2 EPBC Act Environmental Offsets Policy and framework

This section describes how the proposed offset meets the relevant requirements of the EPBC Act *Environmental Offsets Policy* (October 2012) (**EOP**), plans and guidelines.

2.1 Policy principles

The EPBC Act EOP sets out eight key overarching principles to determine the suitability of offsets. *Table 4* outlines each of the policy principles and how it has been considered in the OAMP, with a reference to the relevant OAMP section.

Table 4: EPBC Act Environmental Offset Policy principles

Policy principle	Action offsets
Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the protected matters.	The offset will deliver a conservation outcome by providing habitat for Coastal Swamp Oak TEC, koala and GHFF. The habitat will be managed to improve the habitat values for those species, and the offset area will be secured as a declared area under the *Vegetation Management Act 1999* (Qld) (**VM Act**) to ensure legal protection of the offset area. TMR will legally secure the offset areas in perpetuity through the use of a declared area. Thus, the ecological benefits to the species from the implementation of this OAMP will result in a permanent change to the legal status of the vegetation/habitat which will be protected under the EPBC Act as MNES habitat, *Vegetation Management Act 1999* (Qld) as remnant vegetation and essential habitat and the N*ature Conservation Act 1992 (Qld)* as habitat for a protected species. Additionally, the completion criteria and the 'with offset' non-native species attribute (provided in *Appendix J*, *Appendix K* and *Appendix L*) establishes the acceptable limits to non-native species in the offset area. These will be achieved as a requirement of this OAMP. With respect to the property Tabooba, TMR may enter into an agreement with DES and/or SRRC to have the property established as a nature conservation area and/or be maintained under the Land for Wildlife program respectively. Brief informal discussions have already been had with SRRC's Land for Wildlife Program as to TMR and Council maintaining the property post approval. Decisions on the maintenance of the property would be made closer to the lapsing of the approval. With respect to the property Greenridge, DES and GCCC have previously expressed interest in acquiring Greenridge. Given the interest by both DES and GCCC, TMR may enter into an agreement with either or both DES and GCCC to maintain the property particularly given its proximity to the Pimpama River Conservation Area. Decisions on the maintenance of the property would be made closer to the lapsing of the approval.
Suitable offsets must be built around direct offsets but may include other compensatory measures.	100% of the action's MNES offset obligations for Coastal Swamp Oak TEC, koala and GHFF will be acquitted by the proposed direct land-based offsets.

Policy principle	Action offsets
Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter.	The status of the impacted threatened species has been taken into account by the offset assessment guide that has been used to calculate the offset area requirements. The koala was listed as 'vulnerable' under the EPBC Act at the time of the controlled action decision but assessed as 'endangered' in the PER. Coastal Swamp Oak TEC is listed as 'endangered' under the EPBC Act, and the GHFF is listed as 'vulnerable'.
Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter.	The extent of the offset has been calculated using ecological reports that include both flora and fauna surveys, for both the impact and offset sites to inform inputs into the offset assessment guide (**OAG**). The inputs to the OAGs for each of the protected matters impacted are detailed in *Section 3.3* to *Section 3.5.*
Suitable offsets must effectively account for and manage the risks of the offset not succeeding.	As was required by the Public Environment Report Guidelines by the now DCCEEW, the Precautionary Principle was applied and discussed in the executive summary on page 17 and in section 13.11.1 on page 552 of the Public Environment Report as approved by the Delegate. This assessment included all baseline data, impact assessment and offsets (including Offset Strategy – Appendix 15) as required by the Public Environment Report Guidelines. This OAMP is based on the approved Offset Strategy, and the risks associated with the offsets have been assessed (*Table 10* and *Table 11*) and mitigation and appropriate management actions proposed in the offset area management measures shown in *Table 12* and *Table 13*. In addition, uncertainty, and therefore risk, associated with averted loss and net gain in habitat quality were addressed by applying the offset assessment guide.
Suitable offsets must be additional to what is already required, determined by law or planning regulations, or agreed to under other schemes or programs.	Vegetation clearing as a native forest practice, or a forest practice; the use of fire to manage regrowth and grazing on the offset site; is not currently prohibited by legal mechanisms at either the local, state or Australian government legislative level. See *Section 5* and *Section 7*. The offset areas are zoned rural and have previously been used for timber harvesting and cattle grazing. Areas of the offset properties have been subject to vegetation clearing[6] under the land management practices of previous owners over the last 3 decades. The current regulated vegetation will be secured via a declared area that has its head of power under the VM Act. This threat will be removed from the offset sites. See *Section 9* for further detail. The offset area is not subject to other schemes or programs. The offset areas are being rehabilitated from intensive grazing. The *Biosecurity Act* has a baseline duty of care for weed and pest animal control as detailed in *Table 17*. All of the management actions detailed in *Table 12* to *Table 15* inclusive are above and beyond the requirements of the Biosecurity Act.
Suitable offsets must be efficient, timely, transparent, scientifically robust and reasonable	The proposed offsets will be efficient and timely as the offset will be established and implementation commenced within 6 months of the Minister approving this OAMP. The offsets' scale and suitability are transparent, and the offsets are based on the terrestrial ecology reports prepared by suitably qualified ecologists for the impact and offset sites (Planit 2021a, 2021b; 2022, BAAM, 2022); They have been prepared using the EPBC Act OAG inputs and calculators. Refer to *Section 3* for further detailed application of the OAG. Implementation of the OAMP has begun, with fire management lines installed and security to mitigate illegal access installed. The

