

## 3.2 Threatened species assessment, including for dangerous tree removal

### 3.2.1 Targeted fauna survey methods

Targeted fauna surveys were conducted within the survey area for Snowy 2.0 in accordance with various NSW (DECC 2004) and Commonwealth (DSEWPaC 2010, 2011) guidelines. This section provides a summary of surveys undertaken within Lobs Hole Ravine, including the dangerous trees.

#### i Diurnal birds

Bird surveys for diurnal birds were undertaken for five species listed under the BC Act and three additional migratory species listed under the EPBC Act. Targeted bird species included:

- Gang-gang Cockatoo (breeding habitat)
- breeding habitat for birds of prey, including:
  - Little Eagle;
  - Square-tailed Kite; and
  - White-bellied Sea-eagle.
- Latham's Snipe;
- Rufous Fantail; and
- Satin Flycatcher.

Bird survey methods and survey effort are outlined in Table 3.4.

**Table 3.4 Methods and survey effort – diurnal birds**

Method	Survey description	Survey effort
Transects and area searches	<ul style="list-style-type: none"><li>• Land based areas searches and transects.</li><li>• Surveyors walked transect (access tracks) or area searches within a 1-3 ha area (other areas).</li><li>• All calls and habitat features were investigated.</li><li>• Birds observed or heard were recorded.</li></ul>	<p>DEC (2004) has not resolved bird survey requirements. DSEWPaC (2010a) was reviewed and sympatric species survey efforts indicated a requirement for 10 hours over 5 days (2 hours per day) for sites less than 50 ha. No survey effort for larger sites is provided.</p> <p>A total of 29 bird surveys have been completed with a total of 67 people hours within the survey area between December 2017 and April 2019.</p>
Targeted nest searches	Observers travelled across available habitat, seeking out habitat features including nest trees and hollows. Suitable nests or breeding hollows were marked and watched to determine if they are being used by the target species.	<p>DEC (2004) has not resolved nest search requirements. DSEWPaC (2010a) was reviewed and sympatric species survey efforts indicated 8 hours over 4 days (2 hours per day) for sites less than 50 ha.</p> <p>Completed survey effort is outlined above within transects and area searches.</p>

## ii Nocturnal birds

Bird surveys for nocturnal birds were undertaken to identify breeding habitat for three forest owl species listed under the BC Act. Targeted bird species include:

- Barking Owl;
- Powerful Owl; and
- Masked Owl

Although breeding habitat is restricted within the modification project area, surveys were undertaken across all breeding and foraging habitat to determine if forest owls were active within the survey area. If found to be active surveys would focus on identifying breeding locations, if present. Nocturnal bird survey methods and survey effort are outlined in Table 3.5.

**Table 3.5 Methods and survey effort – nocturnal birds**

Method	Survey description	Survey effort
Call playback and spotlighting	<p>DEC (2004) recommends call playback and spotlighting are undertaken to target these owl species.</p> <ul style="list-style-type: none"><li>• Commence surveys with a 10-15 minute listening period. This will target the male and female calling back and forth to one another and is useful in identifying nesting trees.</li><li>• This will be followed by spotlighting for 10 minutes in the immediate vicinity.</li><li>• Call playback is then undertaken with the call of each target species played intermittently for a 5 minutes period followed by a 10 minute listening period.</li><li>• Following call playback a further 10 minutes of spotlighting is undertaken.</li></ul> <p>If forest owls were found to be present within the survey area, surveys would try to identify nesting sites by listening to roosting males calling to nesting females on dusk. Females calls would be triangulated and nest searches undertaken in identified areas over several nights.</p>	<p>DEC (2004) recommends at least 5 visits for the Powerful Owl and Barking Owl, 6 visits for the Sooty Owl and 8 visits for the Masked Owl. Sites should be separated by 1 km.</p> <p>Surveys have been completed at 24 sites within the survey area, with eight-night visits. Surveys were undertaken within May 2018 and June 2019.</p>

## iii Arboreal mammals

Arboreal mammal surveys were undertaken within the survey area to target four arboreal species listed under the EPBC Act and/or BC Act. Targeted arboreal mammal species include:

- Koala;
- Squirrel Glider;
- Brush-tailed Phascogale; and
- Greater Glider.

Arboreal mammal methods and survey effort is outlined in Table 3.6.

