AMENDMENT C395

GREATER GEELONG

SETTLEMENT STRATEGY

EXPERT EVIDENCE STATEMENT

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5 November 2019

Summary of my evidence

- There are a range of ecological values in the Area west of Grubb Road, mostly related to the Ocean Grove Nature Reserve.
- Some of these ecological values are significant at global, national and/or local levels.
- There are a number of threatening processes to these ecological values.
- Any residential development would significant increase and add to these threatening processes and would reduce the viability of many of these ecological values.
- Options to minimise, mitigate or offset these threatening processes are not effective. To maintain these ecological values, the only viable option is to avoid residential development in this area.

1. Background and experience

1.1. My name is Guy Dutson; I am a Director of the ecological consultancy *Biodiversity Solutions*; and I live at 56 Yellow Gum Drive, Ocean Grove.

1.2. I have a Bachelors and Masters degree from the University of Cambridge majoring in Zoology, and a Bachelors in Veterinary Medicine from the University of Cambridge.

1.3. I am a member of relevant professional bodies such as the International Association for Impact Assessment.

1.4. I have been working on amateur ecological projects since the 1980s.

1.5. After a brief career as a veterinarian, I have been a professional ecologist since 1997.

1.6. My work for BirdLife International from 1998-2009 included managing the 'Important Bird Areas' project for BirdLife Australia in which I identified and documented all areas of high bird conservation value across Australia.

1.7. I have managed my own ecological consultancy since 2009, specialising in field surveys, monitoring responses to management interventions, developing biodiversity management plans, and developing government and corporate polices.

1.8. Over this period, I have used I my practical experience to author academic books and scientific papers, and I have been an honorary fellow of Deakin University and employee of Charles Darwin University.

1.9. I am a member of the Australian Threatened Birds Committee advising the government on listing species under the EPBC Act.

1.10. I co-researched and co-authored the current *Action Plan for Australian Birds*.

1.11. I am a member of community groups such as the Ocean Grove Community Association and offer my professional expertise pro bono to community groups such as the Friends of Ocean Grove Nature Reserve and the Geelong Field Naturalists Club.

1.12. I wrote the submission from the Geelong Field Naturalists Club to the DELWP Bellarine Peninsula Distinctive Areas and Landscape Program.

1.13. I have very deep personal knowledge of the ecology of the Ocean Grove area having lived here since 2014 and having spent a proportion of most days outside observing nature.

1.14. I have visited the Ocean Grove Nature Reserve many hundreds of times and I am very familiar with aspects such as its plant and vertebrate species, its ecological succession, its ecological threats and its ecological management needs.

1.15. I have observed the ecology and constituent species in the area bounding the Ocean Grove Nature Reserve on many hundreds of times, from the surrounding roads many tens of times and from various public and permitted access points in the land to the north of the Ocean Grove Nature Reserve.

1.16. I have contributed many hundreds of data points from the Ocean Grove area to biodiversity databases.

1.17. I have owned a residential block directly abutting the south of Ocean Grove Nature Reserve since 2015 but have no vested interest in the future value of this property as I am moving from the region and am selling the block.

2. Instructions

2.1. I have offered to Ms Wendy Duncan to prepare an expert evidence statement to present at the Planning Panel hearing in relation to her concerns.

2.2. I am independent of Ms Wendy Duncan and other parties, and am undertaking this work pro bono.

2.3. My instructions are to: “Provide expert evidence for presentation to the C395 Planning Panel based on your area of expertise. Your evidence should focus on the ecological impacts of any further development in the area between Grubb Road west through to Wallington Road, Rhinds Road to the north and the Ocean Grove northern settlement boundary to the south.”

2.4. I have made all the inquiries that I believe are desirable and appropriate and no matters of significance which I regard as relevant have to my knowledge been withheld from the Panel.

3. Summary of Ms Wendy Duncan’s Position with respect to the ecological impacts of development

3.1. Ocean Grove Nature Reserve is the largest remnant of native vegetation in the Bellarine Peninsula.

3.2. The Ecological Vegetation Community (EVC) is Grassy Woodland, classified as ‘Endangered’ in the Otway Plain bioregion.

3.3. The Bellarine Yellow Gum is a species listed on the Victorian Fauna and Flora Guarantee Act with a global range of occurrence between Torquay and Ocean Grove.

