Management plan for the Doveton Grey-headed Flying-fox colony

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ECOLOGY & INFRASTRUCTURE INTERNATIONAL

City of Casey

Melbourne Water

GREATER DANDENONG

City of Opportunity

Version Control

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Executive Summary

A colony of Grey-headed Flying-foxes (GHFF) *Pteropus poliocephalus* established a camp in Spring 2013 along Dandenong Creek and associated wetlands in Dandenong and Doveton. The camp currently occurs along an approximately 700 m stretch of the creek immediately south of Heatherton Rd, and varies in size from approximately 3000 - 5000 GHFF in winter and up to 50,000 GHFF in summer and autumn.

The camp occurs on land managed by three different agencies; the City of Casey, the City of Greater Dandenong and Melbourne Water. The broad aim of this management plan is to provide a co-ordinated and consistent approach to the management of the camp, wherever it occurs in the area. The specific objectives are to provide: (1) suitable roosting habitat for the colony into the long-term to maintain the colony in its current location; (2) encourage the colony to roost towards the western side of Dandenong Creek and away from residential houses; (3) build resilience of the camp to cope with future heat stress events and (4) celebrate the presence of the colony and engage constructively with the local community to support the camp.

This management plan differs from other place-based management plans because it only applies to management actions that affect the colony of GHFF. For example, actions involving revegetation only relate to planting to provide roosting opportunities or shelter to the GHFF, and do not address actions to re-create pre-European EVCs. Similarly, weed control is only recommended where the weeds directly affects bats or hamper the success of planting for roost or shelter for bats. In addition, the guidance of actions in this plan will also apply if the colony extends beyond its current location or moves to the wetlands north of Heatherton Rd.

Key threats to the persistence of the colony along Dandenong Creek are the decline and death of overstorey trees, a rapid increase in the size of the colony or expansion of the camp into neighbouring residential properties, and the exacerbation of heat-stress events and mortality of GHFF.

The actions in this management plan are focused on ameliorating these direct threats, such as the planting of trees and shrubs within the colony extent to provide ongoing recruitment of roosting opportunities, revegetation of roost habitat outside the current colony extent and the removal of blackberries to reduce the risk of entanglement during heat stress events. Other pro-active approaches to celebrate the camp include enhanced community engagement, co-selection of a formal name for the camp, weeding and revegetation of shrub-layer to buffer extreme heat events, greater community engagement and improved visitor experiences.

1.0 Introduction

Ecology and Infrastructure International Pty Ltd and Mark Shepherd Ecological Consulting were commissioned by Casey City Council (hereafter 'Council') to prepare a management plan for the colony of Grey-headed Flying-foxes (GHFF) *Pteropus poliocephalus* roosting along Dandenong Creek in Dandenong and Doveton.

1.1 Scope of works and objectives

Council requested a management plan that was succinct and focused on actions, and included the following:

- History of GHFF at the site, including population size and dynamics and distribution of the colony at the site
- Brief summary of the ecology of GHFF, including their conservation status and ecological role
- Current management actions at the site by relevant land managers
- Detailed ground-truthed EVC mapping for the core management zone (the primary area currently and historically occupied by the colony - see Figure 1) between approximately Floriana Ave and Heatherton Rd, and to a maximum width of 250 m
- Broad-scale vegetation mapping into simplified categories, primarily using aerial photo interpretation and limited ground truthing, of the broad management zone from the edge of the colony to the Monash Freeway to the north (~1.3 km) and Kidds Rd to the south ~1.1 km)
- Maps showing major land-uses, land tenure, current and potential roosting habitat, both types/extent of vegetation mapping
- Description and mapping of threats to the colony
- Details of management actions, including a description, location, timing, responsibilities and any additional planning and studies that may be required
- Detailed revegetation plan for the core management zone, including EVC-appropriate species lists, maps showing revegetation areas, description of management actions and timing of works. Areas potentially suitable for revegetation in the broad management zone to be identified on a map, but a detailed revegetation plan for this area is out of scope.

2.0 Background and context

2.1 Distribution, conservation status and ecological role of GHFF

There are four species of flying-fox in Australia, with only the GHFF currently roosting along Dandenong Creek in Doveton and Dandenong. The GHFF is distributed in a broad geographic band within a few hundred km of the coast from Adelaide in South Australia to near Bundaberg, in southern Queensland. The geographic range of the Little Red Flying-fox (LRFF) *Pteropus scapulatus* includes all of Victoria, however there are no records of the species along Dandenong Creek. There are known camps of LRFF in the Goulburn Valley, with occasional sightings at Yarra Bend in Melbourne, so it is possible that the species may be occasionally roosting at Doveton or if not yet, may do so in the future. The Black Flying-fox *Pteropus alecto* occurs in a broad band along the coast from central NSW to central WA, and the Spectacled Flying-fox *Pteropus conspicillatus* is only found in northern Queensland.

Flying-foxes are active at night and during the day they congregate in groups, known as colonies, that can vary in size from tens to tens of thousands of individuals. The location where the colony is gathered during the day is called a camp or roost. Across Australia, GHFF have occupied hundreds of different camps for varying lengths of time (see DAWE 2020). Permanent camps are occupied year-round, seasonal camps are typically occupied most years during specific seasons, and occasional camps are occupied once or infrequently.

Despite their large geographic range, the species is considered a single population, with individuals flying thousands of kilometres annually tracking food availability (Roberts 2013; Roberts et al. 2012; Tidemann and Nelson 2004; Welbergen et al. In prep.). Therefore, management actions in one camp or region can have ramifications for the species as a whole. GHFF play an important role in the ecology and health of forests and woodlands through pollination and seed dispersal (Hall and Richards 2000). Their diet consists of fruit, nectar and pollen, and as they travel up to approximately 100 km per night for foraging and thousands of km annually, they disperse seed and pollen over large distances.

Flying-foxes are placental mammals and give birth to single live young in August to October after a six-month gestation period. The mother carries her pup until approximately 12 weeks of age, after which they are left in the camp at night while the mother feeds. At approximately five months of age the young are able to fly independently and are weaned.

2.2 Legislation and policy

The GHFF is listed as Vulnerable under the National Environment Protection and Biodiversity Conservation (EPBC) Act, 1999 and is listed under the Victorian Flora

and Fauna Guarantee (FFG) Act, 1988 and classified as Vulnerable on the Victorian Advisory List of Threatened Vertebrate Fauna, 2013. The population of the species nationally has declined significantly since European settlement, primarily due to habitat loss for agriculture and urban development as well as direct persecution (Hall and Richards 2000). The most recent (May 2019) results of the CSIRO-co-ordinated national count is approximately 550,000 to 600,000 GHFF across Australia (DAWE 2020).

The Dandenong Creek camp (Camp no. 799, DAWE 2020) is one of four nationally significant GHFF camps in Victoria - the others being Yarra Bend, Bendigo and Bairnsdale. A camp is considered nationally significant under the EPBC Act if it has contained ≥ 10,000 GHFF in more than one year in the last 10 years, or has been occupied by more than 2,500 GHFF permanently or seasonally every year for the last 10 years. Monthly monitoring demonstrates that the camp contains >10,000 GHFF each summer and autumn (Figure 2). Consequently, any actions taken at or near the camp that may have a significant impact on the species and are not carried out in accordance with relevant mitigation standards will likely require a referral under the EPBC Act (DOE 2015) (see Appendix 1).

2.3 History and current status of GHFF along the Dandenong Creek in Doveton and Dandenong

There are records in the Victorian Biodiversity Atlas of flying-foxes in Victoria as far back as the 1800s, and these records indicate that GHFF were only in Victoria occasionally, and in relatively small numbers. Camps near Mallacoota in East Gippsland were frequently occupied seasonally, and the first permanently occupied camp in Victoria was at the Royal Botanic Gardens Melbourne (RBGM), which formed in 1986 (van der Ree et al. 2006). That camp was dispersed from the RBGM in 2003 and two new camps consequently formed in Geelong and Yarra Bend (van der Ree, unpublished data). These two camps have since been permanently occupied by GHFF. A major influx in 2010 resulted in a permanently-occupied camp forming in Rosalind Park in central Bendigo, and since then, dozens of other permanent, seasonal and occasional roosts have been used in Victoria (van der Ree, unpub. data).

The colony of GHFF along Dandenong Creek is was officially reported in Spring 2013, with some anecdotal reports suggesting it may have been utilised by small numbers of GHFF in summer and autumn in the few years prior. Formal monitoring of the number of GHFF in the colony and their distribution at the camp began in late 2013, and have continued at approximately monthly intervals as part of a citizen science monitoring program (https://megabatcount.wordpress.com/). This formal monitoring of population size and distribution consists of static counts, where the number of roosting bats are counted during the day by a single observer who walks around the camp, and flyout counts where a group of observers distributed around

the camp count the bats as they leave the roost at dusk to forage. Both counts are important because static counts at the camp appear to consistently underestimate the number of GHFF present because the dense vegetation and lack of vantage points limits visibility and accuracy (see difference between flyout and static count results in Figure 2). Neither counting technique should be considered 100% accurate, but rather an index of colony size.

The Dandenong Creek camp has been permanently occupied since at least Spring 2013 (Figure 2), with numbers recently ranging from approximately 3000 - 5000 GHFF in winter to 40,000 - 50,000 GHFF in summer and autumn. The colony is currently similar in size and seasonal fluctuation to the colony at Yarra Bend, and a simple linear trend line on both the static and flyout count results shows that the colony is continuing to grow (Figure 2). During summer and autumn the colony extends over approximately 3.7 ha, and this reduces to approximately 0.5 ha in winter when a large proportion of the colony have migrated north.

There is a general trend in Victoria for an increase in the number of GHFF camps, the size of camps, permanent year-round use of those camps and camps occurring within or in close proximity to cities and towns (van der Ree, unpub. data). The specific reasons for this increase is unknown, but is likely to be a combination of warmer winters and fewer frosts due to climate change and/or the urban heat island effect (Parris and Hazell 2005); an increase in the abundance, reliability and temporal availability of food year-round (Williams et al. 2006), and possibly habitat destruction elsewhere within their range. The colony along Dandenong Creek fits this larger trend, as it occurs within a built-up landscape, likely began as an occasionally occupied camp, is now permanently occupied and continues to increase in size.

