Roads and Traffic Authority

Pacific Highway Upgrade - Oxley Highway to Kempsey

Flora and Fauna Working Paper

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Appendix J

EPBC Act assessment

Assessment under the Commonwealth EPBC Act

Pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), an assessment of the impacts of the Proposal on land that is critical habitat or is likely to affect threatened species, populations, or ecological communities, or their habitats listed under the EPBC Act ('Matters of National Environmental Significance'), must be undertaken. This involves assessing the potential impacts of the Proposal based on several criteria. These criteria aid in assessing if the Proposal is likely to have a significant impact on threatened species or their habitat or endangered ecological communities which occur at the site or have the potential to occur. If the assessment concludes that a significant impact is likely then a referral to the Minister of the Department of Environment Water Heritage and the Arts (DEWHA) must be made.

Table 1 outlines the species for which an assessment has been completed:

Table 1 Species assessed under the EPBC Act

Group	Scientific Name	Common Name	EPBC Act Status
Threatened flora	*Acronychia littoralis*	scented acronychia	E
	Phaius tancarvilleae	swamp orchid	E
	Phaius australis	southern swamp orchid	E
	Arthraxon hispidus	hairy-joint grass	V
	Melaleuca biconvexa	biconvex paperbark	V
	Parsonsia dorrigoensis	milky silkpod	E
Threatened fauna	*Mixophyes iteratus*	giant barred frog	E
	Xanthomyza phrygia	regent honeyeater	E
	Lathamus discolor	swift parrot	E
	Dasyurus maculatus	spotted-tailed quoll	E
	Pteropus poliocephalus	grey-headed flying-fox	V
	Potorous tridactylus	long-nosed potoroo	V
	Litoria aurea	green and golden bell frog	V
	Chalinolobus dwyeri	large-eared pied bat	V
	Rostratula benghalensis	Australian painted snipe	V
	Mixophyes balbus	stuttering frog	V
Migratory fauna	*Ardea ibis*	cattle egret	M
	Monarcha melanopsis	black-faced monarch	M
	Gallinago hardwickii	Latham's snipe	M
	Pandion haliaetus	osprey	M
	Rhipidura rufifrons	rufous fantail	M

Group	Scientific Name	Common Name	EPBC Act Status
	Myiagra cyanoleuca	satin flycatcher	M
	Haliaeetus leucogaster	white-bellied sea-eagle	M
	Hirundapus caudacutus	white-throated needletail	M
	Rostratula australis	Australian painted snipe	M
	Apus pacificus	fork-tailed swift	M
	Ardea alba	great egret	M
	Merops ornatus	rainbow bee-eater	M
	Xanthomyza phrygia	regent honeyeater	M
	Monarcha trivirgatus	spectacled monarch	M
	Lathamus discolor	swift parrot	M

Key:

V = Listed as a vulnerable species.

E = Listed as an endangered species

M = Listed as a migratory species

Appendix J.1 Threatened flora

No threatened flora were recorded in the study area during field surveys. However, there is a small potential for threatened flora to occur.

Appendix J.1.1 Critically endangered and endangered flora species

Criteria

An action has, will have, or is likely to have a significant impact on a critically endangered or endangered species if it does, will, or is likely to:

- *Lead to a long-term decrease in the size of a population*

It is unlikely that the Proposal would affect the size of any populations of the endangered species listed above since none were confirmed as occurring within the Proposal footprint during the field surveys. In the unlikely event that there are unexpected finds of any of the listed endangered species within the Proposal footprint prior to or during construction, the Proposal may lead to a minor decrease in the population size of these species if an area of habitat for the species is directly removed, or becomes degraded through pollution, nutrient and sediment runoff as a result of the project

- *Reduce the area of occupancy of the species*

The Proposal may not reduce the area of occupancy of any endangered species at all, but if so, only to a minimal degree. As above, if areas of habitat for endangered species become degraded, this would indirectly reduce the area of occupancy of the species to an incremental extent only.

- *Fragment an existing population into two or more populations*

The Proposal is unlikely to fragment any population of endangered flora species in two or more populations as no threatened flora were recorded during field surveys within the Proposal footprint.

- *Adversely affect habitat critical to the survival of a species*

The Proposal is unlikely to adversely affect habitat critical to the survival of any critically endangered or endangered species listed under the EPBC Act as no threatened flora were recorded during field surveys within the Proposal footprint.

- *Disrupt the breeding cycle of a population*

The Proposal is unlikely to disrupt the breeding cycle of any populations of endangered species as no threatened flora were recorded during field surveys within the Proposal footprint. However, if potential habitat for threatened flora is directly removed or becomes degraded, particularly through changes to water quality, this could potentially disrupt the breeding cycle of a local population of this species.

