RD great places

CITY OF SWAN STRUCTURE PLAN NO. 11

LOT 301 STOCK ROAD AND LOT 302 LAGE ROAD, BULLSBROOK

JANUARY 2020

This structure plan is prepared under the provisions of the City of Swan Local Planning Scheme No. 17.

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

26 November 2014

In accordance with Schedule 2, Part 4, Clause 28 (2) and refer to Part 1, 2. (b) of the *Planning and Development (Local Planning Schemes) Regulations 2015.*

Date of Expiry: 19 October 2025

TABLE OF AMENDMENTS

Amendment No.	Summary of the Amendment	Amendment type	Date approved by WAPC
1	Realignment of access road between Clarkson Rd and Great Northern Hwy; Redesign to comply with the requirements of SPP 3.7 – Planning in Bushfire Prone Areas.	Major	10 February 2020

Disclaimer
This document has been prepared by RobertsDay based on the document prepared by Greg Rowe & Associates dated 25.03.2014.

EXECUTIVE SUMMARY

This Structure Plan applies to Lot 302 Lage Road and Lot 301 Stock Road, Bullsbrook (the subject site). The Structure Plan area is located south-east of the existing Bullsbrook townsite; east of Great Northern Highway; north of the Walyunga National Park; and west of the Shady Hills Rural Residential subdivision.

The Structure Plan proposes development of 219 Rural Residential lots consistent with the objectives of the 'Landscape' zone of the City of Swan Local Planning Scheme No. 17.

The Structure Plan constitutes Amendment No. 1 to the approved Structure Plan No. 11, endorsed by the WAPC on 2nd December 2014.

The proposed amendment comprises a series of modifications that improve the safety, amenity and commercial viability of the development, summarised as follows:

- Provides public access to Great Northern Highway on day one of the development for residents of the Shady Hills Estate and other residents to the east of Clarkson Road.
- Introduction of a range of design measures to bring the development into compliance with the current requirements of State Planning Policy 3.7 – Planning in Bushfire Prone Areas, thereby achieving a lower bushfire risk outcome as compared to the previously approved Bushfire Management Plan and Structure Plan.
- Realigning the Rural Link Road to minimise the engineering challenges and reduce the long term City of Swan maintenance and upkeep costs associated with the current alignment.
- Realigning the future access road and intersection with Great Northern Highway from its approved location 200 metres to the south of Lage Road to the current Lage Road alignment, to comply with the approved Bullsbrook Townsite Land-Use Master Plan.

The amended Structure Plan, appendices and addenda support the proposed modifications to the approved Structure Plan.

Item	Data	Section number referenced in Part 2 of SP Report
Total area covered by SP	625.50 hectares	2.2
Area of each land use proposed: Rural Residential	 580.22 hectares	 n/a
Estimated lot yield	219 lots	1.0 / 9.1
Estimated residential density: - Dwellings per gross hectare as per Directions 2031 - Dwellings per site hectare as per Liveable Neighbourhoods	 - 0.35 du / gross hectare - 0.38 du / site hectare	n/a
Estimated population @ 2.8 pp / household	613 people	n/a

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PART ONE
IMPLEMENTATION

PART ONE – IMPLEMENTATION

1.0 STRUCTURE PLAN AREA

This Structure Plan (SP), applies to Lot 301 Stock Road and Lot 302 Lage Road, Bullsbrook, being the land contained within the inner edge of the line denoting the SP boundary shown on the Structure Plan Map (Plan No. 1).

2.0 OPERATION

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

3.0 STAGING

Staging for the project considers the provision of critical fire-fighting infrastructure, the progressive construction of the Rural Link Rd connecting Clarkson Rd and Great Northern Highway and deferring development within the buffer zone of the adjacent Midland Brick Quarry. Vehicle access staging will generally be in accordance with Figure 20 of this Structure Plan. Anticipated staging is as follows:

- Stage 1: Construction of the Rural Link Road connecting Lage Road with Clarkson Rd to a public road standard to the specifications of the City of Swan in the first subdivision stage. Ceding of Fire Station site and provision of first water tank required by the Bush Fire Management Plan;
- Stage 2: Provision of second water tank required by the Bush Fire Management Plan;
- Stage 3: Provision of third water tank required by the Bush Fire Management Plan;
- Stage 5: Subdivision and release of Lots 1 – 5 not possible until quarry / blasting operations are complete within 500m from the building envelope of each of these lots;
- Stage 7: Provision of fourth water tank required by the Bush Fire Management Plan;
- Stage 9: Provision of fifth water tank required by the Bush Fire Management Plan;
- Stage 15: Provision of sixth water tank required by the Bush Fire Management Plan;
- Stage 16: Provision of seventh water tank required by the Bush Fire Management Plan. Subdivision and release of Lots 124 and 125 not possible until quarry operations are complete within 500m from the building envelope of each of these lots;
- Stage 18: Provision of eighth water tank required by the Bush Fire Management Plan;
- Stage 19: Provision of ninth and tenth water tanks required by the Bush Fire Management Plan.

4.0 SUBDIVISION AND DEVELOPMENT REQUIREMENTS

4.1 Land Use Zones and Reserves

The Structure Plan Map (Plan No. 1) outlines land use, zones and reserves applicable within the Structure Plan area.

4.2 Lot Size

The structure plan area comprises a maximum of 219 Rural Residential lots with no lot to be less than 2ha in area.

4.3 Bushfire Prone Areas

a. Lots declared bushfire prone are in accordance with the Bush Fire Management Plan included in Appendix 10. These lots are required to be constructed in accordance with the identified Bushfire Attack Level to AS3959 requirements.

b. Relevant requirements of the Bush Fire Management Plan may be imposed as conditions of subdivision.

4.4 Midland Brick Clay Quarry Buffer Area

Subdivision/development of land with building envelopes located within the 500m Midland Brick Clay Quarry buffer area will not be supported until the Department of Mines, Industry Regulation and Safety advises the WAPC that blasting operations are no longer required to extract the clay resource and the corresponding stage of the quarry has been closed and the resource on the site exhausted.

4.5 Notifications on Title

In respect of applications for the subdivision of land the City of Swan may recommend to the WAPC that conditions of subdivision approval be imposed requiring the following notifications:

a. That the land is not currently capable of being serviced with either reticulated water or sewerage services and that additional planning and building requirements apply;

b. For onsite wastewater secondary treatment systems as required by the Government Sewerage Policy 2019;

c. To advise that the lot is within a bushfire prone area, is subject to a Bushfire Management Plan and that additional building requirements may apply;

d. Lots that abut Walyunga National Park that the Department of Biodiversity, Conservation and Attractions undertakes prescribed burning and fox baiting in the National Park; and

e. Advising the prospective purchaser of proposed Lot 7 that it contains an Aboriginal Heritage Site and advising the landowner of their responsibilities under the Aboriginal Heritage Act 1972;

f. Lots affected by the clay quarry buffer.

4.6 Building Envelopes

a. Each lot will require a building envelope to be shown on the plan of subdivision and the WAPC may require a condition of subdivision for building envelopes to be identified on a plan in consultation with the City of Swan. Building envelope specifications are to meet the following requirements:

   i. Regular in shape and do not exceed 10% of the area of the lot or 4,000m2 whichever is the lesser.

   ii. Setback to accommodate any required Asset Protection Zone specified in an approved Bushfire Management Plan.

   iii. Sited to cover the least vegetated areas of the lot, to minimise the clearing of vegetation on the property. Where possible, building envelopes should be sited to avoid the plant communities identified at Figure 12 of the Structure Plan.

   iv. Where possible, sited on soils that are suitable for conventional on-site effluent disposal.

v. No effluent disposal systems are to be located within 30 metres of any watercourse or drainage pathway identified at Figure 13 of the Structure Plan.

vi. For lots identified at Part Two, Table 4 of the Structure Plan as being located within a Visual Management Area, building envelopes are to be located a sufficient distance from the top of a ridgeline to minimise the visual impact of buildings upon the skyline.

vii. Where possible, not to contain rock outcrops or slopes exceeding 20%, in order to maximise development options within the building envelope and minimise the need for site works or alteration of natural topographical features of the site.

viii. Not located in the Strategic Development Setback Areas depicted on the Structure Plan.

b. Where a building envelope does not meet all of the above criteria, the applicant will need to demonstrate to the City's satisfaction at the building application stage that the envelope is unable to satisfy the relevant criteria due to the location of the lot and / or specific site conditions.

4.7 Onsite Wastewater Disposal

a. On-site sewerage disposal is to be in accordance with the requirements of the Government Sewerage Policy 2019.

b. In respect of on-site sewage disposal systems within 100 metres of drainage pathways, ATU's to be secondary treatment systems with nutrient removal capability.

4.8 Rural Link Road

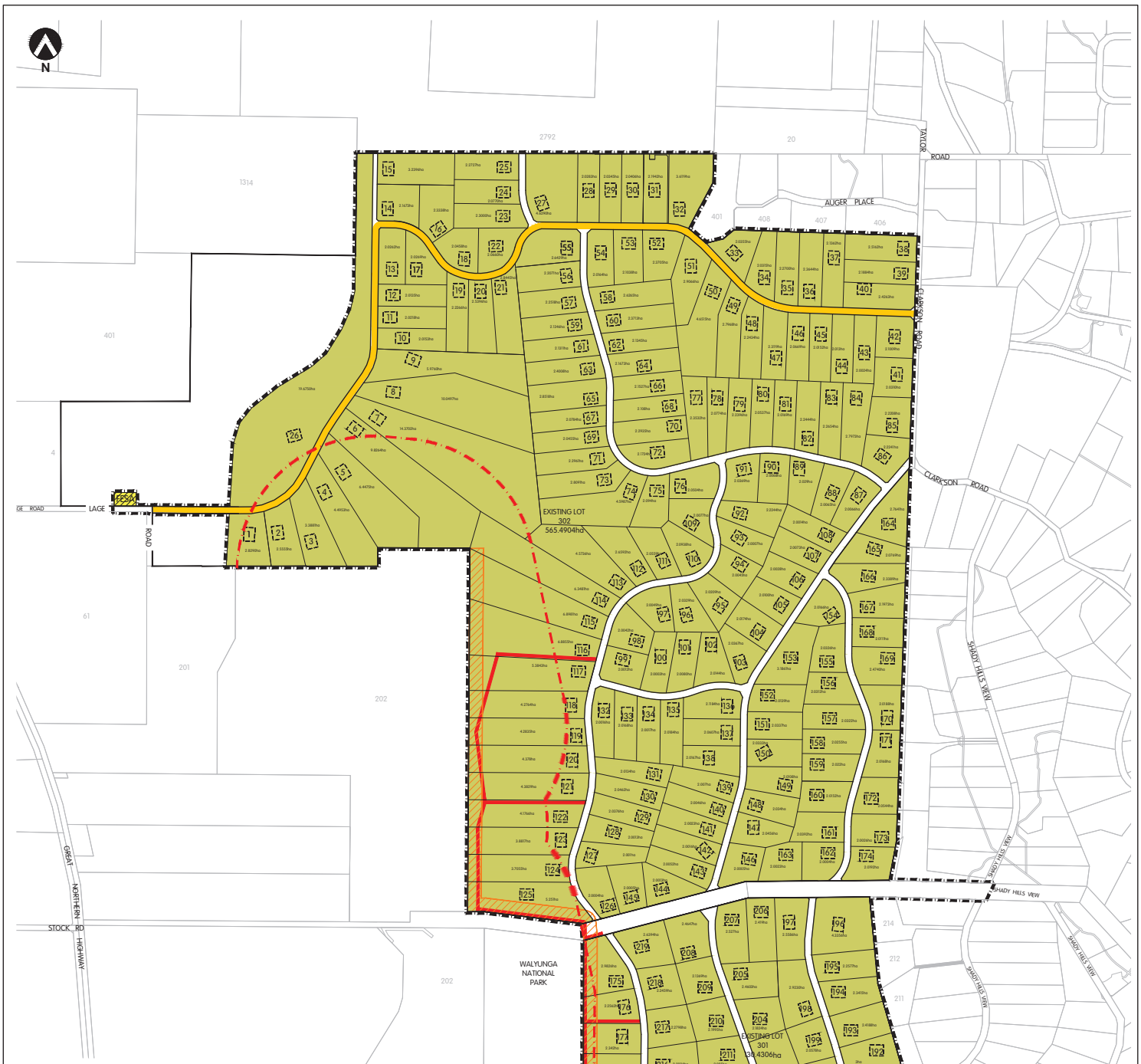
No subdivision is to occur until the through road connection between Clarkson Road and Lage Road is fully constructed and ceded to the Crown as a public road.

4.9 Inert Landfill Buffer Area

Subdivision and residential development of land within the 1000m of the Class 1 inert landfill located on Lot 20 to the north will not be supported unless the facility has closed and is no longer in use.

5.0 ADDITIONAL INFORMATION

Additional Information	Approval Stage	Consultation Required
The future Fire Station site identified on Plan No. 1 is to be ceded to the Crown as part of the first stage of subdivision, or at such later date as agreed with the City of Swan.	Condition of subdivision approval for first stage of subdivision	City of Swan
Construction of the Rural Link Road connecting Lage Road with Clarkson Rd to a public road standard to the specifications of the City of Swan in the first subdivision stage.	Condition of subdivision approval for first stage of subdivision	City of Swan
Bushfire Management Plan	Subdivision	City of Swan / DFES
Water tanks for firefighting required by the Bushfire Management Plan inclusive of access and any relevant easements are to be ceded free of cost to the City of Swan in the corresponding stages of the subdivision.	Condition of subdivision approval	City of Swan
Habitat Tree Protection Plan to be provided in accordance with the referral guidelines of the Environmental Protection Biodiversity Conservation Act as part of a subdivision application	Subdivision	DBCA



LOCAL SCHEME RESERVES

- PUBLIC PURPOSES
- FESA FIRE AND EMERGENCY SERVICES
- LOCAL ROADS

LOCAL SCHEME ZONES

- LANDSCAPE

OTHER CATEGORIES

- STRUCTURE PLAN BOUNDARY
- EXISTING SUBJECT LOT BOUNDARIES
- MAJOR ROAD - RURAL LINK ROAD
- INDICATIVE BUILDING ENVELOPE
- 199 PROPOSED LOT NUMBER
- STRATEGIC DEVELOPMENT SETBACK PER BUSHFIRE MANAGEMENT PLAN (50m)
- STRATEGIC DEVELOPMENT SETBACK PER BUSHFIRE MANAGEMENT PLAN (100m)
- 500m BUFFER TO CLAY QUARRY
- INDICATIVE FIRE SERVICE ACCESS ROUTE

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

AERIAL PHOTOGRAPHY
SOURCE: NA
YYMMDD: NA

RD great places

SIZE A3 1:15000

0 metres 150 300 450 600 750

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
F	26 + 27 BE & LOT 8/9 BNDY MOD.	191121	SB	-
E	WAPC MODIFICATIONS	191119	SB	-
D	REVISE DESIGN AND TRACKS	191118	SB	DP

STRUCTURE PLAN No.1

Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook

City of Swan

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 202**	**F**

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

PART TWO
EXPLANATORY SECTION

1.0 Introduction

This report is prepared on behalf of McRae Investments Pty Ltd as the owners of Lot 302 Lage Road and Clough Nominees Pty Ltd as the owners of Lot 301 Stock Road, Bullsbrook (both lots collectively comprising the subject site).

The purpose of this report is to amend the Approved Structure Plan No. 11 for the subject site.

In summary this Structure Plan proposes to:

- Develop the site into 219 lots for rural living purposes;
- Provide development context that includes landscape protection and bushfire management requirements;
- Provide a Rural Link Road to connect the adjacent Rural Residential Precinct to the Bullsbrook Townsite via Great Northern Highway; and
- Provide appropriate infrastructure and community services to service the development.

The proposed Structure Plan amendment comprises a series of modifications that improve the safety, amenity and commercial viability of the development, as follows:

- Provision of a road connection between Lage Road and Clarkson Road in Stage One of the development, providing residents of the Shady Hills Estate and other residents to the east of Clarkson Road with access to Great Northern Highway. This resolves the long standing elevated bushfire risk for these areas which for 30 years have had only one means of access and egress;
- Introduction of a range of design measures to bring the development into compliance with the current requirements of State Planning Policy 3.7 – Planning in Bushfire Prone Areas, including:
    - Relocation of existing building envelopes previously proposed on steep, vegetated terrain, so that the majority of building envelopes are located in areas with slopes less than 20 degrees;
    - Significantly increasing the Strategic Development Setbacks to the Walyunga National Park (from 60 to 100 metres) and to the adjacent Midland Brick Clay Quarry (from 6 to 50 metres);
    - Removal of all culs-de-sacs and battle-axe legs from the structure plan design, resulting in a total of 22 lots that are now provided with safer and compliant access than the approved Structure Plan; and
    - A threefold increase in the number of static water tanks for fire-fighting purposes from 3 to 10, distributed evenly throughout the development.
    - Introduction of a Fire Services Access Route adjacent the southern and western boundaries of the land.

This range of measures provides a significantly safer bushfire management response to achieve a lower bushfire risk outcome as compared to the previously approved Bushfire Management Plan and Structure Plan;

- Realigning the Rural Link Road (formerly Town Link Road) to eliminate the major engineering challenges and construction costs imposed by the current alignment., as well as reducing the ongoing City of Swan maintenance cost;
- Realigning the future access road and intersection with Great Northern Highway from its approved location 200 metres to the south of Lage Road to the current Lage Road alignment, to comply with the approved Bullsbrook Townsite District Structure Plan;
- Significant reduction in the number of lots with building envelopes located within the 500 metre buffer of the Midland Clay Quarry from 20 lots to only 7 lots;
- Over 10% reduction in the number of building envelopes located within Visual Management Areas from 88 to 79; and
- Modification to the proposed staging of the development, including a reduction in the number of lots per stage (now approximately 10 lots / stage) consistent with anticipated sales rates for this form of development and project feasibility.

Taken together these modifications result a significantly improved development proposal that is safer, better for the community and ultimately capable of delivery by the landowners.

2.0 Site Description and Characteristics

2.1 Location

The Structure Plan area is located south-east of the existing Bullsbrook townsite; east of Great Northern Highway; north of the Walyunga National Park; and west of the Shady Hills Rural Residential subdivision.

Lage Road, which runs off Great Northern Highway, provides access to Lot 302. Clarkson Road, which provides access to the adjoining Shady Hills subdivision, abuts the eastern boundary of the site.

Figure 1 depicts the regional location of the subject site. Figure 2 depicts the local location of the subject site.

2.2 Legal Description

The legal descriptions of the subject landholdings are contained in Table 1 below.

Table 1: Legal Description of the Subject Lots

Lot Number	Street Number	Diagram/Plan/Deposited Plan No.	CT Numbers
301	Lot 301 Stock Road	29235	1642/259
302	61 Lage Road	29235	2096/311

Appendix 1 contains copies of each Certificate of Title.

As a result of a historic realignment of boundaries that occurred before the adjacent Shady Hills area was subdivided, an Easement (Right of Carriageway), was granted in favour of Lot 302 over what is now Lot 100 Clarkson Road and Lots 156, 163, 164 and 167 to 170 Shady Hills View, Bullsbrook. The Easement is approximately 20m wide and the associated instruments (C430599 and C430600), which detail the rights and obligations of the Easement, are contained in Appendix 2.

A Right of Carriageway (Easement) in favour of Lot 301 Stock Road, Bullsbrook over Lot 302 Lage Road, Bullsbrook exists, however, is currently not used for regular access to Lot 301. The Easement was created via Transfer (G386953).

Lot 301 has a total area of 130.4ha. Lot 302 has a total area of 565.5ha. The Structure Plan area comprises a total of 625.5ha, which excludes a portion of Lot 302.

2.3 Existing Use

Lot 301 Stock Road is used for Rural Living purposes. The existing dwelling for Lot 301 is contained on proposed Lot 159 (Refer Section 9.1).

Lots 302 is currently utilised for rural purposes (grazing) and is predominantly cleared with remnants of bushland with little to no understorey. The existing dwelling for Lot 302 is contained on proposed Lot 198 (Refer Section 9.1).

Photograph 1 is a view north-west across Lot 301 and depicts its current Rural Living use. Photograph 2 is a view west across Lot 301 and depicts the scattered vegetation and existing dams on the property. Photograph 3 is a view south-west across Lot 302. The photograph depicts the existing Rural Residential development adjacent to the northern and eastern boundaries of the property, as well as depicting the predominantly cleared nature of Lot 302. Photograph 3 depicts the intersection of Clarkson Road and Auger Place in the foreground. The view westward over Lot 302 in Photograph 4 further depicts the cleared nature of the lot. Photograph 4 depicts the bend in Clarkson Road adjacent to the subject Lot 302.

3.0 Town Planning Framework

3.1 Zoning

3.1.1 Metropolitan Region Scheme

The subject site is zoned "Rural", under the provisions of the Metropolitan Region Scheme (MRS). The proposal is consistent with the MRS "Rural" zoning.

To the north, east and west, land is similarly zoned "Rural", under the MRS. Walyunga National Park to the south is reserved "Parks and Recreation", under the MRS. Further to the north-west of the subject site is the existing Bullsbrook townsite, which is a mixture of "Urban" and "Urban Deferred" zonings.

Great Northern Highway, which is approximately 300m west of the western extremity of the site and 2.7km from the eastern extremity of the site, is reserved "Primary Regional Roads", under the MRS. Further to the west, is the RAAF Pearce Aerodrome, which is reserved "Public Purposes: Commonwealth Government". In between the Aerodrome and the Highway, is the Bullsbrook town centre, which is separated from the balance of the townsite by this main arterial road. The town centre is zoned "Urban", under the MRS.

Figure 3 depicts the MRS zoning of the subject site and its surrounds.

3.1.2 City of Swan Local Planning Scheme No. 17

Lots 301 and 302 are zoned "Landscape" under the provisions of Local Planning Scheme No. 17 (LPS17). Figure 4 depicts the LPS17 zoning of the subject site and its surrounds.

Under the provisions of LPS17, the objectives of the "Landscape" zone are to:

a. *provide for low density rural residential development and associated rural-residential activities, recognizing the visual characteristics of the landscape;*

b. *ensure as far as practicable, that the environmental and landscape characteristics of the area are not compromised by development and use of the land for either rural or residential purposes;*

c. *encourage the rehabilitation of degraded areas through selected replanting of indigenous flora.*

The proposed Structure Plan is consistent with and fulfils the objectives of the "Landscape" zone, as demonstrated in the balance of this report.

The "Landscape" zone is subject to Clause 5A.1 Structure Planning Areas of LPS17. Under Clause 5A.1, the "Landscape" zone is classified as a "structure planning area", with the purpose being to "coordinate subdivision and development in areas requiring comprehensive planning". This report and accompanying material is lodged as a Structure Plan, in accordance with Clause 5A.1 of LPS17 and the deemed provisions of Planning and Development (Local Planning Schemes) Regulations 2015.

As can be seen from Figure 4, land to the west of the subject site is "General Rural", under LPS17. An expansive area of land north east and east of the subject site, which includes the Shady Hills Rural Residential area and beyond, is zoned "Rural Residential", under LPS17. Land to the north and south-west of the subject site is also zoned "Landscape".

3.2 WAPC Policies and Guidelines

3.2.1 State Planning Policy 2.5: Rural Planning

State Planning Policy 2.5: Rural Planning (SPP 2.5) was Gazetted in 2016 to establish a framework which sets out State and Local Government responsibilities for ensuring orderly and proper planning with the development of rural land. In relation to the subject proposal, the provisions of the policy apply to the WAPC's assessment of Structure Plans. The objectives of SPP 2.5 are:

a. support existing, expanded and future primary production through the protection of rural land, particularly priority agricultural land and land required for animal premises and/or the production of food;

b. provide investment security for existing, expanded and future primary production and promote economic growth and regional development on rural land for rural land uses;

c. outside of the Perth and Peel planning regions, secure significant basic raw material resources and provide for their extraction;

d. provide a planning framework that comprehensively considers rural land and land uses, and facilitates consistent and timely decision-making;

e. avoid and minimise land use conflicts;

f. promote sustainable settlement in, and adjacent to, existing urban areas; and

g. protect and sustainably manage environmental, landscape and water resource assets.

These matters were previously considered as part of the approval of the Structure Plan, which considered the majority of the objectives being broader to the Structure Plan or having been addressed through the established zoning of the land for rural residential purposes and via the City of Swan Bullsbrook Townsite District Structure Plan (BTDSP) and Bullsbrook Townsite and Rural Strategy (discussed in Section 3.3). With respect to the above objectives that require a site-specific response (e.g. land use conflict, basic raw materials, access to community services, etc), these matters are addressed in the balance of this report.

