Recent innovations in microbat mitigation on road projects in NSW

Josie Stokes – Biodiversity officer, NSW Roads and Maritime Services

Overview

- Affected microbat species and their roost types
- Impacts on threatened microbat populations
- Historic approaches to mitigate impacts
- Experimental supplementary habitat
- Evolution of habitat within permanent structures
- Population monitoring results
- AN AUSTRALIAN FIRST!!
- Lessons learned and emerging issues

Bent-wing bats (*Miniopterus spp*.)

Small clusters and individuals roost during the colder months in:

- Rock crevices and overhangs
- Concrete box cell culverts, concrete Bebo arches,
- Concrete bridges

They migrate to a limited number of large maternity roost sites in Spring (Sept-Oct) where a single young is born between Oct and Jan. Fly hundreds of km's to maternity roosts.

No breeding in road structures as they are obligate cave breeders.

Eastern bent-wing bats are usually only found in small clusters in the colder months, prior to migrating to maternity colonies (caves)

Large-footed Myotis (*Myotis macropus*)

- Australia's ONLY 'fishing' bat
- Oversized feet used to catch prey
- Rakes water with feet for small fish and insects
- Breeding commences in September
- Synchronised births starting October/November
- Second birthing event in January
- Roosts AND breeds in concrete box cell and pipe culverts, concrete and wooden bridges
- Promiscuous male 'bachelors' usually roost alone but close to the females

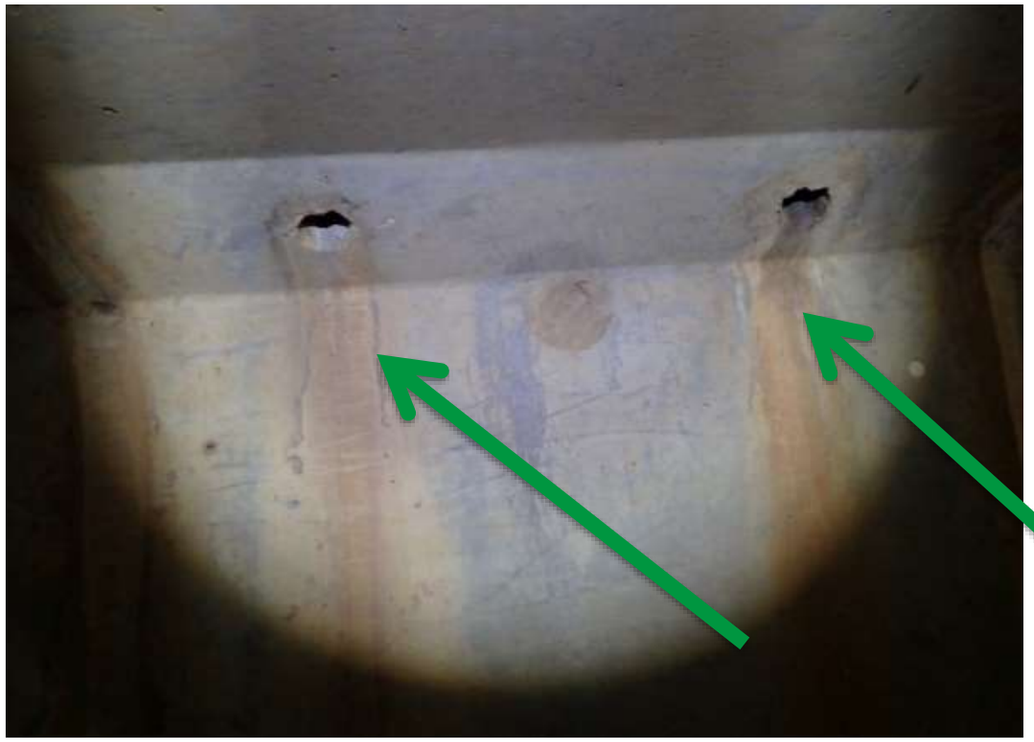
every journey matters

Transport
Roads & Maritime
Services
NSW GOVERNMENT

Bat roost habitat types

- Small, dry crevices in structures **over water or within 100-200m of flowing water.**
- Fairy martin nests, paper wasp nests
- Culvert lift/grab points and drainage scuppers
- Expansion gaps between bridge deck planks
- Roughened and exposed concrete
- Timber bridges

Culvert lift points and drainage scuppers



Expansion gaps (concrete plank bridges)