3.4. There is clear scientific evidence and local experience of species being extirpated from reserves and landscapes as a result of residential development. Any significant development between Wallington Road and Grubb Road would materially threaten the ecological integrity of the Ocean Grove Nature Reserve and neighbouring remnants of Bellarine Yellow Gum woodland and other biodiversity values.

3.5. The ecological values, along with aesthetic, landscape, hydrological and other values are reasons why the local community and Council have repeatedly rejected re-zoning this land for development

4. Scope of my Evidence

4.1. This statement represents my opinion as an independent ecologist.

4.2. I have sought additional expert opinion from Dr Durwyn Liley of Footprint Ecology[1] who has a PhD in the impacts of human disturbance on birds and has represented the English government at various public inquiries relating to housing developments around areas of high ecological value in the U.K., where there has been much more research into this issue.

4.3. This statement addresses the ecological values and threats to these values in the area bounded by Wallington Road to the west, Rhinds Road to the north, Grubb Road to the east and the Ocean Grove Nature Reserve and future extension of the Yellow Gums subdivision to the south. Hereafter, I refer to this as 'the Area'.

5. Ecological values of the Area

Given that the Area is private land and there appear to be no reports of its biodiversity in the public domain, knowledge of its biodiversity is based on personal and databased observations from surrounding public access points and, where made explicit, from extrapolation. Detailed surveys would be likely to discover additional significant values.

5.1. Species which are listed as threatened by the Australian government under the Environmental Protection and Biodiversity Conservation (EPBC) 1999 Act.

5.1.1. Swift Parrot – multiple records annually from Yellow Gums Estate and Woodlands Estate, and occasional records from Ocean Grove Nature Reserve and Hardings Road, mostly feeding in Bellarine Yellow Gums[2], suggest that this species is a regular visitor to the Area. It is listed under the EPBC Act as Critically Endangered.

5.2. Species which are listed as threatened in Victoria in accordance with Section 10 of the Flora and Fauna Guarantee Act 1988[3].

5.2.1. Grey-headed Flying-fox – individuals sometimes feed in flowering gums[4], probably from the population camped in Geelong Botanic Gardens.

[1] https://www.footprint-ecology.co.uk/services/planning-policy
[2] From the quality-controlled ebird and BirdLife Australia databases and personal observations.
[3] https://www.environment.vic.gov.au/conserving-threatened-species/flora-and-fauna-guarantee-act-1988
[4] Personal observation.

5.2.2. Grey Goshawk – regular records from Hardings Road[5] suggest that this species is a regular visitor to the Area.

5.2.3. White-bellied Sea-Eagle – occasional records flying over the Ocean Grove Nature Reserve and wider Ocean Grove area[6] suggest that the pair known to breed west of Wallington Road occasionally uses the Area for foraging.

5.2.4. White-throated Needletail[7] – nearly annual records flying over the Ocean Grove Nature Reserve and wider Ocean Grove area suggest that this species is a regular visitor to the Area.

5.2.5. Swift Parrot – see above.

5.2.6. Bibron's Toadlet – a specimen taken in 2000[8] and eight calling males sound-recorded in 2017[9] in the Ocean Grove Nature Reserve; possibly the only recent record south of Geelong[10]. Its occurrence in the Area is unknown.

5.2.7. Bellarine Yellow Gum - classified as endangered by the Victorian government and subject to a Flora and Fauna Guarantee Act 1988 Action Statement. Some of the largest stands of this tree occur to the west of Ocean Grove Nature Reserve, and scattered trees occur to the north.

5.3. Species highly valued by the local community.

5.3.1. Echidna – based on the frequency of sightings and diggings[11], the Ocean Grove Nature Reserve appears to be the most important location for this species south of Geelong and east of Torquay.

5.3.1.1. The mean annual home-range size of male Echidnas has been measured as 107 ha for males and 48 ha for females in Tasmania[12] and between 21 ha and 93 ha in Queensland[13]. This implies that the Echidnas in the 143 ha the Ocean Grove Nature Reserve are dependent on connectivity into the wider landscape to sustain a viable population.

5.3.1.2. Echidnas probably only occasionally use the Area but this is, in my expert opinion, a vital connection from the core habitat in the Ocean Grove Nature Reserve out across a much wider landscape.