- *Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*

The Proposal is unlikely to result in the overall decline of any endangered flora species listed on the EPBC Act as no threatened flora were recorded during field surveys within the Proposal footprint.

- *Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat**

The Proposal is unlikely to result in an increase in invasive species within the study area, provided effective weed management strategies are adopted.

- *Interfere with the recovery of the species.*

The Proposal is unlikely to significantly interfere with the recovery of any species.

*[*Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a critically endangered or endangered species by direct competition, modification of habitat, or predation]*

Conclusion

The results of this assessment suggest that any impacts on endangered flora species listed on the EPBC Act resulting from the Proposal are unlikely to be significant.

Appendix J.1.2 Vulnerable flora species

Criteria

An action has, will have, or is likely to have a significant impact on a vulnerable species if it does, will, or is likely to:

- *Lead to a long-term decrease in the size of an important population[#] of a species*

Neither of the subject vulnerable species, hairy-joint grass or biconvex paperbark, were recorded in the Proposal footprint during field surveys, and both are readily detectable during any season so are considered likely to be absent. In the unlikely event that either species occurs within the clearing footprint for the Proposal, the degree of loss would be very minor and therefore unlikely to result in a long-term decrease of a local population of either species. Although rare and threatened, both species are relatively robust in their growth habits and reproductive capabilities where they do occur. In the case of biconvex paperbark, the plant can spread and reproduce vegetatively by suckering as well as sexually.

- *Reduce the area of occupancy of an important population*

The Proposal is unlikely to reduce the area of occupancy of either of the above flora species, since neither species is considered likely to occur within the clearing footprint of the study area.

- *Fragment an existing important population into two or more populations*

Since neither of the above species is likely to occur within the clearing footprint, the Proposal is unlikely to fragment an existing important population of any vulnerable flora species into two or more populations.

- *Adversely affect habitat critical to the survival of a species*

No occupied habitat for either of the vulnerable species was found to occur within the study area during the field surveys. The Proposal is unlikely to adversely affect habitat critical to the survival of any vulnerable flora species.

- *Disrupt the breeding cycle of an important population*

Since neither of the above species is likely to occur within the clearing footprint, the Proposal is unlikely to disrupt the breeding cycle of an important population of any vulnerable flora species.

- *Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*

The Proposal is unlikely to affect habitat for any vulnerable flora species. In the unlikely event that habitat for hairy-joint grass or biconvex paperbark is modified, destroyed, removed, isolated or decreased, this would not occur to the extent that the species were likely to decline on a sustained or continuing basis.

- *Result in invasive species that are harmful a vulnerable species becoming established in the vulnerable species' habitat**

The Proposal is unlikely to result in invasive species becoming established within the study area, provided effective weed management strategies are adopted. The principal invasive weed species to target for management are lantana, some exotic perennial grasses and some exotic vines and scramblers.

- *Interferes substantially with the recovery of the species*

While potential habitat for hairy-joint grass or biconvex paperbark could be removed, the Proposal is unlikely to substantially interfere with the recovery of any species. Although the Proposal is unlikely to have a significant impact on any vulnerable flora species listed under the EPBC Act, the expected removal of a large area of potential habitat would not be conducive to the recovery of these species.

[#*An important population is one that is necessary for a species' long-term survival and recovery. This may include populations that are:*

- *Key source populations either for breeding or dispersal,*
- *Populations that are necessary for maintaining genetic diversity, and/or*
- *Populations that are near the limit of the species range.*

**Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a vulnerable species by direct competition, modification of habitat, or predation.*]

Conclusion

The results of this assessment suggest that any impacts on vulnerable flora species listed on the EPBC Act resulting from the Proposal are unlikely to be significant.

Appendix J.2 Threatened fauna

Appendix J.2.1 Critically endangered and endangered fauna species

One fauna species listed as endangered under the EPBC Act, the giant barred frog (*Mixophyes iteratus)* was recorded foraging under the Maria River bridge. Two individuals of this species were recorded during the summer survey period in February 2007. Previous and subsequent visits to the bridge for bridge construction work recorded single specimens of the species, indicating that a resident population occurs. Suitable potential habitat for the giant barred frog within the study area also occurs at the major freshwater creeks, particularly Barrys Creek, Smiths Creek, Pipers Creek and Yarrabee Road.

Two additional species listed as endangered under the EPBC Act, the swift parrot and spotted-tailed quoll, have been recorded within the study locality. The EPBC Act Protected Matters Search Tool identified one additional endangered species, the regent honeyeater, as having potential to occur within the study locality and suitable potential habitat was identified within the study area during the field surveys.

