Commonwealth approval EPBC 2013/6963 conditions compliance tracking and management annual report

Nambucca Heads to Urunga Pacific Highway Upgrade

February 2020 – January 2021

February 2021 | Version: 1

Contents

Glossary / Abbreviations

Acronyms used in this document

Acronym	Definition
BEM	Benchmark Environmental Management
CAR	Corrective Action Request
CEMP	Construction Environmental Management Plan
Clear Milkvine	Marsdenia longiloba
Cryptic Forest Twiner	Tylophora Woollsii
Ecos	Ecos Environmental Pty Ltd
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ER	Environmental Representative - A suitably qualified and experienced person independent of project design and construction personnel employed for the duration of construction. The principal point of advice in relation to all questions and complaints concerning environmental performance.
NCR	Non Conformance Report
NGOMP	Norton and Griffin Offset Management Plan
SAP	Sensitive Area Plan
SES	Sandpiper Ecological Surveys
TFOMP	Threatened Flora Offset Management Plan
TFMP	Threatened Flora Management Plan
TFOS	Threatened Flora Offset Strategy

Introduction

1.1 Purpose of this document

The purpose of this document is to facilitate demonstration by Transport for New South Wales (TfNSW) of satisfactory compliance with the Commonwealth approval conditions for the Nambucca Heads to Urunga Pacific Highway Upgrade project with particular reference to Condition 24, which requires an annual report addressing compliance with each of the conditions of approval. The report covers the sixth period from February 2020 to January 2021.

For each condition, one or more actions are identified which, once implemented, will achieve satisfactory compliance with the condition. Where appropriate, the timing for completion of individual actions is identified.

For each action, the minimum relevant documentation to support demonstration of compliance is identified. This documentation would inform any future compliance audit.

Where an approval condition makes reference to information being provided to the Commonwealth Minister for the Environment, the associated action(s) assumes that this information will be provided, in the first instance, to the Commonwealth Department of the Environment.

1.2 Key dates

The timing for compliance with certain approval conditions is linked to specific dates as follows:

- Commonwealth approval: 26 November 2013
- Start of construction: 4 December 2013
- Completion of construction: 14 February 2018
- Expiry of Commonwealth approval 1 January 2031
- Publish 7th Annual Compliance Report 4 March 2021

1.3 Responsibility for compliance

Responsibility for compliance with all approval conditions sits with TfNSW.

1.4 NSW planning approval

Condition 29 (of the Commonwealth approval) provides for the use of plans, strategies or reports required under the NSW approval to satisfy the requirements of the Commonwealth approval, subject to provision of a separate document demonstrating how the document addresses the relevant Commonwealth approval requirements.

Specialists in the fields of flora and fauna have been engaged by TfNSW and the construction contractor to undertake various ecology-related management activities with regard to complying with the NSW planning approval and the CEMP. The following specialist had been engaged to undertake ecology related activities prior to the EPBC approval:

- Benchmark Environmental Management (BEM) has prepared an ecological monitoring program that addresses relevant matters in the NSW planning approval. The ecological

monitoring program has been incorporated into the CEMP for the contractor to implement during construction.

- Ecos Environmental (Ecos) has been engaged by TfNSW to prepare a Threatened Flora Translocation Program that addresses relevant matters in the NSW planning approval and has additionally been engaged by the contractor to provide advice on the implementation of the translocation program and provide specialist advice on flora to implement other CEMP requirements.
- Sandpiper Ecological Surveys (SES) has been engaged by the contractor to provide specialist advice on fauna to implement CEMP requirements.
- SES has been engaged by TfNSW to undertake the ongoing operational phase monitoring as required under the approved ecological monitoring program.

This document contains actions relevant to compliance with Commonwealth approval requirements.

1.5 Definitions for action status conditions

TBA	To Be Arranged - Further works required prior to starting action.
In progress	Action initiated but not yet complete.
Ongoing	Action in place but ongoing works required to ensure compliance.
Compliant	Action completed and compliant with Condition of Approval

1.6 Non Compliances with EPBC Conditions

No non-compliances were recorded for the period February 2020 to January 2021.

Condition 1

The person taking the action must not clear more than:

a) 171 ha of Koala habitat;

b) 184 ha of Grey-headed Flying-fox habitat

c) 166 ha of Spotted-tail Quoll habitat;

d) 73 ha of habitat for the Swift Parrot and Regent Honeyeater; and

e) 36 ha of habitat for the Cryptic Forest Twiner and Clear Milkvine.

Action		Timing	Status	Compliance evidence
1.1	Progressive review of area cleared	Regularly during construction	Compliant	Record of clearing numbers
1.2	Review outstanding clearing requirements at 75% clearing to confirm clearing limitation targets will be met	Construction (75% clearing)	Compliant	Memo provided 18-6-2014
1.3	Confirm clearing limitation targets have been met	Post-construction	Compliant	As built survey of actual clearing area.

Final Clearing Quantities (EN1 FDD + Additions)			
Habitat Type	**Final Clearing Quantity (ha)**	**Limit (ha) as per Condition 1 Approval**	**Current Difference showing remaining habitat (ha) under Condition 1 Approval**
Koala	157.89	171	13.11
Grey-headed Flying-fox	170.84	184	13.16
Spotted –tail Quoll habitat	71.40	166	94.60
Swift Parrot and Regent Honeyeater	71.40	73	1.60
Cryptic Forest Twiner and Clear Milkvine	34.11	36	1.89

Mainline clearing was completed during 2014. Small amounts of clearing were undertaken throughout 2015 and 2016.

Clearing has been completed and the table above (Final Clearing Quantities (EN1 FDD + Additions) shows the final figures for each habitat type. Clearing totals for each habitat type were less than the approved limits in accordance with Condition 1.

Condition 2

Within 30 days of the completion of *construction* works, the person taking action must:

a) notify the Minister in writing of the completion of construction; and

b) provide a report (supported by appropriate mapping) that clearly shows the location of all vegetation and EPBC species habitat cleared as a result of the action, and that demonstrates compliance with Condition 1.

	Action	Timing	Status	Compliance evidence
2.1	Prepare works as executed Environmental and Clearing Plans to show extent of clearing.	Within 30 days of construction completion	Compliant	Report & supporting mapping provided
2.2	Calculate final clearing quantity and include in summary table.	Within 30 days of construction completion	Compliant	Report & supporting mapping provided
2.3	Provide written notification (letter) of completion of construction and report to Dept of the Environment	Within 30 days of construction completion	Compliant	Notification letter provided 7/03/18.

Completion of construction occurred on 14 February 2018. A report was produced and included in the February 2017 to January 2018 Annual Compliance report.

Condition 3

The *person taking the action* must undertake progressive rehabilitation of *EPBC species' habitat* in areas where *temporary infrastructure* is to occur or, where *short term* impacts are anticipated. Where appropriate, the landscaping / rehabilitation of these areas must be done in a manner that targets the needs and requirements of *EPBC species*.

	Action	Timing	Status	Compliance evidence
3.1	Finalise urban design and landscape plan to capture rehabilitation and revegetation temporary works and areas of short term impact.	Pre-construction or prior to any works in EPBC species habitat areas during construction	Compliant	Urban Design and Landscape Plan
3.2	Implement rehabilitation / landscaping of affected areas as per landscape design.	Following cessation of use of affected areas	Compliant	No EPBC species habitat was cleared as part of the creation of temporary infrastructure

Note: Urban Design Landscape Plan was approved by NSW Department of Planning (DoP) in February 2015.

Landscape planting commenced on Wednesday 4th November 2015. All permanent landscaping works have been completed across the project. Ongoing maintenance works including weed management will be undertaken by the contractor for three years following construction completion under their deed requirements.

No EPBC species habitat was cleared as part of the creation of temporary infrastructure or short term impacts as part of the project.

All sites classified as Temporary Infrastructure for the project were located in areas where no confirmed EPBC habitat was located, and also no Biometric vegetation communities were cleared for the creation of these sites i.e. located in areas previously cleared for agricultural or Forestry purposes.

Condition 4

At completion of construction (and every three years thereafter for the life of this approval or until *the Minister* has agreed in writing that further revisions are no longer required) a progress report assessing the effectiveness of restoring habitat on site (in accordance with Condition 3) must be provided to *the Minister*.

	Action	Timing	Status	Compliance evidence
4.1	Annual Compliance Report Number 3 to Dept of the Environment	March 2017	Compliant	SAP's showing temporary infrastructure was not located within EPBC Species habitat

Landscape planting commenced on Wednesday 4th November 2015. All permanent landscaping works have been completed across the project. Ongoing maintenance works including weed management will be undertaken by the contractor for three years following construction completion under their deed requirements.

No EPBC species habitat was cleared as part of the creation of temporary infrastructure or short term impacts as part of the project.

All sites classified as Temporary Infrastructure for the projects were located in areas where no confirmed EPBC habitat was located, and also no Biometric vegetation communities were cleared for the creation of these sites i.e. located in areas previously cleared for agricultural or Forestry purposes.

Condition 5

Prior to *commencement of the action* the person taking the action must engage a *suitably qualified expert* to:

a) map any areas of habitat for EPBC species that lie adjacent to the construction zone;

b) map the locations of known individuals of Clear Milkvine and Cryptic Forest Twiner that lie adjacent to the construction zone;

c) map any areas of lowland rainforest of subtropical Australia that lie adjacent to the construction zone; and

d) clearly mark exclusion zones along (or around) these areas on site.

Action		Timing	Status	Compliance evidence
5.1	Engage suitably qualified expert	Prior to start of construction	Compliant	Ecos Environmental mapped vegetation and habitat types with information included in SAPs.
5.2	SAPs to show required items	Prior to construction in affected areas	Compliant	SAPs drafted prior to start of construction. SAPs – amended as required with any updated information
5.3	Exclusion zones to be marked on site as appropriate	Prior to construction in affected areas	Compliant	Exclusion zone delineation installed prior to construction in affected areas and maintained as required. Ongoing compliance documented through surveillance checklist.
5.4	SAPs Updated	Construction	Compliant (last revised October 2014)	SAPs updated following new information or removal of sensitive area. Tracked through updated revision of the SAPs.

Condition 6

To mitigate and reduce indirect impacts on the *exclusion zones* identified as a requirement of Condition 5, the *person taking the action* must:

a) ensure that temporary and high visibility fencing will be erected to restrict access to exclusion zones. Temporary fencing must be of a design appropriate to deter the passage of vehicles or placement of construction materials, equipment and waste, in exclusion zones where accidental incursion could reasonably occur;

b) implement measures to prevent the spread or establishment of new or additional weed species, soil or plant pathogens into these exclusion zones as a result of construction;

c) implement stormwater management measures to prevent the unintentional diversion or discharge of stormwater during both construction and operation over exclusion zones; and

d) implement targeted measures for managing construction impacts to Cryptic Forest Twiner and Clear Milkvine associated with dust, sedimentation and erosion.

Action	Timing	Status	Compliance evidence
6.1 Implement protection measures:			
(a) Fencing of exclusion zones	During construction	Compliant	Exclusions zones installed prior to clearing. Exclusion delineation to be maintained until construction completion. Environmental surveillance checklist documenting compliance.
(b) Prevent spread of weeds, soil or pathogens	During construction	Compliant	CEMP measures include implementation of TfNSW best practice measures detailed in the biodiversity guidelines. Including plant wash down prior to entry onto site and separation and segregation of weed infested topsoil. Environmental surveillance checklist documenting compliance.

	(c) Stormwater measures to prevent discharge of stormwater during construction and operation over exclusion zones	Detailed design and during construction	Compliant	Detailed design includes the retention and treatment of road runoff adjacent to sensitive areas. CEMP measures include implementation of best practice erosion and sediment controls during construction. Environmental surveillance checklist documenting compliance
	(d) Implement target measures to manage construction impacts to threatened flora.	During construction	Compliant	Directly and indirectly impacted threatened flora removed from site through implementation of Threatened Flora Management Plan. CEMP includes best practice measures to manage dust and erosion and sedimentation impacts. Environmental surveillance checklist documenting compliance. Progressive revegetation to be undertaken to provide dense ground cover that excludes weeds. Revegetation checklists maintained monthly.
6.2	Monitor In-situ Roadside Threatened Flora	Every 6 months for the first two years and then yearly for 5 years.	Compliant - (Monitoring completed in Jan 2021)	Summary of roadside threatened plant monitoring prepared and included in the annual translocation monitoring report (attached)

Appendix 1 provides full details of the results of the NH2U Year 4 (Operational phase) monitoring of *in situ* Slender Marsdenia. Of the five *in situ* Slender Marsdenia plants being monitored, one (ML119) has now been recorded as died back for four consecutive years. Of the remaining sites, the plants near Martells Road (2010-1 and 2010-3) supported healthy plants, with a condition class of 3. Plants at site UTW3 remained in only fair condition, whilst plants at site UTW4 (Figure 9), had declined in condition.

Condition 7

The *person taking the action* must engage a *suitably qualified expert* to undertake pre-clearing fauna searches within all areas proposed for disturbance, including: hollow bearing trees, logs, existing culverts and bridges, no earlier than 48 hours prior to the removal of vegetation occurring in that area to ensure that the area is free of the *Koala* and *Spotted-tail Quoll*.

Action		Timing	Status	Compliance evidence
7.1	Engage suitably qualified expert	Prior to start of construction	Compliant	Sandpiper Ecological Surveys engaged by contractor in accordance with SWTC Appendix 5.
7.2	Pre-clearing fauna searches identified as activity in fauna management plan (or equivalent)	Prior to start of construction	Compliant	BEM Ecological Monitoring Program
7.3	Undertake pre-clearing fauna searches as required	Prior to start of construction in specified areas	Compliant	Environmental surveillance checklist.

- Sections 2.1 and 3.2 of the ecological monitoring program prepared by BEM and the approved CEMP addresses undertaking pre-clearing fauna searches and fauna relocation.
- Section 5 of the ecological monitoring program prepared by BEM addresses reporting.

Condition 8

The *person taking the action* must implement measures to relocate and/or ensure the appropriate care of individuals of *EPBC species* that are identified during searches referred to in condition 7.

