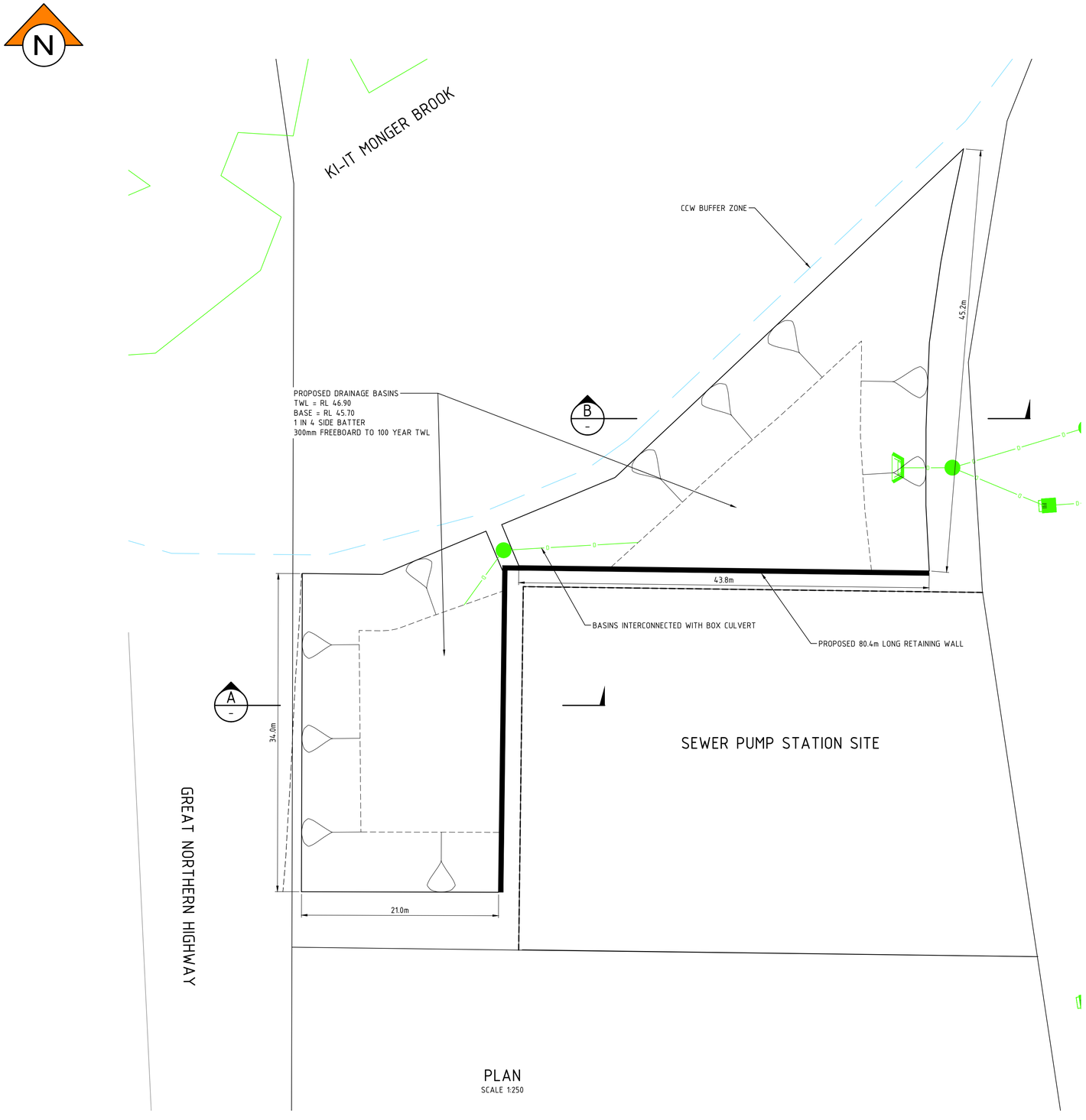
PROJECT: KINGSFORD

STAGE: KINGSFORD - BULLSBROOK TOWN CENTRE

DRAWING TITLE: PRELIMINARY TOWN CENTRE ROADS AND SERVICES LAYOUT PLAN

DRAWN: A. PANZICH
DESIGNED: A. PANZICH
PROJECT MANAGER: G. BOYD
WAPC No.: 0
SCALE @ A1: 1:1000
DATUM: AHD
CO-ORDS: PCG 94
JDSi PROJECT No.: JDS15920.TC01
DRAWING No.: SK02
REVISION: D

