

Central Queensland Coal Project

Chapter 17 – Biosecurity

Environmental Impact Statement





Central Queensland Coal
Chapter 17 - Biosecurity

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17 Biosecurity

This chapter evaluates the potential for the introduction of pest and weed species, through the Central Queensland Coal Mine Project (the Project) activities. This chapter considers the potential for spread of the weeds and pests and proposes biosecurity management activities to protect the environmental values. This chapter also discusses the assessment and management of vector based diseases.

17.1 Project Overview

The Project is located 130 km northwest of Rockhampton in the Styx Coal Basin in Central Queensland. The Project will be located within Mining Lease (ML) 80187 and ML 700022, which are adjacent to Mineral Development Licence (MDL) 468 and Exploration Permit for Coal (EPC) 1029, both of which are held by the Proponent.

The Project will involve mining a maximum combined tonnage of up to 10 million tonnes per annum (Mtpa) of semi-soft coking coal (SSCC) and high grade thermal coal (HGTC). Development of the Project is expected to commence in 2018 and extend for approximately 20 years until the current reserve is depleted.

The Project consists of three open cut operations that will be mined using a truck and shovel methodology. The run-of-mine (ROM) coal will ramp up to approximately 2 Mtpa during Stage 1 (Year 1-4), where coal will be crushed, screened and washed to SSCC grade with an estimate 80% yield. Stage 2 of the Project (Year 4-20) will include further processing of up to an additional 4 Mtpa ROM coal within another coal handling and preparation plant (CHPP) to SSCC and up to 4 Mtpa of HGTC with an estimated 95% yield. At full production two CHPPs, one servicing Open Cut 1 and the other servicing Open Cut 2 and 4, will be in operation.

A new train loadout facility (TLF) will be developed to connect into the existing Queensland Rail North Coast Rail Line. This connection will allow the product coal to be transported to the established coal loading infrastructure at the Dalrymple Bay Coal Terminal (DBCT).

The Project is located within the Livingstone Shire Council (LSC) Local Government Area (LGA). The Project is generally located on the "Mamelon" property, described as real property Lot 11 on MC23, Lot 10 on MC493 and Lot 9 on MC496. The TLF is located on the "Strathmuir" property, described as real property Lot 9 on MC230. A small section of the haul road to the TLF is located on the "Brussels" property described as real property Lot 85 on SP164785.

17.2 Relevant Legislation and Guidelines

The relevant Queensland and Commonwealth biosecurity regulatory framework for the Project includes:

- *Plant Protection Act 1989*;
- *Biosecurity Act 2014*;
- *Public Health Act 2005*;
- *Public Health Regulation 2005*;
- *Agricultural Chemicals Distribution Control Act 1966*;
- *Quarantine Act 1908* (Cth); and
- *Biosecurity Act 2015* (Cth).

17.2.1 Plant Protection Act 1989

The *Plant Protection Act 1989* provides for the prevention, control and removal of plant pest infestations. The Act provides statutory powers to prohibit or restrict the introduction and spread of declared plant pests within Queensland. Weeds and pests pose one of the most significant threats to flora and fauna within the Project area. Accordingly, a range of management measures will be implemented to restrict the introduction and / or spread of pest species.

17.2.2 Biosecurity Act 2014

The *Biosecurity Act 2014* (Biosecurity Act) has adopted a shared approach to managing biosecurity in Queensland. The Act protects the economy, environment and community from pests, diseases and contaminants. The Act also provides a range of tools to implement in a fast and effective manner in the event of an emergency. Central Queensland Coal will incorporate the incoming requirements of the Act in all management procedures, and will take all reasonable steps to prevent or minimise biosecurity risks.

17.2.3 Public Health Act 2005

The *Public Health Act 2005* aims to protect and promote the health of the Queensland public. Division 2 of the *Public Health Regulation 2005* requires the owner and / or occupier of premises to prevent mosquito breeding on their premises and sets out the requirements for rainwater tanks to ensure the tanks do not breed mosquitoes.

17.2.4 Agricultural Chemicals Distribution Control Act 1966

The *Agricultural Chemicals Distribution Control Act 1966* (ACDC Act) regulates the distribution of agricultural chemicals including some mosquito control products. The Act applies to aerial distribution and ground distribution of agricultural chemicals. The distribution of agricultural chemicals via both air and ground methods requires a license by persons operating the equipment and the businesses and contractors undertaking the distribution. However, no license is required where a person is using ground equipment on:

- Their own or a relative's land;
- An employer's land who is primarily engaged in pastoral or agricultural pursuits and to whom the person is bound by a contract of service that is primarily for other work (i.e. not for the ground distribution of pesticides); and
- Or any unallocated State land, reserve or road under the *Land Act 1994* that adjoins land owned by the person with the permission of the entity that holds or controls the unallocated State land, reserve or road.

17.2.5 Biosecurity Act 2015 (Cth)

The *Biosecurity Act 2015* (Biosecurity Act) replaced the *Quarantine Act 1908* in 2016. Just as with the *Quarantine Act 1908*, the Biosecurity Act will be co-administered by the Ministers responsible for the Department of Agriculture and Water Resources and Department of Health. The Biosecurity Act regulates the import of live animals and plants into Australia to protect the community from the adverse effects from animal and plant pests, diseases and weeds to maintain market access. The Act also manages the risk of serious communicable diseases from emerging, establishing or spreading in Australia.

17.3 Environmental Objectives and Performance Outcomes

17.3.1 Environmental Objectives

The protection objectives for the management of pest and weed species are to:

- Minimise the introduction and spread of weeds, pests (including marine pests) and disease; and
- Control existing weeds and pests, including marine pests.

The protection objective for the prevention of the occurrence or spread of vector borne diseases is to minimise the risk of vector borne diseases through the effective control of potential vectors.

The protection objective for the prevention of the occurrence or spread of plant diseases is to minimise the risk of plant diseases through the implementation of effective control measures.

17.3.2 Performance Outcomes

The performance criteria relevant to achieve the objectives for pest and weed species are:

- No new terrestrial pest flora and / or fauna to be introduced to the site because of the Project activities;
- No contamination of land or waters to emerge because of Project activities;
- Declared and environmental weed and pest populations are minimised; and
- No reduction in native species as a direct result of the Project, outside the approved activities.

The performance criteria relevant to achieve the objectives for managing potential impacts of vector borne disease are:

- No outbreaks of vector borne disease because of the Project activities; and
- No environmental harm from management controls.

The performance criterion relevant to achieve the objectives for managing potential impacts of plant disease is no outbreaks of plant disease because of the Project activities.

17.4 Study Methodology

A desktop review and several ecological field surveys have been undertaken for this Project to ground-truth desktop information and identify any additional flora and fauna values not identified through the desktop study. These include studies carried out for the former incarnation of the Project which encompassed a much larger area (EPC 1029). Field surveys comprised:

- Detailed summer (wet season) fauna survey of EPC 1029 (five days) 21 to 25 March 2011 by Ed Meyer (ecological consultant);
- Summer (wet season) flora survey of EPC 1029 (five days) 21 to 25 March 2011 by Oberonia Botanical Services;
- Detailed winter (dry season) aquatic ecology survey of EPC 1029 (six days) 1 to 6 June 2011 by ALS Water Sciences;
- Detailed spring (dry season) fauna survey of EPC 1029 (five days) 25 to 29 September 2011 by Ed Meyer (ecological consultant);

- Targeted threatened fauna survey of EPC 1029 (four days) 7 to 10 February 2012 by Ed Meyer (ecological consultant);
- Stygofauna pilot survey (four days) 21 to 24 November 2011, by ALS Water Sciences;
- Summer (wet season) flora survey of Mining Lease (ML) 80187 and immediate surrounds (three days) 8 to 10 February 2017 by Terrestria (led by Dr Andrew Daniel – Terrestria); and
- Detailed summer (wet season) fauna survey of ML 80187 and immediate surrounds (six days) 8 to 13 February 2017 by CDM Smith (led by Brett Taylor).

