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Secretary Kerrine Blenkinsop
Western Australian Planning Commission
Locked Bag 2506
Perth WA 6001

Submission: Metropolitan Region Scheme Amendment 1270/41 - Ocean Reef Marina Redevelopment

Dear Ms Blenkinsop

The Urban Bushland Council WA Inc. (UBC) is a community association of more than 75 community conservation groups. The UBC has been committed to protecting urban bushland in the Perth region since the organisation's inception in 1993. The UBC has also been committed to protecting Bush Forever Sites since the Bush Forever policy was established in 2000.

The UBC is strongly opposed to Metropolitan Region Scheme (MRS) Amendment 1270/41 - Ocean Reef Marina Redevelopment and the land clearing that is proposed under the Amendment. The UBC is strongly opposed to the clearing of any land that is a part of a Bush Forever Site. We note that this proposal was not formally assessed by the EPA and we believe this represents a significant failure in proper governance under provisions of the Environmental Protection Act. The proposal should have been formally assessed because of the very significant impacts on a conservation area (a 'critical environmental asset') which is both unique in its ecosystem and is irreplaceable. Reliance on the clearing regulations is not an adequate excuse for failure to formally assess in this case.

The redevelopment of the Ocean Reef Marina is proposed to take place on land which contains part of the Bush Forever Site 325, which is coastal bushland stretching between Burns Beach and Hillarys. MRS Amendment 1270/41 states that 25.96 ha of Site 325 will be removed. We understand that the 25.96 ha includes existing slipways and car parks at the Marina.[1] The MRS Amendment states that approximately 19.5 ha of native vegetation would be cleared[2], but the UBC understands that in actuality approximately 16.79 ha of remnant native vegetation will be cleared[3].

The MRS Amendment states that the clearing of vegetation at Site 325 "*…has the potential to impact other parts of Bush Forever Site 325 through weed invasion, hydrological changes and increased pressure from human access"*.[2]
The UBC believes that clearing of 16.79 ha of native vegetation in Site 325 for the Ocean Reef Marina redevelopment would unquestionably impact and damage the remaining bushland in numerous ways that go beyond those listed in the MRS Amendment. The four main areas of negative impacts to the remaining bushland would be:

- habitat fragmentation resulting in edge effects and the disruption of ecological linkages;
- damage to important flora species and ecological communities;
- damage to important fauna species and
- loss of the benefits natural areas provide for the local urban environment and people.

The UBC acknowledges that the Site 325 map within the Bush Forever policy document states that the Ocean Reef Marina is a *"Possible Future Strategic Regional Recreation and Tourism Node".*[4] However, the UBC does not accept that this designation justifies that a large redevelopment to the extent of the one proposed is needed. The proposed expansion of the Ocean Reef Marina and the associated land clearing to make way for residential and commercial development seems especially unnecessary when it is considered that the proposed development lies only 9 km north of Hillarys Boat Harbour and 12 km south of Mindarie Marina.

Site 325 is adjacent to the ocean on its west and adjacent to a vast extent of residential properties on its east, which can only truly be appreciated by viewing a satellite image of the area. Figure 1 shows the residential developments surrounding Ocean Reef Marina, but these developments exist along the full length of Site 325 which is not shown in the image below.

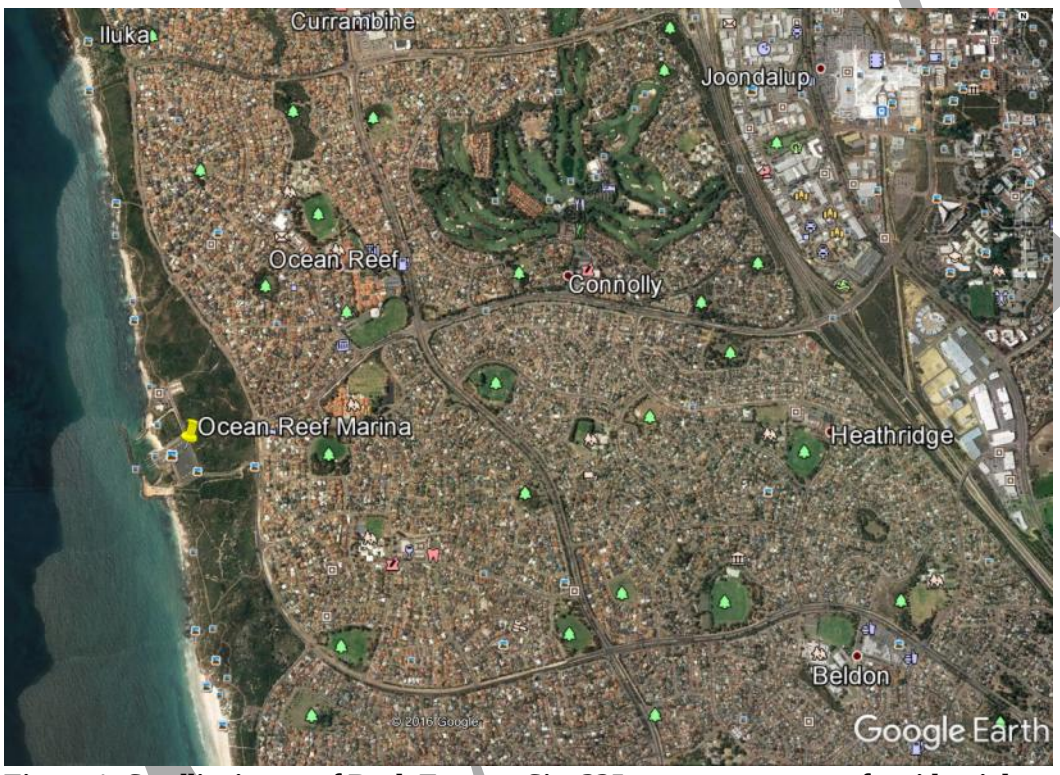

Figure 1: Satellite image of Bush Forever Site 325 next to vast area of residential properties in Ocean Reef area.

There already exists two marinas and extensive residential development close to the proposed Ocean Reef Marina redevelopment. It is expected that the proposed development would have 700 dwellings (600 apartments and 100 dwellings), creating a residential population of approximately 1,250 people. A 260 room hotel is also expected to be built, which increases the average daily population in all accommodation to be approximately 1,500 people (not including workers).[5] This is a very large number of people for the proposed development area and this new population would have significant impact on the remaining bushland that would not be cleared.

There is only one Bush Forever Site 325. If bushland at Site 325 is cleared in accordance with the MRS Amendment, the land is gone forever and the resulting impacts on the surrounding environment, flora, fauna and people are irreversible. The Bush Forever policy was not established to clear regionally significant bushland, like Site 325, but rather to protect it, conserve it and maintain the positive effects of its existence as discussed in "The Vision" section of the Bush Forever policy document:

> 'Bushland conservation not only fulfills a moral obligation to protect habitats from destruction and save species from extinction, it also protects invaluable resources for education, heritage, tourism, scientific and medical research and provides waterway protection, microclimate control, biological control of pests and diseases, visual amenity, and places for quiet contemplation, relaxation and a sense of place. Every city needs it natural spaces: they are impossible to replace once lost.'[4]

The rest of this submission will discuss four main areas of negative impacts that would result from the Ocean Reef Marina Redevelopment. The UBC believes these negative impacts justify the organisation's stance that the MRS Amendment 1270/41 should be rejected.

