REVIEW OF ECOLOGICAL REPORTS –

BELMONT PRECINCT DA0467/15, REDBANK, NORTH RICHMOND

INTRODUCTION

This review has been prepared by Dr Renata Bali from Ecosense Consulting Pty. Ltd. As a member of the EDO NSW's Register of Experts, I was asked to undertake an ecological review of the following reports for the North Richmond and Districts Community Action Association Inc. This review was based on the following project documents:

- Statement of Environmental Effects Belmont Development Application (JBA Urban Planning July 2015);
- DA 12 Ecological Assessment Final Report (Molino Stewart July 2015);
- Cumberland Plain Woodland Management Plan (Molino Stewart July 2015);
- Bushfire Assessment Report (Molino Stewart July 2015);
- RFS Referral Response dated 4 September 2015;
- Tree Assessment (Arterra Design June 2015); and
- Plans relating to development, earthworks, roadworks, landscape and public domain.

In preparing this review, I have also referred to the following background documents:

- LEP Planning Proposal Redbank at North Richmond (JBA Urban Planning March 2012);
- Redbank Environmental Constraints and Benefits Analysis and Preliminary 7-Part Test (GHD May 2013);
- Report for 108 Grose Vale Rd, North Richmond Environmental Constraints and Benefits Analysis (GHD March 2009);
- Report for the proposed Seniors Housing Development Application at North Richmond – Flora and Fauna Impact Assessment (GHD 2008);
- Flora and Fauna Assessment Lot 74 DP1187236 [DA 06], 98 Grose Vale Road, North Richmond (Molino Stewart July 2014a);
- North Richmond Redbank Riparian Assessment DA 04 and DA 06 (Molino Stewart July 2014b);
- Bushfire Threat Assessment 12 Rural/residential Allotments Lot 74 DP 1187236 [DA 06] "Redbank" Belmont Grove North Richmond (McKinlay Morgan & Associates June 2014);
- DA 10 Biodiversity Assessment (Appendix K,Statement of Environmental Effects (SEE) for 98 Grose Vale Road, Molino Stewart July 2014c);
- Tree Assessment (Appendix K, SEE for 98 Grose Vale Road [DA 10], Arterra Design July 2014);

- Proposed Grose River Bridge Crossing at Yarramundi – Opportunities and Constraints Analysis Final Report – Appendix D Biodiversity Assessment (Molino Stewart September 2014);
- DA 12 Belmont Riparian Assessment Final Report (Molino Stewart July 2015);
- Redbank Creek, Belmont Precinct, Plan of Management Draft Interim Plan (Molino Stewart September 2015);
- OEH submission on Planning Proposal for Lot 2 DP607906 at 396 Bells Line of Road Kurmond dated 28 July 2014;
- Hawkesbury Council LEP maps showing significant vegetation; and
- Cumberland Plain Recovery Plan (DECCW 2011).

This review comprises a desktop study only and no site visit was undertaken. I note that I am familiar with the DECCW survey and assessment guidelines as I reviewed earlier drafts of these documents for the Department.

BACKGROUND - PREVIOUS STUDIES

It was not possible to review the SEE Ecological Assessment without examining previous ecological studies that have been conducted on Redbank because:

- There was not enough relevant information provided in the report;
- Previous studies set the ecological context for the Belmont Precinct.

A summary of the previous ecological studies is provided in Table 1. It should be noted that I did not have access to AMBS (2006, in GHD 2009) or to ecological assessments relating to DA 03 (1 lot) and DA 04 (1 lot) referred to in Molino Stewart (Section 2.1c, 2015).

These reports provide a snapshot of development impacts that have occurred or are likely to occur over the entire Redbank site (i.e. the cumulative impacts). The reports are intricately linked in that the GHD surveyswere undertaken on the same dates and parts of the reports are replicated. Similarly two of the Molino Stewart (2014a, c) surveys were undertaken on the same dates and all three of the reports have replicated sections.

The environmental constraints and benefits analysis conducted by GHD in 2009 is necessarily preliminary because it sought to assess the entire Redbank site (180 ha) and to identify critical environmental features. In my opinion, although it is relatively short (2 days, 1 night), it is the most thorough of any surveys conducted and moreover, it is most consistent with the DECCW guidelines. In my opinion, surveys undertaken within each of the smaller DA subdivisions should have been more comprehensive and expanded upon the original survey records. Instead, surveys undertaken in 2014 and 2015 were conducted in autumn or winter and did not include flora quadrat analysis or targeted fauna

surveys as per DECCW guidelines. Together, they added only one new threatened fauna species (i.e. Powerful Owl) to the list provided in GHD (2009).

I am particularly concerned about the botanical assessments that have been undertaken since 2009 (including the SEE). GHD (2008, 2009) identified River-flat Eucalypt Forest Endangered Ecological Community (RFEFEEC) along the margins of Redbank Creek. This was based on analysis of three 20x20 m quadrats and random meanders throughout the riparian vegetation.In 2014, Molino Stewart changed the classification of various sections of RFEF to Forest Red Gum-Grey Gum-Broad-leaved Angophora grassy woodland, based on broad floristic description, but did not provide any detailed quadrat data to support that decision. This reclassification of RFEF was repeated in reports relating to DA 10 and DA 12 (Belmont Precinct) but no further quadrat data were presented. While this change may be justified, I am aware that identification of EECs can be a complex process that the presence/absence of particular species is not necessarily indicative of a particular EEC (e.g. see OEH comments dated 28 July 2014). It is therefore important for botanical experts to be able to inspect raw data to independently confirm the identity of vegetation communities.

