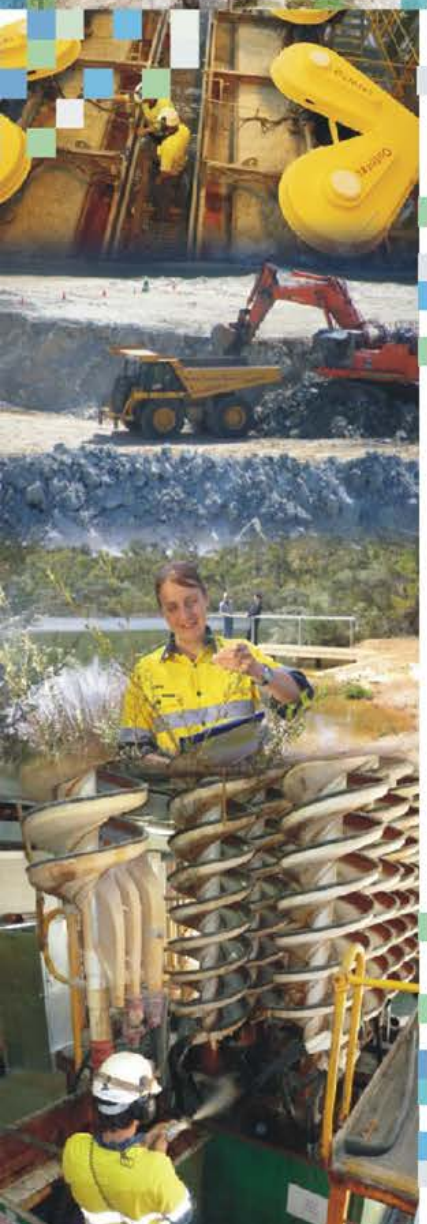
Talison Lithium Pty Ltd

Disease Hygiene Management Plan

SITE MANAGEMENT PLAN: ENV-MP-0003



TALISON
GREENBUSHES
OPERATIONS

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Carmel Griffin

Reviewed By _____ Date 25/10/19

C. Griffin- Superintendent Approvals & Stakeholder

Authorised By _____ Date 25/10/19

I. McGuire –Manager Project Development

Contents

Table Index

1. Executive Summary

This Disease Hygiene Management Plan (the Plan) has been developed to support the environmental referrals under the *Environmental Protection Act 1986* (EP Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the Greenbushes Lithium Mine Expansion (the Project) which will be developed by Talison Lithium Pty Ltd (Talison).

Talison has prepared the Plan to be consistent with the "*Instructions on how to prepare Environmental Protection Act 1986 Part IV Environmental Management Plan*" (EPA 2018). The Plan has been prepared to manage potential impacts from dieback *(Phytophthora cinnamomi*) and marri-canker *(Quambalaria coyrecup)* associated with the Project. The purpose of the Plan is detailed in Table 1.

Table 1: Outline of the Plan

Detail	Description
Proponent Name	Talison Lithium Pty Ltd (Talison)
Project	Greenbushes Lithium Mine Expansion
Ministerial Statement	MS1111
Management Plan Purpose	The purpose of the Plan is to provide a framework to ensure that impacts of dieback and marri-canker on the environment (attributable to the Greenbushes Lithium Mine Expansion) are minimised.
Key environmental factors	Native vegetation, fauna habitats, land/soil quality and hydrological regimes potentially impacted by the Project from the: • increase in the occurrence of marri-canker; and • introduction and spread of dieback.
EPA Objectives	Flora and Vegetation: To protect flora and vegetation so that biological diversity and ecological integrity are maintained. Terrestrial Fauna: To protect terrestrial fauna so that biological diversity and ecological integrity is maintained. Terrestrial Environmental Quality: To maintain the quality of land and soils so that environmental values are protected. Inland Waters: To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.

1.1. Roles and Responsibility

The accountability for fulfilling the requirements of the Plan is dependent on the stage of project development (construction, operations, decommissioning, rehabilitation and closure). Irrespective of whether construction activities are undertaken by external contractor or internal personnel, the designated Project Manager will be accountable for ensuring the requirements of the Plan are met. Responsibility may be delegated to the Environmental Manager or other personnel. During operational stages, the Manager Environment is accountable for ensuring the requirements of the Plan are met (responsibility for specific tasks may be delegated). Where responsibilities are delegated, this must be clearly recorded and communicated. Table 2 attributes specific management actions to the appropriate personnel.

Table 2: Roles & Responsibilities

Roles	Responsibility
Superintendent Approvals & Stakeholder	To formulate the Plan, performance measures, establish clear objectives and provide guidance in the approach to fulfilling commitments of the Plan.
Environmental Team	To provide technical support and advice to site staff.
Manager Environment & Community	To establish roles and responsibilities and allocate appropriate resourcing to the Plan. To provide site staff with the tools and resources required to meet Talison objectives. To ensure that the Plan is implemented and that risks related to the activities, products and services are managed
Construction Manager / Operations Manager	To ensure Talison conditions, commitments and policies are followed on-site
General Manager Operations	To also provide site staff with the tools and resources required to meet Talison's objectives. Ensure overall compliance to The Plan.
Employees, contractors and visitors	To reduce any impacts on the environment resulting from the construction and operation of the Project. To ensure the site disease hygiene procedures are followed.

2. Context, Scope and Rationale

Talison has prepared the Disease Hygiene Management Plan (the Plan) has been prepared to satisfy Ministerial Condition 9 associated Ministerial Statement 1111 published on 19 August 2019 for the Greenbushes Lithium Mine Expansion under the Environmental Protection Act 1986 (EP Act) and in consideration with the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) for the Greenbushes Lithium Mine Expansion (the Project) developed by Talison Lithium Pty Ltd (Talison).The section includes:

- a summary of the Project and its main aspects;
- a summary of baseline flora and vegetation surveys, and dieback surveys undertaken within the Mine Development Envelope and the main findings of these surveys;
- an outline of any assumptions and uncertainties associated with the Plan; and
- management actions to be implemented and the reasoning behind these actions.

2.1. Proposal

The Greenbushes Lithium Mine (the Mine) is an existing mining operation owned and operated by Talison. The Mine is located at the current operations immediately south of the Greenbushes townsite, approximately 250 km south of Perth and 80 km south east of Bunbury in Western Australia (WA) (Figure 1). Talison currently mines and processes spodumene ore at the Mine to produce a lithium mineral concentrate at approximately 6% Lithium Oxide (Li2O).

Talison proposes to expand the Mine within tenements M1/03, M1/06, M1/07, M1/08, M1/09, M1/16, G01/1, G01/2 (see Figure 2). The expansion will require the current approved operational boundary (Active Mining Area) to be extended to the south, with a smaller extension to the north, increasing the current (approved) area of 1,591 hectares (ha) to a 1,989 ha area (i.e. an increase of 398 ha). The new operation boundary is referred to as the Mine Development Envelope.

This expansion includes the following development (See Figure 3):

- Developing an expanded open pit;
- Establishment of two additional chemical grade processing plants (CGPs), a tailings retreatment plant, a crusher and centralised run-of-mine (ROM);
- Establishment of a new Mine Services Area and explosives storage and handling infrastructure;
- Expansion of the existing Floyds Waste Rock Landform;
- Construction of an additional tailings storage facility (TSF4); and
- Establishment of additional linear infrastructure corridors (Bypass Road, powerline, pipeline and road corridors).

The mining rate will also increase from 3.5 Million bench cubic metres per annum (Mbcmpa) to approximately 16 Mbcmpa, which will require additional mining fleet and blasting activity. The ore processing rate will increase from 4.7 Million tonnes per annum (Mtpa) to 9.5 Mtpa. Lithium mineral concentrate production will increase from 1.2 Mtpa to 2.3 Mtpa.

The proposed expansion of 398 ha to the Mine Development Envelope will require the clearing of 350 ha of native vegetation clearing within State Forest 20 (within Talison tenements). The clearing of 350 ha has the potential to cause impacts from dieback and marri-canker on the native vegetation, fauna habitats, land/soil quality and hydrological regimes in the Mine Development Envelope (as detailed below).

