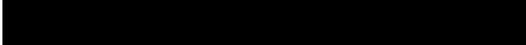


Date 11/09/2020
To 
From 
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Subject MPE Operational – Weed Monitoring Report August 2020

Introduction

Arcadis have been commissioned by Tactical on behalf of Qube Holdings to conduct bi-monthly weed monitoring surveys within Moorebank Precinct East (MPE) Operational Facility at Moorebank Logistics Park (**Figure 1**). The MPE Operational Facility includes the:

- Import and Export Terminal (IMEX)
- Rail Access Land Package (RALP)
- Warehouses, distribution facilities and freight village
- Stormwater trunk drainage infrastructure and landscaping areas

Regular monitoring of the MPE Operational Facility will inform the land manager of weed coverages and the presence of any weeds listed as Priority under the *Biosecurity Act 2015*.

The first monitoring report (May 2020) included a comprehensive baseline assessment of weed coverage within the MPE Operational Area. Subsequent reports, including this report (August 2020), will include survey methodology, summarise changes to weed condition and assess weed control actions against previous recommendations listed in Table 2.

Methodology

Arcadis ecologist Nathan Banks attended the MPE Operational Facility on Thursday 13 August 2020. The area surveyed by the attending ecologist is presented in Figure 1.

Monitoring involved traversing the MPE operational area on foot surveying landscaped areas, stormwater infrastructure and areas adjoining the Rail Link for the occurrence of weed species and signs of weed control works. The following information was collected where weeds were identified:

- Presence of exotic species, including Priority weeds
- Per cent foliage cover of exotic species
- Per cent foliage cover of Priority weeds

The coverage of environmental and Priority weeds was estimated based on the area of cover within a patch and categorised as per Table 1.

Table 1. Categories to describe percent coverage of weeds

Categories	Percentage cover of weeds within a patch (%)
Low	10 – 25
Moderate	25 – 75
High	75 – 100

The location of weed infestations, Priority weed species and observed weed control works were recorded on an Arc-GIS enabled iPad.

The weather on the day of survey was overcast with rain being experienced. The temperature was cool, recording 8.1°C at 9am at the nearest weather station at Holsworthy Aerodrome (station 066161) (BOM 2020).

Study Limitations

The data presented within this report is restricted to what was observed and recoded by the attending Arcadis ecologist during the site assessment on the 13 August 2020.

Monitoring of weeds was restricted to operational areas; weeds were not assessed within the bounds of the active construction site in the eastern portion of the MPE project site currently under the control of Hansen Yuncken.



Figure 1. Survey extent within the MPE Operational Facility

Results

The entire Rail Link corridor was inspected during the August monitoring period. No notable weed infestations were identified in areas not previously inspected and no additional Priority weeds were recorded. The majority of areas at the eastern extent of the Rail Link adjacent to the Southern Sydney Freight Line were covered by environmental weeds including *Gomphocarpus fruticosus* (Narrow-leaved Cotton Bush), *Chloris gayana* (Rhodes Grass), *Melinis repens* (Red Natal Grass) and *Eragrostis curvula* (African Love Grass). There was no evidence of weed treatment or control within this section of the MPE Operational Area.

Since the previous monitoring survey conducted in June, evidence of weed control works was observed at the following locations:

- Spot spraying of weeds was observed within the open trunk drainage channel running along the western boundary of the MPE Operational Area. Weeds observed to be treated included Castor Oil Plant (*Ricinus communis*), Spear thistle (*Cirsium vulgare*), *Solanum sisymbriifolium* and *Conyza* sp.
- Slashing of exotic grass, mainly Rhodes Grass (*Chloris gayana*) was observed within areas adjacent to the rail link at its western extent.

The location of weed control works has been presented in **Figure 2**.

Weed control works observed during the August 2020 monitoring survey have been compared against a series of recommended actions developed during the baseline monitoring survey (Table 2).

Table 2. Weed control works tracking

Priority	Action	Action description	August performance assessment
1	Eradicate Priority weeds	Target Priority weed species through a combination of manual removal and herbicide treatment. Herbicide application should be considerate of timing (i.e. applying herbicide when weeds are actively growing) and best practice methodologies.	No Priority weeds have been removed since previous survey
2	Removal of notable weed species	Notable weed species including Moth Vine and Castor Oil Plant should be removed from operational areas using a combination of manual and herbicide control.	No Notable weeds have been removed since previous survey
3	Suppress further colonisation of environmental weeds and encroachment into areas of bushland	Control of environmental weeds adjacent to biobank areas and natural bushland environments. Manual removal should be adopted in areas adjacent to threatened flora locations.	No evidence of weed control works to suppress exotic species encroaching on the biobank site or natural bushland environments.
4	Slashing of invasive grasses to prevent seeding.	Management of invasive grasses such as Rhodes Grass and African Love Grass through regular mowing or slashing.	Slashing of exotic grasses was observed at the western extent of the Rail Link, outside of the rail corridor (Figure 2).

Priority	Action	Action description	August performance assessment
5	Reduce percent coverage of environmental weeds within the Rail Link	Reduction in percent coverage of environmental weed infestations by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019)	No evidence of weed control works to reduce percent coverage.
6	Reduce percent coverage of environmental weeds within the operational area and trunk drainage infrastructure.	Reduction in percent coverage of environmental weed infestations by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019)	No evidence of weed control works to reduce percent coverage.

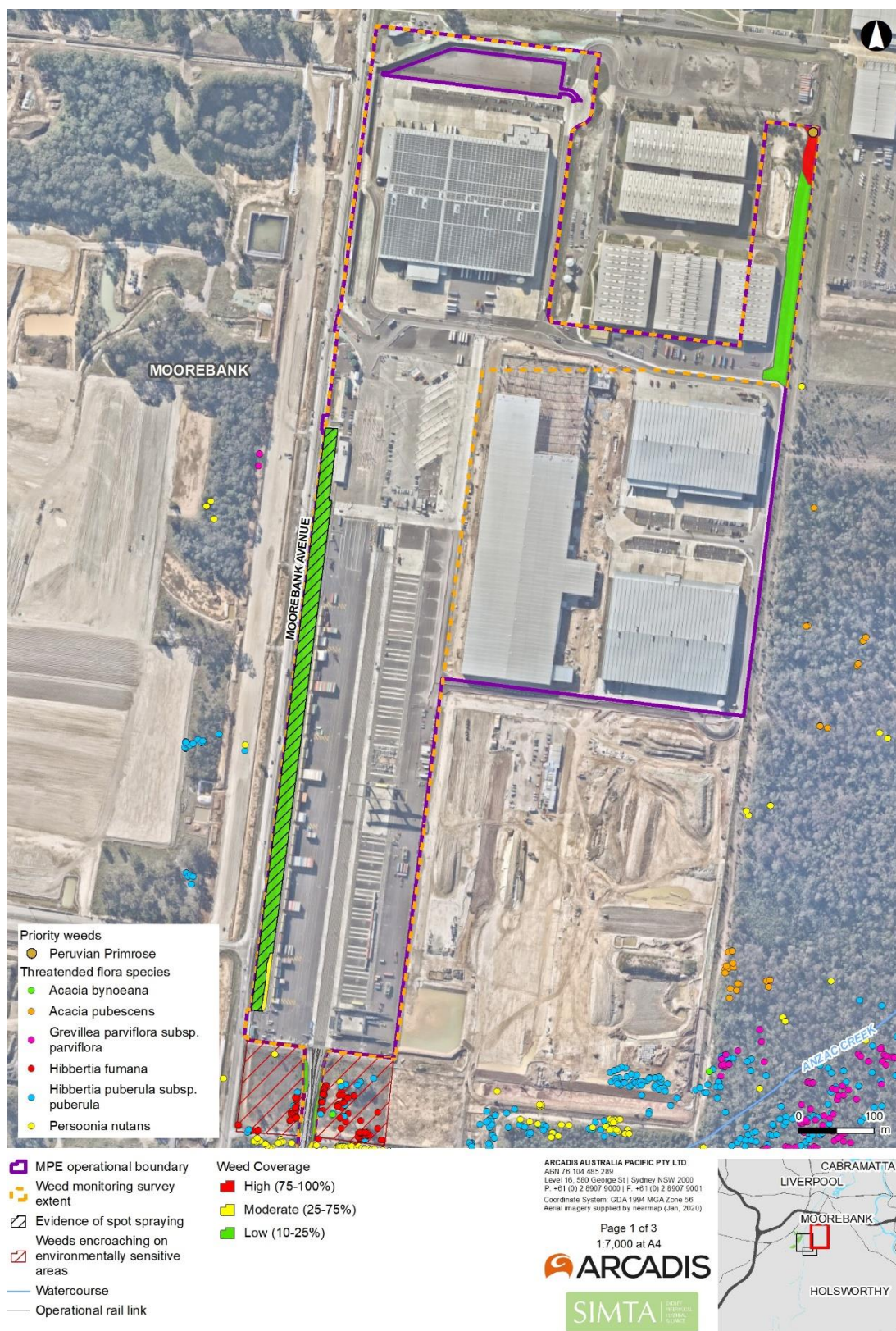


Figure 2. Weed coverages and Priority weeds identified across the MPE Operational Facility (Map 1 of 3)