[6] *Vegetation Management Act 1999*, Schedule dictionary

Policy principle	Action offsets
	management actions within this OAMP will be implemented on approval of the OAMP
Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	The offset sites were surveyed in May 2022 (Tabooba) and June-August 2022 (Greenridge), providing the baseline habitat quality assessment and these scores were compared against the relevant BioCondition benchmarks[7] for each regional ecosystem (**RE**). Habitat quality assessments were conducted in accordance with the *Guide to Determining Terrestrial Habitat Quality Version 1.3, 2020* (Queensland Department of Environment and Science (**DES**)) which involved collecting spatial data; and conducting in situ vegetation surveys, assessing site condition, spatial context as well as targeted species habitat criteria (refer to BAAM 2022, and *Appendix A* of this OAMP). Future habitat assessment measurements will be conducted in accordance with this plan during its implementation phase. Monitoring and reporting are detailed in the Offset Area Management Measures outlined in *Table 12* and *Table 13*, and the monitoring schedule and reporting schedule are shown in *Table 18* and *Table 19*. The offset will be protected from clearing and secured via a Declared Area that has its head of power under the VM Act. Refer to *Section 9* for further detail.

2.2 Addressing relevant EPBC plans and advice

The EOP states that an offset should address key priority actions for the impacted MNES in any approved recovery plans, threat abatement plans, conservation advice, ecological character description or approved Commonwealth Management Plan.

Table 5 summarises how this OAMP addresses the relevant conservation advice, recovery plans and threat abatement plans, on the offset sites.

[7] Benchmarks are quantitative values derived from data collected from field-based reference sites for each site condition attribute assessed in BioCondition

Table 5: Conservation Advice and Threat Abatement Plans addressed in the OAMP

Document	Key threats	Section addressed in document
Conservation advice (incorporating listing advice) for the Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community. (2018) Department of the Environment and Energy, Canberra.	Clearing and fragmentation Extensive land clearing and landscape modification for agricultural and coastal development over the past 200 years has reduced the extent of the ecological community. This remains an ongoing threat as most of the remaining ecological community, as well as potential regrowth areas, occurs in close proximity to regional centres or on productive agricultural land. As Coastal Swamp Oak forest occurs as small patches in a mosaic environment, connectivity with other patches of the ecological community within the mosaic is important, as few individual patches are large enough on their own to provide sufficient species and genetic diversity to ensure their long-term survival.	For the contribution to connectivity and biodiversity corridors – Refer to *Section 3.1.1* and *Section 3.1.2*. The offset site was selected for its potential to provide a substantial increase to the TEC, connectivity and other ecological values within the surrounding area. See also the revegetation plan for the TEC at Greenridge at *Appendix C*.
	Weeds Invasion by non-native plant species is a major threat to this ecological community (Keith and Scott, 2005; Tozer et al., 2010). It is often a result of physical disturbance to the vegetation structure of the community; landfill associated with adjacent urban and industrial infrastructure, including sporting fields; soil disturbance; dumping of building or excavation waste, rubbish and garden refuse; encroachment of garden plants with spread assisted by birds, wind, water and altered drainage patterns; polluted runoff from urban and agricultural areas; construction of roads and other utilities; or grazing by domestic livestock or feral animals. Invasion of some weed species can also be a result of changed fire regimes (Queensland Herbarium, 2016).	Refer to *Table 12* and *Table 13* for details of invasive plant and environmental weed management to be undertaken. Results will be monitored as part of the ongoing monitoring program.
	Invasive fauna The ecological community, particularly its faunal elements, is subject to a range of impacts from invasive animals. These include: • Predation habitat destruction through trampling and soil disturbance, competition and disease transmission by feral pigs; • Predation and spread of invasive plant species by wild dogs, foxes, cats, and other feral species; • Grazing and trampling pressures from rabbits, goats, deer and other feral herbivores, which can leave the ecological community open to erosion and weed invasion.	See *Table 12* and *Table 13:* Feral animals – monitoring and control as detailed. Existing populations of feral and wild animals (feral cats, wild dogs and feral pigs) will be controlled within the offset areas in accordance with the *Biosecurity Act 2014* (Qld). Monthly inspections to record the presence of wallow holes, tracks and visual incidents, in the offset area will be undertaken. On being notified or becoming aware of the presence of large numbers, for example, approximately 10 feral and/or wild animals