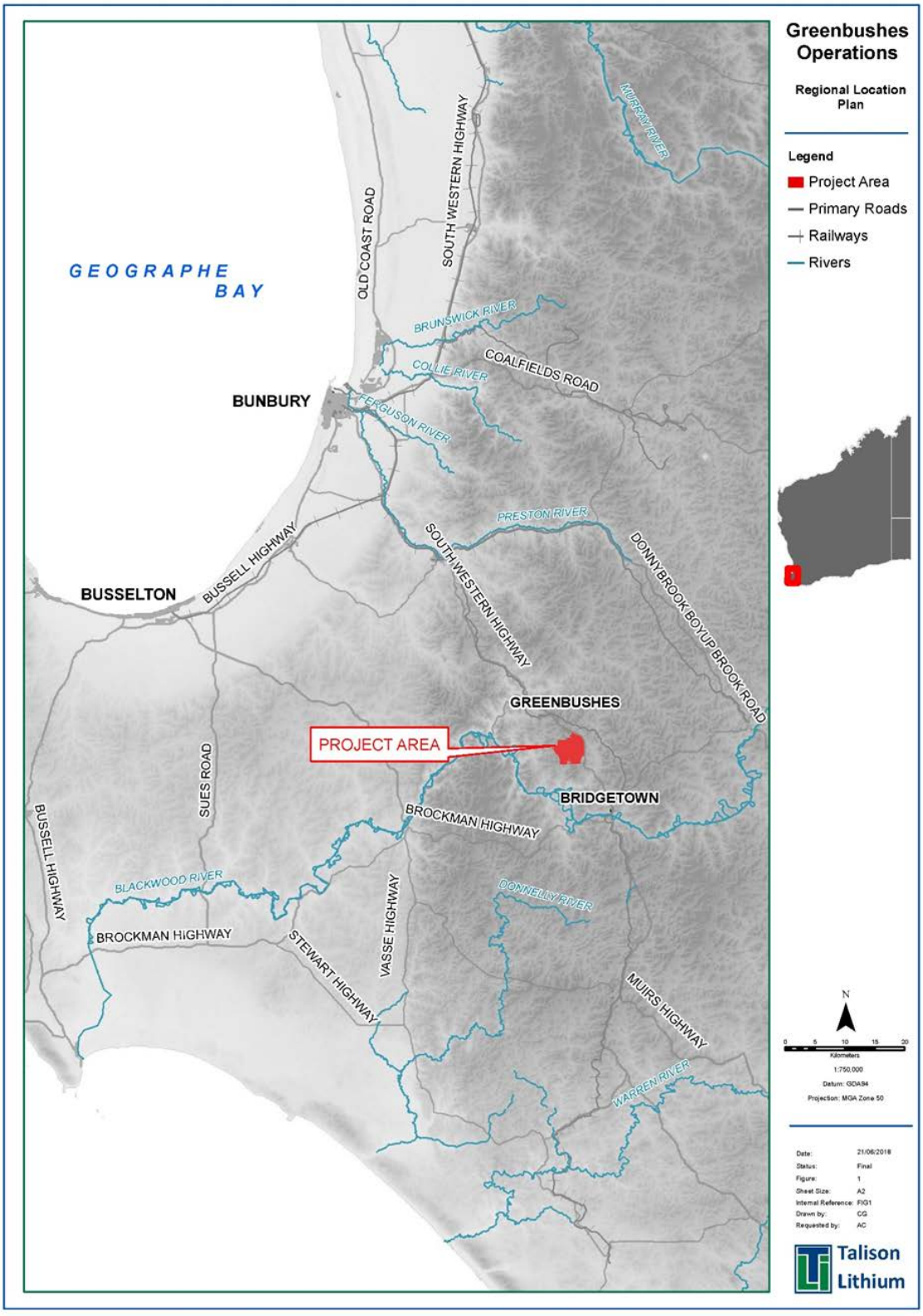

Figure 1: Location of the Project

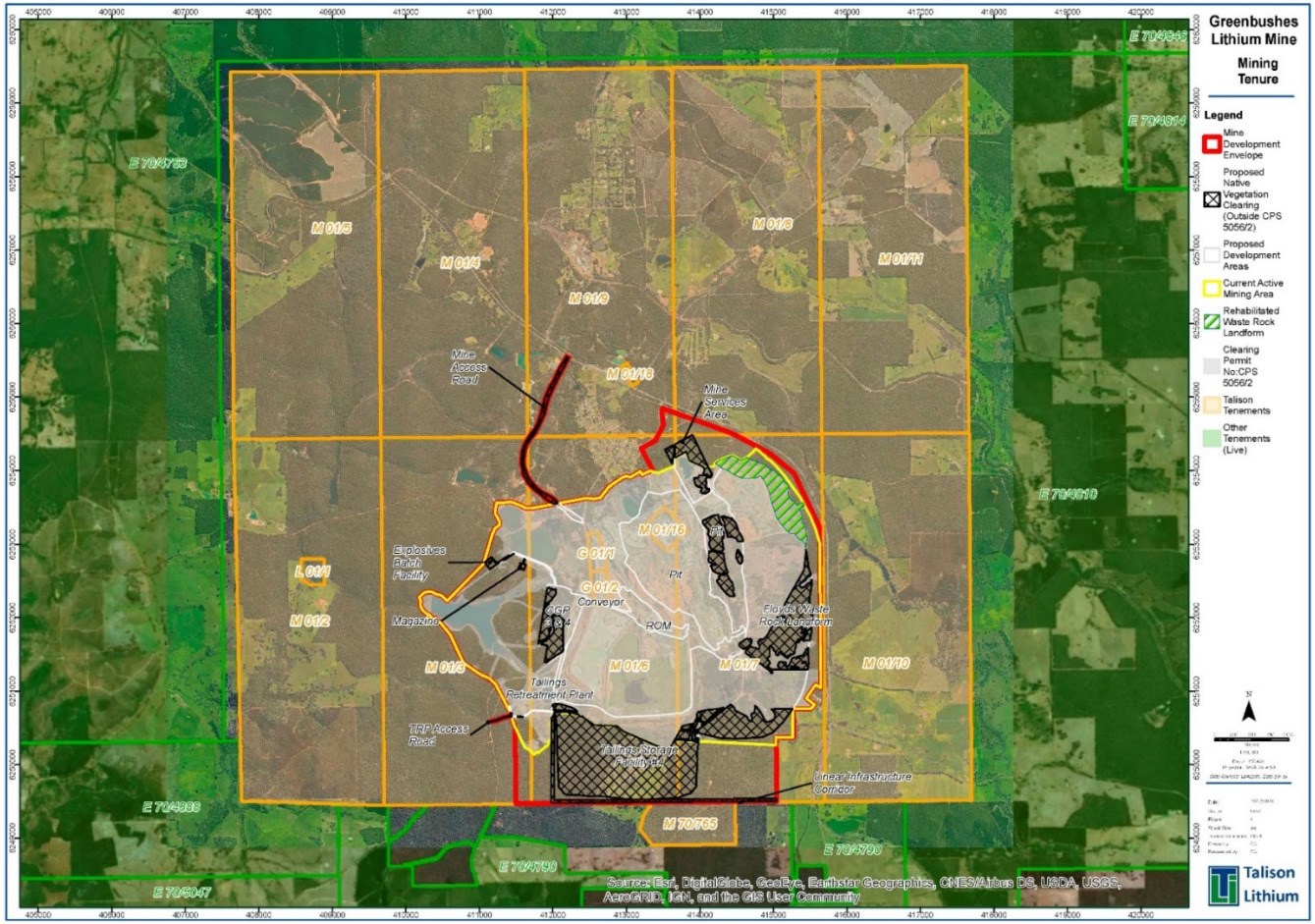

Figure 2: Talison Tenements

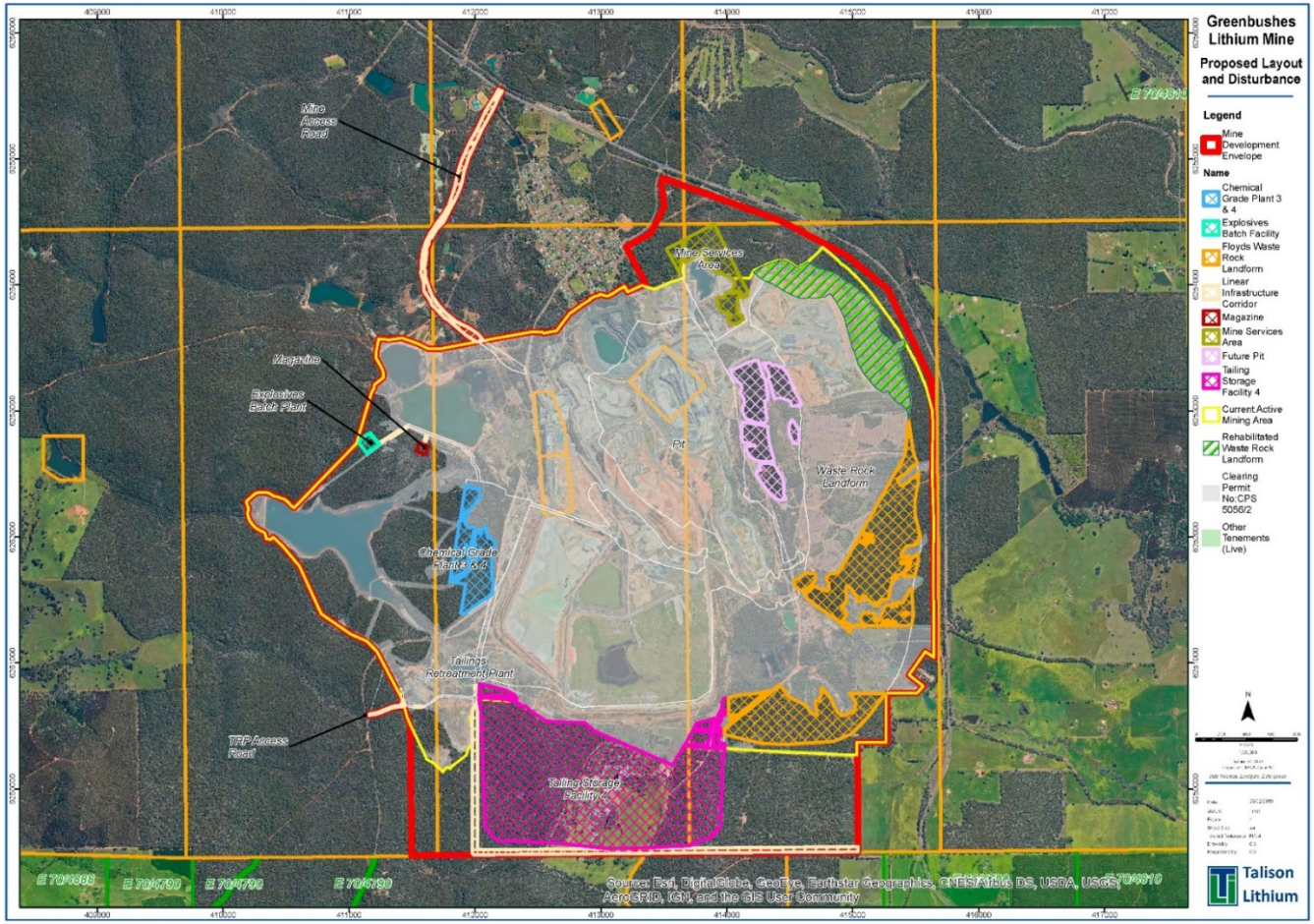

Figure 3: Proposed Disturbance Areas

2.2. Key Environmental Factors

The key environmental factor relevant to the Plan is native vegetation, fauna habitats, land/soil quality and hydrological regimes. The relevant EPA's objective for the Plan are:

- Flora and Vegetation: "*to protect flora and vegetation so that biological diversity and ecological integrity are maintained*";
- Terrestrial Fauna: "*to protect terrestrial fauna so that biological diversity and ecological integrity is maintained*";
- Terrestrial Environmental Quality: "*to maintain the quality of land and soils so that environmental values are protected*"; and
- Inland Waters: "*to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected*".

The key environmental values for the Project are native vegetation, fauna habitats, land/soil quality and hydrological regimes within the Mine Development Envelope. Specially, minimising potential impacts on the key environmental values from dieback and marri-canker. Talison is committed to minimising impacts from the implementation of the proposal to flora and vegetation, including the introduction and spread of dieback *(Phytophthora cinnamomi)* and increased occurrence of marri-canker *(Quambalaria coyrecup)*.

The key potential impacts associated with dieback and marri-canker arising from the Project include the destruction and alteration of native vegetation, fauna habitat, land/soil quality and hydrological regimes (Table 3).

Table 3: Potential Environmental Impacts

Potential Environmental Impacts	Details
Destruction of habitat – terrestrial and aquatic	Some introduced taxa have the ability to invade native vegetation and degrade biodiversity gradually over time, rendering it less valuable to native flora and fauna. Additionally, the incidence of trees with marri-canker is known to be much higher in disturbed areas.
Introduction of plant pathogens marri canker *(Quambalaria coyrecup)* and dieback *(Phytophthora cinnamomi)*	The introduction or spread of plant pathogens can negatively impact on vegetation health including tree health, leading to tree mortality, fewer tree hollows, and loss of habitat for native species including significant fauna.
Alteration of hydrological cycle	Clearing can result in increased surface run-off, erosion and siltation of drainage flats and drainage lines, with potential to impact on the *in-situ* flora and vegetation. Areas impacted by activities that result in elevated soil moisture status are more susceptible to dieback, particularly during summer when soil temperatures are higher.
Reduced biological diversity	The spread of marri-canker and dieback to un-infested areas can reduce biological diversity.
Loss of individuals or populations	Establishment or spread of marri canker or dieback can cause direct mortality to flora and vegetation, including conservation significant species.
Cultural heritage	Marri-canker and dieback can result in the premature loss of significant cultural trees.

2.3. Condition Requirements

This Plan has been developed accordance and refence to Condition 9 of Ministerial Statement 1111 in relation to implementing a Disease Hygiene Management Plan with respect to Marri Canker *(Quambalaria coyrecup)* and Dieback *(Phytophthora cinnamomi)*. The Plan in order to demonstrate that Talison has taken into consideration the environmental objectives as identified above under the key environmental factors and are outlined in Table 4 following. Condition 9 states:

9-1 The proponent shall implement the proposal to meet the following environmental objective:

1) The proponent shall minimise impacts from the implementation of the proposal to flora and vegetation including from marri canker *(Quambalaria coyrecup)* and dieback *(Phytophthora cinnamomi)*.

9-2 In order to meet the requirements of condition 9-1, prior to ground disturbing activities within the mine development envelope delineated in Figure 1 of Schedule 1, unless otherwise agreed by the CEO, the proponent shall prepare a Disease Hygiene Management Plan to the requirements of the CEO on advice of the Department of Biodiversity, Conservation and Attractions. The Disease Hygiene Management Plan shall:

1) when implemented, substantiate and ensure that condition 9-1 is being met;
2) present objectives and monitoring protocols to identify flora and vegetation to ensure impacts are minimised;
3) specify criteria (trigger criteria) that will trigger the implementation of management and/or contingency actions to minimise impacts to flora and vegetation;
4) specify management and/or contingency actions to be implemented if trigger criteria required by condition 9-2(3) have been reached.

9-3 The proponent shall implement the most recent version of the Disease Hygiene Management Plan which the CEO has confirmed by notice in writing, addresses the requirements of condition 9-1.

9-4 The proponent shall continue to implement the Disease Hygiene Management Plan, or any subsequent revisions as approved by the CEO in condition 9-3, until the CEO has confirmed by notice in writing that the plan meets the objective specified in condition 9-1.

Table 4: Condition Requirements

Condition Reference	Condition Detail	Section in the Plan
9-1(1)	*The proponent shall implement the proposal to meet the following environmental objective:* *The proponent shall minimise impacts from the implementation of the proposal to flora and vegetation including from marri canker (Quambalaria coyrecup) and dieback (Phytophthora cinnamomi).*	Section 2.4.4 A. Rationale – Dieback Control Techniques 3.2 Dieback Management – Additional Detail Section 2.4.4 B. Rationale – Marri Canker Control Techniques
9-2	*In order to meet the requirements of condition 9-1, prior to ground disturbing activities within the mine development envelope delineated in Figure 1 of Schedule 1, unless otherwise agreed by the CEO, the proponent shall prepare a Disease Hygiene Management Plan to the requirements of the CEO on advice of the Department of Biodiversity, Conservation and Attractions.*	
9-2(1)	*The Disease Hygiene Management Plan shall:* *when implemented, substantiate and ensure that condition 9-1 is being met;*	Section 2.3 Reporting
9-2(2)	*The Disease Hygiene Management Plan shall:* *present objectives and monitoring protocols to identify flora and vegetation to ensure impacts are minimised;*	Section 3.1 Objectives and Targets Section 3.3 Monitoring
9-2(3)	*The Disease Hygiene Management Plan shall:* *specify criteria (trigger criteria) that will trigger the implementation of management and/or contingency actions to minimise impacts to flora and vegetation;*	Table 7 Management Actions and Targets. Column 1 in Table 7 list a series of management-based actions aimed at minimising the introduction and spread of dieback and marri canker. Monitoring protocols (listed in column 3 of Table 7 will ensure these management actions are implemented by providing relevant inspections and checklists required to inform of any non-compliance. ANY non-compliance will be considered a trigger.
9-2(4)	*The Disease Hygiene Management Plan shall:* specify management and/or contingency actions to be implemented if trigger criteria required by condition 9-2(3) have been reached.	Table 7 Management Actions and Targets
9-3	The proponent shall implement the most recent version of the Disease Hygiene Management Plan which the CEO has confirmed by notice in writing, addresses the requirements of condition 9-1.	Table 2 Roles & Responsibilities Section 2 Disease Hygiene Management Plan Provisions (commitment made by Talison)
9-4	The proponent shall continue to implement the Disease Hygiene Management Plan, or any subsequent revisions as approved by the CEO in condition 9-3, until the CEO has confirmed by notice in writing that the plan meets the objective specified in condition 9-1.	This has been acknowledged as a condition within Section 2.3 Condition Requirements. Additional information provided in Table 7 specifically column 3 (Monitoring) and Column 5 (Reporting)

2.4. Rationale and Approach

2.4.1. Surveys and Studies Findings

Baseline flora and vegetation surveys have provided an opportunity to assess vegetation condition and observe existing impacts on vegetation health caused by dieback and marri-canker. DBCA registered dieback *(Phytophthora cinnamomi)* interpreters were independently engaged to conduct dieback surveys over the Mine Development Area, proposed access road and powerline infrastructure corridor as outlined in Table 5 following.

Table 5: Previous flora and vegetation, and dieback surveys undertaken within the Mine Development Envelope.

