



**Planning**

## **Growth Centres Biodiversity Certification**

Assessment of Consistency between the Relevant Biodiversity Measures of the Biodiversity Certification Order and Alex Avenue and Riverstone Precincts

April 2010

## 1. Introduction

In July 2008 an amendment was made under Schedule 7 Part 7 to the *Threatened Species Conservation Act 1995* (TSC Act) to confer biodiversity certification on the *State Environmental Planning Policy (Sydney Region Growth Centres) 2006* (Growth Centres SEPP). Compliance with the relevant biodiversity measures (RBMS) in the biodiversity certification order (dated 14 December 2007) is required to maintain the certification. The RBMs require (among other things) the retention of 2000 hectares of existing native vegetation within the Growth Centres and additional offsetting outside the Growth Centre boundaries.

This report has been prepared to fulfil the requirement of RBM 35 for an assessment of the consistency of proposed precinct plans with the biodiversity certification and the RBMs.

This report has been prepared in a table format and addresses all RBMs that are relevant to precinct planning. It is noted that many of the RBMs are not specific to precinct planning and have therefore not been included in the report.

A complete copy of the biodiversity certification order (including all relevant biodiversity measures) can be found on the Department of Environment, Climate Change and Water's website at <http://www.environment.nsw.gov.au/biocertification/notcert.htm>

Where the report indicates that precinct planning is inconsistent with the biodiversity certification, full justification for the inconsistency is provided as part of the ecological assessment for the precinct.

## Definitions

Terms defined below appear in **bold** in the table. Where the terms are also defined in the Biodiversity Certification Order, the definitions provided are consistent with those in the Order.

- *Biodiversity Certification Maps* means the maps marked “North West Growth Centre – Biodiversity Certification” and “South West Growth Centre – Biodiversity Certification” dated November 2007 and included in Schedule 2 of the Biodiversity Certification Order.
- *Certified Area* means an area marked as a certified area on a biodiversity certification map.
- *Clearing* of existing native vegetation means any one or more of the following:
  - a) cutting down, felling, thinning, logging or removing existing native vegetation in whole or in part,
  - b) killing, destroying, poisoning, ringbarking, uprooting or burning existing native vegetation in whole or in part.
- *Existing Native Vegetation* means areas of indigenous trees (including any sapling) that:
  - a) had 10% or greater over storey canopy cover present,
  - b) were equal to or greater than 0.5 ha in area, and
  - c) were identified as “vegetation” on maps 4 and 5 of the draft Growth Centres Conservation Plan.
- *DECC* means the former Department of Environment and Climate Change which is now the Department of Environment, Climate Change and Water (DECCW).
- *GCC* means the former Growth Centres Commission which is now the Department of Planning (DoP).
- *Minister* means the Minister administering the TSC Act.
- *Non-certified Area* means an area marked as a non-certified area on a biodiversity certification map.

Assessment of consistency between Relevant Biodiversity Measures of the Biodiversity Certification Order and Alex Avenue and Riverstone Precincts

- *Protection/Protected* in relation to land means land that is protected by a land use zoning under an environmental planning instrument or public ownership arrangements that provide for the protection of biodiversity values as a priority, or another arrangement that provides in perpetuity security for biodiversity on the subject land.
- *Relevant Biodiversity Measures* means the conditions in Schedule 1 of the Biodiversity Certification Order.
- *TSC Act* means the *Threatened Species Conservation Act 1995*.

## 2. Assessment

**Table 1: Assessment of consistency between the relevant biodiversity measures of the Biodiversity Certification Order and the Alex Avenue and Riverstone Precincts.**

	Relevant Biodiversity Measure	Alex Avenue and Riverstone Precincts - Comment	Consistent with RBMs and Schedule 7 Part 7 of TSC Act	Justification
<b>General</b>				
4	Copies of all final reports, maps, reviews, plans and monitoring data referred to in the conditions of biodiversity certification must be held by the <b>GCC</b> and made publicly available, either on request and/or by a mechanism that is broadly publicly accessible. This does not apply to material that is commercially sensitive or contains sensitive information regarding the location of threatened species, populations or ecological communities or their habitat.	All information required by the RBMs for the Alex Avenue and Riverstone Precincts was publicly exhibited from 26 November 2008 to 6 February 2009. Since exhibition, the assessment of consistency (this report) has been updated where necessary and will (along with relevant supporting technical studies and maps) be publicly available following gazettal of the Precinct Plans.	Yes	The following information will be publicly available following gazettal: <ul style="list-style-type: none"> <li>• this report in accordance with RBM 35;</li> <li>• Information required by RBM 8, as contained in this report;</li> <li>• Information required by RBM 18 (<b>Annex D</b>)</li> </ul>
<b>Native vegetation to be retained within the Growth Centres</b>				
6	A minimum of 2,000 hectares of <b>existing native vegetation</b> must be retained and <b>protected</b> within the Growth Centres, either within the <b>certified areas</b> and/or the <b>non-certified areas</b> , subject to conditions 7 to 13 below.	The draft Conservation Plan identifies 66.5 ha (1 ha in Alex Avenue and 65.5 ha in Riverstone) to be retained or otherwise offset within the Precinct to maintain parity with the broader 2,000 ha requirement.	Yes	A total of 72 ha of existing native vegetation is to be protected under the Alex Avenue and Riverstone Precinct Plan. The principle protection mechanism is clause 6.5 of the Precinct Plan, which prohibits clearing of existing native vegetation as shown on the Native Vegetation Protection Areas Map (at <b>Annex C</b> ).

Assessment of consistency between Relevant Biodiversity Measures of the Biodiversity Certification Order and Alex Avenue and Riverstone Precincts

	Relevant Biodiversity Measure	Alex Avenue and Riverstone Precincts - Comment	Consistent with RBMs and Schedule 7 Part 7 of TSC Act	Justification
<b>Retention of existing native vegetation during precinct planning</b>				
7	During the precinct planning process, the <b>GCC</b> may determine to make areas of <b>existing native vegetation</b> within the <b>non-certified areas</b> available for development if the clearance of such vegetation is considered necessary for either the provision of essential infrastructure and/or to meet the required Development Parameters specified in the Growth Centres Development Code.	1 ha of existing native vegetation within the Alex Avenue Precinct is required to be cleared to enable the widening and upgrade of Schofields Road	Yes	See below.
8	<p>In making a determination under condition 7, the <b>GCC</b> must demonstrate by way of information provided during the public exhibition of the precinct plan (where that exhibition occurs after this order takes effect) that the <b>clearing of any existing native vegetation</b> in the <b>non-certified areas</b> will be offset by:</p> <p>(a) the <b>protection</b> of an equal or greater area of <b>existing native vegetation</b> elsewhere in the Growth Centres; and/or</p> <p>(b) the revegetation and/or restoration of an area of land elsewhere in the Growth Centres, subject to satisfying the following,</p> <p>(i) that the clearance of <b>existing native vegetation</b> in the <b>non-certified areas</b> will not affect the capacity to achieve overall improvement or maintenance of biodiversity values for threatened species, populations and ecological communities and their habitats,</p> <p>(ii) the revegetated and/or restored areas will be <b>protected</b>,</p> <p>(iii) the extent of revegetation and/or restoration compared to <b>clearing of existing native vegetation</b> must be undertaken at a ratio of at least 3:1 (to reflect the greater ecological risks</p>	Measures consistent with RBM 8(a) have been implemented to offset the impacts of clearing of ENV as described in relation to RBM 7	Yes	The 1 ha of existing native vegetation to be cleared is to be offset by the protection of 1 ha of ENV on lands that are currently certified within the Alex Avenue Precinct. Refer to RBM 6. Overall, the Alex Avenue and Riverstone Precinct Plans will protect 5.5ha more ENV than is required to maintain parity with the 2,000 ha to be retained across the Growth Centres.

Assessment of consistency between Relevant Biodiversity Measures of the Biodiversity Certification Order and Alex Avenue and Riverstone Precincts

	Relevant Biodiversity Measure	Alex Avenue and Riverstone Precincts - Comment	Consistent with RBMs and Schedule 7 Part 7 of TSC Act	Justification
	<p>relative to retaining <b>existing native vegetation</b>),</p> <p>(iv) areas subject to revegetation and/or restoration must be of a suitable boundary configuration and design to support long-term management,</p> <p>(v) revegetation and/or restoration of the proposed areas would not be undertaken under another scheme or regulatory requirement already in operation at the time that the <b>clearing</b> is approved (this includes but is not limited to any approvals, and associated conditions of such approvals, that may be required under the <i>Rivers and Foreshores Improvement Act 1948</i> and <i>Water Management Act 2000</i>),</p> <p>(vi) revegetation and/or restoration will be undertaken by suitably qualified and experienced persons using indigenous plant stock, and</p> <p>(vii) sufficient resources will be made available to undertake the revegetation and/or restoration and any necessary follow-up maintenance and monitoring for a minimum period of 5 years following the commencement of the revegetation and/or restoration.</p>			
9	<p>Revegetation and/or restoration may be partly counted towards meeting the overall requirement to <b>protect</b> 2,000 hectares of existing vegetation required in condition 6. The amount that may be counted shall be calculated by dividing the total area of revegetation and/or restoration required under condition 8b (iii) by 3.</p> <p><b>Note:</b> for example, if 9 hectares of revegetation is undertaken then 3 hectares may be counted.</p>		N/A	

Assessment of consistency between Relevant Biodiversity Measures of the Biodiversity Certification Order and Alex Avenue and Riverstone Precincts

	Relevant Biodiversity Measure	Alex Avenue and Riverstone Precincts - Comment	Consistent with RBMs and Schedule 7 Part 7 of TSC Act	Justification
<b>Retention of existing native vegetation shown in areas marked with red hatching</b>				
12	Notwithstanding any other conditions of biodiversity certification, in the lands marked by a red hatching on the <b>biodiversity certification maps existing native vegetation</b> must not be <b>cleared</b> unless it is in accordance with a plan of management or unless such clearance has been agreed to by the <b>DECC</b> .	Two areas of land subject to this condition are located in the Riverstone Precinct. Boundary amendments are proposed to align with cadastral boundaries and to facilitate more efficient urban development on adjoining lands.	Yes	<p>Land zoned Environmental Conservation under the Growth Centres SEPP is currently 35 ha in total of which there is 31 ha of ENV. The Riverstone Precinct Plan proposes amendments to the boundaries of the zones of land covered by condition 12 to align with cadastre and to enable provision of essential drainage infrastructure. The amended boundaries 35 ha of land zoned Environmental Conservation and retain 31 ha of ENV.</p> <p>Land zoned Public Recreation - Local under the Growth Centres SEPP is currently 24 ha of which there is 18 ha of ENV. The Riverstone Precinct Plan zone boundary amendments reduce the total area of land zoned Public Recreation - Local to 23.5 ha and but retain 18 ha of ENV.</p>
<b>Ground-truthing of existing native vegetation</b>				
13	If new information becomes available after the biodiversity certification order took effect that demonstrates that the vegetation within an area does not otherwise meet the definition of <b>existing native vegetation</b> , then for the purposes of conditions 7 to 8 and condition 11 to 12 only the area of confirmed <b>existing native vegetation</b> shall be considered.	The mapping of ENV in the Alex Avenue and Riverstone Precincts generally corresponds with the findings of additional investigations done for precinct planning.	Yes	No changes to ENV mapping are proposed.



Assessment of consistency between Relevant Biodiversity Measures of the Biodiversity Certification Order and Alex Avenue and Riverstone Precincts

	Relevant Biodiversity Measure	Alex Avenue and Riverstone Precincts - Comment	Consistent with RBMs and Schedule 7 Part 7 of TSC Act	Justification				
<b>Additional conservation actions within the Growth Centres – native vegetation</b>								
14	During or before the preparation of the relevant precinct plan(s) under the Growth Centres Development Code, a further detailed assessment must be undertaken of the areas adjoining or proximate to the Shanes Park Air Services Australia site marked in blue hatching on the <b>biodiversity certification maps</b> .		N/A					
15	The assessment referred to in condition 14 must examine whether the areas meet the criteria specified in Schedule 3.		N/A					
16	Based on the outcomes of the assessment the <b>DECC</b> shall provide advice to the <b>Minister</b> on whether the areas should be included within the <b>certified areas</b> or the <b>non-certified areas</b> shown on the <b>biodiversity certification maps</b> .		N/A					
<b>Additional conservation actions within the Growth Centres – plants</b>								
17	During or before the preparation of the relevant precinct plan(s) under the Growth Centres Development Code relating to the areas referred to in the table below, the following actions must be undertaken:		N/A					
	<table border="0"> <thead> <tr> <th><b>Species</b></th> <th><b>Required action</b></th> </tr> </thead> <tbody> <tr> <td><i>Acacia pubescens</i></td> <td>                     Potential populations at Cross Street, Kemps Creek and Thirty-second Avenue, Austral – as shown in black hatching on the <b>biodiversity certification maps</b>:                     <ul style="list-style-type: none"> <li>• survey to confirm the presence of the species, and</li> <li>• if the species is present, provide for the</li> </ul> </td> </tr> </tbody> </table>	<b>Species</b>	<b>Required action</b>	<i>Acacia pubescens</i>	Potential populations at Cross Street, Kemps Creek and Thirty-second Avenue, Austral – as shown in black hatching on the <b>biodiversity certification maps</b> : <ul style="list-style-type: none"> <li>• survey to confirm the presence of the species, and</li> <li>• if the species is present, provide for the</li> </ul>			
<b>Species</b>	<b>Required action</b>							
<i>Acacia pubescens</i>	Potential populations at Cross Street, Kemps Creek and Thirty-second Avenue, Austral – as shown in black hatching on the <b>biodiversity certification maps</b> : <ul style="list-style-type: none"> <li>• survey to confirm the presence of the species, and</li> <li>• if the species is present, provide for the</li> </ul>							

Assessment of consistency between Relevant Biodiversity Measures of the Biodiversity Certification Order and Alex Avenue and Riverstone Precincts

	Relevant Biodiversity Measure	Alex Avenue and Riverstone Precincts - Comment	Consistent with RBMs and Schedule 7 Part 7 of TSC Act	Justification
	<p><b>protection</b> of the area of suitable habitat for the species to the satisfaction of the <b>DECC</b>.</p> <p><i>Pimelea spicata</i> Potential populations at Denham Court Road - as shown in black hatching on the <b>biodiversity certification maps</b>:</p> <ul style="list-style-type: none"> <li>• survey to confirm the presence of species, and</li> <li>• if the species is present, provide for the <b>protection</b> of the area of suitable habitat for the species to the satisfaction of the <b>DECC</b>.</li> </ul> <p><i>Persoonia hirsuta</i> Potential populations at North Kellyville – as shown in black hatching on the <b>biodiversity certification maps</b>:</p> <ul style="list-style-type: none"> <li>• survey to confirm the presence of the species, and</li> <li>• if the species is present, provide for the <b>protection</b> of the area of suitable habitat for the species to the satisfaction of the <b>DECC</b>.</li> </ul> <p><i>Leucopogon fletcheri</i> Known population at North Kellyville - as shown in black hatching on the <b>biodiversity certification maps</b>:</p> <ul style="list-style-type: none"> <li>• survey to confirm the extent of the population, and</li> <li>• provide for the <b>protection</b> of the population to the satisfaction of the</li> </ul>			

Assessment of consistency between Relevant Biodiversity Measures of the Biodiversity Certification Order and Alex Avenue and Riverstone Precincts

	Relevant Biodiversity Measure	Alex Avenue and Riverstone Precincts - Comment	Consistent with RBMs and Schedule 7 Part 7 of TSC Act	Justification
	<p><b>DECC.</b></p> <p><i>Darwinia biflora</i>  <i>Hibbertia superans</i>  <i>Epacris purpurascens</i>  <i>var purpurascens</i>  <i>Eucalyptus sp</i>                      "Cattai"</p> <p>Known populations at North Kellyville - as shown in black hatching on the <b>biodiversity certification maps</b>:</p> <ul style="list-style-type: none"> <li>• survey to confirm the extent of the populations, and</li> <li>• provide for the <b>protection</b> of the population to the satisfaction of the <b>DECC</b>.</li> </ul> <p>Note: On completion of the above actions the <b>Minister</b> may decide that it is appropriate to amend the boundaries of the area subject to biodiversity certification, in accordance with condition 3.</p>			
<b>Additional conservation actions within the Growth Centres – animals</b>				
18	During or before the preparation of the relevant precinct plan(s) under the Growth Centres Development Code relating to the area referred to in the table below, the following actions must be undertaken:	Since exhibition, additional targeted surveys have been undertaken on land to which	Yes	Consultation with DECCW in relation to the findings of the additional GGBF assessment concluded that the most

Assessment of consistency between Relevant Biodiversity Measures of the Biodiversity Certification Order and Alex Avenue and Riverstone Precincts