Noting that the land is zoned appropriately and already has Structure Plan approval for rural residential development, compliance with the policy measures of the SPP are detailed below:

Table 2: Compliance with SPP 2.5 Policy Measures

SPP Objective	Statement of Compliance
a. rural living proposals shall not be supported where they conflict with the objectives of this policy or do not meet the criteria listed at 5.3 (b) and (c);	Meets criteria as demonstrated below
b. the rural living precinct must be part of a settlement hierarchy established in an endorsed planning strategy;	Identified in Bullsbrook Townsite and Rural Strategy in "Landscape 2" precinct, which supports rural residential development to a minimum lot size of 2ha
c. the planning requirements for rural living precincts are that:	

SPP Objective	Statement of Compliance
i. the proposal will not conflict with the primary production of nearby land, or reduce its potential;	The subject land is in close proximity (1.5km) to the Bullsbrook townsite and available services (refer Section 8.0). Furthermore, the Bullsbrook townsite is identified to expand significantly southwards under the WAPC Outer Metropolitan Perth and Peel Sub-Regional Strategy (2010) and the BTDSP to abut the Structure Plan area. With this urban expansion, significant upgrades to education, health, community and shopping services are proposed; ensuring even higher accessibility of the subject development to urban standard infrastructure and services in the medium term
ii. the proposal will not conflict with the primary production of nearby land, or reduce its potential;	Surrounding land identified for rural residential or future residential
iii. areas required for priority agricultural land are avoided;	Complies
iv. the extent of proposed settlement is guided by existing land supply and take-up, dwelling commencements and population projections;	Considered as part of local strategic planning instruments
v. areas required for urban uses are avoided;	Amended Structure Plan now excludes land north of Lage Rd identified for future residential (BTDSP)
vi. water supply shall be as follows – - where lots with an individual area of four hectares or less are proposed and a reticulated water supply of sufficient capacity is available in the locality, the precinct will be required to be serviced with reticulated potable water by a licensed service provider. Should an alternative to a licensed supply be proposed it must be demonstrated that a licensed supply is not available; or - where a reticulated supply is demonstrated to not be available, or the individual lots are greater than four hectares, the WAPC may consider a fit-for-purpose domestic potable water supply, which includes water for fire fighting. The supply must be demonstrated, sustainable and consistent with the standards for water and health; or - the development cannot proceed if an acceptable supply of potable water cannot be demonstrated;	Complies, see Section 7.1
vii. electricity supply shall be as follows – - where a network is available the precinct is to be serviced with electricity by a licensed service provider, or - where a network is not available, the precinct is to be serviced by electricity from renewable energy source/s, by a licensed service provider, and this has been demonstrated;	Complies, see Section 7.7

SPP Objective	Statement of Compliance
viii. the precinct has reasonable access to community facilities, particularly education, health and recreation;	Complies, see Section 8.1
ix. the land is predominantly cleared of remnant vegetation, or the loss of remnant vegetation through clearing for building envelopes, bushfire protection and fencing is minimal and environmental values are not compromised;	Complies, see Sections 4.6, 4.7 and 4.9
x. the proposal demonstrates and will achieve improved environmental and landscape outcomes and a reduction in nutrient export in the context of the soil and total water management cycle, which may include rehabilitation as appropriate;	Complies, see Sections 4.6, 4.7 and 4.9
xi. the land is capable of supporting the development of dwellings and associated infrastructure (including wastewater disposal and keeping of stock) and is not located in a floodway or an area prone to seasonal inundation;	Complies, see Section 4.4
xii. the land is not subject to a separation distance or buffer from an adjoining land use, or if it is, that no sensitive land uses be permitted in the area of impact;	Complies, see Section 3.2
xiii. the lots can be serviced by constructed road/s capable of providing access during all weather conditions, including access and egress for emergency purposes; and	Complies, see Section 7.5
xiv. bushfire risk and natural hazards can be minimised and managed in accordance with State policy, without adversely affecting the natural environment. Proposals in areas of extreme bushfire risk will not be supported;	Complies, see Section 5.0
d. development standards for rural living zones are to be included in local planning schemes;	n/a
e. further subdivision of existing rural living lots into smaller parcels is not supported, unless provided for in a local planning strategy and/or scheme; and	n/a
f. rural strata proposals with a residential component are considered to be rural living and will be considered in accordance with the criteria listed at clauses 5.3 (a), (b) and (c) of this policy.	n/a

3.2.2 Rural Planning Guidelines

The Rural Planning Guidelines (2016) were prepared to assist Local Authorities with preparing local rural strategies, assessing re-zonings for rural residential development and considering structure plans within the Perth Metropolitan Region. The Guidelines identify that in addition to the matters required by the deemed provisions of the Planning and Development (Local Planning Schemes) Regulations 2015, Structure Plans should also consider:

- the type and scale of agricultural land uses or rural pursuits that should be permitted;
- minimum development standards (e.g. for repurposed and second-hand dwellings or the use of sea containers);
- regulations and guidelines on the keeping of animals;
- clearing, land management and environmental controls including nutrient export risk management;
- the identification of either a building envelope, or building exclusion area on each lot;
- the restriction of development to only one dwelling per lot;
- any scenic landscape and/or conservation attributes;
- bushfire risk, including a separate water supply for fire fighting. Note that areas of extreme bushfire risk should not be considered for rural living, in accordance with the requirements of State Planning Policy 3.7: Planning in Bushfire Prone Areas; and
- whether the land is seasonally inundated or within a floodplain (floodway or flood fringe).

All of these issues are satisfied and addressed in detail in this report and accompanying material through compliance with the City's suite of policy requirements applying to rural residential development.

3.2.3 State Planning Policy 2.4 Basic Raw Materials Policy

The WAPC's Basic Raw Materials State Planning Policy No. 2.4 (SPP 2.4) was Gazetted in 2000 to ensure important resources are protected for future extraction. The Landscape Structure Plan area contains one Priority Resource Location, being a disused hard rock test pit on Lot 302 Lage Road, and is adjacent to another, being the Midland Brick clay quarry protected on Lots13, 56 and 1010 Great Northern Highway. Figure 5 identifies the extent of the hard rock resource protection area and the three stages of the Midland Brick clay quarry.

3.2.3.1 Hard Rock Resource Lot 302

Substantial justification has been provided as part of the original Structure Plan approval to both the City and WAPC in support of the removal of the hard rock resource protection area as a constraint. In response to these submissions, on 25 January 2011, the WAPC determined that in its view a hard rock quarry on the subject lot would not be an acceptable land use due to adverse environmental / social impacts and having regard for a wider community / urban planning land use interface perspective.

In light of this decision by the WAPC, the hard rock resource protection area was determined not to be a constraint to development on the subject and surrounding land and, as such, no buffer was required to this protection area and no provisions regarding staging or the like are included in the Structure Plan document. The Owners have no intention of operating a hard rock quarry on the site.

3.2.3.2 Midland Brick Clay Quarry

The Midland Brick clay quarry is currently in operation on Lot 13 Great Northern Highway, Bullsbrook, with the Midland Brick landholdings comprising Lots 13, 56 and 1010. The quarry provides clay used for brick manufacture and has been operating for almost 40 years in this location. The quarry is expected to be operational over the medium to long term, with quarrying operations to gradually move to the south, away from the townsite. According to the Environmental Protection Authority's Guidance Statement No. 3 Separation Distances between Industrial and Sensitive Land Uses (2004) potential impacts for soft rock quarries include noise and dust with buffers for soft rock quarries determined on a case by case basis.

During the advertising phase of the Structure Plan, experts from the then Noise Quality Branch of the Department of Environment and Conservation considered the Quarry Noise Assessment – Bullsbrook Landscape Local Structure Plan (Ref: 8081052-01 Draft 6)– Lloyd George Acoustics (contained in Appendix 3).

In considering the above report, the Structure Plan and impacts of drilling noise, air blast noise and ground vibration associated with potential blasting at the Midland Brick clay quarry, the then DEC determined on 12 August 2010:

1. The Local Structure Plan be revised with a view to increasing the buffer distances between the Midland Brick Clay Quarry operations and the nearest residential building envelopes to at least 500 metres;
2. Where the Local Structure Plan does approve the development of residential lots within 500 metres, such development be deferred until quarry operations are complete within 500 metres of that development site.

In relation to fly rock risk associated with future blasting from the Midland Brick clay quarry, the WAPC resolved to endorse the subject Structure Plan on 25 March 2014 with a 500m buffer from the designated pit boundary of the Midland Brick clay quarry. In making this decision, the WAPC advised:

> *"The decision of the Commission affects advice to it in terms of the risk relating to flyrock and request the City of Swan to ensure that any excavation license and associated conditions for a Development Application that may be issued by the City reflects the need to mitigate the potential of any escape of the flyrock on the operation."*

The approved 500m buffer from the designated pit boundary of the Midland Brick clay quarry is depicted on Plan No. 1 for each of the three stages of the Midland Brick clay quarry. The WAPC has advised it will not support subdivision within the Midland Brick Clay Quarry buffer until such time as either the Department of Mines, Industry Regulation and Safety advises the WAPC that blasting operations have ceased and are no longer required to extract the clay resource. or the corresponding stage of the quarry has been closed. This is conditioned at Part 1, clause 4 of the Structure Plan.

The Environmental report in Appendix 4a confirms that of the impacts associated with clay quarries, noise impacts require the greatest separation from sensitive land uses, with other potential impacts of dust, vibration and fly rock able to be managed within any noise buffer.

With regard to dust, Cardno were engaged as part of the original application to undertake four months of dust monitoring at the subject site to determine if there may be potential dust emission impacts from the nearby Midland Brick quarrying operations and to investigate the potential requirement or extent of any necessary separation distances between the subject site and the clay quarry. A copy of the Cardno Dust Monitoring Report is contained within Appendix 4a as an attachment to the Environmental Component Report. The Dust Monitoring Report concludes that dust is unlikely to be a major and significant constraint to the development of the Structure Plan and that the monitoring and sampling regimes employed have not highlighted any significant exceedances of dust levels from the quarrying activities during the sampling period that would ultimately trigger the requirements for buffers to be imposed. In light of the findings of the Dust Monitoring Report, no change is required to the approved 500m buffer.

The redesign proposed in the amendment significantly reduces the number of lots with building envelopes located within the 500m buffer area, from 20 lots to only 7 lots. As per the WAPC decision, the subdivision and release of these lots will be deferred until quarry / blasting operations are complete within 500m from the building envelope of each of these lots. Table 3 (below) indicates which lots are affected by each of the three staged buffers.

Table 3: Lots impacted by Midland Brick Clay Quarry Buffer.

Lot Number	Midland Brick Stage 1	Midland Brick Stage 2	Midland Brick Stage 3
1	Yes		
2	Yes		
3	Yes		
4	Yes		
5	Yes		
124			Yes
125			Yes

3.2.4 Government Sewerage Policy (September 2019)

The Government Sewerage Policy is applicable to consideration of the Structure Plan amendment proposal. The proposed development is exempt from the requirement to connect to a reticulated sewerage service, meeting the provisions for exemption listed at Section 5.1.1 of the Policy, and on-site sewage disposal is proposed.

The proposal meets the requirements of Section 5.2 of the Policy that sets out that on-site sewage disposal may be considered where the responsible authority is satisfied that:

- each lot is capable of accommodating on-site sewage disposal without endangering public health or the environment; and
- the minimum site requirements for on-site sewage disposal outlined in this section and Schedule 2 can be met.

As per Section 7.2 of this Report, wastewater disposal from each lot will be via on-site disposal systems constructed and maintained by each individual lot owner. Each wastewater disposal system will be to the City of Swan and Health Department requirements and guidelines. This is likely to comprise anaerobic treatment units for the whole development in accordance with the Land Capability Report (Appendix 4a) and LWMS (Appendix 7a).

Section 5.2.2 of the Policy details requirements for the 'Separation of Services from Water Resources'. Relevant to the land this includes the restriction on systems within *"100 metres of a drainage system that discharges directly into a waterway or significant wetland without treatment"*. As identified in the EAR Addendum, given the majority of the drainage pathways on the subject site flow east to west down the face of the Darling Scarp and into the Ellen Brook, ATU's within 100 metres of these pathways will need to include secondary treatment systems with nutrient removal capability. This is included a requirement at Part One of the Structure Plan.

The Land Capability Assessment and LWMS accompanying the Structure Plan also recommend that a 30metre buffer from on-site sewage disposal systems be maintained to all drainage pathways. This has been achieved for most lots within the Structure Plan, with only a handful of lots having minor encroachments. This approach is consistent with the Policy which allows for review and application of smaller setbacks where a proponent demonstrates, to the satisfaction of the responsible authority in consultation with the relevant advisory agencies that the reduced setback will not have a significant impact on the environment or public health.

3.3 City of Swan Strategies

3.3.1 Bullsbrook Townsite District Structure Plan

The Bullsbrook Townsite District Structure Plan (BTDSP) was endorsed by the WAPC on April 2018 and is a strategy for the future development of Bullsbrook townsite. It is intended to provide guidance and advocacy for development of the townsite to 2031 and beyond, as the Western Australian government moves towards accommodating Perth metropolitan area's estimated population of at least 2.2 million.

The majority of the subject land lies outside of the study area, with a small portion of the western part of Lot 302 being identified as 'Future Residential'. While the Structure Plan 11 area lies wholly outside the study area, the amended design has been developed with regard to ensuring seamless integration with future development and linkages proposed in the BTLUMP.

3.3.2 City of Swan Bullsbrook Townsite and Rural Strategy

The Bullsbrook Townsite and Rural Strategy (BTRS) was approved by Council in September 2008 as part of the review of the Bullsbrook Rural Strategy and the Bullsbrook Town and Environs Plan. The majority of the subject site is located within the "Landscape 2" precinct, under the BTRS.

The BTRS supports rural residential development of the "Landscape 2" precinct to a minimum lot size of 2ha where it "can be shown to provide linkages between the 'Rural Residential' precinct and the Bullsbrook Townsite area, and are supported by local infrastructure and community services". The Structure Plan fulfils the important objective of establishing a link between the town and the existing Rural Residential areas to the east and south-east through the provision of two emergency vehicle access roads from Day One of development and the ultimate construction of the proposed Rural Link Road to provide gazetted, sealed road access. In addition to providing this link, the proposed road will also provide the opportunity for vehicles to bypass the town, which will reduce traffic through the town and along Chittering Road leading to traffic safety and movement improvements. The proposed emergency vehicle access and Link Road will significantly improve the fire safety conditions of existing Rural Residential areas to the east, which currently have no direct road access to Great Northern Highway in the event of an emergency.

In addition to the above, the BTRS requires that any proposal to develop land within the "Landscape 2" precinct must be "suitable and sustainable on the basis of land capability, environmental, civic and landscape design, social infrastructure planning and site constraints" and "should ensure as far as practicable, that the environmental and landscape characteristics of the area are not compromised by development and use of the land". All of these issues were considered and approved as part of the original Structure Plan approval, and are addressed in detail in this report and accompanying material. These requirements continue to be fulfilled and are in fact improved as a result of the proposed amendment.

3.4 City of Swan Local Planning Policies

The following City of Swan Policies are relevant to the proposal and are addressed in the balance of this report:

3.4.1 Pol-C-060 Rural Subdivision Revegetation

The City of Swan Rural Subdivision Revegetation Policy seeks to standardise approaches to revegetation on rural land during subdivision. Specifically, the Policy seeks to "ensure that degraded land in rural subdivision is revegetated, in order to provide habitat for native fauna, improve visual amenity and screening and reduce the risk of soil erosion and salinity". Where degraded land is present and revegetation required, the Policy also provides for the maintenance of revegetated areas.

Policy measures relevant to the proposal include:

- applies to the subject site as it is within the Landscape zone;
- requires revegetation of land outside of a building envelope where it is affected by erosion or adjoins a wetland / watercourse;
- requires Structure Plans to include an assessment of the need for revegetation and to show any proposed revegetation to enable Council to determine if revegetation is required; and
- where revegetation is necessary:
  - may require this as a condition of subdivision / development;
  - requires a variety and mix of species and planting density for revegetation of only local native species;
  - requires developer maintenance of revegetation for a period of 12 months before the City will recommend issue of subdivision clearances for the affected lots;
  - requires Structure Plans to identify the broad principles of revegetation and maintenance; and
  - requires Structure Plans to confirm a more detailed revegetation plan will be required at subdivision stage.

The Structure Plan Amendment reviewed the extent of revegetation that was proposed as part of the approved Structure Plan relative to the Policy objectives to reduce erosion along drainage pathways, provide screening to minimise visual impacts and Improve biodiversity and habitat values. The conclusions are included in the Environmental Assessment Report Addendum provided at Appendix 4b as follows:

- the subject site is not traversed by any major waterways as shown on the Department of Water and Environmental Regulation mapping tool, however it contains drainage pathways;
- an assessment of drainage pathways including a visual inspection (see Figure 13 and photos at Appendix 12), indicated drainage pathways are not impacted by erosion. Existing rock riffles and established vegetation prevent erosion onsite and will be maintained to ensure drainage pathways are not impacted by erosion following subdivision;
- the majority of the site comprises agricultural paddocks with scattered trees and shrubs as a result of historic grazing, however these areas are in good condition with no evidence of erosion or land degradation that requires remediation;
- where possible, roads and building envelopes have been located to retain vegetation;
- it is proposed that fencing and firebreaks will be controlled to provide a continuous vegetation corridor through the site where possible. Fencing and firebreak information will be provided to lot owners on a lot by lot basis indicating placement and material type compliant with the BMP.

On this basis of this assessment it is concluded that there is no evidence of erosion or land degradation that requires remediation or revegetation as detailed in the City's Policy.

3.4.2 Pol-C-080 Building Envelopes

The City of Swan Building Envelope Policy specifies Council's position with regard to Building Envelopes. Of relevance, the Policy:

- applies to the subject site as it is within the Landscape zone;
- requires building envelopes to be regular in shape and to not exceed 10% of the area of a lot or 4,000m2 whichever is the lesser;
- requires building envelopes to achieve the required setbacks for the Zone;
- requires building envelopes to be on the least vegetated portion of a lot;
- requires building envelopes to be sited on soils suitable for conventional effluent disposal;
- requires building envelopes to not be located within a floodplain or 100m of any watercourse of wetland;
- requires building envelopes to be located away from ridgelines;
- requires building envelopes to not contain rock outcrops;
- requires building envelopes to not be located on slopes exceeding 20%;
- enables building envelopes to be split into two parts;
- requires justification to demonstrate that the location of the lot and / or site conditions require a variation to the above criteria; and
- Provides criteria for modifications to approved building envelopes and for development outside of nominated building envelopes.

The amendment proposal generally complies with these requirements, addressed in detail in Section 9.4.

3.4.3 Pol-C-090 Keeping of Livestock

The City of Swan Keeping of Livestock Policy specifies Council's position with regard to keeping of livestock. The Policy notes that Planning Approval is required for keeping livestock (i.e. Rural Pursuit Use Class under TPS17) and that Council will generally only approve the keeping of livestock in a manner that is consistent with AGWA Guidelines. This Structure Plan has not assessed the base stocking rate applicable to each lot under the Guidelines and this will be the responsibility of each landowner at the time of applying to the City for keeping of livestock.

3.4.4 Pol-TP-126 Building and Development Standards – Rural Zones

The City of Swan Building and Development Standards – Rural Zones specifies general building and development standards applicable to all development with the Rural Zones. Of relevance, the Policy:

- applies to the subject site as it is within the Landscape zone;
- requires buildings not to detract from visual amenity;
- requires dwellings, where mains connection not available, to have a 120,000L water tank with dwellings relying on roof catchment to have no less than 130m2 of roof catchment;
- building envelopes to be stipulated on Structure Plans;
- restricts clearing except where required for building envelopes, access, hazard reduction, fire fighting, including strategic firebreaks and weed control;
- provides for the requirement for revegetation;
- requires Council approval to clearing within 30 metres of a stream, creek, watercourse, permanent / seasonal inundation area and on land with slopes < 20 %;
- notes no dams to be constructed without approval;

- notes Council's requirements with regard to keeping of livestock;
- requires a Fire Management Plan for the land;
- requires off street parking of motor vehicles; and
- requires Landscape lots to have: a minimum effective frontage of 50m and for development - a front and rear setback of 30m and a side setback of 20m.

The amendment proposal generally complies with these requirements, addressed in Section 9.0.

4.0 Site Analysis

4.1 Existing Development

Lot 301 has a total area of 130.4ha. The property has frontage to the un-constructed Stock Road in the north; Walyunga National Park in the south and west; and the Shady Hills subdivision to the east. Lot 301 is presently used for Rural Living Purposes, with a dwelling located slightly south-east of the centre of this lot, which is to be retained on proposed Lot 159. The property is currently accessed via a track on the unconstructed Stock Road, which connects to the Midland Brick clay quarry private road. Two large dams surrounded by a series of smaller dams are located in the north-east of this property. A large dam is also present centrally near the southern boundary of the site. Sporadic remnant and planted vegetation exists across the site with little to no understorey. Refer to Photographs 1 and 2.

Lot 302 is an expansive property with a total area of 565.5ha. The lot has frontage to Lage Road in the west, which provides access to Great Northern Highway. An access track presently extends from this road up and over the Escarpment. In the south, the property has frontage to the unconstructed Stock Road. The site also has frontage to Clarkson Road in its east. Lot 302 is currently utilised for rural purposes (grazing) and is predominantly cleared land with remnants of bushland with little to no understorey. The dwelling on this property is to be demolished; however, it is likely to remain in the short to medium term, as it is within the Midland Brick clay quarry buffer. Refer to Photographs 3 and 4.

4.2 Surrounding Land Uses

The Shady Hills estate, which comprises approximately one hundred and twenty lots, abuts the eastern boundary of both Lot 301 and 302. Shady Hills forms part of a large area of land directly east and north-east of the subject site that has been developed for rural residential purposes. Rural residential development is also located directly north of the subject site on Auger Place.

Lot 301 abuts Walyunga National Park along its southern and western boundaries. During the advertising phase of the approved Structure Plan, the then DEC advised that it undertakes prescribed burning and fox baiting in the National Park and recommended that future landowners be made aware of these practices.

There is a clay quarry west of Lot 302 on Lot 13 Stock Road.

Land located further north, north-west and west of the subject site and between the site and Great Northern Highway is predominantly used for rural activities. A Plant Nursery is also located to the north-west on Lot 1415. This land to the north, north-west and west is intended for Urban purposes confirming the limited primary production potential of this adjacent land.

A former quarry is located on Lot 2792 to the north-west of the subject land. A Greenwaste Recycling Facility was approved by the City of Swan on Lot 1314 Chittering Road, Bullsbrook on 1 July 2009 for a period of 5 years, but did not commence operation during the approval period. The landholding has since been acquired by AMEX and forms part of the Bullsbrook Central Structure Plan currently being considered by the City.

Figure 6 depicts surrounding land uses.

4.3 Preliminary Geotechnical Investigation

A Preliminary Geotechnical Investigation undertaken by Douglas Partners (Appendix 6), included a survey walk of the site, 40 test pit excavations, penetrometer testing and permeability testing. The Preliminary Geotechnical Investigation should be read in conjunction with this report.

The geological units of the land are indicated on Figure 7 and generally comprise Achaean granitic bedrock, schist bedrock of the Leederville formation and laterite. The Preliminary Geotechnical Investigation describes the ground condition of the Darling Plateau as generally comprising gravely sandy clay and sandy clay that overlay the granitic bedrock at shallow depths. This profile is overlain by lateritic gravel and cemented laterite and by surficial gravely, sandy, silty materials in some locations. The Study describes the soil and landform of the Darling Escarpment as gravely sandy clay of colluvial origin overlying granite, gneiss and schist bedrock at shallow depths. Details about the materials forming the soil profile of the land are contained on Page 4 of the Douglas Partner's report.

Test pit refusal was experienced on the granitic bedrock from 0.5m to 3.0m (i.e. not encountered) and averaged 1.8m across the 40 test locations. Outcropping bedrock was noted in locations across the site, particularly, in the northern part of the scarp. The Preliminary Geotechnical Investigation recommends minimising cut and excavation to address outcropping bedrock. As discussed in further detail below in Section 9.2, in June 2007 and again in 2017, the Project Team walked the site with a hand-held GPS to map road locations with the purpose, amongst others, of minimising disturbance to rocky outcrops. High resolution aerial photography was also used to locate roads and building envelopes to minimise the impact on rocky outcrops consistent with the City's Policy requirements. In addition to these measures, the Structure Plan amendment has located building envelopes out of the steeper areas of the site where rocky outcrops are more common.