I. Fragmentation of Perth Bushland and its Associated Problems

The bushlands of Perth are extremely special and this has been recognised by both the people of Perth and its governments. As the Bush Forever policy document states:

'Urban bushland contributes to Perth's unique character and quality of life and has often been described as the 'heart and lungs of the city'.[4]

Perth's natural environments are linked to its identity. Despite the fact that Perth's environment is what makes it unique in the world, bushland fragmentation, edge effects and the disruption of ecological linkages as the result of human interference continually destroy its environment. The proposed land clearing of Site 325 as part of the marina redevelopment is yet another example of human disturbance which would contribute to these problems. How each of these problems will result from the marina redevelopment will be discussed in turn.

Habitat Fragmentation

Habitat fragmentation (Figure 2) refers to the remnants of native vegetation that remain after land has been modified in ways that reduce it in size and disconnect pieces of it from adjoining continuous habitat. The immediate consequence of the fragmentation is that the populations of flora and fauna which occur in the remnants are divided up and exist on smaller patches of habitat, which increase their likelihood of extinction.

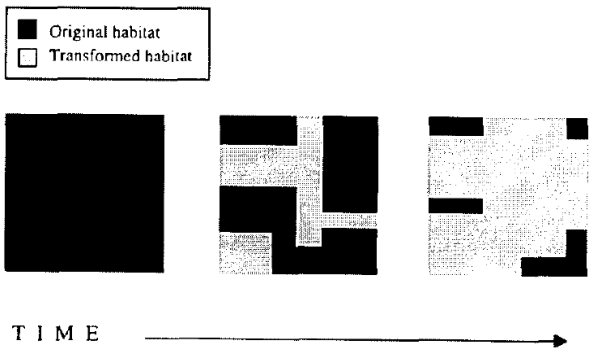

Figure 2: Diagram representing the process of habitat fragmentation over time.[6]

The proposed land clearing at Ocean Reef Marina will fragment Site 325 bushland. The initial fragmentation will occur as the result of the building of two road entrances into the marina at Hodges Drive and at Resolute Way. It is a common occurrence for the construction of roads to fragment the landscape. Not only does the building of the road itself cause fragmentation, but development normally then occurs along the road which continues to reduce the habitat area.[6] However, at Ocean Reef Marina, the development occurs at the end of the bisecting roads and the habitat shrinking occurs from the coast inwards.

What makes Site 325 so unique is its length and width along the coast, which can be found nowhere else in the Perth region. It has been found that long linear reserves can cover a lot of floral diversity

in a landscape because a linear reserve covers more environmental gradients than a square reserve of the same size.[7] The diversity and long linkage of flora and fauna in Site 325 would be destroyed by the implementation of MRS Amendment 1270/41. How the disruption of ecological linkages at Site 325 would occur will be discussed later in this submission.
Habitat fragmentation and its associated problems have been recognised by the Western Australian Environmental Protection Authority (EPA). Perth suffers from habitat fragmentation and its negative effects. Due to the clearing of native vegetation and habitat since Perth was first settled by Europeans, only 29% of the original extent of native vegetation on the Swan Coastal Plain remains. Multiple fauna species that existed at the time of European settlement, including 12 mammals, no longer exist and many flora species are today on the brink of extinction.[8] Habitat fragmentation is a grave threat to biological diversity and it continues to take its toll on the Perth region's environment.[6]

Over 2,000 taxa of native vascular plants have been recorded in the Perth and Peel regions. This great flora diversity is only made up of a few families of plants, but each family has many species. These species are rare in nature, have small areas of distribution and specific habitat requirements. Therefore, Perth's increasingly fragmented landscape makes these flora species very vulnerable to extinction. The species that do remain in small remnants are subject to pressures from outside the remnants such as weed invasion, diseases and different fire regimes.[8] The rare flora that presently occur at Site 325 at Ocean Reef and would be negatively affected by land clearing and fragmentation will be further discussed later in this submission.

Fauna are also negatively affected by habitat fragmentation. Fauna can live in disconnected remnants, but the populations are more susceptible to fire, competition, predation, and loss of genetic diversity.[8] If the Ocean Reef Marina redevelopment were to go ahead and approximately 1,250 people were to move into the new residences, a huge number of dogs and cats would likely come with them as pets. These pets would greatly increase the amount of predators in the area and have a negative effect on the fauna living there, which would already have a weakened resistance due to their fragmented habitat. The outside pressures on flora and fauna in small remnants are greater than those on a large land area due to the phenomenon of "edge effects", which will now be discussed.

Edge Effects

Edge effects are a result of habitat fragmentation. When unbroken areas of habitat are reduced into disconnected remnants, the length of the border between fragments and the surrounding environment increases. The parts of the habitat that were once inside the continuous habitat are now exposed to outside environmental forces. For example, at the edge of a fragment there are large differences in light, moisture, temperature and wind as compared to the interior and these differences can have significant effects on the flora and fauna that occur there.

Fragment edges are also susceptible to the invasion of exotic plant species and the negative effects of human activity, especially if the remnant is in an urban or suburban area. As a large amount of people would be expected to move into the residential units in the proposed Ocean Reef Marina redevelopment, it is thus expected that more human disturbances to the bushland will occur than at present. These "edge effects" not only affect the environment at the edge of the fragment, but they also can significantly influence flora and fauna communities inside the fragment as the effects can reach tens of metres inside the fragment. Since edge effects reach a certain distance inside the fragment, this means that a smaller fragment has a higher percentage of edge habitat (Figure 3) than a larger fragment.[6] **Therefore the small remnant is much more susceptible to the various forces acting upon it than when it was a larger area.**

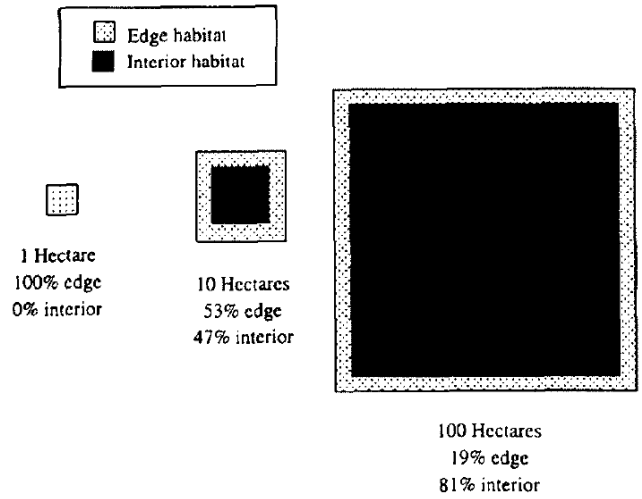

Figure 3: Diagram representing the greater proportions of edge habitat in smaller fragments as compared to larger fragments. Assumed edge width is 50 m.[6]

If MRS Amendment 1270/41 were to be implemented the number of edges that Site 325 at Ocean Reef would have with the surrounding urban environment would increase significantly. The percentage of the edge habitat would also greatly increase as fragments would be created that are reduced in size.