Further discussion on terrestrial pest and weed species is at Chapter 14 – Terrestrial Ecology and Appendix A9a – Terrestrial Fauna Reports, Appendix A9b – Terrestrial Flora Reports, Appendix A9d – Ecological Field Survey Results.

A detailed aquatic ecology survey was also undertaken for the former incarnation of the Project (EPC 1029). The survey was carried out by ALS Water Sciences over six days from 1 to 6 June 2011 (refer Appendix A9e - Aquatic Ecology Results). A second less intensive survey was carried out by CDM Smith in February 2017. The survey focused on freshwater sites previously surveyed in 2011. Further discussion on aquatic pest and weed species is at Chapter 15 – Aquatic Ecology.

A desktop review was undertaken as part of the assessment of potential risks associated with vector borne diseases.

17.5 Existing Environment

Pests and particularly weeds may pose a significant threat to native terrestrial flora and fauna values. Much of the site already contains a high proportion of introduced grass species and woody weeds such as Lantana (*Lantana camara*) and Rubber Vine (*Cryptostegia grandiflora*) because of the long farming history within the Project area. Much of the riparian habitat associated with the creek lines contains infestations of introduced weed species (particularly Lantana and Rubber Vine). Olive Hymenachne, a semi-aquatic grass species that may infest and choke wetlands and waterways, was observed in a farm dam in February 2017 and within a wetland gilgai area in May 2017, but not along any creek lines. Parthenium (*Parthenium hysterophorus*), a problem weed species which is also toxic to cattle, was observed growing on the bed of Tooloombah Creek. No other infestations of this species were observed within the Project area. These weed species are listed under Queensland's Biosecurity Act and as Weeds of National Significance (WoNS).

A total of 28 fish species were recorded during the 2011 survey (including 18 species in the freshwater sites) indicating a relatively diverse native fish fauna. No introduced fish species were collected during surveys for the Project which indicates that the Styx River catchment may be relatively free of introduced taxa which are Restricted Matters under the Biosecurity Act, such as Tilapia (*Oreochromis* sp.) and Mosquito fish (*Gambusia* sp.).

17.5.1 Terrestrial Pests Fauna

Desktop Assessment

A desktop review of EHP's WildNet database of fauna and flora records for the wider area was carried out. The review encountered records of eight introduced fauna species. Four of these species are also listed as Restricted Matters under the Biosecurity Act (Table 17-1). Under the Act a person who has control over a Restricted Matter must not do the following:

- Category 3 – A person who has, or has a thing infested with, the Restricted Matter in the person's possession or under the person's control must not distribute or dispose of the Restricted Matter unless the distribution or disposal is carried out via the methods set out in the Biosecurity Act;
- Category 4 – move the Restricted Matter, or cause or allow to be moved;
- Category 5 – keep in the person's possession or under the person's control; and
- Category 6 – give food to the 'Restricted Matter.'

Table 17-1 Introduced fauna species known from the Project area and surrounds

Species name	Common name	Biosecurity Act category
<i>Rhinella marina</i>	Cane Toad	
<i>Streptopelia chinensis</i>	Spotted Turtle-dove	
<i>Passer Domesticus</i>	House Sparrow	
<i>Bos sp.</i>	Cattle	
<i>Canis lupus familiaris</i>	Dog	Category 3, 4, 6
<i>Felis catus</i>	Cat	Category 3, 4, 6
<i>Oryctolagus cuniculus</i>	Rabbit	Category 3, 4, 5, 6
<i>Sus scrofa</i>	Pig	Category 3, 4, 6

Field Assessment

Seven introduced terrestrial vertebrate species have been recorded within the Project area and surrounds during site surveys including: Cane Toad (*Rhinella marina*); Cat (*Felis catus*); Rabbit (*Oryctolagus cuniculus*); Dingo (*Canis lupus dingo*), Pig (*Sus scrofa*), House Mouse (*Mus musculus*) and Indian Myna (*Acridotheres tristis*). Four of these species (Rabbit, Feral Cat, Dingo and Pig) are declared species under the Biosecurity Act.

No species were identified in large numbers except the Cane Toad during surveys in March 2011 and May 2017. Unusually wet conditions preceded both site visits. House Mouse was recorded during the 2011 site surveys but not in subsequent trapping events. Indian Myna was not recorded until the 2017 site surveys potentially indicating a recent introduction into the area.

Although not recorded during the desktop review or field assessments the European Red Fox (*Vulpes vulpes*) is also considered likely to occur on the site for the purposes of this assessment. The latest pest mapping for the species in Queensland provided by Department of Agriculture and Fisheries (DAF) (DAF, 2016) indicates fox is common and widespread in the Project area.

17.5.2 Terrestrial Pests Flora

Desktop Assessment

The EPBC protected matters search tool identified the following eight WoNS as having the potential to occur in the Project area:

- Rubber Vine;
- Olive Hymenachne;
- Bellyache Bush (*Jatropha gossypifolia*);
- Lantana;
- Prickly Pears (*Opuntia* spp.);
- Parkinsonia (*Parkinsonia aculeata*);
- Parthenium; and
- Prickly Acacia (*Vachellia nilotica*, form. *Acacia nilotica*).

The above species are also listed as Restricted Matters under the Biosecurity Act. Database searches of the wider area encountered records of 153 introduced species, including all eight species listed as WoNS above, and seven other species listed as Restricted Matters under the Biosecurity Act:

- Mother-of-Millions (*Bryophyllum delagoense* and *Bryophyllum x houghtonii*);
- Heart Seed Vine (*Cardiospermum grandiflorum*);
- Cat's Claw Creeper (*Dolichandra unguis-cati*);
- Harrisia cactus (*Harrisia martini*);
- Rat's Tail grasses (*Sporobolus jacquemontii*); and
- Indian Jujube (*Ziziphus mauritania*).

Field Assessment

Fifty-three introduced weed species were identified within the Project area during the onsite surveys (refer to Appendix A9b – Terrestrial Flora Reports). Of the 53 weed species identified, ten are classified as Category 3 Restricted Matters under the Biosecurity Act, and six are also declared as WoNS (Table 17-2). The site surveys in February 2017 identified seven species including an additional species of Prickly Pear (*Opuntia tomentosa*) not identified previously.

Under the Biosecurity Act, a Category 3 restriction requires that 'a person who has, or has a thing infested with, the Restricted Matter in the person's possession or under the person's control must not distribute or dispose of the Restricted Matter unless the distribution or disposal is carried out via the methods set out in the Biosecurity Act.'

The occurrence of the listed weed species is consistent with distributions shown in the latest Biosecurity Queensland Annual Pest Distribution Survey data.

