

Table 1: Significant impact criteria with regards to Tasmanian wedge-tailed eagle

Significant Impact Criteria ¹	Likelihood	Comments
1. Lead to a long-term decrease in the size of a population	Nil	The habitat at risk of impact is not considered to be 'critical habitat' due to its relatively small area and lack of suitable trees within the impact footprint. The habitat is thus not considered likely to have a measurable influence on the local carrying capacity and/or size of the extant population.
2. Reduce the area of occupancy of the species	Nil	<p>Much of this habitat is considered suboptimal for eagle nesting and only represents <1 % of the available potential habitat within 5 km of the project. Regardless, the disturbance caused by the development may deter breeding eagles from returning to the nest within the retention area. Visual disturbances at the nest level has been well documented for this species².</p> <p>This species likely uses the area within the footprint for foraging. It has been documented in Tasmania that eagles will still utilise a site for foraging during and after developments³. Thus wedge-tailed eagles will likely still utilise the area after the development and won't be deterred by the disturbance when it comes to foraging.</p> <p>The scale of the proposal and potential loss of what is considered to be suboptimal habitat, is not considered to constitute a meaningful potential reduction in the area of occupancy of the species for foraging, although may deter eagles from nesting where line of sight of the development is visible.</p>
3. Fragment an existing population into two or more populations	Nil	The entire project area is likely to be within a foraging territory of at least one pair of eagles and thus the proposed footprint is too small to contain a 'population' of eagles. Furthermore, the species is a strong flyer, and has the

¹ Commonwealth of Australia (2013)

² Threatened Species Section (2006); Bekessy et al. (2009); Wiersma (2010); O'Sullivan (2014); Munks & Crane (2017).

³ Hull and Muir (2013)

		<p>capacity to fly between habitat patches; as such it can be expected to be less vulnerable to habitat fragmentation than sedentary and terrestrial species.</p> <p>The proposed development is thus unlikely to result in fragmentation of a local population.</p>
4. Adversely affect habitat critical to the survival of a species	Nil	<p>The habitat at risk of impact is not considered to be 'critical habitat' to the survival of the species due to its relatively small area. More suitable habitat can be found within 10 km of the site. Favoured nesting sites likely occur in the greater vicinity where there is less disturbance.</p> <p>The proposed development is thus unlikely to affect habitat critical to the survival of this species.</p>
5. Disrupt the breeding cycle of a population	Low	<p>While individual responses vary, disturbance occurring even many hundreds of meters away can cause breeding birds to temporarily leave eggs or chicks at risk, or even to desert their nest site for years⁴. Disturbances involving people tend to be more serious when the disturbance is atypical and directed at the nest⁵.</p> <p>It should be noted though that as favoured nesting sites become scarcer due to habitat loss, eagles are known to nest in sub-optimal locations such as the retention area and have been forced to become more habituated to these disturbances⁶, this has been observed in Tasmania, particularly in the midlands⁷. It should therefore not be ruled out that eagles may use the site for nesting in the future prior and post construction.</p> <p>Potential impacts to species breeding cycles are currently considered to be negligible based on the absence of nests within the vicinity of the proposed development. If a nest was to occur within close proximity to the development</p>

⁴ Threatened Species Section (2006); Bekessy et al. (2009); O'Sullivan (2014)

⁵ Bekessy et al. (2009); O'Sullivan (2014)

⁶ Debus *et al* (2007); Debus *et al* (2014)

⁷ Pers Comms. Nick Mooney (2021)

