Appendix C

Significant Impact Assessments for MNES

C1 Significance Assessments

Significance assessment has been conducted using the criteria in the *Matters of National Environmental Significance: significant impact guidelines 1.1* (DoE 2013) and with reference to relevant referral guidelines for species where available. Significant impact assessments have been conducted for the Glass House Mountains National Landscape (National Heritage Place) and for those species known or likely to occur in the study area.

C1.1 Glass House Mountains National Landscape

The Glass House Mountains National Landscape is listed on the National Heritage List, in the 'natural' class. The Glass House Mountains are a distinctive and spectacular landform feature of South East Queensland, and represent the best example of an eroded central volcano complex in Australia. The site is important for elucidating the volcanic history of the eastern Australian mainland. Official values of this National Heritage Place include (DAWE, 2020):

- Events, processes
- Research
- Aesthetic characteristics.

The Glass House Mountains are a natural habitat surrounded by pine plantations and rural and residential development. The existing North Coast rail line runs adjacent to the Glass House Mountains National Heritage Place north of Beerburrum for a distance of approximately 900m (Figure 9). In this location, the new rail alignment will tie into the east of the existing rail alignment (i.e. no closer than the existing rail alignment to the National Park).

The project boundary also includes a property directly north of the National Park, which is currently agricultural land but will be used for the construction and operation of the Barrs Road overpass.

Further south near Beerburrum, the project alignment crosses agricultural land west of the existing rail line and directly east of the Glass House Mountains National Heritage Place for a distance of approximately 150m. Also near Beerburrum part of the new alignment will be further east, therefore further from the National Heritage Place than the existing rail line for a distance of approximately 1km. The existing rail line in that location will be decommissioned.

A significant impact assessment has been undertaken in accordance with the *Matters of National Environmental Significance: significant impact guidelines 1.1* (DoE 2013) for this place in Table 15. Based on the significant impact assessment, it is determined that the action will not have a significant impact on the National Heritage Place.

Table 15: Assessment against significant impact criteria for a National Heritage Place (for a place with natural heritage values)

Criteria if action will cause:	Assessment against criteria
One or more of the National Heritage values to be lost; One or more of the National Heritage values to be degraded or damaged; One or more of the National Heritage values to be notably altered, modified, obscured or diminished.	***Geology or landscape values*** All project works will be outside the boundary of the National Heritage Place, therefore the action will not damage, modify or obscure important geological formations, landforms or landscape features by clearing or infilling the land surface. The nearest important landforms are Mt Tibrogargan and Mt Beerburrum, which are approximately 600m and 500m respectively, to the west of the project boundary and will not be damaged, modified or obscured as a result of the works. The project is adjacent to remnant vegetation within the National Heritage Place boundary and no clearing or damage to vegetation in the National Heritage Place boundary will occur as a result of the project. ***Wilderness, aesthetic, or other rare or unique environmental values*** The works will not involve the construction of buildings, roads or other structures or vegetation clearing in the National Heritage Place. The works will occur adjacent to the boundary of the National Heritage Place, therefore construction may result in localised and temporary impacts as a result of dust or noise generation during construction. Due to the temporary nature of these impacts and the implementation of construction environmental management measures, these impacts are not likely to be substantial or long-term. The new rail alignment is closer to the National Park boundary in some locations than the existing rail alignment, and further away in others. On balance, the new rail alignment is further from the boundary and approximately 1km of the old rail alignment that is adjacent to the National Park will be decommissioned. During operation of the railway upgrade, trains using the North Coast line will generate intermittent noise that would be audible from within the National Heritage Place. The noise assessment for the REF identified that sound levels generated during operation of the rail line would not be significantly different to those generated by existing rail operations on the North Coast line. Operational noise impacts from trains are therefore not expected to have a substantial impact on the aesthetic values of the place.

C1.2 Swamp Stringybark

Swamp Stringybark (*Eucalyptus conglomerata*) is listed as endangered under the EPBC Act.

Swamp Stringybark is a mallee tree to 12 m high with coarsely fibrous grey-brown bark. Swamp Stringybark is found in 10 known locations between Beerburrum and Kin Kin within the South East Queensland Natural Resource Management Region (DAWE, 2008; Halford, 1998). Approximately 1100 individuals are known, occurring both in protected and private land. Swamp Stringybark grows on coastal flats up to 30 m above sea level (Halford, 1998). Its preferred habitat is the ecotone between open forest and heathland (DAWE, 2008; Halford, 1998). Its preferred soil type is infertile, seasonally waterlogged and deep sandy or peaty acidic soils (DAWE, 2008; Halford, 1998). A major factor of the distribution of Swamp Stringybark is its preference for particular soil hydrology and inability to compete with larger Eucalypt species (Halford, 1998).

During flora surveys, 48 individuals of Swamp Stringybark were recorded within a part of the Glass House Mountains National Park, on Lot 127NPW725. None of these plants and the vegetation that supports this population are located inside the project boundary and as such, would not need to be cleared.

A significant impact assessment has been undertaken in accordance with the *Matters of National Environmental Significance: significant impact guidelines 1.1* (DoE 2013) for this species in Table 16. Based on the significant impact assessment, it is determined that there is no real chance or possibility that the action will have a significant impact on the threatened species Swamp Stringybark.

Table 16: Assessment against Significant impact criteria for Swamp Stringybark.

Criteria if action will:	Assessment against criteria
Lead to a long-term decrease in the size of a population.	No. There is no real chance or possibility that the action will remove individuals of the species, as the population is located in a National Park outside of the project boundary. There is also no real chance or possibility that the action will lead to a long-term population decrease, due to the distance of the works from the population (~50m) and implementation of measures to prevent accidental and indirect impacts (including delineation of clearing boundaries and no-go zones).
Reduce the area of occupancy of the species.	No. There is no real chance or possibility that the approximately 1.3 ha area of occupancy of the species will be directly reduced by the action as the location is within a National Park and outside of the project boundary.
Fragment an existing population into two or more populations.	No. The identified population is located outside of the project boundary in an adjacent National Park, therefore the action will not fragment the population into two or more populations or remove individuals from the edge of the patch.

Criteria if action will:	Assessment against criteria
Adversely affect habitat critical to the survival of a species.	No. The identified population and its supporting habitat are located outside of the project boundary in a protected area. There is no real chance or possibility that this habitat will be adversely affected.
Disrupt the breeding cycle of a population.	No. The action will not impact the breeding cycle for pollinator species such as birds and insects for the species, as no vegetation in the National Park will be impacted.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	No. The identified population and supporting habitat is located 50 – 100 m outside of the project boundary and in a protected area. There is also approximately 5.2 ha of additional, connected and suitably protected habitat located further than 100m from the project alignment within the National Park. Therefore the project is not likely to remove species habitat to the extent that the species is likely to decline. There is a low risk that the action will indirectly impact the quality of the species habitat through construction impacts such as changes to hydrology, sedimentation, pollution, water table level change, or alteration of surface water drainage patterns. These impacts are not likely to be significant as environmental management measures will be implemented during construction (erosion and sediment control, dust control) and the project boundary is separated from the National Park in this location by the existing Old Landsborough Road.
Result in invasive species that are harmful to a endangered species becoming established in the endangered species' habitat.	No. A variety of invasive weed species, including identified threatening species such as *Baccharis halimifolia* and exotic grasses are present in the non-remnant areas surrounding the identified habitat. Disturbance from the proposed action will be limited to within the project boundary. As the identified habitat is located outside the project boundary in a protected area, and weed control for the project will be implemented through the construction environmental management plan, there is no real chance or possibility that its habitat will be significantly disturbed to result in invasive species establishment.
Introduce disease that may cause the species to decline.	No. There are no known diseases that threaten the species. Disturbance from the proposed action will be limited to within the project boundary. As the species population is located outside of the project boundary and is separated from the project boundary by the existing Old Landsborough Road, there is no real chance or possibility that the action will introduce disease that may cause the species to decline.
Interfere with the recovery of the species.	No. There is no adopted or made Recovery Plan for this species. There is also no real chance or possibility that the action will interfere with the recovery of the species. However, identified threats to the species relevant to the action include habitat clearing, alteration of hydrology, and introduction of weed species. As described above there is a low risk of these impacts significantly impacting the recovery of the species due to the works being contained within the project boundary and

Criteria if action will:	Assessment against criteria
	separated from the population by an existing road. There is a low risk of indirect construction impacts that will be managed through measures in the construction environmental management plan.

