6.2.5.4 Increase of Pest Fauna

Feral animals threaten populations of native wildlife in two main ways: direct predation (e.g. foxes, cats, dogs) or competition for limited resources (e.g. bird species, rabbits, rodents, cane toads, pigs).

The EPBC Act lists weed invasion, rabbits, cane toads, feral pigs and feral cats as 'key threatening processes' to biodiversity due to their impact on wildlife and the landscape (SEWPaC, 2012). Feral species are more likely to penetrate areas of habitat that have been disturbed. Hence, habitats that have been disturbed or are suffering the impacts of edge effects will often be associated with a population of feral species.

An increase in pest vermin species, such as rats, due to uncontrolled rubbish in the construction and operational phases, can lead to an increase in predation and nesting failure of avian species.

DTMR placed a camera at one of the dam sites south of the alignment in the surrounding state land to determine the likely presence of feral pigs during the 2013 dry season. No evidence of pig was obtained from this operation, nor has pig rooting sign been evident at these waterholes. Townsville City Council pest management activities for feral dogs have also been occurring on private and council land along Shaw Road, but not within the state land itself (pers. comm. Playford, L. TCC). From a management perspective, while the control of feral species can have adverse impacts on the environment, for example baiting for feral dogs is not target specific and can result in native animals, especially carnivores and scavengers consuming poison baits, the overall management benefits outweigh the incidental losses, and TMR's land management plan will address and ensure feral species are managed in the road reserve.

6.2.5.5 Increased Incident and Intensity of Fire

Increased incident and intensity of bushfires may result from an increased fire load, such as weed growth (e.g. buffel grass). Increased fire incident and intensity can lead to vegetation degradation and habitat modification. Fire can travel over large areas; therefore its effects can be felt outside of the defined TRR4 footprint.

Fire can degrade vegetation and habitat for flora and fauna species. Research suggests that fauna diversity may be impacted by a hot fire, particularly for diurnal reptiles. Fire can result in both direct and indirect mortality of fauna. Direct mortality results from species not being able to escape a fire and indirect mortality can result from a lack of cover (resulting in higher predation rates) or a reduction in food resources.

Increases in incidences of uncontrolled burns can occur where through accidental or irresponsible behaviour of humans. Wildfires have occurred in the Townsville area through live cigarettes being thrown from vehicles, individuals playing with lighters/matches and illegally lit campfires or rubbish fires.

Fire will also be an important management measure to improve BTF habitat in the road reserve, as it can be used to reduce weed growth particularly for the invasive grasses which are currently reducing habitat value for BTF. Control measures on lighting fires outside of TMR's proposed fire management regime during construction, will be controlled by the EMP measures (refer to Appendix E).

6.2.5.6 Dust Generation

Excessive dust deposited onto plant foliage can reduce the plants photosynthetic performance (photosynthesis, stomata conductance, transpiration etc.), thus reducing overall health and plant growth. In addition dust may negatively affect the reproduction of plants by covering the stigma or by damaging the petals (reducing the potential for pollination by insects). The chemical nature of the soils can be changed by the deposition of certain dust types, such as nitrogen and phosphorus. These chemicals can result in the displacement or death of sensitive floral species and a change in species composition. The dust may originate from nearby land use activities or by deposition from vehicles over time. Where the pH of the dust is ≥ 9, damage can be caused directly through contact of the particulates with leaves or indirectly through alteration of the soil pH. However, the chemical effects from these impacts at an ecosystem level are thought to be negligible (Trombulak, 2001; Prajapati, 2012; Lewis, 2013).

Lewis (2013) noted that there very few investigations on the impacts of road dust on vegetation, other than of limestone on agricultural plants. However, preliminary work on a number of dust types indicates that physical effects on plants (such as a reduction in photosynthesis) are felt at relatively high surface loads, of greater than 7 g/m2. Therefore as a precautionary approach, and until such time as more concrete scientific studies are undertaken, dust levels should be monitored and kept below surface loads of 7 g/m^2 (where practical) through management measures such as dust suppression. The amount of dust generated on a road is directly related to the weight and speed of the vehicle. Therefore a speed limit respectful of the largest type of vehicle present on the work site should be set (Farmer, 1993; Lewis, 2013).

