Nest Box Plan

Epping to Thornleigh Third Track Alliance

ETT ALLIANCE

Nest Box Plan

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Details of Revisions

Rev	Date	Description
0	25/06/2013	Initial document submission for TPD review
1	09/07/2013	Revised following TPD, ER and Project Ecologist Comments
2	11/07/2013	Revised following comments close out meeting
3	22/07/2013	Updated to reflect Project Determination
4	20/08/2013	Updated following consultation with Agencies
5	04/09/2013	Compiled for DP&I Review and Approval
6	20/09/2013	Updated to reflect DoP Comments
7	24/02/2014	Removal of procedures to central location Addition of table of current nest box locations
8	15/03/15	Annual review, and updated for Organisation Chart. Addition of table of current nest box locations. Incorporate document design changes in-line with Web Content Accessibility Guidelines (WCAG)
9	03/03/16	Annual review, and updated for Organisation Chart. Addition of table of current nest box locations.

Contents

1 Introduction

1.1. Background

- The Project has been assessed under Part 5.1 of the *Environmental Planning and Assessment Act 1979* and will result in impacts on native biota.
- The Environmental Impact Statement (EIS) for the Project has been compiled which has been identified and quantified the biodiversity impact of the project as well as proposing measures to avoid and mitigate these impacts.
- As part of the EIS an initial habit tree survey was undertaken and the results of which are further discussed in Section 4.1 of this Plan.

1.2. Purpose

- The purpose of this Nest Box Plan is to provide a strategy for the installation of nest boxes associated with the Project to offset the impact of removing habitat trees, and to meet the requirements of the Project's Conditions of Approval (CoA) E15, the Revised Environmental Mitigation Measures (REMMs), controls listed in the ETTT Environmental Impact Statement (EIS) and all applicable legislation including Transport for NSW Environmental Requirements.
- The relevant CoA and REMMs are outlined in **Annexure A**.

1.3. Objectives

- The objective of this Nest Box Plan is to provide information on the following:
  - » Review existing (EIS) information relating to habitat trees;
  - » Define the target species that may use the nest boxes;
  - » Outline the process for determining the number, type and location of nest boxes to be placed on the site;
  - » Procedures for undertaking felling of hollow-bearing trees;
  - » Procedures for installing nest boxes and relocating hollows; and
  - » Recommended maintenance schedule.
- Development of the Nest Box Plan in consultation with OEH and Hornsby Shire Council prior to the commencement of construction work that would result in the disturbance of vegetation with habitat trees.

2 Legislation, Licences, Standards, Planning Instruments and Guidelines Applicable to the Project

Table 1: Legislation, Licences, Standards, Planning Instruments and Guidelines Applicable to the Project

Legislation / Licences	Standards & Guidelines	Planning Instrument
• *Environmental Planning and Assessment Act 1979 (EP&A Act)*	• TfNSW Standard Requirements TSR E1 – Environmental Management	• Project Planning Approval dated. 17 July 2013
• *National Parks and Wildlife Act 1974 (NPW Act)*	• NSW National Parks & Wildlife Service (2001), *Policy for the Translocation of Threatened Fauna in NSW: Policy and Procedure Statement No. 9 Threatened Species Unit, Hurstville NSW*	• Epping to Thornleigh Environmental Impact Statement
• *Threatened Species and Conservation Act 1995 and amendments (TSC Act)*	• *OEH Hygiene Protocol for the Control of Disease in Frogs (DECCW* 2008a)	• Epping to Thornleigh Submission Report and Revised Environmental Mitigation Measures (REMMs)
• *Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth - EPBC Act)		
• Project EPL No. 20287		

- A Nest Box Plan compliance tracking sheet is provided in **Annexure A**.

3 Supporting Procedures, Forms, Checklists and Registers

- Tools that are used to support the implementation of this Plan are detailed within **Table 2** below.

Table 2: Supporting Procedures, Forms, Checklists and Registers Applicable to the Project

Procedure	Form	Checklist	Register
Unexpected Ecological Find Procedure			

- The supporting documents applicable to the management of vibration are provided separately on the TfNSW Website and on the Alliance's "Our Way" management system.

