Friends of Pooh Corner

Web: www.poohcorner.info

Thursday 22 March 2018

To: Queensland Parliamentary Committee Members

Dear Committee members,

I write on behalf of Friends of Pooh Corner (FoPC). The following submission seeks to provide specific advice in relation to historic inadequacies of the "Category X classification on Property Map of Assessable Vegetations (PMAVs)" as this relates to the development of the *Vegetation Management and Other Legislation Amendment Bill 2018*. In addition, the failure of "Category X on PMAVs" to recognise the existence of individual high habitat old growth hollow bearing trees is also addressed.

This submission is based on a case study of real events that seeks to expose how the Category X classification masked the existence of endangered regional ecosystems and old growth hollow bearing trees. The case study relates to the planning approval process for an industrial park currently being built by Metoplex[1] at Wacol within the State electorate of Inala currently held by Premier Annastacia Palaszczuk.[2] As part of Metroplex's development approval about 50 ha of remnant bushland was destroyed, in around 2015 -2016. This includes the destruction of approximately 8 ha of endangered RE 12.5.3. The clearing also involved hundreds of significant old growth hollow bearing habitat trees being demolished.

In 2007 - 2008, a number of local grassroot environmental groups, including FoPC were parties to an appeal in the Planning and Environment Court, opposing attempts by the developer Metroplex to rezone the former Sanananda Military Barracks. The approximately 100ha site was purchased from the Commonwealth Government in 2005 for the purpose of building an industrial estate. Leading up to the trial the whole former Sanananda Military Barracks site was subsequently mapped as Category X. During the trial the local community environmental groups suggested independent flora and fauna experts visit the site.

[1] https://metroplexwestgate.com.au/masterplan/lot-availability/
[2] https://www.parliament.qld.gov.au/members/current/list/MemberDetails?ID=2980517905

Three flora experts in the appeal acknowledged the existence of significant endangered RE despite the *'category X – non-remnant classification'.* The following is an extract from their joint expert flora report written for the court (see attached joint flora report to this submission):

> 3.1.1 **Registration of PMAV for the site**. The experts agree that a Property Map of Assessable Vegetation (PMAV) has been registered for the site by the Department of Natural Resources and Water. The whole of the site is mapped as *'category X - non-remnant'*. Therefore the site is exempt from the provisions of the Vegetation Management Act 1999 (*as amended*).
>
> 3.1.2 **Existing Vegetation**. Notwithstanding the fact that the site is not currently mapped as containing remnant vegetation and has a registered PMAV showing category X – non remnant, it appeared to the experts that there may be some remnant vegetation present.

The flora experts agreed there was 15 ha of endangered RE 12.5.3 that was mapped and submitted to the Queensland herbarium. The Category X should have never been applied to the site without it first being checked. The Queensland herbarium subsequently accepted the changes and updated their maps to reflect the endanger RE at the site. See **attached Maps A1(2005) and A2(2008)**. Despite the Category X classification, the court took the flora experts advice and made the developer consider the existence of the endangered RE 12.5.3 as shown in **attached Map B**. The court required that there be off-site offsets to mitigate against the destruction of endangered RE 12.5.3 and that this requirement was later transferred into the subsequent development approval.

In their joint experts report to the court, the three fauna experts acknowledged that hundreds of old growth hollow bearing habit trees were a key feature of the site (see attached fauna report). From page 9:

> **Retention of Hollow-bearing Trees**
> The density and diversity of large hollow-bearing trees on the site is its most distinctive ecological feature. It is also notable that such fauna habitat resources are scarce elsewhere in the surrounding local landscape. Whilst hollow-bearing trees are widely distributed across the site, there are several stands or groupings of these trees which are considered to support comparatively higher value to fauna (by way of the combination of tree size and/or species diversity and/or important co-location of the stand with other fauna habitat values (e.g. riparian vegetation).

The Metroplex site was clearly not 'regeneration' or 'regrowth' but consisted of large number of old growth habitat trees, each hundreds of years old. Again, the category X classification was not appropriate. Again, the Planning and Environment Court determined that the developer was required to mitigate against the loss of hollow bearing trees as shown on **attached Map C**.

The fauna experts acknowledged in their report that old hollow bearing trees cannot simply be 'offset' by planting new trees, but take hundreds of years to grow and develop hollows.

Thus, the fauna experts sought to have at a minimum of at least half of the existing hollow bearing trees retained on the site. Although is not currently the case in Queensland, there is legal recognition of the critical habitat value of hollow bearing trees in other States. For example, in Victoria the *Flora and Fauna Guarantee Act* has listed as a threatening process. and prepared *Action Statement #192,* "*Loss of hollow bearing trees from Victorian native forests and woodlands*" (See attached listing). The role of hollows has been summarised in the *Action Statement* as:

> **Description and occurrence**
> Hollows that form in trees provide essential breeding and roosting spaces for many native wildlife species. Native Australian trees do not usually develop hollows suitable for use by vertebrates until they are very old. Large hollows, essential for some fauna, do not develop until trees are well over a hundred years old; the development of large hollows being a characteristic feature of tree senescence
>
> **Ecological role of hollows**
> Hollows are considered essential for 16 species of mammal and 44 species of bird in Victoria (Emison *et al.* 1987; Menkhorst 1984b, *pers. comm*.; Appendix 1), including 14 mammals and birds considered threatened in Victoria (NRE 2000). The Tree Goanna *Varanus varius* is also dependent upon hollows for shelter (Scotts 1991)

The Queensland State Government needs to, as a high priority, incorporate similar legal protection as part of the *Vegetation Management and Other Legislation Amendment Bill 2018* as a means to recognise the loss of hollow bearing trees, wherever they occur, and regardless of Category X.

In summary, this Metroplex case study shows that a simple application of Category X at the former Sananada Barracks site would have hidden significant nature conservation values. If it were not for the persistence of local environmental community groups, who elected to be party to the court proceedings, the values would have been ignored. Therefore the *Vegetation Management and Other Legislation Amendment Bill 2018* needs to include an independent review of each Category X categorisation to determine the existence of endangered ecosystems and/or hollow bearing trees on a site before land clearing can proceed. Allowance for hollow bearing tree recruitment from existing vegetation should also be considered.

However, the above submission represents a generous compromise that acknowledges governments must find a middle ground between various stakeholders. It is a compromise position and not FoPC's preferred option. FoPC is opposed to any forest destruction regardless of its age or endangered status. This view has very strong support in the broad community. A reference to the campaign to protect the 'Pooh Corner' bushland can make this point.

Pooh Corner was also former defence land in Wacol, within the Inala electorate, that was also for sale in April 2005 concurrently with the former Sanananda barracks. Pooh Corner was predominantly endangered RE 12.5.2 bushland that was also being marketed for conversion into an industrial estate by the Federal Government[3]. In a two week public campaign FoPC succeeded in protecting this site by encouraging the Federal Government to effectively gift Pooh Corner to the Brisbane City Council for a nominal fee of only $1. This concessional acquisition saved the council spending up to between $22 and $50 million buying the land. It is now a popular nature conservation reserve, which is well managed by the Brisbane City Council. Our experience tells us that opposition to land clearing is a highly salient issue across the broader community.

In good faith
Simon Birrell
Friends of Pooh Corner

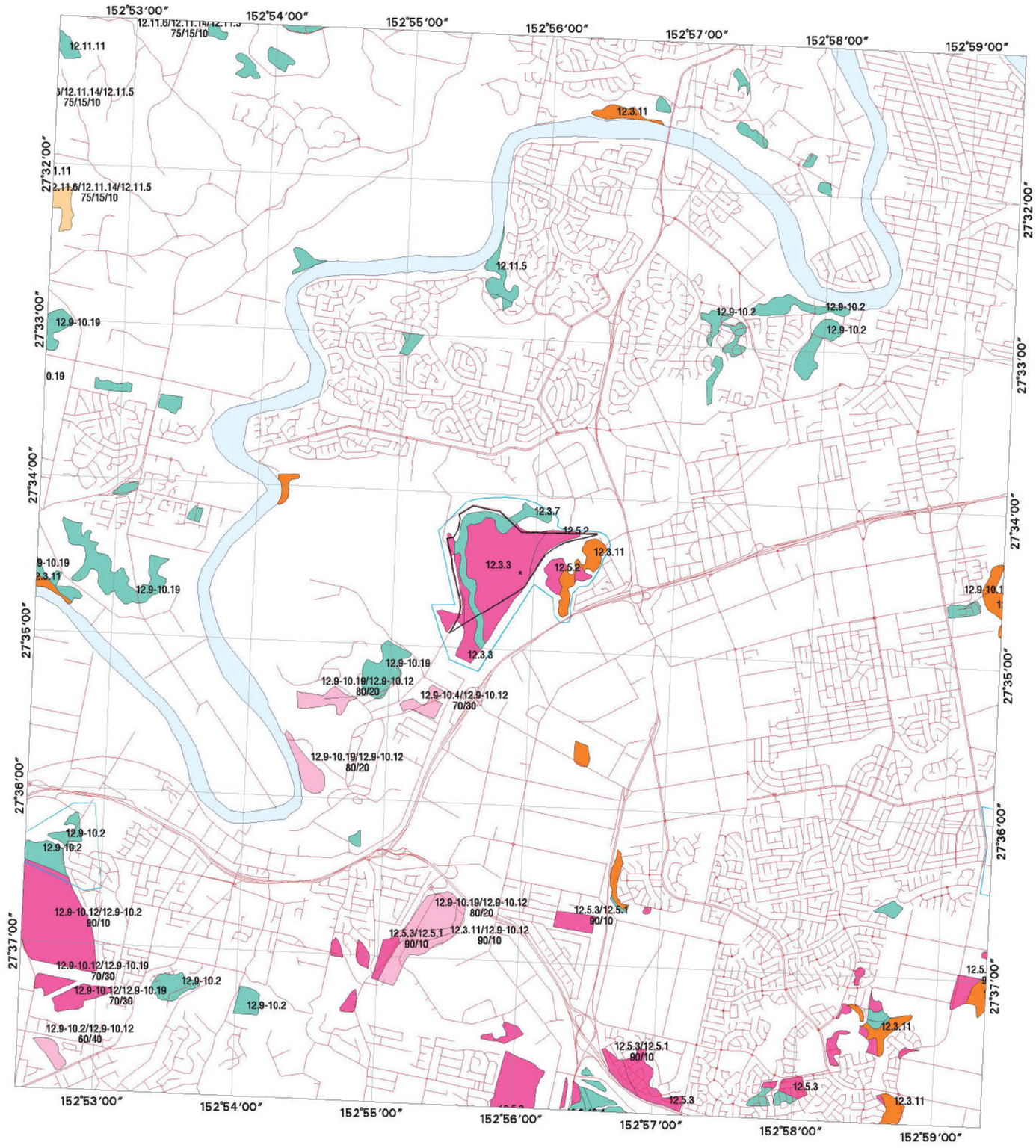
Please note this submission is strongly endorsed by various local environmental groups in southern Brisbane as listed below:

Save our Riverfront Bushland Inc.
Wolston and Centenary Catchments Network Inc. (WaCC) Inc
Rosewood & Districts Protection Organisation Inc. (RDPO)
Centenary & District Environment Action

[3] http://www.poohcorner.info/saved.php

MAP 1A:

2005 Certified Regional Ecosystem Map



REGIONAL ECOSYSTEM MAP

Lot 5 Plan RP179460 Requested By: EPARKER@BIGPOND.NET.AU

Date: 06 Mar 05 Time: 14.04.06

1000 0 1000 m

Geocentric Datum of Australia 1994 : Albers Equal Area Projection

2001 Remnant endangered regional ecosystem

Dominant

Sub-dominant

2001 Remnant of concern regional ecosystem

Dominant

Sub-dominant

2001 Remnant not of concern regional ecosystem

Non-remnant

Plantation Forest

Dam or Reservoir

Map amendment area

Roads
©MapInfo Australia Pty Ltd 2003

Bioregions of Queensland

National Park, Conservation Area State Forest and other reserves

Cadastre line
The maximum spatial error of parcels extracted for this map from the Digital Cadastral Data Base(DCDB) range from: 14m to 251m at a 95% confidence level. Property boundaries shown on this map are provided as a locational aid only. Digital Cadastral Data Base data reproduced with permission of NR&M.

