Attachment 6 – Assessment of Significance under the *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) requires the completion of an 'Assessment of Significance' relating to the potential impacts of a proposed action on listed Matters of National Environmental Significance (MNES). A search of the Department of the Environment (DoEE) Protected Matters Database (undertaken on 17 April 2020; see Attachment 7) identified threatened and migratory species (EPBC Act listed) known to occur or considered likely to occur, within the referral area and a 10 kilometres radius.

Following targeted vegetation community and fauna habitat assessment, and targeted threatened species surveys, an assessment of the habitat requirements and likelihood of occurrence of each TEC, threatened species, and migratory species identified in the Protected Matters Database search was completed. That assessment is included as Appendix G of the Biodiversity Development Assessment Report (BDAR) prepared by NGH Consulting, and summarised in Attachment 5.

An 'Assessment of Significance' (according to the Significant Impact Guidelines 1.1 (DoE 2013)) is provided below for those TECs and threatened species that could be impacted by the proposed action. As outlined in Attachment 5, one critically endangered and two endangered ecological communities, six vulnerable flora and fauna species, and one migratory species may be significantly impacted by the proposed action.

Table 1 presents the threatened ecological communities, and Table 2 presents the threatened and migratory species considered in the assessment.

Table 1: Threatened ecological communities considered in the assessment of significance

Threatened Ecological Communities
Critically Endangered Ecological Communities
Natural Grasslands on Basalt and fine textured Alluvial Plains
Endangered Ecological Communities
Poplar Box Grassy Woodland on Alluvial Plains
Weeping Myall Woodlands

Table 2: Threatened species considered in the assessment of significance

Common Name	**Scientific Name**
Vulnerable Species	
Belson's Panic	*Homopholis belsonii*
Five-clawed Worm-skink	*Anomalopus mackayi*
Painted Honeyeater	*Grantiella picta*

Common Name	Scientific Name
Koala	*Phascolarctos cinereus*
Grey-headed Flying Fox	*Pteropus poliocephalus*
Murray Cod	*Maccullochella peelii*
Migratory Species	
Satin Flycatcher	*Myiagra cyanoleuca*

Description of impacts

The proposed action would involve enhancement of approximately 13.4 km of the existing rail line track, and construction of approximately 1.6 km of realigned rail corridor, including rail embankments and cuttings, within the N2NS corridor running from Moree north to beyond the Camurra hairpin, including:

- Upgrades of nine existing level crossings: three public crossings and six private crossings.
- Replacement of underbridges across the Mehi River and Gwydir River.
- Eight new underbridges, new box culverts and the modification of existing structures to be retained.
- A new road crossing of Back Pally Road.
- Crossings and drainage improvements across Skinner's Creek, Duffy's Creek, two unnamed creeks, and three irrigation canals.
- Construction of a deviation at Camurra to eliminate the existing hairpin curve.

Associated works would include signalling and communications, signage, fencing, services and utilities. The construction and operation of the proposal would also require ancillary facilities, which may include:

- Construction access roads and access tracks.
- Permanent and temporary changes to the road network.
- Construction compounds, storage areas and small quarries or borrow pits.

Bulk earthworks would be required in some sections along the referral area. Subject to the outcomes of the concept design process, the earthworks required could range from relatively minor improvements to total reconstruction of the existing track formation, to new track formation for new sections of track.

Further investigations are currently being undertaken to confirm the extent of works likely to be required to meet the Inland Rail performance specification, based on the condition of the existing track formation.

Where possible, bulk earthworks would include reusing and/or replacing existing material (with treatment as required) to provide the required subgrade, general fill and structural fill for the track formation. Cut and fill operations would also be required in some areas to achieve the required track grades.

Existing drainage within the rail corridor would also be upgraded to suit the upgraded track formation and address existing drainage issues.

To address the impacts of the proposed upgrade works in this referral, the development site, or referral area, consists of a 100 m-wide corridor within which, and following detailed design, the development footprint will be sited, together with areas of land that are subject to potential direct and indirect impacts from the proposed works. This equates to approximately 686.63 ha. The development footprint is the area of land that is directly impacted by the proposed works, and includes all the works as detailed above. The development footprint is approximately 130.29 ha. Native vegetation occurring in these areas may not be fully impacted (i.e., may not be cleared), but will be subject to some disturbance and is expected to recover. Mitigation measures to direct and indirect impacts of the proposed action are detailed in Section 8 of the BDAR.

The proposed action will result in the loss of up to 34.7 ha of woodland and grassland communities. Approximately 95.5 ha of cleared/non-native vegetation will be impacted. The total area of the river system within the referral area is 7.1 ha, of which, 1 ha will be impacted.

A breakdown of the area of impact to each MNES are provided in Table 3.

Table 3: Impacted MNES

Item	Hectares within Referral Area (development site)	Hectares within development footprint	Per cent area of MNES to be impacted within Referral Area
Total Area	686.6	130.2	18.9
Threatened Ecological Communities			
Natural Grasslands TEC	136.6	33.7	23.85
Poplar Box Grassy Woodland TEC	8.52	0.00	0.00
Weeping Myall TEC	6.65	0.13	1.95
Threatened Species Habitat			
Belson's Panic Grass (*Homopholis belsonii*)	16.6	3.4	20.5
Painted Honeyeater (*Grantiella picta*)	6.65	0.13	1.95
Koala (*Phascolarctos cinereus*)	53.1	12.5	23.5
Grey Headed Flying Fox (*Pteropus poliocephalus*)	49.2	12.5	25.4

Item	Hectares within Referral Area (development site)	Hectares within development footprint	Per cent area of MNES to be impacted within Referral Area
Murray Cod (*Maccullochella peelii)*	7.1	1.0	14.1
Five Clawed Worm Skink (*Anomalopus mackayi*)	235	59.1	25.2

Threatened Ecological Communities

Natural grasslands on basalt and fine-textured alluvial plains

The Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales (NSW) and southern Queensland are native grasslands typically composed of perennial native grasses. They are found on soils that are fine textured (often cracking clays), derived from either basalt or alluvium on typically flat to very low slopes (less than 5 percent/< 1 degree). A tree canopy is usually absent, but when present, comprises ≤10 percent projective crown cover. The ground layer is typically dominated by perennial native grasses and contains three or more indicator native species (Threatened Species Scientific Committee (TSSC) 2009a).

Native tussock grasslands, such as this ecological community, once occurred over a large area of Australia. They are now distributed in three major, but disjunct, occurrences where climate, soils and landform are conducive to the development of tussock grasslands. The species composition of tussock grasslands varies throughout the range, and is influenced by factors such as rainfall, soil, geology and land use history. These influences may vary the expression of the ecological community over short periods or across small distances (TSSC 2009a).

Many grass genera that occur as grassland dominants occur within a diversity of habitats. The broad distribution of grass species is driven by climate, although soil properties, such as salinity, fertility or waterlogging may override climate in determining the distribution of certain taxa (TSSC 2009a).

It should be noted that drought conditions were occurring during the field surveys. As identified in Section 7.5.1 of the BDAR, at the time of survey, the species composition largely aligned with this community and occurred in two forms, with the majority of the areas containing infestations of Mimosa, or being of low condition consisting of largely heavily disturbed and degraded vegetation and dominated by exotic flora and sporadic native species adjacent to the existing rail corridor and roadside edges. As such, applying the condition thresholds to this TEC is difficult, and a precautionary approach was applied in assessing this TEC against the criteria listed within the EPBC Act guidance. That assessment is presented below.

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- **Reduce the extent of an ecological community**

The proposed action will result in disturbance or removal of 33.7 ha of this community, of a total of 136.66 ha that exists in the development site. This means 23.85 percent of this existing community within the development footprint would be impacted. Some of this community exists on either side of the current rail alignment and will be subjected to clearing for construction works, whereas another portion will be removed to allow for the Cumurra hairpin bypass portion of rail alignment.

