

LOT 202 BREAKWATER DRIVE, TWO ROCKS

LOCAL STRUCTURE PLAN

PART 1 - IMPLEMENTATION

Prepared for

KINCARDINE HOLDINGS PTY LTD

By

MIKE ALLEN PLANNING

OCTOBER 2019

RECORD OF AMENDMENTS MADE TO THE LOT 202 BREAKWATER DRIVE, TWO ROCKS

AGREED STRUCTURE PLAN NO.53

Amendment No.	Summary of the Amendment	Date approved by WAPC
1	<p>Modifications to the structure plan map and text arising from the following changes to the northern and central portion of the structure plan area:</p> <ul style="list-style-type: none">• Reduction in the area of public open space at the western corner of Breakwater Drive and Oregano Drive from 4.76 ha to 1.7 ha;• Reconfiguration of the road through the area; and• Four additional lots.	

IT IS CERTIFIED THAT AMENDMENT NO. 1 TO LOT 202 BEAKWATER
DRIVE, TWO ROCKS WAS APPROVED BY RESOLUTION OF THE
WESTERN AUSTRALIAN PLANNING COMMISSION ON:

3 OCTOBER 2019

Signed for and on behalf of the Western Australian Planning Commission

A handwritten signature in black ink, appearing to read 'R. G. G.', is written over a horizontal line.

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

OVERVIEW

1.0 PARTS OF THE STRUCTURE PLAN

This Structure Plan comprises three separate parts:

Part 1 – Implementation

Part 2 - Explanatory Report

Part 3 - Appendix containing Supplementary Plans and Reports

Clause 9.8 of the City of Wanneroo District Planning Scheme No. 2 (hereinafter called the Scheme") provides, amongst other things, that a provision, standard or requirements of a Structure Plan approved under Part 9 of the Scheme, shall be given the same force and effect as if it was a provision, standard or requirement of the Scheme. It is hereby provided that such force and effect shall only be given to Part 1 of this Structure Plan. Parts 2 and 3 of this Structure Plan is for explanatory purposes only, providing a descriptive analysis of the background and basis for this Structure Plan.

Clause 9.8.3 (f) of the Scheme states that where, in the event of there being any inconsistency or conflict between any provision, requirement or standard of the Scheme and any provision requirement or standard of an agreed Structure Plan, the provision, requirement or standard of the Scheme shall prevail.

2.0 SUMMARY OF STRUCTURE PLAN

The Local Structure Plan refers to Lot 202 Breakwater Drive, Two Rocks (232 ha) being generally bounded by Breakwater Drive to the north, Mitchell Freeway reservation to the east and Parks & Recreation reservations to the west and south.

The site is currently zoned 'Rural' under the Metropolitan Region Scheme and 'Rural Community' under the City of Wanneroo TPS No. 2. The specific provisions of the "Rural Community" zone requires the preparation of a Local Structure Plan to facilitate an environmentally sensitive subdivision that can be effectively integrated with the existing landscape and amenity of the locality.

Detailed environmental, geological and land use capability assessments recently undertaken and contained in Part 3 Appendices conclude that the proposed development can be satisfactorily accommodated on the site without having an adverse impact on the existing and surrounding landscape. The proposed Structure Plan has been carefully designed to have due regard to protecting and enhancing the natural attributes and landscape features of the site.

The Plan proposes subdivision of the land into 173 lots with lot sizes ranging from 1 ha to 2.77 ha, which comprises a density of about 1.46 hectares of gross site area per lot. This Structure Plan document includes significant development requirements arising from the site investigations and management plans and in response to and addressing the detailed provisions for the Rural Community zone set out in Schedule 12 of the Scheme. It also contains controls to regulate building envelopes, tree planting and vegetation protection areas and livestock controls to ensure an appropriate form of development to complement the landscape and land capability. A total of 10.32 hectares of the site has been set aside as public open space to ensure the preservation of significant vegetation and an Aboriginal Heritage site.

PART 1

IMPLEMENTATION

LOT 202 BREAKWATER DRIVE, TWO ROCKS LOCAL STRUCTURE PLAN

Subject Land:

Lot 202 Breakwater Drive, Two Rocks

1.0 AGREED LOCAL STRUCTURE PLAN

PLAN 1 - The Agreed Local Structure Plan

2.0 PROVISIONS, STANDARDS AND REQUIREMENTS

2.1 The provisions, standards and requirements applicable to the subject land are in accordance with Clause 3.23, Rural Community Zone and Schedule 12 (area RC 1) – Rural Community Provisions.

2.2 The Special Provisions which are relevant to the future owners of the lots, which will be created by the subdivision of the subject land are 1.1.2 (k) and (l). 1.1.3. 1.2.2. 1.2.3. 1.2.4. 1.2.5 of Schedule 12 of the Scheme.

2.3 Building Envelopes:

2.3.1 The location of the building envelopes (to a maximum size of 2000m²) shall be as depicted on the Agreed Structure Plan subject to subclause 2.3.2 below.

2.3.2 Further work involving detailed ground penetrating radar surveys shall be earned out by the developer prior to seeking subdivision approval from the Western Australian Planning Commission in the western part of the Property encompassing: Lots 7, Lots 55- 59, 65-76, 87 - 91 ,100 - 123, 125 – 135 and 173 which are located in the phreatic karst environment, to ensure that building envelopes are positioned in known end-stage/post karst terrains where there will be little risk of collapse.

2.3.3 All building envelopes within lots shall be physically identified and clearly pegged prior to the final approval of a Deposited Plan of Survey for each stage of subdivision.

2.3.4 Building envelopes may only be modified subject to the approval of the Council upon an owner producing a certificate from a registered

engineer that the area within the modified building envelope is geologically suitable for the construction of a dwelling.

2.4 Bushfire Management

Bushfire management will be in accordance with *State Planning Policy 3.7 Planning in Bushfire Prone Areas* and any other relevant requirements including the City of Wanneroo's Firebreak Notice.

2.5 Drainage, Water and Nutrient Management

2.5.1 Storm water Management Strategies

For Vadose Karst Environment

(a) The minor storm drainage system for all roads shall be designed to collect and infiltrate or transmit up to a 1 in 5 year storm to all disposal points.

(b) Compensating basins shall be designed to retain water for a period of 72 hours for a 1 in 10 year ARI storm taken as a one off event.

(c) The major storm 1 in 100 year flood shall be accommodated to flow via flood routes to disposal points, with no effect on the building envelopes.

For Phreatic Karst Environment

(a) The minor storm drainage system for all roads shall be designed to collect and infiltrate or transmit a 1 in 10 year storm to the disposal points.

(b) The major storm 1 in 100 year flood shall be accommodated to flow via flood routes to disposal points, with no effect on the building envelopes

General Requirements

- Infiltrate, at source, the 1 in 1 year ARI event calculated using the Rational Formula.
- Surface water discharge controls to be applied including the provision of kerbed roads in steep areas with soakage occurring in planned and agreed locations reducing the concentration of stormwater run-off to high risk zones.
- Avoid piped drainage where possible.
- Development of exclusion zones to be located a minimum of 30 metres around all road stormwater drainage basins or storage structures.
- Soakwells are to be located no less than 10m from building foundations or lot boundaries in sufficiently deep sandy layers to allow infiltration.
- The retention and planting of native vegetation (other than within strategic firebreaks, road reserve/s, drainage sites and the designated building envelope) to assist in attenuating nutrients generated by fertiliser

applications, waste products and surface runoff.

- The provision of cut-off bunds/swales within lots to prevent any overland flow discharging to road reserves from lots and driveways.

2.5.2 Groundwater Quality and Nutrient Management:

Aerated Treatment Units:

- Provision of Aerated Treatment Units is required for effluent disposal and these must be located at least 5m from buildings and boundaries and be located within areas of sand, where possible, to avoid the requirement for excavation within limestone.
- Groundwater extraction shall be as per the Department of Water guidelines.
- Irrigation shall be via sprinkler systems.

Monitoring Water Quality, Nutrient Levels and Water Surface Elevation

- A minimum of four groundwater monitoring bores to be established and monitored quarterly for a period of 24 months for nutrients and reported to the City of Wanneroo.

2.5.3 Karst Management Requirements for Drainage and Construction

The following measures shall be undertaken by the developer for the development of roads within the phreatic karst environment as identified in the Agreed Structure Plan:

2.5.3.1 Developer's responsibilities

- Utilise Static vibration equipment for the construction of road pavements.
- Ensure construction personnel and machine operators are aware of the potential risks associated with karstic terrain.
- Kerb the roads in steep areas and where necessary so that soakage takes place at planned locations reducing the concentration of stormwater run-off to high risk zones. Roads without kerbing shall be constructed with sufficient crown height to limit the potential catchment area and to direct surface water runoff into table drains on both sides of the road pavement.
- Provide a development (including road pavements) exclusion zone of at least 30m wide around the perimeter of all road stormwater drainage systems or storage structures.
- Undertake geotechnical investigation along proposed road alignments and drainage basins to assess the potential risks prior to construction.

- Areas identified as of high risk shall be avoided by realigning roads and/or building envelopes.
- If the ground penetrating radar shows a substantial sand section (>15m) then no further work will be required. If calcarenite is detected under a particular building envelope, then a minimum of one borehole will be drilled to test for cavities or for calcarenite lying below the water table. If phreatic karst or a cavity is detected then the building envelope will be moved and the testing program will be repeated. Any significant karst features such as caves or sinkholes detected will be delineated and subsequently fenced.
- To undertake Geotechnical investigation consisting of no less than 3 ground penetrating radar probes and/or boreholes within the proposed building envelope prior to the construction to assess the foundation conditions for design of footings on Lots 7, 55 – 59, 65 - 76, 87 – 91, 100-123, 125 – 135 and 173.

To mitigate the potential for groundwater contamination in the phreatic karst environment:

- Avoid concentrated discharge of stormwater where possible.

Drainage should be quarantined from low depressions near the western boundary where dolines and caves are present.

Low depressions are those areas shown on the attached Figure 6 of the Karst Landform Management Plan, Version 5, 11 February, 2007 west of 2.5 m AHD shown as Sinks S3, C3 and C4 and the North-West Sink. Special uses such as fuel and other dangerous goods storage facilities should not be permitted at all within the phreatic karst environment.

2.6 Fauna and Vegetation Management

The developer shall implement the following measures to ensure the protection of the surrounding regionally significant vegetation and the locally significant vegetation:

- Install a standard rural fence at the periphery of the property prior to the commencement of construction activities;
- All machinery shall be cleaned prior to entering the site to minimise the potential spread of dieback;
- All soil and fill material entering the site shall be obtained from a dieback free source;
- Site works which involve the clearing of native vegetation will be clearly delineated and approved by Council prior to the commencement of such works;

Any native tree cleared during construction works shall be replaced with a native sapling to be planted in an appropriate location in the development area;

- Native vegetation cleared during construction activities shall be used to generate on-site chipped mulch material;
- Site residues, such as fallen trees, decaying logs and large rocks shall be retained and used in appropriate locations for provision of fauna habitat;
- Install monitoring plots prior to development commencement within the adjacent regionally significant vegetation to record potential degradation of the bushland. Plots to be monitored annually in spring for a period of two years following commencement of development activities; and
- Install monitoring plots in rehabilitation areas to determine if any further planting and/or weed control is required. The plots will be monitored annually for a period of two years following commencement of development activities.

The following measures will be the responsibility of the residents:

- No vegetation may be cleared for any purpose other than the construction of buildings, driveways, fire breaks and selective clearing to lower fuel areas around buildings.
- Planting of endemic vegetation outside the building envelope.
- The maintenance of drainage bunds within lots.

2.7 Water Supply

The developer shall provide reticulated water supply to each new lot.

2.8 Fencing Controls

Lot perimeter fencing shall be limited to open rural type fencing of a post and rail or post and wire nature to the satisfaction of the City of Wanneroo.

2.9 Management of Public Open Space

The areas of Public Open Space within the Local Structure Plan shall be developed and managed consistent with contemporary landscape practices.

