Central Queensland Coal Project

Chapter 17 - Biosecurity

Central Queensland Coal

CQC SEIS, Version 3

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Terms and Abbreviations

ACDC Act	Queensland *Agricultural Chemicals Distribution Control Act 1966*
BIMP	Biting Insect Management Plan
Biosecurity Act	Queensland *Biosecurity Act 2014*
Biosecurity Act (Cth)	Commonwealth *Biosecurity Act 2015*
DAF	Queensland Department of Agriculture and Fisheries
deet	N,N-Diethyl- 3-methylbenzamide
DNRME	Queensland Department of Natural Resources, Mines and Energy
EA	Environmental Authority
EIS	Environmental Impact Assessment
EMP	Environmental Management Plan
EP Regulation	Queensland Environmental Protection Regulation 2019
GPG	Giant Parramatta Grass
LSC	Livingstone Shire Council
LUMP	Land Use Management Plan
ML	Mining Lease
RRC	Rockhampton Regional Council
SDS	Safety Data Sheet
SEIS	Supplementary Environmental Impact Assessment
SSMP	Significant Species Management Plan
ToR	Terms of Reference
WoNS	Weeds of National Significance

17 Biosecurity

17.1 Introduction

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

Matters raised in submission to the Environmental Impact Statement (EIS) relating to Chapter 17 – Biosecurity were focused on:

- implementing pest and vector management controls in a manner consistent with Livingstone Shire Council's (LSC) Pest and Vector Management Plans that are in preparation and will be completed in the first half of 2018 and
- noting that additional management documents issued by the LSC and Rockhampton Regional Council (RRC) exist and that management approaches and controls need to be consistent with those management documents.

The following sections provide additional information to that included in the EIS in response to the submissions relating to EIS Chapter 17 – Biosecurity.

Appendix A13 includes the full details of all submissions received for the EIS and Version 1 of the Supplementary EIS (SEIS). The submissions received relating to the SEIS version 2 are addressed in Chapter 3 of this SEIS (i.e. Version 3).

It is noted, however, that no submissions relating to biosecurity were received regarding SEIS Version 2.

17.1.1 Environmental Objectives and Performance Outcomes

There are no specific objectives and outcomes for Biosecurity in the Queensland Environmental Protection (EP) Regulation. However, the management of biosecurity will need to have regard to a number of the objectives for land and water, which are detailed in Chapter 5 and Chapter 9, respectively.

Objectives and outcomes for biosecurity that are specific to the Project are given in Table 1 of the Project Terms of Reference (ToR). The overarching objective is to operate the Project in a way that protects the Project site from the introduction and/or spread weeds, pests and diseases.

17.1.1.1 ToR Environmental Objectives and Outcomes Relevant to the Project

The construction, operation and decommissioning of the project must ensure:

- the introduction and spread of weeds, pests (including marine pests) and disease, pathogens and contaminants are avoided or minimised
- existing weeds and pests, including marine pests, are controlled and eradicated where practicable, including biosecurity threats and their management and

- the performance outcomes correspond to the relevant policies, legislation and guidelines, and that sufficient evidence is supplied (through studies and proposed management measures) to show these outcomes are achieved.

17.1.2 Terms of Reference Addressed in this Chapter

Table 17-1 summarises the requirements from the ToR for the Project relevant to this Chapter, and where they are addressed.

Table 17-1: ToR cross-reference

Terms of Reference	Section of the SEIS
8.9 Biosecurity	
Conduct impact assessment in accordance with the EHP EIS information guideline—Biosecurity.	Sections 17.1.2 and 17.2; Chapter 14 – Terrestrial Ecology and Chapter 15 – Aquatic Ecology
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 *Biosecurity Act 2014*, the Commonwealth *Biosecurity Act 2015* and weeds of national significance (WONS).	Sections 17.1.2 and 17.5
Weed and pest animal management measures should be aligned with local government pest management priorities.	Sections 17.1.3.6 and 17.5
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 17.5

17.1.3 Relevant Legislation and Policy Instruments

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

- Queensland *Biosecurity Act 2014*
- Queensland *Public Health Act 2005*
- Queensland Public Health Regulation 2018
- Queensland *Agricultural Chemicals Distribution Control Act 1966* and
- Commonwealth *Biosecurity Act 2015*.

17.1.3.1 Biosecurity Act 2014

The *Biosecurity Act 2014* (Biosecurity Act) regulates the management of pest species in Queensland.

The Biosecurity Act provides a consistent regulatory approach for the management of invasive biosecurity matter across Queensland. The Biosecurity Act specifically requires the local governments to have a biosecurity plan for invasive biosecurity matter for its local government area and to pay an amount each financial year to the Land Protection Fund when requested.

Under the Act, certain species of invasive plants are listed as 'restricted' biosecurity matter

Under the Biosecurity Act everyone has a 'general biosecurity obligation (GBO)'. This means everyone is responsible for managing biosecurity risks that are under their control and that they know about or should reasonably be expected to know about.

