

Draft environmental management plan
Pest and weed management plan



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Santos GLNG Upstream

Pest and Weed Management Plan

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Appendix 1: Weed Species Present within the Santos GLNG Upstream Project Area

Appendix 2: Pest Species Present within the Santos GLNG Upstream Project Area

Abbreviations and Units

Acronym	Description
AS	Australian Standard
ATP	Authority to Prospect
AWS	<i>Australian Weeds Strategy</i>
BQ	Biosecurity Queensland
DAFF	Department of Agriculture, Forestry and Fisheries
EHS	Environment, Health and Safety
EHSMS	Environment, Health and Safety Management System
EP Act	<i>Environmental Protection Act 1994</i>
EPBC Act	<i>Environmental Protection and Biodiversity Conservation Act 1999</i>
GED	General Environmental Duty
GIS	Geographic Information System
GLNG	Gladstone Liquefied Natural Gas
ISO	International Organisation for Standardisation
LP Act	<i>Land Protection (Pest and Stock Route Management) Act 2002</i>
NZS	Standards New Zealand
P&G Act	<i>Petroleum and Gas (Production and Safety) Act 2004</i>
PL	Petroleum Lease
PPL	Petroleum Pipeline Licence
PWMP	Pest and Weed Management Plan
SEQ	South-East Queensland
WoNS	Weeds of National Significance

1.0 Introduction

Pests and weeds pose a considerable threat to the viability and success of modern day land management, agricultural productivity and to the health and diversity of native ecosystems. Pests and weeds can be spread across a landscape either intentionally or unintentionally via both man-made and natural mechanisms including land transport, landscape modification, stock movements, agricultural activities, ecosystem disturbances, deliberate introduction of exotic species and by wind, water and dispersal by fauna.

Santos GLNG activities conducted throughout the Santos GLNG Upstream Project Area have the potential to inadvertently introduce and spread pest and weed species across the region. This issue is of serious concern to landholders and due to the nature of activities and number of vehicle movements into and within the Santos GLNG Upstream Project Area, represents a risk to the environment and to Santos GLNG's Social Licence to Operate.

Santos GLNG has developed a management strategy to minimise the potential for the spread of pest and weed species as a result of Santos GLNG activities. This Pest and Weed Management Plan (PWMP) provides an overview of the strategy and procedures developed to minimise the risk of the introduction and spread of pests and weeds and to appropriately manage identified pest and weed incursions in the Santos GLNG Upstream Project Area.

1.1 Purpose and Scope of the PWMP

1.1.1 Purpose

Santos GLNG has both a legal and social responsibility to manage existing pests and weeds on Santos GLNG assets and to prevent the further spread of pests and weeds as a result of Santos GLNG project activities. This PWMP has been prepared to satisfy these obligations and complements the overarching Santos Environment, Health and Safety Management System (EHSMS).

The objectives of the PWMP are to:

- Facilitate compliance with relevant Commonwealth, State and Local Government legislation, regulations and approvals;
- Support the Santos *Environmental Hazard Standard 09 – Pest Plants and Animals* (EHS09);
- Provide a framework for Santos GLNG to:
 - Identify, monitor and prioritise the appropriate management of pest and weed species present at, or that pose a threat to, Santos GLNG assets and/or activities;
 - Prevent and minimise the introduction and dispersal of pest and weed species into Santos GLNG activity locations and neighbouring properties;
 - Engage stakeholders including landholders and local communities in assisting Santos GLNG in the identification and management of pests and weeds at Santos GLNG assets and activities; and
 - Develop asset-specific / activity specific pest and weed management procedures as required during the Project lifetime.

Santos GLNG will review local government's pest and weed management plans and apply measures from these to the PWMP where it is appropriate.

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1.1.2 Scope

This PWMP provides an overview of the strategy, methods and controls implemented by Santos GLNG to manage the issue of pests and weeds. Specifically, this PWMP:

- Identifies pests and weeds and potential vectors within the Santos GLNG Upstream Project Area; and
- Describes the pest and weed management strategy, including general measures to identify, avoid, prevent / minimise and control the introduction and spread of pests and weeds within the Santos GLNG Upstream Project Area and to neighbouring properties.

The PWMP is to be implemented by all Santos GLNG Project personnel responsible for conducting activities that have the potential to introduce and/or spread pests and weeds throughout the exploration, construction, production, decommissioning and rehabilitation phases of the Project.

This PWMP applies to all activities carried out within the Santos GLNG Upstream Project Area. The Santos GLNG Upstream Project Area consists of Santos GLNG petroleum tenements comprising the Arcadia, Fairview, Roma and Scotia gas fields and as illustrated in Figure 1.

