Iron Bridge

Plan

Iron Bridge weed management plan

Environment

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Iron Bridge weed management plan			
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ACRONYMS

The following acronyms have been used throughout the Plan and are defined in Table 1.

Table 1: Acronyms

Acronym	Definitions
BMS	Business Management System
DBCA	Department of Biodiversity Conservation and Attractions
DPIRD	Department of Primary Industries and Regional Development
EPA	Environmental Protection Authority
PaWS	Parks and Wildlife Service (within DBCA)
WAOL	Western Australian Organism List
WONS	Weeds of National Significance

1. INTRODUCTION

Fortescue Metals Group (Fortescue) is an integrated business comprised of mine, rail and port operations based in the Pilbara region of Western Australia. An unincorporated joint venture between subsidiary group FMG Iron Bridge (Aust) Ltd and Formosa Steel IB Pty Ltd (Formosa) are currently developing the North Star Magnetite Project (the Project), located approximately 145 kilometres south of Port Hedland.

The North Star Magnetite mine comprises an open cut iron ore mine site and associated infrastructure, including roads, administration buildings, accommodation camp, aerodrome, and borefield.

1.1 Objective and scope

The objective of this Iron Bridge weed management plan (this Plan) is to identify weed management and monitoring measures to minimise the introduction and spread of weeds established within, and adjacent to, the North Star mine.

This Plan employs an integrated approach to weed management across the North Star mine using both species-led and asset-protection-based elements. The species-led elements prioritise weed species for their invasiveness, ecological impacts, potential and current distribution and feasibility of control (consistent with the weed prioritisation approach employed by DBCA, see Section 1.2). Widespread weeds that are not reasonably feasible to eradicate or contain to a manageable size (e.g., in terms of resource availability and safety constraints) are accounted for via the asset-protection-based approach that identifies Weed risk areas where infrastructure and important environmental receptors currently intersect, and where the greatest risk of degradation to these receptors from weed infestation occurs on site (see Section 1.3). Management of weeds within these areas have the greatest biodiversity benefit and cost effectiveness.

The environmental outcomes and measures/targets of this Plan, that are commitments made in the North Star Stage 2 (Amendment 2) Mining Proposal (NS-AP-EN-0012; Reg ID 93044), are detailed in Table 2.

Table 2: Environmental outcomes and management targets

Project	Management approach	Environmental outcome	Measure / target
Iron Bridge Mine	Outcome-based	Introduction or spread of weeds minimized within disturbed areas of the MDE.	No statistically significant1 increase in weed species diversity within impact sites over two monitoring events compared to the increase in weed species diversity within the reference sites AND where subsequent investigation determines that the impacts are likely a result of the implementation of the proposal. No statistically significant increase in total weed cover within impact sites over two monitoring events compared to the increase in total weed cover within the reference sites AND where subsequent investigation determines that the impacts are likely a result of the implementation of the proposal.

[1] Significant refers to where an increase is found to be different statistically, by univariate or multivariate analysis (i.e. T-test, ANOVA).

1.2 Definition of priority weed species

Fortescue's weed management activities in part place greater emphasis on priority weed species given their prior recognised invasiveness, high ecological impacts, and/or designation as a high threat to the environment via national, state and regional approaches. Fortescue defines priority weed species as:

- Weeds of National Significance (WoNS).
- Declared Pests that require management within the Local Government Area(s) where the Fortescue controlled site is located.
- Environmental Weeds rated by PaWS with an ecological rating of High or Unknown and invasiveness rating of Rapid or Moderate within the Pilbara Ranking Summary. Environmental weeds rated as High or Unknown and Rapid or Moderate considered important for pastoralists purposes (e.g. Buffel grass and Birdwood grass) are only Priority Weeds within pastoral exclusion areas.
- Weeds that have not been recorded in the Pilbara as Declared Pests or Environmental Weeds within the Pilbara Ranking Summary and have been determined to be introduced into the project area as a result of the implementation of the proposal.
- Weeds that have not been recorded in the Pilbara as WoNS, Declared Pests, or Environmental Weeds within the Pilbara Ranking Summary and have been determined to be introduced into the project area because of the implementation of the proposal.
- New weed species that were not identified during the baseline surveys or within the surrounding area (up to 50 km beyond the project boundary).

The definition of Priority Weed Species will be reviewed when changes are made to the WoNS, Declared Pests, or Environmental Weeds listings.

1.2.1 Weeds of National Significance

The Australian and State/Territory governments have agreed on a list of 32 Weeds of National Significance (WoNS), based on the weed species' invasiveness, impacts, potential to spread and socio-economic and environmental values. The full list of WoNS can be accessed at http://www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html. The WONS list is currently managed by the Department of Primary Industries and Regional Development (DPIRD).

The WoNS list is complimented by the National Environmental Alert List, a list of 28 non-native weeds that have established populations in the wild. Species were identified for the Alert List based on three criteria: posing a high or serious potential threat to the environment; having limited distribution within Australia at present; and being amenable to successful eradication or containment programs.

1.2.2 Declared pests

The Western Australian Organism List (WAOL) classifies organisms under the *Biosecurity and Agriculture Management Act 2007* (BAM Act), into four categories:

- Declared Pests (section 22).
- Permitted (section 11).
- Declared pest - Prohibited (section 12).
- Permitted Requiring a Permit (73, BAM Regulations 2013).

Under the BAM Act, Declared Pests are listed in one of three categories:

- The C1 category (Exclusion) – Pests will be assigned to this category if they are not present in Western Australia and control measures are to be taken, including border checks, in order to prevent them entering and establishing in the State.
- The C2 category (Eradication) – Pests will be assigned to this category if they are present in Western Australia in low enough numbers or in sufficiently limited areas that their eradication is still feasible.
- The C3 category (Management) – Pests will be assigned to this category if they are established in Western Australia but is feasible, or desirable, to manage them in order to limit their damage. Control measures can prevent a C3 pest from increasing in population size or density or moving from an area in which it is established into an area which currently is free of that pest.

Unlisted organisms have not been declared by the Minister for Agriculture and Food, and therefore permission is required before they can be brought into the State for assessment.

1.2.3 Environmental weeds

PaWS ranks weeds for each region through the Weed Prioritisation Process for DPAW – “An integrated approach to Environmental Weed Management in WA on DPAW managed Lands”. The process ranks weeds based on their current and potential distribution, survey effort, abundance, ecological impact, impact attributes, invasiveness, feasibility of control, general trend and status. Within each region each species has been ranked by ecological impact, as one of the following:

- Alert – Priority Alert.
- H – High.
- M – Medium.
- L – Low.

- U – Unknown.

Priority Alert refers to those species identified through the regional weed prioritisation process as being either not found in Western Australia, not found in the DBCA Pilbara Region but known to exist in an adjacent region or found in the region but not on DBCA managed lands or water.

Within each region each weed species have also been ranked by invasiveness, which is the rate of spread in native vegetation, encompassing factors of establishment, reproduction and long-distance dispersal (>100 m). Invasiveness rankings include:

- R – Rapid.
- M – Moderate.
- S – Slow.
- U – Unknown.

The full Pilbara ranking for environmental weeds can be accessed at https://www.dbca.wa.gov.au/parks-and-wildlife-service/threat-management/plant-diseases/weeds.

The priority weed species recorded at the Iron Bridge mine are identified in the Table 3.

Table 3: Priority weed species recorded at Iron Bridge mine and their status as Weeds of National significance, Declared pests and environmental weeds

Species	Common name	Weed of national significance	Declared pests - WOAL	Environmental weeds – DBCA	Priority weeds (Fortescue)	Iron Bridge mine[2]
**Aerva javanica*	Kapok Bush		Permitted	H (R)	Yes	Yes
**Alternanthera pungens*	Khaki Weed		Permitted	L (S)	No	
**Amaranthus viridis*			Permitted	L (S)	No	
**Argemone ochroleuca*	Mexican Poppy		Permitted	U (R)	Yes	Yes
**Asphodelus fistulosus*	Onion Weed		Permitted	U (R)	Yes	
**Bidens bipinnata*[3]	Bipinnate Begger's Tick		Permitted	U (R)	Yes (Pastoral exclusion areas only)	Yes
**Bidens pilosa*	Cobbler's Peg		Permitted	U (R)	Yes (Pastoral exclusion areas only)	
**Bidens subalternans*			Permitted	Not listed	Yes (Pastoral exclusion areas only)	Yes
**Bothriochloa pertusa*	Indian Bluegrass		Permitted	Not listed	No	
**Calotropis procera*	Rubber Tree		Declared Pest	ALERT	Yes	Yes
**Cenchrus ciliaris*	Buffel Grass		Permitted	H (R)	Yes (Pastoral exclusion areas only)	Yes
**Cenchrus echinatus*	Burrgrass		Permitted	M (R)	No	
**Cenchrus setaceus*	Fountain Grass		Permitted	Not listed	No	

[2] *Cucumis melo* subsp. *agrestis* and *Portulaca oleracea* were recorded and identified as weeds within the mine area in the North Star Magnetite Project Public Environment Review, August 2013, however they are not considered a weed based on subsequent taxonomic updates.
[3] *Bidens bipinnata* is currently under assessment by the WA Herbarium, with recent changes to Florabase resulting in *Bidens bipinnata* being restricted to eastern Australia.

Species	Common name	Weed of national significance	Declared pests - WOAL	Environmental weeds – DBCA	Priority weeds (Fortescue)	Iron Bridge mine[2]
**Cenchrus setiger*	Birdwood Grass		Permitted	H (R)	Yes (Pastoral exclusion areas only)	Yes
**Chenopodium album*	Fat Hen		Permitted	Not listed	No	
**Chloris barbata*	Purpletop Chloris		Permitted	H (R)	Yes	
**Chloris virgata*	Feathertop Rhodes Grass		Permitted	H (R)	Yes	Yes
**Citrullus amarus*	Afghan Melon		Permitted	U (M)	Yes	
**Citrullus colocynthis*	Colocynth		Permitted	U (M)	Yes	
**Citrullus lanatus*	Pie Melon		Permitted	U (M)	Yes	Yes
**Cleome aculeata*			Not Listed	Not listed	Yes	
**Conyza bonariensis*	Flaxleaf Fleabane		Permitted	Not listed	No	
**Crotalaria juncea*	Sunn-hemp		Permitted	Not listed	No	
**Cynodon dactylon*	Couch		Permitted	H (R)	Yes	
**Cyperus involucratus*	N/A		Not listed	Not listed	No	
**Cyperus polystachyos*	Bunchy Sedge		Permitted	U (U)	No	
**Datura leichhardtii*	Native Thornapple		Permitted	U (U)	No	
**Digitaria ciliaris*	Summer Grass		Permitted	L (S)	No	Yes
**Echinochloa colona*	Awnless Barnyard Grass		Permitted	H (R)	Yes	
**Eragrostis minor*	Smaller Stinkgrass		Permitted	Not listed	No	
**Euphorbia hirta*	Asthma Plant		Not listed	L (S)	No	
**Indigofera oblongifolia*			Permitted	Not listed	No	Yes
**Flaveria trinervia*	Speedy Weed		Not listed	Not listed	No	Yes

Species	Common name	Weed of national significance	Declared pests - WOAL	Environmental weeds – DBCA	Priority weeds (Fortescue)	Iron Bridge mine[2]
**Lactuca serriola*	Prickly Lettuce		Permitted	Not listed	No	
**Lysimachia arvensis*	Scarlet Pimpernel		Permitted	Not listed	No	
**Macroptilium atropurpureum*	Purple Bean		Permitted	Not listed	No	
**Malvastrum americanum*	Spiked Malvastrum		Permitted	H (R)	Yes	Yes
**Melinis repens*			Permitted	Not listed	No	
**Opuntia* spp.	Prickly Pear	WONS	Declared Pest	H (R)	Yes	
**Oxalis corniculata*	Yellow Wood Sorrel		Permitted	Not listed	No	
**Parkinsonia aculeata*	Parkinsonia	WONS	Declared Pest	H (R)	Yes	
**Paspalum urvillei*	Vasey Grass		Permitted	Not listed	No	
**Passiflora foetida*	Stinking Passion Flower		Permitted	H (R)	Yes	Yes
**Portulaca pilosa*	Djanggara		Permitted	Not listed	No	Yes
**Rumex vesicaria*	Ruby Dock		Permitted	H (R)	Yes	
**Setaria verticillata*	Whorled Pigeon Grass		Permitted	H (R)	Yes	
**Sigesbeckia orientalis*	Indian Weed		Permitted	U (R)	Yes	
**Solanum lycopersicum (*formerly **Lycopersicon esculentum)*	Tomato		Permitted	Not listed	No	
**Solanum nigrum*	Black Berry Nightshade		Permitted	L (R)	No	
**Sonchus oleraceus*	Common Sowthistle		Permitted	L (R)	No	Yes
**Stylosanthes hamata*	Verano Stylo		Permitted	H (M)	Yes	
**Tamarix aphylla*	Athel Pine		Declared Pest	H (R)	Yes	
**Tribulus terrestris*	Caltrop		Permitted	U (M)	Yes	

Species	Common name	Weed of national significance	Declared pests - WOAL	Environmental weeds – DBCA	Priority weeds (Fortescue)	Iron Bridge mine[2]
**Tridax procumbens*	Tridax		Permitted	Not listed	No	
**Vachellia farnesiana*	Mimosa Bush		Permitted	H (R)	Yes	

1.3 Weed risk areas

Fortescue has completed a risk assessment to identify weed risk areas across the Iron Bridge mine.