The Act defines certain invasive species as prohibited or restricted.

Prohibited matter is a disease, exotic fish, insect pest, invasive plant or animal that is currently not found in Queensland, and would cause seriously impacts to health, way of life, the economy or the environment, if it were to be introduced.

Restricted matter can be animal disease, noxious fish, insects, invasive plants or animals that are found in Queensland. Specific actions are required to be taken that limit the impact of this matter by reducing, controlling or containing it.

Prohibited matter must be reported immediately to Biosecurity Queensland. There are obligations to report some restricted matter.

A full list of restricted matter is located in Schedule 2 of the Biosecurity Act.

There are seven restriction categories:

- Category 1 - Includes insects such as red imported fire ants, electric ants and Asian honey bees, and certain animal and plant diseases, aquatic diseases and pathogens. This restricted matter must be reported to Biosecurity Queensland within 24 hours of a person becoming aware of its presence.
- Category 2 - Includes certain noxious fish, invasive plants and animals such as spotted gar, Miconia weed and red-eared slider turtle. This restricted matter must be reported to an authorised person within 24 hours of a person becoming aware of its presence.
- Category 3 - Includes certain noxious fish, weeds, invasive plants, animals and insects. Examples of this category of restricted matter are parthenium and foxes. A person must not supply to another person or release into the environment this category of restricted matter.
- Category 4 - Includes specific noxious fish, invasive plants and animals such as the giant cichlid, bitou bush and feral pig. A person must not move this restricted matter to ensure that it does not spread into other areas of the state.
- Category 5 - Includes certain noxious fish, invasive plants and animals such as carp, Mexican feather grass and rabbits. A person must not possess or keep this restricted matter under your control. These pests have a high risk of negatively impacting on the environment.
- Category 6 - Includes certain invasive animals such as feral deer, foxes, rabbits and wild dogs and noxious fish such as carp, gambusia and tilapia. A person must not feed this category of restricted matter. With the exception of the fish species, feeding for the purpose of preparing for or undertaking a control program is exempted.
- Category 7 - Includes the noxious fish carp, weatherloach, climbing perch, gambusia and tilapia. If a person has these noxious fish in their possession they must kill the restricted matter and dispose of it by burying the whole carcass (no parts removed) in the ground above the high tide water mark or placing it in a waste disposal receptacle.

Multiple categories may apply to restricted matter, and in such cases, a person would need to follow the requirements of all categories for these restricted matter listings. For example, the Act lists rabbits as category 3, 4, 5, and 6 restricted matter.

17.1.3.2 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 2018 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.

17.1.3.3 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 ACDC 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.

17.1.3.4 Biosecurity Act 2015 (Cth)

The *Biosecurity Act 2015* (Biosecurity Act [Cth]) is co-administered by the Ministers responsible for the Department of Agriculture and Water Resources and Department of Health. The Biosecurity Act (Cth) 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 Biosecurity Act (Cth) also manages the risk of serious communicable diseases from emerging, establishing or spreading in Australia.

17.1.3.5 Livingstone Shire Council Pest Management Plan and Vector Management Plan

In their submission, LSC indicated that a Pest Management Plan and a Vector Management Plan are expected to be finalised in the first half of 2018, however, at the time of writing this SEIS (v3) these plans were not yet available. Once finalised, these Plans will provide Central Queensland Coal with further guidance on pest and vector management applicable to the Project.

Central Queensland Coal commits to implementing pest controls in a consistent approach with those of the LSC. Central Queensland Coal further commits to implementing pest and vector controls consistent with the LSC Pest and Vector Management Plans once they are finalised. These controls will be documented in the Land Use Management Plan (LUMP) that will be prepared for the Project and implemented by licensed contractors.

17.1.3.6 Local Government Pest and Vector Management Guidance Documents

Additional relevant pest species and vector management documents are the:

- Livingstone Shire Council Local Law No.3 (Community and Environmental Management) 2011
- Livingstone Shire Council Schedule 1 of Subordinate Local Law 3 (Community and Environmental Management) 2011

- Rockhampton Regional Council Biosecurity Plan for Pest Management 2017 – 2021 (RRC 2017a) and
- Rockhampton Regional Council Vector Management Plan 2017-2021 (RRC 2017b).

The following provides a summary of the documents.

17.1.3.6.1 Livingstone Shire Council Local Law No.3 (Community and Environmental Management) 2011

The purpose of Local Law No. 3 and its subordinate local law is to protect the environment and public health, safety and amenity within the LSC region. The purpose is in part achieved by providing for the elimination or reduction of risks and threats from inadequate protection against animal and plant pests and allows for the declaration of an animal or plant of a specified species to be a local pest.