An assessment of significance pursuant to EPBC Act Policy Statement 1.1: Significant Impact Guidelines has been undertaken for those nationally listed endangered species recorded, or considered likely to occur. The specific EPBC Act criteria for determining whether the Proposal is likely to be considered a controlled action are addressed below:

Criteria

An action has, will have, or is likely to have a significant impact on a critically endangered or endangered species if it does, will, or is likely to:

- *Lead to a long-term decrease in the size of a population*

The Proposal is unlikely to lead to a long-term decrease in the size of a population of the swift parrot or regent honeyeater. Both species are seasonal or opportunistic visitors to coastal NSW and forage in areas containing winter-flowering trees (for example, the swamp mahogany and spotted gum), however neither were recorded during field surveys for the Proposal. The regent honeyeater is known to breed on the western slopes of the Great Dividing Range and the swift parrot breeds in Tasmania, as such breeding habitat for both species would not be impacted by the Proposal.

The Proposal is unlikely to lead to a long-term decrease in the size of a population of spotted-tailed quoll. This species was not recorded within the study area during field survey work, though a few records occur nearby. DECCW's Atlas of NSW Wildlife indicates four main clusters of spotted-tailed quoll records (possibly sub-populations) associated with state forests and nature reserves located to the west side of the existing highway. Nearly all of the records are associated with creeklines within large patches of forest. East of the highway, the species appears to be generally absent, with only a few scattered records.

Road-related deaths are quite common for the spotted-tailed quoll, as the species often scavenges on road kill. The lack of database records along the existing highway suggests that the species is unlikely to use the highway corridor and adjoining habitats, particularly the drier ridgetop forests, on a regular basis, if it does at all. Furthermore, the current distribution of the species, as indicated by the existing records, suggests that core habitat for the species is not likely to be within habitats

close to the highway and that the species is unlikely to move between habitats on each side of the highway on a regular basis.

The Proposal would lead to a decrease in the population size of the giant barred frog if areas of habitat for this species become degraded through pollution, nutrient and sediment runoff or disturbance to riparian vegetation. A monitoring program has been implemented at Maria River bridge for the current construction works. Site inspection and audits conducted by DECCW indicate that mitigation measures have been successfully implemented and are functioning as required. A threatened frog monitoring program targeting the giant barred frog would be established during, and following construction of the Proposal, focusing on areas of known and potential habitat within the Proposal footprint including Maria River and associated tributaries, Cooperabung, Barrys, Smiths and Pipers Creek to determine the species persistence in the area and the success of the mitigation measures. Consideration would be given to constructing artificial breeding ponds to provide alternative habitat. The location, size and design of these ponds would be considered at the detailed design and construction stages. The Proposal is therefore considered unlikely to lead to the long-term decrease in the size of a population of giant barred frog.

- *Reduce the area of occupancy of the species*

'Area of occupancy' is defined as the area within its 'extent of occurrence', which is occupied by a taxon, excluding cases of vagrancy. The measure reflects the fact that a taxon will not usually occur throughout the area of its extent of occurrence, which may contain unsuitable or unoccupied habitats. In some cases (for example, irreplaceable colonial nesting sites, crucial feeding sites for migratory taxa) the area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon. The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the taxon, the nature of threats and the available data.

As above, if areas of habitat for the giant barred frog become degraded, this would reduce the area of occupancy of this species. The Proposal is unlikely to reduce the area of occupancy of the swift parrot or regent honeyeater, though it would contribute to the incremental loss of potential foraging habitat affecting these species.

A long strip of potential spotted-tailed quoll habitat is expected to be removed as a result of the Proposal. This may affect the home territories of some individuals of this species, although it is considered unlikely. The species has a very large home range and tends to favour denser habitats, particularly rainforest, moist sclerophyll forest and riparian forest along creeklines and gullies, rather than the more open dry sclerophyll forests on upper slopes and ridgelines.

The dominant vegetation type throughout the study area is dry sclerophyll forest. The vegetation types within the study area most likely to be utilised by the spotted-tailed quoll include Riparian Forest and Moist Gully Forest, which constitute around 7.8 hectares and 25.8 hectares (33.6 hectares in total) of the study area, respectively. Based on a home range of 500 to 1000 hectares, and the fact that at least four home ranges are likely to be distributed to the west of the study area, this equates to around one to two per cent of an individual's home range. Whilst the Proposal may remove a small area of potential habitat, it is considered that the current area of occupancy of the individuals or sub-populations recorded to the west of the study area will not be affected.

DECCW's Atlas of NSW Wildlife indicates four main clusters of spotted-tailed quoll records (possibly sub-populations) associated with state forests and nature reserves located to the west side of the existing highway. Nearly all of the records are associated with creeklines within large

patches of forest. East of the highway, the species appears to be generally absent, with only a few scattered records.