4 Identify and Assess

4.1. Flora Present

- Most of the vegetation within the rail corridor has been previously cleared and extensively modified as a result of historic and current rail construction activities.
- The Study area contains seven distinct vegetation types of which four are native, namely:
  - » Sydney Turpentine Ironbark Forest — listed as endangered under the *Threatened Species Conservation Act 1995* (TSC Act) and critically endangered under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) (although it is noted that none of the patches of vegetation within the study area meet the criteria for the critically endangered ecological community, Sydney Turpentine Ironbark Forest, as listed under the EPBC Act.);
  - » Blue Gum High Forest — listed as critically endangered under both the TSC Act and EPBC Act;
  - » Coastal Shale-Sandstone Forest;
  - » Sydney Hinterland Transition Woodland;
  - » Landscaped Gardens;
  - » Exotic woody Vegetation; and
  - » Exotic groundcover.
- Non-native vegetation including landscaped gardens, exotic woody vegetation and exotic groundcover are the most prevalent vegetation within the Study area. Blue Gum High Forest accounted for the highest proportion of native vegetation within the study area.
- The Project will require the removal of a number of hollow bearing trees. Based on the EIS and subsequent site ecological assessment, fourteen (14) hollow bearing trees with a total of twenty four (24) hollows would be removed as a result of clearing. **Table 3** below details the identified hollow bearing trees.
- The hollows identified are small to medium in size. As such the hollows identified are likely to provide habitat for small birds and mammals (for example, Squirrel Glider, microchiropteran bats and parrots). Tree hollows represent important local habitat for hollow-dependent fauna such as birds, bats and arboreal mammals, and some reptiles.

Table 3: Hollow-bearing Trees identified

Tree Species	Easting	Northing	Height (m)	DBH (cm)	Trunk Hollows	Potentially Suitable For	Branch Hollows
Eucalyptus pilularis	320853	6263812	30	80	-	Threatened cockatoos, microbats	2x10cm
Eucalyptus saligna	321863	6265818	15	60	-	Threatened Little Lorikeet	1x5cm
Eucalyptus saligna	321707	6265582	30	100	-	Threatened Little Lorikeet	2x5cm
Eucalyptus saligna	321662	6265569	15	80	-	Threatened cockatoos, microbats	1x10cm
Eucalyptus saligna	322327	6261827	20	60	-	Threatened Little Lorikeet	1x5cm

Tree Species	Easting	Northing	Height (m)	DBH (cm)	Trunk Hollows	Potentially Suitable For	Branch Hollows
Eucalyptus saligna	322379	6261981	30	50	1x20cm	Threatened forest owls or cockatoos, microbats	1x10cm
Angophora costata	322436	6262131	20	100	-	Threatened cockatoos, microbats	2x10cm
Eucalyptus saligna	321350	6265140	30	110	1x20cm	Threatened forest owls, microbats	-
Eucalyptus saligna	320770	6264440	30	80	fissure	Threatened microbats	-
Post EIS Survey							
Not recorded	321812	6265744	-	-	-	Threatened cockatoos, microbats, little lorikeet	2x 5cm, 2x 10cm
Not recorded	321676	6265563	-	-	-	Threatened Little Lorikeet, microbats	1x 5cm
Not recorded	321387	6265171	-	-	-	Threatened cockatoos, microbats	1x 10cm
Not recorded	320918	6264100	-	-	-	Threatened cockatoo, Little Lorikeet, microbats	2x 5cm, 2x 10cm
Not recorded	320871	6263867	-	-	-	Threatened microbats	1x 5cm

4.2. Fauna Present

- At least fifty seven (57) species were recorded during the EIS field surveys, comprising fifty two (52) native species and five exotic species. It is noted that a precise number of species could not be identified with confidence at the time of the survey.
- Six (6) threatened fauna species and one endangered population were recorded in the study area, including:
  - » Powerful Owl (*Ninox strenua)*;
  - » Gang-gang Cockatoo (*Callocephalon fimbriatum*);
  - » Little Lorikeet (*Glossopsitta pusilla*);
  - » Grey-headed Flying-fox (*Pteropus poliocephalus*);
  - » Eastern Bentwing Bat (*Miniopterus schreibersii oceanensis*);
  - » Eastern False Pipistrelle (*Falsistrellus tasmaniensis*); and
  - » Greater Broad-nosed Bat (*Scoteanax rueppellii*).
- Of these recorded threatened species, five (5) of the eight (8) are tree hollow-dependent fauna species including the Powerful Owl, Gang-gang Cockatoo, Little Lorikeet, Eastern False Pipistrelle and Greater Broad-nosed Bat.

