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# Comments on the ecological impacts and recommendations towards ecologically sustainability

Shoreline Urban Development –  
Redland Bay South East Queensland

Prepared by a group of concerned  
community members

## Shoreline Urban Development – South Redland Bay Queensland

Shoreline is one of the largest land parcels (about 280 hectares) ever to be approved for residential development in the Redlands. This is the last remaining part of the Redlands coastline that has not been urbanised. Although the greater proportion has been farmed for many years, this parcel (and the surrounding land) still retains significant wildlife habitats and environmental and open space values. It is vital that this land is developed sensitively and with careful regard to its impacts on adjacent and surrounding areas of international environmental significance, primarily Koala Coast Core Habitat, the Moreton Bay Ramsar site and the Moreton Bay Marine Park.



**Prepared by:**

A group of community members who belong to the following groups and are based in the Redlands. They are vitally concerned about the impacts of the Shoreline development on the functioning and wellbeing of the coastal ecological systems and the future of the significant flora and fauna both on and off-site. Collectively these people have many years of experience in leading community groups and expertise in many fields.

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## EXECUTIVE SUMMARY

### Does Shoreline meet the expected standards of an ethical development?

The developers of Shoreline, Lendlease state on their website in “About us”:

*We’re strongly committed to leaving the world a better place in all that we do. We apply bold thinking and world-class knowledge to solving complex challenges and identifying once-in-a-generation opportunities<sup>2</sup>.*

Their “sustainability frame” has among their sustainability imperatives: “Healthy Planet and People” and an environmental focus on “Nature and pollution”.

This gives the impression they are a development company which holds themselves to a higher standard than the minimum standard necessary to gain development approvals. In the current economic climate, there are many shortcuts and cutting of ‘red tape’ and ‘green tape’ by the development industry that will not result in enduringly sustainable developments. Historically, there is a lag between the science and the planning legislation and a disconnect between what is ethical and what is expedient and based more on profit than ethics.

From the website it is reasonable that the community would expect that Lendlease developments will align with the sustainable development goals (SDGs) such as those of the United Nations:

*The SDGs identify 17 goals which governments, business and civil society need to achieve to build a just and sustainable future, things like climate action, reducing inequality and responsible consumption and production.<sup>3</sup>*

We consider that the Lendlease development at Shoreline is in danger of breaching some of these principles by not honouring the following SDG goals:

- *By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans*
- *Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species*

The National Strategy for Ecologically Sustainable Development (1992) defines ecologically sustainable development as: “using, conserving and enhancing the community’s resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.”

This report reviews the planning documents available to us (including their shortcomings), gives evidence-based reasons for finding these shortcomings and offers suggested recommendations that would further the stated sustainability goals. Our recommendations in summary are:

1. A wider coastal corridor
2. Larger freshwater wetland to protect saltmarsh
3. Strengthening of the east-west corridors with an additional northern corridor with an additional fauna crossing

4. Relocation of the Town Centre to already cleared land in the south
5. The adoption of Koala Sensitive Urban Design principles
6. Retention of existing farm dams important to bird life
7. More separation between human uses and migratory shore bird habitat
8. Vegetated buffer areas between developed areas and measures to avoid weed invasion into adjacent conservation areas
9. Focus on the diminution of stormwater *volume* as well as quality, before it reaches the retention basins
10. Increase awareness of the proximity of mosquito breeding areas and the increase of mosquito-borne disease

We recognise that we may not be privy to the most recent documents and plans and sincerely hope that there has been progress made towards the furthering of these recommendations that we are not aware of.

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## BACKGROUND

In November 2015, following much controversy, Redland City Council (RCC) gave a Preliminary Approval to the Shoreline development (see figure 1 for precinct plan). At that time the area was **not** included in the 'Urban Footprint' of the South East Queensland Regional Plan. Regional planning was originally conceived to ensure future urban development was sustainable:

Key features introduced to manage growth within the South East Queensland Regional Plan 2005-2026 included:

- *promoting a compact urban form; and*
- *identifying an Urban Footprint, as a means to control unplanned urban expansion* <sup>4</sup>

It was stated in this plan that the Urban Footprint would accommodate the Region's urban development needs to 2031. This determination was based on population, housing and employment projections, and reasonable assumptions about future growth.

Regional Policy 8 "Compact Settlement" had guiding principles to restrict development to the Urban Footprint, to reduce car dependence, avoid areas that would be affected by Climate Change and importantly maintain inter-urban breaks – all of which do not appear to be respected by the current Shoreline proposal.

The Regional Plan was updated in 2017 and now shows Shoreline in the Urban Footprint. For more information about the process whereby Shoreline was approved by the Redland City Council, see the Redlands 2030 [website](#).<sup>5</sup>

Of necessity we have worked with the draft plans for the project prepared by the original proponent (Fox and Bell), now presumably, being revised by Lendlease in conjunction with the RCC. The approved master plan dated May 2017 is shown in figure 1.

As any changes are not available to us, it is unknown whether the environmental impacts of revisions proposed to RCC are being thoroughly assessed before decisions are made. Moreover, as some of these will affect the ecology of the Moreton Bay Ramsar site, such changes and their impacts may warrant further referrals to the Environmental Protection and Biodiversity Conservation (EPBC) Act. Likewise, we have reviewed only the supporting documents and studies that are publicly available.



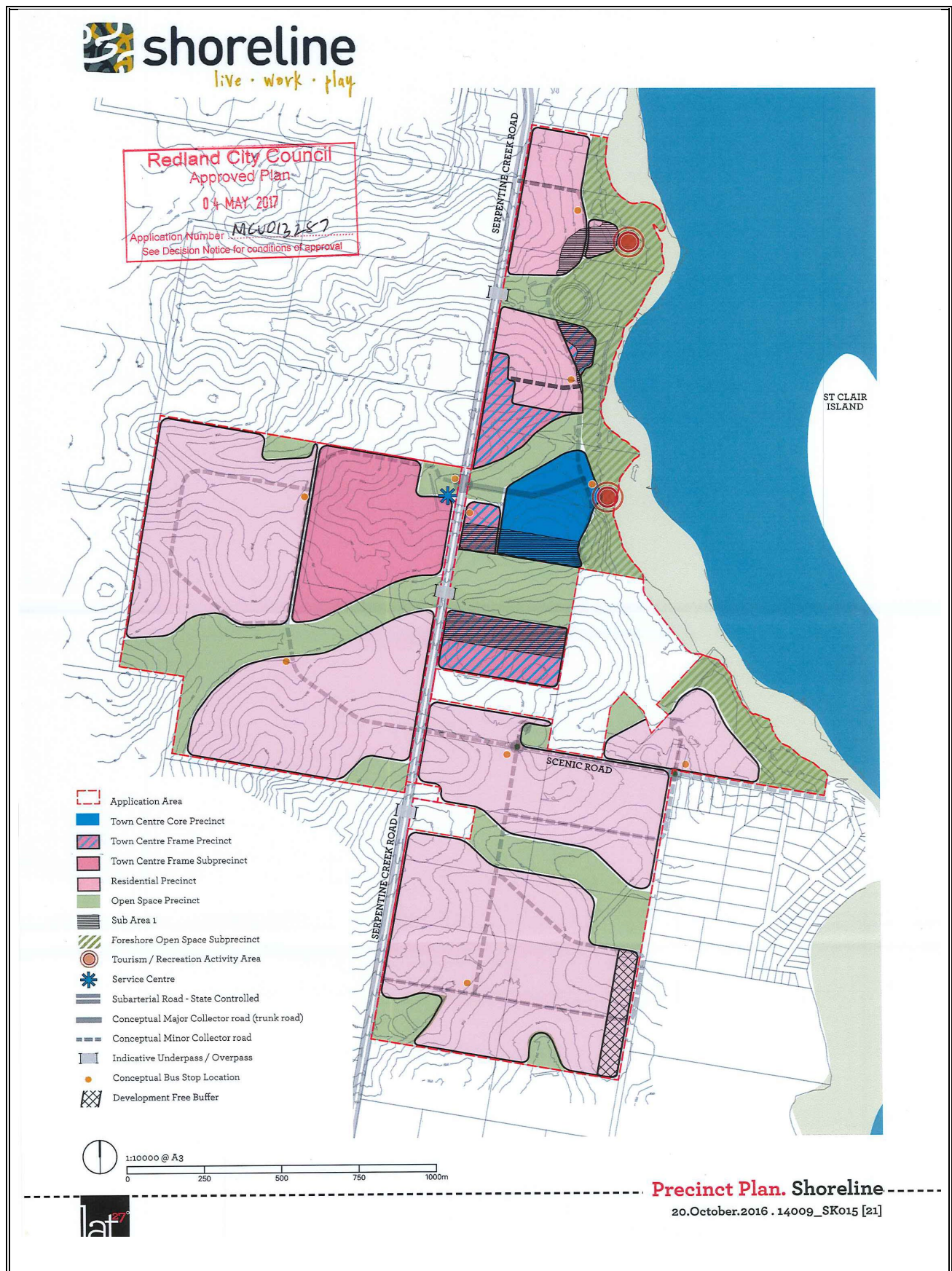


Figure 1 – Approved Precinct Plan – RCC 20 October 2016



## OUR PRIMARY CONCERNS

### 1. Climate change and sea level rise

Past and present planning legislation has done little to prevent inappropriate foreshore development. There are many examples in South East Queensland (SEQ) where past decisions have allowed development to encroach too closely to the marine interface (for example, Palm Beach on the Gold Coast). In the Redlands, king tides presently cause saline water to travel up the stormwater networks and flood public esplanade roads and some private property (see the Redland City Council Red-e-map overlay, Flood and Storm Tide Hazard for these areas)<sup>6</sup>:

But perhaps the most serious environmental shortcoming is something not yet in the state and local planning horizon - the failure to allow for the landward migration of coastal ecosystems such as mangroves and saltmarshes.

The values of saltmarshes are well known. These include water purification, carbon storage, contributions to food webs and fisheries, protecting coastlines from natural hazards and providing habitat for migratory waders.<sup>7</sup> The same article referred to in Endnote 6 also gives data showing saltmarsh sequesters more carbon per square metre than a terrestrial forest. Saltmarsh ecosystems, which have been recognised as Vulnerable under the EPBC Act are an example of a coastal ecosystem threatened by sea level rise. Studies show an estimated 64 percent of the original saltmarshes in the Moreton Bay region had been lost by 2012<sup>8</sup> - these losses are likely to have increased significantly in the last ten years, as threatening processes such as urbanisation, climate change and mangrove encroachment have markedly increased.

There are two large patches of saltmarsh to be seen inside the fringing mangroves located close to the planned town centre of the Shoreline development.



**Figure 2** – Saltmarsh to the east of the Shoreline Town Centre and Town Centre Frame (marked in orange)

One of the most damaging impacts to saltmarsh caused by urbanisation is the increase in **volume** of stormwater runoff, due to impermeable surfaces. This is in addition to other threatening processes including increases in suspended solids and nutrients. The increase of volume is first on the list of threats quoted in research which addresses the impact of urbanisation on coastal structure and function:

*Decreased surface storage of stormwater results in increased surface run-off (resulting in increased surface water input to wetland)<sup>9</sup>*

and

*Saltmarsh cover was significantly lower below stormwater outlets<sup>10</sup>*

Given this, it is perplexing that the Shoreline Water Sensitive Urban Design (WSUD) report dated 2016 (described as ‘preliminary advice’) was accepted by the RCC in 2019. This report advises that “there is no need for peak discharge management as flows enter Moreton Bay”<sup>11</sup>. This illustrates a lack of understanding of coastal ecosystems and how they are affected by stormwater. It is also disappointing the Shoreline EPBC Act referral response prepared by Biodiversity Assessment and Monitoring (BAAM)<sup>12</sup> does not consider there is a need to be concerned about these Vulnerable Threatened Ecological Communities as BAAM claims there will be no direct disturbance to the saltmarsh community resulting from the development.

However, this discounts the fact that increased stormwater flows are likely to cause the saltmarsh to be progressively invaded by mangroves as has happened in many other places that have been urbanised (for example Point Halloran, Victoria Point). The coastal basins, as shown in the Shoreline WSUD (see figure 11) do not appear to be large enough to provide long-term artificial wetlands to not only slow the increased volume of fresh water but to retain it for the period of time required to protect the saltmarsh areas from mangrove invasion.

#### **Recommendation A:**

There is a need to provide large natural freshwater wetlands (which typically lie on the landward side of the coastline in the natural, undeveloped state of the foreshore along the eastern seaboard of Australia)<sup>13</sup>. A series of lagoons would slow down the runoff and improve the water quality before it seeps into the bay. Their main function would be to act as a buffer zone to ensure the saltmarshes are not degraded by direct freshwater runoff. This would have the added advantage of providing habitat for water birds. These lagoons would be aesthetically pleasing with the right vegetation and facilities such as boardwalks. An additional benefit would be to decrease disturbances by distancing human activities on shorebirds and waders in their feeding / roosting grounds. These buffers would also provide a valuable separation between development and the higher storm surges and tides resulting from sea level rise.