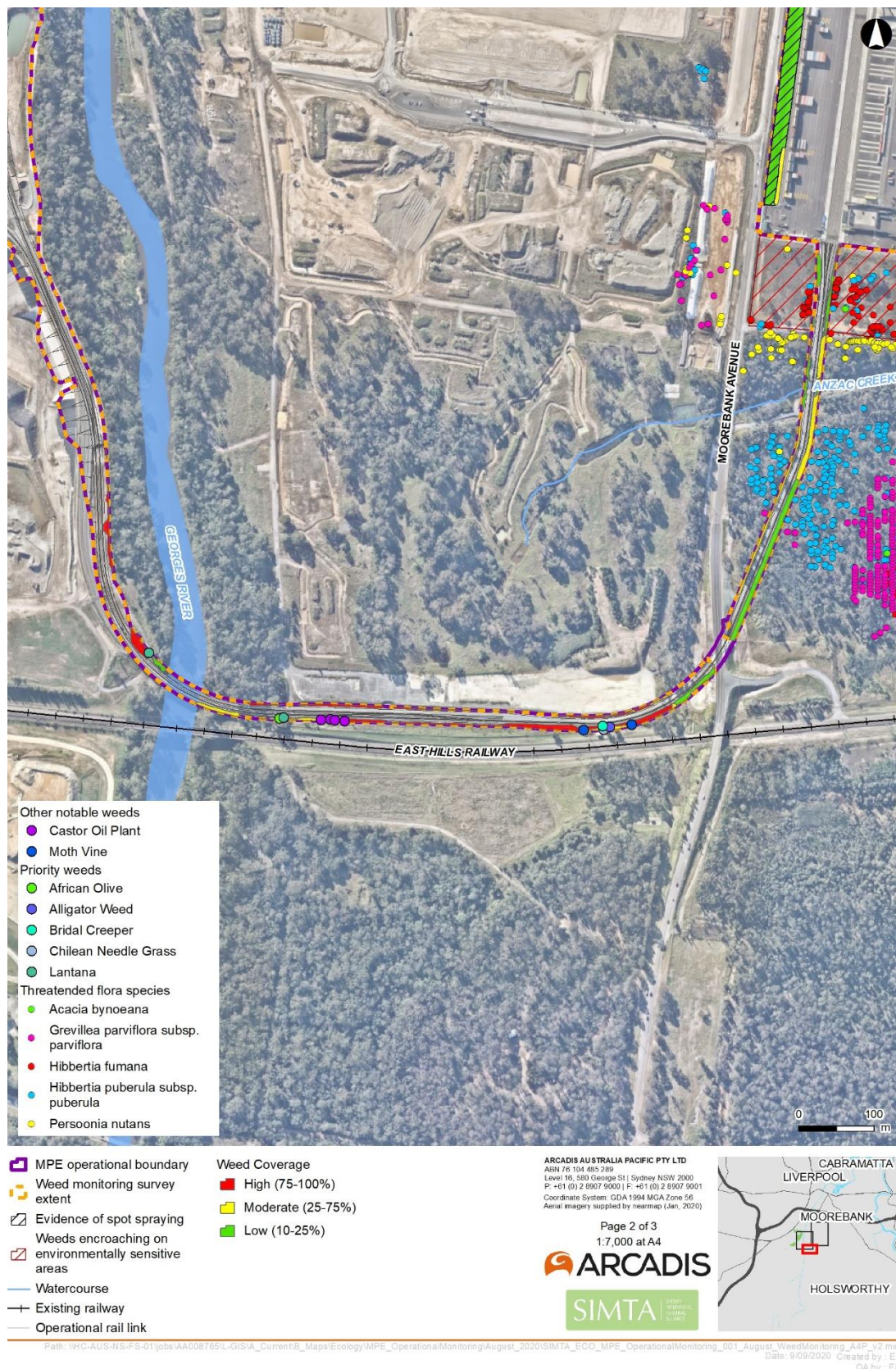


Figure 3. Weed coverages and Priority weeds identified across the MPE Operational Facility (Map 2 of 3)

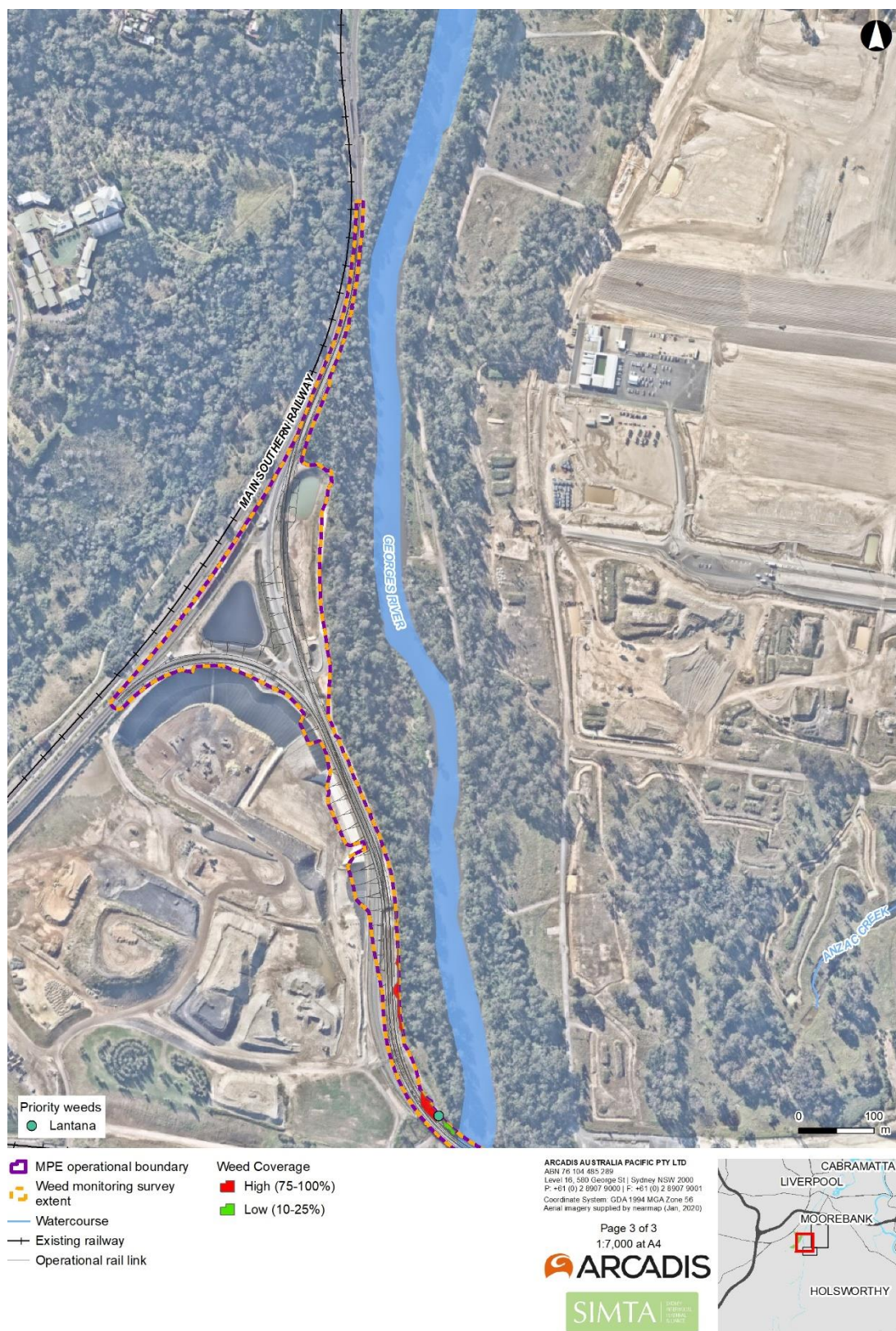


Figure 4. Weed coverages and Priority weeds identified across the MPE Operational Facility (Map 3 of 3)

Recommendations

Actions to manage weeds recommended from previous weed monitoring surveys are included in Appendix A.