		the development footprint would still not be considered to hold a 'population' of eagles.
6. Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Nil	<p>There is no 'optimal' eagle nesting habitat present in the development footprint and the project area is likely to be utilised for foraging only. Significant areas of similar and better condition breeding habitat exist in the local area to the north and southwest.</p> <p>The loss of habitat from the project area is unlikely to result in any meaningful reduction in the availability of habitat from the local area and as such is unlikely to cause a measurable decline in the local population.</p>
7. Result in invasive species that are harmful to the species becoming established in the species' habitat	Nil	<p>There are no invasive species that are harmful to the species are known.</p> <p>The proposed project is unlikely to result in the increase of any other introduced species that may negatively interact with this species.</p>
8. Introduce disease that may cause the species to decline	Nil	<p>Disease is not listed as a threat to this species and is not expected to pose a threat from this project.</p> <p>The project is unlikely to have any impact on the species in this regard.</p>
9. Interfere with the recovery of the species	Nil	<p>Recovery of this species is primarily dependent upon the protection of existing critical habitat. The habitat within the footprint is not considered critical and the suboptimal habitat in the area will be protected from impact and so will not affect recovery.</p> <p>The proposed project is thus not considered to pose any interference to the recovery of the species.</p>

Table 2: Significant impact criteria with regards to spotted-tailed quoll

Significant Impact Criteria ⁸	Likelihood	Comments
1. Lead to a long-term decrease in the size of an important population	Nil	The small loss of marginal potential habitat within an area unlikely to support resident individuals is unlikely to result in a decrease to any local population.
2. Reduce the area of occupancy of an important population of the species	Nil	The small loss of marginal potential habitat within an area unlikely to support resident individuals is unlikely to result in any meaningful decrease in the area of occupancy of any local population.
3. Fragment an existing important population into two or more populations	Nil	A total of loss 16 ha of potential foraging habitat will have a less than 0.1 % impact on this species foraging and breeding range. This species has large home ranges (88 - 5512 ha) and thus the proposal will not result in the fragmentation of existing populations into two or more populations.
4. Adversely affect habitat critical to the survival of a species	Nil	Critical habitat is dependent on the availability of denning habitat and prey density ⁹ . This species has been recorded in the area on occasion, suggesting this site is used as a foraging site only. The habitat within the project area cannot be considered critical for the survival of the species given the location, the history of observations and the absence of denning opportunities found within the footprint.
5. Disrupt the breeding cycle of an important population	Low	Denning habitat can include rocky outcrops, large logs and underground hollows. Potential denning habitat occurs near the creek line. Parts of the study area may occur within the home range of resident spotted-tailed quolls. No evidence of scats was observed during surveys, although footprints have been observed on at least one occasion. Given the scarcity of this species in the area it is not likely the proposal will disrupt the breeding cycle of any local population, perhaps only a single individual.

⁸ Matters of National Environmental Significance: Significant Impact Guidelines 1.1, Commonwealth of Australia (2013)

⁹ Department of Environment, Land, Water and Planning (2016); Department of the Environment (2021a)

		Prior to any disturbance, den management protocol will be applied to mitigate potential for disturbance of denning activities of devils or quolls.
6. Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Nil	The proposed development footprint is 16 ha and likely foraging habitat only. Significant areas of similar and better condition breeding habitat exist in the local vicinity. The loss of habitat from the project area is unlikely to result in any meaningful reduction in the availability of habitat from the local area and as such is unlikely to cause a measurable decline to this species.
7. Result in invasive species that are harmful to the species becoming established in the species' habitat	Low	Invasive species that are harmful to the species include cats, dogs, and foxes ¹⁰ . Cats are ubiquitous throughout Tasmania, dogs are abundant in periurban areas, and foxes are currently thought to be absent from the State. The proposed project is thus unlikely to result in the increase or introduction of these species. The habitat of quolls may be susceptible to weed invasion but weed and hygiene recommendations within the Natural Values Assessment ¹¹ are considered to be sufficient for limiting this likelihood.
8. Introduce disease that may cause the species to decline	Nil	Disease is not currently listed as a cause of species decline ¹² . Proposed project is unlikely to introduce or spread any known diseases that will impact this species.
9. Interfere with the recovery of the species	Nil	Recovery of this species is primarily dependent upon the protection of existing habitat ¹³ . The small loss of marginal foraging habitat within an area unlikely to support resident individuals does not conflict with the objectives of the recovery plan as equivalent habitat is not limiting in the greater area.