**Table 3.6 Methods and survey effort – arboreal mammals**

Method	Survey description	Survey effort
Trapping	<p>Ten Elliot B or cage traps were placed at 2-4 m above the ground, 50 m apart in two parallel lines separated by 50 m:</p> <ul style="list-style-type: none"> <li>• Traps were baited with a mixture of peanut butter, rolled oats and honey.</li> <li>• A mixture of water and honey was sprayed on each tree trunk.</li> <li>• Traps were checked early in the morning and closed for the day.</li> <li>• Traps were re-opened and rebaited in the late afternoon.</li> <li>• Animals were temporarily marked to allow mark-recapture data to be collected.</li> <li>• Trapping was undertaken in conjunction with terrestrial mammal trapping where suitable habitat occurs.</li> </ul>	<p>DEC (2004) requires 24 trap nights over 3-4 consecutive days per 50 ha of stratification unit.</p> <p>Surveys were undertaken between December 2017 and April 2019 at 19 survey sites within the survey area, equating to 760 trap nights.</p>
Spotlighting	<p>DSEWPaC (2011) recommends two parallel 200 m transects per 5 ha site. No survey effort for larger sites is specified.</p> <p>In line with DSE (2011) and DEC (2004), a survey effort of two parallel 2,000 m transects per 100 ha site (half the survey effort, but over a larger area) was deemed suitable in consultation with OEH.</p> <p>Surveys included:</p> <ul style="list-style-type: none"> <li>• 2,000 m transects were undertaken by 2 observers (4,000 m total transect), with 25 m between transects.</li> <li>• Observers moved at a speed of 10 m per minute (ie 200 minutes for a 2,000 m transect).</li> <li>• All animals observed were recorded, including the distance of the animals from the observer.</li> </ul>	<p>DSEWPaC (2011) recommends two parallel transects per 5 ha site, while DEC (2004) recommends 2 transects per 200 ha of stratification unit.</p> <p>Given the size of the survey area and the fact that no species specific guidelines are available for the Greater Glider a survey effort of two 2,000 m transects per 100 ha stratification unit, repeated on two separate occasions, was deemed appropriate based on DSE (2011) and DEC (2004).</p> <p>Surveys were undertaken between December 2017 and June 2019, with 39 transects (2,000 m minimum distance) completed within the survey area, totalling 224,840m in length. Some transects were less than 2,000 m as they were sited in infrastructure areas where a 2,000m transect was not appropriate.</p>

**Table 3.6**      **Methods and survey effort – arboreal mammals**

Method	Survey description	Survey effort
Regularised Grid Based (RGB) Spot Assessment Technique (SAT) (Koala)	<p>The RGB SAT method requires application of a uniform assessment method across a broad area. A 350 m x 350 m grid was applied to the survey area to identify survey locations. At each grid point, the SAT (Phillips and Callaghan 2011) was undertaken, as follows:</p> <ul style="list-style-type: none"> <li>• Centre tree was located and marked with flagging tape.</li> <li>• The 29 nearest trees to the centre tree were also identified and marked.</li> <li>• Koala faecal pellets were searched for beneath each of the 30 trees within a distance of 100 cm. Initial inspections were checked in undisturbed ground surface, followed by a more thorough inspection involving disturbance of leaf litter and ground cover (if no faecal pellets were initially detected).</li> <li>• An average of approximately two person minutes per tree should be dedicated to the faecal pellet search.</li> </ul> <p>Activity levels can be interpreted using Table 2 from Phillips and Callaghan (2011).</p>	<p>Grid points located below 800 m and in proximity to and surrounding the survey area were included for survey.</p> <p>A total of 51 grid locations have been surveyed within the survey area.</p>
Songmeters (Koala)	<p>Following recent use of acoustic recorders to document calling by male Koalas (Law et al. 2018) Songmeters were deployed during the breeding season to record males bellowing:</p> <ul style="list-style-type: none"> <li>• Songmeters were set to record between dusk and dawn</li> <li>• Songmeters were deployed at sites separated by at least 3 km, over a mix of landscape positions (ridge, valley, gully and flat).</li> <li>• Songmeters were deployed at each site for a minimum of 7 nights.</li> <li>• Songmeter data was analysed by Dr Brad Law of the NSW Department of Primary Industry.</li> </ul>	<p>No survey effort has been determined for the use of Songmeters. Three Songmeters were placed out within the survey area for 62 nights.</p>





Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)

#### KEY

- |   |                       |
|---|-----------------------|
| ● Dangerous tree                        | Fauna survey transect |
| ▲ Owl survey                            | — Bird survey         |
| ● Koala Spot Assessment Technique (SAT) | — Spotlighting        |
| — Watercourse/drainage line             |                       |
| ..... Vehicular track                   |                       |

