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Dear Eunjee,

YEAR 8 ANNUAL MONITORING OF TRANSLOCATED MATTED FLAX-LILY FOR THE SOUTH MORANG RAIL EXTENSION PROJECT

The South Morang Rail Extension Project (SMREP) was a controlled action based on the impacts of two Matters of National Environmental Significance (MNES), matted flax-lily (*Dianella amoena*) and Grassy Eucalypt Woodland of the Victorian Volcanic Plain (GEWVVP). The project was granted approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), subject to conditions, which include the implementation of the *Translocation Plan for the Matted Flax-lily (Translocation Plan)*. The Translocation Plan Revision 3 (SMREP 2014) is referenced throughout this report. Condition 5 of the EPBC 2010/5313 approval requires ongoing reporting of project compliance with the approval conditions.

As noted in the Translocation Plan (SMREP 2014), on behalf of Public Transport Victoria (PTV), VicTrack have assumed monitoring responsibilities and have engaged Kellogg, Brown & Root Pty Ltd (KBR) to complete the monitoring for 2018. VicTrack are also responsible for implementing management for Receptor Site 4. Parks Victoria are responsible for managing Receptor Sites 1,2 and 3, on behalf of PTV.

Purpose

The translocation plan developed for the matted flax-lily requires that an annual report be prepared every year for ten years on the status of the plan and the condition of the translocated plants following translocation. This report has been prepared to document the results of the Year 8 monitoring of matted flax-lily and meets the requirement of the translocation plan, which includes the following:

- reporting on the health and success of the translocated plants
- current condition of each of the four receptor sites, including an assessment of the state of threats to translocated matted flax-lily health and survival, such as weeds, pest animals and biomass
- proposed changes to site management if required, to appropriately manage threats to the translocated matted flax-lily
- reporting against each approval condition required for the project under EPBC 2010/5313.

Salvage and Translocation

The salvage of the matted flax-lily from the SMREP corridor took place from 30 September to 6 October 2010. A total of 98 distinct patches were removed from the corridor. From the 98 patches, 422 sections were removed, which resulted in the following distribution of sections:

- 183 sections directly planted into the receptor sites, excluding Receptor Site 3
- 135 sections taken to the nursery for subsequent plantings (delayed translocation)
- 104 sections taken to the nursery for insurance.

The total sections that were planted into each receptor site via direct translocation (September - October 2010) or delayed translocation (which included some insurance plants at the request of Parks Victoria in August 2011) was as follows:

- 50 sections planted into Receptor Site 1, located in Plenty Gorge Parklands, Mill Park
- 186 sections planted into Receptor Site 2, located in Plenty Gorge Parklands, Mernda
- 109 sections planted into Receptor Site 3 (Site 3 includes only delayed translocation plants), located in Plenty Gorge Parklands, Mernda
- 33 sections planted into Receptor Site 4, located on VicTrack owned land, South Morang.

This totals 378 planted salvaged plants, with the 44 remaining plants held and managed at a Parks Victoria nursery for use as insurance plants. The insurance plants are no longer required for the Translocation Plan and are now the property of Parks Victoria.

Method

Annual matted flax-lily monitoring was undertaken by two ecologists over two days, on 23 and 24 October 2018 at the four receptor sites. Monitoring was completed in accordance with the reduced monitoring method outlined in the translocation plan (SMREP 2014), which included a presence/absence survey and assessment of general health of each plant.

All of the translocated (direct and delayed translocation) matted flax-lily were monitored. The monitoring of direct translocated plants corresponds with the Year 8 monitoring period, the monitoring of delayed translocated plants corresponds with the Year 7 monitoring period.

Identification of threats and risks to the translocated matted flax-lily are based on observations made by the ecologists over several years monitoring the receptor sites and the species. These observations are considered in the recommendations for any adaptive management.

Data collection

The assessment of the general health of the plant at the time of translocation was recorded based on five discrete categories ranging from Dead to Very Healthy. Similarly, during the current annual monitoring each section translocated into a receptor site was assigned one of the following health categories:

- Dead; plant generally with dead or dying leaves and no new growth
- Poor health; most leaves in poor condition, evidence of heavy herbivory or large areas of 'browning' of the leaves; > 30% of leaf area affected
- Moderate health; leaves either containing some level of 'browning' or some herbivory; 10 to 30% of leaf area affected
- Good health; leaves generally healthy, containing minimal evidence of herbivory or 'browning'; < 10% of leaf area affected
- Very healthy; plant very healthy with no signs of herbivory or 'browning'.