Relevant Biodiversity Measure		Alex Avenue and Riverstone Precincts - Comment	Consistent with RBMs and Schedule 7 Part 7 of TSC Act	Justification
<p><b>Species</b></p> <p>Green and Golden Bell Frog</p>	<p><b>Required action</b></p> <p>Potential population at Riverstone – as shown in black hatching on the <b>biodiversity certification maps</b>:</p> <p><i>Option 1</i></p> <ul style="list-style-type: none"> <li>survey to confirm the presence of the species, and</li> <li>if the species is present, provide <b>protection</b> of the area of suitable habitat for the species to the satisfaction of the <b>DECC</b>.</li> </ul> <p><i>Option 2</i></p> <ul style="list-style-type: none"> <li>if the species is present at Riverstone but cannot be adequately <b>protected</b> to the satisfaction of the <b>DECC</b>, then:                             <ol style="list-style-type: none"> <li>undertake targeted survey to confirm the presence of the species elsewhere in the Growth Centres, and</li> <li>if the species is present elsewhere in the Growth Centres, provide for the <b>protection</b> of an area(s) of suitable habitat for the species to the satisfaction of the <b>DECC</b>.</li> </ol> </li> </ul>	<p>this condition applies to determine the presence of the Green and Golden Bell Frog (refer to report at <b>Annex D</b>). The survey identified the species within the subject lands and identified areas of habitat for protection, in accordance with Option 1.</p>		<p>appropriate means of protecting habitat for the GGBF is to integrate areas of suitable habitat with trunk drainage infrastructure on the subject lands. A concept design has been prepared and agreed to by DECCW. Provisions are proposed in the Alex Avenue and Riverstone Precinct Plan to require protection of GGBF habitat to be considered when assessing development applications (refer to <b>Annex C</b>). provisions are also included in the Blacktown Growth Centre Precincts DCP (Schedule Two – Riverstone Precinct) to ensure the design, construction and maintenance of trunk drainage works creates and protects suitable habitat for the GGBF and that surrounding development does not impact on the long term viability of the habitat.</p> <p>The Department intends to request the Minister to amend the boundaries of the area subject to certification to reflect the findings of the additional investigations described above.</p>
<p>Note: On completion of the above actions the <b>Minister</b> may decide that it is appropriate to amend the boundaries of the area subject to biodiversity certification, in accordance with condition 3.</p>				
<p><b>Additional conservation actions within the Growth Centres –</b></p>				

Assessment of consistency between Relevant Biodiversity Measures of the Biodiversity Certification Order and Alex Avenue and Riverstone Precincts

	Relevant Biodiversity Measure	Alex Avenue and Riverstone Precincts - Comment	Consistent with RBMs and Schedule 7 Part 7 of TSC Act	Justification
<b>development sites</b>				
19	<p>Within twelve months of the biodiversity certification order taking effect, the <b>GCC</b> (in consultation with the <b>DECC</b>) must put in place procedures so that all future precinct plans (excluding any plans that were publicly exhibited before the biodiversity certification order took effect), where practicable, provide for the appropriate re-use of:</p> <p>(a) native plants (including but not limited to seed collection) and the re-location of native animals from development sites, prior to development commencing; and</p> <p>(b) top soil from development sites that contain known or potential native seed bank.</p> <p>For the purposes of condition 19a and 19b appropriate uses may include, but are not limited to, application in revegetation or restoration works and landscaping in the Growth Centres.</p>	Relevant provisions have been included in the Blacktown Growth Centre Precincts DCP.	Yes	
<b>Future precinct plans</b>				
35	During the preparation of future precinct plans (excluding any precinct plans already publicly exhibited before this order took effect) the <b>GCC</b> must undertake and make publicly available an assessment of the consistency of the proposed precinct plan with the conditions of biodiversity certification. This may occur during or before any public exhibition of future draft precinct plans.	An assessment of consistency was prepared and publicly exhibited with the full precinct planning package, from 26 November 2008 to 6 February 2009.	Yes	This assessment updates the assessment that was publicly exhibited, and addresses all RBMs applicable to the planning for the Alex Avenue and Riverstone precincts.
<b>Future threatened species listings or discoveries</b>				
36	Where a preliminary determination is made under the Act to list a species, population or ecological community, and that species,	This issue was addressed at public exhibition of the	Yes	

Assessment of consistency between Relevant Biodiversity Measures of the Biodiversity Certification Order and Alex Avenue and Riverstone Precincts

	Relevant Biodiversity Measure	Alex Avenue and Riverstone Precincts - Comment	Consistent with RBMs and Schedule 7 Part 7 of TSC Act	Justification
	<p>population or ecological community may or is known to occur within the Growth Centres, then the <b>Department of Planning</b> must (as soon as practicable) provide advice to the <b>DECC</b> on whether:</p> <p>(a) the species, population or ecological community is known or likely to be present in the Growth Centres;</p> <p>(b) it was considered during the preparation of the draft Growth Centres Conservation Plan by the <b>GCC</b>; and</p> <p>(c) whether the SEPP, and related measures, provides adequate <b>protection</b> for the species, population or ecological community.</p>	<p>Precinct Plans. The DoP is not aware of any subsequent Preliminary determinations that would apply to the Riverstone and Alex Avenue Precincts.</p>		
37	<p>Based on the information provided in accordance with condition 36, and any other relevant matters, the <b>DECC</b> shall advise the <b>Minister</b> on whether to formally review, maintain, modify, suspend or revoke the biodiversity certification of the SEPP if the species, population or ecological community is listed under the Act.</p>		N/A	

### **3. Conclusion**

This report has undertaken an assessment of the consistency of the Alex Avenue and Riverstone precinct planning with the biodiversity certification and the applicable relevant biodiversity measures.

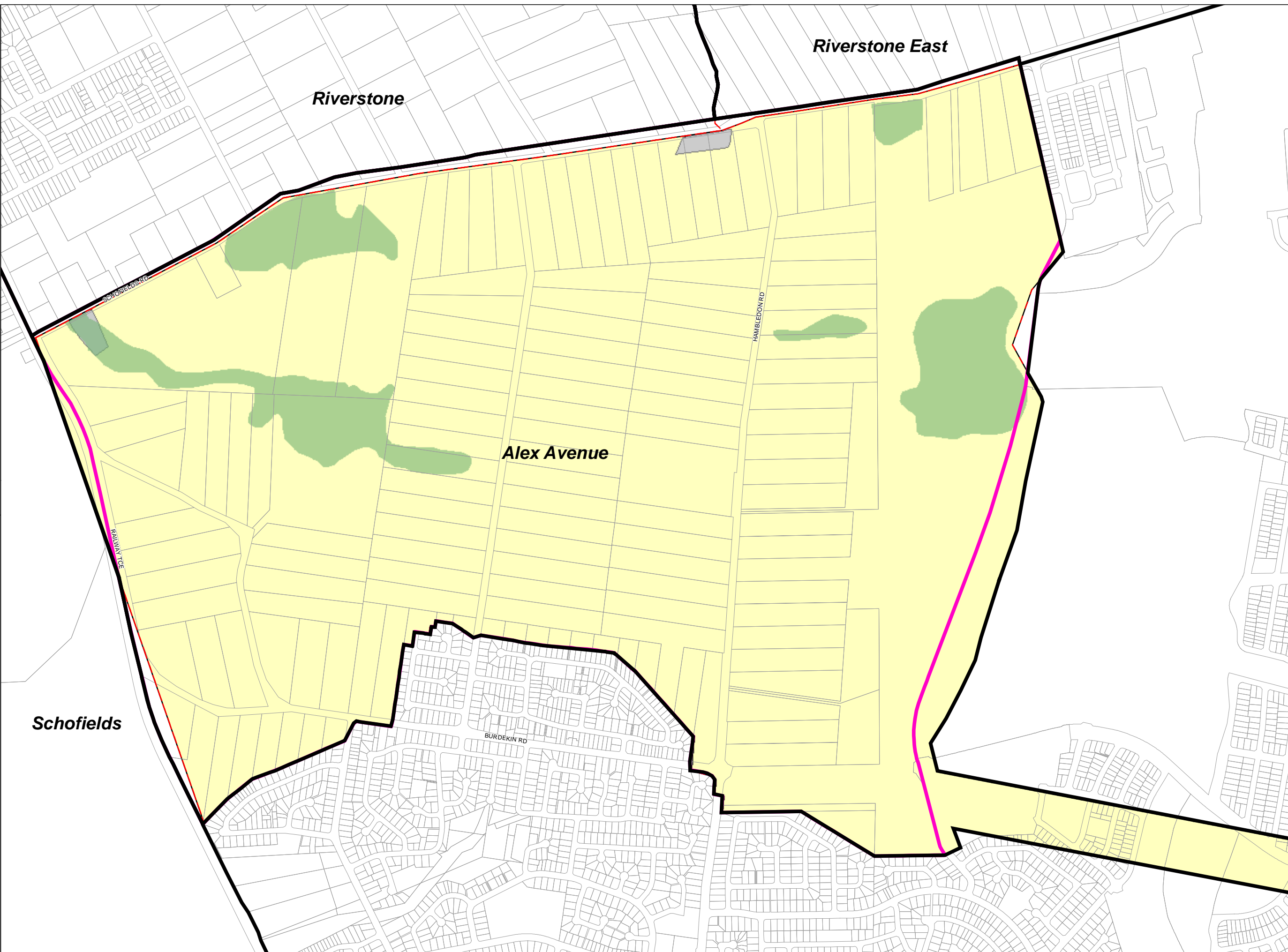
It is concluded that the Alex Avenue and Riverstone precinct planning is consistent with the biodiversity certification of the Growth Centres SEPP, as follows:

- Areas of ENV are to be protected within non-certified areas in excess of the contribution required for both precincts to the 2,000 hectares of ENV to be protected across the Growth Centres. An additional 6.5 ha is proposed to be protected within the Alex Avenue and Riverstone Precincts.
- Provisions are included in the Alex Avenue and Riverstone Precinct Plan that prohibit the clearing of ENV within the Precincts.
- The Department intends to seek amendment of the boundaries of the certified lands to locate all ENV that is to be protected within non-certified lands (currently some ENV to be protected is within certified lands, but the Precinct Planning process has determined that this ENV should be protected, and amendment of the certification maps is sought to ensure the certification is consistent with the Precinct Plan).
- 1 ha of ENV within the Alex Avenue Precinct is anticipated to be affected by the widening of Schofields Road, however, this impact is more than offset by the protection of an additional 5.5 ha of ENV elsewhere in the Riverstone and Alex Avenue Precincts, as described above.
- Minor modifications to the boundaries of lands subject to condition 12 of the RBMs are proposed, and the area of ENV within these reserves has been maintained at 31 ha and 18ha respectively (as per the land areas reported in the draft Conservation Plan). The overall area of land in the reserves that is subject to condition 12 has decreased by 0.5 ha.
- Measures have been put in place through the Alex Avenue and Riverstone Precinct Plan to protect suitable habitat for the Green and Golden Bell Frog on certain land in Riverstone that is subject to condition 18 of the RBMs, and the Department intends to seek amendment of the boundaries of land to which condition 18 applies to increase the area of land that is certified.

**Annex A**

**Biodiversity Certification Map for Alex Avenue and Riverstone Precincts**





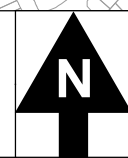
- Legend**
- Draft Precinct Boundary
  - Precinct Boundary
  - Certified Area
  - Non Certified Area
  - Existing Native Vegetation (ENV)
  - North West Growth Centre Land Application Boundary

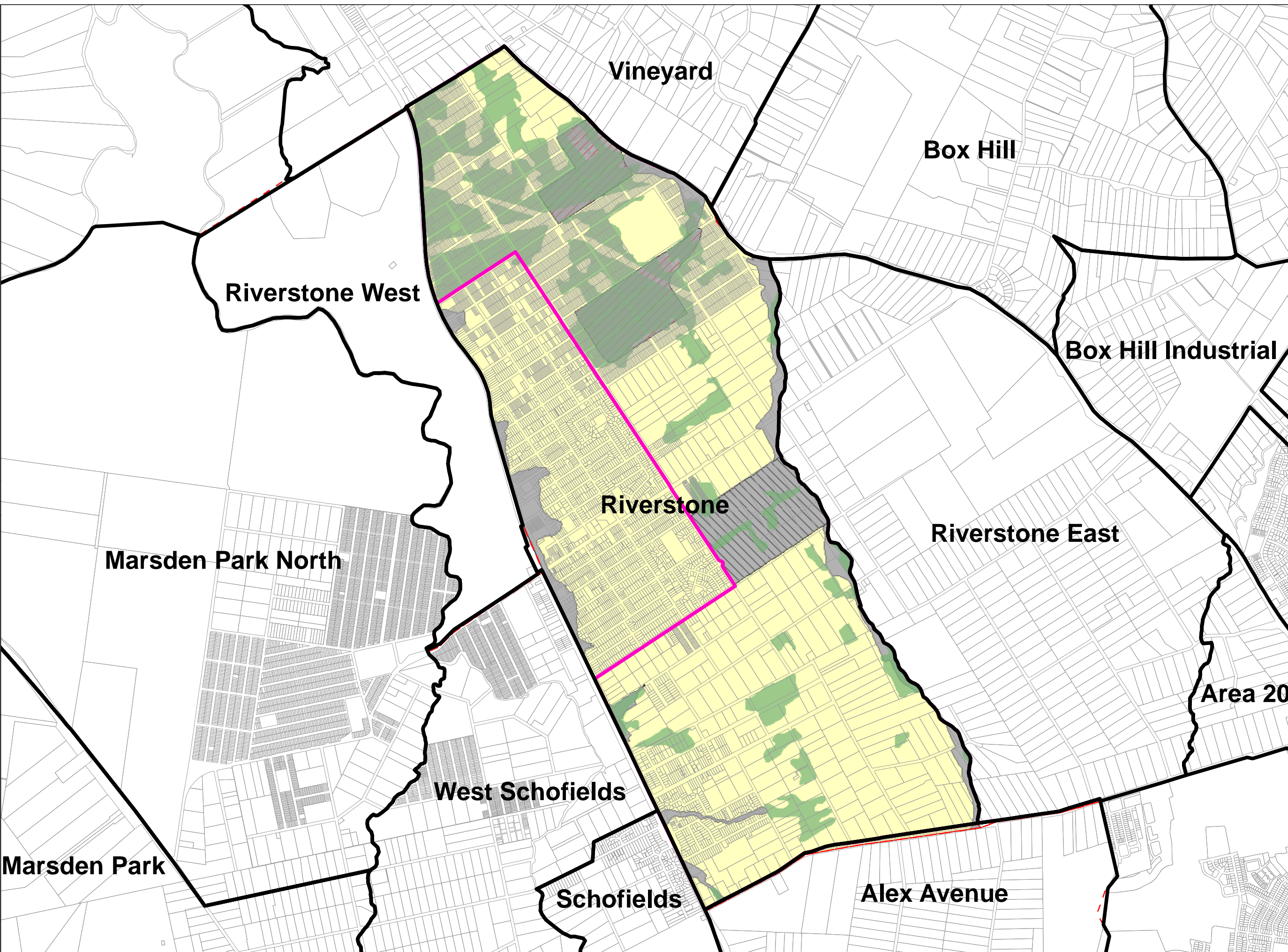
October 2009

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





# Alex Avenue - Biodiversity Certification and Existing Native Vegetation

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**Legend**

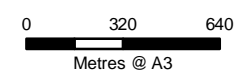
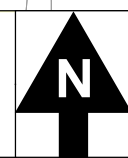
-  Draft Precinct Boundary
-  Precinct Boundary
-  Certified Area
-  Non Certified Area
-  Non Certified Area  
Land subject to Condition 12 of the Biodiversity Certification Order
-  Non Certified Area  
Subject to further investigation in accordance with Conditions 14, 17 and 18 of the Biodiversity Certification Order.
-  Existing Native Vegetation (ENV)
-  North West Growth Centre  
Land Application Boundary

October 2009

Disclaimer  
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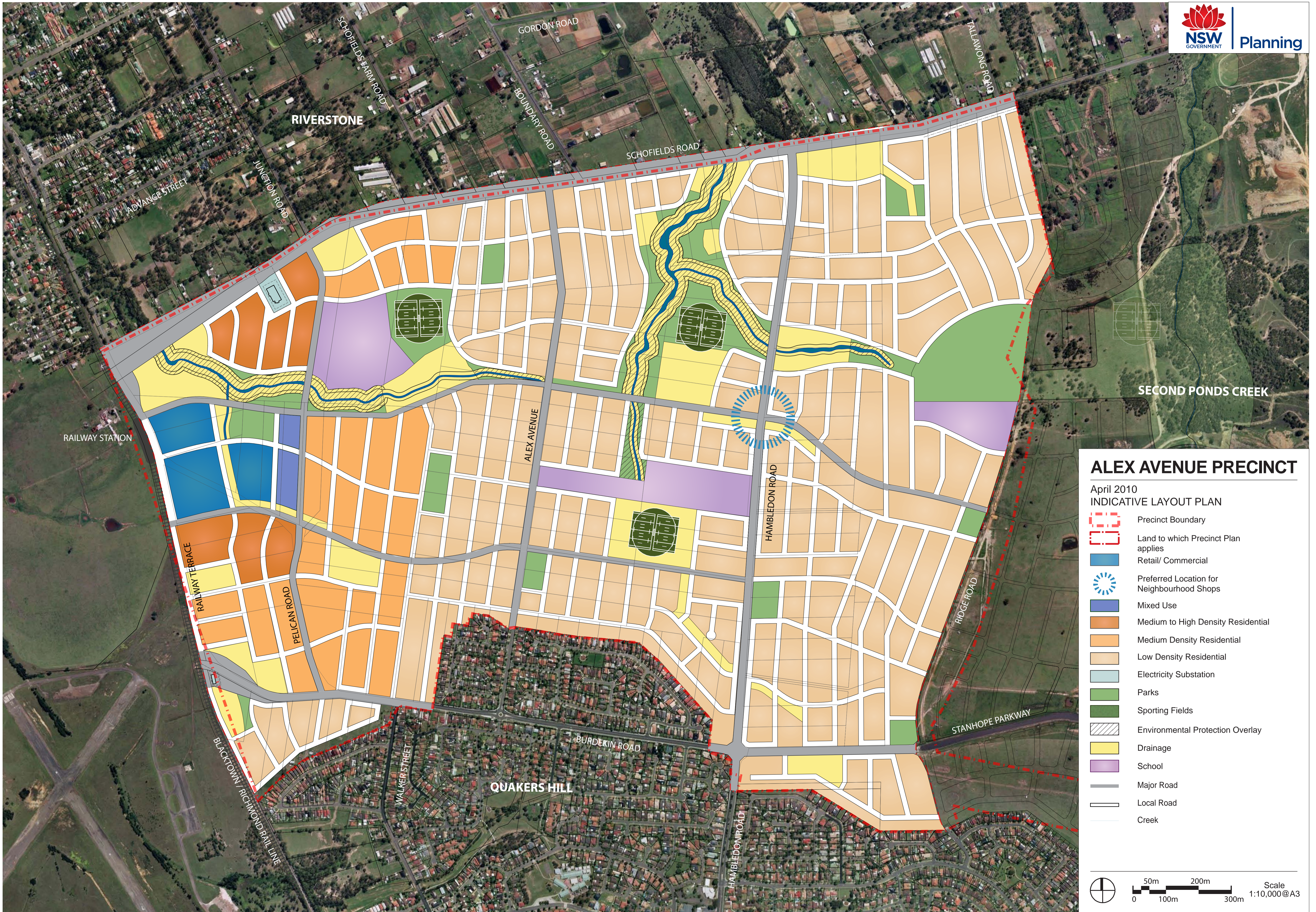
# Riverstone - Biodiversity Certification and Existing Native Vegetation