C1.3 Smooth Davidson's Plum

Smooth Davidson's Plum is listed as endangered under the EPBC Act.

Smooth Davidson's Plum is a small to medium bushy tree from 5-12 m high. It has smooth glossy leaves which are divided into 7-9 toothed leaflets. The plum-like fruits are a well-known bush food and are not known to contain fertile seed (DAWE, 2016; NSW OEHa, 2020). The plant reproduces vegetatively through the growth of root suckers (DAWE, 2016; DEC NSW, 2004). Naturally occurring populations of the species are highly fragmented, and occur on both protected and private land between Tallebudgera and Numinbah Valleys in Queensland to Tintenbar in New South Wales (DAWE, 2016; NSW OEHa, 2020). The preferred habitat is within slopes and gullies in wet sclerophyll forest and complex notophyll vine forest, with a preferred altitude between 15-270 m above sea level (DEC NSW, 2004; DAWE, 2016). The preferred soil type of Smooth Davidson's Plum is shallow clay loams with volcanic sediments. The evolutionary potential of the species is likely to be limited, due to its low genetic diversity and reproductive infertility (DAWE, 2016).

One individual of Smooth Davidson's Plum was recorded on private property on Lot 1 RP124412, within vegetation that is mapped as non-remnant. The identified plant is located within the project boundary shown and will be impacted by the project.

A significant impact assessment has been undertaken in accordance with the *EPBC Act Significant Impact Guidelines 1.1* for this species in Table 17. Based on the significant impact assessment, it is determined that there is no real chance or possibility that the action will have a significant impact on the threatened species Smooth Davidson's Plum.

Table 17: Assessment against Significant impact criteria for Smooth Davidson's Plum.

Criteria if action will:	Assessment against criteria
Lead to a long-term decrease in the size of a population.	No. The single individual identified during field surveys is located within the project boundary and will be impacted by the project. However, the individual seems very likely to be the result of plantings during a revegetation program on the property, rather than a naturally occurring plant. It is also outside the species' known range which is from the Gold Coast south to Tintenbar in NSW. The species is not known to occur in this region. No other individuals of this species were identified during flora surveys. There is not a population of the species here, but an individual that has been artificially located (planted) outside the species' known range. Impacts to this individual will not impact on a population of this species and will not affect the survival of the species. The preferred habitat for the species is within slopes and gullies in wet sclerophyll forest and complex notophyll vine forest. The individual identified in surveys is located in advanced regrowth and not within preferred habitat type for the species.

Criteria if action will:	Assessment against criteria
	Furthermore, there will be plantings of this species included in revegetation/landscaping works this project at a ratio of 5:1 (therefore at least 5 new plants will be established to replace the loss of this individual plant). The project will not lead to a long-term decrease in the size of a population.
Reduce the area of occupancy of the species.	No. See full response for the first criterion above, in particular: There is not a population of the species here, but an individual that has been artificially located (planted) outside the species' known range. Impacts to this individual will not impact on a population of this species and will not affect the survival of the species. Therefore area of occupancy of the species does not extend to this single location where if not planted, the species would not be naturally occupying this location. Furthermore, at least 5 new plants will be established to replace the loss of this individual plant. The project will not reduce the area of occupancy of the species.
Fragment an existing population into two or more populations.	No. See full response for the first criterion above, in particular: There is not a population of the species here, but an individual that has been artificially located (planted) outside the species' known range. Impacts to this individual will not impact on a population of this species and will not affect the survival of the species. There will not be fragmentation of a population, only the removal of one plant, in a region where the species is not known to occur. The project will not fragment a population.
Adversely affect habitat critical to the survival of a species.	No. Critical habitat has not been declared for the species (DAWE, 2016; DEC NSW, 2004). The individual identified is located in advanced regrowth on a property that has been subject to revegetation. The project will impact adjacent vegetation that has been subject to previous disturbance. The proposed action will not adversely affect habitat critical to the survival of the species. Also see full response for the first criterion above, in particular: This is an individual that has been artificially located (planted) outside the species' known range. Impacts to this individual will not impact on a population of this species and will not affect the survival of the species.
Disrupt the breeding cycle of a population.	No. There is no real chance or possibility that the action will impact the breeding cycle for the species, as only one individual was recorded in the study area and the species is not known to produce fertile seed. Direct impacts to the individual (and vegetative reproduction) will be avoided by implementation of clearing limits through the construction environmental management plan. Also see full response for the first criterion above, in particular:

Criteria if action will:	Assessment against criteria
	There is not a population of the species here, but an individual that has been artificially located (planted) outside the species' known range. Impacts to this individual will not impact on a population of this species and will not affect the survival of the species.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	No. See full response for the first criterion above, in particular: This plant is an individual that has been artificially located (planted) outside the species' known range. Impacts to this individual will not impact on a population of this species and will not affect the survival of the species. The preferred habitat for the species is within slopes and gullies in wet sclerophyll forest and complex notophyll vine forest. The individual identified in surveys is located in advanced regrowth and not within preferred habitat type for the species. Indirect impacts to the availability or quality of the species habitat due to the action may include changes to hydrology including sedimentation, pollution, water table level change, or alteration of surface water drainage patterns. This potential indirect impact will be managed by erosion and sediment control during construction. Any disruption to hydrology will be temporary during construction, and will minimised through the implementation of a construction environment management plan. Furthermore, at least 5 new plants will be established to replace the loss of this individual plant.
Result in invasive species that are harmful to a endangered species becoming established in the endangered species' habitat.	No. See full response for the first criterion above, in particular: This plant is an individual that has been artificially located (planted) outside the species' known range. Impacts to this individual will not impact on a population of this species and will not affect the survival of the species. A variety of invasive weed species, including identified threatening species such as *Cinnamomum camphora* and *Lantana camara* are present in the non-remnant and remnant areas surrounding the identified individual. Direct disturbance to the individual is unlikely, and weed control will be implemented through the construction environmental management plan, there this reduces the risk that its habitat will be significantly disturbed to result in invasive species establishment.
Introduce disease that may cause the species to decline.	No. See full response for the first criterion above, in particular: This plant is an individual that has been artificially located (planted) outside the species' known range. Impacts to this individual will not impact on a population of this species and will not affect the survival of the species. Disease is only known to potentially threaten the species when its root suckers are damaged and the surrounding soil disturbed, usually through the illegal and invasive activity of "bush food harvesting" (DAWE, 2016). The action is likely to significantly disturb soil in the project boundary only therefore it is unlikely to result in disease spread to the identified individual. Standard

Criteria if action will:	Assessment against criteria
	biosecurity measures for the project will be implemented through the construction environmental management plan.
Interfere with the recovery of the species.	No. See full response for the first criterion above, in particular: This plant is an individual that has been artificially located (planted) outside the species' known range. Impacts to this individual will not impact on a population of this species and will not affect the survival of the species. There is an Approved Recovery Plan for the species (DEC NSW, 2004). Identified threats outlined in the Approved Recovery Plan which are relevant to the action include habitat loss, weed invasion, physical damage, removal of fruits and vegetative regrowth, and fire. It has been outlined that there is no real chance or possibility that the action will cause a significant impact according to these identified threats in the above sections. In addition, any indirect impacts will be managed with a construction environmental management plan. Furthermore, at least 5 new plants will be established to replace the loss of this individual plant.

C1.4 Macadamia Nut

Macadamia Nut is listed as vulnerable under the EPBC Act.