Data analysis

Data derived on the health of each plant was assigned an arbitrary health index score ranging from 0 to 100 to allow statistical analysis of health over time (Dead 0, Poor 25, Moderate 50, Good health 75, and Very healthy 100).

Plant health was analysed using T–tests (Excel 2010) to determine whether change in health was statistically significant. T–tests are a simple measure of similarity, used to compare the mean of two data sets and determine if they are significantly different. Results with p-values of <0.05 were considered to be a significant change, and results with p-values of <0.01 were considered to be highly significant.

Results

Plant health

In total 378 direct and delayed translocated matted flax-lily sections were monitored. This includes 183 direct translocated sections and 195 delayed translocation sections. Of these, 12 sections were not located during the current monitoring, with no above ground material present. These plants were assigned a rating of 'Dead' in the general health assessment. Therefore the current survival rate for the translocated matted flax-lily is 96.8 per cent.

In comparison to previous years' monitoring (2017), there has been an increase in survival rate of the translocated material. The 2017 survival rate was 95 per cent, where a total of 19 plants were considered dead (KBR 2017). The survival rate is still well above the required target survival rate of 85 per cent (SMREP 2014).

A review of the plants considered dead over the 2017 and 2018 period show there is fluctuation in the presence and absence of plants, though several have been continually observed as dead. Of the 12 not observed in 2018, nine were also not observed in 2017. .

From 2017, 10 of the plants considered dead in that year were present during the 2018 monitoring. Seven of these plants that reappeared were observed in Receptor Site 2, with three reappearing in Receptor Site 3. The current monitoring resulted in the first dead plant in Receptor Site 4

Overall, there has been an increase in survival rate but a significant reduction (P-value = <0.01) in the plant health from 2017 to 2018, see Figure 1. The decline observed in overall plant health is further discussed below for each Receptor Site.

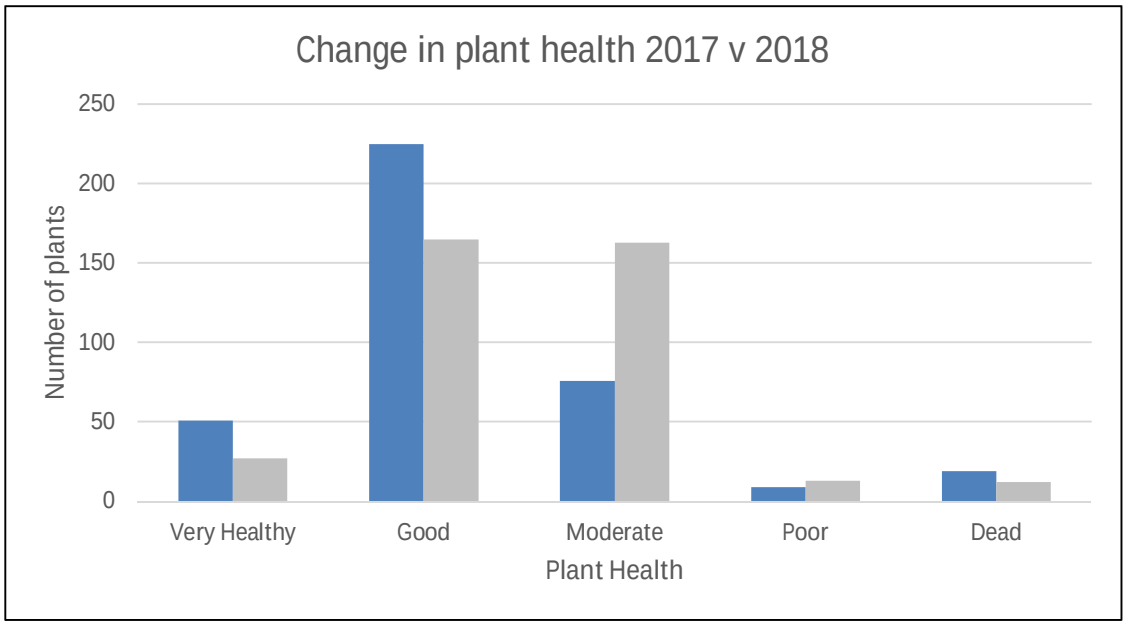

Figure 1. Change in plant health of translocated matted flax-lily from 2017 (Blue) to 2018 (Grey)

Direct translocation

The overall plant health (i.e. average health index) has declined significantly (P-value = <0.01) from the results recorded in 2017 (Table 1). This is a second concessive reduction in health, which has seen overall health drop from an average of 93 in 2016 to a current health average of 64. Although this is still considered to be roughly of good health across the direct translocated plants. The most significant drop was observed in Receptor Site 2, which has a high number of direct translocated plants.