Table 17-2 Declared weed species identified within Project area

Species name	Common name	Biosecurity Act category	WoNS	2011 surveys	2017 surveys
<i>Aristolochia elegans</i>	Dutchman's Pipe	Category 3	No	X	
<i>Bryophyllum delagoense</i>	Mother-of millions	Category 3	No	X	X
<i>Cryptostegia grandiflora</i>	Rubber-vine	Category 3	Yes	X	X
<i>Harrisia martinii</i>	Harrisia Cactus	Category 3	No	X	
<i>Hymenachne amplexicaulis</i>	Olive Hymenachne	Category 3	Yes	X	X
<i>Jatropha gossypifolia</i>	Bellyache Bush	Category 3	Yes	X	X
<i>Lantana camara</i>	Lantana	Category 3	Yes	X	X
<i>Opuntia stricta</i> <i>Opuntia tomentosa</i>	Prickly Pear species	Category 3	Yes	X	X X
<i>Parthenium hysterophorus</i>	Parthenium	Category 3	Yes	X	X
<i>Sporobolus fertilis</i>	Giant Paramatta Grass	Category 3	No	X	

In general, weed species were abundant within the ML and particularly along Deep Creek and Tooloombah Creek (see Figure 17-1). The ground layer of cleared areas within the ML is dominated by the introduced Buffel Grass (*Cenchrus ciliaris*). Bellyache Bush occurs patchily along the margins of both creeks. Rubber Vine is common along both creeks (sometimes forming dense infestations) and occurs along the minor drainage located within the ML to the north of the Bruce Highway. Lantana occurs in varying density throughout much of the remnant vegetation in the area, and in non-remnant areas located near creek lines. High densities were noted in the south of the ML around fauna trap site 2, in the floodplain vegetation adjacent to Deep Creek such as fauna trap site 4 and along the creek lines themselves.

Olive Hymenachne is a semi-aquatic species and was recorded at two sites north of the Bruce Highway. Parthenium was only observed along Tooloombah Creek and not within the ML. Prickly Pear is sparsely distributed throughout the ML although mainly occurs on the heavy clay soils north of the Bruce Highway within the regrowth Brigalow communities.

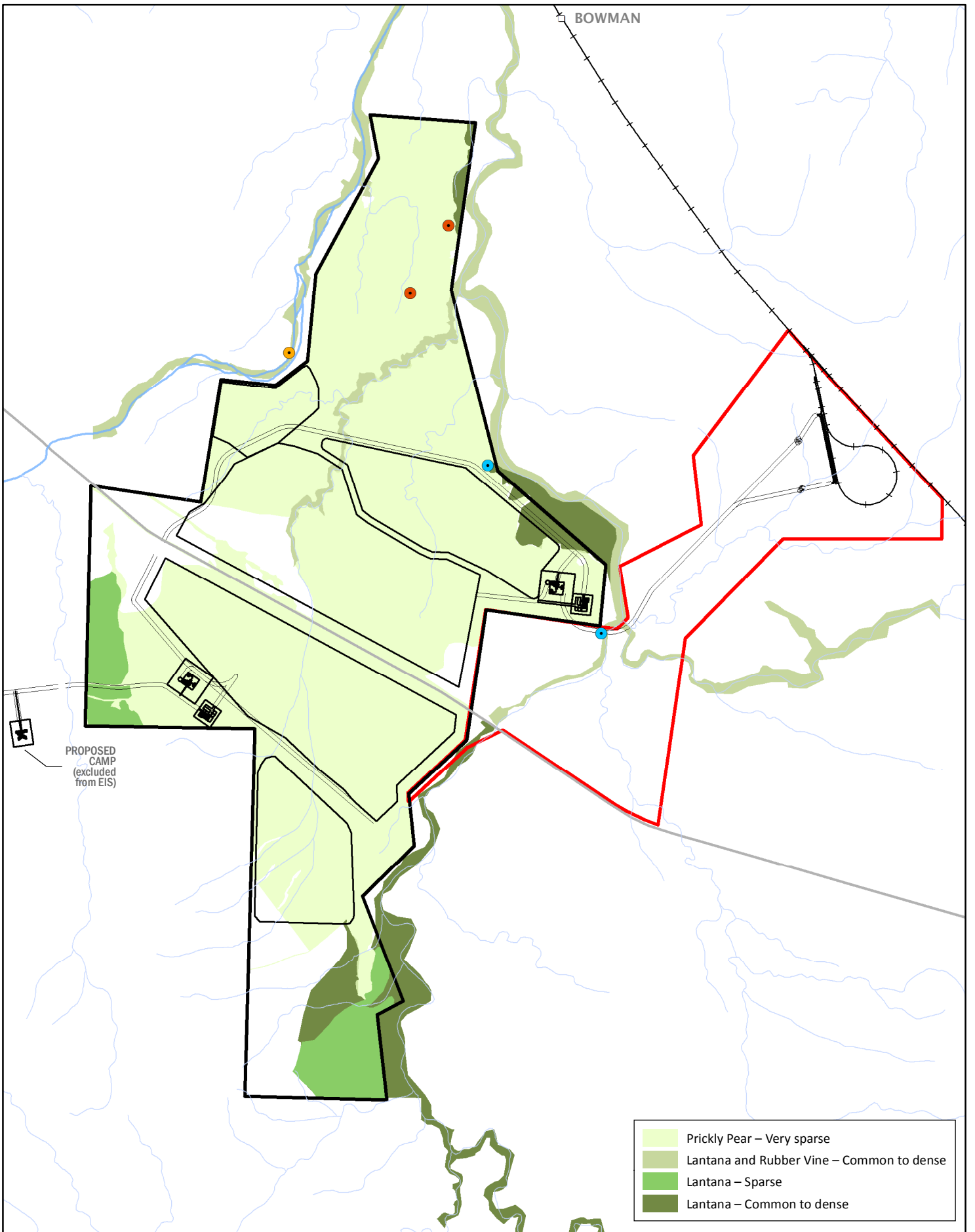


Figure 17-1
Listed (Biosecurity Act) weed species distribution across the Project Area

DATA SOURCE
QLD Department of Environment and Heritage Protection, 2016;
QLD Spatial Catalogue (QSpacial), 2017



0 0.5 1 km

Scale @ A4 1:50,000
Date: 21/07/17
Drawn: Gayle B.

Legend

- *Parthenium*
- *Olive Hymenachne*
- *Bellyache Bush*
- ML 80187
- ML 700022
- Proposed mine infrastructure
- North Coast Rail Line
- Main Road
- Major watercourse
- Minor watercourse

17.5.3 Aquatic Pest Flora and Fauna

17.5.3.1 Desktop Assessment

Past studies have noted several aquatic weed species in the region including: Salvinia (*Salvinia molesta*), Olive Hymenachne and Water Lettuce (*Pistia stratiotes*) (Melzer et al. 2008). Database searches identified Olive Hymenachne, an aquatic weed species within a 50 km radius of the Project area.

Database searches identified 26 native freshwater-associated fish species known to occur within a 50 km radius of the Project area. No introduced pest species are known from the wider area.

17.5.3.2 Field Assessment

Rubber Vine was observed to be a common weed species in the riparian zone of most creek sites. Parthenium was observed in Tooloombah Creek during the 2017 survey. Neither of these species are considered aquatic plants. Olive Hymenachne is an aquatic weed and although not observed at any creek sites, it was recorded in the northern extent of the ML at a farm dam (February 2017) and in a water-filled gilgai (May 2017). These species are listed as a Category 3 Restricted Matter (under the Biosecurity Act) and as a WoNS.

Field surveys identified 28 species of native fish, but no exotic species were recorded in either 2011 or 2017 indicating the catchment may be relatively free of introduced taxa such as Tilapia (*Oreochromis* sp.) and Mosquito fish (*Gambusia* sp.).

17.5.4 Plant Pests and Disease

Plant pests and diseases threaten Queensland's agriculture, environment and economy. These may enter Queensland and spread through several pathways; freight entering the country from overseas, tourists, interstate traveller's and the natural movement of a pest species. The Department of Agriculture and Water Resources administers Australia's biosecurity system through the Commonwealth *Biosecurity Act 2015* and subsequent legislation, with state and territory governments, industry and the community, to minimise the risk of exotic pests and diseases from entering the country and to protect Australia's plant health status.

Plant pests and disease are not known to occur on the ML. Any suspected sighting of a notifiable plant pest or disease will be reported to the DAF as per legal requirements.