Roughened and exposed concrete

Timber Bridges

Impacts of road projects and maintenance on threatened microbat populations

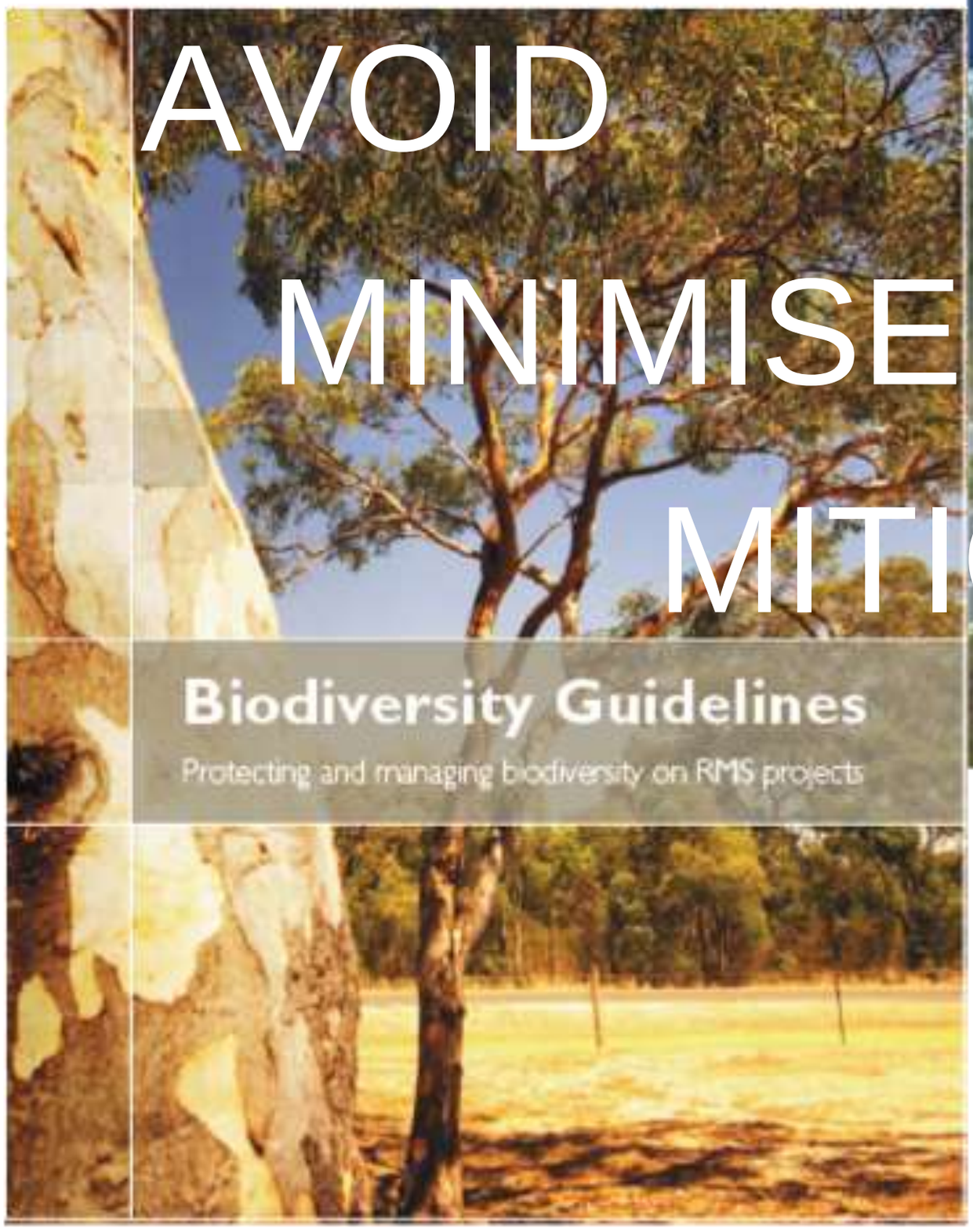
- Local extinctions of species with specific habitat requirements.
- Mortality during bridge cleaning
- Culvert maintenance
- Bridge removal = complete removal of habitat
- Cumulative impacts