As well as better stormwater management, there is a strong case for widening the buffer between the saltmarsh areas and the Shoreline urban development to protect this ecosystem.

The Commonwealth Government's Scientific Committee's Conservation Advice lists coastal buffer zones as 'top priority':

*Provide appropriate buffer zones around patches of Coastal Saltmarsh to increase resilience and make land available to accommodate landward migration of saltmarshes.<sup>14</sup>*

Supporting scientific evidence is quoted in the Conservation Advice as follows:

*For example, saltmarshes naturally retreat landward as sea level increases, and if space is **unavailable** due to local geomorphology or the presence of anthropogenic structures/activities, then saltmarsh will disappear as sea levels are rising due to climate change (Adam, 2002<sup>15</sup>; Saintilan and Rogers, 2013).<sup>16</sup> (emphasis added)*

#### **Recommendation B:**

**Widen Coastal Corridor:** A much wider coastal corridor is essential to allow landward migration of saltmarsh and mangrove ecosystems. The RCC Flood and Storm Tide Overlay (figure 3) predicts that almost all the land under the 5 metres Australian Height Datum (AHD)<sup>17</sup> contour along this coastline will become inundated. Given the landforms, we estimate a coastal corridor up to the 10 metre AHD contour would be unlikely to supply enough room for landward migration of ecosystems. Figure 3 shows the extent of the storm tide mapping and the relevant height above AHD. However, this overlay does not appear to have been updated since 2016 and presumably does not reflect the latest information.

It is noted the latest IPCC report AR6 (2022) on sea level rise is anticipating an even greater sea level rise than currently predicted.<sup>18</sup> We suggest a minimum coastal corridor of at least **200 metres** from the present Highest Astronomical Tide (HAT), will be necessary to protect coastal ecosystems into the future and to give enough space to retain essential terrestrial habitat for species such as the koala.

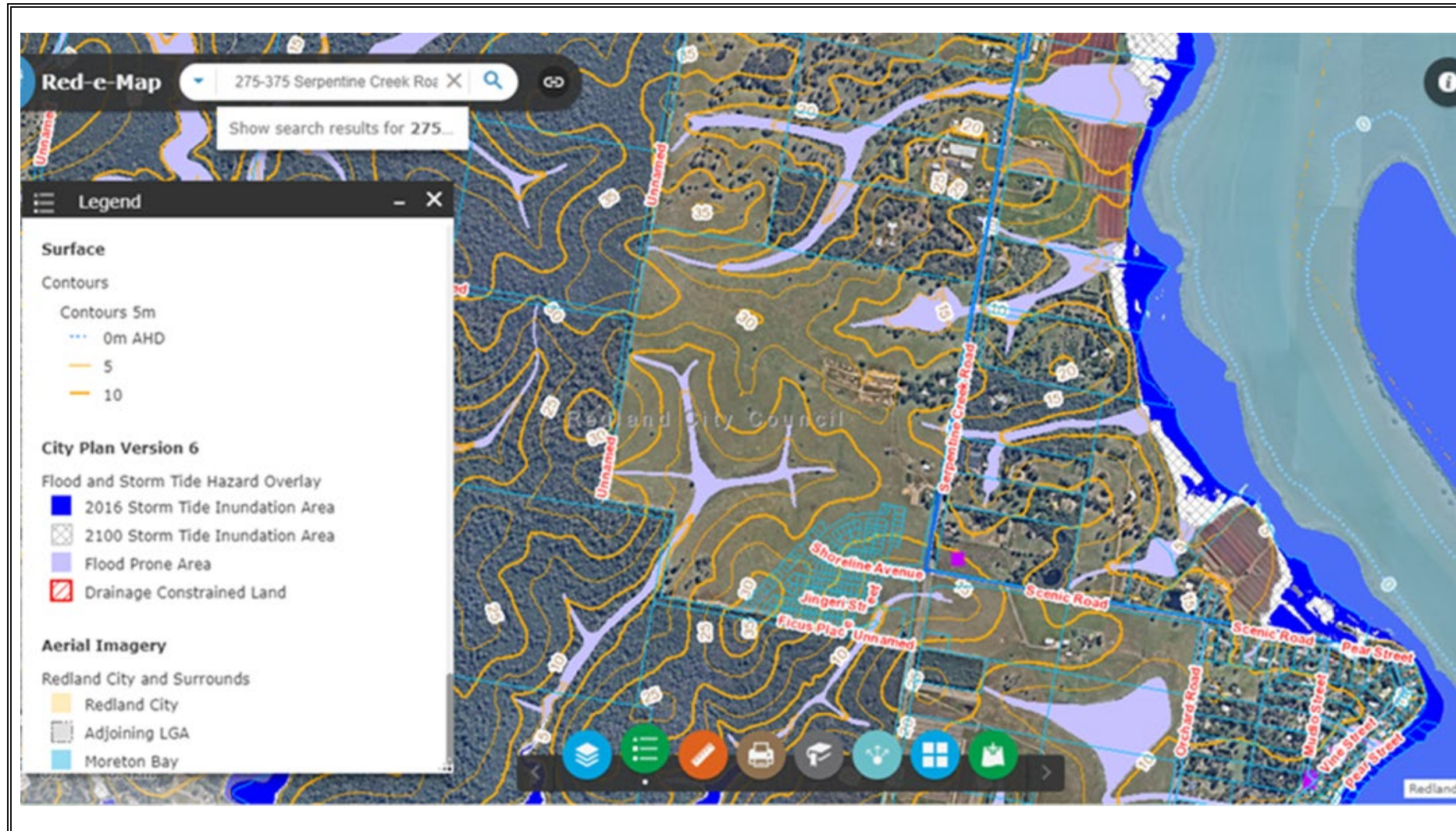


Figure 3 – Flood and Storm Tide Hazard Overlay – Redland City Council City Plan 6 (Accessed from Red-e-Map, RCC website)



## 2. Protection of significant flora and fauna

### Koala (and other mammals)

Koalas in South East Queensland (SEQ) were declared Endangered by the Commonwealth Government in February 2022. The 'Koala Coast' of SEQ (of which Shoreline forms a significant part) has seen drastic declines in koala numbers of an estimated 80 per cent since 2000 (Queensland Koala Population Modelling Study 2015).<sup>19</sup> The major cause has been attributed to habitat loss through urbanisation. This same study noted that koala habitat is not necessarily only intact forest:

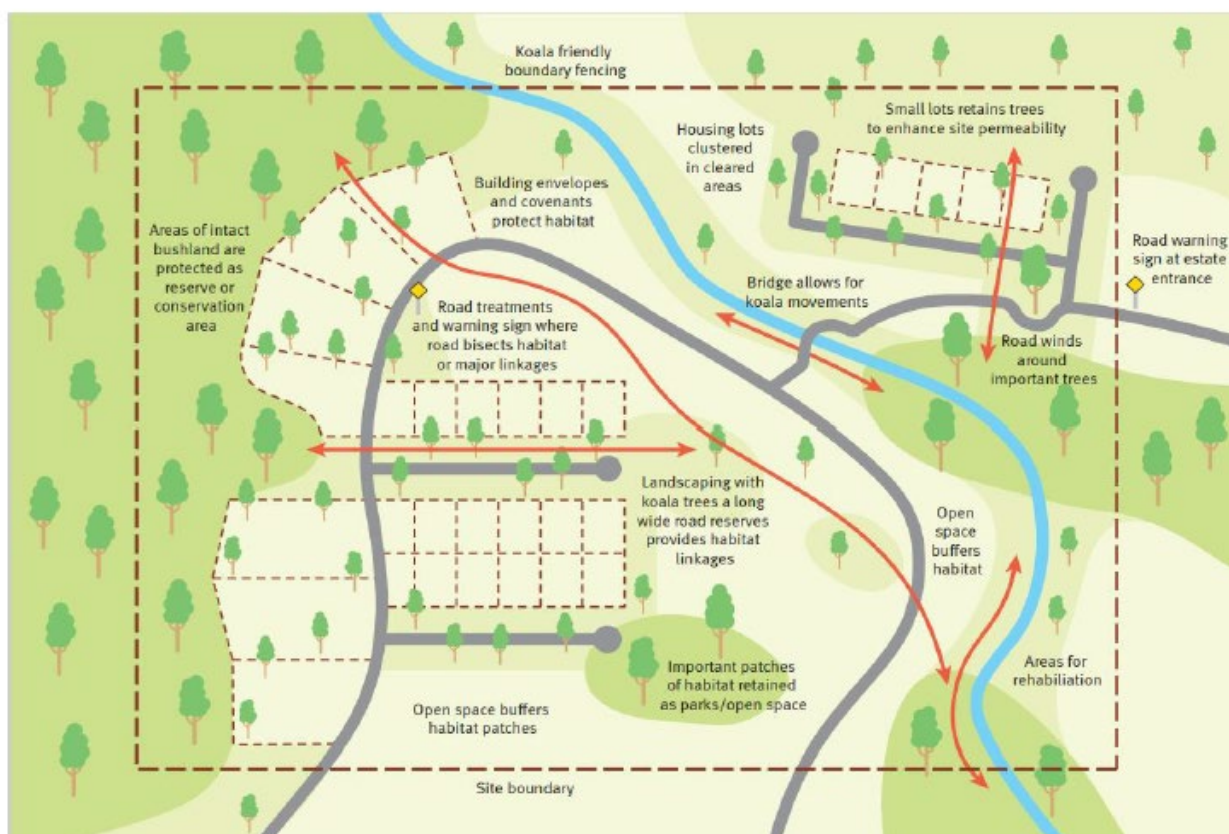
*Eucalypt habitats that koalas prefer occur at intermediate levels of FPC (foliage projective cover\*) and human settlement patterns are largely coincident with where the best koala habitat occurs along the coast... (\* added to quote)*

What is often overlooked by land use planners is that isolated trees in apparently cleared land can provide essential habitat<sup>20</sup> and movement 'steppingstones' which can be blocked by fauna-unfriendly urban development. The loss of these isolated trees would help to explain the enigma of koala population decline in the Redlands. Although there has been no *apparent* loss in koala habitat bushland in the Koala Coast, numbers continue to drastically decline.<sup>21</sup> The cleared or semi-cleared areas are usually found on more fertile soils as they are more productive from an agricultural point of view. However, these areas, being largely cleared are seen as having little impediment to development and have consequently been targeted for urbanisation. A local example of this is found in Victoria Point where a flourishing population of koalas in the Point Halloran Conservation Reserve (possibly the highest density ever recorded locally) declined rapidly after the surrounding farms were urbanised.

A more recent LendLease application (MCU22/0013) to develop land to the north of the Master Plan area, "The Trails" is a prime example of how these isolated trees are discounted. Koalas are expected to confine themselves to the narrow, revegetated creek corridor while major areas of their habitat trees are removed. KAG's long years of experience in studying koalas in the Redlands show that koalas do not keep to corridors. They will venture into urban areas regardless and housing built in their habitat should be permeable to koalas. (See also further discussion on this topic on page 19).

Examples of koala sensitive urban design, illustrating how infrastructure and development can be planned and designed to maximise retention of koala habitat and connectivity are found in the State Government Koala Sensitive Urban Design Guidelines<sup>22</sup>. An example of how infrastructure and development can be planned and designed to maximise retention of koala habitat and connectivity is given below:





The draft Guide to nationally protected species significantly impacted by paddock tree removal (DoEE 2020) notes that for Koala, an impact requiring approval (under the EPBC Act) may be required when 'removing paddock trees where they are habitat critical to the species survival or provide the only movement opportunity / refuge to or between areas of habitat critical to the species survival.'<sup>23</sup>

The coastal corridor along the Shoreline coast, is vital for the protection of the remaining koalas as with the present lower population density, koalas are forced to move further distances for breeding purposes. The great advantage of the coastal corridor is that it is not transected by roads. The importance of the coastal corridor is recognised on the State Government's Regulation Management of Essential Habitat map<sup>24</sup> which shows koala and the Vulnerable water mouse (*Xeromys myoides*) habitat along the whole Shoreline coast (figure 4). Unfortunately, one of the factors not taken into consideration in this map is that with the advent of sea level rise, there is no provision for the landward migration of this habitat.

The problem of habitat loss is compounded for koalas because of the effects of climate change. In a warming world, scientists are warning much of the koala's present range will become untenable.<sup>25,26</sup> Sites such as the Redlands with cooler, well-watered coastal areas will become vital for the survival and conservation of koalas in the long term. This coastal corridor links the east-west corridors in Shoreline that form a conduit from the significant bushland areas in the west. The whole of Shoreline is in a regionally significant corridor (figure 5). To be resilient the coastal corridor must be wide enough to cater for both the shoreward expansion of the marine ecosystems and provide terrestrial habitat for fauna including the koala.



