9 December 2020

Scott Lennon
Director
Lennon Project Management
PO Box 492
Forestville NSW, 2087

Cumberland Ecology
PO Box 2474
Carlingford Court 2118
NSW Australia
Telephone (02) 9868 1933
ABN 14 106 144 647
Web: www.cumberlandecology.com.au

Peer review of Biodiversity Development Assessment Report for 328-330 Annangrove Road, Rouse Hill

Dear Scott,

The purpose of this letter is to provide a review of sections of the Biodiversity Development Assessment Report (BDAR) prepared by Keystone Ecological for the proposed staged development of a commercial centre at 328-330 Annangrove Road, Rouse Hill, New South Wales.

Our peer review is detailed in **Appendix A** and has been conducted as a desktop assessment that included a review of the BDAR in conjunction with relevant legislation and guidance documents. As requested, the focus of the peer review was on the accuracy of the Plant Community Type (PCT) mapping, including PCT selection and extent, and the adequacy of the assessment of Serious and Irreversible Impacts (SAII).

We found that the information presented about the native vegetation and the SAII assessment within the BDAR by Keystone Ecological is valid and in general compliance with the Biodiversity Assessment Method (BAM) as required by the *Biodiversity Conservation Act 2016*. The BDAR was prepared based on BAM 2017, and not the recently released BAM 2020. Therefore, any future mention of the BAM within this peer review refers to BAM 2017.

We note that the proposed development will only impact small areas of relatively degraded Cumberland Plain Woodland (CPW) and Shale Sandstone Transition Forest (SSTF) that are unlikely to be viable in the long-term. Furthermore, the patches of CPW and SSTF that are proposed to be removed only comprise a very small portion of the local and regional extent of the corresponding threatened ecological communities (TECs), as defined in the BAM. Therefore, the impacts associated with the proposed development are not considered to reduce the viability of the TECs at a local, regional or state level and are ultimately unlikely to contribute significantly to the extinction risk of either CPW or SSTF.

If you would like to discuss this review further, please do not hesitate to contact myself or David Robertson on (02) 9868 1933.

Yours sincerely,

Cecilia Eriksson Pinatacan
Senior Project Manager/ GIS Specialist
Accredited Assessor: BAAS19052
cecilia.eriksson@cumberlandecology.com.au

APPENDIX A :

Peer Review

A.1. Introduction

Cumberland Ecology has been requested by Lennon Project Management, on behalf of ABAX Contracting Pty Limited (the 'client'), to undertake a peer review of a Biodiversity Development Assessment Report (BDAR) prepared by Keystone Ecological in July 2020 (the Keystone BDAR). The Keystone BDAR was prepared to support a Development Application (DA/228/2020) submitted to the Hills Shire Council for a proposed staged development of a mixed use/ bulky goods commercial centre (the 'project') at 328-330 Annangrove Road, Rouse Hill, New South Wales (NSW) (the 'subject land').

The Keystone BDAR determined that the proposal would result in the removal of approximately 1.37 ha of native vegetation comprising the following Plant Community Types (PCTs):

- PCT 849 Grey Box – Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion; and
- PCT 1395 Narrow-leaved Ironbark – Broad-leaved Ironbark – Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion.

As outlined in the Keystone BDAR, the occurrences of PCT 849 and PCT 1395 within the subject land conform to the threatened ecological communities (TECs) Cumberland Plain Woodland (CPW) and Shale Sandstone Transition Forest (SSTF), respectively. Both these TECs are listed as Critically Endangered under the NSW *Biodiversity Conservation Act 2016* (BC Act) and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Both CPW and SSTF are also considered as candidate Serious and Irreversible Impact (SAII) entities under the BC Act. The BDAR assessed both candidate SAII entities against SAII requirements in accordance with Section 10.2.2 of the Biodiversity Assessment Method (BAM) and concluded that the project did not comprise a SAII for either CPW or SSTF.