Date	Survey Type	Details
January 2019	Dieback survey	Dieback survey of the Greenbushes Powerline Corridor.
July/ August 2018 **September/ October 2018**	Infrastructure Corridor Detailed Flora and Vegetation Survey (Onshore Environmental 2019)	A detailed two-season survey of proposed infrastructure corridors within, and extending beyond, the Mine Development Envelope was undertaken in 2018.
July 2018 September/ October 2018	Detailed Flora and Vegetation Survey (Onshore Environmental 2018b)	A first season detailed flora and vegetation survey of remnant native vegetation within the Mine Development Envelope, and a follow-up second season survey.
December 2017/ February 2018	Dieback survey	DBCA Dieback survey (protectable areas).
September 2017/ March 2018/ April 2018	Dieback survey	DBCA Dieback survey (protectable areas).
July/ September 2017	Dieback survey	DBCA Dieback survey of southernmost area west of Maranup Ford Road and southernmost area east of Maranup Ford Road (comprehensive assessments); and of powerlines on eastern and southern boundary of assessment area (linear assessment).
July 2017	Dieback survey	DBCA Dieback survey of Forest Park Avenue, South Western Highway, Wilkes Road, Tourmaline Street, and Stanifer Street.
July 2017	Dieback survey	DBCA Dieback survey of (protectable areas) New Zealand Gully (located north of the Greenbushes townsite), Mount Jones Dam (located west of Greenbushes townsite).
May 2017	Dieback survey	DBCA Dieback survey of the south east corner of the Greenbushes forest block south of Forest Park Road.
September 2011	Level 2 Flora and Vegetation Survey (Onshore Environmental 2012)	Broad scale assessment of all the Greenbushes Mine leases.

An up-to-date dieback status for remnant vegetation within the Mine Development Envelope is shown on Figure 6. While marri-canker was occasionally observed within the Mine Development Envelope by the Principal Botanist undertaking the baseline flora and vegetation surveys, the impact was to individual trees and no severe outbreaks were recorded.

Figure 6: Current Dieback Status within the Mine Development Envelope (September 2019)

2.4.2 Key Assumptions and Uncertainties

The key assumption, uncertainties and limitations that relate to the information outlined in Section 1.4.1 that Talison used to develop the Plan include:

- Dieback mapping undertaken for the site is accurate as is the cause of vegetation decline within areas that have been identified as infested.

2.4.3 Management Approach

The management approach has been informed by best practice and recent experience on mine and construction projects in Western Australia. Findings from multiple surveys and the advice of specialist consultants has also informed the management approach.

The hierarchical approach taken focuses on ecologically sensitive areas and where possible, avoiding additional disturbance by utilising previously disturbed or cleared areas. The general approach for managing any impacts from dieback and marri-canker during the Project is to develop a comprehensive management-based program that identifies:

- **criteria with standards** used to trigger the implementation of management and/or contingency actions to minimise impacts to flora and vegetation; and
- **management and/or contingency actions** to be implemented if triggers are reached; and
- **monitoring programs** to assess the *in situ* status, and allow for accurate determination of change over time.

An adaptive risk-based management approach has been developed in order to create a robust management system, that prioritises and manages significant risks using the mitigation hierarchy (i.e. avoid, minimise, manage, rehabilitate and offset). The proposed monitoring and adaptive management approach were informed from risks identified and mitigation proposed in previous versions of the Plan.

2.4.4 Rationale for Choice of Provisions

The management approach was informed by results from baseline flora and vegetation surveys and dieback surveys, and the extent of the Project, in order to minimise potential impacts.

The disturbance footprint and associated impacts from clearing will be minimised by the preferential use of existing disturbed areas and undertaking progressive rehabilitation over the 20-year expected mine life. The mitigation measures have been designed for the approximate 20-year life of mine, and as such the Plan may require revisions and adaptation through the course of the mine life.

The key management targets were selected with the aim to minimise the potential impacts from dieback and marri-canker within the Mine Development Envelope, and are based on:

- review of available data for the region and the existing site;
- the arrangement between Talison and DBCA for the working conditions for dieback; and

industry standards, legislative requirements and best practice procedures.

A. Rationale – Dieback Control Techniques

In areas where dieback status is unknown it is to be assumed that all the native vegetation in the area is at risk and actions are to be taken to avoid spreading infection by the adoption of preventative measures.

Dieback control techniques used are dependent on the level of infection within an area and site conditions. Where light adhesion of dirt on vehicles occurs the recommendations for clearing include blow down using compressed air, brush down using hard brushes, or wash down using high-pressure, low-volume water jets.

In areas of confirmed infection, stringent wash down must be completed before entering into areas that are known to be free of dieback or have been assessed as uninterpretable.

The aim of the dieback control program is to reduce the possibility of introducing and spreading dieback infection into uninfested native vegetation, by:

- Being aware of the presence or absence of dieback within the mining tenements, based on existing surveys;
- Understanding the problems caused by dieback infection;
- Determining the actions that will assist in the prevention of new infections as a result of mining activities;
- Educating staff on the need for and the procedures for dieback hygiene through formal Green Card training;
- Scheduling earthworks during dry seasonal periods wherever possible;
- Preventing vehicles and equipment from carrying any soil or vegetable matter which may be infested with dieback into or out of the area;
- Washing, brushing, or blowing down of equipment and vehicles when they are used in uncleared native vegetation if there is a possibility of infested material being accidentally transported into or exported from the Mine Development Envelope; and
- Ensuring any soil or root matter removed from vehicles or machinery does not pose a threat to uninfested areas.

'Clean on entry' (COE) will be the primary management strategy implemented to protect uninfested areas, by ensuring that all personnel and machinery passing through a boundary are free of all material that could be carrying dieback.

Table 6 describes the requirements for cleaning vehicles and machinery when moving between areas of different categories of dieback infestation.

Table 6: Requirements for cleaning of machinery when moving between areas with different categories of dieback infestation.

Moving from ↓ to →	Infested	Permanently uninterpretable	Uninfested
Infested	No Clean Required	Clean on entry	Clean on entry
Permanently uninterpretable	No Clean Required	Clean on entry	Clean on entry
Uninfested	No Clean Required	No Clean Required	No Clean Required
Excluded	No Clean Required	Clean on entry	Clean on entry
Clean on entry: All vehicles and machinery to be cleaned prior to entering area *No Clean Required: No clean down required*			

B. Rationale – Marri Canker Control Techniques

Marri canker is caused by the microscopic fungus *Quambalaria coyrecup* which may result in the death of areas of bark and the underlying cortex tissue on trunks, branches and twigs of trees of all ages. The fungus can be airborne, or spread by wind or rain. But most likely, the pathogen occurs naturally in healthy trees without any detrimental effects.

Canker disease occurs on marri *(Corymbia calophylla)* trees across the natural range in south west Western Australia. It was first noticed in marri in the late 1930s, and has become increasingly more prominent since the 1970s. Over the last decade the incidence and severity of infection recorded has increased significantly. The incidence of trees with canker is known to be much higher in disturbed or modified areas including road verges, parks, remnant bushland, cleared farmland and smaller rural subdivisions. Initial research suggests that environmental changes are implicated to the plant pathogen. A lot of the environments where marri are declining have seen a history of fertiliser run-off, herbicide and pesticide application, and/or changes in the soil acidity (pH).

While there have not yet been control or management strategies accepted to treat marri canker disease, restricting access to encourage seedling recruitment and understorey development is encouraged to improve vegetation health. Other potential treatments currently under research include:

- Injection with phosphite to prime the tree's immune system (currently used to treat dieback in jarrah);
- Medicap implants to provide effected trees with a dose of complete nutrients; and
- Application of fungicide (to control the fungus).

3 Disease Hygiene Management Plan Provisions

This portion of the Plan outlines the management-based provisions that will be implemented to manage dieback and marri canker and maintain hygiene standards on site, and to minimise potential impacts from the implementation of the Project.

3.1 Objectives and Targets

The overarching objectives of the Plan include providing:

- An effective hygiene management with consideration of main stakeholders;
- A monitoring program to be implemented during all phases of the Project to assess the effectiveness of the mitigation measures and inform an adaptive management approach; and
- A commitment to maximise the ongoing protection and long-term conservation of significant species within the Mine Development Envelope.

The environmental objectives for the Project are proposed to be achieved through to implementation of the provisions detailed in the Plan. The management targets aim to reduce potential impacts to environmental values that may occur within the Mine Development Envelope and indirect impacts that may occur in the immediate surrounding areas and will be used to measure the performance of the provisions against the environmental objectives.

The environmental objectives and management targets for the Plan are presented in Table 8, with additional details provided (where required) in the subsequent Sections.

Table 7: Management Actions and Targets

Management Actions / Standards	Management Standard	Monitoring	Management / Contingency Actions	Reporting
Objective: **To minimise the spread of dieback and marri canker within the Mine Development Envelope**				
All vehicles and machinery will be clean-on-entry and inspected prior to entry to the Mine Development Envelope and active mining areas; see ENV F020 - Plant and Vehicle Hygiene Form ENV F035 - Clean on Entry Record Sheet Maintain records of all vehicle and machinery inspections, including (date of inspection, vehicle and machinery inspected, location of inspection, person conducting inspection and their job role/employer). Restrict access to high risk sites through the installation of perimeter demarcation, clear entry/exit points and signage. Movement of vehicles to be restricted to access roads, unless authorised. Map locations of high-risk sites and provide maps, coordinates and clean on exit instructions for these sites to staff and contractors prior to conducting maintenance activities. Maintain and update dieback mapping. Conduct environmental inductions that discuss high risk areas, dieback areas, and clean-on-entry requirements and wash-down/brush down procedures. Clearly demarcate high risk areas using distinctive markers (flagging tape, signage etc.). Install traffic control methods such as gates (or suitable equivalent to clearly signal to vehicles to stop for inspection) and signage at entry/exit locations identified high risk areas and previously uncleared areas. Inspect vehicles and machinery exiting restricted areas, including (check tyres and the underside of vehicles for plant and organic material, check tools	No spread of dieback or marri canker to Uninfested or Protectable areas attributable to mining operations. No incidents relating to non-compliance with hygiene procedures on site.	Monitoring of dieback areas annually as detailed in .ENV-PR-8001 - Pathogen Management Procedure. Monitoring of marri canker to be incorporated into the biannual vegetation health monitoring program, as presented in ENV-MP-0002 Conservation Significant Fauna Management Plan Monitoring detailed further in Section 2.2.	Internal review to investigate the cause of dieback or marri canker spread. Implementation of site specific management strategies. Review and revise methods used for locating and marking protected areas. Assess the effectiveness of training on hygiene and dieback, amend training method if required and implement more training. Increase the monitoring frequency or change monitoring methodology. Investigate use of fencing/more signage for high risk areas.	Dieback mapping and internal reporting. Ground disturbance register, survey and GIS database. Annual Environmental Report. Incident Reporting for breach in Dieback management procedures.