17.1.3.6.2 Livingstone Shire Council Schedule 1 of Subordinate Local Law 3 (Community and Environmental Management) 2011

The purpose of this subordinate local law is to list declared local pests pursuant to section 6(1) of the authorising local law. The declared pest species listed in Schedule 1 and noted for the whole local government area, are:

- Castor-oil Plant (*Ricinus communis*)
- Devil's Apple (*Solanum aculeatissimum*)
- Devil's Fig (*Solanum torvum*)
- Elephant Grass (*Penisetum purpurem*)
- Feral Leucaena (*Leucaena leucocephala*)
- Lion Tail (Leonotis nepetifloia)
- Maltese Cockspur (*Centaurea melitensis*
- Sisal (*Agave vivipara* (var. vivipara and cv. Marginate (sisal)), Agave sisalana (sisal/sisal hemp) and
- Wild Sisal (*Furcraea selloa*).

17.1.3.6.3 Rockhampton Regional Council Biosecurity Plan for Pest Management 2017 – 2021

The purpose of the Rockhampton Regional Council Biosecurity Plan (the Plan) (RRC 2017-2021a) is to provide a strategic direction for the management of invasive biosecurity matter (plants and animals) in the Rockhampton Region. The plan establishes local priorities and sets out actions that aim to minimise the environmental, economic, social and human health impacts of invasive biosecurity matter and brings all sectors of a local community together to manage invasive biosecurity matter in the region.

The Plan details the key issues of invasive biosecurity matter management and outlines the objectives to achieve Council's Corporate Plan objectives. The key issues are:

- awareness and education
- monitoring and assessment
- prevention, early detection, containment and eradication
- strategic planning framework and management
- effective integrated management systems and

- commitment and partnership.

17.1.3.6.4 Rockhampton Regional Council Vector Management Plan 2017-2021

The Rockhampton Regional Council Vector Management Plan 2017 – 2021 (RRC 2017-2021b) provides a framework for the RRC and the community to manage vector agents and their impacts in the region. The plan incorporates the eight principles of pest management:

- integration
- public awareness
- commitment
- consultation and partnership
- planning
- prevention
- best practice and
- improvement.

The plan also considers environmental impact, sustainability and cost effectiveness.

Priority vector programs for the RRC, based on sustainable control, are also set out.

Vector management within the RRC region incorporates two main areas; mosquitoes and other animals / insects that are vectors for disease or impact on human health, lifestyle and amenity.

In addition to the various mosquito species, the Plan nominates Roof Rat (Black Rat ((*Rattus rattus*)) and Brown Rat (Norway Rat ((*Rattus norvegicus*)) as predominate vectors in the Rockhampton Region. These animals can spread disease, contaminate food and can be destructive and damage materials. These pest species have not been detected in any EIS/SEIS fauna surveys.

The House Mouse (*Mus musculus*) which has been detected in the EIS/SEIS fauna surveys is also noted in the RRR Vector Management Plan.

In addition to mosquito and biting midge species, the Dawson River Black Fly (*Austrosimulium pestilens*) is another predominate insect pest in the Rockhampton Region. The Dawson River Black Fly was not noted in the EIS. The Dawson River Black Fly can be present in plague numbers when the Fitzroy River floods. Management of the Dawson River Black Fly achieves similar benefits to mosquitoes and in addition supports a reduction in:

- allergies and infections associated with bites
- costs associated with allergies and infections from bites, such as medical and vet expenses and time off work and
- impacts on livestock in the region.

Central Queensland Coal notes these additional LSC local laws and RRC management plans and commits to developing and implementing pest and vector controls consistent with these management documents.

17.1.3.7 Queensland Health Guidance on Mosquito Borne Disease

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

under review at the time of writing this SEIS in 2020). 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.

Under this framework a number of other mosquito borne disease management plans have been prepared by Queensland Heath. The following may be relevant to the Project:

- Queensland dengue management plan 2015 – 2020
- Queensland chikungunya management plan 2014-2019
- Mosquito-borne diseases in Queensland 2012 - 2017
- Guidelines for controlling public health risks relating to mosquitoes, flies and black flies in flood events and
- Treatment Advice for Pest Management Technicians: for control of *Aedes aegypti* mosquitoes (vector of Zika and dengue)

17.2 Methods

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). Considerable survey effort has been applied, and a summary of the ecological field surveys undertaken for the Project from 2011 to 2019 is provided in Chapter 14 – Terrestrial Ecology and Chapter 15 – Aquatic and Marine Ecology, including the scope of survey and methods of assessment. Field surveys comprised:

Further discussion on terrestrial pest and weed species is at Chapter 14 – Terrestrial Ecology and Chapter 15 – Aquatic Ecology, and associated Appendices for these chapters, contained in Appendix 9 and 10, respectively.