Weed risks areas were identified by intersecting infrastructure risk areas and environmental risk areas.

Infrastructure weed risks areas were identified by buffering the following infrastructure datasets by 100 meters to address edge effects:

- FMG infrastructure layers
- FMG mine pits boundaries
- Land Use Certificate areas (approved, completed and expired).

Environmental weed risks areas were identified by buffering the following infrastructure datasets by 100 meters:

- Creeks and rivers
- Conservation significant flora and fauna locations
- Significant fauna habitat

The resulting map (Figure 1) show where infrastructure and environmental risk currently intersect, and where the greatest risk from weed infestation occurs on site. Management of weeds within these areas have the greatest biodiversity benefit and cost effectiveness.

Periodic inspections of these weed risk areas are undertaken during operations (Table 6, Management action 1.6), and where new or extended populations of weed species are identified, the locations are appended to the weed dataset to inform management activity as per the actions in this Plan.

Designated weed mapping activities are also undertaken every two years informing updates to Fortescue's spatial datasets with the resulting maps updated during the next revision of this Plan.

1.4 Legislative and regulatory framework

Fortescue employees and contractors are obliged to comply with all relevant environmental Commonwealth and State legislation. Legislation directly relevant to the management of weeds in Western Australia is provided in Table 4.

Table 4: State and Commonwealth Legislation Relating to Weed Management

Legislation	Application
Biosecurity and Agriculture Management Act 2007 and Regulations 2013	Prevents new animal and plant pests and diseases from entering the state and manages the impact and spread of those pests already present in the State.
Biodiversity Conservation Act 2016 (WA)	Conservation and protection of biodiversity and biodiversity components. This Act will replace the *Wildlife Conservation Act 1950*.
Conservation and Land Management Act 1984 (WA)	Provides for the vesting or reservation of land for conservation purposes, and the ability to enter into agreements with private landholders and pastoral leases. It establishes a number of statutory bodies including the Conservation and Parks Commission.
Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)	Protection on environmental matters of national significance.
Environment Protection Act 1986 (WA)	Prevention, control and abatement or pollution and conservation protection and enhancement of environment.
Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (WA)	Regulates the clearing of native vegetation.
Rights in Water and Irrigation Act 1914 (WA)	Relates to rights in water resources, to make provisions for the regulation, management, use and protection of water resources, to provide for irrigation schemes and for related purposes.

1.5 Internal management plans and procedures

The following Fortescue documents should be read in conjunction with this Plan:

- *Weed Hygiene Procedure* (100-PR-EN-1055)
- *Weed Control Guideline* (100-GU-EN-0046)

2. ROLES AND RESPONSIBILITIES

All Fortescue employees and contractors are required to comply with the requirements of this Plan.

During construction stages, the Project Director will be accountable for ensuring the requirements of this Plan are met.

During operational, decommissioning and closure stages the General Manager is accountable for fulfilling the requirements of this Plan.

Where responsibilities are delegated, this must be clearly recorded and communicated. In Table 6 specific Management Actions have been attributed to the appropriate personnel.

RASCI is used to denote:

R-Responsible	Those who do the work to achieve the task.
A-Accountable	Those who are ultimately accountable for the completion of the deliverable or task and the one to whom the Responsible person is accountable.
S-Supportive	Resources allocated to the Responsible person and who will also assist in completing the task.
C-Consulted	Those whose opinions are sought, two-way communication.
I-Informed	Those whom are kept informed, one-way communication.

3. ENVIRONMENTAL MANAGEMENT

A series of environmental management objectives have been developed to mitigate environmental impacts associated with the spread of weeds on conservation values of conservation significant flora, vegetation and/or fauna habitat that could potentially be caused by the Iron Bridge mine. These are:

1. Identify the location of weed species as far as reasonably practical and ensure the potential for weed outbreaks is included in project planning. Particular focus is placed on priority weed species that present the greatest risk to environmental receptors as per the definitions provided in Section 1.2.
2. Establish management strategies to minimise the potential impacts of weeds on conservation values of conservation significant flora, vegetation and/or fauna habitat.
3. Develop weed monitoring programs that employ adaptive management methods to detect impacts arising from weed invasion on conservation values of conservation significant flora, vegetation and/or fauna habitat.

For each objective, management actions have been developed to ensure the impacts from the Iron Bridge mine are managed, and that appropriate monitoring, reporting and corrective action functions are implemented to support the successful implementation of the management actions. The key elements of the environmental management process associated with each objective are described in Table 5

Table 5: Key elements of environmental management process

Element	Definition/Description
Objective	What is intendent to be achieved?
Management Action	Tasks undertaken to enable the objective to be met.
Performance Indicator	Metrics for evaluating the outcomes achieved by Management Action.
Reporting/Evidence	Demonstrates that the Management Action has been applied and the outcome evaluated.
Timing	Period during which the Management Action should be undertaken.
Responsibility	Accountability for ensuring management action is completed. The responsible role is dependent on project timing.

The key management actions, performance indicators, evidence, timing and responsibility for each environmental management objective are provided in Table 6.

3.1 Managing environmental risk

Fortescue actively manages risk by undertaking an Annual Environmental Impact Risk Review. Although the review considers all environmental risks, there is a focus on the inherently moderate to high-risk impacts. The review considers the effectiveness of management actions that are currently in place for these impacts. The review also considers any relevant incidents that may have occurred, if the actions from incident investigations have translated into new

management actions, and generally considers the need for any new management actions to ensure lower risk targets can be achieved.

Table 6: Key management actions for weed management at Iron Bridge mine

Objective 1	Identify the location of priority weed species and ensure the potential for weed outbreaks is included in project planning				
Reference	**Management Action**	**Performance Indicator**	**Reporting/Evidence**	**Timing[4]**	**Responsibility**
1.1	Undertake targeted weed surveys in accordance with EPA Technical Guidance *Flora and Vegetation Surveys for Environmental Impact Assessment* and the *Flora and Vegetation Assessment Guidelines* (100-GU-EN-0005) to determine presence and distribution of weed species within the project area as far as reasonably practical within resourcing and safety constraints.	• Survey undertaken • GIS and PIMS updated	• Survey reports	Prior to relevant approval submission	Manager Environmental Approvals
1.2	Record weed species identified during a targeted weed survey in the Corporate GIS and PIMS in accordance with the *Environmental Datasets – Data Governance Guidelines* (100-GU-EN-0020).	• GIS and PIMS updated	• GIS dataset • PIMS record	Prior to relevant approval submission	Manager Environment Governance
1.3	Conduct a risk assessment to identify weed risk areas where weeds have the potential to quickly establish and/or have an impact on the conservation values of significant flora, vegetation and/or fauna and high-risk activities that have the potential to transport potentially infested material. Current weed risk areas are defined in Figure 1.	• Risk assessment conducted • Weed risk areas identified • Compliance with the Framework • See management targets in Table 2	• Risk assessment outcomes/report • GIS dataset	Prior to relevant approval submission	Manager Environment Governance
1.4	Conduct a desktop assessment for Land Use Certificate (LUC) applications in accordance with the *Land Use Certificate Procedure* (100-PR-TA-0001) to identify weed locations within the proposed disturbance area.	• Assessment conducted prior to disturbance • Compliance with the LUC Procedure	• LUC approval	During the LUC assessment	**Construction** – Manager Project Compliance **Operation** – Manager Environment Operations
1.5	Undertake weed mapping (See Section 1.3) every two years to ensure spatial data for presence and distribution of weeds in Fortescue controlled sites is up to date to enable effective weed management practices to be implemented.	• Weed mapping undertaken according to Timing • Spatial data is current and up to date • See management target in Table 2	• GIS dataset • Consultant report	Every two years during operations	Manager Environment Governance
1.6	Undertake periodic inspections of weed risk areas to ensure new or extended populations of weed species are identified and included in the site-specific weed control program (Action 2.4). New or extended populations of weed species will be included in the subsequent weed mapping activity with particular focus on priority weeds (Action 1.5).	• Periodic inspections of weed risk areas undertaken • New or extended populations of priority weed species recorded in the BMS Plant and Animal register • Control program updated with priority weed species identified • Weed mapping updated with new or extended populations of priority weed species	• Inspection checklist • Weed control program • Control report • BMS Plant and Animal record	**Unscheduled inspection** Ad hoc during operations **Scheduled inspection** Every two years during operations	Manager Environment Operations
Objective 2	**Establish management strategies to minimise the potential impacts of weeds on conservation values of conservation significant flora, vegetation and/or fauna habitat**				
Reference	**Management Action**	**Performance Indicator**	**Reporting/Evidence**	**Timing**	**Responsibility**
2.1	Ensure staff and contractors are provided with the appropriate training and information on weed management to minimise the potential impacts on conservation significant flora, vegetation and fauna habitat. Training may include: • General induction (delivery to all staff and contractors) • Site communications (pre-starts, site notices and toolboxes) (Delivery to relevant work groups). • System management (the use of LUCs and associated management conditions) (Delivery to relevant work groups).	• Inductions include weed management • Site communications delivered (may include toolbox presentations, pre-starts and site notices) • Toolboxes delivered • Where required LUC approval includes weed management measures	• Induction • Toolbox presentation • Training materials/ registers	Prior to new employee commencement Annually during operations	**Construction** – Manager Project Compliance **Operation** –Manager Environment Operations
2.2	Prior to conducting ground disturbance activities, ensure known locations of weed populations and weed risk areas are identified and management measures to minimise the potential for weed spread are included in the LUC. Ensure clearing is conducted in accordance with a permit issued under the *Land Use Certificate Procedure* (100-PR-TA-0001) and the *Ground Disturbance and Topsoil Management Procedure* (100-PR-EN-1042).	• LUC approval includes weed management measures where relevant • Clearing undertaken in accordance with the LUC approval	• LUC approval • LUC inspections	Prior to LUC approval	**Construction** – Manager Project Compliance **Operation** – Manager Environment Operations
2.3	Implement weed hygiene requirements for high risk vehicles, plant and equipment in identified weed risk areas and/or in areas where weed populations have been identified and high-risk activities are proposed to be undertaken as outlined in the *Weed Hygiene Procedure* (100-PR-EN-1055).	• Weed hygiene undertaken in weed risk areas and/or in areas where weed populations have been	• LUC conditions	**Identify high risk activity**	**Construction** – Manager Project Compliance

[4] Relevant approval submission may include an approval issued under the *Environmental Protection Act 1986*, *Environment Protection and Biodiversity Conservation Act 1999*, the *Mining Act 1978, the Rights in Water and Irrigation Act 1914* or the *Bush Fires Act 1954*.

		identified and high risk activities are proposed	• Completed inspection/ clean down checklists where required	During the LUC assessment **Implement hygiene requirements** Following completion of activity	**Operation** – Manager Environment Operations
2.4	Develop and implement a weed control program for priority weed species, and those weeds in identified weed risk areas in accordance with the *Weed Control Guidelines (100-GU-EN-0046)* as far as reasonably practical within resourcing and safety constraints.	• Control program developed • Control program implemented • See management target in Table 2	• Control Program • Control Report	Annually during operations	**Development** Manager Environment Governance **Implementation** Manager Environment Operations
Objective 3	**Develop weed monitoring programs that employ adaptive management methods to detect impacts on conservation values of conservation significant flora, vegetation and/or fauna habitat**				
Reference	**Management Action**	**Performance Indicator**	**Reporting/Evidence**	**Timing**	**Responsibility**
3.1	Implement a weed monitoring program to determine the effectiveness of the weed management strategies and weed control program.	• Weed monitoring program implemented • Weed monitoring undertaken in accordance with the required frequency • See Table 2 for management targets	• Weed monitoring program •	Every two years during operations	**Development** Manager Environment Governance **Implementation** Environment Operations Manager
3.2	Undertake a baseline weed survey of weed monitoring sites prior to the first monitoring event to: • Document all weed species within impact and reference sites • Identify the baseline for existing weed species at impact and reference sites • Compare weed occurrence between impact and reference sites.	• Baseline survey undertaken for all monitoring site locations • Baseline survey undertaken prior to first monitoring event	• Baseline monitoring report	Prior to the first monitoring event	**Construction -** Project Manager **Operations -** Manager Environment Governance
3.3	Where monitoring results indicate: • a potential impact on conservation values of conservation significant flora, vegetation and/or fauna habitat Implement corrective actions defined in Table 9. Update the following to reflect the monitoring outcomes: • the weed mapping dataset and the weed control program • the Plan where required, to inform an adaptive management approach to weed management across the business.	• No significant impact on conservation values of conservation significant flora, vegetation and/or fauna habitat • Corrective actions implemented • Weed mapping and weed control program updated • The Plan is updated	• Weed monitoring report • Corrective actions • Updated Management Plan	When required in response to monitoring outcomes, within 21 days of receiving the consultant's report	**Corrective actions – Construction/ Operation** Manager Project Compliance / Manager Environment Operations **Program and Plan updates** Manager Environment Governance

4. MONITORING GUIDELINES

A weed monitoring program is required to measure the effectiveness of the broad management actions outlined in the Plan. The outcomes of the monitoring program will contribute to ongoing improvements in management actions to ensure an adaptive management approach is adopted.