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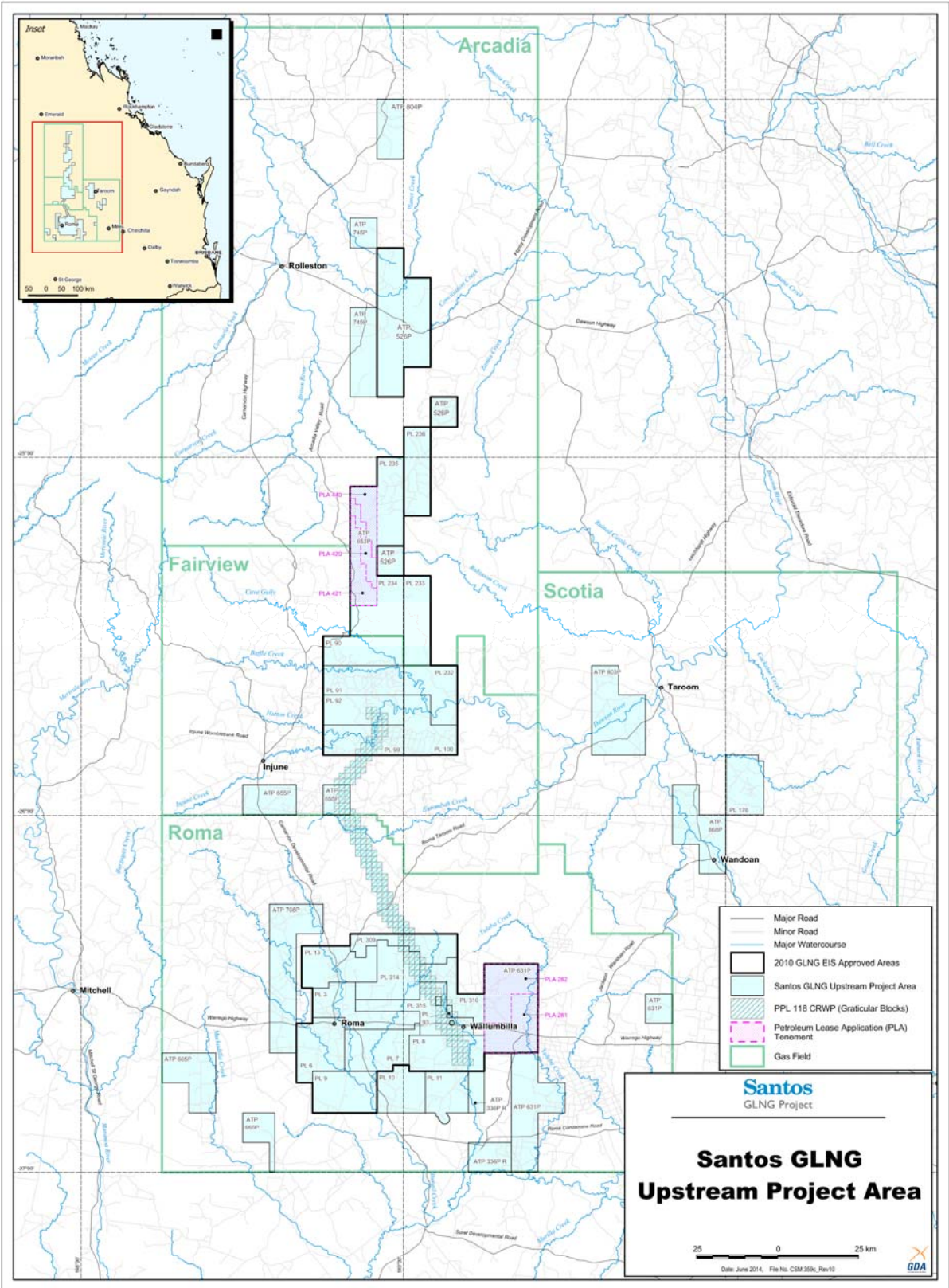


Figure 1: The Santos GLNG Upstream Project Area

2.0 Roles and Responsibilities

Santos GLNG Project personnel are responsible for the environmental performance of their activities, for complying with relevant approval / permit requirements and for ensuring that all environmental objectives associated with the work are achieved. Santos GLNG Project personnel must also be mindful of the General Environmental Duty (GED) as outlined in the *Environmental Protection Act 1994* (Qld) (EP Act). Section 319(1) of the EP Act states that “*a person must not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practical measures to prevent or minimise the harm.*”

Roles, responsibilities and accountability under the PWMP will be assigned in accordance with the *Santos EHSMS05 – Responsibility and Accountability*.

3.0 Legal and Other Requirements

Applicable legislation, regulations, guidance and strategies enacted by the Commonwealth, State of Queensland and regional councils for pest and weed management in the Santos GLNG Upstream Project Area are described in the following sections.

3.1 Commonwealth Legislation and Strategies

An overview of Commonwealth legislation and strategies considered in the development of the Santos GLNG PWMP is presented in Table 1.

Table 1: Summary of Applicable Commonwealth Legislation and Strategies

Act or Strategy	Summary of Act or Strategy
<i>Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)</i>	Regulates the import of live animals and plants into Australia. The Australian Government administers this act with the cooperation of the states and territories. The EPBC Act regulates this matter in conjunction with the <i>Quarantine Act 1908</i> .
<i>Quarantine Act 1908</i>	Regulates the import of live animals and plants into Australia. The Australian Government administers this act with the cooperation of the states and territories. This act regulates this matter in conjunction with the EPBC Act.
Australian Weeds Strategy (AWS)	Provides a national framework for identifying priorities for weed management across the nation to assist in the reduction of detrimental impacts of weeds on agriculture and the environment.
Weeds of National Significance (WoNS)	Under the AWS, 32 out of greater than 3 000 non-native naturalised plants in the Australian environment have been classed as WoNS based on their invasiveness, potential for spread and environmental, social and economic impacts. WoNS require coordination among all levels of government, organisations and individual with weed management responsibilities.
Australian Pest Animal Strategy	Provides national guidance to address the undesirable impacts caused by exotic vertebrate animals (mammals, birds, reptiles, amphibians and fish) that have become pests in Australia and to prevent the establishment of new exotic vertebrate pests.

3.2 State Legislation and Strategies

An overview of Queensland legislation and strategies considered in the development of the Santos GLNG pest and weed management and the PWMP is presented in Table 2. The EP Act and the *Land Protection (Pest and Stock Route Management) Act 2002 (LP Act)* are the two principal pieces of State legislation governing Santos GLNG's pest and weed management activities.

Table 2: Summary of Key Applicable State Legislation and Strategies

Act / Regulation / Code	Summary of Act
<p><i>Environmental Protection Act 1994 (EP Act)</i></p>	<p>The EP Act provides for environmental management practices and environmental safeguards.</p> <p>The EP Act also requires Santos GLNG to take all reasonable and practicable measures to prevent or minimise environmental harm.</p>
<p><i>Land Protection (Pest and Stock Route Management) Act 2002 (LP Act)</i></p> <p><i>Land Protection (Pest and Stock Route Management) Regulation 2003 (LP Regulation)</i></p>	<p>The LP Act and its regulation provide the framework for the planning and management of pests and weeds in Queensland, in order to prevent their spread in the State through:</p> <ul style="list-style-type: none"> • Establishing principles and responsibilities of pest management and planning. • Identifying animals and plants as declared pests. • Preventing the introduction, spread, keeping or sale of declared pests in the State. <p>Landholders are legally obliged to take all reasonable steps to keep their land free of class 1 and class 2 pests.</p>
<p><i>Petroleum and Gas (Production and Safety) Act 2004 (P&G Act)</i></p> <p><i>Petroleum and Gas (Production and Safety) Regulation 2004</i></p>	<p>A key purpose of the P&G Act and its subordinate regulation is to create an effective regulatory system for activities associated with the exploration, development and production of petroleum and gas resources.</p> <p>Section 7 of the Regulation outlines obligations to prevent the spread of declared pests through taking all reasonable steps to:</p> <ul style="list-style-type: none"> • Prevent spreading the reproductive material of a declared pest or weed. • Wash down vehicles and machinery if the risk of spreading a pest or weed is present. • Keep a record of such wash-downs. • Provide a copy of a wash-down record if requested by a landholder.
<p><i>Land Access Code</i></p>	<p>The Land Access Code is provided for under the P&G Act and imposes mandatory conditions concerning the conduct of resource activities on private land. A number of Land Access conditions relate to obligations to ensure that all reasonable steps are taken to prevent the spread of declared pests on private land.</p>
<p><i>Plant Protection Act 1989</i></p> <p><i>Plant Protection Regulation 2002</i></p>	<p>This Act and respective regulation aim to:</p> <ul style="list-style-type: none"> • Prevent, control or remove pest infestations in Queensland. • Help other jurisdictions prevent, control or remove plant pests, diseases, pest infestations, infections or conditions. • Facilitate the movement of plants into and out of Queensland. • Declare notifiable pest species.