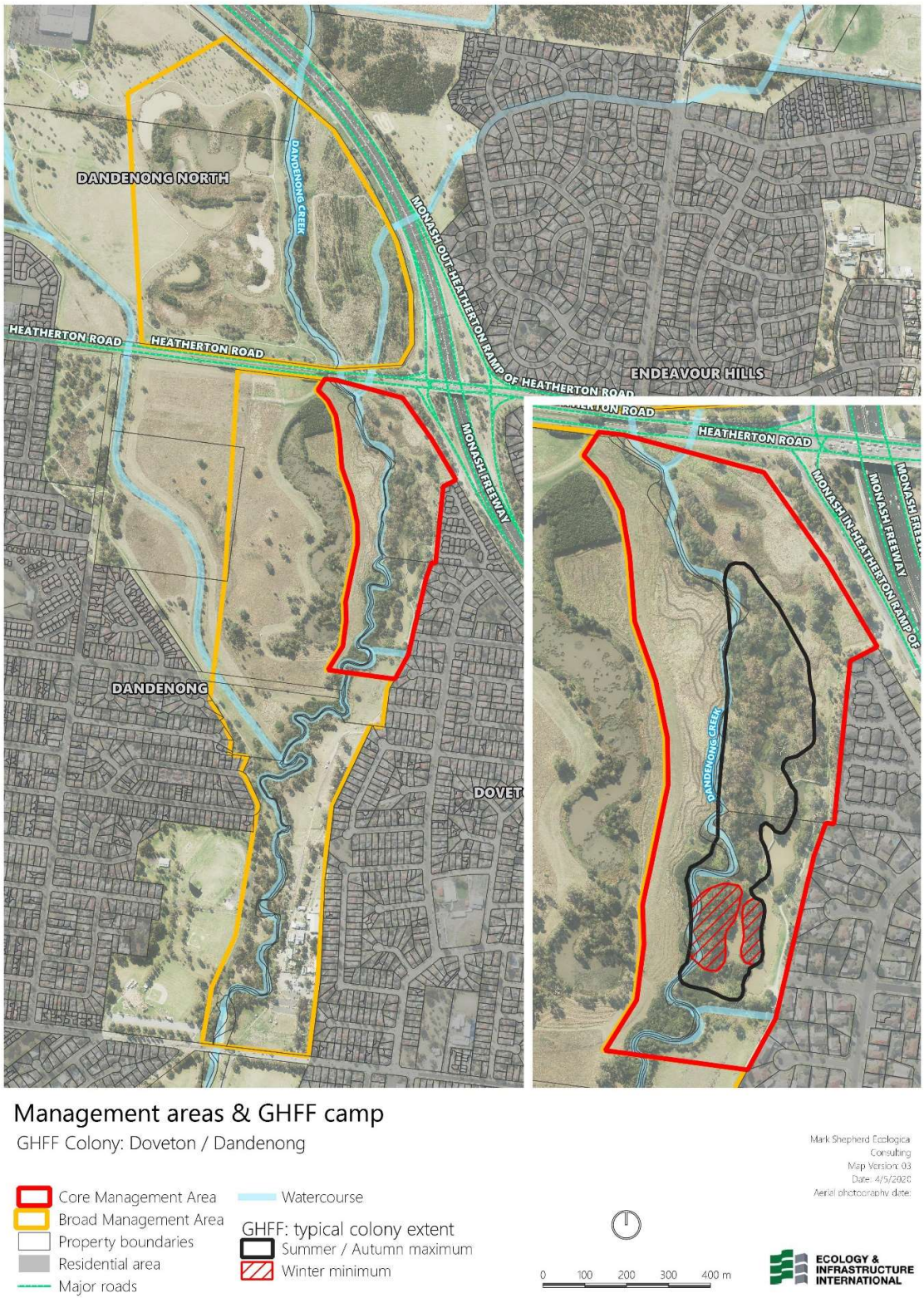

Figure 1. Location and extent of the colony of Grey-headed Flying-foxes (GHFF) along Dandenong Creek, showing typical distribution of the colony during winter (approximate 3000 - 5000 GHFF) and summer/autumn (approximately 40,000 - 50,000 GHFF) and the two zones to guide management actions.

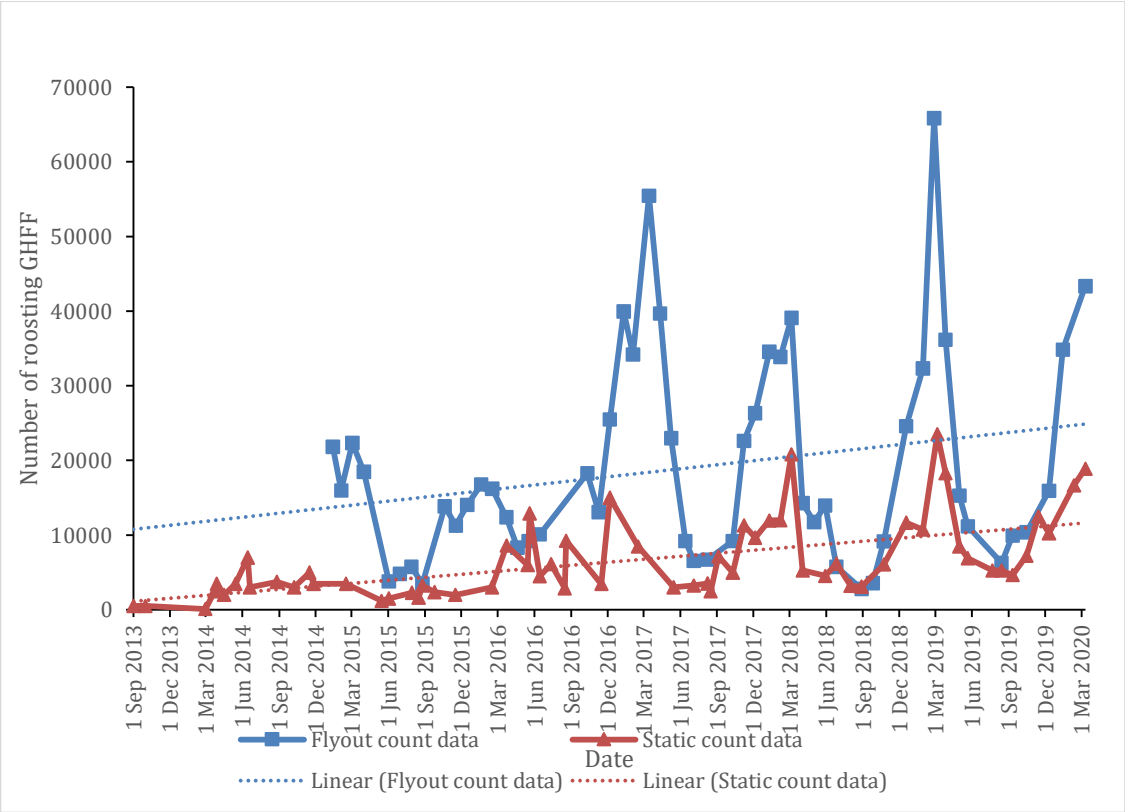

Figure 2. The number of Grey-headed Flying-foxes roosting along Dandenong Creek in Doveton and Dandenong. Data from static counts are shown in red and flyout counts in blue.

2.4 Land tenure and management responsibilities

The colony of GHFF occurs along a 200 - 500 m section of Dandenong Creek to the SW of the intersection between Heatherton Rd and the M1 freeway and encompasses the suburbs of Doveton and Dandenong (Figure 1). The camp occurs on the Dandenong Police Paddocks Reserve and the Dandenong Creek Water Frontage. The camp is adjacent to privately owned residential properties to the east, floodplain land to the west and Myuna Farm to the south.

The land to the east of Dandenong Creek is within the City of Casey, and land to the west of Dandenong Creek is managed by Melbourne Water and is within the City of Greater Dandenong (Figure 3). The City of Casey currently has primary responsibility for the management of the site and camp because the majority of the colony is roosting on the Casey side of the Creek and because access to the colony for most people is from the City of Casey side of Dandenong Creek, either via the pathway from Myuna Farm or via the numerous side streets that provide access to the creek trail.