5.3.2. Koala – the population of Koalas in the Area and Ocean Grove Nature Reserve would historically have been viable through dispersal through remnants and corridors. Koalas persist in the Area and Ocean Grove Nature Reserve but possibly no longer as a viable population.

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[5] From W Duncan and R Weatherly, residents of Hardings Road.

[6] From the quality-controlled ebird and BirdLife Australia databases and personal observations.

[7] From the quality-controlled ebird and BirdLife Australia databases and personal observations.

[8] King, D. (2000) A Brown Toadlet *Pseudophyrne bibroni* (Myobatractidae) from Ovean Grove Nature Reserve. Geelong Naturalist 6:3.

[9] A. Bryne personal communication; recording verified by Victorian government herpetologist.

[10] Atlas of Living Australia.

[11] Personal observation.

[12] Nicol, S.C., Vanpé, C., Sprent, J., Morrow, G. and Andersen, N.A. (2011) Spatial ecology of a ubiquitous Australian anteater, the short-beaked echidna (Tachyglossus aculeatus), Journal of Mammalogy, 92: 101–110

[13] Wilkinson, D.A., Grigg, G.C. and Beard, L.A. (1998) Shelter selection and home range of echidnas, Tachyglossus aculeatus, in the highlands of south-east Queensland. Wildlife Research 25:219–232.

5.3.3. Eastern Grey Kangaroo – a handful (usually two to five seen at a time) are largely resident in the Area and appear to represent the only resident population between Swan Bay and Breamlea[14].

5.3.4. Black Wallaby – the population within the Ocean Grove Nature Reserve regularly pass under the fence into the Area[15], allowing their dispersal and population exchange with populations outside of the Ocean Grove Nature Reserve.

5.3.5. Wedge-tailed Eagle and other birds of prey - Wedge-tailed Eagle used to nest in the Ocean Grove Nature Reserve but no longer, probably because of increased human disturbance. A pair that currently nests in the Area is one of only two or three pairs across the Bellarine[16].

5.4. Large trees.

5.4.1. Large trees are specifically defined and protected in Victoria[17] as they are disproportionately valuable as wildlife habitat, including for hollow-using birds and mammals, and for the landscape and aesthetic values.

5.4.2. Large specimens of Bellarine Yellow Gums, Coastal Manna Gums, Swamp Gums and Black She-oaks occur in the Ocean Grove Nature Reserve and in the Area in native vegetation remnants and along shelterbelts.

5.5. The Grassy Woodland Ecological Vegetation Community (EVC), classified as 'Endangered' in the Otway Plain bioregion.

5.5.1. The largest remnant of this EVC in the Otway Plain bioregion is in the Ocean Grove Nature Reserve[18].

5.5.2. There are numerous patches of native vegetation (as defined by the Victorian government as including any area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy[19]) across the Area. This includes native canopy trees in native vegetation remnants and along shelterbelts.

5.6. Small natural wetlands.

5.6.1. There are several natural wetlands (as defined by the Victorian government Native Vegetation Information Management tool[20]) across the Area. The ecological values of these natural wetlands are enhanced by their hydrological connectivity to each other and through to the Lake Connewarre system, part of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site. This connectivity is often via a series of farm dams which support a fringe of native vegetation and wetlands species such as frogs.

5.7. A buffer for the Ocean Grove Nature Reserve.

[14] Personal observation.
[15] Personal observation.
[16] Geelong Field Naturalists Club databases and personal communications.
[17] DELWP (2017) Guidelines for the removal, destruction or lopping of native vegetation.
[18] http://maps.biodiversity.vic.gov.au/viewer/?viewer=NatureKit
[19] DELWP (2017) Guidelines for the removal, destruction or lopping of native vegetation.
[20] https://nvim.delwp.vic.gov.au/Biodiversity

5.7.1. A significant proportion of the ecological values of the Ocean Grove Nature Reserve are threatened by the direct and indirect impacts of neighbouring land-use, as detailed below.
5.7.2. Buffers mitigate the direct and indirect impacts of neighbouring land-use.
5.7.3. Agricultural land acts a buffer against many of the direct and indirect impacts of residential development, notably disturbance by humans and domestic dogs, as detailed below.