The area of habitat which would be expected to be affected the most is the fragment of Site 325 that would lie in between the entrance to the development at Resolute Way and the entrance at Hodges Drive. This fragment would be greatly deceased in size and would be completely cut off from the rest of the Site 325 bushland as it would be surrounded by roads and development.

The edge effects resulting from the great reduction in size of this part of the bushland and its lack of connectivity with the rest of the Site 325 bushland would lessen the likelihood of survival of the flora and fauna communities in existence there. The great importance of fragment connectivity will now be discussed.

Disruption of Ecological Linkages

Disruption of ecological linkages occurs as the result of habitat fragmentation. Since the Ocean Reef Marina redevelopment would fragment the bushland, it would also disrupt the ecological linkage that Site 325 provides. An ecological linkage can be defined as

"a series of (both contiguous and non-contiguous) patches which, by virtue of their proximity to each other, act as stepping stones of habitat which facilitate the maintenance of ecological processes and the movement of organisms within, and across, a landscape".

The existence of ecological linkages is important for the long term viability of the connected land.[9]

Site 325 is a government recognised linkage Site. The official Bush Forever site description explains that the Site 325 bushland is a linkage to an adjacent bushland to the east, part of a regionally significant fragmented bushland/wetland linkage and a part of a semi-contiguous north-south vegetated coastal strip.[10] The Ocean Reef Marina Environmental Assessment recognises that there will be a linkage disruption, but only a *"partial interruption of the north south linkage values".*[3]

The UBC believes that is not just a "partial interruption" as two roads will be built bisecting and fragmenting Site 325. While the UBC believes that the disruption to the north-south linkage will be most affected by the potential development, the UBC believes that the linkages with other bushlands will also be significantly affected.

The negative impacts that would be felt locally at Ocean Reef, would also extend to the other bushlands with which it has linkages. For example, Site 325 has linkages with Bush Forever Site 322, which is situated north of Site 325 and includes Tamala Park on the coast. The vegetated area

of transition between Site 325 and Site 322 provides an important coastal linkage as well as a linkage inland to Neerabup National Park and further to the state forests on the Gnangara Mound. This vegetated area is a transition between the Quindalup and Spearwood dunes and it provides an important feeding habitat for various fauna due to the seasonal diversity of the vegetation's flowering times.[11]

The EPA has recognised that Perth suffers from all of the above discussed problems (habitat fragmentation, edge effects, disruption of ecological linkages) and action must be taken to prevent them. The EPA has stated that the management of fragmented lands is costly and the protection of continuous blocks of land is preferred because it is more cost effective due to having lower vulnerability to outside pressures. **The EPA has stated that it is necessary to reduce the edge to area ratio of natural areas, restore linkages between natural areas and return habitats for threatened fauna species that have been cleared.[8]**
These recommendations by the EPA speak directly to the negative results that would occur from the implementation of MRS Amendment 1270/41. The Western Australian Planning Commission (WAPC) must take the EPA's recommendations seriously. By considering developments like the Ocean Reef Marina, the WAPC is complicit in contributing to the negative environmental effects that have been continually damaging Perth's environment since the city's inception.

II. Negative Impacts on Important Flora Communities and Species

The most recent flora surveys of the Ocean Reef Marina redevelopment area have been undertaken in 2008 by Natural Area Management (NAM)[12] and in 2013 by Mattiske Consulting[13]. Both of the surveys confirm that there are no Threatened Ecological Communities (TEC) present in the redevelopment proposal area. An ecological community is *"a naturally occurring group of plants, animals and other organisms interacting in a unique habitat. The complex range of interactions between the component species provides an important level of biological diversity in addition to genetics and species".*[14]
An ecological community is considered to be threatened if it is *"presumed to be totally destroyed or at risk of being totally destroyed".*[14] Possibly threatened ecological communities which do not meet survey criteria or are not well defined are put on the priority ecological community (PEC) list, which has priority levels 1, 2 and 3. The priority levels are ranked in order of priority for survey and/or definition and evaluation of conservation status so that it can determined whether the community ought to be declared as a threatened ecological community.[15]
Three Priority 3 Ecological Communities have been found at the Ocean Reef Marina proposal area.
These include: SCP 24 Northern Spearwood shrublands and woodlands, SCP 29a Coastal shrublands on shallow sands, southern Swan Coastal Plain and SCP 29b Acacia shrublands on taller dunes, southern Swan Coastal Plain.
Of the entire Site 325 bushland at Ocean Reef surveyed by Mattiske, 46% of SCP 24 exists within the marina redevelopment proposal area, 67% of SCP 29a exists within the proposal area and 31% of SCP 29b exists within the proposal area.[13] **These are very significant occurrences which must be considered for protection. They should not be cleared**.

In terms of ecological communities present at Site 325 at Ocean Reef, our greatest concern lies with the SCP 29a community, which has the largest presence in the proposed development area. Figure 4 illustrates the locations of the PECs within the proposal area as surveyed by Mattiske Consulting, **which shows the great extent that this PEC will be destroyed through clearing.[13]**