17.5.5 Vector Borne Disease

Queensland has experienced an increase in mosquito-borne disease rates over the last 10 years particularly Dengue, Ross River and Barmah Forest virus infections (Queensland Health, 2016). North Queensland is experiencing regular outbreaks of dengue and the dengue vector, *Aedes aegypti*, is dispersing across Queensland and has been detected in central and southwest Queensland cities and towns.

The greatest threat to public health is posed by the potential introduction of mosquito-borne diseases such as chikungunya and Japanese encephalitis brought into Queensland by travellers from countries where these diseases are endemic. The incursions of exotic vectors pose similar threats where these vectors can readily adapt to the conditions.

To address the mosquito borne disease rates the Queensland Government has prepared The Queensland Joint Strategic Framework for Mosquito Management 2010-2015. The Framework

provides a strategic direction for the management of mosquitoes and mosquito-borne diseases in Queensland.

Priorities for Queensland under the strategic framework include:

- Dengue and the distribution and density of the vector throughout Queensland;
- Exotic mosquito-borne diseases of importance to Queenslanders e.g. chikungunya, malaria and Japanese encephalitis;
- Mosquito-borne diseases of high prevalence in Queensland e.g. Ross River virus and Barmah Forest virus;
- Incursions of exotic mosquitoes e.g. *Aedes albopictus*; and
- Climate change and its effect on vectors of mosquito-borne disease mosquito management programs.

17.6 Potential Impacts and Mitigation Measures

17.6.1 Terrestrial Pests (Fauna)

The potential impacts of the terrestrial pest fauna species, identified in Section 17.5.1, may include changes to the densities of native fauna and flora species present within the Project area and broader region. The storage of waste is a potential attractant for existing pest fauna and may act as a vector for concentrating new populations into the area. Terrestrial pest (fauna) species may become more abundant in the Project area through the establishment of new populations of pest species through the transportation of plant and equipment to the site (i.e. rodents and tramp ant species hidden within the equipment).

Feral pigs have a variety of impacts to native fauna through direct predation on small fauna and competition for herbivorous resources. Their wallowing and trampling behaviour degrades habitats (particularly within riparian and wetland habitats) by destroying shrub ground layers and preventing recruitment, altered soil structure, spreading of weeds and creating erosional and water quality issues. They are vectors for exotic diseases and may spread plant pathogens such as root-rot fungus (*Phytophthora cinnamomi*).

Feral cats cause direct predation pressure on small native fauna within the region, and can respond in large numbers to fluctuations in prey abundances, placing pressure on native faunal assemblages. Although considered a pest under the Biosecurity Act, the presence of Dingo and Wild Dog has been shown to reduce the levels of mesopredators. Retaining these higher-level predators within the systems can keep mesopredator (i.e. feral cat and fox) populations in check.

The term 'Wild Dog' refers to purebred Dingo, Dingo hybrids, and domestic dogs that have escaped or been deliberately released and now live in the wild. Wild Dog is found throughout Queensland in varied habitat. Wild Dog competes directly with Dingo for food and living spaces, particularly in refuge areas. Prey includes a variety of medium to large sized animals which may include widespread, threatened species such as Koala (*Phascolarctos cinereus*), and small remnant populations of threatened species such as Bridled Nailtail Wallabies (*Onychogalea fraenata*). Hybridisation between Dingo and other wild dogs is having a significant impact to the genetics and as such the purity of the remaining Dingo population. From an economic perspective, Wild Dog causes stock losses, lower profitability from bitten stock and increased risk of disease being spread to domestic animals. (e.g. hydatidosis and neospora).

Native to the northern hemisphere, the European Red Fox (*Vulpes vulpes*) was introduced to Australia from England as a sport animal during the 1860s and became a pest species within 30 years. Today, foxes are widespread throughout most of mainland Australia, and are expected to be present in the Project area. Foxes are a threat to Australia's native fauna species as they are adaptable to variety of habitats. European Red Fox pose a risk to the long-term survival of many small marsupial and rodent species in Australia, and can significantly affect ground-nesting birds and turtles.

17.6.1.1 General Impacts

The potential impacts of Project activities and the known pest fauna in the area are likely to include:

- Predation on native species;
- Competition for food resources, which may decrease abundance of prey for native predator species;
- Habitat changes due to destruction of plants causing changed floristic composition;
- Reduced regeneration of plants due to grazing and top soil disturbance (particularly by feral pigs);
- Alteration of soil structure;
- Increased invasion and spread of weeds;
- Increased access for non-native predator species caused by clearing and new tracks;
- Toxicity to native predators (e.g. Cane Toad);
- Increase in pest animal populations from access to waste and food sources;
- Degradation of waterholes / wetlands causing reduced water quality and availability; and
- Spread of exotic invertebrates carrying disease vectors (such as ticks) and creation of habitats suitable for disease proliferation.

17.6.2 Terrestrial Pests (Flora)

Fifty-three introduced weed species were identified within the Project area during the onsite surveys of which, ten are classified as Category 3 Restricted Matters under the Biosecurity Act, and six are also declared as WoNS (see Table 17-2). The ten Category 3 Restricted Matters weed species are described below.

Dutchman's Pipe (*Aristolochia elegans*) - Category 3 Restricted Matter (Queensland)

Native to South America and the West Indies, Dutchman's Pipe is a fast-growing vine that has been widely promoted as an unusual, easily cultivated ornamental plant. Stems are woody, slender and twine tightly in coils around any supporting structure. Leaves are alternate, glossy-green, heart-shaped or broadly triangular, up to 75 mm long, growing closely to form a dense mat of foliage. Flowers are striking, reddish-purple, marked with white and yellow, shaped like traditional Dutchman's pipe up to 10 cm wide and 7.5 cm long. Fruits are capsule-shaped, with six ribs which split open to release seeds which are numerous, brown and 6-7 mm long.

Dutchman's Pipe looks similar to native plants that are used by native butterflies for feeding and egg-laying. However, it is poisonous to butterfly larvae that hatch and feed on its leaves. The survival of the rare Richmond Birdwing Butterfly (*Ornithoptera richmondia*) is threatened by Dutchman's Pipe.

Dutchman's Pipe has naturalised in parts of Queensland and New South Wales (Business Queensland, 2017).

Olive Hymenachne (*Hymenachne amplexicaulis*) - WoNS (Australia) and Category 3 Restricted Matter (Queensland)

Native to South America, Hymenachne is a robust, rhizomatous, perennial grass up to 2.5m tall. Leaf blades are 10-45 cm long, up to 3 cm wide and flower heads are spike-like, cylindrical, 20-40 cm long. Originally introduced to Australia to provide ponded pasture for cattle, it prefers streambanks, shallow wetlands and irrigation ditches and is now found from far north Queensland to Casino in New South Wales, and in the top end of the Northern Territory (Business Queensland, 2017).

Hymenachne has become an unwanted pest of streambanks, shallow wetlands and irrigation ditches, primarily in the coastal wet tropics of northern Queensland. In some areas, it has invaded low-lying sugarcane fields, fish habitats and natural wetlands with high conservation value. Hymenachne damages wildlife habitats and irrigation channels, and degrades recreational water quality (Business Queensland, 2017).

Prickly Pear species (*Opuntia stricta* and *Opuntia tomentosa*) - WoNS (Australia) and Category 3 Restricted Matter (Queensland)

'Prickly pear' is a general term used to describe the *Opuntia* species, members of the Cactaceae family. Opuntoid cacti vary significantly in their form and habit, ranging from low-growing shrubs under 50 cm to erect trees up to 8 m tall. Plants are normally leafless succulent shrubs. Stems are divided into segments (pads or joints) that are flat and often incorrectly called leaves. Young shoots have true leaves resembling small fleshy scales that fall off as the shoot matures.