The report also recommends that at the development / building application stage individual building envelopes be inspected by the home builder / their designer / their geo-technical engineer to determine the best method for footing construction to suit the house, the soil and rock conditions, the aspects and grade of the lot and the range of issues normally taken into account in designing a house. The Australian Standard AS 2870-2011 "Residential slabs and footings" recognises that footings can be placed on or near rock outcrops and in some cases where part of the foundation is on rock and another part is on soil. The Australian Standard details particular and common requirements to be adopted by the home designer. In this district, the best method for home construction is using a combination of footing types including poles, stilts, strip footings or even steel columns that are concreted or fastened to the rock.

The Preliminary Geotechnical Investigation noted that groundwater is anticipated to perch on shallow sandy clay, cemented lateritic layers and bedrock during wet months of the year. The Preliminary Geotechnical Investigation notes that by directing the water away from the proposed buildings by suitably grading the ground surface should be sufficient to protect the buildings from water and that this should be assessed at detailed design stage. The report also recommends that the home builder / their designer / their geo-technical engineer inspect the building envelope prior to commencing housing design to determine the appropriate design response (if any) to this issue.

In addition to the above, the Preliminary Geotechnical Investigation report makes preliminary engineering evaluations and further recommendations, including:

- the whole site be classified as "Class M" in accordance with AS2870 at this stage of the project;
- that "Class S" will possibly apply for some building envelopes in the lateritic areas, with further geo-technical testing to be conducted;
- further geo-technical testing be conducted on all building envelopes to confirm no dolerite dykes are located beneath the building envelopes;
- where the site classification is governed by moderately sandy clay that site classifications could be improved to 'S' or 'A' provided a suitable thickness of non-reactive materials exists or is placed over the sandy clay;
- advice on site preparation and compaction requirements as they relate to earthworks and roadworks required for the subdivision works;
- recommending a survey of the scarp area at detailed design stage to determine if there are any areas of instability; and

- particular geotechnical testing (e.g. Atterburg limits and California Bearing Ratio) along the proposed road pavement alignments in order to identify, delineate and characterise the various subgrade units.

These recommendations will be implemented as required at the relevant stage of subdivision, detailed design and development.

4.4 Land Capability Assessment

A Land Capability Assessment (included in the broader Environmental Report in Appendix 4a) was undertaken by Cardno in order to determine whether the site is suitable for rural residential development and whether it can accommodate onsite effluent disposal.

The Land Capability Assessment describes the soils and landform of the subject land and should be referred to for the detailed description. The Land Capability Assessment describes the existing environment of the subject land as:

- part of the Darling Plateau System and Swan Coastal Plain;
- containing six major soil landscape mapping units (Mambup, Myara, Dwellingup, Balgobin, Darling Scarp and Forrestfield), with eleven land units described as Ma2, Mm1, D1, D2, Bg1, Ds1, Ds2, F1, F2 and F4. The soil landscape mapping units of the land are indicated in Figure 8;
- extremely steep in portions, with grades over 40%;
- comprising soils underlying the majority of the study area being generally gravelly sandy clay and sandy clay, in turn overlying granitic bedrock at shallow depths;
- consisting of infiltration rates measured as "Moderate" across the study area;
- having no groundwater observed during test pitting; and
- exhibiting PRI values as "Moderately High" to "High" across the study area.

The Land Capability Assessment assessed the land units across the site against the six land qualities, being: 1. Waterlogging /Inundation risk; 2. Microbial Purification Ability, 3. Land Instability; 4. Ease of Excavation; 5. Flood Hazard; and 6. Soil Absorption Ability. The result of this assessment is contained within Table 4.7 of the Land Capability Assessment report. The purpose of the land quality assessment was to inform the land capability of those areas for onsite effluent disposal.

Figure 9 demonstrates the land capability mapping of the land overlayed with the Structure Plan. The mapping shows that the majority of the subject site has a "fair" potential for onsite effluent disposal with the steep scarp in the north-west of the land being a large area of "low" capability. Some smaller areas of "low" capability are found in the northern, central-west and south-western areas of the site. A small area of "high" capability is found to the immediate west of the scarp in the northern part of the land.

The Land Capability Assessment also states that the capability of the site to accommodate onsite effluent disposal systems and rural residential development can be increased through several management measures. With the implementation of the management measures the subject site will have a "high" land capability for rural residential development and onsite effluent disposal, and therefore there are no characteristics of the land that would preclude the proposed rural residential development. The management measures, which are proposed to be employed for all building envelopes, include:

- use of Aerobic Treatment Units (ATU);
- using inverted leach drains with amended soils medium in conjunction with ATU's;
- ensuring ATU's are located at least 30m from drainage pathways on the subject site; and
- excluding building envelopes from slopes >20%.

As demonstrated in Figure 9 and at Sections 4.5 and 4.9, the Structure Plan has responded to the Land Capability Assessment and recommended management measures by the use of larger lots in the steeper areas, minimising the number of building envelopes within the "low" capability areas, ensuring building envelopes are 30m from drainage pathways and excluding most building envelopes from slopes greater than 20%.

At the time of Building Licence stage, the final location of each ATU will be determined and where necessary additional treatment such as the importation of drainage media can effectively be used in areas of lower natural absorption capacity.

4.5 Slope Analysis

The topography of the locality varies markedly; with land varying from 70m AHD along the Highway (Swan Coastal Plain) up to 250m AHD along the eastern portions of the subject land (Darling Plateau). The slope of the site ranges from 0 – 40% with the majority of the site with a slope less than 15%. Steeper areas of the site, greater than 20%, are in association with steep gullies and the face of the Darling Scarp.

The Land Capability Assessment (Appendix 4a) recommends that building envelopes be located on slopes 20% or less, as slope above 20% increases the risk of soil instability, erosion and reduces the ease of excavation. Cardno undertook a Slope Analysis study which is contained in the broader Environmental Component Report in Appendix 4. Figure 10 contains the slope analysis plan indicating slopes greater than 20%. Consistent with the recommendations of both the Land Capability Assessment and the updated Bushfire Management Plan building envelopes have been relocated to avoid areas with slopes greater than 20% in most cases.

4.6 Visual Landscape

The visual landscape assessment (Appendix 4a and Addendum at Appendix 4b), undertaken by Cardno, investigates the potential visual impacts of the proposed development when viewed from major viewing locations within the locality, in order to determine if landscape management measures are required when the site is developed.

The existing landscape of the subject site is undulating, with steep slopes rising up to ridgelines, and steep gullies. The landscape character is rural with extensive cleared areas and limited native vegetation. The major landscape features include large cleared open spaces, an undulating profile and some remnant trees, particularly along drainage lines, which provide a key landscape feature. A full description of the visual landscape of the site, as well as the visual landscape of surrounding areas and viewing locations is contained in the reports prepared by Cardno (Appendix 4a and Addendum at Appendix 4b).

The visual landscape assessment considered the potential impacts of development when viewed from Great Northern Highway, Walyunga National Park / Echidna Trail, the Bullsbrook townsite, the Shady Hills subdivision and Chittering Road.

The Assessment determines that there are no visually sensitive areas on the site, with only small portions of the land classified as having potentially "moderate" visual impact. The overall impact is classified as "low".

As demonstrated at Figure 11, the larger visual management area (VMA) is in the north-western part of the site where the steeper gradients of the Darling Scarp are present (Northern VMA) and the other (smaller) area is located in the south adjacent to Walyunga National Park (Southern VMA). The lots within the two VMA's are indicated in Table 4. The amended design results in a 10% reduction in the number of building envelopes located in the VMA's from 88 to 79.

Table 4: Building Envelopes in Visual Management Areas

Visual Management Area	Lots
Northern VMA	1 to 32, 51 to 74, 77 and 113 to 115
Southern VMA	178 to 192, 201 and 214 to 216

The Northern VMA is categorised by a low visual impact and the design response on the Structure Plan has been to include a number of larger lots in this steeper area, locate building envelopes away from the top of ridgelines and highly visible elevated locations. This is considered an appropriate design response to a visual impact area designated as low.

The Southern VMA has also been responded to via larger lot sizes and elongated lots along the shared boundary with Walyunga National Park. The Bushfire Management Plan also requires dwellings to be sited a minimum 100 metres away from the interface with the National Park reducing potential impacts on external views from this area (which are considered to be infrequent) . This is considered an appropriate design response to a visual impact area designated as moderate.

The assessment recommends that in these two areas visual management measures be considered to guide layout, housing design and development. Figure 11 depicts the visual management areas (VMA) overlayed with the Structure Plan. The Cardno report and Addendum identify a number of visual landscape management measures that might be applicable to managing development within the two VMA's. The measures do not aim to prevent development from being visible, but focus on the "screening" and "blending in" of proposed development with existing landscapes. With the exception of the building materials management measure, all of the above measures have been considered in the Structure Plan layout. The measures focus on:

- the location of building envelopes to ensure that no buildings are located within vegetated drainage pathways, rocky outcrops, and on the top of ridgelines where development breaks the skyline when viewed from primary viewing locations;
- the retention of existing trees (where possible) to screen proposed development from primary viewing locations;
- the use of building materials and built form that will assist the "blending in" of proposed development with the existing landscape; and
- the orientation and layout of proposed development to ensure it is not viewed as unnatural from primary viewing locations.

In addition to these design considerations, all lots within the two VMA's will be:

- the subject of Residential Design Guidelines, which are to be implemented as a condition of subdivision approval; and
- at the building licence stage, the subject of further visual management assessment to determine if additional management measures are required in the location of building envelopes (see section 4.7).

The Residential Design Guidelines are likely to address matters such as:

- use of non-reflective materials, particularly on roofs;
- the use of eaves on windows, to shade from glare and reduce the reflection of glass;
- use of colours that blend into the current landscape (neutral colours);
- use of natural building materials, such as local soil or rock;
- minimising the use of retaining walls and terracing;
- restricting development to single storey residences (where relevant); and
- restricting the use of white fencing.

This suite of measures significantly exceeds the minimum standard established in the City's POL-C-080 Building Envelopes" Policy which in relation to visual management requires only that building envelopes are "located a sufficient distance from the top of a ridgeline to ensure that any buildings constructed will not have a visual impact upon the skyline" (this requirement is also achieved from primary viewing locations).

4.7 Flora

A Flora and Vegetation Survey undertaken by Cardno in Spring 2007 (contained in Appendix 4a) concludes the following:

- the majority of the site has limited botanical value;
- no Declared Rare Flora or Priority Flora were recorded on the subject site;
- the majority of the site was in a "Completely Degraded" condition from a vegetation perspective;
- the extant vegetation complexes found on the site are already adequately protected in proposed or existing reserves;
- the vegetation species and plant communities of the site have no intrinsic conservation values that require protection / revegetation; and
- due to the lack of native vegetation across the subject site "it is unlikely that the subject site performs any significant wildlife corridor function".

The Flora and Vegetation report found that there were four plant communities across the site with Community T3, being developed agricultural paddocks with scattered trees and shrubs dominating the land. The plant communities H1, T1 and T2 were found on the north-west portion of the site and are identified on Figure 12. The Flora and Vegetation report recommends:

- the remaining H1, T1 and T2 areas be retained (where possible); and
- the opportunity for the formation of an ecological corridor along the Darling Scarp be explored.

As recommended, the remaining H1, T1 and T2 areas are kept free of building envelopes, excepting portions of Lots 15, 20, 21, 26 and 27 where the higher order priority is to appropriately position the building envelope to minimise bushfire risk. As detailed in the Fire Management Plan in Appendix 10, strategic firebreaks and fencing restrictions will also be used to minimise the need for clearing in these areas.

As development proceeds the property will be also be progressively destocked (currently running approximately 180 head of cattle) enabling the natural re-establishment of vegetation in these steeper areas of retained vegetation.

These measures will in time improve the biodiversity values over the site and contribute to the Regional Ecological Corridor proposed in the City of Swan Local Biodiversity Strategy connecting from the east of the Bullsbrook Townsite, through the subject site and adjacent Midland Brick Quarry to Walyunga National Park.

4.8 Fauna

The fauna values of the subject site have been assessed by Cardno (Appendix 4a) primarily through the habitat values offered by the native vegetation on the subject site. As the subject site has been extensively cleared, grazed and farmed over a long period, there is limited remnant vegetation remaining, which has determined that the fauna habitat values of the subject site are limited.

Therefore, whilst the site is unlikely to hold any local or regional significance to fauna the flora retention measures detailed at Section 4.7 above will in time improve the biodiversity values over the site and contribute to an improvement in fauna habitat.

4.9 Hydrology

A Local Water Management Strategy (LWMS) for the Structure Plan was approved by the Department of Water on 22 September 2011 and is contained within Appendix 7a.

The proposed Structure Plan Amendment is supported by an Addendum (Appendix 7b) to the Approved LWMS prepared in 2017 which confirms that:

> *"The change in the Structure Plan does not impact on the water management strategies proposed (in the Approved LWMS)..... The changes to the document predominantly relate to catchments and the sizing of the basins. The changes are proposed to be incorporated through this addendum to the LWMS".*

4.9.1 Groundwater

The LWMS confirms that in the west of the site groundwater is 15m below ground surface and notes that the majority of the site is east of the Darling Scarp where groundwater is not located in proximity to the surface. Given this, the LWMS concludes that measures to manage groundwater are not required for the development.

The issue of perching groundwater on shallow sandy clay, cemented lateritic layers and bedrock during wet months of the year, as noted in Section 2.6.1 Groundwater of the Environmental Component Report in Appendix 4a, has been addressed in Section 4.3 above.

4.9.2 Drainage Pathways

The Addendum to the Environmental Component Report (Appendix 4b) identifies that the subject site is within the Swan River Surface Water Management Area which is a proclaimed area under the Rights in Water and Irrigation Act 1914 (RIWI Act). The subject site is not traversed by any waterways as shown on the Department of Water and Environmental Regulation mapping tool. The site does contain drainage pathways, typically comprising shallow valleys with no identifiable defined channel or riparian vegetation (see Figure 13). The majority of the drainage pathways on subject site flow east to west down the face of the Darling Scarp and into the Ellen Brook. The south-east corner of the subject site drains directly into the Avon (Swan) River through Walyunga National Park.

Ellen Brook is located approximately 3 km to the west of the subject site and runs north to south. Ellen Brook is one of the major tributaries of the Swan River and is believed to contribute 10% of inflow into the Swan River. Ellen Brook is a priority catchment for the Swan-Canning Cleanup Program and is the only tributary of the Swan River that is not meeting its short term target for Phosphorus (Swan River Trust 2007). The Ellen Brook catchment also includes Western Swamp Tortoise Habitat; however the subject site is not within the Western Swamp Tortoise Habitat Policy Area.

The Swan Coastal Plain Geomorphic Wetlands dataset (Hill et al. 1996) does not extend into the Bullsbrook area. There are a number of storage dams in the study area, which intersect the drainage pathways and retain flow, however there are no natural wetlands or permanent streams.

It is recommended by both the Land Capability Assessment and LWMS that a 30m buffer to building envelopes (including ATU's) be maintained to all drainage pathways. This has been achieved for most lots within the Structure Plan to maintain ecological function and water quality, with only a handful of lots having minor encroachments. In these cases ATU's will be required to be installed in the portion of the building envelope outside the recommended 30 metre setback.

Whilst the majority of existing dams will be retained with implementation of the Structure Plan, dams will be modified as required to facilitate the creation of the proposed lots and building envelopes.

4.9.3 Local Water Management Strategy

The LWMS establishes broad level designs and management measures for flood mitigation and effective stormwater management for the Structure Plan. The stormwater management objectives for the structure plan are to detain post-development peak discharge rates to pre-development rates for the 1 year, 1 hour and 100 year ARI rainfall events and minimise sediment and pollutant transport by minimising erosion during the construction period. The LWMS provides the location and size of all detention storage areas; most of which are in roadside table or swale drains while some catchments will have minor detention provided where strategic fire breaks cross streamlines.

To achieve the design objectives and criteria of the key elements of water conservation and surface water management, the LWMS:

- requires each dwelling to have a 120kL rainwater tank;
- requires each dwelling to be connected to an ATU for wastewater;
- requires each dwelling to install water efficient appliances;
- encourages the reuse of recycled water from ATU's ex-house and waterwise practices via education material to purchasers;
- requires the use of roadside table and swale drains;
- requires building envelopes not to be positioned on drainage paths;
- requires, where possible, road pavements to be flush with existing ground levels and, otherwise, pavements designed with road side swales;
- requires construction during summer;
- requires education material be provided to purchasers to encourage them to reduce the impact on the surrounding environment;
- requires building envelopes to maintain riparian vegetation; and
- requires ATU's to be positioned within building envelopes.

Whilst the LWMS provides strategies for water management within the Structure Plan area, the LWMS identifies several areas that require additional investigation as part of the implementation of the subdivision through the preparation of an Urban Water Management Plan (UWMP). The requirement for an UWMP is proposed as a condition of subdivision approval and will be required to provide further clarification on the following:

- Pre-development surface water monitoring within the study area;
- Detention storage area configurations and outlet structures;
- Implementation of water conservation strategies;
- Non-structural water quality improvement measures;
- Management and maintenance requirements;
- Construction period management strategy;
- Requirements for Aerobic Treatment Units; and
- Monitoring and evaluation program.

4.10 Culture and Heritage

4.10.1 Indigenous Heritage

In June 2007, Rory O'Connor conducted a preliminary Aboriginal Heritage analysis of the subject site (Appendix 8). The study found that ten (10) Aboriginal Sites have been previously recorded within or in close proximity to the subject site. The study recommends:

- an archaeological field survey be carried out with Aboriginal persons present during the field survey;
- in advance of any disturbance an Aboriginal consultative process should also be carried out;
- seasonal drainage pathways be left in their natural condition and included in open space (note this recommendation referred to an earlier, denser development proposal in 2007. Due to the low density nature of the development no open space is now required);
- all Aboriginal sites be left in situ; and
- if any Aboriginal sites are disturbed that Section 18 applications be made for consent for disturbance.

As per the recommendation of the Rory O'Connor report, Quartermaine Consultants undertook an Archaeological Investigation of the subject site in March 2008 with Aboriginal representatives involved in the survey (Appendix 9). The Archaeological Investigation noted that four archaeological sites are recorded on the land, being DIA ids 3956-3959. The Investigation confirms that three of the sites, being DIA ids 3956, 3958 and 3959 are stored data, with DIA id 3957 on the permanent register. The field investigation did not find any new sites and could not find any of the above listed stored data sites. The field investigation confirmed the location of DIA id 3957 and found it intact as originally recorded, however, notes it is of low archaeological significance with the Quartermaine report stating that "(i)t is of dubious nature and is not necessarily an Aboriginal site". The Archaeological Investigation recommends:

- no further archaeological work;
- the development may proceed provided any disturbance to DIA 3957 is approved under the Aboriginal Heritage Act; and
- that proponents take adequate measures to inform any project personnel that it is an offence to disturb any Aboriginal site without the permission referred to above.

As shown on Figure 14 DIA id 3957 has been included on the largest of the proposed lots - Lot 7, away from any proposed building envelope, road or lot boundary to minimise the potential for disturbance.

As earlier detailed the site contains no watercourse, but does contain seasonal drainage pathways. Consistent with the findings of the report, these are to be left in their natural condition, with building envelopes located outside of these areas.

4.10.2 European Heritage

A preliminary investigation undertaken by the project's European Heritage Consultant reveals that there are no listed historical heritage sites located within the subject site.

5.0 Bush Fire Planning

The land the subject of the Structure Plan is an area that is likely to be the subject of bushfires. The land is therefore designated as a "Designated Bushfire Prone Area" by the City of Swan. As the land is a "Designated Bushfire Prone Area", any dwelling that cannot comply with a separation distance of 100m from a bushfire hazard must comply with the requirements of Australian Standard AS3959 "Construction of Buildings in Bushfire Prone Areas".

The Approved Structure Plan was supported by an approved Bushfire Management Plan prepared by Fire Plan WA in accordance with the requirements of the (then) Planning for Bush Fire Protection Guidelines Edition 2 (2010).

In support of the Structure Plan Amendment a new Bushfire Management Plan was prepared by Strategen in 2017 to demonstrate compliance with the current statutory requirements of State Planning Policy 3.7 – Planning in Bushfire Prone Areas (Appendix 10). The more recent results of this reporting are included below in lieu of the findings of the original Fire Plan WA report.

5.1 Bushfire Hazard Assessment

Since classified vegetation has been identified within 150 m of indicative building envelope locations, BAL assessment and application of AS 3959 will ultimately be required to inform future building location, design and construction requirements. To inform detailed BAL assessment, which will need to be undertaken at the subdivision and possibly building license stages, Strategen has undertaken an indicative BAL assessment for proposed building envelopes to determine, at a strategic level, whether development compliance for location and siting of development may be achievable at future planning stages.

Lot design and building envelope location has been strategically developed as part of the Structure Plan redesign process, including significant bushfire planning input from Strategen. Strategen considers the updated Structure Plan design provides a significantly improved and safer bushfire management response compared to the previously approved Structure Plan and FMP to achieve a reduced bushfire risk to future life and property assets. Separation distances between building envelopes and the surrounding classified vegetation will be deliberately engineered through provision of Asset Protection Zones (APZs) constructed around building envelopes and maintained in a low fuel state on a regular and ongoing basis. The current width of each APZ has been determined to provide no less than a 20m separation distance and ensure each building envelope can achieve a rating of BAL–29 or lower and all future dwellings are avoided in areas of BAL–40 and BAL–FZ.

5.2 Bushfire Mitigation

The BMP assessed the Revised Structure Plan design against the acceptable solutions and performance criteria of the Planning for Bush Fire Protection Guidelines and proposed the following mitigation measures;

5.2.1 Asset Protection Zones (APZs)

Strategen has identified indicative APZs for each proposed lot based on indicative building envelope Locations. The width of each APZ has been determined as part of an indicative BAL assessment for the site, which has been undertaken at a strategic level to provide a spatial representation of how compliance with location and siting of development can be achieved as planning stages progress.

Strategen's assessment indicates that all proposed lots can achieve a rating of BAL–29 or lower through provision of compliant APZs.

Strategen recommends as a precaution that APZs be no less than 20 m wide, irrespective of the minimum separation distance required for any lot to achieve a BAL-29 rating. 20 m wide APZs are also recommended around critical infrastructure including the Telstra Tower and defence beacon in the north of Lot 302 and Defence Tower in the west of Lot 302.

5.2.2 Strategic development setbacks

Strategen recommends strategic development setbacks be provided at the interfaces with Walyunga National Park to the south (minimum 100 m setback) and the Boral Brick Quarry to the west (minimum 50 m setback) in recognition of the landscape scale bushfire risk and potential fire behaviour that may occur at these interfaces. These setbacks have been depicted on the revised Structure Plan, and will need to be reflected in detailed BMPs prepared for each subdivision application stage where relevant

5.2.3 Road verges

Following construction by the developer new road verges will need to be managed to ensure surface fuels are kept in a low threat, minimal fuel condition in accordance with Clause 2.2.3.2 (f) of AS 3959. This strategy will be the responsibility of the developer until such time that the road reserves are transferred to the City for ongoing maintenance.

5.2.4 Vehicle Access

The proposed vehicular access network outlined in the revised Structure Plan will provide a minimum of two different public emergency access routes for all proposed lots at all times, commencing from Stage 1 onwards.

This will be achieved via two linkages between Clarkson Road to the east and Lage Road/Great Northern Highway to the west through a combination of the proposed public road network and emergency vehicle access ways. This will also resolve the current legacy single access non-compliance for the adjacent east Shady Hills rural residential development, resulting in improved security of access and significant community benefits for this area. Following implementation of Stage 1 subdivisional works, the proposed access network will achieve compliance with acceptable solution A3.1.

5.2.5 Firebreak requirements

Individual lot boundary firebreaks will need to be constructed in accordance with the City of Swan annual firebreak notice in order to comply with local authority requirements, as well as acceptable solution A3.8 of the Guidelines. The developer will be responsible for constructing the firebreaks following creation of title and the respective landowners will be responsible for ongoing maintenance following lot sale.

5.2.6 Water supply

Due to the non-reticulated status of the proposed development, compliance with Guideline requirements for non-reticulated areas will need to be met in accordance with acceptable solution A4.2. This will be achieved by providing a total of nine, 50 kL static water supply tanks with a suitable hydrant or standpipe dedicated for emergency fire fighting purposes at strategic locations throughout the site. Current indicative locations ensure tanks are sited at key intersections and spaced at sufficient intervals to adequately service the entire site. Each tank will be sited within proposed public road reserves on appropriate hardstand and with provision of sufficient turn-around areas. All water tanks and associated facilities will be vested in the City of Swan.