Management Actions / Standards	Management Standard	Monitoring	Management / Contingency Actions	Reporting
and machinery involved in clearing for plant and organic material) and clean on exit if required. Undertake clearing starting from low risk areas towards high risk areas. Facilitate hygiene inspector training for relevant employees and contractors (i.e. Greencard). Follow dieback management measures outlined in the Dieback Work Procedure: ENV-PR-8001 - Pathogen Management Procedure. As far as practical, time the clearing phase of the operation to occur during the dry months to reduce the risk of spreading the disease. Any construction material brought into the Mine Development Envelope (e.g. gravel) must be certified Dieback free.				

3.2 Dieback Management – Additional Detail

Clearing activities are proposed to commence in early October 2019 and are scheduled to extend through late spring and over the summer period. The timing of activities over dry seasonal conditions will significantly reduce the potential to introduce and spread dieback during clearing and earthmoving operations.

Access into uninfested areas will be controlled and for each clearing block clean machinery will commence within uninfested areas and finish within infested areas. Additionally, when working within infested areas, material will be pushed away from the uninfested area to avoid leaving windrows along the protectable area boundary.

Clean on Entry (COE) prior to entering protectable or uninfested work areas will be achieved by establishing designated cleandown points that will be maintained for the duration of the clearing and earthworks program. Cleandown will involve physically removing any material that could be carrying dieback from personnel, light vehicles, or heavy machinery. There are two main types of cleandown; wet and dry:

- Wet cleandown: achieved by high pressure washing with water to completely remove clods of soil, mud, and vegetative material. Wet cleandown produces potentially infested effluent that should not be disposed of into intact native vegetation. It is also noted that wet cleandown may not be appropriate in dry soil conditions, where application of water might increase the dieback risk.
- Dry cleandown: achieved by brushing off clods of soil and vegetative matter with a broom or brush, blowing off using compressed air in the case of larger machinery, and/or driving over a vibration grid to remove loose material.

COE points will be constructed using appropriate base material and bunding, and ensuring surface drainage to effectively remove contaminated material and effluent. The COE points will be situated at locations where effluent can be managed to ensure there is no discharge into adjacent uninfested vegetation.

In instances where narrow sections of infested ground dissect larger uninfested areas, the requirement to operate multiple cleandown points will be negated by constructing a green bridge. A green bridge comprises a section of road constructed using dieback free material placed over dieback infested or uninterpretable soil, resulting in a road surface that is free from dieback. Suitable construction materials will include blue metal, crushed blue rock, uninfested gravel or crushed limestone.

Similarly, split-phase management will be implemented during logging operations to confine haulage of logs to a laydown on the uninfested side of a management boundary, and loading of logs on the infested side of that boundary. This reduces the requirement for machinery and vehicles to cross the boundary between dieback categories.

3.3 Monitoring

The following monitoring will be undertaken to ensure the management targets outlined in this Plan are being met. To ensure that all vehicles are subject to hygiene management procedures on entering and exiting site, and inspection of high-risk areas will be undertaken weekly during active phases until it is deemed to be low risk by competent site personnel. The site clean on entry (COE) points and documentation will be monitored regularly for compliance with hygiene procedures by the Environmental Team.

Inspection reports will include:

- the condition of the COE point;

- evidence of vehicles or machinery leaving the agreed access route without permission; and
- evidence of inspections not being completed.

Any fill (e.g. gravel) bought on to site will be monitored to ensure it is free of Dieback and other Imported fill will be certified dieback Free prior to being utilised at the Project; and

- Inspections of certifications to occur prior to material being used on-site.

3.4 Reporting

The following reporting in relation to this Plan will be completed:

- Auditing of the implementation and compliance of management actions detailed within
- the Plan will be undertaken annually in an internal performance and compliance report, with an Annual Environmental Report (AER) will be submitted to the appropriate regulatory authorities including the DBCA. The AER will include details on Talison's implementation of the Plan (including monitoring results and trends);
- In the event that there is an exceedance of a management target resulting in an environmental outcome and performance indicator being exceeded (or not met), the relevant authority will be notified in writing within 7 days of identification of the exceedance, including contingency actions which have been implemented.

4 Adaptive Management and Review of the Management Plan

The Plan has defined the purpose, outlined specific management and mitigation measures to address the issue related to dieback, marri canker and hygiene, and introduced methods for monitoring and the evaluation of these measures.

The management approach for dieback and marri canker will be adaptive through ongoing review and reporting measures, to ensure that it achieves the identified purpose and environmental objectives.

The Plan will be formally reviewed annually by a suitably qualified experienced person. In addition to the annual review, the Plan will be reviewed if:

- New information is learned from monitoring, or monitoring indicates that management targets are not being achieved;
- New information becomes available regarding management strategies
- New requirements need to be included as a consequence of approvals being issued or modified.

The Plan will undergo an internal audit to ensure compliance and assess the effectiveness of management measures. The Manager Environment is responsible for ensuring this audit is undertaken on an annual basis. The Manager Environment is responsible for internal monthly reporting of the results of all monitoring and assessments under this Plan. The results of this monitoring will also be included in the Annual Environmental Report.

Talison implement adaptive management to respond to any issues identified in implementation of management measures, monitoring and evaluation against the management targets, to more effectively meet the environmental objective of the Plan.

Environmental management is undertaken in accordance with an Environmental Management System (EMS) developed to meet the requirements of ISO14001, relevant legislation and regulations and Australian Standards and other requirements. The EMS is certified to ISO14001 and the integrated management system is certified to ISO 9001. Environmental measurement and monitoring is undertaken in accordance with the relevant environmental work procedures by Environmental Officers on site and the results recorded in accordance with the Filing Register.

Environmental Work Procedures have been developed to ensure that statutory monitoring requirements are met and to ensure that monitoring is undertaken in a controlled manner. Analysis and evaluation of the monitoring and measurement data is conducted and communicated in accordance with procedure ENV-PR-5001 Environmental Statutory Reporting.

The following potential adaptive management actions have been developed to respond to a change in dieback status, including any outbreaks of marri-canker (i.e. change from un-infested to infested):

- Investigate cause;
- Review and revise as required methods used for locating and marking protected areas;
- Assess the effectiveness of training on hygiene and dieback, amend training method if required and implement more training;
- Increase the monitoring frequency or change monitoring methodology;
- Investigate use of fencing/more signage for high risk areas.

5 Stakeholder Consultation

Talison consulted with key stakeholders while developing the Plan, which is consistent with the EPA's expectations to align the plan with the principles of environmental impact assessment. This section provides a summary of the consultation that has occurred. The comments raised during consultations with stakeholders were considered in preparing the Plan. A summary of the consultation and Talison response is included in Table 9.

Table 9: Stakeholder Consultation

Date	Organisation	Summary of Consultation	Outcome
19/8/18	DoEE	Describe and assess the likely effectiveness of measures proposed to avoid and/or mitigate the direct and indirect impacts of the proposed action on the Western Ringtail Possum. This information must include, but is not limited to, measures proposed to avoid or mitigate impacts of: (a) feral animals (cat and fox); and (b) introduction and/or spread of weeds and *Phytophthora cinnamoni* (Dieback).	Talison has considered this and has within this Management Plan developed suitable procedures to manage appropriately.
31/8/2018	EPA	Additional Information Required for the Key Environmental Factors, request for further information on Diease Hygiene management	Talison has considered this and has updated the Disease Hygiene Management Plan accordingly.
12/9/19	DBCA	Management and mitigation for dieback control the Greenbushes Site	A document reviews based on comments sheet was received from the DBCA as per their requirement for inclusion into the plan. The comments were reviewed, and advice of specialist consultants had been sought to add this advice into the plan.
18/9/19	DBCA	Site Visit and discussion of Management Plans.	Describe and assess the likely effectiveness of measures proposed to avoid and/or mitigate the direct and indirect impacts of the proposed action on dieback management procedures. The advice of specialist consultants had been sought to identify measures to reduce the impacts and plans have been updated as per the advice of the department.
23/9/19	EPA/DBCA	Discussion of Management Plans	Review Management Plan
3/10/19	EPA	Comments EPA	Update Management Plans with comments from EPA

6 References

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7 Appendices

Appendix A – Environmental Pathogen Management Procedure

Environmental Pathogen Management Procedure

This procedure describes:

- The environmental pathogen management / hygiene procedures which must be adhered to during potential soil moving operations
- Forms:
  - ENV F020 - Plant and Vehicle Hygiene Form
  - ENV F035 - Clean on Entry Record Sheet
- Diease Hygiene Management Plan
  - ENV-MP-0003 Disease Hygiene Management Plan

This procedure is used by:

- All Talison personnel
- All contractors and visitors to the site

Environmental Pathogen Management Procedure

Issue No	Issue Date	Document Author	Issue Amendments
1	11/17	L. Perenzin	First issue
2	10/19	G. Mountford	Second issue – aligned with Ministerial Statement 1111

Reviewed By *G Mountford & T Mitchell* Date

Authorised By *B.Vernon* Date

TASK & PURPOSE

Talison's responsibilities include the protection of state forest area within the mining tenements across all projects for which Talison is responsible. Talison recognises that Phytophthora Dieback *(Phytophthora cinnamomi)* and marri canker (*Quambalaria spp*.) diseases pose a significant threat to the conservation, cultural and economic values of land in the South West. Unless necessary care is taken, construction, mining and exploration activities can spread these pathogens and weeds into areas which would not otherwise be contaminated. The program for managing pathogens is relevant for all areas on and off the mine site.