It is our understanding that the Hills Shire Council ('Council') has stated the following in relation to the DA:

- The DA in its current form would result in a SAII due to the proposed loss of CPW, based on the impacts on the local occurrence of the TEC; and
- The extent of CPW within the subject land is greater than what is mapped in the Keystone BDAR and that increased retention of vegetation is therefore required for the project to avoid an SAII.

Due to the difference of opinion, Cumberland Ecology was therefore requested to conduct a peer review of the Keystone BDAR to consider the accuracy of the PCT mapping, including PCT selection and extent, and the adequacy of the assessment of SAII. The purpose of this document is to detail the methods used to conduct the peer review, present the findings of the peer review and detail any recommendations and conclusions.

A.2. Methodology

This peer review has been prepared by Cecilia Eriksson Pinatacan (BAM Accredited Assessor No: BAAS19052). It has been undertaken as a desktop assessment, including document review, database review and Geographic Information System (GIS) file review. Further details of the methods are detailed below.

A.2.1. Document Review

The following documents were reviewed as part of this peer review:

- Biodiversity Development Assessment Report – 328-330 Annangrove Road Rouse Hill, The Hills LGA. Version 2.1. (Keystone Ecological. 2020);
- Relevant legislation, including:
    - *Biodiversity Conservation Act 2016* (BC Act); and
    - *Biodiversity Conservation Regulation 2017* (BC Regulation).
- Relevant BDAR guidance documents:
    - Biodiversity Assessment Method (NSW Government 2017);
    - Biodiversity Assessment Method Operational Manual – Stage 1 (NSW Government 2018);
    - Biodiversity Assessment Method Operational Manual – Stage 2 (NSW Government 2019); and
    - Guidance to assist a decision-maker to determine a serious and irreversible impact (DPIE. 2019).
- Final determinations for Cumberland Plain Woodland (NSW Scientific Committee 2009) and Shale Sandstone Transition Forest (NSW Scientific Committee 2014).

A.2.2. Database and Dataset Review

The following databases were reviewed as part of this peer review:

- BioNet Atlas;
- BioNet Vegetation Classification Database; and
- Threatened Biodiversity Data Collection.

The following mapping datasets were reviewed as part of this peer review:

- Bushland Survey – Baulkham Hills Shire. VIS_ID 2236 (OEH 2011);
- Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands (Tozer et al. 2010); and
- Remnant Vegetation of the western Cumberland subregion, 2013 Update. VIS_ID 4207 (OEH 2013).

The review also included a detailed interrogation of the plot data provided within the Keystone BDAR.

A.2.3. GIS File Review

The following GIS files were reviewed as part of this peer review:

- GIS files prepared by Keystone Ecological, associated with the SAII assessment included in the Keystone BDAR;
- Cadastral boundaries and contours (NSW Government Spatial Services 2019);
- Geology mapping (NSW Department of Regional New South Wales. 2018); and
- Soil Landscape mapping (DPIE. 1990).

A.2.4. Limitations

The following limitations are noted:

- The peer review has been undertaken as a desktop exercise only. Therefore, the conclusions reached have relied on field data collected by Keystone Ecological, and additional sources of desktop information, such as aerial imagery, geology mapping and soil landscape mapping;
- This peer review did not access the Biodiversity Assessment Method Calculator prepared by Keystone Ecological, as that was outside the scope of this peer review

A.3. Key Findings and Recommendations

A.3.1. Native Vegetation Mapping and PCT Selection

The subject land currently comprises a mix of woody vegetation and grassland that has been mapped by several broad-scale vegetation mapping projects to date including:

- Tozer et al (2010) mapping of the Native Vegetation of southeast NSW, which mapped the vegetation as Sydney Hinterland Transition Woodland (PCT 1081);
- The mapping of the Hills Shire Council LGA (OEH 2011), which mapped the vegetation as Cumberland Plain Woodland (PCT 849); and
- Mapping of the Cumberland Plains by OEH (2013), which mapped the vegetation as PCT 1395 and PCT 849.