3.3 Local Government Plans

The Santos GLNG Upstream Project Area lies within the jurisdiction of four regional councils:

- Maranoa Regional Council;
- Central Highlands Regional Council;
- Banana Shire Council; and
- Western Downs Regional Council.

Each regional council has developed a Pest Management Plan identifying priority pest and weed species and management specific to each region. Each of the plans listed below has been considered in the development of this PWMP and in the management of pest and weed species within the respective council boundaries:

- DRAFT Maranoa Regional Council Pest Management Plan, 2012-2016;
- Central Highlands Regional Council Pest Management Plan, 2012-2016;
- DRAFT Banana Shire Regional Council Pest Management Plan, 2010-2014;
- Western Downs Regional Council Pest Management Plan, 2011-2015.

3.4 Santos Environment, Health and Safety Management System

The Santos EHSMS provides a framework for environmental and safety practices across Santos operations worldwide. The framework is consistent with *AS 4801:2000 Occupational Health and Safety Management Systems* and *AS/NZS ISO 14001:2004 Environmental Management Systems*.

This PWMP complements the requirements of the EHSMS, in particular, the Santos Environmental Hazard Standard *EHS09 Pest Plants and Animals*. This standard provides guidance to reduce the risk of pest and weed introduction and spread associated with all Santos activities. Additional relevant EHSMS standards include, *EHS06 – Environmental Impact Assessment and Approvals* and *HSHS08 – Chemical Management and Dangerous Goods*.

This PWMP specifically addresses unique features and requirements relating to the Santos GLNG Project. Santos GLNG specific documentation is based on identified environmental and reputational risks and account for Santos GLNG's legal and other obligations, commitments made by the Santos GLNG Project and Santos GLNG's Social Licence to Operate. In this context, the PWMP provides additional guidance for the management of environmental issues and supports the development of asset / activity / department based guidelines and work instructions, in order to secure compliance with legal requirements as well as deliver on company environmental standards.

A specific set of procedures associated with this PWMP have been developed to further support the PWMP to minimise the potential for the introduction and spread of pests and weed species in the Santos GLNG Upstream Project Area. These are referenced in Table 3.

The Santos approach to environmental management is illustrated in Figure 2.



Figure 2: The Santos Approach to Environmental Management

Table 3: Santos GLNG Pest and Weed Management Procedures

Procedure	Associated Records
Pest and Weed Management Procedure (3301-GLNG-4-1.3-0027)	Pest and Weed Report Form (3301-GLNG-4-1.3-0032)
Vehicle, Machinery Drill Rig and Cargo Washdown – Risk Assessment Process (3301-GLNG-4-1.3-0026)	Santos GLNG Site Inspection Report (3301-GLNG-4-1.3-0031) Santos GLNG Vehicle and Cargo Inspection Report (3301-GLNG-4-1.3-0030)
Leucaena Management Procedure (3301-GLNG-4-1.3-0037)	Weed Hygiene Declarations
Pest Central Database – Data Access and Management (3301-GLNG-4-1.3-0047)	Pest Central Database Access Request Form
Santos Geographic Information Systems Spatial Data Structures for Pest Flora Data (Data Collected Without Electronic Forms) (3301-GLNG-4-1.3-0041)	Electronic Spatial Data Files
Register of Certified Washdown Inspectors (3301-GLNG-4-1.3-0038)	

4.0 Pest and Weed Species in the Santos GLNG Upstream Project Area

4.1 Introduction and Spread of Pests and Weeds

Pest and weed species can be introduced / transported to new areas via a range of methods. Key vectors for pest and weed translocation within the Santos GLNG Upstream Project Area include:

- **Transportation into and across the project area** – via vehicles, equipment, construction and landscape materials, Santos GLNG Project personnel (parts attached to boots, pants etc.) and cattle;
- **Ecosystem disturbance** – via vegetation clearing creating conditions that can promote weed growth (e.g. light, removal of competition etc);
- **Natural methods of dispersion** – via wind, waters (including flood water) and wildlife; and
- **Diet supplementation** – via accessible Project-related food and putrescible waste sources that can supplement the diet and/or support populations of pest vertebrate fauna.

Recognising and managing potential vectors within the Santos GLNG Upstream Project Area is an important step for minimising the spread of pests and weeds. Translocation by project vehicles and construction equipment presents the highest risk for assisting the spread of weed species across the Santos GLNG Upstream Project Area.

4.2 Pest and Weed Species Present in the Santos GLNG Upstream Project Area

A number of pest and weed species are known to exist within the Santos GLNG Upstream Project Area, with the potential for more to be introduced as a result of project activities. Species lists and distributions for pest and weed species known to be present or are likely to be present in the Santos GLNG Upstream Project Area have predominantly been determined from ground-truthed data sourced from Santos GLNG field survey activities and Local Government Pest Management Plans (refer Section 3.3). These are discussed in the following sections.

4.2.1 Weeds

Table 4 summarises the weed species considered to be of the highest priority that are known to be present within the Santos GLNG Upstream Project Area. The majority of species listed are either:

- Class 2 declared species under the *Land Protection (Pest and Stock Route Management) Act 2002* (i.e. present an economic, environmental or social threat and landholders are required to take steps to keep their land free of the pest); and/or
- Weed species known to be of concern to landholders when present on their property.

The priority placed on individual species by Santos GLNG is consistent with the recommendations and emphasis of Local Government pest and weed management plans and strategies and legislative requirements. A complete list of weed species present within the Santos GLNG Upstream Project Area is presented in Appendix 1 of this PWMP.

Fact sheets for all identified declared weed species are available on the Queensland Department of Agriculture, Fisheries and Forestry (DAFF) website. Fact sheets are to be regularly consulted by Santos GLNG for up-to-date species, distribution and control related information.