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

17.3 Description of Environmental Values

17.3.1 Terrestrial Pests Fauna

Database searches revealed 15 introduced fauna species known to occur, or with the potential to occur within the search area (DSITIA 2020 and DEE 2020). Five of these species are also listed as Restricted Matters under the Biosecurity Act (see Table 17-2). Field surveys since 2011 have

regularly recorded a variety of introduced fauna including cats, dogs, pigs, house mouse, rabbits, cane toad, and common mynah (Meyer 2011a, 2011b, 2012, CDM Smith 2018 and Austecology 2020).

Table 17-2: Introduced fauna species

Species Name	Common Name	WO	PMST	Biosecurity Act Category
Acridotheres tristis	Common myna	x	x	
Bos taurus	Domestic Cattle	x	x	
Canis lupus familiaris	Dog	x		Category 3, 4, 6
Cervus timorensis	Rusa deer	x		Category 3, 4, 6
Columbia livia	Rock pigeon		x	
Felis catus	Cat	x	x	Category 3, 4, 6
Lepus europaeus	European brown hare	x		
Lonchura punctulata	Nutmeg mannikin		x	
Mus musculus	House mouse		x	
Oryctolagus cuniculus	Rabbit	x	x	Category 3, 4, 5, 6
Passer domesticus	House sparrow	x	x	
Rhinella marina	Cane toad	x	x	
Streptopelia chinensis	Spotted turtle-dove	x	x	
Sus scrofa	Pig	x		Category 3, 4, 6
Vulpes vulpes	Red fox		x	

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. 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.

17.3.2 Terrestrial Pests Flora

According to the Commonwealth Protected Matters Search Tool Report (DEE 2016 and 2020) eight Weeds of National Significance (WoNS) have the potential to occur within the search area (Table 17-3). Wildlife Online searches produced 165 records of introduced species, including all eight species listed as WoNS in the PMST Report, and seven other species listed as Restricted Matters under the Queensland *Biosecurity Act 2014* (DSITIA 2020).

The results of flora surveys indicate that weed species are abundant within the Project Site and Near Surrounds, particularly along drainage lines such as Deep and Tooloombah Creek (see Figure 17-1). Fifty-four introduced weed species were identified within the Study Area during the field surveys in 2011 and 2017. The 2011 surveys detected 53 species identified, of which 10 are classified as Category 3 Restricted Matters (these are described in more detail below), and six are also declared as WoNS (Table 17-3). The site surveys in February 2017 identified seven species including one additional species not previously identified, prickly pear (*Opuntia tomentosa*) (CDM Smith 2018). Prickly pear is sparsely distributed throughout the Project Site although mainly occurs on the heavy clay soils north of the Bruce Highway within the regrowth Brigalow communities.

Rubber vine (*Cryptostegia grandiflora*) and lantana are common, often forming dense infestations (up to 4m in height) along the creeks (CDM Smith 2018 and Austecology 2020). Bellyache bush