Fauna survey locations

Snowy 2.0  
Ecology RTS  
Modification 1  
3.2 a







Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)

#### KEY

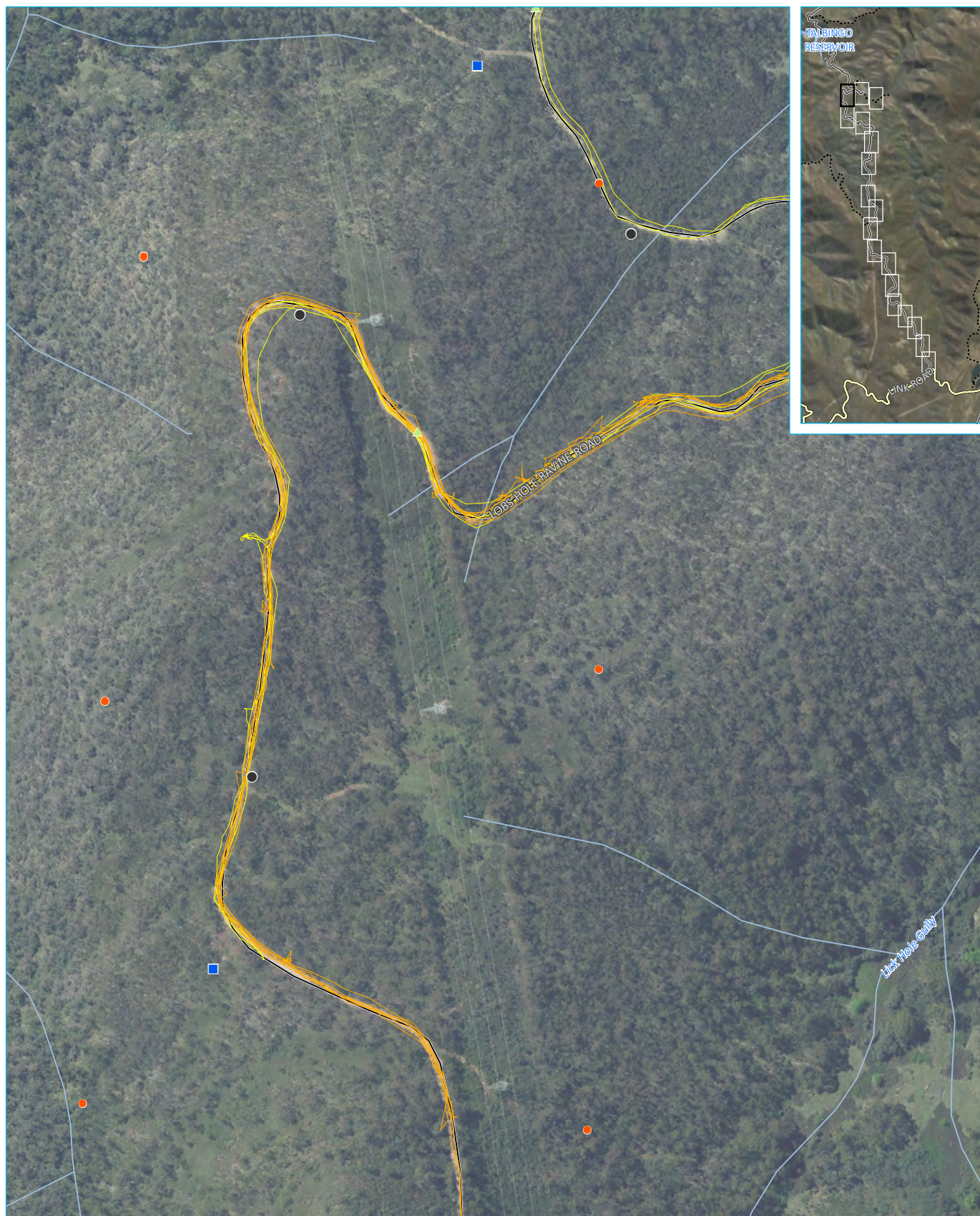
- Dangerous tree
- ▲ Owl survey
- Koala Spot Assessment Technique (SAT)
- Arboreal trapping
- Watercourse/drainage line
- Local road
- ..... Vehicular track
- Fauna survey transect
- Bird survey
- Spotlighting

Fauna survey locations

Snowy 2.0  
Ecology RTS  
Modification 1  
3.2 b







Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)