Figure 4 – Matters of State Environmental Significance (MSES) <sup>27</sup>

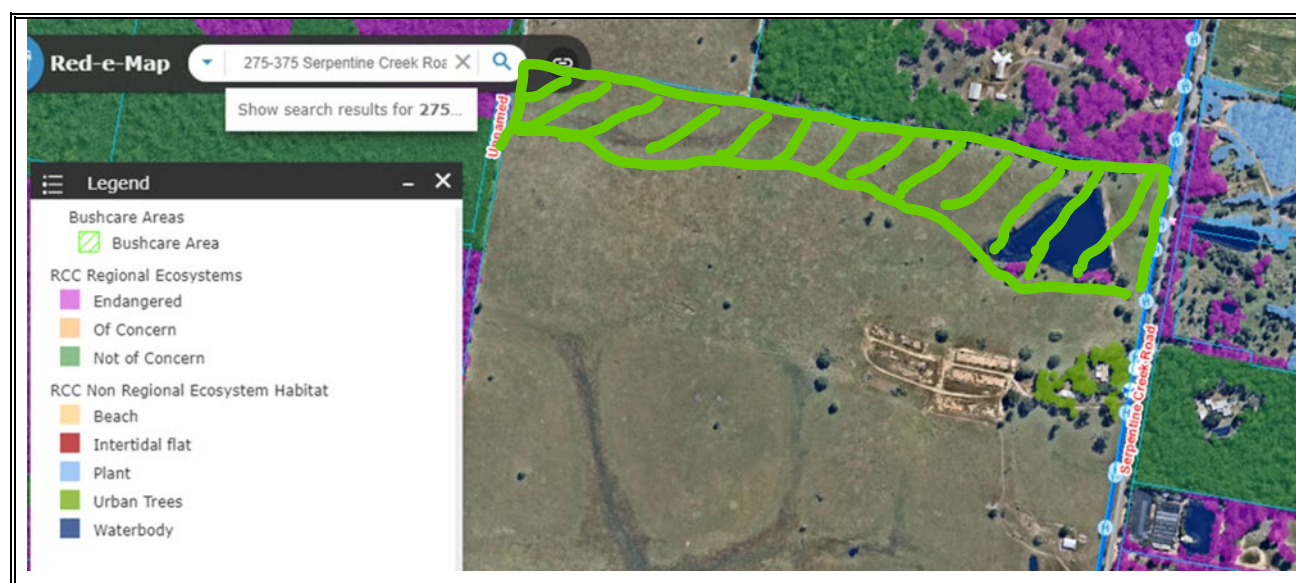




**Figure 5** – Biodiversity corridors – green corridor is of Regional Significance (Qld Globe). Red star denotes position of Shoreline

### Recommendation C:

1. The east-west corridors should be revegetated as soon as possible to a high standard using appropriate local species, with a tree, shrub and ground layer.
2. There is an excellent opportunity to provide an additional corridor at the north side of the present footprint of Shoreline, west of Serpentine Creek Road. This leads directly to the corridor on the eastern side of Serpentine Creek Road (figure 6).
3. It is pleasing to see that Shoreline has plans for safe koala (and other fauna) crossings along Serpentine Creek Road, however, the addition of a safe crossing at the northern corridor is essential.
4. In addition to increased traffic within Shoreline, there will be an increase in traffic to and from Shoreline through core koala habitat areas in Mt Cotton and the Carbrook Wetlands, thus it is reasonable to ask for a contribution to other schemes such as safe fauna crossings and fencing to limit fauna mortality further afield (particularly in the Mt Cotton / Carbrook area which will be severely affected by increased traffic).



**Figure 6** – Northern Corridor Opportunity – marked in green

The Shoreline EPBC Act referral submission<sup>28</sup> contains serious flaws, some of which are noted here. For example, the Koala Action Group's (KAG) surveys have been **misused** as justification for the claimed low density of koalas in Redland Bay. This is not correct. The KAG surveys were opt-in phone surveys in which members of the public were encouraged to report sightings. Obviously, there are more observers in the more densely populated suburbs, so koalas from these areas were more likely to be seen and reported. Bushland areas with little to no human visitation and large acreages were under-reported, a fact often stated by KAG.

Field surveys of the type carried out by BAAM in 2014 are also unlikely to give a true representation, as they were largely conducted in cleared areas and of short duration. **A thorough,**

**multi-season koala survey of the whole site is still required**, especially as the species is now listed as endangered. Technology has also moved on since the first surveys were performed, with drones and koala detection dogs greatly improving chances of finding koalas.

The Koala Assessable Benchmark Report<sup>29</sup> also claims cleared lands are a barrier to koala movement. Open areas are easily traversed by koalas as shown in many studies.<sup>30</sup> This is the opposite to a barrier. Replacing cleared areas with houses and fences provides obstacles that are impediments to koala movement.

The same report shows at least 450 koala trees that were to be removed because they were in a road reserve. This was a missed opportunity to provide a ready-made buffer to the significant adjacent vegetation. There are examples in the Redlands where old historical road reserves have become more valuable over time for their vegetation and have been retained as environmental corridors (for example Goddard Road in Thornlands).

Because there has been so much clearing in the past, *every koala tree* on the Shoreline site is valuable. All existing koala food trees on the Shoreline site need to be protected – at least until new vegetation is established and trees are large enough to be used by koalas. Isolated paddock trees have been shown to be essential ‘steppingstones’ for koalas to move across the landscape.<sup>31</sup> Street trees are also an important refuge for the koalas that come into the urban area. Trees such as Tuckeroo (*Cupaniopsis anacardioides*) are ideal street trees that provide shade for koalas in hot weather.

We hold grave concerns about the **siting of the Town Centre** between two major habitat corridors. The Town Centre appears to be located over existing mature vegetation, some of which was originally designated as High Value Bushland under the Koala Plan in force at the time of the original application.

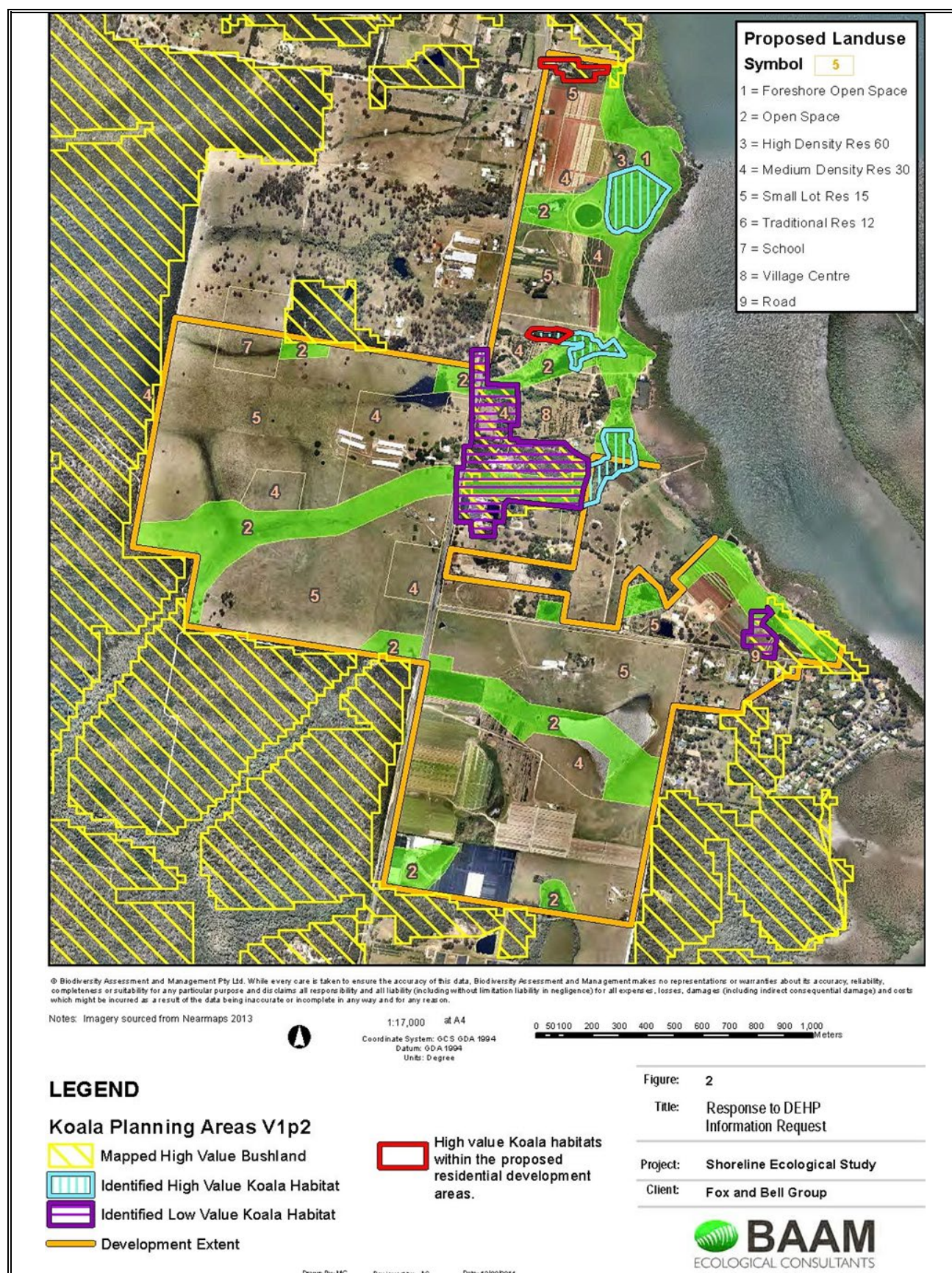
The response (by BAAM) to the State Government concerns in their report<sup>32</sup> shown in figure 7 below, was apparently successful in removing designated High Value Koala Habitat from areas close to the nominated town centre and exchange them with other High Value Koala Habitat areas more conveniently situated from the developers’ point of view. These would not likely have been developed anyway, being in the coastal corridor and along waterways. The protection of the ‘inconvenient’ patch of listed koala habitat in purple has been replaced by the blue areas which are much more conveniently sited (and incidentally, are already existing habitat so can hardly be considered as replacement for lost habitat).

In general, placing intensive uses typical of shopping precincts between the two major corridors is detrimental for fauna and their habitat and therefore unacceptable. The Town Centre ‘Frame’ which appears to have similar development options as the Town Centre (with the addition of dense urban dwellings) also appears to extend the impact area worryingly close to areas of protected vegetation (see figure 1).

#### **Recommendation D:**

1. No net loss of habitat at any location or time in the overall development.
2. Relocation of the Town Centre south of Scenic Road on already cleared land would be an acceptable option. This would allow proper protection of the significant vegetation in the corridors in their present position which is where the proposed town centre / frame is shown. It would also facilitate the retention of the large dam on Orchard Road known to be important for birdlife.





**Figure 7** – Screen capture from report: BAAM Ecological Consultants – Response to Department of State Development, Infrastructure and Planning Information Request September 2014.

Relocation of the Town Centre to a site on Scenic Road would have these advantages:

- Height, (mostly above 20 metres), affording better views of the bay than the present site as well as vistas of the large lake – (“Lakeside” at Victoria Point is a popular model to follow).
- No loss of vegetation
- Existing access from Scenic Road

It is important to note that koalas (and other fauna) do not keep to corridors and are very likely to come into urbanised areas. It is disappointing to see the various environmental reports continuing to wrongly assume koalas will stay in the nominated corridors. Experience in koala behaviour shows koalas have their own reasons for moving across the landscape in ways that may not seem logical to humans. This is supported by numerous koala GPS tracking studies that have shown koalas need to move across an urban landscape and do not remain within their designated corridors. Local examples include the Ormiston Koala Population Monitoring Report<sup>33</sup> and the Toondah Harbour Koala Tracking Report.<sup>34</sup> These studies show how often koalas move through urban house yards and parks and yet are showing some of the best survival rates in the Redlands. This sometimes results in conflict with domestic dogs and vehicle accidents, so appropriate protective measures need to be taken in urban areas such as dog controls and driver education.

#### **Recommendation E:**

1. Fauna sensitive design concepts (such as fauna-safe fencing) should be incorporated into the design and progressively installed, otherwise animals that wander into the urbanised areas will find themselves trapped
2. An information package should be supplied to all new residents explaining how koalas and other fauna should be allowed to move through the development without harassment from domestic pets
3. Dog control or areas that are dog-free should be considered. (This could be seen as an asset by some future residents who are tired of barking dogs and fouling of footpaths.) The BAAM 2014 report recommended extra control measures for those living near open space areas<sup>35</sup>.
4. Traffic calming devices should be incorporated throughout the development area to slow vehicle speed, for both pedestrian and fauna safety

## **Frogs**

The wallum froglet (*Crinia tinnula*) has been reported in the southern part of Shoreline west of Serpentine Creek Road<sup>36</sup>. Suggested improvements to the stormwater management (next section on stormwater) will hopefully improve the likelihood of its survival. Expanding the northern corridor (figure 6) would also protect another minor waterway, a useful habitat dam, areas marked as open space in the Approved Precinct Plan (figure 1) and improve the water quality flow into the neighbouring Endangered Regional Ecosystem vegetated land. It is noteworthy to see the BAAM report (2014) showed parts of the northern corridor slated for protection under the ‘Open Space’ designation (see figure 7).<sup>37</sup>



## Birds

The Shoreline development includes very significant bird habitats. There are several large to smaller dams used by a wide variety of birds, including listed migratory shorebirds. The coastal mudflats, saltmarsh and mangroves, fringing and adjacent to the site, are important feeding sites for migratory shorebirds including the Critically Endangered Eastern Curlew. The trees, bush and paddocks are also used by a variety of other birds. It is clear there will be a significant impact on birdlife unless changes are made to the current plans.