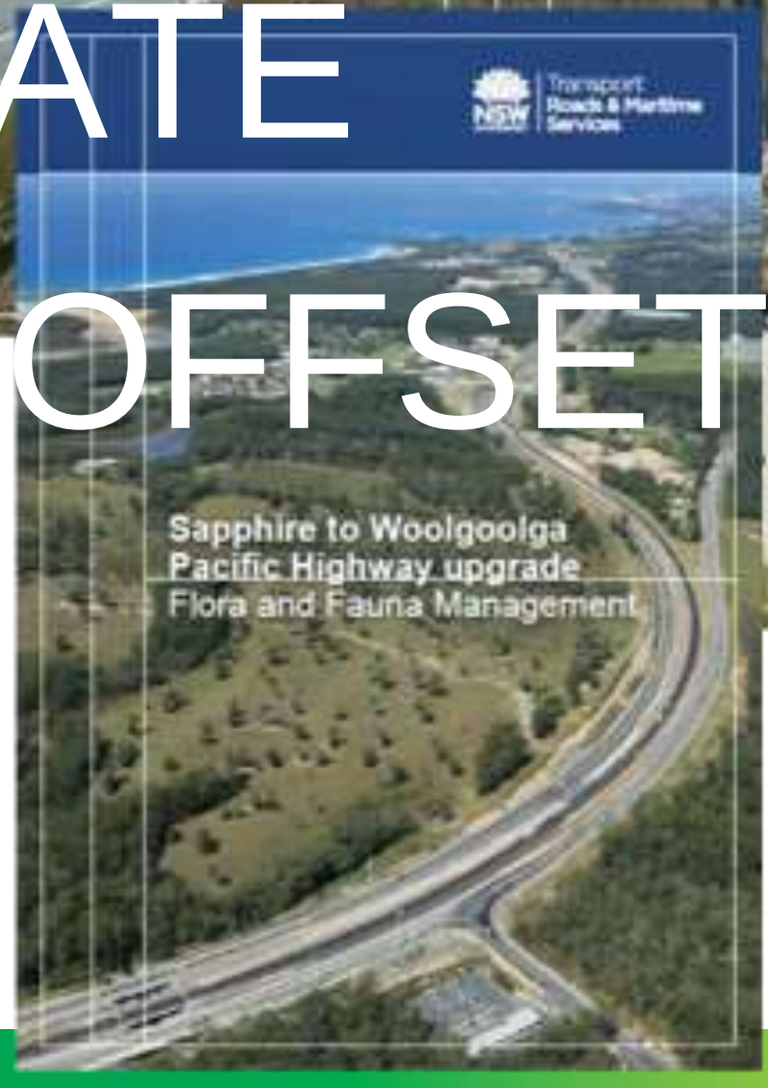
AVOID

MINIMISE

MITIGATE

OFFSET





every journey matters

Historic approaches to microbat mitigation

New ‘CYPLAS’ recycled and plastic roost boxes

Experimental trial of replacement habitat in 2013 – did it work??

The ‘Bat Caves’ – did they work?

NO…..

5 concrete pipes placed into open farm paddocks (with no running water) to mimic concrete culverts.

No uptake by target threatened species (Myotis)

Uptake by some hollow tree dwelling (common) species

The evolution of habitat within permanent structures

1. Incidental

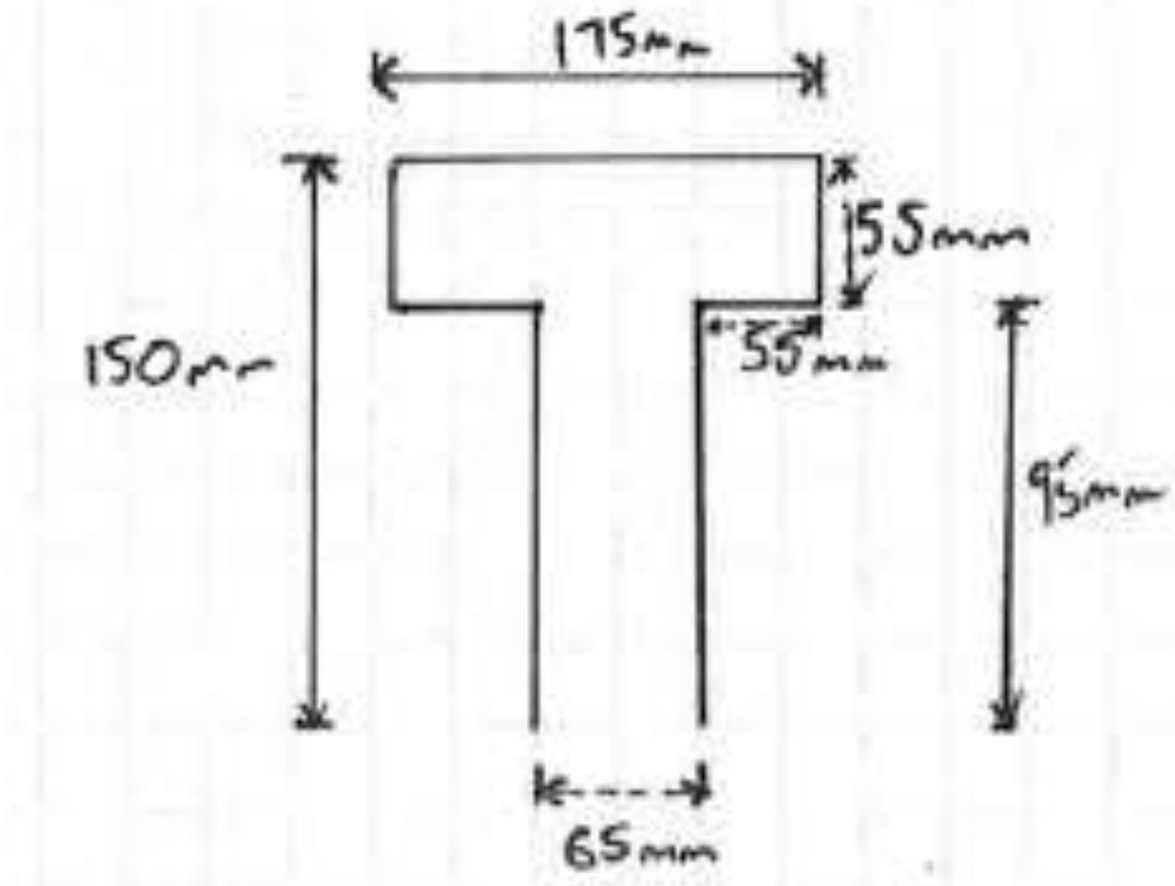
Parapet ledges on Super T or Concrete plank bridges