¹⁰ Department of Environment, Land, Water and Planning (2016)

¹¹ North Barker Ecosystem Services (2021)

¹² Department of Environment, Land, Water and Planning (2016)

¹³ Department of Environment, Land, Water and Planning (2016)

Table 3: Significant impact criteria with regards to eastern quoll

Significant Impact Criteria ¹⁴	Likelihood	Comments
1. Lead to a long-term decrease in the size of a population	Nil	The small loss of potential habitat is unlikely to result in a decrease to any local population, particularly in the context of the abundance of equivalent or better habitat in the broader landscape which can be expected to have some spare capacity given that species with broad ecological niches are unlikely to have full saturation of use of available habitat within their range due to various factors.
2. Reduce the area of occupancy of the species	low	<p>No eastern quolls are known from the area, according to the NVA with the closest record being 2.5 km south.</p> <p>A loss of up to 16 ha of habitat is likely to have a low impact on the carrying capacity of the habitat for this species as they are known to have a home range of upwards of 35 to 44 ha (females and males respectively), with an extensive amount of overlap between individuals.</p> <p>The small loss of potential habitat is unlikely to result in any meaningful decrease in the area of occupancy of any local population, particularly in the context of the abundance of equivalent or better habitat in the broader landscape which can be expected to have some spare capacity given that species with broad ecological niches are unlikely to have full saturation of use of all available habitat within their range due to various factors.</p>
3. Fragment an existing population into two or more populations	Nil	<p>This species is relatively mobile and is known within urban environments, thus habitat loss will not fragment an existing population as this species will be able to cross fragmented patches.</p> <p>The operation of the road however will introduce the new threat of roadkill.</p>
4. Adversely affect habitat critical to the	Nil	Habitat within the project area cannot be considered critical for the survival of

¹⁴ Commonwealth of Australia (2013)

survival of a species		the species given the size of the impact area, the home range of this species, the lack of denning sites within the footprint area and the amount of additional suitable habitat surrounding the proposed footprint.
5. Disrupt the breeding cycle of a population	Low	<p>The proposed site does contain potential denning habitat for eastern quolls although the presence of denning sites was limited. The development footprint is possibly part of the home range for a small number of eastern quolls, although these individuals likely don't have a den within the footprint itself and thus likely only use the area for foraging.</p> <p>The proposal will not disrupt the breeding cycle of a population of eastern quolls, but it could impact one or two breeding individuals if a den does occur within the footprint. Prior to any disturbance, den management protocol will be applied to mitigate potential for disturbance of denning activities of devils or quolls.</p>
6. Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Nil	<p>The proposed development footprint is 16 ha and likely foraging habitat only. Significant areas of similar and better condition breeding habitat exist in the local vicinity.</p> <p>The loss of habitat from the project area is unlikely to result in any meaningful reduction in the availability of habitat from the local area and as such is unlikely to cause a measurable decline in the local population.</p>
7. Result in invasive species that are harmful to the species becoming established in the species' habitat	Moderate	<p>Invasive species that are harmful to the species include cats, dogs, and foxes. Cats are ubiquitous throughout Tasmania, dogs are abundant in periurban areas, and foxes are currently thought to be absent from the State. The proposed project is thus unlikely to result in the increase or introduction of these species.</p> <p>The habitat of quolls may be susceptible to weed invasion but weed and hygiene recommendations within the Natural Values Assessment by NBES¹⁵ are considered to be sufficient for limiting this likelihood.</p>

¹⁵ North Barker Ecosystem Services (2021)

<p>8. Introduce disease that may cause the species to decline</p>	<p>Low</p>	<p>Disease is listed as a potentially severe threat to the species¹⁶ (e.g. bubonic plague, distemper-like virus, toxoplasmosis)¹⁷. <i>Toxoplasma gondii</i> is still present in Tasmanian Eastern Quolls, however, it does not appear to negatively affect them and thus is not responsible for any rapid declines of this species. Therefore, the project is unlikely to encourage the spread of disease through either: introduction of new diseases or spread of infected individuals, to the local population.</p>
<p>9. Interfere with the recovery of the species</p>	<p>Nil</p>	<p>No recovery plan has been developed for this species. As an endangered species, all populations are seen as important, although some areas might be considered as the primary strongholds for the species (e.g. Cradoc and North Bruny island¹⁸).</p> <p>The key threats to this species, and thus recommendations for the recovery of this species surround the mitigation of predation/competition by introduced predators (e.g. cats and foxes). The proposed project is likely to increase the number of introduced predators in the local area as specified above in response to invasive species.</p>