Table 4: High Priority Weed Species Present in the Santos GLNG Upstream Project Area

Scientific Name	Common Name	LP Act Class	WoNS	Present in Santos GLNG Upstream Project Area			
				Fairview	Arcadia	Roma	Scotia
<i>Sporobolus pyramidalis</i>	Giant Rats Tail Grass	2		✓	✓		
<i>Sporobolus natalensis</i>		2		✓	✓		
<i>Parthenium hysterophorus</i>	Parthenium	2	✓	✓	✓	✓	
<i>Eriocereus martinii</i>	Harrisia Cactus	2		✓	✓	✓	
<i>Bryophyllum delagoense</i>	Mother-of-Millions	2		✓	✓	✓	
<i>Parkinsonia aculeata</i>	Parkinsonia	2	✓	✓	✓	✓	✓
<i>Opuntia stricta</i>	Prickly Pear	2		✓	✓	✓	✓
<i>Opuntia monacantha</i> syn <i>O. inermis</i>		2				✓	
<i>Sporobolus jacquemontii</i>	American Rat's Tail Grass	2		✓	✓		
<i>Sporobolus fertilis</i>	Giant Parramatta Grass	2		✓			
<i>Lycium ferocissimum</i>	African Boxthorn	2	✓	✓	✓	✓	
<i>Macfadyena unguis-cati</i>	Cat's Claw Creeper	3	✓		✓	✓	
<i>Scenecio madagascariensis</i>	Fireweed	2	✓			✓	
<i>Gleditsia triacanthos</i>	Honey Locust	1			✓		
<i>Hymenachne amplexicaulis</i>	Hymenachne	2	✓		✓		
<i>Prosopis spp.</i>	Mesquite	2	✓		✓		
<i>Acacia nilotica</i>	Prickly Acacia	2	✓		✓	✓	
<i>Cryptostegia grandiflora</i>	Rubber Vine	2	✓		✓		
<i>Salvinia molesta</i>	Salvinia	2	✓		✓		
<i>Pistia stratiotes</i>	Water Lettuce	2			✓		
<i>Sporobolus africanus</i>	Parramatta Grass	2			✓	✓	
<i>Cestrum parqui</i>	Green Cestrum*	NA				✓	
<i>Acacia farnesiana</i>	Mimosa*	NA	✓	✓	✓	✓	✓
<i>Argemone ochroleuca</i> and <i>A. mexicana</i>	Mexican Poppy*	NA		✓	✓	✓	✓
<i>Eragrostis curvula</i>	African Love Grass*	NA		✓	✓	✓	✓

* Indicates a weed species that has been identified a high priority for management in the Santos GLNG Upstream Project Area due to landholder concerns.

4.2.1.1 Weed Management Zones

Santos GLNG has divided the Santos GLNG Upstream Project Area into zones of risk, known as Weed Management Zones, to reflect the location of known populations of priority weed species and/or the potential for dispersal of priority weed species by Santos GLNG activities. Each weed management zone has been classified with a high, medium or low risk rating.

The distribution of Weed Management Zones according to risk classifications largely reflects the geographic distribution of the primary project areas comprising the Santos GLNG Upstream Project. The risk classification for the upstream project areas are listed in Table 5.

Table 5: Gas Field Risk Rating

Weed Management Zone Risk Rating	Location
High	<ul style="list-style-type: none"> Arcadia Valley gas field – northern section (ATP 526 & PLs 235, 236) Fairfield, Mapala and Nuga Nuga Roads; and Sections of Hutton Creek (within PL 92 and PL 99 within the Fairview gas field).
Medium	<ul style="list-style-type: none"> Fairview gas field (ATP 665 & PLs 90, 91, 92, 99, 100, 232); and Arcadia Valley gas field – southern section (ATP 653 & PL 234);
Low	<ul style="list-style-type: none"> Roma gas field (ATPs 336, 631, 665, 708 & PLs 3, 6, 7, 8, 9, 13, 93, 309, 310, 314, 315). Scotia gas field (ATP 868 & PL 176).

4.2.2 **Pests**

Table 6 summarises the pest species considered to be of the highest priority to Santos GLNG and are known to be present within the Santos GLNG Upstream Project Area. The priority placed on individual species by Santos GLNG is consistent with the recommendations and emphasis of Local Government pest and weed management plans and strategies and legislative requirements.

A complete list of pest species present within the Santos GLNG Upstream Project Area is presented in Appendix 2 of this PWMP.

Fact sheets for declared pest species are located on the Queensland DAFF website. Fact sheets are to be regularly consulted by Santos GLNG for up-to-date species, distribution and control related information.

Table 6: High Priority Pest Species Present in the Santos GLNG Upstream Project Area

Scientific Name	Common Name	LP Act Class	Present in Santos GLNG Upstream Project Area			
			Fairview	Arcadia	Roma	Scotia
<i>Canis familiaris dingo</i>	Dingo	2	✓	✓	✓	✓
<i>Canis lupus dingo</i>			✓	✓	✓	✓
<i>Canus familiaris</i>	Wild Dog	2	✓	✓	✓	✓
<i>Sus scrofa</i>	Feral Pigs	2	✓	✓	✓	✓
<i>Oryctolagus cuniculus</i>	Rabbits	2	✓	✓	✓	
<i>Lepus capensis</i>	Hares	NA	✓	✓	✓	
<i>Vulpes vulpes</i>	European Foxes	2	✓	✓	✓	✓
<i>Felis catus</i>	Feral cats	2	✓	✓	✓	✓

4.2.3 Notifiable Pests

Notifiable pests are plant or animal species whose presence must be notified to the Queensland Government within 24 hours of becoming aware of its presence. Notifiable pests are declared under Section 12 of the *Plant Protection Act 1989* and associated regulation. To date, no pest or weed species declared as notifiable under the *Plant Protection Act 1989* have been identified within the Santos GLNG Upstream Project Area. However, two notifiable invertebrate pests - the Fire Ant (*Solenopsis invicta*) and the Electric Ant (*Wasmannia auropunctata*) - have been determined to have the potential to be introduced to the Santos GLNG Upstream Project Area.

The Fire Ant has a particularly high risk of introduction due to its distribution within the highly populated area of South-East Queensland (SEQ). Many goods and services used within the Santos GLNG Upstream Project Area including transport, earthworks, heavy vehicles or fill and/or plant matter could likely be sourced from SEQ and as such from areas potentially containing Fire Ants.

If introduced to the Santos GLNG Upstream Project Area, the Fire Ant could have far ranging social, environmental, agricultural and economic impacts in the region. Santos GLNG staff must remain vigilant in taking measures to prevent the introduction of this pest.

Up-to-date Fire Ant and Electric Ant distribution maps and required movement controls are available on the DAFF website.