5.8. Ecological connectivity.

5.8.1. The extirpation of multiple species from the Ocean Grove Nature Reserve and across the Bellarine has been well documented[21].
5.8.2. The causes of decline and extirpation are discussed below.
5.8.3. Land-use which enables physical dispersal by animals and plants allows their connectivity across a meta-population[22]. This land-use might not be suitable as long-term habitat for the species, but it enables their dispersal and hence the long-term survival of small, otherwise fragmented, populations.
5.8.4. Different species have different requirements for their physical dispersal and connectivity. Species that are able to disperse and connect across residential landscapes, including large residential blocks, are well-served by the land-use to the south of the Ocean Grove Nature Reserve. Species that are unable to disperse and connect across residential landscapes may need remnant vegetation, ecological corridors, shelterbelts, scattered trees, drainage lines and/or agricultural land.
5.8.5. Ecological corridors are of benefit to the greatest variety of species when they offer contiguous connection between blocks of habitat, are wide, vegetated with a variety of native plants offering structural complexity, undisturbed by humans and other threatening processes and not bisected by roads.
5.8.6. The Ocean Grove Nature Reserve has recently lost most of its connectivity to the east, where mature trees and farmland have been replaced by high-density residential and retail buildings.

6. Threats to the ecological values of the Area and the Ocean Grove Nature Reserve

In my expert opinion, the following threatening processes listed under the *Flora and Fauna Guarantee Act 1988* and/or the *Environmental Protection and Biodiversity Conservation (EPBC) 1999 Act* apply currently or historically to the Area; with evidence demonstrating how any residential development would cause or exacerbate these threatening processes:

6.1 *Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases*.

6.1.1 The primary impacts of climate change on the ecological values of the Area are reduced rainfall, changed rainfall patterns and increased temperatures. Most significantly, this will create a climate that is unsuitable for some species and increase the risk of fire.

[21] Pescott, T. (1981) Gone forever? Seven bird species which no longer nest near Geelong. Geelong Naturalist 18: 59-65.
Hart, B. et al. (2004) The Birds of Ocean Grove Nature Reserve. In The Geelong Bird Report 2004.
[22] A metapopulation is a group of spatially separated populations of the same species which regularly disperse between each other. If populations become small, genetically inbred or extinct, immigrants from another population are likely to re-vitalise the population or re-colonise the habitat.

6.1.2 Replacement of vegetation (including agriculture) with hard surfaces of high thermal mass contributes to climate change, increases local temperatures and reduces local moisture.

6.2 *Land clearance*.

6.2.1 Clearance of native vegetation, including remnants, windbreaks, isolated paddock trees and native grasslands reduces most species' habitat and reduces their population connectivity.

6.2.2 All of the ecological values listed above would be adversely impacted by clearance of native vegetation.

6.2.3 For some other species, clearance of agricultural land for residential development increases their habitat and population connectivity. The suite of species to benefit from residential development depends largely on the amount of public open space, any construction of artificial wetlands and the types of plantings in public open space, roadsides and private gardens. These species are generally species which are benefiting from similar development elsewhere in Ocean Grove, the wider region and globally, and are hence of limited concern or interest for conservation or of wider public value.

6.2.4 For other species, clearance of agricultural land for residential development reduces their habitat and population connectivity. Species that occur in the Ocean Grove Nature Reserve, use agricultural land in Area for habitat and connectivity, and are of local conservation priority include various species of birds of prey (e.g. Wedge-tailed Eagle), various parrots (e.g. Red-rumped Parrot and Eastern Rosella), Flame Robin and Eastern Grey Kangaroo.

6.3 *Habitat fragmentation as a threatening process for fauna in Victoria*.

6.3.1 Loss of vegetation, including remnants, windbreaks, isolated paddock trees and native grasslands reduces the ecological connectivity of remnant habitat, leading to its habitat fragmentation[23].

6.3.2 The recent historical loss of various bird species from the Ocean Grove Nature Reserve[24] and the decline in the Koala population is most likely caused by two main factors: (1) habitat fragmentation and a loss of connectivity and (2) inappropriate fire management.

6.4 *Wetland loss and degradation as a result of change in water regime, dredging, draining, filling and grazing*.