In Queensland, this species is known from Mt Bauple, north of Gympie (Stanley & Ross 1986), to Currumbin Valley in the Gold Coast hinterland (Barry & Thomas 1994). The Macadamia Nut occurs as a scattered rare to occasional tree, and populations sizes are difficult to estimate. The Macadamia Nut grows in remnant rainforest (Gross 1995; Stanley & Ross 1986), preferring partially open areas such as rainforest edges (Ryan 2006). However, this habitat is not continuously fit for the species (Queensland CRA/RFA Steering Committee 1997). Vegetation communities in which the Macadamia Nut is found range from complex notophyll mixed forest, extremely tall closed forest, simple notophyll mixed very tall closed forest to simple microphyll-notophyll mixed mid-high closed forest with Araucaria and Argyrodendron emergents (Barry & Thomas 1994; Queensland CRA/RFA Steering Committee 1997; Ryan 2006).

One young individual of Macadamia Nut was recorded on private property on Lot 4 on SP195902, within vegetation that is mapped as remnant RE 12.3.2 – *Eucalyptus grandis tall open forest on alluvial plains,* however the environment was ground-truthed to be highly disturbed and significantly weed impacted, especially around the buildings on the southeast part of the property. The identified plant is not located within the project boundary and as such would not be cleared.

There is not a population of the species here, but an individual that is likely artificially located (planted) and this individual will not be cleared. Impacts to this individual will not impact on a wider population of this species.

A significant impact assessment has been undertaken in accordance with the *Matters of National Environmental Significance: significant impact guidelines 1.1*

(DoE 2013) for the species in Table 18. Based on the significant impact assessment, it is determined that there is no real chance or possibility that the action will have a significant impact on the threatened species Macadamia Nut.

Table 18: Assessment against Commonwealth Significant Impact Criteria for *Macadamia integrifolia* (Vulnerable Species)

Significant Impact Criteria	Assessment against criteria
Lead to a long-term decrease in the size of an important population of a species	No. There is no real chance or possibility that the action will remove the single individual of this species detected during surveys, as it is located outside the project boundary and measures such as delineation of clearing limits will be implemented through the construction environmental management plan. The field survey team noted that this individual plant identified seems very likely to be the result of plantings during a revegetation program on the property. No other individuals of this species were identified during flora surveys. There is not a population of the species here, but an individual that has been artificially located (planted) and this individual will not be cleared. Furthermore, impacts to this individual will not impact on a population of this species and will not affect the survival of the species. The action will not lead to a long-term population decrease.
Reduce the area of occupancy of an important population	No The 1 m^2 area of occupancy of *Macadamia integrifolia* is located outside the project boundary and would not be impacted. There is not a population of the species here, but an individual that has been artificially located (planted) and this individual will not be cleared. Furthermore, impacts to this individual will not impact on a population of this species and will not affect the survival of the species. Also, the conditions of the location of the plant are already moderately to highly disturbed, being on private property in urban area with significant weed impacts in the vegetation at the property. In this area of the project, the project boundary follows the existing railway. Any impacts to supporting habitat to the species, if any, will be limited to lower quality habitat or edge habitat that is already moderately to highly disturbed and would not be suitable for the species. The action will not reduce the area of occupancy of an important population.
Fragment an existing important population into two or more populations	No See response to criteria 2 above. The action will not fragment an existing important population into two or more populations.
Adversely affect habitat critical to the survival of a species	No See response to criteria 2 above. The action is not likely to affect habitat critical to the survival of the species.

Significant Impact Criteria	Assessment against criteria
Disrupt the breeding cycle of an important population	No See response to criteria 2 above. Also, the project will not increase the existing human impacts on pollinator species. There is not a population of the species here, but an individual that has been artificially located (planted) and this individual will not be cleared. Furthermore, impacts to this individual will not impact on a population of this species and will not affect the survival of the species. The action will not impact 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	No See response to criteria 2 above. Any indirect impacts to habitat from construction activities will avoided or minimised through the implementation of a construction environmental management plan. The action will not modify, destroy, remove or isolate or decrease the availability or quality of habitat 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	No The identified individual was located in an area already significantly impacted by a variety of weed species, including exotic groundcovers, climbers and shrubs. Weed control for the project will be implemented through the construction environmental management plan. The action will not result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.
Introduce disease that may cause the species to decline	No There are no known diseases that threaten *Macadamia integrifolia*. Standard biosecurity measures for the project will be implemented through the construction environmental management plan. The action will not introduce disease that may cause the species to decline.
Interfere substantially with the recovery of the species	No See response to criteria 2 above. There is not a population of the species here, but an individual that has been artificially located (planted) and this individual will not be cleared. Furthermore, impacts to this individual will not impact on a population of this species and will not affect the survival of the species. The project to upgrade the existing railway is not anticipated to interfere substantially with the recovery of the species.

C1.5 Koala

An assessment of the project against the Commonwealth Significant Impact Criteria for Koala is provided in Table 19 below. This assessment refers to both the *Matters of National Environmental Significance: significant impact guidelines 1.1* (DoE 2013) and the *EPBC Act Referral Guidelines for the Vulnerable Koala* (Department of the Environment 2014). The project is not considered likely to result in a significant impact to the Koala.

Assessment in accordance with Table 4 of the *EPBC Act Referral Guidelines for the Vulnerable Koala* (Department of the Environment 2014), identifies that vegetated areas within the project boundary form critical Koala habitat, obtaining a total score of 6 (refer to Section 5.3.2 above). The *EPBC Act Referral Guidelines for the Vulnerable Koala* (Department of the Environment 2014) indicates that high quality habitat critical to the survival of the Koala relates to habitat scoring ≥ 8. The score of 6 for the project indicates the critical Koala habitat in the project boundary is likely to be of moderate quality, rather than high quality.

The project will result in a loss of approximately 25 ha of mapped critical Koala habitat (moderate quality), shown in Figure 11.

Not all vegetation within the project boundary would constitute habitat critical to the survival of the Koala species, particularly considering the outcomes of field surveys for Koala and vegetation types falling within the project boundary (e.g. including street trees in urban area and screen plantings of shrubs). The remaining vegetation within the project boundary generally consists of agricultural land, non-remnant vegetation, plantings or dominated by exotic plants and disturbed area like roads and verges.

Four of the nine Commonwealth Significant Impact Criteria include reference to an 'important population' of a listed vulnerable species, however the concept of 'important population' for Koala was removed from the *EPBC Act Referral Guidelines for the Vulnerable Koala* (Department of the Environment 2014). Given the decline of Koala populations, it is arguable that all Koala populations may be considered important for the long-term survival and recovery of the species. Therefore the significant assessment below refers to the Koala population more generally rather than a specific 'important population'.

Table 19: Assessment against Commonwealth Significant Impact Criteria for Koala

Significant Impact Criteria	Assessment against criteria
Lead to a long-term decrease in the size of an important population of a species.	No The project involves the upgrade of an existing railway. The project boundary partly follows the existing rail line, thereby reducing/minimizing the impacts of the project on vegetation and Koala habitat. Koala habitat values mapping for the project boundary indicates approximately 25 ha of mapped habitat critical to the survival of the Koala (moderate quality) falls within the project boundary, consisting of multiple vegetation patches spread out across the project boundary. Assessment of design