2. Purpose-built recessed chambers in culvert

3. Replicate microbat roost features into culvert relining

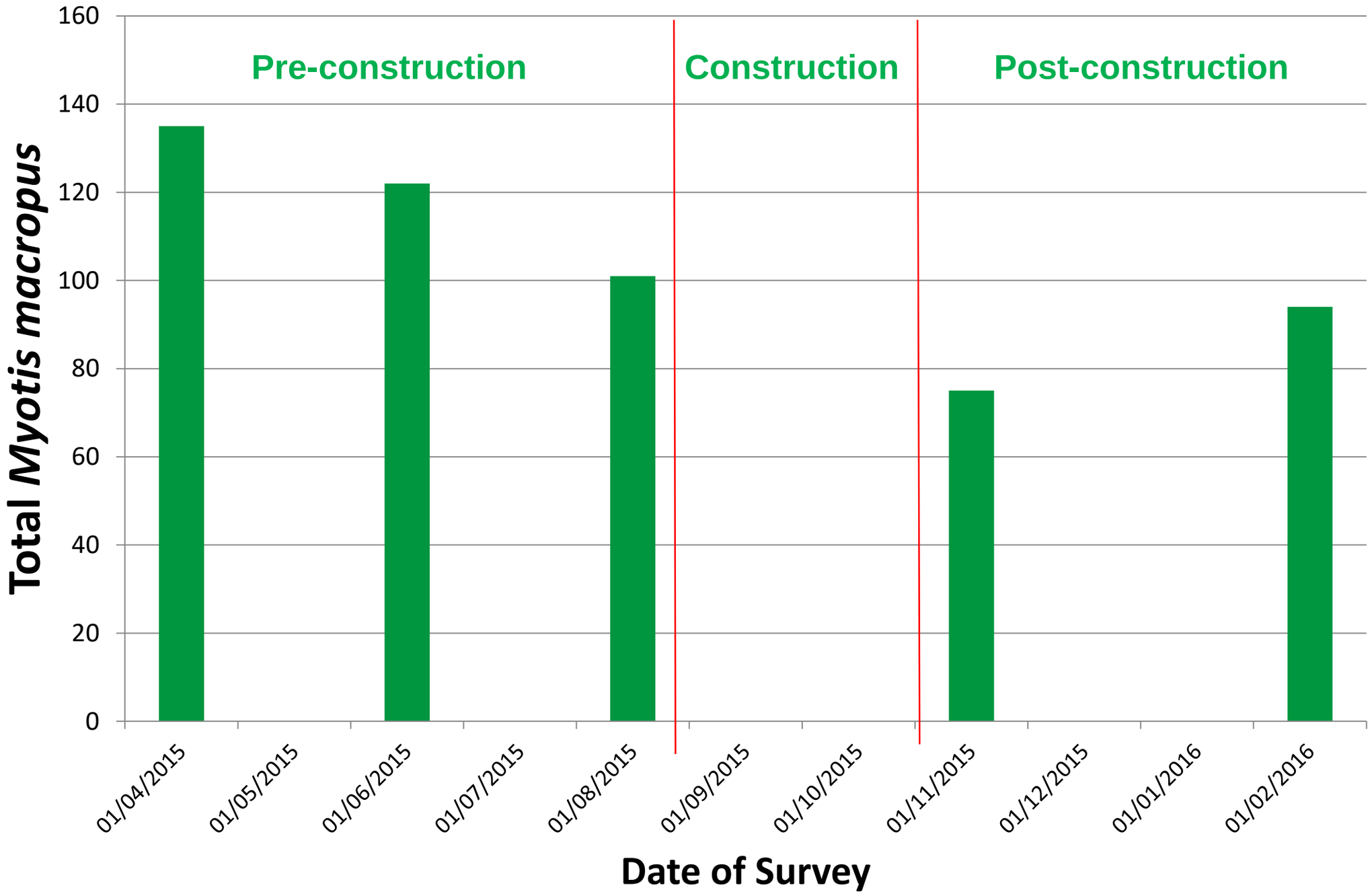
Large-footed Myotis – 122 (breeding and roosting habitat)
Eastern Bent-winged bat- 100 (non-breeding roosting habitat)
Little Bent-winged bat- 19 (non-breeding roosting habitat)

2. First design of permanent cave-dwelling roost habitat within a new culvert



- Install reinforcement
- Install habitat blockouts
- Install confined reinforcement
- Pump reinforcement full of concrete
- Remove reinforcement and blockouts
- Let the concrete cool
- *Look at the happy microbats*

Monitor – did it work?