Dust suppression practices can introduce another potential impact, if dust is suppressed using saline water. Watering with saline water will increase the salt content of the soil and thereby influence plant health. The problems associated with high salinity for plants are:

- High salinity is associated with a low soil water potential, giving rise to symptoms similar to those of water stress.
- Specific ions, especially Sodium (Na+) and Chloride (Cl-), may be toxic to plants.
- High levels of Sodium Chloride (NaCl) may give rise to ion imbalance (predominately Calcium) and lead to deficiency symptoms.

Salt can also remobilise from the soil during flooding events and move into waterways and wetland areas, which can affect the ecology of these systems. Therefore dust will not be suppressed using saline water on TRR4. This issue will be managed by the Construction EMP.

6.2.5.7 Erosion, Sedimentation and Contaminants

Altered landform through excavation or filling, diversion of creek systems, clearing of vegetation and the placement of infrastructure has the potential to alter surface water flows, and thus alter erosion and sedimentation patterns. Clearing vegetation also reduces soil stability and thus increases erosion, sediment and nutrient transport and deposition, and increases the movement of sediment and nutrients into waterways or receptor environments such as wetlands. Erosion of soil material from cleared areas (such as the road corridor) and deposition and sedimentation of that material onto surrounding vegetation or waterways can lead to degradation of vegetation and aquatic systems, most specifically downstream environments.

When mobilised by water, pollutants (inclusive of sediment, nutrients, chemicals and litter) may alter the chemical composition of aquatic and terrestrial environments, cause localised plumes/increase turbidity and smother aquatic organisms. These impacts can alter floral assemblages, cause death or injury to flora and/or flora, cause barriers to fauna passage and in the long term affect ecosystem diversity.

Duplex soil types in the Townsville region are particularly susceptible to erosion once the topsoil has been removed. Gully erosion is common where these soils are present and is a natural phenomenon due to the climate (mainly rainfall intensity) in the tropics. However, erosion can be exacerbated by anthropogenic related practices such as clearing of vegetation for development and alteration of landforms.

Stringent practises for sediment control will be a feature of the road construction for TRR4, and in the revegetation and stabilisation measures that will be deployed on the road embankment post construction and will draw on recent experience in the Douglas Arterial and Port Access Road projects where this element was also of concern.

6.2.5.8 Night Time Works

Night-time works may influence fauna by light, noise, and vibration disturbances as outlined above. The impacts of disturbances are high particularly for nocturnal species. For nocturnal species, light and noise pollution may influence both breeding and foraging behaviour. Mortality due to vehicle collision on roads is also exacerbated at night when many species move across the landscape.

The long term impact of night time works on the behaviour of many species is not well known. While RPS (2013) has suggested that clearing of roost trees for bats should occur at night to allow bats to shift to an alternative roost site, this is in conflict with impacts on other species such as Squatter Pigeon which roosts on the ground.

6.3 Environmental Management Plan

Provide a detailed Environmental Management Plan (EMP) for all MNES impacted by the proposed action. The EMP must incorporate the results of all surveys and information collected and should identify the important habitat on site. The EMP should fully discuss all potential impacts of the proposed action on MNES and outline in detail all proposed avoidance and mitigation measures.

Response:

The EMP (Planning) for TRR4 can be found in Appendix E. The mitigation and management measures proposed in the EPBC referral for TRR4 have been incorporated into this EMP. There is one mitigation measure that was in the referral which has been reconsidered as described earlier. Specifically this relates to the trial seeding of BTF grasses on the road embankments which was previously proposed as a potential mitigation measure in the referral. However, to further reduce this perceived risk of potential death of BTF due to collisions, the project has decided not to plant BTF preferred grasses on the embankments. Furthermore BTF preferred grasses tend to form clumps, some concern has been had as to the ability of these grasses to both cover and stabilise a road embankment quickly when first sown (high levels of vegetated cover are required to prevent soil runoff in the first instance and to prevent large areas of bare ground remaining available for weed invasion). Another related concern has been given to the long term maintenance regime of the embankments (that is through contracted mowing) and the likelihood that a clump forming native grass would not be successful in such a regime.

Extra mitigation measures since the referral are also proposed to address findings from field survey and analysis subsequent to the referral preparation. These are identified below.