4.1 Objectives

The overall objective of the weed monitoring program is to monitor and measure the success of management actions to minimise impacts on conservation significant vegetation and flora.

The guiding objectives of the weed monitoring program include:

1. Develop and maintain an accurate record of weed populations within and adjacent to Iron Bridge mine.
2. Identify changes in the cover and diversity of weed species within the Iron Bridge mine.
3. Monitor and measure the success of management measures to inform an adaptive management approach.
4. Determine if changes in weed cover and diversity within Iron Bridge mine is a direct or indirect result of Fortescue activities or broader regional changes.

Monitoring will be informed by the findings of the monitoring itself as they become available. These findings may similarly lead to ongoing refinements to this Plan and its management strategies to ensure an adaptive management approach is undertaken during Fortescue activities.

4.2 Program summary

An effective long-term weed monitoring program may be adaptive. Innovations in monitoring techniques and methods should be incorporated into the program design over time. This would, however, be dependent on, and driven by, the quality and quantity of data collected from each site.

Monitoring program design should be based on replicable sampling at impact and reference sites. Each plot-based weed monitoring site will consist of three 10 m x 10 m quadrats.

A set of monitoring parameters and methods have been selected to provide broad coverage of changes in weed populations and distributions that can be expected under a range of different mining related impacts.

Where possible, initial baseline survey(s) have been conducted during the pre-construction phase to assess the cover and diversity of weed species prior to the first monitoring event.

Table 8 provides a summary of the weed species, methods, monitoring parameters and monitoring effort for all weed species monitored under the Plan.

4.3 Baseline survey

Baseline monitoring surveys should be undertaken for all monitoring sites to assess cover and diversity of the weed populations prior to the first monitoring event. The baseline surveys aim to:

- Document all weeds within impact and reference sites
- Identify the baseline for existing weeds at impact and reference sites
- Compare weeds between impact and reference sites.

Baseline sampling of weed populations will assist in the development of an effective site-specific monitoring program to determine if changes in weed cover and weed diversity are a direct or indirect result of Fortescue activities or broader regional change. Depending on when the baseline survey was undertaken monitoring methods and sites may vary.

Baseline weed monitoring for the North Star mine was completed in 2019 and included the installation and scoring of 12 potential impact and 8 reference sites (NS-00000-RP-EN-0006 – Appendix 1).

4.4 Monitoring site selection

An effective weed monitoring program should be based on replicable sampling at reference and impact sites:

- Control sites are sites that are not directly or indirectly impacted by the disturbance activities (away from disturbance)
- Impact sites are sites that are in close proximity to disturbance activities that are exposed to the direct and indirect effects of operational activities
- Adequate design to provide evidence of the effectiveness of management measures undertaken to achieve the objectives of the Plan:
    - minimise the potential impacts of weeds on conservation values of conservation significant flora, vegetation and/or fauna habitat
    - detect impacts on conservation values of conservation significant flora, vegetation and/or fauna habitat.

Appropriate control and impact monitoring sites should:

- Be located within a typical area in terms of weed species composition and cover determined by reviewing the existing survey and spatial data for the project area.
- Be located within areas where priority weed species (as defined in Table 3 of the Weed Management Plan) have been recorded.

- Have as many of the preferred habitat types for conservation significant fauna species represented in the monitoring program, with at least one monitoring site per representative habitat type, where possible. This should be reflected in both impact and control sites (1:1).
- Have conservation significant flora and vegetation units represented in the monitoring program, with at least one monitoring site per unit, where possible. This should be reflected in both impact and control sites.
- Use the type and variety of substrate, vegetation, topography, geographic extent and habitat variation to help determine the number and location of control and impact sites required.
- Employ the same design and monitoring methodologies at both impact and control sites and monitoring should be undertaken concurrently at both impact and control sites.
- Take into account availability of access to monitoring sites prior to their selection. This includes any potential land access problems such as their locations within pastoral leases, national parks/government land, third party tenement etc. All sites will need to be accessed at all times during monitoring and under all conditions (i.e. irrespective of climate and logistical issues). It is preferable that sites are established on Fortescue vested lands.
- Consider heritage sites when selecting monitoring sites to avoid access issues and potential impacts.
- Consider site project plans and Mine Plans when selecting monitoring sites to avoid relocation costs, and loss of data continuity.

4.5 Monitoring parameters and methods

A set of monitoring parameters and methods have been selected to provide a broad coverage of potential changes to weed cover and diversity that can be expected under a range of different mining related impacts. The advent of new technology may result in changes to sampling methods employed.

A summary of monitoring parameters and methods have been provided in Table 7.

Table 7: Weed monitoring parameters and methods

Monitoring Parameter	Method
Density	An estimate of density of each weed species within each monitoring site. Each monitoring site comprises of three 10m x 10m quadrats.
Species diversity	Count the number of different weed species present within each monitoring site. Each monitoring site comprises of three 10m x 10m quadrats
Individual species cover	Estimated cover class for each weed species within each monitoring site: 0% (0) <1% (1)

Monitoring Parameter	Method
	1-20% (2) 21-40% (3) 41-60% (4) 61-80% (5) 81-100% (6)
Total weed cover	Calculate total weed cover within each monitoring site: 0% (0) <1% (1) 1-20% (2) 21-40% (3) 41-60% (4) 61-80% (5) 81-100% (6)
Meteorological data	Data from Weather Stations installed near monitoring site locations
Environmental threats	Observation, mapping, photographs etc.
Photo point monitoring	Fixed photo points

Table 8 provides a summary of the monitoring program at the Iron Bridge mine.

Table 8: Summary of weed monitoring program at Iron Bridge mine

Design	Monitoring Parameters	Methods	Monitoring Effort	Frequency/Timing
Quadrats: Three 10 m x 10 m quadrats	Density	An estimate of density of each weed species within each monitoring site	Assessment per quadrat	**Frequency**: biennially **Timing:** 6-8 weeks post wet season (approximate timing)
	Species diversity	Count the number of different weed species present within each monitoring site		
	Species cover class	Estimate of cover class per weed species present within each monitoring site		
	Total weed cover	Calculate total weed cover within each monitoring site		
	Environmental Threats	Observation, mapping, photographs etc.		
	Meteorological data	Data from Weather Stations installed near monitoring site locations	One per operating site	
	Photo Point Monitoring	Fixed photo points	At least one per quadrat	

4.6 Monitoring program review

The overarching monitoring program will be technically assessed and reviewed upon acceptance of this Plan and then every three years thereafter. The main objective of the assessment and review will be to ensure that the methods, parameters and frequency used are considerate and appropriate to the findings of the monitoring programs. If no triggers are exceeded after three years, the frequency of monitoring will be reduced to a frequency supported by the review.

Monitoring sites may need to be adapted over time in response to project impacts.

The assessment and review will be undertaken by an independent Pilbara ecology expert with a relevant tertiary qualification and a minimum 10 years terrestrial Pilbara ecology experience.

Contingency actions and reporting requirements will be implemented where required.

4.7 Data handling and statistical analysis

Data will be handled in accordance with the data handling protocol established as part of the annual monitoring tender. The protocol will include the requirements as to data storage and protection, data extraction, quality control, analysis, interpretation, reporting and presentation. The protocol will also directly reference and align with the requirements detailed in *Document Control, Information Management* (100-ST-DC-001) and *Geographic Information Systems and Raw Data Guidelines* (100-GU-EN-0009).

Statistical analysis of monitoring results will be undertaken using univariate or multivariate analysis (i.e. T-test, ANOVA) to determine whether there is any statistical difference in the parameter values between impact and reference sites.

4.8 Contingency actions

Contingency actions will be initiated during construction, operational and decommissioning activities when an exceedance of a trigger is identified, and monitoring indicates that implemented management measures are not successfully mitigating impacts on conservation values of conservation significant flora, vegetation and/or fauna habitat and/or the management objectives are not being achieved.

Contingency actions for weed monitoring triggers have been developed in Table 9.

Table 9: Trigger Criteria and Associated Contingency Actions

Measure/target	Contingency actions

No statistically significant[5] increase in weed species diversity within impact sites over two monitoring events compared to the increase in weed species diversity within the reference sites
AND
where subsequent investigation determines that the impacts are likely a result of the implementation of the proposal.
 	
No statistically significant increase in total weed cover on impact sites over two monitoring events compared to the increase in total weed cover within the reference sites
AND
where subsequent investigation determines that the impacts are likely a result of the implementation of the proposal.
	After each monitoring event where a statistically significant increase has been recorded:
	• Re-examine applied monitoring parameters to validate they are operating within management levels
	• Cross reference weed monitoring results with the most recent environmental monitoring data (i.e. fauna/ surface water/ meteorological etc.) to determine whether the cause can be identified
	• Undertake a desktop assessment to determine whether the cause can be identified. Ground truth where required to validate findings.
	• Ensure two yearly weed mapping activity includes any results which demonstrate the exceedance may be a result of construction, operation or decommissioning activities.
	
	After an exceedance of a management target has been identified:
	• Re-examine applied monitoring parameters to validate they are operating within management levels
	• Ground truth the monitoring results to validate the findings of the assessment and/or determine/ identify what may be causing the exceedance. Where the cause is identified during ground truthing and can be rectified, undertake immediate action (this may include mechanical/hand removal of small weed populations). For actions which require alternative resources, schedule works to be undertaken as soon as possible (this may include weed control in accordance with the requirements of the Weed Control Guidelines.
	• Cross reference weed monitoring results with the most recent environmental monitoring data (i.e. fauna/ surface water/ meteorological etc.) to determine whether the cause can be identified/
	• Where the exceedance was not caused by construction, operation or decommissioning activities, resume standard monitoring.
	• Where the exceedance was caused by construction, operation or decommissioning activities:
	  ○ Review management measures with an adaptive management response
	  ○ Once management actions have been completed, undertake a subsequent monitoring event to verify parameters are within acceptable limits

[5] Significant refers to where an increase is found to be different statistically, by univariate or multivariate analysis (i.e. T-test, ANOVA).

5. COMPLIANCE

Fortescue ensures compliance with its legal obligations through first party quality assurance by site environment teams with a focus on effective environmental management through the corporate Environmental Management System (EMS).

Fortescue has adopted a risk-based approach to monitor compliance with its legal obligations. Site environment teams will monitor their compliance with this Plan and any site-specific management and monitoring programs using the *Environmental Compliance Obligation Management Procedure* (100-PR-EN-1046).

Where non-conformance issues are identified these will be documented and managed via Fortescue's Business Management System (BMS).

6. REPORTING

Fortescue will report against its compliance with the performance criteria (Table 2) in the Annual Environment report provided to the Department of Mines, Industry Regulation and Safety (DMIRS).

6.1 Biosecurity and Agriculture Management Act 2007

Where a declared pest is identified during a weed survey, weed mapping activity or weed monitoring event, the presence or suspected presence of the declared pest must be reported to the Director General in accordance with the requirements under Section 26 of the *Biosecurity and Agriculture Management Act 2007*.

The report:

(a) May be made in writing

(b) Must indicate where the declared pest is located

(c) Must be made as soon as practicable after finding the declared pest

(d) Must be made in accordance with the Biosecurity and Agriculture Management Regulations where applicable.