Road-related deaths are quite common for the spotted-tailed quoll, as the species often scavenges on road kill. The lack of database records along the existing highway suggests that the species is unlikely to use the highway corridor and adjoining habitats, particularly the drier ridgetop forests, on a regular basis, if it does at all. Furthermore, the current distribution of the species, as indicated by the existing records, suggests that core habitat for the species is not likely to be within habitats close to the highway and that the species is unlikely to be moving between habitats on each side of the highway on a regular basis.

- *Fragment an existing population into two or more populations*

The Proposal is highly unlikely to fragment an existing population of either the swift parrot or regent honeyeater as both are mobile species that travel large distances every year and would easily be able to fly over the upgraded highway. The giant barred frog is known to occur in riparian habitat at the Maria River bridge crossing. Additional potential habitat for the giant barred frog is restricted to the major freshwater creeks within the Study Area, particularly Barrys Creek, Smiths Creek, Pipers Creek and Yarrabee Road. The Proposal is highly unlikely to fragment an existing population of the giant barred frog into two or more populations as this species would be able to continue to cross the highway using the riparian corridor under bridge crossings.

Riparian corridors are favoured by the spotted-tailed quoll as foraging habitat, therefore if the species were to occur in the study area, it is likely that it would be moving along vegetated creeklines and drainage lines, rather than through the drier more open habitats on the slopes and ridges. The DECCW data appears to support this, with nearly all of the records in the locality located along creeklines in the undulating terrain and ranges to the west of the existing highway. Potential habitat for the species is more likely to occur within riparian habitats such as those associated with the various creeks (including Maria River).

Vegetation clearance resulting from the Proposal will be of a long, linear nature, however much of it is along the existing highway. At present, there is limited capacity for the species to move between habitats on either side of the existing highway. With the installation of new bridges there is opportunity at the detailed design stage to ensure that sufficient dry passage is maintained under the structure to allow terrestrial fauna, including the spotted-tailed quoll, to transit safely between habitats on either side of the highway. The species has been recorded using underpasses in gullies and drainage lines (AMBS 1997; AMBS 2000), hence are likely to use bridges as underpasses, providing dry passage is available. To reduce the potential for adverse impacts on native wildlife as a result of habitat fragmentation, barrier effects and road mortality, dedicated fauna underpasses, and combined drainage/fauna movement culverts in conjunction with wildlife exclusion fencing have been incorporated into the Proposal design

Based on the above, it is therefore unlikely that the Proposal will fragment the existing spotted-tailed quoll population into two or more populations.

- *Adversely affect habitat critical to the survival of a species*

While the Proposal would contribute to the incremental loss of potential foraging habitat affecting the swift parrot and regent honeyeater, no breeding habitat would be affected and the Proposal is considered highly unlikely to adversely affect habitat critical to the survival of either of these species.

While known habitat for giant barred frog occurs at Maria River bridge, this species is not reliant upon this one site for its survival. A monitoring program has been implemented at Maria River bridge for the current construction works. Site inspection and audits conducted by DECCW indicate that mitigation measures have been successfully implemented and are functioning as required. A threatened frog monitoring program targeting the giant barred frog would be established during, and following construction of the Proposal, focusing on areas of known and potential habitat within the Proposal footprint including Maria River and associated tributaries, Cooperabung, Barrys, Smiths and Pipers creeks to determine the species persistence in the area and the success of the mitigation measures. Consideration would be given to constructing artificial breeding ponds to provide alternative habitat. The location, size and design of these ponds would be considered at the detailed design and construction stages. Any habitat degradation resulting from the Proposal would have an impact on the local population of the giant barred frog, but would not result in the loss of the species.

Habitat resources critical to the survival of the spotted-tailed quoll are maternity den sites. Potential habitat for the spotted-tailed quoll occurs in state forests, nature reserves, national parks and other large forest sections within the study area. No latrine or den sites were recorded within the study area, rock shelters and small caves were absent and large logs were found to be sparsely scattered throughout the study area, generally in the more mature, unlogged bushland (of which little occurs within the study area). Little intact mature forest occurs within the study area and mature, hollow bearing trees tend to be sparsely distributed along the preferred highway route and are mainly concentrated in less disturbed parts of Cairncross, Ballengarra and Maria River State Forests. It is therefore considered unlikely that the study area provides optimal denning habitat for spotted-tailed quoll.

- *Disrupt the breeding cycle of a population*

The Proposal is unlikely to disrupt the breeding cycle of a population of the swift parrot or regent honeyeater. The regent honeyeater is known to breed on the western slopes of the Great Dividing Range and the swift parrot breeds in Tasmania. Both are seasonal or opportunistic visitors to coastal NSW and forage in areas containing winter-flowering trees (for example, the swamp mahogany and spotted gum). Neither of these species was recorded during the field survey, though both have potential to occur, particularly during peak winter flowering periods.