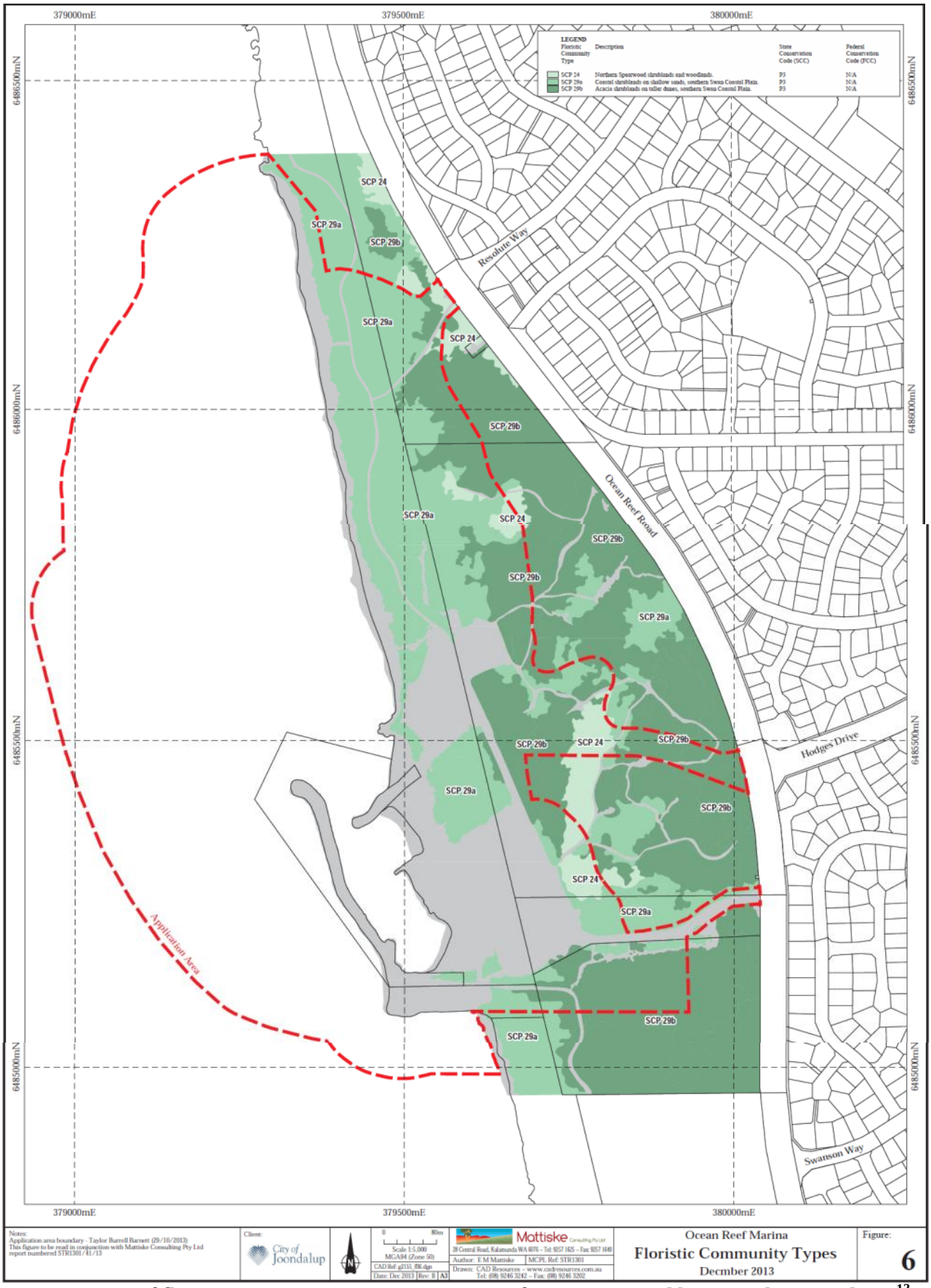

Figure 4: Map of floristic community types at Ocean Reef Marina created by Mattiske Consulting.[13]

Richard McDowell, a local Conservationist with practical field experience in the Joondalup area and considerable knowledge of local endemic flora, believes that the SCP 29a communities found in the Ocean Reef Marina proposal area are both locally and regionally significant.[16] He is also very familiar with the Ocean Reef Marina bushland because he has undertaken native seed collection there for the City of Joondalup.[17] The 2013 Mattiske Report lays out criteria for how vegetation can be determined to be "significant".[13] McDowell points to the criteria of scarcity, unusual species, novel combination of species and a restricted distribution, as these criteria which hold true for species comprising SCP 29a at Ocean Reef Marina.[16]

Figure 5: Photographs of SCP 29a at Ocean Reef Marina exhibiting floral diversity (Imbergamo 2017).

A vegetation community can be "locally significant" if it: contains Priority Flora species, contains an extended range of a certain taxon outside of the normal distribution, restricted to one or two locations, occur as small isolated communities or show unusually high structural and species diversity.[13] McDowell believes that the SCP 29a at Ocean Reef fits some of these criteria as it contains a very unique combination of species. He believes this combination does not exist in any other place in the Perth region. While the individual species which make up this SCP 29a community can be found in other locations, the grouping of the extremely diverse component species together in this location is unique.[18]

However, a few species that comprise the diversity of the SCP 29a have not been noted as present at Ocean Reef Marina by either the 2013 Mattiske Report or the 2008 NAM Report and these are the limestone loving species of *Scaevola globulifera*, *Solanum symonii* and *Lechenaultia linarioides*.[16] It is evident that multiple flora surveys done on the proposed development area have not fully captured the diversity of the SCP 29a communities, which speaks to the extensive diversity

contained within the communities present at Ocean Reef. This also speaks to the biodiversity of Site 325 at Ocean Reef Marina, which may not be fully understood yet, but the potential clearing of these ecological communities for the marina redevelopment would permanently eliminate the opportunity for further research**.**

Indeed the UBC believes that these communities are regionally significant in this Bush Forever area.

Vegetation communities are considered to be "regionally significant" where they are restricted to specific landform types, contain uncommon plant community types in the region or support threatened flora populations.[13] In regards to the SCP 29a communities at Ocean Reef, they are found on limestone cliffs next to the ocean and this makes them regionally significant and special. The limestone cliff and coastal dune landscape features of Site 325 are an important part of its special attributes, as noted in the official Bush Forever Site 325 description. It is also stated in the official Site description that the vegetated areas south of Burns Beach are the best remaining example of a "limestone ridge forming cliffs" in the northwest corridor of the Perth metropolitan region.[10] **Not only is the vegetation at Site 325 at Ocean Reef especially important due its diversity and uniqueness, but the landforms on which the vegetation exists is also unique and would be destroyed under the proposed marina redevelopment.**

Priority flora

There are two flora species present in Site 325 at Ocean Reef that are Priority level species. Individual flora species are ranked in the same way as ecological communities. These species are *Conostylis bracteata* (Priority 3) and *Grevillea sp. Ocean Reef* (Priority 1). *Conostylis bracteata* (Figure 5) is a tufted perennial with yellow flowers that can grow 0.2 to 0.45 m high[19]. Four locations have been found of *Conostylis bracteata* within the proposal area. Most of the locations of *Conostylis bracteata* were outside the development proposal area or on the border of the proposal area.[13] However, some of these populations found lie directly on the boundary or within a small distance of the boundary. Figure 7, a map created by Mattiske Consulting, shows the locations of *Conostylis bracteata*.[13] Although these plant communities will not be cleared, they will likely be largely impacted by edge effects, as discussed earlier in this submission.

Figure 6: Photograph of Conostylis bracteata.[20]