2.10 Noise Study

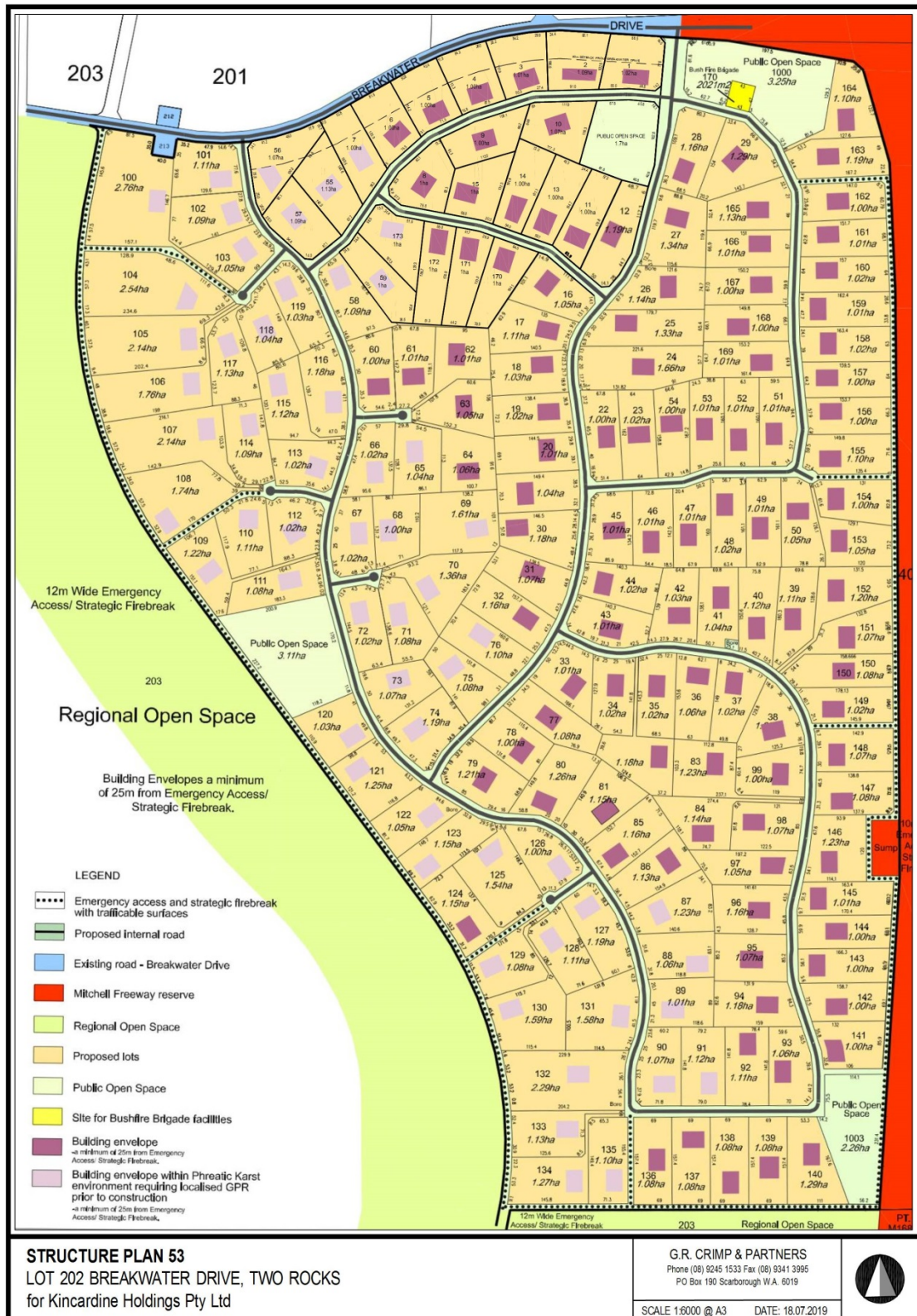
Prior to seeking subdivision approval from the Western Australian Planning

Commission in respect of the lots abutting the Mitchell Freeway road reserve, the developer shall prepare a Noise Study to examine the noise, impact of the future freeway on those lots and the need for notification to residents and/or implementation of attenuation measures, to the satisfaction of the City of Wanneroo.

2.11 Aboriginal Heritage Management Plan

The developer shall prepare an Aboriginal Heritage Management Plan for the 3-hectare Public Open Space area and undertake an Aboriginal Heritage Assessment for any areas which have been exposed during the past 17 years prior to the lodgement with the Western Australian Planning Commission of any subdivision application that include the public open space, to the satisfaction of the Department of Indigenous Affairs.

Plan 1



PART 2 – EXPLANATORY REPORT

AMENDMENT NO.1 TO THE LOT 202 BREAKWATER DRIVE AGREED STRUCTURE PLAN NO. 53

Summary

The proposed amendment is to alter the plan of subdivision that forms part of the Agreed Structure Plan by removing one of the four areas of public open space currently identified on the plan of subdivision and subdividing that land and its immediate surrounds into additional rural residential lots. This will have the effect of increasing the lot yield within the Agreed Structure Plan 53 (ASP 53) from 169 to 175 lots.

There are two principal reasons why the amendment to ASP 53 should be supported.

- There is no policy requirement to provide any areas of open space within rural residential subdivisions. It has been a long-established principle that this type of subdivision does not need additional areas of open space because of the very large lot sizes that are characteristic of these developments. Effectively, open space requirements are contained within each lot.
- The original plan of subdivision for Lot 202 showed only three areas being set aside for open space.

1. Introduction

Mike Allen Planning acts on behalf of Kincardine Holdings Pty Ltd, the owner of the original Lot 202 Breakwater Drive, Two Rocks.

This report has been prepared in support of a proposed amendment to the Lot 202 Breakwater Drive Local Structure Plan, referred to as the City of Wanneroo's ASP 53. The purpose of the amendment is to amend the subdivision guide plan to allow an area shown as public open space on the plan of subdivision contained within the structure plan to be subdivided into additional rural residential lots.

2. Background

ASP 53 controls the development of the Breakwater Estate on Breakwater Drive in Two Rocks. The Breakwater Estate plan of subdivision (see Figure 2) currently comprises 169 rural residential lots, with a minimum lot size of 1 hectare. The land is zoned 'Rural Community' under the City of Wanneroo's District Planning Scheme No 2 (DPS 2).

The Breakwater Estate has been developed on land which was formerly used for grazing purposes prior to the current owner, Kincardine Holdings acquiring the land. It comprises generally open countryside with many mature tuart trees throughout the development. Many thousands of additional trees and shrubs have been planted both prior to and during the development of the estate.

The original Lot 202 has been progressively subdivided over the last six years to the point where some 45 lots remain to be developed under the current plan of subdivision. The current stage of development, which is under construction, will reduce the lots still to be developed to 39.

Development of the area has been undertaken in accordance with the provisions of the City's District Planning Scheme No 2 and the controls imposed by ASP 53.

The plan of subdivision within the structure plan shows four areas to be set aside for public open space. Two of these have already been set aside and are now under the control of the City of Wanneroo. A third area which contains the Emu Cave site of aboriginal heritage significance is currently going through the process of being developed as a conservation reserve, with a view to being taken over by the City of Wanneroo in approximately two years time.

3. The proposal

The proposed change to ASP 53 is to amend the plan of subdivision north and west of the currently developed area. This part of the estate includes a 4.76 hectare area shown as public open space, and also affects the following lot numbers as shown on the plan of subdivision: 1-11, 13-15, 55-57. The road layout also is proposed to be reconfigured. The location of the area of the structure plan to be amended is shown on the attached aerial photograph (figure 3). A modified structure plan map is shown at figure 4, and the proposed plan of subdivision superimposed on contour information together with the extent of the existing public open space is shown on figure 5 attached.

The net result of the proposed changes would see the yield in the affected area rise from 18 to 24 lots. Therefore, the lot yield for the entire subdivision will rise from 169 to 175 lots.

4. Planning Considerations

The following planning instruments are considered to be relevant to this proposal:

City of Wanneroo District Planning Scheme No 2

Agreed Structure Plan 53

State Planning Policy 2.5 – Land Use Planning in Rural Areas

Figure 3 Aerial view of location of proposed structure plan amendment



Figure 4 Proposed amended structure plan map

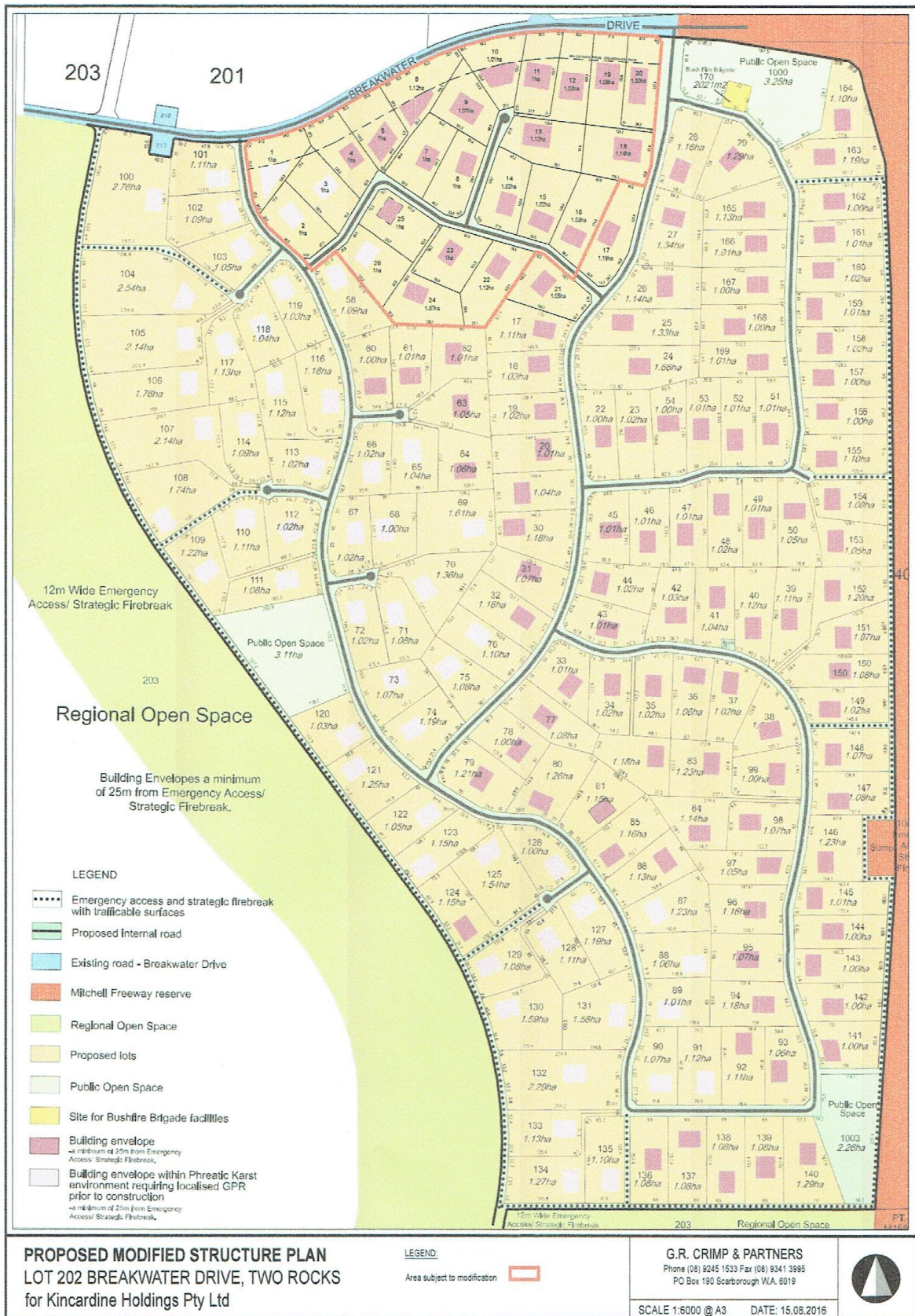
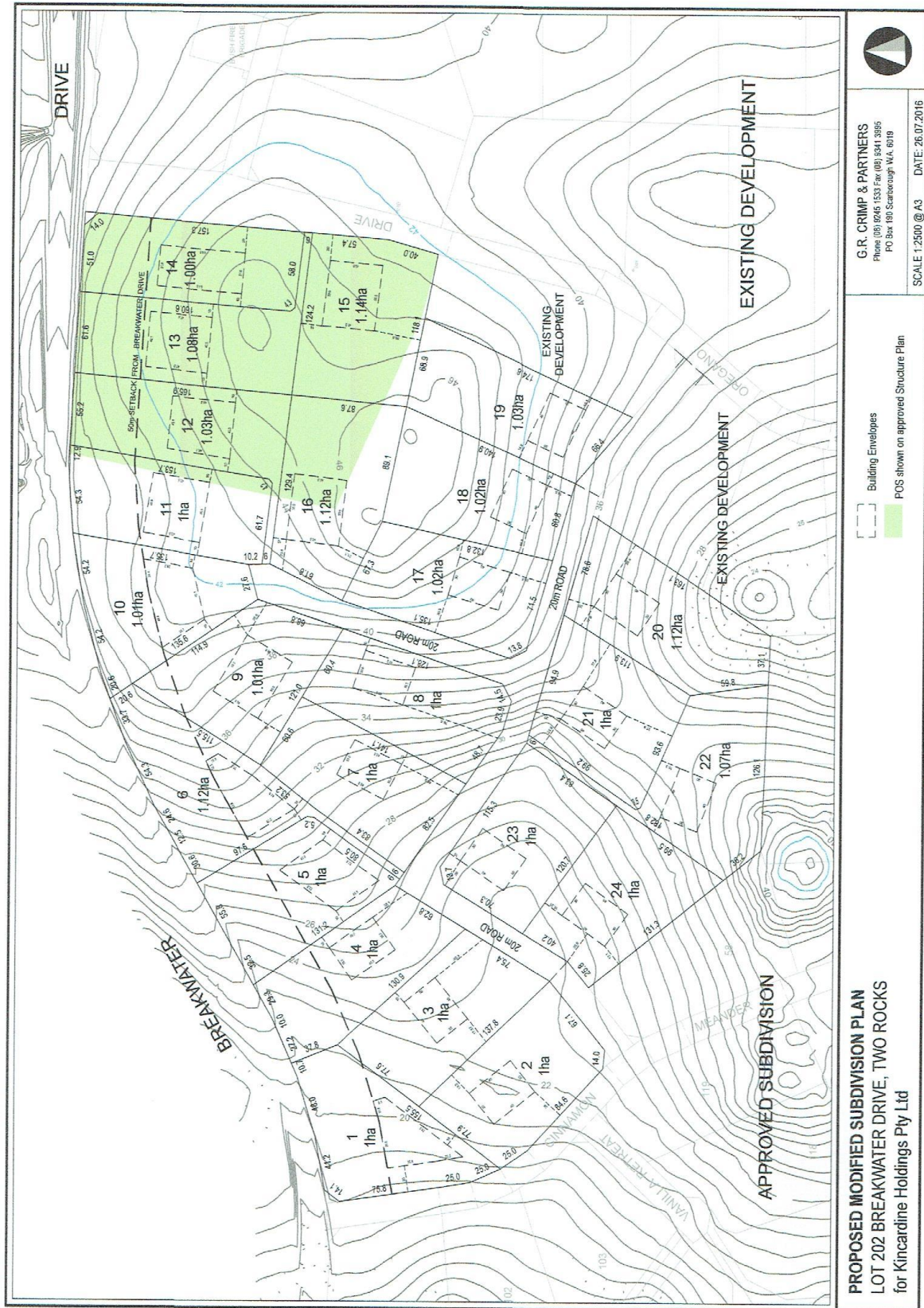


Figure 5 Proposed plan of subdivision superimposed on current POS area.



District Planning Scheme No.2

Clause 3.23 under DPS 2 describes the Rural Community Zone. It states the purpose of the zone is to: *provide for the orderly and integrated subdivision and development of larger areas of land proposed for rural residential use, in a manner which maintains the environmental, vegetation and landscape characteristics of the locality.*

Clause 3.23.2 states no subdivision shall be carried out unless a structure plan has been prepared and adopted. ASP 53 is the required structure plan. This Clause also refers to the requirements of Schedule 12 of DPS 2 and the provisions of the structure plan. Any subdivision must conform to those requirements.

Schedule 12 of DPS 2 covers all the rural community zones in the City of Wanneroo. Lots 201 and 202 Breakwater Drive are referred to as RC1. For the sake of clarity, Lot 201 Breakwater Drive has been fully developed by others and is known as the Sea Trees Estate.

Schedule 12 states that its provisions cater for conventional subdivision. It requires the preparation of various management plans, and the identification of any areas to be ceded as public open space.

Relevantly for the purposes of this proposed amendment, Clause 1.1.2 (f) in Schedule 12 says: *Determination of the maximum development potential of the land as a result of the assessments carried out above, and having regard to the minimum permitted lot sizes and maximum lot yields referred to in special provisions for conventional subdivision.*

Schedule 12 continues under Clause 1.2.1 to say: *The lot yield of Rural Community Zone No 1 shall be determined through a detailed site analysis to be undertaken to the satisfaction of the Council and the Commission as part of the preparation of a Structure Plan for the land. The size of the lots to be created in this zone shall also be determined through this detailed site analysis, but should not involve lot sizes less than 1 hectare.*

Agreed Structure Plan 53

Part 1 of ASP 53 as it stands says the land will be divided into 169 lots with lot sizes ranging from 1 ha to 1.67 ha. In fact the largest lot is 2.77 ha.

The proposed amendment will not alter the minimum lot size but will increase the total yield to 175. This results in a marginal increase in the density of development from one lot per 1.5 ha to one lot per 1.44 ha.

The whole of the structure plan area is within a Karst environment. Approximately the western third of the structure plan area is within what is known as the Phreatic Karst

area, where there may still be some gradual erosion of limestone by the movement of groundwater. For this reason that part of the subdivision has been subject to extensive testing using ground probing radar to determine the location of building envelopes which are suitable for development.

The proposed modification to the plan of subdivision in the structure plan includes four lots within the Phreatic Karst area (lots 55-57 and 59) but the building envelopes have not been extended beyond those shown on the existing plan of subdivision.

The eastern two thirds of the structure plan area, including the majority of the land within the proposed amendment area, is within what is known as the Vadose Karst area. Vadose Karst is where any limestone in the form of rocks or pinnacles has been eroded away by groundwater and any ground settlement that may occur as a result will already have occurred.

ASP 53 refers to various management plans prepared to support the preparation of the structure plan, and the requirements from those management plans as to how the land could be developed. No change to any of those management plans or their recommendations is proposed by this amendment.

Clause 2.9 of ASP 53 refers to the establishment of four areas of public open space. This amendment proposes to remove one of those areas.

State Planning Policy 2.5 – Land Use Planning in Rural Areas

This policy covers (inter alia) the establishment of rural living precincts. As the creation of the Rural Community Zone under DPS 2 and ASP 53 has been endorsed by the Western Australian Planning Commission, the validity of the current subdivision is not in question.

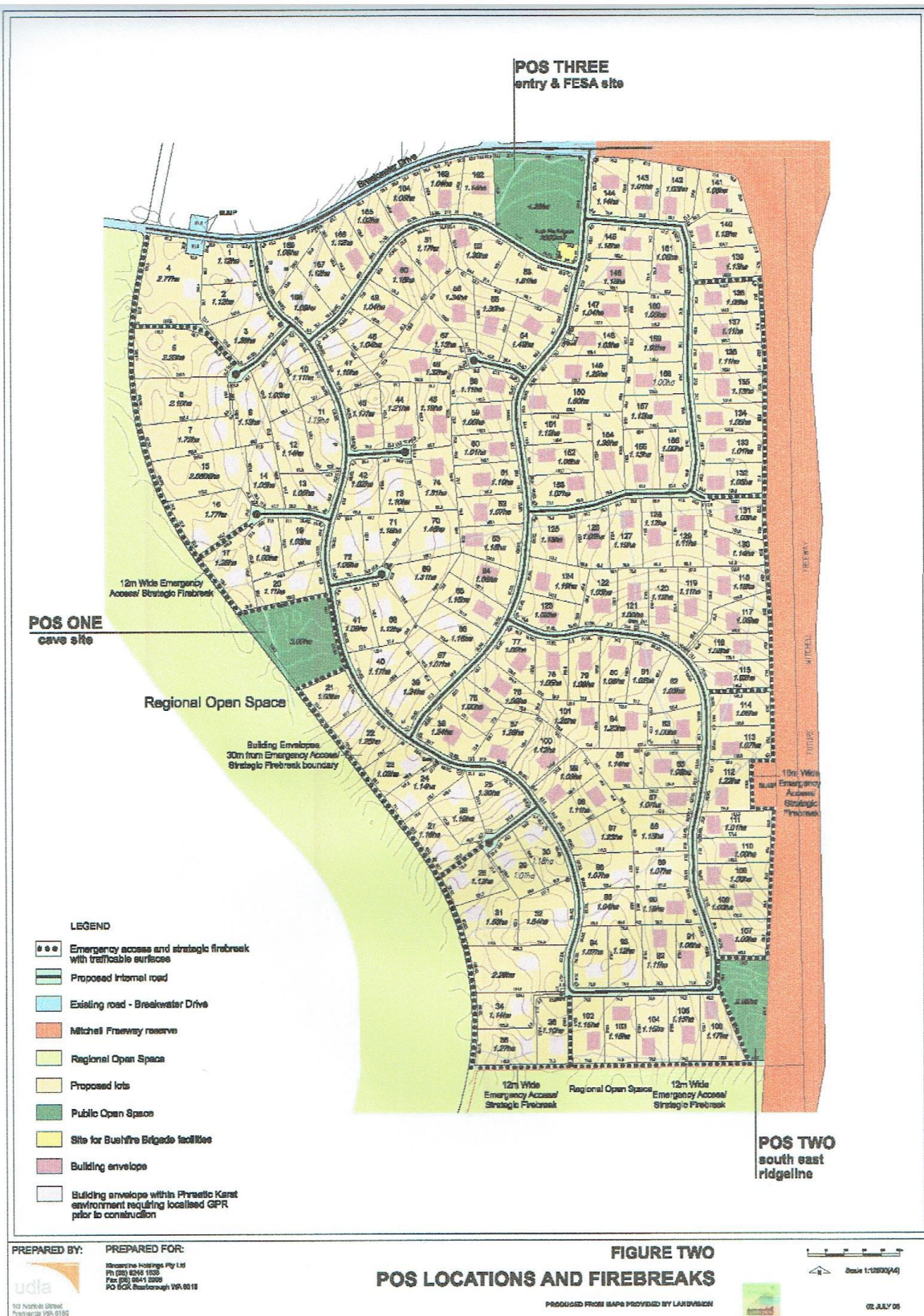
If the amendment to ASP 53 is approved and a subsequent application to subdivide is lodged with the WAPC, it will need to be satisfied that the criteria for establishing rural living precincts are not being compromised. The proposed amendment will satisfy the criteria.

5. Justification for the proposed amendment

There are two principal reasons why the amendment to ASP 53 should be supported.

- (i) There is no policy requirement to provide any areas of open space within rural residential subdivisions. It has been a long-established principle that this type of subdivision does not need additional areas of open space because of the very large lot sizes that are characteristic of these developments. Effectively, open space requirements are contained within each lot.
- (ii) The original plan of subdivision for Lot 202 showed only three areas being set aside for open space (figure 6 attached).

Figure 6 Original plan of subdivision with three areas of POS identified



Some history regarding the open space sites within Breakwater Estate may be helpful.