Document	Key threats	Section addressed in document
	Feral pigs (*Sus scrofa*), are noted as a particular threat to this TEC. As opportunistic omnivores they can have direct impacts such as preying on a range of small animals, eggs, carrion and foliage, or digging up invertebrates, underground fungi, fruit, seeds, roots, tubers, bulbs. This impacts upon the ecological community by altering plant species composition and succession, nutrient and water cycles and degrading water quality.	or multiple tracks in the offset area at any one time, the Landholder is to implement feral animal control measures within one month.
	<u>Impacts resulting from agricultural activities, including grazing</u> Many of the alluvial areas along the east coast of Australia have been grazed and forested since the early to mid-19th century. The need for land for agriculture has driven both the clearing of the ecological community and draining the wetlands it is a part of. Overgrazing can degrade the ecological community through vegetation loss (grazing and trampling), soil compaction (hard hoofed stock), disturbing sediments and increasing nutrient levels	See *Table 12* and *Table 13:* Grazing management. Livestock will be excluded from the offset area.
	<u>Inappropriate fire regimes</u> Fire regimes have been changed throughout the extent of the ecological community in association with the growth of agriculture and urban development. In rural areas, fire is used to promote green pick for livestock and in urban areas, and hazard reduction management can increase fire frequency. The amount of fallen timber and other plant litter can be diminished during such burns.	See *Table 12* and *Table 13:* Fire management. Planned burns undertaken in Coastal Swamp Oak TEC will be in accordance with relevant RE fire management guidelines. See also *Table 15* for the fire management strategy to be used at Greenridge.
Conservation advice for Phascolarctos cinereus *(Koala).* (2022) DAWE, Canberra. *National Recovery Plan for the Koala:* Phascolarctos cinereus *(combined populations of Queensland, New South Wales and the Australian Capital Territory)*. (2022) DAWE, Canberra	<u>Climate change driven processes and drivers:</u> • Loss of climatically suitable habitat Areas that are climatically suitable for koalas are contracting. Climate change predictions indicate drier, warmer conditions across the koala's range. Current and future climate change projections indicate a progressive eastward and southwards contraction in the koala's suitable climate envelope and consequent suitable habitat (Adams-Hosking et al. 2011). • Increased intensity/frequency of drought Low rainfall has been linked with physiological stress to koalas due to low moisture levels, causing negative effects on population viability (Davies et al. 2013). In the future, average winter and	For the contribution to biodiversity corridors and connectivity – Refer to *Section 3.1.1* and *Section 3.1.2*. The offset sites were selected for their potential to provide a substantial increase to the habitat, connectivity and other ecological values within the surrounding area. The areas are currently composed of degraded tracts of regulated and regrowth vegetation. Protecting eucalypt forests from native timber harvesting and clearing, and inappropriate fire will add significant value to the areas by improving the condition and connectivity of local and regional koala habitat. The prevention of harvesting of larger trees will provide more and larger shelter as the RE rehabilitates to scores closer to the benchmark.