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**Annex B**

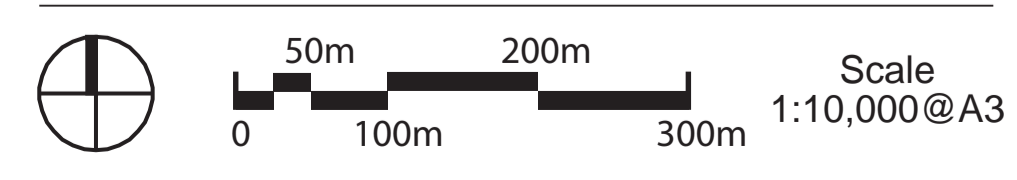
**Proposed Indicative Layout Plans for Alex Avenue and Riverstone Precincts**

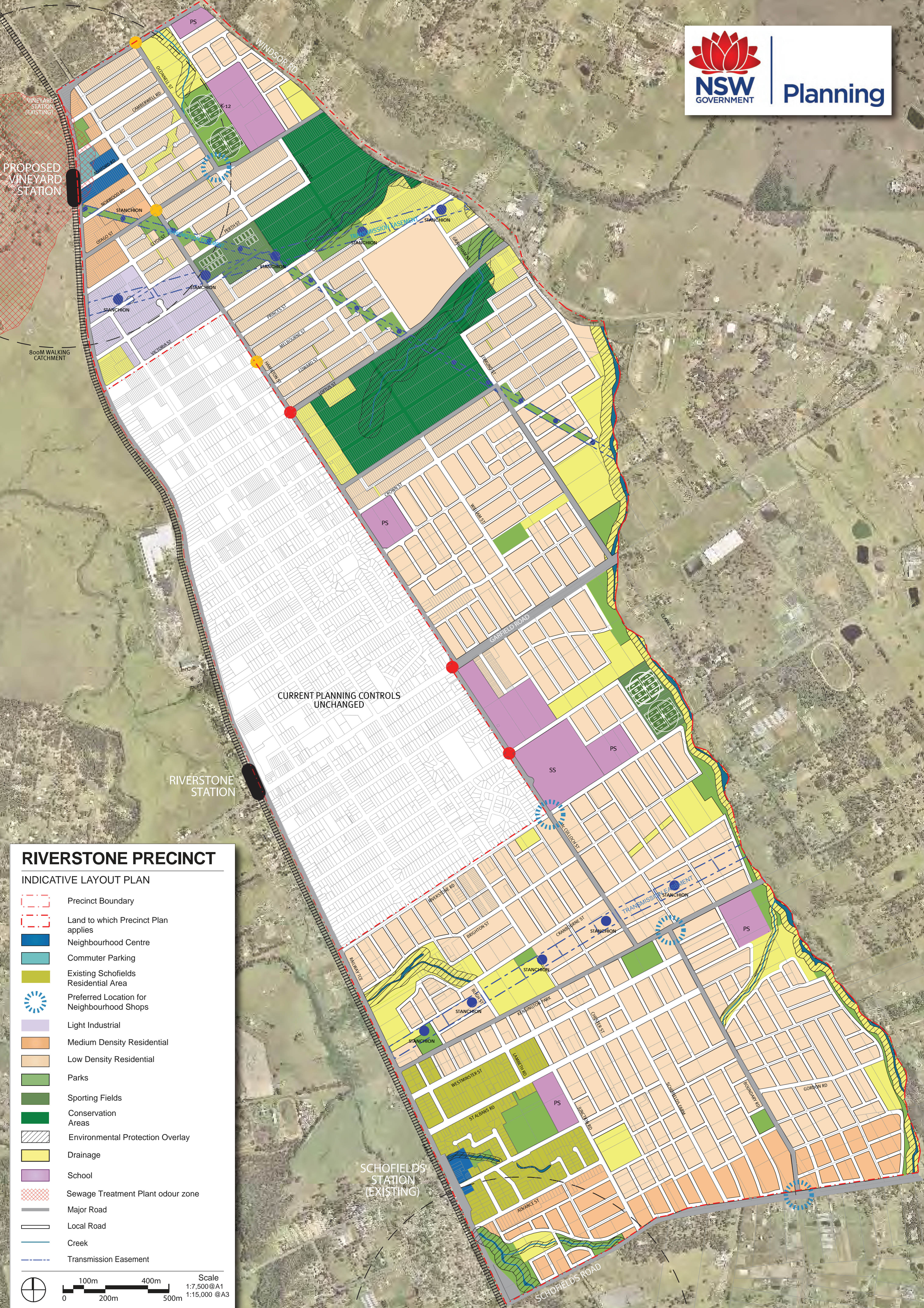


### ALEX AVENUE PRECINCT

April 2010  
INDICATIVE LAYOUT PLAN

- Precinct Boundary
- Land to which Precinct Plan applies
- Retail/ Commercial
- Preferred Location for Neighbourhood Shops
- Mixed Use
- Medium to High Density Residential
- Medium Density Residential
- Low Density Residential
- Electricity Substation
- Parks
- Sporting Fields
- Environmental Protection Overlay
- Drainage
- School
- Major Road
- Local Road
- Creek





PROPOSED VINEYARD STATION

800M WALKING CATCHMENT













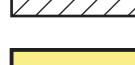



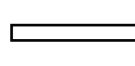

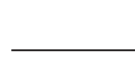

RIVERSTONE STATION

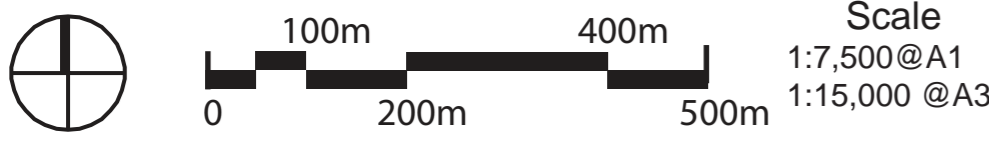
CURRENT PLANNING CONTROLS UNCHANGED

SCHOFIELDS STATION (EXISTING)

### RIVERSTONE PRECINCT

#### INDICATIVE LAYOUT PLAN

-  Precinct Boundary
-  Land to which Precinct Plan applies
-  Neighbourhood Centre
-  Commuter Parking
-  Existing Schofields Residential Area
-  Preferred Location for Neighbourhood Shops
-  Light Industrial
-  Medium Density Residential
-  Low Density Residential
-  Parks
-  Sporting Fields
-  Conservation Areas
-  Environmental Protection Overlay
-  Drainage
-  School
-  Sewage Treatment Plant odour zone
-  Major Road
-  Local Road
-  Creek
-  Transmission Easement



**Annex C**



**Proposed Protection Measures Plan for Alex Avenue and Riverstone Precincts**

State Environmental Planning  
Policy (Sydney Region Growth  
Centres) 2006



North West Growth Centre  
Native Vegetation Protection Map  
sheet NVP\_008

LEGEND


Protected Vegetation

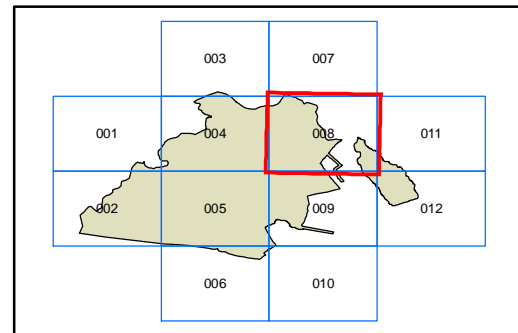
-  Existing native vegetation area
-  Native vegetation retention area

Growth Centres Boundaries

-  North West Growth Centre Boundary
-  North West Growth Centre Precinct Boundary

Cadastre

-  Cadastre 30/03/10 © Dept of Lands

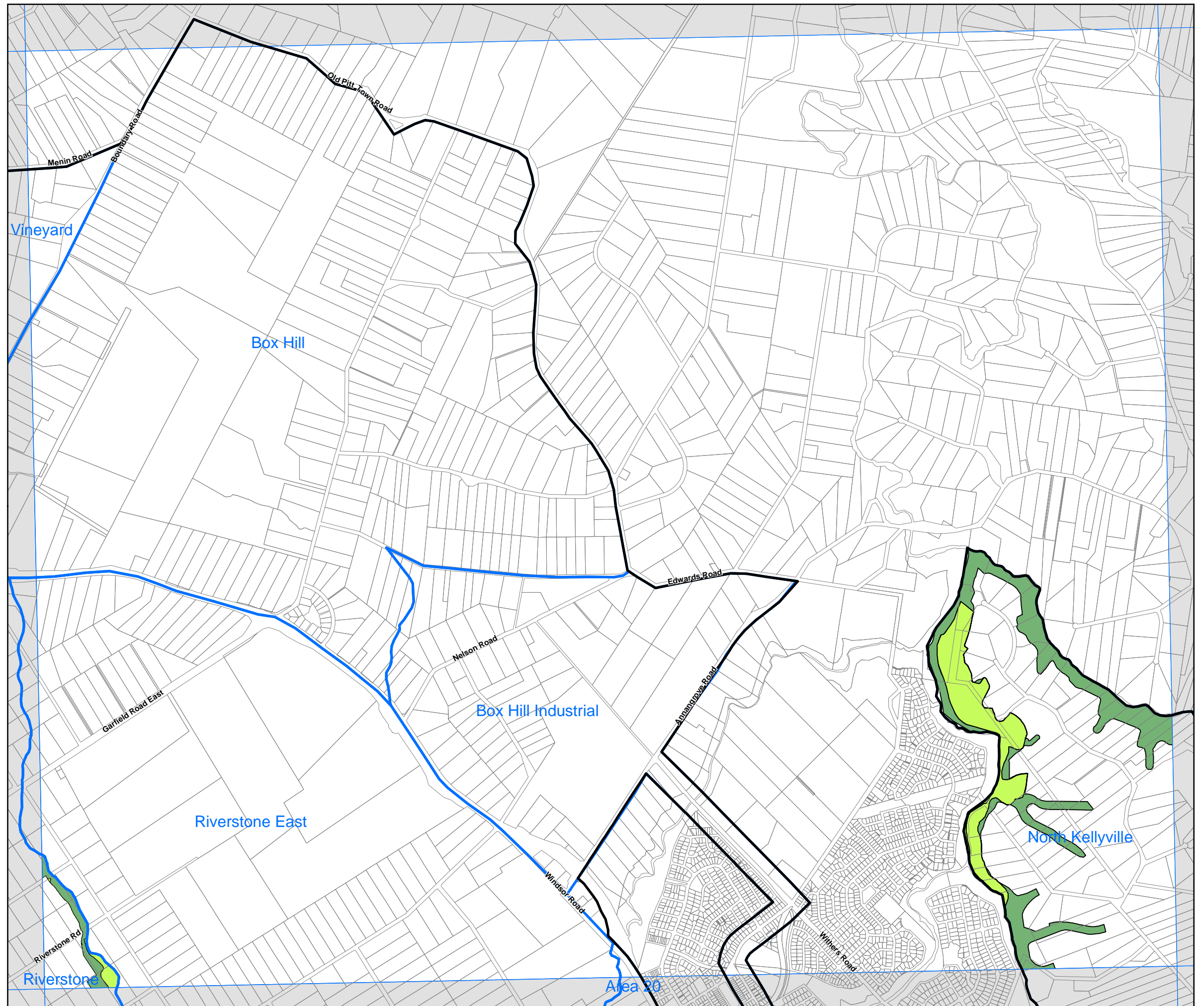


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Scale: 1:20,000 @ A3

Projection: GDA 1994  
Zone 56

Map Identification Number  
SEPP\_SRGC\_NW\_NVP\_008\_020\_20100415





**State Environmental Planning Policy (Sydney Region Growth Centres) 2006**



**North West Growth Centre Native Vegetation Protection Map sheet NVP\_005**

**LEGEND**



**Protected Vegetation**

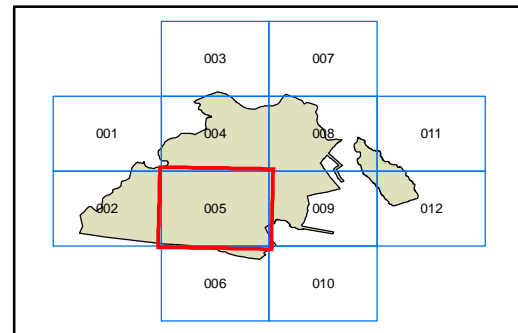
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-  Native vegetation retention area

**Growth Centres Boundaries**

-  North West Growth Centre Boundary
-  North West Growth Centre Precinct Boundary

**Cadastral**

-  Cadastre 02/12/08 © Blacktown City Council
-  Other Cadastre 30/03/10 © Dept of Lands

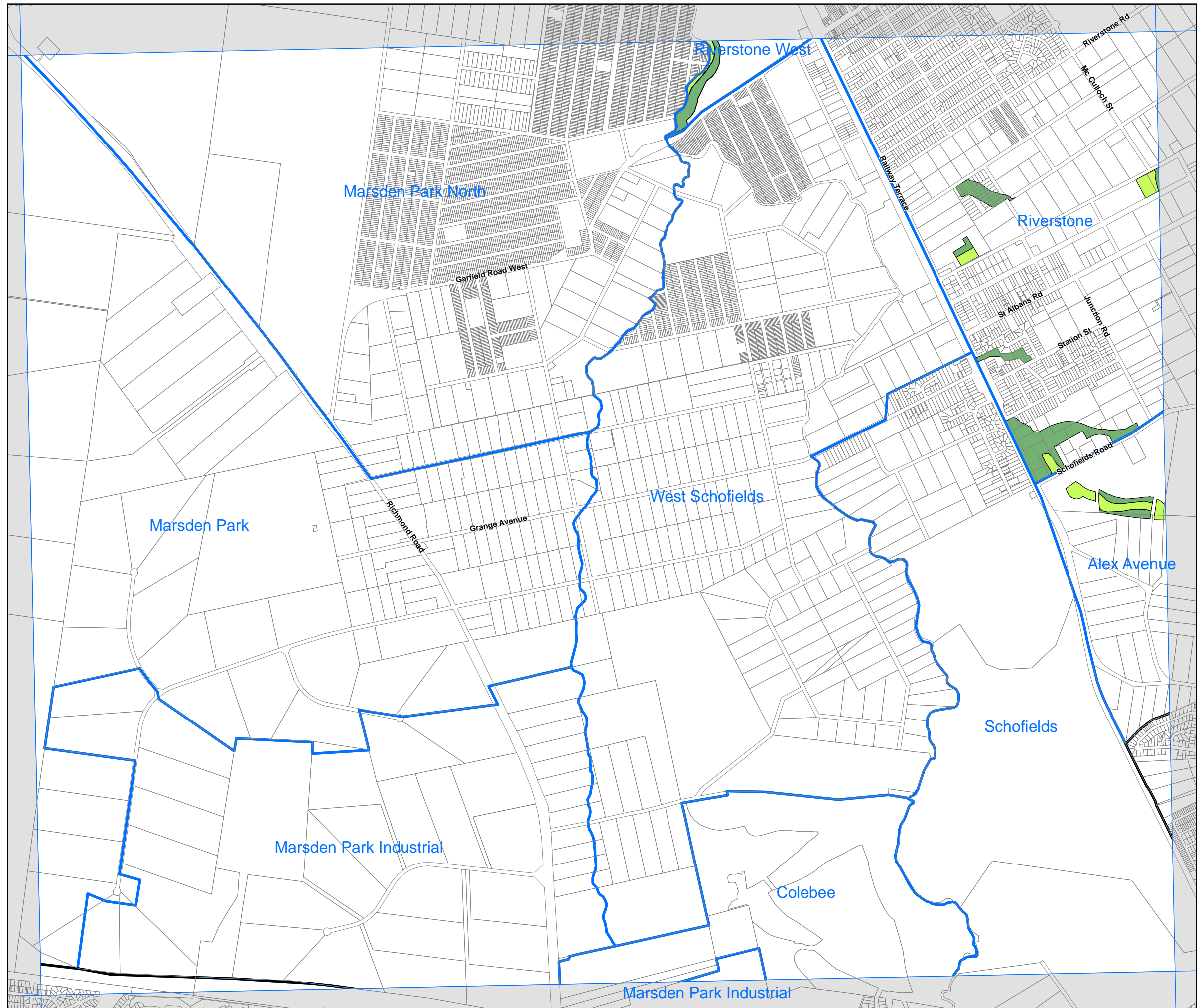


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Zone 56

Map Identification Number  
SEPP\_SRGC\_NW\_NVP\_005\_020\_20100415







State Environmental Planning  
Policy (Sydney Region Growth  
Centres) 2006



North West Growth Centre  
Native Vegetation Protection Map  
sheet NVP\_004

LEGEND



Protected Vegetation

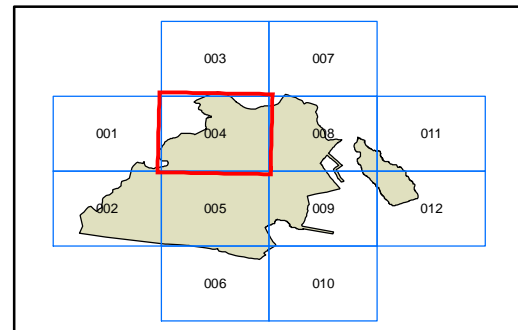
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-  Native vegetation retention area