Action	Timing	Status	Compliance evidence
8.1 Provide for appropriate fauna relocation measures in CEMP documentation	Prior to construction	Compliant	Fauna rescue procedure contained with the FFMP. A specific koala relocation strategy has been prepared and forms an attachment to the Clearing and Grubbing Environmental Work Method Statement.
8.2 Relocate affected fauna as per procedures in ecological monitoring program	As part of pre-clearing activities	Compliant	Environmental surveillance checklist.

Note:

- CEMP contains fauna rescue procedure and a specific koala relocation strategy was developed by SES in consultation with NSW EPA Senior Threatened Species Officer.
- No EPBC fauna was relocated or EPBC threatened flora observed during the reporting period.

Condition 9

Prior to *commencement of the action* the *person taking the action* must engage a *suitably qualified expert* to collect baseline data on *local populations* of the *Koala* and *Spotted-tail Quoll*. The data must address the likely densities and distribution of these species within all habitat *adjacent to* the *construction* footprint that are likely to contain these species and that are likely to be adversely impacted by *the action* (as determined by a *suitably qualified expert*).

Action		Timing	Status	Compliance evidence
9.1	Engage suitably qualified expert	Prior to start of construction	Compliant	TfNSW engagement of BEM.
9.2	Review existing baseline data and assess adequacy with regard to specified matters for management of impacts on identified fauna species	Prior to completion of clearing.	Compliant	Short report or equivalent documenting review outcomes and any identified information gaps
9.3	Where substantive information gaps are identified, develop strategy to obtain required information	Prior to construction activity in adjacent to areas containing potential habitat for either of the two species	Compliant	Short report or equivalent documenting methodology used for monitoring, results of monitoring and compiling the new results with existing information.

Note:

- BEM provided the report in August 2014 that consolidates actions 9.2 and 9.3. The report concluded that the local koala population in the vicinity of the Project corridor is of low density. Consequently, the available information is insufficient to determine an accurate estimate of the koala population. However, assuming there is a low density of koalas in the locality, the Project corridor appears to traverse only a small number of home ranges of individual koalas. The project design incorporates a combination of fauna exclusion fencing and fauna underpass structures within 500 metres of each sample site where koala activity was recorded. The Project is expected to have minimal impact on the viability of the local koala population by preventing direct mortalities during vegetation clearing and operation and by maintaining opportunities for safe koala movement across the Project corridor once operational.
- In reference to Spotted Tail Quolls, no quolls were identified during the study. This is not definitive evidence that the species does not occur in the study area. Whether there is a resident population is uncertain but the distribution of records and presence of recent (2010) records are sufficient to conclude that quolls utilise the study area. Quolls are predicted to occur at low densities and with heightened awareness records may be obtained during construction or in the operational phase. Given the predicted occurrence of quolls the implementation of specific measures, such as underpasses and fauna fencing is warranted to enable quolls to effectively cross the upgraded highway.

- Koala surveys completed by OEH (Jon Turbill) for Bellingen and Nambucca Shire Councils were also used to assess the need for fauna fencing. Following a meeting onsite, further fauna fencing was specified for the south of Oyster Creek. This followed Kola sightings to the immediate east of Oyster Creek during OEH monitoring. This fencing has been installed.

Condition 10

The person taking the action must construct and maintain fauna crossings and fencing in areas that are likely to benefit the Koala and Spotted-tail Quoll.

Action	Timing	Status	Compliance evidence
10.1 Provide for fauna crossings and fencing in detailed design	During design	Compliant	Final design showing required fauna crossings and fencing.
10.2 Construct fauna crossings and fencing	Construction	Compliant	As provided in previous Annual Compliance reports
10.3 Undertake regular maintenance of fauna crossings and fencing	Post-construction	Compliant	Annual reporting and/or maintenance inspection reports.

Note:

- Construction of the permanent fauna fencing commenced in June 2015.
- All combined /dedicated fauna crossing have been completed and installation of the vertical and horizontal refuge poles that offer connection from the mitigation structures to the adjacent native vegetation. A total of 22 combined and 4 incidental crossing have been constructed on the project
- The project scope has increased to include approximately 4km of additional permanent fauna fencing to be installed around the Waterfall Way intersection. The fencing will start at the Shortcut/South arm intersection and work its way to the northern most extent of the project. This followed the Koala road kill recorded in August 2014 immediately south of the existing Waterfall Way Interchange. This work was completed in the first half of 2016.
- Fauna Fencing was completed in August of 2016.
- Ongoing review and maintenance as required of the fauna fence and crossings continues during the operational phase.

Condition 11

The *person taking the action* must engage a *suitably qualified expert* to advise on the design and location of *fauna crossings*, fencing and road medians, for the purpose of maintaining habitat connectivity and facilitating the safe passage of the *Koala* and *Spotted-tail Quoll* across the Pacific Highway.

A *suitably qualified expert* must also be engaged to design a comprehensive monitoring program that tests the *long term success* of these measures.

Action	Timing	Status	Compliance evidence
11.1 Design development in consultation with NSW EPA Biodiversity Specialist	During design	Compliant	Environmental Design Fauna Crossing Refinements report approved by NSW DP&I.
11.2 Engage suitably qualified expert to design monitoring program	Prior to start of construction	Compliant	TfNSW engagement of BEM
11.3 Prepare monitoring program	Prior to start of construction	Compliant	BEM Ecological Monitoring Program

Note:

- Monitoring addressed via Section 3.5 of BEM ecological monitoring program.
- The Before-After Control Versus Impact (BACI) design of the monitoring program requires the monitoring of the fauna crossings prior to the installation of the fauna fence (i.e. before the underpass structures become operational).
- The first stage of the construction phase underpass monitoring was conducted in October and November 2014. The second stage was undertaken in February and March 2015.

Condition 12

To inform the *long term success* of *fauna crossings*, fencing and road medians the *person taking the action* must engage a *suitably qualified expert* to prepare a strategy for monitoring and recording any road kill sightings of the *Koala* and *Spotted-tail Quoll* along the *Pacific Highway*. Prior to *commencement of the action*, the road kill monitoring and recording strategy must be implemented.

Action	Timing	Status	Compliance evidence
12.1 Ecological Monitoring Program to include road kill monitoring and recording strategy	Prior to start of construction	Compliant	Section 3.5.3 of the Ecological Monitoring Program specifies road mortality monitoring and recording strategy
12.2 Implement strategy	Prior to start of construction and ongoing during construction	Compliant	Environmental surveillance checklist developed
12.3 Report on outcomes of monitoring strategy	Construction Post-construction	Compliant	Annual reporting

One road kill of Spotted-Tail Quoll was recorded during the reporting period. Details Follow;

- 16 November 2020, Spotted-Tail Quoll road kill observed approximately 500m south of the Short Cut Road Overpass

The roads kills were reported to the EPA and an inspection of the Fauna Fence was completed. The inspection identified no obvious defects in the fauna fence and all gates were closed in the surrounding areas of the road kill. This is the first Spotted-Tail Quoll that has been recorded as road kill on the project to date.

Condition 13

One year following the *completion of construction works*, the *person taking the action* must provide a report to *the Minister* detailing the success and/or failings of *fauna crossings*, fencing and road medians in achieving their intended purpose. The report must address (but need not be limited to):

a) baseline data collected as a requirement of conditions 9 and 12;

b) the number, design and location of fauna crossings, fencing and road medians, accompanied by maps and photographs;

c) details of a monitoring program to determine the long-term success of fauna crossings, fencing and road medians (including timing, duration, methodology, and performance objectives);

d) the success of fauna crossings to date; and

e) a comparison of data / results from other projects involving upgrades to the Pacific Highway regarding the long-term success of fauna crossings and/or fencing;

The report must be updated on a three-yearly basis until the *long term success* of *fauna crossings* has been proven or *the Minister* has agreed in writing that further revisions are no longer required. All updated reports must be provided to *the Minister* within three years of the last report having being submitted.

Action	Timing	Status	Compliance evidence
13.1 Provide fauna crossings, fencing and road medians outcomes report to Dept of the Environment	February 2019	Compliant	Transmittal form (and any confirmation of receipt)
13.2 Provide updated fauna crossings, fencing and road medians outcomes report to Dept of the Environment	February 2022	TBA	Transmittal form (and any confirmation of receipt)
13.3 Provide updated fauna crossings, fencing and road medians outcomes report to Dept of the Environment	February 2025	TBA	Transmittal form (and any confirmation of receipt)

13.4	Provide updated fauna crossings, fencing and road medians outcomes report to Dept of the Environment	February 2028	TBA	Transmittal form (and any confirmation of receipt)
13.5	Provide updated fauna crossings, fencing and road medians outcomes report to Dept of the Environment	February 2031	TBA	Transmittal form (and any confirmation of receipt)

A summary of the ecological monitoring outcomes will be included in the 2022 annual compliance tracking report, and the full ecological monitoring report will be included as an Attachment.

Condition 14

Should monitoring associated with conditions 11 to 13 demonstrate that the use of *fauna crossings* and/or fencing is not achieving its intended purpose or is having a detrimental effect upon *EPBC species* (as determined by *the Minister*), *the Minister* may request that the *person taking the action* implement alternative forms of mitigation and/or corrective actions to address the relevant impacts to *EPBC species*. Such measures must be implemented as requested.

Action	Timing	Status	Compliance evidence
14.1 Implement additional mitigation/corrective actions	As and when directed by the Minister	TBA	As directed by the Minister

Condition 15

The *person taking the action* must implement a salvage and translocation program for all individuals of *Clear Milkvine* and *Cryptic Forest Twiner* that are proposed to be cleared as a result of *the action*. Translocation procedures must be developed and implemented by a *suitably qualified expert* in accordance with *Guidelines for the Translocation of Threatened Plants in Australia* prepared by the Australian Network for Plant Conservation.

Action	Timing	Status	Compliance evidence
15.1 Engage suitably qualified expert	Prior to construction	Compliant	Engagement of Ecos to prepare Threatened Flora Management Plan.
15.2 Develop translocation procedures	Prior to construction	Compliant	Ecos TFMP developed in consultation with NSW EPA Biodiversity Specialist and approved by NSW DP&I.
15.3 Implement translocation procedures	During construction	Compliant	Annual reporting. First report completed January 2015. Second report completed January 2016, third report completed 2017, and fourth report completed 2018, fifth report 2019, and sixth report 2020 (Yr 4 Operation report (Appendix 1).

Notes:

- These two species are referenced in Section 2.7 (*Establishment of translocation areas*) of the BEM ecological monitoring program by their scientific names, ie *Marsdenia longiloba* (Clear Milkvine), and *Tylophora woollsii* (Cryptic Forest Twiner).
- A Threatened Flora Translocation Program was developed by Ecos in consultation with the NSW Biodiversity Specialist and approved by the NSW DP&I. The program includes a salvage and translocation program for all individuals of *Clear Milkvine* and *Cryptic Forest Twiner* that are proposed to be cleared and the program is considered to meet the requirements of Condition 15.

Condition 16

One year following the *completion of construction works*, *the person taking the action* must provide a report to *the Minister* detailing the long term success of the translocation program. The report must include, but need not be limited to:

a) background information on translocated species (in relation to ecological requirements and life history);

b) the scope of the translocation program (with respect to timing, duration, methodology, and objectives, as well as comprehensive details on the recipient translocation site(s) and how they meet the ecological requirements of each species);

c) details of a comprehensive monitoring program to determine the long-term success of translocation; and

d) the success of translocation to date.

Action	Timing	Status	Compliance evidence
16.1 Prepare translocation outcomes report addressing specified matters and other relevant matters	2019	Compliant	Feb 2019 EPBC annual compliance tracking report
16.2 Provide translocation outcomes report to Dept of the Environment	Feb 2019	Compliant	Transmittal form (and any confirmation of receipt) - Feb 2019 EPBC annual compliance tracking report

A summary of the outcomes from the report as required under Condition 16 are presented below;

Slender Marsdenia

The current (Year 5) mean survival rate of all Slender Marsdenia plants stands at 40.9%. Based on the author's knowledge of other translocations of this species, this is a comparatively good result. It should also be noted that it is highly likely that a significant proportion of those Slender Marsdenia plants recorded as having died back are still alive and may resprout in future years. However, successful achievement of the performance indicators for this species is as dependant on climatic factors as much as anything else. Should the region continue to experience severe winter-spring droughts like the past two years, then the survival rate of Slender Marsdenia transplants would be expected to decline as more plants die back in response to dry conditions. On the other hand, should milder conditions prevail then significantly more plants might be expected to produce aerial shoots and be in better overall condition.

Woolls's Tylophora

The current (Year 5) mean survival rate of Woolls's Tylophora (plants only within Sector B) stands at 9.5%, with a correspondingly low median condition class score of 1. If this low survival and condition persists, then the translocation of this species will have failed all survival and condition class performance indicators.

Condition 17

The report must be updated on a three-yearly basis to provide further insights on the *long-term success* of translocation. All reports must be provided to *the Minister* and made available on the *person taking the action's* website for the life of this approval or until *the Minister* has agreed in writing that further revisions are no longer required.

Action	Timing	Status	Compliance evidence
17.1 Update translocation outcomes report (update #1) and provide to Dept of the Environment	February 2021	Complaint (included as part this Annual Report - Threatened Flora Monitoring Report 20/21)	Completed report Transmittal form (and any confirmation of receipt)
17.2 Update translocation outcomes report (update #2) and provide to Dept of the Environment	February 2024	TBA	Completed report Transmittal form (and any confirmation of receipt)
17.3 Update translocation outcomes report (update #3) and provide to Dept of the Environment	February 2027	TBA	Completed report Transmittal form (and any confirmation of receipt)
17.4 Update translocation outcomes report (update #4) and provide to Dept of the Environment	February 2030	TBA	Completed report Transmittal form (and any confirmation of receipt)

Note:

- The report details survival rates and for more information, please refer to Appendix One
- Uploading of the reports to the project website is addressed via compliance with Condition 29.

Condition 18

With reference to the *department's offset policy*, the *person taking the action* must provide for *the Minister's* approval a threatened flora offset strategy for the *Clear Milkvine* and *Cryptic Forest Twiner*, within 12 months of the date of this approval. *The Minister* will only approve the Threatened Flora Offset Strategy (TFOS), if it demonstrates how a threatened flora offset meeting no less than 90 % of the direct offset requirements (as determined *by the department* in accordance with the offset user guide) will be legally secured in perpetuity within two years of the date of this approval.