Significant Impact Criteria	Assessment against criteria
	and constructability undertaken for each of these patches to minimise clearing of Koala habitat, as shown in Table 11 in this Commonwealth Matters Ecological Report. The 25 ha of mapped critical Koala habitat makes up a small proportion of the total area inside the project boundary (10% of the approximately 253 ha within the project boundary). The project will not result in broad-scale clearing of vegetation that is Koala habitat. The impacts to Koala habitat are mostly clearing the edges of vegetation patches that exist on either side of the existing rail line (and these edges are usually the most weed impacted and disturbed part of the patch). The project boundary partly follows the existing rail line, thereby minimizing the impacts of the project on Koala habitat. Based on Koala SAT surveys combined with detection dogs survey, there appears to be generally low Koala density and abundance in the areas in and near to the project boundary. Surveys showed no evidence for Koala activity, except at two locations adjacent to the project boundary at Landsborough (i.e. one faecal pellet and possible Koala scratch marks on a tree). Key threats to the Koala in the study area already exist. There is an existing lack of connectivity from west to east due to the existing railway alignment and existing main roads such as Steve Irwin Way and Old Landsborough Road. The project will not significantly increase these threats. The majority of the project boundary can be classed as 'urban area' with existing effects of habitat loss, fragmentation, vehicle strike, dog attack, degradation of habitat by weeds and other threats from human activities. Most areas of vegetation in the project boundary, including the mapped critical Koala habitat, have been impacted from existing disturbance and fragmentation. Proposed mitigation measures are discussed in Section 6.2 in this Commonwealth Matters Ecological Report. They include and are not limited to: • Dry fauna passage at suitable bridge crossings including Tibrogragan Creek, Coochin Creek and Coonowrin Creek. • There may also be opportunity for fauna passage to be incorporated at the Steve Irwin Way and Beerburrum Road intersection; • Fauna exclusion fencing to be used in conjunction with fauna mitigation structures, and is to include koala fencing where fauna mitigation structures are adjacent to mapped core Koala habitat. The location and extent of fauna exclusion fencing is to be located to direct fauna into the fauna mitigation structures.; and • Koala structures will be designed and constructed in compliance with TMR's *Fauna Sensitive Road Design Manual*.
Reduce the area of occupancy of an important population.	No See full response for the first criterion above, in particular:

Significant Impact Criteria	Assessment against criteria
	The project involves the upgrade of an existing railway. The project boundary partly follows the existing rail line, thereby reducing/minimizing the impacts of the project on vegetation and Koala habitat. The 25 ha of impacted critical Koala habitat consisting of multiple vegetation patches spread out across the project boundary. The project will not result in broad-scale clearing of vegetation that is Koala habitat. The impacts to Koala habitat are mostly clearing the edges of vegetation patches that exist on either side of the existing rail line (and these edges are usually the most weed impacted and disturbed part of the patch). Based on Koala SAT surveys combined with detection dogs survey, there appears to be generally low Koala density and abundance in the areas in and near to the project boundary. The majority of the project boundary can be classed as 'urban area' with existing effects of habitat loss, fragmentation, vehicle strike, dog attack, degradation of habitat by weeds and other threats from human activities.
Fragment an existing important population into two or more populations.	No See full response for the first criterion above, in particular: The project involves the upgrade of an existing railway. The project boundary partly follows the existing rail line, thereby reducing/minimizing fragmentation of Koala habitat. The impacts to Koala habitat are mostly clearing the edges of vegetation patches that exist on either side of the existing rail line (and these edges are usually the most weed impacted and disturbed part of the patch). Based on Koala SAT surveys combined with detection dogs survey, there appears to be generally low Koala density and abundance in the areas in and near to the project boundary. There is an existing lack of connectivity from west to east due to the existing railway alignment and existing main roads such as Steve Irwin Way and Old Landsborough Road. The project will not significantly increase these threats. The majority of the project boundary and the adjacent surrounds of the project can be classed as 'urban area' with existing effects of habitat loss, fragmentation, vehicle strike, dog attack, degradation of habitat by weeds and other threats from human activities. The project will not significantly increase these threats within or outside the project boundary. Proposed mitigation measures are discussed in Section 6.2 in this Commonwealth Matters Ecological Report. They include and are not limited to: • Dry fauna passage at suitable bridge crossings on Tibrogragan Creek, Coochin Creek and Coonowrin Creek • There may also be opportunity for fauna passage to be incorporated at the Steve Irwin Way and Beerburrum Road intersection; • Fauna exclusion fencing to be used in conjunction with fauna mitigation structures, and is to include koala fencing where fauna mitigation structures are adjacent to mapped core Koala habitat. The location and extent of

Significant Impact Criteria	Assessment against criteria
	fauna exclusion fencing is to be located to direct fauna into the fauna mitigation structures.; and • Koala structures will be designed and constructed in compliance with TMR's *Fauna Sensitive Road Design Manual*.
Adversely affect habitat critical to the survival of a species.	No See full response for the first criterion above, in particular: The project involves the upgrade of an existing railway. The project boundary partly follows the existing rail line, thereby reducing/minimizing the impacts of the project on vegetation and Koala habitat. Koala habitat values mapping for the project boundary indicates approximately 25 ha of habitat critical to the survival of the Koala falls within the project boundary, consisting of multiple vegetation patches spread out across the project boundary. The impacts to Koala habitat are mostly clearing the edges of vegetation patches that exist on either side of the existing rail line (and these edges are usually the most weed impacted and disturbed part of the patch). Most areas of vegetation in the project boundary, including the mapped critical Koala habitat, have been impacted from existing disturbance and fragmentation. Based on Koala SAT surveys combined with detection dogs survey, there appears to be generally low Koala density and abundance in the areas in and near to the project boundary. Surveys showed no evidence for Koala activity, except at two locations adjacent to the project boundary at Landsborough (i.e. one faecal pellet and possible Koala scratch marks on a tree).
Disrupt the breeding cycle of an important population.	No The project is unlikely to disrupt the breeding cycle of an important population (or any population) of Koala. Koala habitat areas within the project boundary are unlikely to be important for breeding - see full response for the first criterion above.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	No See full response for the first criterion above, in particular: The project involves the upgrade of an existing railway. The project boundary partly follows the existing rail line, thereby reducing/minimizing the impacts of the project on vegetation and Koala habitat. Koala habitat values mapping for the project boundary indicates approximately 25 ha of habitat critical to the survival of the Koala falls within the project boundary. The impacts to Koala habitat are mostly clearing the edges of vegetation patches that exist on either side of the existing rail line (and these edges are usually the most weed impacted and disturbed part of the patch). There is an existing lack of connectivity from west to east due to the existing railway alignment and existing main roads such as Steve Irwin Way and Old Landsborough Road. The project will not significantly increase these threats. The majority of

Significant Impact Criteria	Assessment against criteria
	the project boundary can be classed as 'urban area' with existing effects of habitat loss, fragmentation, vehicle strike, dog attack, degradation of habitat by weeds and other threats from human activities. Based on Koala SAT surveys combined with detection dogs survey, there appears to be generally low Koala density and abundance in the areas in and near to the project boundary.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	No Koala habitat within the ecological survey area is already fragmented, often surrounded by developed area and susceptible to exotic fauna disturbance. The project boundary has been confirmed as having existing weed infestations throughout, including in remnant vegetation and particularly at waterways and drainage lines. The proposed works to upgrade the railway are unlikely to increase the risk of invasive species becoming established. Standard management measures for invasive species will address this issue and will be incorporated into the project's construction environmental management plan.
Introduce disease that may cause the species to decline.	No The project is not expected to introduce new diseases that may impact on Koala. The project is unlikely to result in increased koala interaction that may increase the potential for disease spread. Vegetation clearing and the resultant stress on Koala has the potential to increase the expression of existing chlamydia in Koalas, however the implementation of mitigation measures such as sequential clearing will reduce the risk of disease. The project is not likely to introduce disease that may cause the species to decline.
Interfere substantially with the recovery of the species.	No See full response for the first criterion above, in particular: The project involves the upgrade of an existing railway. The project boundary partly follows the existing rail line. Koala habitat values mapping for the project boundary indicates approximately 25 ha of habitat critical to the survival of the Koala falls within the project boundary. The impacts to Koala habitat are mostly clearing the edges of vegetation patches that exist on either side of the existing rail line (and these edges are usually the most weed impacted and disturbed part of the patch). There is an existing lack of connectivity from west to east due to the existing railway alignment and existing main roads such as Steve Irwin Way and Old Landsborough Road. The project will not significantly increase these threats. The majority of the project boundary can be classed as 'urban area' with existing effects of habitat loss, fragmentation, vehicle strike, dog attack, degradation of habitat by weeds and other threats from human activities. Based on Koala SAT surveys combined with detection dogs survey, there appears to be generally low Koala density and abundance in the areas in and near to the project boundary.