Downgrading EECs to a more common community type is likely to lead to their future loss through clearing or inadequate protection. For example, the riparian assessment for DA 04 and DA 06 (Molino Stewart 2014b) shows that most of this community falls within Lots 1-8 (Fig. 11). Although Fig. 4 shows a uniform 10-m APZ in the outer 50% of the Vegetated Riparian Zone (VRZ), the bushfire assessment (McKinlay Morgan & Associates June 2014) reveals that Lot 2 (furthest west) would have to be managed as an APZ in its entirety while Lot 8 (furthest east) would require a 15-20 m APZ within the VRZ. This would result in a significant fragmentation of the riparian corridor (see Fig 11); I have not seen the bushfire assessment for DA 04 which is shown as mostly vegetated. Furthermore, downgrading of the EEC has resulted in Policy 13 of the Conservation Management Plan (Urbis 2013) being superceded in relation to RFEF (see Molino Stewart July 2015, p. 26).

Flora surveys undertaken since 2009(including the SEE) also downgraded the significance of patches of native vegetation due to their "isolation, poor condition and the absence of key diagnostic flora", arguing that these did not constitute 'support for core habitat' as identified on NPWS Conservation Significance mapping (2002). While classification into vegetation communities is dependent on species composition and coverage, the identification of 'core habitat' and 'support for core habitat' is determined on the basis of an overview of the area in terms of broad-scale vegetative coverage and linkages. Mapping does not recognise land ownership or level of degradation. Even degraded native communities are likely to provide more support for core areas than residential lots.

GHD (2009) confirmed the presence of 3 threatened bat species on the Redbank site. The authors also identified and/or mapped key habitat resources (e.g. high quality dams, paddock trees, hollow-bearing trees) and regionally significant species (flora and fauna), and identified potential habitat for threatened fauna species. However, it appears that none of the fauna surveys undertaken since 2009 targeted key resources or significant species or timed survey work to coincide with ideal seasonal conditions for detecting threatened species. Although all reports stated that the DECCW guidelines had been followed, I found no evidence that this had been done (i.e. maps and/or tables indicating survey coverage and effort, data sheets, descriptions of weather conditions at the time of survey, targeted surveys, etc.).

COMMENTS ON THE CURRENT DA 0467/15

Comments below relate specifically to the Ecological Assessment prepared by Molino Stewart (July 2015) for the current DA 0467/15 incorporating the issues discussed above and with reference to other reports related to the Belmont Precinct.

GENERAL COMMENTS SEE

1. The Ecological Assessment states that the methodology and assessment of significance follows the DECCW survey and assessment guidelines (2004) but I can find no evidence of this for flora or fauna surveys (e.g. too few stratification units, no maps showing coverage, no tables showing effort, no justification for lack of targeted surveys, surveys at wrong time of year, no weather data provided).
2. The report lists some of the previous assessments conducted within the Redbank site, but does not compile or review data from all previous reports as a basis for targeted survey work. A review of previous reports is essential to provide an ecological context for the Belmont site.
3. I have serious concerns about the Belmont Precinct botanical survey coverage and effort. It appears that no quadrat or cover-abundance data was collected as part of the ecological assessment and that surveys were restricted to random meanders. The ecological assessment under review and the previous background reports reclassify the RFEF EEC to Forest Red Gum-Grey Gum–Angophora grassy woodland without providing any quadrat data to substantiate this claim. In my opinion, an independent review of the vegetation community assessment is required.
4. The impact of removing 214 trees and most of the hollow-bearing trees from Belmont Precinct on threatened fauna species has not been assessed. Although the importance of hollow-bearing trees for fauna was acknowledged in the report, the impact of their removal on threatened species was not assessed. There is no evidence to demonstrate that paddock trees or hollow-bearing trees were targeted for survey work even though up to 7 threatened bat species potentially occur on site.

5. There is no evidence to show that farm dams were targeted for survey. This is despite the fact that GHD (2008) described Dam 1 as being "good quality" and potential habitat for Green & Golden Bell Frogs. The impact of removing Dam 1 on threatened and regionally significant fauna species was not assessed.
6. A very low fauna species diversity was recorded on site and this may be partly due to the fact that fauna survey was undertaken during autumn and that coverage and effort was insufficient.
7. The discussion about development impacts on threatened species is limited to only those species actually recorded on the site; it should include all threatened and regionally significant species potentially occurring on or adjacent to the site. Regionally significant species are not mentioned even though some of these are associated with higher quality habitat onsite.
8. The assessment report is written as if the site has already been cleared. The authors consider only those habitats that are to be retained or rehabilitated to be beneficial while all those areas to be removed are described as isolated, degraded or unhealthy. Key habitat features are described in terms of whether they will be retained or removed.
9. Although listed threats are assessed generally, the direct and indirect impacts associated with urban development have not been specifically assessed. There is therefore no basis to conclude that impacts on flora and fauna are "minimal, if any".
10. Amelioration measures are described vaguely and do not address those impacts specifically associated with urban development. Although management actions are linked to remnant Cumberland Plain Woodland EEC (CPW) and the drainage corridor, Stream P, within various SEE reports, management of riparian vegetation within the Redbank Creek corridor are linked to several DA approvals.
11. Cumulative ecological impacts have not been described or assessed within the context of other known and proposed developments within the locality.
12. A biodiversity offset strategy has not been developed to mitigate the long-term impacts of urban development at Redbank.