PATHOGEN MANAGEMENT PROGRAM

The aim of the pathogen management program on site is to reduce the possibility of spreading dieback, marri canker and weeds to areas where they currently are not. This can be achieved by following the conditions below:

- Employing current pathogen occurrence maps.
- Understanding the problems caused by these pathogens.
- Using appropriate risk-reduction techniques and compliances for all operations, stated in Hygiene Management Plans.
- Ensure all personnel involved in those activities are trained in following risk-reduction tactics.

Vehicle Hygiene Management – Entering and Exiting Site

Entering Site

Prior to bringing any vehicle, plant or machinery (**Equipment**) to site, the responsible Talison Supervisor must ensure that the equipment complies with the conditions outlined below:

- Provide relevant documentation (ENV-MP-0003, ENV F035 and ENV-F020) to contractors and ensure they are aware of their commitments in line with this documentation.
- Equipment inspected and Vehicle Hygiene form ENV-F020 completed and signed off by the responsible Talison supervisor.
- ENV-F020 is to be submitted to and signed off by the environmental department.
- This process must be followed for any equipment that has previously been inspected but has been offsite conducting works at another location.
- If a piece of equipment does not meet the requirements under ENV-F020 it can be directed to the Gate 2 washdown facility to be decontaminated.

Exiting Site

Prior to any piece of equipment demobbing from site, the responsible Talison supervisor must ensure that the equipment complies with the conditions outlined below:

- Equipment inspected and Vehicle Hygiene form ENV-F020 completed and signed off by the responsible Talison supervisor.
- ENV-F020 is to be submitted to and signed off by the environmental department.
- If a piece of equipment does not meet the requirements under ENV-F020 it can be directed to the Gate 2 washdown facility to be decontaminated.

Exceptions

It is assumed that Talison and regular contractor light vehicles driven by trained personnel (DWG Inc Green Card) coming and going from the mine site wash-down as required. Completion of vehicle hygiene a form is not required in this instance, however if any vehicle is noted by a Talison Supervisor or Environmental Officer to be in an unhygienic condition it is to be directed to a washdown station.

Couriers making deliveries to the minesite are not required to washdown. Trucks hauling product to Bunbury & Fremantle Ports have alternative vehicle hygiene procedures.

Dieback Management Zones

Phytophthora Dieback interpretation surveys have been conducted for all operational areas and occurrence maps are maintained by the environmental department and can be requested as required. The boundaries demarcated during Phytophthora Dieback occurrence mapping are valid for 12 months and are required to be re-assessed after this period using the re-check assessment method. The entire assessment must be repeated using the comprehensive assessment method after 3 years. Refer Appendix A for latest map.

Dieback interpretation areas are classified as below:

- Infested – Show symptoms of plant disease.
- Uninfested – Free from dieback (must be protected).
- Uninfested/Unprotectable – Uninfested areas less than 4 hectares in size that are surrounded by infested area.
- Uninterpretable – Too few susceptible species available to interpret status, treat as uninfested on entry and infested on exit.

In order to effectively control the spread of dieback within the MDE dieback management zones (**MZs**) need to be identified. A number of control measures are then implemented including; Clean on Entry points (**COEs**), Mobile Washdown Units (**MWUs**), Green Bridges, Exclusions Zones, Signage and Demarcation Lines.

COE Point into Uninfested Areas

Only designated COE points are to be used for entry to uninfested areas with MZs. The COE locations are to be predetermined and clearly outlined on maps specific to the work taking place. Each COE will require the following items;

- Signage clearly identifying the COE number
- Pre-mixed boot, tyre and hand tool (eg shovels) decontamination solution in pump pack
- Broom and brush for dry clean down
- Boot scrubber and boot bath
- Clean on Entry Record Sheet (ENV-F035)
- Additional high pressure MWU when required

COE points are to be constructed to the following standards:

- The clean-down point will provide a physical separation between the object being cleaned and the effluent being produced;
- The point will provide easy and safe access for both the placement of the object to be cleaned and the operator conducting the clean down;
- The cleandown pad will be a hard surface, that will not deteriorate and can be easily cleaned, allowing equipment and vehicles to exit clean-down pad without becoming re-contaminated;
- The site allows the effluent to fall directly onto infested soil or in a construction able to capture the effluent for the later transportation and disposal;
- A location for large vehicles and equipment to turnaround and exit the area if on inspection they are not clean or cannot be effectively cleaned in the field. These vehicles should then return to a designated wash-down station for thorough cleaning;
- Any cleaned objects must be allowed to enter the uninfested area without coming into contact with infested materials; and
- Clean down involves brushing down using hard brushes, or washing down using high pressure low volume water jets.

Active COE points will be inspected daily be the environmental department to collect paperwork, renew consumables and ensure compliance.

No piece of equipment or person is to proceed past a designated COE point without signoff of ENV-F035 by an authorised and green card qualified person.

Preventing Cross Contamination when Accessing Infested Areas

Vehicles, machinery, equipment, foot-ware and sample bags can enter uninfested areas when they are clean and be used to carry out a range of activities over time within that area without the need for further cleaning provided they do not come into contact with infested soil. Cross contamination is being managed by:

- The use of demarcation systems and buffer zones to ensure that vehicles and equipment do not cross inadvertently into infested areas;
- Ensuring that drainage, soil and plant material from the infested areas does not enter the uninfested areas; and
- Limit entry to periods when the soil is not moist enough to be picked up and moved by vehicles and equipment.

New Track Construction into Uninfested and Infested Areas

Managing disease when building a new track into an uninfested area is a critical element in the long-term protection of the area. Light vehicle and machinery access to new tracks can be provided with appropriate attention to the hygiene requirements, provision of clean-down facilities and signage.

Specifically for Dieback infested areas, the construction equipment will work from inside the uninfested area towards the boundary of the infested area. Dieback information signs and demarcated boundaries may need to be set in uninfested area.

Entry into Uninterpretable Areas

Areas that are uninterpretable are to be treated as uninfested areas when entering and infested areas when exiting. Equipment must proceed through a desidnated COE point when entering uninterpretable areas.

Greenbridge Purpose & Design

Greenbridges are designed to act as a physical barrier between infested or uninterpretable soil and equipment traversing the area. They may be used as an alternative to having COE points, when a carrier needs to frequently move between infested and uninfested patches.

Greenbridges are constructed using dieback-free material such as quarried blue metal ballast, gravel, shale and crushed limestone, spread to a minimum depth of 100mm and a width of 12m wide. Greenbridges will be clearly demarcated and no equipment is to leave the grennbridge other than through the desiginated entry and exit points.

Demarcation Zones

The boundaries between infested and uninfested areas have been marked out by registered dieback interpreters using pink tape with the knots tied facing the infested area and placed approximately 20 m from the disease front to provide the required buffer zone.

A buffer zone will be marked out for areas that are intended to be cleared, these are demarcated using pink tape and white tape in conjunction.

Exclusions zones have been identified and sign posted, no equipment is to proceed past these signs without consulting the environmental department.

Training Requirements

Information on dieback and vehicle hygiene is delivered to employees at the site induction. Updates to information or procedures related to dieback management are delivered through the site “Toolbox” education system.

For larger projects such as extensive clearing activities, exploration drilling, road construction, powerline construction or anything else not considered usual operations a project specific environmental induction must be completed by all personal involved. These inductions are to be developed and delivered by the environmental department as required.

Green card training is required for any individual who will be inspecting and washing down equipment at COE points. It is also recommended that Talison and contractor supervisors complete the green card training to provide greater awareness and understanding of the importance of dieback control.