The Proposal is considered unlikely to significantly disrupt the breeding cycle of either the regent honeyeater or swift parrot. However it is expected to result in the loss of a long strip of potential foraging habitat, including important winter-flowering trees, which would contribute to the cumulative loss of habitat affecting these species. The clearing of potential regent honeyeater and swift parrot habitat is inconsistent with the aims of the recovery plans for these species (Swift Parrot Recovery Team 2001; Regent Honeyeater Recovery Team 1999), though given the paucity of records for both species, the habitat to be cleared is considered unlikely to be critically important to the survival of either species.

If giant barred frog habitat becomes degraded, particularly through changes to water quality, this could potentially disrupt the breeding cycle of the local population of this species. A monitoring program has been implemented at the Maria River bridge construction site for the current construction works. Site inspection and audits conducted by DECCW indicate that mitigation measures have been successfully implemented and are functioning as required. A threatened frog monitoring program targeting the giant barred frog would be established during, and following construction of the Proposal, focusing on areas of known and potential habitat within the Proposal footprint including Maria River and associated tributaries, Cooperabung, Barrys, Smiths and Pipers creeks to determine the species persistence in the area and the success of the mitigation measures. Consideration would be given to constructing artificial breeding ponds to provide alternative habitat. The location, size and design of these ponds would be considered at the detailed design and construction stages. The Proposal is therefore considered unlikely to disrupt the breeding cycle of a population of giant barred frog.

No spotted-tailed quoll den sites were recorded within the study area, rock shelters and small caves were absent and large logs were found to be sparsely scattered throughout the study area, generally in the more mature, unlogged bushland (of which little occurs within the study area). It is unlikely that the breeding cycle of the local population would be disrupted as the study area does not provide optimal denning habitat. Furthermore the species utilises a number of den sites within its territory, hence the loss of one den site is unlikely to greatly affect the spotted-tailed quoll population. In the unlikely event that an occupied den site was destroyed, particularly one containing a female with young, the local population could be affected. To mitigate against this occurring, the Proposal would include staged vegetation clearing; pre-clearing surveys to locate and inspect hollow logs for denning spotted-tailed quolls; and relocating hollow logs to adjacent habitat.

- *Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*

While the Proposal would contribute to the incremental loss of potential habitat affecting the swift parrot, regent honeyeater and spotted-tailed quoll, it is considered unlikely that this would result in the overall decline of any of these species.

This criterion is relevant to the giant barred frog. In the absence of appropriate mitigation measures, there is some potential for construction works at Maria River to decrease the quality of habitat for the species to the extent that it may decline through pollution, nutrient and sediment runoff or disturbance to riparian vegetation. However, mitigation measures specifically addressing potential impacts on the species' habitat, including water quality impacts, will be developed and implemented as part of the Proposal. Furthermore, the works to take place as part of the Proposal will be located to the west of the existing bridge construction, and therefore further away from known habitat for the species. Note that the previous works on the Maria River bridge were assessed and it was considered that a referral under the EPBC Act was not warranted.

A threatened frog monitoring program targeting the giant barred frog would be established during, and following construction of the Proposal, focusing on areas of known and potential habitat within the Proposal footprint including Maria River and associated tributaries, Cooperabung, Barrys, Smiths and Pipers Creek to determine the species persistence in the area and the success of the mitigation measures. Consideration would be given to constructing artificial breeding ponds to provide alternative habitat. The location, size and design of these ponds would be considered at the detailed design and construction stages. The Proposal is therefore considered unlikely to modify, destroy, remove, isolate or decrease the available or quality of habitat to the extent that that giant barred frog is likely to decline.

- *Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat**

The Proposal is unlikely to result in an increase in invasive species within the study area, provided effective weed management strategies are adopted.

- *Interfere with the recovery of the species.*

If the Proposal results in the degradation of giant barred frog habitat, this would affect the local population of that species, therefore interfering with the recovery of the species as a whole. While the Proposal is unlikely to have a significant impact on the swift parrot, regent honeyeater or spotted-tailed quoll, the expected removal of a large area of potential habitat would not be conducive to the recovery of these species.

[**Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a critically endangered or endangered species by direct competition, modification of habitat, or predation*]

Conclusion

The Proposal is unlikely to have a significant impact on endangered fauna species listed under the EPBC Act, provided that adequate mitigation and management measures are developed in consultation with the relevant authorities at the detailed design stage to:

- Avoid inadvertent removal of spotted-tailed quoll den sites (if present), particularly those being used by a mother with young.
- Ensure areas of habitat for the giant barred frog do not become degraded through pollution, nutrient and sediment runoff or disturbance to riparian vegetation.
- Prevent individual giant barred frogs from accessing construction zones in areas of potential habitat.