The following actions are recommended based on what was observed during the August survey:

- Burr Medic and other weed species were observed growing outside of the rail corridor fence adjacent to the Rail Link, nearest the operational facility (see Figure 3). These weeds are encroaching on areas known to support the 'Critically endangered' plant *Hibbertia fumana*. The encroachment of these weeds outside the rail Link may impact *Hibbertia fumana* plants and cause habitat to become unsuitable. It is important that these weeds are removed as a priority through manual methods including hand weeding and hand tools. If Burr Medic can not be manually removed cut and paint methodology may be adopted. Under no circumstance should herbicide spraying be conducted to treat weeds due to the chance of spray drift impacting *Hibbertia fumana*.
- The exotic grass species *Themeda quadrivalvis* (Grader Grass)¹ is present within the Rail Link. This plant is growing as individuals and in small clumps on the soft batters either side of the rail track. This weed should be removed through hand weeding or slashed regularly to reduce its capacity to spread.

¹ Specimens of *Themeda quadrivalvis* (Grader Grass) have been sent to the Australian National Botanic Gardens for identification confirmation.

References

Arcadis (2019a) Urban Design and Landscape Plan. Moorebank Precinct East Stage 1

Arcadis (2019b) Operational Flora and Fauna Management Plan. Moorebank Logistics Park – East Precinct

Arcadis (2019c) Landscape Vegetation Management Sub Plan. Moorebank Precinct East Stage 2

Arcadis (2020) MPE Operational – Weed Monitoring Report April 2020

Arcadis (2020) Urban Design and Landscape Plan. Moorebank Precinct East Stage 2

Bureau of Meteorology (BOM) (2020) Climate Data Online. Weather and Climate: Holsworthy Aerodrome NSW (station 066161) <http://www.bom.gov.au/climate/dwo/IDCJDW2161.latest.shtml>

NSW Department of Primary Industries (DPI) (accessed 2020) NSW WeedWise. Priority weeds for the Greater Sydney. <https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=3>

APPENDIX A. RECOMMENDED ACTIONS CATALOGUE

Month of logging	Recommended action	Status (Not started, Commenced, Complete)
April 2020	Eradicate Priority weeds species including Bridal Creeper, Chilean Needle Grass, Alligator Weed, Lantana and African Olive	Not started
April 2020	Removal of notable weed species including Moth Vine, Castor Oil Plant, Small-leafed Privet and Balloon Vine within Rail Link	Not started
April 2020	Slashing of invasive grasses including Rhodes Grass and African Love Grass to prevent the seeding.	Commenced
April 2020	Remove environmental weed from within 0.5 metres of the rail corridor fence within the Rail Link to prevent encroachment into areas of bushland.	Not started
June 2020	Planning should commence to remediate areas of soft batter within the Rail Link which have slumped.	Not started
June 2020	Planning should commence to revegetate soft batters and undeveloped areas within the MPE Operational Facility with native species in accordance with the approved Urban Design and Landscaping Plan (Arcadis 2019a, Arcadis 2020)	Not started
August 2020	Exotic species, specifically Burr medic (<i>Medicago polymorpha</i>) should be removed from grassland either side of the Rail Link at its eastern extent, closest to the operational area.	Not started

APPENDIX B SITE PHOTOGRAPHS (13/08/2020)



Burr Medic encroaching on environmentally sensitive areas west of the the Rail Link corridor.



Burr Medic encroaching on environmentally sensitive areas east of the Rail Link corridor.



Grader grass colonising soft batters beside rail track.



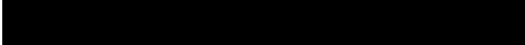
African Love Grass on soft batters adjacent to South Sydney Freight Line



Undeveloped lands at the western extent of the Rail Link, adjoining the South Sydney Freight Line, colonised by environmental weeds.



Environmental weeds colonising undeveloped lands at the western extent of the Rail Link.

Date 23/11/2020
To 
From 
Copy to 
Subject MPE Operational – Weed Monitoring Report October 2020

Introduction

Arcadis have been commissioned by Tactical on behalf of Qube Holdings to conduct bi-monthly weed monitoring surveys within Moorebank Precinct East (MPE) Operational Facility at Moorebank Logistics Park (**Figure 1**). The MPE Operational Facility includes the:

- Import and Export Terminal (IMEX)
- Rail Access Land Package (RALP)
- Warehouses, distribution facilities and freight village
- Stormwater trunk drainage infrastructure and landscaping areas

Regular monitoring of the MPE Operational Facility will inform the land manager of weed coverages and the presence of any weeds listed as Priority under the *Biosecurity Act 2015*.

The first monitoring report (May 2020) included a comprehensive baseline assessment of weed coverage within the MPE Operational Area. Subsequent reports, including this report (October 2020), include survey methodology, summarise changes to weed condition and assess weed control actions against previous recommendations listed in Table 2.

Methodology

Arcadis ecologist Nathan Banks attended the MPE Operational Facility on Thursday 15 October 2020. The area surveyed by the attending ecologist is presented in Figure 1.

Monitoring involved traversing the MPE operational area on foot surveying landscaped areas, stormwater infrastructure and areas adjoining the Rail Link for the occurrence of weed species and signs of weed control works. Areas that have previously been flagged as requiring remediation works were prioritised to assess the status of these. The following information was collected where weeds were identified:

- Presence of exotic species, including Priority weeds
- Per cent foliage cover of exotic species
- Per cent foliage cover of Priority weeds

The coverage of environmental and Priority weeds was estimated based on the area of cover within a patch and categorised as per Table 1.

Table 1. Categories to describe percent coverage of weeds

Categories	Percentage cover of weeds within a patch (%)
Low	10 – 25
Moderate	25 – 75
High	75 – 100

The location of weed infestations, Priority weed species and observed weed control works were recorded on an Arc-GIS enabled iPad.