The estimated total current national extent of this ecological community is 29,319 ha (TSSC 2009a).The permanent loss of up to 33.7 ha as a result of the proposed action represents an approximate 0.11 percent reduction in the estimated current extent of the community across its entire range. This area of impact is very small in the context of the estimated total current national extent. However, this is a significant reduction in the local occurrence of this critically endangered community, and may result in a significant impact.

- **Fragment or increase fragmentation of an ecological community**

The proposed action would fragment this community. Most remnants of this community that remain at a national extent are small and isolated, or occur as long, linear fragments along roadsides and in travelling stock reserves (TSRs), such as that which occurs within the referral area. These linear fragments are especially vulnerable to edge effects and disturbances such as weed invasion owing to the fertile soils, widespread disturbance, fragmentation of remnants and the surrounding matrix of agricultural land (TSSC 2009a).

Within the area, this community occurs as a highly fragmented community on either side of the existing rail alignment and the Newell Highway, which will be subjected to clearing for construction works for upgrades to the existing rail corridor. The realignment of the rail corridor at Camurra would further increase fragmentation of a larger intact area of this threatened community within the referral area. This would result in the fragmenting of the two existing portions of the community into four smaller areas (refer to Figure 3-18 and Figure 6-4 of the BDAR). This increased fragmentation would increase edge effects, resulting in physical and biological changes along and close to the edges, such as changes in species composition, recruitment, increased competition and predation, as well as susceptibility to invasion and establishment of weeds and reducing the functionality of the habitat for fauna species which occur in this community.

- **Adversely affect habitat critical to the survival of an ecological community**

In the context of the local extent of the community and habitat, the loss of habitat resulting from the proposal is not considered to be significant to any critical habitat for this community. The habitat affected by the proposal is typical of the Natural Grasslands community in the locality and is not critical to the long-term survival of the community.

- **Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alternation of surface water drainage patterns**

During construction, the proposal would have a short-term impact upon soils, seed banks and possibly surface water flow, within discrete areas. Soils disturbed during the works would be reinstated to the original soil profile. These impacts are manageable with the implementation of erosion and sediment controls and would be unlikely to further degrade the community in the long-term. The impacts of the proposed actions would be localised, and would not result in changes to abiotic factors outside the impact area. Rehabilitation of disturbed areas is proposed to regulate activity and restore native vegetation in the referral area. Protocols for a construction flora and fauna plan are outlined in Table 8-1 of the BDAR. The actions associated with the proposal are not considered likely to substantially alter hydrological patterns necessary for the community's survival.

- **Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting**

The impacts of the proposed works are expected to be localised, assuming best practice weed control, road and crossing construction and drainage, erosion and sedimentation control measures are adhered to. The existing community is relatively consistent throughout (refer Section 3.3 and Appendix B of the

BDAR for specific species composition information), with some portions containing a higher density of species. The works are unlikely to result in a substantial change in the species composition of the community outside the impact area of the works, as there are no areas of particularly higher quantity of functionally important species. Rehabilitation works are proposed as per the measures outlined in Table 8-1 of the BDAR.

- **Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:**
  - **Assisting invasive species, that are harmful to the listed ecological community, to become established, or**
  - **Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community,**

Where proposed works include clearing of native vegetation, there is a risk that invasive species could establish via seed dispersal or plant parts on machinery during construction. These impacts can be managed and with the careful implementation of a weed management plan can be readily controlled.

Due to the nature of this development, the proposed actions will not incur the requirement for regular fertilisers or other chemicals, which could kill or adversely impact the growth of the species within the community. Therefore, it is unlikely that the proposed actions will negatively impact the existing community through chemicals or pollutants. With the recommended hygiene measures implemented, the likelihood of the proposal resulting in invasive species or introduction of pollutants that are harmful to the CEEC is minimal.

- **Interfere with the recovery of an ecological community.**

There is no recovery plan for this TEC. Priority recovery and threat abatement actions are outlined in the approved conservation advice for this TEC, broadly identifying these actions as general habitat loss, disturbance and modification, invasive weeds, animal predation or competition, fire and conservation information.

The proposed action would reduce the extent of this community by 33.7 ha. Therefore, it will interfere with the recovery actions for this TEC, specifically those addressing habitat loss, disturbance and modification and invasive weeds.

Conclusion

The proposed action is **likely** to result in a significant impact on Natural Grasslands TEC.

The proposed action, as it stands, given current understanding, would result in a reduction of the extent of this community within the development site by 33.7 ha (or 23.85% of the local occurrence). This is a significant reduction in the local occurrence of this critically endangered community, and may result in a significant impact.

However, it is anticipated that as the detailed design of the proposed action evolves, the area of disturbance impacting this community will reduce, and the impact assessment provided above provides a conservative or ‘worst case’ scenario.

Poplar Box grassy woodland on alluvial plains

The Poplar Box grassy woodland ecological community occurs in eastern Australia, intergrading with, but ranging further west and north than other grassy woodlands that extend through NSW and southern Queensland. The vegetation of the community varies from a grassy woodland to grassy open-woodland structure, but may occasionally exhibit an open forest structure, with an overstorey dominated by Poplar Box (*Eucalyptus populnea*) and an understorey predominantly composed of perennial forbs and C4 grasses (C4 being grasses that are better adapted to hotter, drier conditions to balance photosynthesis and water loss processes more efficiently) (DoEE 2019).

The Poplar Box grassy woodland community may include a low density of shrubs; however, patches of the community generally lack a substantial mid-layer (tall shrub). Shrubby forms of Poplar Box woodland typically occur on lower-nutrient sandier soils and are not part of this ecological community (DoEE 2019). The community is found on soils that are fine textured, often cracking clays, which are derived from either basalt or alluvium on flat to low slopes (<1 degree). A tree canopy is usually sparse, but when present comprises >10 percent of the community's overstorey (DoEE, 2019).

The structure and composition of vegetation in the ecological community are primarily determined by topography, hydrology, fire regimes, soil fertility, disturbance, and management history. The community is a continuum, comprising different understorey herbs and low shrub assemblages at the extremities of the distribution in both an east-west and north-south direction, due to variations in climate and substrate (DoEE 2019).

As identified within Section 7.5.1 of the BDAR, areas within the referral area qualifying as this community occur as large patches, with low native species cover, but retain good native understorey diversity and habitat features of mature trees. The community does not contain a Derived Native Grassland component, however, according to the DoEE (2019) conservation advice for this community, patches lacking canopy cover where they occur within a gap or at the edge of a patch up to 50 m should still be considered part of the community.

The proposal would therefore impact on an area of a low condition form of grassland associated with the edge of this TEC, however, the grassland area itself impacted does not conform to the EPBC Act listing of the TEC. Regardless, a precautionary approach was taken in including this TEC in the Assessment of Significance.

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- **Reduce the extent of an ecological community**

Within the referral area, 8.52 ha of this ecological community occurs. The proposed action involves the disturbance or removal of 0.21 ha of a grassland associated with this TEC. However, as discussed, this grassland does not conform to the condition thresholds of the EPBC Act listing. Therefore, a reduction of the extent of this community is considered unlikely.

- **Fragment or increase fragmentation of an ecological community**

This community exists in the north of the development site, and the community is on the southern side of the existing rail alignment (refer Figure 3-18 of the BDAR). The existing rail alignment will be upgraded in this location (not relocated), and would involve clearing of 0.21 ha of the grassland on the edge of this

community closest to the rail alignment. Therefore, the proposed works would not involve fragmentation of the community in the referral area.

- **Adversely affect habitat critical to the survival of an ecological community**

The small area (8.52 ha) of this community in the referral area is typical of this community within the locality, which is already largely cleared and fragmented. In the context of the local extent of the community and habitat, the loss of the grassland patch as a buffer adjacent to the TEC habitat resulting from the proposal is not considered to be significant, or to adversely affect habitat critical to the values of this community in the wider area. The habitat affected by the proposal is typical of the Poplar Box grassy woodland community in the locality, and is not critical to the long-term survival of the community.