### **Direct impacts from farm dams being filled in as part of the development.**

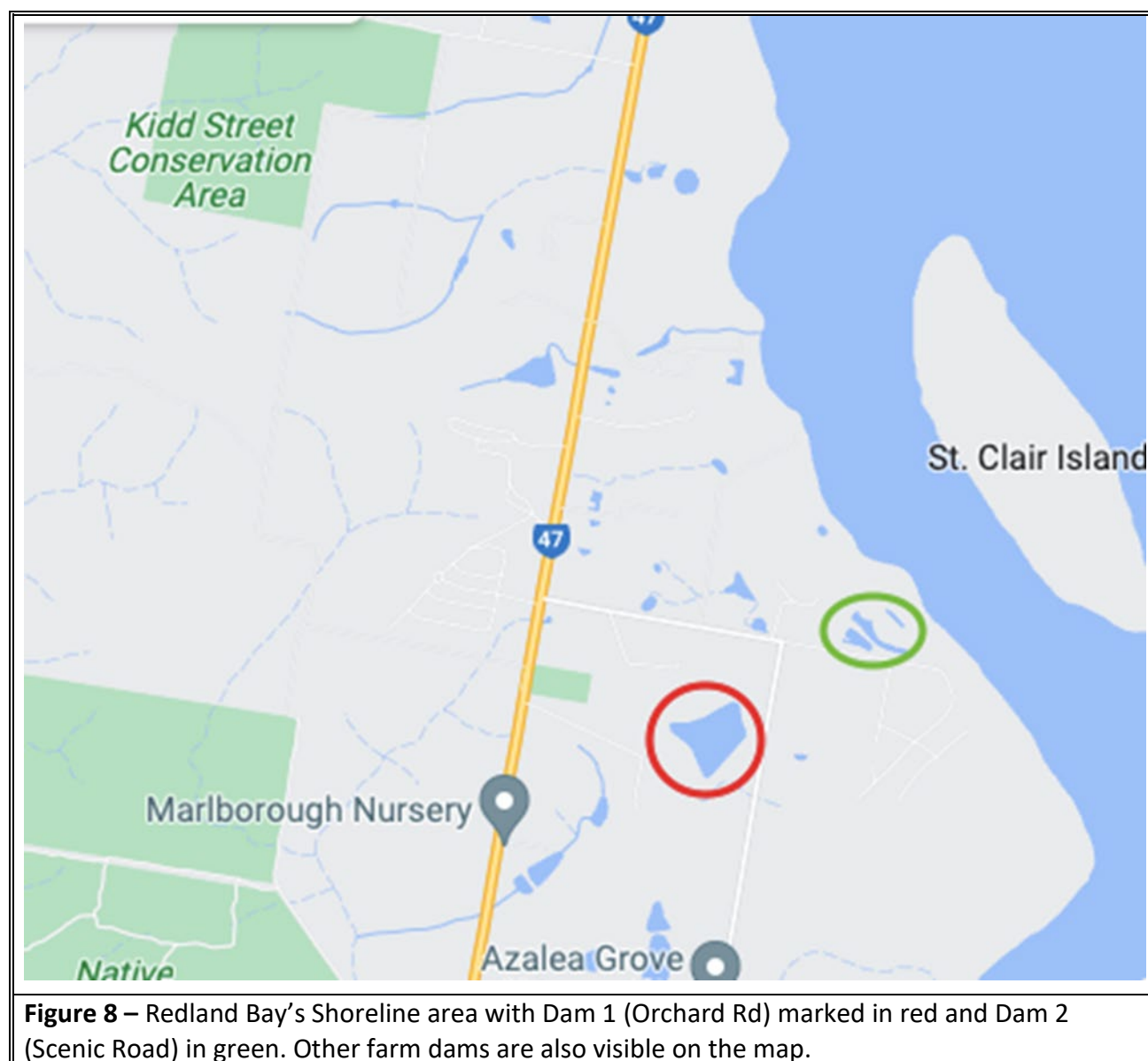
Many of the farm dams in the development (figure 8 below) have existed for 50 years or more and may well have replaced previous natural waterbodies. They are now important habitats for dozens of species and hundreds of birds. Recent research shows the importance of farm dams, suggesting that farm dams are overlooked, and possibly very important, avian biodiversity hotspots.<sup>38</sup>

Two dams are of particular concern: Dam 1 is on the west of Orchard Road and Dam 2 (made up of 2 or 3 lagoons) is on Scenic Road opposite Mudlo Street. These dams are shown in figure 8.

The Orchard Road dam (Dam 1) is a very large farm dam surrounded by paddocks with only about three-quarters of it visible from the road. The dam has a fringing shoreline that is used by a large variety of wetland birds such as pelicans, dotterel, stilts, spoonbills, egrets, ducks, cormorants, and terns. Hundreds of birds can be found here, depending on season and weather, and a huge number of different species, 110 to date, have been recorded there on eBird ([link](#)) since 2014<sup>39</sup>. These records include relatively uncommon birds such as Latham's Snipe and Black-necked Stork (pictured below), as well as migratory shorebirds, such as sandpipers and greenshanks. These eBird records have been summarised into a spreadsheet by Frank Burch (see Table 1 in Appendix).



**Photograph 1.** Pair of Black-necked storks near the Orchard Street Dam (red circle in figure 8)  
Photo: Melody Kemp



The EPBC Act referral required reports to be undertaken of the possible impacts from this large development on threatened and listed species. The EPBC Listed Migratory Shorebird Survey - Shoreline 2016 report by BAAM<sup>40</sup> details the possible impacts on feeding sites in the intertidal zone (particularly for Eastern Curlews). However, this report and the more recent 2020 BAAM Report<sup>41</sup> both state that no shorebirds were found on the only likely high tide roosting site and only one roosting shorebird was found in the mangroves. The latter report states on page 2 that “The surveys also indicated the development area does not support roosting habitats. The closest known Eastern Curlew and other shorebird roosting area to the development is Point Halloran; approximately 9 km north of the development area.”

Table 1 (Appendix) clearly indicates that this statement is incorrect as the following listed migratory shorebirds use the Orchard Road dam as a high tide roosting site and for feeding: Sharp-tailed and March Sandpipers, and Common Greenshanks. Records show that up 20 Greenshanks and 35 Sharp-tailed Sandpipers (Table 1:15.11.2021) have been observed roosting here at high tide.

The BAAM high tide surveys appear to be inadequate, being very brief and done by kayak and on foot along the shoreline. **There were no surveys done of the Orchard Road dam which is further inland and part of the actual development site.** Thus, these reports are in error not showing the use of this dam by the migratory shorebirds for roosting at high tide and for feeding at other times. The map below (Figure 9) shows the potential and actual high tide roost sites. The BAAM high tide roost site is marked in blue, while the Orchard Road dam is marked with a red circle and the smaller red circle marks the Scenic Road dam. The areas shaded in green are the approved development sites with the additional unshaded area north of Scenic Road which is also now approved.





A second significant dam (dam 2 in figure 8) consisting of interconnected lagoons is near the end of Scenic Road (opposite Mudlo Street). It also supports a large variety of birds, with observations of 92 different bird species including the Latham's Snipe (listed species), various egrets, spoonbills, egrets, ducks such as whistling ducks. Whistling kites have bred in the large trees next to the dams here.<sup>42</sup> There are a number of other dams in the Shoreline development proposal, but as they are on private property, and not visible from any roads their use by birdlife is not recorded.

#### **Recommendation F:**

1. The Orchard Road dam be retained as it is a very important site for feeding and roosting, used by a large variety of species and hundreds of birds. It is also a significant roosting site for EPBC Listed Migratory Bird Species. This dam should have been surveyed and included in the ecology reports required for the EPBC Act. Fortunately, there are frequent and thorough observations available (see Table 1 summary of eBird records). This dam could become a feature of Shoreline with viewing platforms and parkland surrounding it with the Town Centre nearby, south of Scenic Road as suggested earlier.
2. The Scenic Road dam be kept as part of a wildlife corridor. It is also an important dam for many wetland birds and for birds of prey. The other existing farm dams should also be retained as habitat for birds and other wildlife.

#### **Impacts on migratory shorebirds**

The EPBC Listed Migratory Shorebird Survey - Shoreline, 2016 report by BAAM<sup>43</sup> noted there could be indirect impacts on the Critically Endangered Eastern Curlew that feed along the mudflats adjacent to the development. Unfortunately, it did not also identify that there would be direct impacts on other listed species of shorebirds from their loss of the roosting site of Orchard Road dam.

#### **Physical disturbance that causes the birds to take flight**

Large shorebirds such as the Eastern Curlews, Godwits and Whimbrel are the most easily "spooked" of any of the shorebirds, with the Eastern Curlew being the most sensitive (average disturbance distance of 126m, BAAM report, page 4)<sup>44</sup>. Such disturbances are likely to interfere with feeding and, consequently, prevent enough weight gain needed for migration.

A major type of disturbance will be caused by people or dogs walking near or across bird feeding areas. The EPBC Listed Migratory Shorebird Survey - Shoreline, 2016 report by BAAM claims that a nearby band of mangroves and the very soft mud will prevent people and dogs going into these areas. However, an estimated 10 000 people moving to Shoreline will be all living right next to these feeding areas. Experience shows that some people will ignore these obstacles to exercise their dogs, explore or collect bait.<sup>45</sup>

It is noted that "Conditions of SARA's (State Assessment and Referral Agency) response require that the foreshore open space sub-precinct is maintained as a development-free buffer, with the exception of infrastructure (which may include road and pathway infrastructure)." <sup>46</sup> To help minimise disturbance the BAAM Eastern Curlew Impact Management Plan report states: "The closest built form to potential shorebird habitats is a pedestrian walkway, which is generally 100 –

150 m away from potential foraging habitats” (page 1). This is not consistent with the Open Space Embellishment Plan in the RCC Minutes.<sup>47</sup> The plan needs to show that these distances will be respected and adhered to, as stipulated in the EPBC referral conditions report. Other disturbance will be from light at night and loud noises from recreational activities, in particular the proposed waterpark, and from work onsite during the construction phase.

**Recommendation G:**

1. Areas near the shore should be kept as “dog and people free” as possible. Playgrounds, water parks and dog off-leash areas should be kept well away from the foreshore bird foraging areas. The foreshore corridor should be made as wide as possible, at least 200m, and any pathways kept close to the residential areas and well away from the mangroves (minimum of 150m from feeding areas).
2. Formal requirement for immediate reporting and logging of disturbances to the Shoreline Project Manager, followed by working with the Council and Department of Environment and Science (DES) on mitigating any problems, as suggested in the BAAM Eastern Curlew Impact Management Plan of 2020. The Project Manager will need to be aware of this.
3. Contingency measures recommended include progressive erection of fences where any tracks to the feeding areas occur, community education and erecting more warning signs (BAAM: page 15). Other areas of the Redlands, such as Point Halloran, Wellington Point and Cleveland, all have significant problems with people and in particular dogs disturbing feeding or roosting shorebirds. Therefore, it is essential that continuing community education programmes about the importance of preventing disturbance to the shorebirds is undertaken by the developer.

**Direct and indirect impacts from loss of habitat on other bird species, such as bushbirds and birds of prey.**

There are many other species of birds found in this part of the Redlands. Large, isolated trees are used by many species while dead trees with hollows are used by many birds, such as rosellas, lorikeets, cockatoos and owls for nesting. Wildlife corridors need to be wide enough to ensure the safe movement of birds and other wildlife and are needed to protect birds from aggressive species such as Noisy Miner. Protection from cats and dogs is also essential. Small birds like robins and fairy-wrens will not fly across open spaces.<sup>48</sup> These birds require areas of dense vegetation not just open areas with some trees. Therefore, wildlife corridors, appropriately positioned, must link the Mt Cotton Core Koala Area with the Coastal Foreshore Corridor. Access to freshwater, such as provided by the dams, is also important.

The proposed “Town Centre Frame Precinct” is situated to the south of the main Town Centre making this a likely area for birds and other fauna to be injured or killed by cars. There are serious concerns caused by the siting of the Town Centre between two major habitat corridors.

