Coffs Harbour Bypass Project

Panama Disease Control Management Plan

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Tables

Figures

Document control

Approval and authorisation

Title	Coffs Harbour Bypass Project Panama Disease Construction Management Plan
Approved on behalf of TfNSW by	Scott Lawrence Environment Manager Northern Project Office
Signed	
Dated	18/05/2021
Approved on behalf of Coffs Harbour Bypass Project Delivery Team by	Gregory Nash Project Director Coffs Harbour Bypass
Signed	
Dated	

Document status

The below document status table is for tracking the revisions of the PDCMP, while the proposal is in construction and if necessary, during operation. It may be modified where necessary to fit with requirements of the individual proposal.

Revision	Date	Description	Approval
1.0	22 October 2020	Draft Issue for Consultation	
2.0	30 November 2020	Draft Issue for Internal Finalisation	
3.0	February 2021	Final document for consultation	
4.0	April 2021	Final document	

Distribution of controlled copies

This Panama Disease Control Management Plan as part of the CEMP is available to all personnel and sub-contractors via the Project document control management system. An electronic copy can be found on the Project website.

The document is uncontrolled when printed. One controlled hard copy of the Panama Disease Management Plan as part of the CEMP and supporting documentation will be maintained by the Quality Manager at the Project office [and on the project website].

Copy number	Issued to	Version

Glossary / Abbreviations

Approved source	Areas from which materials, equipment, machinery or plant are able to be sourced for which an appropriate risk assessment has concluded that there is a very low or negligible likelihood of Panama disease being present and the *Hygiene Declaration Form* (Appendix K) has been submitted and approved by the TfNSW (in accordance with R178 as applicable).
Approval	A formal written authorisation provided by the relevant authority. The relevant authority may include TfNSW, EPA, Biosecurity NSW, Council, Department of Planning, etc. The formal authorisation requirements will be outlined within Contract Documents such as Hold Point submissions, Management Plan submissions, etc., State and Federal legislation, etc.
Appropriate waste disposal	Controlled site from which Panama Disease contaminated soil and risk vegetation material cannot be mobilised.
Banana covering	Means any covering that has contained or been in contact with a banana plant, used banana production equipment or banana soil.
Banana plant	Means any plant belonging to the family Musaceae and includes any part of any such plant.
Biosecurity NSW	NSW Department of Primary Industries team responsible for working with other jurisdictions to prevent, prepare for, respond to and recover from biosecurity incursions and incidents.
Bluebook	Volume 1 and Volume 2 of the Blue Book: Managing Urban Stormwater: Soils and Construction (Landcom, 2004).
CEMP	Construction Environmental Management Plan
CHBP	Coffs Harbour Bypass Project
CHCC	Coffs Harbour City Council
CHDBGA	Coffs Harbour and District Banana Growers Association
CoA	Ministerial Conditions of Approval for the **CHBP**
Construction site	A defined geographical segment of the bypass required for construction of the project. This includes the area required for temporary work such as sedimentation basins, drainage channels, access roads, construction compounds and ancillary sites. This is defined as the area contained within the limits of clearing.
Construction project	A construction program targeting a construction site under legally binding contractual arrangements
CLMP	Contaminated Land Management Plan
CSWMP	Construction Soil and Water Management Plan
DAF	Queensland Department of Agriculture and Fisheries

Depth of topsoil	A determined thickness of natural surface soil that may contain organic matter
DPI	New South Wales Department of Primary Industries
EIS	**CHBP** Environmental Impact Statement Environmental impact statement. An environmental impact assessment document prepared in accordance with the requirements of Part 5.1 of the Environmental Planning and Assessment Act 1979 (NSW), and written generally to comply with the requirements issued by the Secretary of the DPIE.
EPA	New South Wales Environment Protection Authority
Fungus	A fungus is any member of the group of eukaryotic organisms that includes microorganisms such as yeasts and moulds, as well as the more familiar mushrooms. These organisms are classified as a kingdom, which is separate from the other eukaryotic life kingdoms of plants and animals
G36	TfNSW QA specification G36: Environmental Protection
G38	TfNSW QA specification G38: Soil and Water Management
G40	TfNSW QA specification G40: Clearing and Grubbing
Infected banana plant	Banana plants varieties susceptible to Panama Disease that show symptoms of Panama Disease
LLS	Local Land Services
Non-Sensitive Receiver	All land not currently used and unlikely to be used for the cultivation of bananas (any species) that is: adjacent to the project area, or in a drainage catchment downgradient of the Construction site or irrigated from that drainage catchment.
NSW	New South Wales
PD	Panama Disease (also known as Banana fusarium wilt)
PDCMP	Panama Disease Control Management Plan i.e., this plan
Phase 1 - Site preparation phase	The stage of construction where controls are undertaken to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised. This will include the removal of topsoil and risk vegetation material.
Phase 2 - General Construction phase	The phase of construction following the site preparation phase.
Phase 3 - Finishing works phase	This will include activities such as landscaping, revegetation, topsoiling batters, pavement construction, etc.
QLD	Queensland
R1	An abbreviation for Panama Disease of banana plants caused by the Race 1 strain of the fungus *Fusarium oxysporum f.sp. cubense*
R178	TfNSW QA specification R178: Vegetation
Risk vegetation material	Includes: - Lady Finger, Ducasse and Plantain banana varieties that are susceptible to R1 Panama Disease. For these banana varieties, this includes the root ball and plant material located

	below the ground in addition to the plant material above ground. - The root ball and plant material located below the ground surface for all other banana plant varieties and asymptomatic hosts of R1. See Appendix A for a list of known asymptomatic plant species.
Sediment tracking	The transport of earth material outside the project boundary by the plant, equipment and vehicles
Sensitive Receiver	All land currently used or likely to be used for the cultivation of bananas (any species) that is: adjacent to the project area, or is in a drainage catchment downgradient of the Construction site or irrigated from that drainage catchment.
STR4	An abbreviation for Panama Disease of banana plants caused by the sub-tropical Race 4 strain of the fungus *Fusarium oxysporum f. sp. cubense*
Spore	A plant reproductive cell capable of developing into a new individual without fusion with another reproductive cell.
TfNSW	Transport for New South Wales
Washdown Procedure	Rinsing and disinfecting (decontamination) process adopted upon entry and exit of the Construction site. Refer to Appendix E for an example wash down procedure.

1 Introduction

1.1 Context

This PDCMP has been prepared to address the requirements of the Minister's Conditions of Approval (CoA) E75, the Transport for NSW environmental management measures listed in the Coffs Harbour Bypass Environmental Impact Statement (EIS) and all applicable legislation.

1.2 Management plan objectives

Objective 1: Manage the threat to banana growers of spreading Panama disease that could result from construction activities associated with the **CHBP**.

Objective 2: Provide clear guidance to contractors, NSW government agencies (including TfNSW), industry, and landholders on their individual responsibilities and the mandatory controls that must be implemented to effectively contribute to achieving Objective 1.

1.3 Scope of the Management plan

This Panama Disease Control Management Plan (**PDCMP**) provides instruction on the control measures, monitoring and reporting requirements to manage the risks of spread of Panama disease Tropical Race 1 (**R1**) and Subtropical Race 4 (**STR4**) associated with Coffs Harbour Bypass Project (**CHBP**). In this Plan reference to Panama Disease refers to the Tropical Race 1 (R1) and Subtropical Race 4 (STR4).

This PDCMP has been prepared to meet the Transport for NSW (**TfNSW**) Environmental Management Measures listed in the **CHBP** Environmental Impact Statement (**EIS**) and all applicable legislation.

The document addresses environmental management measure AG08 from the **CHBP EIS**, which states:

A Panama Disease Control Management Plan will be prepared and implemented during construction in consultation with Department of Planning, Industry and the Environment (DPIE) (Regions, Industry, Agriculture & Resources), representatives of the Banana Growers Association of Coffs Harbour & District and the Coffs Harbour City Council (CHCC).

The Plan will be prepared in accordance with relevant Queensland's Department of Agriculture and Fisheries guidelines including Panama disease tropical race 4: Biosecurity standards and guidelines (QDAF 2015) and Panama disease tropical race 4: Decontamination guide (QDAF 2016).

1.4 Guiding Principles

This plan is guided towards achieving the above objectives through the following principles:

- **Best Management Practice –** Biosecurity mitigation measures are consistent with advice from NSW agencies, specialist advice and the most current biosecurity protocols established in NSW and QLD to manage Panama disease risks.
- **Risk-based approach –** The management of Panama disease is based on introducing a set of controls to areas that pose the greatest biosecurity risk.

- **Shared responsibility –** all parties including **TfNSW**, contractors, industry, landholders and visitors to the Coffs Harbour region have a shared responsibility and legislative obligation to protect banana plantations from the threat of Panama Disease.
- **Practicable risk mitigation– Notwithstanding the need for best practice,** mitigation measures will be adopted that are commensurate with the scale of the risk and the degree to which they can be implemented in a practicable manner.

2 Background

If not managed correctly, the CHBP poses the following Panama disease biosecurity risks:

- Increased risk of spread of Panama disease as a result of construction activities**.**
- **R1** Infection and mortality of Lady Finger, Ducasse and Plantain varieties through the movement of contaminated risk vegetation material, soil or water.
- Panama disease **STR4** infection across all banana varieties through soil residues and vegetation transported in from other banana growing regions

2.1 What is Panama disease

Panama disease (also known as Banana fusarium wilt) is caused by a soil borne fungus, *Fusarium oxysporum f.sp. cubense*. There are four races of the disease. Whilst not harmful to humans, depending upon the 'race of the disease' it can be fatal to a range of Banana varieties and has a very significant impact upon fruit production. Internationally, it is recognised as a serious threat to food security[1].

Typically, banana plants infected with Panama disease initially appear to be suffering from drought or nutritional disorders. From the time of infection, it can take up to six months for the symptoms to show on the plant. The Panama disease fungus slowly kills a banana plant by invading the roots and blocking the vascular system, cutting off the supply of water and nutrients[2].

Traits of the disease which can make the control and management difficult include:

- it can only be detected visually through symptoms
- the fungus can survive in the soil for up to 40 years[3]
- the disease can be spread rapidly through soil and water movement
- land can be infected for 2-3 years prior to the plant showing symptoms
- some plants can be infected but not show visual symptoms for up to six months
- some other plant species carry the disease, but do not show symptoms.
- There is no cure for the disease and it cannot be eradicated

Panama disease symptoms that can be seen over time include yellowing of the leaf and leaf margins turning brown (see Figure 1-1 to Figure 1-4). In the long term, the stalk will split, bend and collapse. As the disease progresses, cutting the plant will reveal rings of discolouration within the stem[4]. Panama Disease does not affect humans.

Further information on identifying Panama disease can be found in Appendix A - Identifying Panama disease.

[1] Food and Agriculture Organization of the United Nations (FA).
[2] Department of Primary Industries, NSW Government.
[3] Pegg et al. 2019. The Epidemiology of Fusarium wilt of Banana.
[4] Department of Agriculture, Water and the Environment. Australian Government. https://www.pestnet.org/fact_sheets/banana_fusarium_wilt_176.htm

Visual symptoms of Panama disease

Figure 1-1. Early stages of Panama disease show a yellowing of the banana leaves[5]

Figure 1-2. Onset of the disease causes yellowing, parting and wilting of the leaves

Figure 1-3. The leaves begin to die as the plant is starved of nutrients and water

Figure 1-4. The plant is taken over by the fungus and no longer produces fruit

[5] All images obtained from Department of Agriculture and Fisheries website, QLD Government.

2.2 Types of Panama disease

Panama disease is classified into four races that are based on the variety of bananas susceptible to the different forms of the disease:

Race 1 (**R1**) has been present in the Northern NSW region for many years. This race is fatal to Lady Finger, Ducasse and Plantain varieties but Cavendish is resistant to infection. R1 is common in the Northern Rivers in NSW as well as Qld's Sunshine Coast and Brisbane.[6]

Race 2 affects cooking varieties such as Bluggoe. R2 is present in northern NSW[7].

Race 3 only affects some species of Heliconia. R3 is not present in NSW.

Race 4 has two sub types which will kill varieties that are also affected by Race 1 and Race 2, as well as Cavendish types:

- **Subtropical Race 4** (**STR4**) is present in Northern NSW near the Qld border and has been found in the Tweed, South East Qld and Bundaberg districts. STR4 usually produces symptoms in Cavendish after a period of cold stress[8].
- **Tropical Race 4 (TR4)** was found in the Northern Territory in 1997 and has been detected in the Tully Valley, Qld in 2015.[6] It is much more virulent than STR4.

The true extent of Panama disease **R1** and **STR4** in NSW is unknown.

2.3 Panama disease in the Coffs Harbour bypass area

Within the bypass construction site, twelve banana farms have been identified and a further five that are producing bananas as part of a broader cropping mix. It is unknown whether these properties (all) grow banana varieties that are susceptible to Panama disease.

The **CHBP EIS** Agricultural Assessment identified Panama disease (**R1**) as present within the project area on three properties however the current extent in the Coffs Harbour area is not known.[9] Given there can be a substantial time delay between the arrival of the disease, infection of the plant and the plant showing signs of infection, an important indicator of absence of the disease is the successful production of susceptible banana varieties (i.e. Ladyfinger and Ducasse - without symptoms) and/or an on-site assessment of farm biosecurity protocols.[10]

At the time that the **CHBP EIS** was prepared, there was no evidence or reports of **STR4** within the Coffs Harbour region. Given cases of **STR4** have been reported further north in **NSW**[11] it is critical to ensure that the construction project and growers have measures in place to ensure that the construction project is not a source of infection of this race to banana plantations in the Coffs Harbour area.

Using a combination of satellite and aerial photography from 1973, the extent of former and current banana plantations within the bypass construction site has been determined and a set of drawings developed. These Drawings have been provided for information in Appendix J.

[6] Newley, P. (2010) Panama disease in Bananas.
[7] DPI, NSW (2017)
[8] Department of Agriculture, Water and the Environment. Australian Government
[9] Coffs Harbour Bypass EIS Agricultural Assessment. Edge Land Planning, 2019.
[10] In the absence of any alternative ways to diagnose the disease
[11] NSW Biosecurity, 2017.

2.4 Transmission and spread of Panama disease

Panama disease is spread via contaminated water, soil and infected plants[12]. Pathways for spread include human/vehicle transport of soil, animals (particularly wild & feral), vegetation (green or leaf trash) and water. The disease can be spread via footwear, equipment/vehicles and transplanted suckers. It can also be carried through natural processes such as catchment runoff diverted for irrigation and wind-borne dispersion of spores.[13]

Managing the transmission and spread of Panama disease is more challenging than most diseases as it may be present for months to years in soil and asymptomatic vegetation before it is evident in banana plants.

3 Legislation, regulation and guidelines

3.1 Legislation and regulation

The NSW *Biosecurity Act 2015* identifies that the 'General Biosecurity Duty' applies to any person who deals with biosecurity matter or is a carrier and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by the biosecurity matter. The carrier or person dealing with biosecurity matter has a duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised. This Act applies to all individuals, organisations and businesses in NSW as well as landowners. The NSW *Biosecurity Regulation 2017*[14] sets out specific arrangements for the management of banana biosecurity risks, including Panama disease.

This PDCMP outlines the Panama disease biosecurity duties of all individuals and organisations that are responsible in the delivery of the **CHBP** and may be affected by spread of Panama disease. It is also important to recognise that management activities designed to manage the threat of Panama disease is also subject to other legislation/regulations (outlined in Appendix B - Legislative requirements and summarised below).

In summary, **the key legislative requirements** for this PDCMP as it relates **to the construction of the CHBP are**:

- Any person who deals with biosecurity matter (Panama disease in this instance) has a duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised.
- A person who becomes aware of, or suspects, that a prohibited matter event has occurred, is occurring or is about to occur has a biosecurity duty to immediately notify the prohibited matter event through the NSW Biosecurity Hotline https://www.dpi.nsw.gov.au/biosecurity/report-a-pest-or-disease .
- A person must not import into the State (of NSW) any banana plant, any equipment that has been used in the production of a banana plant (used banana production equipment), any soil in which a banana plant has been grown (banana soil), or any covering that has contained or been in contact with a banana plant, used banana production equipment or banana soil.

[12] Dita et al.2018.
[13] Commonwealth of Australia (2004)
[14] https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/722876/Bananas.pdf

3.2 Guidelines

Application of specific biosecurity legislation is supported by a range of government regulations and guideline documents. These documents are referenced within this plan where they apply or support implementation of this plan. These will be referenced both as source and also guides in the next section.

However, other legislation and regulations not directly targeting biosecurity may be relevant to complying with implementing control measures. Pertinent (but potentially not all) legislation and regulations are captured within this PDCMP. Businesses and individuals undertaking Panama disease mitigation measures should familiarise themselves with all relevant regulations and guidelines before implementing control measures

A summary of relevant guideline documents is provided in 12.3 Panama Disease Guidelines and factsheets.

4 Roles & Responsibilities

Achieving the objectives of this plan requires responsible individuals, contractors and agency personnel to undertake the following actions and meet relevant obligations. Roles and responsibilities are outlined below.

Table 1. Roles and responsibilities for Panama disease management under this plan.

Stakeholder	Role	Responsibility
TfNSW	Oversee the construction of the Coffs Harbour bypass	▪ Oversee the project and compliance of its contractors with this plan ▪ Ensure contracts for works for each construction site meet relevant obligations of this plan ▪ Identify the potential Sensitive and Non-sensitive receivers along the CHBP alignment and provide this information (and any updates) to the Contractor. ▪ Contract compliance audits ▪ Record keeping of issues and follow-up response. ▪ Point of contact for feedback or concerns from community (general public) and stakeholders including banana growers, the banana growers association, Biosecurity NSW, CHCC, etc. throughout the project ▪ Review any proposed changes to the PDCMP by the Contractor and consult with all other stakeholders regarding the changes. ▪ Attend and provide assistance to the Contractor during meetings with CHDBGA and landholders with properties deemed to be Sensitive Receivers.

		▪ Develop and maintain a register of contact details for current banana farmers to ensure timely communication of issues or incidents throughout construction. ▪ Records of changes of the Panama disease status of properties [actual or reported] advised by any relevant stakeholders.
Contractor	Undertake contracted construction activities of the Coffs Harbour bypass	▪ Adopt and implement this Management Plan and comply with relevant components of this plan as a condition of contract ▪ Oversee the implementation of biosecurity program ▪ Ensure contracted workforce and on-site visitors are fully inducted and aware of the Panama disease risk and required mitigation measures of the disease within the CHBP ▪ Validate the Sensitive and Non-sensitive receivers identified by TfNSW and update to include any changes to receiver status made through the detailed design phase. Any changes to the receiver status must be reviewed and approved by TfNSW in consultation with Biosecurity NSW ▪ Include management of Panama Disease as part of their incident response management procedures. ▪ Organise and chair monthly meetings with CHDBGA and property owners with landholdings deemed to be Sensitive Receivers during phase 1 operations and thereafter 6 monthly.
Coffs Harbour and District Banana Growers Association (**CHDBGA**)	Representative grower body for the area, and hence point of contact with the local industry on banana biosecurity issues	▪ Notify TfNSW of any known Panama disease status ▪ Notify TfNSW of any reported changes with the Panama disease status [actual or reported] in the area ▪ Assist TfNSW in communicating the PDCMP to the region's banana growers

Property owners and/or banana growers.	Encouraged to manage their property in accordance with Best Management Practices (for example, by developing and implementing a Farm Biosecurity Plan).	▪ Notify Biosecurity NSW and TfNSW of any known Panama disease status ▪ Meet General Biosecurity Duty under the *Biosecurity Act 2015.* ▪ Report any feedback or concerns to TfNSW project manager and adjacent property owners about observed construction activities that appear to breach their on farm biosecurity management practices ▪ Have in place a Biosecurity Plan for their property ▪ Notify TfNSW of any reported changes with the Panama disease status [actual or reported] in the area
Biosecurity NSW (**DPI**)	Support and advise landholders in the management of biosecurity risks Undertake biosecurity compliance and enforcement activities. Lead response to biosecurity emergencies in the state.	▪ Regulatory responsibilities to ensure agencies, organisations and individuals comply with biosecurity regulations ▪ Formally notify TfNSW of any reported changes of the Panama disease status [actual or reported] in the area
North Coast Local Land Services (**LLS**)	Provide technical expertise to help landholders with agricultural production, biosecurity, natural resource management and during emergencies[15].	▪ None specified

[15] https://northcoast.lls.nsw.gov.au/_old/about-lls

General public and other industries	No formal role	▪ Meet General Biosecurity Duty under the *Biosecurity Act 2015.* ▪ Comply with construction site directions ▪ Comply with signage, plans and directions from the landholders in the bypass area
Coffs Harbour City Council (CHCC)	Require consultation as per the Ministers Conditions of Approval	▪ Involved in the development of the Panama Disease Control Management Plan as a stakeholder ▪ Meet General Biosecurity Duty under the *Biosecurity Act 2015.*

5 Construction Risk Framework

This plan provides a risk based approach to managing the threat of spread of Panama disease arising from the construction of the CHBP.

This plan is underpinned by the following management principles for the construction site operations:

- ***'Come clean, go clean'*** - The construction site(s) has restricted and controlled access. Each construction site has defined access points as well as conditions on entry and exit for personnel, machinery, equipment and externally sourced construction materials.
- On-site materials that are likely to contain Panama disease will be managed through "**separation containment and/or isolation**" from material unlikely to contain Panama disease.
- Construction will avoid (where practicable) and minimise (where impractical) procedures that, through natural processes (e.g. rain causing runoff) are conducive to the spread of the disease from potentially infected land or water.

A risk based approach is appropriate given:

- the lack of knowledge of the current distribution of the R1 disease
- the presence but unidentifiable threat of STR4 in northern NSW
- the absence of tests available to prove the diagnosis in soil and water
- the resilience of the disease, being able to exist in the soil for decades.

Under this plan, risk of spread is managed by:

- Categorising the land parcels adjacent to the construction site into Sensitive and Non-sensitive Receivers, as described below in Table 2.
- Construction Site control measures that seek to prevent the introduction of Panama disease from outside the construction site (R1 or STR4) and to prevent the spread of any existing R1 infection from within to outside the construction site.
- Removing, treating, storing or encapsulating materials within the construction site that potentially contain Panama disease, thereby allowing uninhibited internal access for the remainder of construction

5.1 Risk Zones

At the commencement of the **Construction Project**, areas outside of the Construction site will be mapped as ***Non-sensitive Receiver*** or ***Sensitive Receiver*** (outlined below in Table 2 and Figure 7.1). The status of properties will remain labelled as Non-sensitive or Sensitive as per the decision tree in Appendix C, throughout the project phases, unless the receiver status changes.

Table 2. Risk zones for adjacent properties

Adjacent Property	Definition
Non-sensitive Receiver	All land not currently used and unlikely to be used for the cultivation of bananas (any species) that is: adjacent to the project area, or in a drainage catchment downgradient of the Construction site or irrigated from that drainage catchment.
Sensitive Receiver	All land currently used or likely to be used for the cultivation of bananas (any species) that is: adjacent to the project area, or is in a drainage catchment downgradient of the Construction site or irrigated from that drainage catchment. Enhanced control measures will be adopted to mitigate the risks associated with the spread of Panama Disease to these properties.

5.2 Construction Risk Management

TfNSW personnel, their contractors and sub-contractors must be informed of the critical importance of this plan in contributing to the ongoing viability of commercial bananas growing in the Coffs Harbour area.

Materials, equipment, plant or machinery to be brought onto site are to be from an approved source. In practicable terms, this means locations for which Panama Disease is not known to be present, and areas where bananas are not grown.

Contractors are required to complete *Hygiene Declaration Form* in Appendix K for any imported material to CHB. The relevant Hold Point in R178 must be completed for all imported material.

The management of vegetation, soil and water on the construction site must comply with the Protocols specific to each phase.

Control measures are underpinned by the biosecurity principle **“come clean go clean”.**

The following chapters (6 - 8) identify the control measures required to manage the risk of **R1** spread within the Construction site and to prevent the introduction of **STR4** from outside areas into the construction site. These chapters are broken up into the following road construction stages:

- ⇒ Phase 1 - Site Preparation
- ⇒ Phase 2 - General Construction
- ⇒ Phase 3 - Finishing works

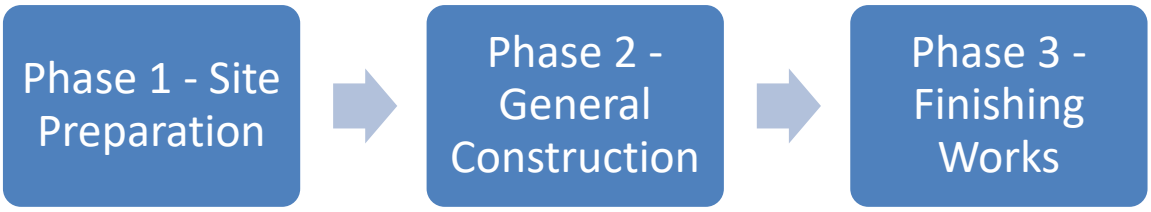

Figure 5 - Road Construction Phases

6 Phase 1 - Site Preparation

The whole of the construction site is proposed to be treated as a single Panama Disease management zone. For clarity, this means that the presence of Panama Disease cannot be accurately determined within the construction site, therefore the entire construction site will be deemed likely to contain Panama Disease. Mitigation requirements will be developed during each of the Construction phases which result in the biosecurity risk to Sensitive Receivers being minimised. In practical terms, this means that free movement of soil or water within the site, poses minimal threat to neighbouring banana plantations.