- **Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alternation of surface water drainage patterns**

During construction, the proposal would have a short-term gross impact upon soils and possibly surface water flow, within discrete areas. Soils disturbed during the works would be reinstated to maintain the original soil profile. These impacts are manageable with the implementation of erosion and sediment controls, and would be unlikely to further degrade the community in the long-term. The impacts of the proposed actions would be localised and would not result in changes to abiotic factors outside the impact area. Rehabilitation of disturbed areas is proposed to regulate activity and restore native vegetation in the referral area. Protocols for a construction flora and fauna plan are outlined in Table 8-1 of the BDAR. The actions associated with the proposal are not considered likely to substantially alter hydrological patterns necessary for the community's survival.

- **Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting**

The proposed actions will not cause any substantial changes in the composition of species in the TEC because the community composition is relatively consistent throughout.

The relatively small portion (0.21%) of the grassland to be removed adjacent to the community does not contain any functionally significant species that define this community. It is unlikely that disturbance or removal of this adjacent vegetation will cause a substantial change in the species composition within the TEC and the broader community.

- **Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:**
  - **Assisting invasive species, that are harmful to the listed ecological community, to become established, or**
  - **Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community,**

A weed management plan will be implemented and will contribute to the control of invasive species in the development site. With the appropriate use of this management plan, it is unlikely that disturbance or

removal of the 0.21 ha portion of adjacent grassland will assist in the establishment of invasive species. However, clearing of any existing native vegetation gives opportunities for invasive species to establish and spread, therefore protocols outlined in the rehabilitation and weed management plans are required to be diligently implemented and monitored.

Due to the nature of this development, the proposed actions will not incur the requirement for regular fertilisers or other chemicals which will kill or adversely impact the growth of the species within the community. Therefore, it is not likely that the proposed actions will negatively impact the existing community through chemicals.

- **Interfere with the recovery of an ecological community.**

While there is no recovery plan for this TEC, protection, conservation management, and recovery actions are outlined within the conservation advice for this community. These actions prioritise measures to protect, restore, research and monitor the community, and communicate through engagement and support.

The proposed action would not reduce the extent of this community, however, it would impact on the adjacent low-condition grassland associated with the TEC, it may interfere with the recovery actions for this TEC, specifically those relating to minimisation of both clearing of surrounding vegetation, and soil disturbance to protect the seed bank and reduce weed invasion.

Conclusion

The proposed action is **unlikely** to result in a significant impact on Poplar Box grassy woodland TEC.

The proposed action, as it stands, given current understanding, would not result in a reduction of the extent of the community within the development site, only a reduction of low condition grassland associated with the TEC, which is not a defining feature. Given this adjacent impact, a significant impact is not considered likely. It is anticipated that as the detailed design of the proposed action evolves the area of disturbance impacting this community will reduce and the impact assessment provided above provides a conservative or ‘worst case’ scenario.

Weeping Myall woodlands

The Weeping Myall Woodlands ecological community occurs on the inland alluvial plains west of the Great Dividing Range in NSW and Queensland. It occurs in the Riverina, NSW South Western Slopes, Darling Riverine Plains, Brigalow Belt South, Brigalow Belt North, Murray-Darling Depression, Nandewar and Cobar Peneplain IBRA Bioregions. The ecological community currently occurs in small pockets throughout this range (TSSC 2009b).

This community occurs in a range of habits from open woodlands to woodlands, generally 4 to 12 m high, in which Weeping Myall (*Acacia pendula*) trees are the sole or dominant overstorey species. Weeping Myall trees often occur in monotypic stands, however, other vegetation may also occur in the ecological community, though not as dominant species, including Western Rosewood (*Alectryon oleifolius* subsp. *elongatus*), Poplar Box, or Black Box (*Eucalyptus largiflorens*) (TSSC 2009b).

The understorey of Weeping Myall Woodlands often includes an open layer of shrubs above an open ground layer of grasses and herbs, though it can exist naturally either as a shrubby or a grassy woodland. Weeping Myall undergoes regular cycles of senescence and regeneration (TSSC 2009b).

The community generally occurs on flat areas, shallow depressions, or gilgais on raised alluvial plains. These areas are not associated with active drainage channels and are rarely, if ever, flooded. The community occurs on black, brown, red-brown or grey clay or clay loam soils. Most areas remaining in the best condition are in lightly grazed, uncropped sites, such as road reserves and Travelling Stock Routes and Reserves (TSSC 2009b).

As identified within Section 7.5.1 of the BDAR, areas within the referral area qualify as Weeping Myall woodlands:

- Where Weeping Myall are present, and the community has a predominantly native understorey.
- Where at least five percent tree canopy exists, or at least 25 dead/defoliated mature Weeping Myalls still stand, and the community is dominated by Weeping Myall.
- Where the patch is greater than 0.5 ha.
- Where the patch has two layers of regenerating Weeping Myall.

Of the 16.6 ha patch of Weeping Myall mapped within the referral area, only 6.65 ha currently meets the condition class criteria of the EPBC Act community detailed above (refer to Figures 3-15 to 3-18 of the BDAR).

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- **Reduce the extent of an ecological community**

The proposed action will reduce the current extent of Weeping Myall Woodland by 0.13 ha, from 6.65 ha to 6.52 ha, thus disturbing 1.95 percent of the community within the referral area. The proposed action disturbs a portion of this community which is currently degraded and is of poor quality compared to the portion which will remain. It has few mature trees and other species in a healthy and valuable condition.

This area of impact is very small in the context of the estimated total current national extent of Weeping Myall Woodland of 220 000 to 361 000 ha (TSSC 2009b). This comprises a permanent reduction of <0.1 percent, based on these national extent estimates.

- **Fragment or increase fragmentation of an ecological community**

The entirety of the 16.6 ha of the Weeping Myall patch within the referral area occurs in one clump on the northern side of the current rail alignment, bordering the existing rail alignment, of which only 6.65 ha qualifies as the TEC, with the balance area being of poor condition, which does not meet the listing criteria requirements (refer to Appendix B of the BDAR for plot data results).

The existing rail alignment in this location is not being relocated for the new rail alignment and will remain in the same position. The area to be cleared (0.13 ha) comprises the area closest to the existing alignment where vegetation will be removed to allow for upgrade works during construction along one edge of the patch, and will not cause any fragmentation through the community. The extent of the community would be reduced by 1.95% within the referral area.

- **Adversely affect habitat critical to the survival of an ecological community**

The portion of the community to be removed, while meeting the requirements of the listing advice, is in a condition of lower quality than the remaining portion of the community and, therefore, does not offer any increased biodiversity value to the overall community. It has few mature trees and other species in a healthy and valuable condition. Remaining areas contain several mature Weeping Myall individuals. The extent of the community would be reduced by 1.95%, however most of this removal area is fragmented, subject to edge effects, and is adjacent to the existing rail corridor.

However, as it is removing an extent of the community it will reduce the overall size of the community and possibly subject it to further degradation regardless of the quality of the areas to be removed. A significant adverse effect as a result of the proposed action is therefore uncertain.

- **Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alternation of surface water drainage patterns**

During construction, the proposal would have a short-term gross impact upon soils and possibly surface water flow, within discrete areas. Soils disturbed during the works would be reinstated to maintain the original soil profile. These impacts are manageable with the implementation of erosion and sediment controls and would be unlikely to further degrade the community in the long-term. The impacts of the proposed actions would be localised and would not result in changes to abiotic factors outside the impact area. Rehabilitation of disturbed areas is proposed to regulate activity and restore native vegetation in the referral area. Protocols for a construction flora and fauna plan are outlined in Table 8-1 of the BDAR. The actions associated with the proposal are not considered likely to substantially alter hydrological patterns necessary for the community's survival.

- **Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting**

As noted in Section 7.5.1 of the BDAR, the proposed actions will not cause any substantial changes in the composition of species in the community because the community composition is relatively consistent throughout, with the exception that portion to be removed, which is of lower quality and density than the proposed remaining community. Whilst the portion to be removed does contain Weeping Myall, which is the defining component of this community, it contains a lower density of this species compared to the

component of the community that is further from the rail alignment and will not be removed. Therefore it does not contain any functionally important species.