Appendix A - Current Dieback Status – Clearing Area 2019 and control Zones

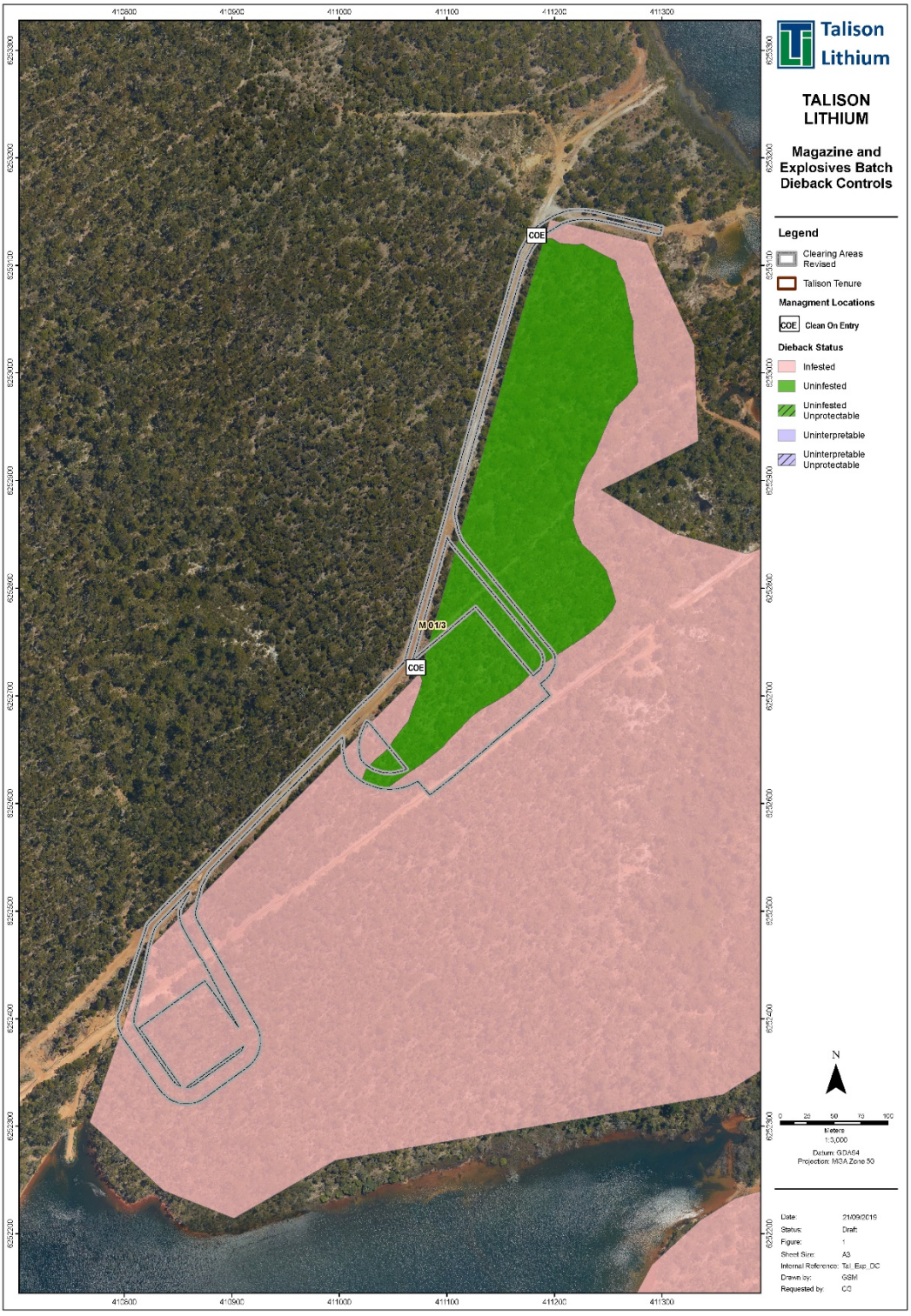

Figure 1- Magazine & Explosives

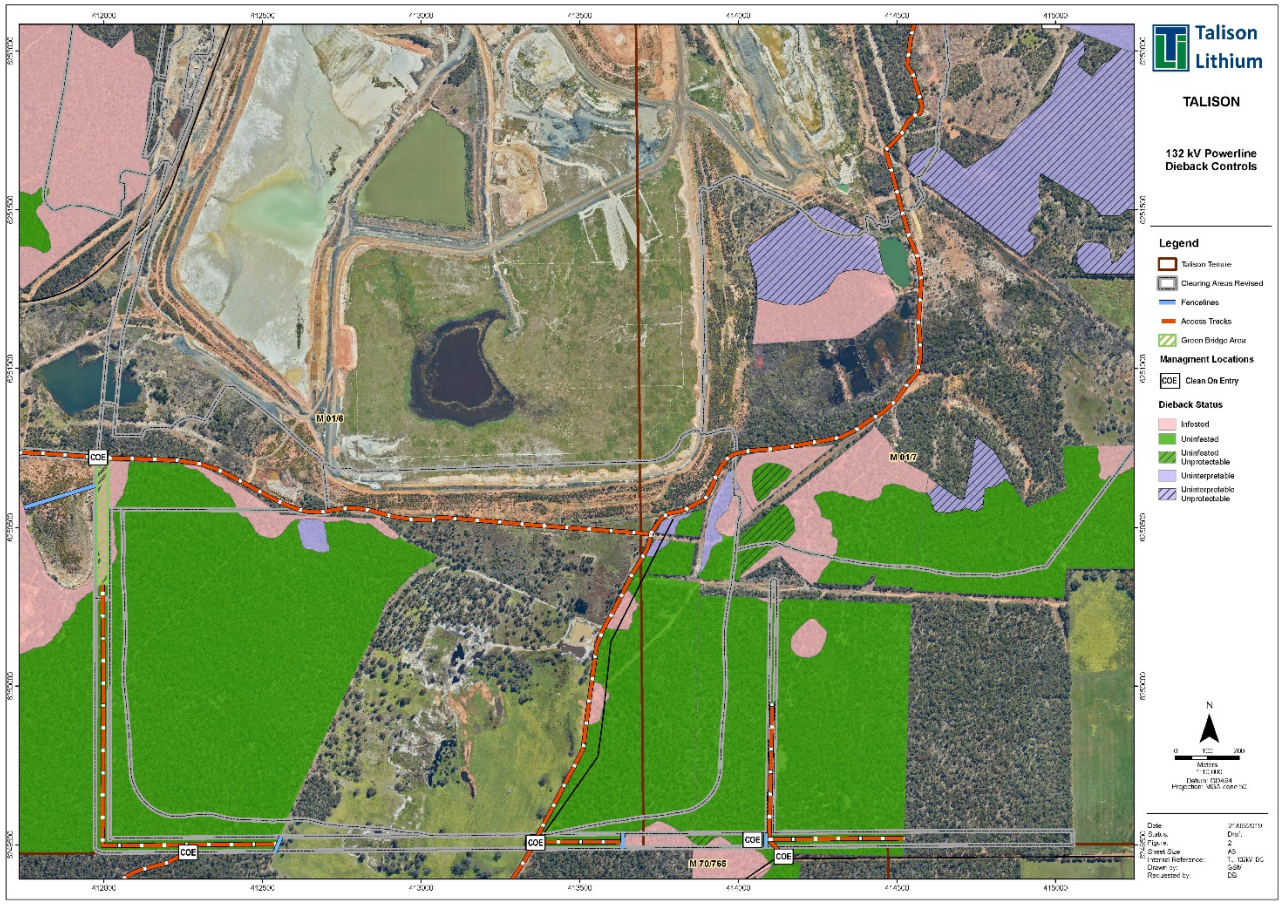

Figure 2 - Tailings Storage Facility 4

Environmental Pathogen Management Procedure

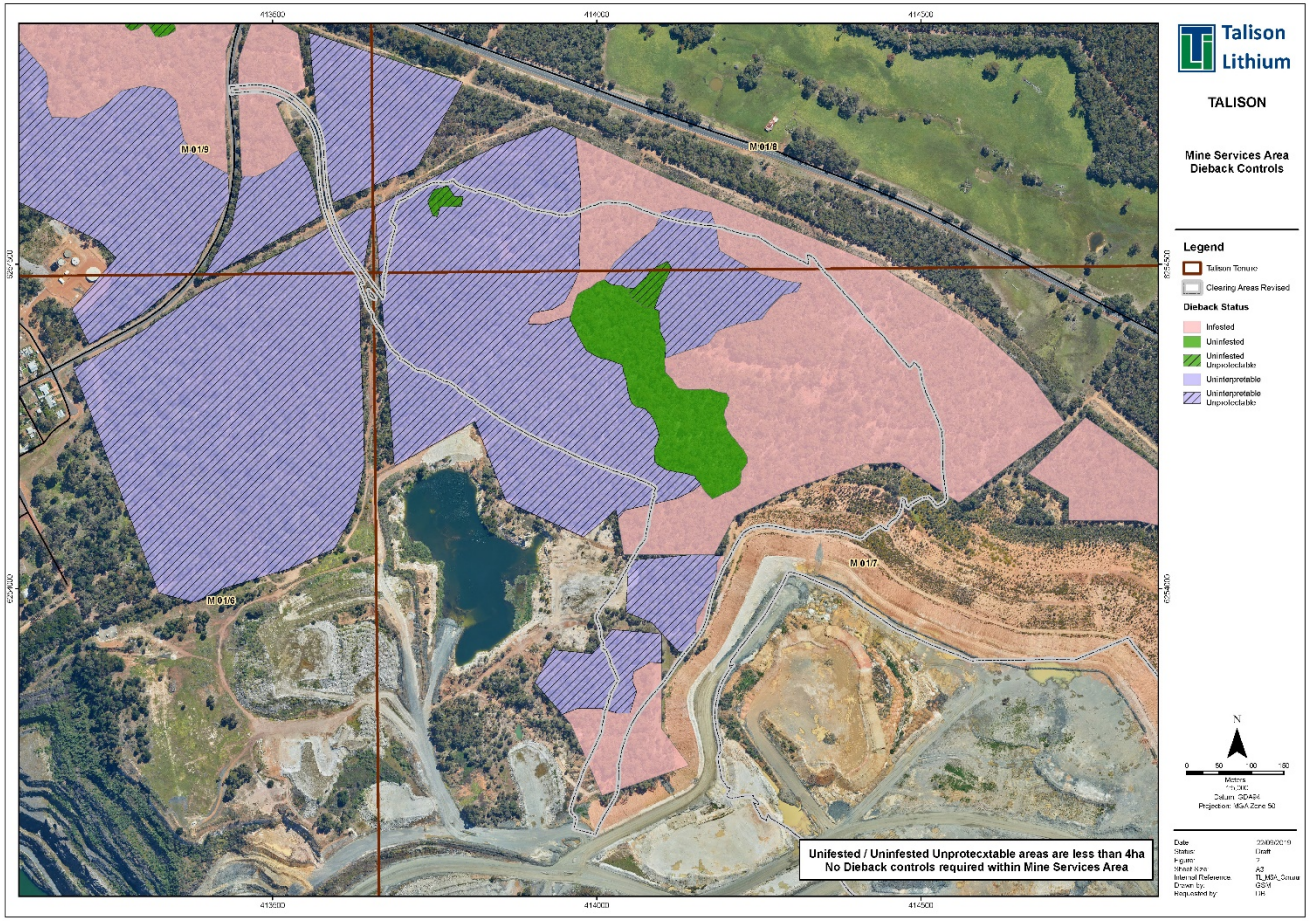

Figure 3-Mine Services Facility

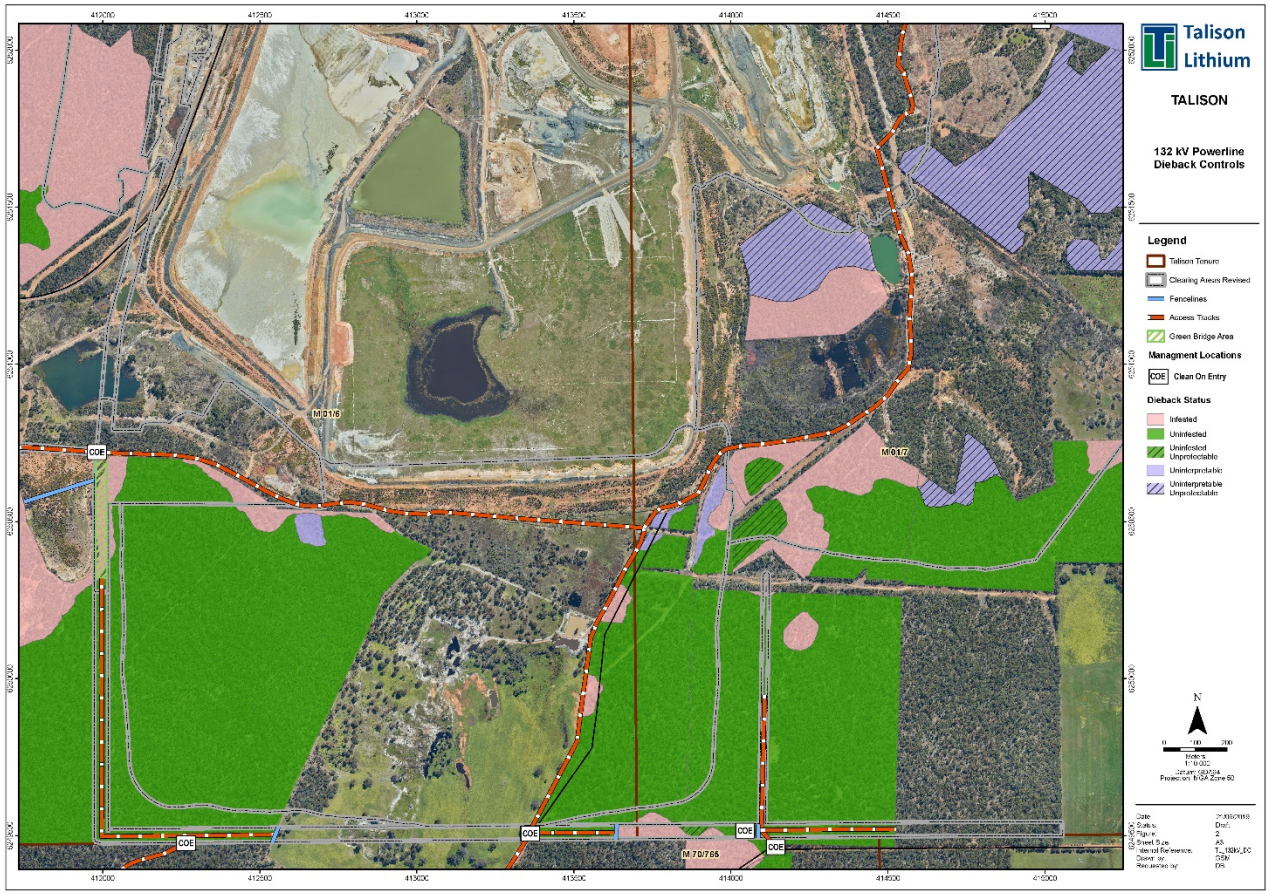

Figure 4 - 132kV Powerline

Appendix B - ENV F020 - Plant and Vehicle Hygiene Form

Plant and Vehicle Hygiene Form

Vehicle hygiene procedures are designed to protect the minesite and state forest from weeds and pathogens including dieback and marri canker.

This Plant and Vehicle Hygiene Form is to be completed for all vehicles, plant and machinery (**equipment**) that meet the below criteria:

- All equipment coming onto site for the first time
- Equipment returning to site after working in another location
- Equipment demobilising from site

Talison supervisors are responsible for ensuring that all contractor vehicles are inspected and washed prior to entering site. This form must be completed by the person responsible for bringing the equipment to site either a contractor or Talison employee. The form must then be signed off by the relevant Talison supervisor. If found to be non-compliant contact Environmental Department for instructions.

Section 1 - Please Complete "*ARRIVE CLEAN LEAVE CLEAN*"

Certificate
Soil, Leak, Weed, Seed & Feral Free

The purpose of this certificate is to demonstrate that this vehicle was inspected for the potential vector(s) listed. It is now certified free of leaks, soil or vegetative material that may carry animals, weeds, seeds, spores or pathogens onto the minesite or off the minesite.

Is vehicle/machine entering site?	Y/N	Is vehicle/machine leaving site?	Y/N

Vehicle/Plant/ Equipment	Make & Model	Identification Ie: Rego, Eng #	Person/Company	Site last used

This vehicle has been declared free of leaks, soil and vegetative material and other contaminants prior to entry to the Greenbushes mine site. To be signed by person responsible for bringing equipment onto site either contractor or Talison employee.