Keystone Ecological subsequently mapped the vegetation in the subject land as a mix of PCT 849 in the western extent of the site and PCT 1395 in the eastern extent, as described in the Keystone BDAR and shown in **Figure 1**.

The boundary between PCT 849 (CPW) and PCT 1395 (SSTF) is generally indistinct by nature as noted by Tozer (2003):

"Shale Sandstone Transition Forest (Low sandstone influence) is typically found on the middle or upper slopes of gently undulating land. As distance to the sandstone/shale boundary increases Map Unit 1 (SSTF) *grades into*

Map Unit 10 (Shale Plains Woodland) *or, less frequently, Map Unit 9* (Shale Hills Woodland). *The boundary between these communities is indistinct by nature, and Shale Sandstone Transition Forest includes areas with only a very slight influence of sandstone.*

The Keystone BDAR provides a detailed assessment of the native vegetation classification and distribution within the subject land, which is generally in accordance with the BAM. Section 3.3 of the Keystone BDAR provides a justification of the selection of PCTs within the subject land, with supporting background information presented in Section 3.1.

To check the selection of PCTs in the Keystone BDAR, the process for PCT selection was undertaken independently for the purposes of this peer review using the plot data collected by Keystone Ecological, as outlined below.

In accordance with the assessment provided in the Keystone BDAR, based on the broad-scale vegetation mapping that covers the subject land, the two PCTs that are considered most likely to occur within the subject land comprise PCT 1395 and PCT 849. Although Tozer et al (2010) maps the vegetation in the subject land as Sydney Hinterland Transition Woodland (PCT 1081), this PCT was ruled out as a candidate PCT. This was done as neither the PCT profile in BioNet Vegetation Classification nor description in Tozer et al (2010) includes *Eucalyptus tereticornis* (Forest Red Gum) as a diagnostic species. That species was found in all plots except for the grassland plot. Other common species recorded in the plots but not included in the PCT profile for PCT 1081 or in the Tozer et al (2010) description for Sydney Hinterland Transition Woodland includes *Microlaena stipoides var. stipoides* (Weeping Grass) and *Bursaria spinosa subsp. spinosa* (Native Blackthorn),

A.i. Analysis Based on Floristic Plot Data

It was not possible to determine the PCT based solely on floristics derived from the plot data, because the lists of characteristic plant species for each PCT are similar and overlap. **Table 1** shows a consideration of species alignment of the plot data with the description of PCT 849 and PCT 1395 from the BioNet Vegetation Classification, whilst **Table 2** shows a comparison of the plot data with the characteristic species assemblages for CPW and SSTF respectively as described in the final determinations. In general, the number of matches for each plot for PCT 849/CPW and PCT 1395/SSTF are quite similar due to the low number of native species recorded within the subject land.

Table 1 Comparison of species alignment of plot data with PCT 849 and 1395 from the BioNet Vegetation Classification

Plot ID	Keystone BDAR Map Unit	PCT 849	PCT 1395
Plot 1-A	PCT 849	7 matches: *Bursaria spinosa, Eucalyptus moluccana, E. tereticornis, Lomandra multiflora, Dichondra repens, Brunoniella australis, Themeda australis*	5 matches: *Bursaria spinosa, E. crebra, Lomandra multiflora, Dichondra repens, Themeda australis*
Plot 2-B	PCT 1395	3 matches: *Eucalyptus tereticornis, Bursaria spinosa, Themeda australis*	3 matches: *Entolasia stricta, Bursaria spinosa, Themeda australis*

Plot ID	Keystone BDAR Map Unit	PCT 849	PCT 1395
Plot 3-D	PCT 1395	2 matches: *Eucalyptus tereticornis, Microlaena stipoides*	1 match: *Microlaena stipoides*
Plot 4-E	PCT 1395	1 match: *Eucalytpus tereticornis*	0 matches
Plot 5-F	PCT 849	4 matches: *Microlaena stipoides, Dichondra repens, Aristida vagans, Themeda australis*	4 matches: *Microlaena stipoides, Dichondra repens, Aristida vagans, Themeda australis*