On the basis of the assessments undertaken, it is concluded that the Proposal is unlikely to impose a significant effect on endangered species listed on the EPBC Act, provided that proposed mitigation and management measures are developed and implemented.

Appendix J.2.2 Vulnerable fauna species

One species listed as vulnerable, the grey-headed flying-fox was recorded at six of the eight base survey sites and four supplementary sites within the study area and has potential to forage seasonally along the entire road route. One species, the green and golden bell frog, has been previously recorded within the study locality. The EPBC Act Protected Matters Search Tool identified five additional species, the Australian painted snipe, stuttering frog, large-eared pied bat, brush-tailed rock-wallaby and long-nosed potoroo, with potential to occur within the study locality. Based on the results of field work and habitat assessment within the study area, all of these species have some potential to occur with the exception of the brush-tailed rock-wallaby, as no suitable potential habitat exists for this species.

An assessment of significance pursuant to EPBC Act Policy Statement 1.1: Significant Impact Guidelines has been undertaken for those nationally listed vulnerable species, populations or ecological communities recorded, or considered likely to occur. The specific EPBC Act criteria for determining whether the Proposal is likely to be considered a controlled action are addressed below:

Criteria

An action has, will have, or is likely to have a significant impact on a vulnerable species if it does, will, or is likely to:

- *Lead to a long-term decrease in the size of an important population[#] of a species.*

Only one listed vulnerable species, the grey-headed flying-fox, was recorded within the study area during the field surveys. While the Proposal would result in a loss of a long strip foraging habitat, given the large home range and migratory habits of this species, it is unlikely that this would lead to a long-term decrease in the size of an important population of the grey-headed flying-fox.

Five additional species, the green and golden bell frog, Australian painted snipe, stuttering frog, large-eared pied bat and long-nosed potoroo, have some potential to occur within the study area. Of these species, only the green and golden bell frog has previously been recorded within the study locality. Given the lack of records and the fact that none of these species were recorded during field survey work, it is considered unlikely that an important population of any of these species occurs within the study area.

The Proposal is therefore considered unlikely to lead to a long-term decrease in the size of an important population of any vulnerable fauna species listed under the EPBC Act.

- *Reduce the area of occupancy of an important population.*

As stated above, with regard to the green and golden bell frog, Australian painted snipe, stuttering frog, large-eared pied bat and long-nosed potoroo, it is considered unlikely that an important population of any of these species occurs within the study area. While the Proposal would result in the loss of potential habitat, it is unlikely to reduce the area of occupancy of an important population of any of these species.

The grey-headed flying-fox is a highly mobile species and while the Proposal would contribute to the incremental loss of habitat affecting this species, it is highly unlikely to reduce the area of occupancy of an important population of the grey-headed flying-fox.

- *Fragment an existing important population into two or more populations.*

It is unlikely that an important population of the green and golden bell frog, Australian painted snipe, stuttering frog, large-eared pied bat or long-nosed potoroo occurs within the study area. The grey-headed flying-fox is known to occur, but as this is a highly mobile species, the Proposal is highly unlikely to fragment an existing important population of the grey-headed flying-fox into two or more populations.

The Proposal is therefore considered unlikely to fragment an existing important population of any vulnerable species listed under the EPBC Act into two or more populations.

- *Adversely affect habitat critical to the survival of a species.*

Potential habitat for the green and golden bell frog, Australian painted snipe, stuttering frog, large-eared pied bat and long-nosed potoroo occurs within the study area. However, given that no known populations of these species occur within the study area, it is highly unlikely that the Proposal would adversely affect habitat critical to the survival of any of these species.

Foraging habitat for the grey-headed flying-fox would be lost as a result of the Proposal, however no known breeding or roosting habitat would be affected. While the loss of foraging habitat contributes to the incremental loss of habitat affecting this species, the Proposal is unlikely to adversely affect habitat critical to the survival of the grey-headed flying-fox.

- *Disrupt the breeding cycle of an important population*

No known populations of the green and golden bell frog, Australian painted snipe, stuttering frog, large-eared pied bat or long-nosed potoroo occur within the study area. It is therefore considered highly unlikely that the Proposal would disrupt the breeding cycle of an important population of any of these species. The grey-headed flying-fox was recorded foraging within the study area during the field surveys, however the nearest known camps are at Sea Acres, Port Macquarie and Crescent Head, north of Kempsey. The Proposal is therefore highly unlikely to disrupt the breeding cycle of and important population of the grey-headed flying-fox.