Date & Time	Signature	Date & Time	Person/Comany	Contact details

This vehicle has been declared free of leaks, soil and vegetative material and other contaminants prior to entry to the Greenbushes mine site. To be signed by the appointed Talison Supervisor

Name	Signature	Date & Time	Person/Comany	Contact details

For Internal Use – Environmental Department to Log in register

Environmental Department	Signature	Date	Log Number
Name			

Section 2 - Standard Vehicle Hygiene Checklist

Tick checklist as applicable Check and washdown as required		Initial		
Item	**Type/Examples**	**Not Applicable**	**Not Compliant**	**Compliant**
Scrub bars, sidesteps	Front, Rear, Side			
Fenders:	Front, Rear, Side			
Radiator area				
Belly plates / Underside Protection				
Bucket /blade /forks				
Rippers				
Suspension				
Spare wheels				
Wheels / tracks				
Mud flaps				
Flat sections	Esp. horizontal			
Cupped sections				
Chassis areas	H- or C- sections			
Hinged Points:	Esp. articulated areas e.g. FEL / Truck/ Crane/ Excavator arm			
Leaks:	Oil, Coolant, Grease			
Spill kit(s)	(e.g. Hydrocarbon)			
Water Tanks:	Potable /Treated /Untreated/ Capacity			

Trailer(s)	Light/ Heavy/ Number/Capacity/Type			
Cargo space				
Cabin; front	Floor and seats			
Cabin; rear	Floor and seat			
Floor mats				

Appendix C - ENV F035 - Clean on Entry Record Sheet

Clean on Entry Record Sheet

COE Num/Location:_____ Talison Project Supervisor:_____ Contact Number: _____

All equipment and personnel must be inspected and found to be compliant by an authorised hygiene supervisor who has completed dieback green card training before proceeding past COE point. If a hygiene supervisor is not present please contact the Talison Project Supervisor on the number above or the Talison environmental department. After hours and on weekends please contact the Talison Project Supervisor.

Equipment/Personnel entering site	Vehicle Clean (Y or N)	If not clean provide details of decontamination process.	Authorised Hygiene Supervisor	Date	Time	Signature

Please return completed record to the Environmental Department