Table 2 Comparison of species alignment of plot data with CPW and SSTF from the final determination for each TEC

Plot ID	Keystone BDAR Map Unit	Cumberland Plain Woodland TEC	Shale Sandstone Transition Forest TEC
Plot 1-A	CPW	11 matches: *Bursaria spinosa, E. crebra, E. molluccana, E. tereticornis, Acacia implexa, Lomandra multiflora, Dichondra repens, Brunoniella australis, Acacia parramattensis, Acacia implexa, Themeda australis*	9 matches: *Bursaria spinosa, Acacia parramattensis, E. crebra, E. tereticornis, Acacia implexa, Lomandra multiflora, Dichondra repens, Brunoniella australis, Themeda australis*
Plot 2-B	SSTF	5 matches: *Eucalyptus tereticornis, Bursaria spinosa, Solanum prinophyllum, Acacia parramattensis, Themeda australis*	6 matches: *E. tereticornis, Acacia parramattensis, Entolasia stricta, Solanum prinophyllum, Bursaria spinosa, Themeda australis*
Plot 3-D	SSTF	4 matches: *E. tereticornis, Microlaena stipoides, Solanum prinophyllum, Acacia parramattensis*	4 matches: *E. tereticornis, Microlaena stipoides, Solanum prinophyllum, Acacia parramattensis*,
Plot 4-E	SSTF	4 matches: *E. tereticornis, Einada hastata, Solanum prinophyllum, Acacia parramattensis*	3 matches: *E. tereticornis, Solanum prinophyllum, Acacia parramattensis*
Plot 5-F	CPW	5 matches: *Microlaena stipoides, Dichondra repens, Aristida vagans, Sporobolus creber, Themeda australis*	4 matches: *Microlaena stipoides, Dichondra repens, Aristida vagans, Themeda australis*

Due to the limited number of native species within the plots completed, and the general lack of multiple diagnostic canopy species, it is acknowledged that it is difficult to ascertain the best-fit PCT and/or associated TEC based on these species alone, in particular for vegetation zones 2-4 as mapped in the Keystone BDAR.

A.ii. Analysis Based on Environmental Variables

In *lieu* of sufficient number of native species present to make a determination of the best-fit PCT, as well as a selection of TEC, additional information can be investigated in relation to soils and geology to provide supporting guidance in the selection of PCT and/or TEC. Both the relevant PCT profiles held within the BioNet Vegetation Classification database and final determinations include information relating to the associated soils and geology for each PCT/TEC.

The final determination for SSTF states that the community "*occurs on soils overlaying the transition between shale and sandstone lithologies",* whilst the PCT profile describes the landscape position for PCT 1395 as occurring on transitional shale-sandstone soils.

For CPW, the final determination states that the community is *"associated with clay soils derived from Wianamatta Group geology",* whilst the PCT profile describes the landscape position for PCT 849 as occurring on clay/loam soils derived from Wianamatta Shales on the Cumberland Plain.

Within section 3.1 of the Keystone BDAR, Keystone Ecological included a discussion in relation to the soil landscapes present in the vicinity of the subject land. Nonetheless, as part of this peer review, an independent review of both soil landscape and geology mapping was undertaken. The relevant mapping is shown in **Figures 2-3.**

The geology mapping indicates that the site occurs at the transition between shale and sandstone lithologies, with the eastern extent of the subject land mapped as occurring on Hawkesbury Sandstone, whilst the most western extent of the site is associated with Ashfield Shale of the Wianamatta Group.

Similarly, the mapping of soil landscapes shows the subject land as occurring at the transition between two soil landscapes, with the eastern extent of the site mapped as part of the Gymea soil landscape and the western part of the site associated with the Blacktown soil landscape. The Gymea soil landscape is described as associated with soils that are dominated by loose coarse sandy loam and clayey sand, whilst the Blacktown soil landscape is associated with soils that are described as dominated by friable brownish-black loam and hardsetting brown clay (Bannerman and Hazelton 1990).