- **Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:**
  - **Assisting invasive species, that are harmful to the listed ecological community, to become established, or**
  - **Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community,**

A weed management plan will be implemented and will contribute to the control of invasive species in the development site. With the appropriate use of this management plan it is unlikely that disturbance or removal of the 0.13 ha portion of this community will assist establishment of invasive species. However, clearing of any existing native vegetation gives opportunities for invasive species to establish and spread, so the weed management plan will need to be carefully implemented and monitored.

Due to the nature of this development, the proposed actions will not incur the requirement for regular fertilisers or other chemicals which will kill or adversely impact the growth of the species within the community. Therefore, it is not likely that the proposed actions will negatively impact the existing community through chemicals.

- **Interfere with the recovery of an ecological community.**

There is no recovery plan for this TEC. Priority recovery and threat abatement actions are outlined in the approved conservation advice for this TEC, which broadly identifies actions such as protecting listed TEC remnants through conservation agreements and covenants, strategic grazing allowing regeneration, replanting understorey species, modified lopping methods, avoidance of fertilisers/herbicides and protecting from weed invasion.

As the proposed action would reduce the extent of this community by 0.13 ha (1.95% of the local extent), the biggest threat to its recovery is that addressing invasive weeds. Provided the protocols in the weed management plan are adhered to, the proposed action will not interfere with the recovery actions for this TEC.

Conclusion

The proposed action is **unlikely** to result in a significant impact on Weeping Myall Woodlands EEC.

The proposed action, as it stands given current understanding, would result in a reduction of the extent of the community within the development site by 0.13 ha (1.95%) out of a total community area of 6.65, Given this small-scale reduction, a significant impact is not considered likely.

Threatened Species

Belson's Panic (*Homopholis belsonii*)

This species occurs on the northwest slopes and plains of NSW, mostly between Wee Waa, Goondiwindi and Glen Innes. It also occurs in Queensland predominately in the Brigalow Belt South bioregion. Two priority management sites exist at Kirramingly Nature reserve NSW and Gurley Road NSW, both approximately 50 km south of the proposed development site. Targeted surveys did not detect this species; however, surveys were undertaken during non-optimal seasonal conditions (i.e. drought) that may have suppressed seasonal growth, or limited population size if it is present, making detection more difficult. Known records south of the development site, near Gurley, were identifiable and detected at the time. Therefore, a precautionary approach has been implemented during the assessment.

The proposed works would result in the loss or disturbance to 3.4 ha of a total 16.6 ha (20.5% of the local extent) of potential habitat for this species within the referral area.

It is considered unlikely that the development site holds any important populations of this species, and that any proposed actions would lead to a long-term decrease in the size of any important populations of this species if present.

An action has, will have, or is likely to have a significant impact on threatened 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, or;**

It is not considered that an important population, or part thereof, is present within the development site. Therefore, the action would not decrease the area of occupancy of an important population. Potential habitat for the species within the study area would be reduced by 20.5 percent.

- **fragment an existing important population into two or more populations, or;**

It is not considered that an important population, or part thereof, is present within the development site. Proposed actions will disturb a portion of potential habitat on one side of the existing rail alignment.

- **adversely affect habitat critical to the survival of a species, or;**

The is currently no register of critical habitat for the species. The potential habitat within the 3.4 ha area to be disturbed is not unique to this location, and is not considered critical to the survival of this species.

- **disrupt the breeding cycle of an important population, or;**

The species was not recorded within the development site. Any population of the species occurring within the development site is not considered to constitute an important population, therefore, the proposal is not likely to disrupt the breeding cycle of an important population.

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

The action will disturb 3.4 ha of suitable habitat. This degree of habitat modification is not considered likely to occur to the extent that the species is likely to decline.

- **result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat; or**

The proposed action has the potential to contribute to the spread of invasive species in the development site through the transfer and introduction of plant material and soil on machinery. Any removal of native plant species also presents opportunities for invasive species to establish where ground cover is exposed. The implementation of a weed management plan will assist in preventing and controlling these impacts. With the appropriate use of a weed management plan, the proposal is not likely to exacerbate this impact to the point that it would constitute a substantial reduction in the quality or integrity of the species habitat within the development site.

- **interferes substantially with the recovery of a species.**

No national recovery plan for this species exists, however, a NSW state plan exists under the Saving our Species program. This plan involves management of the species at two established management sites, and any proposed actions in this development will not interfere with that recovery plan.

Conclusion

The proposed action is **unlikely** to result in a significant impact on an important population of Belson's Panic.

Belson's Panic was not recorded within the development site during targeted surveys. Nevertheless, potential habitat for the species is present, 3.4 ha of which would be disturbed/removed by the proposed action. Given an important population was not recorded, with the application of standard mitigation measures, the potential impact to Benson's Panic is considered negligible.

Five-clawed Worm-skink (*Anomalopus mackayi*)

The Five-clawed Worm-skink is known to occur in both remnant and non-remnant woodlands and grasslands where suitable habitat exists on alluvial, cracking clay soils, or self-mulching, friable basalt soils in NSW. Known important habitat includes habitat within floodplains and riparian zones, uncultivated grassy headlands, and strips between cropped areas, road reserves, travelling stock routes, and remnant vegetation on vacant lands (DSEWPC 2011).

In areas modified by agriculture and other human activities, the species has been found sheltering under artificial materials lying flat on the ground, such as discarded railway sleepers, sheet metal and hay bales. On the floodplains within its range in north-eastern NSW, the Five-clawed Worm-skink occurs in grasslands and grassy, open woodlands on heavy black and grey, alluvial cracking clay soils from 135 to 200 m above sea level. During dry periods, the species is likely to shelter where moisture is available. For example, they may take refuge in deep cracks within alluvial clay soils. It has been recorded in:

- Grasslands dominated by Mitchell Grass (*Astrebla* spp.).
- River Red Gum (*Eucalyptus camaldulensis*) - Coolibah (*E. coolabah* subsp*. coolabah*) - Bimble/Poplar Box (*E. populnea* subsp*. bimbil*) - Weeping Myall grassy woodlands to open forests, with grasses typically of the genera *Austrodanthonia, Austrostipa, Bothriochloa, Chloris, Enteropogon* and *Themeda*.

Floodplain surveys have shown, however, that the species has no preference for particular vegetation types on alluvial cracking clays. Cracking clay soils on the Namoi and Gwydir floodplains support a wide variety of vegetation communities, which are suitable habitat for the Five-clawed Worm-skink (DAWE 2020a). Important populations in north-eastern NSW occur in suitable remnant vegetation and non-remnant vegetation corridors linking remnant patches on the Namoi and Gwydir River floodplains, and on the lower north-western slopes of the Great Dividing Range (DAWE 2020a).

Potential habitat for this species exists both within and outside of the development site. No individuals of this species were recorded during targeted surveys of the development site. Those surveys were extensive and involved sight surveys, fauna trapping, nocturnal spotlighting, and active surveys involving checking under logs, rocks and other debris on the ground where the Five-clawed Worm-Skink would likely inhabit. These surveys occurred on two separate occasions, approximately two months apart, where weather conditions varied vastly during this time period (refer Section 4.2.5 of the BDAR for survey conditions).

No individuals were found, however, any population that may be present would be considered an important population given the species' limited range. Therefore, regarding the development site, a precautionary approach was taken in the assessment of significance presented below.

An action has, will have, or is likely to have a significant impact on threatened 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, or;**

The proposed works would result in the loss of 60.3 ha of an existing 235 ha of potential habitat for this species within the development site. Approximately 41.3 ha of the 60.3 ha to be removed is located in grassland densely populated with Mimosa, where litter cover and woody debris used for surface shelter was minimal or largely absent. Though this species was not detected during surveys, it may be present

within cracking clay soils at the site. Therefore, it is possible a population of this species may be present in these areas (refer Appendix B of the BDAR for survey plot data).

The remaining 19 ha would be important habitat for the species, should an undetected population be present. As clearing four or more hectares of important habitat is a high-risk for a significant impact to this species (DSEWPC 2011), it is likely that the proposed works would have a significant impact. This could lead to a long-term decrease in an important population of the species.