Flowers are large, normally seen during spring and can be yellow, orange, red, pink, purple or white depending on the species. Fruits vary between species and can be red, purple, orange, yellow or green. Areoles (spots with clusters of spines) are found on both the pads (joints, segments) and fruit. In addition to spines, areoles often have clusters of sharp bristles (glochids) and tufts of fibre ('wool'). Each areole contains a growing point that can produce roots or shoots.

Native to the Americas, prickly pear is a spiny, drought-resistant succulent that rapidly invades pastures and natural areas and overwhelms other vegetation (DAF, 2017).

Giant Paramatta Grass (*Sporobolus fertilis*) - Category 3 Restricted Matter (Queensland)

Native to tropical Asia and Malesia Giant Parramatta Grass (GPG) adapts to a wide range of soils and habitat conditions. GPG is a clumping grass that looks very like another weedy sporobolus grass, Giant Rat's Tail Grass (*Sporobolus pyramidalis*). GPG is a lumping grass, growing to 0.8 - 1.6 m tall. Seed head is up to 50 cm long and 1-2 cm wide. Branches of the seed head are pressed to axis and overlapping when young, opening out as they mature.

GPG reduces pasture productivity and causes significant degradation of natural areas. Giant Parramatta grass is found from northern Queensland to the southern coast of New South Wales,

with isolated infestations also found in Victoria and the Northern Territory (Business Queensland, 2017).

Mother of Millions (*Bryophyllum delagoense*) – Category 3 Restricted Matter (Queensland)

Mother of Millions is a perennial succulent growing to 1 m high. Stems are erect and cylindrical. Leaves are sessile, succulent, pale green to brown with dark green blotches, cylindrical and notched at the tips to 2-15 cm long. Flowering occurs mainly from winter to spring and they appear drooping, bell-shaped, orange-red to scarlet and 4-lobed to 2-3 cm long and are held in flat top clusters. Fruit are dry and contain many seeds.

Introduced to Australia as a garden ornamental, from its native Madagascar, Mother of Millions can be found in shady woodlands and along roadsides and in vacant land, in leaf litter and shallow soils, in Queensland (Business Queensland, 2017).

This species of plant, particularly its flowers are poisonous to stock, pets and humans. It is drought tolerant. Dispersal is by seed and plantlets produced in notches on the margin of the cylindrical leaves (Sainty and Associates, 2009).

Rubber Vine (*Cryptostegia grandiflora*) - WoNS (Australia) and Category 3 Restricted Matter (Queensland)

Rubber Vine can grow as a shrub to 3 m (unsupported) or as a woody climber to 30 m (supported) tall and is characterised by whip-like, smooth, warty stems and dark green and glossy, oval-shaped leaves to 10 cm long and 5 cm wide. Leaves are held in pairs on short purplish stems and have prominent thick midribs. Large, showy, funnel-shaped, pink to purple flowers appear in spring and summer and hard, light green fruit pods to 15 cm long and 4 cm wide are produced in summer through to autumn (Parsons and Cuthbertson, 2001).

Native to southwestern Madagascar, Rubber Vine can be found in open grasslands and in canopy gaps along streams, in all soil types in eastern Queensland where it smothers native vegetation and restricts access to waterways. Rubber vine is spread by seed in water and by wind (Parsons and Cuthbertson, 2001).

Harissia Cactus (*Eriocereus martini*) - Category 3 Restricted Matter (Queensland)

Harissia Cactus is a spiny, rope-like, night flowering succulent plant, forming large tangled mats 30 – 60 cm high. Stems are bright green, fleshy, jointed at 30 – 45 cm intervals, ribbed lengthways, each rib with six low pyramidal humps crowned with rounded areoles of grey felted hairs, each giving rise to 1 - 3 sharp central spines and 5 – 7 appressed radial spines. Leaves are inconspicuous at the base of the spines. Fruit is red, subglobular 4 – 5 cm in diameter, with several red tubercles topped by cushions of felted hairs and spines on the stems. Fruit splits down one side when ripe to reveal a mass of black seeds embedded in white pulp (Parsons and Cuthbertson, 2001).

Native to South America, Harissia Cactus can be found in Australia on deep fertile cracking clays of the Brigalow (*Acacia harpophylla*) forests and False Sandalwood (*Eremophiula mitchelli*) scrubs of central and southeast Queensland (Parsons and Cuthbertson, 2001).

Introduced as an ornamental species, dense infestations of Harissia Cactus choke out pasture. The sharp spines, even in light infestations, make pasture unfavourable to stock and reduce productivity. The plant fruits prolifically and seeds are dispersed widely by birds and animals. Harissia Cactus

can also reproduce by stem sections taking root. A deep, underground, tuberous root system allows the plant to survive catastrophes which may kill the above ground parts (Business Queensland, 2017).

Bellyache Bush (*Jatropha gossypifolia*) - Category 3 Restricted Matter (Queensland)

Bellyache Bush is an erect, squat shrub or small tree to 3 m tall. Stems are thick and soft with watery sap to 1-2 m long. Leaves are deep purple and sticky when young and on maturity, bright green, alternate, stalked, rounded to obovate and deeply divided with three lanceolate lobes to 10 cm diameter and hairy stalks and margins. Flowers are purple with yellow centres, small and clustered on axillary, branched stalks to 1 cm diameter. Fruit capsules are oblong and three lobed to 1.2 cm long and 1 cm wide. Roots are fleshy and tubulous. Flowers and fruits year-round but chiefly in Summer and Autumn (Parsons and Cuthbertson, 2001).

Native of tropical Central and South America and the Caribbean Islands this species can be found in disturbed areas including mine sites and rangelands, riverbanks and roadsides, in good loamy soils in northern Australia (Parsons and Cuthbertson, 2001).

Introduced as an ornamental garden species, the shallow roots of the Bellyache Bush inhibit growth of neighbouring plants reducing native vegetation and pasture cover. Seeds are highly toxic to humans and animals (via ingestion). Dispersal is through seeds by explosive release, water borne, and root suckers (Parsons and Cuthbertson, 2001).

Lantana (*Lantana camara*) - Category 3 Restricted Matter (Queensland)

Lantana is a multi-branched thicket-forming shrub growing 2 to 4 m in height. Woody stems are square in cross-section and up to 150 mm thick. Leaves are bright green, ovate, 2 – 10 cm long, finely toothed at the margins and emit a strong odour when crushed. Flowering may be continuous throughout the year along the coast and follows heavy rains further inland. Flowers are held in groups of about 20 individuals and range in colour including white, cream, yellow, orange, pink, red and purple. Mature plants may produce up to 12,000 seeds per year which may remain viable for several years. Root system consists of a brown woody tap root with strong laterals and fine white rootlets (DotEE, 2017; Parsons and Cuthbertson, 2001).

Creeping Lantana (*Lantana montevidensis*) is a closely related species and is a popular ornamental. It is a creeping, trailing or weeping shrub. It is similar to Lantana but lacks thorns, has mainly purple flowers and only grows to approximately 0.5 m in height (Parsons and Cuthbertson, 2001).

Native to Central and Southern America, Lantana can be found in the tropics south to temperate regions. In Queensland and New South Wales, it occurs mainly on or east of the Great Dividing Range on moist soils. It also occurs in Western Australia and the Northern Territory. It has the potential to expand its range into temperate Victoria and southern Western Australia (DotEE, 2017).

Lantana seeds are commonly dispersed by fruit eating animals and birds, also via water flow and mud sticking to clothing and hooves. Predators consuming birds and thereby consuming the seed may disperse seed in droppings over large distances. This species forms dense thickets in native bushland and grazing areas limiting biodiversity and pasture productivity. It easily invades disturbed, sunny areas. Creeping Lantana is known to rapidly replace pasture species affected by prolonged drought. May be toxic to stock (Parsons and Cuthbertson, 2001; DotEE, 2017).