Note: At the time the offset required by condition 18 is submitted for approval, the person taking *the action* may ask the Minister to consider that the salvage and translocation program required by condition 15, meets 10% of the offset requirements for the *Clear Milkvine* and *Cryptic Forest Twiner.*

Action	Timing	Status	Compliance evidence
18.1 Prepare TFOS in accordance with Dept of the Environment offset policy and addressing specified matters	By 26 Nov 2014	Compliant	Completed TFOS
18.2 Submit TFOS to Dept of the Environment for approval	By 26 Nov 2014	Compliant Final Report approved by DoE 19/07/2016	Transmittal form (and any confirmation of receipt)

Action 18.1:

- Tender assessment – (Complete)
- Draft for TfNSW review expected (Complete)
- TfNSW review (Complete)
- Final of the TFOS (Complete)

Action 18.2:

- Submitted to DoE for approval 21/11/2014
- Comments received from DoE 02/09/2015
- Amended report provided to DoE 02/10/2015
- Variation letter submitted to DoE on 20/11/2015 to request the removal of a timeframe to secure the offset property in perpetuity and tie that in with the approval of the TFOMP.
- Comments received from DoE 30/11/2015
- TFOS was resubmitted in 2/6/2016
- The TFOS was approved by DoE on 19/07/2016 and was published on the projects website.

Condition 19

The *person taking the action* must provide a plan for the management and delivery of the offset requirements of the threatened flora offset to *the Minister* for approval no later than 30 June 2015. The Threatened Flora Offset Management Plan (TFOMP) must include, but need not be limited to:

a) map(s) and shapefiles that clearly define the location and boundaries of the offset;

b) details on the quality of the offset;

c) information about Clear Milkvine and Cryptic Forest Twiner (in relation to ecology, biology and conservation status) to inform appropriate management actions;

d) performance objectives and management actions that will enable maintenance and enhancement of Clear Milkvine and Cryptic Forest Twiner the offset and habitat covered by the plan;

e) demonstration that any management actions to be undertaken will not adversely impact EPBC species (for example, this may apply to herbicide usage);

f) a description of funding arrangements or agreements including work programs and responsible entities;

g) an assessment of the baseline population and distribution for Clear Milkvine and Cryptic Forest Twiner within the offset, including:

    (i) the number of plants protected and their location;

    (ii) plant and habitat condition; and

    (iii) age classes.

h) measures for regular monitoring of the status of individuals of Clear Milkvine and Cryptic Forest Twiner and their habitat as measured against the baseline population and distribution, including:

    (i) fluctuations in population size and distribution;

    (ii) life cycle patterns

    (iii) habitat requirements; and

    (iv) response to disturbances and/or management actions.

i) Provision to revise the approved threatened flora offset management plan in response to the findings of research associated with condition 20(h).

j) The approved TFOMP must be implemented within seven days of its approval.

Action	Timing	Status	Compliance evidence
19.1 Prepare TFOMP addressing specified matters and other relevant matters	By 30 Jun 2015	Compliant	Completed TFOMP

19.2	Provide TFOMP to Dept of the Environment for approval	By 30 Jun 2015	Compliant (revised document was resubmitted to DoE on 7/11/2016) Plan approved 4/7/2017	Transmittal form (and any confirmation of receipt)
19.3	Implement TFOMP	Within 7 days of Minister's approval	Compliant	Annual reporting
19.4	Report on outcomes of TFOMP	Post-construction	Ongoing	Reporting as required.

Action 19.1:

- GHD engaged and property surveys completed
- An area within Boambee State Forrest has been identified and TfNSW are currently negotiating with State Forests regarding protection of this area in perpetuity as a Flora Reserve.
- TfNSW wrote to DoE on 30/06/2015 requesting urgent consideration of the TFOS and seeking an extension of time to submit the TFOMP by 3 months, until 30/09/2015.

Action 19.2

- TFOMP was submitted to DoE on the 02/10/2015 for approval.
- Comments received from DoE on 30/11/2015.
- The revised document was resubmitted to DoE on 7/11/2016.
- TFOMP approved by DoE on 4 July 2017

Action 19.3

- Boambee SF (FCNSW) – TfNSW has paid the compensation funding to FCNSW. The new Yuraarla Flora Reserve was gazetted on 15 April 2020 (NSW Government Gazette No. 107 of 29 May 2020).This was provided to Post Approvals via email on 29 June 2020.

Condition 20

Within three months from the date of this approval, the person taking the action must provide to the Minister, a strategy that details how, and when, the Norton Offset Site and Griffin Offset Site (as described in the referral documentation), will be legally secured in perpetuity by the person taking the action.

If the EPBC species habitat cleared as a result of the action is less than the impacts described in the referral documentation then any surplus biodiversity offset areas included in the offset management plans referred to in condition 19 and condition 21 could be secured as biodiversity offsets for other actions undertaken by the person taking the action and included in the offset strategies for those actions.

Action	Timing	Status	Compliance evidence
20.1 Prepare strategy to legally secure offset sites in perpetuity	By 26 Feb 2014	Compliant	Both Norton and Griffin sites have been purchased by TfNSW.
20.2 Provide strategy to Dept of the Environment	By 26 Feb 2014	Compliant	Letter provided to DoEE on 11-2-2014

Condition 21

Within 12 months from the date of this approval, the *person taking the action* must provide to *the Minister* for approval, a plan for the management of the Norton Offset Site and Griffin Offset Site. The Norton and Griffin Offset Management Plan (NGOMP) must be targeted to the ecological requirements of the *Koala*, *Grey-headed Flying-fox*, *Spotted-tail Quoll*, *Regent honey eater* and *Swift Parrot* and build upon the ideas and concepts described in the *referral*. The plan must include, but need not be limited to:

a) map(s) and shapefiles that clearly define the location and boundaries of the offset sites;

b) details on the quality of the offset with reference to all EPBC species this plan is intended to protect;

c) information about the Koala, Grey-headed Flying-fox, Spotted-tail Quoll, Regent honey eater and Swift Parrot (in relation to ecology, biology and conservation status) to inform appropriate management actions;

d) the results of targeted field surveys within both offset sites (undertaken at any ecologically appropriate time of the year) to assess habitat suitability and presence / absence of individuals in relation to the Koala, Grey-headed Flying-fox, Spotted-tail Quoll, Regent honey eater and Swift Parrot;

e) clear performance objectives and management actions that will enable maintenance and enhancement of habitat within the offset area, as well as contribute to the better protection of individuals and/or populations of EPBC species onsite;

f) an assessment of the baseline population for EPBC species which are detected within the offset area during field surveys;

g) demonstration that any management actions to be undertaken will not adversely impact EPBC species (for example, this may apply to pest control);

h) a description of funding arrangements or agreements including work programs and responsible entities;

i) details of a comprehensive long term monitoring program for determining the effectiveness of management actions;

j) commitments to undertake contingency measures and corrective actions in the event that performance objectives are not met; and

k) anticipated timeframes for achieving performance objectives.

l) The approved Norton and Griffin offset management plan must be implemented within seven days of its approval.

Action	Timing	Status	Compliance evidence
21.1 Prepare NGOMP addressing specified matters and other relevant matters	By 26 Nov 2014	Compliant	Completed NGOMP

21.2 Provide NGOMP to Dept of the Environment	By 26 Nov 2014	Compliant - submitted to DoE on the 11/12/14 Re-submitted on the 23/12/16 Plan Approved 5/7/2017	Transmittal form (and any confirmation of receipt)
21.3 Implement NGOMP	Within 7 days of Minister's approval	Compliant	Annual update / reporting

Note:

- It is assumed that satisfactory documentary evidence of implementation of the NGOMP would be provided through annual reporting.

Action 21.1:

- Prepare brief for tender (Complete)
- Tender assessment (Complete);
- Draft for TfNSW review (Complete);
- TfNSW review (Complete)

Action 21.2:

- Final - (Complete)
- Submitted to DoE for approval on the 11/12/14.
- Comments received from DoE on February 2016
- NGOMP re-submitted for approval on 23 December 2016.
- NGOMP approved by DoE on 5 July 2017

Action 21.3:

- Norton (TfNSW) and Swain (private) – BioBanking Agreements have been executed by OEH and registered on title (Norton and Swain complete). The Swain BBA became active in February 2019, after TfNSW purchased the ecosystem credits. Norton has been sold and is due to be settled in late February 2021 after which TfNSW will pay the Total Fund Deposit and the BBA will become active. The required ecosystem credits from both properties will be retired by June 2021 and credit retirement reports provided to the Department.
- Griffin (TfNSW) – TfNSW have finalised the transfer package with NPWS and are aiming to have this completed by March 2021.
- During 2020, TFNSW has undertaken routine property inspections and maintenance of the Norton and Griffin properties. This has included weed control and track maintenance.

Condition 22

Within one month after the commencement of *the action*, the *person taking the action* must advise *the Department* in writing of the actual date of commencement.

Action	Timing	Status	Compliance evidence
22.1 Provide written advice to Dept of the Environment of actual date of commencement	4 Jan 2014	Compliant	Signed copy of letter on TfNSW letterhead. Provided to DoEE on 4-1-2014.

Condition 23

The person taking the action must maintain accurate records substantiating all activities associated with or relevant to the conditions of approval, including measures taken to implement any management plans or reports 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 Department's website. The results of audits may also be publicised through the general media.

Action	Timing	Status	Compliance evidence
23.1 Quarterly review of the EPBC conditions compliance tracking program.	Quarterly Construction Annually Operation	Compliant	First review March 2014 Second review June 2014 Third Review September Forth Review October 2014. Fifth Review December 2014 Sixth Review February 2015 Seventh Review April 2015 Eighth Review June 2015 Ninth review August 2015 Tenth review October 2015 Eleventh review February 2016 Twelfth review May 2016 Thirteenth review July 2016 Fourteenth review December 2016 Fifteenth review 2017 Sixteenth review 2018 Seventeenth review 2019 Eighteenth review 2020 Nineteenth review 2021
23.2 Provide records to Dept of the Environment as requested	As requested	TBA	Transmittal form (and any confirmation of receipt)

Condition 24

Within three months of every one year anniversary of the commencement of the action, the person taking the action must publish a report on their website addressing compliance with each of the conditions of this approval, including implementation of any management plans as specified in the conditions. Documentary evidence providing proof of the date of publication and noncompliance with any of the conditions of this approval must be provided to the Department at the same time as the compliance report is published.

Action	Timing	Status	Compliance evidence
24.1 Prepare compliance report and upload to project website	By 4 Mar 2015	Compliant	Report uploaded to project website. Advice provided to Dept on date of publication and any non-compliances.
24.2 Prepare compliance report and upload to project website	By 4 Mar 2016	Compliant	Report uploaded to project website. Advice provided to Dept on date of publication and any non-compliances.
24.3 Prepare compliance report and upload to project website	By 4 Mar 2017	Compliant	Report uploaded to project website. Advice provided to Dept on date of publication and any non-compliances.
24.4 Prepare compliance report and upload to project website	By 4 Mar 2018	Compliant	Report uploaded to project website. Advice provided to Dept on date of publication and any non-compliances.
24.5 Prepare compliance report and upload to project website	By 4 Mar 2019	Compliant	Report uploaded to project website. Advice provided to Dept on date of publication and any non-compliances.
24.5 Prepare compliance report and upload to project website	By 4 Mar 2020	Compliant	Report uploaded to project website. Advice provided to Dept on date of publication and any non-compliances.
24.5 Prepare compliance report and upload to project website	By 4 Mar 2021	Compliant	Report uploaded to project website. Advice provided to Dept on date of publication and any non-compliances.

Condition 25

Upon the direction of the Minister, the person taking the action must ensure that an independent audit of compliance with the conditions of approval is conducted and a report submitted to the Minister. The independent auditor must be approved by the Minister prior to the commencement of the audit. Audit criteria must be agreed to by the Minister and the audit report must address the criteria to the satisfaction of the Minister.

Action	Timing	Status	Compliance evidence
25.1 Identify potentially suitable auditor(s)	On direction of the Minister	TBA	Tenderer(s) proposal(s) documenting expertise
25.2 Provide auditor's details to Dept of the Environment for approval	On direction of the Minister	TBA	Transmittal form (and any confirmation of receipt)
25.3 Auditor to develop audit criteria	Following receipt of Minister's approval	TBA	Completed audit criteria
25.4 Provide audit criteria to Dept of the Environment for approval	Following receipt of Minister's approval	TBA	Transmittal form (and any confirmation of receipt)
25.5 Conduct audit and document findings	Following receipt of Minister's approval	TBA	Completed audit report
25.6 Provide audit report to Dept of the Environment	At completion of audit	TBA	Transmittal form (and any confirmation of receipt)

- No independent audit of compliance has been requested from *the Minister* to date.

Condition 26

If the person taking the action wishes to carry out any activity otherwise than in accordance with the TFOS, TFOMP, or NGOMP as specified in these conditions, the person taking the action must submit to the Department for the Minister's written approval a revised version of that TFOS, TFOMP, or NGOMP. The varied activity shall not commence until the Minister has approved the varied TFOS, TFOMP, or NGOMP in writing. The Minister will not approve a varied TFOS, TFOMP, or NGOMP unless the revised TFOS, TFOMP, or NGOMP will result in an equivalent or improved environmental outcome over time. If the Minister approves the TFOS, TFOMP, or NGOMP then that TFOS, TFOMP, or NGOMP must be implemented in place of the TFOS, TFOMP, or NGOMP originally approved.

Action	Timing	Status	Compliance evidence
26.1 Assess potential departure(s) from TFOS, TFOMP and/or NGOMP as relevant	As required	TBA	Consistency assessment
26.2 Revise TFOS, TFOMP and/or NGOMP as relevant	As required	TBA	Revised TFOS, TFOMP and/or NGOMP as relevant
26.3 Provide revised TFOS, TFOMP and/or NGOMP as relevant to Minister for approval	As required	TBA	Transmittal form (and any confirmation of receipt)
26.4 Implement revised TFOS, TFOMP and/or NGOMP as relevant in accordance with the Minister's written approval	Prior to any action that would not be consistent with the original approval or subsequent modified approval(s)	TBA	Annual reporting

Condition 27

If the Minister believes that it is necessary or convenient for the better protection of listed threatened species and communities to do so, the Minister may request that the person taking the action make specified revisions to TFOS, TFOMP, or NGOMP specified in these conditions and submit the varied TFOS, TFOMP, or NGOMP for the Minister's written approval. The person taking the action must comply with any such request. The revised approved TFOS, TFOMP, or NGOMP must be implemented. Unless the Minister has approved the TFOS, TFOMP, or NGOMP, then the person taking the action must continue to implement the TFOS, TFOMP, or NGOMP originally approved, as specified in these conditions.