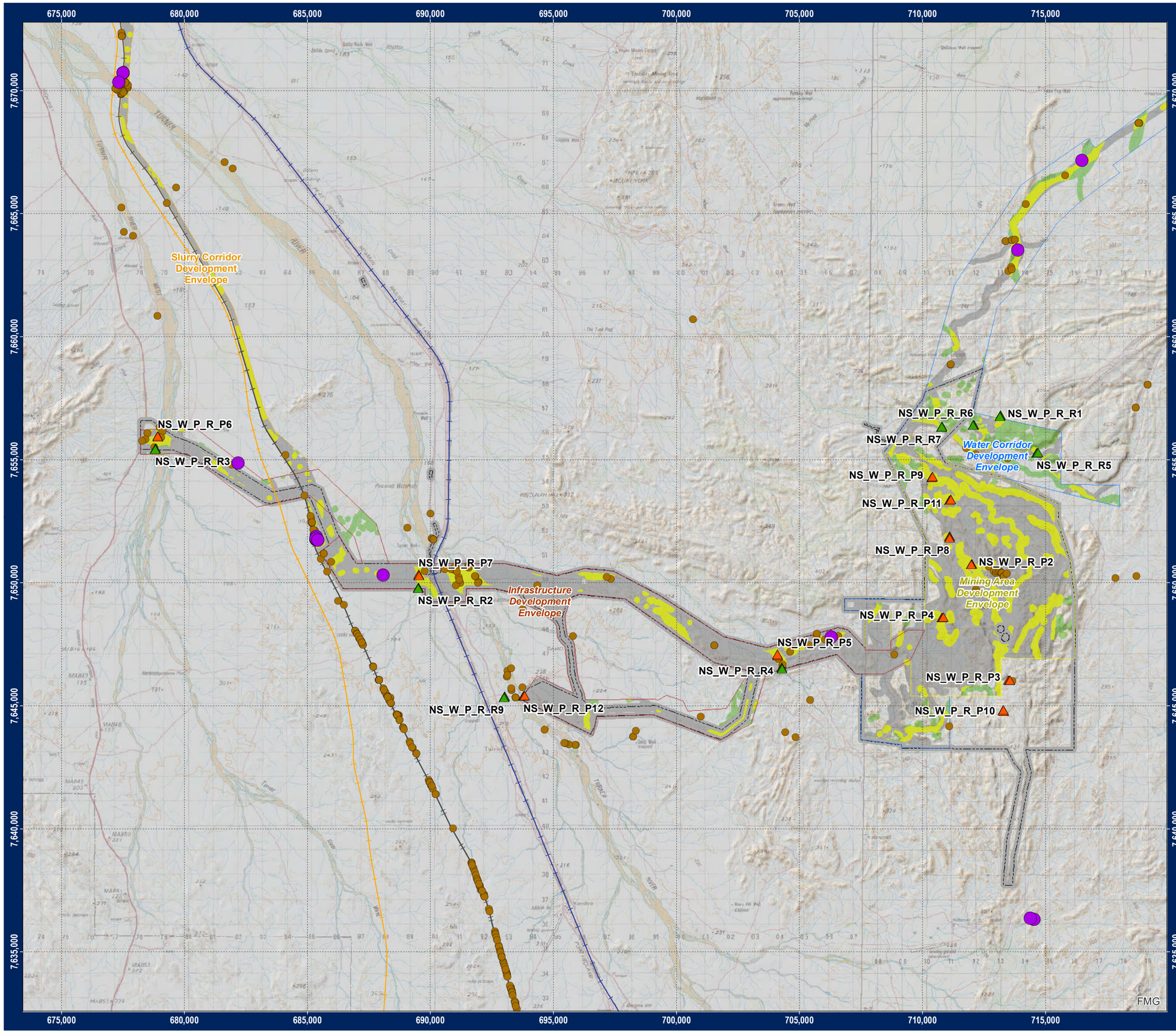
7. ADAPTIVE MANAGEMENT AND REVIEW

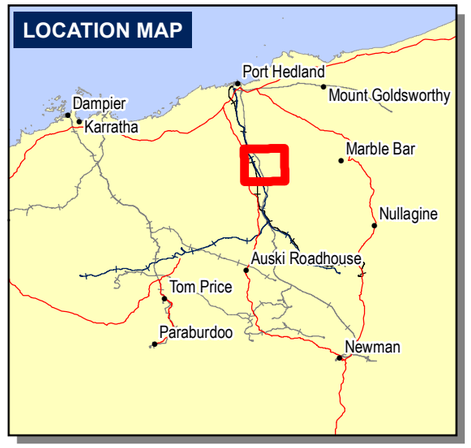
Fortescue will implement adaptive management practices to learn from the implementation of mitigation measures and monitoring. Adaptive management practices that will be assessed may include:

- Evaluation of the monitoring program to verify whether responses to project activities are the same or similar to predictions.
- Evaluation of assumptions and uncertainties of the vegetation health management and monitoring program.
- Re-evaluation of the risk assessment and revision of risk based priorities as a result of monitoring outcomes.
- Review of data and information gathered over the review period that has increased understanding of site environment in the context of the regional ecosystem.
- Review of management actions as the project matures and new management measures and technologies become available that may be more effective for vegetation health management.
- Assessment of changes which are outside the control of the project and the management measures identified (i.e., a new project within the area or region; regional change affecting vegetation health management).
- Evaluation and introduction of new or different monitoring methods due to changes in technology.

Review of the Plan will be undertaken every five years or in response to adaptive management.

Figure 1: Weed risk areas and monitoring sites: Iron Bridge mine





LEGEND

- FMG Rail Alignments
- BHPB Rail
- Rio Tinto Rail
- Roy Hill Rail
- Declared Pest Plants (BAM Act)
- FMG Priority Weeds

Weed Monitoring Locations

- Potential Impact
- Reference
- Mining Proposal Disturbance Envelope

Iron Bridge EP Act Part IV Development Envelopes

- Infrastructure Development Envelope
- Mining Area Development Envelope
- Slurry Corridor Development Envelope
- Water Corridor Development Envelope

Asset Protection Areas

- Weed Risk Areas
- Infrastructure Risk Areas
- Environmental Risk Areas

Data Source(s):
Topo, GA

N

0 2 4 6 8 10
Kilometres

Iron Bridge Mine
Weed Monitoring Sites

Requested By: Jared Nelson
Drawn By: Jared Nelson
Revised By: sanli
Approved By: X
Scale: 1:150,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0245.021_r0

Date: 28/07/2022
Size: A3L
Revision: 0
Confidentiality: 0

Iron Bridge

Appendix 1: 360 Baseline Monitoring Report (NS-00000-RP-EN-0006)

NS-00000-RP-EN-0006_1

360 environmental

North Star Mine Site

Weed Mapping and Monitoring 2019

Prepared for:

Fortescue/Iron Bridge JV

August 2019

people planet professional

Document Reference	Revision	Prepared by	Reviewed by	Admin Review	Submitted to Client	
					Copies	Date
3211AA	Rev0 INTERNAL DRAFT	C. McDonald T. Chapman	S. Walker	N. Lindroos		12/06/19
3211AA	Rev1 CLIENT DRAFT	360 ENV	Fortescue		1 Electronic (email)	12/06/19
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3211AA	Rev3 CLIENT DRAFT	360 ENV	Fortescue	N. Lindroos	1 Electronic (email)	14/08/19

Executive Summary

360 Environmental Pty Ltd (360 Environmental) was commissioned by Iron Bridge Operations Pty Ltd (FMG Iron Bridge) to undertake targeted weed surveys, weed mapping and to establish a weed monitoring program at the North Star Hematite and Magnetite Project (Iron Bridge Project). The works were required in accordance with *Fortescue's Weed Management Plan* (100-PL-EN-1017) (the Plan) that is currently being updated to incorporate the Iron Bridge Project areas and requires the following management actions:

- 1.1 – Undertake targeted weed surveys in accordance with OEPA Guidance Statement No. 51 Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment and the Flora and Vegetation Assessment Guidelines (100-GU-EN-0005) to determine presence and distribution of weed species within the project area.
- 1.5 – Undertake weed mapping every two years to ensure spatial data for presence and distribution of weeds in Fortescue controlled sites is up to date to enable effective weed management practices to be implemented.
- 3.1 – Develop and implement a weed monitoring program to determine the effectiveness of the weed management strategies and weed control program.

The weed mapping and monitoring fieldwork was undertaken in May 2019 with outcomes summarised as:

Key findings from the Weed Mapping

Mapping of current weed distribution within the Iron Bridge Project area identified eight weed species: **Aerva javanica* (Kapok Bush), **Calotropis procera* (Rubber Tree), **Cenchrus ciliaris* (Buffel Grass), **Cenchrus setiger* (Birdwood Grass), **Chloris virgata* (Feathertop Rhodes Grass), **Passiflora foetida* var. *hispida* and **Sonchus oleraceus* (Common Sowthistle). **Calotropis procera* (Rubber Tree) is listed as Declared Pest under the *Biosecurity and Agriculture Management Act 2007* (BAM Act).

In both this and a previous study (Ecoscape, 2016), weeds were commonly associated with disturbed sites (e.g. spoil mounds), tracks, infrastructure and watercourses. Weeds were recorded in higher densities at these locations, especially where tracks crossed watercourses. Although no quantitative spatial analysis of weed distribution and density was carried out, this suggests that combinations of factors may be associated with weeds, including historical land use for pastoralism, current cattle movements and grazing activity, vehicle movement and mining land disturbance, particularly in association with water courses.

Key findings from the Weed Monitoring

Nineteen monitoring sites were established: 11 impact and 8 reference sites, each with three quadrats. Four weed species were recorded in the monitoring sites, with **Cenchrus ciliaris* (Buffel Grass) and **Cenchrus setiger* (Birdwood Grass) most abundant. Only one individual of **Passiflora foetida* var. *hispida* was recorded in one impact site. Seven of the

11 impact and four of the 8 reference sites had no weeds present. There was no statistical difference in weed cover, number of weed species (diversity) or abundance of individuals between impact and reference sites.

One the measured targets of the Plan is to determine that "No statistically significant increases in total weed cover on impact sites over three monitoring events compared to the increase in total weed cover within the reference sites" is detected. This baseline assessment has established the protocols necessary to assess the Plan's objectives on a temporal and spatial scale. As expected for a baseline comparison, there was limited statistically significant differences in weed cover, diversity and abundance between the impact and reference sites. However, the ongoing monitoring and design is statistically robust to determine such changes and meet the requirements of the Plan.

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1 Introduction

1.1 Project Overview

FMG Iron Bridge is developing the North Star Hematite and Magnetite Project (Iron Bridge Project). To comply with project's environmental approvals, Fortescue undertakes targeted weed surveys, weed mapping and monitoring, in accordance with *Fortescue's Weed Management Plan* (100-PL-EN-1017) (the Plan). The Plan is currently being updated to incorporate Iron Bridge Project areas.

To satisfy the management requirements of the Plan, 360 Environmental was engaged to conduct targeted weed surveys, map the distribution and abundance of weeds and establish a weed monitoring program for the Iron Bridge Project operational site (North Star Project Area) and future expansion footprint.

The Iron Bridge Project is located approximately 110 kilometres (km) south of Port Hedland on the Wallareenya and Kagan Pastoral Stations and unallocated Crown Land within the Pilbara biogeographic region of Australia. The weed mapping and monitoring program was undertaken throughout the North Star Mining Lease areas that spanned from the Great Northern Hwy (western most point), east along the mine site access roads, throughout the infrastructure development envelope and to areas to the north and south outside the development footprint (Figure 1).

1.2 Objectives

The weed mapping and monitoring program for the North Star Project Area was required to comply with the management actions as outlined in the Plan that states:

- 1.1 – Undertake targeted weed surveys in accordance with OEPA Guidance Statement No. 51 Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment and the Flora and Vegetation Assessment Guidelines (100-GU-EN-0005) to determine presence and distribution of weed species within the project area.
- 1.5 – Undertake weed mapping every two years to ensure spatial data for presence and distribution of weeds in Fortescue controlled sites is up to date to enable effective weed management practices to be implemented.
- 3.1 Develop and implement a weed monitoring program to determine the effectiveness of the weed management strategies and weed control program.

The guiding objectives of the weed mapping and monitoring program includes the following:

1. Develop and maintain an accurate record of weed populations within and adjacent to Fortescue control site

2. Identify changes in the cover and type of weed species within Fortescue controlled sites
3. Monitor and measure the success of management measures to inform an adaptive management approach
4. Determine if changes in weed cover and type within Fortescue controlled sites is a direct or indirect result of Fortescue activities or broader regional changes.

Figure 1 shows the infrastructure, disturbance footprint and weed monitoring sites.

680,000 688,000 696,000 704,000 712,000

7,656,000 7,648,000 7,640,000

NS_W_P_R_P6
NS_W_P_R_R3
NS_W_P_R_P7
NS_W_P_R_R2
NS_W_P_R_P12
NS_W_P_R_R9
NS_W_P_R_P5
NS_W_P_R_R4
NS_W_P_R_R6
NS_W_P_R_R7
NS_W_P_R_R1
NS_W_P_R_R5
NS_W_P_R_P9
NS_W_P_R_P11
NS_W_P_R_P8
NS_W_P_R_P2
NS_W_P_R_P4
NS_W_P_R_P3
NS_W_P_R_P10

680,000 688,000 696,000 704,000 712,000

LEGEND

- Infrastructure Development Envelope
- Mining Area Development Envelope
- Slurry Corridor Development Envelope
- Water Corridor Development Envelope

Indicative Monitoring Sites

- Impact
- Reference
- Indicative Disturbance Footprint

Data Source(s):
All data; FMG, 2019

N

0 1 2 3 4 5
Kilometres

Requested By: T. Edwards
Drawn By: N. Rappa
Revised By: ccheung
Approved By: P. Mastalir/U. George/J. Thomson
Scale: 1:100,000
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Document Name: 662NS_0000_MP_EN_0035.003_r0

Date: 20/06/2019
Size: A3L
Revision: 0
Confidentiality: 0

Weed Monitoring Sites

Iron Bridge

2 Methods

2.1 Targeted Weed Survey and Mapping

Mapping of current weed distribution was undertaken by 360 Environmental within the North Star Project Area and the future expansions footprint. The targeted weed survey focused on Priority Weed Species (Table 1), and any other weed species recorded within the North Star Project Area were included in the mapping. The list of Priority Weed Species was determined from baseline flora and vegetation surveys (ecologia Environment, 2013; Ecoscape, 2014a, 2014b, 2014c). Table 1 lists the targeted weeds and their status according to:

- Declared Pests (Department of Primary Industries and Regional Development, 2018)
- Weeds of National Significance (WoNS) (Thorp and Lynch, 2000)
- Department of Biodiversity, Conservation and Attractions (DBCA) Environmental Weed List
- Fortescue Priority Weed List
- Fortescue/Iron Bridge North Star Priority Weed List.