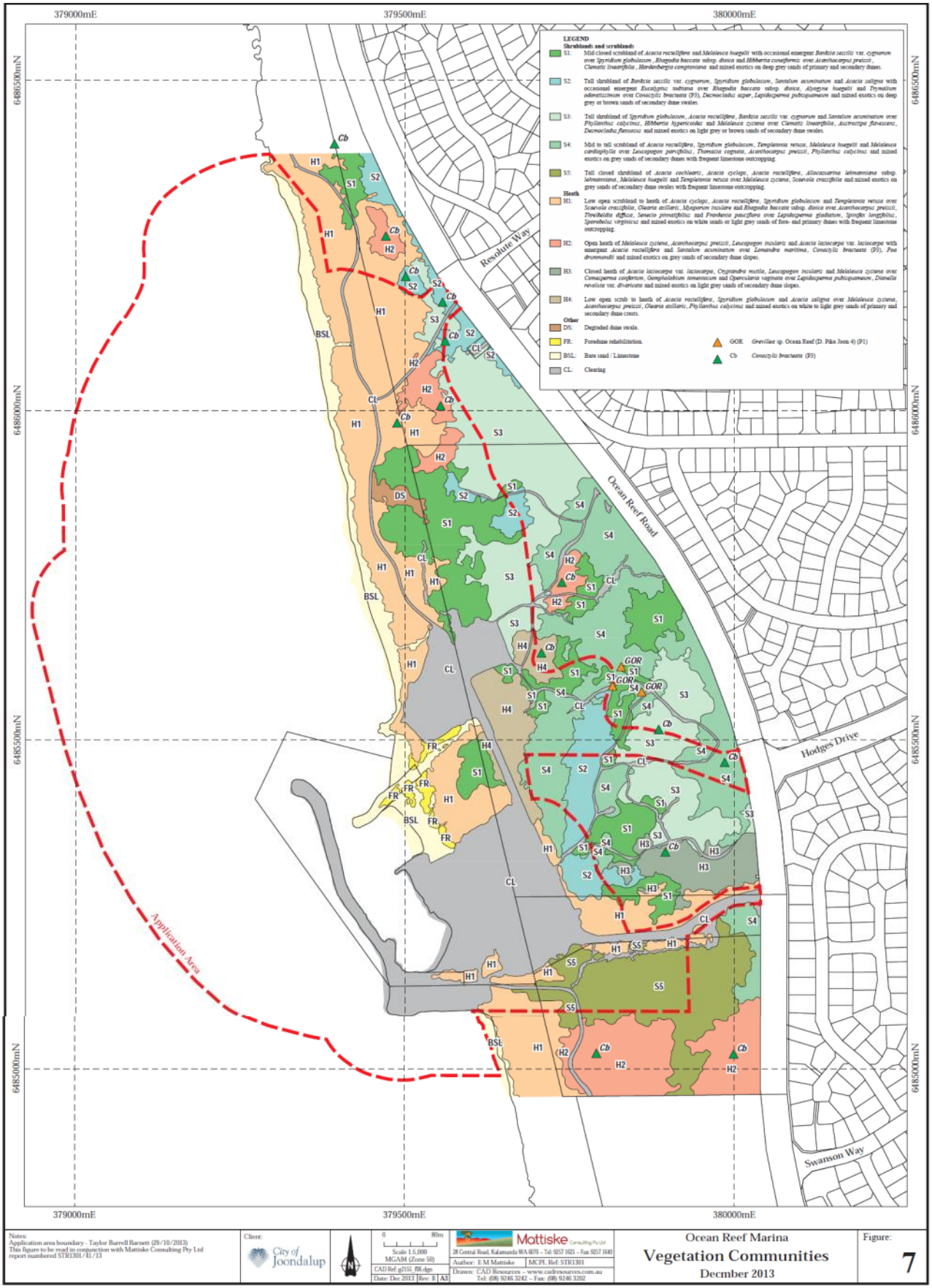

Figure 7: Map of vegetation communities at Ocean Reef Marina created by Mattiske Consulting.[13]

The Mattiske 2013 Report also found a large population (>60 individuals) of *Grevillea sp. Ocean Reef* (Figure 8) in an area of about 50 m by 50 m in the central dunes location of the site (Figure 7).[13] **This population is the only known location of this shrub species in the state according to the Western Australian Herbarium.[19]**

At the time of the Mattiske Report, the proposal boundary near Hodges Drive was situated much closer to the *Grevillea* population than the current MRS Amendment. Mattiske suggested that a greater buffer was needed as the boundary crossed through the most eastern population of the species at the site.[13] The UBC notes that the current MRS Amendment boundary has been adjusted so that none of the *Grevillea* species are cleared as part of it. However the UBC believes that despite the larger buffer, edge effects will still impact the *Grevillea* population. Currently the area of the *Grevillea* population is degraded, as found by Strategen.[3] Mattiske had also found that the area of the *Grevillea* population to be degraded.[13] The presence of the proposed development right next to the population would only contribute to further degradation of the area and population.

Figure 8: *Grevillea sp. Ocean Reef* flower (above)[21] and current degraded *Grevillea sp. Ocean Reef* population area (below).[22]

Diplolaena angustifolia, also known as the Yanchep Rose (Figure 9), is another important shrub species that exists in the Ocean Reef Marina proposal area.[19] This species is not considered to be a threatened or priority species but **the occurrences of this species at Ocean Reef are believed to be the last remaining ones in entire Joondalup coastal reserve, if not in the greater Perth metropolitan area.[23]**

The Yanchep Rose exists at Ocean Reef as part of the SCP 29a ecological communities, which contributes to the uniqueness and diversity of SCP 29a.[16] One particular known location of the Yanchep Rose at Ocean Reef Marina is in a SCP 29a area which would be cleared according to the

proposed MRS Amendment.[18] The Yanchep Rose is not mentioned in the 2013 Mattiske Report[13] as being present at Ocean Reef Marina and only briefly mentioned in the 2008 NAM Report.[12] **This deficiency is unacceptable and this population of the Yanchep Rose should not be cleared.**

Figure 9: Photographs of the Yanchep Rose shrub species.[19]

According to McDowell, the communities of standalone *Melaleuca cardiophylla* (Figure 10) on limestone capping which exist at the Ocean Reef Marina are also important flora because they add to the diversity of the site. McDowell believes these should be considered at least regionally significant because they are unique to the area.[16] This species is briefly mentioned in the 2013 Mattiske Report as they are the most southern extent of the known coastal range. But Mattiske only discusses the species as being a part of a mid to tall shrubland composed of a number of species and does not discuss the presence of individual communities of *Melaleuca cardiophylla* at Ocean Reef.[13] **This is another deficiency which understates the regional significance of the site.**

Figure 10: Photographs of the *Melaleuca cardiophylla* species.[19]

Also according to McDowell, the large community of *Nitraria billardierei*, known at Nitre Bush (Figure 11), located at Ocean Reef Marina is an important flora species. The Nitre Bush community exists adjacent to the southern lower-level car park at Ocean Reef Marina and the community extends southward onto limestone capping next to the ocean.[16] The location in which the community exists is included in the area that would be cleared for the marina redevelopment. **The large size of the Nitre Bush community at this location makes it significant.** The species also adds to the diversity of the SCP 29a ecological community[24] and has importance to Aboriginal

culture as it produces edible berries. Historically Aboriginal people came to the coast to collect the Nitre Bush berries.[18]

The UBC notes that the presence of this species at Ocean Reef Marina is not mentioned in the 2013 Mattiske Report[13] or the 2008 NAM Report [12] and this is another deficiency in the report which understates the significance of the site. This population should not be cleared.

Figure 11: Photograph of Nitraria billardierei (Nitre Bush) species.[25]

While the UBC has discussed what it believes to be the most important ecological communities and individual species at Ocean Reef Marina, there are also some additional flora species in existence at Ocean Reef that are very important to the existence of some fauna as a source of food and habitat. These flora species will be further discussed in the next section of this submission on important fauna species at Ocean Reef.