Heritage bridge replacement

Artist impression of new bridge

Plate 4.1 View north showing underside of Sportsmans Creek Bridge

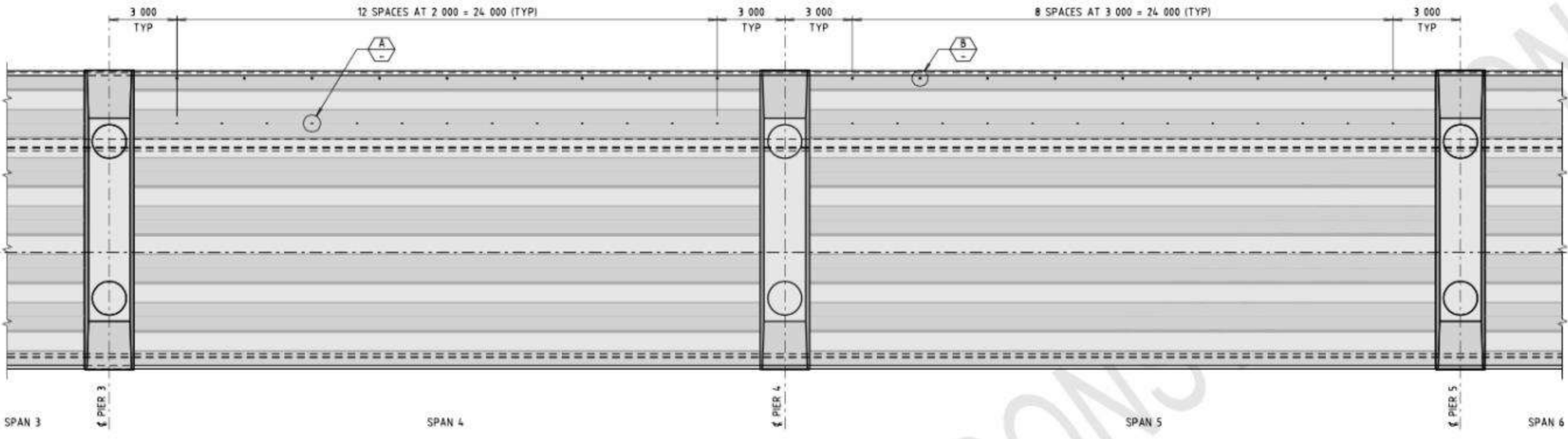
Plate 4.2 Two piece (split) stringer

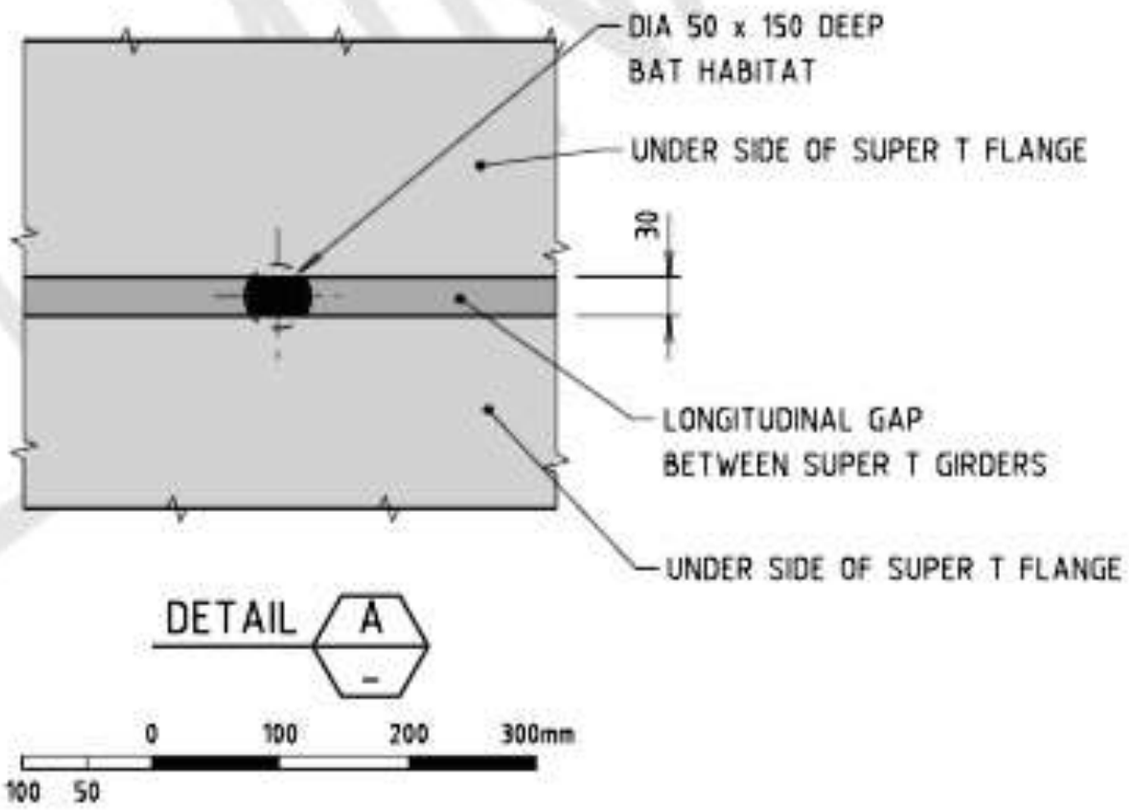