DETAILED COMMENTS

These comments generally refer to the Ecological Assessment (SEE Appendix M) prepared by Molino Stewart (July 2015).

Section 1.4 Stratification into Survey Zones

It is not clear why only 3 stratification zones were identified. According to the DECCW guidelines, these should correspond to vegetation communities/habitats identified on the subject site (see Fig 2 and Fig 12) and including the drainage zone (downstream of Dam 10) and farm dams. According to the DEWCC guidelines there should have been five survey zones.

I found Fig. 2 and Fig. 12 to be misleading. There is no indication on either map that the area to the north of Belmont Precinct is subject to a separate DA application which would result in most or all of the Forest Red Gum-Narrow-leaved Ironbark Grassy Woodland and much of the Forest Red Gum-Grey Gum-Angophora grassy woodland (formerly RFEF EEC) being cleared for building envelopes or APZs. Large lot residential lots associated with DA 06 should be overlaid on this section.

Section 2.2 (a, b, c) Previous Studies

There seems to be disagreement amongst previous studies about the vegetation communities/EECs present on site. I would have expected the SEE to compile all the previous data and then target survey work to positively identify vegetation communities present and to address any gaps in previous surveys.

Section 2.2c Recent residential subdivision applications

In my opinion, this section does not adequately summarise development in and around Redbank. It lists but does not discuss the findings of ecological reports relating to DA 03, DA 04 and DA 06 adjoining the northern boundary of Belmont Precinct. It does not mention reports relating to the Seniors facility or DA 10 located to the east. It does not review the findings of any other residential subdivisions within the Hawkesbury area (i.e. 32 lot subdivision at Kurmond). In my opinion, this section should have compiled the findings of all relevant studies in order to refine and direct present and future survey work. All relevant DA applications should be shown on a map so that it is possible to observe their connectivity to each other and to the subject site. Without this information, I do not consider that it is possible to fully understand the cumulative ecological impacts of this proposal within the context of surrounding development.

Section 2.4 Site Survey

Flora survey effort should be shown on a map so that the reviewer can assesswhether survey coverage was adequate. It appears that no quadrats were sampled although four quadrats were undertaken as part of a previous (GHD 2009) study. If there was any doubt about the identification of vegetation communities/EECs within or adjacent to the subject site, the authors should have collected and analysed quadrat data for verification.

I also query the effect that the timing of the survey (March) had on the detection of threatened or regionally significant species.

Section 2.6.1 Survey Zone 1

In my opinion, the second patch of retained vegetation dominated by Narrow-leafed Ironbark should have been considered as a separate stratification unit and surveyed accordingly. GHD (2009, Section 3.1.2) noted that the CPW

community (including this isolated patch) showed "strong resilience and regeneration potential".

Section 2.6.2 Survey Zone 2

Isolated paddock trees at Belmont are described as generally over-mature or unhealthy; it should be noted that this terminology is not appropriate in an ecological assessment, because it is precisely these trees provide fauna with important roosting and nesting habitat (e.g. hollows, stags, decorticating bark, fissures). Similarly, those trees classed as being of low retention value (128) by Arterra (2015) on the basis of health, safety or visual criteria, are likely to provide foraging and roosting habitat for mobile species, especially birds and bats. The report should assess the removal of 214 trees (70 considered to be of high to medium retention value) to these fauna species. Also, the impact on fauna of retaining mainly younger trees predominantly along the edges of the site needs to be assessed.

GHD (2009, Figure 4) mapped hollow-bearing trees occurring over the entire Redbank site. However, this map is no longer current; 50 trees, including hollow-bearing trees, will be/have been removed as part of the construction of DA 10 in the eastern part of the site (Arterra July 2014). An unknown number of trees were also removed during clearing for the Seniors Facility. Removal of trees (and hollow-bearing trees) associated with Belmont must be assessed in relation to remaining trees and to those proposed to be removed from Redbank in the future as cumulative impacts.

The report is vague with regards to the number of hollow-bearing trees that will be retained. Table 9 states that all hollow-bearing trees outside the development area will be retained. However, hollow-bearing trees within residential development would be retained or'relocated'. How many hollow-bearing trees are located within proposed residential lots? How will hollow-bearing trees be 'relocated' to other ecologically important areas?

Section 2.6.3 Survey Zone 3 Riparian Zone

This survey zone has not been described in Section 1.4 of the report. Here it is defined as "grazing land downstream of Dam 10" and the "existing vegetation along Redbank Creek". The latter community is described as having more affinity with Sandstone Shale Transitional Forest (low influence) than with River Flat Eucalypt Forest EEC (GHD 2009). However, no data is presented to substantiate this classification. Why were these two 'riparian' communities not identified as stratification zones? Why are there no quadrat data presented to verify vegetation communities?