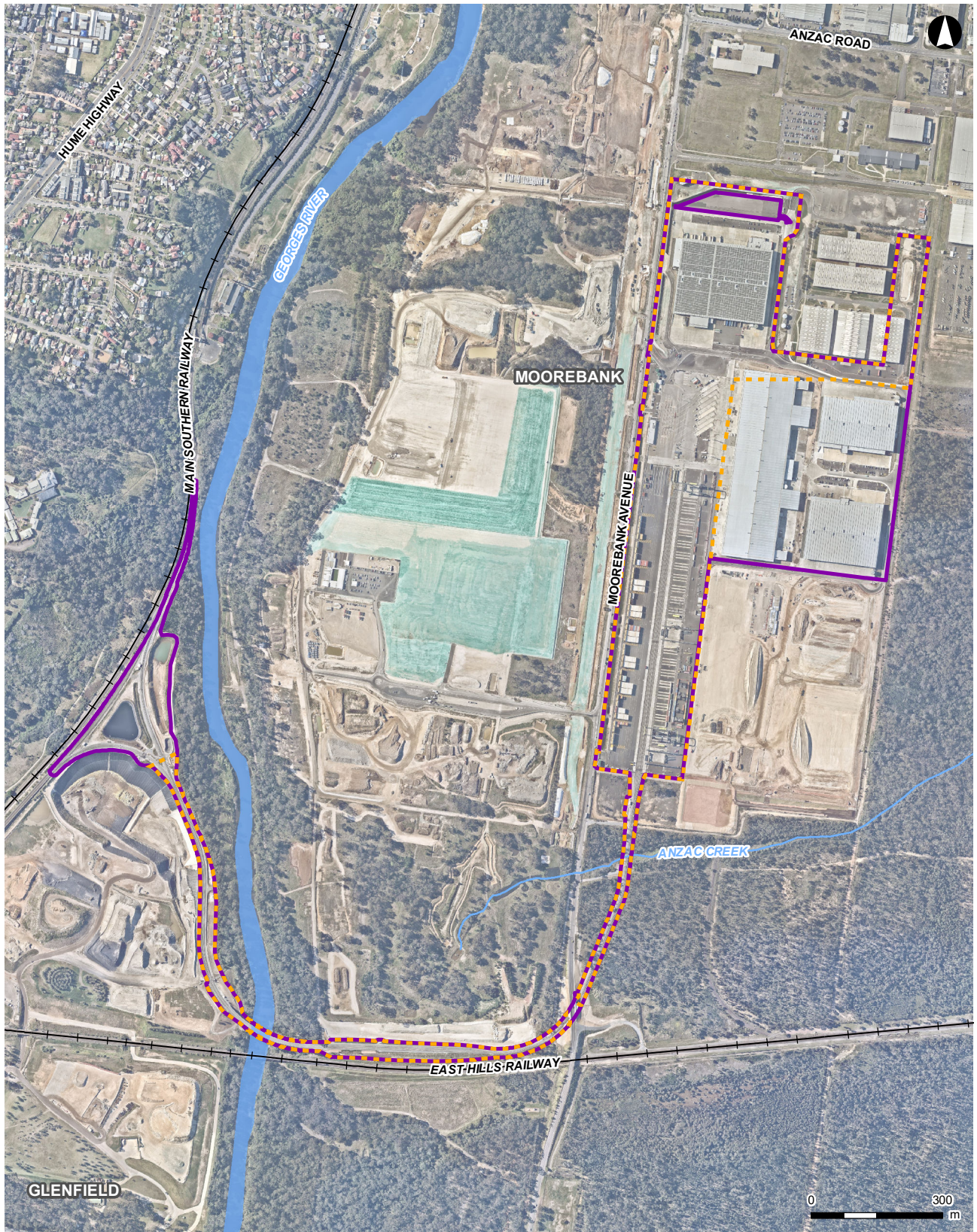
The weather on the day of survey was sunny with a maximum temperature of 29.5°C recorded at Holsworthy Aerodrome (station 066161) (BOM 2020).

Study Limitations

The data presented within this report is restricted to what was observed and recoded by the attending Arcadis ecologist during the site assessment on the 15 October 2020.

Monitoring of weeds was restricted to operational areas; weeds were not assessed within the bounds of the active construction areas surrounding new warehouses.

Surveys were not undertaken in areas extending beyond the junction between the Qube Rail Link and the Southern Sydney Freight Line (SSFL) as the ecologist was not under the supervision of an Australian Rail Track Corporation (ARTC) Protection Officer (PO). Future surveys will require the attendance of a PO to access these areas.



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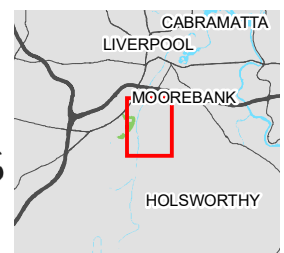
- Weed monitoring survey extent
- MPE operational boundary
- Watercourse
- Existing railway

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INTEGRATION
MANAGEMENT
ALLIANCE



Results

Weed coverages and recent works

Weed cover across the operational facility is generally low. Invasive grasses and sparsely scattered herbaceous weeds remain present within the trunk drainage systems along the western boundary of the operational area and in the drainage swale/retention basin in the north eastern corner, albeit at low coverages (Plate 1).



Plate 1. Drainage swale/retention basin in north eastern corner of operational area at risk of weed infiltration

Since the previous monitoring survey (August 2020) remediation works have been conducted within the Rail Link to remove weeds and stabilise slumping soft batters (Plate 2). Works have occurred along the Rail Link from the operation facility to the junction between the Qube Rail Link and the Southern Sydney Freight Line. As noted in previous weed monitoring reports soft batters within the Rail Link were completely vegetated with exotic plant species. Remediation works included:

- Spraying of weeds colonising soft batters with herbicide
- Clearing of treated weeds, removing vegetative material back to exposed soil
- Reforming of slumped soft batters
- Placing and securing of coir mesh to stabilise exposed batters subject to weed removal and reformation.

It is understood that all remediated areas within and adjacent to the Rail Link are set to be revegetated through hydroseeding using a native plant species seed mix as per the UDLP (Arcadis 2019a).

A series of before and after photo-points have been included in Appendix B evidencing these works.



Plate 2. Soft batters being remediated through removal of weeds and stabilisation with coir mesh

Sections of soft batter on the western side of the Rail Link running parallel to the East Hills Railway line have not been subject to weed removal or batter stabilisation as of the date of survey. This area of soft batter is dominated by exotic species which presents a risk of further weed recruitment occurring on the adjacent remediated areas.



Plate 3. Areas of soft batter dominated by weeds adjoining recently remediated areas

Other implemented weed control works noted during the October survey included:

- Clearing of exotic grassland outside of the rail corridor fence on the western side of the Georges River adjacent to the Rail Link and bridge structure.
- Removal of Burr Medic and other weed species observed growing outside of the rail corridor fence on the western side of the Rail Link, nearest the operational facility.

Figure 2 identifies the locations where weed control works have been undertaken and areas which still require action.

Weed control works observed during the October 2020 monitoring survey have been compared against a series of recommended actions developed during the baseline monitoring survey (Table 2).

Table 2. Weed control works tracking

Priority	Action	Action description	October performance assessment
1	Eradicate Priority weeds	Target Priority weed species through a combination of manual removal and herbicide treatment. Herbicide application should be considerate of timing (i.e. applying herbicide when weeds are actively growing) and best practice methodologies.	Majority of the operational area is free of Priority weeds. Two species of Priority weeds were identified in the Rail Link: <i>Lantana camara</i> (Lantana) and <i>Asparagus asparagoides</i> (Bridal Creeper). These should be removed.
2	Removal of notable weed species	Notable weed species including Moth Vine, Castor Oil Plant and Grader Grass should be removed from operational areas using a combination of manual and herbicide control.	A significant portion of notable weeds have been removed during recent remediation works. Scattered individuals of Moth Vine, Grader Grass and Castor Oil Plant were identified within the Rail Link. These should be removed.
3	Suppress further colonisation of environmental weeds and encroachment into areas of bushland	Control of environmental weeds adjacent to biobank areas and natural bushland environments. Manual removal should be adopted in areas adjacent to threatened flora locations.	Weeds encroaching on the biobank site and other natural bushland environments have been removed through a combination of herbicide and spaying.
4	Slashing of invasive grasses to prevent seeding.	Management of invasive grasses such as Rhodes Grass and African Love Grass through regular mowing or slashing.	A significant portion of invasive grass species have been removed during recent remediation works.
5	Reduce percent coverage of environmental weeds within the Rail Link	Reduction in percent coverage of environmental weed infestations by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019)	Areas subject to remediation have experienced a significant reduced in weed coverage. Areas which have not been subject to recent works maintain a high percent coverage of environmental weeds.
6	Reduce percent coverage of environmental weeds within the operational area and trunk drainage infrastructure.	Reduction in percent coverage of environmental weed infestations by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019)	No evidence of weed control works to reduce percent coverage. Exotic grasses and herbaceous weeds were observed within the operational area and trunk drainage infrastructure, albeit at low coverage.

Impacts to native vegetation

It was noted during the October survey that hi-volume spaying within the Rail Link along the soft batters adjacent to the Moorebank biobank site has resulted in damage to native plants outside of the corridor fencing (Plate 4). One individual of *Acacia bynoeana* (Bynoe's Wattle) was identified as being moderately impacted by herbicide overspray (Plate 5). Upon inspection the individual was still alive however displaying poor condition. This species is listed as Endangered under the BC Act¹ and Vulnerable under the EPBC Act².

A suite of threatened plants and threatened ecological communities are present in the biobank site adjacent to the Rail Link and should be considered and protected from impacts during future works.