- Table 4 provides information on the hollow-dependent threatened fauna that are known or are likely to utilise the subject site.

Table 4: Hollow-Dependent Threatened Fauna Likely to Use the Subject Site

Species	Scientific Name	Conservation Status		Likely to occur in the study area?
		TSC Act[1]	EPBC Act[1]	
Powerful Owl	Ninox strenua	V		Recorded
Barking Owl	Ninox connivens	V		Yes
Masked Owl	Tyto novaehollandiae	V		Yes
Swift Parrot	Lathamus discolor	E	E	Yes
Glossy Black-cockatoo	Calyptorhynchus lathami	V		Yes
Gang-gang Cockatoo	Callocephalon fimbriatum	EP		Recorded
Little Lorikeet	Glossopsitta pusilla	V		Recorded
Grey-headed Flying-fox	Pteropus poliocephalus	V	V	Recorded
Eastern Bentwing Bat	Miniopterus schreibersii oceanensis	V		Recorded
Eastern False Pipistrelle	Falsistrellus tasmaniensis	V		Recorded
East Coast Freetail Bat	Mormopterus norfolkensis	V		Yes
Greater Broad-nosed Bat	Scoteanax rueppellii	V		Recorded
Yellow-bellied Sheathtail Bat	Saccolaimus flaviventris	V		Yes

Notes: [1] CE = Critically Endangered; E = Endangered; EP = Endangered Population; V = Vulnerable.

Nest Box Installation & Management Protocol

4.3. Nest Box Implementation

- It is currently predicted that the Project will remove fourteen (14) hollow bearing trees which contain some twenty four (24) hollows; it is therefore proposed forty eight (48) nest boxes will be procured in advance of clearing operations.
- The total number of hollow trees and logs present on site will be confirmed during the clearing survey, which will include an assessment of the adjacent vegetation for the suitability of nest box installation and to ascertain the density of existing hollows in the area.
- In accordance with REMM L.18, a replacement ratio of at least 1:2 will be implemented across the Project for nest boxes, subject to the method stated below for assessment of adjacent habitat.
- Should subsequent hollows be identified through the pre-clearing and log survey, a 1:2 replacement ratio will also be implemented for these additional hollows, subject to the below assessment.
- Assessment of adjacent habitat will be undertaken using the following methodology;

» Adjacent areas will be surveyed for the presence of hollows, using replicate 250m x 20m (0.5 ha) transects, (or the entire patch for smaller vegetation), to identify the type and density of hollow-bearing trees occurring within these areas.

» Data recorded will include the location, number and type of hollows within each vegetation transect/patch and potential food resources, such as flowering eucalypts.

» The density of hollows within adjacent areas will be compared to the density within the clearing extent, and that of benchmark data for similar undisturbed vegetation types (such as the Office of Environment and Heritage's Vegetation Types Benchmark database).

» The number of hollow-bearing trees required at each site to reach benchmark standards will then be calculated as the difference between the available hollow resource in adjacent habitat and the benchmark data.

» In order to determine the number of each type of nest box to be installed in each adjacent area, the percentage of small, medium and large hollows to be removed from each clearance area will be compared to the percentage of each size in the adjacent area.

» The number of each type of nest box required will be calculated based firstly on the shortfall in the adjacent area to ensure adequate sheltering resources for fauna potentially displaced by the Project, and secondly by the hollow-dwelling preferences of the threatened species known from or likely to occur in the locality.

» Representative tree hollow preferences for the hollow-dwelling threatened fauna species with the potential to occur in the locality (excepting the Swift Parrot as it is not known to breed within NSW, EIS) are presented in **Table 5**. Boxes have been suggested for species identified in the EIS as having a moderate to high potential of occurring on the site. **Table 5** also gives recommended dimensions and indicative number for the installation of nest boxes based on target species.

» The exact number of boxes will be determined by the Project Ecologist using the assessment method identified above.

