NORTH EAST LINK PROJECT

EPBC Referral Attachment F – Draft Translocation Plan

Revision 0

12 January 2018

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Release

Revision	Date Released	Release Status	Comment
0		**For Use**	

Issue

Draft	☐	Final	☒

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Summary of this Plan

The following table provides a summary of this translocation plan.

Project Title	North West Link Authority: North East Link Project
Taxon to be translocated	Matted Flax-lily (*Dianella amoena)*
Number of plants to be translocated	Approximately 88 plants/patches and one large patch (15 x 2m) will be subject to removal. However, it should be recognised that the final figure is likely to vary (+/-) depending on the prevailing conditions at the time of salvage.
Proposed dates of translocation	The proposed timing of translocation depends on when project planning and environmental approvals are received and project procurement. Works are likely to start in 2020. The preference is for salvage to occur outside the flowering and fruiting period of the species (November – April) and as such at this point is scheduled to occur in Winter 2019. Alteration to this program may be considered if suitable conditions are prevalent or if early human intervention is likely to lead to higher salvage success rates. Translocation is proposed to be undertaken within 1 year of salvage; subject to both the conditions of the plants at the time of salvage, and the conditions of the recipient site(s).
Source location or propagation facility	North East Link ('the project') is a proposed new freeway standard road connection that would complete the missing link in Melbourne's metropolitan ring road, giving the city a fully completed orbital connection for the first time. North East Link would connect the M80 Ring Road (M80) to the Eastern Freeway, and include upgrade works at the Eastern Freeway. Within the referred project area (refer Figure 1), Matted Flax-lily have been identified within the: · M80 road reserve · Hurstbridge line rail corridor · Commonwealth Land (Simpson Barracks site)
Recipient sites	The plan outlines the process for identifying a recipient site.
Name of contact person	Michael Crossman Manager - Environment North East Link Authority michael.crossman@northeastlink.vic.gov.au
Name and Affiliation of Proponents	**Cameron Miller (M.Sc. B.Sc.)** *Associate Director – Ecology* AECOM Australia

Project Title	North West Link Authority: North East Link Project
Summary of the Translocation	NELA is proposing to salvage and translocate approximately 93 individual plants. This Plan documents: · A protocol for salvage and translocation · Nomination and selection criteria to determine a recipient site · Pre-clearance surveys · Post translocation management · Monitoring and reporting · Contingency planning and adaptive management.

1. Introduction

1.1 Objectives

GHD Pty Ltd (GHD) and AECOM Australia Pty Ltd were engaged by the North East Link Authority (NELA) to prepare a Preliminary Translocation Plan for those Matted Flax-lily *Dianella amoena* to support an *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) referral for the North East Link project.

The objectives of this plan are to:

- Provide background on the project, the Matted Flax-lily, and the regulatory requirements for translocation
- Identify Matted Flax-lily plants to be salvaged
- Outline the criteria and process for the selection of suitable recipient site(s) for the translocated plants
- Provide details on pre- and post-translocation management actions for both the salvage and recipient site
- Establish clear and effective protocols for the salvage, translocation, propagation, management and monitoring of Matted Flax-lily plants that must be removed prior to project construction
- Identify roles and responsibilities for the parties involved in the translocation process
- Establish benchmarks for translocation success
- Outline future reporting requirements and provide guidelines for potential contingency and adaptive-management measures during the monitoring period
- Satisfy regulatory requirements under State and Commonwealth legislation.

1.2 Project description

North East Link ('the project') is a proposed new freeway standard road connection that would complete the missing link in Melbourne's metropolitan ring road, giving the city a fully completed orbital connection for the first time. North East Link would connect the Western Ring Road (M80) to the Eastern Freeway, and include works along the Eastern Freeway.

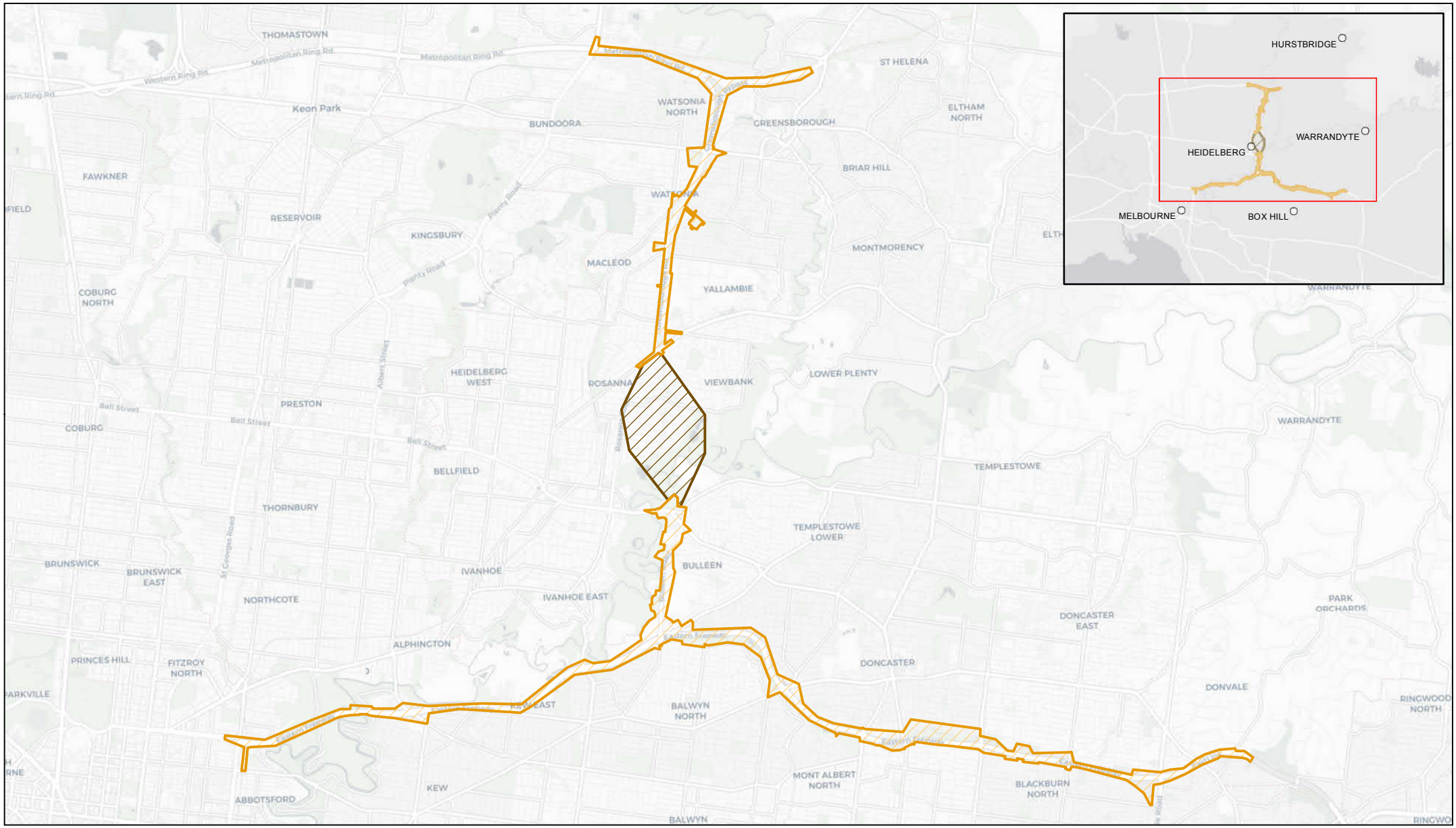
The following section describes the North East Link alignment and the key elements, noting that fine-tuning of the concept design is ongoing.

- **Western Ring Road to Lower Plenty Road** – from the M80 and Greensborough Bypass to the northern tunnel portal, this section would include a mixture of above, below and at surface road sections, with new road interchanges at M80, Grimshaw Street and Lower Plenty Road.
- **Tunnels** – from the northern tunnel portal located just north of Lower Plenty Road to south of Manningham Road, twin tunnels would travel under residential areas, Banyule Flats and the Yarra River. Near each tunnel portal, supporting tunnel infrastructure would be required, including ventilation structures, substations and associated infrastructure. This section would include a new interchange at Manningham Road.

- **Bridge Street to Eastern Freeway** – this section would include open cut and bored or mined tunnel with the southern tunnel portal located south of the Veneto Club. Further south, surface road and viaduct structures would connect to the Eastern Freeway via a new interchange.
- **Eastern Freeway upgrades** – from around Hoddle Street in the west through to Springvale Road in the east, modifications to the Eastern Freeway would include widening to accommodate future traffic volumes, provision of new dedicated bus lanes for rapid bus services (Doncaster Busway) and associated works.

These areas are illustrated in **Figure 1** which shows the area referred to the Commonwealth Minister for the EPBC Act referral.

For a more detailed description of the project, see the covering referral document.



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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

Referred project area

Above ground

Tunnel

North East Link Authority
North East Link Project

Job Number 31-35006
Revision 0
Date 10 Jan 2018

Referred Project Area

Figure 1

G:\31\35006\GIS\Maps\Working\20180108_EPBCUpdates\31-35006_001_EPBC_Boundary_A4L.mxd

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Data source: Carto, 2017. Created by:trighetti

1.3 Project area

Vegetation within the project area is predominantly located within the Gippsland Plain bioregion and to a lesser extent the Highland Southern Fall bioregion.