Towns

Note: If you plan to clear or modify any regional ecosystem, please contact your local Department of Natural Resources and Mines Office before starting any work. To obtain a Certified RE Map for this area, please contact the Department of Natural Resources and Mines.

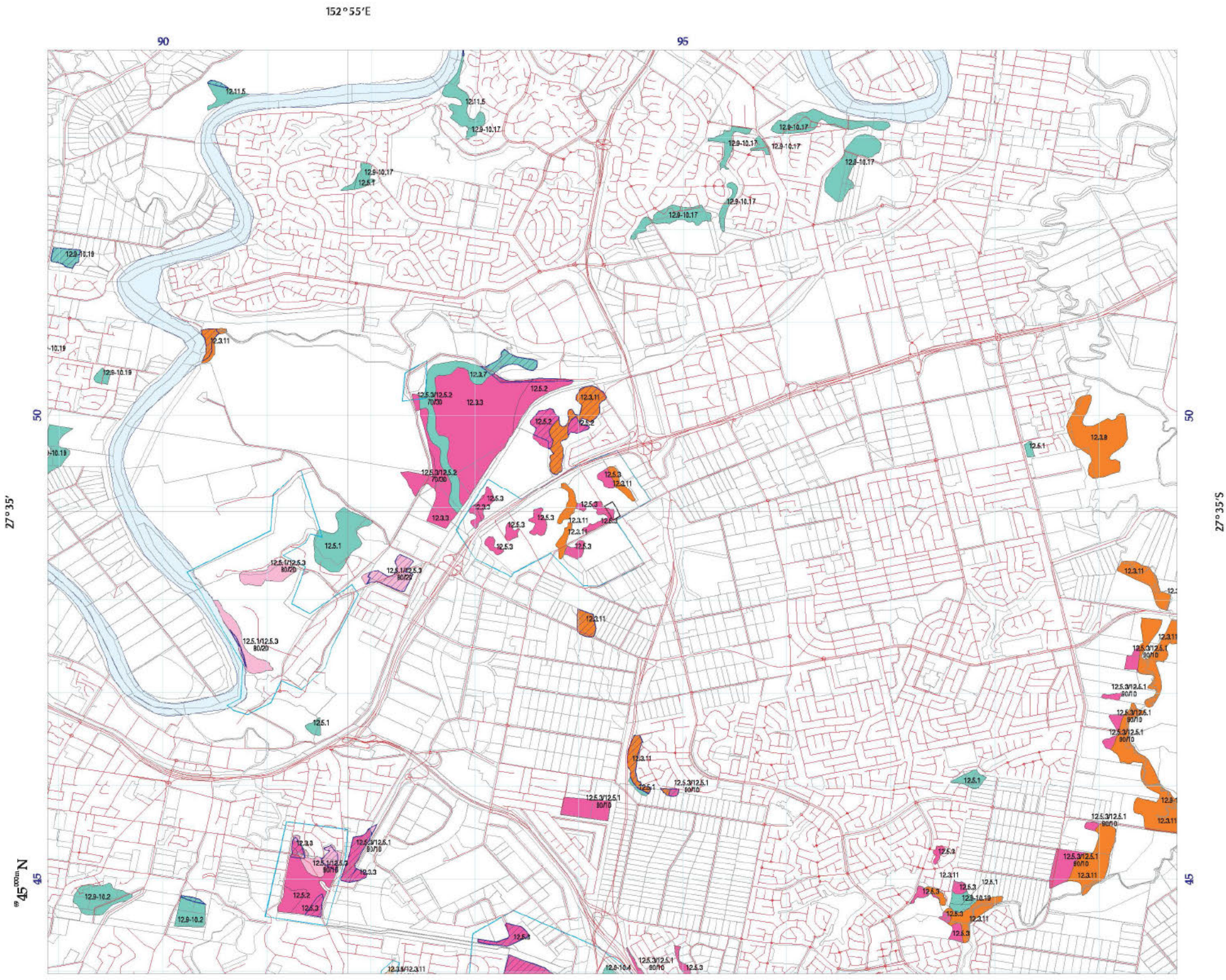
See page 2 for disclaimers and map notes.

LOCALITY DIAGRAM

Queensland Government
Environmental Protection Agency
Queensland Parks and Wildlife Service

Map1B:

2008 Certified Regional Ecosystem Map



2003 REGIONAL ECOSYSTEM MAP

Based on 2003 Landsat TM imagery

Requested By: KATHERINE.JOHNSTON@BRISBANE.QLD.GOV.AU
Date: 17 Jul 08 Time: 16.31.35

Centered on Lot on Plan:
1 SP177827

This is a copy of the certified regional ecosystem map defined by the map extent for the purpose of the *Vegetation Management Act 1999*. Areas of property maps of assessable vegetation (PMAVs) are not shown on this map.

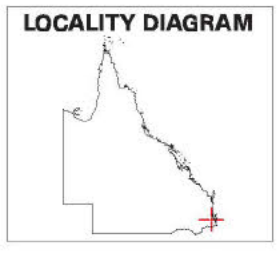
2003 Remnant endangered regional ecosystem
- Dominant
- Sub-dominant

2003 Remnant of concern regional ecosystem
- Dominant
- Sub-dominant

- 2003 Remnant not of concern regional ecosystem
- Non-remnant
- Plantation Forest
- Dam or Reservoir
- 2003 Remnant Vegetation Cover (RVC)
- Vegetation Management Act Essential Habitat
  Area identified as essential habitat by the EPA for a species of wildlife listed as endangered, vulnerable, near threatened or rare under the *Nature Conservation Act 1992*.
  For further information on VMA Essential Habitat, please see the attached VMA Essential Habitat map.
- Subject Lot
- Certified Map Amendment area
- Roads
  © MapInfo Australia Pty Ltd 2006
- Bioregion boundary
- National Park, Conservation Area State Forest and other reserves
- Cadastre line
  The maximum spatial error of parcels extracted for this map from the Digital Cadastral Data Base(DCDB) range from: 14m to 251m at a 95% confidence level. Property boundaries shown are provided as a locational aid only.
- Towns

Queensland Government

LOCALITY DIAGRAM



1000 0 1000 m

Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)

Defined map areas are labelled with the regional ecosystem (RE) code along with the percentage breakdown if more than one RE occurs within the area. Detailed definitions of regional ecosystems are available from www.epa.qld.gov.au/REDD. Defined map areas smaller than 5ha may not be labelled.

Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/-100 metres. The extent of remnant regional ecosystems as of 2003, depicted on this map is based on rectified 2003 Landsat TM imagery (supplied by SLATS, Department of Natural Reources and Water).

Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of Natural Resources and Water, the Environmental Protection Agency and MapInfo Australia Pty Ltd, makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incur as a result of the product being inaccurate or incomplete in any way and for any reason.

All datasets are updated as they become available to provide the most current information as of the date shown on this map.

Additional information is required for the purposes of land clearing or assessment of a regional ecosystem map or PMAV applications. For further information go to the web site: www.nrw.qld.gov.au/vegetation or contact the Department of Natural Resources and Water.

Digital regional ecosystem data is available in shapefile format, for Lot on Plans from www.epa.qld.gov.au/REDATA or from the Queensland Herbarium for larger areas.
Email: regional.ecosystem@epa.qld.gov.au

MAP B: Detailed location of RE 12.5.3

LEGEND

- SITE BOUNDARY
- WATER CORRIDOR
- Q100
- VACANT CROWN LAND
- PROPOSED PARK
- EXISTING TREE
- EUCALYPTUS RACEMOSA
- EUCALYPTUS SEEANA
- EUCALYPTUS TERETICORNIS
- SMALL GROUPS OF EXISTING TREES INCLUDING HOLLOW BEARING TREES RECOMENDED FOR RETENTION
- RECOMENDED PRIVATE OPEN SPACE
- REMNANT VEGETATION (RE 12.5.3) TOTAL AREA: 123950.22m²
- REMNANT VEGETATION (RE 12.3.11) TOTAL AREA: 64385.47m²

SOURCE: EPA

date	amendment	issue
28-7-08		B
24-7-08	Add Recommended Private, Open Space &Tree Retention	A
23-7-08	For Information	0

Integrated Landscape Solutions
landscape design and documentation
recreation and open space planing
environmental management
biodiversity survey
urban design
Yurrah Pty Ltd acn 76 067 601 663
14 Coe Rd Windsor
PO Box 3070 Windsor Q 4030
Tel 3857 8477
email mail@yurrah.com.au
web yurrah.com.au