The weed survey and mapping field team consisted of Catherine Krens (Senior Botanist) and Colleen McDonald (Ecologist). Specimens that required further identification were collected under a DBCA scientific flora collection licence (Colleen McDonald License#SL012436). The mapping effort prioritised areas where weeds are known to occur in the following hierarchy:

- **Priority 1:** Future Expansion Footprint – knowledge of weeds in these areas is vital to inform construction and prevent the spread of weeds around the North Star site
- **Priority 2:** Weed Risk Areas – these are areas that have the greatest requirement for weed management. They are areas that have environmental significance (i.e. significant fauna habitat) and are adjacent to infrastructure (i.e. roads and pits)
- **Priority 3:** Infrastructure Weed Risk Areas – these areas form part of the above Weed Risk Areas, where they intersect with environmental significant areas. However, all areas adjacent to infrastructure can spread weeds and therefore require mapping (i.e. access tracks)
- **Priority 4:** Locations of previous weed records
- **Priority 5:** Areas of pastoral stock activity
- **Priority 6:** All other areas within the project boundary.

The targeted weed survey was used to map the distribution and abundance of weeds in the project areas.

Table 1: Current Priority Weed List and Target Weed Species

Species	Common Name	Status	Environmental Weeds - DBCA	Priority Weeds (Fortescue)	North Star
**Aerva javanica*	Kapok Bush		H(R)	Y	XC
**Calotropis procera*	Rubber Tree	Declared Pest	Alert	Y	X
**Cenchrus ciliaris*	Buffel Grass		H		X
**Cenchrus setiger*	Birdwood Grass		H		X
**Chloris barbata*	Purpletop Grass		H(R)	Y	X
**Chloris virgata*	Feathertop Rhodes Grass		H(R)	Y	X
**Citrullus amarus*	Pie Melon		U(M)		X
**Cynodon dactylon*	Couch		H(R)	Y	X
**Digitaria ciliaris*	Summer Grass		L(S)		X
**Echinochloa colona*	Awnless Barnyard Grass		H(R)	Y	X
**Flaveria trinervia*	Speedy Weed				X
**Indigofera oblongifolia*	-				X
**Macroptilium atropurpureum*	Purple Bean				X
**Malvastrum americanum*	Spiked Malvastrum		H(R)	Y	X
**Opuntia spp.*	Prickly Pear	Declared Pest/ WoNS	H(R)	Y	X
**Parkinsonia aculeata*	Parkinsonia	Declared Pest/WoNs	H(R)	Y	X
**Setaria verticillata*	Whorled Pigeon Grass		H(R)	Y	X
**Sonchus oleraceus*	Common Sowthistle		L(R)		X
**Stylosanthes hamata*	Verano Stylo		H(M)		X
**Vachellia farnesiana*	Mimosa Bush		H(R)	Y	X

X = species previously known from area (including 50 km buffer), C = control activities undertaken within the last 12 months

2.2 Weed Monitoring

2.2.1 Approach

Fortescue has previously undertaken weed monitoring programs across several of its Pilbara operations utilising similar methodologies. This project adopted similar approaches to remain consistent the previously employed methodology, data acquisition and management and statistical analysis.

The experimental design of the weed monitoring program included 11 impact and eight reference sites in locations that were representative of the surrounding vegetation and landform (Table 2). It should be noted that two sites, one planned impact and one planned reference site, were excluded from the fieldwork as they were in inaccessible terrain. They will be installed in future monitoring events if/when access permits.

Monitoring sites were replicated between the impact and reference locations and consisted of three 10 m x 10 m quadrats per site. Each quadrat had a fence dropper (~1 m) installed in the northwest and southeast corners. The northwest fence dropper was flagged (green/white flagging) and labelled with a unique identifier (e.g. NS_W_PRP_Q1 NW) (Table 2). All weed monitoring quadrats were established according to the Plan (100-PL-EN-1017).

2.2.2 Monitoring Sites

The selection of the (potential) impact and reference sites was based on the following criteria (summarised in Table 2):

- Reference sites were established in areas not directly or indirectly impacted by disturbance activities or future disturbance
- Impact sites were established in proximity to current and future disturbance factors associated with operational activities and had the following features:
    - similar floristic structure and composition
    - areas of typical weed composition and cover
    - where priority weed species have been previously recorded
    - where weed management activities have been undertaken
    - preferred habitat for conservation significant flora, fauna and vegetation types (i.e. conservation significant bat species, Northern Quoll, Pilbara Olive Python, Potential Groundwater Dependent Vegetation (GDV) and priority flora)
    - avoidance of heritage constraints and areas
    - sites located on Fortescue tenements
    - safely accessible areas
    - avoidance of areas planned to be disturbed in project/mine plans.

The location and spatial extent of these criteria were established by interrogation of GIS data supplied by Fortescue and preliminary recommendations by Fortescue.

Table 2: Characteristics of the North Star Weed Monitoring Sites

Site Number	Status	*Pityrodia* sp. Marble Bar	Potential Ground Dependent Vegetation (GDV)	Conservation Significant Bats	Northern Quoll	Pilbara Olive Python
NS_W_PRP1*	Impact			X	X	X
NS_W_PRP2	Impact			X	X	X
NS_W_PRP3	Impact			X	X	X
NS_W_PRP4	Impact				X	X
NS_W_PRP5	Impact		X	X		
NS_W_PRP6	Impact		X	X		
NS_W_PRP7	Impact		X	X	X	X
NS_W_PRP8	Impact	X				
NS_W_PRP9	Impact	X				
NS_W_PRP10	Impact			X	X	X
NS_W_PRP11	Impact	X				
NS_W_PRP12	Impact		X			
NS_W_PRR1	Reference	X			X	
NS_W_PRR2	Reference		X	X	X	X
NS_W_PRR3	Reference		X	X		
NS_W_PRR4	Reference		X	X		
NS_W_PRR5	Reference	X			X	X
NS_W_PRR6	Reference	X				
NS_W_PRR7	Reference	X			X	X
NS_W_PRR8*	Reference			X	X	X
NS_W_PRR9	Reference		X			

* These planned sites were not installed during May 2019 trip because of inaccessible terrain.

2.2.3 Data Collection

Weed monitoring sites were established by 360 Environmental in conjunction with the targeted weed survey and mapping from 7 – 11 May 2019. Baseline data for the weed monitoring program was collected by Scott Walker (Principal Ecologist) and Evan Webb (Ecologist). Specimens that required further identification were collected under a DBCA scientific flora collection licence (Scott Walker License#SL012437).

The data collected from each sampling site was consistent with the Plan (100-PL-EN-1017) and previous monitoring events (Ecoscape, 2014a, 2014b, 2014c). Table 3 describes the monitoring parameters that were recorded at each site.

Table 3: Monitoring Parameters Recorded at Each Site

Monitoring Parameter	Method
General data	Names of field collectors, date, coordinates, site description (i.e. landform, soil, vegetation type [NVIS Level V], vegetation condition) and general observations
Density	Number of individual plants of each weed species within each monitoring site
Species Diversity	Count the number of different weed species present within each monitoring site
Total Weed Cover	Calculate total weed cover within each monitoring site: % Cover / Score 0% / 0 <1% / 1 1-20% / 2 21-40% / 3 41-60% / 4 61-80% / 5 81-100% / 6
Meteorological data	Data from weather stations installed near monitoring site locations
Environmental threats	Observations, mapping, photographs etc

2.3 Identification of Weeds

Each weed specimen identified in the field was photographed *in situ* and collected for confirmation by a Pilbara weed specialist. Sophie Fox (Botanist) identified each collected specimen using the internal 360 Environmental herbarium and publicly available information. No specimens were required to be taken to the Western Australian herbarium for identified as each specimen had enough identifying material to identify to species level.

2.4 Statistical Analysis

Field data was analysed by Senior Ecologist/Statistician Dr Tamra Chapman who used the statistical software R (R Core Team (2019). R: A language and environment for

statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/).

2.4.1 Weed Cover

A chi square test was used to test for differences in the frequencies recorded for percent weed cover classes between impact and reference quadrats.

2.4.2 Comparison of Diversity and Abundance for Impact and Reference Sites

Species accumulation curves produced using the R package 'iNEXT' and a standard boxplot was used to visually compare species diversity. Nonparametric Wilcoxon Signed Rank tests were used to test for a significant difference in species diversity and abundance between impact and reference sites. Nonparametric test was used because the data would not meet the assumptions of a parametric test.

Non-metric Multi-Dimensional Scaling (NMDS) was used to examine the similarity between in species composition for impact and reference sites followed by ANOSIM (Analysis of Similarity) from the R package 'vegan'. The ordination did not converge using the standard Bray-Curtis distance (likely due to the small number of sites with shared species and/or large number of sites with no species). Euclidian distance was employed as an alternative and it should be acknowledged, therefore, that the distances may not represent community structure but may for example represent sites missing the same species. Additional testing beyond the scope of this work would be needed to further test the influence of various dissimilarity analyses. The species array was square root transformed prior to analysis to limit the influence of the most abundant species, which is the standard transformation for ecological community studies.

3 Limitations and Constraints

Limitations and constraints of the North Star Weed Mapping and Monitoring Program are detailed below in Table 4.

Table 4: Limitations and Constraints

Variable	Degree of Limitation	Potential Constraints on Survey Outcomes
Access	Minor limitation	The Survey Area was accessed either by vehicle or on foot. One impact site (three quadrats) and one reference site (three quadrats) could not be accessed due to inaccessible terrain. These will be installed in future monitoring events.
Experience	No limitation	The personnel who executed the survey were practitioners suitably qualified in their respective fields: • Field Staff: Scott Walker (Principal Ecologist/Group Leader), Catherine Krens (Principal Botanist), Evan Webb (Ecologist), Colleen McDonald (Graduate Ecologist) • Flora Taxonomy: Sophie Fox • Data Interpretation and Reporting: Dr Tamra Chapman (Senior Ecologist) and Scott Walker • Report Review: Scott Walker (Principal Ecologist/Group Leader).
Timing, weather, season	No limitation	The EPA guidelines recommend that flora surveys within the Eremaean botanic province in which the site occurs are completed post wet season (March to June), and that a supplementary survey be completed after winter rainfall. Flora composition changes with time, particularly seasonally due to changes in conditions such as rainfall. Therefore, botanical surveys completed at different times of the year will often produce varying results. The survey was completed in May which is within the recommended survey period. Recorded rainfall 3 months prior to the mapping and monitoring program was slightly above average (~33 mm). Average temperatures were close to the same as long-term averages. Climate was not considered a limitation to the survey.
Life forms sampled	No limitation	All weed species present were identified to species level.
Completeness	Minor limitation	Two of the 21 planned sites could not be surveyed due to inaccessible terrain. These will be installed in future monitoring events.
Disturbance / Current land use	No limitation	Current land use was kept to within the mining footprint, which did not influence the monitoring program setup and installation. The weed mapping and monitoring was a baseline assessment that will be analysed temporally.

4 Results

4.1 Climate

The most representative long-term official Bureau of Meteorology (BoM) weather station currently operating near the North Star Project Area is at Marble Bar (Station Number 4106), located approximately 85 km east.

Marble Bar received 331.4 mm of rain from January to May 2019 prior to the field program (7 – 11 May 2019) (Bureau of Meteorology, 2019). This is 33.7 mm above the long-term average rainfall for the same period. Majority of the rainfall recorded was from Cyclone Veronica in late March where 138 mm was recorded on 25 March 2019.

The long-term average maximum and minimum temperatures for May are 31.1°C and 17.0°C respectively (Figure 2) (Bureau of Meteorology, 2019). The 2019 average temperatures for May were close to the long-term averages. Marble Bar recorded zero rain days in May 2019.