Table 1 Average health results for direct translocation matted flax -lily

Time since translocation	Site 1	Site 2	Site 4	Overall
Baseline	81	82	78	82
1 month	68**	63**	80	65**
3 months	79**	72**	84	74**
6 months	97**	93**	96**	94**
12 months	96	93	96	94
18 months	72**	67**	81**	68**
2 years	75	53**	91*	61**
3 years	94**	67**	88	74**
4 years	78**	65	81	69*
5 years	86	94**	93	93**

Time since translocation	Site 1	Site 2	Site 4	Overall
6 years	97*	91	99	93
7 years	79**	74**	76**	75**
8 years	68*	61**	73	64**

*Significance of mean health variables using T-test where *P<0.05 and P<0.01***

Delayed translocation

The overall average plant health of the delayed translocation plants showed a highly significant (P-value = <0.01) decrease (Table 2). This is despite an increase in the average health of translocated plants within Receptor Site 3; however, this was not statistically significant. The overall average decrease was mostly influenced by the large decrease s (P-value = <0.01) observed in Site 2 and Site 4.

Table 2 Average health results for delayed translocation matted flax-lily

Time since translocation	Site 1	Site 2	Site 3	Site 4	Overall
Baseline	75	79	81	79	80
1 month	49**	31**	43**	81	43**
3 months	75**	70**	71**	81	72**
12 months	88	73	95**	96**	88**
18 months	24**	16**	24**	25**	22**
2 years	100**	55**	57**	83**	62**
3 years	76**	50	53*	94*	57*
4 years	89**	80**	75**	96	79**
5 years	98*	79	46**	100	73**
6 years	85**	54**	60	79**	62**
7 years	76	52	58	90*	60

*Significance of mean health variables using T-test where *P<0.05 and P<0.01***

Site Condition and Adaptive Management

Receptor Site 1

Receptor Site 1 is located toward the southern end of the Plenty Gorge Parklands, Mill Park, and is managed by Parks Victoria.

This site is considered to be in very good condition, with a high cover of native vegetation, particularly kangaroo grass (*Themeda triandra*) with patches of weedy areas in the centre and north of the site dominated by phalaris (*Phalaris aquatica*), annual veldt grass (*Ehrharta longiflora*), sweet vernal grass (*Anthoxanthum odoratum*), Madrid brome (*Bromus madritensis*), soft brome (*Bromus hordeaceus*), large quaking-grass (*Briza maxima*) and bridal creeper (*Asparagus asparagoides*).

The weedy patches are away from the translocated matted flax-lily and do not currently pose a threat to their health or persistence. The vegetation around the flax-lily plants is generally dense kangaroo grass, particularly for those planted at the southern end of the site. The density of the surrounding grass in this area should be monitored for effect on the health of translocated plants, however, currently most appear healthy.

The plants in the centre of the site are noticeably healthy and they are located in an area with preferred inter-tussock spaces to allow growth, but afforded protection from elements by the surrounding grass. It was noted that three of the plants had been grazed by rabbits. However, grazing does not appear to be concentrated or prolonged and restricted to a few tillers of the overall plant, which remaining tillers appear to be in good condition.

The abundance and diversity of forbs, other lily species and orchids, appears to have reduced on previous years. Previous monitoring had observed several chocolate lilies (*Arthropodium strictum*), bulbine lilies (*Bulbine bulbosa*), onion orchids (*Microtis unifolia*) and sun-orchids (*Thelymitra* spp.), however, these were not as prevalent during the current monitoring.

Overall the cover of annual exotic grasses is considered to have stabilised and potentially reduced from previous years. It is likely the dry conditions through winter and spring (BoM 2018, BoM 2018a) have impacted the emergence, and therefore cover, of annual exotic grasses.