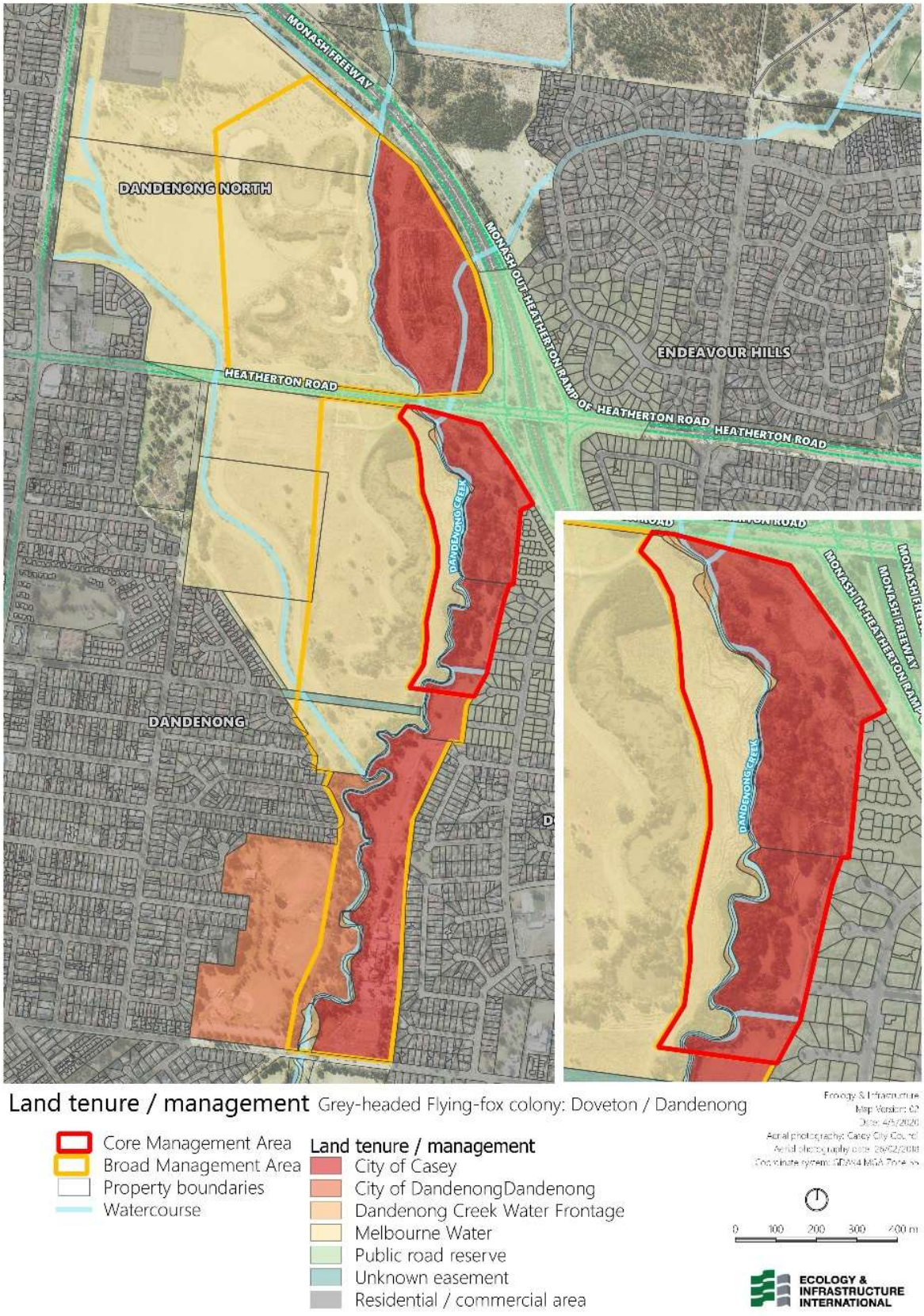

Figure 3. Land tenure / management responsibility of the colony of Grey-headed Flying-foxes along Dandenong Creek in Doveton and Dandenong.

2.5 Vegetation

The region has been subject to a long disturbance history of agriculture, industrial and urban development. An Inspection of aerial photography from 1945 (University of Melbourne 2020) reveals that the majority of the immediate area around the camp was cleared for agriculture, with woodland vegetation confined mostly to the creek-line margins at that time. The area along the creek has also been subject to extensive re-levelling for the purpose of constructing artificial wetlands in recent decades (prior to 2005).

Vegetation in the core management zone now comprises a mosaic of remnant trees, indigenous revegetation (including both wetland and terrestrial vegetation), colonising indigenous scrub, exotic grassland and exotic riparian vegetation comprising dense thickets of Blackberry **Rubus anglocandicans* and Wandering Tradescantia **Tradescantia fluminensis* and exotic grasses (Figure 4) .

Some River Red-gum *Eucalyptus camaldulensis* trees in the core management zone are mature trees and are therefore assumed to be remnant trees, while the remainder of the indigenous vegetation at the study area has been planted. Large areas of Swamp Paperbark *Melaleuca ericifolia* has colonised low-lying areas to form mono-specific scrub thickets. Swamp Paperbark is a clonal species, meaning that new plants form from root suckers slowly radiate out from the parent plant into suitable areas. It is assumed that these thickets have colonised from planted Swamp Paperbarks. Similarly, wetland vegetation originating from planted vegetation has likely colonised large areas of suitable habitat within the wetlands.

2.5.1. Ecological Vegetation Classes

The majority of the vegetation in the core management zone does not clearly meet the benchmark definition of any Ecological Vegetation Class (EVC) described by DELWP (2020) due to the planted status and highly modified condition of the vegetation at the site. However, four EVCs were assigned to vegetation for the purpose of categorising the vegetation (Figure 4):

- Sedge Wetland
- Swampy Riparian Woodland
- Swamp Scrub
- Tall marsh

Sedge Wetland was assigned to all areas of native vegetation within constructed wetlands at the site. This vegetation comprised a suite of common wetland flora, dominated by sedges and rushes with occasional herbs.

Swampy Riparian Woodland was assigned to vegetation dominated by River Red

Gum in the overstorey. Swampy Riparian Woodland typically comprised a mid-storey consisting of indigenous planted shrubs and an understorey comprising dense Blackberry, Kikuyu, and Wandering Tradescantia thickets.

Swamp Scrub dominated the western side of the Dandenong Creek and consisted of mono-specific Swamp Paperbark thickets.

Tall Marsh occurred as mono-specific swards of Common Reed *Phragmites australis* within constructed wetlands and in low-lying areas of exotic grassland.

The broad management zone contains the same broad vegetation categories within constructed wetlands and revegetation that occurs within the core management zone (Figure 5).

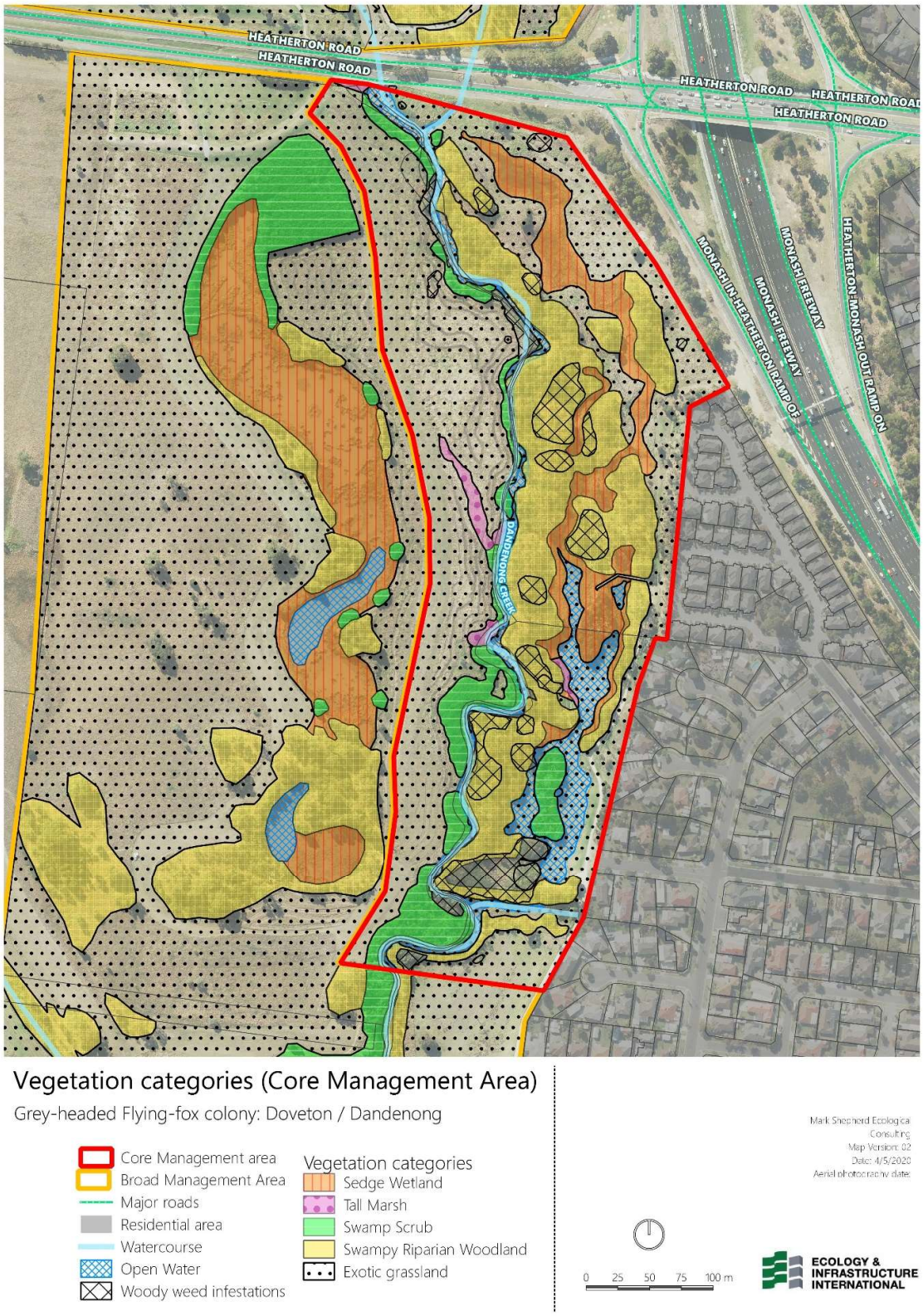

Figure 4. Distribution of Ecological Vegetation Classes (EVC) within the core management zone along Dandenong Creek in Doveton and Dandenong.