The northern parts of the project generally pass through areas that have been previously disturbed. The woodland and forest areas that remain or that have regenerated or been re-planted offer low to moderate value habitat for threatened fauna species. With the exception however are the larger intact areas of Woodland associated with Simpson Barracks and a small area of Commonwealth Land immediately south west of the barracks. Simpson Barracks contains a relatively large area of remnant woodland/forest (EVC 55: Plains Grassy Woodland), particularly for this part of otherwise urbanised Melbourne.

Key areas of riparian and floodplain vegetation located in the referred project area are associated with the Yarra River and its tributaries, including Koonung Creek in the south and Banyule Creek near the centre of the project area. Vegetation in these areas generally consists of Floodplain Riparian Forest (EVC 56) or Swampy Riparian Woodland (EVC 83). These areas contain a mature canopy of River Red gums (*Eucalyptus camaldulensis*) which form remnant patches or occur as isolated scattered trees.

Riparian and floodplain areas within parks and reserves also generally contain a species-rich understorey shrub layer, however the herbs and graminoids are largely absent from these areas due to the presence of high-threat weeds including Wandering Trad *Tradescantia fluminensis*. Several areas of remnant vegetation contained good quality Plains Grassy Woodland (EVC 55) and Valley Grassy Forest (EVC 47) which were characterised by a canopy layer made up of several Eucalyptus and a grassy understorey.

1.4 Matted Flax-lily background

1.4.1 Species description

The National Recovery Plan for the Matted Flax-lily *Dianella amoena* (Carter 2010) describes Matted Flax-lily as:

in the family Hemerocallidaceae (formerly included in the family Liliaceae) is a tufted, mat–forming perennial lily. Plants are rhizomatous and can form loose clumps up to 5 m wide. Rhizomes are yellow and slender, with shoots arising every 10–30 cm. Leaves are grey-green, dull crimson at the base, narrow and tapering, to 45 cm long by 12 mm wide, and broadly V-shaped, with a prominent abaxial keel along the midrib and loose clasping leaf sheaths. Blades, sheaths and midribs usually have small, irregularly spaced teeth. Leaves are deciduous in summer if plants are water-stressed (Gray & Knight 2001). The inflorescence is erect, 20–90 cm long, with a slender, arching scape that bears several bluish, star-shaped, nodding, sweetly fragrant flowers. Perianth segments are pale to deep blue-violet, recurved, elliptic, to 10 mm long by 3 mm, the outer tepals with five veins, the inner tepals with three veins. There are six stamens, to 7 mm long, with pale yellow filaments, orange strumae and pale lime-yellow anthers, while the style is whitish-translucent, to 6 mm long. Fruits are ovoid purple berries to 7 mm long, and seeds are shiny black and smooth, to 3 mm long. Flowering occurs from October to April (description from Carr & Horsfall 1995).

Typical images of the plant in various stages of growth and reproduction are shown in Plate 1a-d.

Plate 1a-d Matted Flax-lily in situ (source Cameron Miller, AECOM)

1.4.2 Conservation status

Matted Flax-lily is listed as Endangered under the EPBC Act and the Victoria Department of Environment, Land and Planning (DELWP) Advisory List, and as Threatened under the *Flora and Fauna Guarantee Act 1988* (FFG Act). In 2010, a National Recovery Plan was prepared for the species that outlines recovery objectives and actions necessary to ensure the species' long-term survival. The Recovery Plan identified the major current threats to the species as weed invasion and competition, habitat destruction and disturbance, and population fragmentation (Carter 2010).

1.4.3 Habitat and ecology

In Victoria, Matted Flax-lily typically occur in grassland and grassy woodland habitats with fertile, well-drained to seasonally-wet soils ranging from sandy loams to heavy cracking clays (Carr & Horsfall 1995; Gray & Knight 2001).

Matted Flax-lily is typically found in association with native grasses such as Common Wheat Grass (*Anthosachne scabra*), Common Tussock-grass (*Poa labillardierei*), Kangaroo Grass (*Themeda triandra*), Grey Tussock-grass (*Poa sieberiana*), Wallaby Grass (*Austrodanthonia*

racemosa var. *racemosa*), and Weeping Grass (*Microlaena stipoides* var. *stipoides*). In grassy woodland habitat, associated tree species include Blackwood (*Acacia melanoxylon*) and a variety of *Eucalyptus* species including River Red Gum (*Eucalyptus camaldulensis)*, Long-leaved Box (*E. goniocalyx)*, Red Stringy Bark (*E. macrorhyncha* subsp. *macrorhyncha)*, Yellow Box (E. *melliodora)*, Swamp Gum (*E. ovata)*, Snow Gum (*E. pauciflora* subsp. *pauciflora)*, and Red Box (*E. polyanthemos* subsp. *vestita*). Matted Flax-lily is also found in association with various introduced grasses and herbs (Carr & Horsfall 1995, Gray & Knight 2001, Carter 2010).

Flowers are buzz-pollinated by the native Blue-banded Bee (*Amegilla cingulata*). Fruits are readily formed but recruitment is often considered low or absent due to habitat disturbance and weed competition, and generally no seedlings are produced. Instead the species typically reproduces vegetatively through the production of rhizomes and ramets. The species can also be propagated by division (Carter 2010 and Ralph 2003). However, given the size of some of the observed plants and their isolation from other plants within the project area, there is the potential that some of these have been produced through sexual reproduction and seed dispersal.

1.4.4 Current population and distribution

Matted Flax-lily is currently known to occur in Victoria and Tasmania. Approximately 2,500 plants are estimated to remain in the wild in Victoria, found in approximately 120 sites (Carter 2010). Multiple populations are known from the northern suburbs of Melbourne, typically within remnant vegetation along roadsides and within rail corridors, conservation reserves, and in translocation sites (Carter 2010). The distribution of Matted Flax-lily at the time of writing the Recovery plan is shown in Figure 2.

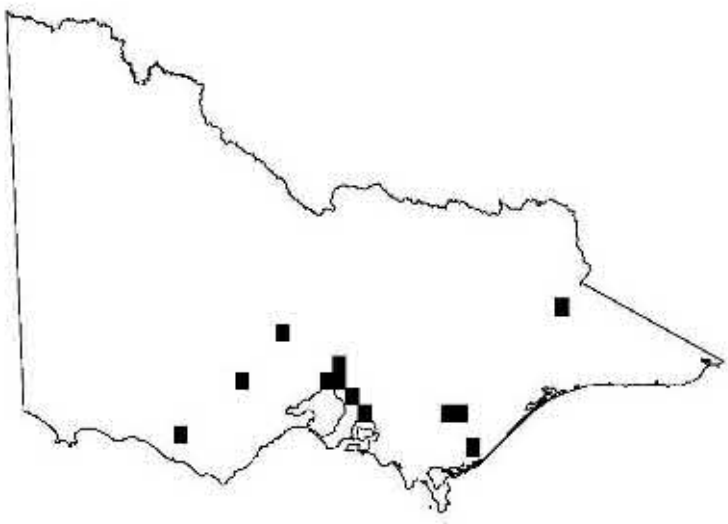

Figure 2 Distribution of Matted Flax lily in 2010 (source Carter, 2010)

It should be noted that the recovery plan is somewhat outdated, and since the expansion of Melbourne's urban growth boundary, additional records and sites have been found as demonstrated by a recent extract of Matted Flax-lily observations from NaturePrint (DeLWP, 2017).

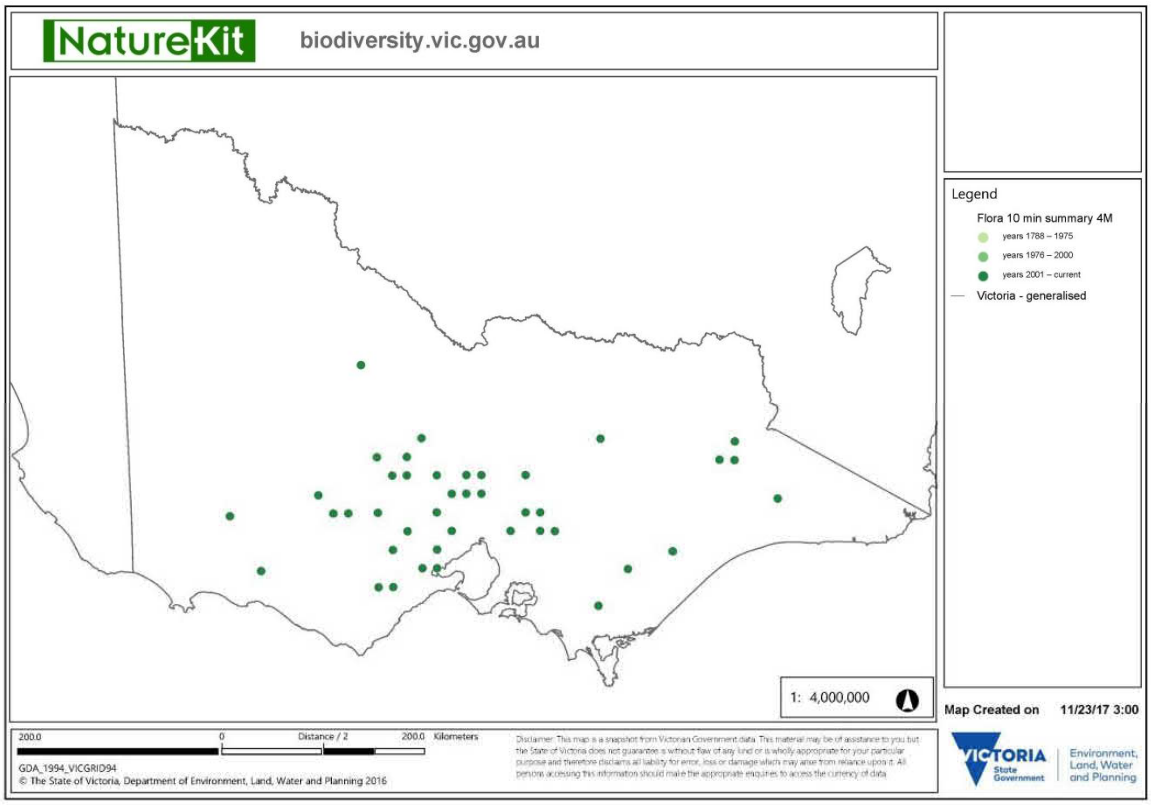

Figure 3 Current observations of Matted Flax-lily from 2000 – 2017 (source DELWP 2017)