The Site Preparation phase works will be undertaken within the project boundaries and include the following activities:

Table 3. Phase 1 – Site Preparation activities and mitigations

Activities	Mitigation Requirements
Identifying Sensitive and Non-sensitive Receivers	Undertake a survey of land use and potential land use of properties adjacent to the construction site, and in catchments downgradient of the construction site, to identify Sensitive and Non-sensitive receivers. Refer to Appendix C.
Establishing Site Access	Installation and delineation of the **Construction site boundary** including the installation of site signage Establishment of controlled access point(s). Installation of Washdown facilities at all access points and implementation of washdown procedures in accordance with Appendix D and to comply with the ***'Come Clean, Go Clean'*** principle. These facilities and procedures must be utilised and maintained until decommissioning in Phase 3 and used for all plant, machinery and vehicles entering and exiting the site.
Maintaining general public and property owners thoroughfares	General public and property owner's thoroughfares will need to be maintained throughout construction. This may be achieved by: - Directing traffic through the Construction Site - Directing traffic around the Construction Site - Staging the works to allow access to remain on existing or newly constructed pavements. If it is proposed to direct traffic through the Construction Site during phase 1, washdown facilities and procedures must be implemented at both the entry and exit access points.
Installation of Erosion and Sediment controls	These will be undertaken in accordance with Appendix F which details the requirements for Sensitive and Non-sensitive Receivers. Implementation of dust control mitigations measures

Activities	Mitigation Requirements
Surface water runoff management	Offsite surface water runoff - Panama disease is potentially already being mobilised through these processes and hence able to spread under the existing hydrological processes that are outside the control of TfNSW. The CHBP is only responsible for managing the potential for these risks to change through construction works. To this end: - To minimise runoff entering from up-gradient of the construction site, water will be diverted through or around the construction site to avoid disturbed areas. To the extent practicable, diversion will not change from the pre-construction drainage catchment flow path characteristics. - Site generated runoff, erosion and sediment controls will be installed to manage all site generated runoff from within the disturbed or active work areas. - Where practicable, discharge points will avoid Sensitive Receiver properties and their catchments. The management controls described above will be developed in accordance with the NSW state guidelines and TfNSW Specifications. These measures are to be implemented to an industry standard consistent with the industry best practice guidelines prescribed by Volume 1 and Volume 2 of the Blue Book: Managing Urban Stormwater: Soils and Construction (Landcom, 2004). Erosion controls and sediment capture measures will be established and regularly maintained to divert offsite stormwater, manage onsite stormwater runoff and stabilise all disturbed areas within the project area.
Clearing	Removal of infected banana plants and risk vegetation material will be undertaken separate to clearing of other vegetation. **Felling:** To fell a banana plant, cut it off at the base using a sharp axe or handsaw. Very healthy plants may send up shoots or suckers after being felled, which must be removed to completely kill the banana plant. The trunk can be chopped up and safely composted. All roots must be removed mechanically. **Mechanical removal:** Very young banana plants can be killed simply by digging them up. This process is more difficult with older plants, which have a larger root system. All banana plant vegetation must remain within the Project Site boundaries unless approval is obtained in accordance with biosecurity guidelines and any other applicable requirements All vegetation removal is to be undertaken in accordance with G40 Specification.

Activities	Mitigation Requirements
	Herbicides: can be used for pest plant management (weed control)
Treatment and disposal of infected banana plants and risk vegetation material	**Risk vegetation material:** Dying risk vegetation material may release fungal spores and hence an increased risk of spreading infection. - Above ground risk vegetation material must be treated and disposed of within 5 days of killing the plant. - Below ground risk vegetation material must be treated and disposed of within 5 days of removing from the ground. **Infected banana plants:** Treatment and disposal of this vegetation must comply with the following mitigation requirements: - Above and below ground infected banana plant material must be treated immediately upon removal. To ensure this treatment occurs immediately, the proposed and approved treatment capacity and productivities will need to be determined and the infected banana plant material removal may need to be staged. This will ensure no infected banana plant material is stockpiled which in turn removes the associated risk of Panama Disease spread to other Sensitive Receivers. The following items are potential options to be considered for disposal of risk vegetation material and are subject to approval by TfNSW as well as compliance with CHCC and EPA approvals and licencing requirements. **Burial:** Removed risk vegetation material may be mulched and buried. Burial depth must be a minimum of 600mm. **Burning:** Removed vegetation may be burnt where approval from the EPA is obtained Note it cannot be assumed that EPA approval will be obtained. If incineration was pursued, measures to reduce air quality impacts would be required. Smoke plumes from burning vegetation is not likely to be an acceptable outcome for the community. If vegetation is incinerated, then no specific biosecurity measures apply to the disposal of the residue. **Composting:** Banana plant varieties that are not susceptible to the R1 Panama Disease may be composted. Vegetation will require mulching prior to composting. **Thermal Treatment:** the thermal treatment process should deliver temperatures of 65-100°C for a minimum of 30 minutes on all parts within the compost.

Activities	Mitigation Requirements
Stripping topsoil	The Panama disease risk will be minimised by removing all topsoil from risk vegetation material. Panama disease risk from remaining topsoil within the Construction site will be minimised as follows: - In embankments, once a depth of the topsoil is determined and stripped, the in-situ material must be covered by a minimum of 600mm where practicable. - In cuts, where adjacent properties and all down gradient properties (or irrigated diversions) are identified as Sensitive Receivers, once a depth of topsoil is determined and stripped, any material to a total depth of 1m (including the topsoil thickness) that is capable of growing vegetation, must be covered by a minimum of 600mm of material. All attempts to undertake these operations will be made as soon as practicable. - In cuts, where adjacent properties and all down gradient properties (or irrigation diversions) are identified as Non-sensitive Receivers, once a depth of topsoil is determined and stripped, remaining material will be managed under standard earthworks operations. Stockpiles will be managed with appropriate controls and in accordance with TfNSW Specifications G36, G38 and Appendix G Washdown of plant and equipment must be undertaken when changing from handling topsoil to other activities. This must be undertaken using the designated washdown facilities and procedures in accordance with Appendix D. All topsoil must remain within the Project Site boundaries unless approval is obtained from TfNSW.

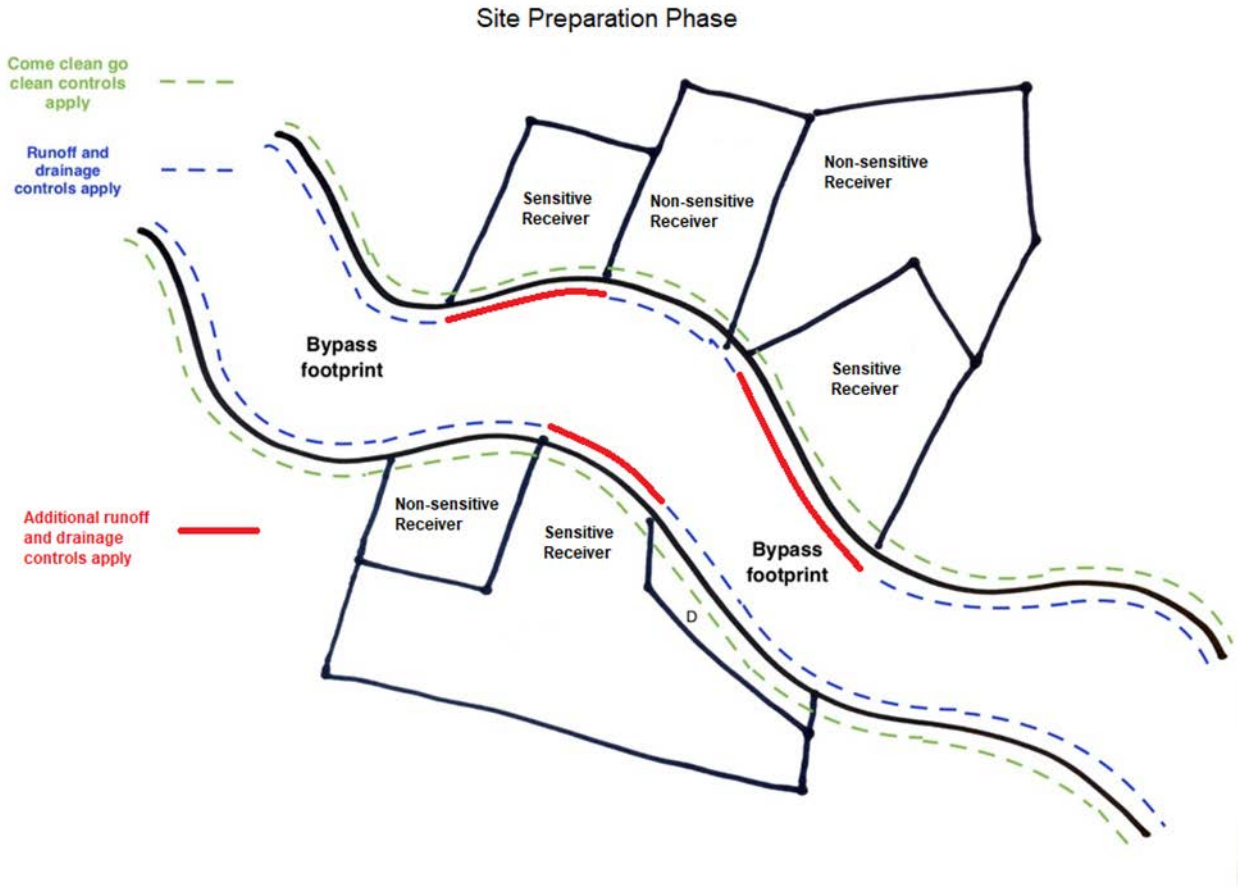

Figure 6. Example of Site preparation controls which will remain in place until decommissioning from Site

7 Phase 2 – General Construction

The following measures outline operational controls to mitigate ongoing risks associated with Phase 2.

Table 4. Phase 2 - General Construction activities and mitigations

Activities	Mitigation Requirements
Maintenance of control measures established and installed during Phase 1 – Site Preparation	This includes maintenance of the following installed during phase 1: - Site Access (includes management of Sediment tracking off site) - Erosion and Sediment controls - Surface water runoff management
Bulk earthworks, installation of drainage, construction of structures, tunnelling works, concrete paving, concrete batch plant operations, etc.	Minimise generation and emission of dust including constraints on construction traffic speed through site Create all weather accesses to reduce dust and dirt transmission Maintain controls around stockpile sites Ensure water discharge practices are undertaken in accordance with the documents outlined in Table 3. Restrict access to outside the disturbed construction areas Water used must be from an approved source.
Importing soil, plant, water or other construction material from outside the construction site	Materials must be from an approved source. Required documentation detailed in the Contract Documents must be submitted and approval obtained prior to movement to site. The Hygiene Declaration form in Appendix K must be completed and approval obtained prior to import.

8 Phase 3 - Finishing works

This phase includes the following activities:

- Landscaping
- Topsoiling of batters and similar works
- Concrete Pavement
- Installation of road furniture
- Linemarking
- Installation of permanent signage including Vehicle Message Boards
- Installation of street lighting
- Decommissioning activities, etc.

The interaction between plant, equipment, vehicles, etc. and topsoil will re-commence during this phase and includes activities such as the placement of topsoil on batters for landscaping. This phase will involve a combination of the Phase 1 - Site preparation control measures and Phase 2 – General Construction control measures.

The following measures outline operational controls that are in place to mitigate residual risk associated with the Construction site.

Table 5. Phase 3 - Finishing works activities and mitigations

Activity	Mitigation Requirements
Maintenance of control measures established and installed during Phase 1 – Site Preparation	This includes maintenance of the following installed during phase 1: - Site Access (includes management of Sediment tracking off site) - Erosion and Sediment controls - Surface water runoff management
Concrete paving, Installation of road furniture, linemarking, installation of permanent signage, installation of street lighting, etc.	Minimise generation and emission of dust including constraints on construction traffic speed through site Maintain controls around stockpile sites Ensure water discharge practices are undertaken in accordance with the documents outlined in Table 3 Restrict access to outside the disturbed construction areas Water used must be from an approved source.
Importing soil, plant, water or other construction material from outside the construction site	Required documentation detailed in the Contract Documents must be submitted and approval obtained prior to movement to site. The Hygiene Declaration form in Appendix K must be completed and approval obtained prior to import.

Activity	Mitigation Requirements
Plant or equipment changing activity or leaving site	Washdown of plant and equipment at washdown facilities and in accordance with washdown procedures once changing from handling topsoil or leaving site
Topsoiling of batters	Enhanced ERSED Controls must be implemented in areas adjacent to or up-gradient of sensitive receivers until topsoiled batters have been stabilised. Alternatively, materials used for landscaping and revegetation in areas adjacent to or up-gradient of sensitive receivers must be from an approved source
Decommissioning of site	Once permanent washdown facilities have been decommissioned and removed, temporary washdown procedures and facilities must be implemented and utilised. A decommissioning procedure and facility must be developed and approved by TfNSW. A procedure for disposing of any residue stockpiles and a basin decommissioning procedure must be developed (consistent with stripping topsoil protocol in Table 3) and approved by TfNSW. This may include burial within the decommissioned basin with a minimum of 600mm of earthworks (similar burial process to Phase 1)

9 Training and awareness

Table 6. Training and induction requirements

Requirement	Further information
Training and biosecurity awareness	
Induction	All personnel entering the site must have been inducted on their duty of care under this plan. All personnel that are attending the CHBP site will be required to attend an environment induction prior to starting work on the project. The induction should cover the following: ▪ Purpose and objectives of the PDCMP; ▪ Requirements of due diligence and duty of care; ▪ Potential environmental emergencies on site and the emergency response procedures; ▪ Reporting and notification requirements for environmental incidents; ▪ High-risk activities and associated environmental safeguards, e.g. working near waterways ▪ Working in or near environmentally sensitive areas; ▪ Traffic issues – including clear instructions to all project staff including delivery drivers with regards to speed limits, approved access routes. Site induction processes will include biosecurity obligations and procedures. An induction register must be maintained. For details, see 11.1 Record Keeping. This can be included as part of the construction site register.
Toolbox	Regular Toolbox Talks will be conducted by the contractor to reinforce the information provided during induction. Toolbox talks will be reported as part of monthly reporting.

10 Environmental Requirements

10.1 Relevant legislation and guidelines

10.1.1 Legislation

All legislation relevant to this PDCMP is included in Appendix B - Legislative requirements.

10.1.2 Additional approvals, licences, permits and requirements

Refer to Appendix B - Legislative requirements

10.1.3 Guidelines and standards

The main guidelines, specifications and policy documents relevant to this Plan include:

- NEPM Guidelines for the Assessment of Site Contamination
- Waste Classification Guidelines – Part 1: Classification of waste (NSW EPA 2014)
- Roads and Maritime QA Specification G36 – Environmental Protection
- Roads and Maritime QA Specification G38 – Soil and Water Management
- Roads and Maritime QA Specification G40 – Clearing and Grubbing Management
- Roads and Maritime Guideline for the Management of Contamination, September 2013
- Environmental Procedure Management of Wastes on Roads and Maritime Services Land (Roads and Maritime 2014).
- Roads & Maritime Services Environmental Incident Classification and Reporting Procedure (2017);
- NSW Environment Protection Authority (EPA) Contaminated Land Management – Guidelines for the NSW Site Auditor Scheme (3rd edition) (2017);
- NSW Department of Planning State Environmental Planning Policy 55 – Remediation of Land;
- Department of Urban Affairs and Planning and Environment Protection Authority Planning Guidelines SEPP 55 – Remediation of Land (1998);
- NSW Office of Environment and Heritage (2011) Guidelines for Consultants Reporting on Contamination Sites;
- Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997 OEH (2009);
- Qld Dept. of Agriculture & Fisheries Guidelines including Panama disease tropical race 4: Biosecurity standards and guidelines (2015)
- Qld Dept. of Agriculture & Fisheries Panama disease tropical race 4: Decontamination guide (2016)
- NSW Environment Protection Authority (1997) Guidelines for Assessing Banana Plantation Sites
- NSW Agriculture (DPI – 423) Panama Disease Management for Machinery Operators
- NSW Agriculture (DPI – 353) Panama Disease: On Farm Management.

11 Monitoring and compliance

TfNSW, their Contractors and sub-contractors will communicate as required with Biosecurity stakeholders and other key stakeholder groups and maintain an up to date contact list.

Any report of a property infection will trigger a review of the management plan.

Construction sites will be audited for compliance with this plan

11.1 Record Keeping

A register of approved suppliers is to be developed to ensure that all outside materials brought on-site are sourced from Panama free sources. This includes but is not restricted to, gravel, rock, water, plants for revegetation and soil.

Table 7. Record Keeping

Requirements	Response
Records of all personnel inducted to the CHBP	Records will be kept on the contractors quality control system and provided on request to TfNSW
Records of all activities linked to this Management Plan will be kept	Records will be kept on the contractor's quality control system and provided on request to TfNSW. Other records to be kept and maintained include those detailed Table 8. Roles and responsibilities for Panama disease management under this plan

Requirements	Response
The Contractor representative will undertake weekly inspections of the worksite	The purpose of the inspections is: • to evaluate the effectiveness of environmental controls outlined in this plan. • record inspection findings and report any non-compliance to the site supervisor.
Audits will be undertaken to assess and confirm all activities are undertaken in compliance with this plan, and other relevant approvals, licenses and guidelines. Internal auditing will be undertaken on a six-monthly basis throughout the Project.	The purpose of auditing is to verify compliance with: • This PDCMP and associated plans. • Approval requirements, both State and Federal. • Any relevant legal and other requirements (e.g. licences, permits, regulations, TfNSW contract documentation). This audit will be undertaken by the Contractor and the findings and recommendations must be submitted and approved by TfNSW.
In the event of a confirmed new Panama Disease report, or the banana plantation/crop of a Sensitive Receiver is reasonably suspected of being infected with Panama Disease, the PDCMP will be immediately reviewed and implementation updated.	This review and update must be undertaken by the Contractor once notified in writing from TfNSW of the confirmed new Panama Disease outbreak. This review and update must be undertaken within 7 days of notification and must be undertaken to the satisfaction of TfNSW.
Any incident or non-compliance/non-conformance with the PDCMP will be reported immediately to the TfNSW.	The Contractor must report any incidents or non-compliances to TfNSW immediately in accordance with the TfNSW incident reporting and classification guidelines. The Contractor must determine the root cause of any non-conformances and develop corrective and preventative actions.

12 References

12.1 Referenced in the plan

- Araya M. (2003) Stratification and spatial distribution of the banana (Musa AAA, Cavendish subgroup, cvs 'Valery' and 'Grande Naine') root system in Banana Root System: towards a better understanding for its productive management eds. D W Turner and F E Rosales p 83-106
- Biosecurity Act 2015, New South Wales NSW Government
- Biosecurity NSW, 2017. Tropical Race 4. Primefact 1331.
- Business Queensland: Panama disease tropical race 4 (TR4) https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/crop-growing/priority-pest-disease/panama-disease
- Commonwealth of Australia (2004) Revised Draft Risk Analysis for Bananas from the Philippines
- Commonwealth of Australia (2019) Final Pest Risk Analysis for Brown Marmorated stink bug
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- Food and Agricultural Organisation of the United Nations. http://www.fao.org/food-chain-crisis/how-we-work/plant-protection/banana-fusarium-wilt/en/
- Pattinson T, Lindsay S (2006) Banana Root and Soil Health User's Manual Queensland Government.
- Pegg K G, Coates L M, O'Neill W T, Turner D W (2019) The Epidemiology of Fusarium wilt of Banana. Frontiers of Plant Science 10: 1395
- Rekah Y, Shtienberg D, Katan J (1999) Spatial distribution and temporal development of Fusarium crown and root rot of tomato and pathogen dissemination in field soil Phytopathology 89: 831-839
- Risbeth J (1955) Fusarium wilt of bananas in Jamaica I Some observations on the epidemiology of the disease. Ann. Bot 19: 293-330
- Woolgoolga to Ballina upgrade (Glenugie to Ballina) Construction Environmental Management PLAN - Appendix B2-1.pdf**. Appendix P. *S 2.3.5 Panama Disease Management measures***

12.2 Further information

Government and industry publications

Biosecurity Guidelines – Protecting and managing biodiversity on RTA projects
https://www.rms.nsw.gov.au/business-industry/partners-suppliers/documents/guides-manuals/biodiversity_guidelines.pdf

Panama Disease Tropical Race 4
https://www.agriculture.gov.au/pests-diseases-weeds/plant/panama-disease-tropical-race-4#how-to-identify-panama-disease-tropical-race-4

Biosecurity Standards and Guidelines, Version 1
http://abgc.org.au/wp-content/uploads/2015/03/Biosecurity-standards-and-guidelines.pdf

Discussion paper: Biosecurity Act 2015, NSW Banana Industry
https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0010/838630/Discussion-Paper-Banana-Industry.pdf

Guidelines for Assessing Banana Sites, NSW EPA
https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/clm/bananaplantsite.pdf?la=en&hash=7145E673C7779C9D9A835B77F6467A44816AAE96

General Biosecurity Duty with Diagram
https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/722886/General-biosecurity-duty-with-diagram.pdf

Farm Biosecurity Manual for the Banana Industry
https://www.farmbiosecurity.com.au/wp-content/uploads/2019/03/Farm-Biosecurity-Manual-for-the-Banana-Industry.pdf

Got a job to do on a banana farm
https://www.publications.qld.gov.au/dataset/ff0ce12a-2703-434b-b406-72eab8e7270a/resource/ec6aba49-e222-4682-a9e1-a28250de5961/fs_download/got-a-job-to-do-on-a-banana-farm.pdf

Early Detection of Panama Disease is critical
https://www.publications.qld.gov.au/dataset/ff0ce12a-2703-434b-b406-72eab8e7270a/resource/3c4bb575-3e7c-40f3-9d7c-86aed486d0c5/fs_download/managing-Panama-tr4early-detection-critical.pdf

Soil and Water best Management Practices for banana growers
https://www.dpi.nsw.gov.au/agriculture/horticulture/tropical/growing-bananas/soil-water-management

Washdown Designs for Panama disease
https://www.publications.qld.gov.au/dataset/ff0ce12a-2703-434b-b406-72eab8e7270a/resource/57f29400-c4cc-4732-9c73-da6936df8ac3/fs_download/wash-down-Panama-tr4-designs.pdf

Decontamination of Vehicles and Equipment NSW Department of Primary Industries
https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0010/545554/procedure-decontamination-vehicles-and-equipment.pdf

Panama Disease Tropical Race 4 Decontamination Guide Version 2 2016, Queensland Department of Agriculture: https://www.publications.qld.gov.au/dataset/Panama-disease-tropical-race-4-grower-kit/resource/566b02f0-eff4-4966-8da7-976c5e64dad6)

Quaternary Ammonium Compounds to manage Panama Disease
https://www.horticulture.com.au/globalassets/hort-innovation/resource-assets/ba14013-quaternary-ammonium-products-aid-in-the-management-of-foc.pdf

Testing the Efficacy of Urea as a treatment for Panama Disease
https://www.horticulture.com.au/globalassets/hort-innovation/resource-assets/ba14013-testing-the-efficacy-of-urea-as-a-treatmetn-for-the-destruction-of-foc.pdf

Monitoring the effectiveness of quaternary ammonium compounds
https://www.horticulture.com.au/globalassets/hort-innovation/resource-assets/ba14013-quaternary-ammonium-qa-products.pdf

12.3 Panama Disease Guidelines and factsheets

- Panama Disease in Bananas NSW Primary Factsheet.
- https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/348900/Panama-disease-in-bananas.pdf
- Edge Land Planning 2019. Coffs Harbour Bypass EIS Agricultural Assessment.
- NSW DPI. Title: Soil & Water Best Management Practices for NSW Banana Growers. Authors: A Akehurst, P Newley & M Hickey Published by NSW Department of Primary Industries. (2008).
- EPA NSW. Contaminated Sites: Guidelines for assessing Banana Plantation Sites (2003).
- NSW Transport, Roads and traffic Authority (now Transport for NSW). Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects. (2011)
- RTA. Technical Guideline: Environmental Management of Construction Site Dewatering. (2011)
- Department of Agriculture and Fisheries, Biosecurity Queensland. Panama Disease Tropical Race 4: Biosecurity standards and guidelines (2015).
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- Qld Dept. of Agriculture & Fisheries Panama disease tropical race 4: Decontamination guide (2016)
- NSW Environment Protection Authority (1997) Guidelines for Assessing Banana Plantation Sites
- NSW Agriculture (DPI – 423) Panama Disease Management for Machinery Operators
- NSW Agriculture (DPI – 353) Panama Disease: On Farm Management.
- NSW Government. Biosecurity Regulation 2017. Bananas fact sheet. https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/722876/Bananas.pdf
- Plant Health Australia, Qld Government and Department of Employment, Economic Development and Innovation 2009. Farm biosecurity manual for the banana industry. https://www.farmbiosecurity.com.au/wp-content/uploads/2019/03/Farm-Biosecurity-Manual-for-the-Banana-Industry.pdf

13 Information source record

This list details sources used in compiling this document and also a list of personnel consulted.