- **reduce the area of occupancy of an important population of a species**

The proposal will disturb or reduce the area of available suitable habitat by 60.3 ha or 25.6% within the development site. As such, the area of potential habitat to be disturbed or removed is considered likely to significantly reduce the area of occupancy of the species.

- **fragment an existing important population into two or more populations, or;**

Although no individuals were detected, due to the cryptic nature of this species, an important population of the species may be present, and potentially impacted by the proposed action. Existing railway infrastructure already fragments the available habitat, and may present a barrier to movement. The species is known to be found under railway sleepers, therefore, this suggests a degree of disturbance tolerance. The proposed action is unlikely to alter the present state of fragmentation or increase a barrier to movement markedly as the rail line already exists through this habitat. As such, the proposed action is considered unlikely to fragment an important population into one or more.

- **adversely affect habitat critical to the survival of a species, or;**

Suitable habitat for this species exists outside of the referral area, and approximately 174.7 ha of such habitat will remain as a large intact area within the development site (refer to Section 3.3.3 and Maps 3-15 to 3-18 of the BDAR for condition of habitat in the referral area). However, clearing of ≥4 ha of important habitat for the proposed works would adversely affect critical habitat for this species's survival, should a population be present.

- **disrupt the breeding cycle of an important population, or;**

Though no individuals were detected during surveys, an important population of the Five-Clawed Worm-Skink may occur in the referral area based on the presence of suitable habitat. Due to the size of the area to be removed, and the surrounding potential habitat, should a population occur here, it would be considered important and it is likely that the proposed actions would disrupt its breeding cycle.

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

The remaining habitat and habitat outside of the development site is considered sufficient to ensure that the disturbance or removal of 60.3 ha, or 25.6% of the current existing habitat within the development site, will not decrease the availability of habitat to the extent where the species is likely to decline.

- **result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat; or**

The proposal is unlikely to generate an increase in invasive species, which are known to be harmful to the species. The proposal is not considered likely to exacerbate this impact to the point that it would constitute a substantial reduction in the quality or integrity of the species habitat within the development site.

- **interferes substantially with the recovery of a species.**

A recovery plan exists for this species under the Saving Our Species program in NSW, however, no nationally coordinated plan exists. Objectives of the NSW plan involve reoccurring surveys in sites where populations are known to occur. The proposed works will not interject with any of the management objectives of the NSW recovery plan.

Conclusion

The proposed action is **likely** to result in a significant impact on an important population of the Five-Clawed Worm-Skink.

The proposed works would result in 60.3 ha of habitat being removed. Due to the nature of the development and the current understanding of development actions and plans, taking a precautionary approach, it is unclear if the development will significantly impact this species. However, it may be more susceptible given its limited range and likely limited dispersal capability.

Painted Honeyeater (*Grantiella picta*)

The species is sparsely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory, where it inhabits mistletoes in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum woodlands, acacia-dominated woodlands, paperbarks, casuarinas, callitris, and trees on farmland or gardens. The species prefers woodlands, which contain a higher number of mature trees, because these host more mistletoes. It is more common in wider blocks of remnant woodland than in narrower strips, although it breeds in quite narrow roadside strips if ample mistletoe fruit is available (DoEE 2020).

During targeted surveys, no Painted Honeyeaters were observed in the referral area. Mistletoe populations were recorded within the Weeping Myall TEC, and other River Red Gum riparian vegetation (refer Section 3.3 and Appendix B of the BDAR). As this species has dispersive habits, the species is considered to have a single population and therefore an important population of this species is considered present.

An action has, will have, or is likely to have a significant impact on threatened 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, or;**

The proposed works would result in the loss of 0.13 ha of Weeping Myall Woodland, which is recognised as habitat for this species in the referral area. Weeping Myall provides foraging and nesting habitat, however, the condition of the weeping Myall woodland to be removed is in sub-optimal condition due to past modification and fragmentation. There is a total of 6.65 ha of Weeping Myall Woodland within the development site, 1.95% of which would be removed (0.13 ha). The majority of potential habitat present, including better condition areas, inclusive of Weeping Myall individuals, and mistletoes (*Amyema* sp.) would remain both within and external to the referral area (refer to Appendix B of the BDAR for survey plot data and availability of mistletoe through the survey areas). A population of the species may utilise the development site on a transient basis is considered unlikely to be subject to a long-term decline resulting from the proposed clearing of habitat.

- **reduce the area of occupancy of an important population of a species**

The remaining Weeping Myall Woodland in the development site will continue to provide moderate quality habitat for this species. However, it is likely that the proposed works would marginally reduce the area of occupancy of an important population.

- **fragment an existing important population into two or more populations, or;**

An important population is not considered present, therefore, the proposed works would not fragment an existing important population into two or more populations.

- **adversely affect habitat critical to the survival of a species, or;**

Weeping Myall is an important habitat for the survival of this species, however, given the availability of other habitat within and in proximity to the referral area, the small area of the patch within the development site is considered unlikely to be critical to the survival of the species. Furthermore, as only a small portion would be removed and areas of greater importance, such as individual Weeping Myall and mistletoes (*Amyema* sp.) would be retained (refer Section 3.3 and Figures 3-19 to 3-22 of the BDA).

Therefore, the proposed action is considered unlikely to adversely affect habitat critical to the survival of the species.

- **disrupt the breeding cycle of an important population, or;**

The species was not recorded within the development site. Though the population of the species occurring within the development site is considered to constitute an important single population, given the small area of the proposed works, the proposal is not considered likely to disrupt the breeding cycle of an important population.

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

It is not likely that the removal or disturbance of 0.13 ha of vegetation will contribute or lead to the decline of the species, as surrounding suitable habitat of higher quality would not be impacted.

- **result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat; or**

Mitigation measures have been recommended to ensure that the proposed works would not result in the introduction or spread of any invasive species. A weed management plan would be prepared prior to any works taking place.

- **interferes substantially with the recovery of a species.**

A recovery plan exists for this species under the Saving Our Species program in NSW, however, no nationally coordinated plan exists. The actions in the NSW recovery plan focuses on: protecting, maintaining and planting important vegetation species such as Weeping Myall, which is a key species in the Weeping Myall Woodland TEC; encouraging landholders to protect vegetation through sensitive grazing practices; removing weeds; conducting further research into the species and the species' threats.

As some Weeping Myall individuals may require removal, this contravenes the NSW recovery objective to protect and maintain this species. However, it is unlikely that this interference would have a significant impact on the Painted Honeyeater because the 0.13 ha portion of vegetation to be disturbed or removed is not high quality and better quality habitat will retained in the surrounding environment (refer Section 3.3 and Appendix B of the BDAR).

Conclusion

The proposed action is **unlikely** to result in a significant impact on an important population of the Painted Honeyeater.

Due to the small amount of vegetation to be removed as part of the proposed works, the remaining vegetation habitat, and the condition of the habitat to be disturbed, the proposal is not likely to adversely affect habitat that is critical to the ongoing survival of this species. The proposed works are unlikely to influence any new establishment of invasive species or diseases that would cause the species to decline.

Koala (combined populations) (*Phascolarctos cinereus*)

Two Koalas were observed at both the Mehi and Gwydir Rivers (four in total) during surveys on 5 December 2019. Additionally, a moderate abundance of Koala scat was recorded at all Spot Assessment Technique (SAT) survey locations. Recent or fresh scat was also recorded frequently along the Mehi and Gwydir Rivers, suggesting this corridor is frequently used for movement, and residence of a local Koala population. The SAT surveys, undertaken at Duffys Creek and Poplar Box/Carbeen woodland, detected a moderate abundance of Koala scat; however, this was much older, suggesting these areas may be used intermittently by Koala individuals. A species polygon has been applied to areas of habitat within the development site.

Using the OEH Atlas of NSW Wildlife, analysis of Koala records from the local area indicated that 33 records exist within 10 km of the referral area. Records of sightings occur in and around Moree township and in one location along the existing rail corridor between Moree and Camurra, amongst vegetation patches and scattered trees (OEH 2020).