Parthenium Weed (*Parthenium hysterophrus*) - WoNS (Australia) and Category 3 Restricted Matter (Queensland)

Parthenium Weed is a Chrysanthemum-like, erect, aromatic herb to shrub to 2 m tall. Stems are erect and branching in the upper half, with longitudinal grooves and becoming woody with age. Leaves are alternate, pale green and shortly hairy. Rosette leaves are deeply lobed to 8-20 cm long and 4-5 cm wide. Stem leaves are shorter and less divided with ultimate segments bluntly pointed or rounded. Flowers appear all year round and are white and compact to 4-10 mm diameter, with five distinct corners and are held in terminal panicles. Seeds are black and flattened to 2 mm long with 2 thin white spoon-shaped appendages at the tips. Taproot is deeply penetrating with many finely branched feeding roots (Parsons and Cuthbertson, 2001).

Native to North and South America Parthenium Weed can be found in disturbed areas including roadsides, railway reserves, stockyards, cultivated fields, disused pastures and vacant lots, in heavily fertile soils, particularly alkaline clay loams and black clay soils, in humid to sub-humid tropical and sub-tropical regions of Queensland and northern and central New South Wales (Sainty and Associates, 2009).

Thought to be introduced with aircraft and machinery during parts of World War II this species is known to reduce pasture productivity and is toxic to cattle (ingestion). Parthenium Weed ingestion can also taint meat from livestock grazing on plants. Reduces biodiversity in native grasslands by out-competing with and displacing (alleopathic) native species. Species is a prolific seeder with a large, persistent seed bank and long seed dormancy. Dispersal by seed, on machinery and animals and in stock feed and water (Parsons and Cuthbertson, 2001).

Potential general impacts of invasive weed species include loss of habitat for native plants and animals and subsequent loss of biodiversity and safety hazards.

17.6.2.1 General Impacts

The potential terrestrial pests (flora) species, listed in Table 17-2 may impact existing vegetation communities, and therefore existing native fauna habitat. Movement of personnel, vehicles and equipment associated with construction and operational activities have the potential to facilitate the introduction and / or dispersal of weeds within the Project area and to the surrounding lands. The introduction and / or dispersal of weeds has the potential to:

- Increase competition for resources (e.g. space, light, nutrients) with native species;
- Reduce productivity of the land;
- Reduce natural biodiversity;
- Alter hydrological regimes, fire regimes and soil processes; and
- Injury of native animals and stock through contact with toxic material, and reduced condition or loss due to consumption of toxic material.

17.6.3 Plant Disease

Plant disease has the potential to impact the existing environmental values (remnant vegetation and fauna habitat) locally and in the surrounding region, should a disease be introduced to the Project area. There are unlikely to be impacts to agricultural values and the economy due to the lack of existing cropping activity in the broader Project area. Notwithstanding, there are presently no biosecurity zones covering the Project area. Central Queensland Coal will implement a duty of care management program to minimise the risk of inadvertently spreading plant disease from international and domestic sources. These are discussed in Section 17.6.6.

17.6.4 Terrestrial Pests (Fauna)

Central Queensland Coal will develop a range of management and mitigation measures to control fauna pests, incorporating both direct controls to reduce existing fauna pests and indirect controls to minimise access to additional food and water sources that could facilitate new or increased pest populations.

17.6.4.1 Mitigation Measures

Direct Controls

Direct controls are proposed to reduce or eradicate completely the existing fauna pest species that occur in the Project area. Site-specific pest and weed management controls will be developed for the Project and incorporated into the Land Use Management Plan (LUMP). Controls will be implemented in a consistent approach with those of the LSC. The pest fauna management aspect of the LUMP will be developed with the following attributes:

- The program will focus on wild dogs, feral pigs and cats, and foxes, which are the main pests in the Project area; however, provision would be made for control of other fauna pests as required;
- The feral animal management program will be developed and implemented in the early stages of the Project;
- The program will focus on reducing priority pest species numbers in sensitive environmental areas where populations may be concentrated;
- Control measures would be compatible with accepted animal welfare outcomes;
- The control program will include an appropriate monitoring plan for measuring program performance and guiding subsequent control effort; and
- The LUMP will work in with existing council / DNRM vermin control programs.

Indirect Controls

Indirect controls are proposed to ensure that pest fauna populations are not increased or introduced because of mining operations. This will incorporate management decisions in relation to waste management, water source minimisation and camp design (i.e. they may live and / or shelter under accommodation during the day).

The following specific mitigation measures are proposed for the management of terrestrial pests (fauna) species:

- Central Queensland Coal will prepare a Waste Management Plan to ensure that wastes are appropriately managed onsite, with a focus on reducing access to food wastes by pest species (refer to Chapter 7 – Waste Management);
- Waste collection areas will be fenced and secured; and
- Water management systems will aim to avoid the creation of artificial water points that could provide a source of drinking water to vertebrate pests or breeding habitat for invertebrate pests.

17.6.5 Terrestrial Pests (Flora)

The Project will establish two roads to access the site. These areas will be the major opportunities for the introduction and spread of weeds. Consequently, the importation of machinery, vehicles and personnel into the area, particularly during the construction phase, presents an opportunity for weed introduction.

Preventative methods proposed to reduce the risk of weeds being introduced into the area include:

- A thorough washdown procedure will be required for all plant and machinery prior to it being shipped to site;
- Clearing will be minimised to the area directly required for mining operations; and
- A washdown facility will be constructed onsite for any vehicles that do enter / leave the mining lease areas, with a standard washdown procedure to be followed.

Any weeds that are identified within the Project area will require appropriate treatment to reduce the potential for these species to spread to new areas. Should weed infestations occur, the treatment applications will be selected relevant to the species, the size and growth stage of each infestation and the timing of application.

Treatment applications that may be used are described in the following sections.

17.6.5.1 Physical Control

Physical control methods can be highly effective for the treatment of small infestations and can often be applied with machinery or equipment that is readily available. This type of control is often cost effective and may help to retain ground cover and discourage germination of weed seeds; however, it has potential to disturb the soil and would be avoided in areas with poor soil stability.

Physical methods may include:

- Hand-pulling;
- Grubbing;
- Slashing / mowing;
- Cultivation (ripping / rotary hoeing / stick raking);
- Bulldozing; and
- Mulching.

17.6.5.2 Chemical Control

All chemical treatment methods will be undertaken by experienced and licensed spray operators in accordance with the ACDC Act. The type and method of application for chemical treatments will vary depending on the targeted species, situation (e.g. waterways, adjacent pastures), size of infestation and growth stage of individuals (refer to the Safety Data Sheet [SDS] for individual herbicides). As a rule, chemicals used for weed control will be chosen with a preference for chemicals that break down quickly in the natural environment, do not bio-accumulate and are not hazardous for aquatic life.

17.6.5.3 Cultural Control

Cultural control refers to land management and focuses on adopting better management practices to reduce weed infestations and prevent weed spread. These methods are most effective when used in conjunction with appropriate physical, chemical and biological control applications and may include:

- Minimise land disturbance – reducing the area of open land that is open for weed colonisation;
- Revegetation – to provide natural ecosystems that will compete with any weed species;
- Fire – fire is a natural part of many native ecosystems and can assist their establishment while reducing weed infestations; and
- Hygiene – procedures to reduce the spread of weeds from contaminated areas to ‘clean’ areas e.g. vehicle washdowns.

17.6.5.4 Monitoring and Reporting

Monitoring is an integral part of the weed management strategy and establishes benchmarks for assessing the extent and distribution of significant weed species within the Project area over time, and the effectiveness of management strategies (including treatment) to minimise the introduction and / or spread of these species and diseases.