Growth Centres Boundaries

-  North West Growth Centre Boundary
-  North West Growth Centre Precinct Boundary

Cadastral

-  Cadastre 02/12/08 © Blacktown City Council
-  Other Cadastre 30/03/10 © Dept of Lands

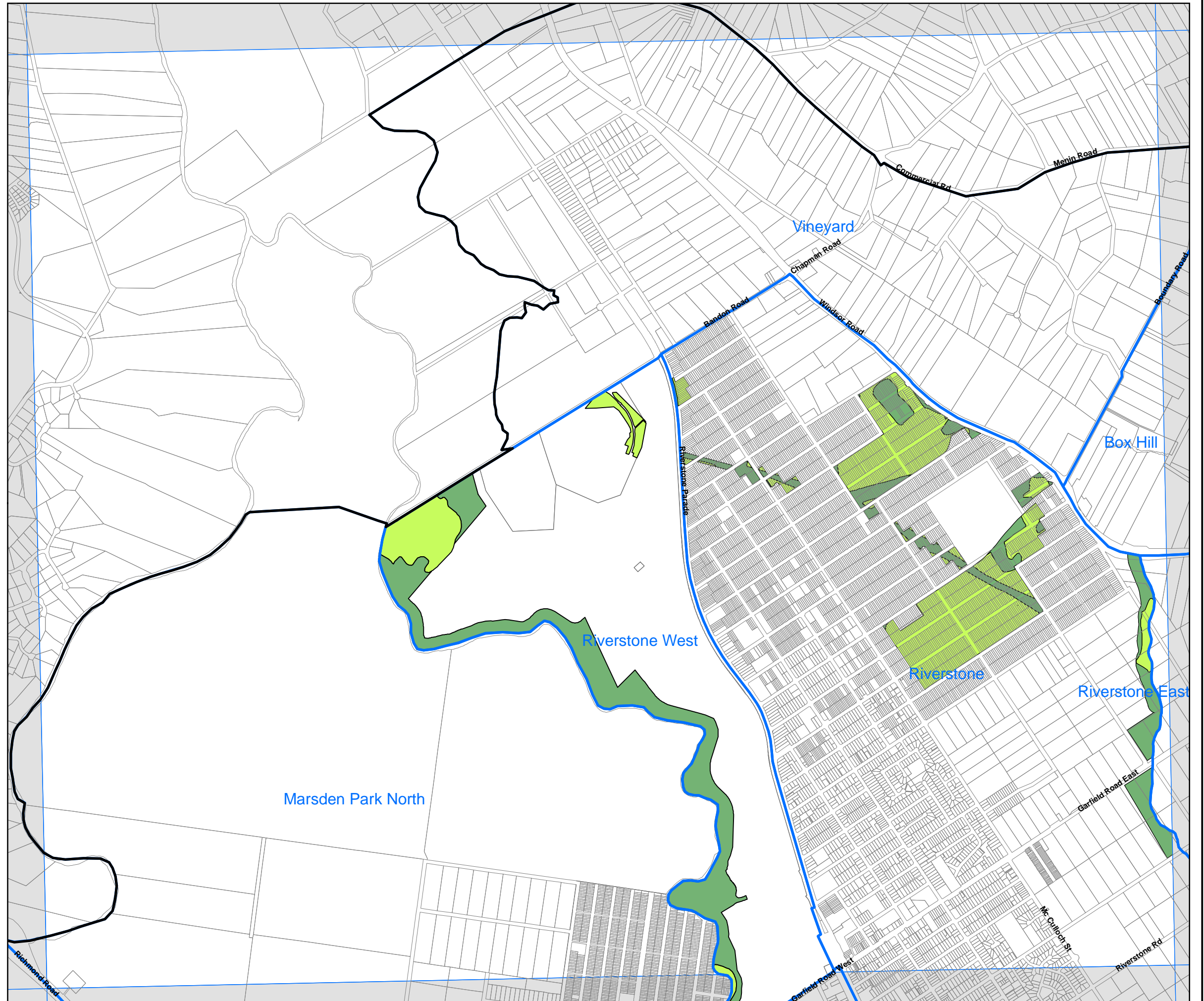


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Zone 56

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State Environmental Planning  
Policy (Sydney Region Growth  
Centres) 2006



North West Growth Centre  
Native Vegetation Protection Map  
sheet NVP\_009

LEGEND


Protected Vegetation

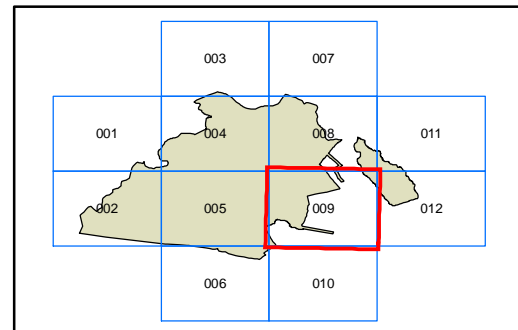
-  Existing native vegetation area
-  Native vegetation retention area

Growth Centres Boundaries

-  North West Growth Centre Boundary
-  North West Growth Centre Precinct Boundary

Cadastre

-  Cadastre 30/03/10 © Dept of Lands



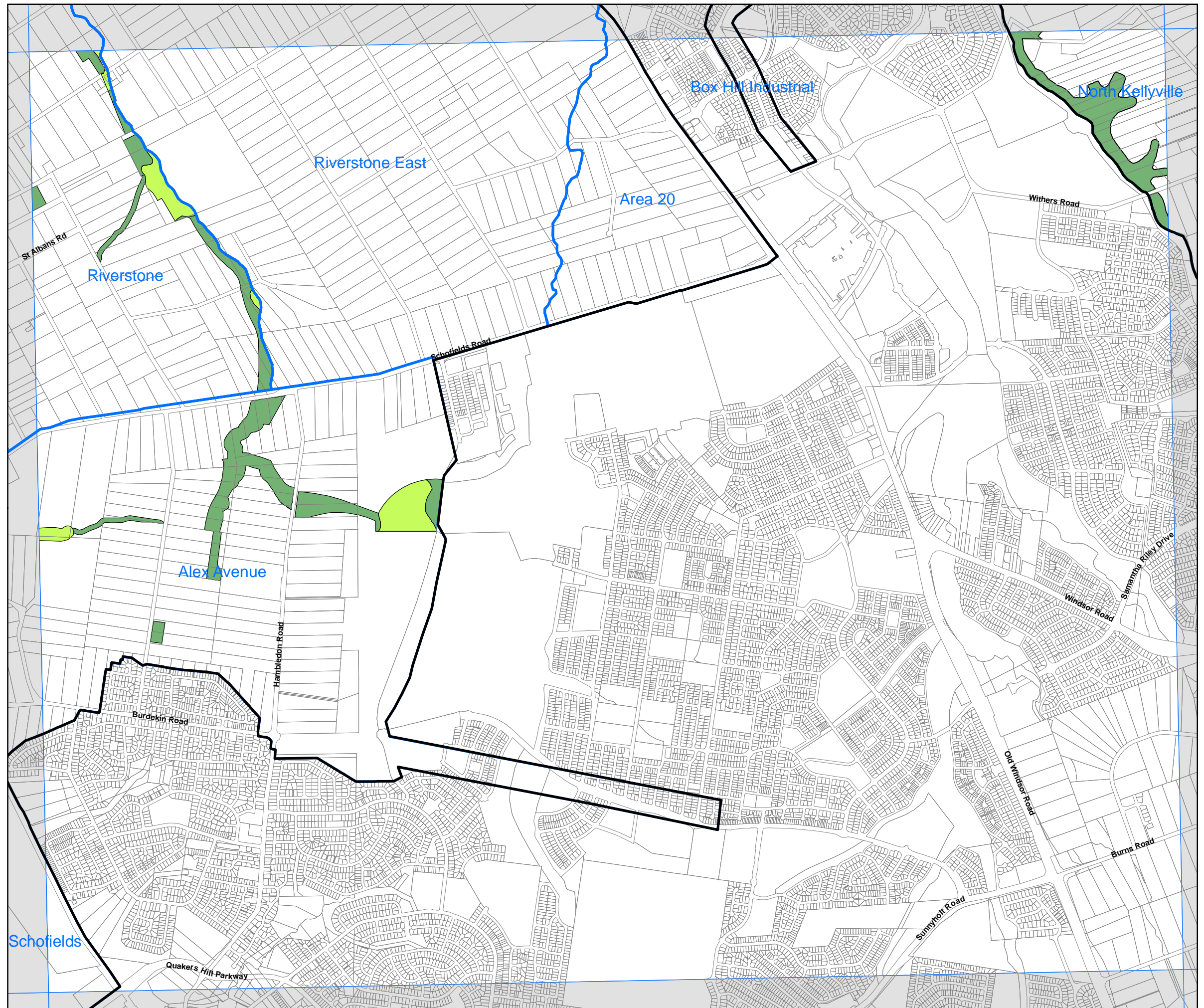
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Zone 56

Map Identification Number  
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**Annex D**

**Green and Golden Bell Frog Assessment Report and Proposed Protection Mechanisms**



# Riverstone precinct Green and Golden Bell Frog Survey

## Growth Centre Biocertification

Prepared for  
**Growth Centres Commission**

23 March 2009







# Riverstone precinct Green and Golden Bell Frog Survey

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**GROWTH CENTRE BIOCERTIFICATION**

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**PREPARED FOR**      **Growth Centres Commission**

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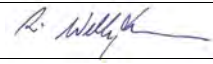
**PROJECT NO**        **0144-0016**

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**DATE**                **April 2009**

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**DOCUMENT TRACKING**

ITEM	DETAIL
Project Name	Riverstone precinct Green and Golden Bell Frog Survey
Project Number	<b>0144-0016</b>
File location	<a href="#">G:\Synergy\Projects\0144\0144-0016 Riverstone Precinct Green and Golden Bell Frog - Stage 2\Reports\Draft Reports</a>
Prepared by	RW 
	DM
Approved by	RM
Status	Draft
Version Number	3.0
Last saved on	16 April 2009

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# Contents

Contents .....	ii
List of Figures .....	iii
List of Tables .....	iii
Abbreviations .....	iii
<b>1</b> Introduction.....	2
<b>1.1</b> Background .....	2
<b>1.1.1</b> Legislative Framework.....	2
Water Management Act 2000.....	4
Fisheries Management Act 1994.....	5
Environment Protection & Biodiversity Conservation Act 1999.....	6
<b>1.1.2</b> Scope .....	6
<b>2</b> Study Area.....	8
<b>3</b> Method .....	12
<b>3.1</b> Data Audit.....	12
<b>3.2</b> Aerial Photo Interpretation.....	12
<b>3.3</b> Field Survey.....	12
<b>4</b> Results .....	14
<b>4.1</b> Data audit and assessment.....	14
<b>4.2</b> Previous Survey Reports .....	15
<b>4.3</b> Community Survey.....	16
<b>4.4</b> site description.....	16
<b>4.4.1</b> Site characteristics.....	16
<b>4.4.2</b> Vegetation Assessment .....	17
<b>4.4.3</b> Drainage Assessment .....	17
<b>4.4.4</b> Reference Site.....	19
<b>4.5</b> Frog Survey Results .....	19
<b>5</b> Discussion .....	22
<b>6</b> Conclusion and Recommendations.....	24



References .....	28
Appendix A: Biodiversity Conservation Order .....	29

## List of Figures

Figure 1 Growth Centres of western Sydney .....	8
Figure 2 North West Growth Centre precinct layout .....	9
Figure 4 Non-certified study area within the Riverstone Precinct .....	11
Figure 5 Habitat areas of the GGBF mapped within the deferred study area .....	17
Figure 6 Flood liable and riparian buffer zones in the locality .....	18
Figure 7 No. 48 Oxford Street Riverstone .....	18
Figure 8 GGBF juveniles and breeding pond at Oxford Street Riverstone .....	19
Figure 9 Frog Survey Sites .....	21

## List of Tables

Table 1 Water Management Act CRZ Widths .....	5
Table 2 Previous records of the Green and Golden Bell Frog in the study area .....	14
Table 3 Results of Community Survey .....	16
Table 4 Prevailing Climatic Data .....	20
Table 5 Frog Survey Results .....	20

## Abbreviations

ABBREVIATION	DESCRIPTION
GCC	Growth Centres Commission
DECC	Department of Environment and Climate Change NSW
BCO	Biodiversity Conservation Order
AEP	Annual Exceedance Probability
SEPP	State Environmental Planning Policy

# 1 Introduction

## 1.1 BACKGROUND

This survey report has been prepared to satisfy one of the environmental requirements related to the release of developable land in the North West Growth Centre of Sydney.

Requirements for such development include that appropriate biodiversity outcomes are achieved within a strategic approach that streamlines the planning and development approval process. One biodiversity element that has been identified as requiring further consideration in this process is the Green and Golden Bell Frog *Litoria aurea* (GGBF), listed under both NSW and Commonwealth threatened species protection legislation.

Under more traditional development approval pathways, assessments on a case by case basis would have to take into consideration the NSW Threatened Species Legislation and its interaction with NSW Planning legislation. However biocertification of planning instruments is a new approach provided for under recent legislative changes allowing biodiversity outcomes to be achieved outside the regular DA by DA approach.

Consequently the Growth Centres Commission (GCC – now the Department of Planning) has sought to have the GCC State Environmental Planning Policy (SEPP), undergo Biodiversity Certification.

In seeking biocertification, the GCC has had to develop an overarching conservation strategy and with this, has achieved partial biocertification of the GCC SEPP via gazettal of a Biodiversity Certification Order (BCO). At least one component of the Riverstone Precinct has been identified as 'non-certified' under this BCO and requires further investigation. This report documents the findings of further investigations in the non-certified area of the Riverstone precinct and endeavours to inform the process so that biocertification can be finalised for the deferred area and planning for the Precinct can be finalised.

Further details of the regulatory framework and requirements of the survey report are expanded on in sections 1.1.1 and 1.1.2 below.

### 1.1.1 Legislative Framework

The Green and Golden Bell Frog (GGBF) is listed as an Endangered species under Schedule 1 of the NSW *Threatened Species Conservation Act, 1995* (TSC Act) and as Vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A draft Recovery Plan has been prepared under both state and commonwealth legislation it identifies key populations as important conservation units and provides a series of actions and a strategic framework to recover the species. The NSW Priorities Action Statement (PAS) for the GGBF more or less reiterates the Recovery Plan actions required to recover the species.

Section 69 of the TSC Act requires that Ministers and Directors General of Public Authorities take actions available to them to implement measures included in a recovery plan, for which they are responsible, and are also not to make decisions that are inconsistent with the provisions of a recovery plan.

In summary, the GGBF Recovery Plan identifies that the species has undergone major declines in its distributional extent from its formerly state wide distribution. The current status of the species is that it persists as 43 more or less isolated Key Populations. The recovery plan also identifies a number threatening processes considered to be operating and that continue to reduce the viability of the species in nature. Among these are: loss of habitat; ongoing fragmentation of habitat; the impacts of frog chytrid disease; and predation by a number of introduced species (including the Plague Minnow *Gambusia* and Carp *Cyprinus carpio*).

One of the Key Populations identified in the draft Green and Golden Bell Frog Recovery Plan is a western Sydney population believed to be operating as a 'meta-population', with population elements transiently identified at St Marys, Mt Druitt and Riverstone. These 'satellites' are all the population elements known to remain of what would have been a widespread more or less contiguous population occurring across much of the Hawkesbury Nepean, their tributaries and floodplains, in western Sydney.

The TSC Act interacts with the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) and requires that consent authorities assessing developments give appropriate consideration to activities and their potential to impact on listed threatened species. However recent amendments to the TSC Act have provided alternative, more strategic, approaches to providing conservation outcomes for threatened species that include options for Biocertification of environmental planning instruments (EPI).

The effect of Biocertification, once granted by the NSW Minister for the Environment, is to remove the development by development approach to considering biodiversity outcomes (including threatened species) and provide an opportunity for more strategic planning to gain similar or perhaps better conservation outcomes. The fundamental test for EPIs to be biocertified is the 'maintain or improve' standard for relevant conservation outcomes.

The steps taken by the NSW Government to streamline the development assessment and approval process through strategic approaches to the Growth Centres has included:

- The Sydney *Metropolitan Strategy 2005* to provides a broad direction for the planned release of urban and employment lands in the Sydney Region.
- State Environmental Planning Policy – (*Sydney Region Growth Centres 2006*) - hereafter Growth Centres SEPP, a Planning Instrument developed in response to the Metropolitan Strategy to identify land capability and provide for the coordinated release of suitable lands.
- *Growth Centres Development Code 2006* – produced to support the Growth Centres SEPP, with details that guide the planning and urban design of individual precincts.
- *Growth Centres Conservation Plan 2007* – developed to support an application to the Minister for Environment and Climate Change, seeking Biodiversity Certification of the Growth Centres SEPP to further streamline the approval process and provide greater development outcome certainty.
- Biodiversity Conservation Order 2007– Minister Assisting the Minister for Environment and Climate Change, by order, confers biodiversity certification on the Growth Centres SEPP, subject to certain general and other, species specific, conditions. One of the conditions, (Condition 18), requires that the Green and Golden Bell Frog gains specific attention via additional targeted assessment to ensure that a standard of 'maintain or improve' is attained for the key population element occurring at Riverstone. See Biodiversity Conservation Order – (BCO) Gazetted December 2007 at Appendix A.