Document	Key threats	Section addressed in document
	spring rainfall are predicted to continue to decline across the koala's range (BoM 2021). • Increased intensity/frequency of heatwaves Due to climate change, average temperatures across the koala's range will continue to increase across all seasons resulting in an increased frequency and intensity of heat stress days and heat wave episodes (BoM 2021). Heat stress threats will synergistically interact with drought, further exacerbating the impacts of reduced water availability. • Increased intensity/frequency of bushfires Australia will continue to experience a harsher fire-weather climate into the future (BoM 2019, 2021). The fire season length is increasing and the number of catastrophic fire days will increase in the future by an estimated 15-70% by 2050 (Climate Council 2019). A broad range of fire-related threats exist including high frequency fire, high severity fire, shifts in fire season, biodiversity loss, declining ecological mechanisms, shifts in biotic interactions including reproduction and fire-predator interactions, fire-drought interactions, and fire-fragmentation interactions which can be amplified by land clearing and logging (Bradshaw et al. 2018; Leavesley et al. 2020). All of these threats will have a significant impact on koala habitat and resident populations. • Declining nutritional value of foliage Physical disturbance (e.g., logging during forestry activities and/or fire) alters tree species composition and can favour tree species that do not support the koala's nutritional requirements (Au et al. 2019). Additional research is required to assess how elevated levels of CO_2 affect nitrogen and available nitrogen (which integrates the effects of tannins) (DeGabriel et al. 2009). Bushfire effects on the nutritional value of eucalypt regrowth (e.g., epicormic growth) are unknown and research has been initiated.	Additionally, the offset will assist in landscape connectivity and context by improving the existing regulated vegetation adjacent to and within the landscape corridors. Fire is not permitted in the offset area unless for fuel reduction purposes, at no less than seven-year intervals and no more than 30% of the area at any one time (as per Queensland DES RE descriptions fire management guidelines) (refer to *Table 12* and *Table 13* for related management actions and *Table 14 and Table 15* for the fire management strategies). Fuel reduction burns will be used as a last resort, and if utilised will be planned to be low intensity with no canopy scorch, with the aim to reduce fuel load in the ground cover layer. This practice aims to prevent unplanned high intensity burns that result from a build-up of fuel. Appropriate fire management will mitigate the increased risks of fires on the site. The prevention of harvesting of larger trees will provide more and larger foraging and shelter trees as the RE rehabilitates to scores closer to the benchmark.
	<u>Clearing and degradation of koala habitat</u> Human activities (e.g., deforestation and land clearance for grazing, agriculture, urbanisation, timber harvesting, mining and other activities) have resulted in habitat loss, fragmentation and degradation.	Refer to *Table 12* and *Table 13* - Forestry and native vegetation - clearing is not allowed under the management plan. No forestry or timber harvesting activities will be conducted during the period of the declaration of the offset area.

Document	Key threats	Section addressed in document
		Forestry and native timber harvesting practices in the offset areas have previously removed large trees that provide shelter and food and may also contain hollows and deadwood. It is therefore considered a potential threat to the quality of the habitat.
	Increased mortality due to vehicle strikes and dogs Vehicle related mortality occurs regularly on roads in close proximity to occupied koala habitat (Gonzalez-Astudillo 2018; Queensland Government 2021). Dog attacks are also a significant cause of death and injury especially in areas within and adjacent to peri-urban and residential areas (DPIE 2020). Koalas are unable to adapt to these threats and as human activities continue to expand into koala habitat, trauma from these threats will continue.	Refer to *Table 12* and *Table 13:* Feral animals – monitoring and control as detailed. Existing populations of feral animals (feral cats, wild dogs and feral pigs) will be controlled within the offset areas in accordance with the *Biosecurity Act 2014* (Qld). Monthly inspections to record the presence of wallow holes, tracks and visual incidents, (e.g. any injury to or predation of koalas), in the offset areas will be undertaken.
	Koala retrovirus (**KoRV**) and Chlamydia (*Chlamydia percorum*) Disease can be a major contributor to population decline and reduces population viability. Infection with the bacterium Chlamydia pecorum can cause infertility, blindness and eventually death (Polkinghorne et al. 2013). The prevalence of disease (chlamydiosis) has been found to increase following extreme stress from hot weather, drought, habitat loss and fragmentation (Lunney et al. 2012; Davies et al. 2013). The Koala Retrovirus (KoRV) is thought to be responsible for a range of conditions, including leukaemia (Tarlinton et al. 2005) and an immunodeficiency syndrome. There is some evidence that chlamydiosis may be exacerbated by KoRV (Tarlinton et al. 2005). KoRV has endogenised in koalas (Hanger 2000, Tarlinton et al. 2006) in Queensland and New South Wales (Simmons et al. 2012). That is, it has infected germ line cells (spermatozoa or oocytes) and is transmitted genetically (by inheritance) from parents to offspring. Although this is a known mechanism of transmission, other non-endogenised (exogenous) variants of KoRV may also spread from koala to koala (horizontal spread) by close contact, and from infected mothers to their joeys via the milk, in a manner similar to the way that many other retroviruses spread (Hanger 2000, Quigley et al. 2018).	Although antibiotics are used successfully to treat some cases of chlamydial disease, there is no known treatment for putative KoRV-associated disease. The establishment of the offset area which adjoins the landscape corridors, as well as buffers and increases in extent and condition of the habitat may act to reduce some of the environmental stressors that are thought to accentuate the diseases. In addition, the Coomera Connector Koala Conservation Strategy defines the management actions that aim to reduce the impact of chlamydial disease in the koala population in the vicinity of the proposed action, as a component of the other compensatory measures proposed - an outcome delivered as part of the Koala Tagging and Monitoring Programs. These management actions include treatment of chlamydiosis-affected koalas and support of koala chlamydial and KoRV vaccine research
National Recovery Plan for the Grey-headed Flying-fox	Loss and degradation of foraging and roosting habitat	Improving the quality of the vegetation will enhance foraging and roosting habitat for the grey-headed flying-fox. Both of the offset