Biosecurity NSW
Dr Satendra Kumar Chief Plant Protection Officer
Ms Janine O'Donnell Manager Plant Product and Integrity Services
Ms Anne Webster Biosecurity Officer Coffs Harbour
Biosecurity Queensland
Mr Mike Ashton Chief Plant Protection Officer
Ms Riannon Evans Program Leader, Panama TR4 Program, Plant Biosecurity and Product Integrity
Biosecurity Western Australia
Ms Sonya Chief Plant Protection Officer
University of Queensland
Professor Elizabeth Aitken
Dr Kenneth Pegg
Australian Banana Growers Council
Dr Rosie Goodwin Australian Research coordinator
Matt Weinert Former Banana Industry Development Officer Coffs Harbour
David Peasley Australian Bunchy Top Virus surveillance and eradication program
Professor Emer O'Gara Department Biodiversity, Conservation Attractions WA
Professor Giles Hardy Murdoch University WA
Dr Geoff Pegg Department of Agriculture Queensland
Mr Stephen Spear Director Australian Banana Growers Council

Appendix A - Identifying Panama disease

How to Diagnose

Panama disease can only be identified once the disease has visually impacted on the plant.

Plants infected with Panama disease typically appear in the first instance to be suffering from drought or nutritional disorders as the disease affects the plants vascular system. From the time of infection, it can take up to six months for the disease to be expressed. It is thought that the Chlamydospores move very little in-situ[16] and must wait until contact occurs with a banana root before germinating. However, the large number of roots produced by bananas means that very few spores are required for infections to occur. Most infections are thought to be on the secondary and tertiary roots. Nonetheless in soils with low spore numbers it is suggested that it may take more than five years for infection to occur[17] .

There is no way to test for Panama Disease. Currently the only accepted method of detection is through identifying plants with symptoms[18] and subsequent isolation of the fungus[19].

Disease life cycle

Panama disease can persist for up to forty years[20]. There is evidence to show that areas which once hosted the disease but have been devoid of bananas for many years can still produce disease if replanted. There is currently no scientific evidence as to how long the disease lives in the soil, although a survival of at least twenty years has been suggested[21]. It is unknown whether persistence of the disease on a site is facilitated by asymptomatic hosts.

Infection generally occurs within one metre of the plant stem, in the finer secondary and tertiary roots which tend to be concentrated in the upper part of the soil profile.

Spore release begins once infection has occurred and thus plant yet to show above ground symptoms may nonetheless be capable of infecting others[22].

Surface wounds caused by weevil borer or other activities are also known to provide access for infection[23] whilst nematodes and even equipment have been shown to harbour potential inoculum that may survive several days.

[16] (Rekah et al 1999 cited in Dita et al 2018)
[17] (Risbeth and Taylor 1957, cited in Pegg et al. 2019).
[18] (Pegg et al. 2019)
[19] (Ashton pers. comm.).
[20] Pegg et al. 2019).
[21] Stover (196 cited in Dita et al.2018)
[22] (Li et al 2011 cited in Dita et al. 2018)
[23] (Pegg et al. 2019)

Asymptomatic Hosts

Common weeds (species of *Paspalum*, *Amaranthus as well as Chloris inflata, Euphorbia heterophylla, Cyanthilium cinerum and Tridax procumbens)* and also sugar cane (*Saccharum* spp*.)* are recorded as hosts of TR4 and STR4.[24] The extent of non-host species is unknown.

R1 does not infect the variety of Cavendish and therefore production of this variety provides no indication as to the presence or absence of this R1 in the soil.

Spreading and Transmission

The fungus is spread via contaminated water, soil and infected plants[25]. Anything which can carry soil is a vector for transmission and infection is spread by footwear, equipment, use of irrigation water from catchments with infected banana plantations or soil as well as using planting stock which may either be infected or carrying infected soil. Leaf trash may also be a carrier[26]. These avenues for spread and transmission are compounded by the characteristics of the disease itself, given Panama disease in all lifecycle stages may be present for months to years before it is evident in plants.

A growing root needs to encounter a spore before infection can occur, thus a low density of spores may not have an encounter with a growing root for several years and can therefore be unknowingly spread without symptoms being present. Water sourced from infected catchments has also a potential contribution to spread. Low lying areas subject to flooding are also at heightened risk if in an area where Panama disease is present.

Although there is no certainty on the depth to which the organism can persist in the soil, research suggests that it is possible for it to occur in soil as far as the rooting zone[27]. Bananas are known to have roots down to at least one to two metres, however 70% of the root mass is in the top 40cm of soil[28] with rooting depth highly dependent upon soil compaction. In compacted soils, 90% of roots can be in the top 60cm[29] whilst in more chalky soils, it has been found that the roots penetrate deeper and the quantity in this depth zone may be between 79-88% [5].

The role of feral animals in the spread is not known, however animals which burrow and rut are likely to be transmitters of the disease. Wild pigs are particularly problematic and where practicable, efforts should be taken to exclude them from the construction site.

Other burrowing and earth scratching animals such as wombats and bush turkeys are also potential vectors. Furthermore, aquatic birds particularly waders are likely to carry water borne spores and thus the potential for them to frequent wastewater settling ponds needs to be considered where required.

Control

Disease transmission can also be facilitated by plant kill if not correctly managed. Application of herbicides such as Glyphosate (Roundup) can lead to the pathogen releasing large numbers of Chlamydospores that can

[24] by Pegg et al. (2019).
[25] (Dita et al.2018).
[26] Commonwealth of Australia (2004)
[27] IRA Phillipine bananas 2004 as reference
[28] (Draye et al.2003, Pattison &Lindsay 2006)
[29] (Araya 2003)

be dispersed by wind[30]. Desiccating contact herbicides such as Diquat and even foliar application of kerosene produced similar results.

Containment

Destruction methods for individual plants have focussed on plant kill and root removal followed by mulching with high concentrations of urea that covered in plastic to allow the formation of Ammonia which acts as a sterilant and has been effective in killing spore down to a depth of 15cm (Biosecurity QLD, 2016.)

In some parts of the world management practices have been trialled, such as building production breaks combined with the use of tolerant/resistant selective breeding, of which both have unfortunately had limited success.

[31]

[30] (Pegg pers comm.).
[31] (Dita et al 2018)

Appendix B - Legislative requirements

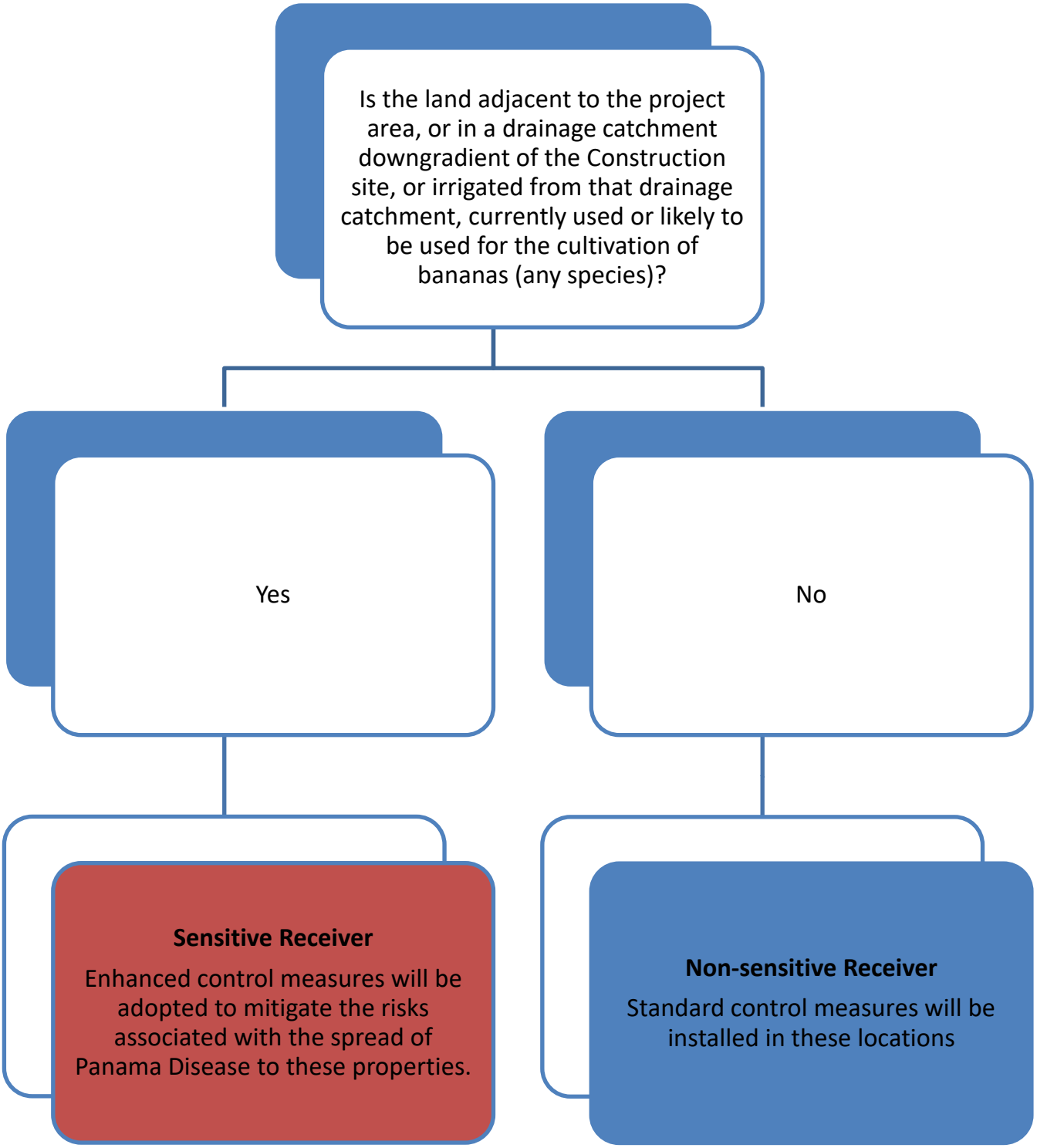
Table 9. Legislative requirements for the management of Panama Disease

Legislation	Description	Legal requirements	Relevant components of the plan
Biosecurity Act 2015. Part 3, Section 22.	Shared responsibility for biosecurity	**Biosecurity duty—dealings with biosecurity matter and carriers** Any person who deals with biosecurity matter or a carrier and who knows, or ought reasonably to know, the biosecurity risk posed or likely to be posed by the biosecurity matter, carrier or dealing has a biosecurity duty to ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised.	Addressed in Chapter 5.2. Construction Risk Management
Biosecurity Act 2015. Part 4 Division 4. S30.	Shared responsibility for biosecurity	**Definition: Biosecurity duty** (1) A person who becomes aware of, or suspects, that a prohibited matter event has occurred, is occurring or is about to occur has a biosecurity duty to immediately notify the prohibited matter event in accordance with the requirements specified in the regulations. (2) A biosecurity duty arises under this Division only if the person— (a) is the owner, occupier or person in charge of, or has the care, custody or control of, premises, a carrier or other thing in relation to which the prohibited matter is present or suspected of being present, or	Refer to Chapter 5.2. Management Refer to Chapter 9.

Legislation	Description	Legal requirements	Relevant components of the plan
		(b) becomes aware of, or suspects, the occurrence of the prohibited matter event as a result of any consultation or other work carried out in relation to premises, a carrier or other thing in the person's professional capacity, or (c) is a person of a class prescribed by the regulations.	
Biosecurity Act 2015. Division 2 Section 16.	Ensure that, so far as is reasonably practicable, the biosecurity risk is prevented, eliminated or minimised	**Definition:** **Reasonably practicable**, in relation to the prevention, elimination or minimisation of a biosecurity risk, means that which is, or was at a particular time, reasonably able to be done, taking into account and weighing up all relevant matters including— (a) the biosecurity risk concerned, and (b) the degree of biosecurity impact that arises, or might arise, from the biosecurity risk, and (c) what the person concerned knows, or ought reasonably to know, about the biosecurity risk and the ways of preventing, eliminating or minimising the risk, and (d) the availability and suitability of ways to prevent, eliminate or minimise the biosecurity risk, and (e) the cost associated with available ways of preventing, eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk.	Refer to Chapter 5.2. Construction Risk Management
NSW Biosecurity Regulation 2017	Regulations on the importation of contaminated material into NSW	**Bananas — Panama disease Tropical Race 4 — carriers** A person must not import into the State (of NSW) any of the following—	Refer to Table 4 and 5 in Chapter 7 and 8 respectively. Also refer to Appendix K

Legislation	Description	Legal requirements	Relevant components of the plan
Division 6, regulation 22.		(a) any banana plant being any plant belonging to the family Musaceae and including any part of any such plant, (b) any equipment that has been used in the production of a banana plant (used banana production equipment), (c) any soil in which a banana plant has been grown (banana soil), (d) any covering that has contained or been in contact with a banana plant, used banana production equipment or banana soil. Fusarium oxysporum f.sp. cubense tropical race 4 (Panama disease tropical race 4) is **prohibited matter** under Part 4 of the Act.	
Rural Fires Act 1997 and Rural Fires Regulations 2013	Regulations on the burning of vegetation	Permitted in rural landscape (RU2) and large lot residential (R5) zones (subject to the rules requirements of the Act and Regulations). All other zonings require approval from Council.	Refer to 6 Phase 1 – Site Preparation
NSW Environmental legislation	Regulations on the disposal of potentially contaminated risk vegetation material, soil and water	EPA have no specific requirements for plant waste that does not pose a threat to Human Health.	Refer to 6 Phase 1 – Site Preparation

Appendix C - Decision tree – Sensitive and Non-sensitive Receiver



Appendix D - Panama disease wash down guide.

Contents

Wash-down designs to combat Panama disease tropical race 4

These wash-down designs have been published by Biosecurity Queensland's Panama TR4 Program to help banana farmers in the region further protect themselves from the threat of Panama disease tropical race 4. Cleaning, washing and decontaminating vehicles, machinery and equipment is important for controlling the spread of the disease.

Wash-down facilities should be tailored to meet operational and maintenance requirements of the property based on farm practises, zoning, level of contamination and hygiene. These designs are specifically aimed at the control of Panama disease tropical race 4 and can be directly applied to farms affected by the disease, as well as to the wider banana industry and agricultural sector in general. Biosecurity Queensland recommends using the design specifications as a guide and to implement some, or all, of the options consistent with your estimated level of risk and your individual situation.

Biosecurity Queensland's Panama TR4 Program engaged FSA Consulting to research current practices and scientific evidence and to consult with industry, government and stakeholders to develop the most effective and practical designs for banana farming operations in a tropical climate.

The designs were based on the following:

- safety – for users of the wash-down facility
- cost effective – for construction, operation and maintenance
- effectiveness – for minimising the risk of disease spread from affected land, or preventing the introduction of the disease to other properties
- ease of implementation – for the facility to be implemented into current farming practices without the need for specialist construction, operation or maintenance services
- risk – for consideration of the different levels of disease contamination risk of a farm with Panama disease tropical race 4 (separation or clean entry/exit point and farming activity zone or dirty exit point)
- practicality – for robust and realistic construction, operation and maintenance
- flexibility – for design options that accommodate different site conditions and operational requirements
- environmental considerations – for climate, high rainfall and evaporation rates and water quality protection
- compliance – for Queensland legislation to minimise the risk of spread of Panama disease tropical race 4 from affected land.

If implemented, these designs should meet the standard required for properties that are confirmed as infested with Panama disease.

While wash-down facilities are optional for all other growers, they play a critical role in protecting properties from the introduction of the disease, and therefore should be considered as part of an integrated on-farm biosecurity action plan.


EXCLUSION ZONE
for the exclusion of all non essential vehicles such as visitor and staff car parking, typically located near the farm entrance.
SEPARATION OR 'CLEAN' ZONE
roadway for essential vehicles that need to come on-farm. This could include fruit pick-up trucks, or fertiliser/fuel delivery or waste pick up.
FARMING ACTIVITY OR 'DIRTY' ZONE
where farm vehicles, machinery and equipment operate. Vehicles, machinery, equipment or tools should not enter or exit this area without appropriate decontamination.
FARM ZONING
By dividing a farm into separate areas or zones, growers can manage the movement of vehicles, machinery and equipment both between zones and within zones. For effective on farm biosecurity, three zones are used. These are the exclusion zone, separation or 'clean' zone and the farming activity or 'dirty' zone. Demarcation of different zones can be made with physical barriers such as fences, signs and road surfaces. An example of farm zoning can be found on page 16.
3

Design options

These two concept designs service the different on-farm biosecurity zones: the separation zone which is a 'clean' area where there is a lower risk of vehicle and equipment contamination by soil and plant matter (e.g. packing sheds and supply receiving areas) and the farming activity zone which is a 'dirty' area where there is a high-risk of vehicle and equipment contamination by soil and plant matter.

OPTION ONE

Farming activity zone or dirty exit point where high-risk vehicles, machinery and equipment exit the farming activity zone of the property to access public roads and/or move to other zones of the farm.

High-risk vehicles that are exiting the farming activity zone, or dirty exit point, must undergo a three step washing/scrubbing, rinsing and disinfection process. A final rinse can be added if there are concerns about long term repeated exposure of disinfectants on vehicles, machinery and equipment.

Automated systems were compared with manual wash-down facilities.

A manual wash-down facility was selected as the preferred option for the farming activity zone or dirty exit point as it allowed for cleaning of both lightly and heavily soiled vehicles, machinery and equipment. Heavily soiled vehicles, machinery and equipment may need additional manual cleaning, which limits the practicality of the automated wash-down facility.

Recommendations for a manual wash-down facility at the farming activity zone or dirty exit point:

- all vehicles, machinery and equipment are required to be washed, rinsed and disinfected with appropriate detergents and disinfectants. Clean water must be used for each cycle (i.e. no recycling).
- a graded, bunded concrete pad that falls to a grated pit with a sediment trap
- a roof and wall to contain overspray and shield against periods of high rainfall
- a high pressure, low volume hose to reduce the volume of water used per vehicle and to mitigate the risk of overspray
- disinfection is performed manually with a small hand operated garden style pressure pack sprayer, garden sprinkler or other manual spray device
- a wastewater disposal system that incorporates a septic type structure, which allows for the captured wastewater to be returned to the land.

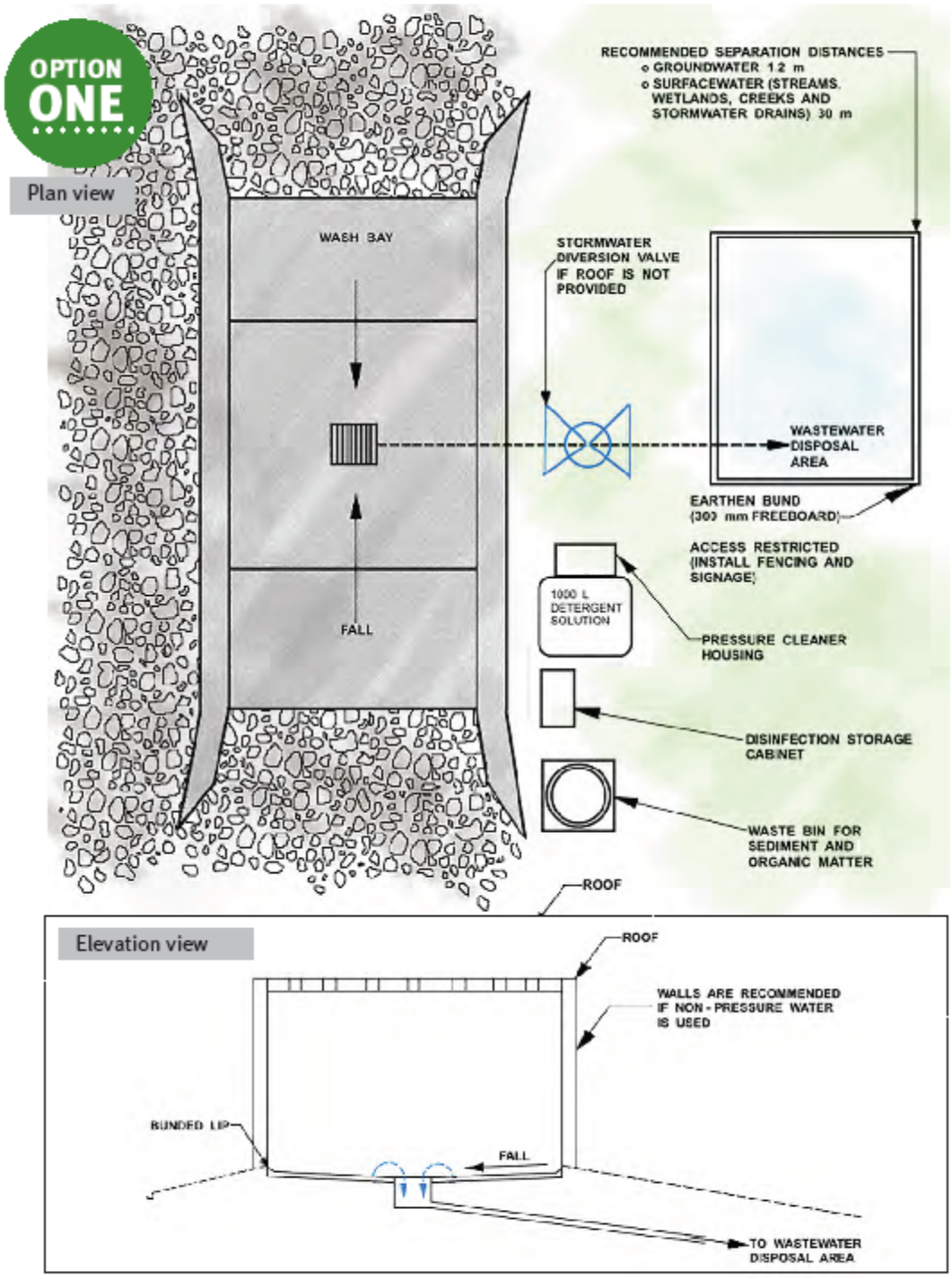
The manual wash-down is designed to be used by vehicles and farm machinery and equipment, e.g. tractors and mobile plant.

OPTION ONE

Design, operation and maintenance considerations and modification options for the farming activity zone or dirty exit point wash-down facility concept design.