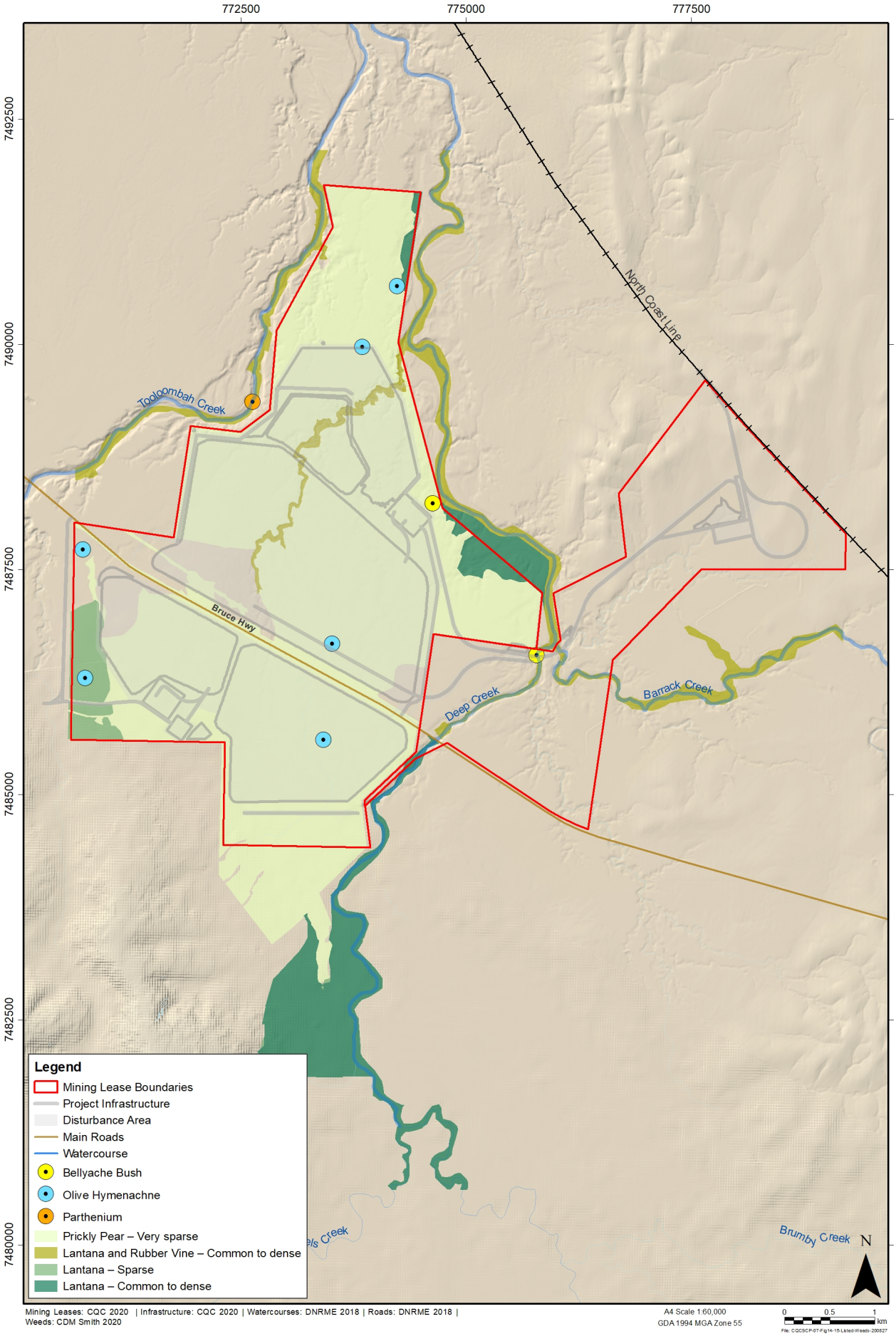

Figure 17-1: Distribution of weed species across the Project site and near surrounds

(*Jatropha gossypifolia*) also occurs in patches along the margins of both creeks (CDM Smith 2018). Parthenium (*Parthenium hysterophorus*), a problem weed species which is also toxic to cattle, was observed growing on the bed of Tooloombah Creek was observed growing on the bed of Tooloombah Creek. No other infestations of this species were observed within the Project area.

Olive hymenachne (*Hymenachne amplexicaulis*) is a semi-aquatic species and was recorded in the northern extent of the Project Site at a farm dam (February 2017) and in a water-filled gilgai (May 2017). Surveys in December 2017 and January 2018 recorded Olive hymenachne in several further waterbodies. Away from watercourses, the ground layer within the northern section of the Project Site is dominated by buffel grass.

Fifty-four introduced weed species were identified within the Project area during the onsite surveys of which 11 are classified as Category 3 Restricted Matters under the Biosecurity Act, and six are also declared as WoNS (see Table 17-3). The 11 Category 3 Restricted Matters weed species are described below.

Table 17-3: Declared weed species

Species name	Common name	Biosecurity Act	WONS	WO	PMST	2011 surveys	2017 surveys
Aristolochia elegans	Dutchman's Pipe	Category 3	No			x	
Bryophyllum delagoense and Bryophyllum x houghtonii	Mother-of millions	Category 3	No	x		x	x
Cardiospermum grandiflorum	Heart seed vine	Yes		x			
Cryptostegia grandiflora	Rubber-vine	Category 3	Yes	x	x	x	x
Dolichandra unguis-cati	Cat's claw creeper	Yes		x			
Harrisia martinii	Harrisia Cactus	Category 3	No	x		x	
Hymenachne amplexicaulis	Olive Hymenachne	Category 3	Yes	x	x	x	x
Jatropha gossypifolia	Bellyache Bush	Category 3	Yes	x	x	x	x
Lantana camara	Lantana	Category 3	Yes	x	x	x	x
Opuntia stricta *Opuntia tomentosa*	Prickly Pear species	Category 3	Yes	x	x	x	x x
Parkinsonia aculeata	Parkinsonia	Category 3	Yes	x	x		
Parthenium hysterophorus	Parthenium	Category 3	Yes	x	x	x	x
Sporobolus fertilis	Giant Paramatta Grass	Category 3	No			x	
Sporobolus jacquemontii	Rat's tail grasses	Yes		x			
Vachellia nilotica, form. Acacia nilotica	Prickly Acacia	Yes	Yes	x	x		
Ziziphus mauritania	Indian jujube	Yes		x			

WONS – Weeds of National Significance; WO – Queensland Wildlife Online Search; PMST – Commonwealth Protected Matters Search Tool

17.3.2.1 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).

17.3.2.2 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).

17.3.2.3 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).

17.3.2.4 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. Harrisia 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).

17.3.2.5 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).

17.3.2.6 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 to 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).

17.3.2.7 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 and 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 or a brown woody tap root with strong laterals and fine white rootlets (DEE 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 (DEE 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 (DEE 2017), (Parsons and Cuthbertson 2001).

17.3.2.8 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. Opuntioid 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).