Action	Timing	Status	Compliance evidence
27.1 Revise TFOS, TFOMP and/or NGOMP as relevant as per directed by the Minister	As directed by the Minister	TBA	Completed revised TFOS, TFOMP and/or NGOMP as relevant
27.2 Provide revised TFOS, TFOMP and/or NGOMP as relevant to Dept of the Environment for approval	As directed by the Minister	TBA	Transmittal form (and any confirmation of receipt)
27.3 Implement revised TFOS, TFOMP and/or NGOMP as relevant in accordance with Minister's written approval	As directed by the Minister	TBA	Annual reporting

Condition 28

If, at any time after five years from the date of this approval, the person taking the action has not substantially commenced the action, then the person taking the action must not substantially commence the action without the written agreement of the Minister.

Action	Timing	Status	Compliance evidence
28.1 Obtain written agreement of the Minister to substantially commence the project	As required after 25 Nov 2018	Compliant	Minister's written agreement. Action substantially commenced on the 4 December 2013

Condition 29

Unless otherwise agreed to in writing by the Minister, the person taking the action must publish all management plans and reports referred to in these conditions of approval on their website. Each management plan or report must be published on the website within 1 month of being approved, or where approval is not required, on the same day as the report is provided to the Minister.

Note

Any plan, strategy or report that has been prepared as a requirement of a state legislation approval (in relation to the action) may be used to satisfy the requirements of any of the above conditions, providing the relevant criteria have been met (as specified in these conditions). Where the option is employed, the plan, strategy or report must be accompanied by a standalone document detailing where each of the relevant criteria have been addressed within that plan, strategy or report. This note is particularly relevant to conditions 13, 16, 17, 19, 21 and 25.

Action	Timing	Status	Compliance evidence
29.1 Upload approved NGOMP to project website (21)	Within 1 month of the Minister's approval	Compliant	NGOMP uploaded to project website
29.2 Upload approved TFOMP to project website (19)	Within 1 month of the Minister's approval	Compliant	TFOMP uploaded to project website
29.3 Upload fauna crossings, fencing and road medians outcomes report to project website (13)	1 year following construction completion	Compliant	Report uploaded to project website
29.4 Upload translocation outcomes report to project website (16)	1 year following construction completion	Compliant	Report uploaded to project website
29.5 Upload updated fauna crossings, fencing and road medians outcomes report to project website (13)	Every 3 year following 29.3 report as above	Due 2022	Report to be uploaded to project website
29.6 Upload updated translocation outcomes report to project website (17)	Every 3 year following 29.4 report as above	Due 2022	2020/21 Report uploaded to project website, and included in this Report Appendix 1.

29.7 Upload updated fauna crossings, fencing and road medians outcomes report to project website (13)		TBA	Report uploaded to project website
29.8 Upload updated translocation outcomes report to project website (17)		TBA	Report uploaded to project website
29.9 Upload updated fauna crossings, fencing and road medians outcomes report to project website (13)		TBA	Report uploaded to project website
29.10 Upload updated translocation outcomes report to project website (17)		TBA	Report uploaded to project website
29.11 Upload updated fauna crossings, fencing and road medians outcomes report to project website (13)		TBA	Report uploaded to project website
29.12 Upload updated translocation outcomes report to project website (17)		TBA	Report uploaded to project website
29.13 Upload compliance audit report to project website (25)	Same day as provided to the Minister	As required	Report uploaded to project website

Note:

- Number in parentheses under ‘Action’ refers to approval condition

Appendix 1 –
NH2U Threatened Flora Monitoring Report Yr 4 2020/21.

Pacific Highway Upgrade Nambucca Heads to Urunga Operational Phase

Threatened Flora Monitoring Annual Report Year 4 – 2020/21

Transport for NSW | 09 February 2021 | Final Report

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This report, **Pacific Highway Upgrade Nambucca Heads to Urunga Operational Phase - Threatened Flora Monitoring Annual Report Year 4 2020/21**, was prepared for Transport for NSW in accordance with the NSW *Environmental Planning and Assessment Act* 1979, the NSW *Biodiversity Conservation Act* 2016 and the Commonwealth *Environmental Protection and Biodiversity Conservation Act* 1999.

The author of this report is Peter Richards, Consultant Ecologist, whose qualifications are B.Sc. (UNE).

Any opinion expressed in this report is the professional, objective opinion of the author.

9th February 2021

TABLES

FIGURES

GLOSSARY

TERM	MEANING
ANPC	Australian Network for Plant Conservation
BC Act	NSW *Biodiversity Conservation Act* 2016
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999
EP&A Act	NSW *Environmental Planning and Assessment Act* 1979
In situ	Latin term meaning 'in the original place'. In this report, refers to threatened plants that are being protected where they were found
LGA	Local Government Area
MCoA	Ministers Conditions of Approval
NH2U	Nambucca Heads to Urunga Pacific Highway Upgrade Project
NSW EPA	NSW Environment Protection Authority
NSW OEH	NSW Office of Environment and Heritage
RMS	NSW Roads and Maritime Services (now known as Transport for NSW)
TA	Translocation Area
TFMP	Threatened Flora Management Plan (Ecos Environmental 2013)
TfNSW	Transport for NSW (formerly RMS)
TSC Act	NSW *Threatened Species Conservation Act* 1995

INTRODUCTION

The Nambucca Heads to Urunga Pacific Highway Upgrade Project (NH2U) is a 22-km-long section of the Pacific Highway upgrade on the Mid North Coast of NSW. The NH2U project comprises the northern half of the Warrell Creek to Urunga section of the Pacific Highway upgrade, which is being built in two stages. Mitigation measures employed during the construction of NH2U included *in situ* protection, or translocation, and monitoring, of populations of the following eight threatened or rare plant species:

Spider Orchid *Dendrobium melaleucaphilum* (Endangered, BC Act)

Red Bopple Nut *Hicksbeachia pinnatifolia* (Vulnerable, BC Act & EPBC Act)

Slender Marsdenia *Marsdenia longiloba* (Endangered, BC Act; Vulnerable, EPBC Act)

Rusty Plum *Niemeyera whitei* (Vulnerable, BC Act)

Woolls's Tylophora *Tylophora woollsii* (Endangered, BC Act & EPBC Act).

Koala Bells *Artanema fimbriatum* (unlisted, nationally rare)

Gully Ironbark, Nambucca Ironbark *Eucalyptus ancophila* (unlisted, local endemic species)

Ford's Goodenia *Goodenia fordiana* (unlisted, nationally rare)

In situ flora populations

One component of the mitigation measures employed on the NH2U project involved the protection and monitoring of *in situ* plants of Spider Orchid, Slender Marsdenia and Gully Ironbark that remain within the NH2U road reserve and were not directly impacted by the project. Baseline data collection, and construction phase monitoring, has been undertaken on 76 Spider Orchid plants, five Slender Marsdenia plants and a single Gully Ironbark (Ecos Environmental 2014, 2016, 2017) which are located at various points in the road reserve along the NH2U route (Figure 1).

Translocated Flora Species

Where threatened or rare plants were recorded within the NH2U construction footprint and direct impact was unavoidable, a program was developed to guide the translocation and monitoring of Spider Orchid, Red Bopple Nut, Slender Marsdenia, Rusty Plum, Woolls's Tylophora, Koala Bells and Ford's Goodenia from the construction footprint into one of two recipient sites (Translocation Areas, TA1 and TA2) that adjoin the NH2U footprint and are owned and managed by TfNSW (Figure 1).

The translocations were conducted according to the Warrell Creek to Urunga Threatened Flora Management Plan (TFMP, Ecos Environmental 2013), which was prepared as a condition of approval by the NSW Department of Planning and the Commonwealth Department of Environment.

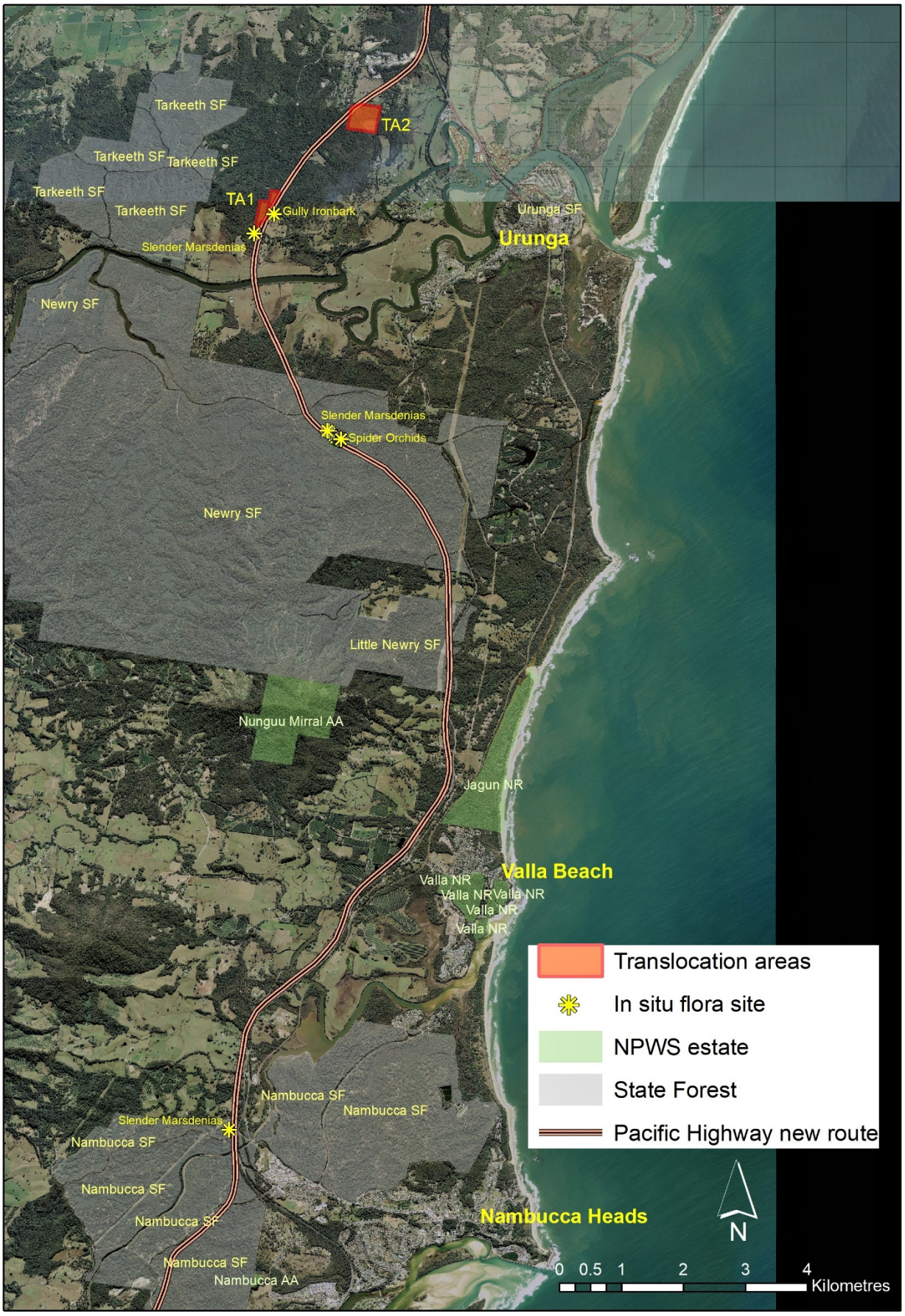

Figure 1: Location of NH2U in situ and translocated threatened or rare flora monitoring sites.

Translocation methods and planting layout

A detailed description of the actual salvage and translocation methodology is provided in Ecos Environmental (2013, 2014a, 2016a, 2016b). The summary provided below is also drawn from these Ecos Environmental reports and explains the source of plant material (transplanted from construction footprint or propagated off-site), whether a slow-release fertiliser was applied, and the location within TA1 or TA2 of the transplants or enhancement plantings.

Translocation Area 1

TA1 was divided into ten sectors (A to J, Figure 2) each receiving one species and different introduction treatments, as described below:

- Transplanted from construction footprint with no addition of fertiliser.
  - Sector A Slender Marsdenia
  - Sector B Woolls's Tylophora
- Transplanted from construction footprint with no fertiliser except initial watering with seaweed solution.
  - Sector C Ford's Goodenia
  - Sector D Koala Bells
  - Sector E Rusty Plum
- Propagated vegetatively and planted in experimental grids with and without addition of slow-release fertiliser.
  - Sector F Slender Marsdenia
  - Sector G Woolls's Tylophora
  - Sector I Woolls's Tylophora
- Propagated from seed and planted in an experimental grid with and without addition of slow-release fertiliser.
  - Sector J Slender Marsdenia
- Transplanted from construction footprint with no fertiliser except initial watering with seaweed solution.
  - Sector H Red Bopple Nut

Translocation Area 2

TA2 consists of two sectors, for the Spider Orchid and Koala Bells (Figure 3).

- Spider Orchid transplanted from construction footprint, no fertiliser addition – Sector A
- Koala Bells population enhancement, no fertiliser addition – Sector B

Individuals were planted at a regular spacing, with rows about 10m apart and individual plants about 5 metres apart along rows. Where a sector was on a hill slope, grid lines were laid out parallel with the slope contour. This facilitated comparison of species performance in relation to slope position.

Monitoring, to date, has been undertaken for a total of 681 translocated plants (Ecos Environmental 2014, 2016, 2016a) as detailed in Table 1 below.

Table 1:Number and location of translocated plants and enhancement plantings at NH2U Translocation Areas.