This targeted GGBF survey report endeavours to satisfy this condition and provide the information needed to allow for certification of the non-certified area and finalise indicative layout areas (ILA) of the Riverstone Precinct Plan.

Consequently, the project brief fulfilled here, was developed to satisfy DECCs requirements that:

- an adequate level of assessment is undertaken in relation to the GGBF;
- a standard of 'maintain or improve' is achieved in relation to any measures taken to conserve GGBFs and their habitat; and
- actions undertaken are consistent with the actions of the GGBF Recovery Plan (PAS).

[see BCO Condition 18 - Appendix A]

Other Legislative requirements that may require consideration in Growth Centre Planning and which may have secondary relevance to this assessment include:

#### **Water Management Act 2000**

The NSW *Water Management Act 2000* has replaced the provisions of the *Rivers and Foreshores Improvement Act 1948*. The *Water Management Act 2000* and *Water Act 1912* control the extraction of water, the use of water, the construction of works such as dams and weirs and the carrying out of activities in or near water courses and water bodies in New South Wales. These 'Water sources' are defined very broadly and include any river, lake, estuary, place where water occurs naturally on or below the surface of the ground as well as coastal waters.

If a 'controlled activity' is proposed on 'waterfront land', an approval is required under the Water Management Act (s91).

'Controlled activities' include:

- the construction of buildings or carrying out of works;
- the removal of material or vegetation from land by excavation or any other means;
- the deposition of material on land by landfill or otherwise; or
- any activity that affects the quantity or flow of water in a water source.

'Waterfront land' is defined as the bed of any river or lake, and any land lying between the river or lake and a line drawn parallel to and forty metres (40m) inland from either the highest bank or shore (in relation to non-tidal waters) or the mean high water mark (in relation to tidal waters). It is an offence to carry out a controlled activity on waterfront land except in accordance with an approval.

Guidelines have been provided for the protection of core riparian areas/zones (CRZs) under the Act are as outlined in Table 1 below.

**Table 1 Water Management Act CRZ Widths**

<b>Types of Watercourses</b>	<b>CRZ Width</b>
Any first order <sup>1</sup> watercourse and where there is a defined channel where water flows intermittently	10 metres
Any permanent flowing first order watercourse, or any second order <sup>1</sup> watercourse where there is a defined channel where water flows intermittently or permanently	20 metres
Any third order <sup>1</sup> or greater watercourse and where there is a defined channel where water flows intermittently or permanently. Includes estuaries, wetlands and any parts of rivers influenced by tidal waters.	20 – 40 metres <sup>2</sup>

<sup>1</sup> as classified under the Strahler System of ordering watercourses and based on current 1:25,000 topographic maps.

<sup>2</sup> merit assessment based on riparian functionality of the river, lake or estuary, the site and long-term land use.

This application for riparian areas under the WM Act replaces the former Department of Infrastructure Planning and Natural Resources (DIPNR) categorisation of watercourses (ie: Category 1, 2 and 3 which was based on a Riparian Corridor Management Study (DIPNR, March 2004) produced for the Wollongong LGA and the Calderwood Valley of the Shellharbour LGA).

Similar to biodiversity certification, it is understood that the intention within the Growth Centres is for an 'order' under the WM Act to be obtained for the precinct that exempts or streamlines future development assessment, providing the development is consistent with the strategic framework and planning controls identified. The riparian corridors that exist within the Riverstone Precinct have been mapped according to watercourse classification along with the identified 1% AEP level (see Figure 6) but are not further discussed other than in relation to their potential as likely GGBF habitat areas. Proposed works and other management plan requirements need to give due consideration to this. The NSW Department of Water and Energy now administers the WM Act.

#### **Fisheries Management Act 1994**

The *Fisheries Management Act 1994* (FM Act) aims to conserve, develop and share the fishery resources of NSW for the benefit of present and future generations. The FM Act defines 'fish' as any marine, estuarine or freshwater fish or other aquatic animal life at any stage of their life history. This includes insects, molluscs (eg. oysters), crustaceans, echinoderms, and aquatic polychaetes (eg. beachworms), but does not include other aquatic/marine vertebrate groups such as mammals (whales and dolphins), reptiles (turtles and sea snakes), birds, amphibians or other species specifically excluded (eg some dragonflies are protected under the TSC Act instead of the FM Act due to aquatic versus terrestrial life cycle stage differences). The FM Act also protects a range of aquatic and marine vegetation such as marine algae and sea grasses. Under this Act, activities that will block fish passage or impact on fish habitat may require a permit under this Act. Similar to the TSC Act the FM Act provides for the listing of threatened aquatic animal and plant species and also operates by interacting with the EP&A Act when considering the impact of developments. Surveys and other investigations or initiatives undertaken in relation to FM Act related issues should note their likely implications for the GGBF where there is an overlap in habitat.

## Environment Protection & Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act) establishes a process for assessing the significance of environmental impact of actions and developments where matters of 'national environmental significance' (NES) may be affected. The EPBC Act lists endangered ecological communities, threatened and migratory species as well as some other natural and cultural values that are considered to be NES matters.

The Green and Golden Bell Frog is listed as a Vulnerable species under the EPBC Act and so is considered an NES matter. The presence of other NES matters in the NW Growth Centre and Riverstone precinct in particular (eg Cumberland Plain Woodland), may require referral and assessment by the Commonwealth whereby potential impacts on all NES matters may be considered.

It is understood however, that the Growth Centre Commission (GCC) and other relevant NSW Government agencies are currently in discussions with the Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA) regarding the possibility of a strategic assessment of the Growth Centres SEPP. A bilateral agreement with respect to assessment under Part 3A, 4 or 5 of the NSW EP&A Act is in place between NSW and the Commonwealth however this has not been extended to cover some of the more recent NSW strategic development approval approaches (eg Biocertification and Biobanking).

A strategic assessment would remove the need for individual referrals under the EPBC Act for agreed development areas within the Growth Centres. If the strategic approach is not agreed to by the Commonwealth then development by development referrals may still be necessary.

A decision on acceptance or otherwise by the Commonwealth of strategic assessment approaches to development approval should be known June/July 2009.

### 1.1.2 Scope

The Biocertification Order, condition 18, is highly prescriptive and is set against the backdrop of the legislative, planning and approval framework outlined above.

Consequently the Growth Centres Commission (now a division of the NSW Department of Planning as an outcome of recent organisational restructure), required the following services to be provided.

- Review an earlier study undertaken in relation to the GGBF at Riverstone by GHD Pty Ltd.
- Develop a survey methodology with reference to the recommended survey methods outlined in the draft Green and Golden Bell Frog Recovery Plan so as to maximise the likelihood of confirming presence of the species on the specified land within the Riverstone precinct and, in the process, adapt this methodology (where necessary) to also satisfy Option 1 and/or Option 2 of Condition 18 of the Biocertification Order. If the GGBF is present/detected, identify areas of suitable habitat for the protection of the population or if not possible within the specified non scheduled area, identify what other areas may be required to secure the local population and its habitat.
- Submit a draft/proposed methodology to the NSW DECC and the GCC for review and approval prior to the commencement of the field work.
- Undertake the required survey fieldwork in accordance with the approved methodology.
- Guarantee that a suitably qualified frog herpetologist with a good knowledge of the Green and Golden Bell Frog directs the survey and ensures that the approved methodology is applied/performed.
- Ensure that the appropriate methods for detection are utilised during surveys to maximise the likelihood of detection during the available survey period. These methods will include (but not

necessarily be limited to): targeting calling males, focusing on previously known locations and other potential breeding sites, (whilst noting that breeding sites are not the only habitat utilised/required by the GGBF), but where calling males are most likely to be detected.

- Prepare a draft report that identifies existing/known habitat(s) and potential habitats if required; detail recommended protection measures; and provide detailed maps/drawings to enable the updating of relevant notices and other documentation within a timeframe to be agreed by DECC and the GCC based on the detailed (approved) methodology.
- Submit a final report within a timeframe to be agreed, based on the detailed methodology. The deadline for completion of the work will be determined with regard to the GCC planned date of Gazettal of the Riverstone Precinct Plan as well as the temporal requirements of applying the approved survey methodology (temperature and rainfall). As a guide the GCC is aiming for gazettal of the precinct plan around March/April 2009.

## 2 Study Area

The study area is contained within the North West Growth Centre located in the northwest sector of the Sydney Cumberland Plain taking in a substantial area of the Blacktown Local Government Area (LGA) along with smaller sections of Baulkham Hills and Hawkesbury LGAs (see Figure 1).



**Figure 1 Growth Centres of western Sydney**

The North West Growth Centre is divided into a series of precincts that are to undergo planning and staged approval. Figure 2 depicts the precinct boundaries of the North West Growth Centre.



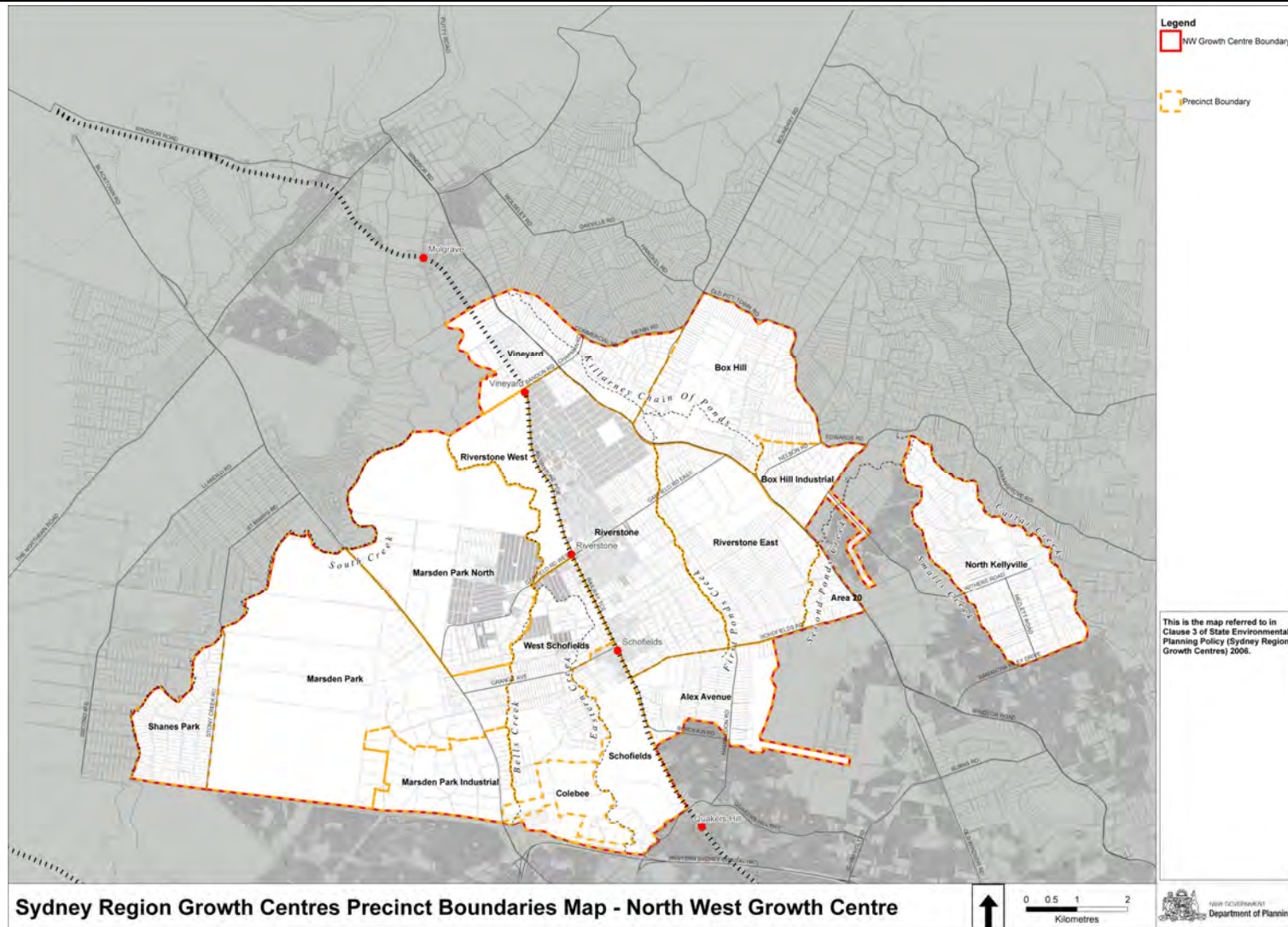


Figure 2 North West Growth Centre precinct layout

The Riverstone precinct has as its boundaries Schofields Road to the south, First Ponds Creek and Windsor Road to the east, the Blacktown to Richmond Rail corridor to the west and the proposed Vineyard precinct to the north (Figure 3). This precinct has an area of approximately 1,149 ha and contains the existing villages of Riverstone and Schofields with their associated residential and industrial zonings. It is proposed that areas of the precinct will be developed as residential and other land use releases and include significant road and other infrastructure developments. Parts of the Riverstone precinct are currently zoned for Environmental Conservation and Public Recreation whilst other areas are constrained by flood affectation and required riparian zones.



**Figure 3 Riverstone Precinct and Study area**

The study area within the Riverstone Precinct of the North West Growth Centre is defined as the 'non-certified' area identified within the Biodiversity Conservation Order (BCO – hatched area in Figure 3 above).

The subject land is more or less bound by Riverstone Road to the south east, Garfield Road to the north west, Clarke Street to the north east and McCulloch Street to the south west (see Figure 4).



Figure 4 Non-certified study area within the Riverstone Precinct

## 3 Method

### 3.1 DATA AUDIT

A search of the NSW Wildlife Atlas and other threatened species data sets was undertaken to provide a basis for previous records and more recent sightings of the Green and Golden Bell Frog (GGBF) for the Riverstone and wider North West Growth Centre. Interviews were also undertaken with other herpetologists that had historical experience with the GGBF in the Riverstone area.

Previous reports relevant to the area were read and reviewed as was information contained within the threatened species profiles, EIA guidelines and the draft recovery plan for the species.

### 3.2 AERIAL PHOTO INTERPRETATION

Orthorectified aerial photographs were provided by the Growth Centres Commission for analysis in combination with other spatial data sets. A desktop GIS analysis of the area was undertaken including an assessment of distributional records and other habitat attributes throughout the precinct.

### 3.3 FIELD SURVEY

A survey methodology for the GGBF was developed and designed to comply with the bio-certification requirements of the Growth Centres Conservation Plan and was framed against Appendix 2 of the DECC GGBF draft Recovery Plan (and GGBF Environmental Impact Assessment (EIA) Guidelines, (NPWS, 2001). The methodology was designed to maximise the opportunity of detecting the GGBF within a single survey season. The method includes three repeated but temporally separated survey efforts and the amended methodology was approved/endorsed by DECC on 2<sup>nd</sup> December 2008.

On Friday 12<sup>th</sup> December 2008 a reconnaissance visit was undertaken with Growth Centre Commission (GCC) project Manager Paul Robilliard, GCC Officer Tom Copping and, from the ELA survey team, Ross Wellington and Daniel Magdi. This preliminary visit was to identify the study area and property boundaries, familiarize team members with the general locality and to identify individual properties for which access and permission had been organised.

Three temporally separated, targeted surveys were then undertaken in accordance with the approved methodology.

Survey timing was as follows:

- Diurnal and nocturnal survey on Tuesday 16<sup>th</sup> December 2008 with a nocturnal survey on Wednesday 17<sup>th</sup> December 2008
- Diurnal and nocturnal survey on Friday 16<sup>th</sup> January 2009 with a nocturnal survey on Thursday 22<sup>nd</sup> January 2009
- Diurnal and nocturnal survey on Friday 20<sup>th</sup> February with a nocturnal survey on Saturday 21<sup>st</sup> February 2009

The prescribed methodology was specifically varied in consultation with the DECC so that there was a period of more than three weeks between survey efforts.

Survey techniques included diurnal searching of emergent rushes and sedges and other aquatic vegetation surrounding water bodies, such as pooled sections of First Ponds Creek, farm dams, depressions, pits, diversion channels and bunded areas that had been created by drainage works or flood mitigation works which retain rain and runoff water from time to time.

During the diurnal searches for basking individuals amongst emergent rushes and sedges, the GGBF's call was also imitated in an effort to elicit a response from any unobserved individuals that may have been present.

Water bodies were dip netted for tadpoles and all ground cover searched, which was able to be turned; including logs, rocks, building material, concrete slabs and other refuse. This was carefully lifted and searched for refuging amphibians and then replaced.

Nocturnal surveys included call playback using a pre-recorded call of the GGBF on CD played back through a PA loud hailer. Call playback was undertaken at 6 sites on each evening and these sites are depicted in Figure 9.

The auditory survey consisted of an initial listening period at each site followed by 15 minutes of repeated replays of calls of the GGBF followed by 10 minutes of listening. Habitat in the vicinity of each call playback site was then thoroughly surveyed using headlamp and spotlight.

To determine/validate GGBF activity and detectability, prior to commencement of each survey, the property of Mr Lance Jurd at 46 Oxford Street Riverstone was visited. This property contains a semi captive colony of the GGBF and the yard is set aside almost entirely to provide various habitat elements for the GGBF. Mr Jurd was interviewed at the start of each survey period regarding any frog activity or calling he had observed. Mr Jurd's garden was also directly inspected for evidence of GGBF activity on each visit.