Table 5: Nest Box Dimensions for Target Species

Fauna Species	Hollow Type	Equivalent Nest Box Type	Internal Dimensions (mm)	Depth of Chamber (mm)	Entrance Diameter (mm)	Preferred Hollow Height Range (m)	Indicative Number of boxes
Bats	Small	Microbat	N/A	400	30 hole / 20 slot	3 to 5	16
Lorikeet	Small to Medium	Lorikeet	135 x 135	400	65	2 to 15	16
Cockatoo's	Large	Cockatoo	300 x 300	1000	200	20 to 30	12
Owl's	Large to Very Large	Barn Owl	250 x 400	250	150	10	4

Nest boxes will be manufactured to reduce the likelihood of occupation by feral animals according to industry standards (e.g. Common *Mynas Acridotheres tristis*, Feral Honey Bees *Apis mellifera*).

4.4. Clearing of Hollow-bearing Trees

- Clearing of hollow-bearing trees is to be carried out in accordance with the **Vegetation Clearing Procedure**. Clearing will occur in a two-stage process, with the removal of non-habitat trees in the Project area first, while leaving habitat trees to stand for 24 hours before felling in the second stage. This will allow hollow-dependent fauna a potential opportunity to move outside the Project area before felling.
- Removal of hollow-bearing trees is only to be conducted with the Project Ecologist present to relocate any fauna present.

- For hollow-bearing trees, the following clearing process will be followed:
  - » Where possible, habitat trees are to be knocked with an excavator bucket or other machinery used for clearing to create only enough disturbance to encourage any remaining fauna to move from the tree, or at least show themselves prior to felling;
  - » The tree is to be left for several minutes before being felled as gently as possible;
  - » Felled habitat trees will be inspected immediately by the Project Ecologist for any fauna present; and
  - » If fauna is found, the **Figure 2: Fauna Handling and Rescue Process** outlined within the **Flora and Fauna Management Plan** is to be followed.
- Hollow-bearing trees will be thoroughly inspected post felling to capture and relocate any fauna found to be inside hollows.

4.5. Hollow and Log Salvage and Reinstatement

- Where possible, the following process will be implemented for salvaging hollows:
  - » Prior to clearing suitable hollow bearing trees or logs will be marked for retention and potential relocated into appropriate areas of retained vegetation adjoining the Project area
  - » Following clearing and inspection by the Project Ecologist to ensure no fauna is present within the hollow tree or log, the tree or log will be cut into sections that permit the recovery of hollow resources. The Project Ecologist is to direct an appropriately accredited chainsaw operator in these works.
  - » Salvaged hollows and logs are to be placed within the adjoining woodland or other suitable location.

4.6. Nest Box Installation Process

- The following process is recommended for installing nest boxes:
  - » Nest boxes and salvaged hollows are to be installed in adjoining woodland habitats.
  - » Nest boxes are to be installed in trees (both rough-barked and smooth-barked eucalypts) that do not already have hollows.
  - » A 40 mm to 50 mm thick layer of wood shavings is to be placed in the base of nest boxes to simulate decaying hollows and provide extra insulation.
- Nest boxes will be set within locations deemed appropriate by the Project Ecologist and will be installed in the following manner (refer to **Figure 1** for diagram of setup):
  - » All nest boxes are to be set at least 3m above the ground.
  - » All nest boxes will be attached to the tree using the "Habisure" system, which involves:
    - ☐ A length of 3.15 mm plastic-coated soft fencing wire will be passed through the nest box and around the tree trunk;
    - ☐ Wire must be folded into at least four folds about 60 millimetres tall and 15 millimetres apart at the sides of the box to allow for tree growth;
    - ☐ Where the wire is in contact with the tree trunk or branch it must be threaded through a length of garden hose to protect the tree;
    - ☐ Where possible the wire around the tree will pass over a branch behind the trunk, although nest boxes can be installed directly on a straight-stemmed tree; and
    - ☐ Nest boxes will be positioned on the north-west to east sector of tree trunks to avoid hot afternoon sun and the predominant aspects of severe storms.
  - » Details of each nest box will be recorded and include:
    - ☐ GPS location; and

- ☐ Nest box type.

» Timing

- ☐ Nest boxes are to be installed prior to or during the early stages of clearing.