Significant Impact Criteria	Assessment against criteria
	The project will impact on Koala habitat however habitat in the study area is already fragmented and the project will not significantly reduce the proportion of available habitat within the region therefore is not likely to interfere with the recovery of the species. Proposed mitigation measures for Koala are discussed in Section 6.2 in this Commonwealth Matters Ecological Report.

C1.6 Grey-headed Flying Fox

Assessment of the project against the Commonwealth Significant Impact Criteria for are provided in Table 20 below. The project is not considered likely to result in a significant impact to the Grey-headed Flying Fox.

The *EPBC Act Administrative Guidelines on Significance - Supplement for the Grey-headed Flying Fox* (Department of the Environment and Heritage 2003) was referenced in conjunction with the *Referral guideline for management actions in grey-headed and spectacled flying-fox camps* (DoE 2015) and *Matters of National Environmental Significance: significant impact guidelines 1.1* (DoE 2013).

Disturbance to Roost Sites

The project will not directly impact on any of the previously known or new roost sites that are identified in this report. In particular, the nationally important flying fox roost at Jubilee Drive will not be impacted by the proposed rail upgrade works at Palmwoods. The proposed project works at Palmwoods are within the existing railway alignment and approximately 455m southwest of where the Jubilee Drive roost is mapped on the DAWE *National Flying Fox Monitoring Viewer* online.

The nearest roost to the project boundary is located at Kolora Park in Palmwoods, approximately 65m east of the existing rail line from the proposed Palmwoods Station upgrade works. Palmwood Station upgrade works are proposed for Stage 2 of the project (timing not currently known). The works involve the demolition and construction of platforms and expansion of the park n ride facility. These works are largely within the existing rail corridor, but will generate noise during the construction period.

Pre-clearing fauna surveys and the presence of a fauna spotter-catcher during clearing activities will minimise direct risk of fauna mortality from the project (this applies to all threatened fauna, however this is also directly relevant to avoiding impacts on roosts for Grey-headed Flying Fox). Indirect impacts during construction on threatened fauna will include noise generation and increased light production during night works. However, these impacts are anticipated to be minor and temporary in nature. Also, the works will include fauna mitigation measures such as directing artificial light away from retained vegetation (particularly where there is an identified flying fox roost) during night works. Monitoring of the behaviour of Flying Foxes by a licensed spotter/catcher on site during construction to occur when works are within 100m of an identified active roost site and corrective action (i.e. temporary stop work in the area) to be implemented if the works are causing the animals stress.

Impacts to Grey-headed Flying Fox roost sites during operation of the upgraded rail line will be limited to noise from passing trains. However, there is existing train noise from the existing rail line, and identified roost sites in the study area (as well as foraging resources) have continued to be used by flying foxes. There will be an increase in train frequency during operation of the project which will generate intermittent noise. The species is known to be habituated to urban environments and this increase in noise is not expected to significantly impact the nearest roost at Kolora Park.

Loss of Foraging Habitat

In the broader study area, the project will involve vegetation clearing and thereby impact on some foraging habitat for Grey-headed Flying Fox. As discussed in C1.5 above, it has been estimated that approximately 25 ha of mapped critical Koala habitat would be impacted by the project. This 25 ha is consistent with State Core Koala Habitat mapping which is based on REs that Koala would inhabit as shown on the State RE mapping. The vegetation types that support Koala contain *Eucalyptus*, *Corymbia* and *Melaleuca* trees which are not only food sources for Koala but would also be nectar resources for Grey-headed Flying Fox, including winter flowering trees that provide seasonal nectar. Therefore, it is considered that approximately 25 ha of suitable foraging habitat for Grey-headed Flying Fox will be impacted. This approximately 25 ha of mapped critical Koala habitat and foraging habitat for Grey-headed Flying Fox is shown in Figure 11.

To account for scattered trees and shrubs that are not mapped as critical Koala habitat but would also provide nectar resources, a further 10% increase of the estimated Koala habitat would result in a conservative estimate of 27.5 ha of Grey-headed Flying Fox nectar resources being in the project boundary. However scattered trees and shrubs that are more isolated, i.e. not within a remnant vegetation patch, would likely provide opportunistic foraging opportunities and less likely to be preferred / primarily used foraging habitat by Grey-headed Flying Fox.

Therefore, the total loss of foraging habitat for Grey-headed Flying Fox is estimated to be approximately 27.5 ha. This is 11 % of the approximately 253 ha ha within the project boundary.

This is considered an overall conservative approach to mapping Grey-headed Flying Fox nectar resources, as not all areas of Koala habitat or isolated shrubs/trees would contain nectar resources (these areas would not entirely consist of the particular shrub/tree species that provide seasonal nectar). Furthermore, the Koala habitat mapping would include many patches of exotic Pine trees that are too small and scattered to map at the scale of the project, and exotic Pine trees do not provide habitat resources for Grey-headed Flying Fox.

Nearby rainforest REs including trees or shrubs with fleshy fruit resources are located outside the project boundary, and as such those resources would not be removed.

At the local and regional contexts, the loss of foraging habitat from the project will comprise a very small proportion of the foraging habitat available for this species in the study area, being limited to the narrow, linear alignment of

proposed railway upgrade and mostly modified/agricultural areas. Surveys for the REF and fauna habitat assessments in 2020 identified foraging resources available for Grey-headed Flying Fox near to but outside of the project boundary – the species will be able to continue using those resources. In addition, the impacts to vegetation from the project will primarily be limited to edge habitat, located on the verge of vegetation patches next to the existing railway and having decreased habitat quality as a result (e.g. edge effects like disturbance from the existing railway and degradation from weeds).

Overall, the impacts to foraging habitat will not result in further fragmentation of the foraging habitat for Grey-headed Flying Fox.

Furthermore, as listed in the mitigation measures in Section 6.2 above, revegetation or rehabilitation of construction areas will use native tree and plant species suitable for their location, and where possible to include flowering nectar trees to replace foraging resources removed for clearing for the project, particularly winter and spring flowering species that occur in the surrounding vegetation and provide seasonal nectar resources such as Pink Bloodwood (*Corymbia intermedia*), Swamp Mahogany (*Eucalyptus robusta*) and Broad-leaved Paperbark (*Melaleuca quinquenervia*).

Table 20: Assessment against Commonwealth Significant Impact Criteria for Grey-headed Flying Fox (Vulnerable Species)

Significant Impact Criteria	Assessment against criteria
Lead to a long-term decrease in the size of an important population of a species	No. There is no 'important population' of this species in the study area. The Grey-headed Flying Fox is highly mobile and the national population is not divided into separate or distinct populations as individuals move between roosts throughout the species' geographic range. Therefore, this significance assessment considers the Grey-headed Flying Fox population more generally rather than an important population. The nearest nationally important roost is approx. 455m away from the project boundary. The project boundary is narrow and linear, mostly in modified/agricultural areas and the project will impact a very small proportion of foraging habitat in the regional context.
Reduce the area of occupancy of an important population	No. See response above to criteria 1.
Fragment an existing important population into two or more populations	No. See response above to criteria 1. The impacts to foraging habitat from the project will not result in further fragmentation of the foraging habitat for Grey-headed Flying Fox.
Adversely affect habitat critical to the survival of a species	No Foraging resources are considered as habitat critical to the survival of the species. Grey-headed Flying Fox presence is dependent on food resources and the species has no adaptations for withstanding food shortages – it migrates in response to changes in the amount and location of available nectar.