Section 2.6.4 Survey Zone 3 Farm Dams

The description of Dam 1 takes no account of the fact that GHD considered this dam to be 'good quality' (Dam 8 in GHD 2008, 2009) and potential habitat for

Green & Golden Bell Frogs. They described this dam as having moderate fringing vegetation and good instream vegetation, being surrounded by regenerating CPW, stag and roost sites and exhibiting only minor erosion and sedimentation and cattle trampling (Table 4). Based on that description, I consider that Molino Stewart ought to have conducted targeted surveys for amphibians, bats, hollow-nesting species and waterbirds around the dam. It may also be used as a watering source for Eastern Grey Kangaroos, a species of regional significance. Although GHD recommends retaining this dam within a 'pocket park', Molino Stewart only mention it with regards to its removal (p.14, Table 6).

Molino Stewart (2015) refers to Dam 10 as the "more ecologically important dam" (p. 28) even though GHD gave this dam a 'moderate' rating (Table 4).

Figure 12 Vegetation Communities

There is no indication on this map that the area to the north of Belmont Precinct is subject to a separate DA application which would result in most or all of the Forest Red Gum-Narrow-leaved Ironbark Grassy Woodland and much of the Forest Red Gum-Grey Gum-Angophora grassy woodland (formerly RFEF EEC) being cleared. Residential lots associated with DA 06 should be overlaid on this section.

Table 6 Habitat Features

This table presents a very simplified assessment of habitat features. I would expect it to link habitat features to locations within the subject site and to threatened, regionally and locally significant species likely to be found on the subject site. Habitat features are described mainly on the basis of whether they will be retained or removed.

The fact that no flora species were flowering during the survey does not mean that none are present. The timing of the survey in March is not appropriate to observe those threatened fauna species that are dependent on nectar resources. Winter flowering species are not only present in CPW.

Although the only threatened species identified on site were insectivorous bats, there is no assessment of the loss of important resources such as paddock trees and farm dams to this fauna group. A quick online search shows that there are many articles and papers that describe the importance of these resources especially for bats and birds:

- Bats in a Farming Landscape Benefit from Linear Remnants and Unimproved Pastures (Lentini *et al*. 2012) http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3498260/
- The Importance of Paddock Trees in the Landscape (Stothers, no date)

http://www.mitchellshire.vic.gov.au/downloads/Services/Environment_and_Waste/Environment/Enviro-Grants/The_Importance_of_Paddock_Trees_in_the_Landscape_web.pdf

- The importance of paddock trees for regional conservation in agricultural landscapes (Gibbons & Boak 2000)
- Scattered trees are keystone structures – implications for conservation (Gibbons & Lindenmeyer 2008)
- The disproportionate value of paddock trees (Fischer *et al*. 2010) http://www.environment.nsw.gov.au/projects/PaddockTreesInAgriculturalLandscapes.htm
- Scattered trees in rural landscapes: foraging habitat for insectivorous bats in south-eastern Australia (Lumsden& Bennett 2005) http://data2.xjlas.ac.cn:81/UploadFiles/sdz/cnki/%E5%A4%96%E6%96%87/ELSEVIER/evironmental%20risk%20assessment/169.pdf
- Fauna on Case Study farms (Reid *et al*. 2006) http://www.wool.com/globalassets/start/on-farm-research-and-development/production-systems-eco/environment/biodiversity/lww_veg_fauna-on-case-study-farms1.pdf

When the Redbank site is fully developed, it is likely that only a small proportion of the existing paddock trees will be retained. In my opinion, this will affect the regional and local distributions of all those threatened, regionally and locally significance species potentially found on the site, and therefore needs to be considered.

2.8 Survey Limitations

It has not been demonstrated how the flora survey followed DECCW guidelines with respect to survey timing, stratification or effort. Survey coverage and effort from Molino Stewart (2015) should complement that of previous studies (e.g. AMBS 2006; GHD 2008-9; Molino Stewart 2014a,c) to ensure that the subject site is comprehensively surveyed.

Section 3 Fauna Assessment

The fauna assessment should not be restricted to the area of impact; it should cover adjacent areas in recognition of the fact that residential development and associated infrastructure will have indirect effects on surrounding habitats (i.e. edge effects, human activity, increased fire risk, etc.). Survey work has not been undertaken in each stratification unit at effort levels specified in DECCW guidelines.

Section 3.4 Site Survey

There is not enough information provided here for the reviewer to assess whether the survey coverage was sufficient to meet the DECCW guidelines. Survey transects, meanders and fixed sampling locations should be shown on a map.

Survey effort included stag watching (6 hours), spotlighting (6 person-hours), call playback (6 species, 2X/night from 2 locations), bird surveys (20 min/location, total?) and diurnal searches (2 kms). This does not appear to satisfy DECCW guidelines that specify survey methods and effort to be undertaken in each stratification unit.

Although the authors considered that trapping on site was 'not warranted', they gave no justification for not deploying hair tubes. Stag-watching is a time-consuming exercise with only a small likelihood of success; it would have been more efficient and wide-ranging to deploy hair tubes in a large number of trees.

The survey did not include Anabat detection or mist-netting even though up to seven threatened bat species potentially occur on the site (GHD 2009, Table 5). Given the importance of paddock trees and farm dams to this fauna group, I would have expected survey effort to be concentrated in these areas.