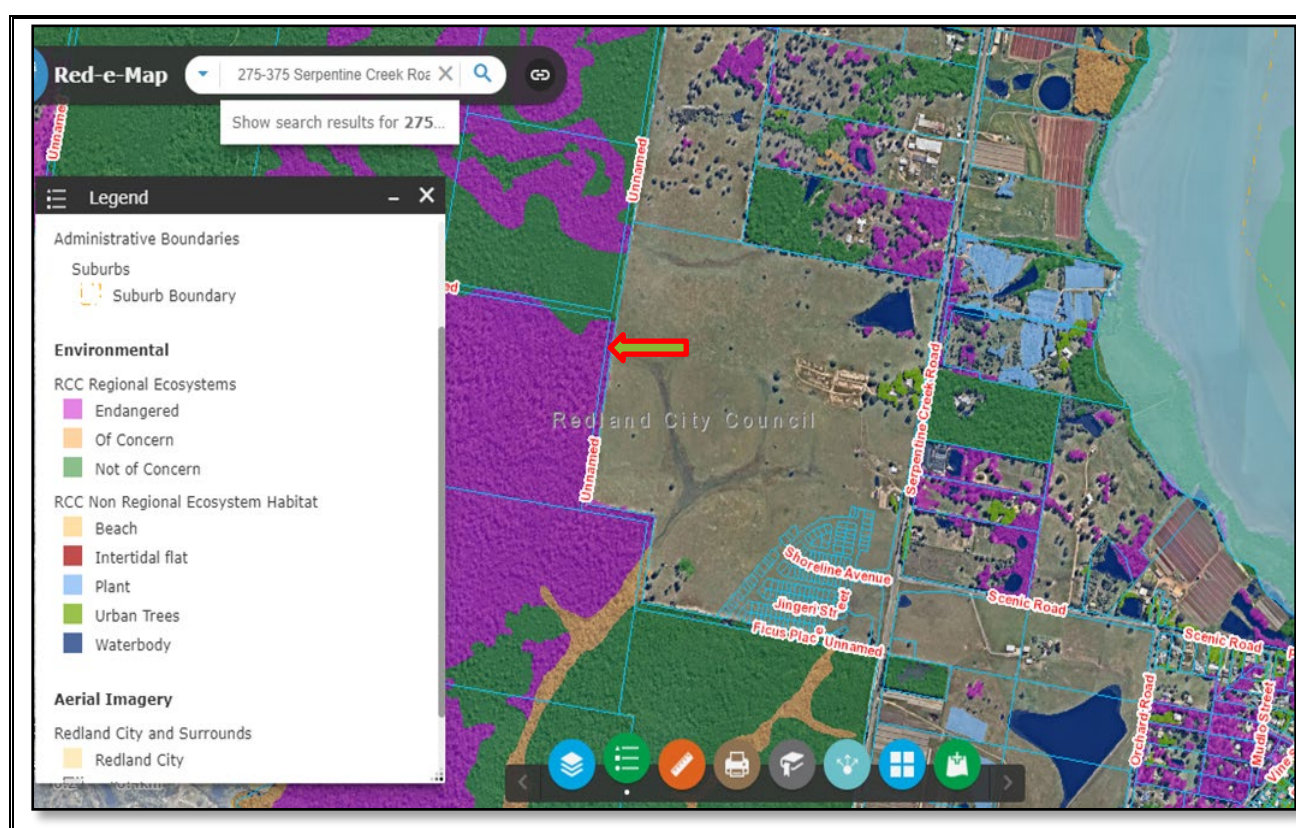
**Recommendation H:**

1. Given the multiple deficiencies in the existing surveys and reports on birds we recommend a new, comprehensive terrestrial and near shore survey be conducted.
2. Wildlife corridors need to be wide enough to ensure the safe movement of birds and other wildlife. Large trees including dead or dying trees with hollows should be retained as they provide hollows needed for nesting by many bird species as well as gliders, such as sugar gliders. Dams should be retained to provide habitat and water for birds and other fauna.

3. The relocation of the Town Centre Frame Precinct and the Town Centre to the south of Scenic Road could allow for the retention of the Orchard Road dam - this is an important feeding and roosting site for many bird species. It should be retained as a feature that would be very attractive to residents, as well as businesses such as cafes and restaurants. Mt Cotton Community Park is good example where a shopping centre and nearby residential areas are adjacent to two large lakes. These two lakes and associated large park are very popular with the community, especially families, but are also excellent bird habitat.

## Significant Flora

The vegetation to the west of the Shoreline development in the Bayside Conservation Area consists of Endangered Regional Ecosystem 12.11.27, 12.11.23 and Of Concern 12.11.26. It is important that this vegetation is actively protected from the edge effects caused by construction and urbanisation. A buffer zone is needed to assist in protecting it from the worst edge effects. A vegetated buffer strip already exists in the form of a road reserve. Instead of clearing and building a road (as has already occurred in the southern part of the development), this should be kept vegetated and the road built on cleared land on the eastern side.



**Figure 10** – Redland City Council Environmental Overlay - Note Endangered Regional Ecosystem in the “Unnamed” road reserve to the west (red arrow).

The RCC mapping above also shows considerable patches of Endangered Regional Ecosystem throughout the site. Many of these patches should be carefully protected as they are in the

drainage corridors marked as open space on the Approved Precinct Plan<sup>49</sup>. Another large patch of Endangered Regional Ecosystem lies between the central corridor and the proposed school site on Scenic Road. There is also considerable planted habitat shown in blue. This strongly supports the argument **against** the Town Centre or the Town Centre Frame being placed in between these important habitat patches.

The endangered swamp orchid (*Phaius australis*) has been found downstream on the creek banks of creeks that originate in Shoreline<sup>50</sup>. According to the EPBC website, since European settlement, 95 per cent of the original populations of the Lesser Swamp-orchid in north-east NSW and south-east Queensland have become extinct. Large populations persisted until the mid-1970s on the Gold Coast and until the mid-1980s on the Sunshine Coast.<sup>51</sup> It is highly likely the swamp orchid would have been found on the Shoreline site prior to the earlier clearing of the vegetation.

According to the EPBC website, threatening processes to the swamp orchid include: collecting; trampling; pollution and weed intrusion. Illegal collection from the wild is likely to increase exponentially with the increase in surrounding population who will use the tracks in the Bayview Conservation Reserve. The other major threat is weed intrusion. The impacts from the stormwater system are discussed below and suggested methods to ameliorate weed intrusion and other impacts on the surrounding Endangered Regional Ecosystem bushland are listed in the following recommendations.

#### **Recommendation I:**

1. Limit weed and alien species intrusion with a firm policy and practice of using only local native species in landscaping
2. Establish and maintain vegetated buffer areas around all existing adjacent bushland
3. New residents should be fully informed about the conservation values of the surrounding bushland
4. Education packages for residents should include information about how damaging practices, such as the dumping of lawn clippings and weeds in bushland, littering and allowing access to unleashed dogs, should be avoided

### 3. Stormwater and its impacts

It is well known that large scale earthworks which interfere with the natural topography exacerbate the problem of stormwater runoff:

*Natural topography is uneven, forcing stormwater runoff to follow a meandering path with many small depressions that capture water and prevent concentrated erosive flows. Human-made changes in topography can adversely affect water quality by concentrating flow paths, causing erosion and carrying sediments and pollutants directly to the receiving water body.<sup>52</sup>*

The first Shoreline stages are characterised by removal of topsoil and benching (see Photograph 2).

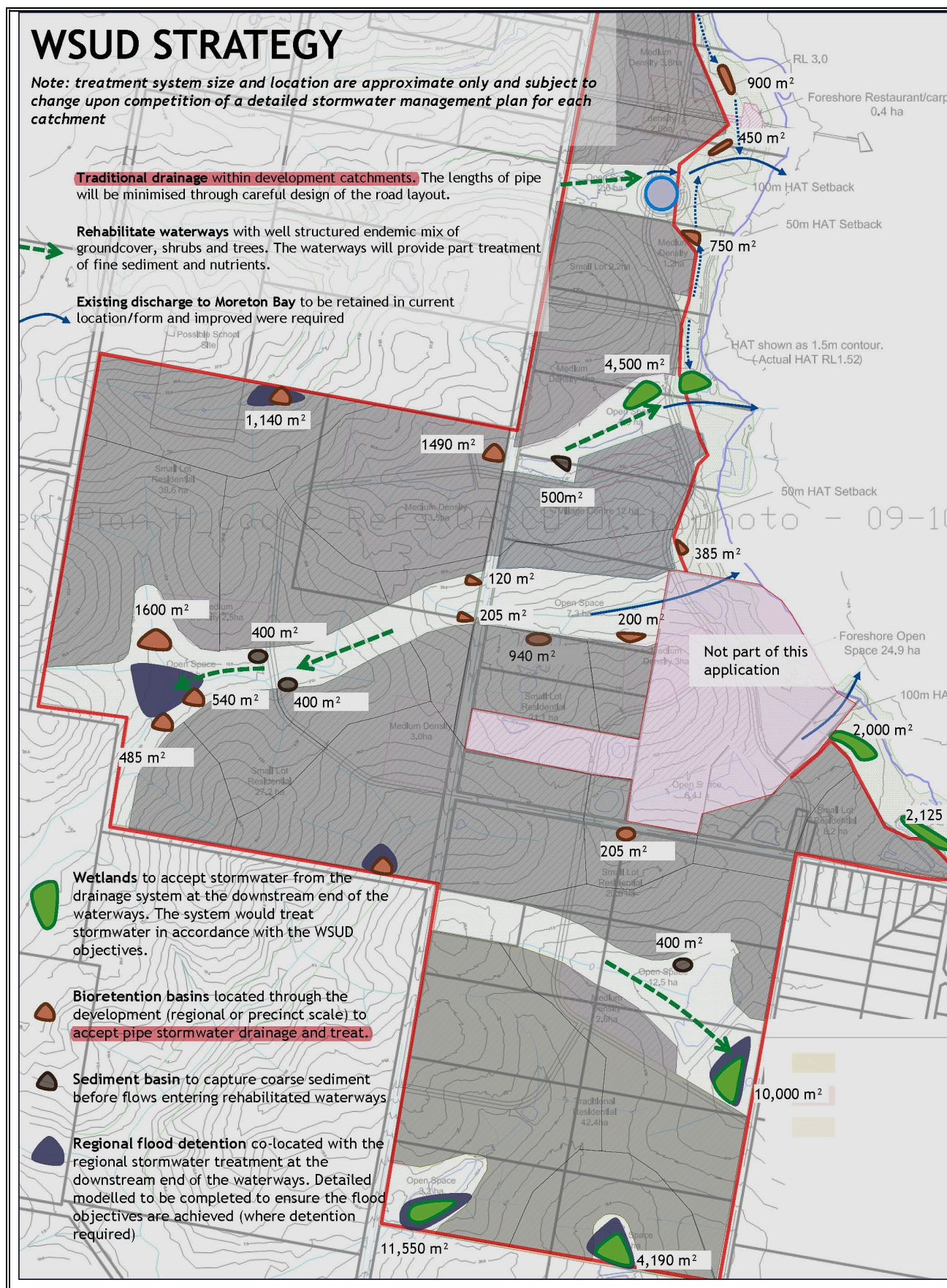


**Photograph 2.** Construction in Elements, Stages 1-4 nearing completion (from Lendlease Shoreline website) <sup>53</sup>

Replacing permeable surfaces with impermeable surfaces, such as roofs, roads and guttering, greatly increases the volume of runoff. It is estimated that stormwater runoff from urbanisation can be as much as five times the runoff from the natural vegetated state.<sup>54</sup> Not only are there increased nutrients and siltation but the sheer volume of runoff from impervious surfaces is highly damaging to small creeks.<sup>55</sup> While we endorse many of the suggested measures in the WSUD Preliminary Report, such as retention basins and wetlands( see figure 11), a vast body of research shows that protection and restoration of riparian vegetation is insufficient to mitigate the effects of urbanisation on small streams and that piped stormwater into small creeks is the main degrading process.<sup>56</sup>

According to the CSIRO, water sensitive urban design (WSUD) “seeks to minimise the extent of impervious surfaces and mitigate changes to the natural water balance.”<sup>57</sup> There is no indication that the need for reduction of runoff from impervious surfaces and complementary mitigation measures plays any role in the *Water Sensitive Urban Design Shoreline* report.<sup>58</sup>





A number of research papers show flow diminution is the most important factor in retaining the ecological health of creeks.<sup>59,60,61</sup> Researchers are adamant in rejecting ‘end of pipe’ solutions (such as those shown in the WSUD Preliminary Report) as they are inadequate to protect the health of the creeks.