III. Negative Impacts on Important Fauna Species

There is a great faunal diversity at Site 325. Site 325 is a part of the Quindalup/Spearwood dune system.[10] The Quindalup/Spearwood dune system is considered to have richer bird and reptile diversity than other dune systems on the Swan Coastal Plain.[11] This great bird and reptile diversity is found at Ocean Reef Marina and will be discussed in this section of the submission. However, many different types of animals have been observed at Site 325 by both formal surveys conducted by consulting firms and by Friends Groups. The fauna sightings by Friends Groups cannot be overlooked. These groups spend the most time on the bushland, while consultants may only spend a couple days at a site. Therefore the knowledge held by the members of Friends Groups about the bushland's fauna is important for understanding the true impact of the proposed marina redevelopment on the existing fauna populations.

While local Friends Groups have not compiled a list of fauna specifically observed at Ocean Reef Marina, much work has gone into compiling observations of species at other areas of site 325 such as Mullaloo and Iluka. The Mullaloo Beach Community Group (MBCG) has a growing list of fauna species that have been observed by members at Mullaloo. The list is currently comprised of 13 reptiles, 18 birds, 3 mammals, 11 invertebrates and 5 introduced species.[26] A formal survey was requested by the Friends of North Ocean Reef – Iluka Foreshore of Spineless Wonders Consultants to investigate the invertebrate species present in the northern part of Site 325 during 2015 and 2016. The findings comprised in the resulting 146 page report are extensive and they speak to the immense diversity of invertebrates that are likely present in all of Site 325.[27]

Although Mullaloo and Iluka are located south and north respectively of the Ocean Reef Marina site, both locations are a part of Site 325 and so can provide strong indications of the type of faunal diversity that exists in the bushland at Ocean Reef Marina.

This section will begin with a discussion of most threatened fauna species found in Site 325 at Ocean Reef by both consulting firms and Friends Groups, as well as discuss the areas of greatest species diversity.

The Carnaby's Cockatoo*, Calyptorhynchus latirostris*, (Figure 12), is listed as "Endangered" both under the federal Environment Protection and Biodiversity Conservation Act (EPBC Act) and under the WA Wildlife Conservation Act 1950. Endangered species are defined *as "threatened species considered to be facing a very high risk of extinction in the wild"*[28].
The 2008 Western Wildlife fauna assessment of Site 325 at Ocean Reef found that Carnaby's Cockatoos were visitors for feeding purposes, rather than using the Site as breeding habitat as the Site does not have large hollow-bearing trees that would be using for nesting. However, the Site does contain Parrotbush (*Banksia sessilis*), which the species uses as a food source.[29]
The presence of Carnaby's Cockatoos flying over the site has been confirmed by local Friends Group members who have observed the birds visiting the site.[30] Approximately 0.43 ha of their foraging habitat would cleared if the proposed development were to go ahead.[3] **Given that the Carnaby's Cockatoo is an iconic and cherished species of the Swan Coastal Plain that is endangered, the species cannot afford further threats to their existence.**
One of the major threats leading to their decline and endangered status is the loss of native food sources brought about by the continued clearing and urban development of the Swan Coastal Plain.[31] Land clearing at Ocean Reef for a marina redevelopment would further contribute to loss of food sources and other threats that this species already faces and the UBC submits this is unacceptable.

Figure 12: Photograph of the Carnaby's Cockatoo.[32]

In general, bird diversity at Site 325 at Ocean Reef is high. The 2008 Western Wildlife Report found that 89 species of birds had the potential to occur at the Site, while 22 were observed during a site visit. However, Western Wildlife found that a lot of the species that are seabirds and shorebirds are commonly found on urban beaches and are reasonably tolerant to disturbance. It was found that a number of bird species, while they are unlikely to use Site 325 as breeding habitat, could forage in the area.[29]

Another important bird species that visits Site 325 at Ocean Reef is the **Rainbow Bee-eater, *Merops ornatus*,** (Figure 13), which is "Specially Protected" under the Wildlife Conservation Act 1950 as it is a migratory bird protected under an international agreement with other nations.[28] The Rainbow Bee-eater visits Perth in the summer where it breeds in sandy banks that can be reasonably degraded. Therefore it is a likely visitor to the Ocean Reef Marina bushland and the area that would be cleared for the marina redevelopment. The potential clearing of bushland for the marina redevelopment would cause the loss of nesting sites for the species.[29] Although this species is considered to be common, the impact of decreased habitat on this species should not be taken lightly. Since Rainbow Bee-eaters are migratory birds which move internationally from Australia, a

decline in the species here could have negative impacts on environmental systems internationally. **The protection of these birds' habitat here in Perth should be taken seriously so to uphold international commitments.**

Figure 13: Photograph of the Rainbow Bee-eater (Birdlife Australia n.d.).

Site 325 at Ocean Reef is also a known habitat location for the **Graceful Sun Moth*, Synemon gratiosa*** (Figure 14). SMEC Australia conducted a survey of this species at the Ocean Reef Marina in 2009.[33] The Graceful Sun Moth used to be listed under the EPBC Act, but was delisted in 2013.[34]

The species is current listed as Priority level 4 in Western Australia.[28] This species relies on two types of habitat (coastal heathland on Quinadalup dunes and Banskia woodland on Spearwood and Bassendean dunes)[34] and these habitats provide specific flora species which the Graceful Sun Moth uses for feeding and growth. The larvae develop underground and feed on the roots of mat-rushes and grasses, such as the *Lepidosperma* and *Lomandra* species during 11 months of the year before emerging from the ground. The Graceful Sun Moth travels at most 200 metres from where they hatch during their lifetimes. [33] At Site 325 at Ocean Reef, areas of open heath are found at site, which contain *Lomandra maritima*[13], a species used for habitat by the Graceful Sun Moth.[33] SMEC believes it observed a minimum of 16 moths over the course of its 4 field surveys. A total of 19 sun moths were observed during their 4 field surveys, but consideration was given that they saw the same moth on different days. Some of these moths were observed in areas of Site 325 which would be cleared under the MRS Amendment. Since the moths travel 200 metres from their place of birth, the proposed development at Ocean Reef Marina would cause the clearing of part of their territory.[33]

The fact that the Graceful Sun Moth is not even discussed by the Ocean Reef Marina Environmental Assessment prepared by Strategen is astonishing given the threatened history of the species under the EPBC Act and its current Priority 4 listing in Western Australia.