17.3.2.9 Parkinsonia (*Parkinsonia aculeata*) - WoNS (Australia) and Category 3 Restricted Matter (Queensland)

Parkinsonia is native to tropical America. This species has spread throughout the world as an ornamental and shade tree. It can render land inaccessible for people and animals, restrict stock access to drinking water, decrease pasture availability and exclude native vegetation because it can form dense impenetrable thorny thickets along river courses, bore drains, floodplains and grasslands (DAF 2020).

Parkinsonia is a hairless shrub or small tree seldom more than 10 m high. It has slender green photosynthetic zigzag branches armed with sharp spines. Its leaf stalks are short and spine-tipped, and the leaf branches are 20–40 cm long, flattened with small, oblong leaflets along each edge. Flowers have five petals and are yellow and fragrant, each on a long, slender drooping stalk. Seeds are oval and hard, about 15 mm long, and borne in pencil-like pods 5−10 cm long, constricted between the seeds (DAF 2020).

Because of its invasiveness, parkinsonia has been recognised in Australia as a Weed of National Significance. At a local level, each local government must have a biosecurity plan that covers invasive plants in its area (DAF 2020).

17.3.2.10 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 lobe 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. Parthenium reduces biodiversity in native grasslands by out-competing with and displacing (alleopathic) native species. The species is a prolific seeder with a large, persistent seed bank and long seed dormancy. Dispersal is 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.

17.3.2.11 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).

17.3.3 Aquatic Pest Flora and Fauna

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.

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.

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. 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 fauna species were collected during surveys for the Project which indicates that the Styx River catchment may be relatively free of introduced taxa such as Tilapia (*Oreochromis* sp.) and Mosquito fish (*Gambusia* sp.).

17.3.4 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 MLs. Any suspected sighting of a notifiable plant pest or disease will be reported to the Queensland Department of Agriculture and Fisheries (DAF) as per legal requirements.

17.3.5 Vector Borne Disease

During the five year period from 1 July 2012 to 30 June 2017, a total of 20,413 mosquito borne infections were notified in Queensland. The most frequently reported was Ross River virus infection (13,921), followed by Barmah Forest virus infection (3,986), dengue (1,895), and malaria (437) (Queensland Heath 2018).

Queensland experienced an increase in mosquito-borne disease rates over the period 2006 – 2016, particularly in Dengue, Ross River and Barmah Forest virus infections (Queensland Health 2016). During this time, North Queensland experienced regular outbreaks of dengue and the dengue vector, *Aedes aegypti*, was dispersing across Queensland and had 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.

17.4 Potential Impacts

17.4.1 Terrestrial Pests Fauna

The potential impacts of the terrestrial pest fauna species, identified in Section 17.3.1, 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 erosion 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.

17.4.1.1 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.

17.4.2 Terrestrial Pests Flora

As described in Section Terrestrial Pests Flora17.3.2, weed species are abundant within the Project Site and Near Surrounds. Lantana is regarded as major threat to a variety of conservation significant species within the Fitzroy NRM region (DERM 2010). Buffel grass is regarded as the most threatening invasive plant within the Brigalow Belt Bioregion (Ponce Reyes et al. 2016). Buffel grass invasion is associated with a loss of diversity and abundance of native ground vegetation, especially where the grass forms dense swards - and a decrease in the abundance of invertebrate prey has been linked with buffel grass density. Granivorous species that prefer native plant seeds or forage in areas with an open under-storey are likely to be negatively affected by increased buffel grass cover (Young and Schlesinger 2014). Research also suggests that buffel grass invasion may also lead to major changes in vegetation structure and composition as a result of altered fire regimes, i.e. a significant increase in the intensity and frequency of fires because of the increased fuel load created by buffel grass and through outcompeting and displacing native grasses (of lower fuel load).

The potential terrestrial pests (flora) species, listed in Table 17-1 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. Where the soil seed bank on site already has a weedy component, further movement of those seeds within the site by earthmoving equipment can be impossible to avoid. 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.

Whilst there is potential for introduction and spread of weed species as a result of the Project, it is considered unlikely that the Project would contribute to a significant further change to existing threats given the current prevalence of weeds in the area and the land use history for the Project area and surrounding area.

17.4.3 Aquatic Pest Flora and Fauna

Any potential unmitigated introductions or spread of weeds and pests as a result of Project activities may pose a risk to the productive capacity of wetlands and waterways and may impact the local diversity of the resident fish community. There is considered negligible potential for introduction of exotic aquatic pest fauna as a result of construction or operation of the Project. However, as described above, the transportation and operation of construction vehicles and equipment has the potential to introduce, or spread already existing, weeds into the Project Area, including the riparian zones and creeks.

17.4.4 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.

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.