6.4.1 The ecological values of the small wetlands, including farm dams, across the Area would be degraded by changed water regimes from development in their water catchment as well as by direct drainage or filling.

[23] E.g. Robinson, D. 1991. Threatened birds in Victoria: their distributions, ecology and future. The Victorian Naturalist 108: 67-77.
Robinson, D., and B.J. Traill. 1996. Conserving Woodland Birds in the Wheat and Sheep Belts of Southern Australia. Supplement to Wingspan 6 (2): 1-16.

[24] Pescott, T. (1981) Gone forever? Seven bird species which no longer nest near Geelong. Geelong Naturalist 18: 59-65.
Hart, B. et al. (2004) The Birds of Ocean Grove Nature Reserve. In The Geelong Bird Report 2004.

6.5 *Inappropriate fire regimes causing disruption to sustainable ecosystem processes and resultant loss of biodiversity*.

6.5.1 One of the greatest post-colonial threats to the ecological values of many Australian ecosystems is the suppression of fire or the inability to undertake controlled management fires because of the risk to neighbouring properties and assets.

6.5.2 The lack of fire in the Ocean Grove Nature Reserve is causing an ecological succession from the Grassy Woodland of high conservation value to thickets of Black She-oak and Hedge Wattle of lower conservation value[25].

6.5.3 The recent historical loss of various bird species from the Ocean Grove Nature Reserve and the decline in the Koala population is most likely caused by two main factors: (1) habitat fragmentation and a loss of connectivity and (2) inappropriate fire management.

6.5.4 Any increase in the number of properties neighbouring the Ocean Grove Nature Reserve would increase this risk and reduce the probability of undertaking the required management burns.

6.6 Invasion of native vegetation by 'environmental weeds'.

6.6.1 Weeds, including woody weeds, perennial grasses, annual grasses and annual forbs, are a limited threat over all timeframes. Weeds of many species are established across the wider region and occur across the Area but are largely controlled by the prevailing agricultural practices and the occasional targeted weed control.

6.6.2 Areas peripheral to residential development, including reserves, set-asides, buffers and adjacent undeveloped land, have an increased incidence of environmental weeds. Causal factors include the physical disturbance of the soil and vehicles, people and domestic animals acting as vectors.

6.7 *Predation of native wildlife by the cat, Felis catus*.

6.7.1 It is estimated that pet cats kill 53 million reptiles and 61 million birds each year in Australia[26].

6.7.2 Areas peripheral to residential development, including reserves, set-asides, buffers and adjacent undeveloped land, have an increased occupancy by domestic cats.

6.7.3 The Ocean Grove Nature Reserve supports an isolated population of White's Skink, which probably occurs in only two other areas on the Bellarine[27], and is in the size range of reptiles vulnerable to depredation by cats.

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[25] Lunt, I.D. (1998) Two Hundred Years of Land Use and Vegetation Change in a Remnant Coastal Woodland in Southern Australia. Australian Journal of Botany 46, 629–647.
Zeeman, B.J. (2013) Vegetation dynamics of a long-unburned coastal woodland: changes from 1971 to 2012. BScWildConvBio (Hons) thesis, La Trobe University, Bundoora, Victoria.

[26] Woinarski J.C.Z., Murphy B.P., Palmer R., Legge S.M., Dickman C.R., Doherty T.S., Edwards G., Nankivell A., Read J.L., Stokeld D. (2018) How many reptiles are killed by cats in Australia?. Wildlife Research 45, 247-266.
Woinarski J.C.Z., Murphy B.P., Legge S.M., Garnett, S.T., Lawes, M.J., Comer, C., Dickman C.R., Doherty T.S., Edwards G., Nankivell A., Paton, D., Palmer R. and Woolley, L.A. (2017) How many birds are killed by cats in Australia? Biological Conservation 214.

[27] Only otherwise recorded in and around Buckley Park Foreshore Reserve and Swan Island; personal observations and Atlas of Living Australia.

6.7.4 It is modelled that buffer zones around nature reserves or protected sites in order to prevent incursions by cats need to be from 360m to 2.4km, noting that cats in areas of lower housing density roam much further[28].

6.7.5 Pet cats are prohibited under covenant from the Yellow Gums subdivision because of their impact on fauna, but this option is not viable for most residential developments

6.8 *Predation of native wildlife by the introduced Red Fox Vulpes vulpes*.