When the original subdivision design was proposed, three POS area were identified. The largest, at over 4.76 ha, was located on the western side of one of the entrances into the subdivision off Breakwater Drive. This was an area that had been identified by the Department of Fire and Emergency Services (then FESA) as a suitable location for a bushfire fighting facility. It was large enough and clear enough to accommodate a helicopter landing area if needed.

A second area of open space in the far south-eastern corner of the subdivision was identified based on its floristic characteristics. It is over 2 hectares in area. It is also an area where limestone pinnacles are at the surface making it very difficult to develop.

The third area on the western boundary of the estate is an aboriginal heritage site, containing Emu Cave. It is over 3 hectares in area. This is a site used by the local aboriginal group for educational and ceremonial purposes, and is being set aside as a conservation reserve rather than a reserve for recreation.

Therefore, in the original plan of subdivision areas of open space totalling almost 10 hectares were identified.

A subsequent change to the plan of subdivision (before the ASP was endorsed) added a further 3.27 hectares of open space. This last change came about for two reasons.

First, the area originally to be used by DFES was found to include an area above the level at which a reliable water supply could be provided. Therefore a site at a lower elevation was needed. In addition, the access to the DFES facility would have been up a relatively steep approach which would not have been ideal.

Second, the new area of open space which was now to include the DFES facility was still close to the intersection with Breakwater Drive – important for access reasons – but was at a suitable lower elevation eliminating water pressure issues. In addition an area of remnant vegetation which had previously been incorporated within private lots would now be within an area of POS, meaning a greater likelihood of it being maintained undamaged.

However, the addition of the new area of POS did not result in the removal of the 4.76 hectare site, so the plan of subdivision as it currently stands now contains over 13 hectares of land set aside for public open space or 5.6% of the original lot area.

Therefore, it is the submission of this proposed amendment that there is no need to retain the area as public open space, and there is certainly no requirement to retain it for such a purpose.

The further subdivision of the area can be justified because there are no impediments to that subdivision other than the requirement for an amendment to the structure plan.

The area of land is on a high part of the estate. Additional vegetation has been planted along the Breakwater Drive frontage as required by the structure plan, and scattered vegetation, including large mature tuart trees is present across the site. Vegetation of some four years old has been planted along the frontage to Oregano Drive, which gives a somewhat false impression of the vegetation cover. This was planted as part of the rehabilitation of the contractor's compound site that was used during the construction of the first two stages.

A number of management plans were prepared to support ASP 53 which are relevant to the proposed amendment.

The Landscape Management Plan for the Breakwater Estate, prepared in August 2008, was based on the original three sites of public open space. It said of the subject 4.76 hectare site that it is recognised as having the most recreational value but was also depleted of much of its vegetation due to former grazing. The Management Plan said none of the three sites was being used for recreational purposes. It warned: *The major threat posed by each of the sites is the potential for weeds infestation, pedestrian compaction and disturbance, public safety and the provision of an environment that demonstrates the local landscape condition.*

While acknowledging the statement about the site having recreational value, as indicated above, rural residential estates are not required to provide for recreational open space.

This management plan was prepared on the basis that the subject site would be used for the DFES facility. As this is no longer the case, the usefulness of this area of open space needs to be critically re-examined. The plan also indicated that this area of open space would include smaller areas for passive and active open recreation. There are a number of reasons why active open space should no longer be supported in this location:

- It is very unusual for rural residential estates to contain areas of active open space which suggests grassed areas with playground equipment and the like as the estate even at full development will not have a large population. The use of this area for active recreation would be minimal.
- In addition, the location of the open space is not central to the estate so it would require a conscious effort on the part of residents to go and make use of any facilities.
- The area is remote and the opportunities for vandalism of any equipment would be very high.

- Active recreation areas suggest that irrigation would be needed which is an expensive maintenance and management item. It is also uncertain as to whether there is any available groundwater allocation for open space irrigation in this area.

The management plan said the site required revegetation to restore the upper and lower storey planting, confirming it was in a degraded state.

The Vegetation and Fauna Management Plan requires the protection of locally significant vegetation. However, as has been noted previously the subject site has been severely degraded in terms of its vegetation cover due to the previous grazing regime.

The 15 metre strip of additional planting along the Breakwater Drive frontage will not be disturbed, along with any existing vegetation, because any building envelopes are required to be setback 35 metres from Breakwater Drive.

The Vegetation and Rare Flora report indicated that the vegetation on the subject site was Degraded or Completely Degraded.

The Karst Landform Management Plan identifies the subject site as being within the Vadose Karst area, which means there is no longer any risk of any ground collapse as a result of the erosion of limestone by groundwater. The proposed revision to the plan of subdivision includes four lots within the Phreatic Karst area, where there is some residual risk of ground movement. However, the building envelopes within those four lots have not been enlarged and those envelopes have been selected through the use of ground probing radar to be suitable for development.

The Fire Management Plan prepared in 2013 which covered the balance of the estate undeveloped at that time includes the subject site. The area was rated as 'Moderate' in terms of Bush Fire Hazard.

The development of the estate has been conscious of the need for bushfire protection. The whole estate is surrounded by a strategic firebreak with a number of points that provide access for people within the subdivision to the strategic firebreak.

The subject site is immediately adjacent to Oregano Drive and Breakwater Drive, which provides ready access onto the road system in the area.

The proposed amendments to the plan of subdivision include lots which will use the second access into the estate off Breakwater Drive.

Council's requirements for the preparation of a structure plan amendment include a Bushfire Hazard Level Assessment where the land is within a Bushfire Prone Area. The Bushfire Hazard Level Assessment has been produced as a separate report and is attached.

This report shows that the proposed amendment and the subdivision layout contemplated is acceptable from a bushfire protection perspective. All proposed lots except one have been given a BAL Rating of 12.5, with the one exception having a BAL Rating of 19.

6. Conclusion

The proposed amendment to ASP 53 to remove one of the areas of public open space and subdivide it for rural residential purposes will not adversely impact on adjoining landowners and will not result in diminished opportunities for recreation for the local residents.

Public open space within rural residential estates is generally not required. If the proposed amendment is approved there will still be three areas of public open space within the Breakwater Estate, with one of them being a conservation reserve.

One of those three areas is immediately adjacent to the area proposed to be subdivided, so for those people who would still like to use the open space areas within the estate there is little change to the current level of convenience.

The proposed subdivision of the area will add a total of six additional lots to the estate. This will not have an adverse impact on the vegetation, fauna and flora in the area, and the proposal is not impacted by the requirements of the Karst Landform Management Plan.

For all these reasons it is requested that Council approves the amendment to the subdivision plan within ASP 53.

LOT 202 BREAKWATER DRIVE, TWO ROCKS LOCAL STRUCTURE PLAN: PART 2 - EXPLANATORY REPORT

CONTENTS

1.0	LOCATION	1
2.0	SITE DESCRIPTION	1
2.1	TITLE AND AREA	1
2.2	TOPOGRAPHY.....	1
3.0	ZONING	1
3.1	METROPOLITAN REGION SCHEME	1
3.2	CITY OF WANNEROO DISTRICT PLANNING SCHEME No 2 -- RURAL COMMUNITY ZONE.	4
4.0	PLANNING CONTEXT	7
4.1	NW CORRIDOR STRUCTURE PLAN (YANCHEP STRUCTURE PLAN)	7
4.2	AMENDMENT NUMBER 837	7
4.3	UNEXPLODED ORDINANCE (UXO'S)	7
5.0	ENVIRONMENTAL ASSESSMENT	8
5.1	EPA ASSESSMENT	8
5.2	MINISTER FOR ENVIRONMENT STATEMENT OF ENVIRONMENTAL CONDITIONS.....	8
6.0	RECOMMENDATIONS FROM MANAGEMENT PLANS FOR IMPLEMENTATION	9
6.1	KARST LANDFORM MANAGEMENT PLAN (ATA ENVIRONMENTAL AND COFFEY GEOSCIENCES PTY LTD).....	9
6.2	WATER MANAGEMENT PLAN (PARSONS BRINCKERHOFF)	11
6.3	VEGETATION AND RARE FLORA (ARTHUR S. WESTON).....	14
6.4	VEGETATION AND FAUNA MANAGEMENT PLAN (ATA ENVIRONMENTAL)	14
6.5	BUSHFIRE MANAGEMENT PLAN	15
6.6	MANAGEMENT OF THE SCENIC RESOURCE AMENITY (ATA ENVIRONMENTAL).....	15
6.7	REPORT FINDINGS.....	17
7.0	PUBLIC UTILITY SERVICES	17
7.1	EXISTING SERVICES.....	17
7.2	DEVELOPMENT SERVICES	18
8.0	THE PROPOSED STRUCTURE PLAN	23

ATTACHMENT – Figure 5: Structure Plan, Subdivision Guide Plan

LOT 202 BREAKWATER DRIVE, TWO ROCKS

LOCAL STRUCTURE PLAN EXPLANATORY REPORT

1.0 LOCATION

Lot 202 Breakwater Drive, Two Rocks is located within the City of Wanneroo, approximately 3 kilometres due east of the existing Two Rocks settlement and about 54 kilometres north of the Perth City Centre (see Figure 1). It is situated on the south side of Breakwater Drive and the eastern boundary of Lot 202 abuts the future Mitchell Freeway. Lot 202 is bounded to the west and south by Regional Open Space.

2.0 SITE DESCRIPTION

2.1 Title and Area

Lot 202 is described in Certificate of Title Vol: CT2097 Vol:779, being Lot 202 on Plan 21783 (Sheet 3).

Lot 202 comprises an area of 232.0414 hectares.

Memorial No G 407782 is registered on the title for the purpose of advising the property is affected by unexploded ordnance.

2.2 Topography

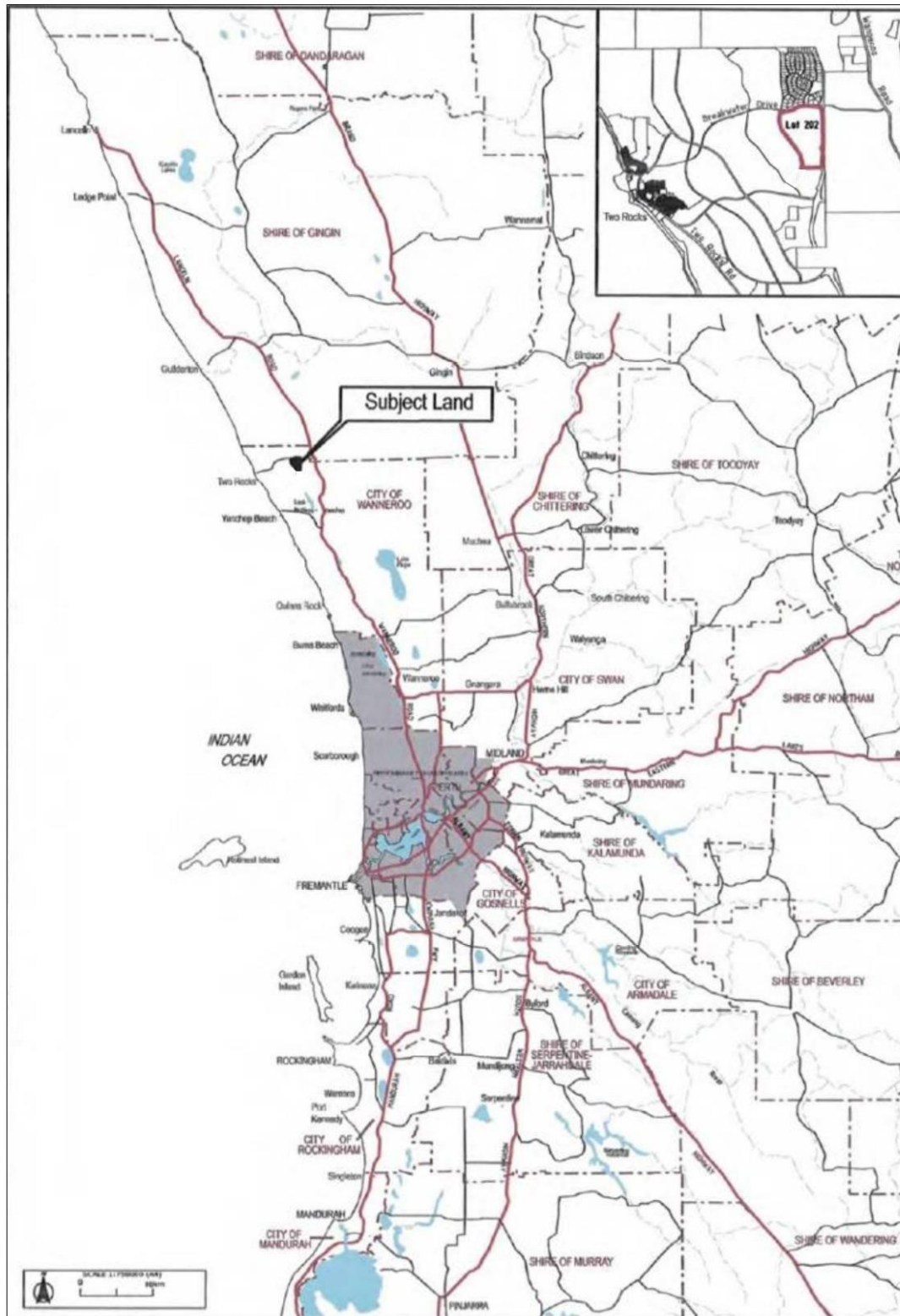
The topography of Lot 202 is irregular and comprises ridges, valleys and closed depressions. The flattest portion of the site is the elevated north eastern corner that lies at about 40m AHD. The surface slopes down to the south and west from this region into a mix of ridges and depressions. The lowest point lies at 8.5m AHD near the northwest corner of the site, whilst the highest point lies at 47.1m AHD in the northern portion of the site.