Woody weeds were also considered to be at the same level of overall cover as compared to last year. Woody weeds are restricted to two species briar rose (*Rosa rubiginosa*) and blackberry (*Rubus fruticosus* spp. agg.). One other significant weed species, bridal creeper, is present in the site. This species has increased in cover from previous monitoring.

The above weed species are all in very low cover in the immediate area surrounding the translocated plants. This area is generally dense cover of kangaroo grass. As such, these weeds are not considered direct threat to the health of the translocated plants. These species should be targeted for management as they have the potential to impact the site over time, however, no changes to the management regime are currently proposed.

Evidence of rabbits and kangaroos was present on site, including grazing on some of the translocated matted flax-lily located in the centre of the receptor site. The grazing did not appear recent and the matted flax-lily appeared to have recovered since. However, it is noted that the plants appear to be preferentially grazed, compared to surrounding grasses.

A review of the perimeter fence identified no clear breaches. However, straining wires have been cut on the western boundary (along Heaths Court Drain), and kangaroos may have been entering at this point. Rabbits are likely entering the site near the entrance gate, where there is also a hole in the fence to the right of the gate.

A potential warren was observed within the site (Figure 2), although did not seem active. The potential breach points should be repaired to make the site rabbit-proof and once complete should be assessed for current rabbit activity. If rabbits are found, rabbit control should be conducted and any warrens should be destroyed.

Figure 2. Evidence of rabbit burrows in Receptor Site 1

Receptor Site 2

Receptor Site 2 is located in the northern end of Plenty Gorge Parklands, accessed from Bridge Inn Road, Mernda and is managed by Parks Victoria.

Recent targeted management of Receptor Site 2, likely assisted by low rainfall and some light grazing, has resulted in reduced biomass cover throughout the majority of the site, particularly along the eastern half of the site where the translocated matted flax-lily is present. Notably, phalaris tussocks had been sprayed over the site which has limited the amount of biomass. In previous monitoring years the species has been a direct threat to matted flax-lily and the targeted spraying of the species is likely to assist in the persistence and health of the matted flax-lily (Figure 3).

The cover of high threat herbaceous species has also significantly reduced on previous years' monitoring. Noticeably, spear thistle (*Cirsium vulgare*) and Paterson's curse (*Echium plantagineum*) were at significantly lower cover. It is likely that these species have been targeted during weed control efforts.

Grazing was evident within the site from both rabbits and kangaroos. The grazing is considered to be light with only localised patches occasionally grazed. Discussion with Parks Victoria staff indicated that the kangaroos had entered through a damaged part of the fence that was recently repaired by Parks Victoria. No kangaroos where present during the monitoring.

Rabbits are entering through several breaches in the fence, mainly along the western boundary with the Plenty River, where the skirt has been dug beneath and lifted. Grazing has impacted the health of several matted flax-lily, as shown in the health assessment. However, most of the grazed plants appear to have, or

are recovering, showing new growth. Currently, the level of grazing is not considered to be an immediate threat to matted flax-lily, as several appear to be responding to the reduction in biomass afforded by the grazing.

Adaptive management should consider allowing kangaroo grazing within the site. Parks Victoria has indicated that kangaroo numbers within the park are high and the dry conditions are likely to result in heavy grazing. Any encouragement of grazing within the site would need to be monitored and excluded if grazing results in very low biomass. It is preferred that grazing be considered from February to August, inclusive, after the species has had a chance to flower and seed.

Notwithstanding the above, biomass is at high levels in the north west portion of the site. Here there is greater cover of Chilean needle-grass and this species is avoided by grazers. It was noted that the majority of matted flax-lily that could not be found and identified as dead are located in this area of the site. This weed species and the amount of cover is the most immediate threat within Site 2 and is considered to be a key reason in the decline in plant health. The species should be targeted for control, particularly in the area surrounding the translocated plants.

Figure 3. Re-emerging matted flax-lily among a recently sprayed phalaris tussock.

In addition, woody weeds are increasing in cover over the site. This is predominantly hawthorn (*Crateagus monogyna*), briar rose and blackberry, and some Montpellier broom (*Genista monspesullana*) observed along the north west boundary.