1.4.5 Population and distribution within project area

Suitable habitats within the project area were surveyed between October and December 2017. Matted Flax-lily was identified at three sites within the project area defined for the project's EPBC referral:

- Commonwealth Land (Simpson Barracks)
- M80 road reserve
- Hurstbridge Rail Line

Each of these sites were surveyed on two separate events, in November/December 2017 by a team of ecologists. Table 1 presents a summary of the Matted Flax-lily observations and Figure 4 a-e presents the mapped observations.

Table 1 Results of the Matted Flax-lily survey for North East Link

Approximate number of Individuals	Approximate area of patches (meters)
Whole Assessment (i.e. inside and outside of the referred project area)	
200 + one large patch (15 x 2m)	8529.0
Within the referred project area	
88 + one large patch (15 x 2m)	3133.9

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0 10 20 40 60

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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LEGEND

Referred project area

Matted Flax-lily Dianella amonea

Matted Flax-Lily Patch

North East Link Authority
North East Link Project

Matted Flax-lily records - M80 interchange

Job Number	31-35006
Revision	D
Date	09 Jan 2018

Figure 4a

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Data source: DELWP, VicMap, AECOM, GHD, 2017.
Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Referred project area
- Matted Flax-lily Dianella amonea
- Matted Flax-Lily Patch

North East Link Authority
North East Link Project

Matted Flax-lily records - Hurstbridge Rail Line

Job Number	31-35006
Revision	D
Date	09 Jan 2018

Figure 4b

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Data source: DELWP, VicMap, AECOM, GHD, 2017.
Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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Paper Size A4

0 10 20 40 60

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Referred project area
- Commonwealth land
- Matted Flax-lily Dianella amonea

North East Link Authority
North East Link Project

Matted Flax-lily records
- Simpson Barracks

Job Number	31-35006
Revision	D
Date	09 Jan 2018

Figure 4c

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Data source: DELWP, VicMap, AECOM, GHD, 2017.
Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Referred project area
- Commonwealth land
- Matted Flax-lily Dianella amonea
- Matted Flax-Lily Patch

North East Link Authority
North East Link Project

Matted Flax-lily records
- Simpson Barracks

Job Number	31-35006
Revision	D
Date	09 Jan 2018

Figure 4d

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Data source: DELWP, VicMap, AECOM, GHD, 2017.
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Paper Size A4

0 10 20 40 60

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

LEGEND

- Commonwealth land
- Matted Flax-lily Dianella amonea
- Matted Flax-Lily Patch
- Rentons Ridge (Simpson)- MFL Survey Area

North East Link Authority
North East Link Project

Matted Flax-lily records - Simpson Barracks

Job Number	31-35006
Revision	D
Date	09 Jan 2018

Figure 4e

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Data source: DELWP, VicMap, AECOM, GHD, 2017.
Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

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1.4.6 Significance of the sites

The Matted Flax-lily Recovery plan lists a number of sites that are considered a 'significant population'. A 'significant population is necessary to the long term survival and recovery of the Matted Flax-lily whose loss would result in a significant range contraction' (Carter, 2010). Of the sites where Matted Flax-lily was observed, Simpson Barracks is recognised by Carter 2010 as one of the 21 significant sites in Victoria. When determining 'significant populations' it was reported that Simson Barracks contained 10 plants (Carter, 2010). However, it should be noted that this is inaccurate as Kinhill (2000) and HLA (2007) recorded 72 individuals or clumps and 41 individuals at Simpson Barracks respectively. An extracted figure from the 2007 HLA report identifying the locations of Matted Flax-lily within Simpson Barracks is presented in Figure 5.

Whilst at Simpson Barracks on 21 November 2017, individual plants were observed in flower and being actively buzz pollinated by the native Blue-banded Bee.

None of the other locations where Matted Flax-lily were observed are considered to be significant sites.

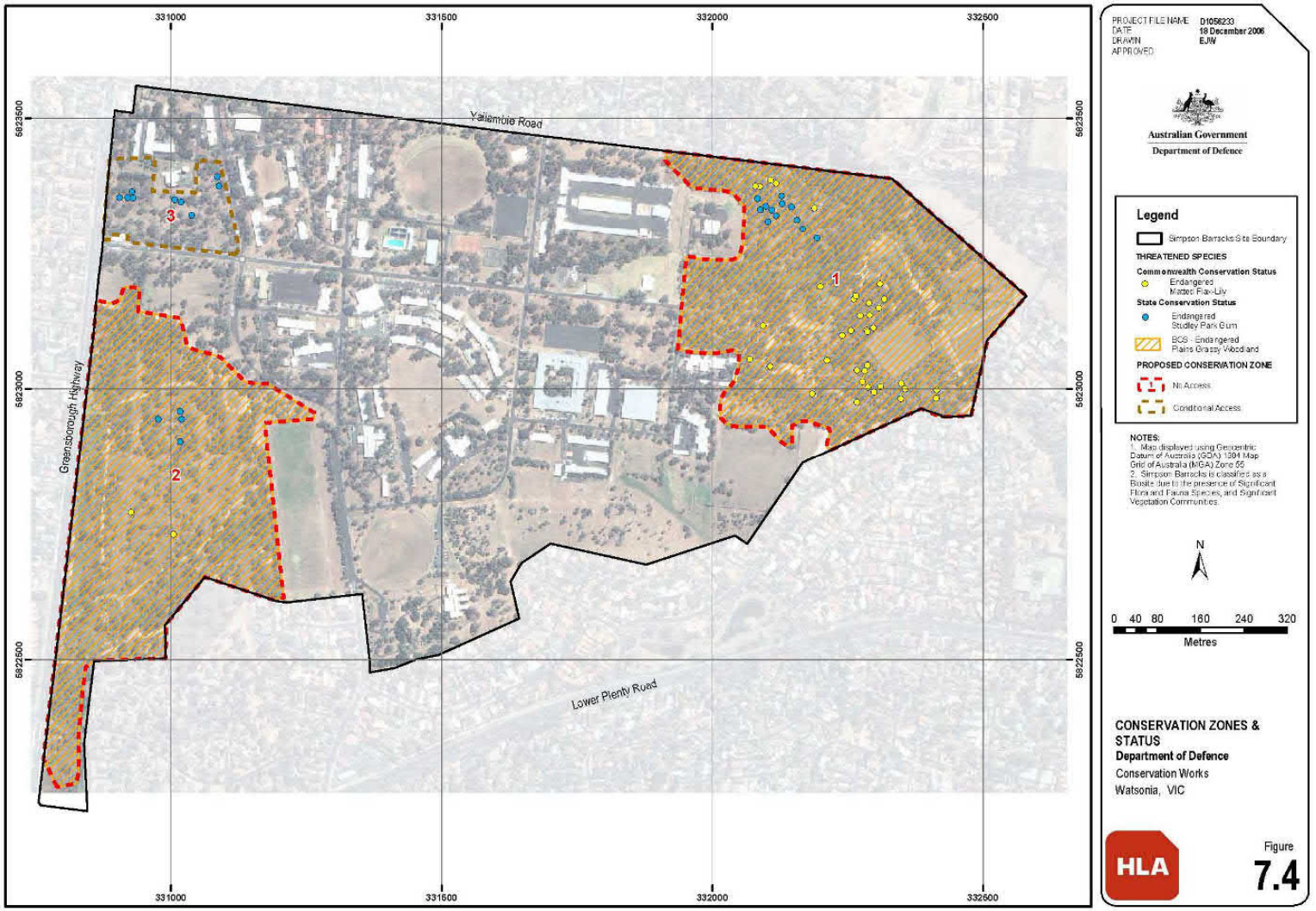

Figure 5 Extract of Matted Flax-lily records at Simpson Barracks (source HLA 2007)

2. Regulatory setting and approvals

The following section of the Plan outlines the regulatory environment and permit requirements as they relate to the translocation of Matted Flax-lily.

2.1 Environment Protection and Biodiversity Conservation Act 1999

The Ecological Assessment prepared for the project EPBC referral (Attachment D) concluded that the project would likely have a significant impact on Matted Flax-lily based on its potential to fragment an existing population and remove habitat to the extent that the species is likely to decline.