It appears that no targeted amphibian or reptile searches were undertaken even though woody debris, woodpiles, remnant bushland and rocky outcrops (along Redbank Ck) provided suitable habitat (GHD 2009). GHD (2009) also noted that Redbank supported a moderate diversity and abundance of frogs and recorded 3 additional species: Whistling Tree Frog, Striped Marsh Frog and Smooth Toadlet. The latter is a species of regional significance. What effect will development of the subject site have on its regional and local distribution?

Section 3.8 Fauna Recorded

A very low fauna species diversity was recorded (30 species) on site and this may be partly due to the fact that fauna survey was undertaken during autumn and that coverage and effort were insufficient. While five common frog species were detected, reptiles did not appear to be targeted at all. The bird species diversity was considered to be low (23 species) and most of the species recorded are common; although the authors claim that this is due to the lack of habitat, it could also be due to poor survey effort, inappropriate time of year and observer inexperience. In fact GHD (2009, Section 3.3.1) noted that there was a moderate diversity of birds at Redbank and suggested that it provides a range of habitats for native birds. They noted that cleared pasture, native grasses in CPW, nectar resources in RFEF and hollow-bearing trees throughout the site, are all important habitat features for birds. All these habitat types are found within Belmont Precinct.

I would have expected that fauna data from GHD (2009) would have been compiled in Table 8 to give an indication of all species likely to be found on the subject site. The impact assessment should consider all species potentially found within and adjacent to the Redbank site. Flora and fauna do not recognise the artificial boundary delineating the Belmont Precinct or Redbank.

Section 3.9 Discussion of Threatened Species

The discussion is limited to those species that were actually detected on site. It should include all threatened species potentially occurring on or adjacent to the site (see Table 7and also Table 5 in GHD 2009). It should include a discussion of the habitat resources available onsite and how removal of those resources would affect populations of threatened species at the state, regional and local levels.

GHD (2009) recorded flora and fauna of regional significance (Table 6) at Redbank: King Quail, Eastern Shrike-tit, Eastern Grey Kangaroo and Smooth Toadlet. The Eastern Shrike-tit was observed along Redbank Creek; this species is typically associated with more complex vegetation structure and larger patch size as are the White-throated Treecreeper and Spotted Pardalote(also recorded by GHD). The Smooth Toadlet is associated with better quality aquatic habitat with native ephemeral vegetation. It is important to assess how the local and regional distributions of these species are likely to change as a result of development at Redbank.

Table 9 Key Resources

As for the ***Habitat Features*** table (see above), this table describes key features largely on the basis of whether they will be retained or removed. In my opinion, these should be linked to threatened and regionally significant species and to locations within the subject site and the Redbank site. How much 'suitable habitat' will remain at Belmont in relation to that contained within the Redbank site? The cumulative loss of key resources must be assessed in relation to the development of the entire Redbank site, not just Belmont Precinct.

Section 3.11 Limitations

The authors recognise that autumn is not an ideal time to survey.Although they note that species recorded are 'similar' to those recorded in previous studies, they neglect to compile all previous records (i.e. in tables, by assessing impacts on them). Although the authors state that they are applying the 'precautionary principle' by assuming that any threatened species is likely to occur if suitable habitat is present, they only assess the impact on development on those species actually recorded on site.

In my opinion, the entire report has been written as if the development has already occurred. There has been no attempt to assess the importance of existing resources and habitats to flora and fauna species; these have been described on the basis of whether they are to be removed or not. The authors consider only those habitats that are to be retained or rehabilitated to be beneficial while all those areas to be removed are described as isolated, degraded or unhealthy. In my opinion, this is an inappropriate way to conduct an ecological assessment.

Section 4– Threat Assessment

This section does not attempt to quantify or qualify environmental impacts associated with residential development but instead describes ecological threats in vague terms:

"Clearing of selected trees and regrowth is required for the access roads and earthworks associated with the residential lots."

"...where possible, mature trees shall be retained within the residential lot, or, if cleared..."

"This road crossing shall incorporate a culvert which may provide a fauna underpass..."

"Part of the patch of Narrow-leaved Ironbark woodland that occurs outside of the RE1 in the southern part of the Precinct shall be removed."

The rest of this section emphasises how amelioration measures proposed will 'compensate' for any impacts in equally vague terms.

Although listed threats must be considered in the report, I would expect this section to assess the direct and indirect impacts of urban development on flora and fauna known to occur or potentially occurring on the site. In my opinion, this section should attempt to answer the following questions:

What key resources will be removed as a result of development? How many hectares of native vegetation will be removed? How many trees, including hollow-bearing trees, will be removed? What proportion of key resources, native vegetation, paddock trees and dams does this represent on Redbank and within the region? How will removal of key habitat resources and habitat affect the distribution of threatened and regionally significant species? Will all species presently using the site be able be able to survive in a 53-m wide newly planted drainage corridor containing a fire-access track, transected by a road and surrounded by houses? If not, where will they go?