5.0 Management Strategy

An overarching pest and weed management strategy applicable to the Santos GLNG Upstream Project Area has been developed based on the following four principles:

1. **Identify** – pest and weed species and areas of infestation;
2. **Avoid** – traversing and placing infrastructure in areas of known infestation;
3. **Prevent / Minimise** – the translocation / spread of pest and weed species by implementing sound work practices and promotion of risk awareness;
4. **Control** – identified pest and weeds to contain, reduce or eradicate populations as required.

Each of these four principles are discussed in further detail in the following Sections.

5.1 Identify

The proper and rapid identification of pest and weed species / infestations provides the basis to actively minimise, control and manage pests and weeds and outbreaks in the Santos GLNG Upstream Project Area. All Santos GLNG Project personnel are responsible for identifying pest and weed species both prior to and during the conduct of a petroleum activity. Identification occurs at two levels of scale:

- Regional or Tenure Scale - identifying species that have the potential to / are known to occur within the Santos GLNG Upstream Project Area by reviewing pest distribution maps and plans created by DAFF Biosecurity Queensland (BQ), regional councils, catchment groups and Santos GLNG GIS Weed Management Zones / Pest Central Database.
- Local / Work Location - Identifying pests and weeds present within a work zone – by conducting a desktop review of pest and weed distribution data available within the Santos GLNG Upstream Project Area and through site scouting and ecological survey activities prior to the siting and/or construction of project infrastructure.

Pest and weed identification will predominantly occur at two phases during the project:

- During surveying activities as part of disturbance planning – this may involve site scouts, landholder discussions and/or ecological surveys, which may involve targeted weed surveys; and
- At all other times of the project – this may be as part of coordinated pest and weed surveys (i.e. with local government), surveys in response to landholder sightings and/or any identification by personnel during the everyday conduct of activities.

All Santos GLNG personnel receive training (relevant to their role) in the basic identifying features of high priority pest and weed species during toolbox meetings, inductions or specialised training sessions. In accordance with the Santos GLNG *Pest and Weed Management Procedure (3301-GLNG-4-1.3-0027)*, all new or previously unrecorded sightings of declared pests and weed species within the Santos GLNG Upstream Project Area will be recorded, photographed and submitted to a qualified Santos GLNG Representative for species confirmation. This process also includes the recording of the location and population data for confirmed sightings into the Santos GLNG Pest Central Database.

5.2 Avoid

Where pest and weed populations are identified as present in a proposed location for project infrastructure or work zone, the infrastructure / work zone should where practicable, be relocated to avoid the weed population.

Access to and from work zones are also to be assessed for the presence of pests and weeds and re-routed wherever possible to avoid these locations.

5.3 Prevent / Minimise

The prevention and/or minimisation of the potential for pests and weeds becoming established in the Santos GLNG Upstream Project Area as a result of Santos GLNG activities, is the most critical form of management. Land transportation currently presents the highest risk of introducing and spreading pests and weeds within the Santos GLNG Upstream Project Area and as such, vehicle, equipment and machinery inspection and washdown is the primary prevention / minimisation measure.

An overarching inspection and washdown strategy is in place for Santos GLNG related vehicles within the Santos GLNG Upstream Project Area, as outlined in the *Vehicle, Machinery, Drill Rig and Cargo Washdown – Risk Assessment Process (3301-GLNG-4-1.3-0026)*. Vehicles, equipment and machinery are to be risk assessed when moving between locations. The basis of the assessment is the likelihood of the vehicle, machinery, equipment and cargo having had contact with weeds which can be associated with activities such as driving off well-formed roads, coming into contact with roadside vegetation, working within areas known to possess declared weeds or driving a vehicle with an unknown washdown history (such as a hire car). The outcome of the assessment will result in the application of varying levels of inspection, washdown and certification. These actions range from mandatory washdown and inspection to no washdown or inspection required.

Asset / activity specific washdown requirements or landholder specific washdown requirements can also exist. These requirements must be adhered to and will override the broader inspection and washdown framework where these requirements are more onerous.

All Project vehicles must carry, and be able to present, a current *Weed Hygiene Declaration* at all times.

Other on-ground prevention and minimisation measures to be carried out throughout all phases of the Santos GLNG Upstream Project Area development are outlined in Table 7.

Table 7: Prevention and Minimisation Measures

Preventative measure	Activity / Description
<i>Minimise land disturbance</i>	<ul style="list-style-type: none"> Avoid disturbances where practicable, especially within weed-prone areas and encourage vegetation growth and cover after disturbances.
<i>Control sourcing of material</i>	<ul style="list-style-type: none"> Preferentially source materials and services from weed-free areas and areas outside of Fire Ant and Electric Ant distributions. Ensure that materials and services (where applicable) are accompanied by a Weed Hygiene Declaration. Ensure that materials and services (where applicable) sourced from a Fire Ant or Electric Ant zone, are accompanied by the necessary statutory documentation (e.g. Approved Risk Management Plan or Biosecurity Approval).

Preventative Measure		Activity / Description
Washdown	Risk Assessment	<ul style="list-style-type: none"> Vehicles and other equipment are to be risk assessed to determine the necessary level of inspection, washdown and certification when travelling to or between locations (Refer <i>Vehicle, Machinery, Drill Rig and Cargo Washdown – Risk Assessment Process (3301-GLNG-4-1.3-0026)</i>)
	Washdown Facilities	<ul style="list-style-type: none"> Vehicles must be cleaned at purpose built washdown facilities. Santos GLNG washdown facilities are to be constructed in accordance with the <i>Queensland Guideline for the construction of Vehicle and Machinery Washdown Facilities</i> and Santos <i>EHS09 How to Guide – Designing and Operating a Weed Washdown Facility</i>.
	Washdown Procedure	<ul style="list-style-type: none"> Washdowns must be undertaken in accordance with Santos <i>EHS09 How to Guide – Designing and Operating a Weed Washdown Facility</i>. Vehicles / machinery / equipment will be inspected after washdown by a certified washdown inspector and certified as 'clean' where appropriate.
	Washdown Record	<ul style="list-style-type: none"> A record of all vehicle and machinery washdowns carried out shall be maintained. All vehicles must possess an up- to-date Weed Hygiene Declaration.
Quarantine	<ul style="list-style-type: none"> Isolate new infestations of Notifiable, Declared Class 1 or Class 2 Weed / Pests (in a previously clean area) and Santos GLNG activities risk spreading the pest / weed further, until such time a management action is determined and agreed to with the landholder. 	
Access (Vehicle, cargo, equipment)	<ul style="list-style-type: none"> Keep vehicles and equipment on public roads, designated access tracks or within approved extra work areas (e.g. designated vehicle turn-around areas). Maintain access tracks to be free of declared or significant weeds to avoid contamination of vehicles and machinery. 	
Minimise access to food sources	<ul style="list-style-type: none"> Appropriately dispose of food scraps – do not leave scraps lying around. Cover putrescible waste storages to minimise vertebrate fauna access to food scraps. Educate personnel regarding the hazards of feeding vertebrate fauna. 	