The observations of '*some small shallow protrusions of fine-grained sandstone'* in the eastern extent of the site, as mentioned in the Keystone BDAR, as well as the presence of the species *Entolasia stricta* (Wiry Panic) in relatively high abundance in plot 2-B, could also indicate the presence of transitional soils with a degree of sandstone influence in parts of the subject land. *Entolasia stricta* is noted as a species that occurs in sandy or sandstone derived soils (Botanic Gardens Trust. 2020). Hence, there is an indication that sandstone influenced soils occur in the central and eastern sections of the subject land.

In light of the information above, although it is acknowledged that it is hard to ascertain the exact boundary between PCT 849 and PCT 1395 due to the relatively degraded state of the vegetation in the subject land and the overlap of species between the two candidate PCTs, the selection of PCTs and general mapped extent of each ecological community in the Keystone BDAR is considered to be justified.

A.3.2. Assessment of Serious and Irreversible Impacts

If SAII entities are present and likely to be impacted by a proposed development, a BDAR must provide information about each SAII entity to enable a determining authority to decide whether the development will cause a serious and irreversible ecological impact. For TECs, in accordance with Section 10.2.2 of the BAM, the information must cover the extent and condition of the of the TEC to be impacted. It must also provide information about the likely occurrence of the TEC at various geographical scales, including the local occurrence represented by a 1,000 ha and 10,000 ha buffer of the development footprint, the regional occurrence represented by the relevant Interim Biogeographic Regionalisation of Australia (IBRA) subregion and IBRA region, and the current occurrence of the TEC within conservation reserves. In accordance with the '*Guidance to assist a decision-maker to determine a serious and irreversible impact*' (DPIE 2019) (the 'SAII guidelines'), based on the information provided in a BDAR, the decision-maker will then form an opinion whether an impact is considered serious and irreversible.

The Keystone BDAR includes a detailed section on SAII for both CPW and SSTF in Section 6.1.2 and Section 6.1.3, respectively. Cumberland Ecology has considered the SAII information prepared in the Keystone BDAR and consider that all required sections have been addressed and that the information is compliant with the requirements of BAM.

As outlined within the Keystone BDAR SAII assessment, the project will result in the removal of small, relatively degraded areas of CPW (~0.37 ha) and SSTF (~1.00 ha) within the subject land. A review of historical aerial imagery from 1975 confirms that parts of the oldest remnant patches of woodland/forest on site have been avoided as part of the avoidance measures outlined in the BDAR.

To mitigate the loss of the removed vegetation, several mitigation measures are proposed for the project, including rehabilitation and revegetation of 0.18 ha of CPW and 0.12 ha of SSTF, as well as the retention and management of 0.44 ha of SSTF under a Biodiversity Management Plan. These measures are in addition to the required offsetting of biodiversity credits under the BAM.

Section 3.2.3 of the SAII guidelines states that measures proposed to avoid or mitigate impacts, as outlined in a BDAR, must be considered by the decision-maker in determining whether an impact is acceptable. Therefore, in making a decision whether the project associated with the DA will result in an SAII, Council should effectively consider the residual impacts of a loss of approximately 0.37 ha of CPW and 1.00 ha of SSTF in conjunction with the avoidance of the oldest remnants of bushland in the subject land, the rehabilitation and revegetation of approximately 0.18 ha of CPW and 0.12 ha of SSTF, as well as the conservation and management of 0.44 ha of SSTF.