6.8.1 Foxes vary geographically in their use of peri-urban and suburban habitats. Their use of agricultural areas varies locally, largely dependent on the efforts made to control them. Areas peripheral to residential development, including reserves, set-asides, buffers and adjacent undeveloped land often, but not always, have increased occupancy by foxes, partly because of constraints to control methods such as poisoning and shooting.

6.9 *Reduction in biomass and biodiversity of native vegetation through grazing by the Rabbit Oryctolagus cuniculus*.

6.9.1 Rabbits vary geographically in their use of peri-urban habitats but are largely excluded from suburban habitats. Their use of agricultural areas varies locally, largely dependent on the efforts made to control them. Areas peripheral to residential development, including reserves, set-asides, buffers and adjacent undeveloped land often, but not always, have increased occupancy by rabbits unless they are controlled.

6.10 *Aggressive exclusion of birds from potential woodland and forest habitat by over-abundant noisy miners* (*Manorina melanocephala*).

6.10.1 Noisy Miners are well-documented to use areas well-wooded with eucalyptus trees but missing dense mid-storey and under-storey plants.

6.10.2 Noisy Miners are rare in the Ocean Grove Nature Reserve away from the immediate peripheries but common to abundant across the well-treed areas of 'old Ocean Grove'.

6.10.3 As noted in a case-example below, the Yellow Gums subdivision appears to have facilitated a significant increase in the number of Noisy Miners. Although the critically endangered Swift Parrot still visits the subdivision most years, they are often observed being chased out of the subdivision by Noisy Miners. The ejection of Swift Parrots is a reason why Noisy Miners are listed as a threatening process[29].

6.10.4 Across 'old Ocean Grove' and the Yellow Gums subdivision, Noisy Miners are commonly seen chasing small birds such as honeyeaters and pardalotes not just out of the trees in which they are feeding but for tens or hundreds of metres[30].

Additional threatening process related to residential development, which are well proven in the scientific literature but are not listed by the relevant Australian and Victorian government Acts, include:

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[28] Hall, C.M., Bryant, K.A., Haskard, K., Major, T., Bruce, S. & Calver, M.C. (2016) Factors determining the home ranges of pet cats: A meta-analysis. Biological Conservation 203: 313–320.

[29] www.environment.gov.au/system/files/pages/a564219c-dd63-4187-a578-6e3cddc7ca31/files/noisy-miner-ktp-advice.pdf

[30] Personal observations and discussions with local amateur and professional zoologists.

6.11 Hydrological change including stormwater run-off.

6.11.1 The Ocean Grove Nature Reserve is fed by direct rainfall plus sheet-flow and drainage lines from the agricultural land in the east of the Area. Heavy rainfall is required to saturate the soil and allow these drainage lines to flow above-ground to the Ocean Grove Nature Reserve.

6.11.2 Agricultural land in the west of the Area drains to the Lake Connewarre system, part of the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar Site. Ramsar sites are Matters of National Environmental Significance under the EPBC Act, and any action that has, or is likely to have, a significant impact requires approval from the Australian Government Minister for the Environment. A local example is the stormwater run-off from the Armstrong Creek development into the same Ramsar Site.

6.11.3 Residential developments replace natural hydrological processes (including seepage and sheet flow across agricultural land) with 'hard' engineering solutions including stormwater systems which changes water provision to downstream and surrounding environments.

6.11.4 Run-off from hard urban surfaces, especially roads, picks up pollutants. The Victorian EPA lists the following as pollutants contained within stormwater: sediment, nutrients, oxygen-demanding substances, pH (acidity), micro-organisms, toxic organics, heavy metals, gross pollutants (litter and debris), oils, detergents and shampoos (surfactants) and increased water temperature[31].

6.11.5 Residential developments are unlikely to be able to maintain the pre-development hydrology without significant pollutants as listed above.

6.12 Disturbance by humans.

6.12.1 There are numerous examples of the negative impacts of human disturbance on species. Perhaps the best-researched example in Victoria is the Hooded Plover[32].