We know from the Tree Assessment (Arterra 2015) that 214 trees will be removed from the site and that 70 of them are considered to be medium to high retention value. Why is this not mentioned in the Ecological Assessment? There are many scientific papers demonstrating that paddock trees are an important resource, especially for bird and bat species, and yet the impact of removing 214 trees is considered to be insignificant. How has this conclusion been reached, especially considering that these were not targeted through survey?

This section does not consider the many indirect effects associated with residential development that will result in further habitat loss through

fragmentation and degradation. It is not accurate to say that the site is already degraded, implying that it cannot be degraded or fragmented further for threatened and regionally significant species using it (e.g. bats, birds, kangaroos, quail). Once paddock trees, grasslands, native vegetation and dams are removed and it is covered in houses and roads, the precinct is not likely to support these species and they will be replaced by urban tolerant pests. Pastures and even weedy regrowth presently act as a buffer between EECs and houses. Their removal will result in native vegetation abutting urban subdivisions and being subjected to edge effects including weed invasion, increased predation pressure and pollution. Human activities associated with residential development will act to further degrade native vegetation through dumping of garden waste and rubbish, increasing the risk of bushfire, removal of dead wood and bushrock and off-road vehicle use. Other indirect impacts include predation by pets, increased traffic, erosion and sedimentation, polluted run-off, increased noise and light, etc.

Impact assessment must also consider the vegetation to be cleared or fragmented as a result of bushfire risk management, including APZs and 10/50 clearing provisions.

Molino Stewart (2015) argues that all the vegetation and trees to be removed are isolated, degraded and/or unhealthy while the habitat to be retained is good quality and will be maintained and managed in perpetuity. However, once the site is cleared, the EECs bordering Belmont Precinct will be subject to increasing indirect impacts from adjacent residential lots and associated human activity.

For example, according to the Cumberland Plain Recovery Plan (DECCW 2011), the main threatening processes affecting CPW are weed invasion, arson and urban run-off. These will be exacerbated when buffering vegetation is removed, leaving only a fire access track separating residential lots from the good quality CPW. Notwithstanding the Cumberland Plain Woodland Management Plan that proposes weed management and revegetation strategies (Molino Stewart 2015), the site is still zoned as Public Recreation (RE1) and so will be subject to ongoing human disturbance from visitors.

Similarly, the good quality vegetation communities found along the southern side of Redbank Creek will be under increasing pressure from direct and indirect impacts associated with residential development. Presently riparian vegetation is buffered by agricultural land but recent DA applications (i.e. DA 04, DA06) are proposing to subdivide the area between Belmont Precinct and the creek into 14 residential lots with at least 7 of them abutting the riparian corridor and a high quality dam where three species of threatened bats were recorded (Fig. 2, Molino Stewart 2014). The creek corridor also supports bird species that prefer vegetation complexity and/or intact forest habitats and good quality habitat for reptiles and amphibians. Although no clearing would be allowed within 15 m of

the creek (i.e. inner 50% of the Vegetated Riparian Zone; Molino Stewart 2014), the remainder of the residential lots may still be cleared for building and/or to maintain Asset Protection Zones. It should be noted too that the new 10/50 clearing provisions allow clearing of trees (without approval) for a distance of 10 m and understorey to a distance of 50 m from the wall of a habitable building. Other impacts associated with adjacent residences include garden waste and rubbish dumping, encroachment, pet predation, run-off, removal of dead wood and bushrock, grazing and increased fire risk. This corridor is zoned RE1 Public Recreation and so will be subject to ongoing impacts associated with human activities; these can be expected to increase as the population of Redbank increases, despite management efforts.

I do not agree with the findings that ecological impacts associated with the development of Belmont Precinct will be "minimal, if any" because the authors did not assess the effects of direct and indirect impacts listed above.
Figures presented in the report showing the extent of vegetation communities are misleading because they imply that all vegetation to the north of Belmont Precinct will be retained.

Cumulative Impact Assessment

Because Belmont Precinct is part of a much larger Urban Release area, it is understood that most of Redbank will be developed for 1400 residences. Given that DA applications reviewed so far all demonstrate the intention to clear most native vegetation and paddock trees from each subdivision(with the exception of EECs on the site boundaries) and all reports conclude that there will be minimal ecological impacts, it is my opinion that DA applications need to take a broader approach by assessing cumulative impacts both within and outside the Redbank site. A summary of cumulative impacts is provided in Table 2.

Data provided in each report varies and are incomplete and inconsistent. None of the DA applications estimated the amount of vegetation to be cleared with the exception of GHD (2008)that estimated that 14.5 ha of modified grassland would be cleared for the Seniors Housing development. Only two applications contained tree assessments; to date 264 trees are to be removed as a result of roadworks and earthworks (i.e. DA 10 and DA12), although it is unknown how many of these are hollow-bearing trees. According to mapping provided by GHD (2009), at least 15 hollow-bearing trees would be removed based on DA applications prepared to date. Although downgraded CPW would be removed as part of three DA applications, the actual amount has not been estimated in hectares. It appears that the fate of many trees occurring on residential lots is unknown as it would depend on final building plans and APZs. In my opinion it is more realistic to assume that all trees will be cleared from residential lots and that all existing habitat will be removed from the Redbank site.

I note too that 'minor' alterations would be made to the high quality dam along Redbank Creek (Fig. 4, Molino Stewart 2014b). As it is my understanding that these alterations are part of the stormwater management plans for the Redbank urban release area, they must be considered as cumulative impacts. What impact will this have on threatened bat species recorded over the dam by GHD (2009)?