project

Proposed Development

for

Metroplex Management P/L

at

Boundary Road, Wacol

drawing

Remnant Vegetation & Existing Tree Survey

dwn JB chk DH north

job # 0711097-1

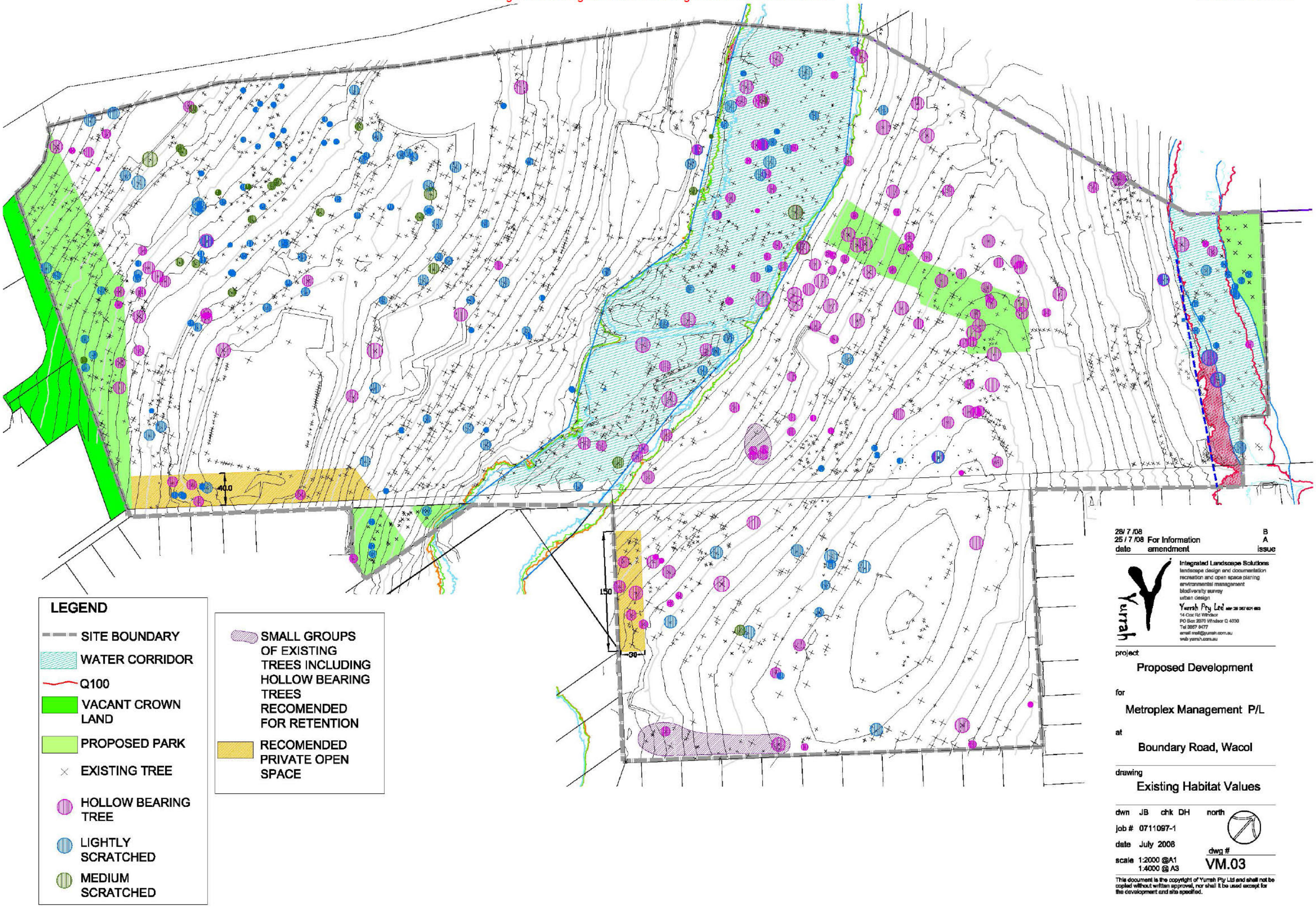
date July 2008

scale 1:2000 @A1
1:4000 @ A3

dwg #

VM.02

MAP C: Detailed location of hollow bearing trees


40.0
150
30
LEGEND
SITE BOUNDARY
WATER CORRIDOR
Q100
VACANT CROWN LAND
PROPOSED PARK
EXISTING TREE
HOLLOW BEARING TREE
LIGHTLY SCRATCHED
MEDIUM SCRATCHED
SMALL GROUPS OF EXISTING TREES INCLUDING HOLLOW BEARING TREES RECOMENDED FOR RETENTION
RECOMENDED PRIVATE OPEN SPACE
28/ 7 /08 B
25 / 7 /08 For Information A
date amendment issue
Integrated Landscape Solutions
landscape design and documentation
recreation and open space planing
environmental management
biodiversity survey
urban design
Yurrah Pty Ltd
14 Cox Rd Windsor
PO Box 2070 Windsor Q 4030
Tel 3857 8477
email mail@yurrah.com.au
web yurrah.com.au
project
Proposed Development
for
Metroplex Management P/L
at
Boundary Road, Wacol
drawing
Existing Habitat Values
dwn JB chk DH
north
job # 0711097-1
date July 2008
scale 1:2000 @A1
1:4000 @ A3
dwg #
VM.03
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Joint Flora Experts Report

Meeting of Experts Interim Joint Report

Meeting Dates: 30th April 2008, 8th May 2008 (DH & MO only), 20th May 2008, 29th May 2008.

Attendees: Paul Grimshaw (PG), David Hassall (DH) and Mike Olsen (MO).

Appeal: **BD2680 of 2007** Metroplex Management v Brisbane City Council and Anor.

Experts Area of Expertise: Flora and Vegetation

We acknowledge that we have been instructed to assist the Planning & Environment Court by investigating and reporting on the issues of Flora and Vegetation relating to a proposed development at Boundary road, Wacol. These are matters within our fields of expertise. We verify that our instructions have included the Planning and Environment Court ***Practice Direction No 1 of 2006***, which we have read and understood, and that no instructions were given or accepted to adopt or reject any particular opinion in preparing our reports.

1.0 Context, Background, Data and Methods

1.1 The land described below as the subject of this appeal comprises Lt 2 on SP177845, Lot 100 on SP177845, Lot 2 on RP129729, Lot 1 on SP177827, Lot 900 on SP17786, Lot 23 on USL1029, and Lot 1 on CP905627. Lot 100 on SP177845 has been transferred to the Department of Main Roads. The total area of the above land is 109.371 hectares. A development application for **Preliminary Approval** for **Material Change of Use to override the planning scheme** was made to Brisbane City Council on 24th July 2006.

1.2 The application was impact assessable and subject to referral coordination. The development was refused by the Brisbane City Council, and subsequently an appeal was lodged by the applicant. Several parties elected to become co-respondents in the appeal. This joint report will consider the Flora and Vegetation issues in the appeal.

1.3 The relevant documents with respect to the appeal are those listed in the Brisbane City Council Decision Notice. The experts considered the following reports and documents:

> Parsons Brinkerhoff Australia Pty Ltd (April 2004) "Ecological Assessment of Pooh Corner at Wacol, Queensland" unpublished report to Department of Defence.
>
> PPK Environment & Infrastructure (May 2004) "Environmental Assessment for Defence Land Disposal, Wacol Army barracks" Unpublished report to Department of Defence.
>
> Parsons Brinkerhoff Australia Pty Ltd (9th March 2005) "Map change request for Regional Ecosystems on Department of Defence property 'Pooh Corner', involving Lots 5 RP179460, 2 RP91957 and 151 RP69639". Letter to department of Natural resources and Mines.

MO
PG

Natural Solutions Environmental Consultants Pty Ltd (May 2006) "Ecological Assessment for Metroplex at Westgate" unpublished report to Metroplex Management.

Natural Solutions Environmental Consultants Pyty Ltd (April 2007) "Detailed Fauna Assessment for Metroplex at Westgate" Unpublished Report to Metroplex Management.

Natural Solutions Environmental Consultants Pty Ltd (May 2007) "Supporting Information for Application for Permit to Clear Protected Vegetation under s19(1) of the *Natural Assets Local Law 2003*" Unpublished report to Metroplex Management.

1.4 The relevant Planning Scheme documents are the Brisbane City Plan 2000 (as amended), and in particular the Western Gateway Local Plan, the Richlands Area Infrastructure Planning Scheme Policy, the Natural Assets Planning Scheme Policy, the Biodiversity Code, the Waterway Code and the Wetland Code.

1.5 Each of the experts relied upon their individual site investigations as well as aerial photographic interpretation and review of reports submitted with the Development Application.

1.6 The experts agreed to consider jointly the issues in the appeal raised by all of the Respondent and Co-respondents.

2.0 Flora Issues

2.1 Matters of Agreement

2.1.1 Presence of listed Threatened species at the State and National Level The experts have not observed any, and agree that it is highly unlikely there are any rare, vulnerable, or endangered plants on the subject land, as listed in the Schedules of the Queensland *Nature Conservation Act 1992* as amended, nor listed Threatened Species or Communities under the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

A single specimen of *Eucalyptus curtisii* was reported from the site in the ecological assessment reports listed above, but its situation and abundance indicate clearly that it is a single cultivated specimen and, as such, has no ecological or biodiversity values.

2.1.2 Presence of Locally Significant species at the Brisbane City level The Brisbane Cityplan Natural Assets Planning Scheme Policy contains a *Schedule 3 – Significant Flora Species*. This schedule contains a list of plant species that are either listed Threatened species or regarded as being of 'citywide' significance. *Eucalyptus seeana*, the Narrow-leaved blue gum, is listed as having 'restricted distribution within Brisbane City', and occurs commonly on the subject site.

E seeana is distributed from Port Macquarie northwards in coastal New South Wales and adjacent areas of South-eastern Queensland as far north as Landsborough. It is a (co)-dominant canopy species throughout much of the Greenbank Military Training Area, and in bushland in Carole Park, Heathwood, Pallara, Forestdale, and Bellbird Park.

While not being considered a listed Threatened species at the State or National levels, it is effectively protected under the provisions of the *Vegetation Management Act 1999* (as amended), being a co-dominant member of RE 12.9-10.12 and RE 12.5.3a. Both of these REs have a VMA classification of 'Endangered', and therefore mapped areas of remnant cannot be cleared under the provisions of the VMA unless an appropriate offset can be provided.

2.2 Matters of disagreement

2.2.1 Conservation/Management Requirements DH and MO recommend that the distribution of *E seeana* be mapped for the site, and as high a proportion as possible be protected and retained within public and private open space.

2.2.2 MO believes that the current Plan of Development does not comply with this recommendation and will require significant changes in this respect.

2.2.3 PG believes that *E seeana* and its associated Endangered Regional Ecosystem 12.5.3 and its variant 12.5.3a need to be mapped for the site, and all of its extent be protected and retained within public and private open space.

2.2.3 DH believes that the current Plan of Development is a significant improvement in this respect from earlier plans, and that subject to minor re-design of the proposed park areas and with successful tree retention in the proposed 'ETRO' precinct, a significant proportion of *E seeana* can be protected and retained within the proposed development.

3.0 Vegetation Issues

3.1 Matters of Agreement

3.1.1 Registration of PMAV for the site The experts agree that a Property Map of Assessable Vegetation (PMAV) has been registered for the site by the Department of Natural Resources and Water. The whole of the site is mapped as 'category X – non-remnant'. Therefore the site is exempt from the provisions of the *Vegetation Management Act 1999 (as amended)*.

3.1.2 Existing Vegetation Notwithstanding the fact that the site is not currently mapped as containing remnant vegetation and has a registered PMAV showing category X – non-remnant, it appeared to the experts that there may be some remnant vegetation present. DH and MO undertook enquiries with the Queensland Herbarium (EPA) in this respect, and were advised the following:

- The Brisbane City Council area had been mapped initially at the scale of 1:100,000 with a minimum polygon (mapping unit) size of 5 hectares. The site had not been considered as containing remnant vegetation at this mapping scale.
- While the 'aspirational' remnant vegetation mapping for Southeast Queensland was 1:50,000, with a minimum polygon size of 1 hectare, there had been no mapping at

this scale of Brisbane City due to the separate mapping undertaken by Brisbane City Council on their own account.

- There were methodological issues with the BCC mapping and the Herbarium has not accepted it into their system. The Herbarium does not expect to re-map Brisbane City in the near future, but undertakes amendments for individual sites.

- The Herbarium will undertake to re-map the subject site when an acceptable request is received that is compliant with their accepted methodology.

3.1.3 BCC Mapping A Remnant Vegetation map produced by BCC for the subject site was provided to DH by MO. The experts agreed that this map was not helpful, since it contained obvious errors with respect to classification of Regional Ecosystems as well as un-defined areas.

3.1.4 Map Amendment Request It was agreed that MO would locate and measure transects for canopy cover and tree height and provide the complying map amendment request to the Herbarium. At this point in time the experts are awaiting the response from the Herbarium. Mr Peter Taylor has advised that it is most likely that the subject site will be classified as belonging to land zone 5, in this respect.

3.1.5 Conservation/Management Requirements The results of the map amendment request are needed before consideration of the requirements for conservation and management of the site vegetation. The agreed quantum of existing remnant vegetation will assist in determining the recommended quantum of offset. It is also regarded as desirable that the flora experts consult with the fauna experts prior to finalising their recommendations, since there is a perceived benefit in coinciding the desired vegetation and fauna habitat offset outcomes.

3.1.6 It is possible that, if the map amendment request results in the mapping of remnant vegetation on the subject site, outside of the defined waterways, it will be classified as RE12.5.3 and its variant 12.5.3a, having a VMA status of 'endangered'. Should this occur, and the proposed development proceed, a detailed offset proposal will be required to mitigate the impact of clearing. The location and type of such offset(s) will be subject to further discussion and consultation with the fauna experts. A draft plan has been produced by DH and is appended below as **Figure 1**, showing the location of four possible offset sites in the vicinity of the subject land.

3.1.7 The experts agree that, while earthwork cuttings on the subject site during construction may have an effect on the vegetation immediately adjacent to the cut surface due to reduced root volume and increasing local drainage, this effect should not extend far enough into a 50 metre wide strip of vegetation to effectively negate the vegetation values in the medium term. The impact can also be mitigated by covering the cut surface, such as with a retaining wall, to reduce evaporative losses.

3.2 Matters of Disagreement

The following statements are provided to summarise the disagreements between the experts.

3.2.1 Mike Olsen Statement

3.2.1.1 MO believes that changes are required to the proposed Plan of Development in order to:

- retain and protect *E seeana*, and
- retain and protect the existing endangered remnant Regional Ecosystems.

3.2.2.2 MO believes that the provision of a detailed plan of the distribution of *E seeana* and an adequate offset proposal capable of being implemented is required to offset the losses of endangered Regional Ecosystems from the subject site, possibly at the ration of 1ha loss to 3ha offset.

3.2.2 Paul Grimshaw Statement

3.2.2.1 It is PG's opinion that the Metroplex Westgate site at Wacol (excluding the waterways riparian vegetation) contains a significant proportion of remnant vegetation, which represents Endangered Regional Ecosystem 12.5.3 and its variant 12.5.3a.