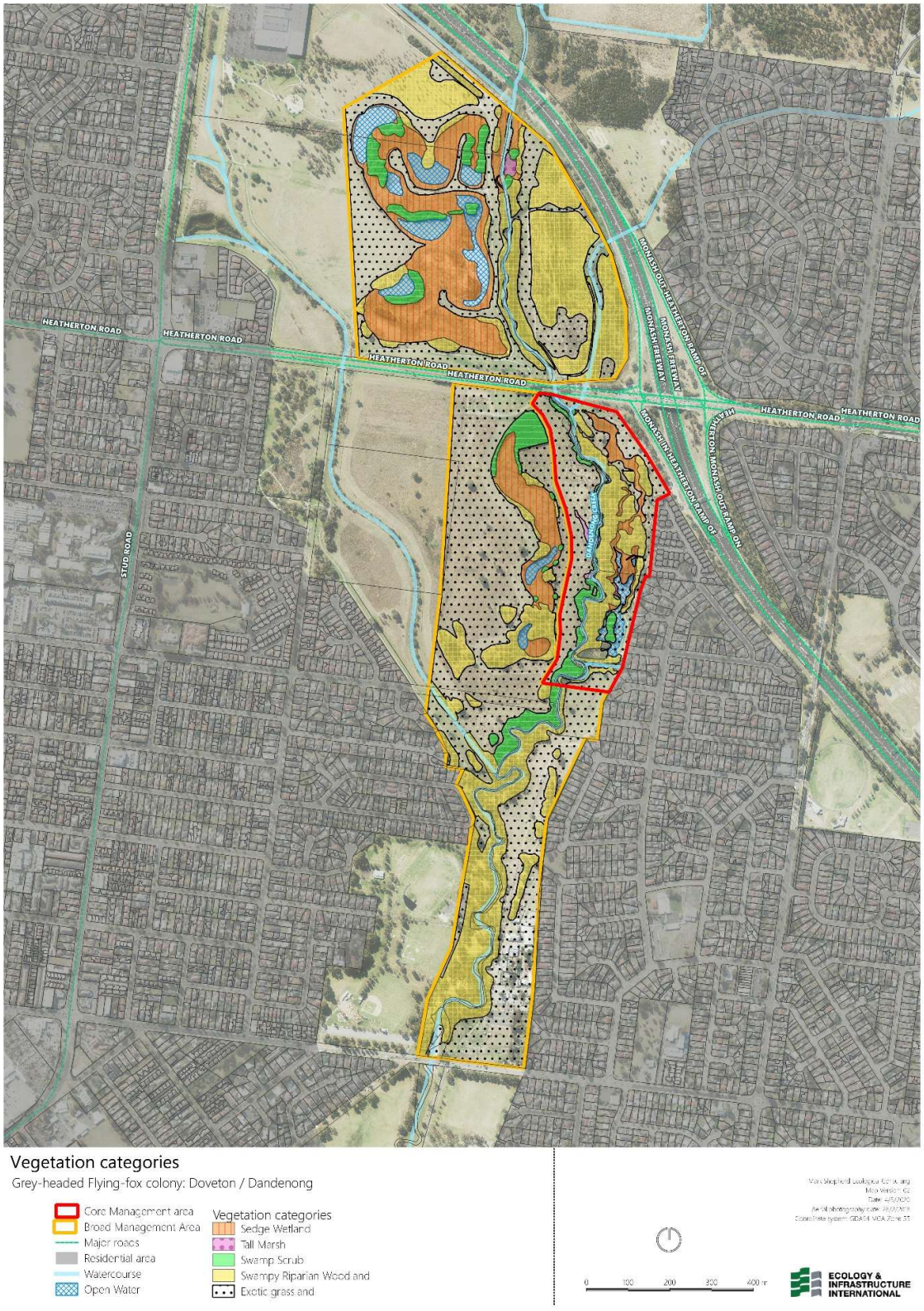

Figure 5. Vegetation of the broad management zone along Dandenong Creek in Doveton and Dandenong.

3.0 Management issues

3.1 Tree decline, death and collapse

Damage to vegetation at flying-fox roosts occurs when large numbers of bats are hanging from branches in a localised area for long periods of time. Damage to vegetation largely occurs because the claws of the bats damage the growing tips of branches or damage the thinner bark on smaller branches. Occasionally bats can cause branch failure due to their combined weight, however this is also probably partially due to inherent weakness or decay in the branch itself. To a lesser extent, damage to tree health within the roost may be caused by foraging bats, however most foraging occurs away from the roost. If the damage to the tree caused by the flying-foxes exceeds the capacity of the tree to regenerate and recover, tree health may be compromised. The decline in tree health and the eventual death of roost trees will have aesthetic impacts to the site and if unabated will result in the collapse of trees and reduction in the suitability of the site as a roost for GHFF. If this continues unabated, the flying-foxes will eventually cease to roost there and will choose an alternative site which could potentially be anywhere. If this occurred to the colony along Dandenong Creek, the colony would most likely move upstream or downstream from the current location but still within the broad management zone.

3.2 Mortality of flying-foxes due to extreme weather events, most commonly heat-stress events

Flying-foxes are vulnerable to extreme weather events, most commonly extreme heat and to a lesser extent extreme cold, which can result in the death of thousands of individuals annually (Welbergen et al. 2008). In Melbourne, GHFF experience heat stress and some bats die when temperatures exceed approximately 42 - 44°C, especially when these temperatures occur on multiple consecutive days or when the cool change does not arrive until after dusk. Interestingly, anecdotal observations suggest that the camp along Dandenong Creek provides cooler conditions with fewer deaths than the camp at Yarra Bend. For example, a heat event at the end of December 2019 resulted in the death of an estimated 4,500 GHFF at Yarra Bend (R. van der Ree, unpub. data), with almost no deaths recorded along Dandenong Creek. However, it is important to note this camp is less accessible than Yarra Bend, which has numerous walking trails and is adjacent to a golf course with easy access, and thus some deaths along Dandenong Creek were likely undetected. Nevertheless, climate change predictions indicate that extreme weather events, including heat events, are likely to become more severe and frequent in the years ahead, increasing the likelihood of heat stress and mortality at the Dandenong Creek camp.

3.3 Community impacts

Human-wildlife conflict is a major issue at many flying-fox camps because they often occur in close proximity to people and can be particularly noisy, smelly and messy at certain times of the day or year (Currey et al. 2018; Lunney et al. 2002). The

severity of these impacts varies among camps, seasons and localities, and is largely dependent on proximity and direction (i.e. upwind or downwind) to neighbours, season, time since camp establishment and housing stock. For example, people living in houses with double-glazed windows and air-conditioning may be less exposed to noise and smell than residents who with single-glazed windows or who lack air-conditioning and keep their windows open on hot days. Other typical complaints and reports include flying-foxes eating fruit from backyard fruit trees and sometimes getting tangled in fruit tree netting, defecating on cars and clothes lines and perceived risk of disease transmission to people and pets.

The majority of complaints about the camp along Dandenong Creek are directed to the City of Casey, with most being received by staff at Myuna Farm. Most interactions appear to focus on the entanglement of bats within backyard fruit tree netting, with a small number of complaints about noise, smell or amenity issues.

3.4 Potential rapid increase in camp size or movement of GHFF towards houses or Myuna Farm

Conflict between people and flying-foxes often occurs when a new camp forms in a previously unoccupied location or when there is a rapid increase in the number of flying-foxes at an existing camp. For example, the arrival in 2016 of more than an estimated 270,000 GHFF to the Water Gardens camp in Batemans Bay NSW caused significant conflict and resulted in the intervention of the National Minister for the Environment granting a National Interest Exemption under the EPBC Act (1999) (Ecosure and Eurobodalla Shire Council 2018). This influx was unprecedented for Batemans Bay, and was attributed to a mass flowering event of Bloodwoods in the nearby native forests. The number of GHFF at Batemans Bay returned to normal levels a few months later after the colony was dispersed and the flowering ceased. It is highly unlikely that an influx of such magnitude will occur at Doveton, but smaller influxes are possible, and even likely.

The most likely scenario is the temporary expansion of the current extent of the camp in summer and autumn (refer Figure 1) due to a major influx of GHFF into Victoria. A less likely scenario is the movement of the camp out of the core management zone into the broad management zone, which is only likely to occur if the quality of the roost declines due to the collapse of trees.

3.5 Human and animal health

Fear of disease is often a major concern of people living near to flying-fox camps. Like all animals, flying-foxes can carry pathogens that have the potential to cause disease in people and other animals, namely Australian bat Lyssavirus and Hendra virus. Human exposure to these diseases is extremely rare, unless their occupation involves close contact with bats, such as wildlife carers and vets. While the results of infection by humans can be fatal, the probability of infection is extremely low and

the overall public health risk is considered similarly low (Queensland Health 2020). Simple steps to avoid exposure include:

- All staff working within or adjacent to the colony must have current vaccination for Lysavirus
- People who are not trained and who are not vaccinated should not handle bats
- Do not attempt to handle an injured flying-fox, but call DELWP, Wildlife Victoria or Casey Council
- If you are bitten or scratched, immediately wash the area for five minutes with warm water and soap, apply disinfectant and immediately seek post-exposure treatment
- Contact Victorian Department of Health and Human Services for more information at www.betterhealth.vic.gov.au

4.0 Management actions

4.1 Establish a multi-agency management committee

The colony of GHFF along Dandenong Creek occupies land that is managed by three separate agencies - namely the City of Casey, the City of Greater Dandenong and Melbourne Water. The proportion of the colony in each jurisdiction varies annually as the extent of the colony expands and contracts seasonally and it will vary over time if the colony continues to grow or moves around the site.

A key priority for management is to co-ordinate management actions by different land managers through the formation of a management co-ordination committee with representation by the three land managers, Myuna Farm and the volunteer 'Friends' group (see Section 4.8). The committee should meet at least four times per year in the first two years of this plan, and then twice per year thereafter.

4.2 Framework for management action

The Federal Government has produced a guideline to inform whether a referral under the EPBC is likely to be required (DOE 2015) for various actions potentially impacting a camp and New South Wales have developed a policy and Code of Practice (Office of Environment and Heritage 2015, 2018) to guide the management of flying-fox camps. These documents use a three-tier framework to guide management actions which are simple routine actions that are permissible and those that may have significant impacts and require further assessment and mitigation (

Table 1). In the absence of such a framework for Victoria, this hierarchy has been adopted to guide management of the Dandenong Creek colony. The only management actions proposed for Doveton, under current conditions, are routine Level 1 actions. Level 2 and 3 actions will only be enacted when certain triggers have been met.

Table 1. Framework of actions within the core management zone of the Grey-headed Flying-fox camp along Dandenong Creek (adapted from DOE 2015 and OEH 2015). All Level 1 and 2 management actions in the broad management zone are permitted, provided GHFF are not present

Level	Typical actions relevant to the Dandenong Creek camp
Level 1 - Minor or routine camp management	• Removal of tree limbs or trees that pose a genuine health and safety risk, as determined by a qualified arborist • Removal of weeds • Trimming of understorey vegetation • Planting of vegetation or application of mulch • Mowing of grass or maintaining paths • Installation of signage or construction/repair of facilities, such as information signs, seats, shelter, boardwalk • Respond to heat events, population monitoring and support of ecological research • Passive recreation (i.e. low noise recreation) • Educational activities
Level 2 - Creation of buffers to create a physical or visual separation between GHFF and homes or other sensitive receptors	• Selectively clearing of trees and shrubs between the colony and homes other sensitive receptors (e.g. Myuna Farm) to remove roosting opportunities and cause GHFF to roost further away • Actions to disturb GHFF roosting in close proximity to homes and other sensitive receptors and nudge them to roost further away, but still within the core management area of Dandenong Creek
Level 3 - Camp disturbance or dispersal*	• Any action to intentionally move the GHFF to another location, including the broad management zone of Dandenong Creek, typically through the use of noise, lights, smoke or tree removal

* Level 3 Actions - i.e. camp disturbance or dispersal - is not proposed and is not discussed further in this plan.