5.2.7 Additional Considerations

The following commitments have been provided for implementation at future planning stages in order to achieve a more robust bushfire management outcome for the site (note most of these are not compliance requirements of the Guidelines or SPP 3.7):

1. Preparation of detailed BMPs to accompany each stage of subdivision application. The BMPs will be consistent with this overarching BMP where relevant and will be prepared to meet the necessary requirements of SPP 3.7 Policy Measure 6.4 in accordance with the Guidelines. Implementation of these detailed BMPs will be enforced through a condition of subdivision.
2. Provision of a 4000 m2 public purposes reserve for fire and emergency services (i.e. a future fire station) to service the local community. This is consistent with provisions made under the previously approved Structure Plan and FMP and provides significant community benefit and enhances community resilience through improved fire suppression capability, response times and emergency water supply.

3. Notification will be placed on the Title of all proposed lots through condition of subdivision to ensure all landowners/proponents and prospective purchasers are aware that their lot is subject to an approved BMP and detailed BAL assessment and specific building and management requirements apply.
4. All parties are to comply with the current City of Swan annual firebreak notice
5. Preparation of a detailed landowner guidance document to be incorporated into each subdivision stage BMP. This document will provide detailed landowner guidance for each individual lot within the relevant subdivision stage, such as APZ requirements, fuel management requirements, firebreak requirements and additional bushfire safety considerations and advice to guide ongoing management of bushfire risks in a rural residential context.

6.0 Traffic and Transport

A Traffic Assessment has been prepared by Shawmac in support of the proposed Structure Plan amendment and is contained in Appendix 11. This supersedes the original Shawmac report provided in support of the approved Structure Plan. Traffic Assessment follows the recommendations outlined in the WAPC guideline 'Transport Assessment Guidelines for Developments – Volume 3 – Subdivisions'.

6.1 Major Attractors

The site's location to the south of the Bullsbrook Townsite and to the north of Perth limits the number of attractors and generators external to the site. The major generators / attractors are likely to be the Bullsbrook Townsite, including the Pearce Airport Base, Midland and the Perth Metropolitan Area to the south. As such it is expected that in the order of 70% of all trip origins / destinations will be to the south and approximately 30% to the north.

There are not expected to be any significant internal attractors – generators associated with the proposed subdivision. There is also potential urban subdivision as outlined in the BTLUMP which would impact on Lage Road which could be developed in the future. Assessment of traffic flows on links to and from the adjacent urban development sites have been considered as part of this assessment.

6.2 Existing Roads

The site is bounded by Great Northern Highway to the west and Clarkson Road and Shady Hills Road to the east.

Great Northern Highway is classified as a Primary Distributor under the Perth Metropolitan Road Hierarchy and is a National Highway providing an important regional link between Perth and the north of the State. Adjacent to the site the Highway consists of a two lane undivided carriageway with passing lanes and channelised intersections. Speed zoning along Great Northern Highway is predominantly 100 km/h with a 60 km/h speed zone imposed through the Bullsbrook Townsite. Buffer speed zones are provided between the 100 km/h zone and the 60 km/h zone.

Chittering Road is a two lane undivided road unkerbed road with 3.5 metre wide traffic lanes and 1.5 to 2.0 metre wide unsealed shoulders. It is classified as a Regional Distributor. Within the Bullsbrook Townsite the speed zoning is 60 km/h, changing to 90 km/h east of the Hurd Road intersection.

Shady Hills Road, Clarkson Road and Taylor Road are typically 2 lane rural roads with lane widths of between 3.5 and 3.6 metres. Some sections are bounded by sealed shoulders and some sections are kerbed. Speed zoning is typically 70 km/h.

Ultimate connection will be made to Great Northern Highway via Lage Road. Lage Road is currently a single carriageway no through road. The connection of the development to Great Northern Highway via Lage Road will occur when Stage 3 is developed.

Stock Road is classified as an 'Other Regional Road' under the State's MRS and is identified as a key connection route from Great Northern Highway to Tonkin Highway extension (Northlink Project). Whilst this development does not connect directly to Stock Road its connection to Northlink is one of the main reasons some external traffic will travel through the development to travel south.

6.3 Proposed Infrastructure

The proposed road network, as indicated on the Structure Plan:

- maintains a 'Rural Link Road', that provides a key link for the development to Great Northern Highway with Lage Road. The revised structure plan has realigned Lage Road to allow the provision of a four way intersection with Dewar Road rather than the previous relocation 200 metres south to allow a T junction intersection with Great Northern Highway. The relocation to the existing Lage Road alignment is consistent with the BTDSP concept and also the City of Swan Transport Strategy;
- Provides 2 emergency vehicle access roads, being the first works to be undertaken in Stage One of the development, providing residents of the Shady Hills Estate and other residents to the east of Clarkson Road with two options for 2 wheel drive emergency access to Great Northern Highway. This resolves the long standing elevated bushfire risk for these areas which for 30 years have had only one emergency access route; and
- the construction of Stock Road to its intersection with Shady Hill View from the proposed internal roads system.

The Transport Assessment designates internal roads as 'Rural Residential street with kerb' under the City of Swan Design Specifications with a 20m road reserve, with the Rural Link Road classified as a Major Road and reserve width of 25m.

6.4 Transport Assessment

The Transport Assessment concludes that:

- A total of 219 rural residential lots would be realised and would generate in the order of 1,632 trips per day based on the WAPC traffic generation rate per dwelling of 8 which is considered very conservative;
- 2 Emergency Access routes would be provided at the start of the development preceding the Lage Road connection providing Shady Hill and the adjacent area with emergency access which is currently not available thereby improve safety for the local community;
- The induced regional traffic demand from existing rural living areas to the north and east of the site that would use the Rural Link Road and Lage Road to access Great Northern Highway is 2,246vpd. This represent 57% of the traffic generated at the intersection of Lage Road and Great Northern Highway once the development is complete;
- The ultimate development of the BTDSP will result in the development contributing approximately 10% of the total traffic to Lage Road at Great Northern Highway;
- The Lage Road connection will be provided in Stage 3 to service the development and will experience approximately 205vpd from the development and 2,246 vehicles from the existing development external to the site. Lage Road will ultimately be required to service 1,632vpd (43%) from this development and 2,246vpd (57%) from existing developments to the north and east;
- Lage Road has been realigned to its existing alignment which is consistent with the BTDSP;
- The development requires a single lane roundabout at the intersection of Great Northern Highway and Lage Road; and
- The road hierarchy and road alignment are considered appropriate for the development.

6.5 Public Transport

An existing bus service between Bullsbrook and Midland (Route 311, Timetable 91) operates along Great Northern Highway deviating through Bullsbrook Townsite using North Ave, Brearley Road and Chittering Road. From previous advice it is understood that the existing service may be enhanced if and when resources become available to provide additional capacity and frequency to serve further development and patronage from Bullsbrook.

Transperth also previously advised that if development and patronage become supportive, it may be viable to add a bus service to Ellenbrook from Bullsbrook. Medium term planning is likely to include an improved service from Bullsbrook to Midland (to serve increased patronage from Bullsbrook and other development sites along GNH).

Four school bus services currently operate in the vicinity of the site servicing the Bullsbrook District High School and as the site is greater than 4.5 kilometres from the school the rural subdivision would qualify for Transport Assistance.

6.6 Pedestrian / Cycle Networks / Multi-Use Trail

Pedestrian and cyclist facilities are not common in rural residential subdivisions as demand is expected to be low and pedestrian and cycle movements can generally be accommodated on low volume subdivision roads.

A Multi-Use Trail for horse riders, pedestrians and cyclists is proposed through the site and connecting with the existing road network to the east (Figure 16). The Multi-Use Trail Network includes provision for a future connection to the north of the subject land.

7.0 Engineering Aspects

The Approved Structure Plan was supported by an Engineering Aspects report prepared by The Civil Group which included an assessment of water supply, wastewater disposal, geotechnical aspects, stormwater drainage, road works, power supply, communications and site works.

In support of the Structure Plan Amendment an updated Servicing Report was prepared by JDSI in October 2017 (Appendix 5). The results of this reporting are included below in lieu of the findings of the original Civil Group Report.

The Servcing Report summarises the results of a review of the civil engineering issues which have influenced the form of the amended Structure Plan design and which are related to the future servicing of the rural residential development within the plan area.

The key objectives of the report are to highlight:

- Existing infrastructure assets;
- Provide advice on infrastructure requirements for the planned development;
- Demonstrate the development can be serviced in the short to medium term;
- Provide advice on the implementation of key infrastructure requirements; and
- Confirm that the existing and planned road network is capable of supporting the proposed rural residential development.

7.1 Water Supply

The Water Corporation (WC) has advised that the development is located within the current scheme planning and that a connection to water reticulation has ultimately been planned for, based on the addition of future high level tanks. WC further advised that water planning for the area has recently been reviewed in 2016 and the long term strategy for the area may change. They further advised that short term options for the development are limited to the supply capacity of the current ground tank on Chittering Road. This tank cannot supply the development with reticulated water.

In lieu of reticulated water it is proposed that each dwelling be serviced by a water storage tank of 120,000L, to be supplemented by occasional water cartage from local suppliers during extended dry periods. This is consistent with the servicing of surrounding Rural Residential estates.

7.2 Wastewater

Water Corporation has confirmed there are no long term plans to provide a gravity sewerage service to this site. Rural residential developments are generally not required to be serviced by gravity sewerage.

Wastewater disposal from each lot will be via onsite disposal systems constructed and maintained by each individual lot owner. Each wastewater disposal system will be to the City of Swan and Health Department requirements and guidelines. This is likely to comprise anaerobic treatment units for the whole development in accordance with the Land Capability Report (Appendix 4a) and LWMS (Appendix 7a).

7.3 Geotechnical Aspects

Geotechnical matters have been addressed in Section 4.3 above.

7.4 Stormwater Drainage

An updated site drainage catchment and concept plan has been prepared by JDSi and included within the Cardno LWMS and addendum. The alignments of the roads through the site are positioned to reduce the longitudinal grade (where possible) and hence minimise issues with scour and erosion. Where the longitudinal grade of the road is too steep it will be proposed to utilise standard pit and pipe drainage with kerbed roads to accommodate the stormwater runoff. Where the grades are flatter it is proposed to utilise open swales adjacent to the road pavement to convey the stormwater runoff.

The general concept to manage runoff and potential scour is to provide drainage basins, with overflow culverts under the roads, discharging to the nearby drainage line or watercourse. Generally the drainage basins will trap, store and attenuate part of the minor events, and restrict outflows back to the predevelopment flows by storage of the extra volume of runoff created by the development. The storage provided in these basins together with roof connections to rainwater tanks and infiltration (where possible) into swales alongside the high sides of the roads will provide an "at source" management of the runoff from the development. These concepts are consistent with the methods of Water Sensitive Design.

Other important stormwater management criteria to be adopted in the roadworks design are as follows:

- The effect of the 100 year ARI event for the drainage basins and culverts to be undertaken at the detailed design stage;
- The runoff generated from lots, the natural surface and roads for a variety of storm durations and return periods to be undertaken at the detailed design stage. This may involve cut off drains/swales along the front of lots to direct lot runoff away from road reserves;
- Use of low fuel landscaping with suitable species and ongoing management in a minimal fuel condition to stabilise these areas;
- Maintenance of roadside drains by slashing or mowing rather than grader trimming. Grader trimming will destroy the vegetation and rapidly lead to scour and erosion;
- Roadside drain protection and stabilisation against scour for grades exceeding 3-5%. This will depend on the soil type but may include rock pitching, revegetating or terracing with suitable rock pitching graded from 50mm to 150mm;
- Where roads exceed 5% the localised need to kerb and pipe drain these roads will be considered and a drainage connection to a drainage detention basin will then be provided; and
- A preference for sheet flow of runoff from roads rather than directing road runoff to channels. Where this is impractical then the criteria above would prevail.

It is recognised that the majority of the stormwater volume from developments, and hence pollutants, is generated from the frequent, lower intensity storms (the 1 year event is the design Average recurrence interval (ARI) for stormwater quality). The drainage basins and roadside swales are seen as a treatment mechanism to reduce pollutants associated with road runoff entering the watercourses. Sheet flow across vegetated surfaces within lots is seen as a treatment suitable for the uses associated with rural residential lots.

Runoff from road reserves will be directed to roadside table or swale drains prior to discharge to existing drainage pathways or to downstream detention areas. The storage areas will be positioned in order to avoid the concentration of flows and will aim to reinstate the sheet flow hydrology of the study area. This will reduce the potential impact of erosion and sediment transport.

7.5 Roadworks

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 Clarkson Road can be managed. This will be achieved by implementing an upgraded controlled access to the intersection of Lage Road and the GNH, complementing the existing GNH Access Strategy for the connections to GNH and will involve joint liaison with MRWA, the Owners and relevant stakeholders. The Access Strategy is currently in draft format and subject to change.

The internal roads are proposed to be to the City of Swan's standards which require a minimum 6m pavement in a 15m road reserve for urban access roads, increasing to a 7m pavement within a 20m or 25m road reserve for rural roads and local distributors. Where the longitudinal grade of the road is too steep it is proposed to utilise standard pit and pipe drainage with kerbed roads to accommodate the stormwater runoff. Where the grades are flatter it is proposed to utilise open swales adjacent to the road pavement to convey the stormwater runoff. 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.

A detailed geotechnical investigation along the proposed roads will be undertaken to assist in the roadworks design.

7.6 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 22km 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. Although Western Power Network Capacity Mapping Tool indicates that there is enough capacity to feed the estimated ultimate 219 lots, due to the capacity limitation of the existing 22kV high voltage aerial feeder and the dynamics of the power network, the Servcing Report recommends a Western Power feasibility study to further investigate the existing network capacity as development progresses. A feasibility study was undertaken back in 2010 that indicates the remaining capacity on the existing 22kV feeder adjacent to the development was approximately 4MVA, and that most of the development may be supplied from the existing surrounding infrastructure Reinforcement of the upstream 22kV feeder line, and voltage regulator may also be required as the outcome of the study. The initial development would also require a number of transformers, switchgear units and associated low voltage cable and pillar infrastructure to service the lots.

The Western Power Network Capacity Mapping Tool indicates that the forecast 2020 capacity for the area will be between 20 to 25 MVA.

7.7 Communications

NBN Co. has advised that the development can be serviced from its existing infrastructure in the vicinity of the site. It has advised that there is already permanent equipment in the Bullsbrook exchange as well as a live network as part of the Bullsbrook Townsite. Fixed and fixed wireless connections are available close to the intersection of Lage Road and the Great Northern Highway.

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.

7.8 Gas

The Bullsbrook area currently has no reticulated gas network. Reticulated gas is not considered to be an essential service and as such is not a requirement 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.

As the proposed development is a rural residential subdivision gas is not a requirement to be installed within these types of developments and as such has not been considered.

7.9 Siteworks

The previous Engineering Aspects report has confirmed that no earthworks are proposed as part of the implementation of the Structure Plan for the creation of Building Envelopes, with any earthworks to be assessed by the individual home builder's consultants.

8.0 Community Services and Infrastructure

8.1 Existing Infrastructure and Services

Based on information provided by the City of Swan, the following Table 4 summarises the community services and infrastructure available in and around the Bullsbrook townsite. Figure 17 depicts the community services and infrastructure identified in Table 5 below.

Table 5: Existing Community Services and Infrastructure in Bullsbrook

Category	No.	Name	Location	Capacity	Use	Supporting Infrastructure
Community Halls, Centres and Library	1	Picket Park Hall	5 Marouba Avenue	200 people	- Functions - Girl Guides/ Scouts - Fitness classes - Gateway Ministry	- Car parking bays (84) - Outside play area/ play equipment - Ovals
	2	West Bullsbrook Hall	Lot 11666 Brockholes Street	50 people	- Private functions - Muchea Christian Fellowship	- Car parking bays (27) - Outside play area/ play equipment - Toilet block
	3	Bullsbrook	43 Bowman Street	-	- Activity rooms - Youth centre (The Shack) - Crèche - Second-hand stall - Workshops	- Car parking bays (25) - Outside play area/ play equipment
	4	Bullsbrook Community Library	Lot 351 Chittering Road	-	- Extensive library collection - Book Club - Story Time	- Car parking bays (51) - Bus bays (3)
BMX and Skate Parks	5	Bullsbrook Skate Park	C/o Chittering Road and Marouba Avenue	-	- Recreational pursuits (Skate boarding)	- Park benches - Car parking bays - Covered picnic tables
	6	West Bullsbrook BMX Track and Play park	C/o West Road and Railway Parade	-	- Various recreational pursuits	- Car parking bays - Football goal posts - Cricket Pitch - Playground - Picnic Tables
	7	Bullsbrook (Picket Park) BMX Track	Located along Marouba Avenue, alongside Picket Park Hall	-	- Recreational pursuits (BMX)	- Picket Park Hall - Car parking bays - BMX dirt track

Category	No.	Name	Location	Capacity	Use	Supporting Infrastructure
Sporting Ovals and Pavilions	8	Picket Park Oval	5 Marouba Avenue	-	- Various recreational pursuits	- Playground equipment nest to picket hall - BBQ facilities - Gazebo's - Outdoor lighting - Tennis courts (2) - Lawn bowls courts (2) - Outdoor/ security lighting
	9	Bullsbrook Sports Club/ Pavilion	Lot 88 Second Avenue	200 people	- Meeting rooms for sporting clubs - Heart Health Club - Functions	- Car parking bays (84) - ACROD bays (4)
	10	Lowery Park Pavilion	6 Eden Drive	50 people	- Functions - Bullsbrook Playgroup - Swan Community Care Services	- Car parking bays (16) - ACROD bays (1) - BBQ facilities - Tennis Court
Parks and Reserves	11	Lowery Park	Eden Drive to the west, Field View to the south, Golden Retreat to the east	-	- Various recreational pursuits	- Playground equipment nest to picket hall - BBQ facilities - Gazebo's - Outdoor lighting
	12	Ballad Park	Ballard Park, Ballard Crescent	-	- Various recreational pursuits	- Park benches
	13	Brearley Park	Lot 8738 North Avenue, Lot 8739 Bowman Street and Lot 8740 Brearley Street	-	- Various recreational pursuits	- Park benches - Playground equipment
	14	Wally Jones Park/ Tourist Information Bay	Lot 9 Chittering Road	-	- Rest stop - Tourist centre - Various recreational pursuits	- Tourist information bay - Toilet block - Picnic tables - Benches - BBQ facilities

Category	No.	Name	Location	Capacity	Use	Supporting Infrastructure
Bushland/ Nature Reserves	15	Smith/ Chittering Road Bushland	15 Smith Road	-	- Various recreational pursuits	- Gazebo - Picnic tables and benches
	16	Burley Park	Lot 3291 Chittering Road, and Lot 3- 42 Quin Road	-	- Various recreational pursuits	- Walking trails
	17	Ashton/ Kimberley Bushland	Lot 15456 Ashton Road	-	- Various recreational pursuits	-
Golf Course	18	Chequers Golf Club	79 Sounness Drive	-	- Recreation (golf)	- Activity room - Gazebos with picnic tables and chairs - Car parking - BBQ facilities
Education Facilities	19	Bullsbrook District High school	Bordered by Chittering Road, Kimberly Street and Kind Street	- 938 students enrolled - 86 staff	- K-12 - Education (public)	- Sporting grounds
	20	Bullsbrook Pre-primary 2-3	Corner North Avenue and Kind Street	-	- Education	- Outdoor playground equipment
	21	Bullsbrook Kindergarten	25-29 Caporn Street	-	- Education	- Car parking bays (20) - Outside play area/ play equipment
	22	Bullsbrook Community Preschool and "Flying Start" childcare Centre	25-29 Caporn Street	-	- Early childhood education - Child care	- Car parking bays (20) - Outside play area/ play equipment
	23	Bullsbrook Out-of-School Centre	North Avenue	-	- Child Care - Education	- Outdoor play area
Health Services	24	Bullsbrook Child Health Clinic	25-29 Caporn Street	-	- - Child Health Clinic	- Car parking bays (20) - Outside play area/ play equipment
	25	Bullsbrook Family Medical Centre	2529 Great Northern Highway	-	- Health Care Clinic	- Communal car parking bays

Category	No.	Name	Location	Capacity	Use	Supporting Infrastructure
	26	Great Northern Highway Chiropractic Centre	2539a Great Northern Highway	-	- Health Care Clinic	- Car parking bays
Retail/ Commercial	27	Various Retail and Commercial Shops / Bullsbrook Shopping Centre	Various locations along Great Northern Highway and Bullsbrook Road	-	- Shopping/ retail - Service	- Automotive Services - Bank - Cafes / Restaurants - Hotel - Newsagency - Offices - Pharmacy - Post Office - Service Station - Shops - Take Away

8.2 Proposed Community Infrastructure and Services

The proposed Structure Plan contributes the following significant community infrastructure / services that have benefits for the broader Bullsbrook District:

» a Rural Link Road providing fire safety access for existing residents of development to the east and general accessibility benefits to the wider community;

» a monetary contribution of $4,000.00 per lot to the City of Swan for the upgrading of community infrastructure within the Bullsbrook locality to accommodate demand for such infrastructure created by the proposed development. This will be enforced by a legal agreement between the Owners and the City of Swan for the per lot contribution prior to the approval of the first stage of subdivision; and

» the ceding to the City of Swan of a 4,000m2 site for a future Fire Station as shown on Plan No. 1 as part of the first stage of subdivision (or such time as agreed with the City of Swan). Ceding of this site will generate a credit of $219,000 against the first of the $4,000.00 per lot contributions referred above.

9.0 Structure Plan Design and Description

9.1 Proposed Structure Plan

The Structure Plan No. 1 includes:

- 219 lots ranging in size from 2.0ha to approximately 14.00ha in area;
- building envelopes to restrict development to less sensitive areas (in accordance with City of Swan policy requirements) and providing for required clearing in these locations;
- a Rural Link Road, being a 25m road reserve connecting into the existing Lage Road alignment and intersecting with Great Northern Highway through to Clarkson Road on the eastern edge of the Structure Plan boundary in the first stage of subdivision;
- providing residents of the Shady Hills Estate and other residents to the east of Clarkson Road with two options for 2 wheel drive emergency access to Great Northern Highway;
- future Fire Station site of 4,000m2 (minimum dimensions of 80m by 50m) re-located to the northern side of the existing Lage Rd reserve with accessibility to services;
- appropriate infrastructure, including strategic fire fighting infrastructure (10 x water tanks); and
- construction of a Multi-Use Trail through the development.

9.2 Design Response Summary

The Structure Plan layout at depicted on Plan No. 1 has responded to the matters analysed above in Sections 1.0 to 8.0, as follows:

- a Rural Link Road has been included as per the City of Swan Bullsbrook Townsite and Rural Strategy and the recommendations of the attached Fire Management Plan (Appendix 10);
- a minimum lot size of 2ha has been maintained consistent with the City of Swan Bullsbrook Townsite and Rural Strategy, with larger lots proposed in the constrained portions of the site;
- local infrastructure, being the proposed future road connection between Great Northern Highway and Clarkson Road and the 2 x emergency access roads, drainage infrastructure, services and 9 10 x water tanks for fire fighting purposes, as per the City of Swan Bullsbrook Townsite and Rural Strategy and the Servicing Report in Appendix 5;
- community services, being the ceding of a Fire Station site of 4,000m2, as per the City of Swan Bullsbrook Townsite and Rural Strategy;
- clearing of remnant revegetation has been minimised, in accordance with the objectives of the Landscape Zone, the City's Building and Development Standards – Rural Zone Policy and the recommendations of the Environmental Component Report (Appendix 4a), by: proposing larger lots to protect the H1, T1 and T2 communities; through the use of aerial photography analysis to minimise roads, boundaries and building envelopes in areas of existing vegetation and through the application of Building Envelopes;
- building envelopes are depicted at a uniform 2,000m2, which is 10% of the smallest proposed lot, and are of regular shape in accordance with the City's Building Envelope's Policy (see Section 9.4 below);
- no building envelope is located on a slope greater than 20% in accordance with the City's Building Envelope's Policy, the attached Land Capability Assessment (Appendix 4a) and the attached LWMS (Appendix 7a);
- the setbacks of each proposed building envelope meet the requirements (i.e. 30m setback to street frontage, 20m setback to side boundaries and 30m setback to rear boundaries) in accordance with the City's Building Envelope's Policy and Building and Development Standards – Rural Zone Policy (See Section 9.4 below);
- each lot achieves an effective minimum frontage of 50m, as per the City's Building and Development Standards – Rural Zone Policy (See Section 9.4 below);
- staging has complied with the requirements of the DBCA letter dated 12 August 2010 with regard to deferring

lots within 500m of the Midland Brick clay quarry operations;

- building envelopes within the "low" Land Capability rating as defined by the Land Capability Assessment at Appendix 4a have been minimised;
- disturbance of rocky outcrops will be minimised, as recommended by the Preliminary Geotechnical Investigation (Appendix 6). The location of rocky outcrops was identified through field inspections by the Project Team and through aerial photography analysis. The Structure Plan layout has responded by minimising roads and building envelopes in the location of rocky outcrops;
- no building envelopes are located within 30m of drainage pathway as recommended by the Land Capability Assessment and Environmental Component Report (Appendix 4a) and LWMS (Appendix 7a);
- the Structure Plan layout has responded to the two proposed Visual Management Areas by including larger lot sizes / elongated lots in these locations, locating building envelopes away from ridgelines and visible elevated locations and through the proposed use of Residential Design Guidelines consistent with the recommendations of the Environmental Component Report (Appendix 4a);
- the Aboriginal Heritage site DIA id 3957 is located in the largest lot (Lot 7) clear of any road, lot boundary or building envelope, as per the Archaeological Investigation (Appendix 9);
- building envelopes are excluded OR minimised in the areas of "extreme" bush fire risk, as identified by the Fire Management Plan (Appendix 10);
- provision of Strategic Development Setbacks to exclude development within 50 metres and 100 metres to the western boundary of the site and the adjacent Walyunga National Park respectively to mitigate bushfire risk;
- the installation of nine ten x 50,000L concrete tanks in expanded road reserves of minimum dimensions 15m by 15m, as per the Fire Management Plan (Appendix 10); and
- a road reserve width of 25m for the Rural Link Road and 20m for all other roads, as per City of Swan standards reported in the Transport Assessment Appendix 11.