3.2.2.2 PG believes that the proposed Metroplex development for this site will not enhance, sustain or maintain the current ecological values or the biodiversity of these Endangered remnants.

3.2.2.3 The small proportion of areas proposed in the Metroplex development plan for retention of tree copses and vegetation corridors will not function ecologically to the same extent that the extant vegetation does.

3.2.2.4 Neither will any loss, caused by the proposed Metroplex development, of mature and old growth vegetation remnants and the biodiversity within them, be adequately compensated for by any proposed 'offsets' elsewhere. Even with the lack of lower layers (vegetation understorey) in the (possible) remnant vegetation at the Wacol Metroplex site it still provides an ecologically richer and more advanced starting point for the recovery and restoration of Endangered RE 12.5.3 and its variant 12.5.3a than any newly planted 'offsets' proposed to be sited elsewhere.

3.2.3 David Hassall Statement

3.2.3.1 DH believes that the issue of the presence of remnant vegetation on the site will be clarified once the reply to the map amendment request is received from the Queensland Herbarium. There may however be on-going issues of remnant versus non-remnant vegetation due to methodological difficulties with the selection of transects and reference sites. The final resolution of this issue will form the subject of a future joint report addendum.

3.2.3.2 DH also believes that the subject site has an unusual history of vegetation management under the Department of Defence. Most of the canopy trees were apparently left during this period, except where they subsequently died or where built infrastructure was installed, resulting in a highly heterogeneous, small-scale pattern of canopy and non-canopy. This situation makes the drawing of a map of remnant vegetation very difficult, if not unreliable, if its objective is to provide a surrogate for the ecological and biodiversity values of the subject site.

3.2.3.3 Further, the lack of lower layers of vegetation reduces the biodiversity values of the (possible) remnants since, depending on future management, the patches will be subject to severe edge effects including wind-throw, fire and weed invasion. This makes it very difficult to predict how the vegetation will regenerate in the near and medium term, or indeed if it will become a natural vegetation type, as opposed to several patches of mature and over-mature trees.

3.2.3.4 Therefore the presence of a remnant canopy, as narrowly defined under the provisions of the VMA, may not be the best assessment tool for this site. DH believes that an integrated analysis of flora, fauna, vegetation and habitat values is a more comprehensive approach that will optimise biodiversity outcomes.

3.2.3.5 DH suggests that an acceptable outcome can be achieved with respect to the balance between development of the site and conservation of biodiversity, based on the integrated assessment of all ecological constraints. The likely solution will include a mixture of protection and retention of (a) patches of canopy trees and (b) individual trees in open space, (c) suitably designed rehabilitation in the Waterway corridors including as a priority, Bullockhead Creek, and (d) an appropriately designed offset proposal based on the rehabilitation of strategically located areas external to the subject site. Four possible candidates for such areas are illustrated in the attached plan, **Figure 1**.

Figure 1 Four possible offset areas external to the subject site

4.0 Relevant Planning Scheme Document Issues

4.1 The Western Gateway Local Plan

Matters of Agreement

4.1.1 The subject site is located in the Wacol Industrial Precinct. The intent of this Precinct is to:

become an industrial area of Citywide and regional significance. Industrial activity is to generally be contained by the Ipswich Motorway, the Centenary Highway and elements of the greenspace network.

4.1.2 With respect to the greenspace network, it is stated that:

To facilitate stormwater and water quality management, land along the Bullockhead Creek waterway is to be acquired and rehabilitated. This corridor is intended to form part of a regional open space link to Greenbank, south of the Local Plan area.

4.1.3 Map A illustrates the intent of the Local Plan with respect to the Bullockhead Creek corridor being incorporated into the Parks designation.

Matters of Disagreement

4.1.4 DH believes that the Council has identified the Bullockhead Creek corridor in the Local Plan as being the most significant part of the subject site from the perspective of ecological values, and other parts of the site have not been identified as being of equal significance.

4.2 The Richlands Area Infrastructure Planning Scheme Policy

Matters of Agreement

4.2.1 The Figure 7.2 'Proposed and Existing Parks' includes the Bullockhead Creek corridor as a waterway corridor. There are two such corridors noted for the subject site, being the main tributary in the centre of the site, and the un-named tributary at the eastern end of the site.

4.2.2 This policy identifies a number of 'sites of ecological significance' located in the plan area, and:

Of these sites, the corridor along Bullockhead Creek is the most significant (BCC 1998). These areas support habitats that contain a range of flora and fauna and provide important links with other habitat areas to the south.

Matters of Disagreement

4.2.3 DH believes that the Council has clearly identified in this planning scheme policy that the Bullockhead creek corridor is the most significant part of the subject site from the

perspective of ecological values, and that other parts of the site have not been identified as being of equal significance in this respect.

4.3 The Natural Assets Planning Scheme Policy

Matters of Agreement

4.3.1 This policy is divided into two sections, being a 'Natural Assets Register' and 'Management Intent'.

4.3.2 The subject site falls within the valuable ecological features listed in Schedule 1 of the Register.

4.3.3 The subject site is listed as a Significant Site in Schedule 2 of the Register, described as an: *important section of waterway corridor along Bullockhead Creek. Commonwealth Government owned. Special Purpose Centre.'*

4.3.4 The subject site contains a Significant Flora Species listed in Schedule 3 of the Register, namely *Eucalyptus seeana* (see section 2.1.2 above).

4.3.5 Schedule 4 of the Register is a list of Significant Fauna species and this is discussed elsewhere by the fauna experts.

4.3.6 Schedule 5 of the Register identifies a list of Significant Vegetation Communities in Brisbane, based on their significance at the Global/National, Regional, or Local/Citywide levels. Each vegetation community in Schedule 5 is given a Regional Ecosystem code. The likely Regional Ecosystem 12.5.3 and variant 12.5.3a on the subject site are not included in the Schedule 5 list.

4.3.7 The 'Management Intent' section of the Policy indicates that 'Conservation Action Statements' are to be prepared for significant flora, fauna and vegetation communities. There are no relevant 'Conservation Action Statements' at the present time.

4.4 Biodiversity, Waterway and Wetland Codes

Matters of Agreement

4.4.1 The experts agree that the proposed Plan of Development must be assessed against the performance criteria of the above Codes. The current proposal complies with the relevant acceptable solutions of the Waterway and Wetland Codes, but does not comply with the acceptable Solutions of the Biodiversity Code.

Matters of Disagreement

4.4.2 DH believes that, consistent with his comments in para. 3.2.3.5 above, although the proposal may not currently comply with all of the acceptable solutions of the Biodiversity Code, with some minor changes to the layout there is a very good chance that alternative solutions will be provided that satisfy all of the relevant performance criteria.

Signed:	Signed	Signed
.....	M - Olsen	.....
David Hassall	Mike Olsen	Paul Grimshaw
Date 5.6.08	Date 05/06/08	Date 05/06/08

Joint Fauna Experts Report

Meeting of Fauna Experts Joint Statement

Appeal No.: BD2680 of 2007

Parties to the Appeal: Metroplex Management Pty Ltd (Appellant) v Brisbane City Council (Respondent) and Ors.

Expert's Statement: We (FC, JR & LA) acknowledge that we have been instructed to assist the Planning & Environment Court by investigating and reporting on the fauna values and constraints relating to a proposed development at Boundary Road, Wacol. These are matters within our fields of expertise. We verify that our instructions have included the Planning and Environment Court *Practice Direction No 1 of 2006*, which we have read and understood; and that no instructions were given or accepted to adopt or reject any particular opinion in preparing our reports.

Experts' meetings were held on 30th April 2008 (FC & LA), 12th May 2008 (FC, JR & LA) and 19th May 2008 (FC, JR & LA). This report represents the deliberations of the experts nominated by the Appellant (Professor Frank Carrick – FC), the Respondent (Mr Lindsay Agnew – LA) and the Co-respondents by Election (Dr. Jonathan Rhodes - JR), but also takes into consideration matters related to fauna issues raised by the Respondents by Election – most of these had in any case been notified by the Respondent.

In preparing this report, we have been assisted by the plan of the site with detailed plots of tree locations and distribution of hollows and marks indicating usage by arboreal animals. This has been produced by Yurrah Pty Ltd (Drawing Number HBT.01 Dated May 2008).

MATTERS OF AGREEMENT

Rare or threatened fauna as recognised under the Commonwealth's EPBC Act and/or the State's NC Act.

The following species (with relevant source) have been recorded for the site:

- **Grey-headed Flying-fox** *Pteropus poliocephalus* - *vulnerable* EPBC Act - (PPK 2004; Natural Solutions 2007; Agnew 2007)
- **Grey Goshawk** *Accipiter novaehollandiae* – *rare* NC Act - (Natural Solutions 2007; Agnew 2007 / 2008)
- **Little Pied Bat** *Chalinolobus picatus* – *rare* NC Act (Natural Solutions 2007 – "possible" Anabat acoustic signature, but outside recognised range of the species – see discussion below)
- **Koala** *Phascolarctus cinereus* – *regionally vulnerable* NC Act (Agnew 2007 / 2008; Carrick 2008; PPK 2004 – scratch marks on trees consistent with usage by Koalas)

Known or likely site habitat usage by these species is sumarised as follows:

- **Grey-headed Flying-fox** – Feeding on any flowering and/or fruiting tree across the site, though especially eucalypts, corymbias or melaleaucas. Likely to be present throughout the year.

- **Grey Goshawk** – May forage within any treed part of the site, though higher habitat values are associated with riparian forest along Bullock Head Creek and the un-named waterway on the Eastern side of the site. Site usage is likely to be seasonal (Autumn-Winter).
- **Little Pied Bat** – Presence on site is equivocal, but if present would be expected to be dependent on hollow-bearing trees as refuge and breeding sites and likely to forage throughout more open treed areas. This microbat is known from dry forest and woodland and its distribution is thought not to extend into the South-Eastern corner of Queensland (Van Dyck 2008, Churchill 1998), though there are recent records which suggest that this species may occur further East than generally accepted (possible record for Pinjarra Hills in 2002 [L. Agnew *pers comm.*] and in the Helidon Hills area [G. Ford & I. Gynther *pers comm.* 2002]).
- **Koala** – Absence of actual sightings indicates low numbers and/or sporadic presence on site; any eucalypt and/or corymbia trees on the site may be used for feeding and/or refuge. Treed and terrestrial connectivity between habitats to North and South are important (especially to North). This species may occur in low abundance (e.g. 1 or 2 animals) as permanent/semi-permanent residents and transients from forested areas to the North of Ipswich Motorway.
    - The tree survey data indicate that the area showing most intense signs of use by Koalas was the North-Eastern corner (now cleared and within the area resumed by Main Roads) and the Western part of the site, with less activity associated with the central parts – this may be because there is probably a better mix (for Koalas) of big old trees for roosting and younger food trees in this area, plus the proximity of the Western parts of the site to the functional linkage to bushlands to the North, via Sandy Creek.
    - We have been advised that the specific regulatory instrument with respect to Koala habitat, at the time the application was made which is the subject of this appeal, was the "Southeast Queensland Regional Plan Interim Guideline: Koalas and Development", wherein the site is classified as "Urban Koala Area".

Potentially suitable habitat occurs on the site for the following species which have been identified in Commonwealth and/or State databases and/or are regarded by the experts as known or likely to occur within the local area. These are:

- **Red Goshawk** *Erythrotriorchis radiatus* – *endangered* EPBC Act and *vulnerable* NC Act.
- **Powerful Owl** *Ninox strenua* – *vulnerable* NC Act.
- **Tusked Frog** *Adelotus brevis* – *vulnerable* NC Act.
- **Glossy Black Cockatoo** *Calyptorhynchis* – *vulnerable* NC Act.
- **Lewin's Rail** *Rallus pectoralis* – *rare* NC Act.