DESIGN, OPERATION AND MAINTENANCE CONSIDERATIONS	COMMENTARY	MODIFICATION OPTIONS
Wastewater and rainwater need to be segregated. **A roof is recommended.**	• This to prevent contamination of stormwater and reduce the volume of wastewater requiring management. • Diversion drains are required to direct up gradient stormwater flows around the wash-down bay. • 150 – 200mm high concrete bunds are required on all sides of the slab. Rollover bunds should be used on entry and exit points. • A roof is recommended to divert stormwater and encourage use during inclement weather. • Walls should be included to reduce windblown rainfall and contain overspray (if high-pressure water is used). • The roof over the wash-down bay may be classified as a Class 10a structure and a town planning or building permit may be required.	• *A roof could be omitted but alternate stormwater controls will be required.* • *There are several options to manage incidental rainfall. Examples include manually operated diversion valve (low cost but high-risk of user error), automated diversion valve (may need to modify for remote applications without mains power or water (about $6,000)) or roof (minimal maintenance but high capital outlay). A roof would make the site easier to use by personnel in wet or hot weather.* • *If walls are not provided a horizontal roof overhang of 25% of the roof height on each side will be necessary to reduce windblown rainfall.*
A concrete slab is included in the concept design.	• This is for ease of cleaning after use to prevent cross contamination. • A concrete slab should also require no maintenance.	• *Ballast rock could be used in place of concrete. It may be more difficult to clean after use and require ongoing maintenance. It would also be difficult to manage wastewater drainage.*
Slab size needs to be suitable for the largest equipment and splash containment.	• The slab should extend at least 2m in each direction from the largest vehicle/equipment to enable users to move around freely. • Largest vehicles accessing the facility will be heavy farm machinery and the wash-bay shall be sized to allow for at least half a wheel rotation. • 150 – 200mm high concrete bunds are required on all sides of the slab. Rollover bunds should be used on entry and exit points. • Walls should be installed to manage wastewater splash and overspray if a high- pressure washer is used. • An operational works approval could be required from the local Council if earthworks exceed prescribed thresholds.	• *Walls could be omitted if a low-pressure washer is used.*

DESIGN, OPERATION AND MAINTENANCE CONSIDERATIONS	COMMENTARY	MODIFICATION OPTIONS
This is a manual hand-wash type facility and uses the three-step wash-down procedures identified by Biosecurity Queensland as: **1. Wash with biodegradable detergent and clean water** **2. Rinse with clean water** **3. Sterilise with biodegradable disinfection agent.** **A final rinse can be added if there are concerns about long term repeated exposure of disinfectants on vehicles, machinery and equipment.**	• A high-pressure low-volume water sprayer is recommended for washing and rinsing. • Clean water is bore water, rainwater collected directly into a tank, town water or chlorinated river water. • The detergent solution needs to contain a suitable biodegradable detergent agent mixed with clean water in accordance with the product label. Farmcleanse® is a commonly used detergent. • A disinfectant solution should be prepared with clean water in accordance with the product label. Research has shown that disinfectant products with a minimum of 12% didecyldimethyl-ammonium chloride (DDAC) as the active ingredient to be effective when mixed at 1% as per the product label.	• *Petrol or electric high pressure sprayers are available.*
The slab should grade to a central drainage pit.	• The drain pit should include a heavy-duty steel grate and a sediment trap to contain mud/silt/organic matter.	• *Nil identified*
The wash-down bay must be cleaned of all soil, mud and plant material after each use.	• This is to prevent stormwater contamination and contamination of other equipment in the wash-down bay. • The silt trap should be emptied, washed and sterilised after each use.	• *Nil identified*
Wastewater can be disposed to land in a controlled manner.	• Wastewater could be released to the ground surface in a wastewater disposal area to be contained on-farm. • The area should be level, vegetated and stable. • Wastewater should be distributed uniformly across the disposal area. • Vegetated earthen bund walls are required to contain the solution and divert overland flow around the disposal area. • Bund walls must be of a sufficient height to contain the volume of the spent solution and with a 500mm freeboard. • Fencing or signage of the disposal area to prevent uncontrolled access. • Wastewater should not be directed into growing areas. • [1] Recommended separation distances from waters: 1.2m to groundwater and 30m to streams/creeks, gutters and stormwater drains. • A buffer zone should be provided between the wash-down bay and wastewater disposal areas and adjoining crop land.	• *Remove spent solution with a vac truck for offsite disposal at a licensed waste disposal facility.* • *Release spent solution to a subsurface infiltration system (i.e. septic tank soakage system) as per guidance provided by AS/NZS 1547:2000 On-site domestic wastewater management.*


OPTION ONE
Plan view
WASH BAY
FALL
RECOMMENDED SEPARATION DISTANCES
o GROUNDWATER 1.2 m
o SURFACEWATER (STREAMS, WETLANDS, CREEKS AND STORMWATER DRAINS) 30 m
STORMWATER DIVERSION VALVE IF ROOF IS NOT PROVIDED
WASTEWATER DISPOSAL AREA
EARTHEN BUND (300 mm FREEBOARD)
ACCESS RESTRICTED (INSTALL FENCING AND SIGNAGE)
1000 L DETERGENT SOLUTION
PRESSURE CLEANER HOUSING
DISINFECTION STORAGE CABINET
WASTE BIN FOR SEDIMENT AND ORGANIC MATTER
ROOF
Elevation view
ROOF
WALLS ARE RECOMMENDED IF NON-PRESSURE WATER IS USED
BUNDED LIP
FALL
TO WASTEWATER DISPOSAL AREA

MANUAL WASH-DOWN FACILITY

Cost estimates (current at May 2016)

	Unit	Quantity	Rate	AIQS BCI 2015 BRISBANE RATE	Total
GROUNDWORKS					
Earthworks	m3	29		26.48	$767.92
100mm rock ballast	m2	115		5.82	$669.30
Fence changes (allowance)	Item	1	1000		$1,000.00
Subtotal					**$2,437.22**
WASH BAY (assume 4 x 8 m slab)					
Concrete slab (labour and concrete) - all concrete N32	m3	10		223.46	$2,234.60
Concrete slab reinforcement (labour and F81 reo)	m2	32		30.18	$965.76
Concrete bunds formwork (labour and materials)	m2	5		95.31	$476.55
Subtotal					**$3,676.91**
ROOF STRUCTURE & WALLS					
Estimated dimensions 4 m x 8 x 4 m (based on estimate for larger shed provided by Transportable Shade Sheds on 10/03/2017)	Item	1	18000		$18,000.00
Subtotal					**$18,000.00**
ANCILLARY ITEMS					
1000L detergent solution storage (shuttle pod)	ea	1	250		$250.00
Detergent in solution (allow Farmcleanse®) 1,000L total sol @ 10% (quote from Lowes Petroleum)					
(excludes future refills)	L	100	7.15		$715.00
Disinfectant solution (allow Steri-max®) (excludes future replenishment costs)	L	20	19.24		$384.80
High pressure washer	ea	1	2000		$2,000.00
Rain water storage tank (10,000L)	ea	1	2000		$2,000.00
Clean water storage (1000L shuttle pod)	ea	1	250		$250.00
Disinfectant storage cabinet (allowance)	Item	1	800		$800.00
10L hand pump dispensers	ea	3	100		$300.00
Subtotal					**$6,699.80**
TOTAL					**$30,813.93**

Cost estimate (plus or minus 25%) = $31,000.

Cost estimates are provided for the key elements or components of the wash-down facility and are current as at May 2016. Farm-specific factors must be considered when estimating costs and growers must make an individual assessment of their requirements to determine the cost of implementation.

Estimate does not include mains power supply, water supply, staff time to operate and maintain, freight and transport, wastewater disposal systems and breakdown replacements costs.

This wash-down facility is designed for vehicles that are routinely moved on and off the property. Extremely high-risk, heavily soiled vehicles, machinery and equipment such as oversized earth moving equipment, are not catered for in the dirty exit wash-down facility design as it was decided that this equipment is infrequently used, and therefore, alternate decontamination facilities should be sought.

OPTION TWO

Separation zone or clean entry/exit point for low-risk vehicles that access areas such as packing sheds and supply receiving areas.

Vehicles using the separation zone or clean entry/exit point should arrive at the zone visually free of mud/soil and/or organic material and undergo disinfection only. If a vehicle arrives at this point dirty, they should be refused entry. No wash-down capability is required as it is assumed that vehicles and machinery entering and leaving this zone use only clean asphalt/concrete or gravel sealed roads that prevent vehicles driving on dirt or mud. This zone is for low-risk vehicles that access areas such as packing sheds and supply receiving areas. Vehicles do not enter the farming activity zone.

A separation zone clean entry/exit point or access road on affected land must be:

- built using clean construction machinery
- built and maintained in a manner to ensure the surface remains free from soil, mud or plant material
- either sealed or built from heavy grade gravel
- designed to include sufficient turning and parking areas for incoming vehicles accessing residences and packing sheds and fully fenced and signposted, which includes any demarcation lines within packing sheds where clean zones and dirty zones abut
- accompanied with fencing and signage that restricts movement of persons between the clean access road and surrounding dirty zones
- equipped with suitable wash-down and decontamination facilities at the exit point where machinery, personnel and equipment exit dirty zones.

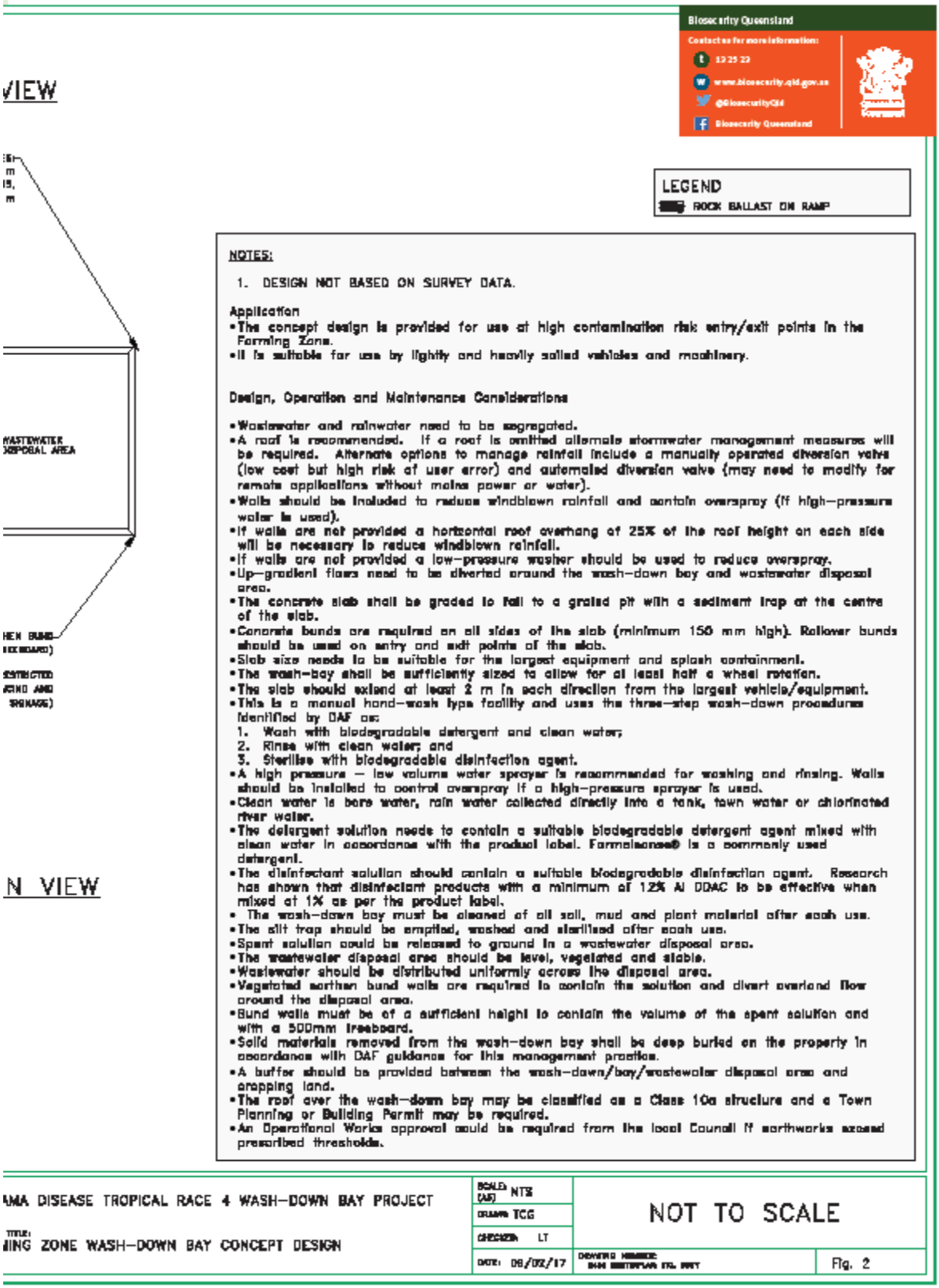
Automated wash-down systems were compared with manual and drive through dip style wash-down facilities.

The dip style wash-down facility, where vehicle tyres are disinfected by driving through a shallow pool that contains a disinfectant solution, was not considered to be a cost-effective design for disinfecting vehicles that use the separation zone or clean entry/exit point due to the significant annual cost of chemicals required to maintain an effective disinfecting solution.

An automated system was identified as better than a manual system due to issues with practicality and compliance. Manual disinfection limits the ability to apply disinfectant to the underbody of vehicles, machinery and equipment, and relies on drivers/operators to stop, exit the cab and apply the appropriate amount of disinfectant.

The recommendation for a clean entry/exit point was for an automated drive through disinfection spray system that includes:

- a wash grid, spray grid or spray shuttle system, for example a Gridrite® system or similar
- a wastewater disposal area to prevent further spread of the disease
- ballast rock with vegetated earthen bund walls
- a roof to minimise evaporation of disinfectant solution and dilution by rainfall
- a rainwater storage tank to collect rainfall runoff from the roof to provide a clean water source.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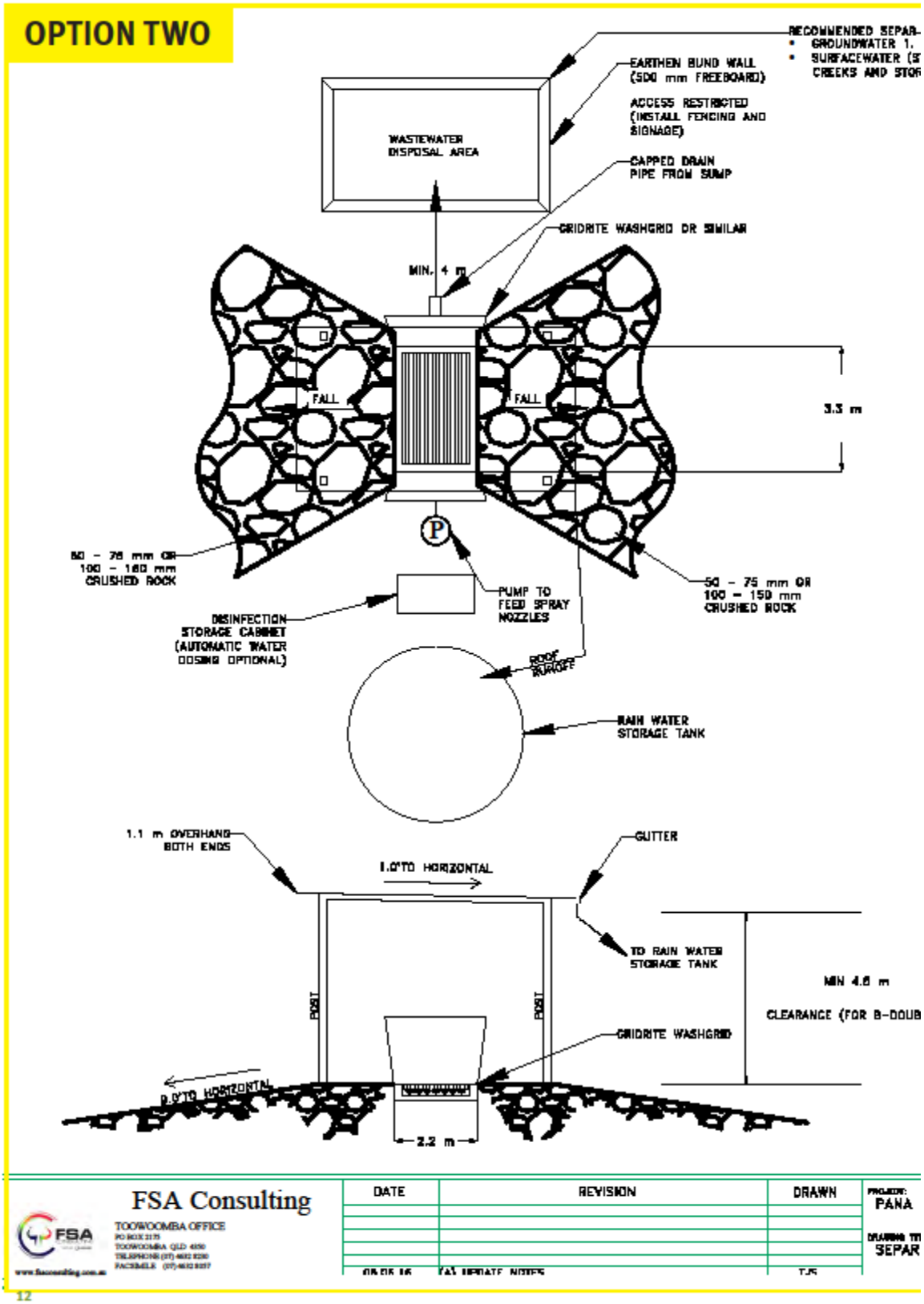
www.biosecurity.qld.gov.au
@BiosecurityQld
Biosecurity Queensland
VIEW
LEGEND
ROCK BALLAST ON RAMP
NOTES:
1. DESIGN NOT BASED ON SURVEY DATA.
Application
•The concept design is provided for use at high contamination risk entry/exit points in the Farming Zone.
•It is suitable for use by lightly and heavily soiled vehicles and machinery.
Design, Operation and Maintenance Considerations
•Wastewater and rainwater need to be segregated.
•A roof is recommended. If a roof is omitted alternate stormwater management measures will be required. Alternate options to manage rainfall include a manually operated diversion valve (low cost but high risk of user error) and automated diversion valve (may need to modify for remote applications without mains power or water).
•Walls should be included to reduce windblown rainfall and contain overspray (if high-pressure water is used).
•If walls are not provided a horizontal roof overhang of 25% of the roof height on each side will be necessary to reduce windblown rainfall.
•If walls are not provided a low-pressure washer should be used to reduce overspray.
•Up-gradient flows need to be diverted around the wash-down bay and wastewater disposal area.
•The concrete slab shall be graded to fall to a grated pit with a sediment trap at the centre of the slab.
•Concrete bunds are required on all sides of the slab (minimum 150 mm high). Rollover bunds should be used on entry and exit points of the slab.
•Slab size needs to be suitable for the largest equipment and splash containment.
•The wash-bay shall be sufficiently sized to allow for at least half a wheel rotation.
•The slab should extend at least 2 m in each direction from the largest vehicle/equipment.
•This is a manual hand-wash type facility and uses the three-step wash-down procedures identified by DAF as:
1. Wash with biodegradable detergent and clean water;
2. Rinse with clean water; and
3. Sterilise with biodegradable disinfection agent.
•A high pressure – low volume water sprayer is recommended for washing and rinsing. Walls should be installed to control overspray if a high-pressure sprayer is used.
•Clean water is bore water, rain water collected directly into a tank, town water or chlorinated river water.
•The detergent solution needs to contain a suitable biodegradable detergent agent mixed with clean water in accordance with the product label. Formalsense® is a commonly used detergent.
•The disinfectant solution should contain a suitable biodegradable disinfection agent. Research has shown that disinfectant products with a minimum of 12% Al DDAC is be effective when mixed at 1% as per the product label.
• The wash-down bay must be cleaned of all soil, mud and plant material after each use.
•The silt trap should be emptied, washed and sterilised after each use.
•Spent solution could be released to ground in a wastewater disposal area.
•The wastewater disposal area should be level, vegetated and stable.
•Wastewater should be distributed uniformly across the disposal area.
•Vegetated earthen bund walls are required to contain the solution and divert overland flow around the disposal area.
•Bund walls must be of a sufficient height to contain the volume of the spent solution and with a 500mm freeboard.
•Solid materials removed from the wash-down bay shall be deep buried on the property in accordance with DAF guidance for this management practice.
•A buffer should be provided between the wash-down/bay/wastewater disposal area and cropping land.
•The roof over the wash-down bay may be classified as a Class 10a structure and a Town Planning or Building Permit may be required.
•An Operational Works approval could be required from the local Council if earthworks exceed prescribed thresholds.
N VIEW
AMA DISEASE TROPICAL RACE 4 WASH-DOWN BAY PROJECT
IING ZONE WASH-DOWN BAY CONCEPT DESIGN
SCALE (A3) NTS
DRAWN TCG
CHECKED LT
DATE: 09/02/17
NOT TO SCALE
Fig. 2


OPTION TWO
RECOMMENDED SEPAR-
• GROUNDWATER 1.
• SURFACEWATER (S
CREEKS AND STOR
EARTHEN BUND WALL
(500 mm FREEBOARD)
ACCESS RESTRICTED
(INSTALL FENCING AND
SIGNAGE)
WASTEWATER
DISPOSAL AREA
CAPPED DRAIN
PIPE FROM SUMP
GRIDRITE WASHGRID OR SIMILAR
MIN. 4 m
FALL
FALL
3.3 m
P
50 - 75 mm OR
100 - 150 mm
CRUSHED ROCK
PUMP TO
FEED SPRAY
NOZZLES
50 - 75 mm OR
100 - 150 mm
CRUSHED ROCK
DISINFECTION
STORAGE CABINET
(AUTOMATIC WATER
DOSING OPTIONAL)
ROOF
RUNOFF
RAIN WATER
STORAGE TANK
1.1 m OVERHANG
BOTH ENDS
1.0°TO HORIZONTAL
GUTTER
TO RAIN WATER
STORAGE TANK
MIN 4.6 m
CLEARANCE (FOR B-DOUB
POST
POST
GRIDRITE WASHGRID
2.2 m
FSA Consulting
TOOWOOMBA OFFICE
DATE
REVISION
DRAWN
PANA
SEPAR

TION DISTANCES:
m
TREAMS, WETLANDS,
WATER DRAINS) 50 m

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LEGEND
ROCK BALLAST ON RAMP

PLAN VIEW

SECTION VIEW

LES)

NOTES:

1. DESIGN NOT BASED ON SURVEY DATA.

Application

- The concept design is provided for use at low contamination risk entry/exit points in the Separation Zone.
- It is only suitable for use by vehicles that are free of soil, mud and organic matter.
- Vehicles entering the farm must be visually inspected prior to accessing the wash-down bay for any obvious signs of soil/mud/plant matter. Should a "dirty" vehicle be encountered, it should not be allowed to access the wash-down facility or the property. It should be directed to either return to its place of origin for cleaning or attend a wash-down facility a Farming Zone of the property at the property owner's discretion.

Design, Operation and Maintenance Considerations

- The length required to allow one full rotation of a truck tyre is 3.3 m. However, this may be modified if the spray jets can treat a tyre without the need for full rotation.
- A minimum width of approximately 3.5 m is recommended for facilities used by trucks.
- Roof is recommended to minimise evaporation of solution and dilution by rainfall.
- A roof height of at least 4.5 m is recommended for facilities used by B-double trucks.
- Horizontal roof overhang of 25% of the roof height on each side to reduce windblown rainfall (unless walls are installed).
- The disinfectant solution should contain a suitable biodegradable disinfection agent. Research has shown that disinfectant products with a minimum of 12% Al DDAC to be effective when mixed at 1% as per the product label.
- The wash-down bay solution should be removed and replaced every 3 weeks (or sooner if required).
- Spent solution could be released to ground in a wastewater disposal area.
- The wastewater disposal area should be level, vegetated and stable.
- Wastewater should be distributed uniformly across the disposal area.
- Vegetated earthen bund walls are required to contain the solution and divert overland flow around the disposal area.
- Bund walls must be of a sufficient height to contain the volume of the spent solution and with a 500mm freeboard.
- Solid materials removed from the wash-down bay shall be deep buried on the property in accordance with DAF guidance for this management practice.
- A buffer should be provided between the wash-down/bay/wastewater disposal area and cropping land.
- The roof over the wash-down bay may be classified as a Class 10a structure and a Town Planning or Building Permit may be required.
- An Operational Works approval could be required from the local Council if earthworks exceed prescribed thresholds.