The design development phase of both the original Structure Plan and the proposed amendment included numerous site inspections, meetings and discussions by the Project Team. Analysis of topographic conditions (Figure 18 depicts the contours of the land) and aerial photography together with site visits to "ground truth" the analysis was used extensively. Figure 10, being the Slope Analysis in Degrees, demonstrates how the proposed road layout follows the contours of the land by minimising roads through the steeper portions of the site. High resolution aerial photography (Refer Figure 19) was utilised to minimise road alignments and building envelopes in areas of rocky outcrops and to site roads, building envelopes and lot boundaries to maximise vegetation retention.

In addition to the numerous single discipline visits to the subject site throughout the design development phase, the key members (i.e. planners, engineers, environmentalist, surveyor and fire planner) of the Project Team undertook joint visits to the subject site with the express purpose of ground truthing and refining the proposed layout, including recording of position and paths taken by GPS. Such visits included:

- 21 and 28 June 2007 Site Visits – The Project Team walked / drove the site to consider location of Rural Link Road and proposed alignments specifically focussing on location of rocky outcrops, existing tracks and depressions. Design aspects considered included fire management issues and interface with existing Shady Hills community, retention of dams and water courses.
- 2 Nov 2007 Site Visit – the Project Team walked / drove the draft Structure Plan layout to confirm the road alignments, general building envelope locations specifically focussed on water courses, the scarp, vegetation and fire planning considerations.
- 12 June 2008 - the Project Team walked / drove the site with the purpose of refining the Rural Link Road design and alignment.
- 15 September 2015 – new Project Team and landowner group walked / drove the site to review options for realignment of the Rural Link Road.

- 2017 - Site inspection by Deputy Mayor and Ward Councillor Kevin Bailey, first along the proposed alignment of the Rural Link Rd, and then the old alignment in the approved Structure Plan to demonstrate why the modification was required and the effectiveness of the new alignment.
- 12 November 2017 - the Owners escorted 21 cars and around 60 people (mostly from the Shady Hills development as well as members from the volunteer fire brigade) down EV2 from Clarkson Rd through to Lage Rd, to demonstrate the effectiveness of the proposed the emergency exit route and to demonstrate that even in its current condition it provides a viable option in the case of an emergency. It was explained to everyone that the current condition of the road will be upgraded as part of Stage One works to the relevant City of Swan standard for emergency access (see Photograph 5).

9.3 Road Network

9.3.1 Existing Roads

9.3.1.1 Lage Road

Gazetted road access from Great Northern Highway is provided to the western boundary of Lot via Lage Rd. Lage Rd is constructed to a sealed road standard for approximately 600 metres, before turning southward as an unconstructed road for a further 200 metres.

The approved Structure Plan proposed to close portion of Lage Rd to create a new intersection with Great Northern Highway 200m south of the existing Lage Road intersection. This proposal involved a complicated series of road closures and amalgamations involving multiple landowners outside of the Structure Plan area and who are no longer party to the Structure Plan.

The amended design proposes to revert to the existing Lage Rd alignment and intersection with Great Northern Highway, consistent with the intersection configuration depicted in the BTLUMP.

Preliminary discussions with MRWA indicated its support for the revised road configuration and intersection treatment.

9.3.1.2 Stock Road

Whilst the Stock Road reserve runs from Great Northern Highway (in the west) through to Shady Hills View (in the east) the road is only constructed for a small portion west of the Scarp. Due to steep topographic conditions, it is not feasible or economically viable to use Stock Road as a connection down the Scarp to the Highway.

The portion of Stock Rd within the Structure Plan area is proposed to be constructed to provide access as part of the relevant stages of future development. Previous proposals in the approved Structure Plan to modify and close portions of the Stock Road reserve are no longer being pursued.

9.3.2 Proposed Roads

The new road pattern has been designed in response to the site constraints, working with existing topography where possible to minimise disturbance of the natural landform. The road pattern was further refined through on-site evaluation and aerial photography analysis. While aspects of the approved road network have been incorporated into the new design, the revisions substantially simplify the network, avoid placing roads in areas of steeper terrain (such as the approved 'Town Link Road'), remove undesirable culs-de-sacs and ensure direct frontage for all lots rather than the current reliance on battle-axe design.

The resulting road layout is a more legible and permeable pattern of streets than currently approved, facilitating a variety of movement modes, services and drainage and minimising disturbance to the existing landform.

The Structure Plan continues to provide three points of access to the adjacent Shady Hills road network (2 connections to Clarkson Rd and one via Stock Rd) which significantly increases access to / from this area, strengthening its connection to the Bullsbrook Townsite and Great Northern Highway and improving fire safety egress for residents and access for fire appliances.

9.3.3 Rural Link Road

A key difference between the proposed Structure Plan and the current approval is the location of the Rural Link Road (formerly 'Town Link Rd'). The previous plan had the road aligned through the middle of the site, traversing very steep terrain on the alignment of an existing track. The new alignnment is located further towards the northern part of the development connecting into Clarkson Rd to the east.

Thie new alignment provides a more direct route from Clarkson Road (Shady Hills Development) to Lage Road, and being located through more moderate terrain with flatter grades for most of its alignment, will be signficantly more cost effective to construct. This direct route will provide improved egress for Shady Hills residents in the event of fire emergencies and access for emergency services than the original alignment. Development of the Rural Link Rd as a public road will be completed as part of Stage One of the development.

9.3.4 Fire Service Access Route

The Structure Plan includes an indicative Fire Services Access Route (FSAR) adjacent to the Boral Brick Quarry and Walyunga National Park on the southern and western boundaries of the land. The FSAR alignment has regard for the limitations of the site topography, potential for practical implementation and overall benefit to the development. The final FSAR alignment will be confirmed at the subdivision stage and would be installed with agency agreement to comply with acceptable solution A3.7 of the Guidelines as development proceeds. The proposed FSAR is depicted on Plan No. 1 and at Figure 20 of this Structure Plan.

At no point is the FSAR network situated further than 600 m from the internal public road network and links back to the public road network are provided at regular intervals along lot boundaries, taking account of site topographical constraints. A total of nine connections are proposed along the FSAR alignment linking back to the internal public road network along lot boundaries. In addition, a potential future link is made available to the external public road network in Shady Hills View to the east, however this will be subject to agreement of the adjacent landowner. The FSAR network will follow lot boundaries where possible and civil engineering solutions will be employed to achieve acceptable road grades where required.

9.4 Lot Layout

9.4.1 Lot Configuration

All proposed lots have maintained a minimum size of 2.0ha, however, where required by site conditions such as drainage pathways, vegetation or steeper land, larger lot sizes are proposed.

All of the proposed lots have a minimum 50m effective frontage as per Table 1 of the City of Swan Policy 126: Building and Development Standards – Rural Zone.

In accordance with the recommendations of the Bushfire Management Plan (2017) the amendment has also removed all culs-de-sacs and battle-axe legs from the structure plan design, resulting in a total of 22 lots that are now provided with safer and compliant access than the approved Structure Plan.

9.4.2 Building Envelopes

Indicative building envelopes are identified on the Structure Plan to demonstrate that future development can meet the requirements of the City of Swan Local Planning Policy – Building Envelopes (POL-C-080), as detailed at Section 3.4.2, as follows:

- all building envelopes are of regular shape being rectangular or square as per POL-C-080;
- all building envelopes are approximately 2,000m2, which is typically 10% or less than the smallest proposed lot as per POL-C-080. Building envelopes will be reviewed, located and sized appropriately at the subdivision and development stages;
- with only a handful of exceptions, no building envelope is located within 30m of a drainage pathway, as recommended by the Environmental Component Report and Land Capability Report (Appendix 4a) and LWMS

(Appendix 7a), and where these exceptions occur measures are in place to prevent any potential for water quality issues by ensuring ATU's are located outside of the 30m buffer;

- most building envelopes are located on land with a slope less than 20% as per POL-C-080 (Figure 10);
- no building envelope is located within the identified vegetation communities H1, T1 and T2 as encouraged by POL-C-080 and recommended in the technical reporting (Refer Figure 12), excepting portions of Lots 15, 20, 21, 26 and 27 where the higher order priority is to appropriately position the building envelope to minimise bushfire risk;
- no building envelope is located over Aboriginal Heritage Site DIA id 3957 (refer Figure 15);
- away from the top of ridgelines where development might break the skyline when viewed from primary viewing locations;
- the setbacks of most building envelopes meet the requirements of the City's Policy for development, except in a handful of cases where other factors, such as achieving the preferred 30m setback to drainage pathways, take pre-eminence. The proposed variations are nevertheless within the scope of discretion detailed at Clause 5.2 of the Policy; and
- building envelopes have been located to enable the implementation of the APZ's specified in the Bushfire Management Plan.

Where possible, the amended Structure Plan has also minimised the location of building envelopes:

- in vegetated areas of vegetation community T3 – Developed Agricultural Paddocks. Building envelopes were located through the use of high resolution aerial photography to minimise impact on vegetation community T3;
- in areas of rocky outcrops. Outcrops occur where soil has been washed away and are generally located in the steeper areas of the site as this is where water runoff flows at greater velocity and soil is eroded more quickly. The Structure Plan has located building envelopes out of the steeper areas of the site, as per Figure 10, and thus has avoided the areas having the highest propensity for rocky outcrops. Building envelopes were then further located through the use of high resolution aerial photography to minimise impact on rocky outcrops, as per Figure 19; and
- within areas of low land capability for effluent disposal.

Part One, Clause 4.6 establishes detailed design criteria for the identification of final building envelopes at the building application stage, to optimise their location relative to site specific conditions. The proposed provisions augment and supersede the criteria of the City's Policy to ensure a site responsive outcome that considers local factors.

Part One, Clause 4.5 of the Structure Plan also requires that building envelopes be implemented via a Notification on the Certificate of Title pursuant to Section 165 of the Planning and Development Act 2005.

9.5 Staging

A key aspect of the amended Structure Plan is the provision of smaller development stages that better correlate with anticipated sales rates for this form of development, comprising approximately 10 lots per stage. Reduction in the yield for each stage significantly improves the viability of the project by reducing the per stage infrastructure costs. The anticipated staging for development is provided at Figure 20.

A key element of staging for the project is the provision of the critical fire-fighting infrastructure (including ensuring two points of access for each stage). This and other staging considerations are detailed below:

- Stage 1: Construction of the Rural Link Road connecting Lage Road with Clarkson Rd to a public road standard to the specifications of the City of Swan in the first subdivision stage. Ceding of Fire Station site and provision of first water tank required by the Bush Fire Management Plan;
- Stage 2: Provision of second water tank required by the Bush Fire Management Plan;
- Stage 3: Provision of third water tank required by the Bush Fire Management Plan;

- Stage 5: Subdivision and release of Lots 1 – 5 not possible until quarry / blasting operations are complete within 500m from the building envelope of each of these lots;
- Stage 7: Provision of fourth water tank required by the Bush Fire Management Plan;
- Stage 9: Provision of fifth water tank required by the Bush Fire Management Plan;
- Stage 15: Provision of sixth water tank required by the Bush Fire Management Plan;
- Stage 16: Provision of seventh water tank required by the Bush Fire Management Plan. Subdivision and release of Lots 124 and 125 not possible until quarry operations are complete within 500m from the building envelope of each of these lots;
- Stage 18: Provision of eighth water tank required by the Bush Fire Management Plan;
- Stage 19: Provision of ninth and tenth water tanks required by the Bush Fire Management Plan.

10.0 Conclusion

This report has been prepared in support of a request to the WAPC to endorse amendments to the Approved Structure Plan No. 11 for the subject site.

The request follows review of the existing Structure Plan and the conclusion of current technical reporting, as well as further detailed technical investigations by the Project Team.

The amendment proposal results in substantial improvements to the safety, amenity and commercial viability of the development, enabling development to proceed and key public benefits to be delivered.

In summary, the proposed amendment:

- Realigns the Rural Link Road to eliminate the major engineering challenges and costs imposed by the current alignment;
- Realigns the future access road and intersection with Great Northern Highway to accord with alignment depicted in the BTDSP;
- Provides public access to Great Northern Highway on day one of the development for residents of the Shady Hills Estate and other residents to the east of Clarkson;
- Introduces of a range of design measures to bring the development into compliance with the current requirements of State Planning Policy 3.7 – Planning in Bushfire Prone Areas, thereby achieving a lower bushfire risk outcome compared to the Approved Bushfire Management Plan and Structure Plan; and
- Satisfies current State and Local Government strategic and statutory planning guidance and policy requirements.

We therefore respectfully request the Commission's support of the amendment proposal.

FIGURES

Figure 1

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

SIZE A3
0 KM 2 4 6 8 10

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
A	BASE PLAN RD1 202A	171218	SB	DP

REGIONAL LOCATION
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 219**	**A**

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

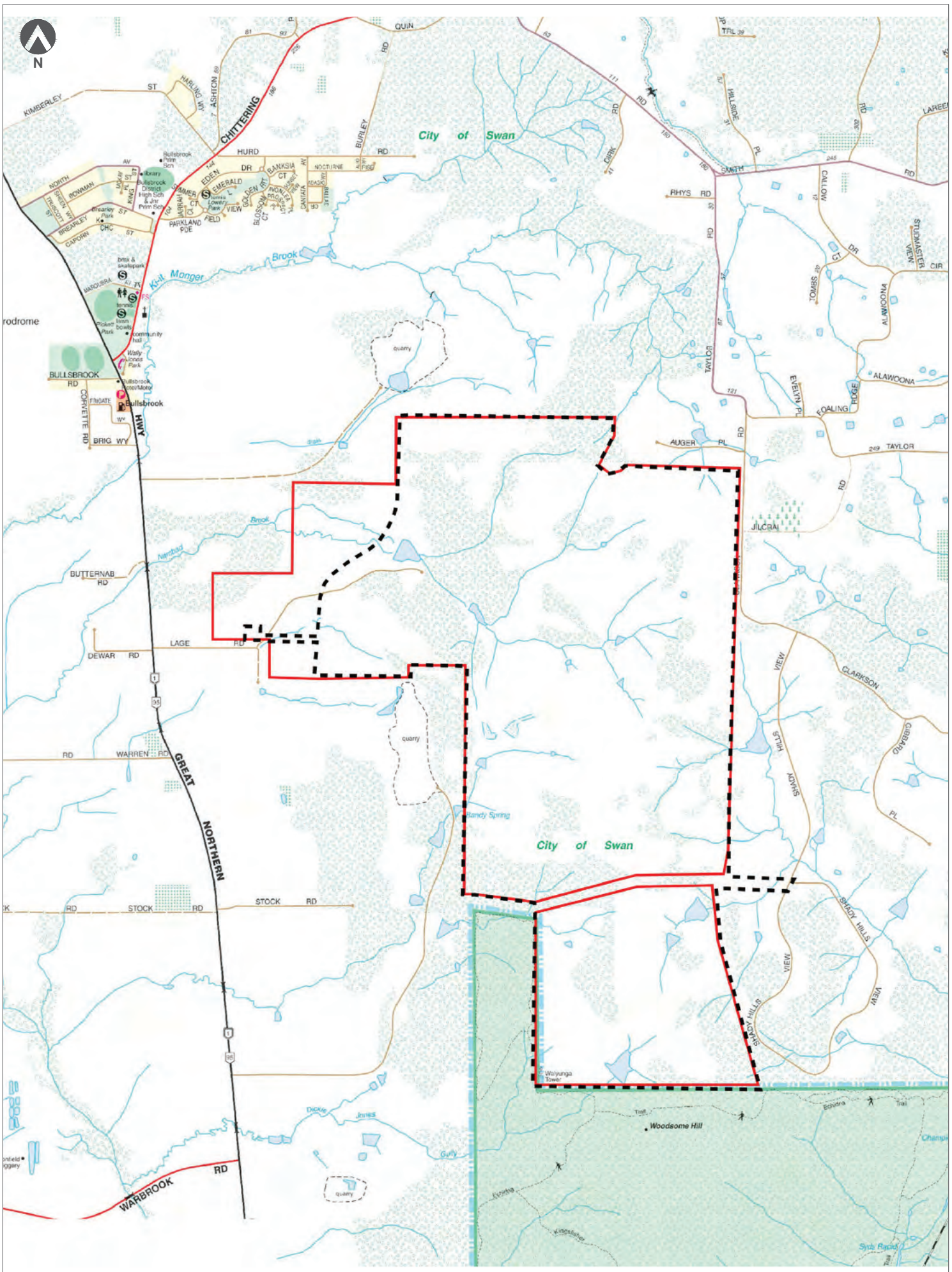


Figure 2

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

LOCAL LOCATION
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

1:20,000 SIZE A3 0 metres 200 400 600 800 1000

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
B	UPDATE SUBJECT AREA	191202	SB	DP
A	BASE PLAN RD1 202A	171218	SB	DP

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 220**	**B**

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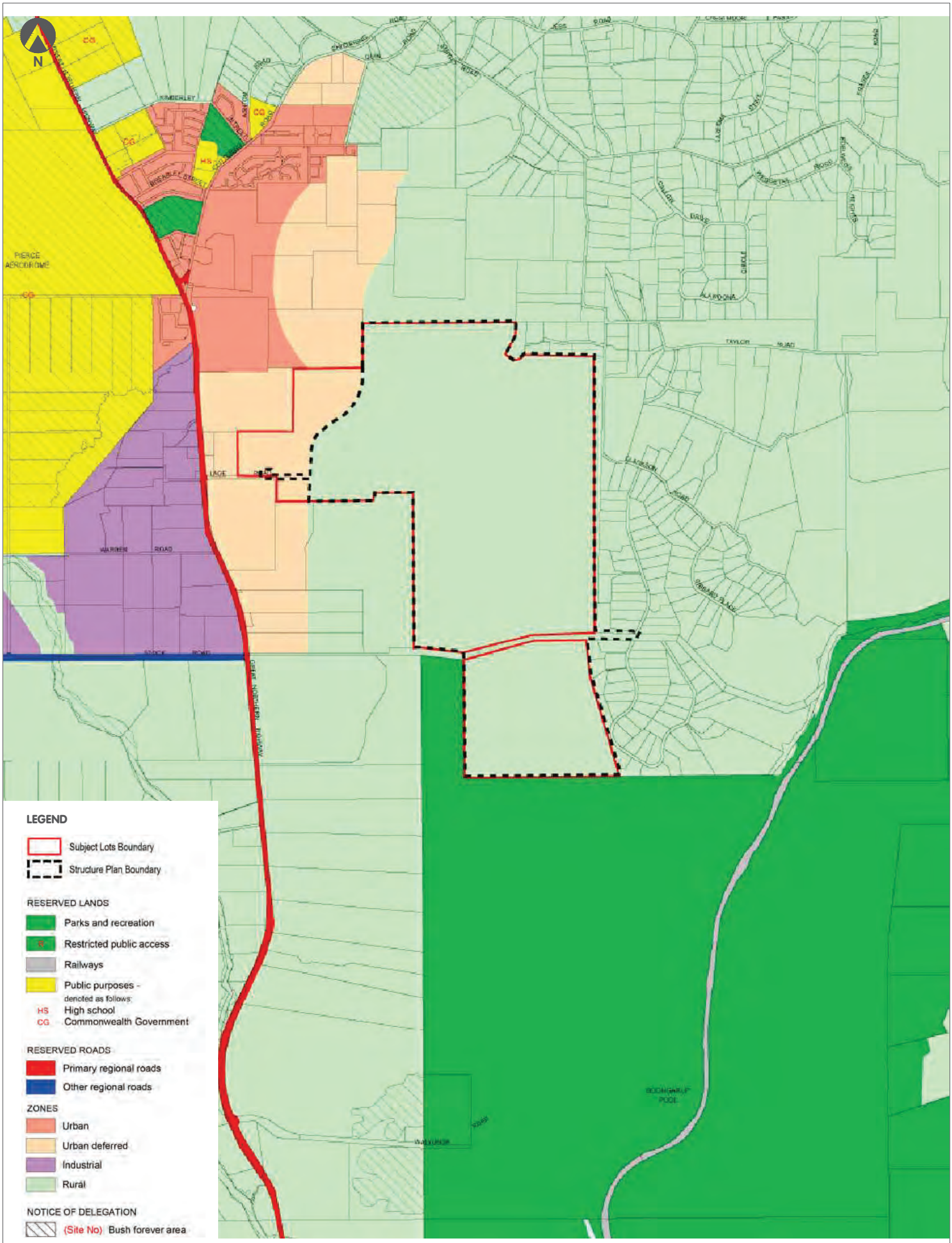


Figure 3

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

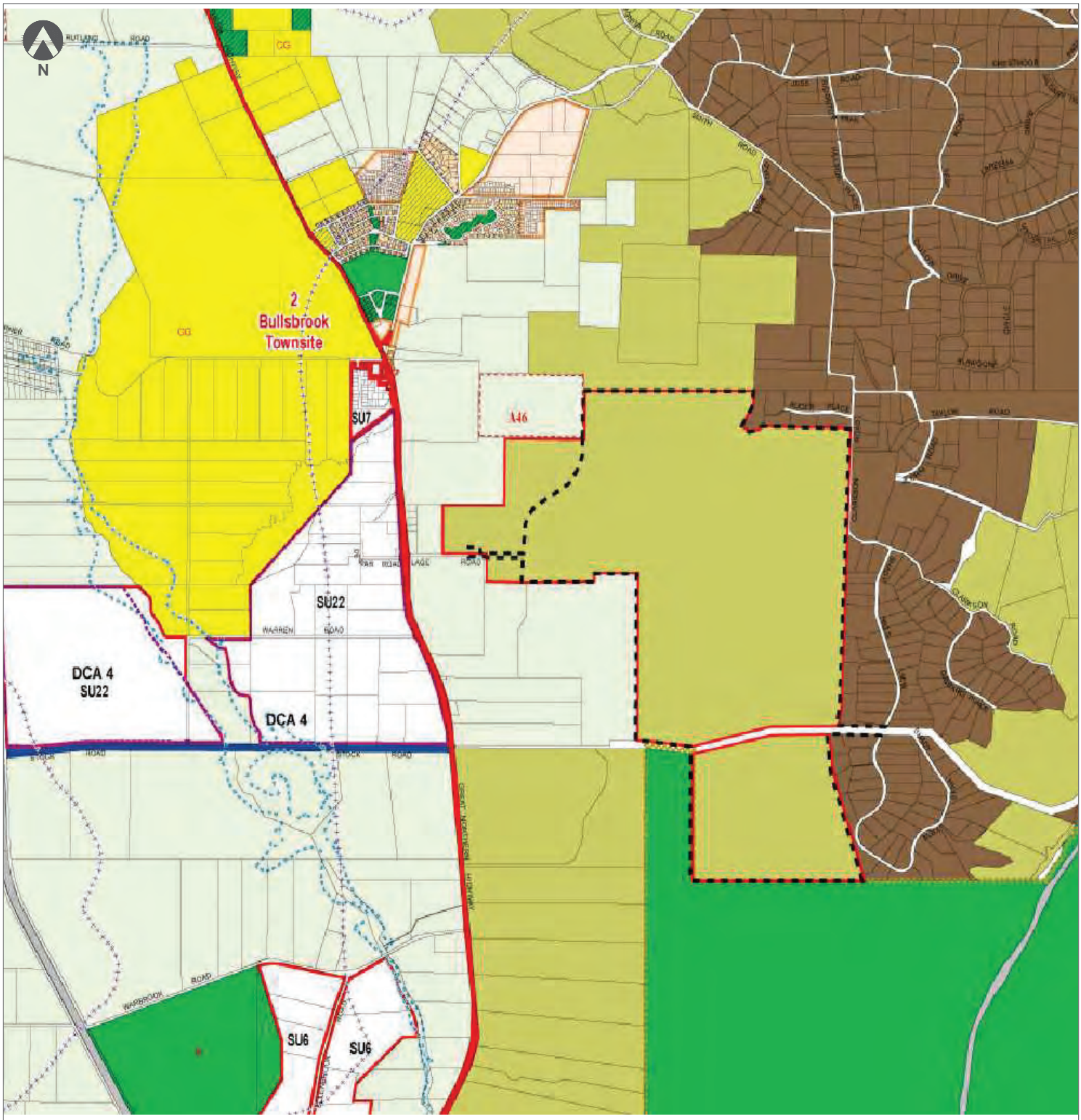
METROPOLITAN REGION SCHEME
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