*Recent studies of urban impacts on streams in Melbourne, Australia, on water chemistry, algal biomass and assemblage composition of diatoms and invertebrates, suggested that the **primary degrading process** to streams in many urban areas is effective **imperviousness (EI)**, the proportion of a catchment covered by impervious surfaces directly connected to the stream by stormwater drainage pipes.<sup>62</sup> (added emphasis)*

## RECOMMENDATION G

1. Retain the natural topography of the landscape as far as possible
2. Subsurface drainage (for example: vegetated, infiltration swales) and the introduction of semi-permeable surfaces should be installed progressively, as each stage is developed to decrease the large volumes entering creek systems
3. Because of the sensitivity of the surrounding ecosystems (for example: vegetated creeks and saltmarsh), WSUD parameters should significantly exceed planning policy objectives. Current baseline testing is from a very low base, as cleared, farmed areas are not a good benchmark for future environmental outcomes.
4. High standard of nutrient reduction parameters is especially important for flows into the surrounding bushland, as increased nutrients will affect many native species sensitive to nutrients (e.g. Banksia species and the Swamp orchid)
5. Existing farm dams should be retained, landscaped and revegetated to act as retention and detention devices to enable stormwater to be treated to remove silt and nutrients using assemblages of suitable native water plants.
6. See also Recommendation A which addresses stormwater entering Moreton Bay

#### 4. Mosquitoes and biting midges and their impacts

Shoreline is situated close to a number of major salt marsh breeding sites according to the *Shoreline Biting Insect Management Plan*.<sup>63</sup> Because of the growing problem of mosquito borne disease, Queensland Health's *Guideline to minimise mosquito and biting midge problems in new development areas* recommends avoiding development on land that may expose significant numbers of people to biting insects (as does Shoreline).



**Figure 5** – Marine and brackish water breeding sites (yellow) adjacent to the Shoreline site (from Mosquito Consulting Services Pty Ltd, 2014).<sup>64</sup>

The Biting Insect Management Plan prepared for Shoreline recommends limiting the amount of vegetation, by “providing sparsely vegetated buffer zones (including public open space / playing fields) between known breeding sites and residential areas.”<sup>65</sup> This is in direct conflict with Shoreline’s promises to revegetate Corridors and Open Space areas.

There is also a serious contradiction between Shoreline’s marketing where outdoor living is emphasised with videos showing a number of outdoor experiences with nary a screened area in site.<sup>66</sup> The Biting Insect Management Plan recommends outdoor areas be screened.

##### **Recommendation J:**

1. Shoreline should be more truthful in its advertising, letting prospective buyers know the problems entailed with houses and facilities located close to mosquito and biting midge breeding sites
2. An increase in the coastal buffer may help to diminish the incidence of mosquito borne diseases



## CONCLUDING REMARKS

We feel we have made a strong case for improving the outcome of the Shoreline development, pointed out many of its shortcomings and provided strong recommendations. The guiding principle of the latter is: **at no stage during the development should there be a net loss of habitat**. This, and the other recommendations would align Shoreline more closely to the stated Lendlease aspirations:

*Founded on innovation, integrity and a collaborative spirit, Lendlease communities are designed with an emphasis on **environmental** and social impacts. Our focus is to enrich the lives of our residents both now and in the future, fostering opportunities for connection, collaboration and growth.*<sup>67</sup>

The recommended changes are necessary, not only to fulfil the promises made in the Shoreline website but to maintain the important biodiversity values of the area. We note that in the advertising for the Yarrabilba development, also in South East Queensland, there has been a promise to dedicate 35 per cent of the site to parklands and green space:

*Enjoy living a connected life at The Parks, the green heart of Yarrabilba.*

*Surrounded by nature, more than 35 per cent of The Parks is dedicated to parklands and green space, creating a truly harmonic connection to the natural environment.*<sup>68</sup>

Surely Shoreline, surrounded by environmental land worthy of the highest protection: the Moreton Bay coastline; Ramsar wetlands; fish and migratory shorebird habitat; endangered regional ecosystem bushland and habitat to the endangered koala and other endangered animals is equally or more deserving of such consideration. According to the Shoreline website, 25 per cent is proposed as greenspace. Surely Shoreline can do much better than that!

Although we concede there are inherent flaws in introducing such a large number of people in this rural part of the Redlands Coast, it would be good to see some recognition of the previous 'market garden' of the Redlands by the saving of some of the fertile farmland as community gardens. This concept is becoming more and more popular as the price of fresh produce rises with transport costs increasing more and more in the future.

We look forward to Lendlease living up to its ideals and accepting our suggestions to minimise Shoreline's negative impacts to sensitive ecosystems and to protect our valuable native flora and fauna. We hope to be able to see a development at Shoreline that is truly sustainable and will be recognised in the future as a prime example of innovative, ecologically friendly design. We believe there would be a distinct market advantage in this approach.

## APPENDIX

**Table 1 (extract of eBird List by Frank Burch)**

Note – Migratory Species are highlighted in yellow.

### eBird List

Date	Time	Migratory species (M/S)	M/S	Total species #	Coastal tide status, H-M-L	Including among which were;
19.06.14	?	None	0	9	?	200-Little Black Cormorant / 40-Terns / 25-Pelicans
23.07.14	12.10pm	None	0	21	L	24-Pied Stilts
23.07.13	1.00pm	None	0	16	L	25-Little Black Cormorants / 40-Pelicans / 24-Pied Stilts
20.01.16	11.15am	None	0	25	L	30-Pied Stilts / 50-Pelicans
15.07.16	10.45am	4-Common Greenshank	1	37	L	58-Pied Stilts / 36-Gull Billed Terns / 20-White Ibis / 30-Pelican / 30-Little Black Cormorant / 40-Egrets
04.12.16	11.02am	None	0	5	H	20-Pelican
28.08.17	4.00pm	None	0	25	H	50-Pied Stilt / 100-Gull Billed Tern / 20-Caspian Tern / 40-Pelican
23.09.17	9.21am	None	0	15	H	100-Gull Billed Tern / 45-Pelican / 1-Whistling Kite



Comments on Shoreline – February 2023

03.08.18	4.40pm	None	0	22	H	20-Pied Stilt / 16-Pelican
17.08.18	4.00pm	None	0	22	H	30-Pied Stilt / 20-Gull Billed Tern / 1-Whistling Kite
28.08.18	4.00pm	None	0	28	L	30-Pied Stilt / 15-Pelican / 10-Straw Necked Ibis / 2-Whistling Kite / 1-White Bellied Sea Eagle
24.09.18	6.30am	1-Lathams Snipe	1	33	H	40-Pied Stilt / 12-Gull Billed Tern / 10-Pelican / 1-Whistling Kite
18.10.18	4.30pm	None	0	24	H	1-Whistling Kite
23.10.18	4.15pm	None	0	21	H	40-Pied Stilt / 15-Straw Necked Ibis / 1-Whistling Kite
01.11.18	6.00am	30-Sharp Tailed Sandpiper	1	39	M	50-Pied Stilt
06.11.18	5.30am	30-Sharp Tailed Sandpiper	1	37	H	100-Pied Stilts / 30-Gull Billed Tern / 15-Pelican / 1-Whistling Kite
12.11.18	5.30am	6-Sharp Tailed Sandpiper	1	43	L	60-Pied Stilt / 4-Whistling Kite
19.11.18	5.30am	30-Sharp Tailed Sandpiper	1	38	H	60-Pied Stilt / 20-Gull Billed Tern / 12-Pelican
05.12.18	8.40am	15-Sharp Tailed Sandpiper / 18-Common Greenshank	2	22	H	150-Pied Stilt / 120-Gull Billed Tern / 45-Whiskered Tern / 1-Whistling Kite / 1-Black Kite
06.12.18	5.30am	4-Sharp Tailed Sandpiper	1	33	M	100-Pied Stilt / 50-Gull Billed Tern / 1-Black Necked Stork
10.12.18	6.15am	2-Sharp Tailed Sandpiper	1	32	M	50-Pied Stilt / 13-Pelican
14.12.18	5.30am	6-Sharp Tailed Sandpiper	1	38	M	50-Pied Stilt / 10-Whiskered Tern / 1-Black Kite / 1-White Bellied Sea Eagle

Comments on Shoreline – February 2023

15.12.18	2.25pm	None	0	12	H	10-Whiskered Tern
07.01.19	6.00am	5-Sharp Tailed Sandpiper	1	43	M	50-Pied Stilt / 1-Black Kite
13.01.19	4.05pm	None	0	10	H	100-Gull Billed Tern / 40-Pied Stilt
15.01.19	5.30am	4-Sharp Tailed Sandpiper	1	40	H	40-Pied Stilt / 15-Gull Billed Tern / 2-Whiskered Tern / 1-Black Shouldered Kite
21.01.19	6.00am	None	0	31	H	50-Pied Stilt
28.01.19	5.30am	2-Common Greenshank	2	40	H	200-Pied Stilt / 10-Gull Billed Tern
01.02.29	6.00am	4-Sharp Tailed Sandpiper / 6-Common Greenshank	2	33	H	100-Pied Stilt / 10-Gull Billed Tern / 1-Whistling Kite / 200-Fairy Martins
01.02/19	5.15pm	None	0	24	H	100-Fairy Martin
05.02.19	5.30am	3-Sharp Tailed Sandpiper	1	29	M	50-Pied Stilt / 30-Little Black Cormorant / 2-Whistling Kite / 100-Fairy Martin
11.02.19	5.45am	3-Sharp Tailed Sandpiper	1	23	M	40-Pied Stilt
13.02.19	5.45am	2-Sharp Tailed Sandpiper	1	32	M	50-Pied Stilt / 2-Gull Billed Tern / 1-Caspian Tern / 800-Fairy Martin
18.02.19	5.45am	2-Sharp Tailed Sandpiper / 1-Lathams Snipe	2	41	M	60-Pied Stilt / 200-Fairy Martin
20.02.19	6.00am	None	0	22	M	60-Pied Stilt / 150-Fairy Martin
27.02.19	6.00am	2-Sharp Tailed Sandpiper	2	38	M	100-Pied Stilts / 20-Little Black Cormorants / 18-Pelican / 1-Whistling Kite

Comments on Shoreline – February 2023

27.02.19	11.25am	None	0	16	M	12-Gull Billed Tern / 30-Pied Stilt
07.03.19	5.45am	None	0	34	M	40-Pied Stilt / 100-Fairy Martin
11.03.19	5.45am	None	0	31	L	40-Pied Stilt / 200-Fairy Martin
18.03.19	6.00am	None	0	30	H	50-Pied Stilt / 500-Fairy Martin
01.04.19	5.45am	None	0	20	M	40-Pied Stilt / 20-Little Black Cormorant
08.04.19	5.45am	None	0	36	L	1-Whistling Kite / 1-White Bellied Sea Eagle / 1-Black Shouldered Kite
24.05.19	10.49am	None	0	4	M	1-White Bellied Sea Eagle
31.05.19	6.45am	None	0	27	H	50-Pied Stilt / 20-Little Black Cormorant / 100-Fairy Martin / 1-Wedge Tailed Eagle / 1-Whistling Kite
13.06.19	6.15am	None	0	31	H	100-Pied Stilt / 40-Little Black Cormorant / 1-White Bellied Sea Eagle / 1-White-necked Heron
18.06.19	6.30am	None	0	27	M	50-Pied Stilt / 200-Little Black Cormorant / 1-Whistling Kite
27.06.19	11.30am	None	0	13	L	100-Pied Stilt / 100-Little Black Cormorant / 20-White Ibis / 1-Whistling Kite / 1-Black Kite / 1-White Bellied Sea Eagle
12.07.19	6.45am	None	0	25	H	40-Pied Stilt / 2-Whistling Kite / 1-Australian Hobby
04.09.19	6.15am	4-Sharp Tailed Sandpiper	1	33	L	50-Plumed Whistling Duck / 50-Pied Stilt / 2-Black-fronted Dotterel / 1-Whistling Kite / 1-Black Kite
10.09.19	4.15pm	None	0	22	L	200-Pied Stilt / 150-Gull Billed Tern / 1-Whistling Kite / 1-White Bellied Sea Eagle

Comments on Shoreline – February 2023

16.09.19	6.15am	4-Sharp Tailed Sandpiper	1	21	M	40-Pied Stilt / 3-Black-fronted Dotterel
19.09.19	6.30am	3-Sharp Tailed Sandpiper	1	31	L	100-Pied Stilt / 2-Red-kneed Dotterel / 2-Black-fronted Dotterel / 1-Black-shoulderd Kite / 1-Whistling Kite / 1-White Bellied Sea Eagle
25.09.19	6.15am	None	0	34	H	40-Pied Stilt / 40-Gull-billed Tern / 1-Whistling Kite / 1-Black Kite
04.10/19	6.00am	3-Sharp Tailed Sandpiper	1	35	L	80-Pied Stilt / 2-Whiskered Tern / 1-White Bellied Sea Eagle
08.10.19	5.45am	20-Sharp Tailed Sandpiper / 12-Common Greenshank	2	37	H	100-Pied Stilt / 70-Gull-billed Tern / 15-Whiskered Tern / 1-White-necked Heron
21.10.19	4.30pm	6-Sharp Tailed Sandpiper	1	21	H	150-Gull-billed Tern / 8-Whiskered Tern / 1-Glossy Ibis
28.10.19	5.45am	None	0	25	M	25-Pied Stilt
05.11.19	4.00pm	1-Black-tailed Godwit / 5-Sharp-tailed Sandpiper / 1-Marsh Sandpiper	3	9	H	40-Gull-billed Tern / 4-Whiskered Tern
06.11.19	5.30am	1-Black-tailed Godwit / 5-Sharp-tailed Sandpiper / 2-Marsh Sandpiper	3	5	M	
08.11.19	5.45am	30-Sharp-tailed Sandpiper / 10-Common Greenshank	2	16	H	60-Gull-billed Tern
10.01.19	7.48am	None	0	7	M	1-Whistling Kite
13.01.20	5.15am	None	0	20	M	70-Straw-necked Ibis / 1-Whistling Kite