¹⁶ Woinarski *et al.* (2014)

¹⁷ Department of the Environment (2021b)

¹⁸ Fancourt *et al.* (2013)

Table 4: Significant impact criteria with regards to Tasmanian devil

Significant Impact Criteria ¹⁹	Likelihood	Comments
1. Lead to a long-term decrease in the size of a population	Nil	The small loss of potential habitat is unlikely to result in a decrease to any local population, particularly in the context of the abundance of equivalent or better habitat in the broader landscape (< 1 % expected loss of potential habitat), which can be expected to have some spare capacity given that species with broad ecological niches are unlikely to have full saturation of use of available habitat within their range due to various factors.
2. Reduce the area of occupancy of the species	Nil	Tasmanian devils are known from the area. A loss of up to 16 ha of habitat is unlikely to adversely impact on the carrying capacity of the habitat for this species as they are known to have a home range of upwards of 1300 ha. The small loss of potential habitat is unlikely to result in any meaningful decrease in the area of occupancy of any local population, particularly in the context of the abundance of equivalent or better habitat in the broader landscape which can be expected to have some spare capacity given that species with broad ecological niches are unlikely to have full saturation of use of all available habitat within their range due to various factors.
3. Fragment an existing population into two or more populations	Nil	This species frequently uses roads to move around the landscape, thus the habitat loss will not fragment an existing population as this species will be able to cross fragmented patches. The operation of the road however will introduce the new threat of roadkill ²⁰ .
4. Adversely affect habitat critical to the survival of a species	Nil	Habitat within the project area cannot be considered critical for the survival of this species given the size impact area, the home range of this species, the lack of denning sites within the footprint area and the amount of suitable habitat

¹⁹ Commonwealth of Australia (2013)

²⁰ Jones (2000).

		surrounding the impact area.
5. Disrupt the breeding cycle of a population	Low	<p>The proposed site does contain potential denning habitat for Tasmanian devil within the footprint and the footprint is also likely to be part of the home range for a single devil. The proposal will not disrupt the breeding cycle of a population of devils, but it could impact one individual.</p> <p>Prior to any disturbance, den management protocol will be applied to mitigate potential for disturbance of denning activities of devils or quolls.</p>
6. Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Nil	<p>There is no 'critical' habitat present within the project area for this species and the project area is likely to be utilised for foraging only, although den management protocols must be in place to protect breeding individuals if breeding does occur. Significant areas of similar and better condition breeding habitat exist in the local vicinity.</p> <p>The loss of habitat from the project area is unlikely to result in any meaningful reduction in the availability of habitat from the local area and as such is unlikely to cause a measurable decline in the local population.</p>
7. Result in invasive species that are harmful to the species becoming established in the species' habitat	Nil	<p>The only invasive species listed as potentially harmful to the species is the red fox²¹ which is currently thought to be absent from Tasmania. The proposed project is unlikely to result in the introduction of this species.</p> <p>The habitat of devils may be susceptible to weed invasion but weed and hygiene recommendations within the Natural Values Assessment²² are considered to be sufficient for limiting this likelihood.</p>
8. Introduce disease that may cause the species to decline	Nil	<p>Disease is listed as a severe threat to the species due to DFTD²³. The project area is within the known range of DFTD and is unlikely to have any influence on its virility or dispersal.</p>

²¹ Department of the Environment (2021c)

²² North Barker Ecosystem Services (2021)

²³ Hawkins *et al.* (2006)

9. Interfere with the recovery of the species	Nil	Recovery of this species centres around the management of DFTD, the biosecurity insurance populations, and development of a vaccine ²⁴ . The proposed project is not considered to pose any interference to the abatement of these threats and recovery of the species.
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²⁴ Department of the Environment (2021c)