3.0 ZONING

3.1 Metropolitan Region Scheme

Under the Metropolitan Region Scheme Lot 202 Breakwater Drive is included in the “Rural” zone (see Figure 2).

Figure 1: Location

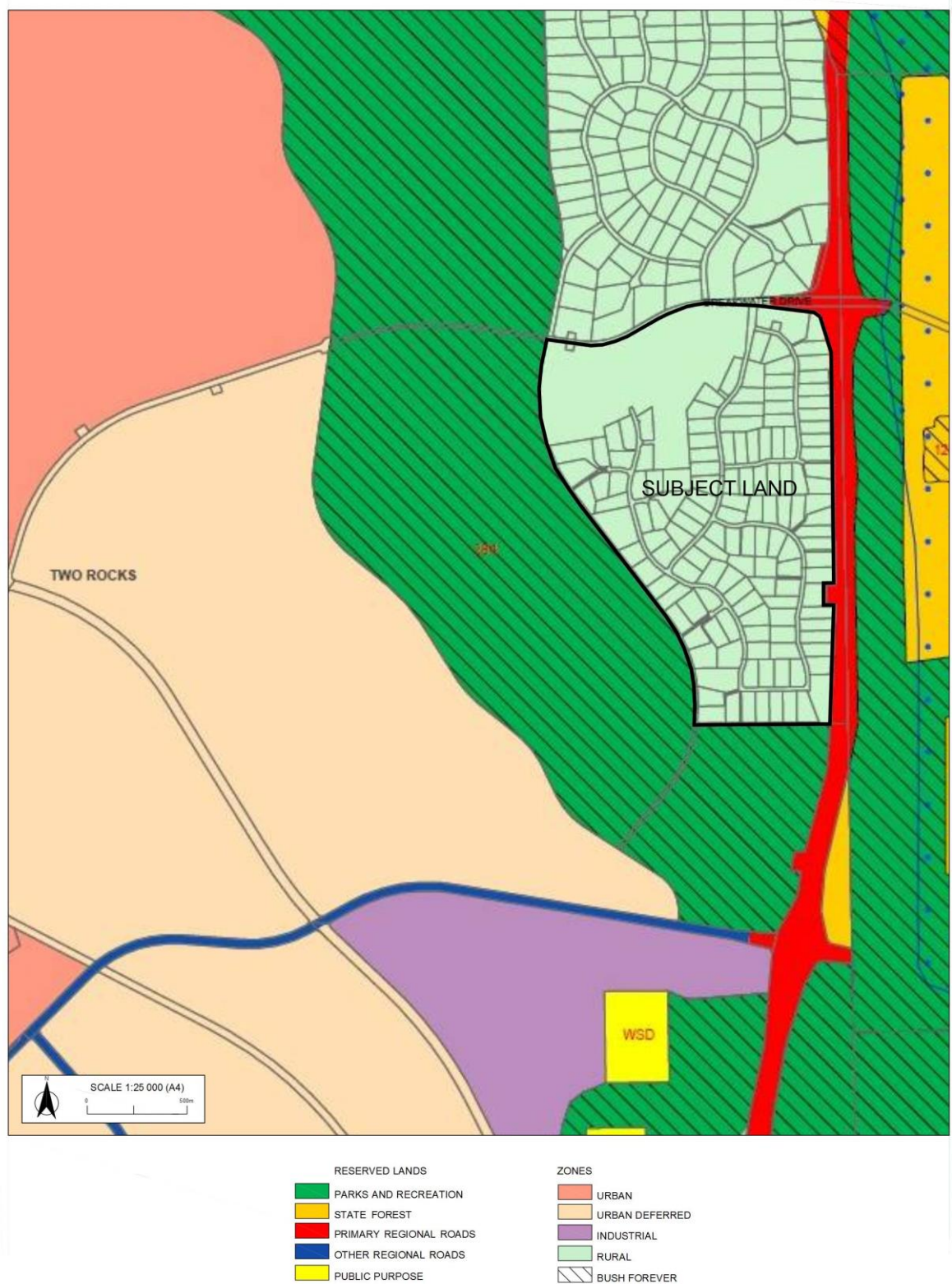


G.R. CRIMP & PARTNERS
Phone (08) 9245 1533 Fax (08) 9341 3995
PO Box 190 Scarborough W.A. 6019

LOCATION
LOT 202, BREAKWATER DRIVE, TWO ROCKS

DATE: 8 Oct - 19
FIGURE 1

Figure 2: Extract from Metropolitan Region Scheme



G.R. CRIMP & PARTNERS
Phone (08) 9245 1533 Fax (08) 9341 3995
PO Box 190 Scarborough W.A. 6019

EXTRACT FROM METROPOLITAN REGION SCHEME
LOT 202, BREAKWATER DRIVE, TWO ROCKS

DATE: 8 Oct - 19
FIGURE 2

3.2 City of Wanneroo District Planning Scheme No 2 -- Rural Community Zone.

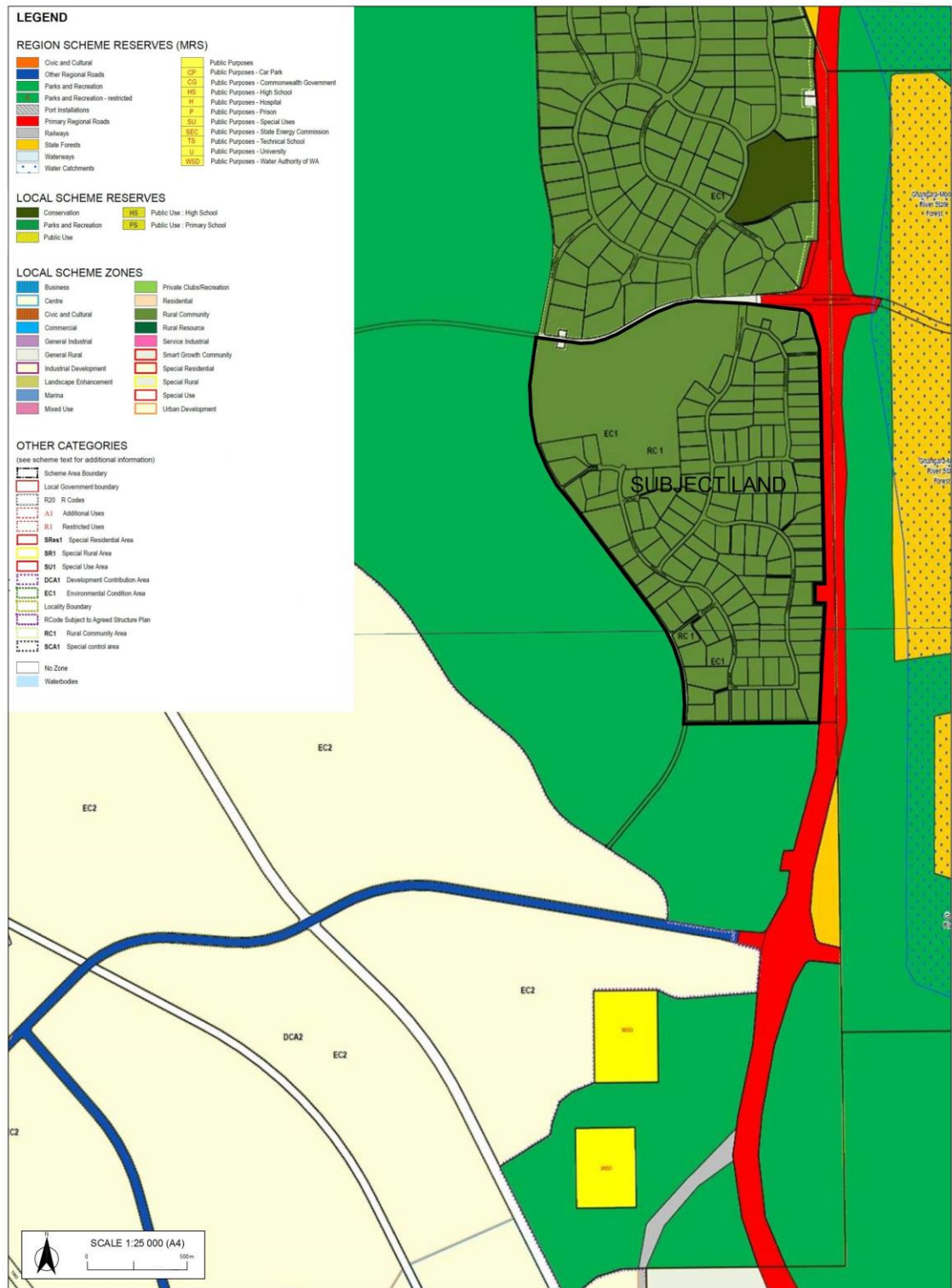
Under Scheme No 2, Lot 202 is included in the “Rural Community” zone (see Figure 3). This is a special zone introduced to into the Scheme via Amendment No 837 which was assessed by the EPA resulting in the introduction of Environmental Conditions reflecting Ministerial Conditions.

The purpose of this zone is to provide for the coordination of subdivision and development of land for rural -- residential use having regard to the environmental, vegetation and landscape character of the land (see Figure 4). It applies to lots 201 and 202.

The main provisions of this zone require a Structure Plan to be prepared prior to subdivision or development. The Agreed Structure Plan must contain land use provisions and would not need to be replaced by a subsequent Amendment to the Scheme. The detailed provisions for this zone are set out in Schedules 12 of the Scheme which requires the preparation of the following Management Plans:

- Vegetation and Fauna (Including Fire Management) Management Plan;
- Drainage and Nutrient Water Management Plan;
- Aboriginal Heritage Management Plan; and
- Karst Landform Management Plan.