Furthermore, in Section 3.2.4 of the SAII guidelines, which provides guidance to decision-makers on evaluating a serious and irreversible impacts, it reads:

"*The assessment criteria in the BAM under Subsection 10.2.2 for TECs and 10.2.3 for species, are designed to estimate the impact the proposal will have on the viability of the entity at the local, Interim Biogeographic Regionalisation of Australia (IBRA) subregional/regional and state scales (see Appendix B).*"

The SAII assessment included in the Keystone BDAR calculates the impact the project will have on a local level as representing a 0.6% reduction in occupancy within a 1,000 ha buffer and 0.04% within a 10,000 ha buffer for CPW, whilst for SSTF the reduction of occupancy would be 1.3% within a 1,000 ha buffer and 0.09% within a 10,000 ha buffer. On a subregion scale, the reduction in area of occupancy for each TEC would instead be 0.003% for CPW and 0.01% for SSTF.

During the review of the GIS layers used for the SAII assessment it was noted that the buffer circles used in the Keystone BDAR for the 1,000 ha and 10,000 ha buffers were smaller than what is required (~690 ha and ~6880 ha respectively). Nevertheless, an independent verification of the calculations for the 1,000 ha and 10,000 ha buffers was undertaken for the purpose of this review, using the same broad-scale vegetation mapping projects as were used in the Keystone BDAR. It was found that the reduction in occupancy for CPW will be ~0.5% within a 1,000 ha buffer and ~0.04% within a 10.000 ha buffer, whilst for SSTF the reduction of occupancy will be ~0.8% within a 1,000 ha buffer and ~0.07% within a 10,000 ha buffer. In other words, when using the correct buffer circle sizes, the reduction in area of occupancy for CPW and SSTF will be slightly less than what is reported in the Keystone BDAR.

Based on the calculations of extent for each TEC, although the project will to a degree reduce the current extent of both TECs, it is considered unlikely that the impacts associated with the project would significantly reduce the viability of the TECs at the local, IBRA subregional/regional and state scales. Hence, it is unlikely that the project would significantly contribute to the risk of extinction of either CPW or SSTF.

It is noted that Council has indicated that the impact of a project on the local occurrence is an important consideration, based on the document *Threatened Species Assessment Guidelines* prepared by NSW Department of Primary Industries (2008), The mentioned document defines the local occurrence as '*the ecological community that occurs within the study area'* (DPI 2008). However, an SAII assessment is required to follow section 10.2.2 of the BAM, as also included in Appendix B of the SAII guidelines. It does not include assessment of local occurrence as per the document that Council referenced. Based on the geographical scales included in section 10.2.2 of the BAM, the local occurrence is instead represented by the 1,000 ha and 10,000 ha buffers.

Nevertheless, the viability of the occurrences of CPW and SSTF within the subject land should also be considered in the context of the contribution the relevant patches have on a local and regional level, when making a decision regarding whether the impact of the proposal would result in an SAII.

The occurrences of CPW in the subject land comprise a moderate condition woodland form (~0.30 ha with VI score of 41.2) and a heavily degraded grassland form (~0.07 ha with a VI score of 0.07 ha). The land directly north and south of the subject land are currently the subject of separate DAs, whilst land directly west of the subject land is categorised as 'certified land' under the *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*, hence it is earmarked for development. As a result, the small, already degraded occurrence of CPW that exists in the western section of the subject land along Annangrove Road is likely to become further isolated in the future and is not considered viable in the long-term.

Similarly, the potential for retention of patches of SSTF in the front section of the subject land are also considered less viable due to future surrounding land uses. On the contrary, as described in the Keystone BDAR,

the patches of SSTF that are proposed to be retained in the rear of the subject land are likely to be more viable as they are directly connected with a larger patch of bushland along Second Ponds Creek that continues offsite in a north-southerly direction. Hence, a modification of the development footprint in an attempt to avoid the patches of CPW in particular onsite is quite unlikely to result in any biodiversity gain on a local or regional level as the small CPW patches in the subject land are unlikely to remain viable in the long-term when considering surrounding future land-uses.

A.4. Conclusions

The findings presented in the native vegetation section, including PCT selection, and SAII section of the BDAR by Keystone Ecological are considered valid and in general compliance with the requirements of BAM.