As an additional survey technique a focused community survey was also undertaken. Each of the schools at Riverstone were approached and provided with Green and Golden Bell Frog identification brochures and stickers produced by the DECC.

The Principal and or other relevant teaching staff were advised of the potential presence of the GGBF in the area and the purpose of the survey. The principal and teachers were asked to advise students of the possible presence of the GGBF and to strategically locate identification brochures around the school or in class rooms. Students were requested to notify the DECC Enviro Line or other contact number provided if any suspected observations of the species were made. A number of GGBF stickers were also distributed to students.

Schools visited:

- Riverstone High School – corner Riverstone Road and McCulloch Street
- St Johns Primary School – corner of Garfield and McCulloch Streets
- Norwest Christian College – corner of Regent and McCulloch Streets
- Riverstone Public School – Regent Street
- Casuarina School – Garfield Street

## 4 Results

### 4.1 DATA AUDIT AND ASSESSMENT

An assessment of the wildlife atlas revealed that 16 records of the Green and Golden Bell Frog have been registered in the Wildlife Atlas and associated licensed data sets within a radius of 10 kilometres of the study site. Of these records only two are relatively recent and only one is recent and within the study area (Table 2). These records constitute most of what is considered to make up the Western Sydney GGBF Key Population in the GGBF Threatened Species Recovery Plan (DEC 2005), (see Table 2).

**Table 2 Previous records of the Green and Golden Bell Frog in an approximate 10km radius of study area**

Observation Date	Observer	Location	Easting	Northing
1998	Arthur White and Leah Morgan	St Marys, Driving Range	294140	6263672
1994	Arthur White	Mt Druitt, power easement near Kurrajong Street	296236	6261736
1974	Arthur White	Pitt Town	301414	6280591
1994	Arthur White	Reserve land north of the railway line and east of Rope's Creek. T8	296200	6261800
1998	Arthur White	St Marys Leagues Club Site dam	294236	6263720
1998	Arthur White	NE of driving range	294476	6263736
2001	Arthur White	St Marys Leagues Club Site	295650	6263600
1973	P Wettin	Long Neck Lagoon	304268	6282502
1969	Richard Wells	Eastern Creek now Nurragugy Reserve	301508	6261728
1968	Richard Wells	Elizabeth Macarthur Creek, ponds along	308568	6267964
1960	Richard Wells	Long Neck Lagoon	304056	6283200
1960	Richard Wells	Long Neck Lagoon	304232	6281896
1969	Richard Wells	Riverstone, Clarke Road	303536	6272024
2000	Richard Wells	Riverstone	303020	6271236
1969	Richard Wells	Riverstone High School	303004	6271272
1966	Richard Wells	Ropes Creek, ADI site	293676	6264852

During the formulation of the Growth Centres Conservation Plan, the most recent GGBF record at Riverstone was identified as occurring behind the Riverstone High School. Personnel in the Planning and Aboriginal Heritage Section of NSW DECC Metro Branch were required to provide advice to the Minister for Environment and Climate Change regarding the Growth Centre Conservation Plan and the application for biocertification of the Growth Centres SEPP. It is understood that the most recent observation of GGBF within the study area, coupled with the recognition of the significance of the record with respect to the western Sydney GGBF Key Population still persisting in the locality, triggered the requirement for further assessment (R. Mezzatesta, T. Hager and L. Peterson, pers. comm.; NSW DEC, 2005). It is further understood that it was on this basis that a buffer was placed around the most recent GGBF record and this defined the (non-certified) study area of the Riverstone Precinct.

## 4.2 PREVIOUS SURVEY REPORTS

A GGBF report was previously commissioned by the Growth Centres Commission to satisfy the BCO. Consulting company GHD Pty Ltd (GHD 2008) endeavoured to address the same issues and is briefly reviewed below.

The survey report documents field work that covered the lands constituting the non-certified area and followed a methodology that may have resulted in the detection of the GGBF if present. However the methodology did not follow the GGBF EIA guideline as closely as it could have. The survey timing was during a time towards the end of the species activity period in mid March of 2008. Survey effort was only made up of two visitations and these separated by a single week. The GHD report asserts that the survey effort and timing is in accordance with the survey guidelines for the GGBF. However the DECC Environmental Impact Assessment (EIA) Guideline for the GGBF (NPWS 2003) actually states "*It is likely that several visits to a site will be required to detect the species (ideally each survey separated by 2-4 weeks)*". Similarly the GGBF EIA guidelines identify that a nearby reference point should be selected to determine GGBF activity as well as be undertaken during or immediately following suitable weather patterns. The GHD report further indicates that it relied on a verbal report from surveyors undertaking monitoring of the Sydney Olympic Park (SOP) GGBF population during February and weather information taken from the Bureau of Meteorology (BoM) site at Observatory Hill, nearer the coast.

Whilst none of these factors on their own mean that the surveys undertaken by GHD were lacking in rigor or were carried out during unsuitable conditions; together they may mean that the chances of finding the GGBF at Riverstone were reduced. The SOP site is some 26 km away and the Observatory Hill BoM site 38km away, from the Riverstone precinct study area where conditions and species activity may have been different. The intent of the DECC EIA guidelines is to maximise the likelihood of finding the GGBF because it is a species that can be difficult to detect when in low numbers and diffusely distributed. Notwithstanding the above, the EIA guidelines still do not guarantee detection. The GHD report contains some somewhat perfunctory general information about the GGBF that appears to be virtually verbatim from the species Recovery Plan (DEC 2005; GHD, 2008). The discussion and recommendations section deserves some merit as it provides useful suggestions that would assist the ongoing survival of the GGBF in the Riverstone precinct in the face of major development pressures on habitat and habitat quality that are likely to occur as a result of the wider NW Growth Centre land releases.

A survey and report was also commissioned by the NSW DECC to undertake surveys of historical GGBF sites in western Sydney where the species had been recorded (Jurd, 2008). This included sites identified in the NSW Wildlife Atlas comprising most of the western Sydney GGBF Key Population, as well as sites known to Lance Jurd but not previously entered into the Wildlife Atlas. Mr Jurd is a long time local resident of Riverstone, a frog enthusiast and maintains his residential allotment for the benefit of the GGBF (see Figure 7),

The DECC sponsored surveys failed to detect the GGBF at any of these former sites but documented the generally degraded or altered habitat condition at these sites. Most had factors that reduced the GGBF habitat quality including lack of fringing vegetation, presence of predatory fish (Gambusia, Carp and Eels), shading by emergent vegetation and lack of overwintering shelter or basking sites.

### 4.3 COMMUNITY SURVEY

The results of a community survey produced three unconfirmed observations of the GGBF in the study area and additional historic locality information from elsewhere in the precinct and NW Growth Centre. Another possible record from Cranbourne Street (off Clarke Street) was also reported but was considered likely to be a misidentification.

This information is presented in Table 3 below.

**Table 3 Results of Community Survey**

Date	Observer	Location	Easting	Northing
2008	Principal St Johns Primary School	Nunnery, released near school boundary	302572	6271712
2008	Principal St Johns Primary School	Playground, released near school boundary	302569	6271632
2007	Principal Riverstone HS	Girls toilets Riverstone HS; released at the back of the school.	302974	6271130
2009	Resident*	Cranbourne Street, off Clarke Street	303802	6271121
1974	Lance Jurd	Riverstone Meat works	301360	6271574
1975	Lance Jurd	2nd Ponds Creek	306495	6268569
1975	Lance Jurd	2nd Ponds Creek	305855	6268361
1975	Lance Jurd	2nd Ponds Creek	306414	6268034
2008	Lance Jurd	Residential record Wellington Street	301717	6272635
1976	Lance Jurd	Chain of Ponds Creek	301262	6275410
1976	Lance Jurd	Chain of Ponds Creek	301514	6275291
1977	Lance Jurd	Bush Rd near Long Swamp Maraylya	308716	6280885

\* likely misidentification

### 4.4 SITE DESCRIPTION

#### 4.4.1 Site characteristics

The study area is approximately 76 ha in area and is bound by the streets indicated in Section 2 and depicted in Figure 4 above. The site was searched for various habitat components and areas, that had obvious breeding, foraging, and shelter attributes, were plotted using a GPS and mapped in a GIS see Figure 5 below.

The site slopes generally in a south west to the north east direction towards First Ponds Creek. A heavily modified lateral creek traverses the centre of the study area in the same direction. First Ponds Creek is also heavily modified with ponded areas, diversions to dams and other bunding and earth



works associated with it. Most of the study site is cleared of much of the natural vegetation and has been used for various small scale agricultural activities including nursery, market gardens, dog kennels, stock grazing, agistment as well as dwelling houses. The upper most section of the study area is occupied by Riverstone High School and the Norwest Christian College, both fronting McCulloch Street.



**Figure 5 Habitat areas of the GGBF mapped within the study area.**

#### 4.4.2 Vegetation Assessment

Vegetation across the site is primarily cleared grassland of predominantly introduced grasses and weed species but some areas still retain patches of native grasses. Some sections of First Ponds Creek maintain small stands of *Casuarina glauca* as a simple riparian zone while a few upslope areas have small patches of remnant *Eucalyptus tereticornis* indicative of a former cover of Cumberland Plain Woodland.

Freshwater wetland species predominated around the low lying depressions of the floodplain and bordering constructed dams and bunded areas. Species included *Typha ssp*, *Eleocharus sphaecelata*, *Juncus usitatus*, *Carex adpressa*, *Cyperus ssp* and *Triglochin procerum*.

These species are indicators of periodic or more permanent inundation and provide elements of the required foraging, shelter and basking habitat as well as complementing the ephemeral and permanent water bodies that provide breeding habitat for the species in the study area.

#### 4.4.3 Drainage Assessment

The main drainage line traversing the study area is a section of First Ponds Creek. The creek meanders more or less in a NNW direction parallel to Chain of Ponds Creek and Eastern Creek towards its confluence with South Creek and then the Hawkesbury River.

Parts of the study area, sections of the precinct and the broader Growth Centre adjacent to the creeks are identified as flood prone. These areas are likely to have restricted development potential. Similarly riparian zones along the creeks will likely be retained and rehabilitated as part of the overall precinct conservation strategy and to conform with aspects of the WM Act.

These areas are all likely to contain elements of suitable GGBF habitat. They also provide a connectivity network throughout the Growth Centre as well as opportunities for GGBF habitat creation and enhancement initiatives. Much of the identified habitat areas within the study area are contained within the 1% AEP level indicated land or adjacent to it.

Figure 6 depicts the drainage of the study area and its surrounds and also indicates the 1% AEP flood liable land and riparian buffers.

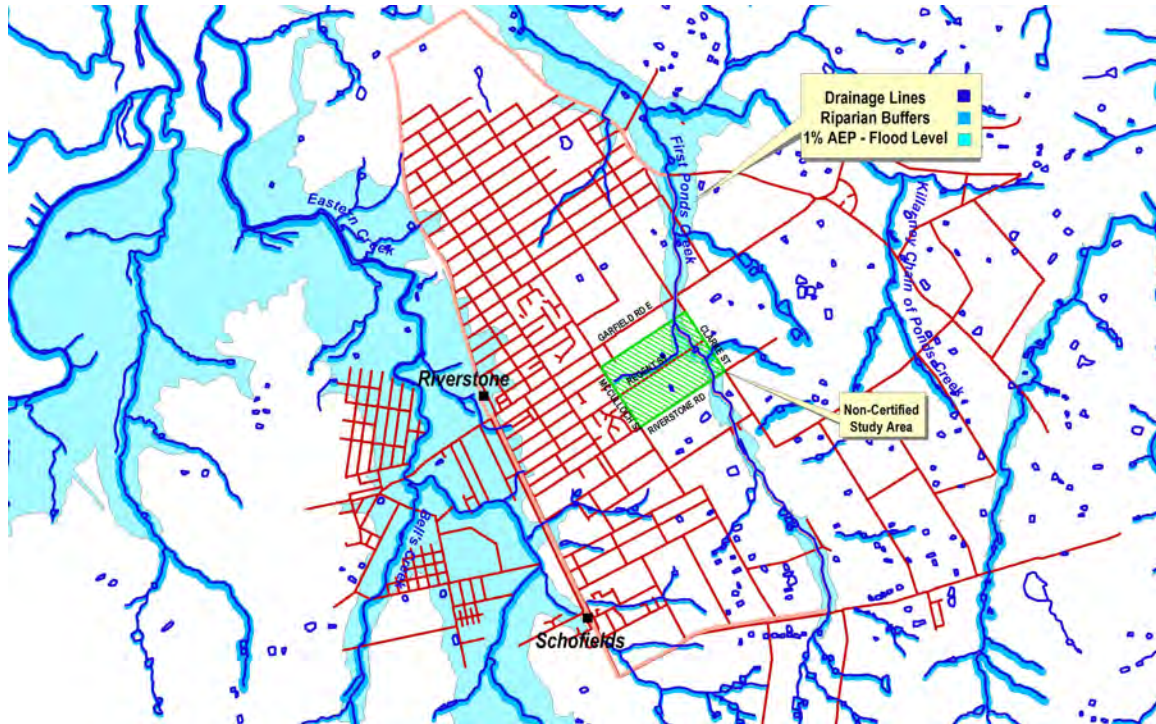


Figure 6 Flood liable and riparian buffer zones in the locality



Figure 7 No. 48 Oxford Street Riverstone

#### 4.4.4 Reference Site

The private residence of Mr Lance Jurd is located at 48 Oxford Street Riverstone. It is approximately 700 metres in a straight line distance from the study area, at its closest point, and approximately 1200 metres in a straight line distance from the main areas of habitat surveyed within the study area. It was considered that the semi-wild population of the GGBF at this residence would be likely to provide an indication of cues that were the same or similar to that which were being experienced by other wild specimens of the target species elsewhere at Riverstone. No other closer reference populations are known.

Mr Jurd's 48 Oxford Street residence is situated in an average residential area; however the front and back yard have approximately 10 water filled ponds of various sizes and styles randomly positioned throughout. The garden area is overgrown with long Kikuya grass that surrounds the ponds. An aviary area also contains a pond and has a funnel trap set up in the roof to attract and collect insects as supplementary food for the large GGBF population that is located there. The ponds were observed to contain many thousands of tadpoles at various stages of development including many at or near metamorphosis. Adult, juvenile and metamorphing frogs were also observed to be present surrounding and in the ponds as well as throughout the elongated vegetation covering the garden area.



Figure 8 Recently metamorphosed GGBF juveniles and breeding pond at Oxford Street Riverstone

#### 4.5 FROG SURVEY RESULTS

Climatic parameters were considered to be identical between the reference site and the study area and surveys were undertaken during or immediately following ideal conditions when diurnal temperatures and humidity were high and, where possible, when thunderstorms were threatening. Rain fell during the first survey period, in the same week but prior to the second survey period and immediately following the third survey period of this study.

Climatic data recorded for the meteorological site at Richmond (approximately 10 km from the study area in western Sydney) are provided in Table 4 below.

**Table 4 Prevailing Climatic Data**

Date	Temp <sup>o</sup> C	Rainfall mm	Relative Humidity %	Details
16 <sup>th</sup> December 2008	28.8		76	34 mm of rain fell on previous 2 days
17 <sup>th</sup> December 2008	29.7		70	heavy cloud cover during evening survey
16 <sup>th</sup> January 2009	34.9	4	72	heavy cloud cover during evening survey
22 <sup>nd</sup> January 2009	32.8	1.8	65	
20 <sup>th</sup> February 2009	32.4	5	45	
21 <sup>st</sup> February 2009	26.8	2	87	Heavy cloud cover during evening survey

Table 5 below shows the composite survey results of frogs detected by all methods. Sites are as indicated in Figure 9 below.

Two juvenile GGBFs were detected amongst Kikuyu on the margins of the Cumbungi covered ephemeral breeding area near Site 3 during the third survey period and another probable but unconfirmed sighting near Site 2 during the first survey period.

**Table 5 Frog Survey Results**

Common Name	Scientific Name	Status	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Brown Toadlet	<i>Crinia signifera</i> #	P	X		X	X	X	X
	<i>Uperoleia laevigata</i> #	P						
Brown-striped Marsh Frog	<i>Limnodynastes peronii</i> #	P	X	X		X	X	X
Spotted Marsh Frog	<i>Limnodynastes tasmaniensis</i> #	P				X	X	X
Green and Golden Bell Frog	<i>Litoria aurea</i>	E		X?	X			
Dwarf Green Tree Frog	<i>Litoria fallax</i> #	P	X			X	X	X
Brown Tree Frog	<i>Litoria peronii</i> #	P				X	X	X
Whistling Grass Frog	<i>Litoria verreauxii</i>	P				X	X	X

Some species were also observed opportunistically at other non survey sites and are indicated by #; ? = probable but unconfirmed sighting; P = protected; E = Endangered



Figure 9 Frog Survey Sites

## 5 Discussion

Surveys for the Green and Golden Bell Frog within the non-certified area revealed that substantial areas of various habitat for the species still exist within this deferred area. However substantial areas of similar habitat also exist elsewhere within the Riverstone precinct and the wider North West Growth Centre.

Much of the habitat that remains is located within the vicinity of First Ponds Creek, adjacent to farm dams and associated with other drainage features on the creek flood plain. Habitat consists of the predominantly cumbungi lined and pooled sections of the creek itself and around the similarly vegetated flood plain features that retain water after heavy rain and following flooding events. These features include ox-bows, overflow depressions and swales that are likely filled during heavy flow events. Some of the floodplain features have been created or modified by human activities. Modified/created features that provide habitat include farm dams, diversion channels, and other bunded areas.

The obvious habitat features forming breeding, shelter and high quality foraging habitat within the study area were mapped during the targeted surveys (Figure 5). However similar habitat features were observed to occur along much of the flood prone areas of other parts of the precinct.