5.4 Control

5.4.1 Eradication

After prevention, eradication is the most preferable management strategy for pests and weeds. Eradication is the goal through all phases of development in the Santos GLNG Upstream Project Area, however, this may only be feasible where there is a recent pest or weed incursion, or there is only a small population or a limited distribution. Eradication is highly dependent on early detection and requires coordination of Santos GLNG and landholder activities. The feasibility of an eradication program will be determined on a case-by-case basis.

5.4.2 Contain, Reduce and Manage

Where eradication is not a feasible option for pest and weed outbreaks, containment and treatment are the most appropriate measures to manage and/or reduce a population. These will typically be ongoing measures to reduce the risk of further spreading the pest or weed. There are two primary management priorities:

- On Santos GLNG property, Santos GLNG is legally required to manage pests and weeds declared as Class 1 or 2 under the LP Act; and
- On private property where Santos GLNG is not the landholder, the responsibility to manage declared pests and weeds rests with the landowner. Whilst not required to remove the pest or weed, Santos GLNG must take the necessary precautions to prevent furthering their spread.

Field and site-based pest and weed management programs will be developed by Santos GLNG on an as needs basis to ensure compliance with legal obligations and in consultation with landholders and any other affected stakeholders. This includes state and local governments who manage targeted and coordinated programs, particularly in relation to vertebrate pests. All weed and pest control will be conducted in accordance with the recommended BQ methods (refer [BQ Declared Weed Species and Declared Pest Species Fact Sheets](#)) and other best practice guidelines (<http://www.feral.org.au/pestsmart/>).

Table 8 contains general principles and measures of pest and weed management control in the Santos GLNG Upstream Project Area.

Table 8: General Control Measures

Action required	Activity / Description
Managing pests and weeds	<ul style="list-style-type: none"> • Develop and document procedures for managing new pest infestations. • Advise and consult with relevant stakeholders (landowners, local government, Land Protection Officers) of infestation and proposed management, prior to implementation. • Ensure chemical use is in accordance with any label requirements or permit conditions and applied by personnel trained in chemical application methods in accordance with the Santos <i>HSHS 08 – Chemical Management and Dangerous Goods</i>. • Removal or disposal of weeds is site and species specific and is to be completed in accordance with the relevant Local Government recommendations.
Prioritise	<ul style="list-style-type: none"> • Prioritise control programs throughout the Santos GLNG Upstream Project Area based on considerations of risk to factors such as environmental value, landholder concerns, seriousness of the pest or weed, population size (i.e. can it be eradicated) and the potential to spread. • Liaise / coordinate pest management in accordance with Biosecurity Queensland and local government pest control priority programs.
Contain spread	<ul style="list-style-type: none"> • Isolate infestations to prevent further spread and establish quarantine zones as necessary. • Implement best practice control measures in accordance with Queensland Biosecurity guidelines, Santos GLNG procedures and landholder requests. • Limit movement into or out of areas of infestation. • Enforce the requirements for vehicle and equipment washdown. • Maintain access tracks to be free of declared or significant weed species to avoid accidental contamination of vehicles and machinery.
Monitor	<ul style="list-style-type: none"> • Closely monitor controlled infestations for response to controls. such as: <ul style="list-style-type: none"> ○ Population is being appropriately managed and contained; or ○ Population is being reduced in size. • Responses to controls to be used to direct future management.

5.5 Training

All Santos GLNG Project personnel working in the Santos GLNG Upstream Project Area undergo a basic site-specific induction which includes an outline of the pest and weed prevention, minimisation and management requirements (and other environmental issues) on-site. Applicable training suited to the different roles and responsibilities (Section 2.0) is also to be undertaken in accordance with appropriate Santos Standards including *EHSMS06 Training and Competency* and *EHS09 Pest Plants and Animals*.

Regular toolbox meetings and pest and weed awareness sessions are also conducted. Topics addressed by these sessions include key pest and weed management principles to maintain compliance with regulatory requirements and to reinforce solutions or increase awareness of any pest and weed-related issues that arise during the course of exploration, construction, operations, decommissioning and rehabilitation.

Up-to-date extension and identification materials developed by QDAFF (Biosecurity Queensland) relating to pests and weeds that may be present within the Santos GLNG Upstream Project Area are also available to Santos GLNG field and logistics staff, including:

- Fact sheets;
- Identification cards;
- Posters;
- Distribution maps; and
- Relevant website information.

6.0 Evaluation and Review

6.1 Evaluation

The implementation and effectiveness of this management plan and its associated procedures will be regularly assessed to ensure:

- Santos GLNG is demonstrating compliance with legal and landholder obligations;
- The overall management strategy remains relevant and up to date; and
- The plan and procedures adequately manage the environmental issue.

Effectiveness can be assessed by a number of methods as shown in Table 9.

Table 9: Methods to Assess Legal and Procedural Effectiveness

Assessment Tool	Description
Checklists – Santos GLNG Compliance Management System	<ul style="list-style-type: none"> • Checklists, developed to reflect legal and procedural requirements / outcomes will be used by individual Santos GLNG Departments to assess and manage compliance. The results of the checklists will be evaluated for trending non-compliances that may be resolved through procedural change or by implementing another measure or process.
Audits	<ul style="list-style-type: none"> • Conduct internal and third party audits to formally assess the level of compliance with both regulatory requirements and with Santos GLNG procedures. • Audit outcomes are used to develop corrective actions which may include changes to this plan and/or procedures.
Review of Incidents	<ul style="list-style-type: none"> • A review of internal incidents, near misses or hazards will be undertaken to identify recurrences of similar incident types. This may highlight a requirement for a change in the existing plan and/or procedure, require the development of a new procedure or by implementation of another measure or process to address the recurring issue.
Review of Data	<ul style="list-style-type: none"> • Analyse all relevant data collected for negative and/or undesirable trends that may be prevented by procedural changes or by implementing another measure or process.