Figure 3: Extract from City of Wanneroo TPS No. 2



G.R. CRIMP & PARTNERS
Phone (08) 9245 1533 Fax (08) 9341 3995
PO Box 190 Scarborough W.A. 6019

EXTRACT FROM CITY OF WANNEROO TPS No. 2
LOT 202, BREAKWATER DRIVE, TWO ROCKS

DATE: 8 Oct - 19
FIGURE 3

Figure 4: Aerial Photograph of Subject Land and Surrounds



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Phone (08) 9245 1533 Fax (08) 9341 3995
PO Box 190 Scarborough W.A. 6019

AERIAL PHOTOGRAPH
OF SUBJECT LAND AND SURROUNDS
LOT 202, BREAKWATER DRIVE, TWO ROCKS

DATE: 8 Oct - 19
FIGURE 4

4.0 PLANNING CONTEXT

4.1 NW Corridor Structure Plan (Yanchep Structure Plan)

In January 1993, the Department of Planning and Urban Development published the Yanchep Structure Plan as a modification / addendum to its NW Corridor Structure Plan of 1992. In regard to lots 201 and 202 Breakwater Drive, the Yanchep Structure Plan report states:

“It would be an advantage to extend the spine of regional open space which currently has been planned from Lake Goollellal through Neerabup National Park to Yanchep National Park and is based predominantly on the geomorphological feature known as the inter-barrier depression. This depression extends through the north-east corner of the Tokyu property. It could form the extension of Yanchep National Park to link with the Wilbinga/Caraban greenbelt as described on the previous page. It is not necessary for all of the north-east corner of the Tokyu property to be region open space. The most eastern portion, which is tuart woodland country, has been parkland cleared for pasture. The land (about 500 hectares) could have potential for urban development, the form of which could reflect the character of the area. The area is partially situated over karstic (cave) formations. These areas will require more detailed assessment to define areas suitable for development. In order to achieve planning and environmental objectives for the area innovative urban design will be expected.”

The Approved Yanchep Structure Plan showed lots 201 and 202 Breakwater Drive as "Areas Subject To Further Investigation". As a consequence of this, the land remained Rural Zone under the Metropolitan Region Scheme.

4.2 Amendment Number 837

The “Rural Community” zone which specifically applies to Lots 201 and 202 was introduced into the Scheme through Amendment No 837. It reflected the then owners request for flexible zoning to accommodate either conventional rural -- residential subdivision or cluster rural -- residential subdivision. The zone provided that detailed structure planning, subdivision and development of the site would be through subsequent steps in the planning process whereby the fine details of the proposal would be finalised. Amendment 837 included Special Provisions for the zone relating to the preparation of a Structure Plan and a Schedule of Environmental Conditions.

4.3 Unexploded Ordinance (UXO's)

The City of Wanneroo received advice from FESA in June 1999 as follows:

“UXO has completed an extensive Field Validation Study (FVS) of the subject area.

The result of this Field Validation Study is such that no further action by UXO Unit is required for this area and therefore have no objection for the proposed

amendment No 837 Lots 201 & 202 Breakwater Drive Two Rocks at Reference A.”

In 2003 discussions with the field operations officer of FESA confirmed that FESA had already conducted a field evaluation study of Lot 201 which indicated no evidence of high explosives. He advised, there is no requirement for additional on site investigation searching of Lot 202 and no requirement for future action regarding UX0's. In the event that a single UX0 is found on the site it would be likely to be a one off event as the land is outside (1 km west) of the identified impact zone.

5.0 ENVIRONMENTAL ASSESSMENT

5.1 EPA Assessment

The EPA issued its assessment in Bulletin No 956 in November 1999 in response to Amendment No 837. The assessment focused upon evaluation of the following matters:

- vegetation
- stygofauna and troglobitic fauna
- karst landform
- groundwater quality, and
- Aboriginal culture and heritage.

It is notable that the EPA assessment did not focus on Lot yield at all, other than incidentally within development scenarios to model potential water demand and nitrogen impacts of the proposal. Furthermore, that modelling indicated that both water demand and nutrient risk had a high sensitivity to agricultural uses of the land, but only a very low sensitivity to increased lot numbers supporting a restriction on rural-residential activities while having no objection to an increased lot yield as lot sizes did not need to have sufficient area to encourage agricultural activities. In any case, the maximum lot yield of 300 lots (including horse and agricultural land uses) was tested and assessed as acceptable. (This compares with the maximum 308 lots proposed by this Amendment.) The EPA's recommendations included specific environmental conditions to be included in the Scheme.

5.2 Minister for Environment Statement of Environmental Conditions

The Minister published the Statement on 15th February 2000 (reference: 000 537) requiring environmental conditions be incorporated into the Scheme. These are summarised as follows:

(a) Environmental Management Plans:

- Drainage Nutrient and Water Management Plan
- Karst Landform Management Plan

(b) Vegetation and Fauna Management.

(c) Aboriginal Heritage Management

Additional geotechnical work was specified with regard to the karst terrain of proposal of the structure plan, subdivision and building envelopes.

These Ministerial Conditions were subsequently included in Scheme No 2 as Item 1 in Schedule 12.

The Ministerial Conditions have been included into Part 1 of this Local Structure Plan and fully addressed in Part 2 and the reports relating to 5.2 (a) and 5.2 (b) above, included as Appendices in Part 3 of this Structure Plan.

6.0 RECOMMENDATIONS FROM MANAGEMENT PLANS FOR IMPLEMENTATION

The Management Plans prepared to satisfy the Ministerial Conditions and the Scheme are contained in the Appendices comprising Part 3 of this Structure Plan.

The following summarises the Management Plans and provides recommendations derived from the Management Plans and additional work undertaken both before and since this initial assessment of the Structure Plan by the local government and State government agencies. The recommendations have been included in the Part 1 of this Local Structure Plan - Statutory Planning Section in section “2.0 Provisions, Standards and Requirements”.

6.1 Karst Landform Management Plan (ATA Environmental and Coffey Geosciences Pty Ltd)

Lot 202 Breakwater Drive, Two Rocks lies within a zone that contains karst features. Investigations conducted as part of this Karst Landform Management Plan (KLMP) and a more extensive technical report on site geology (see Technical Report attached to the Structure Plan), identified a number of karst features including: - sinkholes, intraformational voids, caves and dolines. The investigation also found large tracts of the Property are underlain by a 5m to 15m-thick formation of stable sand that is suitable for development purposes.

Key management strategies relate to further detailed investigations within some building envelopes in the western part of the Property, where the geological studies revealed the existence of a subsurface phreatic karst environment characterised by sand sequences, calcarenite sequences lying above the watertable and calcarenite sequences lying partially within the watertable that are interspersed with occasional decametre-scale sinkholes and caverns.

The geotechnical and geological investigations undertaken at Lot 202 Breakwater Drive to date have found three locally significant features

associated with karstic terrain in addition to the previously identified cave and dolines. The additional three features comprise three significant cavities within calcarenite. Another seven dolines (bringing the total to twelve) have also been identified. Other minor karst features include smaller 0.1m-0.5m thick voids. All of the significant features located to date have been incorporated into the subdivision design. The comprehensive data set and associated maps have also been used in positioning roads and building envelopes to take consideration of the geology of the site. As a result, roads have been positioned along areas identified as calcarenite outcrop and/or pinnacle fields and building envelopes have largely been kept off these areas and where they have had to be placed in these areas, they have been positioned such that stormwater and effluent can be shed to adjacent sandy areas.

The most significant aspect of the technical investigations that provide the basis of this management plan is the identification of the vadose karst environment and the phreatic karst environment over the site. This division determines karst risk and thus dictates the requirements for where further work on the site is necessary. The vadose karst environment (incorporating end-stage/post-karst terrains) requires very little further work, whilst the phreatic karst environment requires additional, mainly GPR work to identify the low risk, end stage-karst/post-karst areas within it. Building envelopes in the phreatic karst environment will be tested to ensure they lie over these end stage-karst/post-karst areas.

The management techniques that this KLMP has identified, including the proposed additional investigations and footing design, combined with the large amount of work undertaken to date and the large lot sizes, reduces the risks of development in those parts of the site, near the western boundary, that fall within the phreatic karst environment. The bulk of the site actually falls within the vadose karst environment and is suitable for the proposed development.

The management techniques that this KLMP has identified, including the proposed additional investigations and footing design, combined with the large amount of work undertaken to date and the large lot sizes, reduces the risks of development in those parts of the site, near the western boundary, that fall within an area of mixed end-stage/post-karst and phreatic karst.

In addition to the preparation of the Karst Landform Management Plan (KLMP) by ATA Environmental the KLMP has been subject to peer review. Most significantly Dr Brian W. Logan of Logiden Pty Ltd who is an expert in this field has reviewed the scientific aspects on behalf of the City of Wannon.

Logiden's response advised that:

"The revised Structure Plan be accepted. This Plan represents the successful integration of a comprehensive scientific database with statutory requirements and also accounts for perceived problems in connection with the presence of karstic limestone foundations beneath some parts of the Property.

It is expected that the revised Plan will result in “an environmentally sensitive subdivision effectively integrated with the existing landscape and amenity of the locality”, as specified for a Rural Community Zone subdivision.”

The following measures must be undertaken to satisfy the recommendations in the KLMP.

- 1) Further work involving detailed GPR surveys be carried out in the western part of the Property encompassing: Lots 7, Lots 55-59 (inclusive), 65-76 (inclusive), 87 – 91 (inclusive), 100-123, 125-135 (inclusive) and 173. This work should be part of the conditional approval or building envelope stage of the development and be directed towards delineation of karst base, caves and substantial terrains of post-karst sand.
- 2) Further “infill” work involving eastward extension of GPR lines 1100, 1200 and 1300 be carried out. These lines were not completed during the January, 2005 GPR survey because of operational difficulties. This work should be carried out in conjunction with the work program recommended in 1) above.
- 3) One mechanical cone penetrometer probe will be undertaken on each building envelope to a depth of up to 10 metres or until refusal.

6.2 Water Management Plan (Parsons Brinckerhoff) Supplementary Report – Drainage, Water and Nutrient Management Plan (McDowell Affleck)

6.2.1 Aims

Parsons Brinckerhoff (PB) was commissioned by Kincardine Holdings to undertake a Water Management Study for Lot 202 Breakwater Drive, Two Rocks.

The aim of this plan/report involves the following:

- To identify and address wastewater and stormwater disposal and treatment issues for the proposed site;
- Assessment of the rate, quantity and quality of wastewater infiltration;
- A water balance investigation to determine site effluent loadings;
- Provide recommendation to facilitate the removal of pollutants and nutrients;
- Develop strategies for sewerage disposal mechanisms;
- Undertake stormwater drainage assessment and where suitable implement water sensitive urban development design principles to promote groundwater recharge; and
- Develop drainage strategies to minimise impact on karstic zones.

During the assessment of the LSP the City of Wanneroo required additional detail which is provided in a supplementary report prepared by McDowell Affleck titled 'Drainage, Water and Nutrient Management Plan' (June 2009).

This report should be read in conjunction with the Water Management Plan by Parsons Brinckerhoff. It provides additional information on the treatment of stormwater run-off utilising strategies in accordance with the Stormwater Management Manual produced by the Department of Water.

The McDowell Affleck report is included in Part 3 Background Reports, Appendix 2 and Part 2 of this LSP.

6.2.2 Stormwater management strategies

Post-development may impact on the volumetric runoff at the catchment low points due to increased imperviousness (road reserves). The following strategies are recommended to maintain predevelopment flows into the catchment low points and to mitigate risks to sinkholes:

General Requirements

- Roads are to be uncurbed so that pipe drainage can be avoided.
- The natural hydraulic regime should be maintained where possible with highly channelised flows to be avoided.
- Avoid channelling runoffs from the road reserves directly into sinkholes. Where natural topography and lot layout necessitate the use of table drains, use appropriate treatment such as check dams and riffles to encourage at source infiltration and control erosion.
- Where building envelopes are located in the vicinity of low lying areas, a minimum 500mm separation from 100-year flood levels are to be provided.
- Surface water discharge controls to be applied including the provision of kerbed roads in steep areas with soakage occurring in planned and agreed locations reducing the concentration of stormwater run-off to high risk zones.
- Development of exclusion zones to be located a minimum of 30 metres around all road stormwater drainage basins or storage structures.
- Soakwells are to be located no less than 10m from building foundations or lot boundaries in sufficiently deep sandy layers to allow infiltration.
- The retention and planting of native vegetation (other than within strategic firebreaks, road reserves, drainage sites and the designated building envelope) to assist in attenuating nutrients generated by fertiliser applications, waste products and surface runoff.