The cumulative impacts associated with the residential development of 180 ha are not likely to be insignificant. It is evident that constructed corridors and remnant EECs will not be able to support the same number and diversity of species found there now (especially bats and hollow-nesting, grassland and aquatic species) and that we can expect local/regional changes in their distributions at the very least. There has been no attempt to assess cumulative impacts associated with Redbank nor to develop biodiversity offset strategies to mitigate long-term impacts of the proposal in recognition of this.

The assessment of cumulative impacts should not be limited to the Redbank site itself. For example, it is evident that there is a need for a second bridge crossing over the Grose River as alternative vehicle access to the Redbank subdivision. A constraints and benefits analysis of three potential crossing points was prepared by Molino Stewart in July 2015. Based on a very preliminary ecological assessment of Option 3 that traverses Yarramundi and Navua Nature Reserves (Appendix D), the report concluded that, due to past levels of disturbance, this option was likely to have the least impact on biodiversity, noise and Aboriginal heritage. This is despite the fact that access could not be obtained to investigate Options 1 and 2 which are located on private land. Based on the paucity of ecological data presented (i.e. only common species) , it seems likely that Option 3 was selected mainly because it would have less impact on surrounding residents and businesses and that it would be cheaper to construct (i.e. least amount of land acquisition). No weight was given to the fact that the reserves are dedicated for public recreation and flora and fauna conservation whereas private land can be developed or rezoned in the future.

Nevertheless, the fact remains that there would be no need for a second bridge crossing if the Redbank urban release area did not exist. A detailed impact assessment for a road/bridge development would need to take into consideration not only the removal of EECs and potential habitat for threatened species, but also habitat fragmentation and degradation, edge effects (e.g. weeds, windthrow, increased predation), changes in hydrology, sedimentation and erosion, road kills and the effects of noise and light on fauna. The cumulative impacts of residential development should incorporate the second bridge when developing biodiversity offset strategies to mitigate the long-term impacts of the proposals.

Other major land releases within the Hawkesbury district also need to be considered as they are contributing to the loss of native vegetation and wooded grassland habitat in the region. For example, a 32-lot subdivision is proposed for Lot 2 DP 607906 Kurmond. This development appears similar to the Belmont Precinct subdivision in that it involves large residential lots backing onto riparian vegetation. In particular, comments issued by OEH dated 28 July 2014 related to:

- Appropriate methodology used to identify EECs;
- The lack of targeted fauna searches; and
- Lack of protection for EECs within the riparian zone.

The OEH review also highlighted additional threatened species potentially found in remnant Shale Sandstone Transition Forest on site, namely the Brown Treecreeper, the Black-chinned Honeyeater and the Turquoise Parrot. None of these species were considered within Table 7 (Molino Stewart 2015).

Section 4.3 – Amelioration and Opportunities

Amelioration measures listed in this section are vague and it is difficult to determine if these will be implemented or if they are just suggestions. I would have expected the ameliorative actions related to the patch of CPW in the southern section to reference the Cumberland Plain Woodland Management Plan that was prepared in July 2015 by Molino Stewart. The Plan contains management and maintenance strategies that should have been summarised in Section 4.3.

The viability of this patch of CPW, measuring 3.2 ha, was not discussed in the report. The following information is summarised from:

- http://www.environment.gov.au/biodiversity/threatened/communities/pubs/112-listing-advice.pdf
- http://www.environment.nsw.gov.au/determinations/cumberlandwoodlandsFD.htm

The CPW EEC has been severely fragmented in the Sydney Bioregion with approximately 72% of remaining CPW patches being between 0.5 and 5 ha in size. Small isolated patches are less likely to be survive than larger interconnected patches. Small patches are only able to support small species' population sizes that are therefore more susceptible to environmental stochasticity and reduction in gene flow. In particular, fire suppression can increase the dominance of shrubs and decrease diversity of herbs and grasses. CPW is threatened by weed invasion, dieback and human activity, particularly where it is embedded within an urban matrix.

It is impossible to determine if the patch of CPW on the Belmont precinct will remain viable in the medium-long term. Native vegetation and an existing dam to the north presently act as buffers between the CPW and farmland. However, once vegetation is cleared and residences are built, the CPW patch would be almost completely surrounded by roads. While roads also act as buffers, they are relatively narrow and would expose the remnant vegetation to edge effects such as weed invasion, windthrow and increased predation pressure.

The CPW would maintain some connectivity to Redbank Creek via a newly planted multi-use 'corridor' that will be transected by a road and would comprise mainly mown grassland, wetland and some planted trees. This is unlikely to promote gene flow for threatened species typical of CPW but may be used by introduced and common flora and fauna species. Its persistence as an isolated patch will therefore probably largely depend on the effort and resources dedicated to its management over the medium-long term.

Amelioration measures relating to Dam 10 and the drainage corridor (Stream P) connecting to CPW to the south are similarly vague and do not make reference to the DA 12 Riparian Assessment prepared in July 2015 by Molino Stewart. The latter report describes the corridor as being 53 m wide and incorporating a 4-m wide fire access/pedestrian trail. It also describes indicative revegetation works that would be implemented as offsets for development undertaken in the outer 50% of the Vegetated Riparian Zone (VRZ). However, as the Riparian Report does not mention a fauna underpass or traffic calming measures, I can only assume that these are recommendations only.