This Assessment of Significance for the koala has been prepared in consideration of the EPBC Act Referral Guidelines for the Vulnerable Koala (DoE 2014).

The Referral Guidelines advise that the assessment of significant impacts on the Koala is to be undertaken primarily through the assessment of habitat critical to the survival of the Koala and actions that interfere substantially with the recovery of the Koala. This approach aims to avoid and address habitat loss, and promote a streamlined assessment and approval process.

Koala feed trees for the Northwest Slopes Koala Management Area (KMA) were determined from the *State Environmental Planning Policy (Koala Habitat Protection) 2019*, which commenced on 1 March 2020 (refer to Section 4.2.5 of the BDAR).

Table 4 identifies the extent of Koala habitat within the referral area, based on the extent of primary and secondary Koala feed trees occurring within discrete vegetation communities.

Remnant vegetation associated with rivers and creeks are likely to provide important corridors for the species within the highly modified and fragmented landscape in the western slopes and plains KMA. Approximately 12.5 ha of koala habitat will be permanently impacted (out of a total of 53.1 ha (23.5%)) as a result of the proposed action. There are no areas of temporary disturbance.

Table 4 applies the Koala Habitat Assessment Tool, as outlined in Table 4 of the Koala referral guidelines (DoE 2014).

Table 4: Koala Habitat Assessment Tool

Koala Habitat Assessment Tool (Table 4 from DoE 2014)			**Referral Area Assessment**	
Attribute	**Score**	**Inland**	**Allocated Score**	**Score Justification**
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 5 years.	+2	**Desktop:** EPBC PMST report identified the koala as ‘known to occur’ in the study area.

Koala Habitat Assessment Tool (Table 4 from DoE 2014)			Referral Area Assessment	
Attribute	**Score**	**Inland**	**Allocated Score**	**Score Justification**
	+1 (medium)	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 10 years.		OEH Atlas of NSW Wildlife point buffer search identified 32 koala records within 10 km of the referral area and 19 within 2 km within the last 10 years. **On-ground:** Evidence of the koala was recorded during the field surveys of the referral area in 2019, including 4 sightings at 2 locations, and scats recorded at all locations.
	0 (low)	None of the above.		
Vegetation composition	+2 (high)	Has forest or woodland or shrubland with emerging trees with 2 or more known koala food tree species in the canopy. **OR** 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.	+2	**Desktop:** **On-ground:** This referral area contains woodland and riparian areas contain several Koala feed tree species for the Northwest Slopes KMA, including River Red Gum *Eucalyptus camaldulensis* (refer to Section 4.2.5 of the BDAR).
	+1 (medium)	Has forest or woodland or shrubland with only 1 species of known koala food tree present in the canopy.		
	0 (low)	None of the above.		

Koala Habitat Assessment Tool (Table 4 from DoE 2014)			Referral Area Assessment	
Attribute	**Score**	**Inland**	**Allocated Score**	**Score Justification**
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 1000 ha.	+2	The referral area is within a highly fragmented region with a long history of broad scale cultivation and other agricultural activities. The proposed action involves small areas of habitat clearing spread over a long rail line corridor. Scattered woodland areas occur, but are relatively uncommon across the broader landscape. Despite the above, some areas that would be impacted are connected to outside bushland that exceeds 1000 ha.
	+1 (medium)	Area is part of a contiguous landscape < 1000 ha, but ≥ 500 ha.		
	0 (low)	None of the above.		
Key existing threats	+2 (high)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence. Areas which score 0 for koala occurrence and have no dog or vehicle threat present.	+1	**Desktop:** BioNet Wildlife Atlas records note two koala road mortalities, in 2014 and 2016 ranging between 1km and 4 km of the referral area on local roads (OEH 2020). **On-ground:** It is expected that any local koala populations could be affected by infrequent or irregular koala mortality from vehicle strike associated with the Newell Highway, Gwydir Highway, local roads, and the existing railway.
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence,		

Koala Habitat Assessment Tool (Table 4 from DoE 2014)			Referral Area Assessment	
Attribute	**Score**	**Inland**	**Allocated Score**	**Score Justification**
		OR Areas which score 0 for koala occurrence and are likely to have some degree dog or vehicle threat present.		
	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, **OR** Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.		
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	+2	**Desktop:** The interim recovery objectives for inland areas listed under Table 1 of the DoE (2014) guidelines are to: ▪ Protect and conserve the quality and extent of habitat refuges for the persistence of the species during droughts and periods of extreme heat, especially in riparian environments and other areas with reliable soil moisture and fertility (this may include habitat which occurs on permanent aquifer, in a riparian zone, on upper or mid-
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the		

Koala Habitat Assessment Tool (Table 4 from DoE 2014)			Referral Area Assessment	
Attribute	**Score**	**Inland**	**Allocated Score**	**Score Justification**
		relevant context, as outlined in Table 1.		slopes, on a fertile alluvial plains or where soil moisture/rainfall is reliable). ▪ Maintain the quality, extent and connectivity of large areas of koala habitat surrounding habitat refuges. **On-ground:** Supports important connectivity
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.		
TOTAL SCORE			**9**	**Decision: Habitat critical to the survival of the Koala**

According to the EPBC Act Referral Guidelines for the Vulnerable Koala, impact areas that score five or more using the habitat assessment tool contain habitat critical to the survival of the koala. This is the case for the development area, which has a score of 9 (Table 4).

In this case, an important population is a population 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; or**
- **populations that are necessary for maintaining genetic diversity, and/or**
- **populations that are near the limit of the species range.**

An action has, will have, or is likely to have a significant impact on threatened 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, or;**

Distribution of this species ranges from north-eastern Queensland to the south-east corner of South Australia. Targeted surveys revealed both sightings and scat present throughout potential habitat areas. Within the development site, there is 53.1 ha of habitat for this species. The individual(s) whose territory overlaps with the habitat present within the development site are likely to be members of a population whose home range may be far reaching given the generally cleared nature of the surrounding landscape. The nearest formally protected land is Midkin Nature Reserve, over 13 km to the north-east of the development site. This suggests that the population is likely to be dispersed commensurate to available resources. Prior to the 2019/2020 bushfire season, this population was unlikely to be considered an

important population, however, as the impacts of the fire season to Koala numbers and distribution across NSW are yet to be accurately quantified, on a precautionary basis, an important population is considered to be present. Further discussion on Koalas and impacts to population is provided throughout Section 7.3 of the BDAR.

Within the development site, there is 53.1 ha of potential habitat for this species, of which, 12.5 ha of this area will be disturbed as a result of the proposed action, or a total of 23.5% of the total potential habitat. Also, as discussed within Section 7.3.5 of the BDAR, increased construction and operational rail traffic and, therefore, greater risk of vehicle strike is considered likely during construction. It is unclear if the proposed actions will lead to a long-term decrease in the size of a potential important population of this species, however, disturbance of 23.5% of potential habitat is substantial.

- **reduce the area of occupancy of an important population, or;**

The proposed actions will disturb or remove 23.5% of potential habitat for this species within the development site. It is possible that this would reduce the area of occupancy of an important population of this species.

- **fragment an existing important population into two or more populations, or;**

Koala habitat in the development site is already separated by the existing rail corridor. Proposed actions to relocate the rail alignment do not separate any whole patches of potential habitat. Dependent on the proposed actions, if habitat is to be cleared away from each side of the rail alignment, this could pose further disturbance and solidify fragmentation of habitats. It is unclear if the proposed actions will fragment an existing important population into two or more populations.

- **adversely affect habitat critical to the survival of a species, or;**

The EPBC Act referral guidelines for the vulnerable koala (DoE, 2014) focus on the impacts of proposals to habitat critical to the survival of the koala present and future. Table 4 of the guidelines provide a habitat assessment tool that allows for a flowchart to be followed in determining whether the habitat proposed to be impacted should be considered critical habitat. In the case of the proposal, the habitat to be impacted generated a score of nine (9) and is therefore considered critical habitat. 12.5 ha of critical habitat would be adversely affected, indicating that a referral is recommended.