Squatter Pigeon

- Prior to clearing activities the area should be traversed by qualified spotter catchers searching for potential 'core' feeding habitat areas or roosting and nesting sites of the Squatter Pigeon. Should no nesting sites be found the area proposed for clearing should be traversed by foot to flush any potential Squatter Pigeons residing within the project footprint.
- If any such core feeding, roosting or nesting sites of the Squatter Pigeon are identified they are proposed to be clearly marked out as 'no go' zones with appropriate flagging material.
- Due to the tendency of the Squatter Pigeon to utilise disturbed areas (such as access track and pastoral grasslands) vehicle and machinery speed limits will be restricted.
- If it is determined that clearing of nesting sites is unavoidable, a suitably qualified and licensed fauna spotter catcher who is in possession of appropriate permits for fauna relocation will check the nest for active use by the Squatter Pigeon. Should the nest have evidence of previous use, actions as identified in the Species Management Program for breeding places will be implemented.
- Where species have been identified, temporary lighting shall be directed away from light-sensitive areas

Noise Impacts on Black-throated Finch

Dense graded asphalt for the rural section of TRR4 to reduce the extent of noise impacts into the BTF habitat south of the alignment.

All proposed environmental mitigation measures relating to MNES are shown in the mitigation drawings in the EMP and provided to the contractors involved in the Early Tender Involvement process.

Clearing of Roost Trees for Bare-rumped Sheathtail Bat

Should tree roosts be found to be actively used by the bare-rumped sheath tail bat during pre-clearance surveys, then clearing of those trees will be attempted at night to allow the bats to relocate to an alternative roosting site. This will only be done if it is feasible and can be done in a manner that is cognisant of any other species (such as Squatter Pigeon) that has also been found in the area.

6.4 Offsets

Identify suitable offsets to compensate for any residual significant impacts to MNES after all avoidance and mitigation measures have been implemented. Any proposed offsets must be consistent with the department's offset policy statement at: http://www.environment.gov.au/epbc/publications/environmental-offsets-policy.html.

Response:

Offset investigation has been underway since November 2012. The nature of these investigations has included:

- Desktop assessment of parcels of TMR owned and state land in Townsville to determine presence of regional ecosystems known to support BTF, within BTF important habitat mapping and known BTF locations
- Liaison with relevant state and local government agencies regarding knowledge of potential parcels of state or freehold land with BTF values that could be suitable for offsetting, including discussions on the viability of establishing a state offset bank for future development in Townsville
- Interim calculations of offset parameters for TRR4 BTF habitat area impacted by the proposed road (NRA 2013a)
- Evaluation of Lot 1 SP232873 Bohle for its suitability for offsetting (NRA 2013d)
- Discussions with the Port of Townsville Ltd (PoTL) regarding potential offset land within Lots 10 SP228126 and12 E124175 near the Pinnacles Quarry, and
- Targeted survey (for BTF and threatened microbats) of state land (Lot 5030 on PH2274, Lot 1 on AP20165 and Lot 1 on SP236363) near the Pinnacles National Park (NRA 2013c).