Known or likely site habitat usage by these species is sumarised as follows:

- **Red Goshawk** – Requires extensive areas of habitat for foraging and breeding (i.e. hundreds of hectares). Core habitat is likely to be associated with D'Agular Range (e.g. Mt. Coot-tha bushlands) which is within 10 kilometres of site (and well within foraging range of this wide-ranging and highly mobile raptor). The site supports feeding and breeding habitat for several favoured prey species (e.g. Rainbow Lorikeets) and hollow-bearing trees are important for such species. Red Goshawks

may use the site infrequently as part of seasonal extensions to foraging range (*pers. comm.* G. Czchezura, Qld. Museum, 2007).

- **Powerful Owl** - Requires extensive areas of habitat for foraging and breeding (i.e. hundreds of hectares). Dependent on large tree hollows for breeding and areas of forest with denser understorey for day roosts. The species is a predator on a variety of mammals (including possums, gliders and flying-foxes). May use the site infrequently as part of a wider, more extensive set of habitats (including "Pooh Corner" bushlands to North and along the Brisbane River).
- **Tusked Frog** – Habitats associated with Bullock Head Creek (and to a lesser extent, the Eastern un-named waterway) are potentially suitable. If this frog occurs on-site, it is likely to be resident.
- **Glossy Black Cockatoo** – Dietary specialist dependent on seeds of she-oaks. Requires large hollow-bearing trees in close proximity to water. She-oaks (*Allocasuarina littoralis*) occur on-site though are not abundant (more abundant on adjacent lands), but there have been no sightings nor have any distinctively chewed cones been detected. May use the site irregularly/intermittently to feed for short periods when food shortages (seasonal or otherwise) occur in larger core habitat areas to South (e.g. Greenbank area) and to the North (e.g. Mt. Coot-tha bushlands).
- **Lewin's Rail** – This is a cryptic ground-dwelling bird associated with well vegetated wetlands and riparian habitats. Known to be highly mobile, using a series of wetlands within a locale, though these movements are typically based around a central core habitat wetland. Depending on seasonal influences, this rail may occur on the site (riparian areas of Bullock Head Creek and the Eastern un-named waterway) when denser vegetation cover coincides with some surface water and damp soils; however, it should be noted that there were no observations of this species on the site despite a considerable amount of fieldwork in those areas most likely to be frequented and in the most favourable (wet) conditions in early 2008. The best method to assess presence is call playback. Unfortunately, the Natural Solutions survey did not undertake such methodologies.

Species of City-wide significance as recognised by Council's Brisbane City Plan

The following species (with relevant source) have been recorded on the site:

- **Swamp Wallaby** *Wallabia bicolor* - (PPK 2004; Natural Solutions 2007; Agnew 2007/2008)
- **Sugar Glider** *Petaurus breviceps* - (PPK 2004)
- **Brown Goshawk** *Accipiter fasciatus* - (Natural Solutions 2007)
- **Squirrel Glider** *Petaurus norfolcensis* - (Natural Solutions 2007)
- **Yellow-bellied Bat** *Saccolaimus flaviventris* - (Natural Solutions 2007)

Known or likely site habitat usage by these species is sumarised as follows:

- **Swamp Wallaby** - Potentially suitable feeding and refuge habitat occurs within the riparian zone of waterways (with additional feeding habitat occurring throughout the site). Bullock Head Creek riparian areas are likely to form core habitat for this species. Suitable terrestrial linkages to other local habitat nodes are important.
- **Sugar Glider** - Dependent on hollow-bearing trees (live or dead stags) as refuge and breeding sites and a diversity of native flowering trees and shrubs (especially eucalypts, corymbias, paperbarks and acacias). Core habitat is likely to be restricted

to denser forest within riparian vegetation associated with both waterways, though may use treed areas nearby. The site's riparian areas may not provide a sufficiently dense vegetation structure which would allow Sugar Gliders to compete successfully in the longer term with the more common Squirrel Gliders (which are more likely to occur throughout the site). To the experts' knowledge, records of Sugar Gliders are rare in Brisbane City. Differentiation in the field between this glider and its congener, the Squirrel Glider, can often be highly problematic as both are of very similar appearance and good views are usually mandatory for confident identification. It should be noted that there were no observations of Sugar Gliders on the site (though in contrast, Squirrel Gliders were recorded) despite a considerable amount of fieldwork in early 2008 in those areas most likely to be frequented by Sugar Gliders. We believe that there is potential that the earlier record (PPK 2004) may have been a misidentification and that only Squirrel Gliders occur on the site.

- **Brown Goshawk** - Potentially suitable habitat occurs throughout the open forest and riparian habitats of the site. Likely to use the site regularly (possibly daily) as part of a wider foraging range within local bushlands.
- **Squirrel Glider** – Dependent on hollow-bearing trees (live or dead stags) as refuge and breeding sites and a diversity of native flowering trees and shrubs (especially. eucalypts, corymbias, paperbarks and acacias). Core habitat is likely to be provided by forest vegetation associated with both waterways, though this glider is likely to utilise any treed part of the site. Hollow-bearing trees located outside riparian areas are important in facilitating usage of those areas as supplementary feeding habitat. It is highly likely that family groups occur as residents on the site.
- **Yellow-bellied Bat** - Dependent on large hollow-bearing trees as refuge and breeding sites. Likely to forage over the tree canopy and open cleared area across the site and surrounds. May well be resident.

Potentially suitable habitat occurs on the site for the following species which have been identified in Commonwealth and/or State databases and/or are regarded by the experts as known or likely to occur within the local area.

- **Yellow-footed Antechinus** *Antechinus flavipes*
- **Greater Glider** *Petauriodes volans*
- **Australian Spotted Crake** *Porzana fluminea*
- **Spotless Crake** *Porzana tabuensis*

Known or likely site habitat usage by these species is sumarised as follows:

- **Yellow-footed Antechinus** – A small mammal occurring in a variety of wet or dry forest habitats. On the site, riparian areas are likely to be more favourable for this species as these areas provide a combination of important habitat elements (i.e. forest/open forest tree canopy, shrubby understorey, hollow-bearing trees and denser ground cover).
- **Greater Glider** – This large glider is dependent on large hollow-bearing trees as refuge and breeding sites and is a dietary specialist (primarily foliage of eucalypts and corymbias). If this glider occurs on the site, it is likely to be resident. However, since there were no sightings of this species despite some 120 hours of spotlighting on the site, it probably does not presently form part of the site's faunal assemblage.
- **Australian Spotted Crake** and **Spotless Crake** – These are relatively secretive birds occupying dense vegetation associated with wetlands and waterways.

Occurrence of either species may be uncommon and linked to habitat suitability which is likely to vary considerably as a result of seasonal influences (optimum in wetter summer conditions). Larger areas of potentially suitable habitat occur along Bullock Head Creek adjacent to and South of the unformed section of Boundary Road.

Habitat Values and Retention

The site provides habitat values for a variety of native fauna, including species of conservation significance. The extent, quality and value differ depending on the facet of the fauna assemblage or particular species considered. Generally, the site's key habitat elements can be categorized as follows:

- **Riparian habitat** – That habitat associated with the three waterways, i.e. Sandy Creek (Western extreme of the site), Bullock Head Creek (centre of site) and the un-named waterway (Eastern extreme of the site). The riparian habitat associated with Bullock Head Creek is the widest and is of generally higher value (due to width, nature of tree canopy and understorey and presence of hollow-bearing trees). These habitats support habitat values for a substantial proportion of the species of conservation significance known or likely to occur on the site (e.g. Swamp Wallaby, Grey Goshawk). These areas also include small areas of seasonal wetland habitat.
- **Non-riparian habitat** – Areas beyond the bands of waterway vegetation are dominated by mature tree cover. Understorey has been largely cleared, resulting in a "park-like" environment. Habitat values of these areas are highest for highly mobile and typically aerial fauna (birds, flying-foxes, microbats) and arboreal mammals (possums, gliders) though a variety of other species will use this habitat type (e.g. wallabies, reptiles, frogs). This habitat type also provides feeding, roost and breeding opportunities for a variety of species of conservation significance known or likely to occur on the site (e.g. Koala, Grey-headed Flying-fox).
- **Hollow-bearing trees** – Hollow-bearing trees (live trees and dead stags) are distributed throughout both the abovementioned habitat types. Notably, there are many very old mature hollow-bearing trees, especially on the Eastern side of Bullock Head Creek. Hollow-bearing trees provide essential resources for a variety of native fauna (including owls, parrots, lorikeets, microbats, monitor lizards), including many of the species of conservation significance known or likely to occur on the site (e.g. Yellow-bellied Bat, Squirrel Glider).

All three general habitat types support values for native fauna and species of conservation significance known or likely to occur on the site. In addition to these values, the site's habitats are likely to provide a locally significant contribution to the maintenance of local biodiversity. Continuance of local populations is highly dependent on maintaining opportunities for movement between habitat areas on the site and the more extensive areas of bushland to the North of the Ipswich Motorway. For many species (particularly ground-dwelling fauna), movement between habitat patches (broadly, to the North and South of the site) is largely restricted to vegetated waterway corridors.

Whilst it is our opinion (FC, JR & LA) that it is likely that a solution can be devised which will retain adequate connectivity through and within the site, if development proceeds as an industrial estate, incorporating anything like the development footprint proposed, we (FC, JR & LA) believe it will result in the loss of a high proportion of the "carrying

capacity" component of the site's present habitat values. It is our opinion (FC, JR & LA) that a solution that might resolve conflict with the BCC Biodiversity Code will require a combination of retention of an adequate proportion of the site's distinctive hollow bearing trees and restoration of foraging capacity in the wider area by revegetation of suitable locations within reasonable proximity to the site and linked to it by vegetated linkages (probably riparian corridors).

Any consideration of future development on the site must provide retention of the three primary habitat types sumarised above. It is considered that the extent of the proposed retention of all three vegetated waterway bands (as depicted on the site plan) is adequate in meeting minimum requirements for the riparian habitat on the site.

Habitat Connectivity and Fauna Movement

It is likely that retention of that part of the vegetated waterway habitat remaining on the Eastern side of the site will generally be reduced to the maintenance of a "habitat patch". Its contribution to fauna movement will be minimal given the ecological disruption created on its Northern side (resulting from the upgrade of the Ipswich Motorway) and permanent removal of upstream sections (South of Boundary Road) which has resulted from piping and concrete channelisation associated with existing commercial and industrial development.

Whilst the habitat values associated with that part of Bullock Head Creek on the site are comparatively higher than of those areas of the site to its East and West, in the short to medium term, the current wildlife movement opportunities under the Ipswich Motorway are severely constrained. The Bullock Head Creek culverts are relatively small and dark, with field observations suggesting that these are inundated for extended periods (if not for most of the year). These conditions will either prevent or deter most ground-dwelling fauna species from using these structures to move from or into the site along Bullock Head Creek.

In contrast, there is evidence that movement of a variety of terrestrial fauna into and out of the site is presently occurring via the under-road passages associated with Sandy Creek (Western extreme of the site). Although other habitat values associated with Sandy Creek and its environs are lower than those associated with Bullock Head Creek, the former appears to be providing the current functional terrestrial linkage to bushland areas to the North of Ipswich Motorway.

In strategic terms, the fauna linkage function of the site predominates, but is made more complex by previous and likely future developments. To the South of the site, Sandy Creek has been severely degraded in terms of ecological values, but at present the bridging structures over Sandy Creek appear to be the only functional linkage for fauna to traverse the Ipswich Motorway (to and from important forested areas to the North) in this immediate vicinity. Bullock Head Creek has been identified as and currently provides some of the only ecological connectivity to the South of the site but this is severed by the existing culverts under the Ipswich Motorway.

Given the above, it is vital that adequate ecological connectivity is provided between the Bullock Head and Sandy Creek "corridors". In our opinion, the proposal to link these waterway corridors as depicted on the current site plan (via the Northern side of Boundary Road and the Southern side of the Ipswich Motorway) is inadequate. The

linkages must be made more robust (greater extent and security) to provide for survival of native vegetation in the long term, upon which fauna using the site depend.