Significant Impact Criteria	Assessment against criteria
	Whilst the site does contain foraging habitat that is used by Grey-headed Flying Fox, similar flowering species are widely available in the local/regional areas around the project boundary. The removal of foraging habitat (flowering or fruiting trees) for the project is not expected to result in a significant reduction in foraging resources. As the species has a wide foraging range and is highly mobile, the removal of patches of foraging habitat is not expected to result in the decline of this species. The project boundary is narrow and linear, mostly in modified/agricultural areas. The project will impact a very small proportion of foraging habitat in the regional context.
Disrupt the breeding cycle of an important population	No Grey-headed flying-foxes are seasonal breeders, with a single breeding event per year. Females give birth to a single pup and the majority of births occur from October to December. At four months, flying-foxes are weaned and become fully independent and move to a winter camp. Staging of works will avoid works within 100m of the roost sites identified in this Commonwealth Matters Ecological Report during flying-fox breeding and rearing seasons, particularly at Kolora Park. High risk and high-noise inducing construction activities such as pile driving will be avoided within 100m of the of the Kolora Park flying-fox roost between October and December. Another main mitigation measure to avoid and minimise any impacts to Grey-headed Flying Fox breeding will be monitoring of the behaviour of Flying Foxes by a licensed spotter/catcher on site at intervals during construction, when works are within 100m of an identified active roost site and corrective action (i.e. temporary stop work in the area) to be implemented if the works are causing the animals stress (full list of mitigation measures provided in Section 6.2 of this Commonwealth Matters Ecological Report). Proximity of roost sites to be communicated to all personnel during inductions and appropriate protocols implemented should an injured or orphaned Flying Fox be encountered; The project will not directly impact on any of the roost sites that are identified in this report. The nationally important flying fox roost at Jubilee Drive, Palmwoods, will not be impacted by the proposed rail upgrade works at Palmwoods being more than 400m from the works. Breeding camps at these roost sites are not expected to be affected by the project. Localised and temporary construction disturbance may impact the roost at Kolora Park during construction works at Palmwoods station, however this is not expected to significantly disrupt the roost, and monitoring will be implemented so that works temporarily cease if signs of stress are identified. There will be an increase in train frequency during operation of the project which will generate intermittent noise. The species is known to be habituated to urban environments and this increase in noise is not expected to significantly impact the nearest roost at Kolora Park.
Modify, destroy, remove or isolate or decrease the	No

Significant Impact Criteria	Assessment against criteria
availability or quality of habitat to the extent that the species is likely to decline	The project will not directly impact on any of the roost sites that are identified in this report. The loss of foraging habitat for Grey-headed Flying Fox is estimated to be approximately 27.5 ha. This is 11 % of the approximately 253 ha within the project boundary. The removal of a small amount of foraging habitat is not expected to result in the decline of this species. As the species has a wide foraging range and is highly mobile, the proposed action is highly unlikely to interfere with the recovery of the species. The project boundary is narrow and linear, mostly in modified/agricultural areas.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	No The works will be implemented with mitigation measures to avoid or mitigate the spread of weeds. The project is considered very unlikely to result in establishment of invasive species harmful to the Grey-headed Flying Fox.
Introduce disease that may cause the species to decline	No The effects of pathogens on this species are currently unknown, however in any case the project is considered very unlikely to result in introducing disease that may cause the species to decline.
Interfere substantially with the recovery of the species	No The project will not directly impact on any of the previously known or new roost sites that are identified in this report. The nationally important flying fox roost at Jubilee Drive, Palmwoods, will not be impacted. Localised and temporary construction disturbance (changes in noise or light) may impact the roost at Kolora Park during construction works at Palmwoods station, however this is not expected to significantly disrupt the roost. The removal of approximately 27.5 ha of foraging habitat is not expected to result in the decline of this species. As the species has a wide foraging range and is highly mobile, the proposed action is highly unlikely to interfere with the recovery of the species. The project boundary is narrow and linear, mostly in modified/agricultural areas.

C1.7 Giant Barred Frog

Assessment of the project against the Commonwealth Significant Impact Criteria for Giant Barred Frog is provided in Table 21. The project is not expected to result in a significant impact to the Giant Barred Frog.

The project will not remove confirmed breeding and foraging habitat for Giant Barred Frog, which is outside of the project boundary at Mellum Creek where the species was detected during field surveys. The extents of suitable habitat identified at Coochin Creek and Addlington Creek tributaries (note the species was not detected here) which will be directly impacted are very limited and direct impacts are restricted to where Coochin Creek and Addlington Creek tributaries traverse the project boundary. Indirect impacts such as water quality impacts will be managed through construction environmental management measures including minimising clearing in riparian areas, erosion and sediment control and water quality monitoring.

Table 21: Assessment against Commonwealth Significant Impact Criteria for Giant Barred Frog (Endangered Species)

Significant Impact Criteria	Assessment against criteria
Lead to a long-term decrease in the size of a population	No Field assessment results concluded that there are Giant Barred Frog and breeding habitat for the species present at one site at Mellum Creek. However, this site is located about 105m east of the project boundary and will not be directly impacted by construction activities. There is not habitat for this species within this section of the project boundary that intersects with Mellum Creek. The species was not detected at other identified suitable habitat (sites at Coochin Creek and Addlington Creek tributaries) during frog surveys and their extents within the project boundary are very limited. At Coochin Creek, approximately 98m of the waterway traverses the project boundary with about 48m located inside the existing rail corridor (not suitable habitat). The approximately 50m (in total) of vegetated area on either side of the exiting rail corridor contains some suitable habitat, however they are already fragmented, disturbed and not high quality breeding habitat due to their location close to the rail. Considering no Giant Barred Frog were detected here, impacts to these small sections of the waterway are not expected to lead to a long-term decrease in the size of population in the local area. The works will not prevent the species from using suitable habitat upstream and downstream of the project boundary, if they occur there. At Addlington Creek, suitable habitat was identified about 150m west of the project boundary however the area closer to the project boundary was not identified as suitable habitat. No suitable habitat at Addlington Creek will be impacted. Indirect impacts to suitable habitat on site or downstream (e.g. erosion and other surface water quality impacts) will be managed through environmental mitigation measures such as minimising clearing area, erosion and sediment control and water quality monitoring. Disturbance from construction activities will be temporary. It is unlikely that the project will lead to a long term decrease in the size of a population.

Significant Impact Criteria	Assessment against criteria
Reduce the area of occupancy of the species	No See full response to criteria 1 above, in particular: Giant Barred Frog was only detected at Mellum Creek. The site with confirmed presence of this species would not be reduced. Identified suitable habitat for this species at Mellum Creek and Addlington Creek would not be directly impacted as the suitable habitats are located outside the project boundary. At Coochin Creek, the 50m (in total) of vegetated area on other side of the exiting rail corridor within the project boundary contains some suitable habitat, however they are already fragmented, disturbed and not high quality breeding habitat due to their location close to the rail. Considering no Giant Barred Frog were detected here, impacts to these small sections of the waterway are not expected to reduce the area of occupancy of the species. The works will not prevent the species from using suitable habitat upstream and downstream of the project boundary, if they occur there. Indirect impacts to suitable habitat on site or downstream (e.g. erosion and other surface water quality impacts) will be managed through environmental mitigation measures such as minimising clearing area, erosion and sediment control and water quality monitoring. Disturbance from construction activities will be temporary.
Fragment an existing important population into two or more populations.	No See full response to criteria 1 above, in particular: Giant Barred Frog was only detected at Mellum Creek, about 105m east of the project boundary. The site with confirmed presence of this species would not be fragmented by the works. Identified suitable habitat for this species at Mellum Creek and Addlington Creek would not be directly impacted as the suitable habitats are located outside the project boundary. At Coochin Creek, the 50m (in total) of vegetated area on other side of the exiting rail corridor within the project boundary contains some suitable habitat, however they are already fragmented, disturbed and not high quality breeding habitat due to their location close to the rail. No Giant Barred Frog was found here during the field surveys. The works will not prevent the species from using suitable habitat upstream and downstream of the project boundary, if they occur there. Indirect impacts to suitable habitat on site or downstream (e.g. erosion and other surface water quality impacts) will be managed through environmental mitigation measures such as minimising clearing area, erosion and sediment control and water quality monitoring. Disturbance from construction activities will be temporary. It is unlikely that the project will fragment an existing important population.