6.4.1 Proposed Offset for TRR4

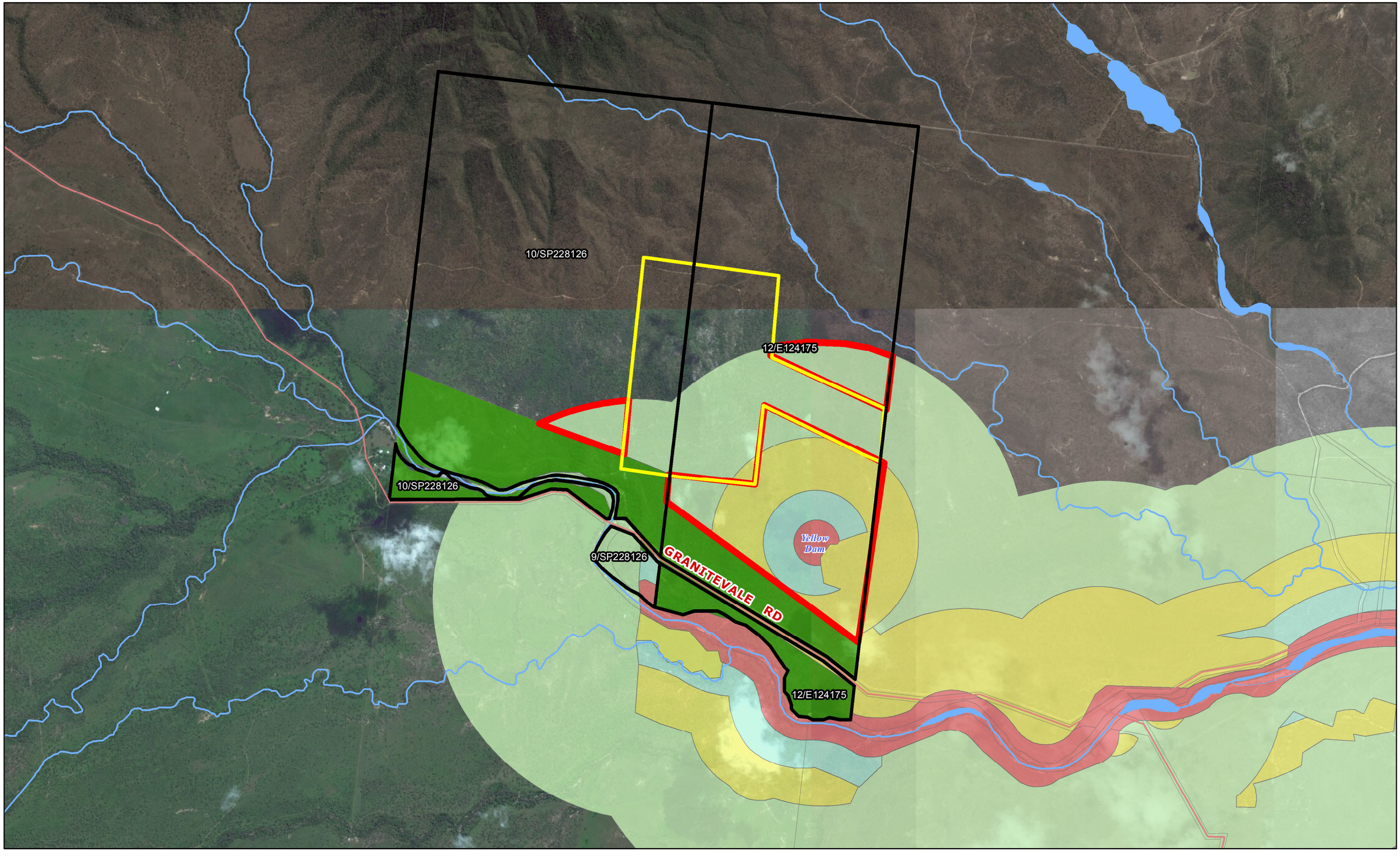
The proposed offset site is located off Granitevale Road, Pinnacles and is south west of Lake Ross, approximately 25 km south of Townsville CBD (Figure 11). The offset is positioned approximately eight kilometres to the west of the Ross River Dam, is bounded by the Pinnacles Mountains to the north and Central Creek to the South. The Hervey's Range escarpment is located approximately five kilometres to the west.

The lots containing the proposed offset are currently zoned rural (Rural 40) under the City of Thuringowa planning scheme now within the Townsville City LGA. Planning scheme maps note that it is within the Ross River Dam catchment.

The lots are freehold land and owned by the Port of Townsville (POTL) for its marine armour quarry. POTL is required to formally protect by way of a covenant on title, 198.77 ha as an offset for the quarry's controlled action requirements at the southerly extents of Lots 12 and 10. The port offset will protect predicted nesting habitat along Central Creek.

The proposed TRR4 offset is adjacent to Central Creek and would protect Yellow Dam and the remaining BTF habitat in both lots around the quarry.

TMR and PoTL are currently negotiating an agreement regarding the offset proposal. Securing the offset proposal will be subject to successfully completing these negotiations. Further evidence of these negotiations can be provided to DoE separately on a confidential basis given the commercial nature of this documentation.



PROJECT ID 60264706
LAST MODIFIED CFS 25-Nov-2013
FILE NAME 60264706_ENV_70

AECOM

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Scale: 1:25,000
(when printed at A3)

0 500 1,000 Metres

Legend

- Highways
- Main Roads
- Local Roads
- Port Central Creek Offset Area
- High Likelihood BTF Nesting Habitat
- Moderate Likelihood BTF Nesting Habitat
- Low Likelihood BTF Nesting Habitat
- BTF Foraging Habitat
- Pinnacles Quarry
- Property Boundary
- TRR4 Proposed Offset Area

TOWNSVILLE RING ROAD SECTION 4

Proposed Offset Site and BTF Habitat that will be Protected

Figure 11

The port land contains a mosaic of woodland and grassland ecosystems with some vine thicket elements on granite outcrops. The landscape is undulating with a number of rocky peaks, meandering gullies and minor gradients in lowland areas. Vegetation communities vary in complexity from tall woodlands to low open woodlands/shrublands and riparian woodland areas and are closely linked with hydrological processes and the terrain (EPBC 2010/5461 referral).