6.12.2 Wedge-tailed Eagles are well-known to be sensitive to human disturbance. The Tasmanian government conservation advice for the Wedge-tailed Eagle includes avoiding "disturbance (visible, or extreme audible) to a nesting eagle… including people or loud machinery too near the nest during the breeding season ('too near' can be many hundreds of metres if in direct line of sight of the nest) or residential development near nesting habitat"[33]. Wedge-tailed Eagle used to nest in the Ocean Grove Nature Reserve but no longer, probably because of increased human disturbance. A pair that currently nests in the Area is one of only two or three pairs across the Bellarine[34].

6.12.3 Broader research outside Victoria has demonstrated the impact of human disturbance on various woodland bird species[35].

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[31] https://ref.epa.vic.gov.au/your-environment/water/stormwater/types-and-causes-of-urban-stormwater-pollution

[32] http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=66726

[33] https://www.threatenedspecieslink.tas.gov.au/Pages/Wedge-tailed-Eagle.aspx

[34] Geelong Field Naturalists Club databases and personal communications.

[35] E.g. Liley, D. & Clarke, R.T. (2003) The impact of urban development and human disturbance on the numbers of nightjar Caprimulgus europaeus on heathlands in Dorset, England. Biological Conservation 114, 219–230. Lowe, A., Rogers, A. & Durrant, K.L. (2014) Effect of human disturbance on longterm habitat use and breeding success of the European Nightjar, Caprimulgus europaeus. Avian Conservation and Ecology, 9.

6.12.4 This broader research has led to residential development being rejected in multiple planning enquiries around Special Protection Areas in the U.K.[36].

6.12.5 Human disturbance is hardly affecting the Area given the very limited human access to the Area.

6.12.6 Human disturbance resulting from increased population density in the greater Ocean Grove area is likely to threaten the ecological values of the Ocean Grove Nature Reserve.

6.12.7 Human disturbance resulting from any residential development in the Area would likely to threaten the ecological values of the Ocean Grove Nature Reserve.

6.13 Increased risk of wildfire.

6.13.1 Wildfire is a risk to the ecological values of the Area and the Ocean Grove Nature Reserve as well as being a major risk to the residents of the greater Ocean Grove area, especially those living directly south of the Ocean Grove Nature Reserve.

6.13.2 Increased human populations and access increases the risk of wildfire, both accidental (e.g. barbeque embers blown downwind) and deliberate (arson).

6.14 Artificial light.

6.14.1 Artificial light is likely to have a negative impact on the ecological values of the Area and of the Ocean Grove Nature Reserve. Street lights and household lights attract many night-flying insects, disrupt their natural lives and leave them susceptible to predation by opportunistic birds.

6.14.2 Increased artificial light is an inevitable outcome from residential development.

6.15 Noise pollution.

6.15.1 Noise pollution is likely to have a negative impact on the ecological values of the Area and of the Ocean Grove Nature Reserve.

6.15.2 Increased noise is an inevitable outcome from residential development.

Residential development of any sort is, based on the above evidence, the greatest short-term and medium-term threat to the ecological values of the Area.

7 Conserving the ecological values of the Area for the benefit of the Ocean Grove and wider communities

7.1 As demonstrated by the evidence above, the only realistic way to conserve the ecological values would be to abide by the City of Greater Geelong's current plans and not allow any future residential development. Avoidance is the first step in threat mitigation and should be followed to the maximum extent feasible.

7.2 Minimisation (sometimes also referred to as mitigation) is the second step in threat mitigation. Minimising the impacts of residential development is challenging and often of limited benefit to the threatened ecological values.

[36] E.g. over 60 appeals which related to development within 400m of two Special Protection Areas in the U.K. were dismissed.

7.3 The most locally relevant example of the limitations of minimisation is the Yellow Gum subdivision. I have unparalleled experience[37]of the outcomes of planning overlays and covenants, including buffers and a reserve, on conserving the biodiversity of the Yellow Gums subdivision.

7.3.1 The City of Greater Geelong followed the prescription in the Victorian Government Flora and Fauna Guarantee Act 1988 Action Statement 180 to "Include Bellarine Yellow Gum sites in Environmental Significance Overlays and applying planning restrictions to ensure their long-term protection". However, many Bellarine Yellow Gums have been cleared from inside building envelopes or because of bushfire or other safety concerns. Protection and enhancement of the Yellow Gums Reserve has not led to an increase in the number of Bellarine Yellow Gums, but has enabled the permitted removal of Bellarine Yellow Gums from inside building envelopes, and does not constitute a genuine offset under globally accepted definitions of biodiversity offsets[38].