Competing hypotheses exist to explain the apparent shift of GGBF from occupying permanent water bodies as breeding habitat to more ephemeral breeding locations. One hypothesis is that GGBF prefer early successional stages of ponds for breeding when they have just formed or refilled after an extended dry period. Other hypotheses relate to the presence of introduced predatory fish and/or the arrival of frog chytrid carried by vector animals and then the permanent water bodies developing an infective load that persists unless drying or other factors eliminate the pathogen (or fish) eg in the case of frog chytrid, salinity fluctuations. Some evidence is available to support both contentions (Pyke and White, 1999; DECC 2005) but whether it is a one of these factors or a combination there is clearly an active GGBF avoidance of large permanent water bodies for breeding today when compared to historical observations (DECC 2005).

Both types of habitat occur in the study area and these issues should be considered when deciding which areas should be conserved and/or how habitat is managed or constructed in any outcomes of the development decisions for the precinct.

Investigations of how the non-certified area was selected for targeted survey revealed that the selection of the area to be deferred from biocertification was somewhat arbitrary and based on allocating a buffered area to surround the most recent GGBF record at Riverstone. Consequently this has likely skewed the analysis away from other possible/probably habitat areas that may also be utilised by the GGBF from time to time. Nevertheless the selected area does contain significant GGBF habitat and the GGBF was detected in the study area.

Unconfirmed observations of GGBF have also been reported in local schools within the study area for some time and from other residents in the surrounding area. This is not unexpected, given the high densities of GGBF being produced and emanating out from the local residential property in Oxford Street and well within the species regular movement range.

The specimens observed during this study were juveniles but no evidence of functional breeding habitat was found in the study area during the survey period. Most of the likely breeding habitat was either dry leading up to and during the survey period or otherwise heavily infested with *Gambusia* and Carp that render it less suitable for breeding. No tadpoles were detected in the permanent water bodies. The bunded swale area where the juveniles were detected appears to receive overland and partially channelled flow after rain. After a heavy rain event, or a series of smaller ones, this area would collect and hold water for some time. This functionality became apparent during the surveys when the initially dry swale area became wet when the area received a short episode of heavy rain in the period leading up to the third survey visit. This area, when filled by more substantial inflows, would become an ideal area of ephemeral breeding habitat, free (at least initially) of *Gambusia* and likely to retain water for a suitable period for breeding. This area should be rated the most important area of habitat in the study area. The conditions that would make this site an ideal ephemeral breeding site did not eventuate during the study period. This was despite the extended survey period being designed to maximise the likelihood of surveys corresponding with favourable conditions for detection ie during or extending across breeding events that make the species most obvious (aggregated and calling).

Nevertheless it is considered likely that the detected specimens of GGBF, in particular juveniles, are a consequence of dispersal from the nearby residential property in Oxford Street rather than on site breeding.

GGBF metamorphlings and juveniles are known to vacate breeding areas because of cannibalism (DEC, 2005). This fact, coupled with the observed high density of juveniles and metamorphlings at nearby Oxford Street and the noted recent instances of cannibalism (L. Jurd pers. comm.), as well as further reports of recent frog sightings from neighbouring residences and the closely located schools is further evidence to support this.

Green and Golden Bell Frogs were once widespread and abundant in the Riverstone area and were regularly detected throughout the First Ponds and Chain of Ponds Creek drainages (R. Wells pers. comm. L. Jurd. pers. comm.). Other historical records for the area are also known to exist but are currently unavailable. These observations are from the late 1960s and early 1970s when the then President of the Australian Herpetological Society Geoff Manning resided in Clarke Street, Riverstone and society meetings were regularly held at his residence (Wells, 2009).

The current colony that persists in Oxford Street Riverstone originated from the Riverstone locality when it was encouraged to establish on the residential allotment during the late 1970s and early 1980s (L. Jurd pers. comm.). This flourishing colony is being considered as the founding source for a possible reintroduction into Scheyville National Park where it was previously known from near Long Neck Lagoon (Ann Goeth pers. comm.; Wellington and Wells 1991).

## 6 Conclusion and Recommendations

Good quality Green and Golden Bell Frog habitat continues to exist in the study area, however similar habitat also exists over an extensive area of the Riverstone precinct outside the 'non-certified' area as well as within other precincts of the North West Growth Centre and beyond.

Observations of the GGBF within the vicinity of the Riverstone High School appear to have triggered a conservative consideration by the DECC when the Growth Centres SEPP Biocertification application was being considered. The area depicted as non-certified in the BCO maps was arrived at by a decision to protect and buffer likely habitat surrounding a specimen record.

The Wells Wildlife Atlas record for 2000 (Table 2), appears to have been the basis for the BCO Condition 18, and ultimately this report, and was apparently triggered by a communication made at a Hawkesbury Herpetological Society meeting at Richmond where a record of the GGBF was reported as having been recently found in the playground at the back of Riverstone HS (R. Wells pers. comm.).

A residual population of the GGBF still persists in the Riverstone precinct but is possibly only sustained by the persistence of a 'hotspot' population element in a private residence nearby. This is most likely emulating what happens at other 'more natural' locations and fits the 'metapopulation' model of expansion during favourable conditions and contraction to important hot spot areas that operate as refugia during less favourable episodes (DEC 2005).

The private residence at 48 Oxford Street Riverstone maintains a large population of the GGBF in a semi captive situation but where GGBF are able to escape from and return to the residential property. This residential population is large and demonstrates regular breeding events and recruitment (L. Jurd pers. comm.). The population was originally founded on specimens collected at another site in Riverstone during the 1970s (vicinity of the Riverstone meat works L. Jurd pers. comm.). This resident should be encouraged to maintain the colony and supported in other initiatives that may arise out of the recovery program for the species in western Sydney.

Observations of possible sightings at two of the local schools could not be confirmed but were potential sightings. A number of identification posters were distributed to all the schools in the area to assist with possible identification and reporting. This illustrates the importance and potential for further community education awareness and engagement initiatives that would likely assist the species survive locally. A wider circulation of these brochures and promotion to encourage community engagement would likely result in wider reporting of GGBF observations in the area.

Detection of a possible GGBF juvenile and a subsequent observation of two confirmed juvenile specimens in the same area of the study site shows that the areas mapped as GGBF habitat were well founded.

Conditions during the study period were such that no suitable breeding habitat was detected during the three visitations to the subject land. Areas that contained permanent water such as farm dams and suitable fringing habitat would be ideal foraging habitat but appear less suitable than ephemeral locations as breeding habitat.



This is likely due to a combination of factors that include introduced predatory fish and persistence of frog chytrid disease pathogens.

There is also permanent water along First Ponds Creek in pooled sections along this reach of the creek where it traverses the study area. Some of these pooled sections have habitat value but were also observed to have a high level of infestation of *Gambusia* and Carp along with a significant population of eels. Whilst none of these renders the habitat unusable by the GGBF, the likelihood is that breeding efforts in these sites would be severely curtailed by predatory threats on eggs and larvae as well as possible chytrid infection that appears to prevail in permanent water bodies.

The area with greatest potential for being good ephemeral breeding habitat is the large 'L' shaped patch of Cumbungi that covers a drainage depression bounded by earthworks (Sites 2 and 3). This vegetation patch is located on the north west side of the end of Regent Street (south).

The presence of juveniles in what appears to be the best quality habitat area, and where pests/threats are absent, could be explained by dispersal from the known breeding habitat area at Oxford Street or from another breeding site outside the study area and not detected. The former is considered more likely given observed predation pressures to disperse from that site.

This colony should be utilised to assist the founding or supplementing of other component/satellite elements of the western Sydney GGBF key population (eg those reintroductions previously proposed for Long Neck Lagoon/Scheyville NP and Penrith Lakes, Ann Goeth pers. comm.; Sandy Booth pers. comm.), and perhaps elsewhere in the North West Growth Centre.

This project has confirmed the presence of the GGBF in the study area and mapped the important GGBF habitat elements present. Management of some, or all, of this habitat would be relatively easy to achieve and is recommended although other more strategic approaches may be a preferred outcome. Creation of alternative habitat in the study area may be another option to accommodate intended development for the area. Such an option would however be likely to require habitat performance criteria on created habitat prior to removal of existing habitat to be consistent with other conditions imposed by DECC at other GGBF sites with likely development impacts (eg Woonona, Edgewood Village Building Co site; Kurnell, Australands site; Arncliffe M5 RTA site; and Greenacre, Hannas site). However as is concluded here that the GGBF appear to be merely occupying habitat in the study area after dispersal rather than completing the reproductive stages of their life cycle in situ, the DECC may decide to adopt a less onerous performance criterion than at some of these other sites?

Ideally any retained and/or created habitat would include habitat enrichment, supplementation and remediation actions as well as the maintenance of connectivity as indicated in *Best Practice Guidelines Green and Golden Bell Frog Habitat* (DECC, 2008). These Guidelines provide specific advice regarding habitat components required by the species and how these may be provided or enhanced to satisfy its various life cycle stages.

However the identification of extensive areas of other habitat outside the study area in the precinct and wider Growth Centre coupled with the knowledge of other GGBF satellite populations suggest that a strategic approach to conserving and linking these would be preferable to undertaking extensive habitat creation and remediation provisions restricted to one site within the Precinct to satisfy the BCO.

Consequently it is recommended that the GCC discuss this issue with the DECC to perhaps broaden the scope of habitat creation and maintenance works and perhaps synchronise some of these with other initiatives and actions that are likely to arise or be required under waterfront land management strategies under the WM Act and as part of WSUD principles forming part of drainage and flood

mitigation requirements. It is understood that Creek and riparian zones are to be kept as part of the precinct plan, and rehabilitated as Category 2 streams – this will contribute some habitat values and connectivity to other areas and further opportunities may arise to integrate DECC 2008 Guidelines with these other requirements under other legislation.

Other wet and periodically dry (ephemeral) habitats could also be recreated in association with drainage works and possibly provide higher quality habitat that is more appropriately located?

Nevertheless, in order to satisfy the requirements of the BCO the following matters will still need to be addressed and negotiated as to the detail of extent of such things as:

- how the demarcation of the identified habitat is to be achieved because various habitat areas interconnect with others and some habitat is likely better quality than other habitat but the full extent of its utilisation by the species is still not understood;
- what level of management/maintenance/monitoring might be required and for what duration;
- whether there will be a requirement for provision of other habitat elements within the study area and whether performance criteria will or won't be imposed;
- whether any areas of habitat outside the study area will require conservation and management and how many and to what extent is reasonable.

These are all somewhat open ended matters and available for interpretation as to the detail and scope, both missing from the BCO, in how certification is to be met once the specific surveys and mapping of GGBF habitat have been completed.

The GGBF Recovery Plan and PAS identifies the Riverstone population is an element of the western Sydney GGBF Key Population that requires strategic management across much of the Blacktown and surrounding LGAs eg Penrith.

A GGBF Key Population Management Plan for the western Sydney Key Population would satisfy the DECCs recovery planning requirements for MPs in the Sydney region and would, if implemented, likely achieve a more coordinated and strategic GGBF conservation outcome in western Sydney that includes the North West Growth Centre and Riverstone precinct.

The preparation of such Management Plans in other areas has generally been a very productive exercise that fosters collaboration across land owner/managers and spreads responsibility for the conservation of the GGBF more widely. However the responsible agency for undertaking preparation of such a management plan is the DECC and so is beyond being considered as a responsibility for the GCC. Previously the Hawkesbury Nepean Catchment Management Authority (HNCMA) has funded other such GGBF Key Population Management Plans using Commonwealth allocated CMA investment funds.

From a purely GGBF conservation outcome driven perspective, it is therefore recommended that the GCC enters into discussions with the DECC in relation to its meeting the requirements of BCO Condition 18 and in gaining Biocertification of the outstanding non-certified section of the Riverstone Precinct. Other opportunities or options for the DECC to consider regarding the BCO requirements and perhaps with potential for them to vary from the original specific intent should be discussed with the view to achieve a more strategic conservation outcome. The scope of such an approach would need to be agreed to by both the DECC and the GCC.

It is here further recommended for consideration that the existing high quality habitat areas within the study area, identified herein, be set aside from any proposed development footprint ('L' shaped area mapped and depicted in Figures 5 and 9 and the ill-defined overland flow path connecting the habitat area downstream) and that habitat enhancement initiatives be employed to improve the extent of the various habitat components present in this habitat element in this locality in accord with DECC 2008.

That other sites be identified for establishment as additional habitat 'nodes', via a rapid assessment process, and the areas so identified be similarly set aside and enhanced. The number and precise location of such nodes should be a matter for discussion and agreement between the GCC and the DECC and informed by the rapid assessment. It may be possible for a component of funding for such matters to come from the Growth Centres Conservation Fund to be established as part of BCO Conditions 20 and 21 (Appendix A).

That DECC, the GCC and perhaps the HNCMA enter into discussions with respect to catalysing the development of a GGBF Key Population Management Plan in accordance with the GGBF Recovery Plan. It may also be possible to integrate this with other initiatives including DECCs proposed reintroduction of GGBF at Scheyville/Long Neck Lagoon and/or through industry partners like Penrith Lakes Development Corporation who have previously expressed an interest in undertaking similar GGBF habitat creation and GGBF reintroductions at their site which also forms another component of the western Sydney GGBF Key Population.

That the process of preparing such a GGBF Key Population Management Plan be through a facilitated, consultative process that engages with key stakeholders and the community. GCC participation in such a strategic approach and adopting a wider scope and identify other opportunities for the conservation of the western Sydney GGBF population would not only be preferable to the securing of a small area of habitat in one locality, but would also be seen as a highly visible and meaningful effort by the GCC to conserve an important population of a high profile threatened species.

# References

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Pyke, G. H. and White, A. W. (1999) Dynamics of co-occurring frog species in three ponds utilised by the endangered Green and Golden Bell Frog *Litoria aurea*. Aust. Zool. 31(4): 563-598

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# Appendix A: Biodiversity Conservation Order

## **Gazetted Bio-certification Order - Condition 18**

The Minister, under advice from the DECC, has specified within the bio-certification order matters that are required to be satisfied.

The relevant sections of the bio-certification order gazetted 11<sup>th</sup> December 2007 are provided below.

### **THREATENED SPECIES CONSERVATION ACT 1995**

*Order to confer biodiversity certification on the State Environmental Planning Policy (Sydney Region Growth Centres) 2006*

*I, Verity Firth, Minister Assisting the Minister for Climate Change, Environment and Water (Environment), do by this order confer biodiversity certification on the State Environmental Planning Policy (Sydney Region Growth Centres) 2006 (the SEPP) for the purposes of the Threatened Species Conservation Act 1995 (the Act).*

*I am satisfied that the SEPP, and other relevant measures, will lead to the overall improvement or maintenance of biodiversity values.*

*Pursuant to section 126H of the Act, the biodiversity certification of the SEPP is subject to the conditions listed in Schedules 1, 2, 3 and 4 below. The conditions are necessary to ensure that the SEPP and other relevant measures will lead to the overall improvement or maintenance of biodiversity values, including the limiting of certification to specified lands, procedures for the allocation of conservation funding for offsets, and mechanisms for the on-going review of progress in delivering offsets.*

*This order is made under section 126G (1) of the Act.*

*This order is to take effect on and from the date of its publication in the Government Gazette.*

*Pursuant to section 126J of the Act, biodiversity certification of the SEPP shall remain in force from the date the biodiversity certification order takes effect until 30 June 2025.*

**VERITY FIRTH, M.P.,**

**Minister Assisting the Minister for Climate Change, Environment and Water (Environment)**

**Signed at Sydney, this 11th day of December 2007.**

### **Conditions**

*Additional conservation actions within the Growth Centres – animals*

*18. During or before the preparation of the relevant precinct plan(s) under the Growth Centres Development Code relating to the area referred to in the table below, the following actions must be undertaken:*

*Species Required action - Green and Golden Bell Frog Potential population at Riverstone - as shown in black hatching on the biodiversity certification maps:*

*Option 1*

- *survey to confirm the presence of the species, and*
- *if the species is present, provide protection of the area of suitable habitat for the species to the satisfaction of the DECC.*