Translocation Area (TA)	Species	Sector / Method	Number of plants
TA1	Slender Marsdenia	Sector A – transplants	104
		Sector F – population enhancement (veg) & fertilizer experiment	90
		Sector J – population enhancement (seed) & fertilizer experiment	103
	Woolls's Tylophora	Sector B – transplants	42
		Sector G – population enhancement (veg) & fertilizer experiment	87
		Sector I – population enhancement (veg)	51
	Rusty Plum	Sector E – transplants and population enhancement (seed)	3 trees 40 seeds
	Red Bopple Nut	Sector H - transplant	1
	Koala Bells	Sector D - transplants	35
	Ford's Goodenia	Sector C – transplants	5 patches
TA2	Spider Orchid	Sector A - transplants	55
	Koala Bells	Sector B - population enhancement (veg)	69

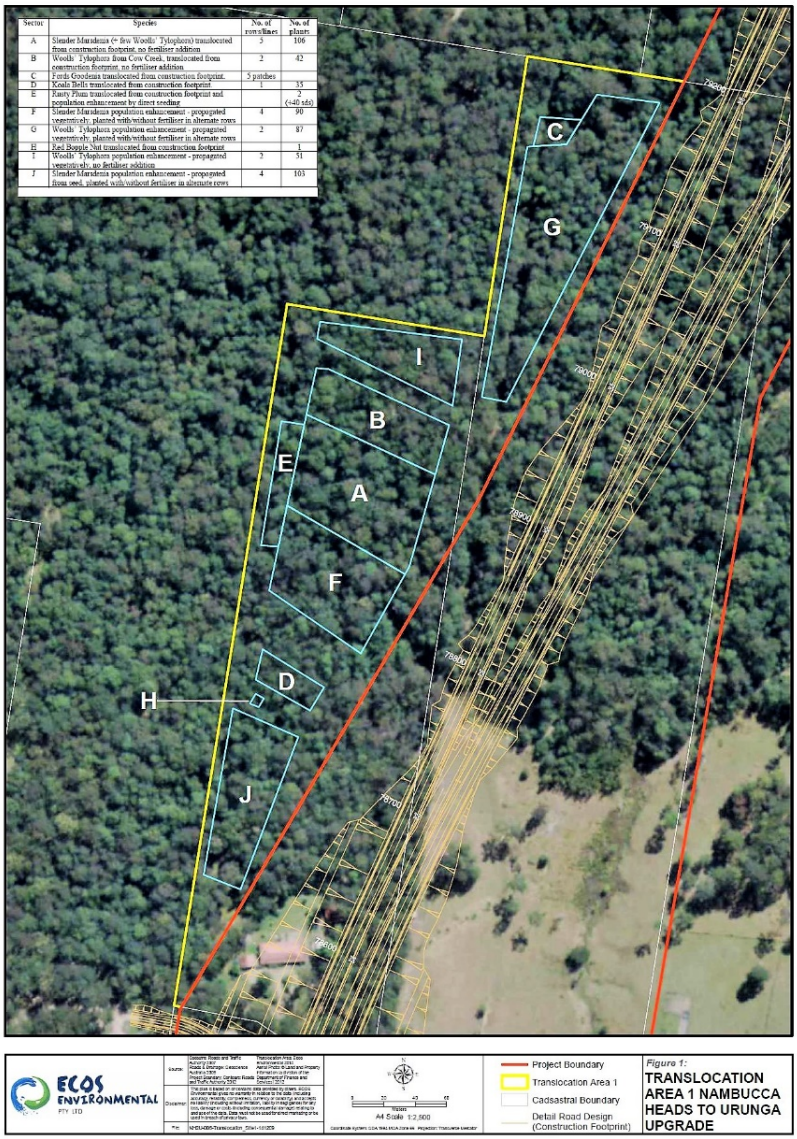

Figure 2: Translocation Area 1 (TA1) showing sectors supporting different species and treatments (from Ecos Environmental 2016a).

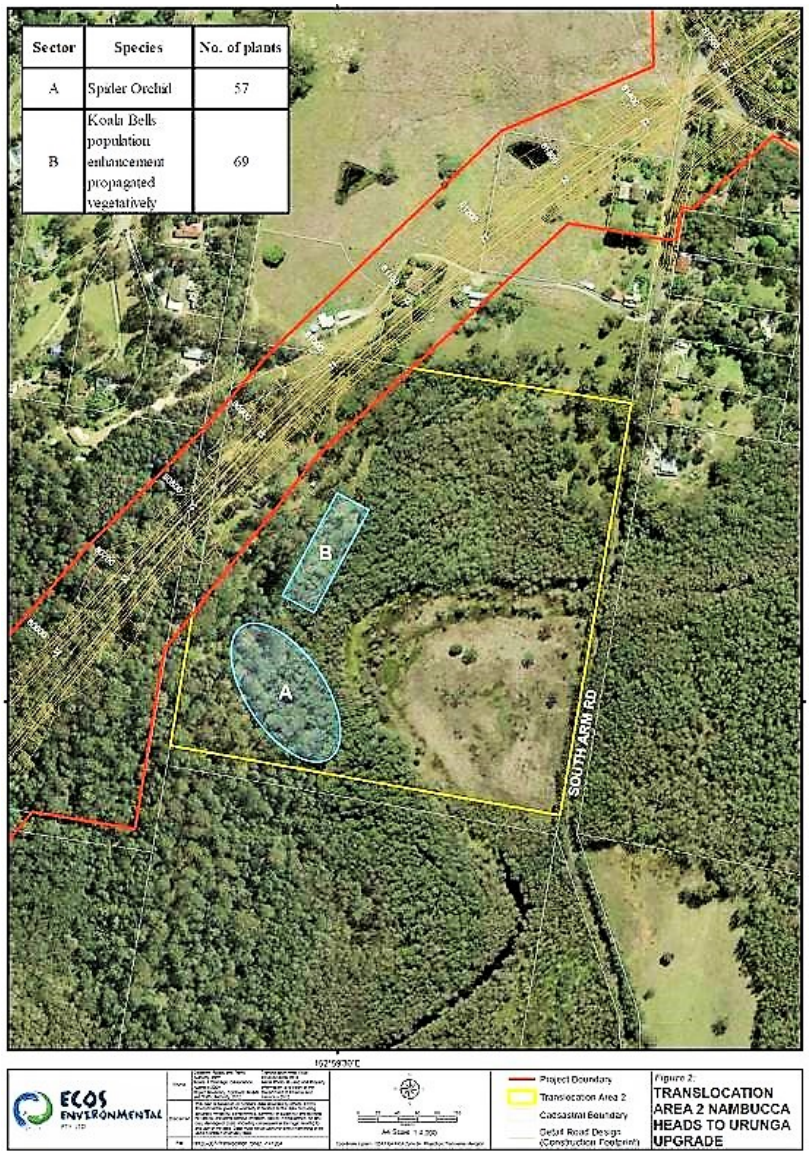

Figure 3: Translocation Area 2 (TA2) showing sectors supporting different species and treatments (from Ecos Environmental 2016a).

Objectives of translocation

The objectives of the translocation project set out in the TFMP are:

- To salvage and re-establish impacted individuals of threatened (TSC/BC/EPBC Act) species.
- To re-establish species at a recipient site near the original site with closely matching habitat and long-term security of tenure.
- To enhance the size and genetic diversity of the translocated population by propagation and introduction of individuals additional to those salvaged from the road footprint.
- To maintain good quality habitat to the relocation site(s).
- To preserve individuals of threatened species *in situ* wherever possible and limit translocation to plants within the highway footprint and construction buffer.

In accordance with the Ministers' Conditions of Approval (MCoA) for the TFMP, an annual monitoring report is to be prepared which addresses the monitoring goals, provides an evaluation of the effectiveness of the mitigation measures against performance indicators, documents any corrective actions implemented, and identifies recommendations for any adaptive management.

Upon completion of the construction phase of the NH2U upgrade, responsibility for operational management passed to TfNSW. This report describes the results of Year 4 (operational phase) monitoring of *in situ* and translocated flora for the NH2U upgrade. It should be noted that, upon completion of construction phase monitoring of translocated plants, monitoring of those species not listed as threatened under the TSC (BC) Act or the EPBC Act (Koala Bells and Ford's Goodenia) has been discontinued.

MONITORING METHODS

Monitoring of all *in situ* and translocated plants was undertaken in November 2020 and January 2021.

The following description of the NH2U flora monitoring methodology is adapted from Ecos Environmental (2014 to 2017). During the NH2U construction phase, monitoring of transplants was conducted every 3 months in Year 1, every 6 months in Year 2 and annually in Year 3. Population enhancement individuals were monitored twice in Year 1 thence at the same time as transplanted individuals. Ongoing monitoring during the NH2U operational phase is to be undertaken annually for a minimum five years.

Each transplanted and propagated plant was given a unique identification number which was written on flagging tape and attached to the plant itself, or to its protective wire cage. Transplants were re-located in the field using a hand-held GPS to navigate to a set of coordinates that had been recorded when the plants were introduced to the sites (in some cases coordinates were not available – in such cases a thorough search of the relevant sector was undertaken by the author, and each transplant found had locality coordinates recorded with a GPS unit). Data were recorded as per Section 3.8 of the TFMP and listed in Table 2 below.

Table 2: Monitoring data recorded for each translocated species.

Data Recorded	Slender Marsdenia	Woolls's Tylophora	Rusty Plum	Red Bopple Nut	Spider Orchid
Monitoring Number	y	y	y	y	y
Date	y	y	y	y	y
Line	y	y	-	-	-
Source Label	y	y	y	-	y
Translocation Label	y	y	y	y	y
Species - Current ID	y	y	-	-	-
Condition Class	y	y	y	y	y
No. leaves	y	y	-	-	
Height (cm)	y	y	y	y	
New Shoots – New Active Growth (Y/N)	y	y	y	y	y
Comment	y	y	y	y	y
No. of pseudobulbs with leaves	-	-	-	-	y
Length of the longest pseudobulb	-	-	-	-	y
Waypoint	y	y	y	y	y
Coordinates	y	y	y	y	y

Condition Class Scores

The key attribute for evaluating species survival and performance was Condition Class, which was scored on a scale of 0 to 5. The scores were defined differently according to plant type, as detailed below in Table 3, Table 4 and Table 5.

Table 3: Condition scores applied to Slender Marsdenia and Woolls's Tylophora.

Score	Condition
0	dead
1	stem died back to ground, no leaves or green stem, live stem stub may be present
2	plant < 75 cm tall; stem with leaves, with or without new shoots (active growth), or green leafless stem
3	plant > 75 cm tall, stem with leaves, with or without new shoots (active growth), if green leafless stem <1m or leaves discoloured score as 2
4	plant > 1.5m tall with > 15 leaves, mature or nearing maturity
5	plant flowering or seeding

Table 4: Condition scores applied to Rusty Plum and Red Bopple Nut.

Score	Condition
0	dead
1	leafless and no sign of re-shooting
2	pruned foliage retained, or small amount of re-shooting after defoliating, or foliage sparse/discoloured (<40 cm tall Koala Bells)
3	vigorous re-shooting (>40 cm tall Koala Bells)
4	crown recovering, foliage healthy
5	growing actively, flowering or seeding recorded

Table 5: Condition scores applied to Spider Orchid.

Score	Condition
0	dead
1	pseudobulbs discoloured/grazed/withering, no new growth
2	pseudobulbs healthy in colour, not withering, no new growth
3	plant small, not many healthy pseudobulbs, new growth occurring
4	several healthy pseudobulbs present, new growth occurring
5	several good sized, healthy pseudobulbs, flowering or seeding recorded

Data Analysis

Monitoring data were stored and processed in Excel™ spreadsheets.

Species survival rate was calculated as:

(no. of individuals in condition classes 2+3+4+5/total no. plants) X 100

Species 'thrival' rate (a term used by Ecos Environmental to describe the general trend in vigour of plants in individual sectors or subject to different treatments) was calculated as:

(number of individuals in condition classes 3+4+5/total no. plants) X 100

The thrival rate provides, according to Ecos Environmental (2016a) a better indication of the percentage of plants likely to reach reproductive maturity. Mean species height was calculated for all plants including those with zero height (i.e., plants that had died back to the ground – condition class 1 - not just plants in condition classes 2 to 5).

YEAR 1 MONITORING RESULTS AND RECOMMENDATIONS

The Year 1 NH2U threatened flora monitoring report (Richards 2017) found that whilst the survival of Slender Marsdenia transplants was comparable to that achieved in other translocation projects, many transplants had died back as a result of a very dry winter-spring in 2017. Furthermore, it was discovered that the Woolls's Tylophora plants were in fact the common *Tylophora paniculata*, and that the Rusty Plum enhancement plantings had been almost entirely lost. Therefore, the following recommendations were made:

1. Discontinue monitoring of *Tylophora paniculata* plants in Sectors G and I in TA1.
2. Direct seed an additional 40 Rusty Plum seeds into Sector E in TA1.
3. Install protective cages on all new and surviving Rusty Plum enhancement plantings.

The direct seeding of Rusty Plum seed, and installation of cages, was undertaken in October 2018 and is described in a separate report (Richards 2018). From 2018 on, Sectors G and I in TA1 will no longer be monitored.

YEAR 2 MONITORING RESULTS AND RECOMMENDATIONS

The Year 2 NH2U threatened flora monitoring report (Richards 2018a) found that performance indicators were met for *in situ* plants of Slender Marsdenia and Gully Ironbark, but that Spider Orchid had failed to meet the target for percentage of plants in condition class 3 or better. Results for translocated plants were mixed, with target survival rates after five years not met for Slender Marsdenia, Woolls's Tylophora and Rusty Plum. Recommendations arising from the Year 2 report were:

1. Monitor Rusty Plum enhancement plantings six months after planting (i.e., April 2019) to assess condition of protective cages, incursion of weeds or competing native species, whether any seeds have germinated, and to undertake any necessary maintenance of the enhancement plantings.
2. Engage a qualified bush regenerator to assess the current level of infestation of Broad-leaved Paspalum and Lantana in TA1, and, if necessary, provide an appropriate control program. Observations by the author during monitoring surveys suggests that both weed species have increased in density in parts of TA1, particularly in the vicinity of old vehicular tracks. Early action to control both species would be beneficial.