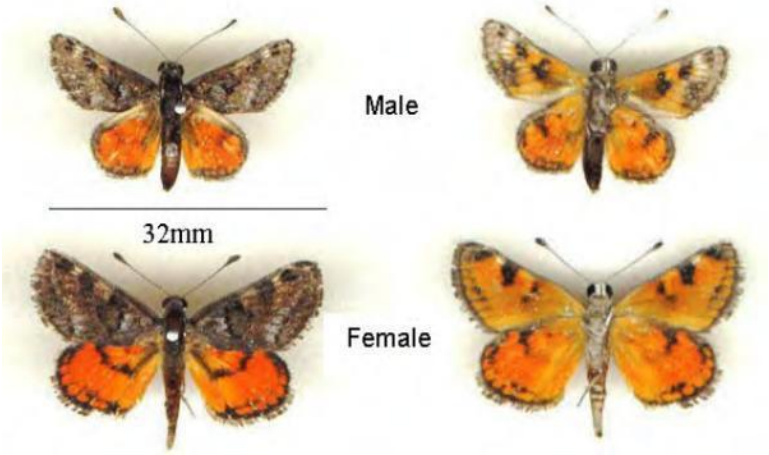

Figure 14: Photographs of the Graceful Sun Moth.[33]

The Quenda, *Isoodon obesulus*, (Figure 15) is a marsupial species currently listed as Priority 4 in Western Australia that is known to occur on the Site. Western Wildlife did not find diggings at the site that are an attribute of the species at the time of its 2008 survey (Western Wildlife 2008). However, the Quenda has been sighted in the area by the Department of Parks and Wildlife[29]. It has also been sighted by local Friends Groups members both at Site 325 at Mullaloo[26] and at Site 325 at Ocean Reef.[35] The species prefers dense understorey which characterises the vegetation at the Site.[29]

As discussed earlier in this submission, European settlement in WA has impacted the existence of many mammals; more than 40 mammal species have declined considerably or are in jeopardy of extinction.[36] Western Australia's native marsupials are in particular danger, and like the Carnaby's Cockatoo, are iconic and cherished species that help make the state and Perth environment unique. The Quenda's existence on the Swan Coastal Plain is threatened by habitat clearing and fragmentation, as well as predation by cats and dogs.[37] As previously discussed, the proposed Ocean Reef Marina redevelopment would cause habitat fragmentation, as well as increase the population of cats and dogs in the area.

Figure 15: Photograph of a Quenda.[38]

Species richness of Reptiles

Finally, Site 325 at Ocean Reef has a great diversity of reptiles. Western Wildlife found that there are 45 reptile species that could potentially occur on the Site. Only one reptile, a Bobtail, *Tiliqua rugosa* (Figure 15), was observed during Western Wildlife's 2008 site visit.[29] However, it is known by Friends Groups that a great variety of reptiles exist at Site 325 at Ocean Reef. Sharon McArthur of the MBCG and Friends of Mullaloo believes that the greatest faunal diversity found at Site 325 at

Ocean Reef is in the reptile population. The reptiles at Ocean Reef use the dunes to burrow, so McArthur believes any clearing of land would destroy their habitat.[35]
The Black-striped snake, *Neelaps calonotos* (Figure 16), which is listed as Priority 3 in Western Australia[28], is expected to occur at Ocean Reef. The Black-striped Snake prefers sandy soils which certainly characterises the Site, so this species is likely to occur at the Site. Like the other animals discussed in this submissions, Black-striped Snakes are threatened by habitat loss due to the expansion of urban areas.[29] **Therefore the potential clearing of the habitat for the Black-striped Snake at the Site to make way for urban development is another threatening process for the species to endure and a further reduction in their available habitat.**

Figure 16: Photograph of a Black-striped Snake (right).[39]

As briefly discussed previously, **13 reptiles have been observed at Site 325 in Mullaloo by the MBCG.[26]** It is very likely that these species could be present at the Ocean Reef section of Site 325. Of the 13 reptiles species observed at Mullaloo, 11 of these species were determined to have the potential to occur at Site 325 at Ocean Reef by Western Wildlife's 2008 report. The Dugite, *Pseudonaja affinis* (Figure 17) is a species that has the potential to occur at the Site according to Western Wildlife's 2008 Report[29] and has been sighted in Site 325 at Mullaloo.[26] A Dugite was recently observed at Site 325 at Ocean Reef in 2017[18]. The recent observation of a Dugite at Site 325 at Ocean Reef confirms that it is very possible that the other reptiles observed at Mullaloo are also present in Site 325 at Ocean Reef.

Figure 17: Photograph of a Dugite.[40]

The two reptile species which were not included in Western Wildlife's Report, but have been observed at Mullaloo are the Western Blue-tongue Skink (*Tiliqua occipitalis*) and the Red-naped Snake (*Furina diadema*) (Figure 18). **The fact that these species were not captured in the Western Wildlife Report speaks to the diversity of reptile species that is likely present in Site 325. The extent of reptile diversity in Site 325 may not be fully understood yet**. The observation of a Red-naped Snake is particularly interesting as this species is known to occur in the eastern part of Australia[41], so perhaps this observation at Mullaloo should be further investigated. However, **the proposed clearing of bushland at Ocean Reef Marina would damage the opportunity for**

further research of reptile species in Site 325 as these reptile species would be negatively impacted by loss of habitat.

Figure 18: Photograph of a Western Blue-tongue Skink (left)[42] and a Red-naped Snake (right).[41]

IV. Negative Impacts on the Local Urban Environment and People

The Bush Forever policy document states that the main theme of Bush Forever is "Keeping the Bush in the City".[4] **MRS Amendment 1270/41 is not consistent with this aim because it seeks to remove bushland from the Perth metropolitan region.**

Throughout the Perth metropolitan region residents are never too far away from a natural area, even in our most urban areas. The ability to reach a natural area from one's home or workplace quickly is something very special about Perth. The Bush Forever policy document recognised the value that people take in having a natural area nearby that they can enjoy:

"The vision is the creation of a conservation estate of which Perth can be justly proud, so that everyone has their own 'Kings Park' within easy reach for present enjoyment and, as a legacy of the unique quality of life, to hand on to our children".[4]

For the people of the Ocean Reef, a beautiful, untouched area of bushland and coastline is going to be permanently impacted. The people who enjoy strolling, running or biking through the bushland at Ocean Reef overlooking the coastline will never be able to do this again at Ocean Reef if the MRS Amendment were to be implemented.

Perth is one of the healthiest[43] and most livable[44] cites in the world. The UBC believes this is very much linked to Perth's natural environment and the ease with which people have to interact with the environment. Between 2011 and 2012, 7 out of 10 people in Perth participated in activities in nature in the previous year. It is well known that a people's interaction with the natural environment can improve their physical and mental health, such as by lowering a person's stress levels.[8] A study conducted in England found that the mental benefits from having contact with urban natural areas actually increased with an increased level of biodiversity in that natural area, which was measured by the species richness of the flora, birds and butterflies. Although people are able to receive psychological benefits from any type of natural area, this study suggested that protecting and creating urban green spaces with high levels of diversity is important for people's health.[45] As previously discussed, Site 325 at Ocean Reef has extensive biodiversity, and <u>if bushland were to be cleared as part of the MRS Amendment, the amount of benefits people receive from its high biodiversity receive would be decreased.</u>

Urban natural areas not only benefit people's well being, but they also provide important ecosystem services that counteract the negative environmental effects of urban developments. Urban natural

areas, no matter their size, provide ecosystem services.[45] **Urban environments suffer from the urban heat island effect.** This occurs when the ambient air temperature in an urban area is higher than in the surrounding rural area due to the large amount of impervious surfaces and the heat produced from vehicles and appliances. The CSIRO has projected that by 2030, the average warming will be approximately 0.5 to 1.2 degrees Celsius above 1986-2005 levels annually in southwestern Australia. It is also projected that the frequency and duration of days with extremely hot temperatures will increase.[8] The elimination of urban bushlands and natural areas only worsens the urban heat island effect.