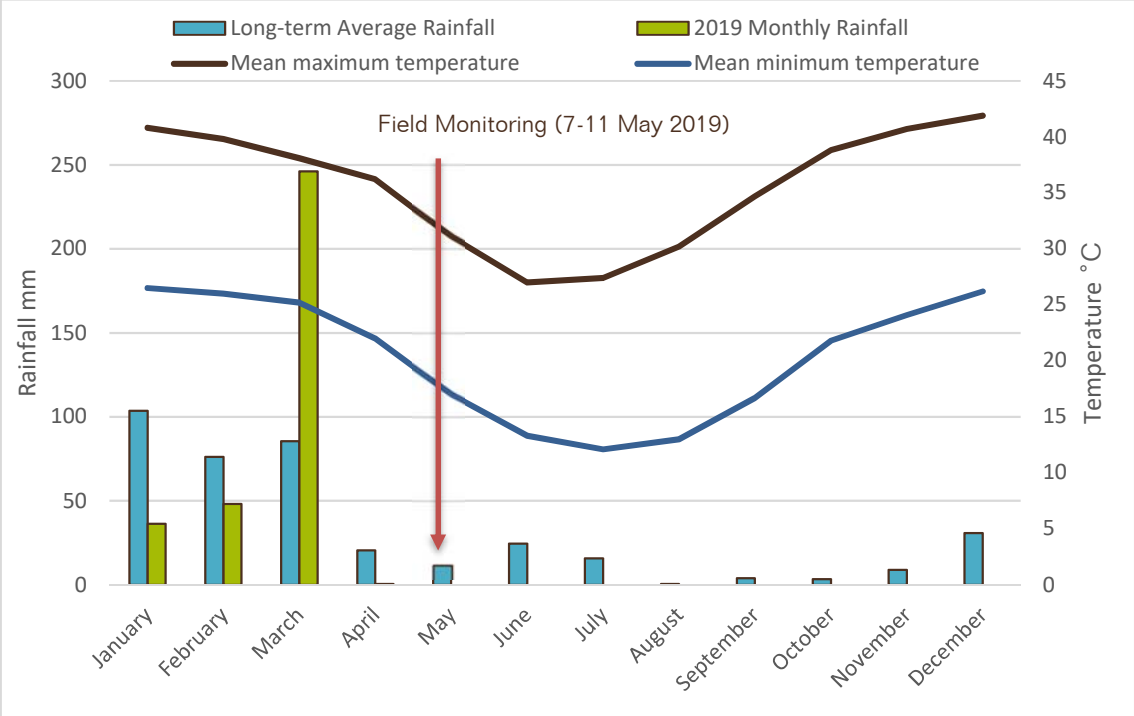


Figure 2: Long-Term Monthly Average Rainfall (from 1948 to 2017) and Monthly Rainfall Data for 2019 Recorded in Marble Bar (4106), Plus Mean Maximum and Minimum Temperatures (BoM 2019)

4.2 Weed Species Inventory

Of the weed species targeted during this study, seven were recorded and one species that was not on the target list, **Passiflora foetida* var. *hispida*, was also documented (Table 5).

Table 5: Inventory of Species Recorded During Mapping and Monitoring as Part of this Baseline Study in Comparison with the Target Species List

Species	Common Name	Status	Environmental Weeds - DBCA	Priority Weeds (Fortescue)	North Star	Mapping (Map)/ Monitoring (Mon)
**Aerva javanica*	Kapok Bush		H(R)	Y	XC	Map/Mon
**Calotropis procera*	Rubber Tree	Declared Pest	Alert	Y	X	Map
**Cenchrus ciliaris*	Buffel Grass		H		X	Map/Mon
**Cenchrus setiger*	Birdwood Grass		H		X	Map/Mon
**Chloris virgata*	Feathertop Rhodes Grass		H(R)	Y	X	Map
**Passiflora foetida* var. *hispida*			H(R)			Map/Mon
**Sonchus oleraceus*	Common Sowthistle		L(R)		X	Map

4.3 Weed Mapping

4.3.1 Weed Species Inventory

Eight weed species were identified during weed mapping (Table 6) and of these, **Calotropis procera* is listed as Declared Pest under the BAM Act.

Table 6: Identified Weed Species

Name, Description and Management	Images
Common Name: Kapok Bush **Species**: **Aerva javanica* Erect, much-branched perennial herb, 0.4-1.6 m high. Flowers white, January to October. Often on sandy soils, along drainage lines.	
Common Name: Rubber Tree **Species**: **Calotropis procera* Shrub or tree, 1-4 m high. Flowers cream/white and purple, January to December. Often on sandy and clayey soils.	
Common Name: Buffel Grass **Species:** **Cenchrus ciliaris* Tufted or sometimes stoloniferous perennial, grass-like or herb, 0.2-1.5 m high. Flowers purple, February to October. White, red or brown sand, stony red loam, black cracking clay.	

Name, Description and Management	Images
Common Name: Birdwood Grass **Species:** **Cenchrus setiger* Erect, tussocky, stoloniferous perennial, herb or grass-like, to 0.5 m high. Flowers cream-purple, April to May. Brown sands, red loam, pindan soils. Sand dunes, plains, rangelands, stony hillsides, floodplains.	
Common Name: Feathertop Rhodes Grass **Species:** **Chloris virgata* Annual, grass-like or herb, 0.15-0.95 m high. Flowers green-purple, April to May or September. Clay, sand/sand dunes.	
Common Name: Spiked Malvastrum[1] **Species:** **Malvastrum americanum* Erect perennial, herb or shrub, 0.5-1.3 m high. Flowers yellow-orange, April to July. Orange/red/yellow sands, gritty alluvial sand, black/brown clay, alluvial cracking clays, limestone and calcrete. Stony ridges and hillsides, floodplains, along drainage lines.	

Name, Description and Management	Images
Species: **Passiflora foetida* var. *hispida*[1] Woody climber (vine with an unpleasant smell), to 9 m high. Flowers cream-white-blue, February to November. Coastal areas, river and creek banks.	
Common Name: Common Sowthistle **Species:** **Sonchus oleraceus* Erect annual, herb, to 1.5 m high. Flowers yellow, January to December. Variety of soils. Weed of waste places and disturbed ground.	
[1]**Images sourced from:** (Department of Biodiversity Conservation and Attractions, 2019)	

Table 7 shows a summary of the weeds recorded during weed mapping. Eight weed species were recorded in 787 locations and the total number of individuals was estimated at 30,397. The most dominant species were **Cenchrus setiger* (Birdwood Grass), with a relative abundance of 88.8 individuals per location and **Cenchrus ciliaris* (Buffel Grass), with a relative abundance of 72.7 individuals per location. The relative abundance of all species combined was 38.6 individuals per location.

Table 7: Summary of Species Recorded During Weed Mapping

Species	Number of Locations	Number of Individuals	Relative Abundance (Individuals per Location)
**Aerva javanica* (Kapok Bush)	445	7,275	16.3
**Calotropis procera* (Rubber Tree)	17	84	4.9
**Cenchrus ciliaris* (Buffel Grass)	306	22,256	72.7
**Cenchrus setiger* (Birdwood Grass)	8	710	88.8
**Chloris virgata* (Feathertop Rhodes Grass)	4	49	12.3
**Malvastrum americanum* (Spiked Malvastrum)	5	15	3.0
**Passiflora foetida* var. *hispida*	1	3	3.0
**Sonchus oleraceus* (Common Sowthistle)	1	5	5.0
Total	787	30,397	38.6

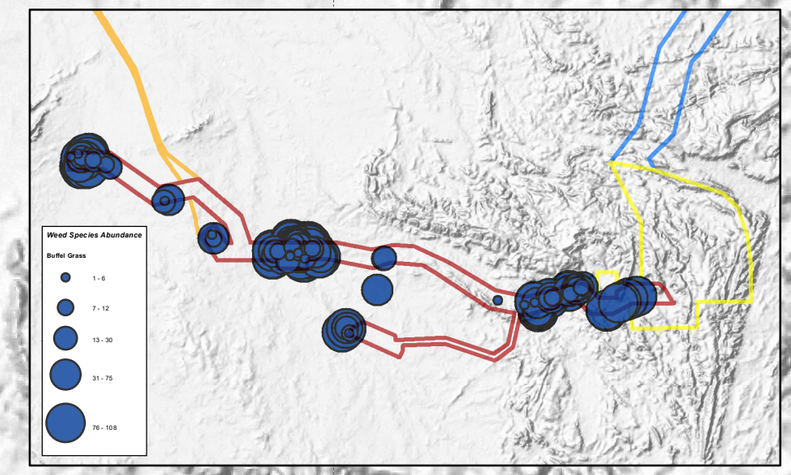
4.3.2 Spatial Comparison

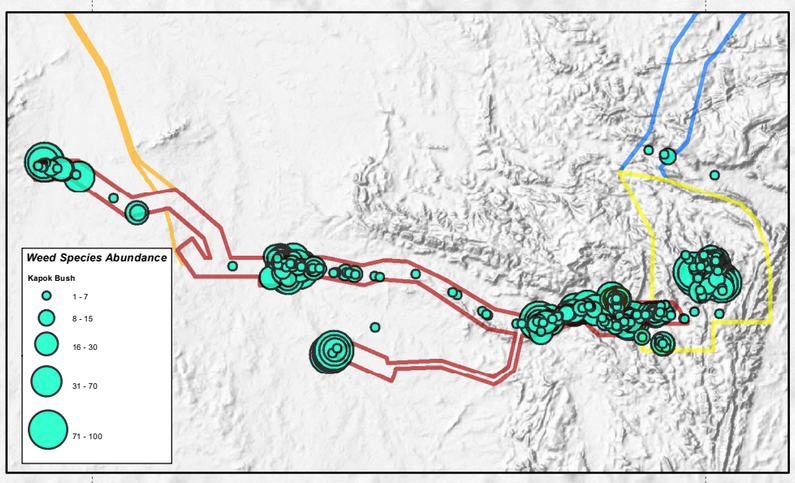
Weeds were commonly associated with disturbed sites (e.g. spoil mounds), tracks and watercourses and were recorded in higher densities where tracks crossed watercourses (Figure 3). This suggests that combinations of factors may be associated with weeds, including as historical land use for pastoralism, current cattle movements and grazing activity, vehicle movement and land disturbance, particularly in association with water courses.

680,000 690,000 700,000 710,000

7,650,000

7,640,000





Weed Species Abundance

Common Sowthistle	Stinking Passionflower	Spiked Malvastrum	Rubber Tree	Birdwood Grass	Feathertop Rhodes Grass	Kapok Bush	Buffel Grass
5	1	1	1 - 3	5	1	1 - 7	1 - 6
	2 - 3	2	4 - 12	6 - 10	2 - 3	8 - 15	7 - 12
		3 - 10	13 - 20	11 - 30	4 - 15	16 - 30	13 - 30
				31 - 70	16 - 30	31 - 70	31 - 75
				71 - 100		71 - 100	76 - 108

LEGEND

- Infrastructure Development Envelope
- Mining Area Development Envelope
- Slurry Corridor Development Envelope
- Water Corridor Development Envelope
- Indicative Disturbance Footprint

Data Source(s):
All data; FMG, 2019

N

0 1 2 3 4 5
Kilometres

Requested By: T. Edwards
Drawn By: N. Rappa
Revised By: ccheung
Approved By: P. Mastalir/U. George/J. Thomson
Scale: 1:100,000
Coordinate System: GDA 1994 MGA Zone 50
Document Name: 662NS_0000_MP_EN_0035.002_r0

Date: 20/06/2019
Size: A3L
Revision: 0
Confidentiality: 0

Weed Species by Abundance Part 1

Iron Bridge

4.4 Weed Monitoring

4.4.1 Weed Cover for Quadrats

Of the 57 quadrats surveyed (3 quadrats in each of 19 sites), most quadrats had low weed cover (0-20% cover). Weed cover was slightly higher for reference than impact quadrats (Figure 4), but a chi-square test showed that the distribution of quadrats among the percent cover classes did not differ from expected for impact and reference quadrats (X^2=7.254, *d.f.* = 6, p=0.38).