As of February 2020 (when Year 3 monitoring surveys occurred, see below), the Year 2 recommendations had not been implemented, due to a lapse in communication between different contractors and TfNSW personnel. Recommendations provided in the Year 3 report accounted for this oversight and provided appropriate mitigation measures, as described below.

YEAR 3 MONITORING RESULTS AND RECOMMENDATIONS

Monitoring surveys are usually undertaken during late spring to early summer (October to December). However, the early start to the 2019 bushfire season was accompanied by extended periods of high to extreme fire danger and hazardous levels of bushfire smoke across the NSW mid-north coast from August 2019 to January 2020. This situation compelled the author to postpone field-based surveys until early February 2020. The Year 3 NH2U threatened flora monitoring report (Richards 2020) found that performance indicators were met for *in situ* Slender Marsdenia and Gully Ironbark. Despite *in situ* Spider Orchid meeting only two of three performance indicators, it was considered that this was due to three seasons of drought and recent tree fall in the site making it very difficult to re-locate all tagged plants. Translocated Spider Orchid, Rusty Plum, Red Bopple Nut and Slender Marsdenia had, to date, met performance indicators. Woolls's Tylophora and Rusty Plum enhancement plantings had not met performance indicators. Based upon these results, recommendations arising from the Year 3 report were:

1. Cessation of monitoring of all *in situ* plants. After six years of monitoring, it is considered that all extant *in situ* plants are highly likely to survive into the future.
2. Cease monitoring the translocated Spider Orchids in TA2.
3. Continue monitoring of all currently monitored sectors and plants in TA1.

4. Repeat the Rusty Plum enhancement planting program. Rather than direct-planting of seeds, it is recommended that collected seeds are germinated and grown on in nursery conditions. Planting of seedlings into TA1 would occur only when weather conditions are favourable. The protective tree guards from the previous attempt in 2018 are already in place within TA1 and can be re-used. The planting should be followed up with regular inspections and hand-watering as required..
5. Implement weed control program in TA1 targeting Broad-leaved Paspalum and Lantana in areas identified by bush regenerator as requiring action.

While all the above recommendations were accepted by TfNSW, endorsed by NSW EPA, and approved by DPIE, the monitoring of *in situ* Slender Marsdenia was continued in the current survey. This is because Slender Marsdenia is also listed as threatened under the EPBC Act, and Commonwealth approval of the Year 3 recommendations had not been received at the time of Year 4 surveys and preparation of this report.

RESULTS – IMPLEMENTATION OF YEAR 3 RECOMMENDATIONS

Rusty Plum Enhancement Planting

Mature Rusty Plum fruits were collected during late spring 2020. Less than 10% of discernible fruits were gathered from individual sites. Seeds were prepared in accordance with known techniques (e.g., Dunphy *et al*. 2020) by soaking overnight to remove insect larvae, then removing the outer coat by hand before potting into individual pots and maintaining in a shadehouse. As of early February 2021, 10 of 40 seeds had germinated (B. Hely, New Earth Bush Regeneration, pers. comm. 9th Feb 2021). It is envisaged that, if all seedlings have grown sufficiently (> 30cm tall) and weather conditions are suitable, planting out may be possible as early as spring 2021, otherwise when appropriate up to February-March 2022.

Weed Control Program – Initial Treatment

The first weed treatment at TA1 was performed on 25th November 2020 by New Earth Regeneration (three personnel). Treatment involved hand removal and cut and paint of Lantana plants (Figure 4) and targeted spot-spraying of Broad-leaved Paspalum (Figure 5) in the vicinity of the Rusty Plum translocations and enhancement plantings.

Figure 4: Bush regeneration team cutting and painting Lantana. Large translocated Rusty Plum in background.

Figure 5: Spot-spraying of Broad-leaved Paspalum in TA1.

An inspection of the treatment area on 3rd January 2021 revealed significant reduction in weed cover and minimal impact upon native recruitment into the site (Figure 6).

Figure 6: Post-treatment image taken 3rd Jan 2021 of area treated for Broad-leaved Paspalum 25th Nov 2020.

Weed Control Program – Follow-up Treatment

The follow-up weed treatment was undertaken at the site on 22nd January 2021, after being delayed by wet weather. Inspection of treated areas at the time of follow-up show complete removal of Lantana from treated areas and almost complete removal of adult and seedling Broad-leaved Paspalum (Figure 7; Figure 8).

Figure 7: Follow-up treatment of seedling Broad-leaved Paspalum 22nd Jan 2021

Figure 8: Follow-up weed treatment, TA1, 22nd Jan 2021

RESULTS – *IN SITU* FLORA MONITORING

Slender Marsdenia

Appendix 1 provides full details of the results of the NH2U Year 4 monitoring of *in situ* Slender Marsdenia. Of the five *in situ* Slender Marsdenia plants being monitored, one (ML119) has now been recorded as died back for four consecutive years. Of the remaining sites, the plants near Martells Road (2010-1 and 2010-3) supported healthy plants, with a condition class of 3. Plants at site UTW3 remained in only fair condition, whilst plants at site UTW4 (Figure 9), had declined in condition.

Figure 9: In situ Slender Marsdenia UTW4 in Jan 2021.

RESULTS - TRANSLOCATED FLORA MONITORING

Appendix 2 provides full details of the results of the NH2U Year 4 monitoring of translocated flora within TA1. Monitoring of translocated Spider Orchid plants in TA2 has now ceased. A summary of Year 4 results is provided below.

Slender Marsdenia

Slender Marsdenia was planted in three sectors in TA1:

- Sector A - Directly transplanted from construction footprint with no fertiliser.
- Sector F - Propagated vegetatively and introduced with and without fertiliser.
- Sector J - Propagated from seed and introduced with and without fertiliser.

Sector A

Survival rate for all 106 plants in Sector A was 40.6%, a small increase on the previous year (39.6%). Mean plant height increased from 40.4cm to 46.6cm. 23 of these plants were a metre or more in height. The percentage of plants with active shoot growth was 42%. 62 plants had died back, and two plants that could not be found last year were re-located and were resprouting under tree-fall debris.

Survival and mean height results recorded during all Sector A surveys are summarised in Table 6 below.

After six years the 'thrival rate' of Slender Marsdenia in Sector A was 28.3% (30 plants out of 106 with a Condition Class score of 3, 4 or 5), an increase from the previous survey rate of 25.5%. No plants were in flower or fruit at the time of survey.

Table 6: Slender Marsdenia in TA1 Sector A - mean height in centimetres and percent survival of transplants – all surveys.

All plants n = 106	Mar 2014	Dec 2014	Jan 2016	Nov 2016	Oct 2017	Nov 2018	Feb 2020	Jan 2021
Survival %	90.5	87.6	71.2	67.9	40	36.8	39.6	40.6
Mean height (cm)	36.25	36.25	42.38	39.97	36.3	40.7	40.4	46.6

Sector F

The survival rate of all 90 plants in Sector F was 58.9%, a significant improvement on the previous survey. Mean plant height was 56.6cm, also a significant increase on the previous survey. Survival and mean height results recorded during all Sector F surveys are summarised below in Table 7.

The thrival rate after six years was 37.8%, an improvement on the previous survey rate of 36.7%. 25 plants with a condition class score of 3 or more were more than one metre in height. No plants were in bud, or flowering, at the time of the current survey.

Table 7: Slender Marsdenia in TA1 Sector F - mean height in centimetres and percent survival of transplants.

All plants n = 90	Jul 2014	Jan 2016	Nov 2016	Oct 2017	Nov 2018	Feb 2020	Jan 2021
Survival %	83.63	77.1	66.75	61.1	42.2	51.1	58.9
Mean height (cm)	21.04	68.50	55.89	52.44	30.7	46.1	56.6

Sector J

103 propagated Slender Marsdenia seedlings were planted in Sector J in August 2014. Results from the current survey reveal an increase in survival rate to 58.3% and mean plant height to 41.98 cm since the last monitoring survey (Table 8).

The current thrival rate of Slender Marsdenia in Sector J is 30.1%, which is slightly lower than the previous year, but not significantly so. 17 plants were one metre or more in height. No plants were in flower or fruit.

Table 8: Slender Marsdenia in TA1 Sector J - mean height in centimetres and percent survival of transplants.

All plants n = 103	Dec 2014	Jan 2016	Nov 2016	Oct 2017	Nov 2018	Feb 2020	Jan 2021
Survival %	92.2	86.4	82.5	54.39	43.7	48.5	58.3
Mean height (cm)	46.75	69.15	64.19	54.61	32.3	37.2	41.98

Woolls's Tylophora

Woolls's Tylophora *Tylophora woollsii* was translocated to TA1 into Sector B as direct transplants from the construction footprint with no fertiliser.

Sector B

Mean survival rate for all plants in Sector B for the current survey was 9.52% (4 plants of 42), a slight decrease from the previous year. Mean plant height increased to 5.81cm (Table 9).

The strongest indicator of the poor state of plants in this sector is the thrival rate of just 2.38% (i.e., only one plant was assessed as being in condition class 3 or better). As suggested previously by the author and Ecos Environmental (2016a), the recipient site represents sub-optimal habitat for Woolls's Tylophora.

Table 9: Woolls's Tylophora in TA1 Sector B - mean height in centimetres and percent survival of transplants.

All plants n = 42	Mar 2014	Dec 2014	Jan 2016	Nov 2016	Oct 2017	Nov 2018	Feb 2020	Jan 2021
Survival %	90.5	80	73.8	31	14.29	9.5	11.9	9.52
Mean height (cm)	76.31	38.84	34.07	11.73	4.88	2.07	1.6	5.81

Identity of Tylophora Plants in Sector B

In the first NH2U Operational Phase threatened flora monitoring report, Richards (2017) noted that *Tylophora* plants in Sectors G and I were actually the common species *T. paniculata* (based upon flowering specimens observed by A. Benwell of Ecos Environmental). It was recommended that monitoring in those sectors be discontinued, leaving only Sector B containing putative *T. woollsii* transplants. Richards had also noted on monitoring proformas, and in monitoring reports, that a number of plants (vegetative material only) in Sector B looked very much like *T. paniculata* (*T. woollsii* and *T. paniculata* are difficult to separate vegetatively, even by experienced botanists). In attempting to determine the origin of the Sector B material, the original Threatened Flora Management Plan (Ecos Environmental 2013) and the Year 1 Construction Phase Threatened Flora Monitoring Report (Ecos Environmental 2014a) were re-visited. These documents confirm that the translocated plants in Sectors B, G and I originated from the same source (Cow Creek, within the highway construction footprint). Thus, the plants in Sector B are actually *T. paniculata* and not *T. woollsii*.

Rusty Plum

Translocated Rusty Plums

Two small Rusty Plum trees (4-8m high) were transplanted into Sector E in TA1. One tree had split and was separated into two pieces (plants 1 and 2) before planting. The other tree (plant 3) was pruned back to remove most of the branch system before being transplanted. Plant 2 died in 2017. The current survey revealed no losses since the previous survey, with a survival rate of 67%. Plant 1 bore a healthy, basal stem shoot which had almost doubled in height since the previous survey (Figure 10). Plant 3 was in excellent health, with flowering observed on this plant for the first time since translocation.

Figure 10: Rusty Plum transplanted tree No. 1 in excellent health with new growth.

Rusty Plum enhancement plantings

The original 40 Rusty Plum enhancement plantings (Ecos Environmental 2016a) had decreased to one surviving seedling in 2020, a survival rate of 2.5%. As described in the introductory section of this report, the direct seeding of Rusty Plum seed was repeated, including the installation of tree guards, in October 2018 (Richards 2018), but they all succumbed to severe drought conditions. As noted above, Rusty Plum fruits were collected in spring 2020 for a future attempt at enhancement planting.

Red Bopple Nut

A single Red Bopple Nut tree was transplanted to Sector H in TA1. The tree was recorded in excellent condition during the current survey. Flowering had occurred, with several developing fruits observed (Figure 11).

Figure 11: One of several immature fruits observed on Red Bopple Nut transplant in TA1 Nov 2021

DISCUSSION

In accordance with the MCoA of the NH2U TFMP (Ecos Environmental 2013), each annual monitoring report must include an assessment of the success or failure of protective measures for *in situ* threatened flora, and an assessment of the success or failure of the threatened flora translocation program (salvage translocation and population enhancement measures). These assessments are provided below. Note that only *in situ* Slender Marsdenia is assessed here, and *in situ* and translocated Spider Orchid plants are no longer evaluated. This is in accordance with recommendations in the previous monitoring report. The MCoA also requires a recommended work plan for the next 12 months. This too is provided below.

Evaluation of *in situ* Flora Management

The following performance indicators are used to evaluate the success of protective measures for *in situ* threatened flora:

a) The survival rate of *in situ* threatened flora at the finish of clearing is 100%. No accidental damage occurs during clearing.
b) The survival rate of *in situ* threatened flora at the end of years 1-3 of the monitoring program is at least 80% and at least 70% at the end of years 4-8.
c) Of plants surviving at the end of each year, at least 75% are in good condition – i.e., they have healthy foliage, no sign of die-back or disease and exhibit new shoot growth (Condition Class 3 or better).

Table 10 below summarises how the above performance indicators have been met to date.

Table 10: Evaluation of performance indicators for in situ Slender Marsdenia.

Species	100% survival rate at the finish of clearing.	80% survival rate at the end of years 1-3	At least 75% of surviving plants are	Performance indicators met?

	No accidental damage during clearing	and at least 70% at the end of years 4-8	in good condition at each year end (Condition Class 3 or higher)	
Slender Marsdenia	Y	Y	N (40%)	2 of 3

Slender Marsdenia

Slender Marsdenia currently meets 2 of 3 performance indicators for *in situ* flora. There was a decline in condition of some plants resulting in a median condition class of 2. This is probably a result of the past three seasons of hot dry weather having a significant impact, in particular, on the plants UTW3 and UTW4, which occur on a much drier site than is typical for Slender Marsdenia.

Evaluation of Flora Translocation Program

The following performance indicators are used to evaluate the success of the threatened species translocations (salvage translocation and population enhancement):

a) All directly impacted individuals of threatened species were salvaged and relocated to the receival sites.
b) At least 60% of transplant and enhancement individuals are surviving after the first year, 50% after five years and 40% after eight years.
c) At the end of the monitoring program (8 years), at least 50% of surviving individuals have a Condition Class of 3 or higher.