The guiding principle for all actions at Doveton is that they must be carried out in a manner that:

1) Celebrates the species and presence of GHFF in the area
2) Encourages and supports the continued use by GHFF of Dandenong Creek in the vicinity of the current camp
3) Avoids harming any flying-foxes
4) Avoids adverse impacts on the life cycle of flying-foxes, especially the breeding and rearing of young

4.3 Standard measures to avoid impacts

The timing of all management actions at or adjacent to the camp must be undertaken in accordance with the four guiding principles for management of the camp (Section 4.2).

Even though all actions proposed in this management plan are routine or Level 1 actions, the following standard measures to avoid impacts are required for all works within the core management zone and recommended for works in the broader management zone, especially if within 50 m of the core management zone:

- Induction of all staff and sub-contractors working within or adjacent to the core management zone, including an introduction to GHFF, standard measures to avoid impacts and stop-work triggers and responses.
- The potentially disturbing action must not occur during the sensitive birthing season - which is the final trimester of pregnancy and when females are carrying pups (August to December) and when non-flying young are creched (November to February).
- Undertake all disturbing works (e.g. tree removal) at night after GHFF have left the camp. Where such works can't be undertaken at night, do them in late afternoon or as close to flyout as possible.
- Allow at least 3 days between major disturbing works.
- Use chainsaws and chippers at night or if works are unable to be conducted at night, operate them (where possible) at least 250 m from the edge of the colony. If works must be conducted within or in close proximity to the colony, start the machinery away from the colony and slowly approach, allowing animals to adjust to the noise and disturbance.
- Undertake no more than 2.5 hours of disturbing works in a 12-hour period when flying-foxes are present
- Avoid the use of large field crews
- Ideally, conduct disturbing works when camp is at its smallest size - typically winter and early spring
- Trees are not felled, lopped or have large branches removed when flying-foxes are in or near to the tree and likely to be harmed.
- No works during or within 48 hours of an actual or predicted heat stress event (when temperature exceeds or is predicted to exceed 38°C, or other extreme weather event such as a cold snap
- If works are unable to avoid sensitive times, engage an expert GHFF ecologist to monitor flying-fox behaviour and response to determine if a significant impact occurring

4.4 Stop-work triggers

The majority of actions in this plan are Level 1 and are very unlikely to cause

significant negative impacts to GHFF. Nevertheless, Council and any sub-contractors working on site must monitor the colony and immediately stop works if any of the following triggers are met:

- There is a flying-fox injury or death attributable or likely attributable to the management action
- A new camp or camps appear to be establishing or flying-foxes are permanently or temporarily roosting in residential properties
- Impacts are created or exacerbated at other locations that are attributable or likely attributable to the management action
- There appears to be potential for conservation impacts (e.g. reduction in breeding success identified through independent monitoring)
- Standard measures to avoid impacts (Section 4.3) cannot be met.
- Unintended impacts are created for residents or neighbours of the camp

If any stop-work triggers are identified, Council is to engage a GHFF ecologist to quantify the level of impact and investigate the relationship between the impact and action.

4.5 Routine vegetation management

The objectives for the management of vegetation in the core management zone is to maintain and improve the extent and quality of native vegetation in and around the camp for:

- The long-term suitability of the site as a roost for GHFF
- The conservation of biodiversity generally (birds, frogs, plants etc)
- Aesthetic appeal

Proposed vegetation management actions include:

- Planting of trees, shrubs, and understorey within the bounds of the GHFF camp
- Weed control - as required under CALP act and for facilitating the growth of plantings
- Slashing and cutting of grass
- Removal of trees or tree limbs will only be undertaken if overhanging paths or other high-risk areas. All trees within the core management zone to be removed or pruned must be assessed by a qualified arborist and the written report must be retained on file by the relevant manager to justify the works in case of any investigation under the EPBC Act.
- Mulching

Given the location of the site within a riparian corridor that has been highly modified, the ecological processes that result in the introduction of weed propagules into the site are long-established and cannot be controlled. Therefore, the aim of weed management is to give indigenous species an ecological advantage over the weeds,

rather than attempting to eliminate weeds entirely. This approach also minimises herbicide usage for health and ecosystem benefits.

Recognition should also be given to the habitat values of exotic vegetation, particularly in relation to GHFF. For example, GHFF have been observed sheltering in Wandering Tradescantia thickets in hot weather to seek shade and cooler conditions. Therefore, the only proposed control of Wandering Tradescantia is the clearing of micro-sites in preparation for plantings of indigenous species. Further investigation of the use of Wandering Tradescantia by GHFF during heat events is recommended prior to any broad scale clearing. Similarly, exotic mid-storey and overstorey species may provide roosting habitat for GHFF and should be poisoned and left standing rather than removed.

Wildlife carers have observed that GHFF have become entangled in Blackberry thickets during heat events resulting in injury and death of the flying-foxes. Therefore, the broad-scale control of Blackberry within the core management zone and areas utilised by GHFF during heat events is a priority. Blackberry control will likely require initial mechanical control to reduce biomass and to facilitate access into the thickets for spraying. This will need to be done sensitively to minimise disturbance to GHFF.

Specifications for weed control, including management prescriptions for major weeds such as Blackberry and Wandering Tradescantia are provided in Appendix 2.

4.6 Habitat creation and revegetation

Additional revegetation and supplementary planting is proposed to create new habitat and replace habitat specifically for GHFF, both within the core and broad management zones (Figure 6, Figure 7). New revegetation within areas of existing exotic grassland is proposed only for areas at least 100 m from dwellings on the western side of Dandenong Creek, while supplementary planting is proposed for within the existing camp area to replace dead or dying overstorey trees. The wetlands to the west of the GHFF camp contain extensive areas of Swampy Riparian Wetland vegetation and may eventually attract GHFF away from the current roost and increase the separation between bats and residences.

Revegetation is proposed for the core management zone and the broad management zone:

- Core management zone: comprising a 20 meter buffer along the western flank of the existing revegetation bounding Dandenong Creek, adjacent to the GHFF camp
- Broad management zone: comprising the balance of exotic grassland throughout the expanded study area.

Revegetation will consist of locally indigenous vegetation that provides roosting habitat (e.g. River Red Gum, Black Wattle, Blackwood or Black Sheoak) or shelter during extreme heat (e.g. mid-storey shrubs). Canopy trees will only be planted at least 100 meters from dwellings and 30 metres from powerlines. Please note that the land titles within the study area will specify the precise buffer requirement from powerlines and must be reviewed prior to finalisation of revegetation zones.

Melbourne Water have undertaken revegetation within constructed wetlands and within the Dandenong Creek corridor over the last ~20 years. Melbourne Water have also recently installed low-density revegetation in small groupings of canopy trees and shrubs throughout much of the exotic grassland area, which functions as a retarding basin. The revegetation proposed in this plan is intended to compliment the revegetation already installed, through replacement of damaged trees, and the introduction of more understorey vegetation. Consultation with Melbourne Water will be required to ensure the proposed revegetation does not compromise the functioning of the retarding basin.

Appendix 3 provides prescriptions for revegetation including proposed plant protection and maintenance.

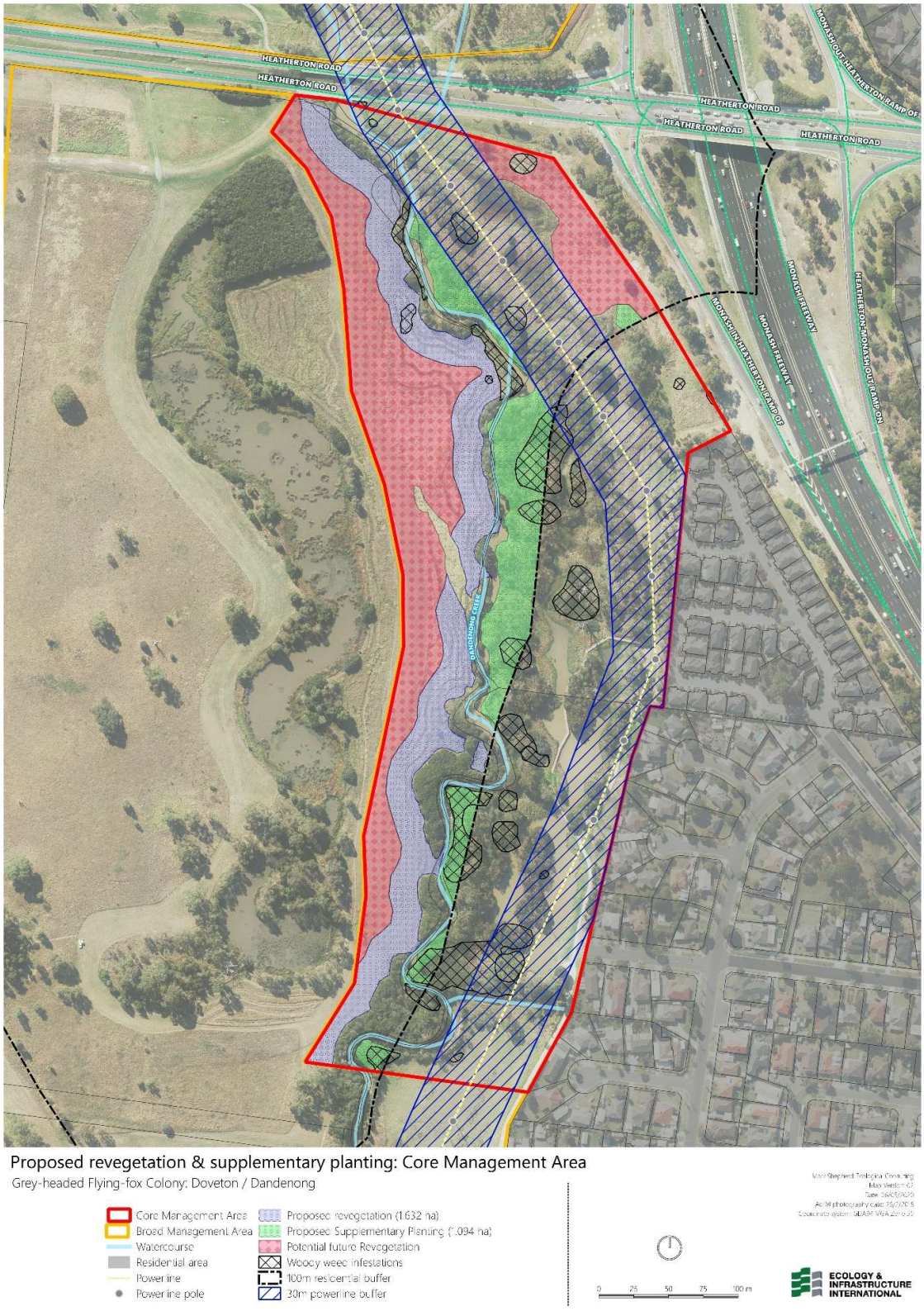

Figure 6. Revegetation and habitat creation within the core management zone of the GHFF camp along Dandenong Creek. The primary focus of revegetation works is the planting of trees to increase roosting opportunities and shrubs to create shade to ameliorate extreme heat.