For Vadose Karst Environment

- (a) The minor storm drainage system for all roads shall be designed to collect and infiltrate or transmit up to a 1 in 5 year storm to all disposal points.
- (b) Compensating basins shall be designed to retain water for a period of 72 hours for a 1 in 10 year ARI storm taken as a one off event.
- (c) The major storm 1 in 100 year flood shall be accommodated to flow via flood routes to disposal points, with no effect on the building envelopes.

For Phreatic Karst Environment

- (a) The minor storm drainage system for all roads shall be designed to collect and infiltrate or transmit a 1 in 10 year storm to the disposal points.
- (b) The major storm 1 in 100 year flood shall be accommodated to flow via flood routes to disposal points, with no effect on the building envelopes

Monitoring Water Quality and Nutrient Levels

- A minimum of four groundwater monitoring bores to be established and monitored quarterly for a period of 24 months for nutrients and reported to the City of Wanneroo.

6.2.3 Waste Water Management

The subdivision of Lot 202 under the Structure Plan will see moderate increases in peak discharge for the majority of the catchments. More importantly the estimated post-development flows are low and therefore provide significant opportunities to implement Water Sensitive Urban Design. It is anticipated that storages for post-development runoffs can be adequately accommodated using at-source (e.g. soakwells) and in-transit (e.g. swales) Best Management Practices.

Additionally the resulting change in land use through the cessation of grazing is expected to significantly reduce nutrient loadings on the site. Nutrient balance for post-development will likely attract a 90% reduction in total nitrogen and 80% reduction in total phosphorus based on a 30% fertilisable area. At these rates an improvement to the groundwater quality can be expected during post-development.

Wastewater treatment systems are subject to significant fluctuations in both hydraulic loading (principally wastewater inflows) and ambient environmental conditions which cause fluctuations in their treatment efficiency and hence the quality of the treated effluent over time. Notwithstanding the inherent level of natural variability, this report provides some useful insight into the likely performance of such systems.

The analysis undertaken in this report indicates that adequate onsite treatment of wastewater can be achieved such that the quantity and quality of effluent arising would meet environmental and health requirements applicable for subsoil drip irrigation. Importantly, the land area of the development is of sufficient size to enable the quantity of effluent under consideration to be irrigated back onto the site. The nutrient budget for the site includes this contribution.

Accordingly it is recommended that an Aquarius MK1-MP2.4F model ATU (or similar performing system to the satisfaction of the Department of Health) which incorporates phosphorus removal is sufficient, when coupled with an appropriately designed subsoil drip irrigation system, to cater for the onsite reuse of treated effluent at the proposed rural subdivision of Lot 202 Breakwater Drive in Two Rocks.

6.3 Vegetation and Rare Flora (Arthur S. Weston)

A comprehensive site survey of vegetation and rare fauna was conducted by botanist Arthur Weston and a management plan which is discussed in Section 6.4 below was then prepared by ATA Environmental.

The Weston report made four recommendations pertaining to conservation and management of native plants in Lot 202 Breakwater Drive, Two Rocks are:

- Conserve and protect the limestone heath in the southeast corner of the lot.
- Leave as many live, healthy Tuart trees as possible, especially where they are densest.
- Consider not clearing or building on stands of vegetation shown on Figure 1, the vegetation map, as having vegetation in a condition of D-G (Degenerated to Good).
- Consider planting Tuart trees, other specials of eucalyptus and species of *Melaleuca* and *Acacia* along the northern boundary of the lot to act as a vegetation buffer between the property and Breakwater Drive.

These recommended actions have been addressed in the revised subdivision plan and the Vegetation and Fauna Management Plan.

6.4 Vegetation and Fauna Management Plan (ATA Environmental)

As a result of the assessment of the vegetation and rare flora by Arthur Weston and responses from the referral authorities, ATA Environmental has prepared the Vegetation and Fauna Management Plan. Specifically the Plan has been adjusted to:

- Identify and retain ‘locally significant’ areas of native vegetation, especially those of native vegetation that provide fauna habitat.
- Clearly delineate and retain the significant stands of trees (one stand is located in POS in Lot 201 Breakwater Drive, immediately north of the site) to avoid habitat loss for fauna, particularly threatened fauna.
- Provide details of arrangements for maintenance of the on-site native vegetation.
- Allocate management responsibilities relating to the on-site native vegetation and identification of timing for implementation, as appropriate.
- Introduce an appropriate fire management plan and program.
- Control off-road vehicle use and dumping of rubbish.

6.4.1 Monitoring

A monitoring program will be established which will include both the monitoring of vegetation and revegetation within the POS and monitoring of the adjacent Bush Forever vegetation along the eastern and southern boundaries

6.4.2 Responsibility

The proponent will be responsible for fulfilling the requirements of the Fauna and Vegetation Management Plan to the satisfaction of the City of Wanneroo within a period of two years from commencement of site works at Lot 202 Breakwater Drive. Following this period, the City of Wanneroo will adopt responsibility for the POS and rehabilitation corridors.

6.5 Bushfire Management Plan

The Bushfire Management Plan (prepared by Bushfire Prone Planning, 5 December 2017) is consistent with *State Planning Policy 3.7 – Planning in Bushfire Prone Areas*.

6.6 Management of the Scenic Resource Amenity (ATA Environmental)

This report provides a database and analysis of the scenic resource amenity that has been integrated with the planning process by incorporation in the Structural Plan for Lot 202. The objectives of the study were to define the

scenic resource using maps, photographs and a digital database that identifies significant floral and landscape features. The objectives also include identification of measures for preservation and enhancement of the scenic resource.

6.6.1 Scenic Resource

On Lot 202, the scenic resource is described as a blending of an indigenous Tuart parkland flora with a gently rolling landscape composed of karst amphitheatres, rocky ridges and sandy, grassed slopes. The vistas offer pleasant outlooks that evoke feelings of tranquillity. Presumably, this is an ideal environment for those seeking a spacious and tranquil, rural- residential lifestyle. In addition, there are numerous specific sites where conjunctions of floral assemblage and landform provide charming outlooks that will be valued by residents and visitors.

It is the blending of an anthropogenic Tuart parkland with the gently rolling landscape overprinted by karst amphitheatres, rocky ridges and sandy, grassed slopes that create the valuable scenic resource of Lot 202. The parkland flora is vital in creating this scenic resource and its preservation and enhancement is integral to the Structure Plan guiding subdivision and development of the site. The karst landform is a key factor in the presentation of the scenic resource because it provides the topographic variations that produce an interesting and pleasing array of vistas. This topographic variation also assists in concealment of dwellings and provision of unobtrusive roads.

6.6.2 Floral Component

Management of the floral component of the scenic resource mostly involves:

1. Limitations on clearing; and
2. Measures for preservation and possible enhancement.

The Structure Plan has been developed to minimise the impact of clearing by incorporating only rural-residential lots of 1ha or more and by judicious placement of proposed building envelopes. Roads also have been aligned to avoid clearing.

It is recommended that a mechanism for monitoring of the Tuart and other parkland species be developed, so that if necessary there can be additional plantings over the next year.

Grass-tree groves are being preserved by careful placement of road alignments and building envelopes.

Weeds are significant contributors to the scenic resource, particularly in winter; but represent a fire hazard during summer. It is recommended that a weed management plan be produced at the subdivision development stage.

6.6.3 Landform Component

Preservation of the current landform will be achieved by minimising earthworks. In the Structure Plan there are no requirements for major earthworks in relation to road alignments or building envelopes.

Planned roads run unobtrusively over and around slopes to reduce unsightly viewsheds and large scale excavations.

The proposed road alignments were primarily influenced by landscape, parkland management and other criteria, but about 40% of the road network is over pinnacle field substrate.

Building envelopes have been individually located by on-ground inspection to minimise clearing and earthworks. Most Lots underlain by pinnacle field or rock have sand patches suitable for building envelope sites.

6.7 Report Findings

Based upon the environmental and geotechnical site investigations and the management plans it is clear that Lot 202 Breakwater Drive is suitable for development as proposed in the draft Structure Plan with appropriate planning for management of karst issues, vegetation protection and fire management.

7.0 PUBLIC UTILITY SERVICES

The following advice was provided by the Project Engineers, Development Engineering Consultants:

7.1 Existing Services

- Roads

The site is located on the south side of Breakwater Drive east of the Two Rocks townsite and abutting the future freeway reserve. The site covers 232 hectares, which is proposed for development into rural residential lots with reticulated water supply from the Water Corporation.

Land on the northern side of Breakwater drive opposite the site has recently been subdivided into rural residential lots with reticulated water supply.

The site is generally undulating sand over limestone country with stands of Tuart trees in a parkland setting due to grazing activities in the past.

- Power

Western Power 3 phase supply is available to the site from the extension to the neighbouring development. The aerial power line supplying the development has been extended from Wanneroo Road, and terminates at Countryside Drive.

- Telephone

Telephone services are available in Breakwater Drive, although the capacity is limited and will need upgrading.

7.2 Development Services

7.2.1 Roads

The site is serviced by Breakwater Drive on the northern boundary, which is constructed to a good rural road standard, sealed with shoulders.

The development will provide roads in accordance with Council's specifications and requirements, similar to the development north of Breakwater Drive. This will entail sealed roads of 8 metres width.

- Roads are to be uncurbed so that pipe drainage can be avoided.
- The natural hydraulic regime should be maintained where possible with highly channelised flows to be avoided.
- Avoid channelling runoffs from the road reserves directly into sinkholes. Where natural topography and lot layout necessitate the use of table drains, use appropriate treatment such as check dams and riffles to encourage at source infiltration and control erosion.

Further management and design aspects for development of roads within the phreatic karst environment are as follows:

- Use only static vibration equipment during construction of road pavements. The effect that this requirement may have on pavement thickness will be addressed at the detailed design stage.
- Ensure that construction personnel and machine operators are aware of the potential risks associated with karstic terrain through an induction form requiring signing by contractors.
- Kerb the roads where necessary so that soakage takes place at planned locations. It is not considered necessary to kerb the roads in areas where there exists a deep sand profile or in the outcrop or pinnacle field areas where they are more than 10m above the water table. It is recommended however, in the phreatic karst environment, that roads without kerbing are constructed with sufficient crown height to limit the potential catchment area and direct surface water runoff into table drains on both sides of the road pavement.
- Provide a development (including road pavements) exclusion zone of at least 30m wide around the perimeter of all road stormwater drainage basins in the phreatic karst environment.
- Undertake geotechnical investigation along proposed road alignments and drainage basins to assess the potential risks prior to construction.

There are a number of potential risks during road construction which are further detailed in Section 3.2.1 of the KLMP, wherein management and design aspects to reduce risk. It is anticipated that conditions relating to road construction would be implemented as conditions of subdivision.

7.2.2 Drainage

Post-development may impact on the volumetric runoff at the catchment low points due to increased in imperviousness (road reserves). The following strategies are recommended to maintain predevelopment flows into the catchment low points and to mitigate risks to sinkholes:

- Roads are to be uncurbed so that pipe drainage can be avoided. Natural hydraulic regime should be maintained where possible with highly channelised flows to be avoided.
- Avoid channelling runoffs from the road reserves directly into sinkholes. Where natural topography and lot layout necessitate the use of table drains, use appropriate treatment such as check dams and riffles to encourage at source infiltration and control erosion.
- Where building envelopes are located in the vicinity of low lying areas, a minimum 500mm separation from 100-year flood levels are to be provided.
- Soakwells for the disposal of roof runoff to be located no less than 10m from building foundations and less than 5m from lot boundaries. Soakwells are to be installed in sufficiently deep sandy layers to allow infiltration to occur.

To mitigate the potential for groundwater contamination in the phreatic karst environment:

- Drainage should be quarantined from low depressions near the western boundary where dolines and caves are present.
- Low depressions are those areas shown on the attached Figure 6 of the Karst Landform Management Plan, Version 5, 11th February, 2007 west of 2.5 m AHD shown as Sinks S3, C3 and C4 and the North-West Sink.
- Special uses such as fuel and other dangerous goods storage facilities should not be permitted at all within the phreatic karst environment.