Significant Impact Criteria	Assessment against criteria
Adversely affect habitat critical to the survival of a species.	No See full response to criteria 1 above, in particular: Giant Barred Frog was only detected at Mellum Creek, about 105m east of the project boundary. The site with confirmed presence of this species would not be fragmented by the works. Identified suitable habitat for this species at Mellum Creek and Addlington Creek would not be directly impacted as the suitable habitats are located outside the project boundary. At Coochin Creek, the 50m (in total) of vegetated area on other side of the exiting rail corridor within the project boundary contains some suitable habitat, however they are already fragmented, disturbed and not high quality breeding habitat due to their location close to the rail. No Giant Barred Frog was found here during the field surveys. This suitable habitat is not likely to be critical to the survival of the species. The works will not prevent the species from using suitable habitat upstream and downstream of the project boundary, if they occur there. Indirect impacts to suitable habitat on site or downstream (e.g. erosion and other surface water quality impacts) will be managed through environmental mitigation measures such as minimising clearing area, erosion and sediment control and water quality monitoring. Disturbance from construction activities will be temporary. It is unlikely that the project will adversely affect habitat critical to the survival of a species.
Disrupt the breeding cycle of a population.	No See full response to criteria 1 above, in particular: Giant Barred Frog was only detected at Mellum Creek, about 105m east of the project boundary. The site with confirmed presence of this species would not be fragmented by the works. Identified suitable habitat for this species at Mellum Creek and Addlington Creek would not be directly impacted as the suitable habitats are located outside the project boundary. At Coochin Creek, the 50m (in total) of vegetated area on other side of the exiting rail corridor within the project boundary contains some suitable habitat, however they are already fragmented, disturbed and not high quality breeding habitat due to their location close to the rail. No Giant Barred Frog was found here during the field surveys. It is unlikely that works at this location will disrupt the breeding cycle of a population. The works will not prevent the species from using suitable habitat upstream and downstream of the project boundary, if they occur there. Indirect impacts to suitable habitat on site or downstream (e.g. erosion and other surface water quality impacts) will be managed through environmental mitigation measures such as minimising clearing area, erosion and sediment control and water quality monitoring. Disturbance from construction activities will be temporary. It is unlikely that the project will disrupt the breeding cycle of a population.

Significant Impact Criteria	Assessment against criteria
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No See full response to criteria 1 above, in particular: Giant Barred Frog was only detected at Mellum Creek, about 105m east of the project boundary. The site with confirmed presence of this species would not be fragmented by the works. Identified suitable habitat for this species at Mellum Creek and Addlington Creek would not be directly impacted as the suitable habitats are located outside the project boundary. At Coochin Creek, the 50m (in total) of vegetated area on other side of the exiting rail corridor within the project boundary contains some suitable habitat, however they are already fragmented, disturbed and not high quality breeding habitat due to their location close to the rail. No Giant Barred Frog was found here during the field surveys. It is unlikely that works at this location will modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. The works will not prevent the species from using suitable habitat upstream and downstream of the project boundary, if they occur there. Indirect impacts to suitable habitat on site or downstream (e.g. erosion and other surface water quality impacts) will be managed through environmental mitigation measures such as minimising clearing area, erosion and sediment control and water quality monitoring. Disturbance from construction activities will be temporary.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	No Significant invasive flora and fauna species for Giant Barred Frog are already known to or are likely to occur near the project boundary, including exotic weeds, Mosquito Fish and Cane Toad which was found across the study area during surveys. The project is not expected to result in the establishment of new invasive species harmful to Giant Barred Frog. Biosecurity mitigation measures will be implemented during the project to manage introduction or spread of invasive species.
Introduce disease that may cause the species to decline.	No Chytrid fungus is a known threat to Giant Barred Frog, however, the project is not expected to result in changes that are likely to introduce or further spread this disease. Biosecurity mitigation measures will be implemented during the project to manage risk of Chytrid fungus spreading as a result of the project.

Significant Impact Criteria	Assessment against criteria
Interfere with the recovery of the species.	No The project is unlikely to interfere with the recovery of the species. See full response to criteria 1 above, in particular: Giant Barred Frog was only detected at Mellum Creek, about 105m east of the project boundary. The site with confirmed presence of this species would not be fragmented by the works. Identified suitable habitat for this species at Mellum Creek and Addlington Creek would not be directly impacted as the suitable habitats are located outside the project boundary. At Coochin Creek, the 50m (in total) of vegetated area on other side of the exiting rail corridor within the project boundary contains some suitable habitat, however they are already fragmented, disturbed and not high quality breeding habitat due to their location close to the rail. No Giant Barred Frog was found here during the field surveys. It is unlikely that works at this location will interfere with the recovery of the species. The works will not prevent the species from using suitable habitat upstream and downstream of the project boundary, if they occur there. Indirect impacts to suitable habitat on site or downstream (e.g. erosion and other surface water quality impacts) will be managed through environmental mitigation measures such as minimising clearing area, erosion and sediment control and water quality monitoring. Disturbance from construction activities will be temporary.

C1.8 Threatened Fish

Assessment of the project against the Commonwealth Significant Impact Criteria for the EPBC Act-listed Oxleyan Pygmy Perch and Honey Blue-eye are provided in Table 22 and Table 23, respectively. Based on the assessment, the project is not likely to have a significant impact on the Oxleyan Pygmy Perch and Honey Blue-eye.

Overall, the presence of Oxleyan Pygmy Perch and Honey Blue-eye within the project boundary would be transitory (during movements between habitats upstream and downstream). The majority of locations where the project alignment crosses waterways would be within the already modified channels associated with the existing rail and road infrastructure, which will limit the impacts of this project on fish. Some of the waterways traversing the project alignment are potential habitat waterways and may contain these fish species, but due to the existing modification of these waterways within the existing alignment, the habitat available within the existing rail and road corridors does not provide suitable habitat for this species.

The project design will be required to comply with DAF requirements under the Queensland Fisheries Act to maintain fish connectivity in waterways for fish passage.

Table 22: Assessment against Commonwealth Significant Impact Criteria for Oxleyan Pygmy Perch (Endangered Species)

Significant Impact Criteria	Assessment against criteria
Lead to a long-term decrease in the size of a population	No The Oxleyan Pygmy Perch is confined primarily to dystrophic, acidic, freshwater systems draining through sandy coastal lowlands and 'wallum' heaths between north-eastern NSW and south-eastern Queensland (including Fraser, Stradbroke and Moreton islands). However, land clearing has caused remaining wallum heath areas to be highly fragmented. Field assessment results concluded that for majority of the sites assessed, there is very limited to no habitat available. A few sites near to the project boundary in association with Mellum Creek and Bluegum Creek are potential habitat waterways, but due to the existing modification of these waterways, the habitat available within the existing rail and road corridors does not provide suitable habitat for this species. If Oxleyan Pygmy Perch was present it would be for transitory purposes, not for foraging and or breeding habitat. Overall, the majority of crossing locations are within the existing modified channels associated with the existing infrastructure. The majority of new crossings for the project are located adjacent to existing waterway crossings, with only a few in a different location such as Back Creek, Coonowrin Creek and Tibrogargan Creek. The project design will be required to comply with DAF requirements under the Queensland Fisheries Act to maintain fish passage habitat and connectivity. Potential impacts to water quality, mainly release of sediments, will be managed through environmental mitigation measures. Disturbance from construction activities will be temporary and standard mitigation measures will be implemented to avoid or mitigate water quality impacts from construction (as discussed in Section 6.2 of this report). It is unlikely that the project to upgrade the railway will lead to a long term decrease in the size of a population.
Reduce the area of occupancy of the species	No See response above to criteria 1. It is unlikely that the project will reduce the area of occupancy of the species.
Fragment an existing important population into two or more populations.	No See response above to criteria 1, in particular there is limited habitat available in the project boundary and the project will maintain existing fish connectivity/habitat at waterways and drainage lines traversing the project boundary. It is unlikely that the project will fragment an existing important population.