- **disrupt the breeding cycle of an important population, or;**

Females breed in high quality habitat with dense resource species. The development site supports Koala food trees and has the possibility to support some breeding behaviour, however, it does not contain the highest quality habitat within the connective landscape (refer to Section 2.7 and Figure 2-1 of the BDAR). It is likely that this is part of a key breeding area for a dispersed population of this species and therefore is likely to disrupt the breeding cycle of an important population.

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

The proposed action has the possibility to disturb or remove 23.5% of the current existing Koala habitat within the development site. This has the potential to reduce the carrying capacity of the population present.

- **result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat, or;**

The proposal is considered unlikely to generate an increase in invasive species harmful to the species. The proposal is not considered likely to exacerbate this impact to the point that it would constitute a substantial reduction in the quality or integrity of the species habitat within the development site.

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

The EPBC Act referral guidelines for the vulnerable Koala (DoE, 2014) list several potential impacts that could interfere substantially with the recovery of the species. Impacts relevant to this project include:

- Increasing Koala fatalities in habitat critical to the survival of the koala due to vehicle-strikes during construction and operation to a level that is likely to result in multiple, ongoing mortalities.
- Facilitating the introduction or spread of disease or pathogens for example Chlamydia or *Phytophthora cinnamomi*, to habitat critical to the survival of the Koala, that are likely to significantly reduce the reproductive output of koalas or reduce the carrying capacity of the habitat.
- Creating a barrier to movement to, between or within habitat critical to the survival of the Koala that is likely to result in a long-term reduction in genetic fitness or access to habitat critical to the survival of the Koala.
- Changing hydrology which degrades habitat critical to the survival of the Koala to the extent that the carrying capacity of the habitat is reduced in the long-term.

As mentioned, the habitat to be removed may constitute critical habitat for Koala. Direct mortality of individuals from actions such as disruption of breeding is considered unlikely, and although increased rates of vehicle and train strike is likely, impacts can be reliably mitigated by installing fauna exclusion fencing and barriers to movement. Koalas may also be struck by trains, but this is considered less likely than vehicle strikes. Similarly, implementing hygiene protocols for plant and equipment, and through ensuring that hydrological regimes remain unaltered as far as is practical would protect remaining adjacent vegetation. Movement barriers created in proximity to fauna movement corridors will exclude threatened species, including Koalas, from the transport corridor. Further discussions on impacts to koalas and specific mitigation measures are in Sections 7 and 8 respectively of the BDAR.

There is no national recovery plan for this species. A NSW state plan exists under the Saving our Species Program. The objectives of this program include aiming to secure the species in the wild in NSW for 100 years, engaging local communities in its conservation and encourage the NSW community to identify with it as a flagship for threatened species conservation. The proposed actions may interfere with securing this species in the wild.

Conclusion

The proposed action is **likely** to result in a significant impact on an important population of the koala.

Disturbance or removal of 12.5 ha (23.5%) of potential Koala habitat in the development site has the possibility to impact an important population of this species. Given that this habitat has been assessed as constituting habitat critical to Koala this suggests a significant impact is possible.

Grey-headed flying-fox (*Pteropus poliocephalus*)

Fourteen Grey-headed Flying-foxes were recorded during targeted surveys of the referral area. All woodland vegetation within the referral area is expected to provide potential foraging habitat for this species.

Camp sites (breeding habitat) were not identified and are not expected to occur due to a lack of suitable habitat. According to the Draft National Recovery Plan for the Grey-headed Flying-fox (DoEE 2017), foraging habitat that meets one of the following criteria is considered critical to the survival of the species:

- productive during winter and spring, when food bottlenecks have been identified
- known to support populations of >30,000 individuals within an area of 50 km radius (the maximum foraging distance of an adult)
- productive during the final weeks of gestation, and during the weeks of birth, lactation and conception
- productive during the final stages of fruit development and ripening in commercial crops affected by grey-headed flying-foxes
- known to support a continuously occupied camp.

The nearest known roost camp site of the Grey-headed Flying-fox to the referral area is at Blair Athol, near Inverell, approximately 120 km south-east of the referral area. A currently un-used camp site was formerly known at Barraba, approximately 75 km east of Narrabri. The referral area does not contain known camp sites of the grey-headed flying-fox.

The population estimate for the Grey-headed Flying-fox population at Inverell is estimated at between 16,000 and 49,000 individuals (National Flying-fox Monitoring Viewer, accessed 16 January 2020). As the referral area is not located within 50 km of a population of the Grey-headed Flying-fox that supports more than 30,000 individuals it is not considered that it is habitat critical or essential to the survival of this species and the referral area does not support an important population of the species, as defined by the significant impact guidelines below.

In this case, an important population is a population 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; or**
- **populations that are necessary for maintaining genetic diversity, and/or**
- **populations that are near the limit of the species range.**

Fourteen Grey-headed Flying-foxes were recorded within the referral area. There are no records of grey-headed flying-fox on the OEH Atlas of NSW Wildlife within 10 km of the referral area. There are no camp sites or breeding habitat for this species within the referral area and therefore, it is unlikely to be a key source population either for breeding or dispersal or comprise a population that is necessary for maintaining genetic diversity. The species is not near the limits of its known range within the referral area. Therefore, any potentially occurring population of Grey-headed Flying-fox within the referral area would not be an important population.

An action has, will have, or is likely to have a significant impact on threatened 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, or;**

There is a total area of 49.2 ha of potential flying-fox habitat in the development site. The proposed works would remove 12.5 ha potential (11.1 ha on the Mehi and Gwdir Rivers) or marginal (1.4 ha Mehi Billabong and floodplain) Grey-headed Flying-fox roosting habitat present within the development site (approximately 25.4% in total). Targeted surveys observed large numbers of Little Red Flying-foxes and occasional Grey-headed Flying-foxes foraging within the development site and roosting approximately 500 m north-west of the development site. This camp is not known to be an important roosting or breeding site for these species, however it may be considered an important population in future as there are few NSW BioNet records of the species west of Moree, suggesting this camp is nearly the westerly limit of the species' range. This site would not be directly impacted. Therefore, impacts to the species is limited to removal of potential foraging habitat and impact to a potential future roost site. Despite the degree of habitat removal proposed, it is unlikely to lead to a long-term decrease in the population as of the habitat to be removed.

- **reduce the area of occupancy of an important population, or;**

Grey-headed Flying-fox do not occupy any area within the development site for roosting and use is limited to foraging. Therefore, the proposed actions will not reduce the area of occupancy of an important population of this species.

- **fragment an existing important population into two or more populations, or;**

This species does not have any roosting camps within the site, and so it is not possible that the proposed actions will cause any existing important populations to fragment into two or more populations.

- **adversely affect habitat critical to the survival of a species, or;**

This species does not have defined critical habitat and utilises a broad range of resources. Further, the potential habitat to be removed is of poor – moderate quality and is of minimal use to this species. It is more reasonable that this species would utilise resources in other areas of the development site which is not being removed, and habitat available within the populations' range. It is unlikely that the proposed actions will adversely affect habitat critical to species survival.

- **disrupt the breeding cycle of an important population, or;**

Roosting sites for populations in this location are not within the development site and proposed actions are unlikely to disrupt the breeding cycle of important populations.

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

The potential habitat to be removed is of poor – moderate quality and most likely contributes little to the longevity of this species. As a large portion of the potential habitat to be removed is currently of sub optimal quality, it is most likely inconsequential to the decline of this species. It is unlikely that the proposed actions will alter the existing habitat to the extent which this species declines. Habitat for the species will be retained within the higher quality portion of foraging habitat within the proposal site.

- **result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat, or;**

The proposal is considered unlikely to generate an increase in invasive species harmful to the species. The proposal is not considered likely to exacerbate this impact to the point that it would constitute a substantial reduction in the quality or integrity of the species habitat within the proposal site.