Myotis habitat on the old bridge

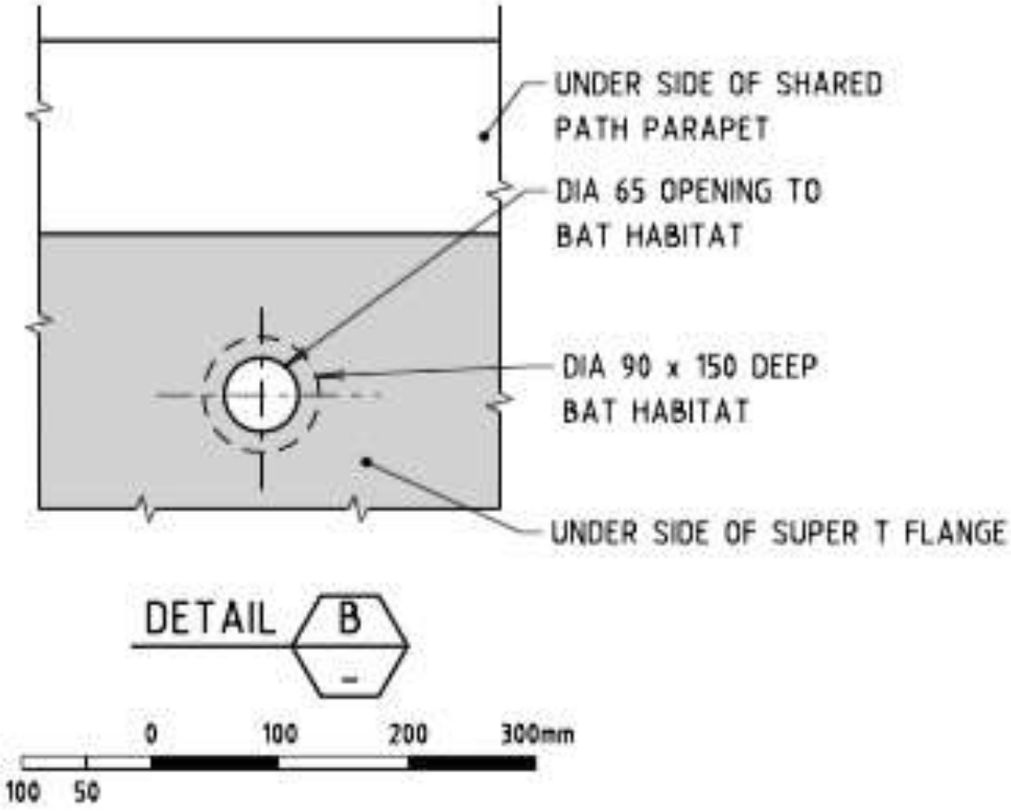
Plate 4.3 Large-footed Myotis in bridge decking

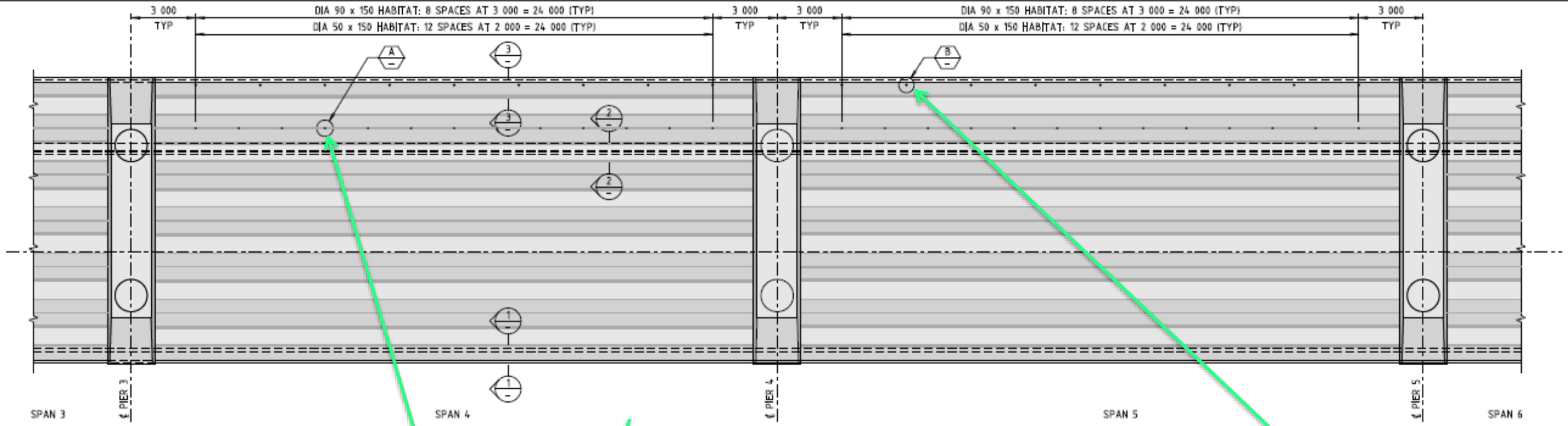
Plate 4.4 Cavity at the end of a rotted girder