Table 11 below summarises how the above performance indicators have been met to date.

Table 11: Evaluation of performance indicators for translocated flora.

Species	All directly impacted individuals of threatened species were salvaged and relocated to the receival site(s).	At least 60% of transplant and enhancement individuals are surviving after the first year, 50% after five years and 40% after eight years	At the end of the monitoring program (8 years), at least 50% of surviving individuals have a Condition Class of 3 or higher.	Performance indicators met?
Slender Marsdenia	Y	Y, Y, n/a	n/a	2 of 3 to date
Woolls's Tylophora*	Y	Y, N, n/a	n/a	1 of 3 to date
Rusty Plum transplants	Y	Y, Y, n/a	n/a	2 of 3 to date
Rusty Plum enhancement plantings	n/a	N, N, N	N	0 of 3 to date
Red Bopple Nut	Y	Y, Y, n/a	n/a	2 of 3 to date

***Note** – refer to comments regarding identity of *Tylophora* plants on p.20, and recommendation regarding ongoing monitoring of *T. woollsii* below.

It is clear from Table 11 above that the performance indicators are designed to provide an assessment of translocation success mainly for the latter half of the program (years 5 to 8). Because of this, little can be gleaned from this current assessment, apart from some specific comments below.

Slender Marsdenia

The current mean survival rate of all Slender Marsdenia plants stands at 52.6%, an increase over the previous year's rate of 46.4%. As noted in the previous report (Richards 2020), **this should be considered a very good result for this species, and it is highly likely that a proportion of those Slender Marsdenia plants recorded as having died back are still alive and may resprout in future years**. However, successful achievement of the performance indicators for this species is as dependent on climatic factors as much as anything else. With wetter, milder 'La Niña' weather conditions arriving in early December 2020, it would be expected that significantly more plants will produce aerial shoots and be in better overall condition should this weather pattern persist.

Woolls's Tylophora

The current mean survival rate of Woolls's Tylophora (plants only within Sector B) has decreased to 9.52%, with a correspondingly low median condition class score of 1. If this low survival and condition persists, then the translocation of this species will have failed all survival and condition class performance indicators. Note, however, as discussed on p.20 above, it has been discovered that these plants are actually *Tylophora paniculata*. See recommendation regarding this species below.

Rusty Plum transplants

Because all Rusty Plum transplants and half the Rusty Plum enhancement plantings survived through Year 1, at present Rusty Plum meets relevant performance criteria. Current Rusty Plum transplant survival is 67%, which, if maintained, will meet ongoing performance criteria.

Rusty Plum enhancement plantings

The Rusty Plum enhancement planting survival rate is 2.5%, with all seeds direct-planted in October 2018 failing to survive the winter-spring drought of 2019. It is apparent that these enhancement plantings require ongoing maintenance to assist in their survival in such adverse weather conditions. The current proposal to germinate Rusty Plum seed and only plant seedlings out into TA1 when prevailing weather conditions would assist in their survival aims to redress these failed attempts.

Red Bopple Nut transplant

The single translocated Red Bopple Nut tree is in excellent condition, flowering and sparse fruiting occurring in spring 2020. It is expected that this specimen will meet ongoing performance criteria.

RECOMMENDED 12 MONTH WORK PLAN

The following actions are recommended here with the aim of achieving the principle objectives and performance indicators of the TFMP for *in situ* and translocated flora.

1. Discontinue monitoring of *Tylophora paniculata* plants in Sector B in TA1;
2. Continue monitoring of all other translocated flora in TA1;
3. Assess success of weed control program during Spring 2021 monitoring and advise on whether further weed control is required.

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APPENDIX 1:

Monitoring Results – *in situ* Slender Marsdenia January 2021

Site No	Species	Chainage	Date	Condition 2021	Ht (m)	No. lvs	New shoots	Comment 2021
ML 119	Marsdenia longiloba	62100	25-Nov-20	1				Died back. Two other healthy plants 30m upstream
ML 2010-1	Marsdenia longiloba	75000	3-Jan-21	3	1.2	13	y	On Notelaea longifolia
ML 2010-3	Marsdenia longiloba	75000	3-Jan-21	3	0.9	10	y	At base of Forest Oak. Another healthy plant near survey pegs
UTW3	Marsdenia longiloba	78450	25-Nov-20	2	0.2	6	y	Recent re-shoot of last season 'seedling'
UTW3	Marsdenia longiloba	78450	25-Nov-20	2	0.6	11	y	Uphill plant sprawling over litter
UTW4	Marsdenia longiloba	78450	25-Nov-20	2	0.5	10	y	c. 1.5m from bloodwood sapling on Lomandra and leaf litter
UTW4	Marsdenia longiloba	78450	25-Nov-20	1				Died back. New seedling near Turpentine sapling as well

APPENDIX 2:

Monitoring Results –Translocated Flora in TA1 January 2021

Slender Marsdenia - Sector A transplants

No	Date	Species	Line	Source Label	Cond	No. lvs	Height (cm)	New Shoots (Y/N)	Comment
1	Jan-21	Marslong	L7 east	ML14	1		0		db. Parsdorr on cage
2		Marslong	L7	ML2010-2	1		0		db
3		Marslong	L7	MLN-5	1		0		db
4		Marslong	L7	ML14A	1		0		db
5		Marslong	L7	ML14A	1		0		db. P. dorrigoensis in cage
6		Marslong	L7	ML14A	2	8	20	y	Probably Tylophora paniculata
7		Marslong	L7	ML13	1		0		db
8		Marslong	L7	ML14A	1		0		db
9		Marslong	L7	ML11	1		0		db
10		Marslong	L7	UTW-2	1		0		db - tree fall debris
11		Marslong	L7	UTW-2	4	40	170	y	Large, healthy resprout
12		Marslong	L7	TWN-1	1		0		db
13		Marslong	L7	UTW-2	4	15	90	y	resprout recent shoot
14		Marslong	L7	ML20	4	20	140	y	resprout
15		Marslong	L7	ML21	2	5	20	y	resprout
16		Marslong	L7	TWN-1	0		0		gone
17		Marslong	L7	UTW-2	1		0		db
18		Marslong	L7	UTW-2	4	20	120	y	
19		Marslong	L7	UTW-1	3	11	80	y	
20		Marslong	L7 west	UTW-4	1		0		db
21		Marslong	L6 west	TWN-1	3	4	100	y	
22		Marslong	L6	TWN-1	2	5	30	y	
23		Marslong	L6	TWN-1	1		0		db
24		Marslong	L6	TWN-1	1		0		db
25		Marslong	L6	UML-6	3	6	120	y	
26		Marslong	L6	UML-6	2	7	60	y	
27		Marslong	L6	MLN-6	2	8	70	y	
28		Marslong	L6	UML-5	1		0		db

No	Date	Species	Line	Source Label	Cond	No. lvs	Height (cm)	New Shoots (Y/N)	Comment
28b/41		Marslong	L6	UML-5	1		0		db
29		Marslong	L6	ML17	1		0		db
30		Marslong	L6	new near ML18	4	28	200	y	on Cryptocarya rigida
30b/42		Marslong	L6	UML-5	2	0	40	n	db - green stems remain
31		Marslong	L6	new near ML18	1		0		db
32		Marslong	L6	MLN-6	4	38	240	y	on Cryptocarya rigida
33		Marslong	L6	ML18	1		0		db
33b/40		Marslong	L6	ML21	1		0		db
34		Marslong	L6	ML18	1		0		db
35		Marslong	L6	MLN6	3	10	240	y	Climbing Cryptocarya rigida
36		Marslong	L6	ML19	4	40	200	y	Climbing Cryptocarya rigida
37		Marslong	L6	ML19	4	100	200	y	Climbing dead sapling
38		Marslong	L6	ML20	1		0		db
39		Marslong	L6 east	ML21	1		0		db
43		Marslong	L5	ML18	2	5	50	y	resprout
44		Marslong	L5	ML30	2	4	60	y	resprout
45		Marslong	L5	TW29	3	10	90	y	
46		Marslong	L5	ML32	1		0		db
47		Marslong	L5	new adj. ML33	1		0		db
48		Marslong	L5	new adj. ML33	2	6	10	y	resprout
49		Marslong	L5	new adj. ML33	1		0		db
50		Marslong	L5	MLN-2	4	30	400	y	On Cryptocarya rigida
51		Marslong	L5	ML15	1		0		db
52		Marslong	L5	ML15	1		0		db
53		Marslong	L5	new adj. ML33	1		0		db
54		Marslong	L5	new adj. ML33	4	23	160	y	
55		Marslong	L5	new adj. ML33	2	3	15	y	resprout
56		Marslong	L5	new adj. ML33	4	20	150	y	
57		Marslong	L5	new adj. ML33	1		0		db
58		Marslong	L5	ML45-	1		0		db
59		Marslong	L5	ML45-11	3	6	90	y	T. paniculata - recent resprout
60		Marslong	L5	ML47-1	1		0		db
61		Marslong	L5	ML47-2	1		0		db
62		Marslong	L5	ML45-4	1		0		db
63		Marslong	L5 west	ML45-	1		0		db

No	Date	Species	Line	Source Label	Cond	No. lvs	Height (cm)	New Shoots (Y/N)	Comment
106		Marslong	L4	ML2010-3	1		0		db
107		Marslong	L4	ML2010-3	1		0		db
108		Marslong	L4	ML2010-3	1		0		db
109		Marslong	L4	MLN-4	1		0		db
110		Marslong	L4	ML126	4	28	180	y	
111		Marslong	L4	ML126	1		0		db
112		Marslong	L4	ML127	1		0		db
113		Marslong	L4	ML2010-3	1		0		db
114		Marslong	L4	ML2010-3	4	25	190	y	
115		Marslong	L4	ML2010-3	1		0		db
116		Marslong	L4	ML127	1		0		db
117		Marslong	L4	MLN-3	2	5	70	y	
118		Marslong	L4	MLN-3	3	6	90	y	
119		Marslong	L4	MLN-3	2	4	20	y	resprout
120		Marslong	L4	MLN-3	3	9	90	y	
121		Marslong	L4	ML2010-4	4	15	120	y	
122		Marslong	L4	ML2010-4	1		0		db
123		Marslong	L4	MLN-4	3	12	90	y	
124		Marslong	L4	MLN-4	3	5	100	y	
125		Marslong	L4	TWN-2	1		0		db
126		Marslong	L4	TWN-2	1		0		db
127		Marslong	L4	TWN-2	1		0		db
128		Marslong	L3	MLN-4	3	6	100	y	
129		Marslong	L3	MLN-4	1		0		db
130		Marslong	L3	MLN-4	4	16	240	y	on Cryptocarya rigida
131		Marslong	L3	MLN-4	1		0		db
132		Marslong	L3	MLN-3	3	10	100	y	
133		Marslong	L3	MLN-3	1		0		db
134		Marslong	L3	MLN-3	1		0		db
135		Marslong	L3	ML3	1		0		db
136		Marslong	L3	ML3	3	6	130	y	resprout amongst Gynocthodes
137		Marslong	L3	ML3	3	6	120	y	good condition
138		Marslong	L3	ML3	1		0		db
139		Marslong	L3	ML3	1		0		db recent tree fall
140		Marslong	L3	ML2	4	15	120	y	under tree fall

No	Date	Species	Line	Source Label	Cond	No. lvs	Height (cm)	New Shoots (Y/N)	Comment
141		Marslong	L3	ML2	1		0		db - cage collapsed
142		Marslong	L3	ML3	1		0		db - Parsonsia dorrigoensis in cage
143		Marslong	L3	ML3	2	6	15	y	resprout
144		Marslong	L3	UTW10	1		0		db
145		Marslong	L3	UTW10	1		0		db
146		Marslong	L3	UML8	1		0		db - under tree fall
147		Marslong	L3	ML3	1		0		db
148		Marslong	L3	ML3	1		0		db - cage crushed tree fall

Slender Marsdenia - Sector F transplants

No	Species	Line	Date	Cond.	No. leaves	Height (cm)	New Shoots (Y/N)	Comment
F1	Marslong	Line 1 fert	Jan-21	1		0		db
F2	Marslong	Line 1 fert		3	12	90	y	
F3	Marslong	Line 1 fert		1		0		db
F4	Marslong	Line 1 fert		1		0		db
F5	Marslong	Line 1 fert		4	23	160	y	
F6	Marslong	Line 1 fert		3	9	90	y	
F7	Marslong	Line 1 fert		2	4	40	n	yellowing
F8	Marslong	Line 1 fert		1		0		db
F9	Marslong	Line 1 fert		3	9	70	y	
F10	Marslong	Line 1 fert		1		0		db
F11	Marslong	Line 1 fert		3	13	120	y	resprout cage crushed by tree fall
F12	Marslong	Line 1 fert		2	2	60	y	under tree fall
F13	Marslong	Line 1 fert		4	30	190	y	on Cordyline stricta
F14	Marslong	Line 1 fert		1		0		db
F15	Marslong	Line 1 fert		2	2	60	y	
F16	Marslong	Line 1 fert		2	7	50	y	resprout
F17	Marslong	Line 1 fert		1		0		db
F18	Marslong	Line 1 fert		1		0		db
F19	Marslong	Line 1 fert		1		0		db - under tree fall debris
F20	Marslong	Line 1 fert		2	8	40	y	
F21	Marslong	Line 1 fert		2	6	60	y	
F22	Marslong	Line 1 fert		3	13	90	y	