Comments on Shoreline – February 2023

16.01.20	5.30am	4-Sharp-tailed Sandpiper	1	27	M	60-Pied Stilt / 20-Great Egret / 3-Glossy-black Cockatoo
20.01.20	5.30am	None	0	42	H	60-Pied Stilt / 19-Gull-billed Tern / 10-Pelican / 1-Whistling Kite / 1-White-bellied Sea Eagle / 350-Fairy Martin
22.01.20	4.40pm	None	0	18	L	50-Pied Stilt / 10-Gull-billed Tern / 12-Pelican / 100-Straw-necked Ibis / 8-Royal Spoonbill / 1-Whistling Kite
24.01.20	5.30am	None	0	44	M	50-Pied Stilt / 1-White Throated Heron / 80- Straw-necked Ibis / 200-Fairy Martin
28.01.20	5.45am	None	0	33	L	80-Pied Stilt / 15-Little Black Cormorant / 30-Straw-necked Ibis / 300-Fairy Martin
01.06.20	6.30am	None	0	21	H	6-Gull-billed Tern / 15-Little Black Cormorant / 30-Straw-necked Ibis / 3-Whistling Kite
20.07.20	6.30am	None	0	24	M	1500 - Little Black Cormorant
28.07.20	6,30am	None	0	30	M	1-Whistling Kite / 1-Black Kite
06.08.20	6.30am	None	0	27	M	20-Australasian Grebe / 30-Pied Stilt / 1000 - Little Black Cormorant / 2-Black Kite / 1-Whistling Kite
06.08.20	4.30pm	None	0	25	M	300-Little Black Cormorant / 1-Brahminy Kite / 1-White-bellied Sea Eagle
11.08.20	4.15pm	None	0	20	M	20-Pied Stilt / 10-Australasian Grebe
27.08.20	3.00pm	None	0	31	M	1-Brahminy Kite / 1-White-bellied Sea Eagle
09.09.20	6.00am	None	0	39	L	15-Australasian Grebe / 20-Pied Stilt

Comments on Shoreline – February 2023

12.09.20	7.00am	3-Sharp-tailed Sandpiper	1	40	M	20-Pied Stilt / 1-Whistling Kite / 1-White-bellied Sea Eagle / 1-Peregrine Falcon
17.09.20	5.45am	4-Sharp-tailed Sandpiper	1	35	M	2-Black-fronted Dotterel / 1-Whistling Kite / 1-White-bellied Sea Eagle
02.10.20	5.45am	None	0	39	M	2-Black-fronted Dotterel / 10-Royal Spoonbill / 1-Whistling Kite
07.10.19	5.30am	None	0	34	L	2-Black-fronted Dotterel / 1-Black Kite / 2-Whistling Kite / 1-Peregrine Falcon
13.10.19	5.45am	None	0	39	H	30-Pied Stilt / 1-Black Kite
27.10.20	6.00am	6-Sharp-tailed Sandpiper / 14-Common Greenshank	2	38	H	30-Pied Stilt / 40-Gull-billed Tern / 2-Black Kite / 1-Whistling Kite
02.11.20	5.30am	2-Sharp-tailed Sandpiper	1	39	L	20-Hardhead / 10-Australasian Grebe
06.11.20	3.30pm	None	0	26	M	25-Maned Duck / 10-Australasian Grebe / 40-Gull-billed Tern
09.11.20	3.45pm	1-Marsh Sandpiper	1	22	H	10-Australasian Grebe / 20-Pied Stilt / 50-Gull-billed Tern
10.12.20	5.45am	8-Sharp-tailed Sandpiper / 14-Common Greenshank	2	37	H	30-Gull-billed Tern
11.11.20	6.30am	4-Sharp-tailed Sandpiper / 1-Marsh Sandpiper	2	32	H	22-Gull-billed Tern / 1-Black-fronted Dotterel
05.12.20	7.19am	None	0	25	L	30-Grey Teal / 31-Pied Stilt / 2-Caspian Tern
10.12.20	5.45am	25-Sharp-tailed Sandpiper / 18-Common Greenshank	2	42	H	30-Pied Stilt / 3-Black-fronted Dotterel / 3-Gull-billed Tern

Comments on Shoreline – February 2023

18.12.20	9.32am	2-Common Greenshank	1	24	M	15-Pelican / 1-Wedge-tailed Eagle / 1-Brahminy Kite
05.01.21	6.00am	None	0	31	L	15-White-throated Needletail
15.01.21	6.00am	5-Common Greenshank	1	28	M	20-Pied Stilt / 8-Pelican / 2-White-bellied Sea Eagle / 3-Plumed Whistling Duck
25.01.21	2.30pm	None	0	16	L	10-Australasian Grebe / 10-Chestnut Mannikin / 100-Fairy Martin
09.02.21	5.45am	4-Sharp-tailed Sandpiper / 2-Common Greenshank	2	37	M	10-Australasian Grebe / 20-Pied Stilt / 40-Cattle Egret
13.02.21	4.10pm	None	0	16	L	26-Cattle Egret / 1-Brown Quail
19.04.21	6.20am	None	0	22	L	20-Cattle Egret
22.04.21	6.00am	None	0	24	H	5-Red-kneed Dotterel / 150-Little Black Cormorant / 25-Cattle Egret
01.06.21	4.25pm	None	0	21	H	1-Whistling Kite
02.06.21	6.15am	None	0	36	L	15-Australasian Grebe / 10-Little Black Cormorant / 30-Cattle Egret / 10-Straw-necked Ibis / 1-White-bellied Sea Eagle / 1-Peregrine Falcon
07.06.21	6.00am	None	0	30	H	10-Australasian Grebe / 300-Little Black Cormorant / 30-Cattle Egret
28.06.21	6.30am	None	0	22	L	12-Australasian Grebe / 50-White Ibis / 30-Cattle Egret
12.07.21	7.00am	None	0	38	L	10-Australasian Grebe / 12-Straw-necked Ibis / 1-Wedge-tailed Eagle / 1-Swamp Harrier / 1-Black Kite / 1-Whistling Kite

Comments on Shoreline – February 2023

12.07.21	10.19am	None	0	8	H	8-Pelican / 1-Black Swan
20.07.21	6.15am	None	0	26	H	12-Australasian Grebe / 30-Cattle Egret / 15-Straw-necked Ibis / 1-Wedge-tailed Eagle / 1-Black Kite / 2-Peregrine Falcon / 100-Fairy Martin
28.07.21	8.40am	None	0	26	M	50-cattle Egret / 14-Straw-necked Ibis / 1-Swamp Harrier / 1-Whistling Kite.
14.08.21	9.35am	None	0	19	L	2-Black Kite
28.08.21	7.30am	None	0	29	L	12-Australasian Grebe / 2-Great Cormorant / 1-Brahminy Kite
07.09.21	6.15am	None	0	28	M	20-Pied Stilt / 2-Great Cormorant / 30-Cattle Egret / 1-Whistling Kite
10.09.21	6.15am	2-Lathams Snipe	1	32	L	15-Pied Stilt / 1-Black-necked Stork / 30-Cattle Egret
11.09.21	9.25am	None	0	28	M	17-Pelican / 18-Royal Spoonbill / 1-Black-shouldered Kite / 2-Swamp Harrier / 1-Whistling Kite
12.09.21	6.08am	1-Lathams Snipe	1	27	L	2-Black-necked Stork / 11-Royal Spoonbill
14.09.21	6.00am	2-Lathams Snipe	1	31	L	30-Cattle Egret / 2-Great Cormorant / 1-Black-shouldered Kite
15.09.21	8.14am	None	0	26	L	11-Australasian Grebe / 19-Pied Stilt / 2-Whistling Kite
16.09.21	9.41am	None	0	25	M	2-Great Cormorant / 3-Whistling Kite
22.09.21	6.00am	2-Lathams Snipe	1	33	L	40-Pied Stilt / 1-Whistling Kite / 1-White-bellied Sea Eagle



Comments on Shoreline – February 2023

24.09.21	6.15am	2-Sharp-tailed Sandpiper	1	37	L	40-Pied Stilt / 1-Whistling Kite
28.09.21	5.45am	1-Latham's Snipe	1	36	L	20-pied Stilt / 1-Whistling Kite
01.10.21	6.00am	9-Common Greenshank	1	32	H	1-Whistling Kite / 20-Pied Stilt
07.10.21	6.00am	None	0	35	M	1-Whistling Kite / 1-Nankeen Kestrel
11.10.21	5.45am	None	0	36	L	12-Australasian Grebe / 1-Whistling Kite / 1-Swamp Harrier
13.10.21	5.45am	2-Sharp-tailed Sandpiper	1	33	M	1-Whistling Kite
03.11.21	6.00am	20-Sharp-tailed Sandpiper / 2-Marsh Sandpiper	2	30	H	2-Black-fronted Dotterel / 2-Whiskered Tern / 150-Fairy Martin
15.11.21	6.00am	35-Sharp-tailed Sandpiper / 20-Commonn Greenshank	2	40	H	10-Australasian Grebe / 35-White-throated Needletails / 1-Whistling Kite
05.12.21	7.38am	3-Commonn Greenshank	1	18	M	2-Black-necked Stork
07.01.21	5.51am	None	0	16	L	
11.01.22	6.15am	None	0	28	M	300-Fairy Martin / 100-Tree Martin
13.01.22	6.00am	None	0	29	H	200-Fairy Martin
24.01.22	6.00am	None	0	25	L	
04.02.22	6.00am	None	0	31	L	60-Rainbow Lorikeet
08.02.22	6.10am	None	0	23	M	200-Fairy Martin / 200-Tree Martin

Comments on Shoreline – February 2023

18.02.22	6.00am	None	0	30	L	15-Australasian Grebe / 1-Peregrine Falcon /
21.02.22	5.45am	None	0	23	L	18-Australasian Grebe
23.02.22	4.15pm	None	0	10	M	169-White Ibis
08.03.22	6.00am	None	0	23	M	30-White Ibis
15.03.22	5.50am	None	0	34	H	12-Australasian Grebe / 1-Black-shouldered Kite / 1-Whistling Kite / 30-Little Lorikeet
21.03.22	12.23pm	None	0	15	H	3-Whistling Kite / 26-Little Pied Cormorant
25.03.22	5.50am	None	0	32	L	12-Australasian Grebe / 2-White-faced Heron / 1-Whistling Kite /
06.04.22	5.45am	None	0	30	L	12-Straw-necked Ibis / 2-Whistling Kite /
07.04.22	9.40am	None	0	21	M	1-Brown Goshawk / 2-Whistling Kite / 2-Brahminy Kite
19.05.22	4.10pm	None	0	24	L	30-Australasian Grebe / 30-Straw-necked Ibis / 2-Whistling Kite
20.05.22	6.10am	None	0	29	L	30-Australasian Grebe / 50-Cattle Egret / 2-Whistling Kite / 1-Peregrine Falcon
27.05.22	6.10am	None	0	30	M	12-Australasian Grebe / 30-White Ibis / 15-Straw-necked ibis / 1-Brown Goshawk / 1-Whistling Kite
30.05.22	6.15am	None	0	28	M	10-Australasian Grebe / 12-Little Black Cormorant / 40-Cattle Egret / 1-Black-shouldered Kite / 1-White-bellied Sea Eagle
01.06.22	6.15am	None	0	35	L	15-Australasian Grebe / 1-Comb-crested Jacana / 40-Cattle Egret / 1-Whistling Kite