When considered as part of a development proposal, translocation may be proposed as a mitigation measure, particularly for Matted Flax-lily. DoEE (2016) state '*The rhizomatous nature of Matted Flax-lilies allows plants to be translocated. Translocation has occurred at a number of sites*'. Translocation plans / strategies are factored into the approval decisions under Section 133 of the EPBC Act to address any residual impacts to Matters of National Environmental Significance (MNES) (DSEWPaC 2013). Given that translocation measures are recognised to reduce residual impacts, ultimately this can lead to a reduction in required offsets. All offsets for residual impacts to this MNES will be assessed under the EPBC Act offsets policy (DSEWPaC 2012).

2.1.1 Application of Commonwealth outcomes-based policy

The Australian Government has developed policy and guidance on outcomes-based conditions under the EPBC Act. Outcomes-based conditions specify the environmental outcome that must be achieved by an approval holder without prescribing how that outcome should be achieved. Outcomes-based conditions allow approval holders to be innovative and achieve the best environmental outcome at the lowest cost, while increasing the public transparency of the required environmental outcomes.

With this in mind, proposed environmental outcomes that specifically relate to Matted Flax-lily have been developed, as well as management and monitoring measures to achieve these outcomes. The proposed outcome, management measures, and monitoring objectives for Matted Flax-lily, which are detailed in this Translocation Plan, are summarised in Table 1.

Table 2 Proposed outcomes for Matted Flax-lily

Outcome	Management measures	Monitoring
No net loss to the extent and distribution of Matted Flax-lily as a result of the project	Based on the concept design, a number of Matted Flax-lily plants would be directly impacted by the project with approximately 88 and one large patch identified as requiring translocation in surveys undertaken in late 2017.	Not applicable
	Matted Flax-lily to be impacted would be translocated to a suitable recipient site in accordance with a Matted Flax-lily Translocation Plan.	Condition of translocated plants would be monitored prior to, during and immediately post translocation in accordance with a Matted Flax-lily Translocation Plan. Recipient sites would be monitored in accordance with a Matted Flax-lily Translocation Plan.
	Remaining Matted Flax-lilies would be managed during construction, including fencing of 'no go' areas, appropriate sediment controls and training of project personnel. Fencing of 'no go' areas would occur prior to construction commencing.	Condition of remnant plants would be monitored monthly throughout construction.
	Ecological offsets that meet Commonwealth and State offset requirements would be secured.	Ecological offsets would be monitored in accordance with Commonwealth and State requirements.

2.1.2 Commonwealth and State offsets

Offsets are required under the EPBC Act to compensate for any residual impacts to MNES once avoidance and mitigation measures have been considered (DSEWPaC 2012). An offset must deliver an overall conservation outcome that improves or maintains the viability of the MNES and should be tailored specifically to the attribute of the MNES that is to be affected.

Given that translocation measures are recognised to reduce residual impacts, ultimately this can lead to a reduction in required offsets. Flora and Fauna Guarantee Act 1988

Under Section 48 of the FFG Act, a permit is required from the Secretary of DELWP for the translocation of flora listed under the Act. As part of the FFG Act permit application, a Translocation Plan is to be submitted describing the justification, nature of and likely success of translocation as described in Appendix 1 and 2 of the *Procedures Statement for Translocation of Threatened Native Flora in Victoria* (Department of Environment and Primary Industries

[DEPI] 2013c). This document also addresses the principles and decision-making framework that are used by DELWP when assessing a Translocation Plan.

2.2 Permits and approvals

Before undertaking the proposed salvage and translocation of the Matted Flax-lily, NELA will:

- Seek approval from DoEE to salvage and translocate Matted Flax-lily
- Seek a general permit application for threatened species and ecological communities (Section 201) from DoEE under the EPBC Act 1999.
- Obtain a permit from DELWP pursuant to Section 48 of the FFG Act for the translocation of listed flora.

3. Translocation management plan

3.1 Translocation activities

This section summarises the activities that will be undertaken to translocate the Matted Flax-lilies. Further detail is provided in Sections 4 to 7.

3.1.1 Salvage

Construction timing depends on the timing of planning and environmental approvals and procurement and indicatively envisaged to commence in Winter 2019. It is proposed that salvage will occur shortly before construction commencement. Salvaged material will be propagated in a nursery that has demonstrated suitable experience with native plants (and preferably with Matted Flax-lily), and translocated to the selected recipient sites provided that:

- Plants have recovered from the disturbance of the salvage process, which is most readily identified by the new vegetative growth.
- A sufficient number of clones have been propagated from the salvaged plants such that the required number of individuals are able to be planted to satisfy any required offset.

It is proposed that, where possible, whole plants (or sufficient material to produce the clones required) be salvaged at least six weeks prior to the commencement of works, allowing for the salvage of any additional material if required. If sufficient material is not present, more clones may need to be produced from a lesser number of individuals, as discussed in Section 4.3.

Translocation will be completed under the supervision of a suitably qualified botanist approved by DELWP and the botanist will follow the Guidelines for the Translocation of Threatened Plants in Australia, (Vallee et al. 2004), as applicable. The selection of a suitably qualified botanist to undertake salvage activities will the responsibility of the construction contractor.

3.1.2 Nursery management

A suitable nursery for propagation will be engaged prior to commencement of salvage works.

Existing nurseries under consideration and with experience in Matted Flax-lily salvage and propagation include:

- Grey box and Grassland Nursery (GAGN)
- Victorian Indigenous Nursery Co-operative (VINC)
- Australian Ecosystems.
- Merri Creek Management Committee (MCMC)
- Buxton Nursery.

3.1.3 Recipient site management

Recipient sites will be identified in accordance with the process outlined in Section 6.

The ongoing management of each recipient site after translocation will be undertaken for a period of 5 years following initial translocation, or until long-term performance benchmarks are met (see Section 7.1).

General management requirements are described in Section 5 and site-specific requirements will be developed once the recipient sites have been identified.

3.2 Management responsibilities

Responsibilities of each party are summarised in Table 3 below.

Table 3 Translocation program responsibilities

Activity	Responsibility	Monitoring and reporting
Plant salvage and nursery management		
Pre-clearance survey	NELA	NELA
Nursery selection	NELA[1]	NELA
Plant salvage	Contractor	NELA
Nursery management until translocation completed	Contractor	NELA
Nursery management of "insurance" plants (after translocation)	Contractor until practical completion. NELA from practical completion to year 5.*	NELA
Recipient site management		
Site preparation	To be determined following selection of site(s)	NELA
Planting	To be determined following selection of site(s)	NELA
Management: Years 1 to 5	To be determined following selection of site(s)	NELA

** NELA will engage a suitably qualified contractor*

3.3 Timing and schedule

The proposed salvage of Matted Flax-lily material within the project disturbance area will be undertaken prior to the start of construction and once the necessary approvals have been obtained. This is likely to be in 2019.

The optimal time for salvage and translocation is when Matted Flax-lily is not flowering or fruiting, daily maximum temperatures are low, soil moisture is high and the corresponding increase in vegetative growth means the species can be easily identified in the field. Matted Flax-lily typically begins flowering in October and finishes setting seed by the end of April. Mean daily maximum temperatures in the project area are lowest during winter (June-August), which is also the season of most consistent rainfall (i.e., highest mean number of days of rainfall per month). Conducting salvage and translocation between winter and early spring enhances the chance of success, primarily because the plants are more resilient to disturbance at this time, and because this timing allows for a longer period of beneficial growing conditions prior to the arrival of summer heat. Therefore, it is the preference that salvage occurs during the winter or

[1] In consultation with DoEE

early spring prior to start of construction, but provided that rainfall and other climatic conditions are suitable.

Salvage and translocation may occur outside of this time period if climatic conditions are conducive and/or if supplemental watering and monitoring are conducted to ensure the survival of the plants. Based on the current project timelines, salvage is expected to occur in winter 2019.

The exact timing of salvage and other translocation actions is yet to be determined; however, Table 4 provides a summary timeline for translocation activities relative to the initial salvage event.

Table 4 Summary schedule for translocation

Task	Action	Timeframe
1	Pre-clearance surveys of salvage site, including installation of protective fencing around plants to be salvaged	Within 6 months prior to salvage
2	Identification of a suitable nursery	Within 3 months prior to salvage
3	Pre-translocation watering - undertake an appropriate watering schedule to maintain plant health and optimise translocation success	Assessment of plants to be translocated approximately 1 month prior to removal
4	Salvage of plants to be translocated	Prior to start of construction
5	Labelling of plants	During salvage and propagation at nursery
6	Propagation of clones (six per plant)	After transport of salvaged material to the nursery and then as needed during nursery management period
7	Nursery management	For up to 5 years following salvage, or until long-term performance criteria have been met
8	Preparation of a Management Plan for the recipient sites	Within 6 months prior to planting of salvaged material
9	Physical preparation of the recipient sites	During the 3 months prior to planting of salvaged material
10	Initial translocation to recipient sites to include 4 clones of each plant (where possible) and 2 retained as a safety net in the nursery	At end of Year 1 or 2 of nursery management period (subject to site conditions); optimal time is winter-early spring
11	Active recipient site management	For 5 years following initial translocation or until long-term performance criteria have been met
12	Monitoring period	Periodically for 5 years following salvage, or until long-term performance criteria have been met (monitoring schedule provided in Section 0)
13	Replacement plantings	As needed for 5 years following initial translocation; optimal time is winter-early spring

Task	Action	Timeframe
14	Reporting	Reports after salvage and initial translocation and then annually for 5 years or until long-term performance criteria have been met. Reports to be delivered to DoEE and DELWP
15	Adaptive management measures	As needed during 5 year monitoring period, or until long-term performance criteria are met
16	Evaluation of long-term performance criteria	At end of 5th year following initial translocation. If criteria not met, annually thereafter until criteria are met

4. Salvage and translocation

Survival rates for Matted Flax-lily that have been translocated for other developments in the local area have been high. The most relevant and recent examples are the South Morang Rail Extension Project and Melbourne Wholesale Markets. In addition, the Mernda Rail Extension Project has also been granted approval to translocate plants, however, as yet these have been salvaged but have not been translocated. Provided certain safeguards are in place, the translocation procedure is generally considered low risk. This document incorporates protocols and procedures that have been informed by the translocation plans prepared for the Mernda Rail Extension Project (AECOM, 2016) and other translocation plans prepared for recent projects in Victoria, and have therefore been proven to be effective for the species in the local area. Measures to be implemented for the management and monitoring of the translocated plants are detailed in Section 7.