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#### KEY

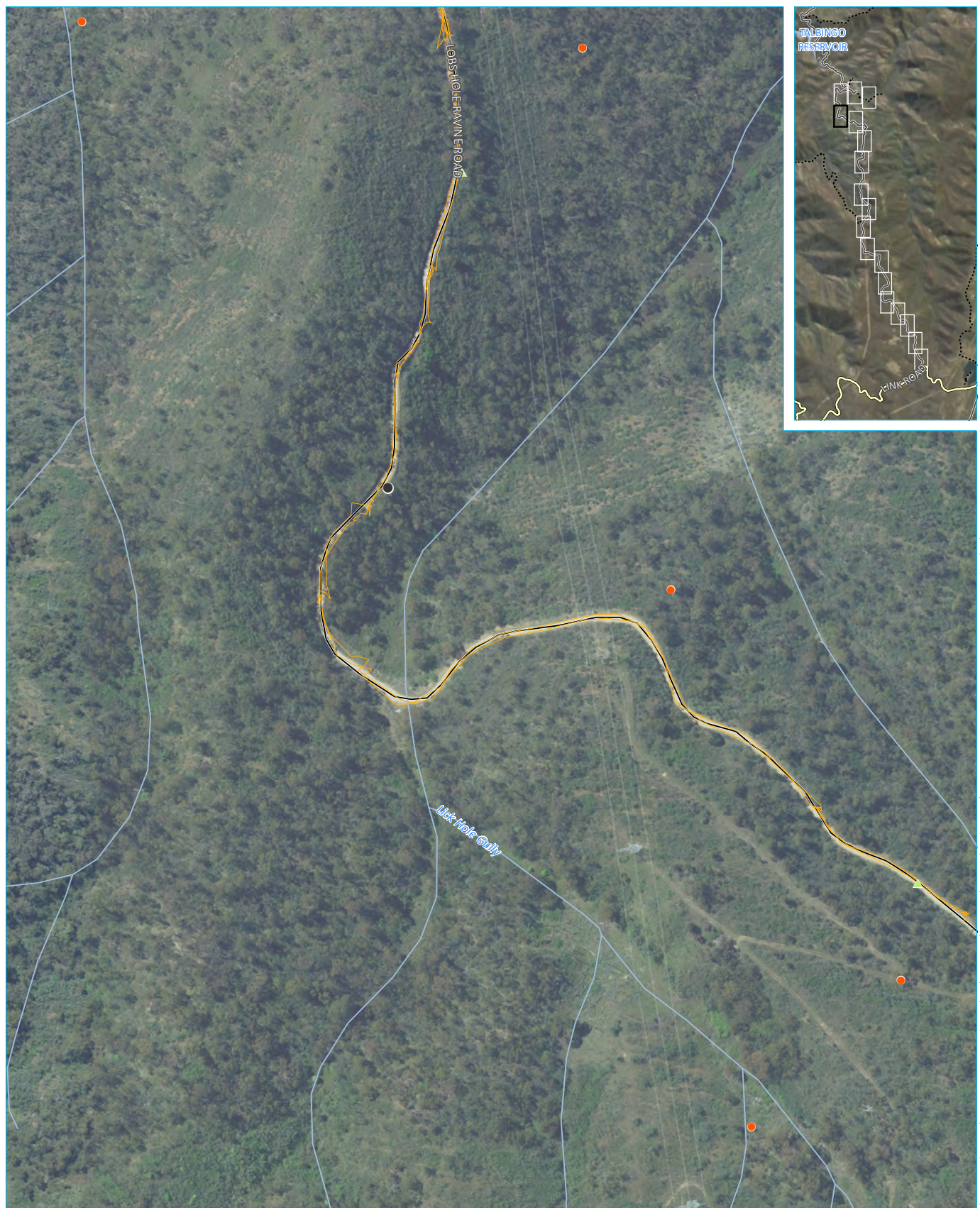
- Dangerous tree
- ▲ Owl survey
- Koala Spot Assessment Technique (SAT)
- Arboreal trapping
- Watercourse/drainage line
- Local road
- ..... Vehicular track
- Fauna survey transect
- Bird survey
- Spotlighting

Fauna survey locations

Snowy 2.0  
Ecology RTS  
Modification 1  
3.2 c







Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)

# KEY

- Dangerous tree
- ▲ Owl survey
- Koala Spot Assessment Technique (SAT)
- Watercourse/drainage line
- Local road
- Fauna survey transect
- Bird survey