No amelioration measures are recommended for riparian vegetation along Redbank Creek. A Draft Interim Plan of Management (Molino Stewart September 2015) has been prepared for that part of Redbank Creek that occurs in Belmont Precinct. It describes broad management objectives, issues and strategies for both natural and public use areas. The riparian assessment also states that a proposed pathway along Redbank Creek will be part of a "future DA application". As part of the DA application for DA 06, located between Belmont Precinct and Redbank Creek, Molino Stewart (2014a) recommended that "a vegetation strategy should be developed for riparian vegetation within the environmental buffer to Redbank Creek and its tributary adjacent to DA 06". It appears that this has not occurred to date.

I note that all amelioration measures discussed in this section relate to remnant areas of native vegetation but do not address impacts that are specifically associated with urban development (see Section 4 above). It is unclear to me why this section does not incorporate summaries from relevant management plans that have been prepared as part of the SEE. Although it appears that management of the CPW remnant and Stream P is linked to the current DA

application, the future management of Redbank Creek is discussed as part of several different DA applications.

I would have expected all amelioration measures relating to erosion, sedimentation, dam decommissioning, vegetation clearing protocols, pre-clearing surveys etc. to be described in this section.

Section 5.2 Threatened Ecological Communities

I disagree with the statement that "the existing over-storey vegetation within the proposed residential lots does not constitute support for core habitat due to its isolation, poor condition and absence of key diagnostic flora." While classification into vegetation communities is dependent on species composition and coverage, the identification of 'core habitat' and 'support for core habitat' is related to broad-scale vegetative coverage and linkages. Even degraded native communities are likely to provide more support for core areas than residential lots.

Section 5.5 Listed Ecological Communities

In my opinion, the previously identified RFEF along Redbank Creek should be independently assessed. No quadrat or cover-abundance data are provided to substantiate its downgrading to Forest Red Gum-Grey Gum-Broad-leaved Angophora grassy woodland.

Section 6.0 Recommendations

These are recommendations only and until they are formalised through management actions or covenants, it should not be assumed that they will be implemented and they should not be considered as amelioration measures. In particular, I do not think that there is any possibility that companion animals, including cats, could be excluded from the site. It is recommended that an ecologist be present on site during tree clearing.

Compensatory offsets

Section 4 describes measures that, in the authors' opinion, would compensate for the loss of habitat features within Belmont. However, new plantings along the Stream P corridor or within remnant CPW will not compensate for the removal of 214 trees (some of which are mature hollow-bearing). Furthermore, the enhancement of Dam 10 (moderate quality) will not compensate for the removal of Dam 1 that is already established and is considered to be good quality. In the time taken to create similar habitats (if this is possible), the species presently using the site are likely to have disappeared from the local and/or regional area.

Offsets are described in detail in the riparian assessment reports relating to DA 04, DA 06 and DA 12. It is a requirement of the NSW Office of Water that an appropriate riparian corridor width or Vegetated Riparian Strip (VRZ) is

calculated. Non-riparian corridor works or development may be undertaken within the outer 50% of a VRZ, as long as this activity is offset by connecting an equivalent area to the riparian corridors within the development site. It should be considered as a completely separate exercise from compensating for impacts associated with residential development.

Given that the Redbank development is likely to result in the loss of most existing habitat due to earthworks and roadworks and clearing associated with building and fire management, the proponent should be required to develop biodiversity offset strategies to mitigate the long-term and cumulative impacts of all proposals for the site.

RECOMMENDATIONS

Based on the information presented in the Ecological Assessment, it is my opinion that the proposal should not proceed, as the claim that it will have "minimal, if any" environmental effects has not been substantiated.

Any future proposal for the development of the Belmont Precinct should be accompanied by an ecological assessment that includes:

- Flora and fauna surveys undertaken at an appropriate time of year that follow DECCW guidelines with respect to stratification, targeted methodology, survey coverage and effort;
- A summary of assessments undertaken at Redbank and in surrounding areas as a basis for survey work and to provide an ecological context for the precinct;
- Field surveys that target key habitat features (i.e. paddock trees, farm dams) and known and potential threatened and regionally significant species identified by GHD (2009);
- An assessment of the impact of removing 214 trees and at least 15 hollow-bearing trees on threatened species, especially bats and birds;
- An assessment of the habitat values of Dam 1 and the impact of its removal on threatened and regionally significant species likely to use it;
- An assessment of the direct and indirect impacts of urban development on flora and fauna species recorded from or potentially occurring within or adjacent to the Belmont Precinct;
- A description of amelioration measures that will be implemented that address impacts associated with urban development;
- An assessment of cumulative impacts within the context of other known and proposed developments within the locality; and
- A biodiversity offset package that considers cumulative impacts on the Redbank site (including the alternative bridge crossing) aimed at mitigating the long-term impacts associated with the development of the Redbank urban release area.

Finally, the botanical information used to downgrade the RFEF EEC to Forest Red Gum-Grey Gum-Angophora grassy woodland, should be independently reviewed.