Any significant weed infestation would be considered an environmental incident and will be reported in the site incident reporting system triggering appropriate activities to be undertaken.

The management approaches will need to be flexible in reacting to information gathered through the monitoring process. Management strategies may need to be altered as needed to improve results and respond to changes in the environment, thereby giving the weed management approach resilience, and flexibility to react to seasonal conditions and changes that may compromise existing priorities and previously set goals.

Monitoring activities will focus on:

- Extent and distribution of new weed infestations. Regular weed surveys will be undertaken during construction activities. Following construction, surveys will be undertaken on a regular basis to assess the extent and distribution of significant weed species present within the Project area. This survey will include previously disturbed areas, retained vegetation and buffer areas; and
- Treatment applications – For any significant weed infestations, photos will be taken prior to and after treatment applications to provide a visual assessment of the effectiveness of methods to reduce weed density.

17.6.5.5 Mitigation Measures

The following mitigation measures are proposed for the management of terrestrial pests (flora) species:

- Endemic vegetation species will be used for revegetation and landscaping activities;
- Disturbed areas will be rehabilitated at the earliest opportunity, and buffers will be created around identified riparian and wetland areas to reduce edge effects;
- A wash down facility will be constructed at the main site access point for vehicles which have travelled off formed roads. These facilities are to be bunded and located away from drainage lines to minimise the risk of weed spread;
- While onsite, vehicles to keep to roads or compacted surfaces wherever possible and reduce vehicle movements in wetted soil where avoidance is not possible;
- Identified weeds of management concern, including declared and environmental weeds, to be controlled in accordance with local best practice management as described in the Pest Fact sheets published by the DAF;
- Treated areas will be monitored to assess the success of declared weed eradication;
- Weed management to be included in the site induction program for the Project to promote awareness of weed management issues;
- Site-specific weed and pest management strategies will be developed for the Project that are consistent with LSC's pest management strategies. The controls will include a management program such as:
 - Weed surveys would be conducted post wet season, targeting all operational areas and immediately adjacent ecosystems
 - Periodic weed surveys would be conducted targeting habitats where key weed species are most likely to become established in high value areas such as riparian and wetland areas
 - Detailed GIS mapping of the above areas would form the basis of the weed management program and guide weed surveys
- Site-specific fire management controls will be developed as part of the LUMP that will be interrelated with the proposed weed and pest management practices.

17.6.6 Plant Disease

It is likely that equipment will be sourced from overseas destinations for the Project. When vehicles, machinery, plant equipment or materials are imported from overseas, it will be required to enter Australia through international ports, in accordance with existing quarantine laws and procedures. Consequently, it is unlikely that plant diseases from overseas will be introduced into the Project area. As another form of management Central Queensland Coal will ensure that any vehicles, machinery, plant equipment or materials imported from overseas will be inspected for plant material prior to arriving at the Project area.

The following management measures will also be considered:

- Central Queensland Coal will ensure construction contractors and visitors to the site will be made aware of plant disease quarantine requirements;
- Where necessary quarantine bins will be provided for the receipt of plants and / or plant materials which may potential be affected by disease or bacteria; and
- Plants and plant materials suspected of being affected by a plant disease will be immediately reported to DAF so that they are then able to provide instruction on further actions to be taken such as diagnosis, containment and treatment.

17.6.7 Vector Borne Disease

Mosquito management strategies will be developed to manage mosquitoes (and midges) for public health at the site and broader community well-being. Mosquitoes pose a risk to human health as mosquitoes are vectors for many serious diseases, such as Dengue fever, Ross River Virus and Barmah Forest Virus.

A range of approaches to managing vector borne diseases will be considered by Central Queensland Coal. Control measures targeting adult mosquitoes have a large and immediate impact on virus transmission, whereas larval control removes the subsequent generation of mosquitoes within the affected area. Measures to address both stages of development will be implemented by Central Queensland Coal.

The most effective measure to reduce the risk of mosquito-borne transmission is to prevent or reduce mosquito breeding. Mosquito control in Queensland is the legislative responsibility of local government; however, Central Queensland Coal will implement a range of measures in the Project area to limit the risk of the vector borne disease.

Mosquito management strategies will be incorporated into the Project's Environmental Management Plan and will combine a variety of control measures to reduce population numbers and disease risk of mosquitoes, while having minimal impact on the environment. Mosquito management programs differ according to mosquito type and habitat. The mosquito species *Aedes aegypti* and *Aedes albopictus*, both vectors of Dengue Fever, breed in artificial containers such as pot plant bases, rainwater tanks and tyres, as well as in natural habitats such as tree holes, plant axils and bromeliads. Whereas the mosquito species *Aedes vigilax* and *Culex annulirostris*, both vectors of Ross River Virus and Barmah Forest Virus, breed in saltmarsh and freshwater areas respectively.

Illness symptoms in employees (such as temperature, fever, joint and muscle pain) that may indicate vector borne disease will be monitored and reported to the appropriate authorities.

The following list of management strategies are listed in order of preference; however, for effective mosquito and midge management an integrated approach is required with most likely a combination of the management strategies needing to be adopted.

17.6.7.1 Personnel Protection Measures

Personal protection measures to be implemented to avoid and repel mosquitoes include:

- Personnel will be educated on the mosquito and midge problem onsite and educated in management strategies and responsibilities for their own health (through induction and regular communication);
- Where practicable, personnel will avoid peak biting times, specifically at dusk;
- Personnel will wear hats, socks, and loose fitting, light coloured clothing with long pants and long sleeves when outdoors. Head nets and gloves will also be worn, if required. Head nets with 1-1.5 meshes to the centimetre are recommended. Sleeves and collars will be kept buttoned and trousers tucked into boots. In severe cases, clothing may be impregnated with permethrin;
- When required, personnel will use mosquito repellents. The main active ingredient in mosquito repellents is N,Ndiethyl- 3-methylbenzamide (deet) which has a broad spectrum of effectiveness against a variety of arthropods, including mosquitoes. Repellents have differing concentrations of deet with the concentration of deet needed depending on the individual; and
- The workforce will be notified if there is a mosquito or biting midge problem and individuals will take appropriate personal protection.

17.6.7.2 Planning Tools

Planning tools to be used for mosquito and midge management include:

- All onsite accommodation will be air-conditioned and screened. Screens will be the correct mesh size, fit tightly and be in good repair. As mosquitoes follow people into buildings, all screen doors on buildings should open outward and have automatic closing devices. Where required, Bifenthrin barrier treatments around personnel areas will be implemented to reduce adult biting midge numbers; and
- Yellow or red lights will be used in personnel areas, where possible, to prevent attracting midges. White lights will be used away from non-personnel areas to divert the midges.

17.6.7.3 Source Reduction

Source reduction refers to the elimination and removal of potential breeding grounds, feeding opportunities and harbourage in areas associated with human habitation.

17.6.7.4 Container Breeding

Management actions for container and vessel breeding include:

- The creation of areas and structures in which water could be retained for more than five days will be avoided (i.e. potential mosquito breeding habitat); and
- If not able to be avoided (e.g. bunded areas), these will be drained and treated as required.

17.6.7.5 Drainage Systems

Stormwater drains will be constructed in a manner that does not lead to the creation of new mosquito breeding sites. The design of drainage systems will consider the following design features:

- Drainage design will prevent the accumulation of silt and debris that may create pooling of water;
- Erosion control measures will be installed on drain batters to prevent silting;
- Discharging water into mangrove and vegetated wetlands will be avoided, as this can help maintain permanent breeding sites; and
- Drains will be maintained free of siltation and debris.