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

The national recovery plan for this species lists the following objectives

- Recovery objective 1: Identify, protect and enhance native foraging habitat critical to the survival of the Grey-headed Flying-fox.
- Recovery objective 2: Identify, protect and enhance roosting habitat of Grey-headed Flying-fox camps.
- Recovery objective 3: Determine population trends in Grey-headed Flying-foxes so as to monitor the species' national distribution and conservation status.
- Recovery objective 4: Build community capacity to coexist with flying-foxes and minimise the impacts on urban settlements from existing camps without resorting to dispersal.
- Recovery objective 5: Increase public awareness and understanding of Grey-headed Flying-foxes and the recovery program, and involve the community in the recovery program where appropriate.
- Recovery objective 6: Improve the management of Grey-headed Flying-fox camps in sensitive areas.
- Recovery objective 7: Significantly reduce levels of deliberate Grey-headed Flying-fox destruction associated with commercial horticulture.
- Recovery objective 8: Support research activities that will improve the conservation status and management of Grey-headed Flying-foxes.

Whilst the recovery plan states protection of native foraging habitat, the habitat for disturbance or removal in the development site is not only a small area but is also sub-optimal, therefore it is not considered critical habitat. The proposed works do not substantially interfere with the recovery plan.

Conclusion

The proposed action is **unlikely** to result in a significant impact on an important population of the Grey-headed Flying-fox.

The habitat to be removed (12.5 ha) as part of this proposal is not of critical importance to the Grey-headed Flying-fox. Generally, although vegetation may be used for foraging, no roosting camp will be directly impacted. Likelihood of a roosting camp being established within the development site is unlikely and increases in likelihood further away from the existing rail and highway. The proposed action is therefore not considered likely to have a significant impact on this species.

Murray Cod (*Maccullochella peelii*)

The Murray Cod was historically distributed throughout the Murray-Darling Basin (MDB), and still occurs in most parts of this natural distribution (the species' distribution) up to approximately 1000 m above sea level. The MDB contains about 13,245 km of waterways that may encompass areas of habitat suitable for this species and its estimated extent of occurrence, based on areas with an average river width of 50 m, is 660 km^2 (DAWE 2020c).

The Murray Cod utilises a diverse range of habitats from clear rocky streams, such as those found in the upper western slopes of NSW (including the ACT), to slow-flowing, turbid lowland rivers and billabongs. Murray Cod are frequently found in the main channels of rivers and larger tributaries, and tend to occur in floodplain channels and anabranches when they are inundated, but the species's use of floodplain habitats appears limited. Preferred microhabitat consists of complex structural features in streams such as large rocks, snags (pieces of large submerged woody debris), overhanging stream banks and vegetation, tree stumps, logs, branches and other woody structures (DAWE 2020c).

Fourteen Murray Cod were recorded during targeted aquatic surveys of the referral area, one recorded from the Mehi River, and 13 from the Gwydir River. The proposed works would disturb approximately 1 ha of the waterway and associated riparian vegetation to upgrade the two existing bridge crossings at the Mehi and Gwydir Rivers.

Habitat conditions for this species at both proposed bridge disturbance areas comprise low amounts of instream woody debris and moderate amounts of bank overhang and trailing vegetation. Habitat assessments at the sites are detailed in both Appendix A of the aquatic ecology report and Section 3.3 of the Umwelt report.

An action has, will have, or is likely to have a significant impact on threatened 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, or;**

In NSW, the Gwydir River is identified as a key asset site for the Murray Cod and the Gwydir River population. The Gwydir River population is identified as an important population in the National Recovery Plan for the Murray Cod. It is more commonly recorded in the Mehi River, and may occur in class 1 key fish habitats in the Mehi and Gwydir Rivers. Disruption of habitat as a result of the proposed actions would be limited to a small area associated with locations where the rail alignment crosses these rivers, replacement of bridges, and limited to the construction phase of the project.

The total area of river within the development site is 7.1 ha, of which, an area of 1 ha intersecting the two rivers within the referral area will be disturbed to upgrade the existing bridges. The actions will not lead to a long-term decrease in the size of the Gwydir River important population, provided the Construction Management Plan specified in Table 8-1 of the BDAR and the mitigation and management measures in Section 6.2 of the aquatic ecology report are adhered to.

- **reduce the area of occupancy of an important population, or;**

Disruption of habitat would be limited to the 1 ha area which intersects rivers within the development site. Where the new alignment crosses these areas via bridges, existing rail alignment and bridges already exist. It is unclear what the new design of proposed structures would entail and, therefore, it is not known if these actions will reduce the size of the river passage in this area.

- **fragment an existing important population into two or more populations, or;**

If the existing structures are to be expanded from their current state, it will further reduce the movement of passage of this species through these locations. However, if the proposed actions do not block the river passage, it is unlikely that the present important populations will be fragmented into two or more populations.

- **adversely affect habitat critical to the survival of a species, or;**

Present river conditions and vegetation at the bridge sites are like other habitat values recorded at other sites along the Gwydir and Mehi Rivers, and are not critical to the survival of this species generally. Detailed habitat assessments undertaken at numerous locations along these watercourses are described in both Appendix A of the aquatic ecology report, and Section 3.3 of the Umwelt (2017b) report. Therefore, with appropriate mitigation, as identified in Section 6.1 of the aquatic ecology report, it is unlikely that the development will adversely affect habitat which is critical to this species' survival.

- **disrupt the breeding cycle of an important population, or;**

Murray Cod have an annual reproductive cycle with egg development through winter, spawning over four to five weeks when water temperatures are higher than 15°C. Eggs are most likely laid in a sunken log. Recruitment success is linked to higher flowing rivers. If construction involves removal of debris or materials within the riverbed, it has the potential to disrupt breeding cycles.

This species was recorded at both bridge locations within the development site during surveys undertaken in March 2020. It should be noted that numerous prior records of this species are located elsewhere in the river system, not within the development site.

Mitigation measures proposed in Section 6.2 of the aquatic ecology report include recommendations to relocate large woody debris up and downstream. Provided these are implemented, it is not considered likely that disruption to important breeding populations will occur within this area.

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

Dependant on the proposed actions to the bridges, habitat within the development footprint may modify the quality of existing habitat. It is unclear if the proposed actions will decrease the availability of habitat in the long term to the extent which causes the species to decline.

- **result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat, or;**

Introduced species may compete with this species for habitat resources, and any works related to the modification of bridges may influence further establishment of invasive species.

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

A national recovery plan exists for this species and has the following objectives:

- Determine the distribution, structure and dynamics of Murray Cod populations across the MDB.
- Manage river flows to enhance recruitment to Murray Cod populations.

- Evaluate the risks of threats and benefits of recovery options on Murray Cod populations for each management unit.
- Determine the habitat requirements of Murray Cod life stages and populations.
- Manage the recreational fishery for Murray Cod in a sustainable manner while recognising the social, economic and recreational value of the fishery.
- Encourage community ownership for Murray Cod conservation.
- Manage Recovery Plan implementation.

The proposed works do not interfere with the recovery plan for this species.

Conclusion

The proposed action is **unlikely** to result in a significant impact on an important population of Murray Cod.

Although, the Gwydir River population is identified as an important population in the National Recovery Plan for the Murray Cod, with the implementation of the management and mitigation measures proposed, the extent/type of potential impacts is such that the action is unlikely to have a significant impact.

Migratory Species

Satin Flycatcher (*Myiagra cyanoleuca*)

Satin Flycatchers are widespread in eastern Australia. In NSW, they are widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains. Satin Flycatchers are a summer breeding migrant and generally inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, riparian areas, woodlands, mangroves and drier woodlands and open forests. They are mainly recorded in wet sclerophyll forests (DAWE 2020d).

Will the action substantially modify (including fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species?

One Satin flycatcher was heard calling with the riparian vegetation along the Gwydir River in February 2019. The proposed actions of this development do not substantially modify, destroy or isolate any areas that are this critical habitat type for this species.

Will the action result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for migratory species?

It is not likely that the proposed actions will result in an invasive species becoming established which is harmful to this species.

Will the action result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for migratory species?

The proposed actions do not impact specific areas that are of importance to this species and therefore will not have adverse impacts on the lifecycle of an important population of this species.