No	Species	Line	Date	Cond.	No. leaves	Height (cm)	New Shoots (Y/N)	Comment
NF23	Marslong	Line 2 no fert		3	14	120	y	
NF24	Marslong	Line 2 no fert		2	6	60	n	
NF25	Marslong	Line 2 no fert		1		0		db
NF26	Marslong	Line 2 no fert		1		0		db
NF27	Marslong	Line 2 no fert		1		0		db
NF28	Marslong	Line 2 no fert		4	25	190	y	
NF29	Marslong	Line 2 no fert		1		0		db
NF30	Marslong	Line 2 no fert		3	11	75	y	
NF31	Marslong	Line 2 no fert		2	5	35	n	
NF32	Marslong	Line 2 no fert		1		0		db
NF33	Marslong	Line 2 no fert		1		0		db - under dense Cissus hypoglauca
NF34	Marslong	Line 2 no fert		3	8	110	y	
NF35	Marslong	Line 2 no fert		2	1	50	n	dying off
NF36	Marslong	Line 2 no fert		1		0		db
NF37	Marslong	Line 2 no fert		1		0		db
NF38	Marslong	Line 2 no fert		1		0		db
NF39	Marslong	Line 2 no fert		2	4	80	n	on cage and dead limb
NF40	Marslong	Line 2 no fert		1		0		db - cage knocked over
NF41	Marslong	Line 2 no fert		4	16	120	y	resprout
NF42	Marslong	Line 2 no fert		1		0		db
NF43	Marslong	Line 2 no fert		1		0		db
NF44	Marslong	Line 2 no fert		2	5	10	y	
NF44a	Marslong	Line 2 no fert		2	8	30	y	resprout
NF44b	Marslong	Line 2 no fert		3	8	120	y	
F45	Marslong	Line 3 fert		1		0		db
F46	Marslong	Line 3 fert		1		0		db
F47	Marslong	Line 3 fert		2	7	40	n	
F48	Marslong	Line 3 fert		4	27	140	y	
F49	Marslong	Line 3 fert		2	6	15	n	
F50	Marslong	Line 3 fert		1		0		db
F51	Marslong	Line 3 fert		2	2	35	n	yellowed leaves
F52	Marslong	Line 3 fert		3	12	90	y	
F53	Marslong	Line 3 fert		1		0		db
F54	Marslong	Line 3 fert		3	4	90	y	resprout
F55	Marslong	Line 3 fert		3	9	120	y	on Tabernaemontana. Good condition

No	Species	Line	Date	Cond.	No. leaves	Height (cm)	New Shoots (Y/N)	Comment
F56	Marslong	Line 3 fert		4	16	110	y	resprout
F57	Marslong	Line 3 fert		4	26	180	y	on Cordyline stricta
F58	Marslong	Line 3 fert		3	14	70	y	Under tree fall debris
F59	Marslong	Line 3 fert		3	10	140	y	
F60	Marslong	Line 3 fert		1		0		db
F61	Marslong	Line 3 fert		3	12	110	y	
F62	Marslong	Line 3 fert		1		0		db
F63	Marslong	Line 3 fert		2	10	40	y	resprout
F64	Marslong	Line 3 fert		1		0		db
F65	Marslong	Line 3 fert		1		0		db
F66	Marslong	Line 3 fert		3	10	90	y	
NF67	Marslong	Line 4 no fert		3	6	170	n	Growing up Gynocthodes
NF68	Marslong	Line 4 no fert		4	21	160	y	resprout
NF69	Marslong	Line 4 no fert		4	20	180	y	
NF70	Marslong	Line 4 no fert		4	36	210	y	on small dead shrub and Trochocarpa laurina
NF71	Marslong	Line 4 no fert		3	15	105	y	some leaves yellowing
NF72	Marslong	Line 4 no fert		1		0		db
NF73	Marslong	Line 4 no fert		1		0		db
NF74	Marslong	Line 4 no fert		1		0		db
NF75	Marslong	Line 4 no fert		3	8	120	y	
NF76	Marslong	Line 4 no fert		2	2	70	y	resprout, tiny leaves
NF77	Marslong	Line 4 no fert		1		0		db
NF78	Marslong	Line 4 no fert		4	15	130	y	
NF79	Marslong	Line 4 no fert		3	5	100	y	resprout
NF80	Marslong	Line 4 no fert		3	5	100	y	on Cissus hypoglauca
NF81	Marslong	Line 4 no fert		3	3	100	y	
NF82	Marslong	Line 4 no fert		1		0		db
NF83	Marslong	Line 4 no fert		4	20	130	y	
NF84	Marslong	Line 4 no fert		2	4	70	y	resprout
NF85	Marslong	Line 4 no fert		2	6	60	n	
NF86	Marslong	Line 4 no fert		1		0		db
NF87	Marslong	Line 4 no fert		1		0		db
NF88	Marslong	Line 4 no fert		0		0		gone

Slender Marsdenia - Sector J transplants

Monit. No.	Species	Line	Fertiliser	Date	Cond	No. Lvs	Ht (cm)	New Shoots (Y/N)	Comment
Line 1	Marslong	L1	no fert						
1				Jan-21	3	14	110	y	
2	Marslong	L1	no fert		4	20	120	y	
3	Marslong	L1	no fert		4	16	100	y	
4	Marslong	L1	no fert		4	32	150	y	
5	Marslong	L1	no fert		2	1	50	n	
6	Marslong	L1	no fert		3	14	90	y	
7	Marslong	L1	no fert		3	10	80	y	
8	Marslong	L1	no fert		2	4	20	y	only just shooting, cage fallen over
9	Marslong	L1	no fert		3	12	80	y	on Morinda and Endiandra sieberi
10	Marslong	L1	no fert		1		0		db
11	Marslong	L1	no fert		3	10	110	y	on Hibbertia scandens
12	Marslong	L1	no fert		2	3	45		resprout
13	Marslong	L1	no fert		2	10	50	y	
14	Marslong	L1	no fert		2	5	30	y	resprout
15	Marslong	L1	no fert		1		0		db
16	Marslong	L1	no fert		1		0		db
17	Marslong	L1	no fert		2	8	30	y	resprout
18	Marslong	L1	no fert		1		0		db
19	Marslong	L1	no fert		1		0		db
20	Marslong	L1	no fert		1		0		db
21	Marslong	L1	no fert		1		0		db - under tree fall debris
22	Marslong	L1	no fert		1		0		db
23	Marslong	L1	no fert		1		0		db
24	Marslong	L1	no fert		3	10	70	y	resprouting
25	Marslong	L1	no fert		2	2	5	n	
Line 2	Marslong	L2	fert						
1					3	6	95	y	
2	Marslong	L2	fert		3	14	105	y	
3	Marslong	L2	fert		2	6	50	y	resprout
4	Marslong	L2	fert		1		0		db
5	Marslong	L2	fert		3	6	95	y	
6	Marslong	L2	fert		3	6	80	y	resprout
7	Marslong	L2	fert		2	6	15	y	resprout
8	Marslong	L2	fert		4	25	90	y	
9	Marslong	L2	fert		4	36	120	y	good health despite sapling fallen on cage

Monit. No.	Species	Line	Fertiliser	Date	Cond	No. Lvs	Ht (cm)	New Shoots (Y/N)	Comment
10	Marslong	L2	fert		1		0		db
11	Marslong	L2	fert		2	6	25	y	resprout
12	Marslong	L2	fert		2	5	70	y	
13	Marslong	L2	fert		2	2	8	n	reshooting at ground level, lvs yellowed
14	Marslong	L2	fert		2	5	20	y	resprout
15	Marslong	L2	fert		3	12	60	y	
16	Marslong	L2	fert		3	10	100	y	
17	Marslong	L2	fert		1		0		db
18	Marslong	L2	fert		1		0		db
19	Marslong	L2	fert		1		0		db - cage crushed
20	Marslong	L2	fert		4	22	110	y	
21	Marslong	L2	fert		3	9	110	y	
22	Marslong	L2	fert		1		0		db - under pile of Cissus and Melodinus
23	Marslong	L2	fert		2	4	90	n	
24	Marslong	L2	fert		1		0		db - cage crushed
25	Marslong	L2	fert		4	38	200	y	on Synoum glandulosum
Line 3 1	Marslong	L3	no fert		1		0		db
2	Marslong	L3	no fert		1		0		db
3	Marslong	L3	no fert		1		0		db
4	Marslong	L3	no fert		3	8	110	y	growing up Cordyline stricta
5	Marslong	L3	no fert		2	3	30	y	
6	Marslong	L3	no fert		4	20	90	y	on Ripogonum fawcettianum
7	Marslong	L3	no fert		4	28	130	y	
8	Marslong	L3	no fert		2	3	70	n	
9	Marslong	L3	no fert		4	16	130	y	wild Marsdenia longiloba also present
10	Marslong	L3	no fert		3	9	75	y	resprout
11	Marslong	L3	no fert		2	7	25	y	
12	Marslong	L3	no fert		1		0		db
13	Marslong	L3	no fert		2	3	15	n	
14	Marslong	L3	no fert		1		0		db
15	Marslong	L3	no fert		2	4	30	y	
16	Marslong	L3	no fert		2	4	5	y	resprout
17	Marslong	L3	no fert		1		0		db
18	Marslong	L3	no fert		2	4	30	n	
19	Marslong	L3	no fert		4	16	100	y	

Monit. No.	Species	Line	Fertiliser	Date	Cond	No. Lvs	Ht (cm)	New Shoots (Y/N)	Comment
20	Marslong	L3	no fert		1		0		db - cage knocked over
21	Marslong	L3	no fert		1		0		db
22	Marslong	L3	no fert		2	8	6	n	resprout in poor condition
23	Marslong	L3	no fert		1		0		db
24	Marslong	L3	no fert		1		0		db
25	Marslong	L3	no fert		1		0		db - cage overgrown
26	Marslong	L3	no fert		1		0		db
27	Marslong	L3	no fert		1		0		db
Line 4 1	Marslong	L4	fert		2	3	30	n	
2	Marslong	L4	fert		1		0		db
3	Marslong	L4	fert		2	4	60	y	
4	Marslong	L4	fert		2	5	20	n	
5	Marslong	L4	fert		4	15	180	y	resprout - east side of creekline
6	Marslong	L4	fert		4	26	190	y	resprout
7	Marslong	L4	fert		2	4	30	n	
8	Marslong	L4	fert		1		0		db
9	Marslong	L4	fert		1		0		db
10	Marslong	L4	fert		1		0		db
11	Marslong	L4	fert		1		0		db
12	Marslong	L4	fert		1		0		db
13	Marslong	L4	fert		2	6	70	y	
14	Marslong	L4	fert		1		0		db
15	Marslong	L4	fert		3	10	80	y	
16	Marslong	L4	fert		1		0		db
17	Marslong	L4	fert		3	11	95	y	
18	Marslong	L4	fert		1		0		db
19	Marslong	L4	fert		1		0		db
20	Marslong	L4	fert		2	3	50	n	
21	Marslong	L4	fert		2	6	10	y	resprout
22	Marslong	L4	fert		1		0		db
23	Marslong	L4	fert		1		0		db
24	Marslong	L4	fert		1		0		db
25	Marslong	L4	fert		1		0		db
26	Marslong	L4	fert		3	8	80		Under fallen Forest Oak but resprouted

Woolls's Tylophora - Sector B transplants

No	Date	Line	Tentative Species ID	Source Label	Cond	No. lvs	Height (cm)	New Shoots (Y/N)	Comment
64	Jan-21	L8 east, gate	Tylophora woollsii	ML46-6	2	6	15		resprout
65		L8	Tylophora woollsii	ML46-	1		0		db
66		L8	Tylophora woollsii	ML48-5	1		0		db
67		L8	Tylophora woollsii	ML46-1	1		0		db. P. dorrigoensis on cage
68		L8	Tylophora woollsii	ML46	1		0		db
69		L8	Tylophora woollsii	ML46-	1		0		db
70		L8	Tylophora woollsii	ML46-3	1		0		db
71		L8	Tylophora woollsii	ML46-2	1		0		db
72		L8	Tylophora woollsii	ML47-3	1		0		db
73		L8	Tylophora woollsii	ML47-10	1		0		db
74		L8	Tylophora woollsii	ML46-6	1		0		db
75		L8	Tylophora woollsii	ML47-4	1		0		db
76		L8	Tylophora woollsii	ML48	1		0		db
77		L8	Tylophora woollsii	ML48-2	1		0		db
78		L8	Tylophora woollsii	ML47-5	1		0		db
79		L8	Tylophora woollsii	ML46-4	1		0		db
80		L8	Tylophora woollsii	ML47-6	1		0		db
81		L8	Tylophora woollsii	new near TA	1		0		db
82		L8	Tylophora woollsii	new near TA	1		0		db
83		L8	Tylophora woollsii	ML45-3	2	4	7	y	T. paniculata? Very narrow leaves
84		L8	Tylophora woollsii	ML45-2	1		0		db
85		L9	Tylophora woollsii	ML45-6	1		0		db
86		L9	Tylophora woollsii	ML45-10	1		0		db
87		L9	Tylophora woollsii	ML45-4	3	12	80	y	
88		L9	Tylophora woollsii	ML48-4	1		0		db
89		L9	Tylophora woollsii	ML47-8	1		0		db
90		L9	Tylophora woollsii	ML46-7	1		0		db
91		L9	Tylophora woollsii	ML47-7	2	4	20	y	
92		L9	Tylophora woollsii	ML48-1	1		0		db
93		L9	Tylophora woollsii	ML48-5	1		0		db
94		L9	Tylophora woollsii	ML48-7	1		0		db
95		L9	Tylophora woollsii	ML48-4	1		0		db
96		L9	Tylophora woollsii	ML	1		0		db
97		L9	Tylophora woollsii	ML47-9	1		0		db

No	Date	Line	Tentative Species ID	Source Label	Cond	No. lvs	Height (cm)	New Shoots (Y/N)	Comment
98		L9	Tylophora woollsii	ML48-7	1		0		db
99		L9	Tylophora woollsii	ML48	1		0		db
100		L9	Tylophora woollsii	ML47-10	1		0		db
101		L9	Tylophora woollsii	ML45-5	1		0		db
102		L9	Tylophora woollsii	ML45-8	1		0		db
103		L9	Tylophora woollsii	ML48-9	1		0		db
104		L9	Tylophora woollsii	ML48-1	1		0		db
105		L9	Tylophora woollsii	ML48-8	1		0		db

Rusty Plum & Red Bopple Nut transplants

Monitoring Number	Condition notes	Condition Score	Height (m)	Comments
Rusty Plum 1	split one from Boggy Creek shooting	4	1.6	In excellent health. One shoot from base of main stem with vigorous new growth Jan 2021
Rusty Plum 2	split one from Boggy Creek shooting	0	0	dead
Rusty Plum 3	Excellent health	5	4.1	In excellent health. Old flowers present Nov 2020
Red Bopple Nut	Excellent health	5	3.3	Flowered spring 2020, with several young developing fruit present Nov 2020