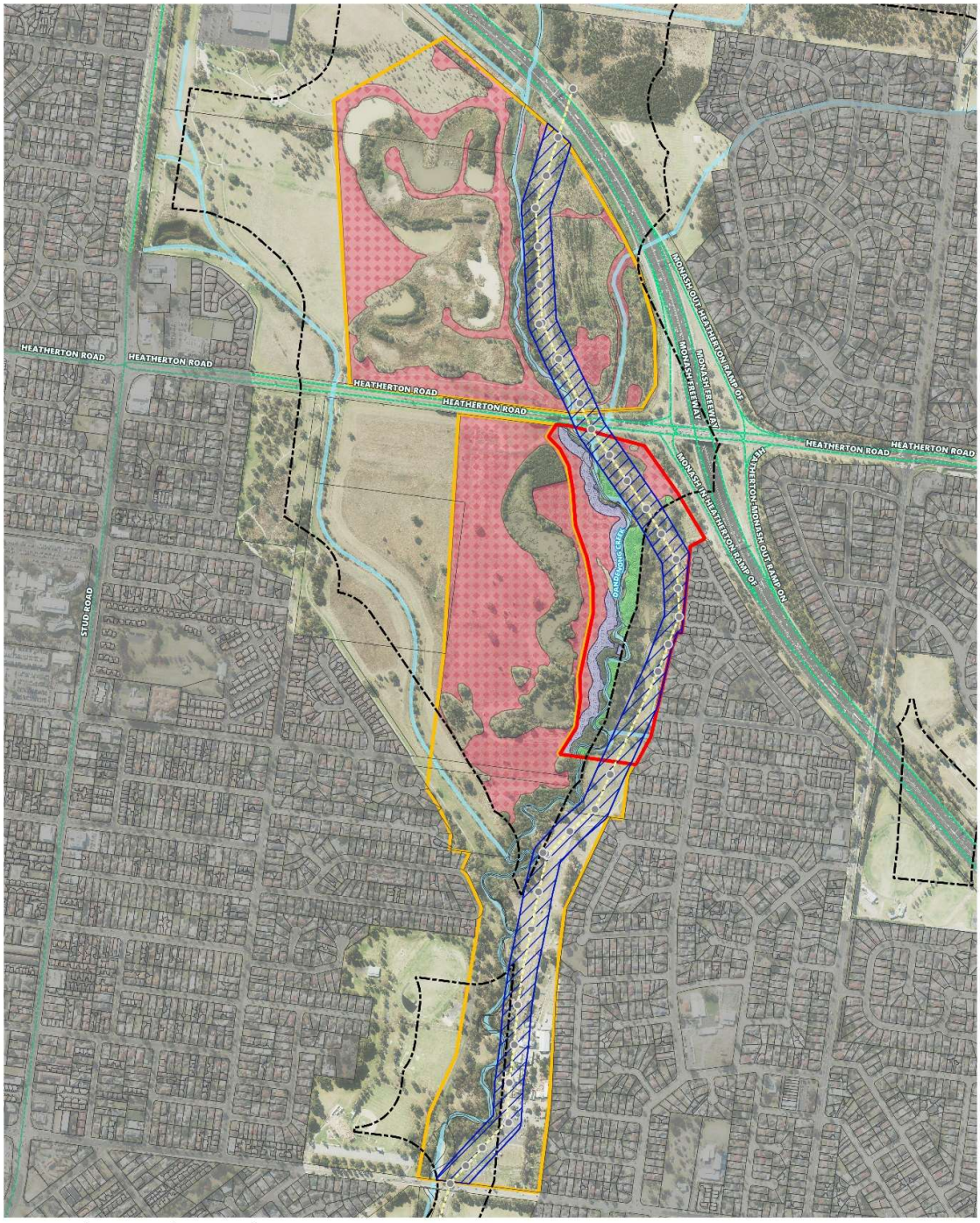

Figure 7. Revegetation for the broad management zone.

4.7 Open space maintenance and infrastructure activities

The broader area in which the GHFF camp occurs is public open space and includes shared use paths for walking and cycling, floodwater retention and biodiversity conservation. These areas require ongoing maintenance to ensure they function safely and effectively. Where possible, potentially disturbing routine activities should be undertaken according to prescriptions specified in Section 4.3. However, the following routine activities associated with maintaining public open space are permitted in the core management zone at any time:

- Emergency repairs of the boardwalk, tracks or other structures to prevent injury to people
- Mowing and grass slashing

Capital works and infrastructure works within and adjacent to the core management zone that are potentially disturbing to the GHFF should be conducted according to prescriptions specified in Section 4.3. These include, but are not limited to the following:

- Creation of new paths, shelters or visitor facilities
- Installation of new wetlands or other drainage infrastructure
- Replacement or installation of fencing

Any routine maintenance or new capital works and infrastructure projects that are potentially disturbing to bats and are unable to be conducted according to the prescriptions specified in Section 4.3 must be conducted as follows to ensure that there are no significant impacts to the nationally significant GHFF camp:

1. Engage a suitably qualified GHFF expert to prepare a succinct impact assessment report, identifying the likely impacts, mitigation measures to be employed and a monitoring protocol.
2. If impacts are likely to result in a significant impact to the camp, a referral under the EPBC may need to be prepared.

4.8 Community engagement and education

A key strategy to achieving the goals of this management plan is to engage and inspire the local community to support the persistence of the GHFF colony along Dandenong Creek. Because the camp occurs on land managed by two local councils and Melbourne Water, the community engagement and education activities must be co-ordinated across the jurisdictions. The following activities are recommended:

1. Establish a cross-jurisdiction 'Friends of' group to assist with community engagement, weed control, revegetation works and heat-stress response.
2. Engage the local community and indigenous people to develop a name for the camp that is engaging, accurate, representative and inspiring.
3. Implement quality on-site signage and interpretation, including information sessions, community 'fly-out' nights, encouraging participation in the citizen

science monthly monitoring, etc

4. Develop and implement an integrated visitor access strategy to increase the accessibility of the camp through the construction or upgrading of walking paths, car parks and other facilities. For example, a small car park could be constructed on Heatherton Rd and additional paths that connect to the existing shared use paths to the west and north.
5. Develop a consistent and co-badged set of resources such as information or fact sheets and FAQs that are available on websites and from partner call centres.

4.9 Creation or maintenance of buffers

Buffers are typically used to increase the spatial separation between the camp and adjacent residential properties or other sensitive receptors. Buffers are created by pruning or removing trees in proximity to sensitive receptors that the GHFF are roosting in, in order to make them unsuitable for roosting. The creation of buffers along Dandenong Creek are not currently proposed, but may be considered if the camp expands eastwards towards neighboring residents or moves closer to Myuna Farm. If the need for buffers arose, it is likely to be due to an unusual influx of bats into the camp, and thus is unlikely to be a permanent expansion. Therefore, buffers will only be considered if the influx is extremely large (e.g. > 50,000 additional GHFF) and is sustained for an extended period (e.g. > 3 months). The revegetation plan is also designed to avoid the need for buffers by infill planting within the colony extent and by creating all additional roost habitat > 100 m from all residential properties and by targeting works along the western side of Dandenong Creek.

4.10 Response to heat events

Extreme heat events which result in heat stress and mortality of GHFF typically occurs when the temperature exceeds approximately 42°C for multiple consecutive days. GHFF respond to increasing temperatures by fanning their wings, dipping into the water to drink and moving into lower branches, shrubs and clustering on tree trunks seeking shade and cooler conditions. Under extreme conditions, these behaviours cease and the flying-foxes become dehydrated and can die if if the heat persists,

The camp along Dandenong Creek appears to fare comparatively well compared to the camp at Yarra Bend, which has experienced mortality rates in the low thousands with almost none occurring at Dandenong Creek. The response to heat events at Yarra Bend includes a range of interventions, co-ordinated by Parks Victoria, including monitoring, rehydrating heat-stressed bats by spraying them in-situ, collection of extremely dehydrated bats and taking them into care and collection of dead bats after the heat event has finished. Management of heat events at the Dandenong Creek camp currently consists of staff from Myuna Farm setting up signs to warn the public of the risk of bats coming close to the ground, and

numerous local wildlife carers volunteering to monitor the colony and rehydrate bats as required.

The need for a formal protocol to respond to heat-stress events is currently a low priority because the camp appears to keep the bats well-shaded and relatively cool, and with good access to standing water, resulting in low rates of heat stress and mortality. Furthermore, the complex land-tenure arrangements of the camp complicate ultimate responsibility for responding to heat stress events. Management of wildlife under the Wildlife Act lies with the land manager, which in this case is both Melbourne Water and the City of Casey, not the Crown, and thus the Department of Environment, Land Water and Planning are not responsible.

The following actions are recommended:

- Engage an experienced contractor to undertake more thorough quantification of rates of mortality after a heat event to fully quantify the scale and severity of heat events at the camp along Dandenong Creek
- Continue to place signage at the start of Summer at main entrances to the shared use path running adjacent to the camp to warn users of the risks of flying-foxes coming to the ground during heat stress events.
- Allow wildlife carers to access the camp and undertake monitoring and rehydration as required. However, the land manager is responsible for the health and well-being of volunteers and must supervise the carers.
- If the scale and severity of heat events is worse than expected, or increases over time in response to climate change or other factors, the cross-jurisdictional camp management group should, in collaboration with DELWP, establish and implement formal heat-stress response protocols.