4.1 Pre-clearance surveys

The detectability of Matted Flax-lily plants and/or populations is known to vary significantly within and between seasons and numbers of plants in a defined area can fluctuate markedly. This presents some difficulty both when defining a number of individuals to be impacted, but also provides uncertainty around the final number of Matted Flax-lily that are able to be salvaged and translocated. As such, it is proposed that a pre-clearance survey is implemented prior to the commencement of works (within a three month period prior to commencing construction). The aim of this survey is to confirm the total number of plants to be translocated and to identify any new individuals.

The pre-clearance survey will utilise the following methodology:

1. All patches identified by previous surveys will be located by differential GPS, and any deviations from previously recorded locations and/or additional patches identified during the salvage will be recorded using the GPS unit
2. Each patch or plant will be marked with a red flag by a qualified botanist. The flag nominates that the individual is considered suitable for salvage
3. Appropriate protective fencing will be installed around each patch to protect the plants from damage prior to translocation
4. A qualified botanist will survey the area post-salvage to ensure all plants identified for translocated have been salvaged
5. A tally of plants will be recorded and mapped
6. The final removal number will be updated, and provided to DoEE and DELWP.

4.2 Proposed end-uses of salvaged plants

The Matted Flax-lilies salvaged from within the project disturbance area will be divided, propagated and managed to reproduce vegetatively (i.e. clones) to establish a nursery population of a sufficient number of plants to allow for a variety of end-uses including as back-up material for each salvaged patch in case of losses within the recipient sites. Establishing a nursery population will also provide an appropriate amount of time to prepare the recipient site

(i.e. weed control, fencing, vermin control, etc.) to maximise the probability of the clones' survival after replanting.

It is the intent that six clones are created from each plant, however this number may vary depending on the quality of the salvaged material. Where sufficient material cannot be obtained to generate six clones (e.g. small ramets / plants < 10 X 10 cm), a whole plant may be initially removed with the view to clone this plant in the nursery at a later date. Alternatively, where more than six clones can be created, this will be undertaken to increase the number of clones available for translocation and insurance.

The proposed end-uses of the propagated material include:

- Four clones would be grown at the nursery until the following winter-spring planting season, or until they become sufficiently established in the nursery, at which point they would be translocated to the recipient sites (proving suitable climatic conditions prevail)
- Two clones would be retained at the nursery for a period of between two to five years. This material would be used for insurance to provide replacement plants in the case of losses of plants at the recipient site. If, at the end of the five-year period, not all of these plants have been used for replacement planting, they would be provided to Parks Victoria and/or other local agencies or organisations for revegetation projects in the region.

The goals of these proposed end-uses are:

1. To ensure that the proposed performance benchmarks are met at the recipient site (see Section 7.1)
2. Once those performance benchmarks have been met, to provide additional plants for other projects to expand the population and distribution of the Matted Flax-lily within Victoria.

4.3 Salvage protocol

A qualified botanist will oversee the salvage of all plants identified by the pre-clearance surveys as being suitable for translocation. All vegetative material of viable Matted Flax-lily plants within the proposed project disturbance area will be removed and salvaged utilizing the following procedure:

1. Plants will be watered the day before the removal, or for several days if conditions are dry, to loosen the soil and to ensure the plants are not water-stressed during salvage and transport
2. All patches previously marked with a red flag during the pre-clearance survey will be removed and recorded on a monitoring sheet. It is proposed that only enough material (attached ramets and rhizomes) is collected to generate the six clones. Any excess plant material can be left *in situ*
3. For each patch removed, the extent (length and width) will be measured, recorded and a photo taken along with an estimation of the height of ramets
4. Material will be dug from the ground by hand using suitable equipment that have been cleaned of dirt and debris prior to each day's removal work

5. Plants/divisions should be excavated as intact clumps, i.e. in such a manner that sufficient soil is maintained around the root system to keep roots from exposure and desiccating. This will be achieved by wrapping the clump of roots in a wet hessian or similar material until plants are potted-up at the nursery
6. Patches will be separated into divisions of a size that fits the transport container (polystyrene box or similar sealed container) to allow for ease of handling and transport. Care will be taken to ensure that sufficient root material is included with each division and that ramets are not separated from their attached rhizome/root base, to the extent practicable. Ideally, small plate sized material will be left intact (approximately 14 cm diameter pots). If smaller pieces of rhizomes or ramets accidentally become separated from the larger divisions, these may be gathered and taken to the nursery, as Matted Flax-lily can be propagated from relatively small pieces of vegetative material
7. Plant material other than Matted Flax-lily will be removed from the salvaged material prior to transport to the nursery
8. All vegetative material removed will be labelled by patch and division identifiers, using small aluminium 'dog-tag' labels attached with wire, and recorded on a tracking form according to the system described in Section 5.4 (below), in order to monitor the number of divisions created and to facilitate identification and tracking upon arrival at the nursery
9. Depending on soil moisture levels, the excavated divisions may need to be hand-watered to ensure that the soil is moist prior to transport
10. Once all plants are lifted from the ground and placed into transport containers, they will be promptly transported to the nursery.

Consideration would be given to the preservation of material for the purpose of genetic testing, subject to further consultation with DoEE and DELWP.

4.4 Labelling

The correct labelling of all salvaged material needs to be undertaken to ensure plants can be identified and tracked throughout the entire removal, propagation, translocation and monitoring process.

Plants will be labelled with small metal labels at the salvage site during the removal and division process, using a numeric system that identifies both the patch and field division number. For example, the divisions from Patch 001 would be labelled 001-01, 001-02, 001-03 and so on.

At the nursery, the plants will be further divided to a size appropriate to the propagation containers – 14 to 24 cm diameter pots (6-10 inch pots) or other suitable propagation containers to be used. The metal dog-tag will be replaced with a staked metal nursery label, and the side of the pots will be also be labelled with a permanent marker. The nursery label will include the patch number and, in place of the two-digit field division number, will use a three-digit nursery clone number, e.g. 001-001, 001-002, etc., to simplify tallying of the total number of divisions taken from the parent plant.

4.5 Propagation and nursery management

All plants to be grown out at the nursery will be potted in a medium specifically designed for propagating native plants. Where achievable, six clones will be created to allow for four to be planted at the recipient site after one year, and two to be retained in the nursery as potential replacement plants.

After the clones are potted, they must be managed correctly to ensure survival and good health within the nursery environment. Appropriate management will depend on conditions and the length of stay in the nursery. Watering, fertilisation, and disease and pest control will need to be undertaken to ensure survival and sufficient growth over the nursery management period. Disease and pest control in the nursery are also important to ensure no diseases or pests are introduced to the recipient site during delayed translocation. Correct hygiene procedures should be practiced at all times within the nursery. Any plants suspected of being diseased should be treated according to nursery guidelines or destroyed and disposed of appropriately to avoid spread of the disease. Plants suspected of carrying a disease or having pests will not be introduced to the recipient site. Weeding of pots will also be undertaken periodically and prior to translocation.

Generally, Matted Flax-lilies do well within a nursery environment and may spread to fill their container. If plants become pot-bound, further division and correct labelling will be undertaken.

Nursery populations will be monitored by a qualified botanist every six months in the first two years, and annually during Years 3 to 5. Results of the nursery monitoring will be included in the translocation program's annual report (see Section 7.5).

Before planting into the recipient site, plants need to be 'hardened-off' (i.e. exposed to conditions similar to those occurring at the recipient site) gradually to ensure that they are not stressed by a sudden change in watering regime, sun and wind exposure, or temperature. Before the plants are translocated into the recipient sites, the health and readiness of the plants for translocation must be inspected and approved by the project botanist.