Table 5: Significant impact criteria with regards to the eastern-barred bandicoot

Significant Impact Criteria ²⁵	Likelihood	Comments
1. Lead to a long-term decrease in the size of an important population	Nil	<p>The small loss of habitat within the context of the abundance of equivalent habitat in the broader landscape (thousands of hectares present, such that the potential loss is < 1 % loss of potential habitat), has no likelihood of resulting in a long-term decrease of the local population as there is no reason to suspect the small area of habitat within the project footprint contains a limited or particularly critical resource for the local population, let alone an important population.</p> <p>Eastern barred bandicoots do not have full saturation of occurrence across suitable habitats within a population, with various fine-scale factors influencing local distribution, with ostensibly ideal areas of habitat not always occupied due to chance, land management, and/or past events²⁶. It can thus be expected that within the thousands of hectares of suitable bandicoot habitat around the project area, there will be some spare capacity to compensate for any individuals that could be evicted from the local area due to clearance within the footprint.</p>
2. Reduce the area of occupancy of an important population	Low	<p>Given that thousands of hectares of equivalent suitable habitat are present in the local area, the fact that bandicoots do not have perfect occupation of suitable habitat²⁷, and the fact that conversion to modified land will not preclude the bandicoots from occurring at a site²⁸, it is not conceivable that the proposal will result in a decrease in the area of occupancy of the local population of the species, let alone an important population. It may at worst result in the shifts in the ranges of some individuals.</p>

²⁵ Commonwealth of Australia (2013)

²⁶ Daniels (2011)

²⁷ Daniels (2011)

²⁸ Daniels (2011)

3. Fragment an existing important population into two or more populations	Nil	<p>Habitat within project area already consists of small fragments and remaining remnants are further perforated by low density residential use. The proposal will further fragment the available habitat and possibly the home range of an individual or pair, as this species has such small home ranges, however the development likely won't result in the fragmentation of an existing important population, due to the small size of the development footprint in a single given area.</p> <p>The operation of the road however will introduce the new threat of roadkill.</p>
4. Adversely affect habitat critical to the survival of a species	Nil	<p>There is no reason to suspect the small area of habitat within the project footprint contains a limited or particularly critical resource for the local population such that it may be critical to their survival.</p> <p>Given that thousands of hectares of equivalent suitable habitat are present in the local area, the fact that bandicoots do not have perfect occupation of suitable habitat²⁹, and the fact that conversion to modified land will not preclude the bandicoots from occurring at a site³⁰, it is not conceivable that the proposal will result in the loss of the local population.</p>
5. Disrupt the breeding cycle of a an important population	Nil	<p>Bandicoots are prolific breeders that build ephemeral grassy nests and can have multiple litters per year, not necessarily using the same natal location within a season³¹. This life strategy is thought to be one of the primary reasons they are successful in periurban locations³². Given the local population is not considered to be at risk from the proposal and that conditions for breeding will still be suitable, it is not conceivable the proposal will breach this criterion.</p>
6. Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the	Low	<p>This species likely persists across the project area on the lower slopes of the mountain within the more periurban areas and grassy areas of the footprint</p>

²⁹ Daniels (2011)

³⁰ Daniels (2011)

³¹ Pers. Comms Daniels pers. Obs (2021)

³² Daniels (2011)