Based on our review of the Keystone BDAR and supporting information, the following is concluded in relation to Council's statements regarding SAII and vegetation mapping:

- The impacts associated with the project are unlikely to reduce the viability of the TECs at a local, regional or state level when assessed against the criteria included in section 10.2.2 of the BAM and Appendix B of the SAII guidelines, and would therefore not be likely to constitute a serious and irreversible ecological impact; and
- Although it is hard to ascertain the exact boundary between CPW and SSTF, the PCT selection and general PCT extent mapped in the Keystone BDAR is justified based on an analysis of the floristic data in combination with geology and soil landscape mapping.

It is noted that the Council appears to have based their assessment of the project's impacts at a local level on older guidelines rather than what is included in section 10.2.2 of the BAM and in the SAII guidelines.

Irrespective of whether or not the subject land is developed, if left unmanaged the condition of the patches of CPW onsite are likely to further degrade due to an increase in indirect impacts from surrounding developments directly north, west and south of the subject land. The proposal in the BDAR for management of the retained areas of SSTF and revegetation of areas of both CPW and SSTF, as well as retirement of credits for vegetation removed, is appropriate and could contribute towards long-term conservation of the TECs.

A.5. References

Bannerman, S. M., and P. A. Hazelton. 1990. Soil Landscapes of the Penrith 1:100,000 Sheet. Soil Conservation Service of New South Wales, Sydney, NSW.

Botanic Gardens Trust. 2020. PlantNet - Entolasia stricta.

DPI. 2008. Threatened Species Assessment Guidelines: The Assessment of Significance. NSW Department of Primary Industries, Sydney.

DPIE. 1990. Soil Landscapes of the Penrith 1:100,000 sheet. **2010 revision**.

DPIE. 2019. Guidance to assist a decision-maker to determine a serious and irreversible impact.

Keystone Ecological. 2020. Biodiversity Development Assessment Report, 328-330 Annangrove Road, Rouse Hill, The Hills LGA.

NSW Department of Regional New South Wales. 2018. NSW Seamless Geology.

NSW Government. 2017. Biodiversity Assessment Method. Office of the Environment and Heritage, Sydney.

NSW Government. 2018. Biodiversity Assessment Method Operational Manual – Stage 1 Office of Environment and Heritage, Sydney.

NSW Government. 2019. Biodiversity Assessment Method Operational Manual – Stage 2. Environment, Energy and Science, Department of Planning, Industry and Environment, Sydney.

NSW Government Spatial Services. 2019. SIX Maps.

NSW Scientific Committee. 2009. Cumberland Plain Woodland in the Sydney Basin Bioregion - critically endangered ecological community listing. Department of Environment, Climate Change and Water (NSW), Hurstville.

NSW Scientific Committee. 2014. Shale Sandstone Transition Forest in the Sydney Basin Bioregion critically endangered ecological community - Final Determination, Hurstville.

OEH. 2011. Bushland Survey - Baulkham Hills Shire VIS_ID 2236. NSW Office of Environment and Heritage, Sydney.

OEH. 2013. Remnant Vegetation of the western Cumberland subregion, 2013 Update. VIS_ID 4207 Office of Environment and Heritage, Hustville.

Tozer, M. G., K. Turner, D. A. Keith, D. Tindall, C. Pennay, C. Simpson, B. MacKenzie, P. Beukers, and S. Cox. 2010. Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. Cunninghamia **11**:359-406.

Tozer, M. G. 2003. The native vegetation of the Cumberland Plain, Western Sydney: systematic classication and field identification of communities. Cunninghamia **8** (1): 1-75.