4. Pioneering long term habitat



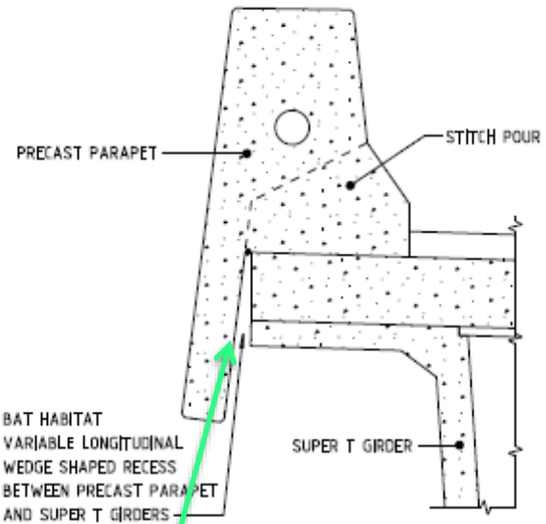




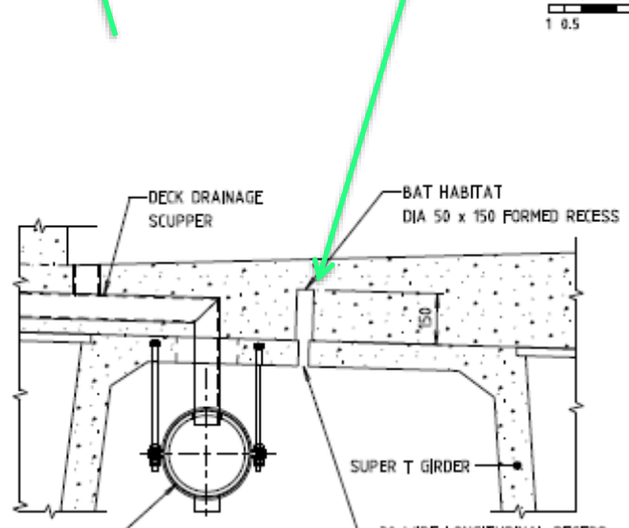


VIEW FROM UNDERSIDE OF DECK

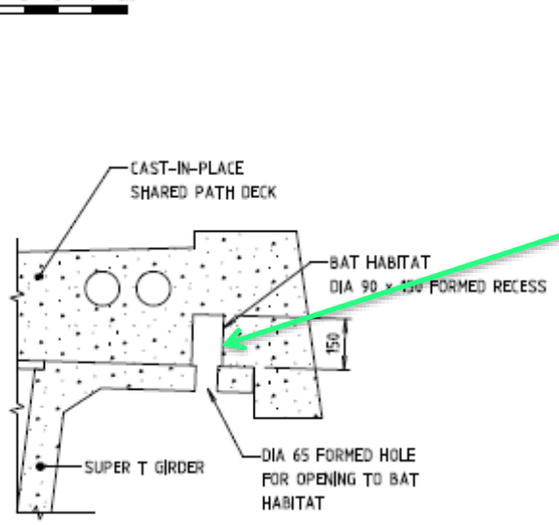
0 1 2 3 4 5m
1 0.5



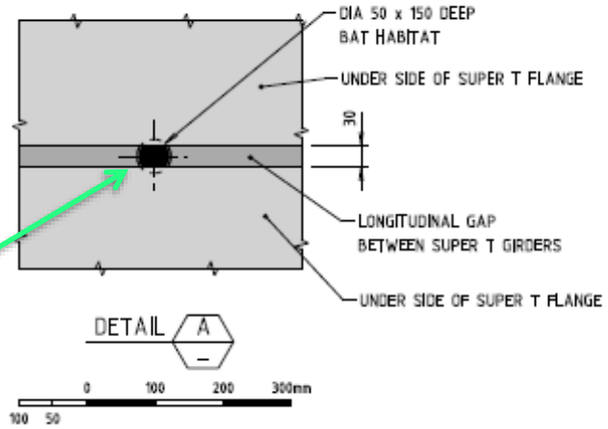
SECTION 1



SECTION 2

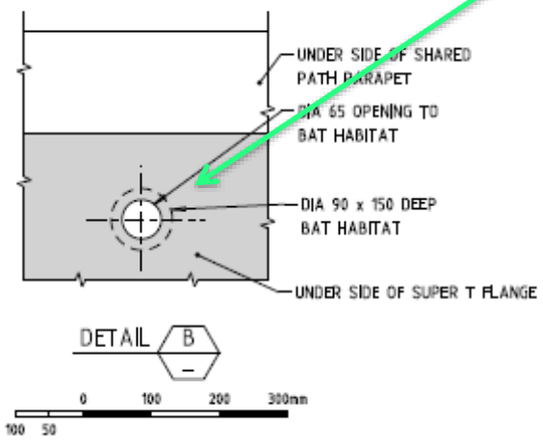


SECTION 3



DETAIL A

0 100 200 300mm
100 50



DETAIL B

0 100 200 300mm
100 50

GENERAL NOTES

SCALE 0 100 200 300 400 500mm
100 50
OR AS SHOWN

ALL SURFACES FOR BAT HABITAT TO BE ROUGHENED TO A MIMIMUM TEXTURE VARIATION OF 1-2mm, ON A RANDOM OR HORIZONTAL PLANE.

ISSUE	DATE	REVISION	PREP	CHECK	AUTH

MAIN ROAD No 152 — CLARENCE VALLEY LGA

BRIDGE OVER SPORTSMANS CREEK

AT LAWRENCE

BAT HABITAT PROVISIONS - SPAN Nos 4 AND 5

NSW GOVERNMENT Transport Roads & Maritime Services

PREPARED BY
BRIDGE AND STRUCTURAL ENGINEERING BRANCH
110 GEORGE STREET PARRAMATTA NSW 2150
PHONE (02) 8837-0802 FACSIMILE (02) 8837-0055

CLIENT:
NORTHERN REGIONAL OFFICE
31 VICTORIA STREET GRAFTON
PHONE (02) 6640-1300 FACSIMILE (02) 6640-1301

PREPARED	CHECKED	REGISTRATION No OF PLANS	
DESIGN M Cabrak	M Siddiqui	DS2014/006042	
DRAWING ML	M Cabrak	BRIDGE NUMBER	6152-BR-0008
S Ahn BRIDGE ENGINEER (NSW DESIGN)		ISSUE STATUS: FOR CONSTRUCTION	
		SHEET No 79	ISSUE A