6.2 Review

The PWMP is a living document and shall be reviewed at least every three years or sooner if any of the following occur:

- The plan is not adequately managing the issue (refer Section 6.1);
- Legislative requirements change;
- The area of activity changes;
- A previously unidentified declared pest or weed species is found within an area of activity; and/or
- New procedures relating to pest and weed management are developed.

Reviews and changes to the PWMP are to be communicated to relevant Santos GLNG Project personnel.

7.0 Definitions

Term	Definition
Certified Washdown Inspector	<p>A person who has completed the Washdown Inspectors training and holds the appropriate certification:</p> <ul style="list-style-type: none"> • RTD2313A - Clean machinery of plant, animal and soil material (superseded module); and • RTD2312A - Inspect machinery for plant, animal and soil material (superseded module) OR • AHC BIO201A - Inspect and clean machinery for plant, animal and soil material (current module).
Checklist	<p>Checklists assist in assessing the implementation of a Procedure. Checklists contain a list of key items required, things to be done, or points to be considered and are a tool to assess compliance with a Procedure.</p>
Class 1 Weed / Pest	<p>A plant (weed) or animal (pest) prescribed under Section 38 of the <i>Land Protection (Pest and Stock Route Management) Act 2002</i>, which:</p> <ul style="list-style-type: none"> • is not commonly present or established in Queensland; and • has the potential to cause an adverse economic, environmental or social impact in Queensland or another State of Australia. • Landholders are legally required to keep their land free of Class 1 weeds / pests.
Class 2 Weed / Pest	<p>A plant (weed) or animal (pest) prescribed under Section 38 of the <i>Land Protection (Pest and Stock Route Management) Act 2002</i>, which:</p> <ul style="list-style-type: none"> • is established in Queensland; and • is causing, or has the potential to cause, an adverse economic, environmental or social impact in Queensland or another State of Australia. • Landholders must take reasonable steps to keep land free of Class 2 pests.
Class 3 Weed / Pest	<p>A plant (weed) or animal (pest) prescribed under Section 38 of the <i>Land Protection (Pest and Stock route Management) Act 2002</i>, which:</p> <ul style="list-style-type: none"> • Is established and commonly found in Queensland; • is causing, or has the potential to cause, an adverse economic, environmental or social impact in Queensland or another State of Australia. • Landholders are not required to control Class 3 pests unless their land is adjacent to an environmentally significant area and are issued with a control notice.
Declared Weed / Pest	<p>A highly invasive plant (weed) or animal (pest) that is targeted for legislative control due to serious economic, environmental and/or social impacts and is declared under:</p> <ul style="list-style-type: none"> • <i>Land Protection (Pest and Stock route Management) Act 2002</i>; or • Local Government model local laws.
Environmental Weed	<p>Plants that invade native ecosystems and adversely affect the survival of native flora and fauna. Environmental weeds damage the native environment, irrelevant to whether or not it is a declared weed under legislation.</p>

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Management Plan	Management Plans are specific to an environmental issue and/or topic. They primarily serve to provide a high level overview of the legislative and approval requirements and the Santos GLNG management strategy in place for the relevant environmental issue. Management Plans are also suitable for providing environmental regulators an overview of Santos GLNG environmental management, and in many cases, may be a direct requirements of an environmental approval.
Non-Declared Animal or Plant	While sometimes pests, they are not considered a significant state-wide threat and do not require an enforceable response. If warranted, local governments can declare these animals using local laws.
Notifiable Pest	A plant or animal species whose presence must be notified to the Queensland Government within 24 hours of becoming aware of it. Notifiable pests are declared under Section 12 of the <i>Plant Protection Act 1989</i> and associated regulation.
Pest Central	A restricted Santos GLNG database containing pest and weed distribution data.
Procedure	Procedures are designed to assist in the implementation of the Management Plan, by prescribing a series of processes and actions for a specific topic.
Santos GLNG Upstream Project Area	Comprises all Santos GLNG exploration and production tenements of the Arcadia, Fairview, Roma and Scotia gas fields.
Vector	An agent (person, animal or microorganism) that carries / transmits pests or weeds.
Washdown	The process of cleaning an object using compressed air, vacuum, brush or a high pressure spray. Washdown is to be conducted at a designated washdown facility and all reasonable effort must be made to ensure that both the operator and the vehicle, toolboxes and equipment are free of contaminates prior to leaving an area.
Weed Hygiene Declaration	Provides information on whether something (including gravel, mulch, machinery, packing material, sand, soil, vehicles and water) is contaminated with the reproductive parts of prescribed pest plants. Weed Hygiene Declarations can be used as regulatory statement under the <i>Land Protection (Pest and Stock Route Management) Act 2002</i> (LPA).

8.0 References

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- Santos GLNG (2014) *Upstream Management Plans Library* <http://teams-bne.santos.com/sites/USSUS/ENV/PlansProcedures/Forms/AllItems.aspx>

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WDRC (2013) Western Downs Regional Council, *Western Downs Regional Council Pest Management Plan 2011-2015*, viewed 2 April 2013 at http://www.wdrc.qld.gov.au/local-laws2/-/journal_content/56/12392/3B42A9AFF629677FD969DB7D660EFAD9

APPENDIX 1

Weed Species Present within the Santos GLNG Upstream Project Area

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Scientific Name	Common Name	LP Act Class	WoNS	Present in GLNG Upstream Project Area			
				Fairview	Arcadia Valley	Roma	Scotia
<i>Sporobolus pyramidalis</i> and <i>S. natalensis</i> ¹	Giant Rats Tail Grass	2		✓	✓		
<i>Parthenium hysterophorus</i>	Parthenium	2	✓	✓	✓	✓	
<i>Eriocereus martinii</i>	Harrisia Cactus	2		✓	✓?	✓	
<i>Bryophyllum delagoense</i>	Mother-of-Millions	2		✓	✓?	✓	
<i>Eragrostis curvula</i>	African Love Grass	NA		✓	✓	✓	
<i>Parkinsonia aculeata</i>	Parkinsonia	2	✓	✓	✓	✓	✓
<i>Opuntia stricta</i> and <i>O.monacantha</i> syn <i>O. inermis</i> ²	Prickly Pear	2		✓	✓	✓	✓
<i>Cardiospermum grandiflorum</i>	Balloon Vine	NA				✓	
<i>Sporobolus jacquemontii</i>	American Rat's Tail Grass	2		✓	✓		
<i>Sporobolus fertilis</i>	Giant Parramatta Grass	2		✓			
<i>Acacia farnesiana</i>	Mimosa	NA	✓	✓	✓	✓	✓
<i>Argemone ochroleuca</i> & <i>A Mexicana</i>	Mexican Poppy	NA		✓	✓	✓	
<i>Macfadyena unguis-cati</i>	Cat's Claw Creeper	3	✓		✓	✓	
<i>Scenecio madagascariensis</i>	Fireweed	2	✓			✓	
<i>Cestrum parqui</i>	Green Cestrum	NA				✓	
<i>Opuntia aurantiaca</i>	Tiger Pear	2		✓	✓	✓	

¹ Fairview and Arcadia Valley include both *Sporobolus pyramidalis* and *S. natalensis*. Roma only includes *S. pyramidalis*.