17.5 Mitigation, Management and Monitoring

CQC have prepared a draft Environmental Management Plan (EMP) for construction and operation of the Project. The draft EMP is contained in Appendix 12 and has been developed to manage and

mitigate potential environmental impacts, and to assist Central Queensland Coal to comply with relevant environmental approvals and permit conditions. The draft EMP has been prepared in general accordance with the Commonwealth Environmental Management Plan Guidelines (Commonwealth of Australia 2014) and is modelled on the AS/NZS ISO 14001 (Standards Australia 2016) Plan-Do-Check-Act continual improvement model.

Appendix C of the draft EMP provides the specific sub-plans for managing environmental impacts. The following sub plans are relevant to this chapter:

- Land Use Management Plan (LUMP), including:
  - Biodiversity Management Strategies
  - Weed and Pest Management Plan (WPMP)
  - Bushfire Management Plan (BfMP)
- Waste Management Plan (WSTMP)
- Surface Water Management Plan (SWMP)
- Biting Insect Management Plan (BIMP).

The management plans in Appendix C of the draft EMP are high-level at this stage and will be updated following project approval to reflect the Environmental Authority Conditions. Central Queensland Coal will ensure that the LSC and RRC pest and vector management plans are considered and that the EMP management approaches and controls will be consistent with those documents.

In addition to the plans in Appendix C of the draft EMP, a number of separate, more detailed management plans, have been prepared in response to the government submissions on SEIS version 2. The following detailed plans are also relevant to this chapter:

- Groundwater Dependent Ecosystem Management and Monitoring Plan (GDEMMP – Appendix A10e)
- Offsets Delivery Plan and Offsets Management Plan/s (Appendix 11b)
- Receiving Environment Monitoring Program (REMP – Appendix A10f)
- Significant Species Management Plan (SSMP – Appendix A9e).

17.5.1 General Monitoring and Management

The following management and monitoring measures, which are relevant to both weeds and pests, will be implemented. Measures specific to fauna and flora are provided below in Sections 17.5.2 and 17.5.3, respectively.

- Prior to construction commencing a baseline weed and pest survey will be conducted in the Project footprint plus a 200m buffer. This will be used to prepare a digital weed map of the site identifying the distribution and density of weed infestations and will enable tracking changes over time. In addition, a register of pertinent information in relation to weed and pest distribution, numbers and control requirements will be established.
- Following the baseline survey, ongoing weed and pest monitoring surveys will be undertaken every two years, consisting of a survey during the dry season and a survey post-wet season.
- Employee and contractor training will include identification of key weeds and pests on the site. Instructive materials are to be displayed around the site identifying key weeds and pests that require control to aid in employee reporting.

- Weeds and pests are to be controlled as per the requirements of statutory management plans for particular species, where available. Management requirements are to be defined explicitly for each weed and pest potentially or actually present on the site, based on advice from experienced experts.

17.5.2 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.

17.5.2.1 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 have been developed for the Project and incorporated into the draft Land Use Management Plan (LUMP) that will form the basis of a more detailed plan to be developed in accordance with the EA conditions and Significant Species Management Plan. Controls will be implemented in a consistent approach with those of the LSC. The pest fauna management aspect of the LUMP will be further 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 maybe 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 / Department of Natural Resources, Mines and Energy (DNRME) vermin control programs.

17.5.2.2 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 mine infrastructure area designs (i.e. pest animals may live and / or shelter under built structures during the day).

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

- central Queensland Coal has prepared a draft 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, and Appendix 12 - Draft EMP)
- 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.

17.5.3 Terrestrial Pests Flora

The Project will involve the implementation of a comprehensive suite of best-practice prevention strategies through the EMP, both within the Project Site and in adjacent areas of the Mamelon Station to minimise the risk of weed introduction and spread. Furthermore, the implementation of weed control measures within and adjacent to the Project Site is likely to relieve the pressure of introduced flora on terrestrial ecological values, improving the quality of vegetation and habitats within and adjacent to the Project Site.

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:

- For shipped plant and machinery, a thorough washdown procedure will be required for all plant and machinery prior to it being shipped to site.
- All contractors bringing vehicles/plant onto the site will be required to complete a Weed Declaration Form, in which they formally declare that all required weed hygiene measures have been taken and that their vehicles/plant are free of weed material (in particular, weed seeds).
- Establish a weed wash-down facility at or near the entrance to the Project Site for any vehicles that do enter / leave the mining lease areas
- For vehicles and plant that are unable to provide a Weed Declaration Form wash down will be required.
- All weed washes will be documented and evidence maintained of weed wash-downs on or off-site.
- Clearing will be minimised to the area directly required for mining operations.
- Removal, stockpiling and movement of topsoil on the site will be tracked, particularly where the topsoil contains weed species. Top-soil from weed infestation areas (as identified in the pre-construction mapping) will be carefully stockpiled and if moved, not stored or reused in areas where those weeds are not present.

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.

17.5.3.1 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.

17.5.3.2 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 (reference will be made to the relevant 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.

17.5.3.3 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.

17.5.3.4 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.
- 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.