There are three basic options for linking the Sandy Creek and Bullock Head Creek riparian corridors:

- **Option N** - along the Northern boundary of the Western Precinct of the site (i.e. along the Southern boundary of the Ipswich Motorway road reserve);
- **Option C** - about and through the middle of the Western Precinct; and
- **Option S** - along the Northern boundary of the Boundary Road extension / electricity supply easement.

All three basic options for linking the Sandy Creek and Bullock Head Creek riparian corridors have advantages and disadvantages:

- **Option N** - This is considerably longer than the other options: thus for a given width of vegetation it will provide a greater area of habitat, but it is a longer path for fauna to leave the relative security of one riparian corridor to reach the other riparian corridor. In the short to medium term it is unlikely to be functional, since even if it were to be substantially widened it would preserve few, if any, existing "habitat" trees – indeed for much of its extent, it presently is devoid of any trees at all; it would only have significant value as a vegetated linkage for fauna in the long term. Its other advantage is that it would not be transected by any roadway infrastructure.
- **Option C** - This would arguably be in the best position to link the two riparian corridors and would preserve the largest number of existing "habitat" trees and other mature trees. But we are advised that to provide for the very large industrial buildings intended for this part of the site, substantial earthworks would be required that would result in the linkage being perched approximately five metres above the building pads (*pers comm.* P. Cockerill, Sheehy & Partners) – consequential changes to the water table would almost certainly lead to the eventual demise of the existing trees and probably any revegetation attempts. Thus its functionality as a vegetated linkage for fauna would only exist in the short to medium term. Its functionality would also be compromised by being transacted at both ends by the Western Precinct "ring road".
- **Option S** - This provides the shortest connection and in this location a broader range of fauna might be expected to use it over time. It probably provides the most "cost-effective" location for a linkage of adequate width. It preserves more existing "habitat" trees and regrowth than Option N but less than Option C, but also probably presents some opportunities to consolidate with existing vegetation which might be retained on the Southern side of the Boundary Road reserve. Its major disadvantage is that it would be transacted by the proposed entry road for the Western Precinct – this will require a design solution to allow fauna to move safely over or under the entrance road.

In considering the abovementioned issues, it is agreed (FC, JR & LA) that the least preferred option for linking the Sandy Creek and Bullock Head Creek riparian corridors is Option C (based on information currently available to the experts). LA notes that in regards to his position, the lower level of support for this option reflects information provided to date in regards to the potentially significant height differential between linkage Option C and surrounding industrial land.

Of the two remaining options, *Option S is preferred*, though only on the basis that it can be demonstrated that the proposed Option S can successfully incorporate the following design elements:

- **Linkage width** - Narrow bands of trees or isolated trees generally do not survive in the long term due to factors such as wind shear and other edge effects – as a rule of thumb, linkages should be about twice as wide as the upper stratum is high; for the Metroplex site this means about 40 to 50m. Thus linkage should achieve a minimum width of 40m and average 50m in width over its full length.
- **Road crossings** – At this stage, three options are envisaged (see Attachment). *Option 1 is preferred.*
    - **Option 1** – Provides a continuous terrestrial path from the West into the proposed park and continued passage underneath a proposed bridging structure (which is the South-Western continuation of Boundary Road) to the Bullock Head Creek riparian corridor. The vertical clearance between dry terrestrial ground passage and road/bridge structure should provide a minimum of 2 to 3 m to cater for the largest local ground-dwelling taxa (i.e. Eastern Grey Kangaroo *Macropus giganteus*). This option would restrict fauna movement across road surfaces via exclusion fencing.
    - **Option 2** - Provides a continuous terrestrial path from the West then under the road entry to the "Western precinct" via a multi-purpose underpass constructed to a standard appropriate for fauna and human pedestrians.
    - **Option 3** - Provides a continuous terrestrial path from the West to the road entry to the "Western precinct". This option necessitates engineering solutions for larger fauna (e.g. Koalas and macropods) traversing over the road surface of the entrance road, whilst encouraging smaller ground-dwelling fauna to traverse via under-road culverts. Minimum culvert height of 0.6m (between dry terrestrial ground passage and structure) is required for herpetofauna and small to medium-sized mammals. As underpass structure height decreases and length increases, the diversity of fauna likely to use the structure decreases. We understand that the maximum entry road width can be restricted to about 7m (D. Hassal *pers comm.*). This would provide for a maximum length of the small fauna underpass of approximately 8m, which in combination with a culvert height of 0.6m represents an acceptable fauna underpass outcome. Faunal movement through the culvert should be encouraged by the use of vegetation and provision of other suitable cover. Option 3 is also predicated on the basis that the vehicle speed on the entrance road will be limited to 40kph.
- **Habitat Rehabilitation** – Areas of sparse tree and/or shrub cover will need to be rehabilitated. Dense understorey plantings will need be established along the outer margins of the linkage to facilitate both visual and environmental buffering of the central core of the linkage.
- **Vegetation shading** – To maintain vigour of existing and rehabilitation plantings, buildings proposed on land adjacent and to the North of the linkage will need to be designed to ensure that shading of vegetation within the linkage area is minimised and does not exceed 4 hours in each daily diurnal phase.
- **Fencing –** Fencing may be required to define the boundary between the linkage and adjacent land uses (particularly with the adjacent "Western precinct" of the site). A suitable design could involve a chain-wire fence incorporating a 30cm gap between the bottom of the chain-wire and ground level. The overall height of any chain-wire fence should be limited to maximum overall height of 1.5m (or less) and must not

incorporate barbed wire. The fence design will need to include provision of arboreal mammal refuge poles (maximum of 15cm diameter) at 100m intervals and located on the outside (development side) of the fence.

- **Stormwater management** - Water quality protection measures (e.g. sediment and pollutant controls) are to be installed prior to the main construction works and maintained to ensure that stormwater from the developed areas does not enter the linkage habitat area (and especially the road underpasses).

Retention of Hollow-bearing Trees

The density and diversity of large hollow-bearing trees on the site is its most distinctive ecological feature. It is also notable that such fauna habitat resources are scarce elsewhere in the surrounding local landscape. Whilst hollow-bearing trees are widely distributed across the site, there are several stands or groupings of these trees which are considered to support comparatively higher value to fauna (by way of the combination of tree size and/or species diversity and/or important co-location of the stand with other fauna habitat values (e.g. riparian vegetation). The figure (HBT.01 dated May 2008) attached to this statement indicates the general extent and location of stands or groupings which are considered to support comparatively higher value to fauna. **Note** - the purpose of highlighting these areas is to provide guidance on retention of hollow-bearing trees beyond those areas already committed for retention on the proponent's plan ("Plan of Development" – Job Number 7096-78).

In regard to the retention of hollow-bearing trees, it is agreed (FC, JR & LA) that any future development of the site must ensure retention and protection of a minimum of 50% of those hollow-bearing trees identified within the attachment to this statement (Figure HBT.01 dated May 2008). Outside of those areas already committed for retention on the proponent's plan ("Plan of Development" – Job Number 7096-78), priority is to be given to retention and protection of the stands or groupings of hollow-bearing trees as noted in the attachment to this statement (Figure HBT.01 dated May 2008).

The retention and protection of existing hollow-bearing trees must be supported by the retention and protection of younger (though advanced trees) in order to maintain a base for recruitment as future hollow-bearing trees. In this regard, we (FC, JR & LA) agree that within the "Etro" precinct, approximately 50% of the current tree cover (including both hollow-bearing trees and younger trees) be retained and protected. Retention of trees in a single stand is preferable.

Habitat Loss Offsets

As acknowledged previously, if development proceeds as an industrial estate incorporating anything like the development footprint proposed, we (FC, JR & LA) believe it will result in the loss of a high proportion of the "carrying capacity" component of the site's present habitat values and hence loss of biodiversity values. It is our opinion (FC, JR & LA) that part of an overall solution that might resolve conflict with the BCC Biodiversity Code should include offsets to the loss of the site's (and surrounding local area's) fauna habitat carrying capacity by way of revegetation of suitable locations within reasonable proximity to the site and linked to it by vegetated linkages (probably riparian corridors).

It is recognised that offsets will not directly compensate for the loss of biodiversity value on the site in the short term, because revegetated areas will take a significant amount of time to attain habitat values for fauna equivalent to those on the site. It is likely to take a decade or two for revegetated areas to be useful to fauna such as Koalas and a century or two to produce medium and large sized tree hollows for hollow dependent fauna.

We agree (FC, JR & LA) that potentially suitable off-site areas are located along Wolston Creek which connects "Pooh Corner" and Brisbane River riparian corridor. These areas are located to the near North of the subject site.

Environment Management Plans

Whilst the experts acknowledge that detailed environmental/ecological management plans will be required for any future development on-site, it is not meaningful at this point to attempt to address such detailed management requirements when there remain uncertainties in regard to any agreed position on the above mentioned issues. It is anticipated that a subsequent addendum to this report will be prepared which addresses fauna and fauna habitat management plans.

MATTERS OF DISAGREEMENT

None

References

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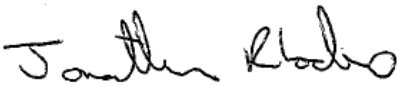
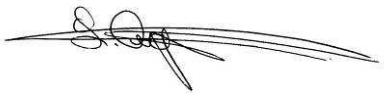
Signed & Dated by

Frank Carrick 22 May 2008

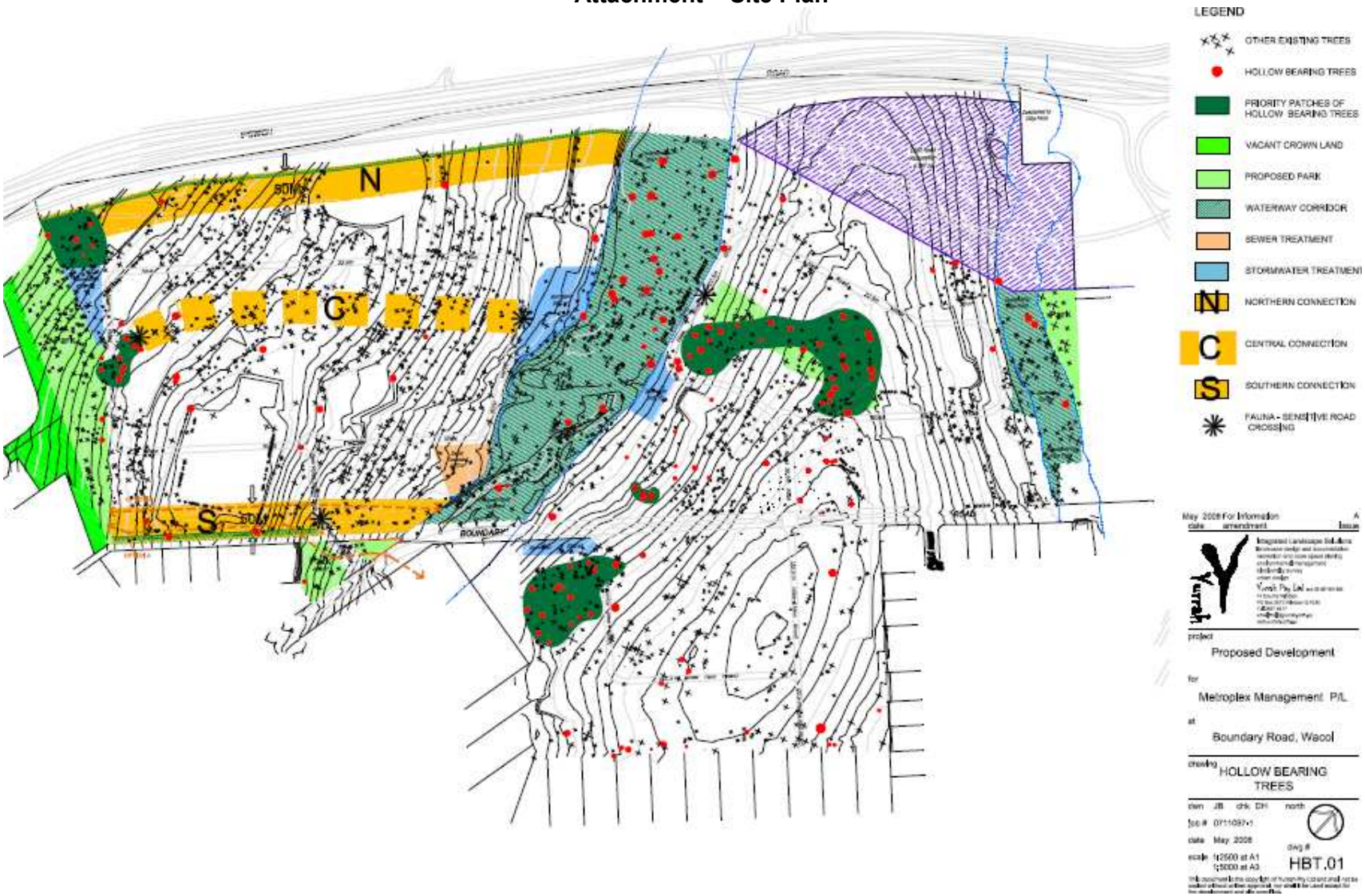


Jonathan Rhodes 22 may 2008



Lindsay Agnew 22 May 2008

Attachment – Site Plan



Action Statement #192
“Loss of hollow bearing trees from Victorian native forests and woodlands”