A DISEASE TROPICAL RACE 4 WASH-DOWN BAY PROJECT

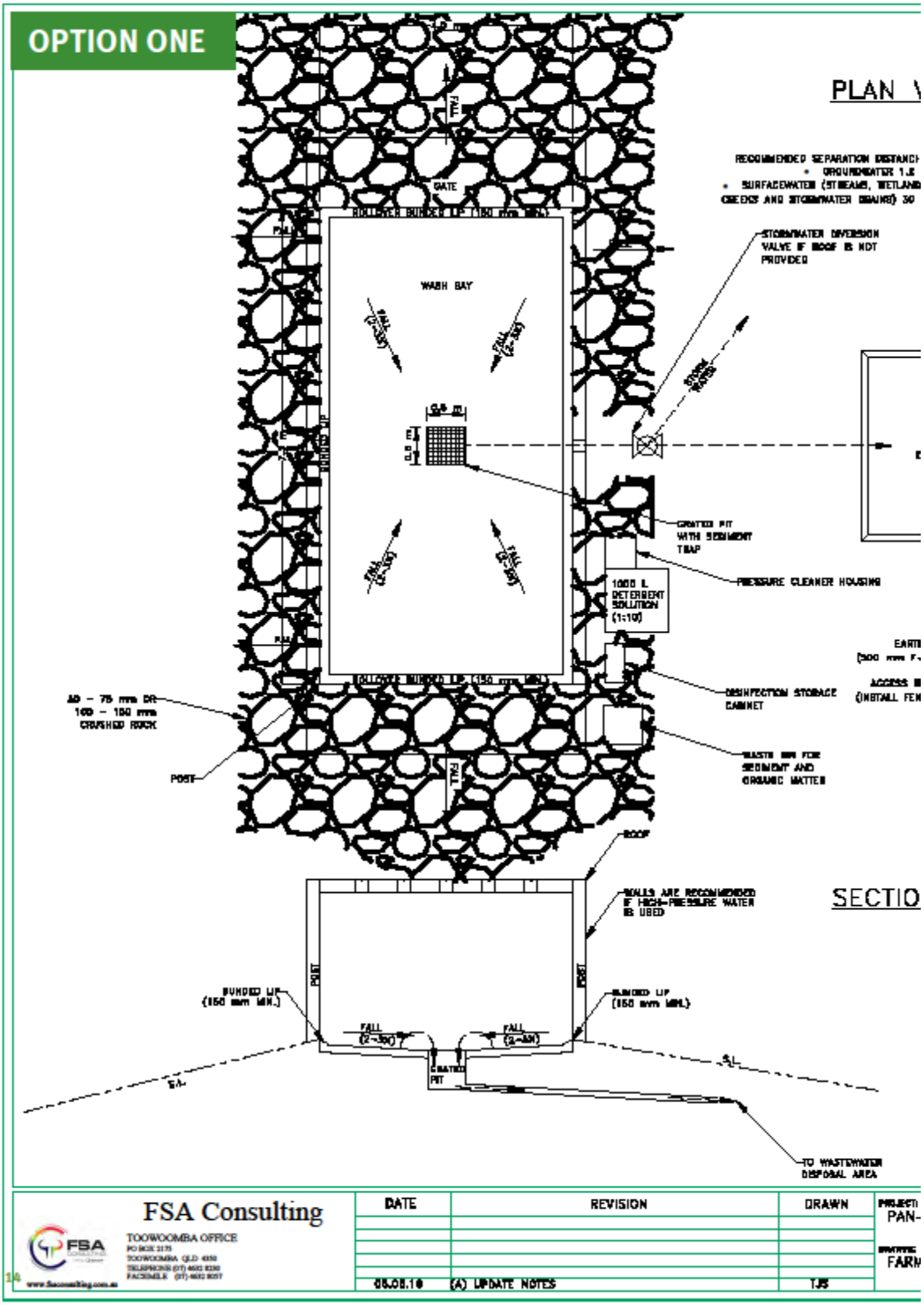
E:
ATION ZONE WASH-DOWN BAY CONCEPT DESIGN

SCALE: (A3) NTS
DRAWN: TCC
CHECKED: LT
DATE: 09/02/17
DRAWING NUMBER: [illegible]

NOT TO SCALE

Fig. 1

13


OPTION ONE
PLAN
WASH BAY
GATE
STORMWATER DIVERSION VALVE IF ROOF IS NOT PROVIDED
GRATED PIT WITH SEDIMENT TRAP
PRESSURE CLEANER HOUSING
1000 L DETERGENT SOLUTION (1:10)
DISINFECTION STORAGE CABINET
WASTE BIN FOR SEDIMENT AND ORGANIC MATTER
POST
ROOF
SEALS ARE RECOMMENDED IF HIGH-PRESSURE WATER IS USED
SECTIO
BUNDED LIP (150 mm MIN.)
FALL
GRATED PIT
TO WASTEWATER DISPOSAL AREA
FSA Consulting
TOOWOOMBA OFFICE
DATE
REVISION
DRAWN
05.08.10
(A) UPDATE NOTES
TJS


“ AN AUTOMATED SYSTEM WAS IDENTIFIED AS BETTER THAN A MANUAL SYSTEM DUE TO ISSUES WITH PRACTICALITY AND COMPLIANCE. MANUAL DISINFECTION LIMITS THE ABILITY TO APPLY DISINFECTANT TO THE UNDERBODY OF VEHICLES, MACHINERY AND EQUIPMENT. ”
For all enquiries

11

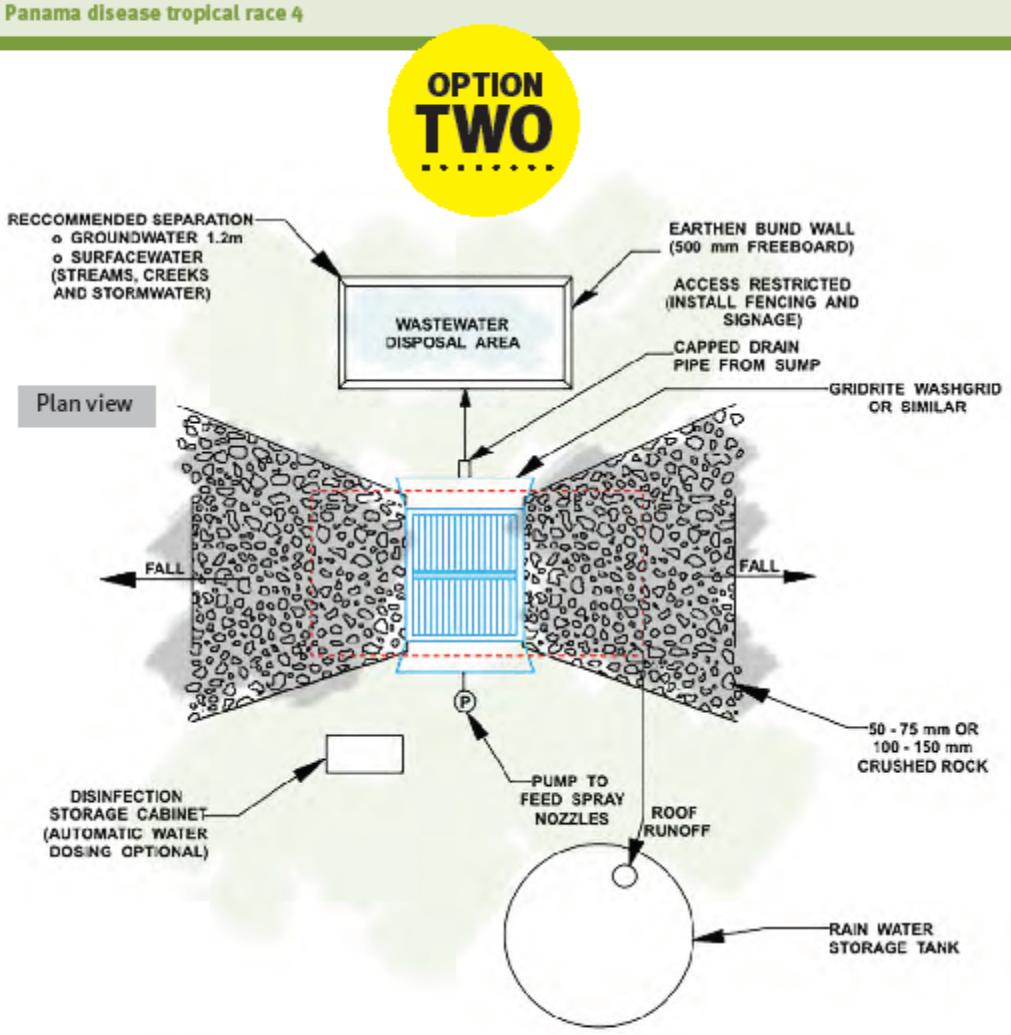
OPTION TWO

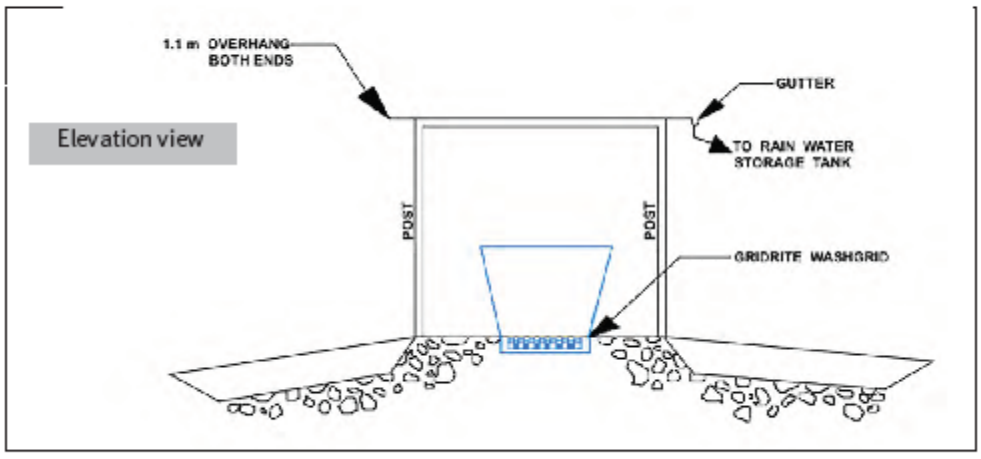
Design, operation and maintenance considerations and modification options for the separation zone or clean entry/exit point wash-down facility concept design

DESIGN, OPERATION AND MAINTENANCE CONSIDERATIONS	COMMENTARY	MODIFICATION OPTIONS
A minimum width of approximately 3.5m is recommended for facilities used by B-double trucks. The length of the wash-down bay or spray jet arrangement needs to be able to accommodate the wheel circumference of the largest vehicle.	• The length required to allow one full rotation of a truck tyre is 3.3m. However, this may be modified if the spray jets can treat a tyre without the need for full rotation. • A B-double is about 2.5m wide. A width of approximately 3.5m (same as highway lane) will provide about 0.5m either side of a B-double. • An operational works approval could be required from the local Council if earthworks exceed prescribed thresholds.	• *Longer/shorter or wider/narrower wash-down bays could be considered based on vehicle types that use a particular entry/exit point.* • *The length needs to be sufficient to allow disinfection of the largest expected tyre.* • *The width needs to be sufficient to allow safe use by the largest expected vehicle.*
A disinfectant solution should contain a suitable biodegradable disinfection agent. A disinfectant solution should be prepared with clean water in accordance with the product label. The wash-down facility solution should be removed and replaced as per the product label.	• Research has shown that disinfectant products with a minimum of 12% DDAC to be effective when mixed at 1% as per the product label. • Disinfectant solutions have been shown to be active, stable and effective when used in accordance with the instructions on the product label. • Clean water is bore water, rain water collected directly into a tank, town water or chlorinated river water.	• *An automatic dosing/injection system (Dosatron ® or similar) for the incoming clean water supply could be considered to reduce the risk of human error of over or under dosing the water.* • *A tank could be connected to the roof to provide a water source.*
The disinfectant solution volume and concentration needs to be monitored and maintained. The wash-down facility solution should be drained and replaced as per the product label.	• This is to ensure the disinfectant is maintained at an effective concentration. • The volume of top ups between change-outs need to be measured and correctly dosed with disinfectant.	• *Automated dip solution level monitoring and dosing could be considered.*
A roof is recommended to minimise evaporation of solution and dilution by rainfall. A roof height of at least 4.5m is recommended for facilities used by B-double trucks.	• Horizontal roof overhang of 25% of the roof height on each side to reduce windblown rainfall. • The roof over the wash-down bay may be classified as a Class 10a structure and a town planning or building permit may be required.	• *Alternate roof materials (e.g. plastic sheeting) could be selected to reduce cost if deemed acceptable by engineer/building certifier.* • *Roof height can be adjusted to suit the largest expected vehicle.* • *Walls could be included to exclude rainfall.*

DESIGN, OPERATION AND MAINTENANCE CONSIDERATIONS	COMMENTARY	MODIFICATION OPTIONS
Entry/exit ramps to the wash-down bay.	• Stable entry and exit to the wash-down bay is required. • The ramps should direct overland stormwater flow away from the wash-down bay.	• *Ramps could be ballast rock or concrete.* • *Ballast rock may be cheaper to use than concrete initially but may require more ongoing maintenance.*
Disposal of spent wash-down bay solution.	• Spent solution could be released to the ground surface in a wastewater disposal area. • Wastewater should be distributed uniformly across the disposal area. • The area should be level, vegetated and stable. • Vegetated earthen bund walls are required to contain the solution and divert overland flow around the disposal area. • Bund walls must be of a sufficient height to contain the volume of the spent solution and with a 500mm freeboard. • Fencing or signage of the disposal area to prevent uncontrolled access. • Wastewater should not be directed into growing areas. • [1] Recommended separation distances from waters: 1.2m to groundwater and 30m to streams/creeks and stormwater drains. • A buffer zone should be provided between the wash-down bay and wastewater disposal areas and adjoining crop land.	• *Remove spent solution with a vac truck for offsite disposal at a licensed waste disposal facility.* • *Release spent solution to a subsurface infiltration system (i.e. septic tank soakage system) as per guidance provided by AS/NZS 1547:2000 On-site domestic wastewater management.*
Silt/sediment/sludge and organic matter shall be removed every 3 weeks from the wash-down or as required.	• Solid materials removed from the wash-down bay must be deep buried on the same property, away from cropping areas.	• *Nil identified*

[1]Separation distance to groundwater was adapted from AS/NZS 1547:2000 On-site domestic wastewatermanagement and Chapter 7 – Infiltration Measures of Water Sensitive Urban Design Guidelines for South East Queensland (Healthy Waterways, 2006). Separation distance to surface waters was adopted from the Queensland Wetland Buffer Guidelins (DERM, 2011) for controlling water pollution. This separation distance was commonly cited in literature regarding wash-down facility design.


OPTION TWO
RECCOMMENDED SEPARATION
o GROUNDWATER 1.2m
o SURFACEWATER (STREAMS, CREEKS AND STORMWATER)
EARTHEN BUND WALL (500 mm FREEBOARD)
ACCESS RESTRICTED (INSTALL FENCING AND SIGNAGE)
WASTEWATER DISPOSAL AREA
CAPPED DRAIN PIPE FROM SUMP
GRIDRITE WASHGRID OR SIMILAR
Plan view
FALL
FALL
50 - 75 mm OR 100 - 150 mm CRUSHED ROCK
DISINFECTION STORAGE CABINET (AUTOMATIC WATER DOSING OPTIONAL)
PUMP TO FEED SPRAY NOZZLES
ROOF RUNOFF
RAIN WATER STORAGE TANK


1.1 m OVERHANG BOTH ENDS
GUTTER
TO RAIN WATER STORAGE TANK
Elevation view
POST
POST
GRIDRITE WASHGRID

14

AUTOMATED DISINFECTION SPRAY FACILITY

Cost estimates (current at May 2016)

	Unit	Quantity	Rate	AIQS BCI 2015 BRISBANE RATE	Total
GROUNDWORKS					
Earthworks	m3	50		26.48	$1,324.00
100mm rock ballast	m2	100		5.82	$582.00
Fence changes (allowance)	Item	1	1000		$1,000.00
Subtotal					**$2,906.00**
SPRAY BOOTH					
Gridrite® Wash Bay (single phase) estimate provided by Gridrite® on 06/05/2016)	Item	1	15000		$15,000.00
Subtotal					**$15,000.00**
ROOF STRUCTURE & WALLS					
Estimated dimensions 6m x 6 x 5m (based on estimate for larger shed provided by Transportable Shade Sheds on 10/03/2017)	Item	1	10000		$10,000.00
Subtotal					**$10,000.00**
ANCILLARY ITEMS					
Concrete slabs (labour and concrete) - all concrete N32	m3	8		223.46	$1,787.68
Concrete slabs reinforcement (labour and F81 reo)	m2	50		30.18	$1,509.00
Disinfectant storage cabinet (allowance)	Item	1	800		$800.00
Rain water storage tank and pump (10,000L)	ea	1	2500		$2,500.00
Generator	Item	1	1500		$1,500.00
Rainwater recycle pipework (80mm pvc)	m	15		29.76	$446.40
Disinfectant in solution (allow Steri-max®) 2,000L total sol @ 1% (Estimate from CRT Gordonvale $192.35 for 10L) (17 changes per annum)	L	350	19.24		$6,734.00
Subtotal					**$15,227.08**
TOTAL					**$43,183.08**

Construction cost estimate (plus or minus 25%) = $43,000.

Cost estimates are provided for the key elements or components of the wash-down facility and are current as at May 2016. Farm-specific factors must be considered when estimating costs and growers must make an individual assessment of their requirements to determine the cost of implementation.

Estimates do not include mains power supply, water supply, staff time to operate and maintain, freight and transport, wastewater disposal systems and breakdown replacements costs.

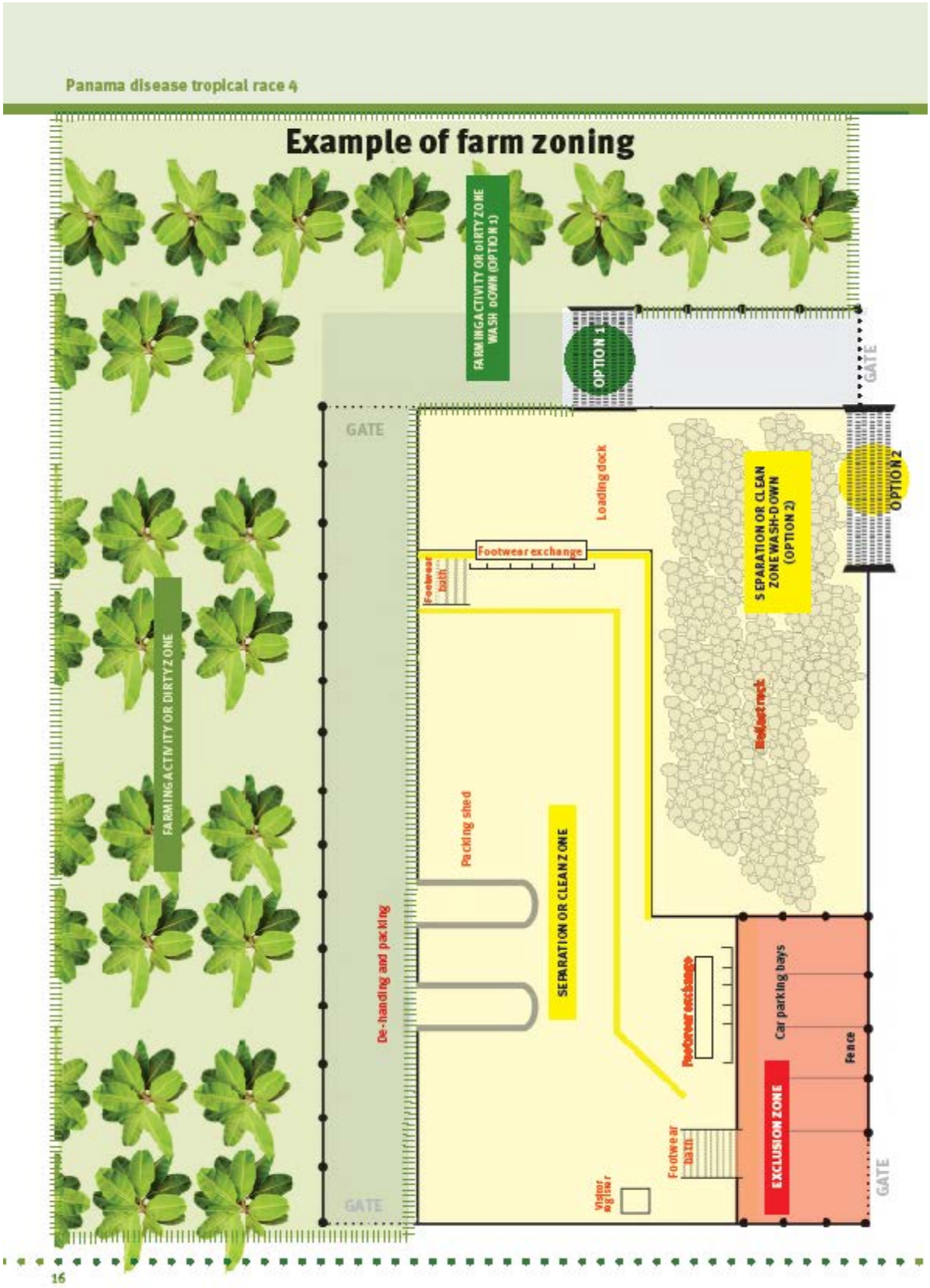
This wash-down facility could be expanded to include a full wash-down and disinfectant process to eliminate any uncertainty about the cleanliness of the vehicle. The expanded system would need a wash, rinse and disinfect function, which would incur a substantially greater cost, build and operation and maintenance requirements.

The automated drive through disinfection spray system was found to be a suitable option for disinfecting vehicles that utilise the separation zone clean entry/exit point over a dip style wash-down facility as it had:

- lower water demand and wastewater output
- lower capital and operating cost (based on lower disinfectant consumption)
- smaller footprint and wastewater system required
- easy application of disinfectant solution to the underbody of high clearance vehicles.

Farmers in areas of lower rainfall may prefer to use a drive-through dip facility. For a dip style facility to be effective:

- all vehicles must be free of soil and plant material
- all vehicles are disinfected upon entry and exit
- the dip is used by vehicles up to the size of a B-double
- the wash-down facility is covered to limit rainfall ingress and evaporation.


Panama disease tropical race 4
Example of farm zoning
FARMING ACTIVITY OR DIRTY ZONE WASH DOWN (OPTION 1)
OPTION 1
GATE
GATE
Loading dock
SEPARATION OR CLEAN ZONE WASH-DOWN (OPTION 2)
OPTION 2
Footwear exchange
Footwear bath
FARMING ACTIVITY OR DIRTY ZONE
Packing shed
SEPARATION OR CLEAN ZONE
De-handing and packing
Car parking bays
Fence
EXCLUSION ZONE
Footwear bath
Visitor sign in
GATE
GATE
16

Additional points

- Both design specifications include a variety of options to allow growers to tailor the facility to their specific needs and budget.
- Products recommended for cleaning and disinfection are based on current research and on-farm practices already in place. It is advised that quaternary ammonium (QA) disinfectant products containing at least 12% didecyldimethyl-ammonium chloride (DDAC) active ingredient mixed at a minimum ratio of 1:100 with clean water should be used to disinfect vehicles, machinery and equipment, as per label directions for use.
- A detergent-based cleaner used as per label instructions will assist in the removal of dirt, followed by a rinse with clean water and then application of a quaternary ammonium disinfectant. If you're concerned about long term repeated exposure of QA compounds on vehicles, machinery and equipment, consider an additional, final rinse step.
- Dip style wash-down solution (QA) should be removed and replaced every three weeks or sooner if required, or as advised on the label instructions.
- For current research information about disinfectants, read the Panama disease tropical race 4 Research Update June 2016 'Disinfectant trials' at www.biosecurity.qld.gov.au.
- Wastewater and stormwater management in wash-down facility areas is critical to managing spread of the disease. Wastewater must be controlled and contained on-farm and away from waterways and growing areas.
- Banana growers are obligated under the *Environmental Protection Act 1994* to take all reasonable and practicable measures to prevent the release of wastewater, detergents and disinfectants and sediment from wash-down facilities to surface water, wetlands, groundwater and stormwater.
- Growers may need to contact their local Council to determine if town planning or building permits are required for construction of wash-down facilities. All wash-down facilities and associated structures must be constructed within property boundaries.
- The recommendations and concept designs must be referred to in conjunction with
  - the *Biosecurity Act 2014* and the *Biosecurity Regulation 2016*
  - the *Environmental Protection Act 1994*.

17

Notes:

Notes:

Notes:

The Panama disease tropical race 4 wash-down facility concept designs were developed by FSA Consulting. Growers that require assistance with tailoring wash-down facilities for their particular requirements may contact FSA Consulting direct. Biosecurity Queensland is not responsible for any arrangements between growers and FSA Consulting.

Panama TR4 Program Version 1, April 2017

Wash Down Designs Panama Disease Tropical Race 4, Qld Department of Primary Industry, also available https://www.publications.qld.gov.au/dataset/Panama-disease-tropical-race-4-grower-kit/resource/57f29400-c4cc-4732-9c73-da6936df8ac3

Appendix E - Example site specific Panama disease wash down procedure

These example procedures follow those recommended by QLD Government for Panama R4 and this document should be consulted for further reference.

Site Entry Decontamination

Only town water, bore water or potable chlorinated water from an approved source to be used for all cleaning activity.

Personnel

Anyone who refuses to abide with instructions is refused entry.

Step 1. Cleaning

- Designated cleaning areas can be temporary as required but must meet the following minimum standards:
- Mud to be removed in designated cleaning areas where the residue cannot flow off-site. Remove all visible soil, plant material and debris from boots, hats, clothing and any other items by scrubbing with water and detergent and then rinse. A screwdriver or brush may be required to completely remove mud from within the tread of the soles of boots.
- Water used for vehicle wash-downs must not come from run-off in sedimentation basins, streams or farm fed dams.
- The washdown area for this type of washing is to be bunded by a sandbag wall 400mm high or similar and constructed so as to prevent to prevent flow away from the washdown area.
- Wastewater from this washing must be collected and not be permitted flow elsewhere.
- This waste can be used for deep burial within the Zone it has been created or, if approved by TfNSW, removed off-site in sealed containers for burial elsewhere at an appropriate waste disposal facility and disinfected with a suitable disinfectant product such as those containing didecyl dimethyl ammonium chloride as an active ingredient.