² *Opuntia stricta* within Fairview, Arcadia Valley and Roma. *O.monacantha* syn *O. inermis* only in Roma.

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Scientific Name	Common Name	LP Act Class	WoNS	Present in GLNG Upstream Project Area			
				Fairview	Arcadia Valley	Roma	Scotia
<i>Opuntia tomentosa</i>	Velvet Tree Pear	2		✓	✓	✓	✓
<i>Eichhornia crassipes</i>	Water Hyacinth	2	✓	✓		✓	
<i>Lycium ferocissimum</i>	African Boxthorn	2	✓	✓	✓	✓	
<i>Datura species</i>	Thorn Apple	NA		✓		✓	
<i>Carthamus lanatus</i>	Saffron Thistle	NA		✓	✓	✓	✓?
<i>Silybum marianum</i>	Variegated Thistle	NA		✓		✓	
<i>Xanthium spinosum</i>	Bathurst Burr	NA		✓		✓	
<i>Xanthium occidentale</i>	Noogoora Burr	NA		✓	✓	✓	✓
<i>Ricinus communis</i>	Castor Oil Plant	NA				✓	
<i>Echium plantagineum</i>	Paterson's Curse	NA				✓	
<i>Rapistrum rugosum</i>	Turnip Weed	NA				✓	
<i>Typha spp.</i>	Cumbungi	NA				✓	
<i>Froelichia spp.</i>	Cotton Tails	NA				✓	
<i>Phyla canescens</i>	Lippia	NA		✓		✓	
<i>Gleditsia triacanthos</i>	Honey Locust	1			✓		
<i>Hymenachne amplexicaulis</i>	Hymenachne	2	✓		✓		
<i>Prosopis spp.</i>	Mesquite	2	✓		✓		
<i>Verbena aristigera</i>	Mayne's Pest	NA		✓	✓	✓	
<i>Verbena bonariensis</i>	Purpletop Verbena	NA		✓		✓	
<i>Acacia nilotica</i>	Prickly Acacia	2	✓		✓	✓	
<i>Cryptostegia grandiflora</i>	Rubber Vine	2	✓		✓		
<i>Salvinia molesta</i>	Salvinia	2	✓		✓		

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Scientific Name	Common Name	LP Act Class	WoNS	Present in GLNG Upstream Project Area			
				Fairview	Arcadia Valley	Roma	Scotia
<i>Pistia stratiotes</i>	Water Lettuce	2			✓		
<i>Jatropha gossypifolia</i>	Bellyache Bush	2	✓		✓		
<i>Zizphus mauritiana</i>	Chinee Apple	2			✓		
<i>Baccharis halimifolia</i>	Groundsel Bush	2			✓		
<i>Thunbergia grandiflora</i>	Thunbergia	2			✓		
<i>Lantana camara</i>	Lantana	3	✓		✓	✓	
<i>Leucaena leucocephala</i>	Leucaena	NA		✓*	✓	✓*	
<i>Spathodea campanulata</i>	African Tulip Tree	3			✓		
<i>Tamarix aphylla</i>	Athel Pine	3	✓	✓	✓	✓	
<i>Asparagus africanus or A. plumosus</i>	Asparagus Fern	NA				✓	
<i>Heliotropium amplexicaule</i>	Blue Heliotrope	NA			✓		
<i>Schinus terebinthifolia</i>	Broad-leaved Pepper Tree	3		✓	✓	✓	
<i>Sphagneticola trilobata</i>	Singapore Daisy	3			✓		
<i>Agave spp.</i>	Sisal hemp	NA			✓		
<i>Sporobolus africanus</i>	Parramatta Grass	2			✓		
<i>Acanthocereus pentagonus</i>	Sword Pear	NA			✓		
<i>Acanthocereus tetragonus</i>							
<i>Cereus uruguayensis</i>	Willows Cactus	NA			✓		
<i>Tecoma stans</i>	Yellow Bells	3			✓		

✓* Present as a crop

APPENDIX 2

Pest Species Present within the Santos GLNG Upstream Project Area

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GLNG Project

Scientific Name	Common Name	LP Act Class	Present in GLNG Upstream Project Area			
			Fairview	Arcadia Valley	Roma	Scotia
<i>Bufo marinus</i>	Cane Toad	NA	✓	✓	✓	✓
<i>Canis familiaris dingo</i>	Dingo	2	✓	✓	✓	✓
<i>Canis lupus dingo</i>			✓	✓	✓	✓
<i>Canus familiaris</i>	Wild Dog	2	✓	✓	✓	✓
<i>Capra hircus</i>	Feral Goat				✓	
<i>Sus scrofa</i>	Feral Pigs	2	✓	✓	✓	✓
<i>Oryctolagus cuniculus</i>	Rabbits	2	✓	✓	✓	
<i>Lepus capensis</i>	Hares	NA	✓	✓	✓	
<i>Chortoicetes terminifera</i>	Australian Plague Locusts	2	✓	✓	✓	
<i>Locusta migratoria</i>	Migratory Locusts	2		✓		
<i>Austracris guttulosa</i>	Spur-Throated Locusts	2		✓		
<i>Mus domesticus /Rattus rattus</i>	Mice / Rats	NA	✓	✓	✓	✓
<i>Equus caballus</i>	Wild Horses	NA		✓		
<i>Equus asinus</i>	Feral Donkey			✓		
<i>Vulpes vulpes</i>	European Foxes	2	✓	✓	✓	✓
<i>Felis catus</i>	Feral cats	2	✓	✓	✓	✓
<i>Sturnus vulgaris</i>	Common Starlings	NA		✓		
<i>Cervus timorensis</i>	Feral Rusa Deer	2		✓		
<i>Axis axis</i>	Chital Deer	2		✓	✓	
<i>Cervus elaphus</i>	Feral Red Deer	3		✓	✓	
<i>Dama dama</i>	Feral Fallow Deer	3		✓		
<i>Acridotheres tristis</i>	Indian Myna			✓	✓	