Document	Key threats	Section addressed in document
'Pteropus poliocephalus', (2021) DAWE, Canberra.	Human activities (e.g., deforestation and land clearance for grazing, agriculture, urbanisation, and timber harvesting and other activities) have resulted in habitat loss, fragmentation and degradation.	sites and surrounding landscape are dominated by vegetation species that are important habitat such as *Eucalyptus tereticornis* and *E. crebra*. The prevention of harvesting of larger trees will provide more and larger foraging and shelter trees as the regional ecosystem rehabilitates to scores closer to the benchmark. Habitats of Tabooba are within the typical foraging distance of the 6 known GHFF camps that are located within a 20 km radius of the boundary of the property. At Greenridge, the dominant canopy species within the REs present indicates REs 12.3.5, 12.3.20 and 12.11.23 have high value for GHFF, attributed to the dominance of winter-flowering canopy species. During a Koala survey of Greenridge conducted by ddwfauna for Titanium Enterprises Pty Ltd in 2006, GHFF were reported to be widespread throughout vegetated areas and were observed feeding on *E. tereticornis* and *Melaleuca quinquenervia.* See *Section 5, Table 12* and *Table 13,* and *Appendix C.*
	<u>Conflict with people</u> Conflict with people, including disturbance in camps and mortality from actions to manage commercial fruit crops, is considered to be a moderate threat, but is increasing in urban areas. Most conflict occurs in heavily urbanised environments where domestic gardens can provide an increased density and diversity of food trees. Negative perceptions of GHFF can lead to conflict, impacting the population directly through harassment, deliberate destruction and attempts at dispersal or indirectly by inhibiting community support for conservation initiatives. People living near flying-fox camps can find them annoying and unpleasant. Flying-fox camps are often noisy during the day and just before dawn when individuals return from foraging, and can generate a strong smell caused by the dense concentration of animals. People in close proximity can also be concerned about mess from faecal droppings and the potential for transmission of diseases from flying-foxes to people (Eby 1995, Tidemann 1999, Smith 2002).	Access limitations to the offset sites will reduce the likelihood of human disturbance to the species and its foraging and roosting habitat. Public access to the offset area is prohibited. Access is restricted to those authorised persons required to undertake actions described in this management plan, including the landholder, and approval holder staff and their contractors and assigns. The offset area is not to be utilised for any purpose including recreational activities, or any other activities that deter from achieving the outcomes of this plan. See *Section 5, Table 12* and *Table 13.*

Document	Key threats	Section addressed in document
	Entanglement in barbed wire fencing Flying-foxes can become entangled in barbed wire, usually on the top strand. Actions under the recovery plan include promoting methods of fencing to avoid entanglement.	Use of plain top wire on fencing instead of barbed wire will reduce the likelihood of entanglement. See *Section 5, Table 12* and *Table 13.*
	Climate change driven processes The impact of climate change on grey-headed flying-foxes is unknown but increasing temperatures, storms, bushfires and floods and drought conditions are likely to degrade foraging and roosting habitat, influence the frequency of foraging in commercial orchards, cause heat stress and increase heat related mortality.	The connecting of the protected areas around the offset sites will increase the ability of the habitat to withstand periods of drought and increased heat waves. The prevention of harvesting of larger trees will provide more and larger shelter as the regional ecosystem rehabilitates to scores closer to the benchmark. Additionally, the offset will assist in landscape connectivity and context by improving the existing regulated vegetation adjacent to and within the landscape corridors that link to the offset properties.
Threat Abatement Plan for predation, habitat degradation, competition and disease transmission by feral pigs (2005) Department of Environment and Heritage, Canberra	Predation by feral pigs	Refer to *Table 12* and *Table 13*, and to *Section 5* for a detailed description of the feral pest animal strategy that will be employed. Major damage to the environment/habitat occurs when large numbers of animals congregate in the area. Feral animals will be monitored and controlled as described in *Table 12* and *Table 13.*
Threat Abatement Plan for predation by the European red fox (2008) Department of the Environment, Water, Heritage and the Arts, Canberra.	Predation by foxes	The plan will minimise the presence of feral animals and control of existing populations of feral animals (wild dogs and feral pigs) within the offset areas in accordance with the *Biosecurity Act 2014* (Qld).