Step 2. Rinsing

- Following the cleansing process, rinse all relevant surfaces with clean water

Step 3. Disinfecting

Disinfect by dipping and soaking boots or equipment in a suitable disinfectant such as those containing dodecyl dimethyl ammonium chloride as an active ingredient. You must use each product in accordance with its label or Australian Pesticides and Veterinary Medicines Authority (APVMA) Permit instructions. Typically, this is a plastic tray filled with disinfectant and a sponge upon which you stand. **Notes**

- Disinfectants used should have a short lifespan with their effectiveness reducing over time. Disinfectant Activity of quaternary ammonium compounds can be monitored with test strips. Foot baths should be renewed at least daily
- Ideally site workers will have footwear that stays on site.
- The same procedure is to be followed for personnel leaving the site
- Workers handling plant material need to disinfect hands with antibacterial hand gel after contact with banana plants susceptible to R1 Panama Disease.

Machinery and vehicles

All machinery entering the Construction Site will be required to be cleaned by removal of all soil followed by disinfection and a further rinse to minimise damage to metal surfaces from continued disinfection application. The cleaning procedure from the Decontamination guide is reproduced below. Two documents inform this process the NSW Guide to Decontamination of vehicles and Equipment and the Qld Guide referenced above and summarised below. Where differences exist between the two documents the more stringent provision is to apply

Step 1 - Cleaning

- Ensure the vehicle or machinery is parked in a safe position. This may involve applying the parking brake, lowering ploughs, chocking wheels, etc.
- Identify areas that may require cleaning with compressed air rather than water and clean these first e.g. radiators.
- Use clean water with a detergent-based cleanser to clean all surfaces, so that they are visibly free from soil and plant material. Your agricultural chemical retailer can provide advice on which detergent-based cleansers are appropriate to use.
- Clean machinery from the top down and dismantle to gain access to internal spaces. Brooms, brushes, scrapers can be used to assist in the removal of mud and plant material.
- Determine the extent of mud, soil and plant material build up and identify areas that require particular attention e.g. behind guards and protective plates, radiators and spare tyres.
- Clean under the guards and underneath the machine or vehicle and the cabin, including the interior, upper body and implements as well as toolboxes and storage compartments.

Step 2 - Rinsing

- Following the cleansing process, rinse all relevant surfaces with clean water.

Step 3 - Disinfecting

- After rinsing, use a suitable disinfectant product such as those containing didecyl dimethyl ammonium chloride as an active ingredient on all relevant surfaces. You must use each product in accordance with its label or Australian Pesticides and Veterinary Medicines Authority (APVMA) Permit instructions. Your agricultural chemical retailer can provide advice on which broad spectrum disinfectants are appropriate to use.
- An additional rinse step may be considered following disinfection.

Step 4 - Checking and record keeping

- Carry out a final check to ensure all areas have been cleaned effectively.
- Replace any guards or belly plates that were removed for cleaning.
- Move the clean vehicle or machine, avoiding recontamination and if necessary, wash, rinse and decontaminate all surfaces harbouring any remaining mud, soil or plant material.
- Record details of each wash-down and decontamination as appropriate, e.g. vehicle or machinery logbooks.

Notes

- Dedicated wash down facilities are to be constructed at designated and signposted entry/exit points.

- All equipment entering and exiting the construction site is to be cleaned in this manner and a register maintained to record activity. It is recommended to use the check sheet on p11 from the Decontamination guide referenced as a formal part of record keeping.
- Potential Design of a washdown facility designs and procedures are in Appendix D
- Disposal of contained wastewater will be undertaken in accordance with the CHBP approved dewatering procedure to ensure appropriate disposal i.e. avoiding potential impacts to Sensitive Receivers.
- For equipment that cannot be cleaned in this manner such as chainsaws and electrical apparatus they will need to be surface cleaned to remove all traces of plant/soil residue using a suitable solvent and then surface sterilised using a 70% alcohol solution, a suitable disinfectant product such as those containing didecyl dimethyl ammonium chloride as an active ingredient or quaternary ammonium compounds.
- Cleaning materials such as rags are to be collected and disposed of by burial or burning.

Appendix F – Erosion and Sediment Control and Water Management summary

Coffs harbour Bypass construction activities will be undertaken in accordance with the best practice erosion and sediment control principles to mitigate potential for spread of Panama Disease as detailed below:

- All disturbed catchment areas within the project boundary require an Erosion and Sediment Control Plan to be implemented to ensure that controls are in place to manage potential erosion, surface runoff and off site water flows to the best industry practice and consistent with the Blue Book (Managing Urban Stormwater: Soils and Construction, Volume 1 and Volume 2 (Landcom, 2004).
- A suitably qualified and experienced soil conservationist will be engaged during construction of the project to advise and review the implementation and management of erosion and sediment controls.
- All erosion and sediment control plans are to be reviewed and endorsed by the qualified Soil Conservationist. The plan will identify detailed measures and controls to be applied to minimise erosion and sediment control risks including:
  - Runoff, diversion and drainage points
  - Sediment basins and sumps
  - Scour protection
  - Stabilising disturbed areas as soon as practicable, check dams, fencing and swales
  - Dust suppression strategies and procedures
  - The need for site-specific plans to address staged implementation arrangements.
  - The plan will also include arrangements for managing wet weather events, including monitoring of potential high-risk events (such as storms) and specific controls and follow-up measures to be applied in the event of wet weather.

The following targets have been established for the management of soil and water impacts during the project:

- Meet environmental protection licence water quality discharge parameters for all planned basin discharges (i.e. those within design capacity)
- Manage downstream water quality impacts attributable to the project (i.e. maintain water waterway health by avoiding the introduction of nutrients, sediment and chemicals outside of that permitted by the environmental protection licence and/or ANZECC guidelines)
- Ensure training on best practice soil and water management is provided to all construction personnel through site inductions

Appendix G – Stockpile Protocol

The following primary controls will be implemented before any stockpile is established to manage it use and operation during construction:

- Containment controls will be implemented to ensure runoff, leachate and sediment does not enter any watercourses or mobilise from the project site.
- Stockpiles will be managed to minimise soil disturbance and erosion.
- All stockpiles in place for longer than one month will be stabilised with cover crop or soil binder.
- Controls will be implemented to ensure that construction traffic working on stockpile sites does not track Sediment onto the wider road work or cause the spread of pathogens, diseases, or (noxious weed) seed stock.
- Topsoil will be stockpiled separately and inspected for noxious weed seedlings at six monthly intervals, and controlled with herbicide as required
- Stockpiles located on a floodplain be finished and contoured so as to minimise loss of material in flood or rainfall events
- The height of all stockpiles will be limited to prevent dust propagation and visual amenity impacts while all vehicle carrying stockpiled materials will be covered to prevent the spread of dust
- All temporary stockpiles will be removed to ensure that no material is left onsite. The primary objective will be to reuse and recycle stockpiled material. Where this is not practicable the stockpiled material will be (waste) classified, managed and treated accordingly.

Appendix H – NSW Panama disease known hotspots

Panama Disease has been identified within the following council shires:

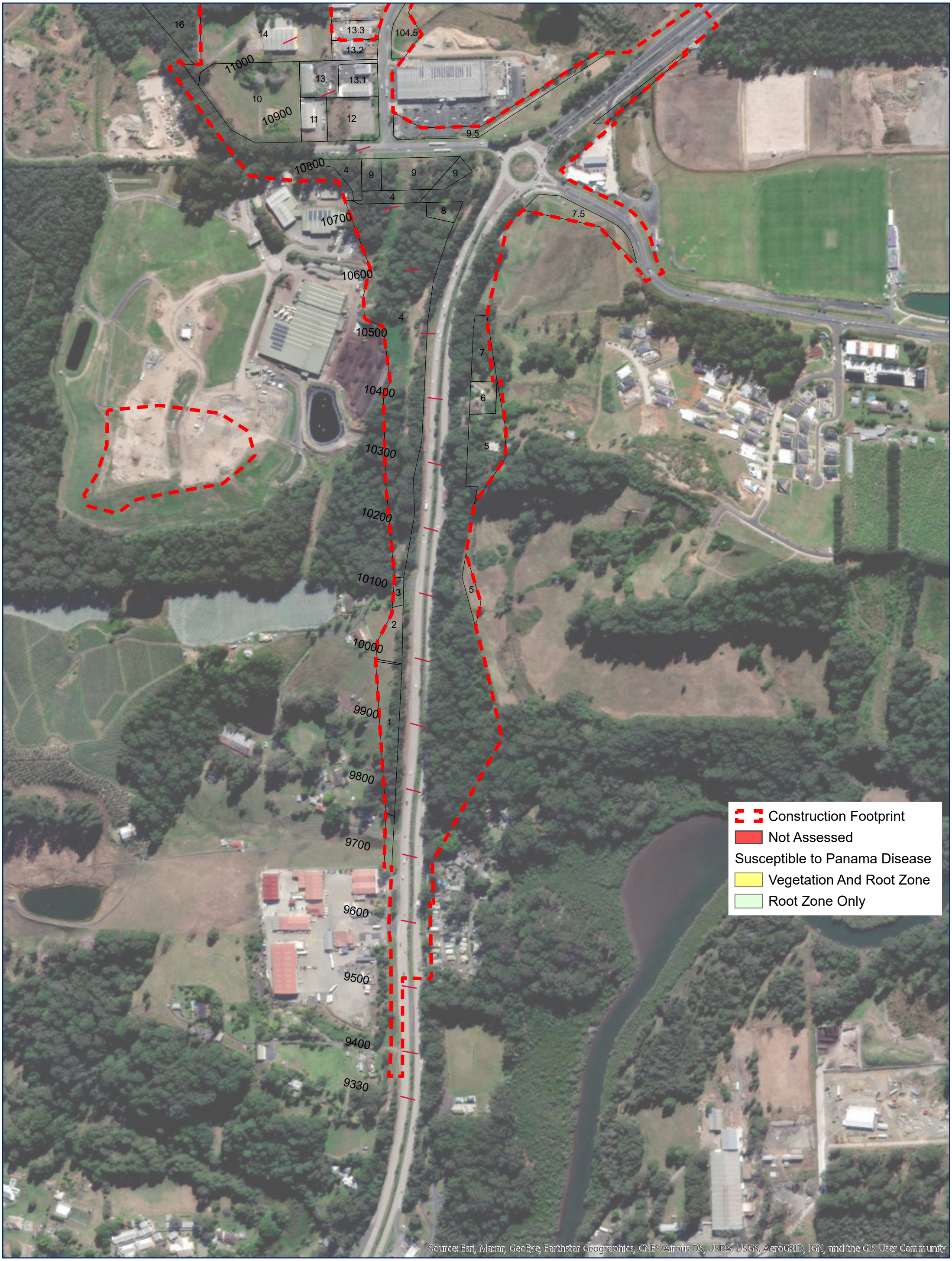
- Ballina shire council
- Byron shire council
- Coffs Harbour city council
- Lismore city council
- Tweed shire council
- Kempsey shire council

Appendix I – Panama Disease control signage

https://www.publications.qld.gov.au/dataset/panama-disease-tropical-race-4-grower-kit/resource/9e5728a9-918d-4bb2-9447-01771c4ac5c1

Appendix J – Former and current banana plantations throughout the Coffs Harbour Bypass alignment including variety mapping undertaken to date


Ulidarra National Park
Orara East State Forest
Shephards Lane tunnel
Gatelys Road tunnel
Korora Hill interchange
Korora Nature Reserve
Coffs Harbour Montessori Preschool
Korora Public School
Korora
Coffs Coast Regional Park
Gatelys Road
Baringa Private Hospital
Red Hill
Orara High School
Coramba Road interchange
Coramba Road
Existing Pacific Highway
Roberts Hill tunnel
Boambee State Forest
Coffs Harbour CBD
Muttonbird Island Nature Reserve
Coffs Harbour
Thompsons Hill
Bishop Druitt College
Englands Road
Coffs Harbour Health Campus
Englands Road interchange
Coffs Harbour Airport
Boambee Equestrian Centre
North Coast Railway
Boambee Creek
Legend
Construction footprint
Former and existing banana plantations
Alignment
North Coast Railway
Watercourse
Coffs Harbour Bypass
Location of potential agricultural sources of contamination
Figure 17-1
Scale @A4: 1:50,000
GDA 1994 MGA Zone 56



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COFFS HARBOUR BYPASS
Current Banana Plantation Locations (May 2021)
Page 1

Map Published: 13/05/2021
Author: LPIETRINI

NSW GOVERNMENT

75 37.5 0 75 150
Metres

Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Sheet 1 of 11

1:5,000
at A3

COFFS HARBOUR BYPASS
Current Banana Plantation Locations (May 2021)
Page 2

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Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Sheet 2 of 11

75 37.5 0 75 150
Metres

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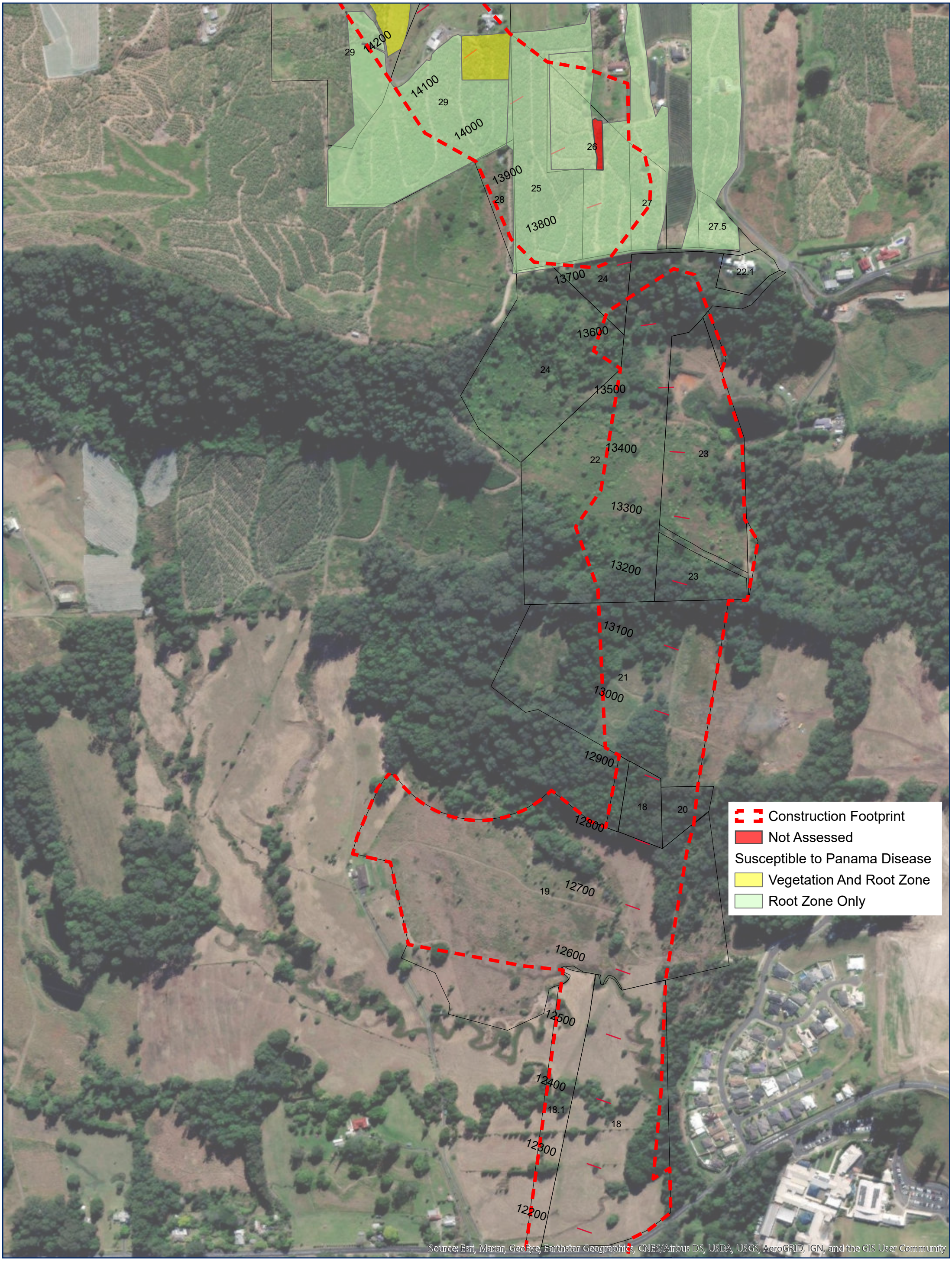
at A3

Construction Footprint
Not Assessed
Susceptible to Panama Disease
Vegetation And Root Zone
Root Zone Only

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



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Horizontal Datum: GDA 1994
Sheet 3 of 11

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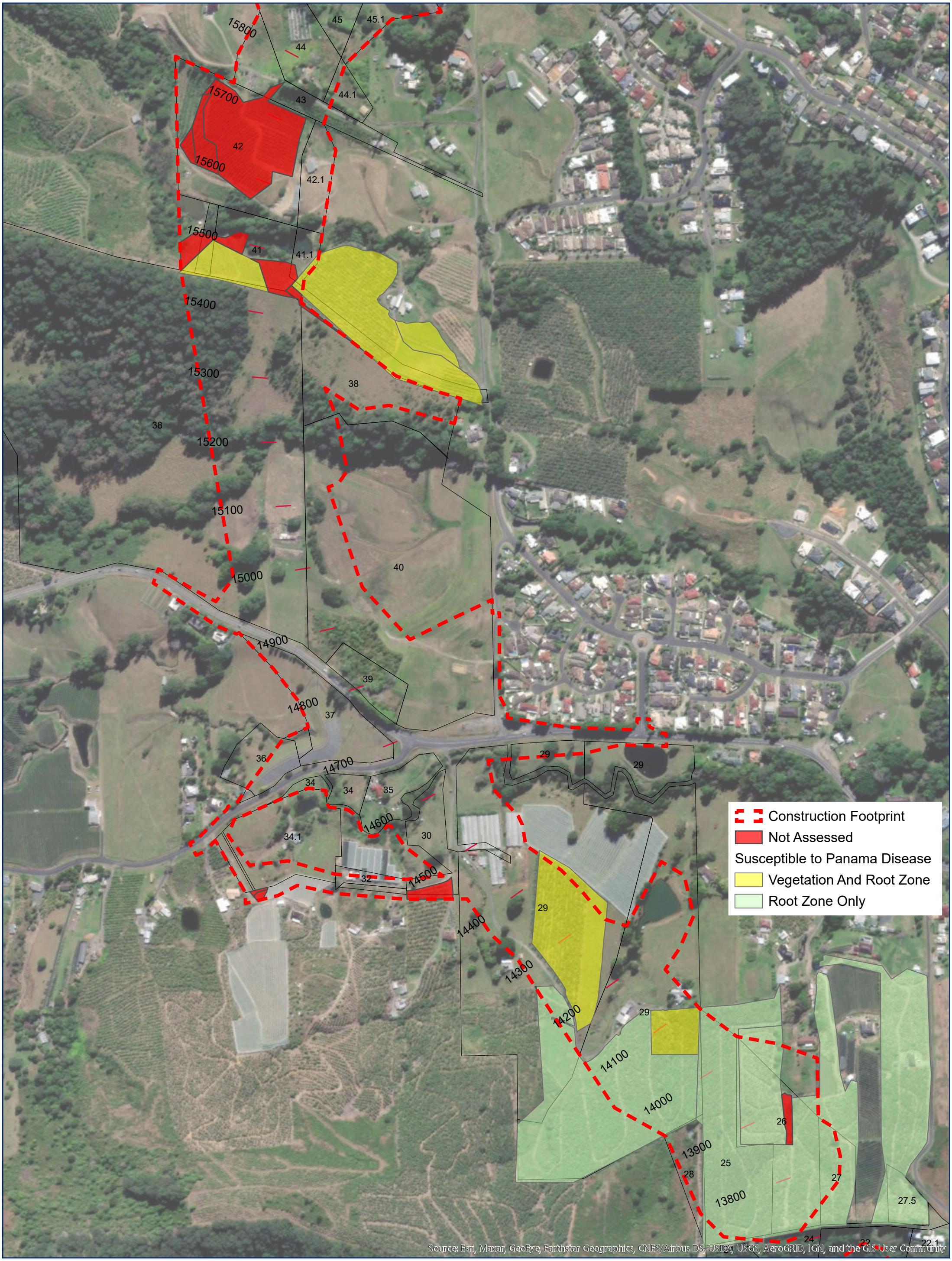

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Horizontal Datum: GDA 1994
Sheet 4 of 11

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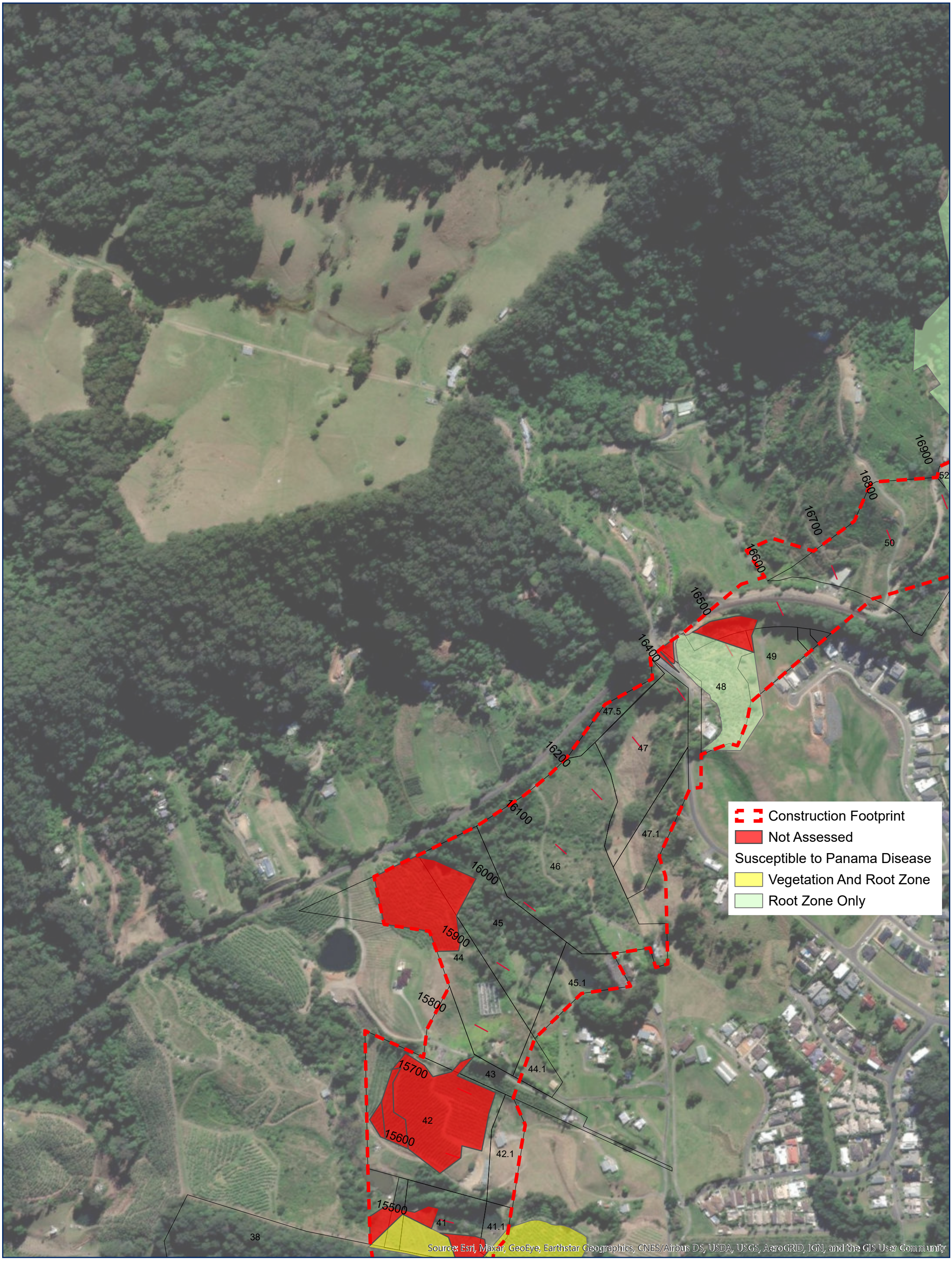

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Metres

Coordinate System: GDA 1994 MGA Zone 56
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Horizontal Datum: GDA 1994