## ENDNOTES

- <sup>1</sup> Base map from Department of Environment Wetlands [Website](#)
- <sup>2</sup> <https://www.lendlease.com/au/sustainability/sustainability-framework-and-targets>
- <sup>3</sup> **Sustainable Development Goals (SDGs)** set by the United Nations General Assembly in 2015
- <sup>4</sup> South East Queensland Regional Plan 2009–2031 – Qld Government 2009
- <sup>5</sup> <https://redlands2030.net/>
- <sup>6</sup> Redland City Council [website](#)
- <sup>7</sup> 2015, Carla Wegscheidl, Marcus Sheaves, Ian McLeod and Jakob Fries, *Queensland's Saltmarsh Habitats: Values, Threats and Opportunities to Restore Ecosystem Services* - Centre for Tropical Water & Aquatic Ecosystem Research, James Cook University Townsville
- <sup>8</sup> 2019 Catherine E. Lovelock, Arnon Accad, Ralph M. Dowling, Norm Duke, Shing Yip Lee, Mike Ronan, Mangroves and saltmarshes of Moreton Bay, in *Moreton Bay Quandamooka & Catchment: Past, present, and future* [website](#)
- <sup>9</sup> 2006, S. Y. Lee, R. J. K. Dunn, R. A. Young, R. M. Connolly, P. E. R. Dale, R. Dehayr, C. J. Lemckert, S. Mckinnon, B. Powell, P. R. Teasdale and D. T. Welsh Impact of urbanization on coastal wetland structure and function, *Austral. Ecology* (2006) **31**, 149–163
- <sup>10</sup> 2018, Geedike, I., Oldeland J. and Leishmann, M.R., 2018 *Urban stormwater runoff promote compression of saltmarshes by freshwater plants and mangrove forests*. *Science of the Total Environment*, Vol 637-638, pp 137-144.
- <sup>11</sup> Shoreline, Redlands Water Sensitive Urban Design Preliminary Advice, 2016, DesignFlow
- <sup>12</sup> Referral of proposed action 2016 – Shoreline Development – Dr Jo Chambers, Biodiversity Assessment and Monitoring.
- <sup>13</sup> Timms BV (1982). Coastal dune waterbodies of North-eastern New South Wales. *Australian Journal of Marine and Freshwater Research* 33(2):203–222.
- <sup>14</sup> Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (s266B) Conservation Advice for SUBTROPICAL AND TEMPERATE COASTAL SALTMARSH, Department of Environment: [Website](#)
- <sup>15</sup> Adam P (2002). Saltmarshes in a time of change. *Environmental Conservation* 29(1): 39–61. Quoted in Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (s266B) Conservation Advice for SUBTROPICAL AND TEMPERATE COASTAL SALTMARSH
- <sup>16</sup> Saintilan N and Rogers K (2013). The significance and vulnerability of Australian saltmarshes: implications for management in a changing climate. *Marine and Freshwater Research* 64: 66–79. Quoted in Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) (s266B) Conservation Advice for SUBTROPICAL AND TEMPERATE COASTAL SALTMARSH
- <sup>17</sup> See Marine Science Australia for definitions of both AHD and HAT - [Website](#)
- <sup>18</sup> IPCC Sixth Assessment Report 2021
- <sup>19</sup> Rhodes, J. R., Beyer, H. L., Preece, H.J. and McAlpine, C.A. 2015. *South East Queensland Koala Population Modelling Study*. UniQuest, Brisbane, Australia.
- <sup>20</sup> Barth, Benjamin J., FitzGibbon Sean I., Gillett, Amber, Wilson, Robbie S., Moffitt, Beth, Pye, Adam, Dalene, Preece, Harriet and. Ellis, William A. 2020. “Scattered paddock trees and roadside vegetation can provide important habitat for koalas (*Phascolarctos cinereus*) in an agricultural landscape”. *Australian Mammalogy*, 2020, **42**, 194–203.
- <sup>21</sup> State of Queensland (Department of Environment and Resource Management) 2009, *Decline of the Koala Coast Koala Population: Population Status in 2008*

<sup>22</sup> Koala Sensitive Urban Design Guideline, 2022.

[https://environment.des.qld.gov.au/\\_data/assets/pdf\\_file/0025/102859/koala-sensitive-design-guideline.pdf](https://environment.des.qld.gov.au/_data/assets/pdf_file/0025/102859/koala-sensitive-design-guideline.pdf)

<sup>23</sup> Guide to nationally protected species significantly impacted by paddock tree removal - draft (DoEE 2020).

<sup>24</sup> [Qld Globe Maps](#) Matters of State Environmental Significance (MSES) Essential Habitat Map

<sup>25</sup> Clive McAlpine, Daniel Lunney, Alistair Melzer, Peter Menkhorst, Stephen Phillips, David Phalen, William Ellis, William Foley, Greg Baxter, Deidre de Villiers, Rodney Kavanagh, Christine Adams-Hosking, Charles Todd, Desley Whisson, Robyn Molsher, Michele Walter, Ivan Lawler, Robert Close 2015. *Conserving koalas: A review of the contrasting regional trends, outlooks and policy challenges*. Biological Conservation 192, Elsevier.

<sup>26</sup> W. Ellis, A. Melzer, I.D. Clifton and F. Carrick, 2010, Climate change and the koala *Phascolarctos cinereus*: water and energy, Australian Zoologist Vol 35 (2)

<sup>27</sup> [Qld Globe Maps](#), <https://qldglobe.information.qld.gov.au/>

<sup>28</sup> Referral of proposed action 2016 – Shoreline Development – Dr Jo Chambers, Biodiversity Assessment and Monitoring.

<sup>29</sup> Saunders Havill Group for Lendlease Communities (Shoreline) Pty Ltd, 2019 *Koala Assessable Benchmark Report - Shoreline DA 1 (Issue A)*.

<sup>30</sup> BAAM Ecological Consultants, 2019 *Koala Assessable Benchmark Report*

<sup>31</sup> Barth, Benjamin J., FitzGibbon Sean I., Gillett, Amber, Wilson, Robbie S., Moffitt, Beth, Pye, Adam, Dalene, Preece, Harriet and. Ellis, William A. 2020. "Scattered paddock trees and roadside vegetation can provide important habitat for koalas (*Phascolarctos cinereus*) in an agricultural landscape". *Australian Mammalogy*, 2020, **42**, 194–203.

<sup>32</sup> BAAM Ecological Consultants – Response to Department of State Development, Infrastructure and Planning Information Request September 2014.

<sup>33</sup> University of the Sunshine Coast, Detection Dogs for Conservation Dr Riana Gardiner, Kye McDonald, Katrin Hohwieler, Dr Céline Frère and Dr Romane Cristescu, 2020, *Progress Report Ormiston Koala Population Monitoring Report 2020 (1).pdf*

<sup>34</sup> Deidre de Villiers, Debbie Pointing, Ken Rawlins, Jo Loader and Jon Hanger . 2019. *Toondah Harbour Tracking Report* Endeavour Veterinary Ecology Pty Ltd and Koala Action Group Qld Inc [file:///C:/Users/KAG/Downloads/Toondah-Harbour-koala-tracking-project%20\(2\).pdf](file:///C:/Users/KAG/Downloads/Toondah-Harbour-koala-tracking-project%20(2).pdf)

<sup>35</sup> BAAM Ecological Consultants 2014 *Shoreline Ecological Assessment Redland Bay*

<sup>36</sup> BAAM Ecological Consultants 2014 *Shoreline Ecological Assessment Redland Bay*

<sup>37</sup> BAAM Ecological Consultants 2014 *Shoreline Ecological Assessment Redland Bay*

<sup>38</sup> Andrew J. Hamilton, Chloé Conort, Aureo Bueno, Christopher G. Murray and James R. Grove, 2017. Waterbird use of farm dams in south-eastern Australia: abundance and influence of biophysical and landscape characteristics. Hamilton *et al. Avian Res* (2017) 8:2

<sup>39</sup> <https://ebird.org/australia/hotspot/L2994978>

<sup>40</sup> BAAM Ecological Consultants: EPBC Listed Migratory Shorebird Survey - Shoreline 2016 report

<sup>41</sup> BAAM Ecological Consultants: Eastern Curlew Impact Management Plan - Shoreline Urban Development prepared for Lendlease (Shoreline) Pty Ltd Jan 2020. [Website](#)

<sup>42</sup> Ebird list (<https://ebird.org/checklist/S74197726>)

<sup>43</sup> BAAM Ecological Consultants: EPBC Listed Migratory Shorebird Survey - Shoreline 2016 report

<sup>44</sup> BAAM Ecological Consultants: Eastern Curlew Impact Management Plan - Shoreline Urban Development prepared for Lendlease (Shoreline) Pty Ltd Jan 2020. [Website](#)

<sup>45</sup> Fuller, R., Milton, D., Rothlisberg, P., Clemens, R.S., Coleman, J., Murray, K., Dhanjal-Adams, K.L., Edwards, D., Finn, P.G., Skilleter, G., Stigner, M., Woodworth, B.K., 2019. *Migratory Shorebirds of*



Moreton Bay, in Tibbetts, I.R., Rothlisberg, P.C., Neil, D.T., Homburg, T.A., Brewer, D.t., Arthington, A.H. (Editors) Moreton Bay Quandamooka & Catchment. Past, present and future.

<sup>46</sup> RCC Minutes March 16, 2022 - Shoreline Application MCU17/0108 Shoreline Morris - preliminary approval (variation request for MCU to vary effect of RPS V7.1 T, p143-144.)

[http://redland.infocouncil.biz/Open/2022/03/CO\\_20220316\\_MIN\\_2291\\_AT.PDF](http://redland.infocouncil.biz/Open/2022/03/CO_20220316_MIN_2291_AT.PDF)

<sup>47</sup> RCC Minutes March 16, 2022, Item 14.1 Figure 7 page 148

<sup>48</sup> Johnson, Christopher D., Daryl Evans, Darryl Jones. 2017 **Birds and Roads: Reduced Transit for Smaller Species over Roads within an Urban Environment**. *Frontiers in Ecology and Evolution*, 2017; 5 DOI: [10.3389/fevo.2017.00036](https://doi.org/10.3389/fevo.2017.00036)

<sup>49</sup> Approved Precinct Plan, Redland City Council Minutes 06.03.2019

<sup>50</sup> Lynn Roberts personal communication.

<sup>51</sup> Benwell 1994b on [http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon\\_id=5872](http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=5872)

<sup>52</sup> Protect natural drainage paths and drainage areas, Link: [Low Impact Development](#)

<sup>53</sup> Shoreline Lendlease website:

<https://communities.lendlease.com/queensland/shoreline/news/2020/05/28/welcome-to-elements/>

<sup>54</sup> United States Environment Protection Agency.2003. *Protecting water quality from urban runoff*.

<sup>55</sup> Walsh CJ, Fletcher TD, Burns MJ (2012) *Urban Stormwater Runoff: A New Class of Environmental Flow Problem*. PLoS ONE 7(9): e45814. <https://doi.org/10.1371/journal.pone.0045814>

<sup>56</sup> Imberger, S.J., Cook,P.L.M., Grace, M.R. and Thompson R.M 2013 *Tracing carbon source in small urbanising streams: Catchment-scale stormwater drainage impacts overwhelm the effects of reach-scale riparian vegetation*. *Freshwater Biology*, Vol 59, Issue 1 Jan 2014

<sup>57</sup> *Urban Stormwater: Best Practice Environmental Management Guidelines*. CSIRO 1999. Chapter 5.

<sup>58</sup> "Shoreline, Redlands Water Sensitive Urban Design Preliminary Advice" 2016. DesignFlow (Redland City Council approved plan).

<sup>59</sup> Burns, M.J., Fletcher, T.D., Walsh, C.J, Ladson, A.R. and Hatt, B.E. 2012 *Hydrologic shortcomings of conventional stormwater management and opportunities for reform*. *Landscape and Urban Planning* Vol.105, Issue 3, pages 230-240.

<sup>60</sup> Fred L. Ogden, Nawa Raj Pradhan, Charles W. Downer, and Jon A. Zahner. 2011 *Relative importance of impervious area, drainage density, width function, and subsurface storm drainage on flood runoff from an urbanized catchment*. *Water Resources Research*, Vol. 47, W12503

<sup>61</sup> Walsh, C.J, Fletcher, T.D., Ladson, A.R. *Stream restoration in urban catchments through redesigning stormwater systems; Looking to the catchment to save the stream*. *Freshwater Science* Vol. 24, No.3 September 2005

<sup>62</sup> Walsh, C.J, Fletcher, T.D., Ladson, A.R. *Stream restoration in urban catchments through redesigning stormwater systems; Looking to the catchment to save the stream*. *Freshwater Science* Vol. 24, No.3 September 2005

<sup>63</sup> Redland City Council Agenda 18.11.2015

<sup>64</sup> Mosquito Consulting Services Pty Ltd. 2014, *Shoreline Biting Insect Management Strategy*. Report prepared on behalf of Shoreline Redlands Pty Ltd.

<sup>65</sup> *Shoreline Biting Insect Management Plan 2015* frc environmental PO Box 2363, Wellington Point QLD

<sup>66</sup> [https://lendlease.widen.net/s/t5vwnj8ln7/2022au\\_shoreline\\_flythrough](https://lendlease.widen.net/s/t5vwnj8ln7/2022au_shoreline_flythrough)

<sup>67</sup> <https://www.lendlease.com/au/>

<sup>68</sup> <https://communities.lendlease.com/queensland/yarrabilba>