4.7. Nest Boxes Installed To Date

Box Number	Size	Easting	Northing
1	Owl		
2	Possum	322372	6262016
3	Possum	322373	6262025
4	Possum	322371	6261997
5	Possum	322374	6261986
6	Small hollow – retrieved during clearing	322373	6262025
6	Bat	322316	6261932
7	Bat	322317	6261935
8	Bat	322305	6261933
9	Lorikeet	322297	6261947
10	Lorikeet	322311	6261954
11	Bat	322303	6261962
12	Bat	322314	6261966
13	Lorikeet	322304	6261931
14	Bat	322312	6261971
15	Lorikeet	322314	6261979
16	Bat	322309	6261979
17	Lorikeet	322307	6261971
18	Lorikeet	322321	6261988
19	Lorikeet	322329	6261987
20	Lorikeet	322318	6262017
21	Lorikeet	322329	6262012
22	Lorikeet	322317	6262014
23	Lorikeet	322320	6262019
24	Lorikeet	322325	6262047
25	Lorikeet	322324	6262069
26	Lorikeet	320849	6264247
27	Lorikeet	320796	6264366
28	Bat	320795	6264359
29	Bat	320803	6264342
30	Bat	320804	6264336
31	Bat	320764	6264475
32	Bat	320765	6264470
33	Bat	321027	6264813

Box Number	Size	Easting	Northing
34	Bat	321027	6264816
35	Lorikeet	321013	6264825
36	Lorikeet	320850	6264727
37	Owl	320849	6264725
38	Bat	320849	6264725
39	Lorikeet	320828	6264704
40	Bat	322392	6262298
41	Bat	322390	6262302
42	Bat	321624	6266310
43	Owl	321624	6266328
44	Owl	321655	6266299
45	Owl	321636	6266312
46	Owl	321652	6266301
47	Bat	321642	6266310
48	Bat	321620	6266312
49	Bat	321611	6266324
50	Possum	321633	6266307
51	Possum	320968	6263985
52	Possum	320953	6263982
53	Bat	320969	6263984
54	Possum	320957	6263922
55	Bat	320950	6263907
56	Bat	320954	6263903
57	Possum	320941	6263906
58	Bat	320939	6263907
59	Possum	321124	6264798
60	Bat	321031	6264761
61	Bat	321031	6264760
62 (no ID on box)	Powerful Owl	320957	6263988
63 (no ID on box)	Powerful Owl	320931	6263922
64 (no ID on box)	Powerful Owl	320924	6263905

5 Monitoring

- Nest boxes will be monitored annually by the Project Ecologist during construction for signs of active use or intrusion by feral animals. If recommended by the Project Ecologist the frequency of monitoring may be increased or decreased. The following process will be undertaken:
  - » Binoculars or nest box camera will be used to check nest boxes for signs of use. Information collected on a pro-forma will include:
    - ☐ Date;
    - ☐ Nest box number;
    - ☐ GPS coordinates (GDA94);
    - ☐ Evidence of fauna occupancy (e.g. species observed entering or exiting the box, chew marks, scratch marks on the box, debris on ground and droppings or whitewash under the box. If identified the species and number of individuals observed;
    - ☐ Presence of feral animal activity (e.g. feral bees, Indian miners etc);
    - ☐ Assessment of nest box condition (i.e. termite damage, evidence of rot and condition of fastenings); and
    - ☐ Identification of maintenance requirements.
  - » Monitoring and maintenance will be undertaken throughout the construction phase of the Project.

6 Recording and Maintenance

- Maintenance actions arising from inspections will be recorded on the **Environmental Inspection Actions Form** and each action will be allocated to the foreman for the work area.
- Maintenance of nest boxes will be undertaken where identified during the inspections as being required.
- Damaged nest boxes or those containing feral animals are to be taken down and repaired on site where possible or an additional nest box of similar type added.
- Feral animals captured during the maintenance period will be removed and humanely euthanised.