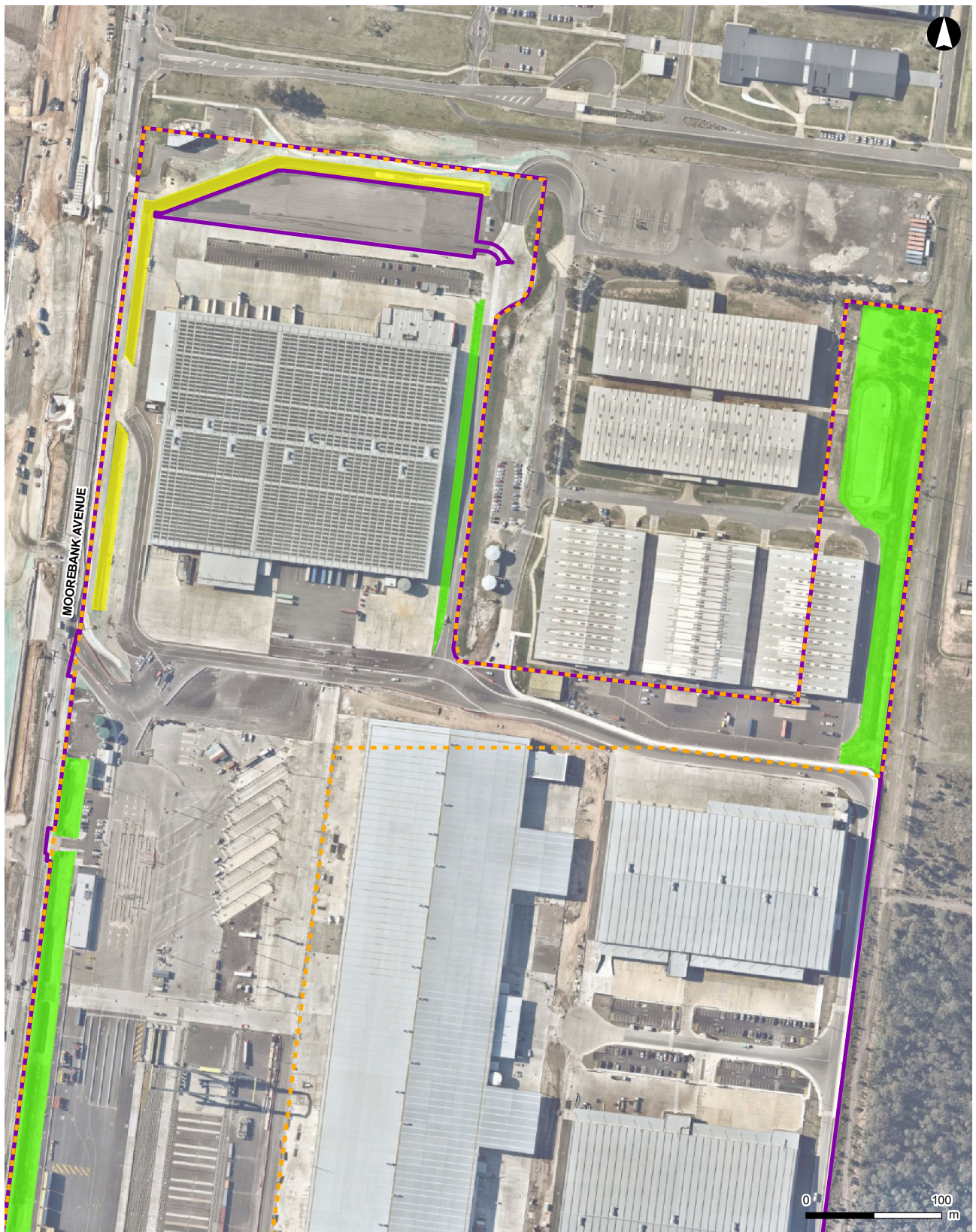
Plate 4. Native plants within the Moorebank biobank site poisoned due to over spray/ spray drift



Plate 5. Bynoe's Wattle in close proximity to rail corridor fencing impacted by herbicide overspray

¹ Biodiversity Conservation Act 2016

² Environment Protection and Biodiversity Conservation Act 1999



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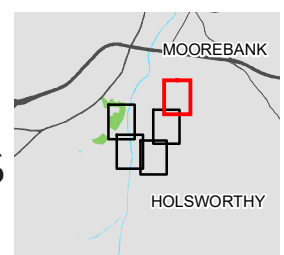
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|  MPE operational boundary |  Weed coverage |
|  Weed monitoring survey extent |  Low |
| |  No weeds recorded |

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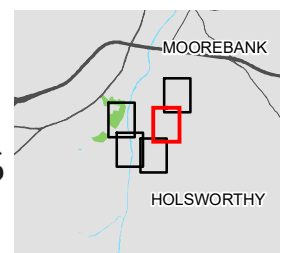
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|---|---|---|---------------|
|  | MPE operational boundary |  | Weed coverage |
|  | Weed monitoring survey extent | | Low |
|  | Remediated batters (weed removal & coir mesh) | | |
|  | Watercourse | | |

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 INTERMEDIATE
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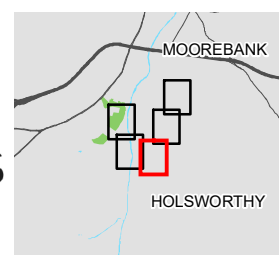
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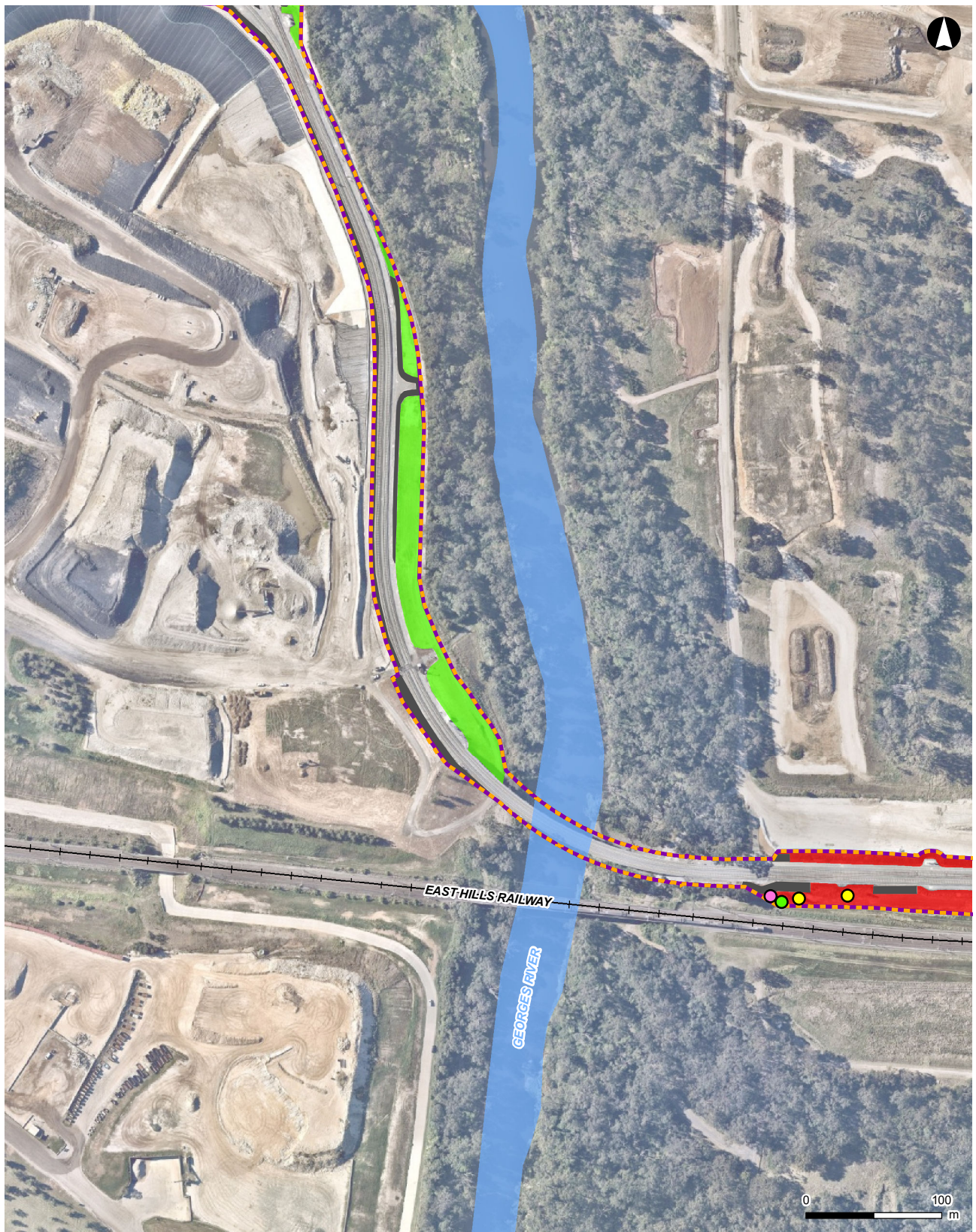
- MPE operational boundary
- Weed monitoring survey extent
- Remediated batters (weed removal & coir mesh)
- Watercourse
- Existing railway