*Option 2*

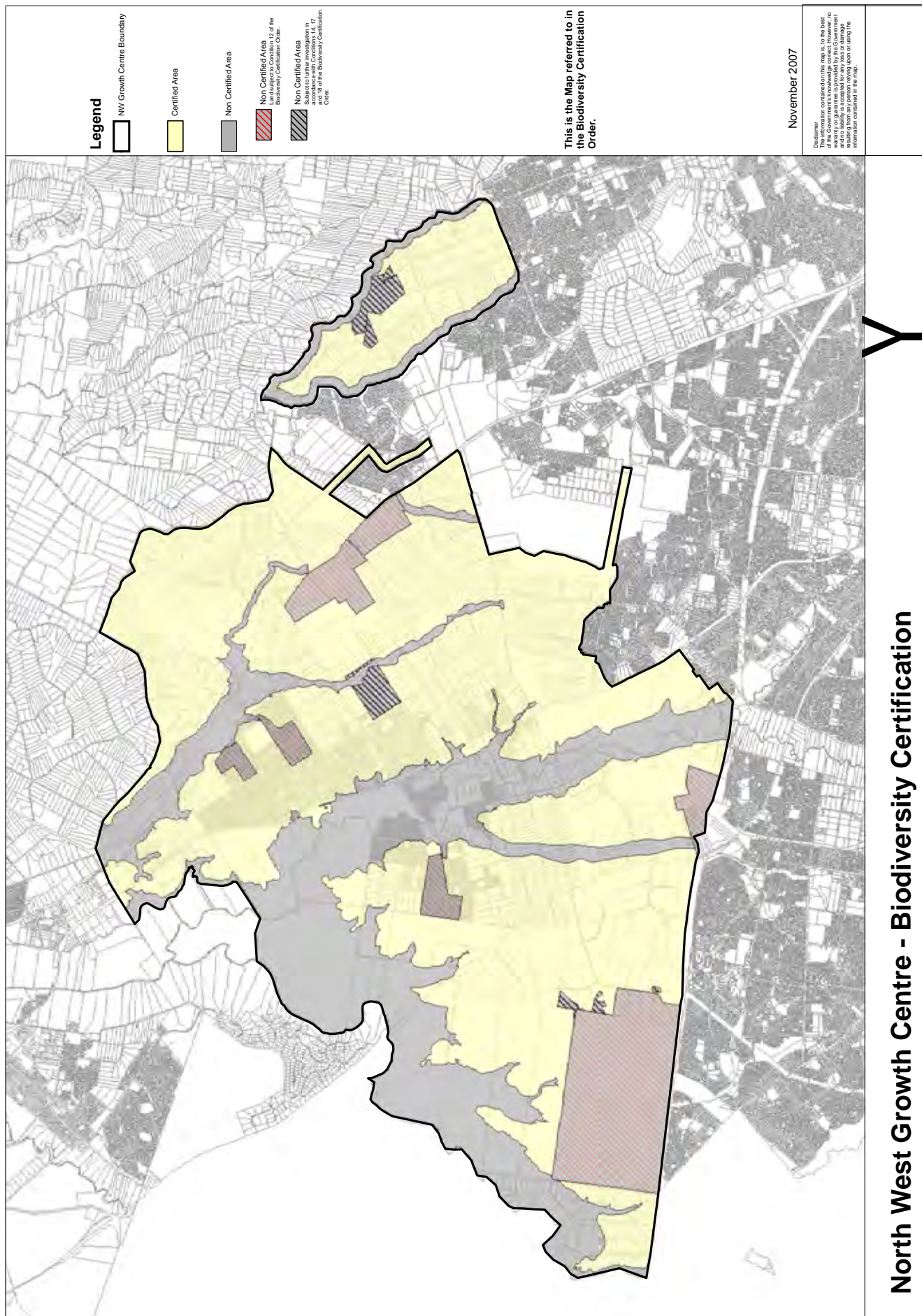
- *if the species is present at Riverstone but cannot be adequately protected to the satisfaction of the DECC, then:*
  - (a) undertake targeted survey to confirm the presence of the species elsewhere in the Growth Centres, and*
  - (b) if the species is present elsewhere in the Growth Centres, provide for the protection of an area(s) of suitable habitat for the species to the satisfaction of the DECC.*

*Note: On completion of the above actions the Minister may decide that it is appropriate to amend the boundaries of the area subject to biodiversity certification, in accordance with condition 3.*

**Conservation Fund**

*20. For the purposes of the conditions of biodiversity certification, references to dollar values are taken to be 2005/2006 values. All values shall be indexed in accordance with the "land index" to be published by the GCC, as detailed in the Special Infrastructure Contribution Practice Note.*

*21. Over the life of the development of the Growth Centres funding shall be provided to establish a Conservation Fund of at least \$530 million to be used for biodiversity conservation and regional open space purposes. \$397.5 million of the Conservation Fund is planned to be used to acquire lands and/or enter into conservation agreements over lands that are outside of the Growth Centres for the primary purpose of biodiversity conservation.*





**HEAD OFFICE**

Suite 4, Level 1  
2-4 Merton Street  
Sutherland NSW  
T 02 8536 8600  
F 02 9542 5622

**SYDNEY**

Suite 604, Level 6  
267 Castlereagh Street  
Sydney NSW 2000  
T 02 9993 0566  
F 02 9993 0573

**ST GEORGES BASIN**

8/128 Island Point Road  
St Georges Basin NSW 2540  
T 02 4443 5555  
F 02 4443 6655

**CANBERRA**

Level 4  
11 London Circuit  
Canberra ACT 2601  
T 02 6103 0145  
F 02 6103 0148

**HUNTER**

Suite 17, Level 4  
19 Bolton Street  
Newcastle NSW 2300  
T 02 4910 0125  
F 02 4910 0126

**NAROOMA**

5/20 Cauty Street  
Narooma NSW 2546  
T 02 4476 1151  
F 02 4476 1161

**COFFS HARBOUR**

35 Orlando Street  
Coffs Harbour Jetty NSW 2450  
T 02 6651 5484  
F 02 6651 6890

**ARMIDALE**

92 Taylor Street  
Armidale NSW 2350  
T 02 8081 2681  
F 02 6772 1279

**BRISBANE**

93 Boundary St  
West End QLD 4101  
T 0429 494 886

**WESTERN AUSTRALIA**

108 Stirling Street  
Perth WA 6000  
T 08 9227 1070  
F 08 9227 1078



- 
- (3) Subclause (2) does not apply to the subdivision of land that has a frontage directly onto Loftus Street, Bandon Road or Windsor Road.

**6.9 Development on certain land identified as Green and Golden Bell Frog habitat**

- (1) The clause applies to land within the Riverstone Precinct that is shown as “Green and Golden Bell Frog habitat” on the Land Zoning Map.
- (2) The objectives of this clause are as follows:
- (a) to ensure that suitable habitat for the Green and Golden Bell Frog species is created on certain land to which this clause applies,
  - (b) to ensure that the biodiversity values of that habitat are protected and preserved,
  - (c) to ensure that appropriate measures are in place to minimise or prevent any adverse impacts of development on the species or its habitat by protecting land surrounding that habitat.
- (3) Consent must not be granted for any development on the land to which this clause applies that is within Zone SP2 Infrastructure and marked “Drainage” unless the consent authority is satisfied that the development is consistent with any recovery plan (within the meaning of the *Threatened Species Conservation Act 1995*) for the Green and Golden Bell Frog or, if no such plan has been prepared and approved under that Act, the draft recovery plan for that frog prepared by the Department of Environment and Conservation dated February 2005.
- (4) Consent must not be granted for development on land to which this clause applies unless the consent authority is satisfied that the development will not adversely affect the quality and condition of any habitat of the Green and Golden Bell Frog on the land to which this clause applies that is within Zone SP2 Infrastructure and marked “Drainage”.

**Schedule 1 Additional permitted uses**

(Clause 2.5)

**1 Multi dwelling housing in the Riverstone Precinct**

On land shown on the Land Zoning Map as “Low density residential (Multi dwelling housing)” —multi dwelling housing.

# State Environmental Planning Policy (Sydney Region Growth Centres) 2006

## North West Growth Centre Land Zoning Map sheet LZN\_004

### LEGEND

Zone	
B1	Neighbourhood Centre
B2	Local Centre
B4	Mixed Use
B7	Business Park
E2	Environmental Conservation
E3	Environmental Management
E4	Environmental Living
IN1	General Industrial
IN2	Light Industrial
R1	General Residential
R2	Low Density Residential
R3	Medium Density Residential
RE1	Public Recreation
RE2	Private Recreation
SP2	Infrastructure

### Special Provisions

- A Low Density Residential ( multi-dwelling housing ) - Appendix 4, clause 2.5
- B Riverstone Scheduled Lands - Appendix 4, clause 6.8
- C Green & Golden Bell Frog Habitat - Appendix 4, clause 6.9
- D Additional Uses - Appendix 3, Clause 6.5
- E Additional permitted uses. (Clause 13)

### Original SEPP Zones

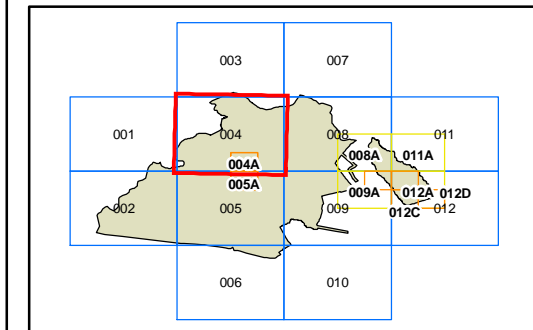
- Environmental Conservation
- Public Recreation - Regional

### Growth Centres Boundaries

- North West Growth Centre Boundary
- North West Growth Centre Precinct Boundary

### Cadastr

- Cadastre 02/12/08 © Blacktown City Council
- Cadastre 30/03/10 © Dept of Lands

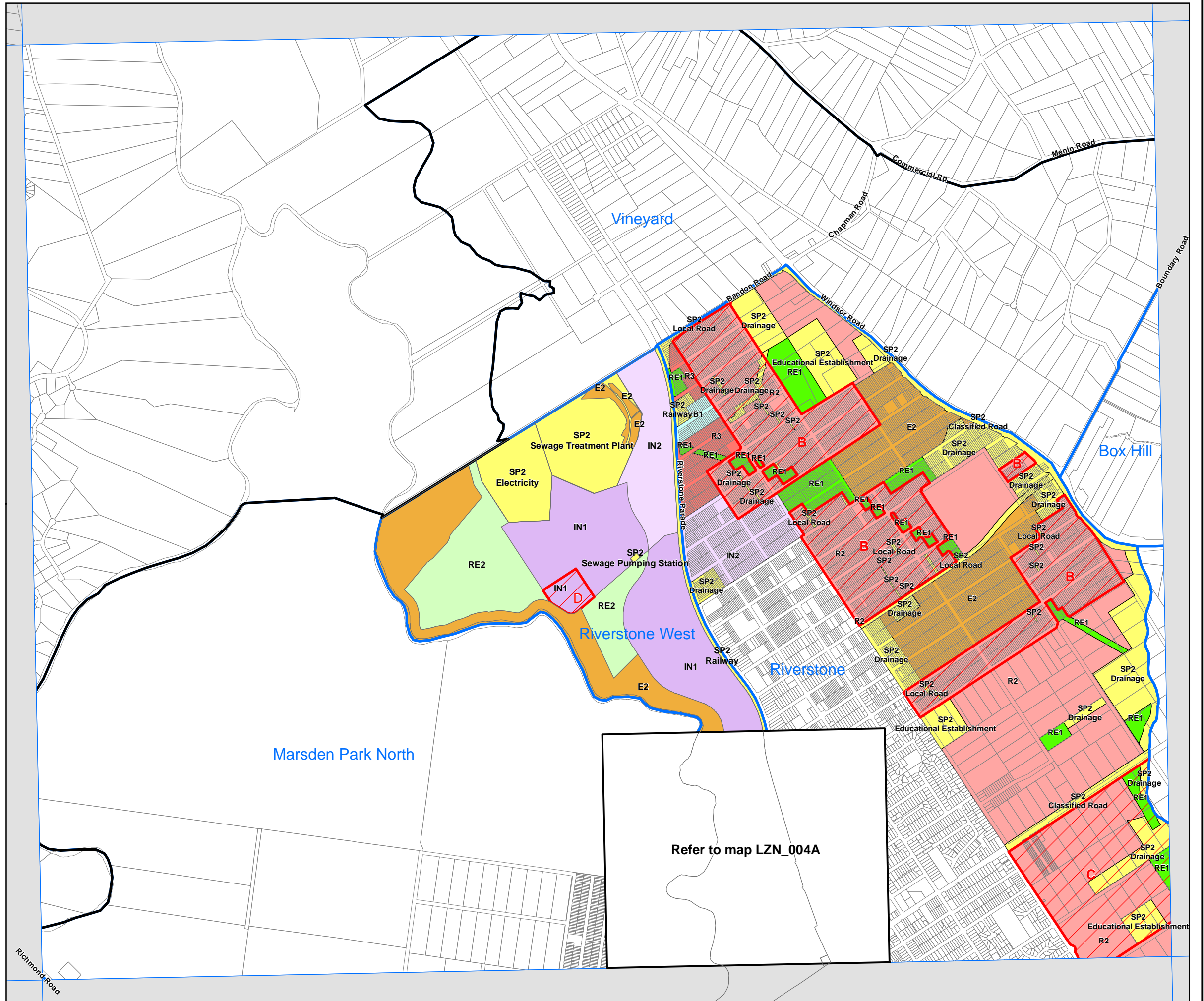


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Projection: GDA 1994  
Zone 56

Map Identification Number  
SEPP\_SRGC\_NW\_LZN\_004\_020\_20100415



Refer to map LZN\_004A

# State Environmental Planning Policy (Sydney Region Growth Centres) 2006

## North West Growth Centre Land Zoning Map sheet LZN\_008

### LEGEND

Zone	
B1	Neighbourhood Centre
B2	Local Centre
B4	Mixed Use
B7	Business Park
E2	Environmental Conservation
E3	Environmental Management
E4	Environmental Living
IN1	General Industrial
IN2	Light Industrial
R1	General Residential
R2	Low Density Residential
R3	Medium Density Residential
RE1	Public Recreation
RE2	Private Recreation
SP2	Infrastructure

### Special Provisions

A	Low Density Residential ( multi-dwelling housing ) - Appendix 4, clause 2.5
B	Riverstone Scheduled Lands - Appendix 4, clause 6.8
C	Green & Golden Bell Frog Habitat - Appendix 4, clause 6.9
D	Additional Uses - Appendix 3, Clause 6.5
E	Additional permitted uses. (Clause 13)

### Original SEPP Zones

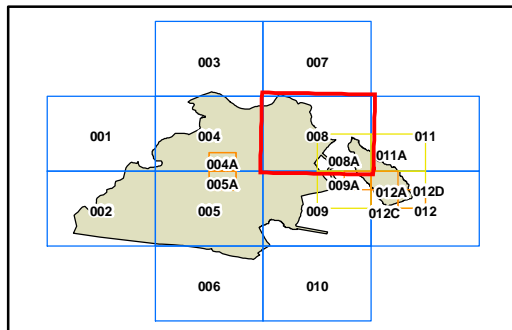
Light Green	Environmental Conservation
Dark Green	Public Recreation - Regional

### Growth Centres Boundaries

Black line	North West Growth Centre Boundary
Blue line	North West Growth Centre Precinct Boundary

### Cadastral

White box	Cadastral 30/03/10 © Dept of Lands
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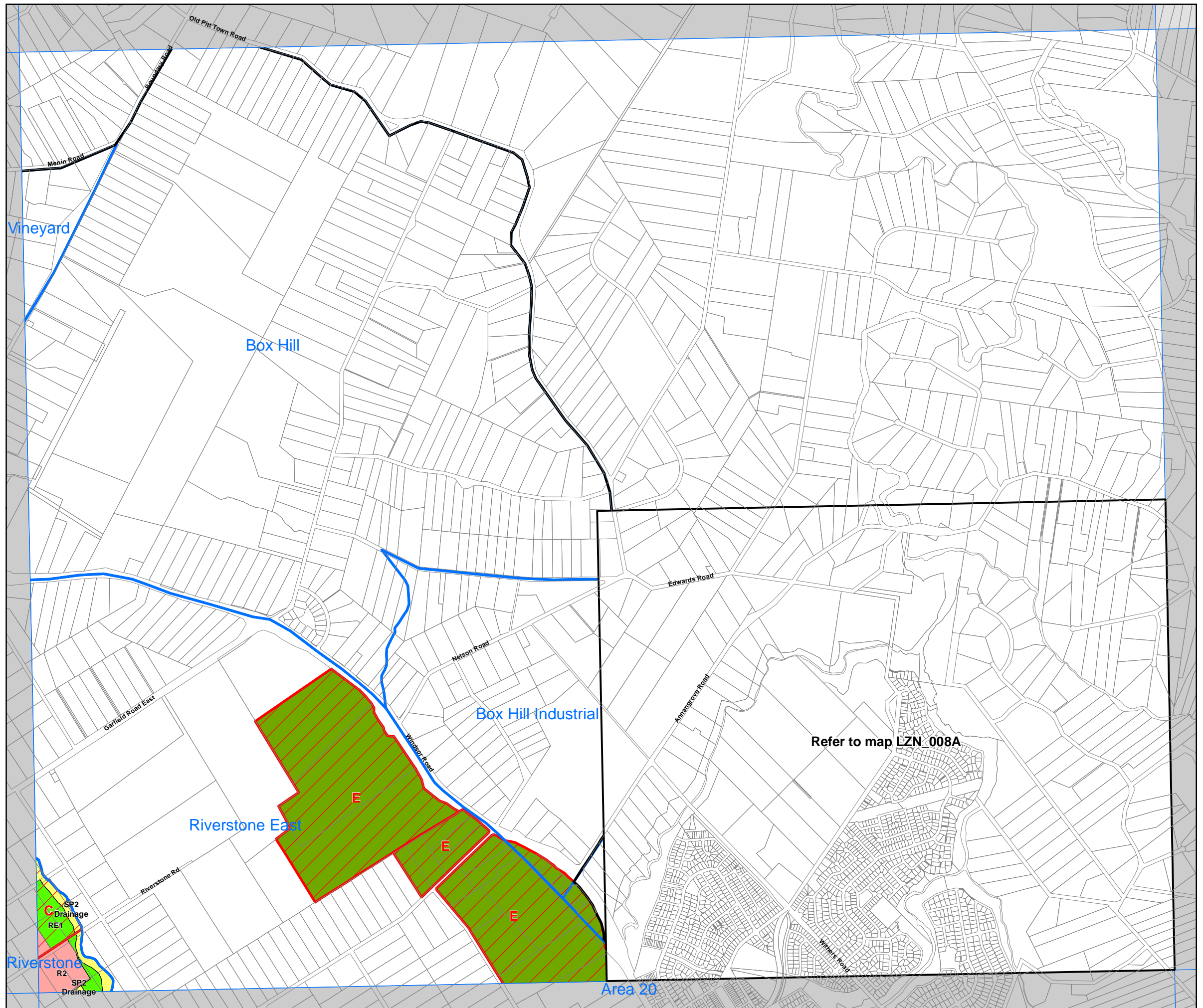


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Zone 56

Map Identification Number  
SEPP\_SRGC\_NW\_LZN\_008\_020\_20100415



Refer to map LZN\_008A