Significant Impact Criteria	Assessment against criteria
Adversely affect habitat critical to the survival of a species.	No See response above to criteria 1, in particular there is limited habitat available in the project boundary and the project will maintain existing fish connectivity/habitat at waterways and drainage lines traversing the project alignment. It is unlikely that the project will adversely affect habitat critical to the survival of a species.
Disrupt the breeding cycle of a population.	No See response above to criteria 1, in particular there is limited habitat available in the project boundary and the project will maintain existing fish connectivity/habitat at waterways and drainage lines traversing the project alignment. It is unlikely that the project will disrupt the breeding cycle of a population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	No See response above to criteria 1, especially that the existing rail and road corridors do not provide suitable habitat. Potential impacts to water quality, mainly release of sediments, will be managed through environmental mitigation measures including erosion and sediment control and water quality monitoring. Disturbance from construction activities will be temporary. The project is not expected to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species 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	No A potential threat to this species from other fish species that are not native is the Mosquito Fish which competes with native species like Oxleyan Pygmy Perch for resources. Significant invasive flora and fauna species are already confirmed to occur in and near the project boundary, including exotic weeds, Mosquito Fish and Cane Toad. Standard biosecurity mitigation measures will be implemented during the project to manage introduction or spread of invasive species. The project is not expected to result in the establishment of new invasive species harmful to Oxleyan Pygmy Perch.
Introduce disease that may cause the species to decline.	No There is not an identified threat from any particular pathogen to this species based on the DAWE conservation advice. The project is not expected to result in changes that are likely to introduce or further spread this disease. Standard biosecurity mitigation measures will be implemented during the project. The project is not expected to result in introduced disease harmful to Oxleyan Pygmy Perch.
Interfere with the recovery of the species.	No See response above to criteria 1. The project is unlikely to interfere with the recovery of the species.

Table 23: Assessment against Commonwealth Significant Impact Criteria for Honey Blue-eye (Vulnerable Species)

Significant Impact Criteria	Assessment against criteria
Lead to a long-term decrease in the size of an important population of a species	No. There is no 'important population' of this species at the study area. The species has been reported from about 18 locations on both the mainland and Fraser Island, with most populations totally isolated from one another. This species remains relatively abundant in the Noosa River, Tin Can Bay creeks and Fraser Island localities. Lacustrine populations occur in several lakes on Fraser Island and one lake in Great Sandy National Park. Population fluctuations of this species in mainland streams is associated with floods flushing large numbers of the fish into the intertidal areas. Field assessment results concluded that for the majority of the sites assessed, there is very limited to no habitat available and many of the site habitats within the existing road and rail corridors are very limited (but note there would be potential habitat present up and downstream of many of the sites). Overall, it is considered unlikely Honey Blue-eyes would be present within the rail corridor and would only occur transitorily, during movements between upstream and downstream habitat. Overall, the majority of crossing locations are within the existing modified channels associated with the existing infrastructure. The majority of new crossings for the project are located adjacent to existing waterway crossings, with only a few in a different location such as Back Creek, Coonowrin Creek and Tibrogargan Creek. The project design will be required to comply with DAF requirements under the Queensland Fisheries Act to maintain fish passage habitat and connectivity. Potential impacts to water quality, mainly release of sediments, will be managed through environmental mitigation measures. Disturbance from construction activities will be temporary and standard mitigation measures will be implemented to avoid or mitigate water quality impacts from construction (as discussed in Section 6.2 of this report). It is unlikely that the project to upgrade the railway will lead to a long term decrease in the size of a population.
Reduce the area of occupancy of an important population	No. See response above to criteria 1. It is unlikely that the project to upgrade the railway will reduce the area of occupancy of an important population.
Fragment an existing important population into two or more populations	No. See response above to criteria 1. It is unlikely that the project to upgrade the railway will fragment an existing important population into two or more populations.

Significant Impact Criteria	Assessment against criteria
Adversely affect habitat critical to the survival of a species	No There are no habitats in the project boundary considered as habitat critical to the survival of the species. See response above to criteria 1, in particular there is limited habitat available in the project boundary and the project will maintain existing fish connectivity/habitat at waterways and drainage lines traversing the project alignment. It is unlikely that the project to upgrade the railway will adversely affect habitat critical to the survival of a species
Disrupt the breeding cycle of an important population	No. See response above to criteria 1, in particular there is limited habitat available in the project boundary and the project will maintain existing fish connectivity/habitat at waterways and drainage lines traversing the project alignment. It is unlikely that the project to upgrade the railway will 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	No See response above to criteria 1. The project is not expected to modify, destroy, remove, isolate or decrease the availability or quality of habitat 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	No A potential threat to this species from other fish species that are not native is the Mosquito Fish (Gambusia holbrooki) which competes with native species like Oxleyan Pygmy Perch for resources. Significant invasive flora and fauna species are already confirmed to occur in and near the project boundary, including exotic weeds, Mosquito Fish and Cane Toad. Standard biosecurity mitigation measures will be implemented during the project to manage introduction or spread of invasive species. The project is not expected to result in the establishment of new invasive species harmful to Honey Blue-eyes.
Introduce disease that may cause the species to decline	No There is not an identified threat from any particular pathogen to this species based on the DAWE conservation advice. The project is not expected to result in changes that are likely to introduce or further spread this disease. Standard biosecurity mitigation measures will be implemented during the project. The project is not expected to result in introduced disease harmful to Honey Blue-eyes.
Interfere substantially with the recovery of the species	No See response above to criteria 1. The project is unlikely to interfere with the recovery of the species.

C1.9 Migratory Species

The migratory species considered in this assessment are those identified in Section 5.7 of this report; that section discusses the potential habitat for migratory species in the study area.

Assessment of the project against the Commonwealth Significant Impact Criteria for listed migratory species is provided in Table 24. The project is not likely to have a significant impact on listed migratory species.

The terms 'important habitat', 'ecologically significant proportion' and 'population' of a migratory species have defined meanings under the *Matters of National Environmental Significance: significant impact guidelines 1.1* (DoE 2013), which have been adhered to in the assessment.

There will be some minor loss of foraging habitat for the listed migratory species occurring in the project boundary, with the exception of the Fork-tailed Swift and White-throated Needletail (both being aerial insectivores that breed in the northern hemisphere). However, the extent of clearing required suggests that the project would not affect an ecologically significant proportion of any migratory bird species.

Table 24: Assessment against Commonwealth Significant Impact Criteria for Listed Migratory Species.

Significant Impact Criteria	Assessment against criteria
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	No The project will not substantially modify, destroy or isolate important habitat for listed migratory species relevant to this assessment. Although there will be some loss of foraging resources within the project boundary, this is a very small proportion of resources available in the local area/region (would not support ecologically significant proportion of the population) and it is unlikely migratory species use the study area for breeding. These migratory species are also capable of crossing more open habitat during migration and it is unlikely that important habitat or even any habitat at the local/regional scale would have increase in fragmentation/isolation than currently.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	No The project will not result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat. The project works will involve mitigation measures to avoid or mitigate the spread of new weed species during the project. It should be noted that the study area is generally already weed impacted by the human activities in and surrounding the study area. Most of the study area is already modified or developed, and in addition many survey sites during field assessments in natural areas and waterways were found to be significantly weed impacted.

Significant Impact Criteria	Assessment against criteria
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	No The project will not seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species. There will be a relatively small amount of foraging habitat loss for the relevant migratory bird species (with the exception of the Fork-tailed Swift and White-throated Needletail which are unlikely to be impacted). However, the extent of clearing required suggests the project would not affect an ecologically significant proportion of any migratory bird species.