4.11 Population monitoring and support of ecological research

Accurate and consistent information about the size and distribution of the colony along Dandenong Creek is critical to effective management. The relevant land managers of the camp will support the ongoing monitoring of the camp through the monthly flyout and static counts (www.megabatcount.wordpress.com) and the national flying-fox monitoring program (DAWE 2020). Monitoring of the severity of heat-stress events, including the use of Wandering Tradescantia and the response of GHFF to management activities will also be supported.

4.12 Human safety

As explained in Section 3.5, GHFF do carry viruses that can result in illness to people. The following safety protocols are recommended for people who handle GHFF or work within or immediately adjacent to the colony:

- Must have their vaccinations for Lyssavirus up to date and titre levels checked within the last 2 years
- Inducted prior to conducting works, including explanation of the risks and

likelihoods of being bitten or scratched by bats and response to being bitten or scratched
- Wear appropriate PPE, including long sleeves and long pants, glasses and gloves

People who walk through the colony or observe the colony from its periphery are not at risk unless they encounter a sick bat close to the ground and they are bitten or scratched while attempting to pick it up or touch it. To reduce the likelihood of infection of the general community, install signage at relevant locations advising people of the risk, what to do if they find a sick or injured bat and necessary treatment if they are bitten or scratched. It is important that the messaging is clear without being alarmist.

Refer to the VicHealth website for up to date information about diseases and flying-foxes.

4.13 Monitoring and reporting

All works undertaken within both management zones will be recorded in order to co-ordinate management actions across jurisdictions, evaluate effectiveness and assess the degree of impacts to the GHFF. Actions that are ineffective or result in excessive stress or injury to GHFF should be modified before repeating. A standardised proforma should be developed and provided to the management co-ordination group for filing. The minimum details to be included are:

- Specific location(s) of the management actions
- Detailed description of management actions, including the type, timing and duration of works, including photos of the before and after condition
- Details of any measures implemented to minimise impacts to the GHFF, such as conducting works at night or at times of year when the camp is typically at its lowest, use of electric chainsaws, etc
- The response of the GHFF to the management action, including details of monitoring procedures and whether any stop-work procedures were triggered.

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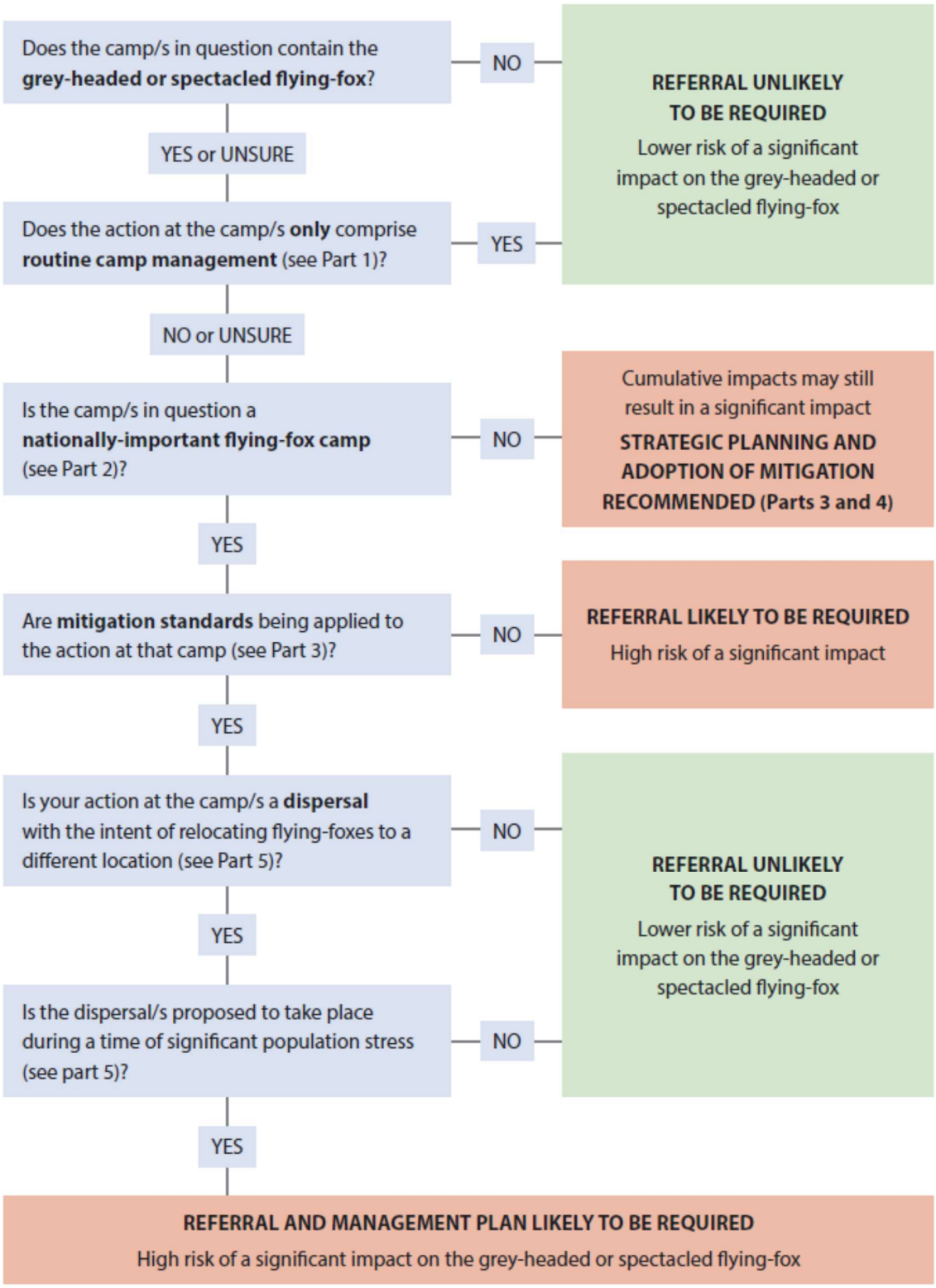
Appendix 1. Summary of the referral decision-making process under the EPBC Act. (Source: DOE 2015)



Appendix 2. Weed management

Introduction

Given the location of the site within a riparian corridor in a semi-urbanised setting, the ecological processes that result in the introduction of weed propagules into the site are long-established and cannot be controlled. The aim of weed management at the site is therefore to prioritise longer-term actions that will give indigenous species an ecological advantage, rather than attempting to eliminate weeds entirely.

The primary goals of weed control in the context of GHFF management is to reduce competition with plantings and to reduce physical risks to GHFF associated with entanglement during heat events with Blackberry. Particular weeds that are recommended for management intervention are addressed below and include:

- Blackberry
- Wandering Tradescantia
- Exotic shrubs, including Tree Tobacco and Desert Ash
- Willow

Blackberry

Blackberry **Rubus anglocandicans* was recorded as tall thickets throughout much of the camp area and is likely to occur within riparian areas in the broader study area. Smaller plants and small isolated infestations were also observed throughout the damp areas of the study area. The approximate extent of major infestations within the core management area are displayed in Figure 4.

Blackberry can take root wherever the canes touch the ground and has formed impenetrable thickets several meters tall in the core management area. The control of Blackberry needs to be undertaken over an extended period with several follow up treatments. Control methods vary, depending on the maturity of the plant, and the size of the infestation.

GHFF have been observed by wildlife carers as being tangled within Blackberry at the study area. The priority is therefore to kill the Blackberry plants, and to cut and flatten the canes using a brush-cutter or other mechanical methods. In order to avoid disturbing the bats, brush-cutting within the camp must be confined to cutting in paths to gain access to the infestations ahead of herbicide spraying. The use of a brush-cutter within the camps should be avoided between the months of August to February (the GHFF breeding and young rearing period). As an alternative, brush-cutters can be used at night, apart from between the months of December-February when non-flying young may be creched alone at night in the camp. An ecologist must be present prior to any night works to confirm that GHFF adults are not nursing young and that the majority of bats have left the camp prior to brush-cutting works taking place. In areas greater than approximately 30m from the camp, a brush-

cutter can be used to cut all of the canes to ground level (to be undertaken within the same timing constraints specified above). The re-growth can then be sprayed. Any dead standing canes can be cut in the following months with a brush-cutter or other mechanical methods (to be undertaken within the same timing constraints specified above).

Larger infestations are efficiently treated with a herbicide spray. A formulation consisting of 8 g/L AMINOPYRALID present as hexyloxypropylamine salt, 300 g/L TRICLOPYR present as butoxyethyl ester and 100 g/L PICLORAM present as hexyloxypropylamine salt (such as Grazon® Extra) is considered an effective herbicide and doesn't need to be applied while the plant is flowering (unlike more traditional Blackberry herbicide treatments), however, herbicide application in warmer months is generally more effective. Herbicide spraying must only take place during calm and dry conditions and care must be taken to ensure coverage over the entire plant.

Physical removal is possible for small plants. All root material must be extracted from the ground as new plants can form from any root fragments left in the soil. Medium sized plants can be cut and painted with undiluted Glyphosate. However, it is important to cut through the root nodule that sits below the ground and paint immediately with Glyphosate (simply cutting and painting the stems will not likely be effective). Larger plants can be cut and painted after removing the canes by slashing with a brush-cutter and then using secateurs and thick gloves to carefully remove the remaining canes. Access to the root nodule can then be gained.

Figure 3. Location of Blackberry thickets at the study area.

Wandering Tradescantia

Wandering Tradescantia *Tradescantia fluminensis* was recorded as dense thickets of up to one meter high throughout the much of the study area, particularly in damp shaded areas.

GHFF have been observed utilising Tradescantia during hot weather. Furthermore, it is not feasible to achieve a significant long-term reduction of the cover of this plant due to the highly suitable growing conditions at the site without excessive herbicide use and excessive budget expenditure. For these reasons, the aim for Tradescantia control at the site is to prevent further spread and to create planting microsites free of Tradescantia (approximately one meter diameter) using mechanical means, such as a brush-cutter, combined with manual removal of plant material, prior to planting and/or solarization (the laying of black plastic over the plant). These micro-sites will need to be regularly maintained for 1-2 years after plant installation (e.g. every 6 weeks in warm and wet conditions) to ensure that Tradescantia does not envelop the plantings.