Department of Sustainability and Environment

Action Statement

Flora and Fauna Guarantee Act 1988 No. 192

Loss of hollow-bearing trees from Victorian native forests and woodlands

Description and occurrence

Hollows that form in trees provide essential breeding and roosting spaces for many native wildlife species. Native Australian trees do not usually develop hollows suitable for use by vertebrates until they are very old. Large hollows, essential for some fauna, do not develop until trees are well over a hundred years old; the development of large hollows being a characteristic feature of tree senescence (Jacobs 1955; Ambrose 1979; Mackowski 1984; Perry *et al.* 1985; Inions *et al.* 1989). Hollows develop in Australian trees largely as a result of natural branch shedding and damage by wind, lightning, fungi and wood-boring insects, particularly termites. Fire can accelerate this damage, but it also accelerates deterioration and collapse of existing hollow trees. In contrast to other parts of the world, where animals like woodpeckers actively excavate holes, the only primary hole-excavating vertebrate animals in Australia are a few species of tropical parrot.

Some eucalypt species (eg River Red Gum *Eucalyptus camaldulensis*) may survive for many centuries, providing a dynamic supply of hollows that suit different species at different stages of hollow development. Each animal species has its own requirements and preferences for factors such as hollow size, location (branch or trunk), tree species and surrounding vegetation. Old trees may continue to provide hollows for many years between death and eventual collapse and decay.

Hollow-bearing trees are usually the oldest and largest members of their communities. Therefore they often have values beyond the hollows they contain that cannot be provided by younger trees; by virtue of their age, size, form, root development and ability to sequester resources from surrounding vegetation. These include: landscape value; a large and diverse invertebrate fauna, particularly in peeling bark which provides a distinctive foraging substrate; non-hollow nest, roost and perch sites; nest materials; open stand structure; clusters of mistletoes and other epiphytes, and a more regular and prolific flowering and nectar production (Ashton 1975; Recher *et al.* 1980; Loyn 1980; Smith & Woodgate 1985; Lunney *et al.* 1985, 1988; Kavanagh 1987; Taylor & Savva 1988; Lindenmayer *et al.* 1991a, 1991c; Recher 1991; Scotts 1991; Morrison 1992; Webster & Menkhorst 1992).

When large trees eventually collapse or fall, they provide a range of resources for different groups of fauna. Large hollow logs on the forest floor are used by ground-dwelling animals, particularly mammals, for shelter and as foraging sites (eg How 1983; Dickman 1991; Scotts 1991). Branches and trees falling into water provide shelter for fish and other aquatic animals (Koehn & O'Connor 1990; Benke *et al.* 1984). Rotting wood contributes nutrients and organic matter to the soil, and fungi are used as food by various mammals including possums, bandicoots and potoroos.

Rates of formation and loss of hollow-bearing trees have been affected by European settlement in all Australian states. Usually this has involved accelerated rates of loss (principally through clearing for agriculture) and reduced rates of formation (by preventing regeneration of trees in farmland, or as a consequence of wildfire (eg 1939 fires) or timber harvesting activities in areas of forests); hence numbers of hollow-bearing trees are reduced.

Ecological role of hollows

Hollows are considered essential for 16 species of mammal and 44 species of bird in Victoria (Emison *et al.* 1987; Menkhorst 1984b, *pers. comm.*; Appendix 1), including 14 mammals and birds considered threatened in Victoria (NRE 2000). The Tree Goanna *Varanus varius* is also dependent upon hollows for shelter (Scotts 1991)

Hollows are also used opportunistically by at least 17 species of mammal, (2 of which are threatened) (NRE 2000), 17 species of bird (Ambrose 1979; Emison *et al.* 1987; Menkhorst 1984b, *pers comm.* Appendix 1), and the threatened snakes Diamond Python *Morelia spilota spilota* and Carpet Python *Morelia spilota variegata*. However, the loss of hollow-bearing trees may not be the main factor affecting the conservation status of these species because they can use alternative sites.

For fauna that use hollows, the hollows are usually only important for shelter, roosting or nesting. Foraging occurs in surrounding habitat that does not necessarily need to contain hollow-bearing trees. For instance, while bats need large trees for roosting, some species will feed in younger forest at least 12 km from their roost sites (Taylor & Savva 1988; Cherry *et al.* 1992). Similarly, while the prey of Sooty Owls *Tyto tenebricosa* in extensive mature forests is largely hollow-dependent (Milledge & Palmer 1990), the owls will feed on a wider range of prey where suitable roosting and nesting habitat is only available in gullies within open or younger forest (Smith 1984; Loyn *et al.* 1986). The relative long-term success of populations in which the distribution of hollow-bearing trees is patchy is not yet known.

Another ecological issue is that some species need several hollows in close proximity, to support a social community, to provide a choice of hollows for different circumstances, to allow regular movements for hygienic reasons, or to avoid ectoparasites (eg with Brown Antechinus *Antechinus agilis*; Cockburn & Lazenby-Cohen 1992). Each species has its own requirements for type of hollow, and various habitat and social needs determine the density of hollows that may be most useful to that species.

There are several studies that suggest a shortage of hollows is limiting the abundance of some fauna species. In the Wombat State Forest, some species increased in abundance when artificial hollows were provided (Calder *et al.* 1979). Artificial hollows are more likely to be used in forests where hollows are scarce than where they are plentiful (Golding 1979; Menkhorst 1984a). In montane ash, River Red Gum and box-ironbark forests, strong correlations have been found between abundance of arboreal mammals and densities of old hollow-bearing trees (Smith & Lindenmayer 1988; Lindenmayer *et al.* 1991a,b; A. Bennett, Deakin University pers. comm.).

Status of threat

The 'Loss of hollow bearing trees from Victorian native forests' is listed as a Potentially Threatening Process under the **Flora and Fauna Guarantee Act 1988**. The 'Continuing net loss of hollow-bearing trees in native forests and woodlands due to firewood harvesting practices' has been nominated and recommended for listing as a Key Threatening Process under the Commonwealth **Environment Protection and Biodiversity Conservation Act 1999.**

Factors influencing the loss of hollow-bearing trees

Permanent clearing on private land or along roads

Permanent loss of hollow-bearing trees occurs primarily as a result of clearing for agriculture and urban development. Most of the losses from this cause have already occurred in Victoria but remnant trees are still being felled for firewood. This permanent loss has occurred and is continuing to occur primarily on private land in the grassy woodlands of northern and western Victoria and in Gippsland Burbidge 1985; Joseph *et al.* 1991). Changes to farming practices may lead to a loss of scattered trees on farms, including live or dead hollow-bearing trees. In the past decade there has been a substantial move from grazing to cropping in parts of Victoria, and towards large-scale irrigation systems, which can also lead to the removal of isolated trees.

These trees may represent important remnants of native forest. In addition, when hollow-bearing trees die from old age, exposure to windfall or as a result of land degradation, they are not being replaced through regeneration because of grazing by stock, rabbits and kangaroos.

Dead trees, which often contain hollows important to wildlife, are generally not protected under the current Native Vegetation Retention controls. Retention of hollow-bearing trees and encouragement of regeneration may be assisted by provision of financial incentives to forego the cutting of trees for firewood or fence posts, and to fence areas (using metal posts, in some cases) to encourage natural regeneration and to protect seedlings. Supply of artificial hollows may be necessary for endangered fauna, such as the Red-tailed Black-Cockatoo (Joseph *et al.* 1991), as an interim measure until natural hollows can be restored.

Large trees, many of which are likely to contain hollows, are commonly considered an essential feature of the rural Victorian landscape. The progressive loss of these trees in western Victoria may affect overall attitudes to the land, land values and the attractiveness of the region to tourists. Loss of these trees can have serious effects on erosion, water tables and soil salination. They provide a valuable source of shade and shelter for stock. Protection of trees involves outlays for fencing and other protective measures. It may involve some temporary cost in terms of stock numbers, and a reduction in firewood supply to sustainable levels.

Deliberate permanent removal of hollow-bearing trees from public land on a large scale has ceased but small, possibly significant, areas continue to be cleared through activities such as road construction. Roadside trees are a particularly important source of hollows in rural landscapes. Extensive tree planting schemes have been undertaken along new roads, and old trees have often been protected as well. However, there has also been a tendency to remove old trees when they are assessed as a hazard to traffic or a fire risk in relation to power lines. The management issue is to ensure the right balance, and in particular to avoid unnecessary removal of old hollow-bearing trees that may take centuries to replace.

Forest harvesting

Forest management practices that result in a net loss of hollow-bearing trees include timber harvesting, some silvicultural practices and fuel reduction burning. Relative to an undisturbed forest, the number of new hollows formed will be reduced on non-selectively harvested areas (ie clearfall and seedtree systems) because fewer trees grow on and replace old trees as they proceed through various stages of decay and eventual collapse. However, the rate of hollow development may increase as a result of incidental damage to retained trees during harvesting operations. Another consideration is that the survival of retained trees in and beside coupes may be reduced after harvesting through increased exposure and effects of fire used for regeneration. High intensity regeneration burns to promote ash germination can result in premature death of retained trees. However, less intensive regeneration burning in mixed species forests may enhance hollow development. In contrast, in an old forest, the major agents of tree death are fire, fungi and insects, whose effects may interact and increase with old age. These impacts are generally reduced in less intensive, selective harvesting systems such as those applied in mixed species and box ironbark forests where regeneration burning is less likely to take place.

Options available to forest managers to retain hollow densities include varying rotation periods, varying silvicultural systems, retaining areas of high hollow density, retaining existing hollow-bearing trees and trees likely to develop hollows in the future within areas available for harvesting.

Less than a quarter of the total area of State forest across Victoria is available or suitable for timber harvesting. In addition to maintaining a representative reserve system, it is crucial to manage non-reserved areas to ensure that sufficient habitat elements are protected and maintained into the future. Key mechanisms for conserving habitat features including hollow-bearing trees within State forest are:

- exclusion or modification of timber harvesting and other disturbances through the application of forest management zones, and/or
- application of prescriptions (rules) governing the way in which these activities are carried out to minimise impacts on habitat values. Forest management zones and prescriptions for the retention of wildlife habitat in State forests are specified in Forest Management Plans and Regional Forest Management Prescriptions, in accordance with the 'Code of Forest Practices for Timber Production' (CFPTP-NRE 1996). Prescriptions vary according to region and forest type.

In relation to hollow-dependent species, the critical factors to consider when developing prescriptions include:

- the habitat requirements of fauna species and their prey, including minimum number, size and type, location of hollow, preferred species and location within the landscape;
- the distribution of hollow-bearing trees taking into account dispersal distances of fauna species;
- the growth stages of the forest to plan for adequate recruitment of hollow-bearing trees over time;
- the forest in the context of the surrounding landscape and existing habitat;
- silvicultural considerations, including adequate regeneration response, and
- operational considerations, including occupational health and safety.