17.6.7.6 Sewerage Systems and Wastewater Disposal

Sewerage systems and wastewater disposal will be managed in accordance with the following:

- Sewerage systems and wastewater disposal will be operated in a manner to avoid ponding of water;
- Irrigation rates will be effectively managed to prevent the creation of temporary pools; and
- Temporarily flooded areas will be managed through filling depressions and draining pooling areas.

17.6.7.7 Construction

Construction activities may create mosquito and midge breeding sites. To minimise potential impacts, the following actions will be followed:

- Roads will be fitted with culverts where necessary, to prevent water ponding upstream, and thus prevent mosquito breeding;
- Rehabilitated sites will be re-contoured to prevent ponding; and
- Design landscaping and drainage so that no stagnant ponding occurs during and after construction.

17.7 Qualitative Risk Assessment

A qualitative risk assessment associated with the potential introduction and spread of weeds and pests is summarised in Table 17-3. An analysis of initial risk, without mitigation, was considered for each potential impact. The residual risk considers the implementation of mitigation and management measures.

Table 17-3 Qualitative risk assessment

Issue	Potential impacts	Potential risk	Mitigation measures	Residual risk
Introduction and / or spread of terrestrial pests (fauna)	<ul style="list-style-type: none"> ▪ Direct predation on, and resource competition with native fauna ▪ Habitat disturbance due to foraging activity causing changed floristic composition, reduced seedling regeneration, altered soil structure, and increased potential for weed invasion ▪ Increased access for introduced predators through clearing and new track construction ▪ Toxicity to native predators ▪ Increase in pest populations from access to waste and food sources ▪ Degradation of waterholes / wetlands causing reduced water quality and availability ▪ Spread of exotic invertebrates carrying disease vectors and creation of habitats suitable for disease proliferation 	Medium	<p>Pest animal management will be an important and integral part of proposed site management activities, and will be outlined in the Project LUMP. The LUMP will be developed and managed in accordance with the requirements of the Land Protection Act, and will include the following measures:</p> <ul style="list-style-type: none"> ▪ Implement control strategies outlined in the DAF pest animal fact sheets and other relevant government biosecurity management strategies; ▪ Onsite waste disposal strategies (particularly for food wastes) to be employed that will not encourage the presence of pest fauna; ▪ Strategies for the storage of construction and operation materials / equipment to be employed that will not encourage the presence of resident pest fauna; ▪ Regular onsite inspections of site infrastructure / equipment for resident pest fauna; and ▪ Monitoring and pest inspections particularly in responses to reported outbreaks. 	Low
Introduction and/or spread of terrestrial pests (flora)	<ul style="list-style-type: none"> ▪ Competition with native species ▪ Reductions in biodiversity values of native vegetation ▪ Reduction in productivity of local agricultural / grazing lands ▪ Altered ecological regimes (hydrological, fire and soil) ▪ Injury, reduced fitness or loss due to contact/ingestion of toxic plants 	Medium	<p>Weed management will be an important and integral part of proposed site management activities, and will be outlined in the Project LUMP. The LUMP will be developed and managed in accordance with the requirements of the Land Protection Act, and will include the following measures:</p> <ul style="list-style-type: none"> ▪ Implementation of sediment control mechanisms to minimize the risk of weed seed washing into waterways; ▪ Implement control strategies outlined in the DAF weed fact sheets and other relevant government biosecurity management strategies; ▪ All machinery brought to site must undergo the approved washdown process; ▪ Minimise the use of off-road vehicle movements; and 	Low

Issue	Potential impacts	Potential risk	Mitigation measures	Residual risk
			<ul style="list-style-type: none"> ▪ Monitoring and weed inspections particularly in responses to reported outbreaks. 	
<p>Increase of disease vectors (e.g. biting insects)</p>	<ul style="list-style-type: none"> ▪ Risk of aiding the spread of mosquito-borne disease vectors ▪ Risk to human health including site workers and surrounding landowners 	<p>Medium</p>	<ul style="list-style-type: none"> ▪ development and implement mosquito and biting insect management strategies in the Land Use Management Plan; ▪ Appropriate chemical control measures will be utilised as appropriate to mitigate adverse health conditions; ▪ Develop and implement a Water Management System designated to prevent pooling of still water or creation of favorable mosquito habitat; and ▪ Regular maintenance of all structures associated with storage or treatment of recycled water. 	<p>Low</p>
<p>Introduction of plant disease</p>	<ul style="list-style-type: none"> ▪ Potential to impact existing environmental values in local area and surrounding region 	<p>Medium</p>	<p>The following measure will be implemented:</p> <ul style="list-style-type: none"> ▪ All vehicles, machinery and equipment imported from overseas will be inspected for plant material prior to entering site; ▪ Potentially disease material will be stored in a quarantine bin to enable investigation by DAF; and ▪ Plants and plant materials suspected to be affected by plant disease will be immediately reported to DAF. 	<p>Low</p>

17.8 Conclusion

The increased movement of people and machinery in the area, storage of wastes and clearing of vegetation may result in the increase in pest and weed species to the region. Site-specific controls that are consistent with LSC pest and weed management strategies, will be developed and will mitigate these potential risks by ensuring equipment is free from soil and pests before entering the area. Wastes will be handled and stored in an appropriate manner, to minimise access to pest fauna. During construction and operations, disturbed areas will be progressively rehabilitated and buffers will be created around undisturbed areas of remnant vegetation to minimise the risk of weed incursion.

There is the potential for weeds, pests and to a much lesser likelihood plant disease to be introduced to the area by equipment and machinery brought to site. The risk of the Project activities resulting in the introduction of plant disease is anticipated to be low given national and state regulatory requirements.

The appropriate management of the risks associated with vector borne diseases, including mosquitos, will be addressed in a Land Use Management Plan. The objective of management measures is to ensure the public health well-being of the employees and visitors to the site. Management includes a framework for identifying and monitoring mosquito populations as well as outlining procedures for implementing management strategies during the construction and operation phases of the Project.

17.9 Commitments

In relation to biosecurity, Central Queensland Coal's commitments are provided in Table 17-4.

Table 17-4 Commitments - biosecurity

Commitments
Develop and implement the Project Waste Management Plan using the principles of the waste management hierarchy, for the construction, operational and decommissioning phases of the Project. This will incorporate storage, handling, management and disposal of all Project waste streams, including regulated wastes.
Implement a duty of care management program to minimise the risk of inadvertently spreading plant disease from international and domestic sources
Incorporate the incoming requirements of the <i>Biosecurity Act 2014</i> in all management procedures, and will take all reasonable steps to prevent or minimise biosecurity risks.
Develop a range of both direct controls to reduce existing fauna pests and indirect controls to minimise access to additional food and water sources that could facilitate new or increased pest populations.
Ensure that any vehicles, machinery, plant equipment or materials imported from overseas will be inspected for plant material prior to arriving at the Project area.
Ensure construction contractors and visitors to the site are made aware of plant disease quarantine requirements

17.10 ToR Cross-reference Table

Table 17-5 ToR Cross-reference Table

Terms of Reference	Section of the EIS
8.9 Biosecurity	
Conduct impact assessment in accordance with the EHP's <i>EIS information guideline—Biosecurity</i> .	Sections 17.5, 17.6 and 17.7
Propose detailed measures to remove, control and limit the spread of pests, weeds disease, pathogens and contaminants on the project site and any areas under the proponent's control, particularly declared plants and animals under Queensland's <i>Biosecurity Act 2014</i> , the Commonwealth <i>Biosecurity Act 2015</i> and weeds of national significance (WONS).	Sections 17.6 and 17.7
Weed and pest animal management measures should be aligned with local government pest management priorities.	Sections 17.6 and 17.7
Detail a monitoring program that would audit the success of measures, whether objectives have been met, and describe corrective actions to be used if monitoring shows that objectives are not being met.	Sections 17.6 and 17.7