FIGURES

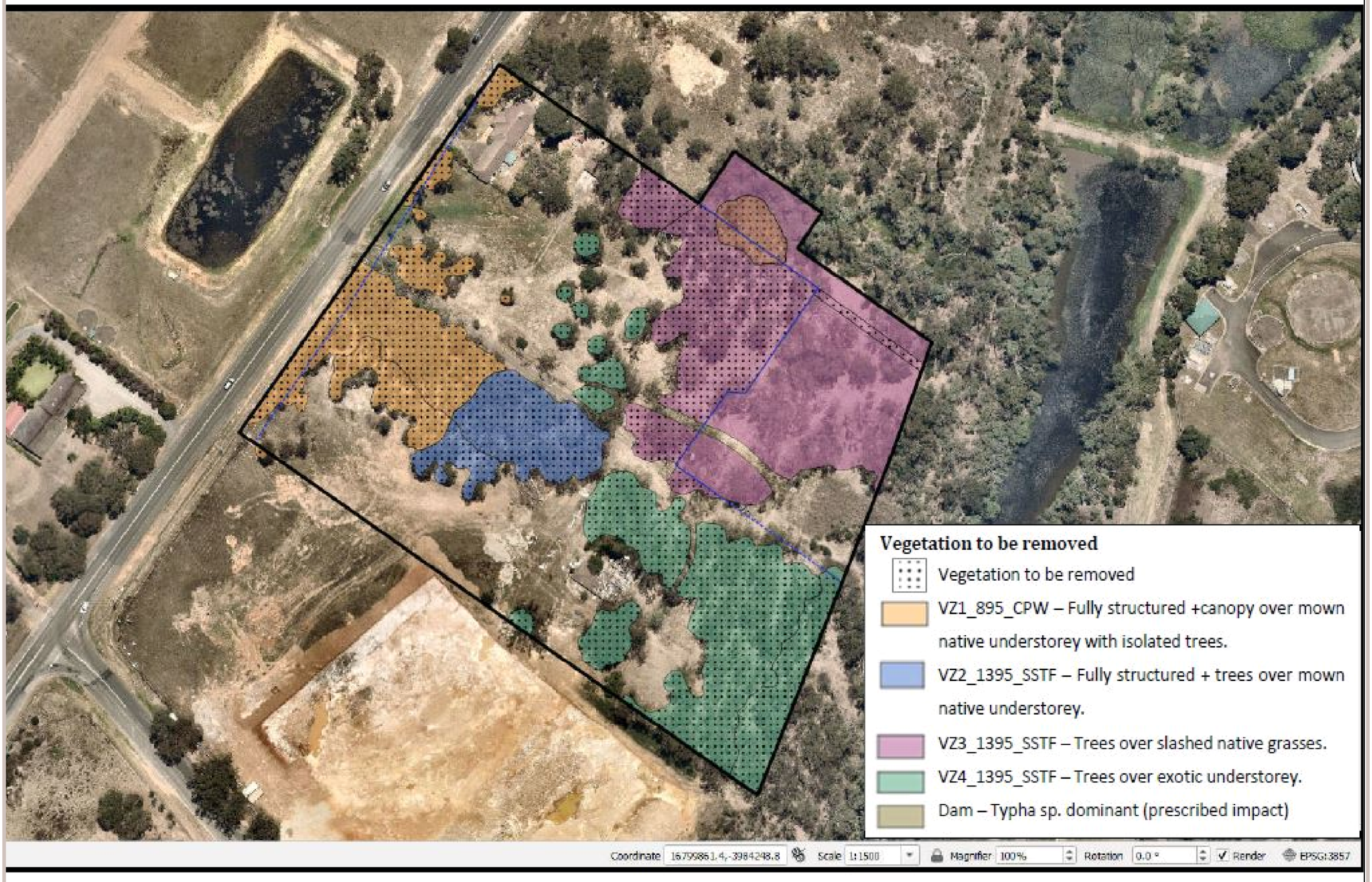

Image Source: Keystone Ecological (2020). Fig 16.

I:\...\20236\Figures\Letter 2\20201119\Figure 1. Keystone PCTs

Figure 1. Mapping of PCTs and vegetation zones by Keystone Ecological

Figure 2. Geology mapping within the subject land and surrounds

Figure 3. Soil landscapes within the subject land and surrounds