Sheet 5 of 11

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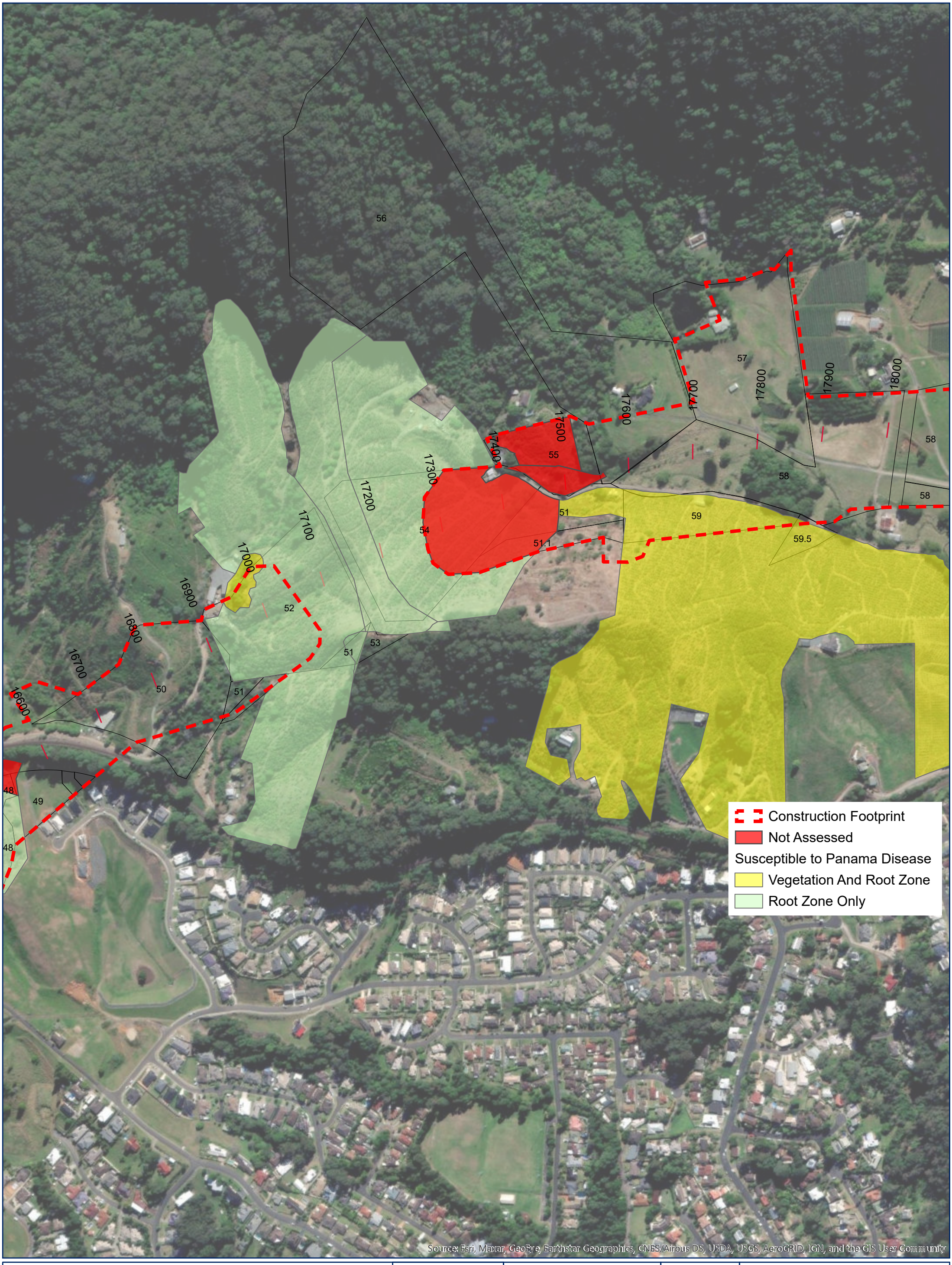

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Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Sheet 6 of 11

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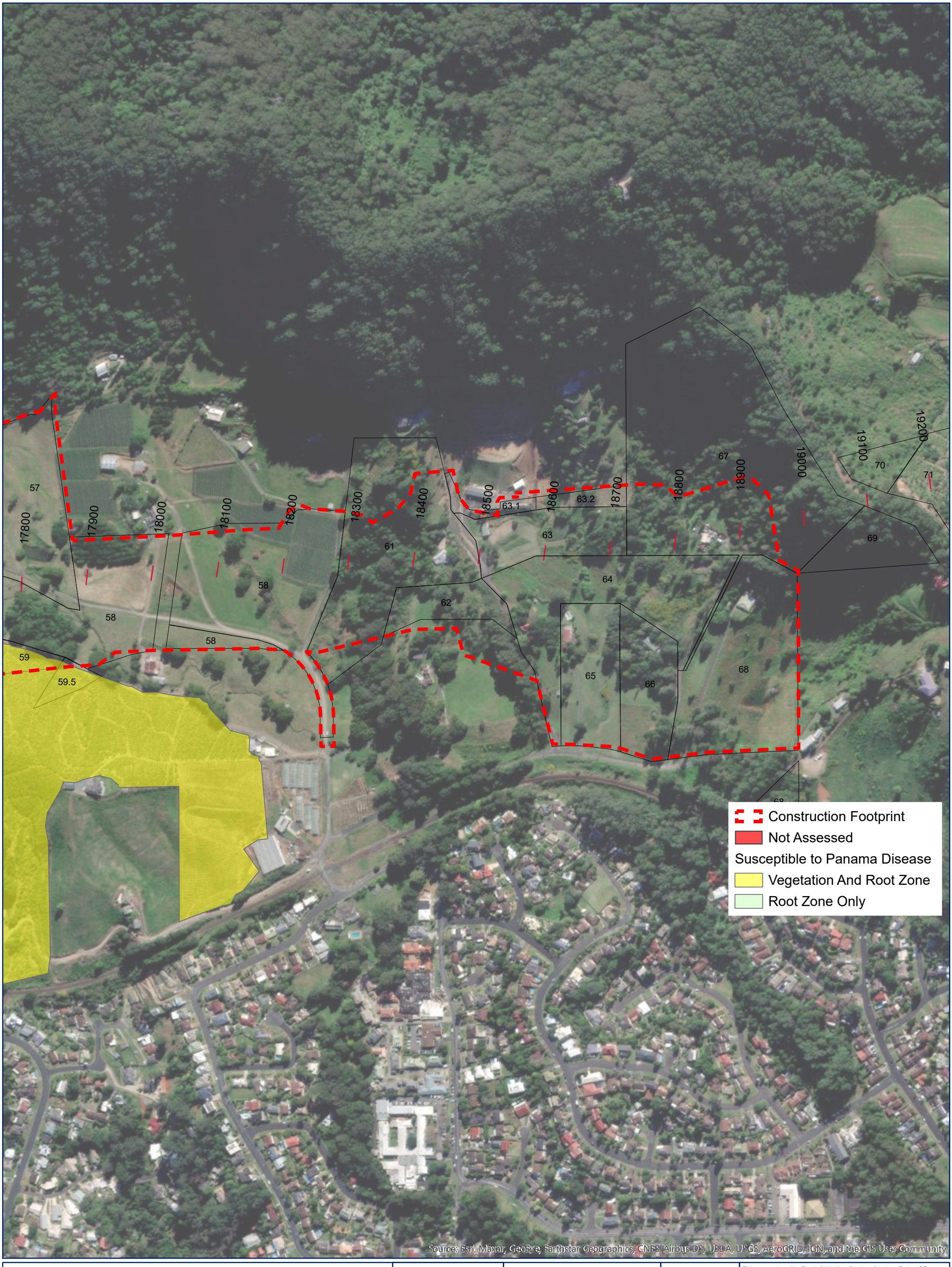

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Metres

Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Sheet 7 of 11

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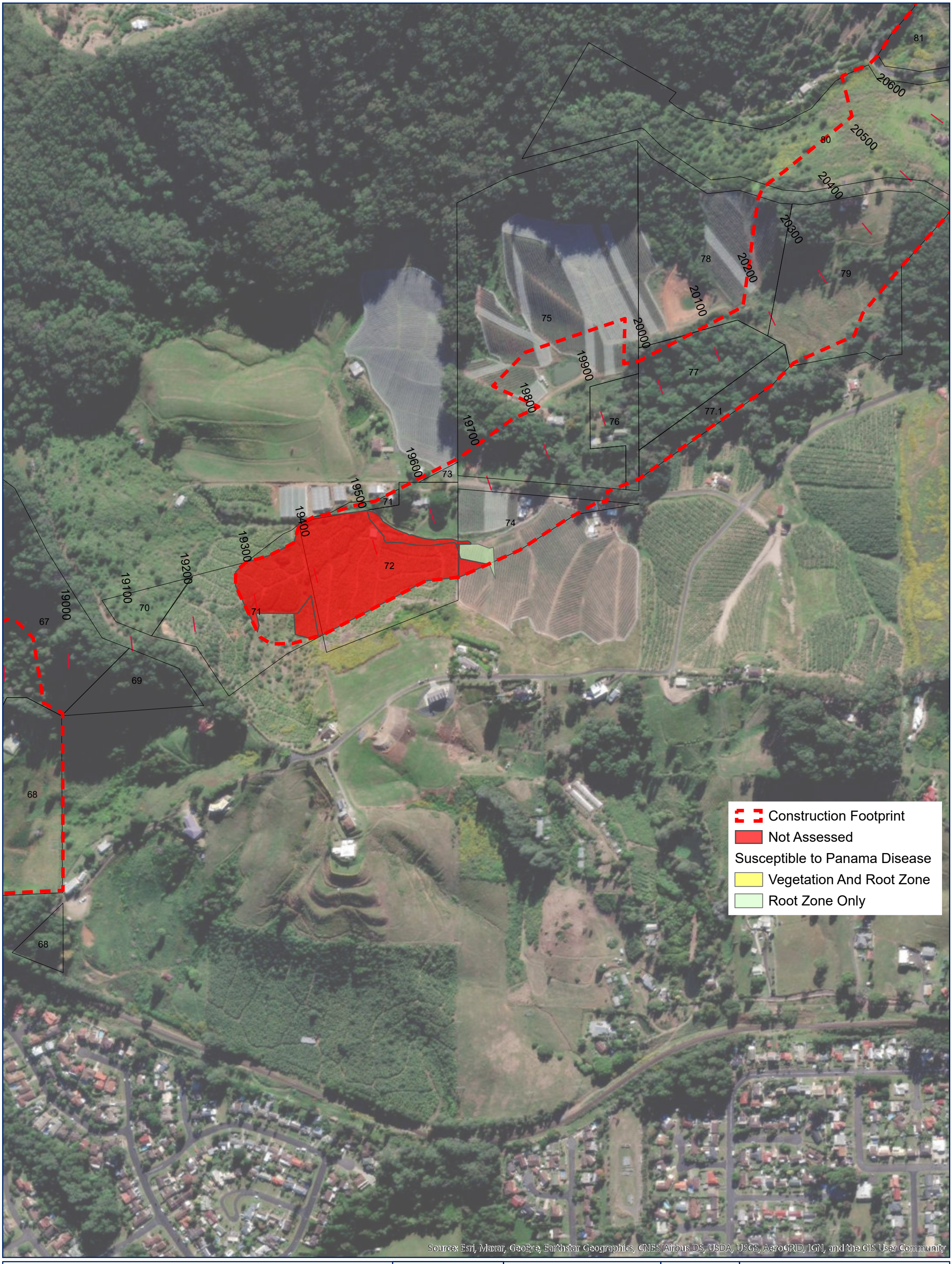

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Coordinate System: GDA 1994 MGA Zone 56
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Horizontal Datum: GDA 1994

Sheet 8 of 11

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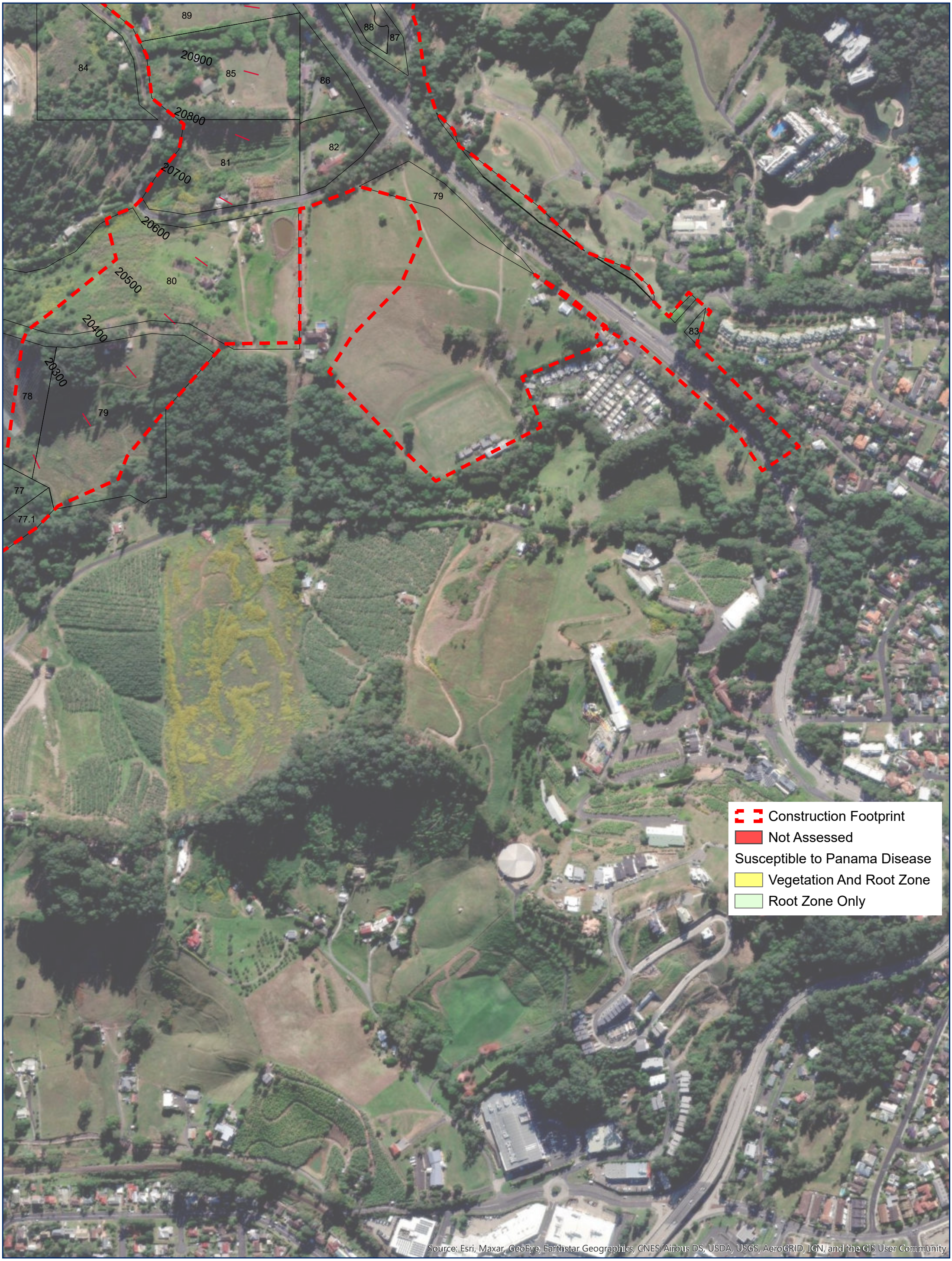

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Metres

Coordinate System: GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Sheet 9 of 11

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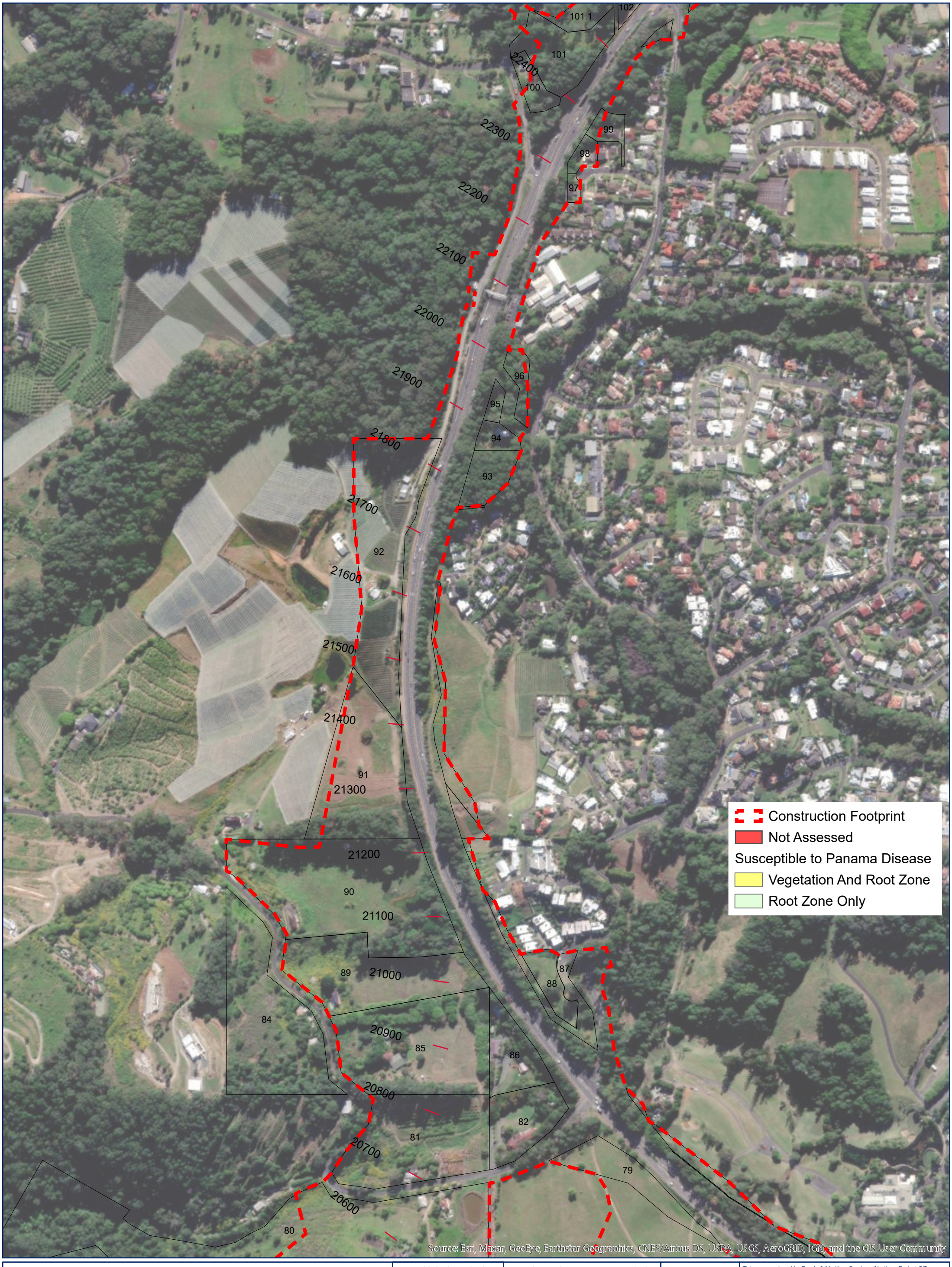

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Horizontal Datum: GDA 1994

Sheet 10 of 11

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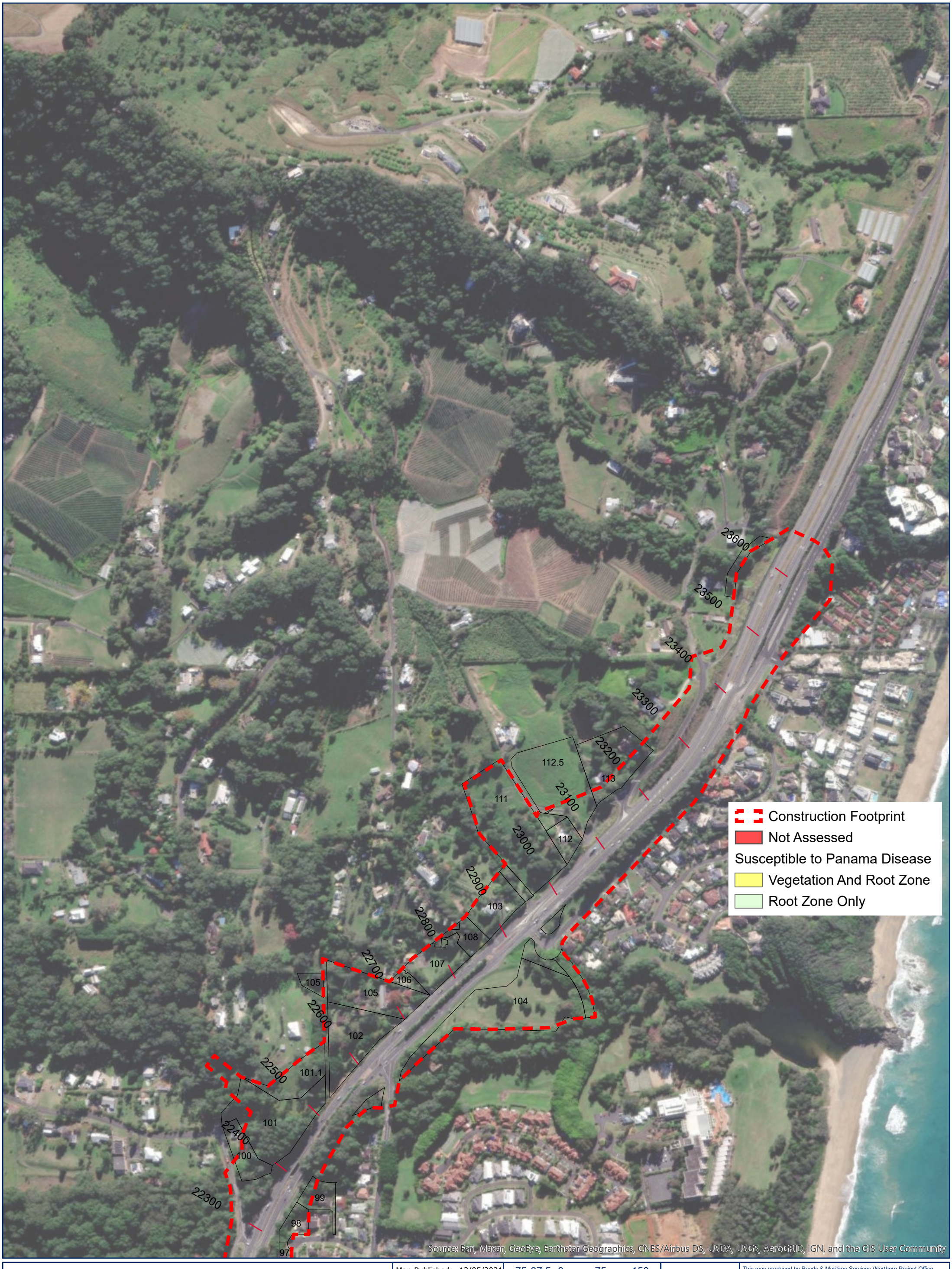

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Sheet 11 of 11

1:5,000 at A3

NSW GOVERNMENT

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Appendix K – Coffs Harbour Bypass Hygiene Declaration Form

COFFS HARBOUR BYPASS

HYGIENE DECLARATION FORM

Supply of Material & Equipment

(Examples of Material & Equipment include soil, seed, gravel, sand, mulch, machinery, vehicles or water).

This Declaration is valid for supplying the material & equipment specified in Table 1

The Material & Equipment being declared is;

Table 1: Materials & Equipment Table

Material or Equipment	Quantity	Supplier name & location	Destination on-site location [chainage]	Dates of transfer	Comments
Soil					
Seed					
Gravel					
Sand					
Mulch					
Machinery					
Vehicles					
Water					

Has the Material or Equipment listed in Table 1 been through, stored in, come from, or used in a place infested in or likely to be infested with;

Table 2: Risk Table

Risk	Yes	No	Unsure
Panama Disease			
Known current or past banana plantation			
other			

What actions have been taken to remove or ensure that there is no risk to the local banana industry?