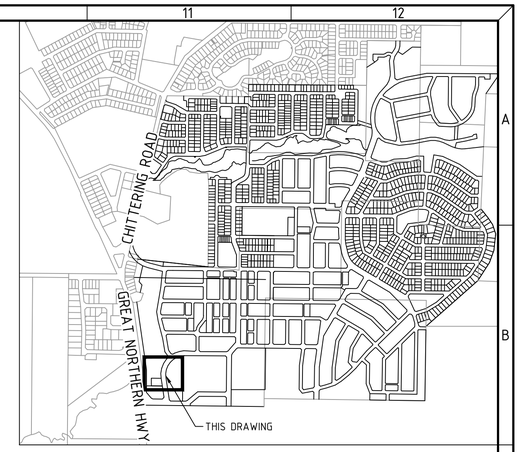
Plotted By: APanzich Plot Date: 30/06/21 - 08:57 Cad File: I:\JDS15920\JDS15920.TC01\02 CIVIL\Drawings\Sketches\JDS15920.TC01_SK02.dwg



PLAN
SCALE 1:250

0 2.5 5 10 15m
SCALE 1:250 @ ORIGINAL SHEET SIZE A1

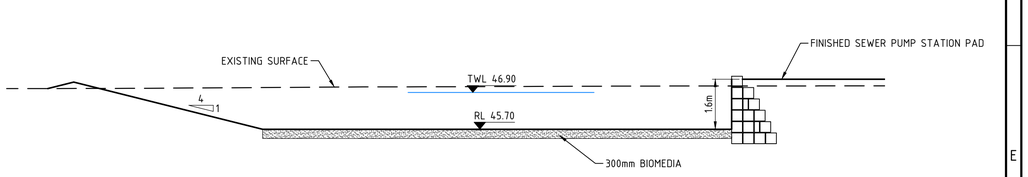
0 1 2 4 6m
SCALE 1:100 @ ORIGINAL SHEET SIZE A1



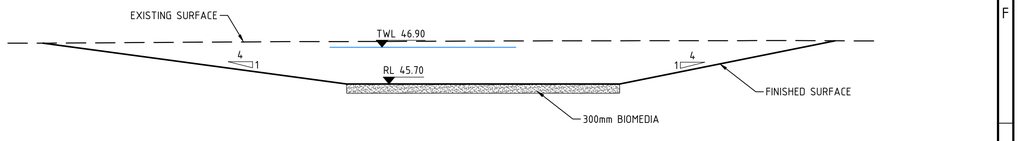
LOCALITY PLAN
SCALE: NTS

LEGEND

- PROPOSED RETAINING WALL
- PROPOSED BATTER
- EXISTING TREE TO REMAIN
- PROPOSED DRAINAGE



SECTION A
SCALE 1:100



SECTION B
SCALE 1:100

WARNING
□EWARE O□ □NDERGRO□ND SER□ICES
T□e lo□a□ion o□ □ndergro□nd □a□le□are a□□ro□□a□e onl□and □ele□e□a□□o□□ion □□o□d □e □□e□□ed on □□e. No g□aran□ee i□ gi□en □□a□all e□□□ing □a□le□and □er□□a□ are □□o□n. Lo□a□e all □ndergro□nd □a□le□ and □er□□a□e□ore □o□□□en□a□en□o□□or□ Re□er □o Wor□□a□e Reg□a□ion □□1.

DIAL1100
□E□ORE □O□ DIG

REV	DATE	DRAWN	CHECKED	APPROVED	
A	29.06.21	AP			ISSUED FOR INFORMATION

NOTE
This drawing shall be preliminary only until it is issued for Construction.

Cer□□ed □□ali□S□□e□ □o ISO 9001

JDSi CONSULTING ENGINEERS
Level 1, 432 MURRAY STREET, Perth WA 6000
P: (08) 9227 0595 F: (08) 9227 8617

CLIENT: okeland COMMUNITIES

PROJECT: KINGSFORD

STAGE: KINGSFORD - BULLSBROOK TOWN CENTRE

DRAWING TITLE: TOWN CENTRE STORM WATER BASIN ARRANGEMENT PLAN

DRAWN: A. PANZICH	WAPC No.: 0
DESIGNED: A. PANZICH	SCALE @ A1: 1:1000
PROJECT MANAGER: G. BOYD	DATUM: AHD; CO-ORDS: AS SHOWN
JDSI PROJECT No.: JDS15920.TC01	DRAWING No.: SK03; REVISION: A

MEMO

Date: 30 June 2021
Regarding: Kingsford town centre - Bullsbrook

Appendix D
Landscape concept plan

KINGSFORD TOWN CENTRE PRECINCT

Landscape concept plan

DWG **BU-TC-01**
REV **A**
DATE **30.06.2021**

0 10 20 30 40 50 m

SCALE **1 : 2000 @ A3**

emerge ASSOCIATES

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