1:3000 SIZE A3 0 metres 30 60 90 120 150

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
B	UPDATE MRS MAPPING	191202	SB	DP
A	BASE PLAN RD1 202A	171218	SB	DP

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 221**	**B**

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



LEGEND

Subject Lots Boundary
Structure Plan Boundary

REGION SCHEME RESERVES (MRS)

- Other regional roads
- Parks and recreation
- R Parks and recreation restricted
- Public purposes
- CG Public purposes - Commonwealth Government
- Primary regional roads
- Railways

LOCAL SCHEME RESERVES
(see scheme text for additional information)

- Local road
- Public purposes
- HS Public purposes : High school
- Recreation

LOCAL SCHEME ZONES
(see scheme text for additional information)

- General rural
- Landscape
- Rural residential
- Special use
- Residential
- Residential development
- Residential redevelopment
- Resource

OTHER CATEGORIES
(see scheme text for additional information)

- R20 R Codes
- A1 Additional uses
- SU1 Special use area
- Aircraft noise exposure
- Development contribution area boundary
- Municipal boundary
- No zone

Figure 4

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

CITY OF SWAN LOCAL PLANNING SCHEME NO. 17
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

1:3000 SIZE A3 0 metres 30 60 90 120 150

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
B	UPDATE TPS MAPPING	191202	SB	DP
A	BASE PLAN RD1 202A	171218	SB	DP

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 222**	**B**

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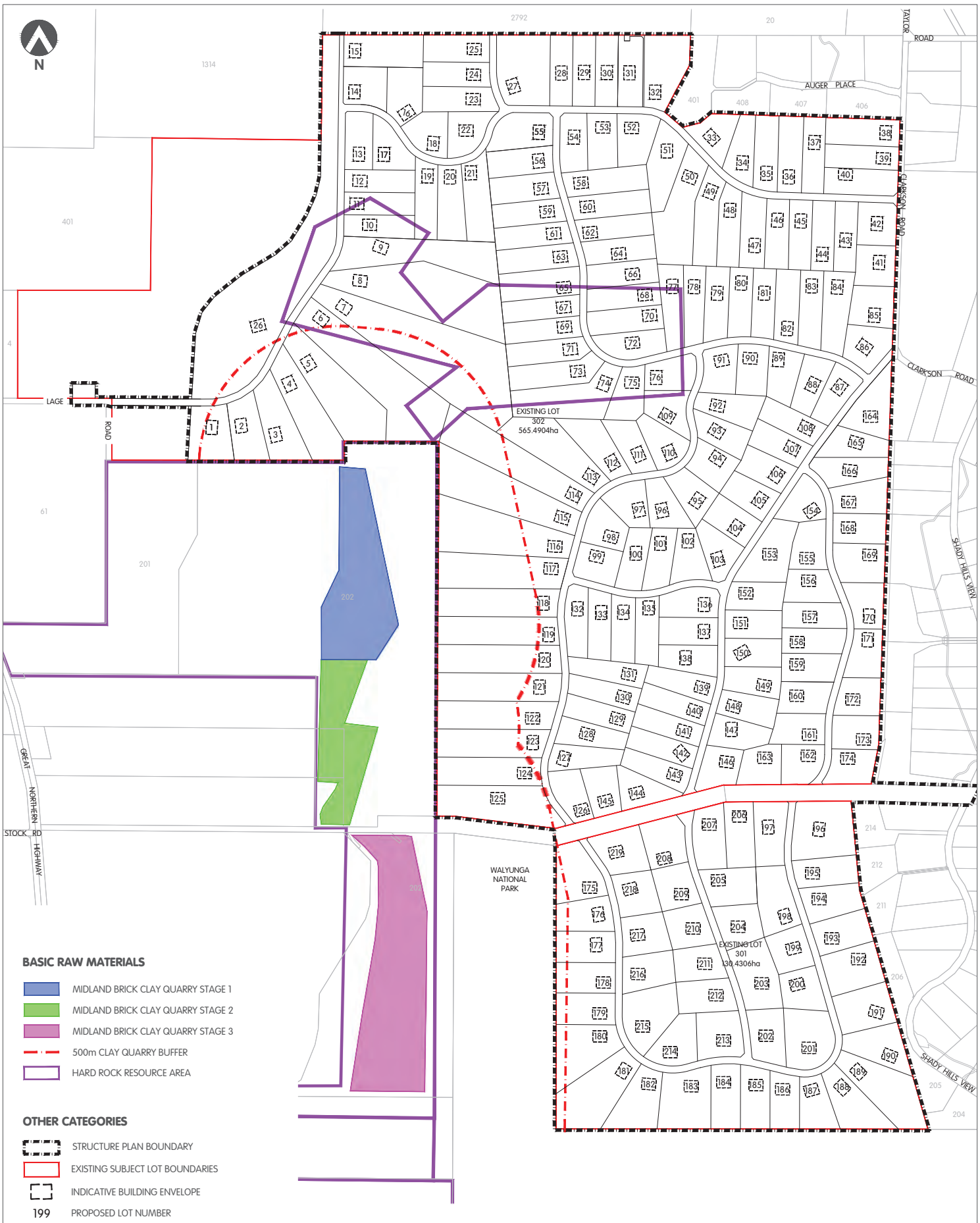

Figure 5

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

PRIORITY RESOURCE LOCATIONS OF BASIC RAW MATERIALS POLICY (SPP 2.4)

Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook

City of Swan

1:12500 SIZE A3 0 metres 125 250 375 500 625

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
C	UPDATE LOTS + DESIGN	191126	SB	
A	BASE PLAN RD1 202A	171218	SB	DP

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 206**	**C**

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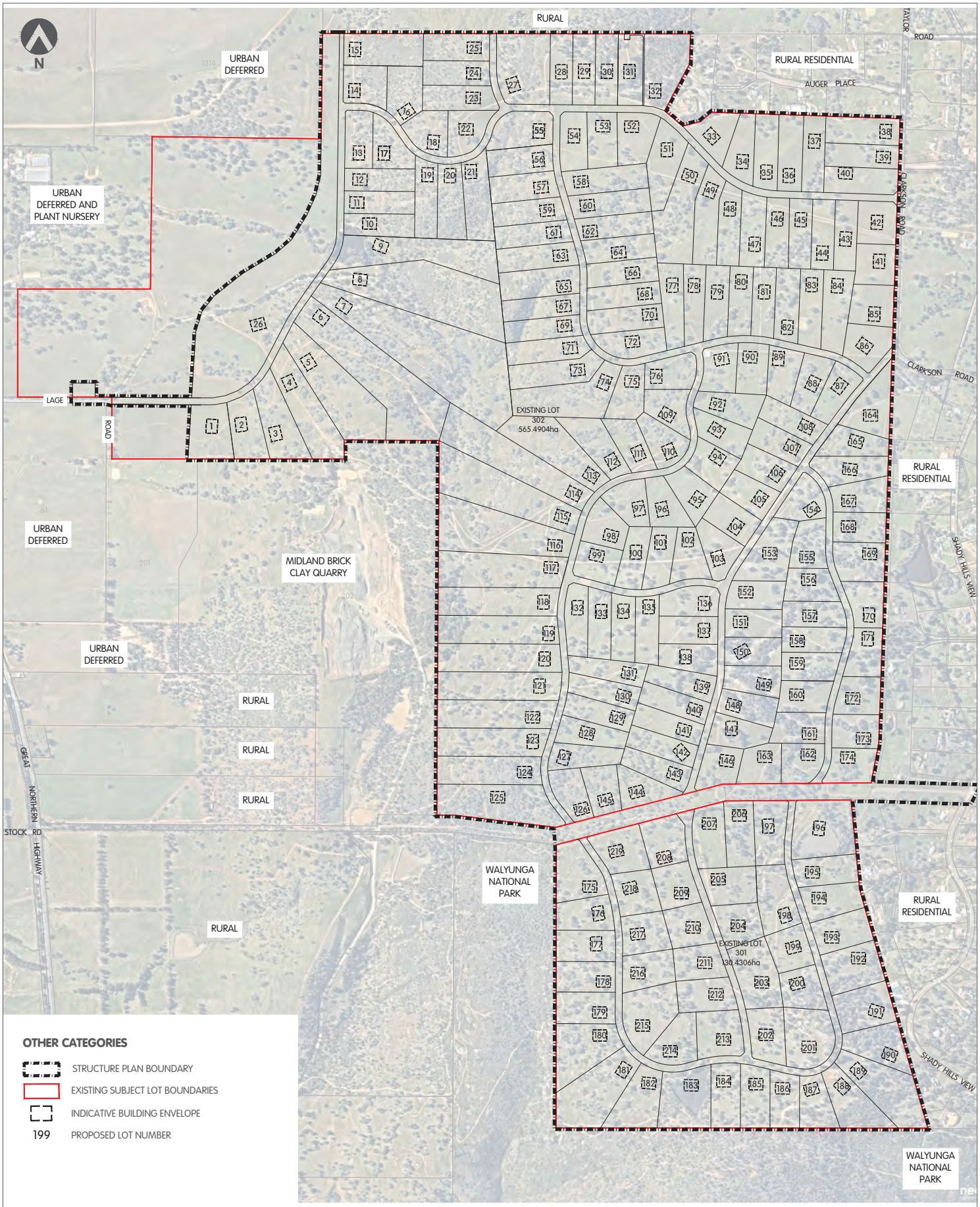

Figure 6

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

SURROUNDING LAND USES
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

1:12500 SIZE A3 0 metres 125 250 375 500 625

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
B	UPDATE DESIGN + LAND USES	191126	SB	
A	BASE PLAN RD1 202A	171218	SB	DP

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 207**	**B**

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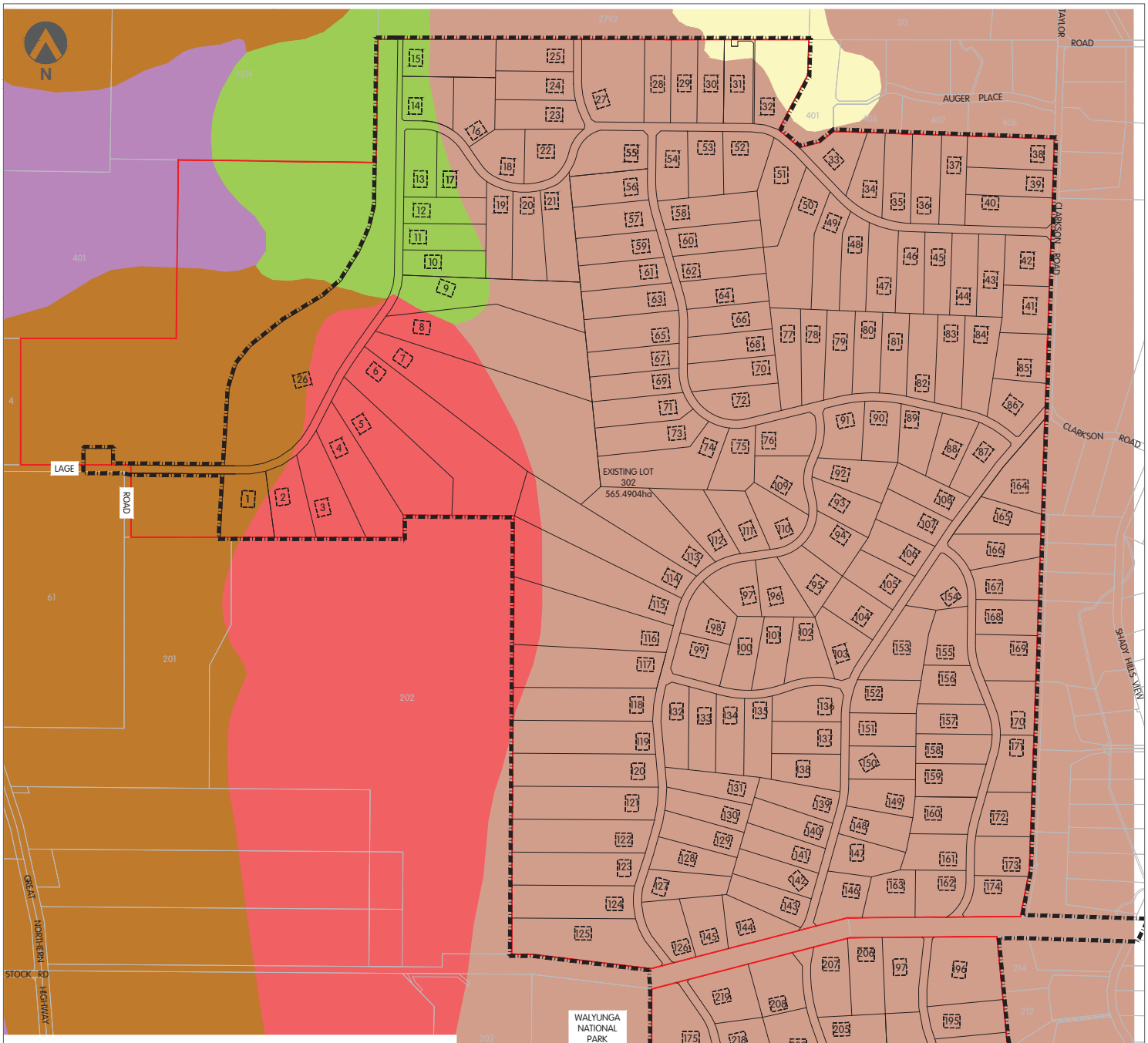

GEOLOGY MAPPING (SOURCE:DMP,2009)

- GRANITE/GRANITE AND GNEISS
- SCHIST
- COLLUVIUM (GRAVELLY SILTY)
- COLLUVIUM (SANDY)
- GUILFORD FORMATION
- LATERITE (MASSIVE AND CEMENTED)

OTHER CATEGORIES

- STRUCTURE PLAN BOUNDARY
- EXISTING SUBJECT LOT BOUNDARIES
- INDICATIVE BUILDING ENVELOPE
- 199 PROPOSED LOT NUMBER

Figure 7

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

GEOLOGICAL UNITS
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

1:12500 SIZE A3 0 metres 125 250 375 500 625

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
B	UPDATE DESIGN	191126	SB	DP
A	BASE PLAN RD1 202A	171218	SB	DP

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 216**	**B**

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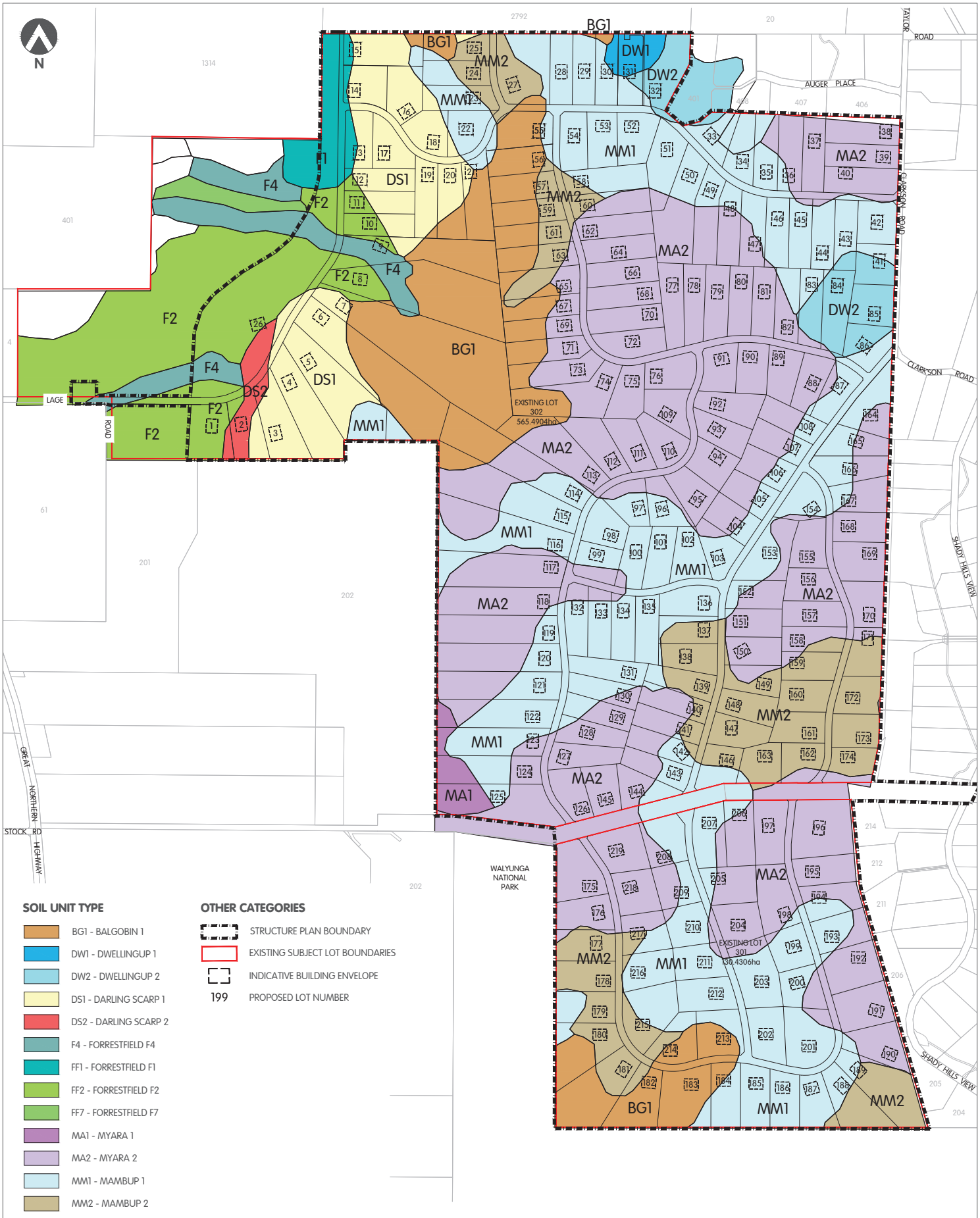

Figure 8

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

SOIL PROFILE
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

1:12500 SIZE A3 0 metres 125 250 375 500 625

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
B	UPDATE DESIGN	191126	SB	DP
A	BASE PLAN RD1 202A	171218	SB	DP

REF NO.	DRAW NO.	REV.
PKF BUL	RD1 209	B

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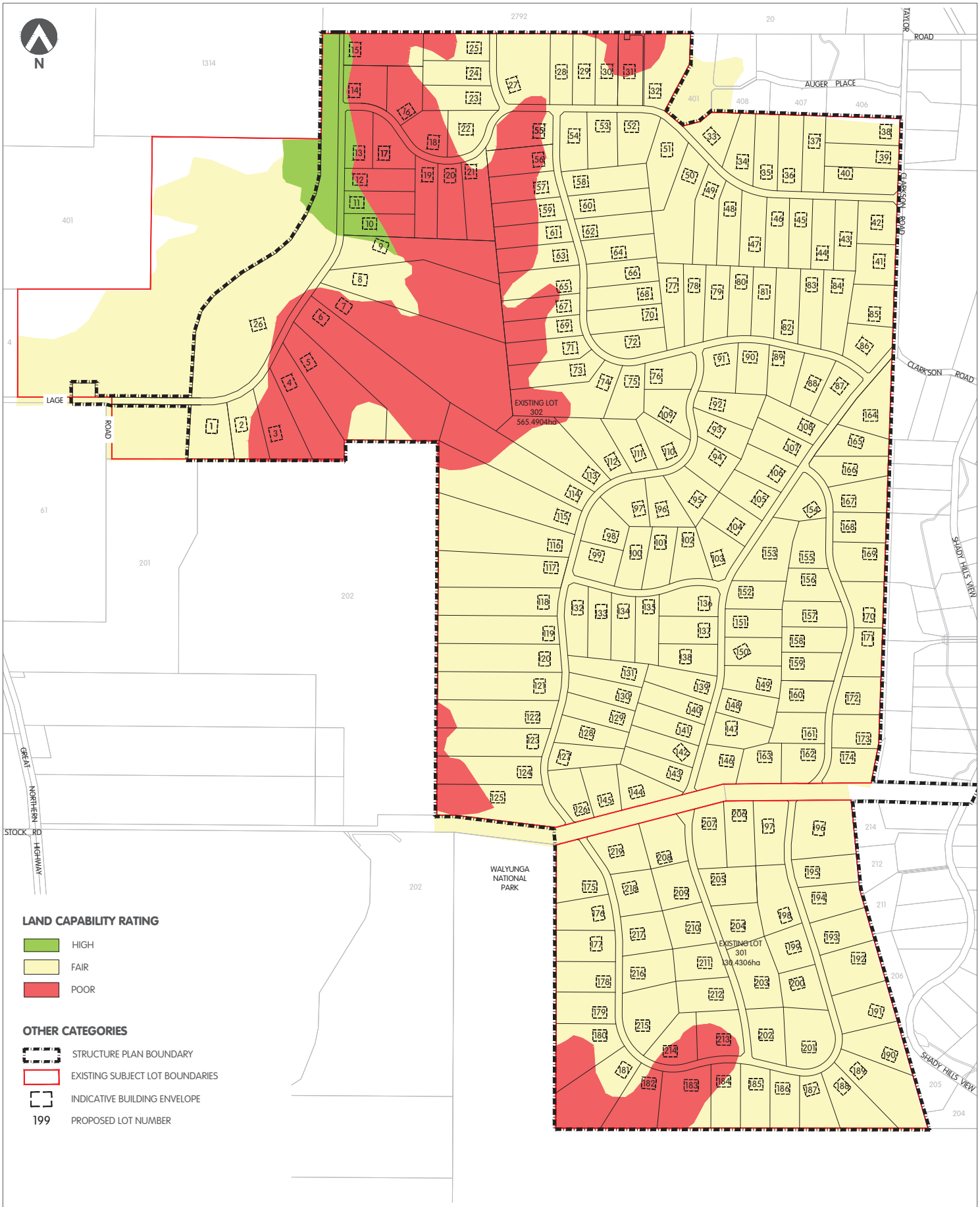

Figure 9

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

LAND CAPABILITY
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

SIZE A3
1:12500 0 metres 125 250 375 500 625

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
B	UPDATE DESIGN	191126	SB	DP
A	BASE PLAN RD1 202A	171218	SB	DP