Table 3: Treatment Actions

ACTION	DETAILS	COMMENTS
NIL		
Washing / Cleaning		
Chemical Treatment		
Certified Washdown		

To the best of my knowledge the Material & Equipment described in Table 1 contains NO RISK to the local banana industry

AGREE	DISAGREE

Supplier Signature		Supplier Company	
Contractors Signature		Contractors Company	

Appendix L – Consultation with Stakeholders

CHDBGA – Meeting Minutes 24/02/21

MINUTES

Coffs Harbour Bypass Project

Date	24 February 2021		
Time	5.00 pm		
Venue	Coffs Harbour Showground		
Chairperson	Ben Kresevic	BK	Project Manager/Engineer
Attendees	Rob Newberry Tim Gooley Mick Browne Scott Lawrence Jeff Eggins Walter Gately Brian Singh Nicky Singh Cathy Franco Sandro Franco Tom Flanagan	RN TGo MB SL JE WG BS NS CF SF TF	Senior Project Manager Environmental Manager Environment Officer Environment Manager Development and Delivery North BGA BGA BGA BGA BGA BGA BGA
Apologies			

Items		**Responsible/ Due Date**
1	**Overview**	
1.0	The Project delivered a presentation which included; • Project update • Background of PDCMP • Overview of PDCMP • Erosion & Sediment Control Measures • Next steps	All

Items		Responsible/ Due Date
2.0	Questions Raised by BGA	ALL
2.1	Q - The basins won't be big enough & will over top A – The project team explained how basins are sized & the capacity requirements. It was also explained that basins can not contain all the surface water generated on-site & are not expected to under the EPL Q – The Cavendish plant can have Panama disease below the surface in the root zone A – The project team explained the current advice on what plants and soils zones are susceptible to Panama Disease Q – Can TfNSW liaise with adjoining landowners every few weeks to check how works are going & that everyone is satisfied and complying A – TfNSW will co-ordinate regular updates with BGA & specifically adjoining landowners of the works program Q – How are TfNSW going to manage the farm which already has the Panama Disease A – The project team will manage the construction works around this farm & consider the risk in the design & construction of the project Q – Can we have dedicated wash down areas for the known Panama Disease areas A – It's proposed to have washdowns at all access areas Q – Will the machinery be washed down before arrival to site A – Yes. The plant wash down process was explained Q – Will the wash down area be maintained A – Yes. The wash down areas will be part of the contractors regular maintenance routine Q – TfNSW will need to manage the contractors strongly to ensure they are complying A – The project team explained the contractual measures in place to ensure compliance & also the surveillance processes TfNSW will adopt	

Items		Responsible/ Due Date
	Q – During construction, access across the alignment will need to be maintained. How does TfNSW propose to manage Panama Disease in these locations? Will washdown facilities be required on both the access points across the alignment? A – TfNSW will investigate and develop controls to address this specific circumstance. Q – TfNSW subcontractors have previously entered our property without undertaking any washdown procedures. How are TfNSW ensuring their subcontractors are adhering to the Panama Disease protocols? A – TfNSW will undertake more surveillance of subcontractors to ensure compliance and undertake toolbox talks to reinforce. Q – The proposed management plan indicates that washdown facilities will be installed at each entry and exit point. These are not currently installed and early works are occurring. How is Panama Disease being managed at this point in time? A – TfNSW have currently implemented an early works Panama Disease protocol for any preliminary works and the intention is that the proposed Management Plan will be implemented for the main contract.	
3.0	Comments required on PDCMP from BGA by 5th March 2021	NOTE
	Meeting Closed	

STATUS OF ACTIONS

This Meeting –

		Status	Responsible/ Revised Due Date

Previous Meetings –

		Status	Responsible/ Revised Due Date

Coffs Harbour bypass

Panama Disease Control Management Plan

1

Acknowledgement to Country

We acknowledge the local Gumbaynggirr people as the traditional custodians of this land, waters and sea.

We pay our respect to Gumbaynggirr people's connection and their belonging to this beautiful country that is located within the North Coast of NSW.

Panama Disease Control Management Plan

Coffs Harbour bypass / February 2021

3

Contents

Consultation Process

1. TfNSW have engaged with a number of resources and stakeholders to enable development of a draft plan to consult with the Banana Growers Association, including:
   - RMCG – Firm engaged with specific Technical / Biosecurity Consultant to provide advice regarding specific legislative obligations and technical review of options.
   - Dept. of Primary Industries (Agriculture)
   - Biosecurity NSW
2. Following the development of a working draft of the PDMP, TfNSW are now consulting with stakeholders to provide comment on the plan. This includes:
   - Banana Growers Association
   - Coffs Harbour City Council
   - Dept. of Primary Industries (Agriculture)
   - Biosecurity NSW
3. Following completion of consultation, the plan will be then provided to Dept. of Planning, Industry and Environment for their information.
4. The plan will then be provided to and discussed with Contractor's during the procurement for information to incorporate into construction methodology.

Summary

The Coffs Harbour Bypass involves a 14 kilometre dual carriage way upgrade of the Pacific Highway from south of Englands Road to Sapphire.

Key features of the proposal include:

- Around 14 km motorway style upgrade that links south of Englands Rd dual carriage highway south of Coffs Harbour and the Sapphire to Woolgoolga upgrade that was opened in 2014.
- Three grade separated interchanges at Englands Road to the south; Coramba Road and Bruxner Park Road at the northern end of the project.
- Tunnels through the ridgelines at Roberts Hill, Shephards Lane and Gatelys Road
- 30 + Bridge structures along the route to provide drainage and creek crossings, a rail crossing and local road crossings to maintain connectivity.
- Approx. 4 million m^3 of earthworks
- Extensive retaining walls, and noise walls along the alignment

Panama Disease Control Management Plan Principles

‘Come clean, go clean’

- The construction site will have restricted and controlled access through designated approved defined access points. In addition to this, conditions on entry and exit for personnel, machinery, equipment and externally sourced construction materials will apply.

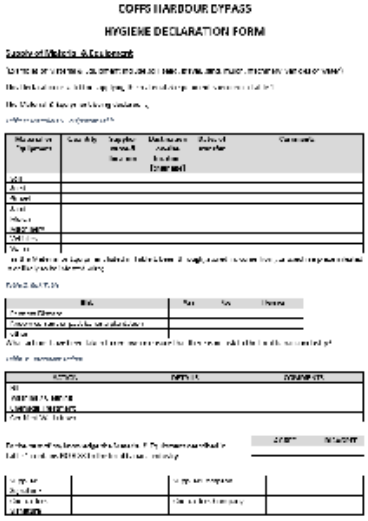
Construction Exit and Entry Controls

Example of construction exit and entry controls

Management of site material

- It can not be determined whether Panama Disease is present within the construction site, therefore all onsite materials will be treated as likely to contain Panama Disease. This will mean that all materials will remain within the Project or if importing is required, they must be from approved source

Hygiene Declaration Form



COFFS HARBOUR BYPASS

HYGIENE DECLARATION FORM

Form required to be completed and approved prior to importing material, supplying equipment, etc.

Risk Zones

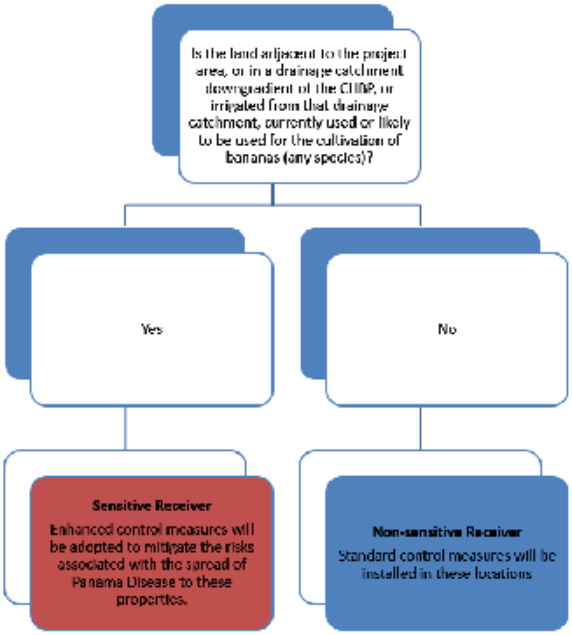
Risk Zones

At the commencement of the Project, areas outside of the Construction footprint will be mapped as ***Non-sensitive Receiver*** or ***Sensitive Receiver.*** Regardless of any works, the status of adjacent properties will remain as zoned at the commencement of works.

Adjacent Property	Definition
Non-sensitive Receiver	All land not currently used and unlikely to be used for the cultivation of bananas (any species) that is: adjacent to the project area, or in a drainage catchment downgradient of the CHBP, or irrigated from that drainage catchment.
Sensitive Receiver	All land currently used or likely to be used for the cultivation of bananas (any species) that is: adjacent to the project area, or is in a drainage catchment downgradient of the CHBP, or irrigated from that drainage catchment Enhanced control measures will be adopted to mitigate the risks associated with the spread of Panama Disease to these properties.

Risk Zones

Decision matrix within the PDCMP which will assist in determining Sensitive/Non-sensitive Receivers and the level of control measures to be implemented

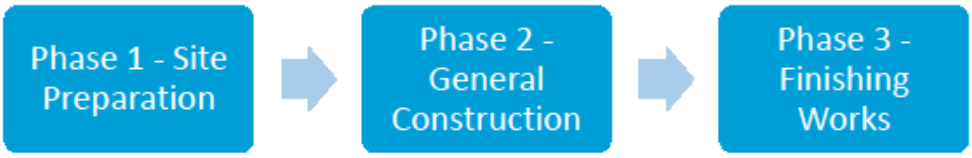


Project Phases

16

Project Phases

The following project phases have been identified in which different activities and mitigation requirements will apply.

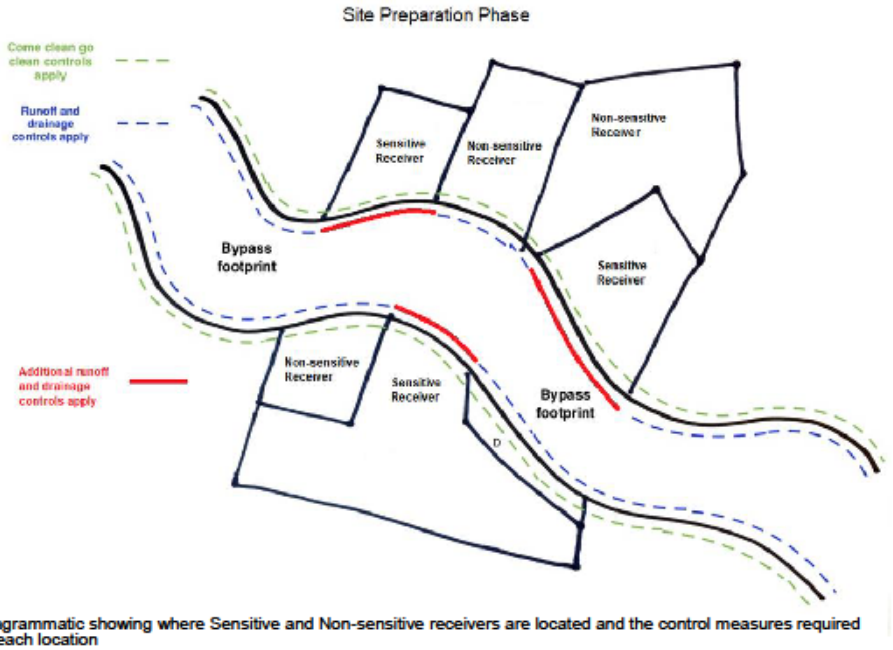


Phase 1 – Site Preparation

This phase includes the following:

- Identifying Sensitive and Non-sensitive receivers
- Establishing site accesses
- Installation of Erosion and Sediment Controls
- Surface water runoff management
- Clearing vegetation
- Treatment and disposal of risk material vegetation
- Stripping topsoil

Identifying Sensitive and Non-sensitive receivers



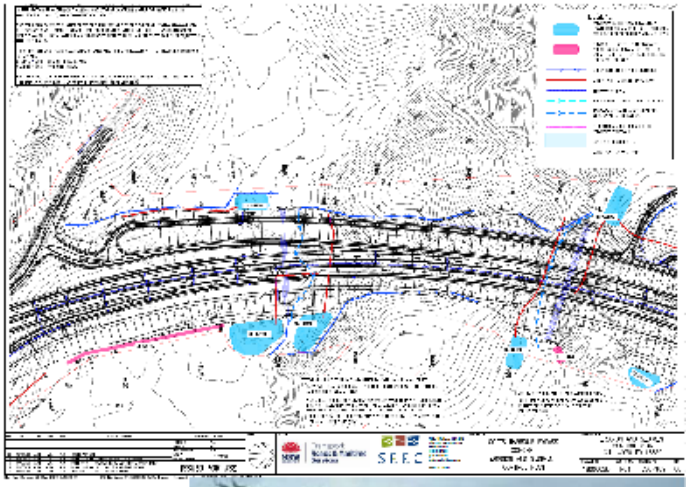
Diagrammatic showing where Sensitive and Non-sensitive receivers are located and the control measures required at each location

Establishing site accesses

Installation of washdown facilities and procedures
Installation of site signage and delineation

Installation of Erosion and Sediment Controls and surface water runoff management

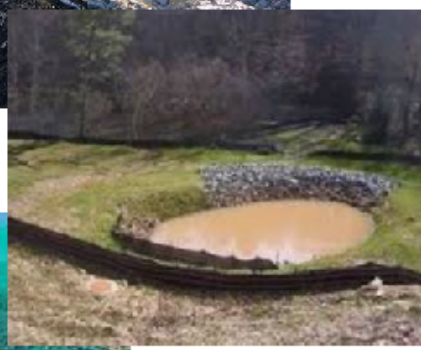
- Erosion and Sediment Control Plans are developed for all site areas prior to works commencing
- All plans are reviewed and approved by a qualified and independent Soil Conservationist
- Plans must comply with industry best practice guidelines: *Volume 1 and Volume 2 of the Bluebook: Managing Urban Stormwater: Soils and Construction*



Erosion and Sediment Controls and surface water runoff management

Key Controls

- Upstream runoff diverted through and around site
- Site runoff diverted through controls to prevent erosion and sediment transport
- Sediment basins installed to capture site runoff to maximum of 90th Percentile rain events
- All discharges of water from site must be through site controls to improve water quality
- Revegetation is a priority to reduce erosion risk.



Installation of Erosion and Sediment Controls and surface water runoff management

Clearing

Vegetation clearing will be undertaken in a two staged process to allow treatment of risk vegetation material:

1. Removal of risk vegetation material susceptible to Panama Disease by felling or mechanical removal. This vegetation includes Lady finger, Ducasse and Plantain varieties and is to remain within the project site boundaries unless approved.
2. Removal of any other vegetation

The root balls of all banana plant vegetation and asymptomatic vegetation will be removed and treated/disposed

Treatment and disposal of banana plant vegetation

- Timing – Banana Plant vegetation susceptible to infection with Panama Disease R1 must be treated within 5 days of killing the plant to reduce the risk of fungal spores releasing.
- Above ground treatment of all Lady Finger Ducasse and Plantain banana varieties
- Below ground treatment of all banana varieties and asymptomatic hosts
- Current treatment options include:
  - Burial – 600mm at a minimum
  - Burning (subject to EPA approval)
  - Thermal Treatment – 65-100°C for a minimum of 30 minutes
  - Alternative options may be developed by the construction contractor during the tender process
- This treatment and disposal option developed by the Contractor will be required to be submitted and approved by TfNSW in consultation with relevant authorities

Stripping Topsoil

- Once a depth of topsoil is determined, it will be removed (within the root zone) and stockpiled.
- Topsoil stockpiles will be managed with appropriate controls in accordance with TfNSW Specifications
- If plant or equipment needs to change from stripping topsoil to another activity, washdown of the plant and equipment using the designated facilities and procedures will be required.
- Any material below the stripped topsoil surface that is capable of growing vegetation (up to 1m in depth) will be required to be buried by 600mm of material. This will ensure any risk of spreading Panama Disease is mitigated

Phase 2 – General Construction

- Maintenance of control measures established and installed during Phase 1 – Site Preparation
- Bulk earthworks, installation of drainage, construction of structures, tunnelling works, concrete paving, concrete batch plant operations, etc.
- Importing soil, plant, water or other construction material from outside the construction site

Phase 3 – Finishing Works

- Maintenance of control measures established and installed during Phase 1 – Site Preparation
- Concrete paving, Installation of road furniture, linemarking, installation of permanent signage, installation of street lighting, etc.
- Importing soil, plant, water or other construction material from outside the construction site. This importing process will require submission and approval of the completed Hygiene Declaration form.
- Plant or equipment changing activity or leaving site
- Topsoiling of batters
- Decommissioning of site – temporary washdown procedures and facilities will need to be implemented and utilised if the permanent ones are decommissioned and removed.

Program

- TfNSW will consider any comments and feedback from BGA for incorporation into the PDCMP. Comments/feedback is requested by 5th March 2021.
- The CHCC will be provided a copy of the PDCMP by 26th of February and comments/feedback will be requested by 5th of March 2021.
- Following receiving and incorporating any comments/feedback from BGA and CHCC, TfNSW will submit the PDCMP to Department of Planning Industry and Environment for information by 15th of March.

Questions


NSW
GOVERNMENT

CHDBGA – Correspondence

From: jeff eggins
To: Ben Kresevic
Subject: Re: Working Draft Panama Disease Control Management Plan
Date: Thursday, 11 March 2021 9:17:15 PM

Hi Ben
Wally and I have had no grower feedback or comments in relation to the working draft for panama disease. As we were disappointed to see such a small attendance at the meeting you organised.
Regards Jeff Eggins Coffs Harbour banana growers association 11/3/21

On 8 Mar 2021, at 5:20 pm, Ben Kresevic <Ben.Kresevic@transport.nsw.gov.au> wrote:

Hi Jeff/Wally,

Just touching base to see if the Banana Growers Association had any further comments or feedback in relation to the 'working draft' Panama Disease Control Management Plan developed for the Coffs Harbour Bypass Project.

We received feedback from Coffs Harbour City Council and they had no further comments.

Please give me a call to discuss if required.

Regards,

Ben Kresevic
Project Development Manager
Northern Project Office Grafton
Infrastructure and Place
Transport for NSW

M 0438404424
Level 2 76 Victoria St Grafton NSW 2460
PO Box 576 Grafton NSW 2460

From: Ben Kresevic
Sent: Wednesday, 24 February 2021 11:34 AM
To: jeffeggins@gmail.com
Cc: Robert Newberry <Robert.NEWBERRY@transport.nsw.gov.au>; Tim Gooley <Tim.Gooley@transport.nsw.gov.au>; Mick Browne <mick.browne@transport.nsw.gov.au>; Scott Lawrence <Scott.LAWRENCE@transport.nsw.gov.au>; thegatelys5@bigpond.com; Tom Flanagan <tom.flanagan@dpi.nsw.gov.au>
Subject: Working Draft Panama Disease Control Management Plan

Hi Jeff,

Please find attached a copy of the 'working draft' PDCMP.

The presentation tonight will be a summary of the 'working draft' PDCMP.

Feel free to distribute the 'working draft' PDCMP amongst the members of the Banana Growers Association, but please note that this is not a public document and not to be distributed to any other members of the public. Can you please make members of the BGA who are forwarded a copy aware of this requirement.

Please give me a call to discuss if required, otherwise I will see you tonight.

Regards,

Ben Kresevic
Project Development Manager
Northern Project Office Grafton
Infrastructure and Place
Transport for NSW

M 0438404424
Level 2 76 Victoria St Grafton NSW 2460
PO Box 576 Grafton NSW 2460

From: Sally Whitelaw
To: Ben Kresevic
Subject: RE: CHBP - Panama Disease Control Management Plan
Date: Friday, 5 March 2021 1:47:06 PM
Attachments: image001.jpg
image002.png

Hi Ben,

I've consulted with my colleagues within Council and have no comments. Thanks for the chance to provide input, I think other topics will generate more comments.

Regards,
Sally Whitelaw
Team Leader Biodiversity, Coastal & Flooding
Local Planning | Coffs Harbour City Council
P: 02 6648 4673 | 02 6648 4000
E: sally.whitelaw@chcc.nsw.gov.au | W: www.coffsharbour.nsw.gov.au | @coffscouncil
@heartofcoffs | https://clicktime.symantec.com/38kTW8bB2r6ivBTKxeRUx287Vc?u=www.heartofcoffs.com.au


From: Ben Kresevic <Ben.Kresevic@transport.nsw.gov.au>
Sent: Thursday, 25 February 2021 10:58 AM
To: Sally Whitelaw <sally.whitelaw@chcc.nsw.gov.au>
Cc: Tim Gooley <Tim.Gooley@transport.nsw.gov.au>; Robert Newberry <Robert.NEWBERRY@transport.nsw.gov.au>; Scott Lawrence <Scott.LAWRENCE@transport.nsw.gov.au>
Subject: RE: CHBP - Panama Disease Control Management Plan

Hi Sally,

Please find attached a copy of the 'working draft' PDCMP.

Feel free to distribute the 'working draft' PDCMP amongst the relevant CHCC representatives, but please note that this is not a public document and not to be distributed to any other members of the public. Can you please make CHCC representatives who are forwarded a copy aware of this requirement.

We are requesting any comments or feedback by Friday 5th March. Please advise if this is not

achievable or you require additional time.

Please give me a call to discuss if required.

Regards,

Ben Kresevic
Project Development Manager
Northern Project Office Grafton
Infrastructure and Place
Transport for NSW

M 0438404424
Level 2 76 Victoria St Grafton NSW 2460
PO Box 576 Grafton NSW 2460

From: Sally Whitelaw [mailto:sally.whitelaw@chcc.nsw.gov.au]
Sent: Tuesday, 16 February 2021 4:13 PM
To: Ben Kresevic <Ben.Kresevic@transport.nsw.gov.au>
Subject: RE: CHBP - Panama Disease Control Management Plan

Hi Ben,

I've confirmed that Council doesn't need a meeting, just send the draft plan through to me and I'll coordinate a response.

Regards,
Sally Whitelaw
Team Leader Biodiversity, Coastal & Flooding
Local Planning | Coffs Harbour City Council
P: 02 6648 4673 | 02 6648 4000
E: sally.whitelaw@chcc.nsw.gov.au | W: www.coffsharbour.nsw.gov.au | @coffscouncil
@heartofcoffs | https://clicktime.symantec.com/3UANjRHEcRmeQW8WJisWTfE7Vc?u=www.heartofcoffs.com.au

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From: Ben Kresevic <Ben.Kresevic@transport.nsw.gov.au>
Sent: Tuesday, 16 February 2021 12:23 PM

To: Sally Whitelaw <sally.whitelaw@chcc.nsw.gov.au>
Cc: Robert Newberry <Robert.NEWBERRY@transport.nsw.gov.au>; Tim Gooley <Tim.Gooley@transport.nsw.gov.au>
Subject: CHBP - Panama Disease Control Management Plan

Hi Sally,

As discussed, the Coffs Harbour Bypass Project Team is in the process of finalising a Panama Disease Control Management Plan for the project. TfNSW is happy to present the Management Plan to CHCC, however you advised that just sending the Management Plan through for review and feedback may be a more suitable option for CHCC. Can you please discuss amongst CHCC and advise what is your preference.

Please give me a call to discuss further if required.

Regards,

Ben Kresevic
Project Development Manager
Northern Project Office Grafton
Infrastructure and Place
Transport for NSW

M 0438404424
Level 2 76 Victoria St Grafton NSW 2460
PO Box 576 Grafton NSW 2460

content security solution.

From: Tom Flanagan
To: Ben Kresevic
Subject: RE: Finalising the PDCMP
Date: Thursday, 22 April 2021 7:48:39 AM
Attachments: image002.png

Hi Ben,

Sorry for the late reply, I was away from the office the past few days.

I can confirm that TfNSW have met their Ministers Condition of Approval as stated below and that they have consulted with NSW DPI as a part of the preparation and implementation of the PDCMP.

If you need anything further let me know.

Cheers.

Tom

Tom Flanagan | Industry Development Officer
NSW Department of Primary Industries | Horticulture
Wollongbar Primary Industries Institute, 1243 Bruxner Highway, Wollongbar NSW 2477
T: +61 2 6626 1352 | M: 0437 654 633 | E: tom.flanagan@dpi.nsw.gov.au | W: www.dpi.nsw.gov.au

I would like to acknowledge the Bundjalung people who are the traditional custodians of the land on which I live and work. I would also like to pay respect to the Elders past, present and future of the Bundjalung nation.

From: Ben Kresevic <Ben.Kresevic@transport.nsw.gov.au>
Sent: Monday, 19 April 2021 2:59 PM
To: Tom Flanagan <tom.flanagan@dpi.nsw.gov.au>
Cc: Tim Gooley <Tim.Gooley@transport.nsw.gov.au>; Robert Newberry <Robert.NEWBERRY@transport.nsw.gov.au>
Subject: Finalising the PDCMP

Hi Tom,

We are in the process of finalizing the PDCMP and would like DPI to confirm that we have currently met our Ministers Condition of Approval requirement which is:

A Panama Disease Control Management Plan will be prepared and implemented during construction in consultation with Regions, Industry, Agriculture & Resources, DPIE and representatives of the Banana

Growers Association of Coffs Harbour & District. The plan will be prepared in accordance with relevant Queensland's Department of Agriculture and Fisheries guidelines including Panama disease tropical race 4: Biosecurity standards and guidelines (2015) and Panama disease tropical race 4.

Can you please confirm that to date, TfNSW has consulted with DPI as part of the preparation and implementation of the PDCMP. TfNSW will continue to consult with DPI regarding any changes that may develop in relation to the PDCMP. I have attached the latest PDCMP for your information.

Please give me a call to discuss if required.

Regards,

Ben Kresevic
Project Development Manager
Northern Project Office Grafton
Infrastructure and Place
Transport for NSW

M 0438404424
Level 2 76 Victoria St Grafton NSW 2460
PO Box 576 Grafton NSW 2460