- Weed coverage**
- High
- Priority and notable weeds**
- Bridal Creeper
- Grader Grass
- Moth Vine

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 SIMTA | STORM INTERMEDIATE ALLIANCE



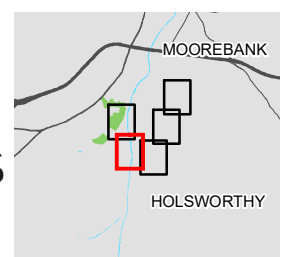


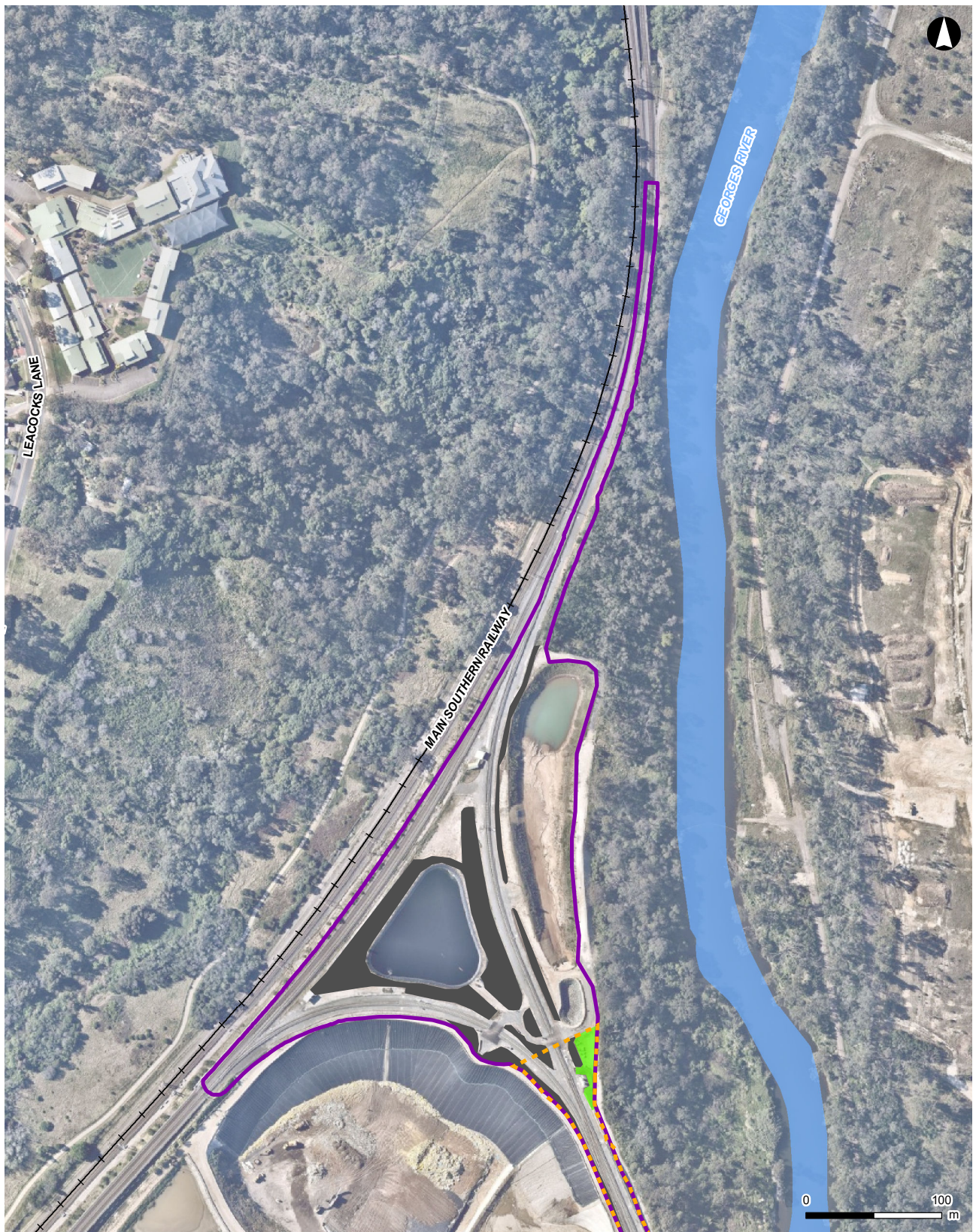
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|--|---|--|----------------------------|
| | MPE operational boundary | | Weed coverage |
| | Weed monitoring survey extent | | High |
| | Remediated batters (weed removal & coir mesh) | | Low |
| | Existing railway | | Priority and notable weeds |
| | | | African Olive |
| | | | Castor Oil Plant |
| | | | Lantana camara |

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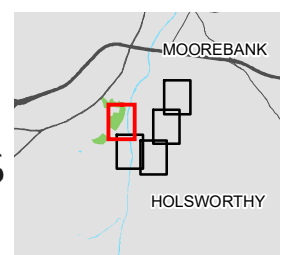
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|---|---------------|
| MPE operational boundary | Weed coverage |
| Weed monitoring survey extent | Low |
| Remediated batters (weed removal & coir mesh) | |
| Existing railway | |

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Recommendations

Recommended weed control actions resulting from the previous weed monitoring surveys are included in Appendix A: Recommended Actions Catalogue. The catalogue has been reviewed and updated to reflect the works undertaken since the August surveys.

The following actions are recommended based on observations made during the October survey:

- Remove all occurrence of *Araujia sericifera* (Moth Vine), Bridal Creeper, Lantana, *Olea europaea* subsp. *cuspidata* (African Olive), *Ricinus communis* (Castor Oil Plant) and *Themeda quadrivalvis* (Grader Grass) within the Rail Link.
- Monitor recently remediated areas for weed re-growth. Any re-occurring weed growth should be controlled in line with the approved Weed Management Plan prior to future revegetation efforts.
- Areas of soft batter which were not subject to recent remediation actions should be made weed free through similar actions.
- Weeds should be actively controlled around the drainage swale/retention basin to prevent colonisation into recently planted areas.

Hi-volume spraying of herbicide to control weeds in the Rail Link along soft batters adjacent to the Moorebank biobank site should not be conducted. Application of herbicide should be administered through localised spot spraying during optimal spray conditions to prevent damage to native plants from over-spray/spray drift.