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 208**	**B**

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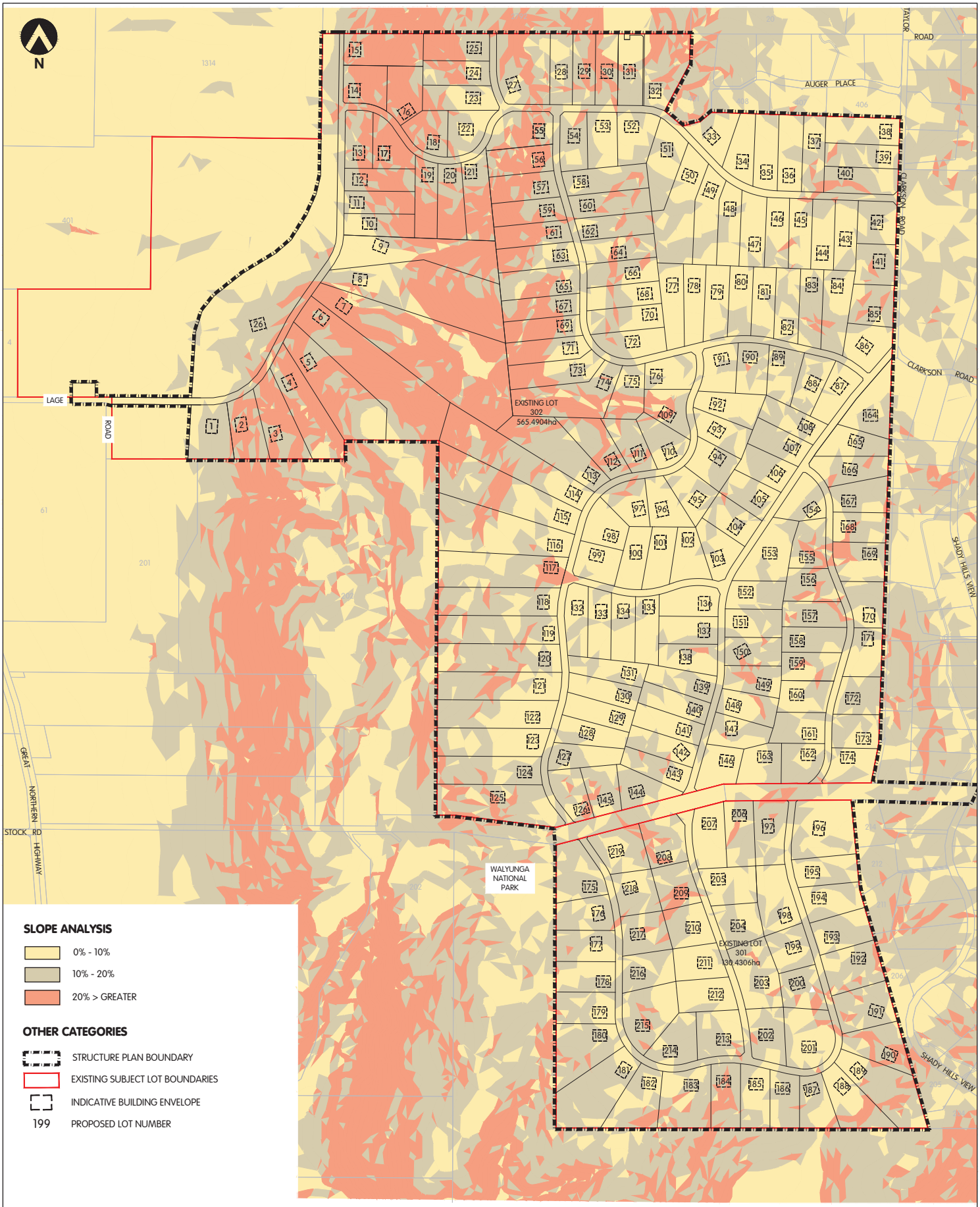

Figure 10

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

SIZE A3
1:12500
0 metres 125 250 375 500 625

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
C	UPDATED DESIGN	191126	SB	DP
B	ADJUSTED DESIGN	190530	LI	DP
A	BASE PLAN RD1 202A	171218	SB	DP

SLOPE ANALYSIS
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 217**	**C**

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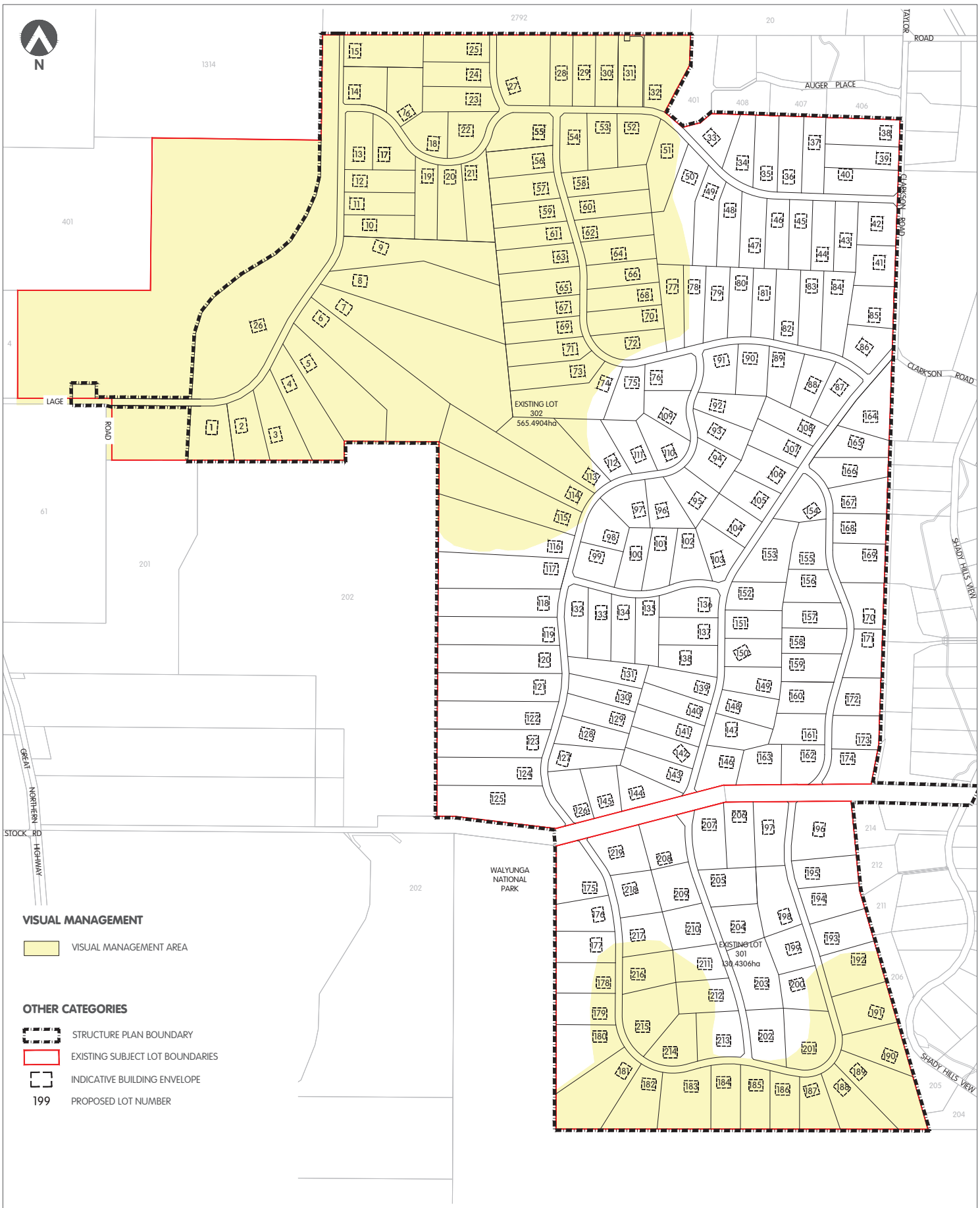

Figure 11

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

VISUAL MANAGEMENT
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

1:12500 SIZE A3 0 metres 125 250 375 500 625

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
B	UPDATE DESIGN	191126	SB	DP
A	BASE PLAN RD1 202A	171218	SB	DP

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 210**	**B**

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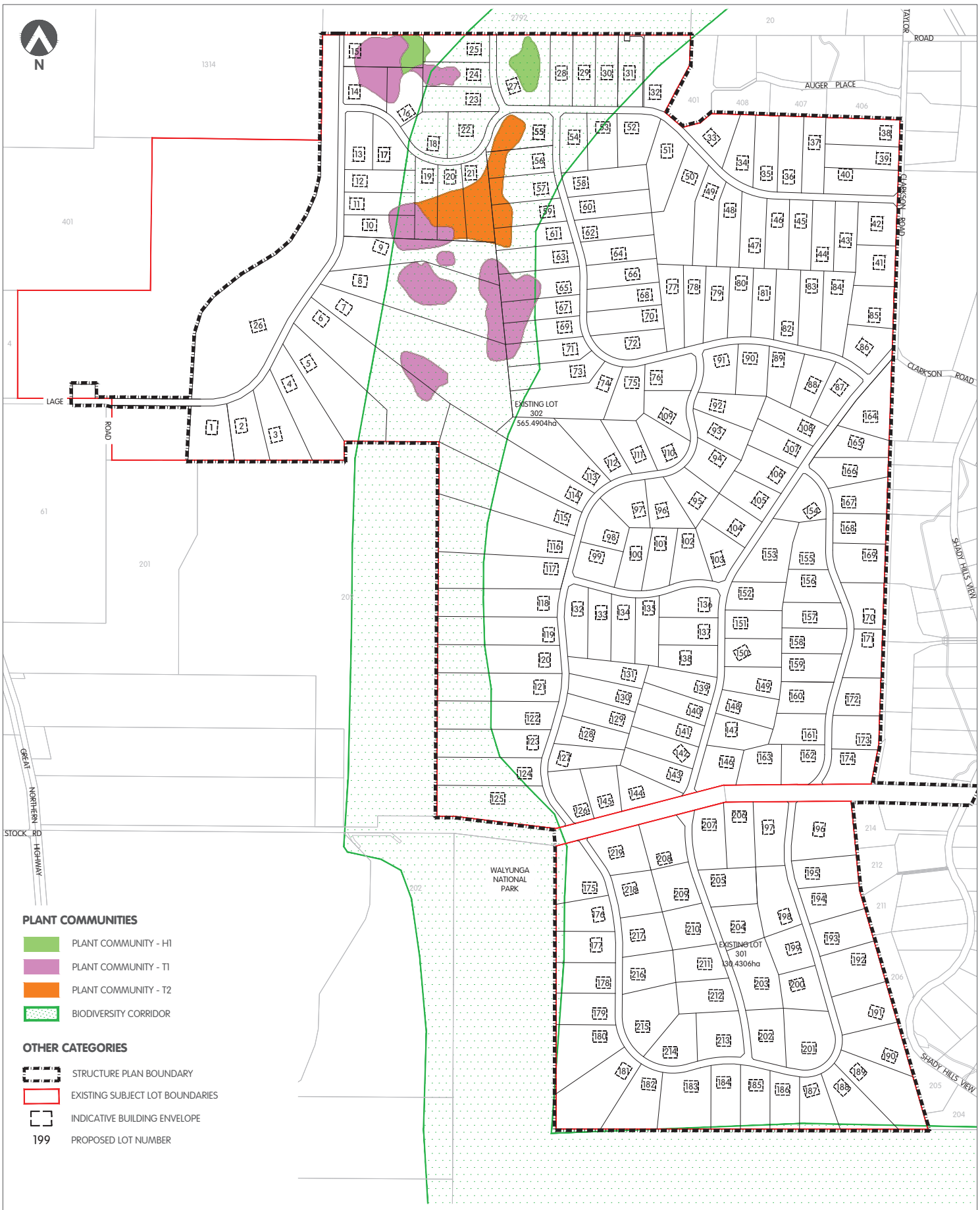

Figure 12

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

VEGETATION COMMUNITIES
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

1:12500 SIZE A3 0 metres 125 250 375 500 625

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
D	UPDATE DESIGN	191126	SB	DP
A	BASE PLAN RD1 202A	171218	SB	DP

REF NO. **PKF BUL** DRAW NO. **RD1 203** REV. **D**

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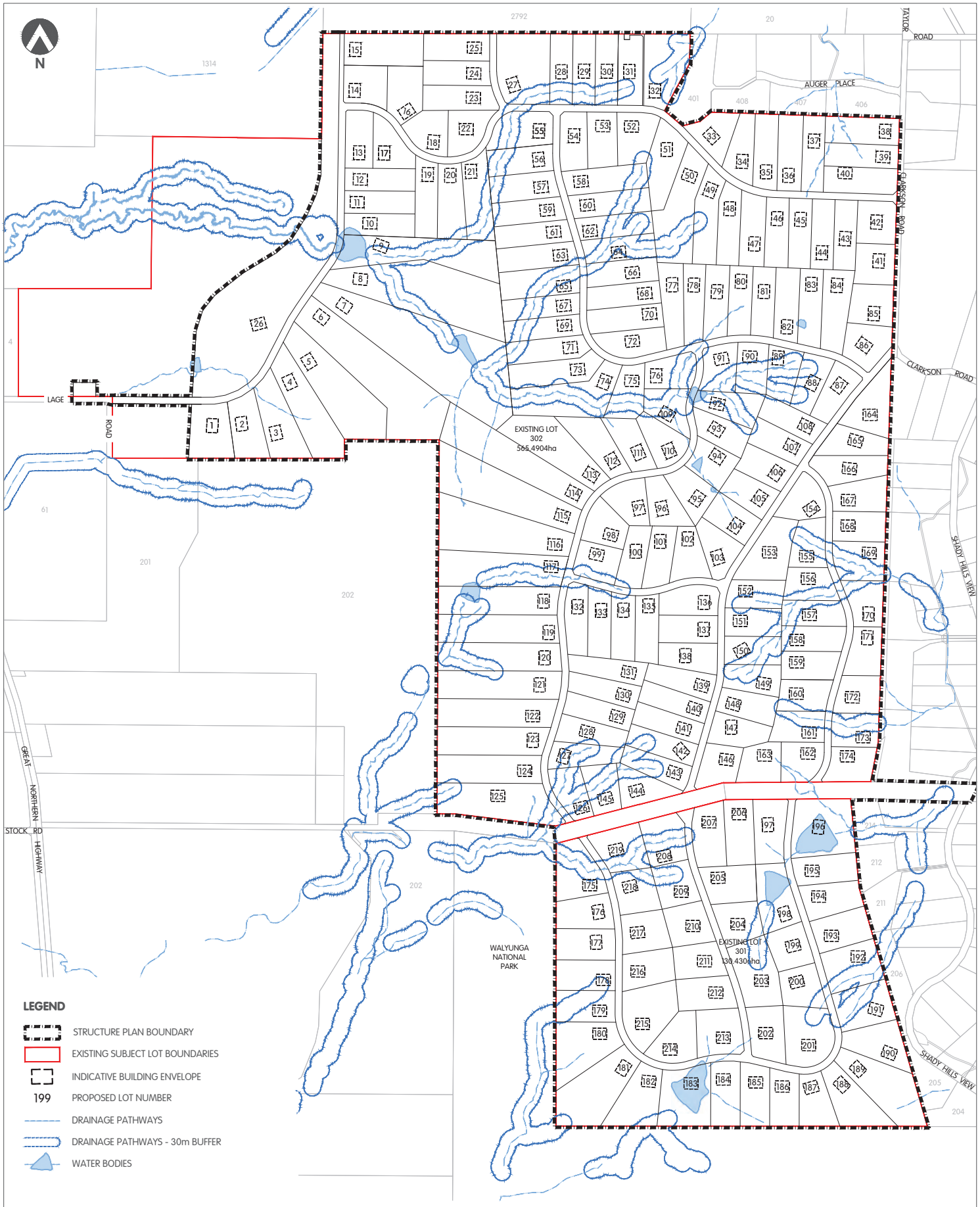

Figure 13

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

1:12500 SIZE A3 0 metres 125 250 375 500 625

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
C	UPDATE DESIGN	191126	SB	DP
B	ADJUSTED DESIGN	190530	LI	LI
A	BASE PLAN RD1 202A	171218	SB	DP

DRAINAGE PATHWAYS
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 215**	**C**

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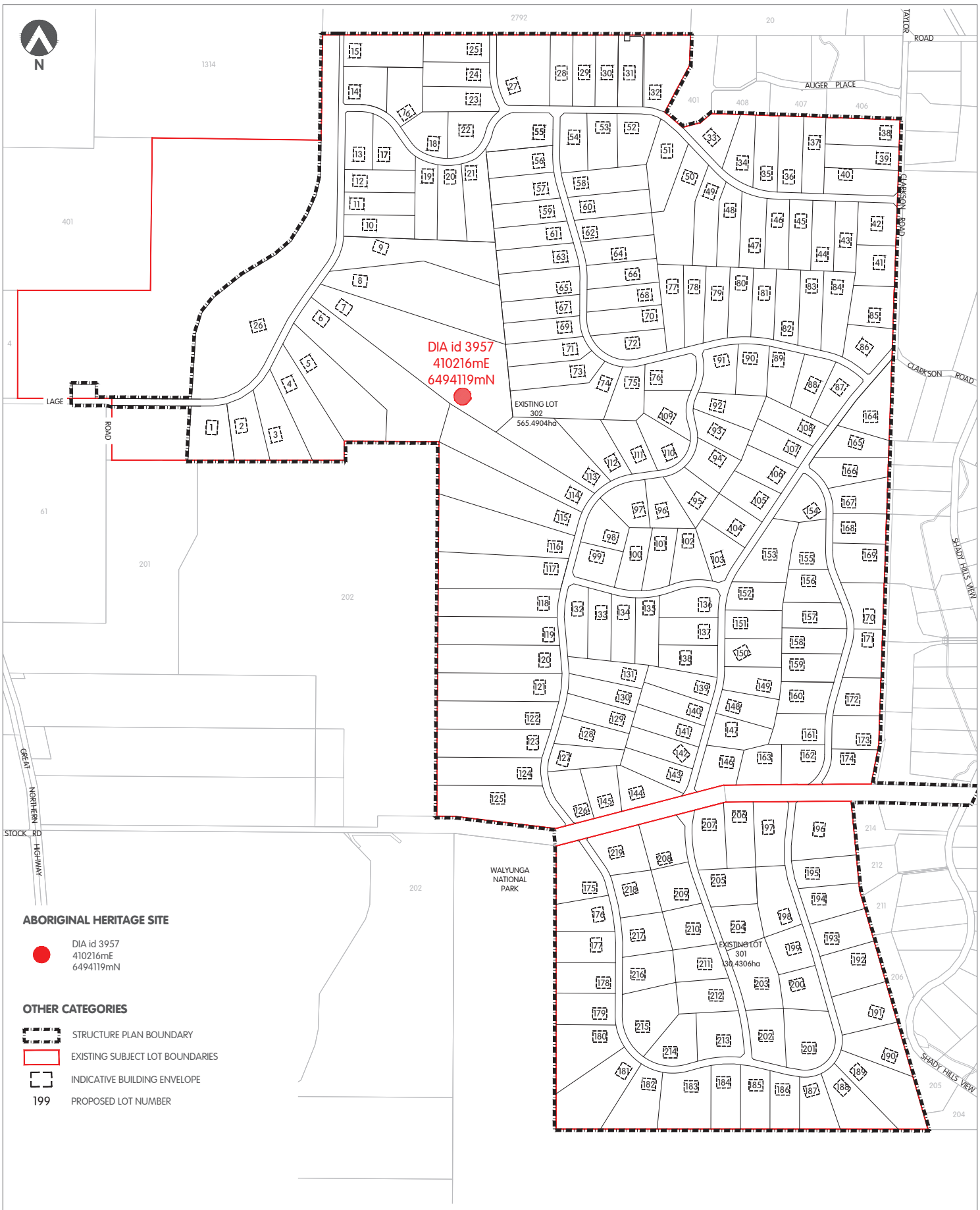

Figure 14

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

ABORIGINAL HERITAGE SITE
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

1:12500 SIZE A3 0 metres 125 250 375 500 625

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
B	UPDATE DESIGN	191126	SB	DP
A	BASE PLAN RD1 202A	171218	SB	DP

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 204**	**B**

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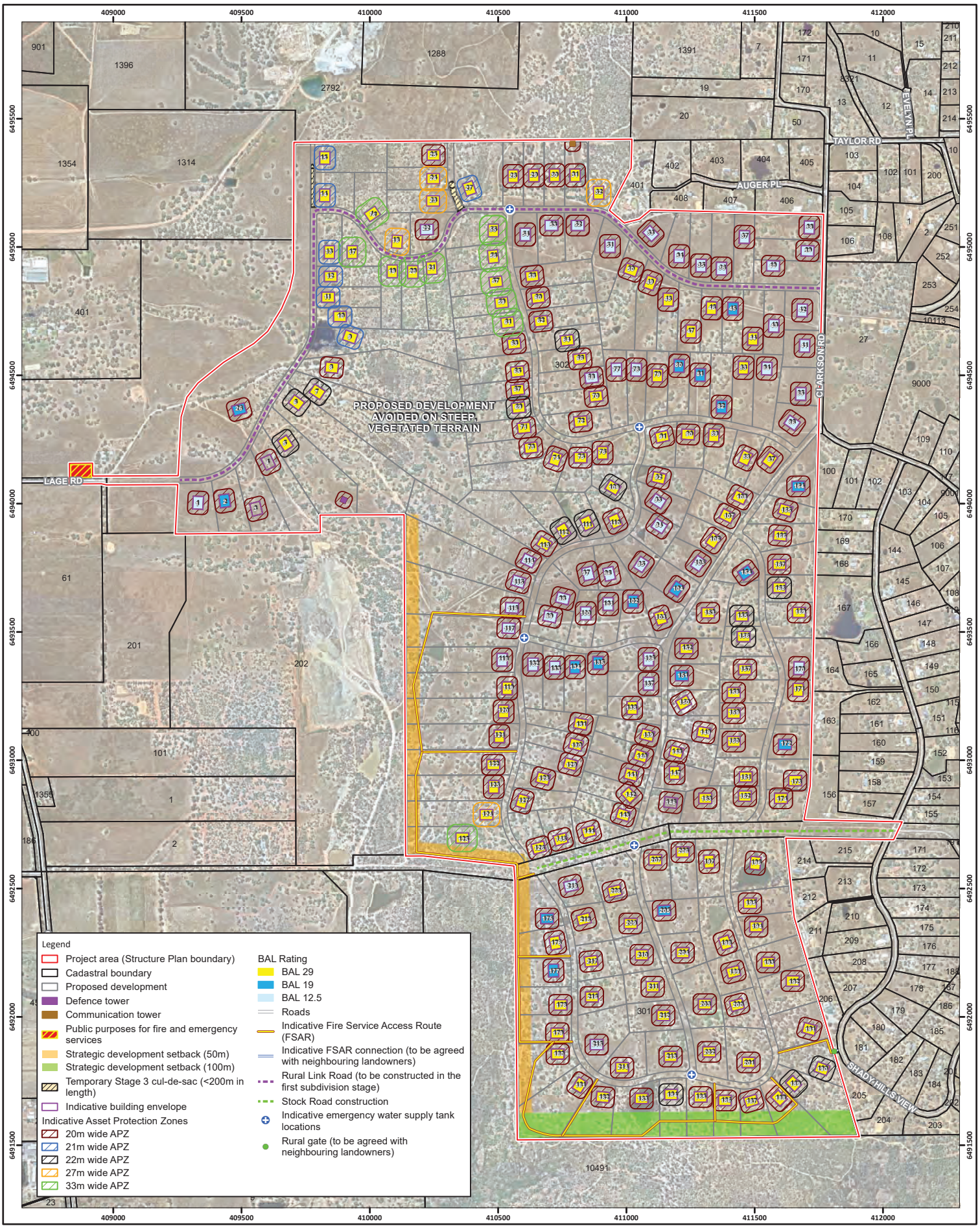

strategen JBS&G		0 500 metres	Lot 301 Stock Road and Lot 302 Lage Road, Bullsbrook, WA
Job No: 56810		Scale 1:13,500 at A3	INDICATIVE BAL ASSESSMENT AND BUSHFIRE MANAGEMENT MEASURES
Client: Roberts Day		Coord. Sys. GDA 1994 MGA Zone 50	
Drawn By: hsullivan	Checked By: CT	Version: A	Date: 19-Dec-2019

Figure 15

Document Path: W:\Projects\1)Open\Roberts Day\56810 BMP Lot 301 Stock Rd & Lot 302 Lage Rd, Bullsbrook (RDP17002.02)\GIS\Maps\R01 Rev A\56810_10_BALs.mxd