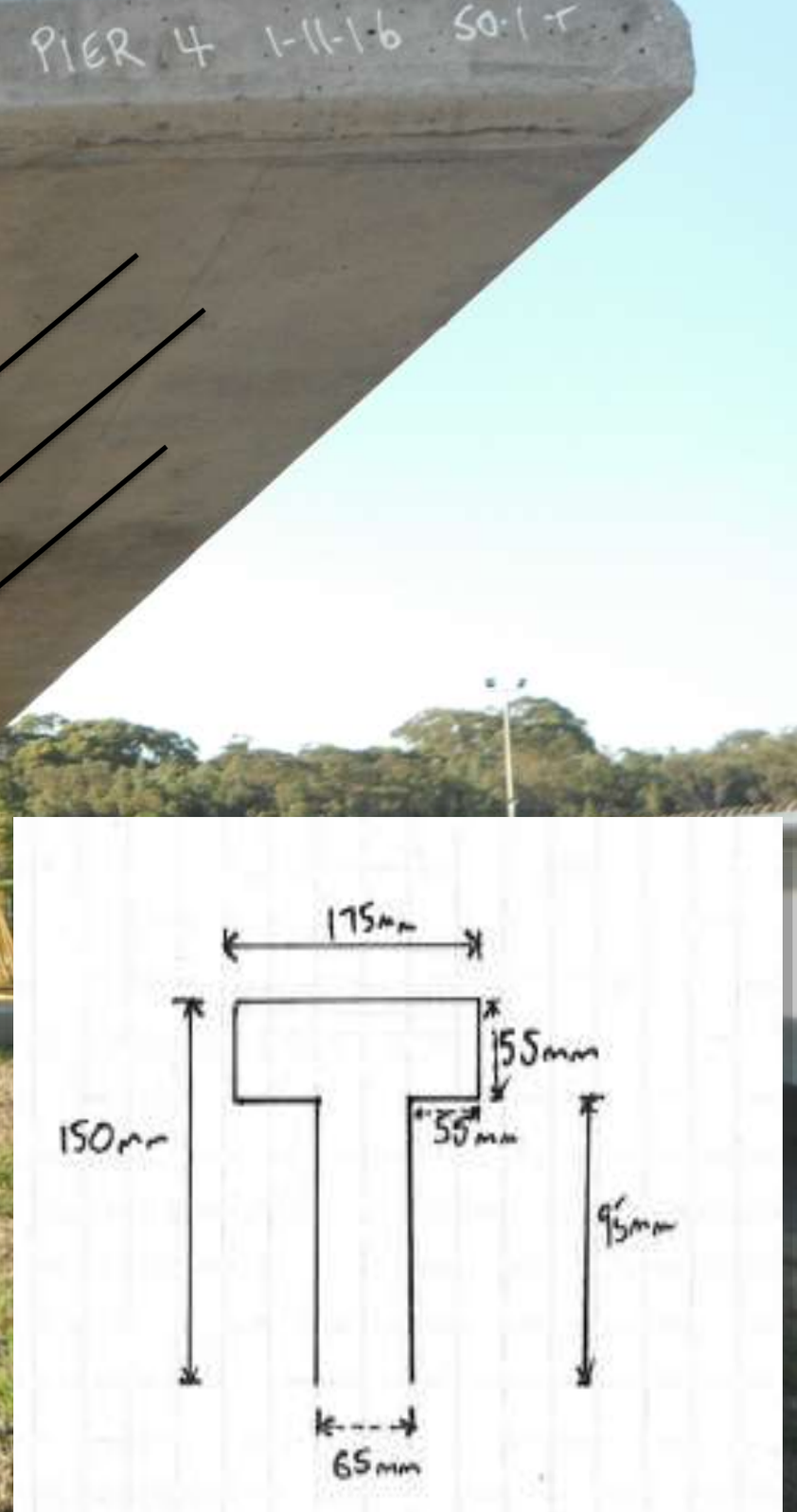
CAD No D1090BAT.dgn

Super T Bridge deck

- **row of 12 x 65mm diameter holes which extend through the Super T.**

- **There are two Super T's with these built in.**

- **Internally roughened.**



View from underside of concrete girders

Lessons learned and emerging issues

- Installing microbat habitat into the bridge deck
- ‘Scabbling’ of the parapet
- Super T lift-holes could be left unsealed
- Never trust a bat!
- Timber Truss Bridge Strategy

Installing microbat habitat into the bridge deck

What’s a parapet again??

Scabbling of the parapets

Use Rugasol to roughen surface to in casting yard

NEVER TRUST A BAT!

8 Large-footed Myotis in permanent breeding habitat under the Super T deck but not the shared pathway. WHY?

90mm vs 50mm entry diameter?
Not roughened at entry?
Too exposed?
Too soon to tell?

Emerging issue: Timber Truss Bridge Strategy

Removal of virtually all microbat habitat on bridge

Split stringer breeding habitat:
35mm gap x 20-25cm long

Replicate breeding habitat into secondary cross girders
Drill cylindrical ‘bat caves’ and horizontal chambers
Same dimensions as bat breeding habitat on old bridge

Any questions- come see me at the RMS Trade Booth