- *Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*

Potential habitat for the green and golden bell frog, Australian painted snipe, stuttering frog, large-eared pied bat and the long-nosed potoroo would be affected as a result of the Proposal. However given that no known populations of these species occur within the study area, the Proposal is unlikely to affect any of these species to the extent that they would decline.

While foraging habitat for the grey-headed flying-fox is expected to be removed as a result of the Proposal, it is unlikely that this would affect the species to such an extent that it would decline.

- *Result in invasive species that are harmful a vulnerable species becoming established in the vulnerable species' habitat**

The Proposal is unlikely to result in invasive species becoming established within the study area, provided effective weed management strategies are adopted.

- *Interferes substantially with the recovery of the species.*

While the Proposal is unlikely to have a significant impact on any vulnerable species listed under the EPBC Act, the expected removal of a large area of potential habitat for vulnerable species would not be conducive to the recovery of these species.

[#*An important population is one that is necessary for a species' long-term survival and recovery. This may include populations that are:*

- *Key source populations either for breeding or dispersal,*
- *Populations that are necessary for maintaining genetic diversity, and/or*
- *Populations that are near the limit of the species range.*

**Introducing an invasive species into the habitat may result in that species becoming established. An invasive species may harm a vulnerable species by direct competition, modification of habitat, or predation.*]

Conclusion

On the basis of the assessments undertaken, it is concluded that the Proposal is unlikely to impose a significant effect on vulnerable species listed on the EPBC Act, provided that proposed mitigation and management measures are developed and implemented.

Appendix J.3 Migratory species

In terms of listed migratory species, eight species were recorded during Ecotone and GHD surveys within the study area. These were the black-faced monarch, cattle egret, Latham's snipe, osprey, rufous fantail, satin flycatcher, white-bellied sea-eagle and white-throated needletail. The EPBC Act 1999 Protected Matters Search Tool identified seven additional migratory species that have potential to occur within the study locality, the Australian painted snipe, fork-tailed swift, great egret, rainbow bee-eater, regent honeyeater, spectacled monarch and swift parrot. The specific EPBC Act criteria for determining whether the Proposal is likely to have a significant impact on any migratory fauna species are addressed below:

Criteria

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- *Substantially modify (including by fragmentation, altering fire regimes, altering nutrient cycles or altering hydrological cycles) destroy or isolate an area of important habitat* for a migratory species*

The black-faced monarch, rufous fantail, satin flycatcher and spectacled monarch are found in a range of vegetation types, but tend to prefer moist forest habitats. Potential and known habitat within the study area does not support an ecologically significant proportion of the population of any of these species, is not of critical importance at any particular life-cycle stage to any of these species, is not at the limit of the species' range and is not in an area where any of these species is declining. While the Proposal would result in the loss of habitat for these species, these areas do not constitute 'important habitat' as defined by the EPBC Act.

The cattle egret and Latham's snipe were both observed in areas of open pasture and are most likely to inhabit the open grazing lands of the Hastings River and Wilson River floodplains. The Australian painted snipe and great egret were not recorded within the study area, but are known to occupy similar habitats. Latham's snipe breeds in the northern hemisphere while the cattle egret and great egret breed in colonies with other waterbirds in wetland areas. No cattle egret or great egret breeding sites are known to occur within the study area. The Australian painted snipe nests on the ground in tall reeds or grasses near water. Some potential breeding habitat for this species does occur within the study area, however given that these areas are degraded and currently grazed by cattle, they are unlikely to represent 'important habitat' for the Australian painted snipe. While some habitat for these species may be destroyed or modified as a result of the Proposal, these areas do not qualify as 'important habitat' according to the EPBC Act definition of the term.

The osprey and white-bellied sea-eagle were both observed flying over the study area. Both species feed mainly on aquatic animals and are unlikely to rely heavily upon terrestrial environments within the study area for foraging. No nest trees of either species were observed within the study area and the Proposal is unlikely to substantially modify, destroy or isolate an area of 'important habitat' for either of these species.

The rainbow bee-eater was not recorded during the field surveys, though it could potentially visit the study area. Potential foraging and breeding habitat for this species occurs within the study area and could be affected as a result of the Proposal. However as the rainbow bee-eater is a common, widespread species, it is considered highly unlikely that the Proposal would substantially modify, destroy or isolate an area of 'important habitat' for the rainbow bee-eater.

The regent honeyeater is known to breed on the western slopes of the Great Dividing Range and is highly unlikely to breed within the study area. One record of the regent honeyeater exists for the locality and this species could potentially forage on an opportunistic basis within the study area. The regent honeyeater is not likely to be a resident or regular visitor to the area and the habitats within the study area are highly unlikely to constitute 'important habitat' for this species. Similarly, swift parrot breeds in Tasmania and no breeding habitat would be impacted by the Proposal. There are seven records of the species from within the locality, and the species could potentially forage on an opportunistic basis within the study area. The swift aprrot is not likely to be a resident or regular visitor to the area and the habitats within the study area are highly unlikely to constitute 'important habitat' for this species.