Figure 1: Nest Box Installation Diagram

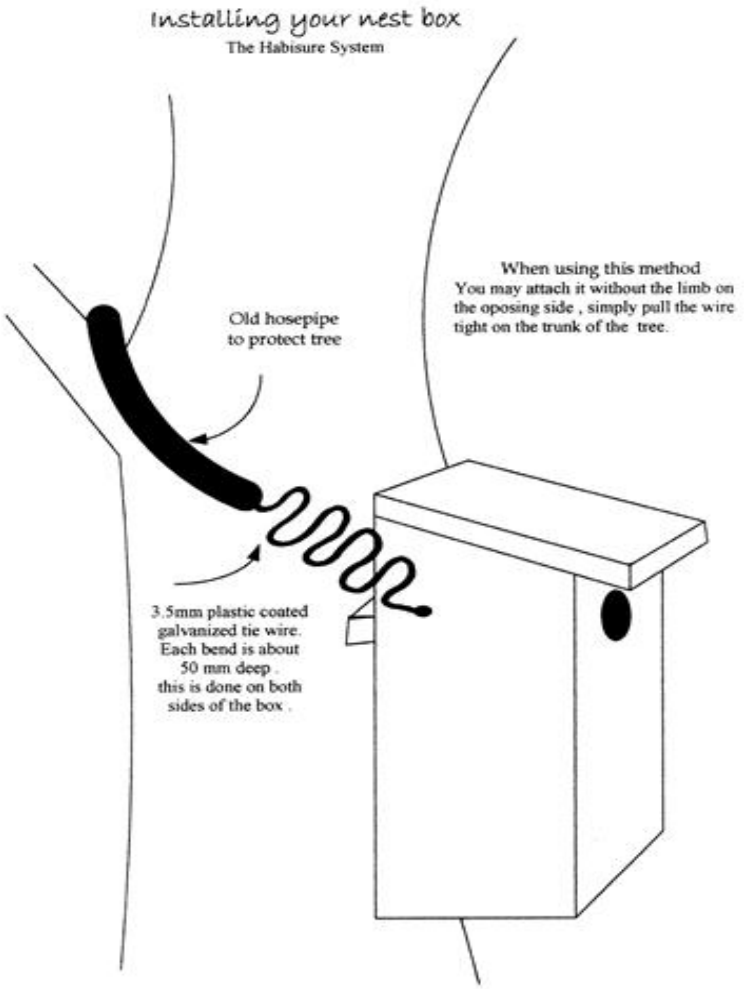

Figure from Page 28 of *Nest Boxes for Wildlife – A Practical Guide* by Alan and Stacy Franks (2003).

Annexure A – Nest Box Plan Compliance Tracking Sheet

CoA

Area	No.	Sub	Requirement	Where Addressed?
Nest Box Plan	E15.		Prior to the commencement of construction work that would result in the disturbance of vegetation with habitat trees (or as otherwise agreed by the Director General), a Nest Box Plan to provide replacement hollows for displaced fauna shall be prepared in consultation with the relevant Council(s). The Plan, to be incorporated into the Construction Environmental Management Plan (condition E33) and Biodiversity Offset Package (condition condition C8), shall detail the number and type of nest boxes to be installed, which shall be justified based on the number and type of hollows removed (based on pre clearing surveys), the density of hollows in the area to be cleared and in adjacent areas, and the availability of adjacent food resources. The Plan shall also consider the relocation of any hollows removed from the site to provide for potential nesting habitat. The Plan shall also provide details of maintenance protocols for the nest boxes installed including responsibilities, timing and duration.	Nest Box Plan Section 1.3 Objectives Table 3: Hollow-bearing Trees to be Removed Section 5.1 Nest Box Implementation Table 5: Nest Box Dimensions for Target Species Section 5.3 Hollow and Log Salvage and Reinstatement Section 6 Monitoring, Section 7 Recording and Maintenance

REMMs

Area	No.	Sub	Requirement	Where Addressed?
Ecology	L.14		Any hollow bearing trees to be felled would be marked on site prior to the clearing of vegetation. The removal of hollow bearing trees would be undertaken in the presence of a qualified ecologist or wildlife specialist experienced in the rescue of fauna, and in accordance with a tree hollow management protocol (to be included in the CEMP).	Section 5.
Ecology	L.18		Nest boxes would be installed in adjoining/nearby areas of retained vegetation prior to clearing activities at a ratio of 2 nest-boxes for every hollow removed. The proposed biodiversity offset package would provide offset for habitat loss as a result of the proposal.	Section 5.1 Nest Box Implementation