In summary, the following recommendations are proposed for adaptive management at Site 2, in order of importance:

- Targeting Chilean needle-grass, particularly within close proximity to matted flax-lily with a grass specific herbicide, such as Fusilade. Care should be taken in applying herbicide as matted flax-lily and kangaroo grass is present, particularly during November and December when these species are growing and flowering. Fusilade can have an increased effect on these species during this time.
    - Where high biomass surrounds the plant, some over-spraying may occur, which is considered acceptable, as the matted flax-lily is often contained beneath the targeted weed and will likely benefit from space being created;
- Continue targeted management of high threat grass species, sweet vernal-grass, paspalum, phalaris and Yorkshire fog. At a minimum this should include spot-spraying with herbicide in the vicinity (1-2 m of flags) of matted flax-lily plants.
- Undertake fence and gate repairs to prevent rabbits entering the site. The gates may need to be adjusted to ensure rabbit access is prevented. Review the site for rabbit activity following fence repairs. Conduct rabbit control if rabbits are within the site. The area should also be searched for any active warrens;
- Consideration by Parks Victoria to modify the fence to allow seasonal access and grazing by kangaroos between February to July. This should be applied with regular monitoring of conditions and grazing pressure
- Removal of high threat woody weeds, blackberry, briar rose and hawthorn should be targeted to reduce cover to less than 1 per cent.

Receptor Site 3

Receptor Site 3 is also located at the northern end of Plenty Gorge Parklands, on the west side of Plenty River and to the south of Receptor Site 2. The site is managed by Parks Victoria. PTV recently handed over the management of the site to Parks Victoria, following an extensive revegetation program.

Receptor Site 3 was subject to a recent revegetation project throughout the site. This was completed in 2016 and has resulted in high levels of native grass. It was noted during the current monitoring that there has been a significant increase in exotic grass cover amongst the revegetated areas. Yorkshire fog and Chilean needle-grass were the two most prevalent species within the revegetated areas. Chilean needle-grass in particular had formed some large clumps and is dominating certain areas (Figure 4). In consideration of the condition prior to management and the high density of Chilean needle-grass, it is likely that ongoing management of the species is required to help establish the native grass sown into the site.

The two areas containing translocated matted flax-lily are also high in biomass, particularly the northern area. This area also has high cover of Chilean needle-grass, which has an infestation along the north eastern portion of the site along the Plenty River. The species is increasing in cover in the area and is

impacting on the health of matted flax-lily. Chilean needle-grass control in the area should be a priority for management.

The southern plot was considered to be in similar condition to the previous year, though high threat perennial grass weeds, including sweet vernal grass, phalaris and paspalum, are still reasonably high around translocated matted flax-lily.

The north eastern boundary of the receptor site contains the highest concentration of weeds. This area has high concentrations of Chilean needle-grass, which is spreading into the adjacent northern translocation plot. The site also has an infestation of the high threat woody weed, Montpellier broom (*Genista monspessulana*).

Figure 4. Dense clump of Chilean needle-grass within Receptor Site 3

It is recommended that the recent weed control is followed up to manage weeds within the two plots, including targeting the high threat exotic grasses, Yorkshire fog and sweet vernal grass, within at least 1 m of the translocated matted flax-lily.

It is recommended that regular weed control occur within the re-seeded area to maintain the high quality condition. Concentrated weed control should focus on the north east of the site, working from the higher quality areas within the centre of the site toward the eastern boundary.

No evidence of animal activity was observed within the site.

In summary, there are no recommendations for additional management; however the existing allocation of resources should target the following:

- Biomass control and target control of Chilean needle-grass around translocated matted flax-lily within the northern plot;
- Target control of Chilean needle-grass within the revegetation areas;
- Weed control in the southern translocation plot to control exotic grasses and high biomass, targeting high threat weeds – sweet vernal grass, Yorkshire fog, paspalum and phalaris.

Receptor Site 4

Receptor Site 4 is located on VicTrack land to the south of the South Morang rail station car park. The site is managed by VicTrack. A 0.82 ha section of the site along the northern boundary was removed to facilitate the Mernda Rail Extension Project. The northern boundary included the disused Whittlesea rail line, which is a cutting through most of the site. Approximately 1.22 ha of the woodland remains, including the two plots comprising Receptor Site 4 along the southern boundary.

The two plots containing the translocated matted flax-lily are generally in good condition. The site contained only minimal exotic species, generally present as occasional clumps of exotic grasses, such as cocksfoot (*Dactylis glomerata)*.