Urban green spaces also provide the important ecosystem service of counteracting pollution through carbon sequestration. It has been found that urban vegetation can sequester large amounts of carbon. One study conducted in California, U.S.A. found that certain urban trees could remove more carbon from the atmosphere than the same type of trees in a forested area.[45] It is therefore very essential that local and state government protect urban natural areas as our natural areas have important effects on people's health. As discussed earlier, Site 325 at Ocean Reef lies next to an extensive amount of residential area and this bushland provides ecosystem services to the people that live there.

Educational opportunities: Site 325 at Ocean Reef also provides a great opportunity for education of school children and adults about our natural environments. The Bush Forever policy document states the following:

"An important aim of Bush Forever is to foster a greater awareness and appreciation of urban bushland, and to develop a stronger sense of responsibility and belonging by the community through active management to control threatening processes".[4]

If bushland at Site 325 is cleared, then another opportunity to teach local people, especially young people, about environmental appreciation is lost. Instead of seeing their government as working to protect their local environment, young people instead would witness their government destroying the environment and going against its promises to promote community appreciation of bushland. If government does not appreciate its natural areas or take responsibility for protecting them, then why should local citizens and young people? The governments' actions in regards to the environment can strongly influence the perceptions of future generations.

If the Ocean Reef Marina redevelopment goes ahead, the image the City of Joondalup would portray of itself on environmental protection would be a dubious one. The actions that the City has performed in the past to further environmental protection would directly conflict with the potential Ocean Reef Marina redevelopment. In 2008 the City of Joondalup signed the "Durban Commitment: Local Governments for Biodiversity" alongside 20 other international local governments. By signing this commitment the local governments stated that they understood the importance of biodiversity and the ecosystem services that it provides for local communities. They also recognised the vital role and responsibility that local governments have in protecting biodiversity for current and future generations. The local governments declared their intentions to undertake and promote a number of activities which would protect biodiversity in the communities that they serve, such as developing and implementing a long-term biodiversity strategy for the management of natural areas among other things.[46]

In 2009 the City of Joondalup Biodiversity Action Plan 2009-2019 (BAP) was published that laid out the City's commitments to biodiversity. **In the BAP, Site 325 is stated to be one of the City's "Biodiversity Zones" and called "The Coastal Zone".**[47] All of the biodiversity threats that are listed in the BAP are issues that would occur as a result of the implementation of the Ocean Reef Marina redevelopment. Particularly, the first four listed biodiversity threats in the BAP are problems which have already been discussed in this submission: clearing of native vegetation, habitat fragmentation, uncontrolled access into natural areas by humans and pets, as well as the

invasion of environmental weeds. The BAP also discusses the importance of habitat corridors and connectivity of the City's multiple regional ecological linkages, including its north-south linkage (which is Site 325 as discussed earlier). The BAP states that the *"protection of the viability of these linkages is critical"*.[47] However, the clearing of bushland for the Ocean Reef Marina redevelopment, as previously discussed, would disrupt and negatively impact the viability of the north-south linkage not protect it.

There is a photograph (Figure 19) in the BAP of an area of the Site 325 bushland at Ocean Reef close to coastline which would be cleared under the Ocean Reef Marina redevelopment proposal. The photograph shows part of the pathway which goes through the bushland and is used by people to walk, run and bike. The presence of this photograph in the BAP is ironic. The presence of the photograph in the BAP is meant to showcase the City of Joondalup's biodiversity hotspots, but it is known that if MRS Amendment 1270/41 is accepted, this very area will be cleared.

Figure 19: Photograph of an area of Site 325 at Ocean Reef as it appears in the City of Joondalup Biodiversity Action Plan 2009-2019, which would be cleared under the proposed marina redevelopment (above). Photograph of the same area of Site 325 at Ocean Reef taken in 2017.[22]

The City of Joondalup has simultaneously put forth a strong commitment to biodiversity through the Durban Commitment and the BAP, while also supporting the Ocean Reef Marina redevelopment which would oppose every commitment and goal laid out in these two documents. If the City of Joondalup were truly committed to biodiversity and honoring its international agreement, then they would not be supporting the Ocean Reef Marina project and the clearing bushland in Site 325. By the Western Australian Government supporting the City of Joondalup with the Ocean Reef redevelopment, they are implicitly stating that they sanction the actions of City of Joondalup to not fully follow through with their promises to their local community and their international agreement partners.

V. CONCLUSION

By clearing 16.79 ha of native vegetation at Site 325, the remaining bushland would be negatively and permanently impacted. The problems of habitat fragmentation, edge effects and the disruption of ecological linkages that would result are extremely significant as these problems are suffered throughout the Perth metropolitan region. The Perth region is fortunate to have immense floral and faunal diversity, but ongoing urban development seeks to devastate the extent of this diversity. Our natural environment is unlike any other in the world. It is tied to our identity as a city and a region.

Not only does the proposed Ocean Reef Marina redevelopment have implications for the environmental health of the area, but it is a loss of an "untouched" bushland and coastline (Figure 20) that is used by many local people to stroll, run and enjoy the health benefits of urban natural areas. As the Perth metropolitan region becomes more and more developed, areas like Site 325 at Ocean Reef are becoming increasingly rare. The residents of Perth are losing the benefits of an undeveloped coastline.

Our local governments and state government are focused on improving the economy and bringing tourists to our capital city and state. However, tourists visit Perth and the state of Western Australia to visit our one of a kind natural environment, not to visit our urban landscapes. Clearing bushland at Site 325, or at any other Bush Forever site in the Perth region, is not consistent with what our communities or our tourists want.

The City of Joondalup should have recognised all these values and acted to ensure that any development plans encompass retention and management to ensure all the above values are retained and enjoyed. The City of Joondalup has not done this and thus we believe shows a failure in governance.

Figure 20: Areas of Site 325 at Ocean Reef Marina which would be cleared under the proposed marina redevelopment (Imbergamo 2017).

Based on all of the above information presented in this submission, the Urban Bushland Council strongly recommends that the Western Australian Planning Commission rejects MRS Amendment 1270/41 in the public interest on behalf of the residents, visitors and future generations of Ocean Reef and the Perth metropolitan region. It is now incumbent on the WAPC to address the failures in governance described in this submission.

Accepting the MRS Amendment 1270/41 to enable an Ocean Reef Marina redevelopment would be an irreversible mistake, negatively impacting our environment, as well as the well being of our communities and visitors far into the future.

Representatives of the UBC request the opportunity to discuss these matters with the WAPC. We may be contacted by phone at our office 9420 7207 or if unattended, direct to our Secretary on phone 9381 1287.

Yours sincerely

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