Field surveys that have been undertaken for the original POTL quarry referral and the haul road alignments to understand the BTF habitat and other MNES values within the two lots. NRA in 2010 collated historical sightings, reported abundance and seasonal information for BTF recorded near the proposed TRR4 offset site (within Lots 9 and 12) and along Granitevale Road and nearby areas. From this information NRA generated a BTF habitat model, based on water sources, predicted foraging habitat and predicted nesting habitat. Significant flock sizes of 50-60 birds had at that time been seen in the preceding decade within 1.2 km of the POTL land. Such numbers are considered to be large and of regional and national conservation significance.

Based on those records, it was considered that discrete nesting colonies occurred at the following locations (refer to Figure 12):

- Central Creek in the vicinity of Beyonda Station gate next to Granitevale Road in the most southerly portion of Lot 12
- Yellow Dam in Lot 12 about one km south east of the proposed quarry
- Bucks Dam, in the adjacent lot, some three km south east of the POTL land, and
- Central Creek, near Plum Tree Creek adjacent to Granitevale road five km to the south east of POTL land.

Estimates of populations from each location (2002 to 2009) have fluctuated over those five years, but all have consistently declined from earlier records. Of the locations listed above Yellow Dam had the highest maximum group sizes with 110 birds in 2005, 40 in 2007, and five birds in 2009 (Figure 12). The fluctuation in BTF numbers and recent decline provides an opportunity to increase BTF habitat suitability through integrated land management (i.e. fire management, weed control especially of *Sporobolus* and grazing management).

A breakdown of BTF habitat in the balance of these lots is presented in Table 16.

Table 16 Area of BTF Habitat in the Port Land

BTF Habitat Areas within Lots 9 and 12	Hectares
High likelihood BTF nesting habitat	6.9
Moderate likelihood BTF nesting habitat	28.03
Low likelihood BTF nesting habitat	70.83
Predicted BTF foraging habitat	87.4
Total	**193.61**