References

Arcadis (2019a) Urban Design and Landscape Plan. Moorebank Precinct East Stage 1

Arcadis (2019b) Operational Flora and Fauna Management Plan. Moorebank Logistics Park – East Precinct

Arcadis (2019c) Landscape Vegetation Management Sub Plan. Moorebank Precinct East Stage 2

Arcadis (2020) MPE Operational – Weed Monitoring Report August 2020

Arcadis (2020) Urban Design and Landscape Plan. Moorebank Precinct East Stage 2

Bureau of Meteorology (BOM) (2020) Climate Data Online. Weather and Climate: Holsworthy Aerodrome NSW (station 066161) <http://www.bom.gov.au/climate/dwo/IDCJDW2161.latest.shtml>

NSW Department of Primary Industries (DPI) (accessed 2020) NSW WeedWise. Priority weeds for the Greater Sydney. <https://weeds.dpi.nsw.gov.au/WeedBiosecurities?AreaId=3>

APPENDIX A. RECOMMENDED ACTIONS CATALOGUE

Month of logging	Recommended action	Status (Not started, Commenced, Complete)	Comments
April 2020	Eradicate Priority weeds species including Bridal Creeper, Chilean Needle Grass, Alligator Weed, Lantana and African Olive	Commenced	Lantana and Bridal Creeper remain within the Rail Link
April 2020	Remove notable weed species including Moth Vine, Castor Oil Plant, Small-leafed Privet, Grader Grass and Balloon Vine within Rail Link	Commenced	Moth vine, Grader Grass and Castor Oil Plant remain within the Rail Link
April 2020	Slashing of invasive grasses including Rhodes Grass and African Love Grass to prevent the seeding.	Completed	Exotic grasses have been majorly removed through scraping with machinery. These areas will be subject to revegetation through hydroseeding as per the UDLP in the near future.
April 2020	Remove environmental weed from within 0.5 metres of the rail corridor fence within the Rail Link to prevent encroachment into areas of bushland.	Completed	Weeds identified encroaching on native bushland areas adjacent to the Rail Link have been removed
June 2020	Planning should commence to remediate areas of soft batter within the Rail Link which have slumped.	Completed	Works have been conducted to remediate soft batters
June 2020	Planning should commence to revegetate soft batters and undeveloped areas within the MPE Operational Facility with native species in accordance with the approved Urban Design and Landscaping Plan (Arcadis 2019a, Arcadis 2020)	Commenced	A large portion of the soft batters adjacent to the Rail Link have been remediated through the removal of weeds and stabilisation with coir mesh. These areas will be revegetated through hydroseeding as per the UDLP in the near future.
August 2020	Exotic species, specifically Burr medic (<i>Medicago polymorpha</i>) should be removed from grassland either side of the Rail Link at its eastern extent, closest to the operational area.	Commenced	Weeds on the eastern side of the Rail Link corridor have been removed. Weeds on the western side of the corridor remain to be treated/removed.

APPENDIX B. BEFORE AND AFTER PHOTOGRAPHS



August 2020



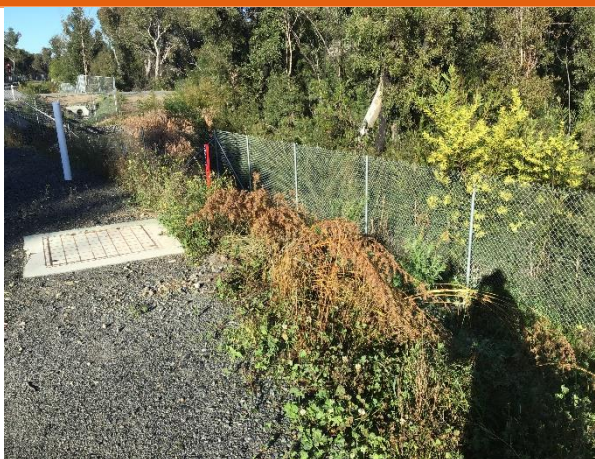
October 2020



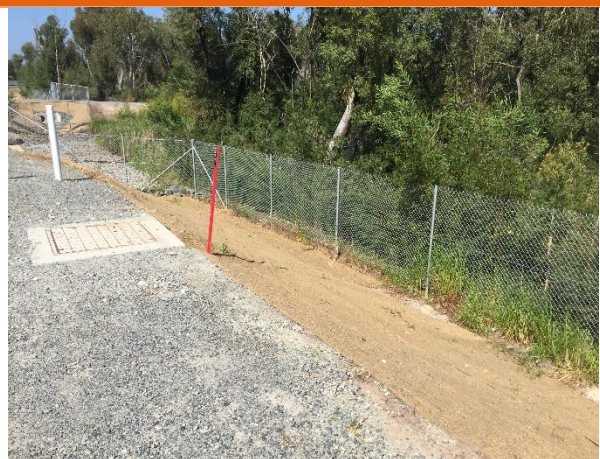
August 2020



October 2020



August 2020



October 2020



June 2020



October 2020



June 2020



October 2020



June 2020



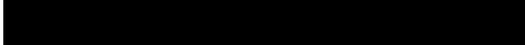
October 2020



June 2020



October 2020

Date 18/12/2020
To 
From 
Copy to 
Subject MPE Operational – Weed Monitoring Report December 2020

Introduction

Arcadis have been commissioned by Tactical on behalf of Qube Holdings to conduct bi-monthly weed monitoring surveys within Moorebank Precinct East (MPE) Operational Facility at Moorebank Logistics Park. The MPE Operational Facility includes the:

- Import and Export Terminal (IMEX)
- Rail Access Land Package (RALP)
- Warehouses, distribution facilities and freight village
- Stormwater trunk drainage infrastructure and landscaping areas

Regular monitoring of the MPE Operational Facility will inform the land manager of weed coverages and the presence of any weeds listed as Priority under the *Biosecurity Act 2015*.

The first monitoring report (May 2020) included a comprehensive baseline assessment of weed coverage within the MPE Operational Area. Subsequent reports, including this report (October 2020), include survey methodology, summarise changes to weed condition and assess weed control actions against previous recommendations listed in Table 2.

Methodology

Arcadis ecologist Nathan Banks attended the MPE Operational Facility on Tuesday 1 December 2020. The area surveyed by the attending ecologist is presented in Figure 1.

Monitoring involved traversing the MPE operational area on foot surveying landscaped areas, stormwater infrastructure and areas adjoining the Rail Link for the occurrence of weed species and signs of weed control works. Areas that have previously been flagged as requiring remediation works were prioritised to assess the status of these. The following information was collected where weeds were identified:

- Presence of exotic species, including Priority weeds
- Per cent foliage cover of exotic species
- Per cent foliage cover of Priority weeds

The coverage of environmental and Priority weeds was estimated based on the area of cover within a patch and categorised as per Table 1.

Table 1. Categories to describe percent coverage of weeds

Categories	Percentage cover of weeds within a patch (%)
Low	10 – 25
Moderate	25 – 75
High	75 – 100

The location of weed infestations, Priority weed species and observed weed control works were recorded on an Arc-GIS enabled iPad.

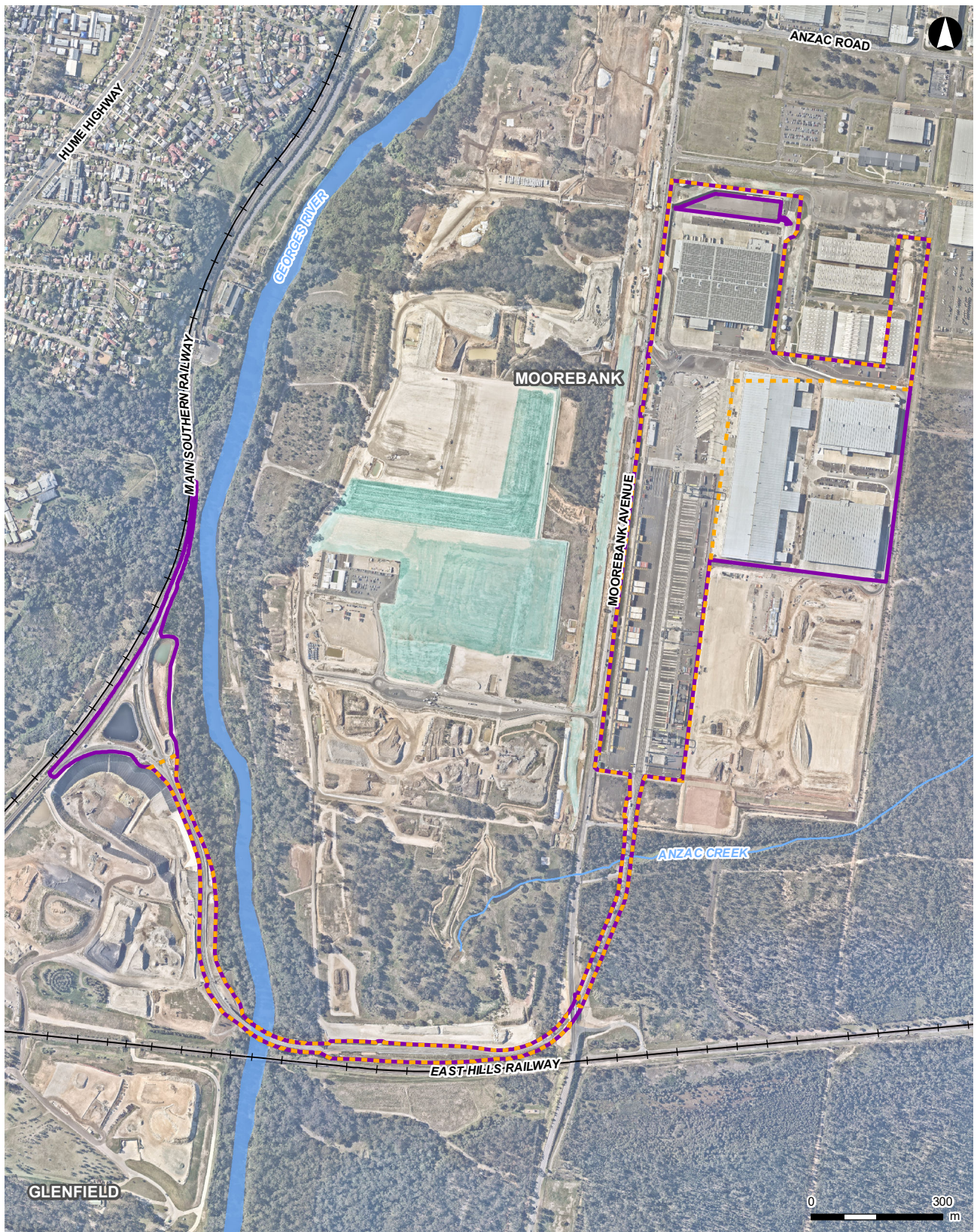
The weather on the day of survey was sunny with a maximum temperature of 29.5°C recorded at Holsworthy Aerodrome (station 066161) (BOM 2020).