17.5.3.5 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 and
- 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.

17.5.4 Aquatic Pest Flora and Fauna

Potential indirect impacts on riparian vegetation as a result of groundwater drawdown (see Chapter 24 – Terrestrial Ecology) will be mitigated through the active management of those areas of Deep Creek which are likely to be affected by groundwater drawdown. This will involve

revegetation and rehabilitation of the riparian corridor with the aim of building ecological resilience. Revegetation will include expansion of the existing riparian corridor by a width of 10 m. A revegetation program will be designed and implemented to ensure the planting of drought tolerant species of similar ecological function as those with the potential to be impacted. The revegetation program will be in accordance with the mitigation measures proposed in Section 17.5.3.5, above. A priority of this work in the riparian and stream areas will be the removal of known infestations of lantana, rubber vine, noogoora burr and the aquatic weed olive hymenachne and replanting with native species.

With these mitigation measures in place the potential for Project related activities to increase or spread aquatic pest species are expected to be minor.

17.5.5 Plant Disease

As equipment for the Project is likely to be sourced from overseas destinations for the Project it will have already been through quarantine protocols as part of the international importation process. 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
- 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.

17.5.6 Vector Borne Disease

Mosquito management strategies have been developed as part of the BIMP (contained in the draft EMP [Appendix 12]) 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 to be incorporated into the Project's Environmental Management Plan 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.

17.5.6.1 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.

17.5.6.2 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 number 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.

17.5.6.3 Source Reduction

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

17.5.6.4 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.

17.5.6.5 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.

17.5.6.6 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.

17.5.6.7 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.

17.6 Qualitative Risk Assessment

A qualitative risk assessment associated with the potential introduction and spread of weeds and pests is summarised in Table 17-4. An analysis of initial risk, without mitigation, was considered for each potential impact. The residual risk considers the implementation of mitigation and management measures.

For the purposes of risk associated with biosecurity, risk levels are defined as follows:

- Extreme – Works must not proceed until suitable mitigation measures have been adopted to minimise the risk

- High – Works should not proceed until suitable mitigation measures have been adopted to minimise the risk
- Medium – Acceptable with formal review. Documented action plan to manage risk is required; and
- Low - Acceptable with review.

Table 17-4: Qualitative risk assessment

Issue	Potential impacts	Potential risk	Mitigation measures	Residual risk
Introduction and / or spread of terrestrial pests (fauna)	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**	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 Biosecurity Act, and will include the following measures: • 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)	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**	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 Biosecurity Act, and will include the following measures: Implementation of sediment control mechanisms to minimize the risk of weed seed washing into waterways;	**Low**

Issue	Potential impacts	Potential risk	Mitigation measures	Residual risk
			• 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 • monitoring and weed inspections particularly in responses to reported outbreaks.	
Increase of disease vectors (e.g. biting insects)	Risk of aiding the spread of mosquito-borne disease vectors Risk to human health including site workers and surrounding landowners	**Medium**	• development and implement mosquito and biting insect management strategies in the LUMP • appropriate chemical control measures will be utilised as appropriate to mitigate adverse health conditions • develop and implement a Water Management System to prevent pooling of still water or creation of favourable mosquito habitat and • regular maintenance of all structures associated with storage or treatment of recycled water.	**Low**
Introduction of plant disease	Potential to impact existing environmental values in local area and surrounding region	**Medium**	The following measure will be implemented: • 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.	**Low**

17.7 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, has been addressed in a high-level LUMP (contained within the draft EMP), which will be expanded upon receipt of Project approvals, in line with the Project's Environmental Authority (EA). The objective of biting insect 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. 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.

17.8 Commitments

In relation to biosecurity, Central Queensland Coal's commitments are provided in Table 17-5.

Table 17-5: 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 requirements of the *Biosecurity Act 2014*, LSC and RRC weed and pest management strategies 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 new vehicles, machinery, plant equipment or materials arriving onto the Project site, including those arriving from overseas, are thoroughly inspected for biosecurity matter before being introduced onto the site. For vehicles, machinery, plant and equipment that regularly arrive at the site, a Risk Assessment will be undertaking at the start of the project and when new vehicles commence regular arrivals, to ascertain those vehicles that require a thorough routine inspection.

Commitments
Report suspected prohibited species to Biosecurity Queensland within 24 hours. Restricted species category 1 to a Department of Agriculture inspector within 24 hours; and category 2 restricted matter to an inspector or authorised person within 24 hours.
Ensure construction contractors and visitors to the site are made aware of plant disease quarantine requirements.
Further develop and implement the LUMP to mitigate potential impacts associated with the introduction and/or spread of pest species.
Ensure that the LSC and RRC pest and vector management plans are considered in the LUMP and BIMP and that the CQC management approaches and controls will be consistent with those documents.
Detailed design and implementation of the Water Management System to include for consideration of the need to prevent pooling of still water, or creation of other favourable mosquito habitat.