7.3.2 The City of Greater Geelong has not fully enforced the VPO2 *Thacker Street, Ocean Grove – Vegetation Protection Area* where "A permit is required to remove, destroy or lop native vegetation" outside of a building envelope. Residents have an understandable lack of understanding of this regulation and especially the value of the ground-storey vegetation where much of the ecological value of the Grassy Woodland EVC exists. Many residences in this *Vegetation Protection Area* have cleared or converted a significant proportion of the native grassland vegetation outside of the building envelope. In my opinion, it is not feasible to enforce such a regulation in a residential subdivision.

7.3.3 Subdivision appears to have facilitated a significant increase[39] in the number of Noisy Miners, a listed threatening process. Although the critically endangered Swift Parrot still visits the subdivision most years, they are often observed being chased out of the subdivision by Noisy Miners. The ejection of Swift Parrots is a reason why Noisy Miners are listed as a threatening process[40]. Therefore, the subdivision appears to have led to a loss in value for its other highest priority species (along with the current net loss in Bellarine Yellow Gums).

7.3.4 Subdivision appears to have eliminated Koalas from using the area: although previously recorded in what is now residential blocks[41], none has been seen since subdivision[42].

7.3.5 Subdivision is predicted to have led to a decline in a number of bird species which are relatively intolerant of human disturbance, such as birds of prey, but there are no baseline data on which to demonstrate this outcome.

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[37] Based on my ownership of and residence on the largest block in the Yellow Gums subdivision, my near-daily observations of the ecology and threatening processes, including across the area before subdivision, and my professional expertise to interpret these observations.

[38] E.g. https://www.iucn.org/resources/issues-briefs/biodiversity-offsets

[39] Although there are no robust baseline data from before submission, all of the highest counts of this species in the Geelong Bird Report 2013-2016 were from the Yellow Gums subdivision.

[40] www.environment.gov.au/system/files/pages/a564219c-dd63-4187-a578-6e3cddc7ca31/files/noisy-miner-ktp-advice.pdf

[41] T Fletcher personal communication.

[42] Personal observation and conversations with residents.

7.3.6 Subdivision has led to a great increase in the number of wire-mesh fences and domestic dogs, making the environment less suitable for Echidnas.

7.3.7 Subdivision has brought greater vehicular traffic which has led to wildlife casualties including annual cases of dead Jacky Lizards and occasional cases of dead blue-tongues[43].

7.4 Biodiversity offsets are often offered as a solution to enable development and conservation. They are however contentious for various reasons, including their sanction of ongoing net loss of ecological values[44].

7.4.1 Offsetting any lost ecological values only works if genuine offsets can be found – areas supporting similar ecological values which are predicted to be destroyed or degraded or can be restored. At the time of writing (2 November 2019), there are no offsets available for Bellarine Yellow Gums[45].

7.4.2 Offsetting replaces ecological values lost in one geographical area with similar ecological values protected or restored in another geographical area. Therefore, these ecological values are lost to the local people currently benefiting from their geographical proximity to these values. Similarly, there is a loss to associated ecological assets (such as the Ocean Grove Nature Reserve) currently benefiting from their geographical proximity to these values. An analogy is to destroy the beach at Ocean Grove but to protect another beach outside of the Bellarine.

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[43] Personal observations.

[44] E.g. Gibbons, P, Macintosh, A, Constable, AL, Hayashi, K. (2018) Outcomes from 10 years of biodiversity offsetting. Glob Change Biol. 24: e643– e654.
Sonter, L. J., Tomsett, N., Wu, D. and Maron, M. (2017) Biodiversity offsetting in dynamic landscapes: influence of regulatory context and counterfactual assumptions on achievement of no net loss. Biological Conservation. 206: 314-319.
Maron, M., Bull, J. W., Evans, M. C. and Gordon, A. (2015) Locking in loss: Baselines of decline in Australian biodiversity offset policies. Biological Conservation 192:504–512

[45] https://nvcr.delwp.vic.gov.au/Search/SHU