Study Limitations

The data presented within this report is restricted to what was observed and recoded by the attending Arcadis ecologist during the site assessment on the 1 December 2020.

Monitoring of weeds was restricted to operational areas; weeds were not assessed within the bounds of the active construction areas surrounding new warehouses.

Surveys were not undertaken in areas extending beyond the junction between the Qube Rail Link and the Southern Sydney Freight Line (SSFL) as the ecologist was not under the supervision of an Australian Rail Track Corporation (ARTC) Protection Officer (PO). Future surveys will require the attendance of a PO to access these areas.



LEGEND

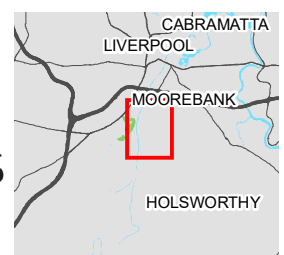
- Weed monitoring survey extent
- MPE operational boundary
- Watercourse
- Existing railway

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 Coordinate System: GDA 1994 MGA Zone 56
 Aerial imagery supplied by nearmap (Oct, 2020)

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Results

Weed coverage

Weed levels across the operational facility have remained low since the October survey. Soft batters of the trunk drainage system, along the western boundary of the operational area, have a sparse scattering of the exotic grass (*Setaria* sp.) and herbaceous weeds including *Solanum sisymbriifolium*, *Sida rhombifolia* and *Conyza* sp. Within the channel of the truck drainage system, where water is present, *Cyperus eragrostis* (Umbrella sedge) is becoming dominant (Plate 1). This invasive sedge species is likely to outcompete native species within the channel if not controlled.



Plate 1. *Cyperus eragrostis* (Umbrella sedge) colonising wet environments in trunk drainage system

The drainage swale/retention basin in the north eastern corner of the operational precinct is majorly vegetated with *Secale cereale* (Cereal Rye) although in a senescent state (Plate 2). It is thought that this grass is remnant from the cover crop used to stabilise the soft batters during formation of the drainage swale/retention basin. Senescent Cereal Rye being the only vegetation present increases the susceptibility of the areas to invasion from herbaceous weeds and aggressive invasive grasses. One small patch of the woody weed, *Acacia saligna* (Golden Wreath Wattle), was observed on the eastern batter of the retention basin.



Plate 2. Senescing *Secale cereale* (Cereal Rye) on soft batters of drainage swale; increasing susceptibility of area to invasion by herbaceous weeds and aggressive invasive grasses.

Herbaceous weeds and exotic grasses are beginning to colonise remediated areas within the Rail Link including, *Conyza* sp. (Fleabane), *Medicago polymorpha* (Burr Medic), *Solanum nigrum* (African Nightshade) and *Trifolium repens* (White Clover) (Plate 3). If left untreated these weeds will quickly colonise remediated areas.



Plate 3. Exotic grasses and herbaceous weeds colonising remediated areas

Areas not subject to remediation within the Rail Link continue to have a high percentage cover of exotic grasses and herbaceous weeds (Plate 4).



Plate 4. Weeds dominating non-remediated areas within the Rail Link

Three species of *Priority* weed are present within the Rail Link:

- *Asparagus asparagoides* (Bridal Creeper)
- *Lantana camara* (Lantana)
- *Olea europaea* subsp. *cuspidata* (African Olive)

The location of these *Priority* weeds as well as the percent coverages of weeds across the MPE operational area is included in Figure 2 - Figure 6.

The status of weeds and weed control works observed during the December 2020 monitoring survey has been compared against a series of recommended actions developed during the baseline monitoring survey (Table 2).

Table 2. Weed control works tracking

Priority	Action	Action description	December performance assessment
1	Eradicate <i>Priority</i> weeds	Target <i>Priority</i> weed species through a combination of manual removal and herbicide treatment. Herbicide application should be considerate of timing (i.e. applying herbicide when weeds are actively growing) and best practice methodologies.	Majority of the operational area is free of <i>Priority</i> weeds. Three <i>Priority</i> weed species were identified in the Rail Link: <i>Asparagus asparagoides</i> (Bridal Creeper), <i>Olea europaea</i> subsp. <i>cuspidata</i> (African Olive), <i>Lantana camara</i> (Lantana) (Figure 2 - Figure 6). These should be removed.
2	Removal of notable weed species	Notable weed species including Moth Vine, Castor Oil Plant and Grader Grass should be removed from	A significant portion of notable weeds were removed during the

Priority	Action	Action description	December performance assessment
		operational areas using a combination of manual and herbicide control.	remediation works conducted in September/October. Scattered individuals of Golden Wreath Wattle, Moth Vine, Grader Grass and Castor Oil Plant remain within the Rail Link (Figure 2 - Figure 6). These should be removed.
3	Suppress further colonisation of environmental weeds and encroachment into areas of bushland	Control of environmental weeds adjacent to biobank areas and natural bushland environments. Manual removal should be adopted in areas adjacent to threatened flora locations.	No weeds were observed encroaching on the biobank site and other natural bushland environments.
4	Slashing of invasive grasses to prevent seeding.	Management of invasive grasses such as Rhodes Grass and African Love Grass through regular mowing or slashing.	Large patches of exotic grasses within the Rail Link should be slashed to prevent seeding and minimise risk of grass fire.
5	Reduce percent coverage of environmental weeds within the Rail Link	Reduction in percent coverage of environmental weed infestations by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019)	Remediated areas within the Rail Link are showing signs of invasion by exotic grasses and herbaceous weeds. Areas which were not subject to remediation works in September/October have a high percent coverage of environmental weeds and exotic grasses Works should be commenced to reduce weed coverage in these areas.
6	Reduce percent coverage of environmental weeds within the operational area and trunk drainage infrastructure.	Reduction in percent coverage of environmental weed infestations by applying control methods commensurate with the Operational Flora and Fauna Management Plan (Arcadis 2019)	Exotic grasses and herbaceous weeds were observed within the trunk drainage infrastructure, albeit at low coverage. Removal should be conducted to reduce percent coverages.

Erosion

Batter slumping was observed at two locations within the Rail Link (Figure 2 - Figure 6). These areas were not remediated during recent works and are completely vegetated with exotic grasses and herbaceous weeds (Plate 5).



Plate 5. A section of soft batter which has slumped within the Rail Link