<p>extent that the species is likely to decline</p>		<p>site. This area is likely used for foraging and possibly nesting where grasses are longer and areas are more protected. In the unlikely scenario of disturbance of a natal nest, the species is so highly fecund that breeding is likely to be repeated in a nearby location shortly after disturbance. The species is also capable of moving their litter to a new location in the event of disturbance (G. Daniels pers. Obs.).</p> <p>The loss of habitat from the project area is unlikely to result in any meaningful or measurable reduction in the availability of habitat from the local area as this species will likely take up new habitat and as such is unlikely to cause a measurable decline in the local population.</p>
<p>7. Result in invasive species that are harmful to the species becoming established in the species' habitat</p>	<p>Moderate</p>	<p>Invasive species that are harmful to the species include cats, dogs, and foxes³³. Cats are ubiquitous throughout Tasmania, dogs are abundant in periurban areas, and foxes are currently thought to be absent from the State. The proposed project is thus unlikely to result in the increase or introduction of these species.</p> <p>The habitat of bandicoots may be susceptible to weed invasion, although conversely, they can also use certain weeds as shelter and nest sites. Weed and hygiene recommendations³⁴ are considered to be sufficient for limiting the likelihood of this being a detrimental impact.</p>
<p>8. Introduce disease that may cause the species to decline</p>	<p>Low</p>	<p>Toxoplasmosis can be expected to be present in the area already, due to the ubiquity of feral and free-ranging domestic cats as vectors³⁵. It is conceivable that the proposal will increase virility or transmission of the disease.</p>
<p>9. Interfere with the recovery of the species</p>	<p>Low</p>	<p>Habitat loss/ degradation, predation, and <i>Toxoplasma</i> are considered the main drivers for declines³⁶, none of which are considered a risk of meaningfully increasing as a result of this proposal in a way that might interfere with the</p>

³³ Department of Sustainability and Environment (2009)

³⁴ DPIPWE (2015)

³⁵ Obendorf and Munday (1990); Hill *et al.* (2010); Department of the Environment (2021d)

³⁶ Department of Sustainability and Environment (2009)

		<p>recovery of the species. Noting that as the species is not listed at the state level in Tasmania its status here may be effectively redundant in discussion of a national recovery.</p>
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Table 6: Significant impact criteria with regards to the Tasmanian Masked Owl

Significant Impact Criteria ³⁷	Likelihood	Comments
1. Lead to a long-term decrease in the size of an important population	Low	The size of the development footprint is relatively small given the home range for this species (1800 – 2500 ha). It is likely this species uses the area for foraging on occasion. No impact is anticipated.
2. Reduce the area of occupancy of an important population of the species	Nil	<p>The area of occupancy for this species covers a large portion of Tasmania, generally < 600 m a.s.l, with the highest densities occurring in low land areas of dry mature forest in the east and north.</p> <p>Given the highly mobile nature of this species, their large home range and the habitat that will remain within the surrounding vicinity, the species will still have the same potential for local occupancy and thus the project will not reduce the area of occupancy for this species or any population.</p>
3. Fragment an existing important population into two or more populations	Nil	<p>Because of the ecology of this species (highly nomadic, highly mobile and found in a range of environments including fragmented land), they are resilient to fragmentation.</p> <p>Clearing of trees within the project area will thus have no fragmentation effect on this species or population.</p>
4. Adversely affect habitat critical to the survival of a species	Nil	There is a total of 3 large trees with hollows in the vicinity, this limited number would not have any adverse effect critical to the survival of this species.
5. Disrupt the breeding cycle of an important population	Low	There is only one suitable nesting tree anticipated to be cut down, with another 5 suitable nesting trees being retained. The removal of one possible nesting tree will not result in the decline of the species, although it could result in the displacement of a breeding pair. No disruption to breeding is anticipated

³⁷ of Australia (2013)

		unless the hollows in this one tree is occupied.
6. Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Nil	There is no 'critical' habitat present within the project area for these species and the project area is likely to be utilised for foraging only.
7. Result in invasive species that are harmful to the species becoming established in the species' habitat	Low	Secondary poisoning through the consumption of prey (particularly rodents) that have been poisoned is often fatal. The introduction of the development may provide shelter and food for non-native rodents which could result in baiting as a result of curtailing the issue of a rodent invasion.
8. Introduce disease that may cause the species to decline	Nil	Most known diseases in owls are a result of unclean captive environments. The project is unlikely to encourage the spread or introduction of diseases.
9. Interfere with the recovery of the species	Nil	There is no recovery plan for this species. The key threats to this species are habitat clearing, fragmentation and rural tree decline along with competition for hollows, collision and secondary poisoning ³⁸ . The project will have an impact on the continuing loss of large old growth trees with suitable hollows for nesting for this species.

³⁸ Department of the Environment (2021e)

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