As noted in the 2017 monitoring (KBR 2017), species used in the revegetation within the plots, mainly common woodruff (*Asperula conferta*) and kidney weed (*Dichondra repens*), have become invasive and are outcompeting and suppress the translocated matted flax-lily (Figure 5). These species are of greater cover in the western plot, which has contributed to the lower health value observed in the direct translocation plants in 2017 and 2018.

Figure 5. Common woodruff and kidney weed outcompeting matted flax-lily

Through continued management of the receptor site, minimal threats from exotic weed species are present. No evidence of vandalism or animal use of the site was observed.

Rabbit activity was observed within the wider woodland site, however, no grazing or other rabbit activity was observed in the fenced plots.

Current management is considered sufficient to maintain the plots that comprise Receptor Site 4. Although it is recommended that during management of the site, where common woodruff and kidney weed are over-crowding the matted flax-lily plants, they be pulled back or trimmed to make space around matted flax-lily plants.

Compliance with EPBC Act conditions

The following table (Table 3) describes how SMREP and PTV have demonstrated compliance with each of the EPBC approval conditions for the project (referral number EPBC 2010/5313).

Table 3 Compliance with EPBC Act conditions

Conditions of approval	Compliance with approval conditions
1. For the protection of the endangered matted flax-lily (*Dianella amoena*) and the critically endangered Grassy Eucalypt Woodland of the Victorian Volcanic Plan (GEWVVP) within the rail reserve, adjacent E6 road easement, McDonald Road reserve and South Morang Protection Zone (see Attachment 1) the Matters of National Environmental Significance, Document No. SMREP–APP–PW–ENV–010, Revision 0, South Morang Rail Extension Project (September 2010), must be implemented.	Implementation of this plan occurred during the construction phase of the project. Construction is now complete and there are no remaining actions that are required to be implemented.
2. For the protection of the endangered D. amoena the Translocation Plan for Matted Flax-lily, Document No. SMREP–REP–PW–ENV–002, Revision 1, South Morang Rail Extension Project (September 2010), must commence prior to the commencement of construction and be implemented for a period of at least 10 years.	The salvage effort to translocate affected matted flax-lily began on 30 September 2010 and was completed on 6 October 2010. Construction commenced on the 13 October 2010, following the salvage of matted flax-lily. This report reviews the state of plant and receptor site health and the management actions being implemented.
3. Within 7 days of construction commencing the person taking the action must advise the Department in writing of the actual date of commencement.	An email was sent by Shelley Heron (SMREP Environment & Approvals Manager) to Narelle Sutherland (Department Assessment Officer) to confirm the commencement of construction on 15 October 2010.
4. If ownership and/or management of the protected land are to be transferred to another party, the person taking the actions must provide the Department with evidence that the other party has agreed to assume all the management responsibilities in accordance with the Translocation Plan and MNES Plan, and the conditions of this approval prior to any transfer occurring.	PTV has assumed the overall responsibility of the project approvals, with assistance from VicTrack, who have agreed to complete monitoring and reporting actions of all sites and management actions for Receptor Site 4. PTV and VicTrack have been assigned responsibility of actions within the current Translocation Plan, issued to the Department on 22 September 2014.
5. Within three months of every 12 month anniversary of the commencement of salvage of material for the translocation of D. amoena, the person taking the actions must submit to the Department a report addressing compliance with the conditions of this approval. Annual reports must be provided until the Minister is satisfied that the proponent has complied with all conditions of the approval.	This report demonstrates compliance with this condition.
6. If the person taking the action wishes to carry out any activity otherwise than in accordance with the MNES Plan or Translocation Plan referred to in	Revision 3 (May 2014) of the Translocation Plan was submitted to the Department on 22 September 2014.