The white-throated needletail and fork-tailed swift would only fly over the study area and would not be affected by the Proposal.

The Proposal is therefore unlikely to substantially modify, destroy or isolate an area of important habitat for any migratory species listed under the EPBC Act.

- *Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species*

The Proposal is unlikely to result in any invasive species becoming established within the study area, provided effective weed management strategies are adopted.

- *Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion[#] of the population[+] of a migratory species,*

The black-faced monarch, rufous fantail, satin flycatcher and spectacled monarch are found in a range of vegetation types, but tend to prefer moist forest habitats. These species do not tend to congregate in large groups and the study area is highly unlikely to support at any lifecycle stage an ecologically significant proportion of the population of any of these species. While the Proposal would result in the loss of habitat for these species, it is highly unlikely to seriously disrupt the lifecycle of an ecologically significant proportion of the population of any of these migratory species.

The cattle egret and great egret both congregate with other waterbirds to breed. No known breeding areas for either species occurs within the study area and none are likely to be affected by the Proposal. As both the cattle egret and great egret are common widespread species, it is considered highly unlikely that the study area would at any stage support an ecologically significant proportion of the population of either species.

Latham's snipe is a non-breeding migrant to Australia and was observed foraging within the study area during the field surveys. It does not tend to congregate in large numbers and it is considered highly unlikely that the study area would at any stage support an ecologically significant proportion of the Latham's snipe population

The Australian painted snipe was not recorded within the study area and no records exist for the locality. Some potential breeding habitat for this species does occur within the study area on the floodplains of the Hastings Wilson Rivers, however these areas are degraded and currently grazed by cattle. The Australian painted snipe does not tend to congregate in large numbers and given the marginal nature of the available habitat, it is unlikely that the study area would at any stage support an ecologically significant proportion of the Australian painted snipe population.

The osprey and white-bellied sea-eagle were both observed flying over the study area. Both species tend to occur in pairs and do not congregate in large groups. While the study area may support one or two pairs of each species, it would not support an ecologically significant proportion of the population of either species.

The rainbow bee-eater was not recorded during the field surveys, though it could potentially visit the study area. The rainbow bee-eater is a common, widespread species and it is considered highly unlikely that the study area would support an ecologically significant proportion of the rainbow bee-eater population at any lifecycle stage.

The regent honeyeater and swift parrot is not likely to be a resident or regular visitor to the area and it is considered highly unlikely that the study area would at any stage support an ecologically significant proportion of the population of this species.

The white-throated needletail and fork-tailed swift would only fly over the study area and would not be affected by the Proposal

The Proposal is therefore unlikely to seriously disrupt the lifecycle of an ecologically significant proportion of the population of any migratory species listed under the EPBC Act.

[* *An area of 'important habitat' for a migratory species is:*

- *Habitat utilised by a migratory species occasionally or periodically within the region that supports an ecologically significant proportion of the population of the species; and/or*
- *Habitat that is of critical importance to the species at particular life-cycle stages; and/or*
- *Habitat utilised by a migratory species which is at the limit of the species range; and/or*
- *Habitat within an area where the species is declining.*

[#] *Listed migratory species cover a broad range of species with different life cycles and population sizes. Therefore, what is an 'ecologically significant proportion' of the population varies with the species (each circumstance will need to be evaluated). Some factors that should be considered include the species' population status, genetic distinctiveness and species specific behavioural patterns (for example, site fidelity and dispersal rates).*

[+] *'Population', in relation to migratory species, means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries including Australia.*]

Conclusion

In summary, while the Proposal is expected to result in the loss of habitat for some of these species, based on the criteria outlined above, the Proposal is considered unlikely to have a significant impact on any migratory species listed under the EPBC Act.

Appendix J.4 Conclusion to the EPBC Act assessment

The Proposal is unlikely to have a significant impact on endangered fauna species listed under the EPBC Act, provided that adequate mitigation and management measures are developed in consultation with the relevant authorities at the detailed design stage to:

- Avoid inadvertent removal of spotted-tailed quoll den sites (if present), particularly those being used by a mother with young.
- Ensure areas of habitat for the giant barred frog do not become degraded through pollution, nutrient and sediment runoff or disturbance to riparian vegetation.
- Individual giant barred frogs are prevented from accessing construction zones in areas of potential habitat.

On the basis of the assessments undertaken, it is concluded that the Proposal is unlikely to impose a significant effect on threatened and migratory species listed on the EPBC Act, provided that proposed mitigation and management measures are developed and implemented.