Image Reference: www.nearmap.com© - Imagery Date: 29 October 2019

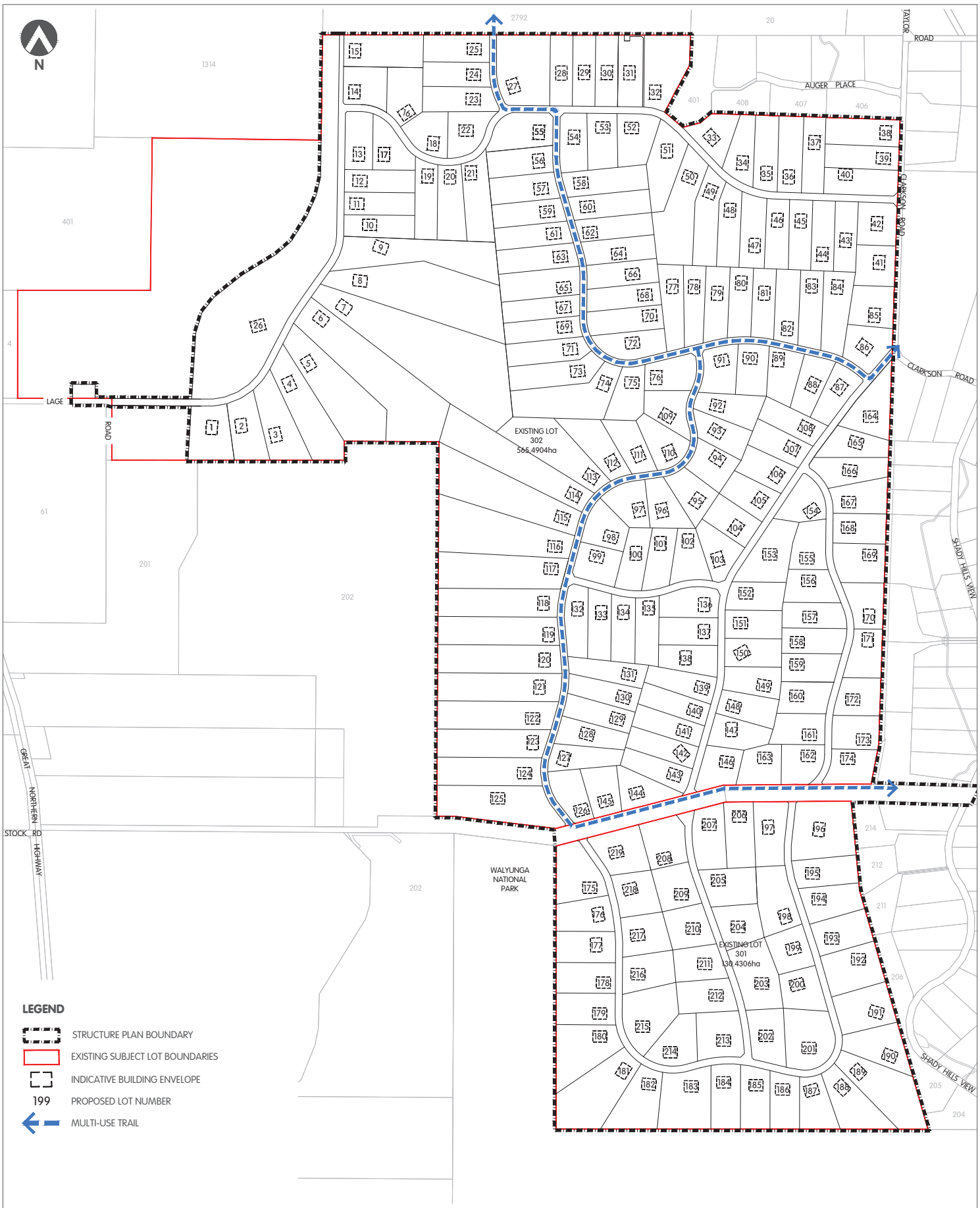

Figure 16

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

MULTI-USE TRAIL
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

1:12500 SIZE A3 0 metres 125 250 375 500 625

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
B	UPDATE DESIGN	191126	SB	DP
A	BASE PLAN RD1 202A	171218	SB	DP

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 213**	**B**

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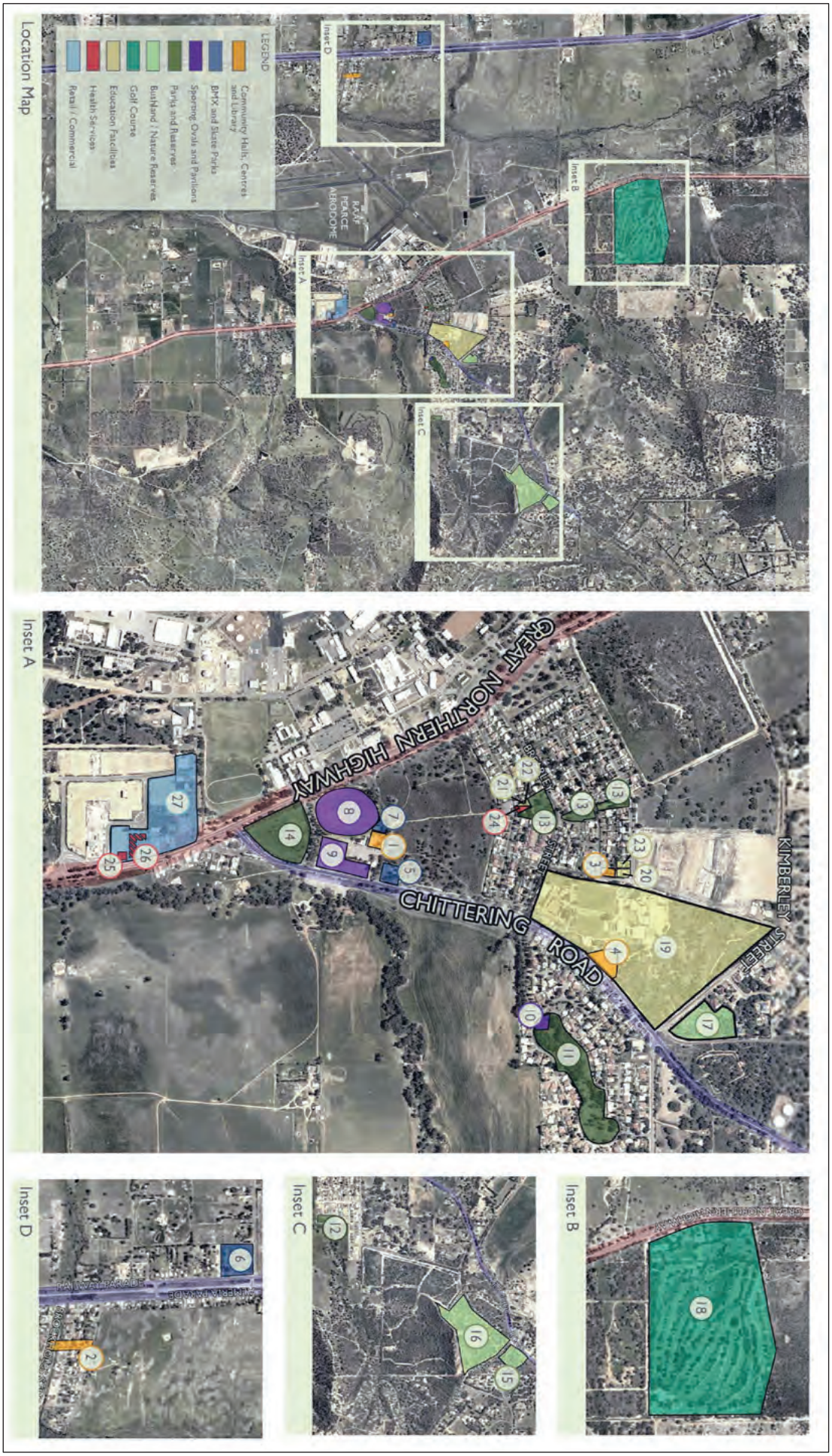

Figure 17

COMMUNITY SERVICES AND INFRASTRUCTURE

Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook

City of Swan

SIZE A3

NOT TO SCALE

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
A	BASE PLAN RD1 202A	171218	SB	DP

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 214**	**A**

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

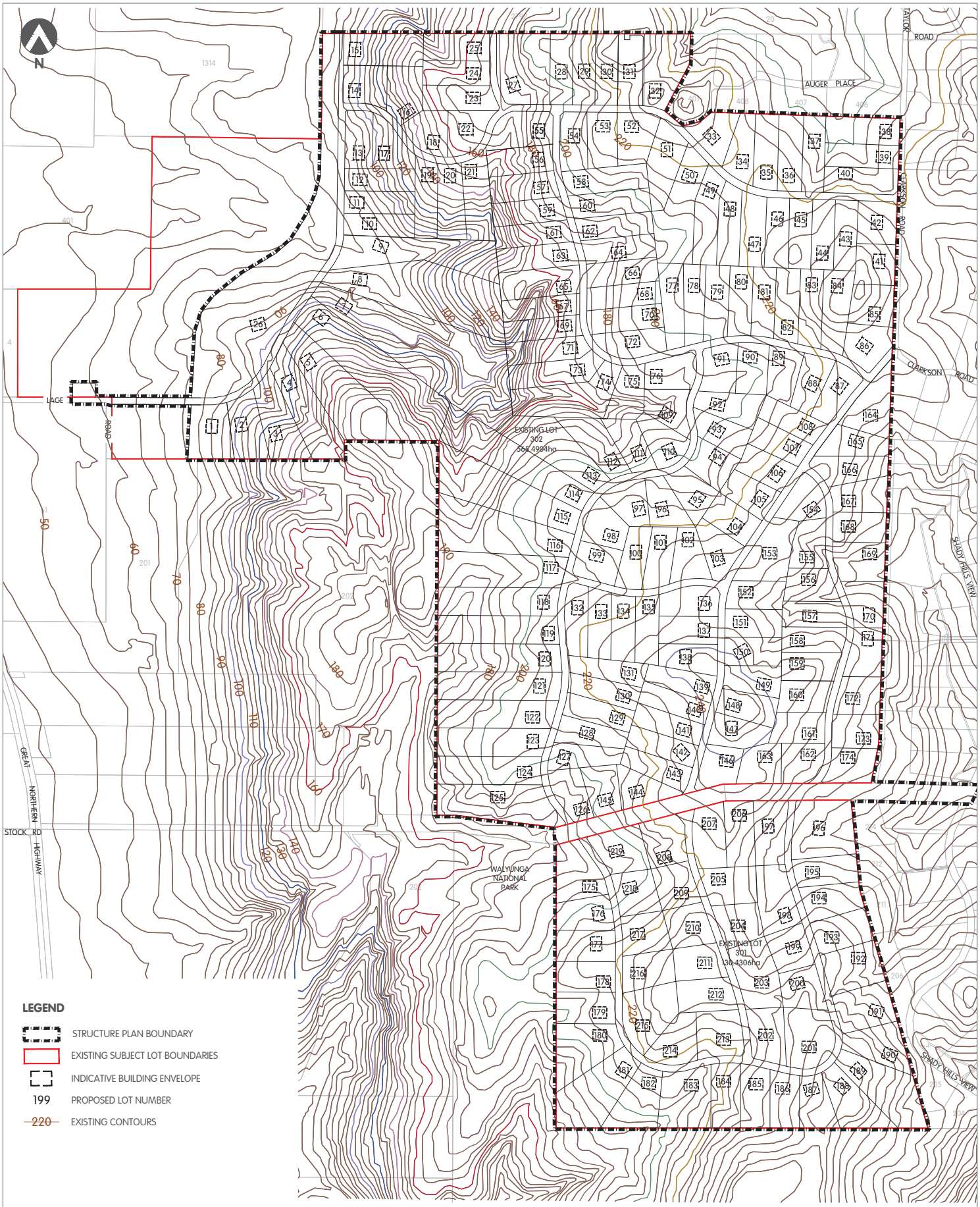

Figure 18

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

CONTOUR ANALYSIS
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

1:12500 SIZE A3 0 metres 125 250 375 500 625

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
B	UPDATE DESIGN	191126	SB	DP
A	BASE PLAN RD1 202A	171218	SB	DP

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 211**	**B**

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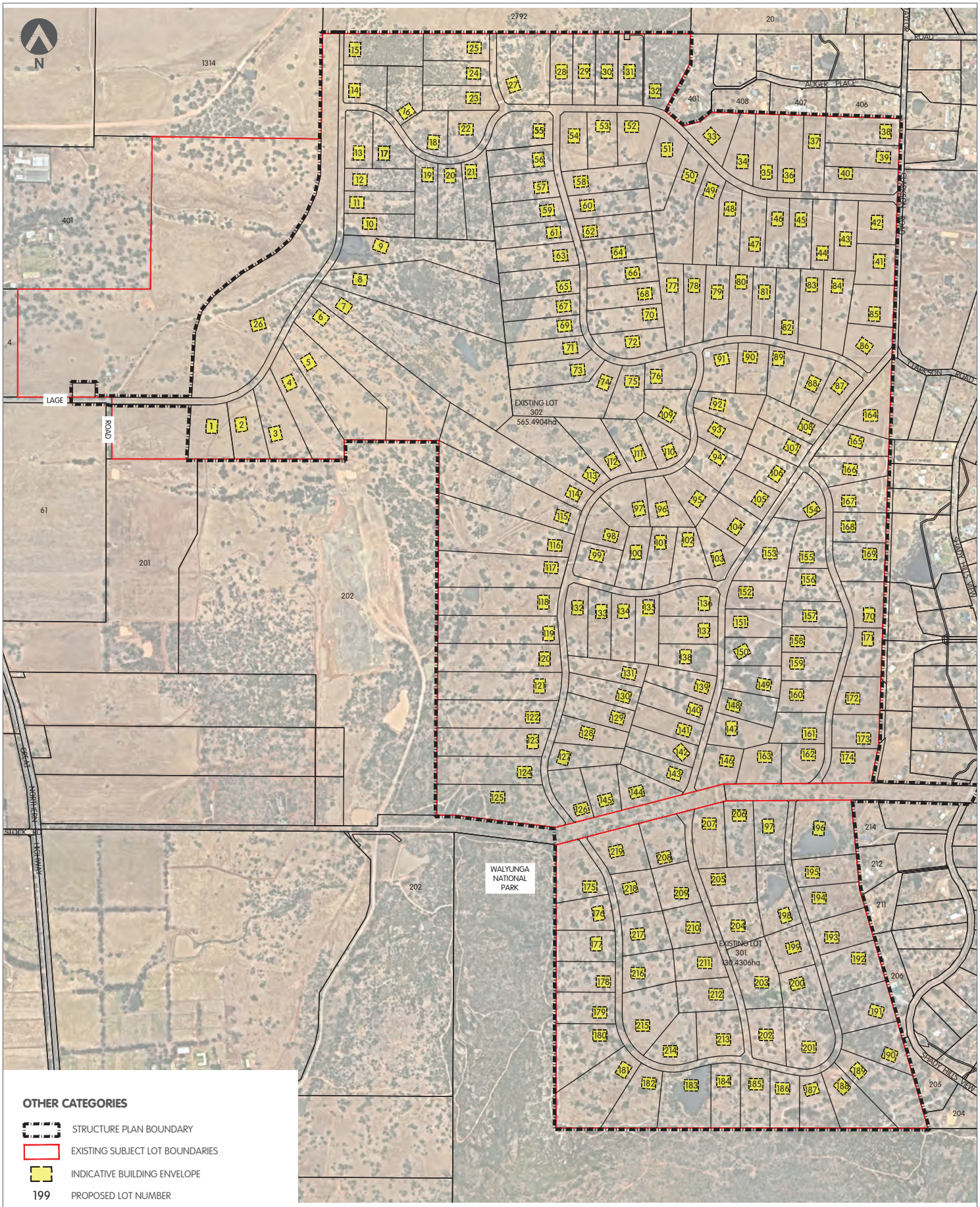

Figure 19

CADASTRAL INFORMATION
SOURCE: LANDGATE SLIP
YYMMDD: 170118
DWG REF: 170118 SLIP LANDGATE
PROJECTION: PCG94

AERIAL PHOTOGRAPHY
SOURCE: NEARMAPS
YYMMDD: 171202

AERIAL PHOTOGRAPHY
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook
City of Swan

SIZE A3
1:12500 0 metres 125 250 375 500 625

REV	DESCRIPTION	YYMMDD	DRAWN	APPR'D
B	UPDATE DESIGN	191126	SB	DP
A	BASE PLAN RD1 202A	171218	SB	DP

REF NO.	DRAW NO.	REV.
PKF BUL	**RD1 205**	**B**

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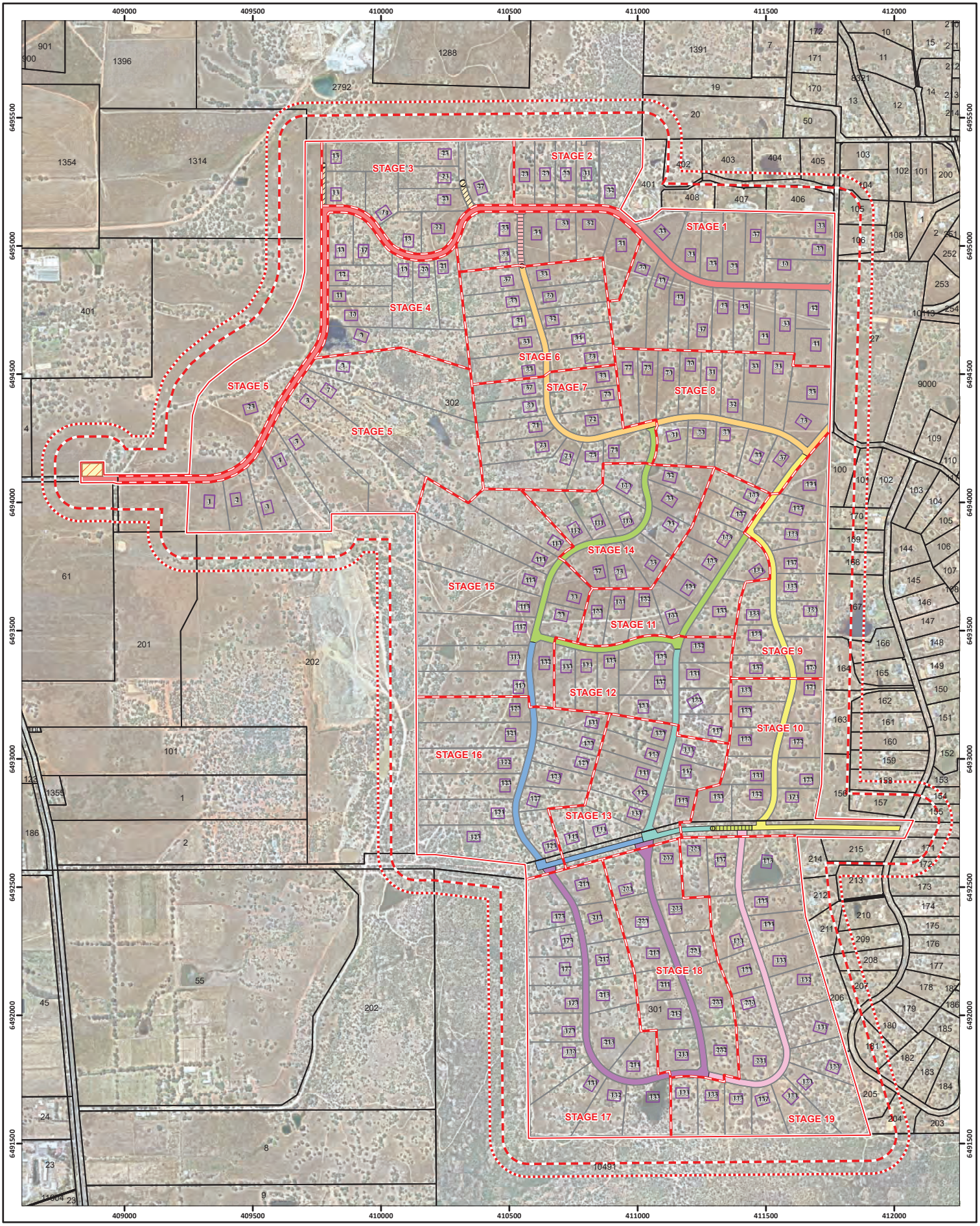

Legend:

- Project area (Structure Plan boundary)
- 100m assessment area
- 150m assessment area
- Cadastral boundary
- Proposed development
- Indicative building envelopes
- Stage boundary
- Fire and emergency service

Vehicular Access

- Constructed at Stage 1
- Temporary Stage 2 cul-de-sac (<200m in length)
- Temporary Stage 3 cul-de-sac (<200m in length)
- Constructed at Stage 6
- Constructed at Stage 9
- Temporary Stage 10 cul-de-sac (<200m in length)
- Constructed at Stage 11
- Constructed at Stage 12
- Constructed at Stage 13
- Constructed at Stage 17
- Constructed at Stage 19

Figure 20

strategen JBS&G

0 500 metres

Lot 301 Stock Road and Lot 302 Lage Road, Bullsbrook, WA

PUBLIC VEHICULAR ACCESS STAGING PLAN

Job No: 56810		Scale 1:13,500 at A3	
Client: Roberts Day		Coord. Sys. GDA 1994 MGA Zone 50	
Drawn By: hsullivan	Checked By: CT	Version: A	Date: 12-Dec-2019

Figure 20

Document Path: W:\Projects\1)Open\Roberts Day\56810 BMP Lot 301 Stock Rd & Lot 302 Lage Rd, Bullsbrook (RDP17002.02)\GIS\Maps\R01 Rev A\56810_06_VehicularAccess.mxd

Image Reference: www.nearmap.com© - Imagery Date: 29 October 2019

PHOTOGRAPHS

Adjoining Shire of Northam Boundary

N:\Town Planning\4000-4999\4790\DRAFTING_

TOWN PLANNING MASTER PLANNING URBAN DESIGN PROJECT MANAGEMENT

date	8 June 2011	job no.	4790	scale	NTS
designer	D Evans	prepared by	E Tan	e-ref	061101 photos
client					

title photograph 1

address lot 301 stock road & lot 302 lage road
bullsbrook

GREG ROWE & associates
FOCUSED ON ACHIEVEMENT

perth
Level 3, 369 Newcastle Street, Northbridge, Western Australia, 6003
email gra@greg-rowe.com web greg-rowe.com tel +618 9221 1991 fax +618 9221 1919

PERTH • PEEL / SOUTH WEST • MID WEST • PILBRA

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TOWN PLANNING MASTER PLANNING URBAN DESIGN PROJECT MANAGEMENT

date	8 June 2011	job no.	4790	scale	NTS
designer	D Evans	prepared by	E Tan	e-ref	061101 photos
client					

title photograph 2

address lot 301 stock road & lot 302 lage road
bullsbrook

perth
Level 3, 369 Newcastle Street, Northbridge, Western Australia, 6003
email gra@greg-rowe.com web greg-rowe.com tel +618 9221 1991 fax +618 9221 1919

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Bullsbrook Village - Photo Copy

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TOWN PLANNING MASTER PLANNING URBAN DESIGN PROJECT MANAGEMENT

date	8 June 2011	job no.	4790	scale	NTS
designer	D Evans	prepared by	E Tan	e-ref	061101 photos
client					

title photograph 3

address lot 301 stock road & lot 302 lage road
bullsbrook

perth
Level 3, 369 Newcastle Street, Northbridge, Western Australia, 6003
email gra@greg-rowe.com web greg-rowe.com tel +618 9221 1991 fax +618 9221 1919

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TOWN PLANNING MASTER PLANNING URBAN DESIGN PROJECT MANAGEMENT

date	8 June 2011	job no.	4790	scale	NTS
designer	D Evans	prepared by	E Tan	e-ref	061101 photos
client					

title photograph 4

address lot 301 stock road & lot 302 lage road
bullsbrook

perth
Level 3, 369 Newcastle Street, Northbridge, Western Australia, 6003
email gra@greg-rowe.com web greg-rowe.com tel +618 9221 1991 fax +618 9221 1919

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GREG ROWE & associates
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Photograph 5 - 12th November 2017 Site Tour for Locals of Emergency Vehicle Access Route No. 2
Lot 301 Stock Road & Lot 302 Lage Road, Bullsbrook

CITY OF SWAN STRUCTURE PLAN NO. 11

LOT 301 STOCK ROAD AND LOT 302 LAGE ROAD, BULLSBROOK

APPENDICES

APPENDIX I
CERTIFICATES OF TITLE

APPENDIX 2

RIGHT OF CARRIAGEWAY DOCUMENTS

APPENDIX 3
QUARRY NOISE ASSESSMENT

APPENDIX 4A

ENVIRONMENTAL ASSESSMENT REPORT

APPENDIX 4B

ENVIRONMENTAL ASSESSMENT REPORT ADDENDUM 2017

APPENDIX 5
SERVICING REPORT

APPENDIX 6

PRELIMINARY GEOTECHNICAL INVESTIGATION

APPENDIX 7A

LOCAL WATER MANAGEMENT STRATEGY

APPENDIX 7B

LOCAL WATER MANAGEMENT STRATEGY ADDENDUM 2017

APPENDIX 8
ABORIGINAL HERITAGE

APPENDIX 9
ARCHAEOLOGICAL INVESTIGATION

APPENDIX 10

BUSH FIRE MANAGEMENT PLAN

APPENDIX 11
TRANSPORT ASSESSMENT

APPENDIX 12

SITE PHOTOS OF DRAINAGE PATHWAYS