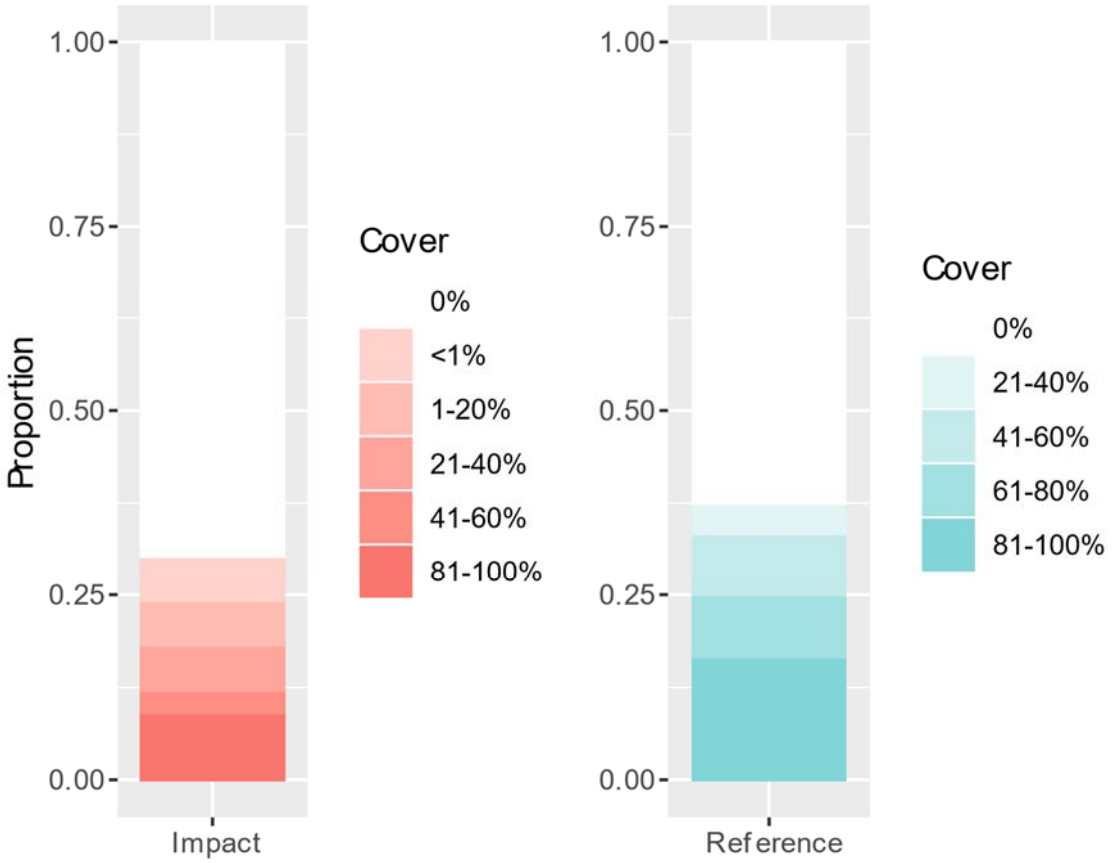


Figure 4: Proportion of Impact (n=23) and Reference (n=15) Quadrats in Classes of Percent Cover

4.4.2 Weed Species Inventory

Four weed species were recorded in the monitoring sites and Table 8 compares the number of sites in which each weed species occurred and the number of individuals recorded for impact, reference and all sites combined. **Cenchrus ciliaris* (Buffel Grass) occurred in similar numbers of impact and reference sites, but there were more individuals in reference sites. Only one individual of **Passiflora foetida* var. *hispida* was recorded in one impact site (NS_W_P_P3).

Table 8: Weed Species Recorded, the Number of Sites in Which They Were Observed, and Relative Abundance (Total Individuals/Total Number of Sites) for Impact (*n*=11), Reference (*n*=8) and all Sites Combined (*n*=19)

Site Status		**Aerva javanica* (Kapok Bush)	**Cenchrus ciliaris* (Buffel Grass)	**Cenchrus setiger* (Birdwood Grass)	**Passiflora foetida* var. *hispida*
Number of sites	*Impact*	1	3	1	1
	Reference	1	3	2	0
	All sites	2	6	3	1
Number of individuals	*Impact*	18	593	35	1
	Reference	3	820	245	0
	All sites	21	1413	280	1
Relative abundance	Impact	2.3	74.1	4.4	0.1
	Reference	0.3	74.5	22.3	0
	All	1.1	74.4	14.7	0.1

4.4.3 Weed Species Diversity and Relative Abundance

Eight of the 19 sites (four impact and four reference sites) had one or more weed species present and for those sites with weeds present, all sites had one or two species (Figure 5). Reference sites had more individuals than impact sites (Figure 6). The number of species and individuals recorded at each site is shown in Appendix A.

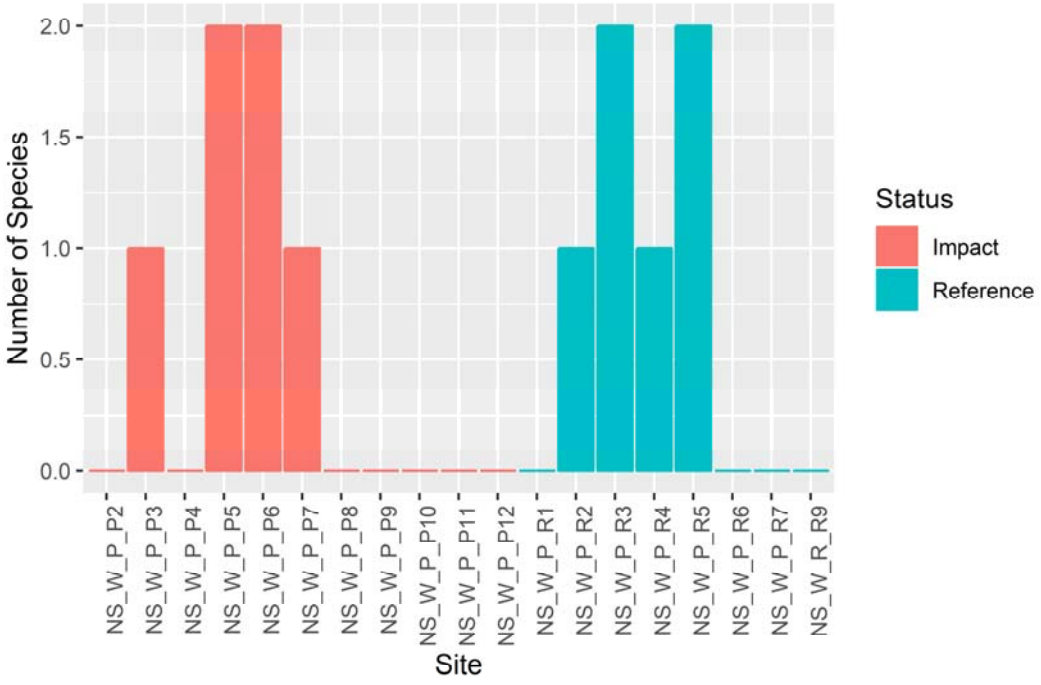


Figure 5: Summary of the Number of Weed Species and Individuals Per Site for Impact (*n*=11) and Reference (*n*=8) Sites

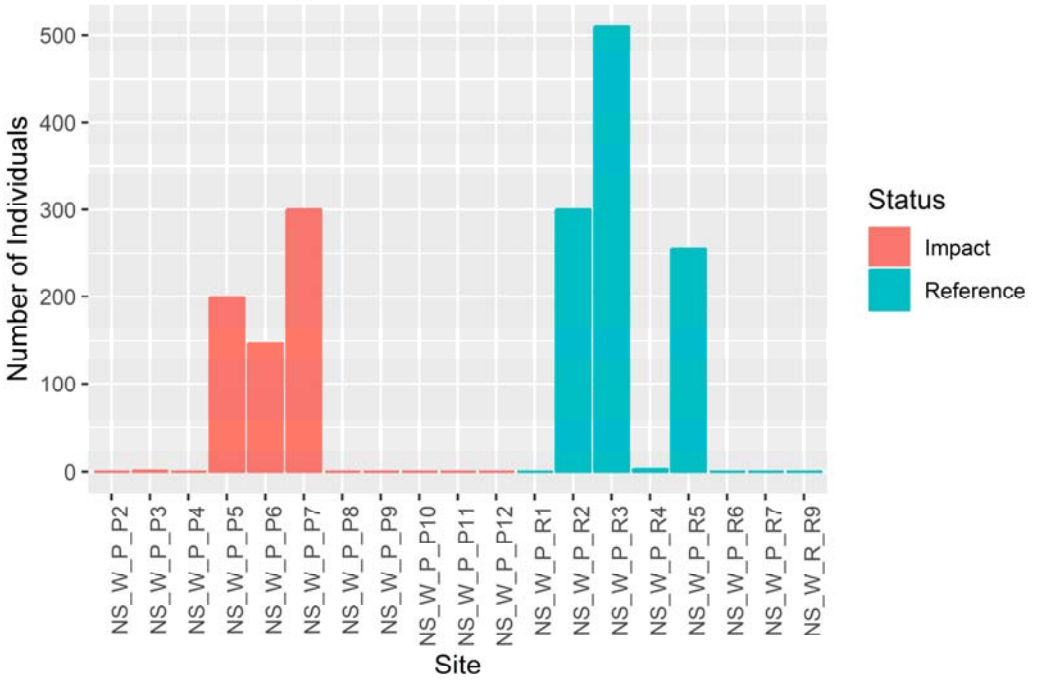


Figure 6: Summary of the Number of Weed Species and Individuals Per Site for Impact (*n*=11) and Reference (*n*=8) Sites

Species diversity was low for all 19 sites combined at around 0.63 species per site and was higher for reference than impact sites (Figure 7). For all 19 sites combined, relative abundance was around 90 plants per site and was 2.3 times higher for reference than

impact sites (Figure 7), but the standard errors were large and overlapping, suggesting there would be no statistical difference between statuses.

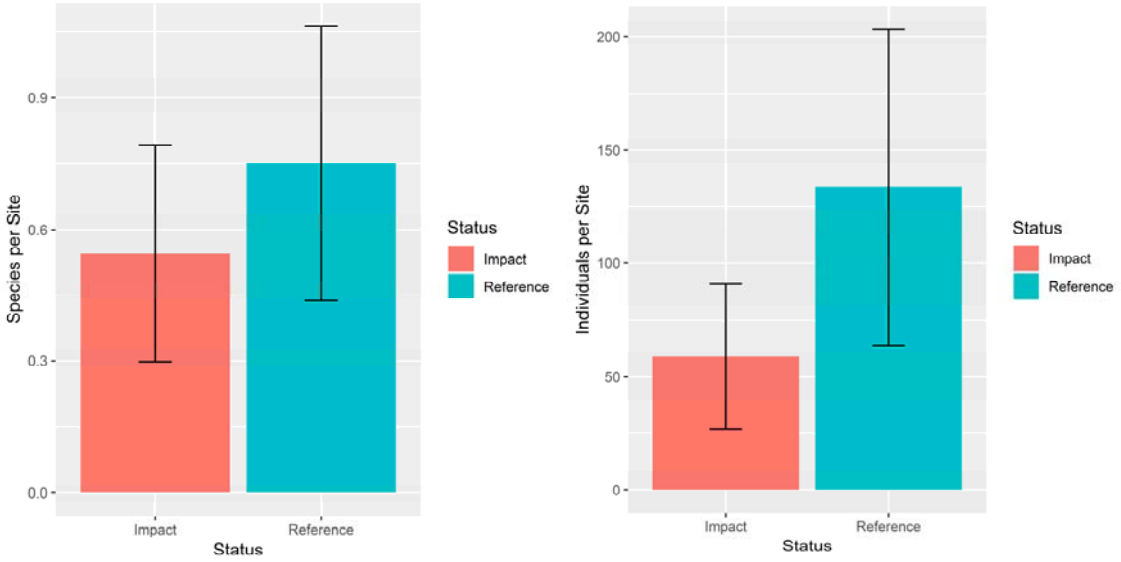


Figure 7: Number of Species and Individual Plants per Site for Impact (n = 11), Reference (n = 8) Sites (bars show standard error)

4.5 Statistical Comparison of Impact and Reference Sites

The close overlap of the species accumulation curves (and their confidence intervals, Figure 8) suggested richness was similar between impact and reference sites.

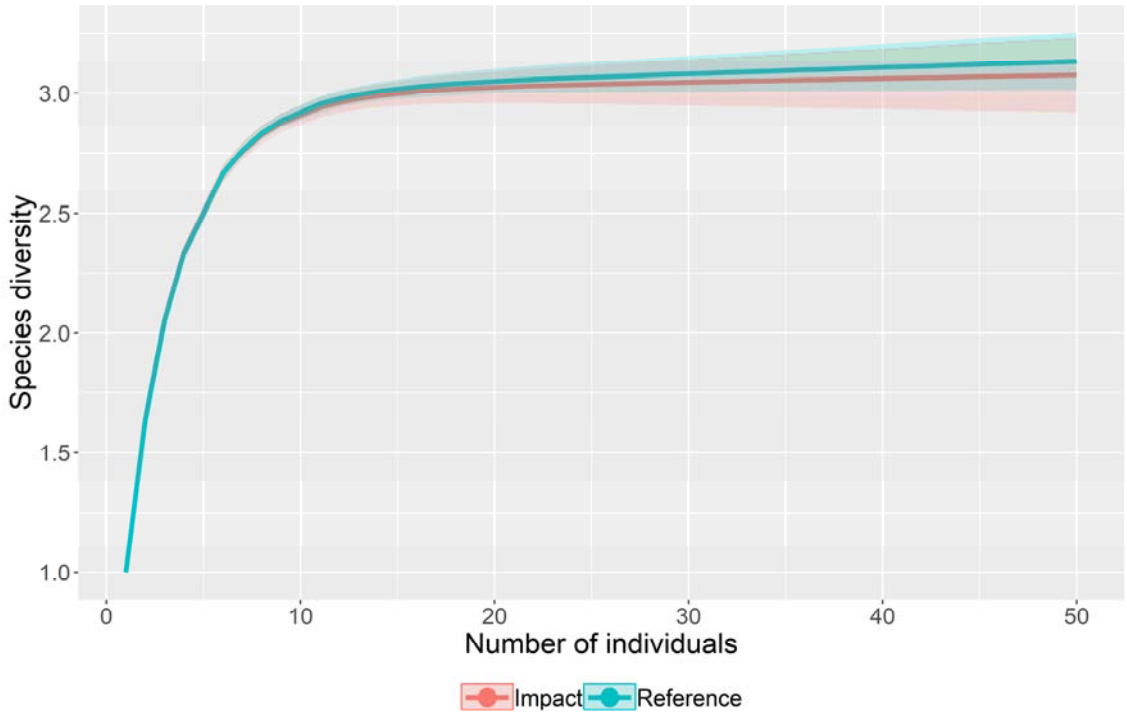


Figure 8: Comparison of Species Accumulation Curves. Shading shows 95% Lower and Upper Confidence Limits of Diversity for Impact and Reference Sites

The comparative boxplots (Figure 9) suggested that there was little detectable difference in species richness and abundance between impact and reference sites. This was confirmed via Nonparametric Wilcoxon Signed Rank tests for both richness ($W = 38$, d.f.=1, p-value = 0.6093) and abundance ($W = 34.5$, d.f.=1, p-value = 0.4078).