4.6 Planting procedure

The translocation to the recipient site will occur once plants have become established within the nursery and conditions at the site (e.g. climate, soil moisture, weed control) are favourable. The ideal time to conduct translocation is during winter or early spring, when temperatures are cool and rainfall is more consistent. Planting will be overseen by a qualified botanist approved by DELWP. Planting of the plants/clones at the recipient site will be accomplished by adopting the following practices:

1. Holes will be pre-dug systematically and filled with water the day before translocation occurs; the holes will be dug roughly twice as wide as and slightly deeper than the pot in which the material is grown in. The holes should be laid out in a loose grid formation, no closer than four metres from one another, to assist in later monitoring of the plants. Holes should be placed so as to avoid impacts to existing native vegetation at the site, to the extent practicable. Holes should also be placed so that they are not too close to any perimeter fence or to any large trees or other vegetation that would excessively shade the translocated plants or compete with them for water or nutrients. The spoils from the hole should be broken down into small clumps and mixed with a small amount of weed-free planting medium to serve as backfill during planting

2. The pre-dug planting holes will be re-filled with water just before the translocation to moisten and soften the surrounding soil and facilitate quick root growth. Any high-threat weeds that have not already been removed from the area immediately around the hole should also be removed at this time
3. The potted plants will be well watered prior to translocation
4. After being transported from the nursery, the plants will be laid out systematically at pre-identified recipient holes. The plants will be arranged so that divisions planted next to each other are from different parent plants to facilitate cross-pollination and enhance genetic diversity within the recipient site.
5. Care should be taken when removing the material from the pot to avoid damage to the plant and to keep the planting medium intact around the root system. If the plant is root-bound, the outer layer of roots may be loosened by hand or with pruning shears, taking care to not cause excessive damage to the roots
6. The translocated material should be placed in the centre of the planting hole at a sufficient depth so that the top of the root ball sits slightly lower than the surrounding soil surface, to create a slight basin to capture water
7. The backfill material will be placed around the root ball and tamped down slightly so that it is packed around the root ball and no large air pockets remain. Care should be taken to minimise disturbance of the root ball and avoid over-compacting the soil during backfilling. In order to avoid crown rot, the backfill soil also should not cover the crown of the plant
8. The area around the plant will be covered with a 7 to 10 cm layer of certified weed-free mulch consisting of organic material (e.g. wood chips or pea straw). Mulch should not cover the crowns of the plants. If considered appropriate and necessary, weed matting will also be considered to supress the establishment of weeds
9. The plant will be watered-in immediately after placement in the hole. Watering should continue until the soil in the planting depression is saturated, taking care not to displace the mulch when watering
10. The plant will be labelled according to the nursery number, using a small metal label attached to metal stake embedded in the ground, and the location of the plant will be recorded using a differential GPS
11. Immediately following translocation, the basal diameter and height of each clump and the number of ramets per clump will be measured in order to establish a baseline for monitoring the success of translocation. Reference photos will also be taken of the recipient site after the translocation episode is complete, to serve a visual baseline for subsequent monitoring, and the photo point location will be recorded using GPS.

5. Translocation recipient site selection

Prior to translocation, an appropriate recipient site must be identified. This will occur once this Plan has been approved by DELWP and will be done in consultation with DELWP.

In considering whether a site is a suitable translocation recipient site, a key consideration is the presence, historical or otherwise, of Matted Flax-lily at that site. A site that has remained undisturbed following recent extinction of the species or where the species is present in low numbers in otherwise suitable habitat and that is not currently protected through relevant planning controls is considered to be the best option.

Securing such an area for active ecological management in perpetuity would provide a strong ecological benefit for the species. Whilst the presence of an existing, large and self-sustaining population at a potential recipient site may indicate that the habitat would be suitable for translocated plants, there is a risk that the addition of more plants to the site may adversely affect the current population and therefore this should be avoided. However, translocation to sites with existing self-sustaining populations and/or which are already under active conservation management can be undertaken in circumstances that would provide a benefit to both the species and the community or ecosystem at the site and where no other more suitable sites are available.

A number of criteria will be considered when identifying potential recipient sites for the Matted Flax-lilies to be translocated for the project. Selection factors for consideration are documented in Figure 6.

Once the recipient site has been identified, this Plan will be updated to reflect the selected site and the specific arrangements for the translocation and the ongoing management of plants at the site.

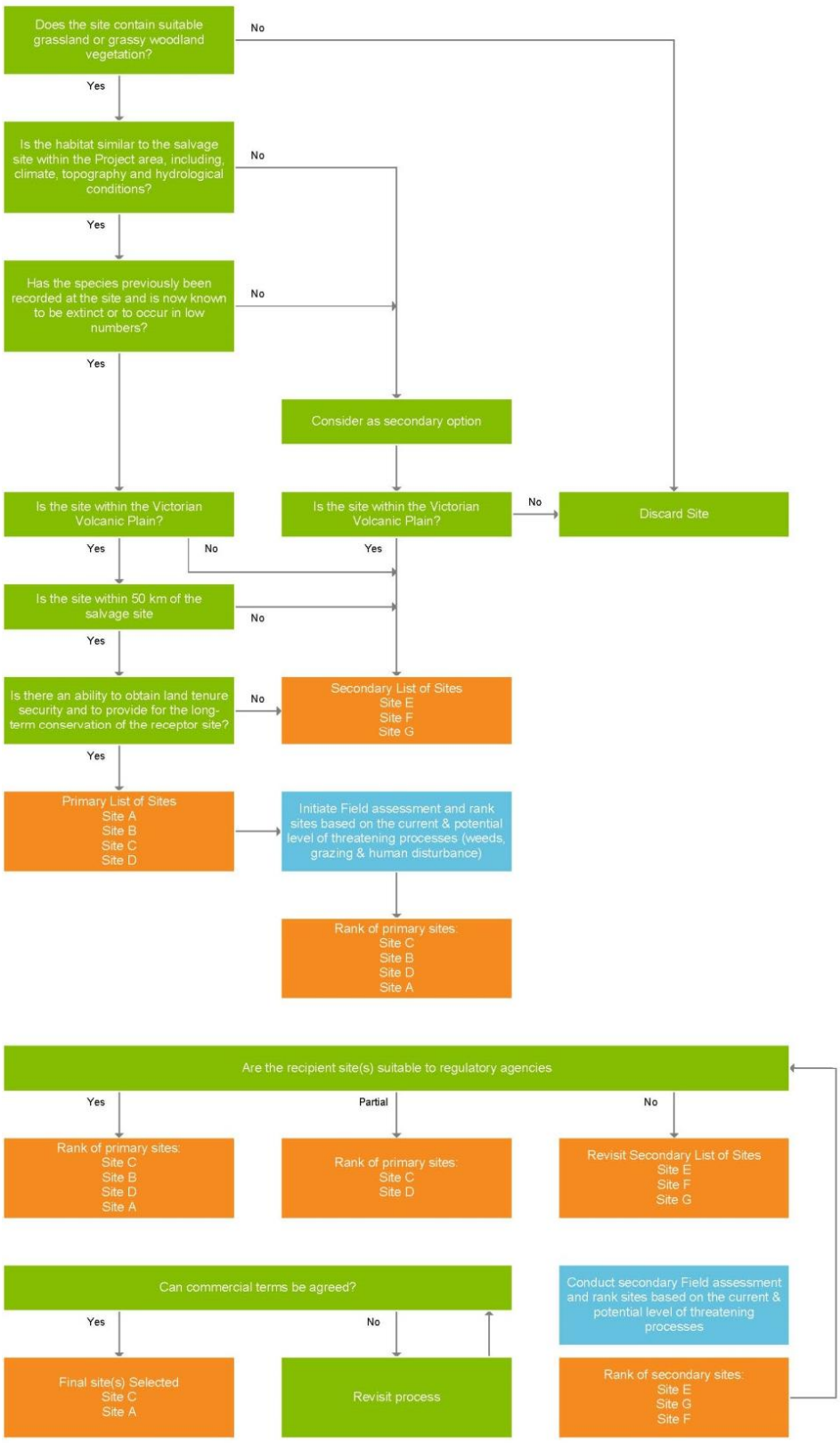

Figure 6 Recipient site selection flowchart

6. Recipient site management

Prior to and following translocation, management and maintenance activities at the recipient site will be required to control threatening processes, and improve the health, growth and survivorship of the translocated plants. This section provides broad management activities that will be required across both recipient sites to achieve a successful translocation program. In order to ensure the longevity of recipient sites, the sites require a holistic management approach that aims to improve the ecological value of the entire site rather than focussing solely on the health of translocated plants. In some cases, this will involve enhancing and restoring parts of the recipient site not directly related to the translocated plants.

Management responsibilities and site security information is presented in Section 3.

6.1 Watering

Watering of translocated plants at the recipient site will be undertaken to ensure that the plants establish quickly and survive through dry periods during the establishment phase (considered here to include the first summer endured by the planted material). Supplementary watering can be critical to the plants' survival during the first year, and particularly the first summer after translocation, when the plants are still establishing their root systems and are therefore more prone to drought-stress. The frequency and volume of watering required during this period is dependent on a number of factors, including the time of year that translocation occurs, rainfall, temperature, soil type and topography. After the plants have lived through the first summer, supplemental watering is unlikely to be required unless the plants show signs of water-stress.

A suggested watering schedule is outlined in Table 5. The schedule may be modified based on the time of planting as well as monitoring of weather conditions, soil moisture, and the condition of the translocated plants at the recipient site. The quantity of water used for each watering episode will be sufficient to promote survival of the translocated plants, as informed by monitoring of soil moisture and the condition of the plants at the recipient site.

Table 5 Watering requirements for translocated plants

Months after planting	Period between significant rainfall events[1] that will trigger watering	Watering schedule
0-3	1 week	Weekly[2]
3-9	2 weeks	Weekly
9-21	1-2 months	Monthly
21-36	1-2 months	Only if plants display signs of stress

[1]A "significant rainfall event" will be defined as ≥20 mm of rainfall within a 24-hour period; rainfall and watering records will be included the project monitoring reports.
[2]More frequent monitoring may be required in the first months if planting occurs outside of the preferred winter to early-spring season.
Source: Adapted from EP (2010)

6.2 Weed control

Control of high-threat weeds within and adjacent to the location(s) of transplanted Matted Flax-lilies will be will be undertaken prior to translocation. This includes woody, grassy and herbaceous weeds.