2.2.2.1 Resident's responsibilities

- To undertake Geotechnical investigation consisting of no less than 3 ground penetrating radar probes and/or boreholes within the proposed building envelope prior to the construction to assess the foundation conditions for design of footings on Lots 1-36, 47, 89-97 and 167-169 inclusive.

7.2.3 Power

The site is currently served from an aerial line in Breakwater Drive extending from the east to the corner of Countryside Drive to service the new development opposite lot 202.

The Electrical Consultants for the project, JCE Pty Ltd advise that sufficient power is available for the scale of this proposal.

It is envisaged that 3 phase power will be distributed throughout the development via underground reticulation.

Transformers will be located as required by Western Power.

7.2.4 Water Supply

The Water Corporation has advised that the land can be served from the existing Corporation water main located in Breakwater Drive on the north side of the site.

They further advise that there is a height limit on this supply, which will affect two areas above RL 42m AHD. These areas are some 7.5ha and 2.25 ha respectively and are located in the north east of the site however the majority of this area is included in the POS and building envelopes have been located outside the 42 metre contour in whole or part.

Siting of building envelopes on this higher ground will need to be carefully considered to ensure servicing to Water Corporation requirements. It is therefore proposed to carry out judicious earthworks to enable all lots to comply with the level restriction.

Water Corporation standard water Headworks charges will be applicable.

7.2.5 Telephone & Communications

The development opposite the site is connected to telephone services by the Telstra landline network. Notification will be given to Telstra to enable them to extend their planning so that their services are available to this development.

7.2.6 Waste Water

Disposal of domestic wastewater will be via ATU's located on each building lot.

Part 3 contains the Water Management Plan by Parsons Brinckerhoff, November 2006, which recommends that an Aquaris MK1 – MK2.4F model ATU or similar unit which performs to the satisfaction of the Department of Health should be used to service each residence.

The ATU should incorporate adequate phosphorus removal performances connected to an appropriately designed sub-soil drip irrigation system which caters for the on-site, re-use of treated effluent generated on each lot.

Use of these systems improves the general sustainability of the development with respect to nutrient management and groundwater recharge and re-use of water.

7.2.7 Monitoring Water Quality and Nutrient Levels:

Monitoring Water Quality and Nutrient Levels

- A minimum of four groundwater monitoring bores to be established and monitored quarterly for a period of 24 months for nutrients and reported to the City of Wanneroo.

Monitoring should include testing of groundwater levels and groundwater quality to monitor potential impacts of the subdivision on karstic landforms, as well as chemical and physical analysis.

A schedule of activities to be undertaken and a time frame for their maintenance by each responsible party is specified in the following Table.

SCHEDULE OF ACTIVITIES/COMMITMENTS

Activity / Commitment	Responsibility		
	Construction	Maintenance / Implementation	
		0-24 Months After Construction	Long Term (after 24 months)
Vegetation Protection	Developer	Developer	Local Government
Fire Protection	Developer	Developer	Local Government
Development of Fire Management Plan	Developer	Developer	Local Government
Drainage System	Developer	Developer	Local Government
ATU Systems	Landowner	Landowner	Landowner
Construction of Monitoring Bores & On-Going Groundwater Monitoring	Developer	Developer	DEC or Local Government
Community Education	Developer	Developer	Local Government
Construction of Roads	Developer	Local Authority	Local Government

7.2.8 Karst Management

The developer shall commit to implementing the Karst Landform Management Plan (KLMP) for a period of 24 months after construction. The only aspect of

the plan which falls outside this period is the ongoing groundwater monitoring program. DEC will have responsibility for this ongoing part of the Plan.

Within Lot 202 the potential risks have been reduced by adopting a rural-residential type subdivision where building development is relatively sparse and is restricted to defined building envelopes.

7.2.9 Summary of Commitments and Responsibilities - Fauna and Vegetation Management

The following table sets out the measures, timing and responsibilities for implementation as part of this Vegetation and Fauna Management Plan:

Management Measure	Specific Information	Timing of Implementation	Responsibility
Site Works	All machinery entering the site to be cleaned to minimise the potential spread of dieback.	During construction activities	Developer
	All soil and fill material entering the site will be obtained from a dieback free source.	During construction activities	Developer
Vegetation Protection	All site works which require clearing of native vegetation to be clearly delineated.	Prior to construction activities	Developer
	Protection of locally significant vegetation in POS. Install bollards at road boundary of POS. Implement revegetation works.	Prior to construction activities	Developer
	For every native tree cleared during construction works a native seedling will be planted in an appropriate location in the development area.	During construction works	Developer
	Where appropriate, cleared native vegetation will be used to generate on-site chipped mulch material, to be used in areas requiring stabilisation and rehabilitation.	During construction activities	Developer
Revegetation and Planting Works	Areas to be rehabilitated include selected median strips and road reserves	During construction activities	Developer
Native fauna protection	Site residues, such as fallen trees, decaying logs and large rocks will be retained and used in appropriate locations for provision of fauna habitat.	During construction activities	Developer
	Prospective landowners will be advised of cat ownership restrictions within the development area.	Following purchase of lot	Developer
Fire Management	Fire management measures to be implemented as in the Management Plan	During construction activities	Developer
Building Envelopes	All building envelopes within lots will be physically identified and clearly pegged. Native vegetation to be reinstated if clearing is undertaken beyond this area without the approval of the City of Wanneroo.	Prior to construction activities	Developer; prospective purchasers

Management Measure	Specific Information	Timing of Implementation	Responsibility
Fencing	Installation of a standard rural fence at the periphery of the property.	Prior to commencement of construction activities	Developer
Monitoring and maintenance	Monitoring sites to be established in adjacent regionally significant vegetation to ensure that the development of the site does not result in degradation of the bushland (ie weed invasion, vegetation trampling / loss). In addition, monitoring plots will be installed in rehabilitation areas to monitor the success of works and to determine if any further planting (and weed control) is required.	Prior to commencement of construction activities	Developer for a period of 2 years

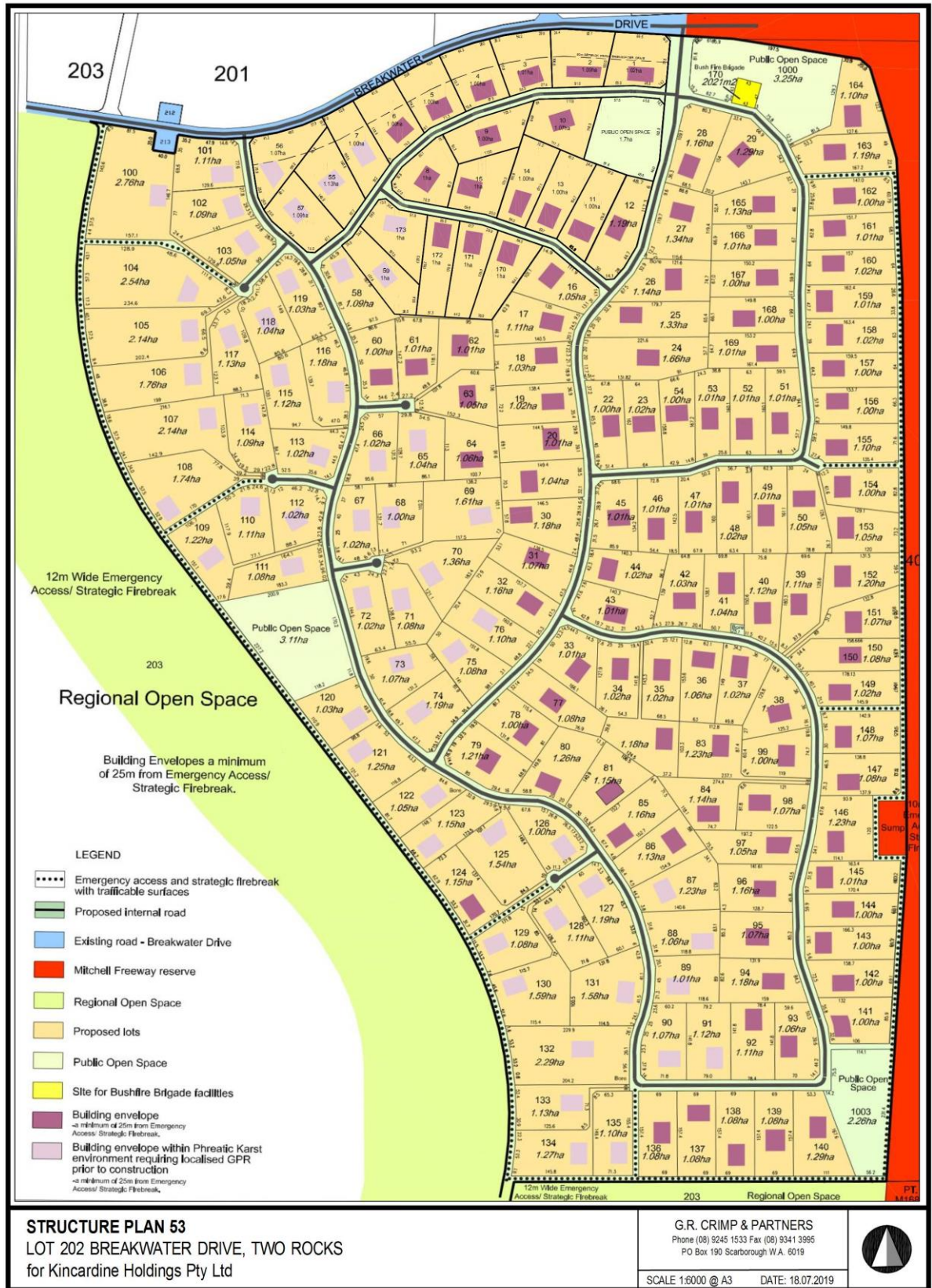
8.0 THE PROPOSED STRUCTURE PLAN

The Structure Plan shown in Figure 5 illustrates the proposed development which is likely to result from implementation of this proposed amendment to the Scheme. Notable features of this structure plan include:

- A simple, legible and continuous road system with alternative access routes to and from Breakwater Drive.
- Peripheral strategic fire breaks with emergency access tracks and fencing interfacing with Regional Open Space on the eastern and southern boundary of the site.
- Large lots to accommodate karst features and outcropping limestone areas as well as for visually obvious areas abutting Breakwater Drive and the future freeway.
- Protection of locally significant vegetation located in the south, south -- west and north -- eastern parts of the site as Public Open Space.
- Protection of the Aboriginal Heritage site within a 3 hectare area of Public Open Space.
- Localised drainage reserves to manage storm water discharge in accordance with Geotechnical recommendations and water sensitive design principles.
- 30 m wide tree planting strips adjoining Breakwater Drive and the future freeway (15 m width required under the Scheme).
- Designated tree planting areas where presently cleared.

Requirements for future geological testing may require some changes to this structure plan as detailed planning and subdivision proceeds. However, the detailed investigations already undertaken are likely to keep any changes to a minimum. This structure plan has been prepared in conjunction with the preparation of the management plans referred to above. It is consistent with the recommendations of those management plans and reflects the land capability potential of Lot 202 for development.

ATTACHMENT – FIGURE 5: STRUCTURE PLAN, SUBDIVISION GUIDE PLAN



PART 3 - APPENDIX

The following documents are contained in Part 3 and provide the detailed assessment and requirements to support the adoption of the Structure Plan and subsequent Scheme Amendment.

1. KARST LANDFORM MANAGEMENT PLAN
2. DRAINAGE, NUTRIENT AND WATER MANAGEMENT PLAN
3. VEGETATION AND RARE FLORA SURVEY
4. VEGETATION AND FAUNA MANAGEMENT PLAN
5. FIRE MANAGEMENT PLAN
6. MANAGEMENT OF THE SCENIC RESOURCE AMENITY