Conditions of approval	Compliance with approval conditions
condition 1 and 2 the person taking the action must submit for the Minister's approval a revised version of the MNES Plan or Translocation Plan. The varied activity shall not commence until the Minister has approved the varied MNES Plan or Translocation Plan in writing. If the Minister approves such a revised plan that plan must be implemented in place of the MNES Plan or Translocation Plan originally approved.	
7. If the Minister believes that it is necessary or desirable for the better protection of listed threatened species and communities (under sections 18 and 18A of the EPBC Act) to do so, the Minister may request that the person taking the action make specified revisions to the MNES Plan or Translocation Plan approved pursuant to condition 1 and 2 and submit the revised MNES Plan or Translocation Plan, for the Minister's approval. The person taking the action must comply with any such request. The revised approved MNES Plan or Translocation Plan must be implemented. Unless the Minister has approved the revised MNES Plan or Translocation Plan then the person taking the action must continue to implement the MNES Plan or Translocation Plan originally approved, referred to in condition 1 and 2.	No such request has been made.
8. The person taking the action must maintain accurate records substantiating all activities associated with or relevant to the above conditions of approval, including measures taken to implement the MNES Plan or Translocation Plan required by this approval, and make them available upon request to the Department. Such records may be subject to audit by the Department or an independent auditor in accordance with section 458 of the EPBC Act, or used to verify compliance with the conditions of approval. Summaries of audits will be posted on the Departments website. The results of audits may also be publicised through the general media.	Records on the health of the matted flax-lily have been compiled and reported on in this report.

Conclusion

Overall the current survival rate for the translocated matted flax-lily is 96.8 per cent, which is slightly above the survival rate of 96.6 per cent recorded in 2016 (KBR 2016). This is still well above the required target survival rate of 85 per cent and it is likely that the project will maintain a similar rate at the completion of monitoring in 2019.

The species is considered well suited to translocation and is well established at each of the four receptor sites. The increase in the survival rate indicates that the species responds quickly to management actions, notably removal of exotic biomass. This is evident through the re-emergence of plants previously considered dead following completion of management actions. For example the management completed in Receptor Site 2 to manage exotic grasses and reduce biomass has resulted in seven plants re-emerging from 2017 when they were considered absent.

The key threats to the species are those exotic grasses that form dense clumps, including Chilean needle-grass, and those that also have an apparent allelopathic effect, Yorkshire fog, phalaris and sweet vernal grass. These species are currently of greatest threat within Receptor Sites 2 and 3, which contain the highest concentration of translocated plants and it is likely that these species are the primary reason for the significant decline observed in overall plant health.

Notably, Chilean needle-grass has increased in cover in these two sites to become the primary weed for management. The species is at high density in Receptor Site 2 in the north west portion of the site where there is a concentration of plants (six of the seven) considered dead.

There is potential for several of the plants located within the northern plot in Receptor Site 3 to die-back in response to the high cover of Chilean needle-grass currently present. If the species is not controlled in this location, this could result in a further reduction of the total survival rate. As noted previously, the species health and persistence is strongly linked to management. Therefore, it is expected that the species will respond positively to any management completed within the plot.

If you have any queries regarding the above please contact me at Adam.Rigg@kbr.com or on (03) 9828 5421.

Yours sincerely,

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References

Bureau of Metrology (BoM), 2018. Greater Melbourne in winter 2018: drier than average, mild days, viewed online 31 October 2018, Bureau of Metrology
http://www.bom.gov.au/climate/current/season/vic/summary.shtml

Bureau of Metrology (BoM), 2018a. Greater Melbourne in September 2018: drier than average with cool nights, viewed online 21 October 201, Bureau of Metrology.
http://www.bom.gov.au/climate/current/month/vic/melbourne.shtml

Carter, 2010. National Recovery Plan for the Matted Flax-lily *Dianella amoena*. Prepared by Oberon Carter, Arthur Rylah Institute for Environmental Research, Department of Sustainability and Environment, Heidelberg, Victoria.

Kellogg Brown & Root Pty Ltd (KBR) 2014, Translocation Plan for the Matted Flax-lily; Year 4 Annual Report, MEN403-TD-EV-REP-0001 Rev. 0.

Kellogg Brown & Root Pty Ltd (KBR) 2016, Translocation Plan for the Matted Flax-lily; Year 6 Annual Report, MEN403-C1-S0060. Report prepared for VicTrack.

Kellogg Brown & Root Pty Ltd (KBR) 2017, Translocation Plan for the Matted Flax-lily; Year 7 Annual Report, MEN403-C1-S00120. Report prepared for VicTrack.

South Morang Rail Extension Project (SMREP), 2014. Translocation Plan for Matted Flax-lily, SMREP-REP-PW-ENV-002 Revision 4. Prepared by AECOM-GHD for the Level Crossing Removal Project.