After an initial weed control effort prior to translocation, an ongoing weed control program will occur biannually at times of the year when weeds are germinating and actively growing (autumn and spring). Spring weed control timing is critical so that high-threat weeds can be targeted before setting seed. The weed control methods will include undertaking spot-spraying using both broad-leaf and grass selective herbicide. Woody weeds will be removed using the cut-paint method and germinates will be treated with a broad-leaf selective herbicide. The alternate use of selective herbicides reduces the likelihood of off-target damage, increases the ability of applicators to target broad-leaf weeds amongst indigenous grasses, and assists exotic grass control amongst indigenous herbs.

Noxious weeds will be maintained at <1% cover within 5 metres of any planted material within the first five years of management. To achieve this, carefully targeted spot-spraying with selective herbicides must only be undertaken at distances greater than 50 centimetres away from translocated plants. Mulching and hand weeding will be required to remove weeds within 50 centimetres of translocated plants.

Herbicide application must only be undertaken during conditions considered suitable by an experienced operator, and all operators must be familiar with the range of exotic and indigenous species present on site. Prior to application, the contractor would be informed of the locations of the translocated plants, and instructed in the identification of Matted Flax-lily and other sensitive native species occurring at the recipient site. This will ensure that the plants are not affected by off-target application or overspray.

Nursery stock will be inspected prior to planting to avoid introducing weeds to the recipient site, and additional weed control will be undertaken at the recipient site before and after the replanting of the salvaged material. Monitoring of weed levels at the recipient site will be performed according to the monitoring schedule outlined in Section 7.3, and weed control actions will take place as needed according to the monitoring results and associated observations of environmental conditions.

6.3 Pest animal control

If rabbits and/or hares are present within fenced recipient areas, or pose a threat to isolated plants, a combination of harbour removal, warren destruction and baiting will need to be undertaken.

Baiting will ideally be undertaken in late summer to mid-autumn when populations are naturally low, and repeated on a yearly basis as required. Baiting can also be undertaken during winter and spring, although this may not be as effective if there is high availability of natural feed (potentially reducing the desirability of baits). Given translocation areas at both reserves are within close proximity to neighbouring properties, roadsides and pedestrian paths, appropriate warning signage must be erected at access points and along fence lines prior to laying baits. Sites will need to be revisited four days after baiting to remove uneaten baits and again 12 days after laying baits to remove any dead carcasses. Uneaten baits and carcasses are to be buried to a depth of at least 500 millimetres in cleared areas outside of recipient sites.

Surveys for rabbits and active warrens at recipient sites will be undertaken at least twice yearly, and any warrens located are to be fumigated and destroyed. Following each warren treatment, affected areas are to be re-sown with indigenous grasses and follow-up weed control undertaken as required.

6.4 Biomass control

An integrated biomass control program will be implemented with the aim of reducing competition for light, nutrients and moisture from grassy weeds. In the later stages of the management plan, biomass control will be used to reduce competition (thatching) from native grasses and to promote understory species diversity. A mixture of low impact techniques will be used to reduce biomass and may include low intensity burning, slashing, spraying and hand removal. Techniques will vary between recipient site(s) due to management protocols required by the respective site managers.

Any proposed burns would be carried out during autumn (cool burn) with the aim of reducing competition from annual grassy weeds and to encourage germination of native understorey herbs and graminoids.

Cut grass will be removed from recipient sites where this has the potential to smother translocated plants (a hand mower with a catcher may be used if appropriate for parts of each site). Where lower quantities of biomass are concerned, a brush cutter will be used as this is likely to disperse grass in the process of slashing.

It will be ensured that translocated Matted Flax-lilies and other newly established plants are not damaged or destroyed during slashing. Before a plot is slashed, each Matted Flax-lily will have a fluorescent flag placed near its base or several flags placed around the edge of the colony for plants consisting of numerous ramets. If a high quantity of biomass is growing within translocated plants, this will be removed by hand, being careful not to damage or cause significant disturbance to the Matted Flax-lilies.

Spring slashing will occur prior to exotic grasses and herbs setting seed to prevent seed spread.

6.5 Fencing

The design and construction of fencing will ensure the exclusion of herbivores known to occur in the vicinity and which pose a potential threat to the translocated plants at each recipient site. Decisions on fencing type will be made following the identification of recipient site(s) as existing fencing may vary and the nature of the herbivore threats may differ.

Fences will be inspected on a regular basis after translocation, including during the project monitoring events conducted, and maintained as necessary. The translocated plants will also be

monitored for evidence of grazing, and additional measures, such as use of cages or tree guards for individual plants, may be implemented as necessary. Additional pest fauna controls, such as bait traps for snails or similar pests, would also be implemented if the need is indicated by monitoring.

On occasion, herbivore control will be too difficult to achieve and individual plants may be caged. This will be considered as an option if other herbivore control is not effective.

6.6 Enhancement planting

Recipient sites will be selectively revegetated with locally indigenous plants particular to the relevant EVC. Plants chosen will predominately be from understorey lifeforms and consist of herbs, groundcovers, daisies, lilies and graminoids to assist with weed suppression and potentially attracting pollinators. Areas that have been removed of woody, herbaceous and grassy weeds will require revegetation with indigenous grasses to provide competition against colonising weeds. Areas containing existing understory grasses will require supplementing with herbs, groundcovers, daisies, lilies to improve species diversity. Enhancement planting is scheduled to take place in year two and beyond to allow targeted weed control and to provide optimum opportunity for translocated Matted Flax-lilies.

Table 6 Understory species suitable for enhancement planting

Common name	Scientific name
Shrubs	
Sweet Bursaria	*Bursaria spinosa*
Hedge Wattle	*Acacia paradoxa*
Groundcovers	
Berry Saltbush	*Atriplex semibaccata*
Kidney Weed	*Dichondra repens*
Purple Coral-pea	*Hardenbergia violacea*
Running Postman	*Kennedia prostrata*
Berry Saltbush	*Atriplex semibaccata*
Daisies	
Clustered Everlasting	*Chrysocephalum semipapposum*
Wiry Buttons	*Leptorhynchos tenuifolius*
Lilies	
Chocolate Lily	*Arthropodium strictum*
Grasses	
Common Wallaby-grass	*Austrodanthonia caespitosa*
Brown-back Wallaby Grass	*Austrodanthonia duttoniana*
Clustered Wallaby-grass	*Austrodanthonia racemosa*
Australian Wheat Grass	*Anthosachne scabra*
Wattle Mat-rush	*Lomandra filiformis*
Spiny-headed Mat-rush	*Lomandra longifolia*
Weeping Grass	*Microlaena stipoides*
Velvet Tussock-grass	*Poa morrisii*
Large Tussock-grass (volcanic plains form)	*Poa labillardieri*

7. Monitoring and reporting

Monitoring of the translocated plants as well as the conditions at each recipient site will be required to identify key threatening processes, determine whether additional management actions are necessary, track the health, growth and survivorship of the translocated plants and demonstrate whether performance benchmarks and regulatory requirements are being met. Monitoring will be performed by a qualified botanist familiar with Matted Flax-lily biology and ecology. As detailed in Section 7.3, monitoring at the recipient site(s) will include the documentation of threatening processes, such as water stress, pest animals and signs of grazing, weed infestation and other site disturbances, as well as the condition, growth rates, reproduction, and survivorship of the translocated material.

7.1 Performance benchmarks

The translocation process does stress salvaged plants and without active management, most plants would be unlikely to survive. Successful translocation of Matted Flax-lily has occurred within Victoria, with the first two years following re-planting seen as the most critical period for plant establishment. Once planted material has survived for a period of five years it is considered established at that location and is otherwise part of the broader ecosystem in which it has been planted. However, each salvage and translocation operation needs to be carefully planned, managed, and monitored to ensure that plants successfully become established at the recipient site within the agreed-upon timeframe.

The overall goals of the proposed Matted Flax-lily translocation program are to ensure that genetic diversity of the species is conserved and that the population affected by the project is re-established into suitable habitat and managed for the survival and reproduction of this species. Individual performance criteria have been created to assess the translocation program's progress towards meeting those goals. The following performance criteria are derived from Vallee *et al.* (2004) with adaptation to suit the circumstances of the current project and species to be translocated. The criteria are divided according to the phase of the proposed translocation program:

Propagation and nursery management:

1. The required number of transplants was available for the proposed translocation
2. Correct labelling and documentation was maintained throughout the propagation and nursery management period
3. Techniques for successful propagation of Matted Flax-lily developed through past translocation projects in Victoria were tested and/or advanced
4. A genetically representative collection was maintained.

Habitat and threat management:

1. Good-quality habitat was restored or maintained within the recipient site
2. Management and maintenance activities were carried out at suitable intervals and to the required standard
3. Threatening processes, including weed invasion, were eliminated or effectively controlled.