The ordination plot in Figure 10, shows that there was a strong overlap between impact and reference sites in species composition. ANOSIM confirmed that there were no detectable differences in species composition for impact and reference sites (ANOSIM statistic -0.023, $p = 0.558$). Although the stress value was low = 0.013, indicating a good representation of the weed communities, these results should be interpreted with caution because the low species diversity and abundance, coupled sites with no species present meant that eight of the 19 sites could not be plotted in two dimensions (Figure 10).

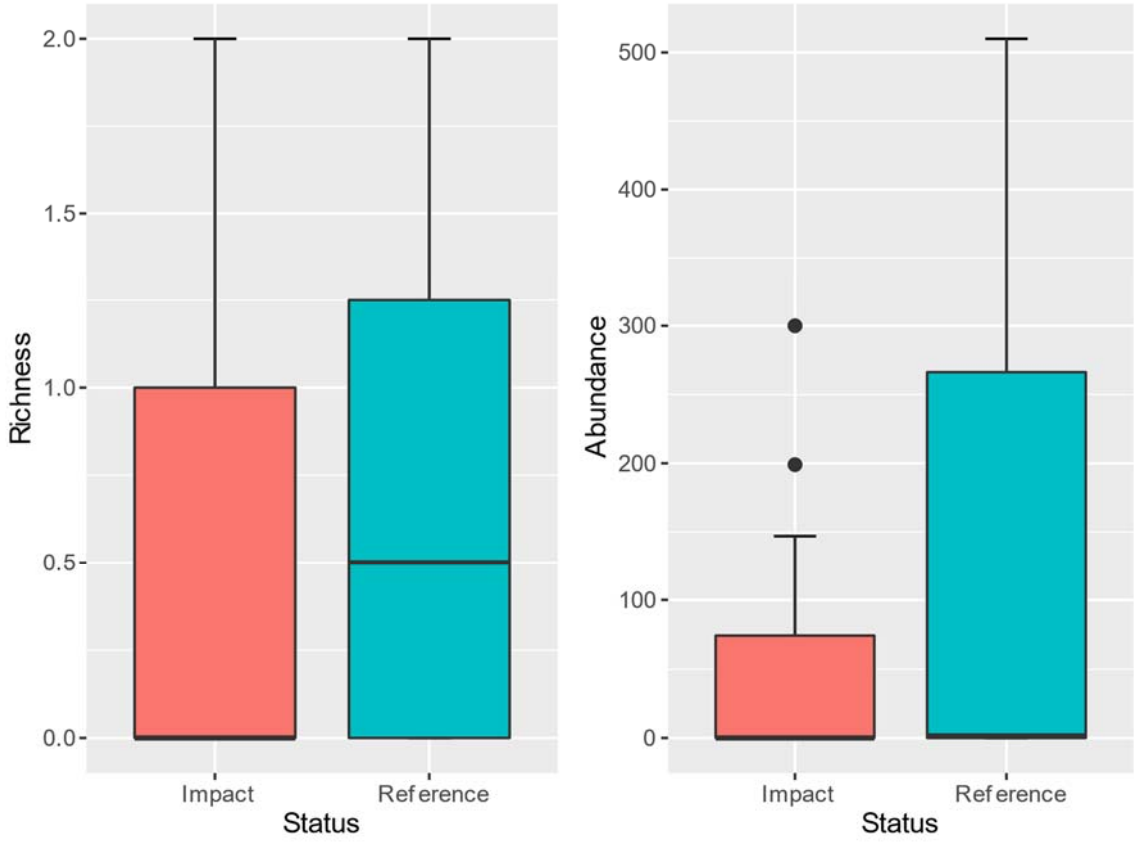


Figure 9: Comparison of Species Diversity and Abundance for Impact and Reference Sites. The line that divides the box into two parts represents the median of the data, the end of the box shows the upper and lower quartiles, the lines show the highest and lowest value (excluding outliers), and the points show outliers

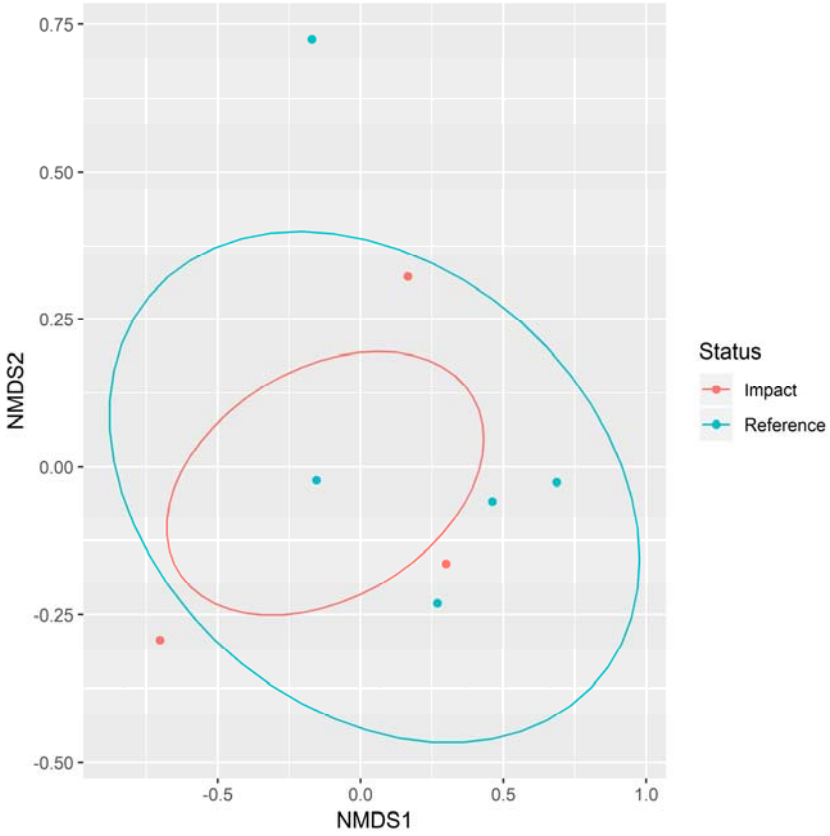


Figure 10: Two-Dimensional Plot of Similarity for Impact and Reference Sites

5 Discussion and Conclusion

Fortescue's Weed Management Plan (100-PL-EN-1017) addresses the EPA's objective for the key environmental factors for Flora and Vegetation that state "to protect flora and vegetation so that biological diversity and ecological integrity are maintained". The primary goal of the Plan is to "minimise the introduction and spread of weeds established within and adjacent to Fortescue controlled sites". This program established a baseline assessment of the weed diversity and abundance throughout the North Star Project Area and surrounding areas in May 2019. The results determined a baseline Weed Mapping and Monitoring Program that can meet the Plan's objectives on a temporal and spatial scale using statistical validation of results.

5.1 Mapping

Mapping of current weed distribution within the North Star Project Area future expansion footprint identified eight weed species: **Aerva javanica* (Kapok Bush), **Calotropis procera* (Rubber Tree), **Cenchrus ciliaris* (Buffel Grass), **Cenchrus setiger* (Birdwood Grass), **Chloris virgata* (Feathertop Rhodes Grass), **Passiflora foetida* var. *hispida* and **Sonchus oleraceus* (Common Sowthistle). **Calotropis procera* (Rubber Tree) is listed as Declared Pest under the BAM Act.

Weeds were found at 787 locations in the North Star Project Area and the total number of individuals was estimated at 30,397. The species, number of locations and individual weeds recorded in this study was higher than that for a previous study of the same area in 2016 (Ecoscape, 2016). However, the survey effort was more extensive and rainfall prior to this field assessment was also much higher.

In both this and a previous study (Ecoscape, 2016), weeds were commonly associated with disturbed sites (e.g. spoil mounds), tracks and watercourses and occurred in higher densities where tracks crossed watercourses. Although no quantitative spatial analysis of weed distribution and density was carried out, this suggests that combinations of factors may be associated with weeds, including as historical land use for pastoralism, current cattle movements and grazing activity, vehicle movement and mining land disturbance, particularly in association with water courses.

5.2 Monitoring

Nineteen monitoring sites were established: 11 impact and 8 reference sites, each with three quadrats. Four weed species were recorded in the monitoring sites, with **Cenchrus ciliaris* (Buffel Grass) and **Cenchrus setiger* (Birdwood Grass) most abundant. Only one individual of **Passiflora foetida* var. *hispida* was recorded in one impact site. Seven of the 11 impact and four of the 8 reference sites had no weeds present. There were no statistical differences in weed cover, number of weed species (diversity) or abundance of individuals between impact and reference sites.

One the measured targets of the Plan is to determine that "No statistically significant increases in total weed cover on impact sites over three monitoring events compared to the increase in total weed cover within the reference sites" is detected. This baseline assessment has established the protocols necessary to assess the Plans objectives on a temporal and spatial scale. As expected for a baseline comparison, there was limited statistically significant differences in weed cover, diversity and abundance between the impact and reference sites. However, the ongoing monitoring and design is statistically robust to determine such changes and meet the requirements of the Plan.

6 Limitations

This report is produced strictly in accordance with the scope of services set out in the contract or otherwise agreed in accordance with the contract. 360 Environmental makes no representations or warranties in relation to the nature and quality of soil and water other than the visual observation and analytical data in this report.

In the preparation of this report, 360 Environmental has relied upon documents, information, data and analyses ("client's information") provided by the client and other individuals and entities. In most cases where client's information has been relied upon, such reliance has been indicated in this report. Unless expressly set out in this report, 360 Environmental has not verified that the client's information is accurate, exhaustive or current and the validity and accuracy of any aspect of the report including, or based upon, any part of the client's information is contingent upon the accuracy, exhaustiveness and currency of the client's information. 360 Environmental shall not be liable to the client or any other person in connection with any invalid or inaccurate aspect of this report where that invalidity or inaccuracy arose because the client's information was not accurate, exhaustive and current or arose because of any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available to 360 Environmental.

Aspects of this report, including the opinions, conclusions and recommendations it contains, are based on the results of the investigation, sampling and testing set out in the contract and otherwise in accordance with normal practices and standards. The investigation, sampling and testing are designed to produce results that represent a reasonable interpretation of the general conditions of the site that is the subject of this report. However, due to the characteristics of the site, including natural variations in site conditions, the results of the investigation, sampling and testing may not accurately represent the actual state of the whole site at all points.

It is important to recognise that site conditions, including the extent and concentration of contaminants, can change with time. This is particularly relevant if this report, including the data, opinions, conclusions and recommendations it contains, are to be used a considerable time after it was prepared. In these circumstances, further investigation of the site may be necessary.

7 References

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APPENDIX A

Monitoring Sites Weed Distribution and Abundance

Site Number	Status	*Aerva javanica (Kapok Bush)	*Cenchrus ciliaris (Buffel Grass)	*Cenchrus setiger (Birdwood Grass)	*Passiflora foetida var hispida	Species	Individuals
NS_W_PRP2	Impact					0	0
NS_W_PRP3	Impact				1	1	1
NS_W_PRP4	Impact					0	0
NS_W_PRP5	Impact	18	181			2	199
NS_W_PRP6	Impact		112	35		2	147
NS_W_PRP7	Impact		300			1	300
NS_W_PRP8	Impact					0	0
NS_W_PRP9	Impact					0	0
NS_W_PRP10	Impact					0	0
NS_W_PRP11	Impact					0	0
NS_W_PRP12	Impact					0	0
NS_W_PRR1	Reference					0	0
NS_W_PRR2	Reference		300			1	300
NS_W_PRR3	Reference		270	240		2	510
NS_W_PRR4	Reference	3				1	3
NS_W_PRR5	Reference		250	5		2	255
NS_W_PRR6	Reference					0	0
NS_W_PRR7	Reference					0	0
NS_W_PRR9	Reference					0	0