The on-going maintenance of Wandering Tradescantia within micro-sites may need to adopt an adaptive management approach, whereby different maintenance methods are trialed to develop the most effective and efficient methods suited to the site. The use of herbicides to control Wandering Tradescantia should be considered a last option (due to the potential to pollute waterways), however, herbicides may be the most efficient method of maintaining micro-sites.

Tobacco-bush, Desert Ash and other introduced shrubs

Exotic shrubs such as Tobacco-bush *Solanum mauritianum*, Desert Ash *Fraxinus angustifolia* subsp. *Angustifolia* and Plum **Prunus* spp., were recorded within the management area. The aim for exotic shrub management is to eliminate all mature plants and control seedlings with the aim of preventing any new plants from reaching maturity.

It is recommended that any such plants must not be sprayed with herbicide (due to the large volume of herbicide required and the potential for off-targeted damage to native plants and potential to pollute waterways). The hand-pulling of smaller plants, cut and painting of moderately sized plants, and drill and filling of larger plants are the preferred methods of control. Any mature plants that are drilled and filled must be evaluated for their potential to release seed. Any plants with potential for seed shed should be transported off-site or heaped in piles to contain the seeds. Otherwise, dead plants can be left in situ as habitat if there is no potential for seed shed.

Willow

Several mature Willow *Salix* spp. plants were recorded within the high-density occupation areas of the GHFF camp (Figure 1). Willows have not been observed as a high utilisation plant by GHFF and are therefore recommended to be destroyed. It is recommended that Willows are treated using the drill and fill method described in *General Woody Weed Control Measures* section below. Dead Willows must be left standing for habitat following treatment.

General weed control methods

Other bulbiferous plants

Angled Onion and other bulbiferous plants are likely to occur within the wetter areas near to the creek. The spraying of herbicide over waterways should not be undertaken. Furthermore, large infestations of weeds such as Angled Onion within remnant vegetation will result in off-target damage to native plants. Therefore, the control of such weeds should therefore be undertaken manually using a herbicide wick (wiping the leaves with undiluted herbicide) in any areas close to the creek or manually removed if practical.

Angled Onion can also be managed by brush-cutting the stems immediately prior to

flowering, which weakens the plant and prevents seed shed.

If control of any large infestations that occur near waterways is impractical, then these may need to be left in situ with the aim of maintaining the current extent (not allowing the plants to spread into adjacent areas).

General woody weed control measures

Herbicide spraying

Herbicide spraying is an efficient and effective method of managing large weed infestations (such as Blackberry thickets). However, given the considerations outlined above, it is recommended that herbicide spraying is only appropriate for certain weeds (such as Blackberry), and its use should be minimised at the site.

When herbicide must be used, the minimisation of herbicide spraying can be achieved by aiming to treat individual plants in a single herbicide application (rather than repeat applications), through:

- appropriate herbicide and additive product choices,
- appropriate herbicide and additive rates,
- undertaking herbicide use in appropriate weather,
- complete coverage of the plant,
- the use of marker dye to monitor treated areas and coverage during and after application.

Drill and Fill Method

This method is for large established woody weeds:

- Drill hole to 2-3cm deep, as close to the base of the tree as possible.
- Fill the hole immediately with herbicide (typically a glyphosate based herbicide using a stem-injection gun)
- Repeat this process at intervals of 3-5 cm around the entire base of the tree including larger exposed roots.

Cut and Paint Method

This method is for small woody weeds where the stem is less than 5cm in diameter. The cut and paint method must be undertaken in the following manner:

- Cut the plant at the base (as close as possible to the ground) with secateurs or handsaw
- Herbicide (typically a Glyphosate based product) is applied to the cut stem within seconds (typically using a herbicide ‘dabber’)
- Monitor cut stumps for re-sprouting within six months of initial treatment. Cut and reapply herbicide if re-sprouting is evident or use the Drill and Fill method.

As a general rule, when cutting and painting or drill and filling, neat (undiluted) Glyphosate should be applied to the cut or drill hole at the closest possible point to

the ground, and immediately after drilling or cutting (within seconds).
Note: Established pines can be effectively controlled by cutting off the plant at the base without herbicide application.

Hand pulling

Hand-pulling does not utilise herbicides and is therefore the preferred method of woody weed control, if practical. However, in general, only immature woody weeds and woody herbaceous weeds, such as Aster-weed can be hand-pulled.
Many species such as Blackberry will re-sprout from root fragments left in the ground, so the use of hand-pulling must be evaluated for the species in question.

Disposal of cut material

Where possible, cut material should be left on-site, in order to reduce the time and cost burdens associated with woody weed removal. Case by case decisions will need to be made as to whether cut material would be best piled up so that good access can be maintained throughout the site, or whether cut material is left in situ. If large amounts of seeds remain on cut material, then removal from the site may be required. Care should also be taken to avoid cut material re-shooting and taking hold.

Appendix 3. Revegetation & supplementary planting

Revegetation Zones and buffers

Revegetation and supplementary planting is proposed within three zones at the management area:

- Zone 1; comprising a 20 meter buffer of the western flank of the existing revegetation bounding Dandenong Creek, adjacent to the GHFF camp within the core study area,
- Zone 2; comprising supplementary planting within the core management area, considering a 100 meter buffer to residential areas, and a 30 meter buffer to powerlines,
- Zone 3 comprising the balance of exotic grassland throughout the broad management area.

Revegetation is proposed to consist only of locally indigenous vegetation that is considered suitable as GHFF habitat, comprising roost trees (River Red Gum *Eucalyptus camaldulensis*) and various tall shrub species. Canopy trees are proposed as a component of revegetation only in areas at least 100 meters from dwellings and for areas greater than 30 metres from powerlines. Please note that the various land titles within the study area will specify the precise buffer requirement from powerlines and must be reviewed prior to finalisation of revegetation zones.

Planting schedule

The proposed planting schedule for Zones 1 and 2 are provided below. A schedule of plants for Zone 3 will be provided at a later date (subject to confirmation of Melbourne Water requirements). The planting schedule has been calculated based on a density of 1000 plants / hectare for zone 1 and 500 plants / hectare for Zone 2.

Revegetation & Supplementary planting		ZONE	1 (1.632 ha)	2 (1.094 ha)	
Common name	Scientific name	No. of plants	1632	1094	Totals
River Red Gum	*Eucalyptus camaldulensis*	Overstorey tree	816	274	1090
Black Wattle	*Acacia mearnsii*	Understorey Tree	272	91	363
Blackwood	*Acacia melanoxylon*		272	91	363
Black Sheoak	*Allocasuarina littoralis*		272	91	363
		Totals	1632	547	2179

Plant protection and maintenance

It is considered unlikely that large browsing mammals such as Wallaby, Kangaroo, Wombat or Deer occur at the management area. However, Rabbits or Hares are likely to persist in low numbers. It is therefore proposed that 600 mm tall cor-flute style plant guards are installed around each plant. The taller style plant guard will also likely provide some protection against Wandering Tradescantia and other weeds from smothering the plants. It is recommended that plants will need to be

maintained for at least 1-2 years after plant installation and up to every 6 weeks in warm and wet conditions, particularly within Wandering Tradescantia infestations (as per the Wandering Tradescantia section above).

It is further recommended that jute-mat is installed at the base of each plant, to limit the potential for Wandering Tradescantia and other weeds to infiltrate the plant guard.

Appendix 4. Summary of timing of works in relation to proximity to the colony of GHFF

Management action	Within colony or within 50 m of colony edge, irrespective of management zone*	Core management zone and > 50 m from colony edge*	Broad management zone and > 50 m from colony edge
Hand weeding, including drill and fill, cut and paint using hand tools	Anytime, but ideally winter and spring when colony smallest. Use battery drill/saw and/or non-mechanical hand tools	Anytime	Anytime
Monitoring of camp size and distribution	Anytime	Anytime	Anytime
Ecotours, including Myuna Farm tractor rides	Anytime, drive slowly when close to colony, keep to paths and tracks	Anytime	Anytime
Tree planting by hand	Anytime, but ideally winter and spring when colony smallest	Anytime	Anytime
Tree planting by ripping and with machinery	Never	Never	Anytime
Grass slashing	Anytime, but each mowing event < than 2.5 hrs. Work slowly when within 50 m of colony.	Anytime	Anytime
Emergency tree lopping or pruning	Anytime, but ideally at night, ensure no bats in tree or likely to be harmed, and use electric chainsaw if bats in vicinity. If creched bats in tree, engage flying-fox expert to move bats out of tree before pruning or lopping.	Anytime. Ideally at night and using electric chainsaw. Ensure no bats in tree or likely to be harmed	Anytime
Non-emergency tree lopping	During winter when colony smallest, and at night, ensure no bats in tree or likely to be harmed, and use electric chainsaw.	Anytime, but ideally winter when colony smallest and at night. Use electric chainsaw if works conducted during day.	Anytime
Mechanical weeding/slashing of blackberries	Always at night. Ideally during winter when colony smallest. Never when juveniles creched.	Daytime during winter when colony smallest or at night at other times. None when juvniles creched.	Anytime
Construction of infrastructure (e.g. walking path, wetland, info shelter, toilet block, carpark)	Winter when colony smallest and ideally at night. Non-disturbing works can be conducted during day.	Winter when colony smallest and ideally at night. Non-disturbing works can be conducted during day	Anytime

Emergency repair of infrastructure (e.g boardwalk, walking path, fence)	If potentially disruptive and during Aug - Feb, undertake at night, otherwise anytime	Anytime	Anytime

*Always monitor bat behaviour and look for stop-work triggers

Principles for work conducted within the colony or within 50 m of colony edge

- Short-term works, routine maintenance, non-disruptive - anytime
- Disruptive - do during winter when colony smallest, and/or at night (except when juvs creched), and/or for less than 2.5 hrs per event
- emergency repairs to prevent injury to people - anytime, but do at night if disruptive or make safe until less sensitive time
- Start noisy equipment outside colony and slowly bring into colony area, allowing bats to become accustomed to noise
- If OHS regs allow, avoid wearing high-vis colors

Critically sensitive times to avoid disturbance in the camp

- Third trimester of pregnancy and dependent young - about August to February
- November to February when dependent juveniles are likely to be creched in trees at night while mother is out feeding