Translocation criteria (1 to 5 years):

The translocation of each species:

1. At least 85% of transplanted clones survive, including representatives from the range of genetic individuals salvaged
2. The translocated populations display similar growth, development and vigour as naturally occurring populations
3. Transplants survive to a reproductive stage (producing flowers and fruit)
4. If plants don't survive to reproductive stage, then the plants will be replaced
5. Regeneration occurs in the translocated individuals (since the recruitment of Matted Flax-lily through seed is thought to be rare, the production of ramets at a rate similar to naturally occurring populations is considered sufficient to meet this criterion)
6. The number of individuals within the population is stable, or has increased by natural (including vegetative) recruitment
7. Adequate levels of genetic diversity are maintained.

The number of surviving plants at the end of the 5 year monitoring program that are needed to meet the long-term success criteria will depend on the number of clones propagated and planted out. Condition and success of the clones will continue to be monitored up to 5 years with the aim of achieving 85% survival of clones. Should 85% survival not be achieved at the end of 5 years, contingency planning shall be initiated (refer Section 7.2).

7.2 Contingency and adaptive management

A sufficient number of clones will be propagated and retained in the nursery to replace any losses of the translocated plants at the recipient sites to ensure 100% genetic survivorship of salvaged material. This is critical to the success of the approach. Based on previous translocation programs, Matted Flax-lily can be successfully propagated in a nursery setting and a large number of clones can often be produced from a single parent plant.

The primary criteria for triggering replanting will be plant mortality at the recipient sites, based on the judgement of the project botanist. Plants in poor health and/or which are not sufficiently growing either in width or number of ramets should first be watered before being considered for replacement.

The health and survivorship of the translocated plants will be monitored according to the protocol described in Section 5.3, and if the translocated population appears to be declining and/or performance benchmarks are not being met, the root cause of the decline will be assessed, and further adaptive management measures will be developed in consultation with DELWP. If the root cause is determined to be an aspect of the management of the recipient sites (e.g. insufficient watering or weed control), then modifications to site management will evaluated and implemented as needed. In addition, if survivorship criteria are not being met, the number of clones in the nursery can be increased by creating further divisions of established nursery stock to ensure that sufficient clones are available to replace losses. If the long-term success criteria have not been met at the end of the 5-year monitoring period, then the monitoring period may be extended until it is determined that survival of additional replacement plantings have met the criteria. Performance measures and contingency measures are presented in Table 7.

Table 7 Performance management and contingency planning

Year for completion of Activity	Standard to be achieved	Contingency
Pre-planting	· 100% salvage of pre-clearance plants · Where achievable six clones to be created to replace salvaged plants	· If the six clones cannot initially be established, additional clones to be produced · Two clones maintained in nursery conditions
End of first year	· >85% survivorship	· Do nothing and continue to monitor
	· <85% survivorship	· Replant up to 85% survivorship of 4 clones
End of second year	· >85% survivorship	· Do nothing and continue to monitor
	· <85% survivorship	· Replant up to 85% survivorship of 4 clones
End of third year	· >85% survivorship	· Do nothing and continue to monitor
	· <85% survivorship	· Replant up to 85% survivorship of 4 clones
End of fourth year	· >85% survivorship	· Do nothing and continue to monitor
	· <85% survivorship	· Replant up to 85% survivorship of 4 clones
End of fifth year	· Achieved a performance target of at least 85% of clones surviving? · If this is the case the translocation plan is declared a success.	· No contingency required
	· If the performance target has not been met at the end of a 5-year period continue with replanting strategy.	· Review the existing strategy and explore options to improve success rates · Replant with 'insurance clones' as required to achieve performance target and monitor until performance target achieved

Note: This table will be modified and updated to reflect the starting point at the time of salvage. This will allow % targets to be converted to actual targets.

7.3 Monitoring schedule

Generally, monitoring needs to be conducted more frequently immediately following replanting to confirm that the new transplants are establishing themselves at each site. Monitoring can be undertaken less frequently once the plants become established. Therefore, monitoring will be conducted weekly for the first month after replanting, monthly during the second through fifth month, and then quarterly through the remainder of the two-year period. Thereafter, monitoring will be conducted on a 6 monthly basis up to five years or until long-term performance criteria are met. This schedule may be revised, with approval of DoEE and DELWP, depending on establishment rates and achievement of performance benchmarks. A final site assessment would be conducted at the end of the fifth year after the initial translocation event to confirm that performance benchmarks have been met. The reporting schedule for providing the results of the monitoring to DoEE and DELWP is discussed below in Section 7.5.

7.4 Monitoring protocol

Monitoring at the recipient site will be undertaken or overseen by a qualified botanist approved by DELWP. Monitoring will include the following components:

1. A population count of all translocated Matted Flax-lilies at the site
2. An assessment of the growth and condition of the plants will be conducted for four 25 m^2 quadrats set up in established locations that are easily locatable and repeatable. Quadrat monitoring will be conducted on an annual basis during the summer, when the plants are most actively growing. Information to be collected will focus on plant health and cover, but will also look at other information such as plant reproduction, weed abundance and diversity, grazing impacts and other issues
3. Photo point monitoring would be conducted at established locations showing representative views of the translocated population. Photos will be taken on a quarterly basis
4. A general site assessment and threats analysis for the entire recipient site.

A monitoring form will be completed for each monitoring event to record the results of the monitoring, including:

- Location and population of individual plants
- Plant cover and growth (basal diameter and height of each patch, number of ramets per patch)
- Presence of flowers and/or fruits and height of inflorescence or infructescence
- Evidence of herbivory or pathogens
- Presence and cover of weed species
- Other potential or occurring threats or management issues
- Maintenance or corrective actions completed or recommended.

7.5 Reporting

NELA will submit an initial report summarising the results of the salvage and nursery propagation to the DoEE and DELWP within three months after salvage. A report will also be provided after the initial translocation and again after the first three months of monitoring have occurred. Thereafter, a summary report will be prepared annually for 5 years, or until long-term performance criteria have been met.

The reports will discuss the survivorship and growth of the plants and include information on conditions at both the recipient site and the nursery and an assessment of the status of the translocation program relative to the established performance benchmarks. The report will also discuss occurring or potential threats or management issues and any maintenance or corrective actions taken or proposed. The reports will include rainfall and watering data, the monitoring forms for each monitoring event and the quarterly photos taken from each established photo point.

A final report will be provided after the fifth year and will include an analysis of whether the translocation program has achieved the long-term performance benchmarks, or whether further management and monitoring is required, and a summary of lessons learned and recommendations for future translocation programs.

8. References

Carr, G.W. and Horsfall, P.F. 1995. Studies in the Phormiaceae (liliaceae) 1: New Species and combinations in Dianella Lam. Ex. Juss.; In Muelleria 8; (3):365-378.

Carter, O. 2010. National Recovery Plan for the Matted Flax-lily Dianella amoena. Department of Sustainability and Environment, Victoria.

DELWP 2017. NatureKit viewer sourced at: http://maps.biodiversity.vic.gov.au/viewer/?viewer=NatureKit

DEPI. 2013a. Biodiversity Conservation Strategy for Melbourne's Growth Corridors. Victorian Government Department of Environment and Primary Industries, Melbourne, May 2013. Available at: http://www.depi.vic.gov.au/environment-and-wildlife/biodiversity/melbourne-strategic-assessment/conservation-strategies#A2.2a

DEPI. 2013b. Permitted clearing of native vegetation – biodiversity assessment guidelines. Victorian Government Department of Environment and Primary Industries, Melbourne, September 2013.

DEPI. 2013c. Procedures Statement for Translocation of Threatened Native Flora in Victoria. Victorian Government Department of Environment and Primary Industries, Melbourne, June 2013.

DoEE, 2016. Dianella amoena — Matted Flax-lily. Website accessed 2016 at: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64886.

DoE. 2012. Offsets Assessment Guide spreadsheet. Australian Government Department of the Environment, October 2012. Available at: http://www.environment.gov.au/epbc/publications/ epbc-act-environmental-offsets-policy

DSEWPaC. 2013. Environment Protection and Biodiversity Conservation Act 1999 (Cth) Policy Statement: Translocation of Listed Threatened Species – Assessment under Chapter 4 of the EPBC Act. Available at: https://www.environment.gov.au/resource/epbc-act-policy-statement-translocation-listed-threatened-species-assessment-under-chapter

DSEWPaC. 2012. Environment Protection and Biodiversity Act 1999 Environmental Offsets Policy. October 2012. Available at: http://www.environment.gov.au/system/files/resources/ 12630bb4-2c10-4c8e-815f-2d7862bf87e7/files/offsets-policy_2.pdf

Gray, M. and Knight, J. (eds.). 2001. Flora of Melbourne: A Guide to the Indigenous Plants of the Greater Melbourne Area, Hyland House Publishing, Melbourne.

HLA 2007. Biodiversity Assessments and Strategies for Simpson Barracks. Prepared by HLA Environsciences.

Ralph, M. 2003. Growing Australian Native Plants from Seed. Second Edition. Bushland Horticulture. Fitzroy.

Tasmanian Department of Primary Industries and Water. 2008. Threatened Flora of Tasmania: Dianella amoena. [Online]. Available at: http://www.dpiw.tas.gov.au/inter.nsf/Attachments/LJEM-74ZUT6/$FILE/Dianella%20amoena.pdf

Vallee, L. Hogbin, T., Monks, L., Makinson, B., Matthes, M. and Rossetto, M. 2004. Guidelines for the translocation of threatened plants in Australia. Second edition. Australian Network for Plant Conservation, Canberra.