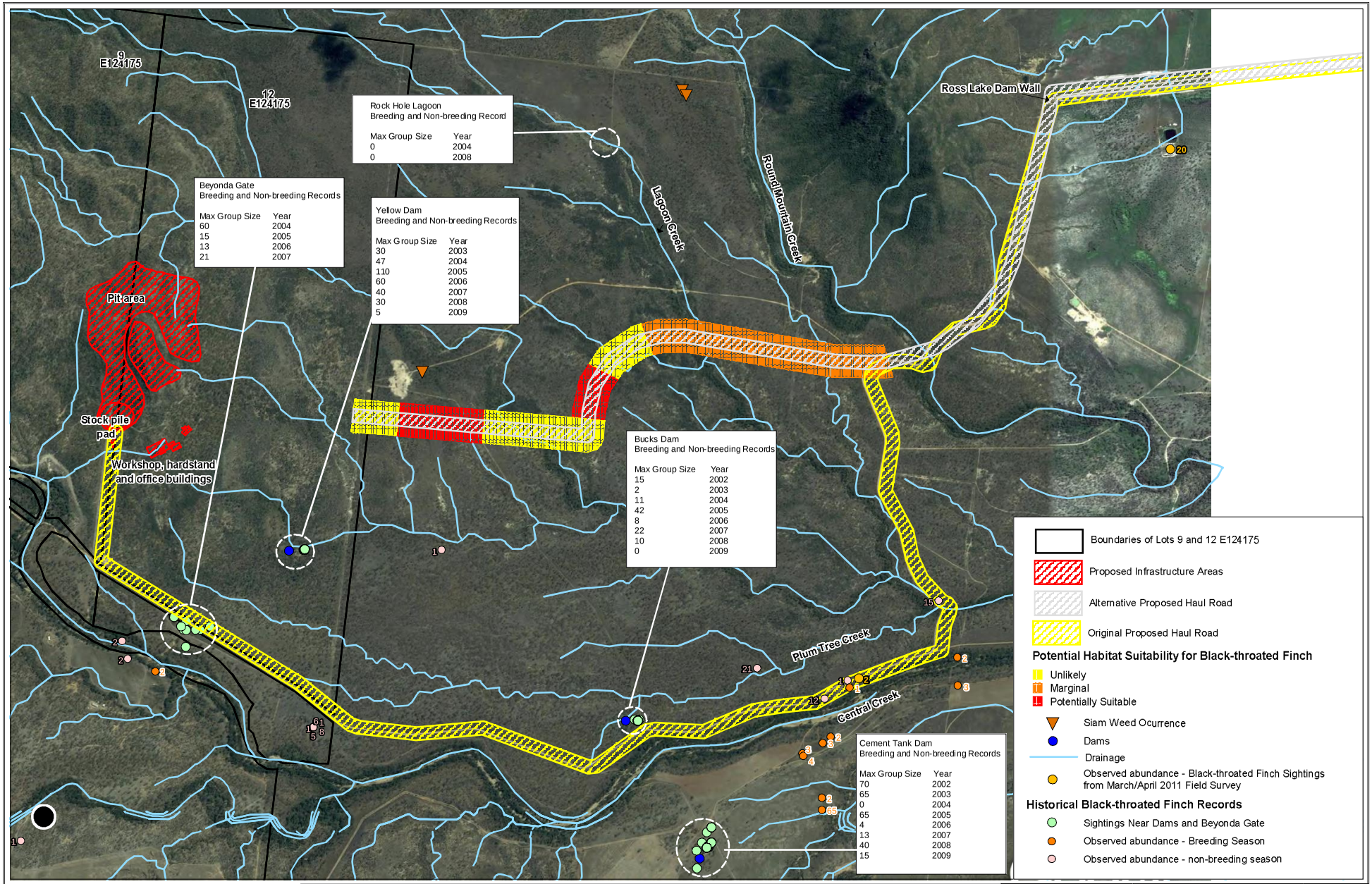
The relationship of this habitat to important BTF habitat mapping and the broader protected area estate in the Townsville region is shown in Figure 12. This illustrates that 12% of the BTF important habitat mapping (Commonwealth of Australia, 2009) overlaps with some form of protection category for conservation, with those protected areas mostly at the fringes of BTF distribution (Mt Elliot in Bowling Green Bay National Park and Paluma Ranges National Park). This mapping exercise probably over represents the likelihood that existing protected areas, outside of the Town Common, and the Oak Valley BTF reserve (not mapped), actually protect extant populations of BTF[3].

The port site in relation to the broader protected estate, important BTF areas, and supporting BTF regional ecosystems is shown in Figure 13. This figure illustrates that the proposed offset is within a broader area of fairly

[3] Over representation of the level of protection afforded to BTF habitat implied by Figure 12 is a reflection of the uniform polygon mapping (i.e. a buffered circle drawn around a BTF record point) which form the basis of the important BTF habitat maps in the *Background paper to the EPBC Act policy statement 3.13* which has not been further interpreted with respect to underlying topography or habitat suitability for BTF, given that these national parks are mostly rugged upland habitat.

continuous vegetation containing supporting BTF regional ecosystems[4]. The site is some 10-15 km from the eastern edge of the Ross River catchment which is known to contain BTF (Black-throated Finch Recovery Team, 2004 and NRA, 2007). The location of the port offset in the southern centre of the BTF distribution pattern is pertinent.

[4] Figure 13 has mapped the following regional ecosystems, Einasleigh Upland 9.5.1, 9.5.5, 9.8.1; Brigalow Belt North 11.3.12, 11.3.25b, 11.3.27, 11.3.30, 11.3.35 and 11.11.9 which are ecosystems in which BTF have been recorded in north Queensland since 1994 (as provided by Table 1 in Black-throated Finch Recovery Team *et al* 2007).



PROJECT: Impact Assessment of Alternative Haul Route for the Proposed Stone Quarry on Lots 9 and 12 E124175, Townsville
TITLE: Results From Field Survey and Desktop Assessment for Alternative Haul Route

349004_Field results and desk ass for alt Haul Rd_2011_04_19.wor

JOB NO: 349004
DATE: April 2011
SOURCE: NRA, DERM, PoTL Google Earth,

NRA Environmental Consultants
NATURAL RESOURCE ASSESSMENT AND MANAGEMENT

Figure 12

Recommended print size: A3