Fire

Severe wildfires can reduce numbers of hollows by killing most of a particular cohort of trees, resulting in a relatively even-aged regrowth with a few old or dead trees. This may create a

temporary abundance of hollows as large, fire-killed trees decay, but over the following decades these trees are likely to collapse more quickly than new hollows are formed. This is currently happening in the Central Highlands, where most trees in 65% of the montane ash forests were killed by wildfire in 1939 (Noble 1977; Smith & Woodgate 1985). The subsequent loss of dead hollow-bearing trees in these forests has been estimated at 3.6% per year, as measured over a five year period in the 1980s (Lindenmayer *et al.* 1990a). Most remaining stags with hollows will collapse in the next 75 years, leaving a period of at least 50 years when there will be a shortage of hollows for Leadbeater's Possum and other arboreal marsupials (Smith and Lindenmayer 1988; Lindenmayer *et al.* 1990a). The problem exists because trees that germinated after the 1939 fires are not yet old enough to develop hollows.

Fuel reduction burns are fires of low intensity used to remove the fine, more flammable fuel from strategic areas within forests and parks. Variables such as the frequency and intensity of prescribed fire and the forest type may also contribute to the rate of hollow development in trees, and the number and survival of trees with hollows. Ecological burning to achieve biodiversity conservation outcomes may also be a useful tool to alter habitat structure and manage for the loss of hollow-bearing trees.

Fire also causes a net loss of hollow-bearing trees in mallee woodlands, where the low canopy may be sensitive to wildfire. Although hollow loss may be accelerated when trees are killed or hollow limbs ignite, burn out and collapse, formation of new hollows may be accelerated by this damage, through subsequent loss of branches and entry of termites and fungal pathogens (Inions *et al.* 1989). In southern New South Wales, eleven species of hole-using mammals are thought to be advantaged by a regime of infrequent intense fires and one species disadvantaged (Catling 1991).

Hollows can also form in tree stumps and even fence posts through decay or fire, and these may be used by some species including Squirrel Gliders *Petaurus norfolcensis* (Traill 1991) and Turquoise Parrots (Quinn & Baker-Gabb 1993), especially where tree hollows are in short supply. However, in the case of Turquoise Parrots, predation of nesting female birds was suspected to be substantial because of their use of these hollows close to the ground (Quinn & Baker-Gabb 1993).

Other management options

Artificial Hollows

There is potential to overcome a scarcity of natural hollows through the provision of artificial hollows and the acceleration of natural hollow development, although the usefulness of artificial hollows, such as next boxes, varies considerably. For instance, the provision of artificial nesting boxes, along with close management of existing natural nesting hollows, is a major component of the recovery program for the endangered Kangaroo Island Glossy Black-Cockatoo (Garnett *el al.* 2000). Artificial nest boxes were also provided for Red-tailed Black-Cockatoo in south-western Victoria, but with minimal success so far. Turquoise Parrots were reluctant to use nest-boxes but used hollow logs strapped to trees (Quinn & Baker-Gabb 1993). In the Whipstick Forest near Bendigo, Brush-tailed Phascogales *Phascogale tapoatafa* used at least one box in each clump of boxes provided (T. Soderquist *pers. comm.*). The provision of nest boxes was instrumental in the successful reintroduction of Sugar Gliders to Tower Hill (Suckling & Macfarlane 1983).

Accelerating hollow-development

The rate of natural hollow formation could be artificially accelerated, such as through removal of tree-tops using explosives, inoculation of trees with fungi (Lindenmayer *et al.* 1991d) or chemicals, artificial establishment of termites, thinning, burning, killing selected trees and direct drilling. A shortage of hollows in regrowth forests resulting from wildfire or past utilisation may be addressed through ecological thinning to promote growth and branch development. It may also be possible to accelerate hollow formation through choice of trees to be used in regeneration or replanting schemes. However, the broad practical application of this process has yet to be demonstrated, and it is likely that, at least initially, it could be applied only in limited specialised circumstances, such as for conserving a highly endangered species. In National Parks and some other reserves, many other factors (eg fire, feral bees) may require management to ensure a continuing supply of available hollow trees.

Existing management measures

- Regulations have been introduced to control and reduce the extent of clearing on public and private land. The Glenelg and West Wimmera Shires have included an Environmental Significance Overlay to protect Red-tailed Black Cockatoo habitat in their local planning schemes Both State and Local Government agencies are involved in the administration of these regulations.
- Many private initiatives by individuals and groups have been taken to maintain existing hollow-bearing trees and to provide artificial hollows. The Bird Observers Club of Australia (BOCA), Bendigo Field Naturalists Club and

Healesville Sanctuary have each produced leaflets on hollows and nest-boxes, with BOCA having a wide range of artificial nest boxes for sale to the public. Healesville Sanctuary conducts an education program including this issue for students. The Victorian Field and Game Association has a number of active programs supplying nest-boxes for waterfowl and encourages its members to undertake individual initiatives.

- The Code of Forest Practice for Timber Production 1996 (Code) requires that planning and harvesting operations in native forests specifically address the conservation and protection of flora and fauna values including the protection and provision for recruitment of old trees and strategies for maintaining a mosaic of corridors and zones to enhance conservation values and biodiversity.
- A comprehensive forest management planning framework, which includes Regional Forest Agreements, Forest Management Plans and associated comprehensive adequate and representative reserve systems, and forest management prescriptions, provides for ecologically sustainable management of Victoria's forest resources.
- Forest management prescriptions provide detailed measures for maintenance and protection of State forest habitat values and indicate how they are to be implemented and how they should be varied for particular forest locations.
- In 2001, the State Forest Flora and Fauna Habitat Management Working Group, recommended a series of objectives and principles for a statewide review of prescriptions for the retention of wildlife habitat, including hollow-bearing trees, within the General Management Zone of Victoria's State forests The recommendations of the Working Group provide for a landscape approach, taking into account harvesting methods, the requirements of key sensitive species and the extent of harvesting within forest landscapes. These principles and objectives will underpin the review of prescriptions for habitat retention across the state.
- Prescriptions for retention of habitat based on the Working Group recommendations are applied in the Wombat State Forest to protect existing and future hollow-bearing trees in harvested areas.
- Detailed prescriptions have been developed and implemented for Leadbeater's Possum in montane ash forests (Macfarlane *et al.* 1995). Under these prescriptions live stands of montane ash forest >120 years old are excluded from logging as well as regrowth ash with >12 hollow-bearing trees/3ha. Veteran old trees are retained on coupes and measures taken to protect them. Trees are also retained to provide hollows in the future, though the optimal pattern and size of retained stands is not yet known and requires further research. Refer to Action Statement
- Research has been conducted on various aspects of hollow-bearing trees for at least 19 wildlife species (Appendix 2).
- Data have already been collected about the incidence of hollows and ground debris from over 3000 State Forest Resource Inventory field plots in State forest throughout Victoria
- Artificial hollows have been erected in numerous forests, often with high occupancy rates (eg Menkhorst 1984a, 1994b; Traill & Lill 1998), including by reintroduced Sugar Gliders (Suckling & Macfarlane 1983) and Brush-tailed Phascogales (T. Soderquist *pers. comm.*).
- Extension work has begun in farmland to encourage the exclusion of stock to allow regeneration, planting of native vegetation and retention of existing vegetation (Landcare, Greening Australia, Potter Farmland Plan, Land for Wildlife). The *Land for Wildlife* scheme has encouraged retention of hollow-bearing trees and management of retained wildlife habitats by its members on nearly 4,000 properties. Regular newsletters, a technical note (Note No. 20), newspaper articles and field days have addressed this issue for a wider audience.

Major Conservation Objectives

Long term objective

To ensure that the conservation status of Victorian fauna is not compromised by a shortage of hollow-bearing trees.

Objectives of this Action Statement

- Significantly reduce the loss of hollow-bearing trees from private land and encourage their retention and replacement.
- Manage parks and State forest to ensure that an appropriate level of hollow-bearing trees is restored and maintained in all forest types.
- Foster an appreciation of the role and importance of hollow-bearing trees in Australian ecosystems.

Intended management actions

The intended management actions listed below are further elaborated in DSE's Actions for Biodiversity Conservation Database. Detailed information about the actions and locations, including priorities, is

held in this system and will be provided annually to land managers and other authorities.

Private land and roadsides

1. Identify, assess and map significant areas or stands of hollow-bearing trees on private land and on roadsides.

   Responsibility: DSE Regions, Catchment Management Authorities, local government authorities, Vicroads

2. Incorporate information on the location and significance of hollow-bearing trees into local government planning mechanisms such as the Vegetation Protection and Environmental Significance Overlays. Develop and apply appropriate planning controls to achieve protection of all significant stands or trees.

   Responsibility: local government authorities

3. Protect hollow-bearing trees and stags on existing roadsides and new alignments, where it is safe to do so. Assess and map stands or isolated trees and incorporate this information early in the planning and execution of road construction and maintenance works.

   Responsibility: local government authorities, Vicroads

4. Incorporate information on the location and significance of hollow-bearing trees into Regional Catchment Strategies and Regional Implementation Plans, via Biodiversity Action Plans. Target activity and investment towards the protection of significant areas or stands of hollow-bearing trees.

   Responsibility: Catchment Management Authorities

5. Provide information and advice to assist local government authorities, Catchment Management Authorities, developers and landholders to protect hollow-bearing trees.

   Responsibility: DSE Regions

6. Continue to encourage and assist private landholders to protect hollow-bearing trees and stags via voluntary programs such as Land For Wildlife, BushTender and Trust for Nature covenants.

   Responsibility: DSE Regions, Trust for Nature

State forest

7. Continue to identify significant areas or stands of hollow-bearing trees in State forest, using the State Forest Resource Inventory and other relevant information, to inform management decisions.

   Responsibility: DSE Parks and Forests Division, DSE Regions

8. Continue to implement a range of measures to maintain or enhance the extent and/or density of hollows in State forest where this is known to be limiting the distribution and/or abundance of hollow-dependent species. These measures include:

- Application of management guidelines, including forest management zones and prescriptions, for fauna species as provided in Forest Management Plans (e.g. Leadbeaters Possum Special Protection Zones and prescriptions).
- The development and application of revised habitat retention prescriptions for areas within the General Management Zone (GMZ) in accordance with the principles and objectives established by the State Forest Flora and Fauna Habitat Management Working Group.

   Responsibility: DSE Forests Service, DSE Regions

Parks and reserves

9. Identify, assess and map significant areas or stands of hollow-bearing trees on parks and reserves, targetting priority species and areas as required.

   Responsibility: Parks Victoria

10. Incorporate measures to maintain or enhance the extent and / or density of hollows in park and reserve management plans where this is considered to be limiting the distribution and / or abundance of hollow-dependent species.

    Responsibility: Parks Victoria

Research and Monitoring

11. Continue to conduct research, including investigation into the formation of hollows and measures to enhance this process, the use of hollows by hollow-dependent species and the effect of hollow distribution and characteristics on population size and reproductive success in such species.

    Responsibility: DSE (Biodiversity and Natural Resources Division)

12. Continue work investigating the use of forest inventory mapping of hollow-bearing trees for developing predictive models of hollow incidence to facilitate appropriate forest management. Initial work has been undertaken (Fox *et al.* 2001).

13. Develop cost effective methods for monitoring the effectiveness of habitat retention measures on a landscape scale.

    Responsibility: DSE (Parks and Forests Service, Biodiversity and Natural Resources)

14. Use the native vegetation permit tracking system to monitor the loss of hollow-bearing trees on private land.

Responsibility: *DSE (Regions)*

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Flora and Fauna Guarantee Action Statements are available from the Department of Sustainability and Environment website: http://www.dse.vic.gov.au

This Action Statement has been prepared under section 19 of the Flora and Fauna Guarantee Act 1988 under delegation from Professor Lyndsay Neilson, Secretary, Department of Sustainability and Environment, September 2003.

Published by the Department of Sustainability and Environment, Victoria. 8 Nicholson Street, East Melbourne, Victoria 3002 Australia