Fauna survey locations

Snowy 2.0  
Ecology RTS  
Modification 1  
3.2 d







Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)

#### KEY

- Dangerous tree
- ▲ Owl survey
- Koala Spot Assessment Technique (SAT)
- Watercourse/drainage line
- Local road
- Fauna survey transect
- Bird survey

Fauna survey locations

Snowy 2.0  
Ecology RTS  
Modification 1  
3.2 e







Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)

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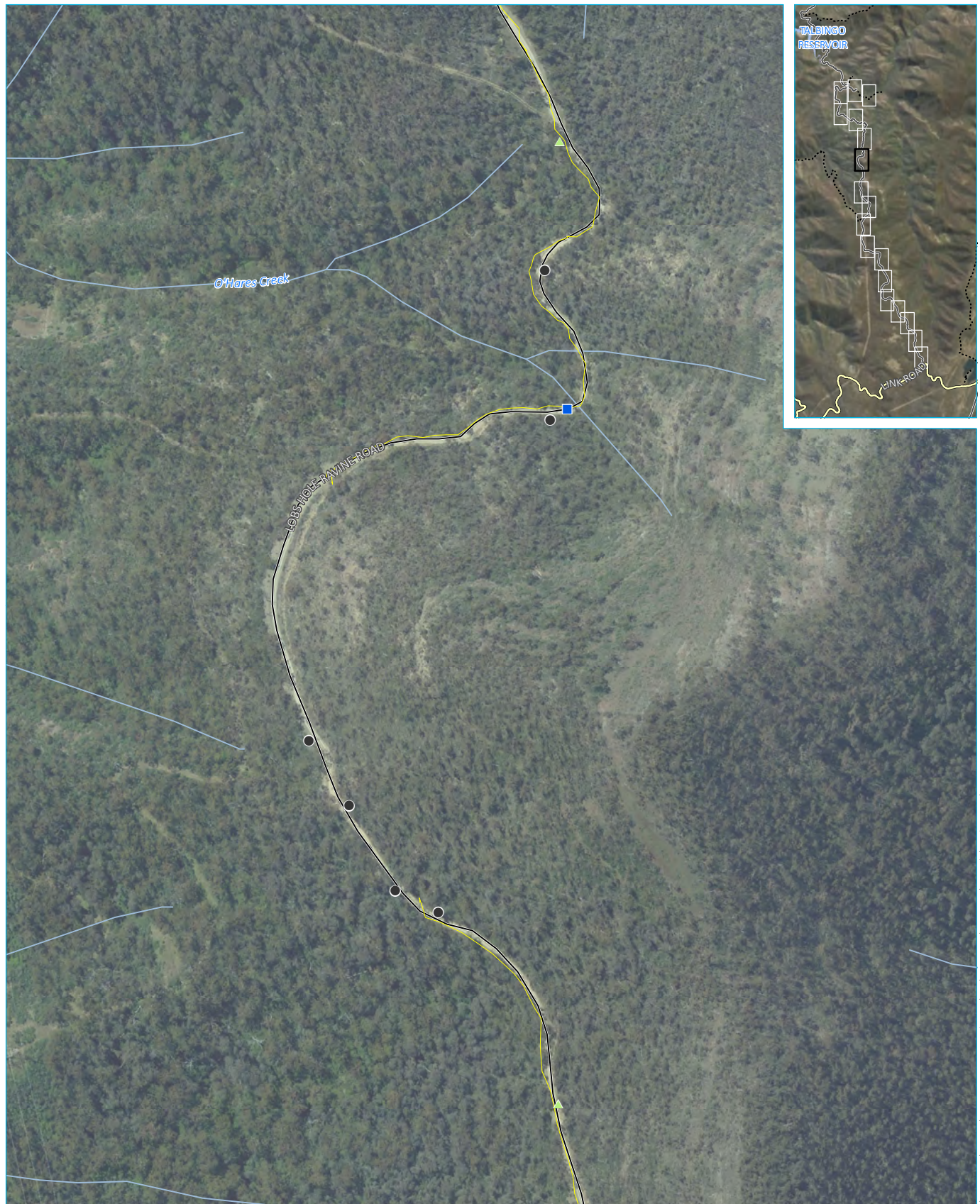
- Dangerous tree
- ▲ Owl survey
- Koala Spot Assessment Technique (SAT)
- Watercourse/drainage line
- Local road
- Fauna survey transect
- Spotlighting

Fauna survey locations

Snowy 2.0  
Ecology RTS  
Modification 1  
3.2 f







Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)

#### KEY

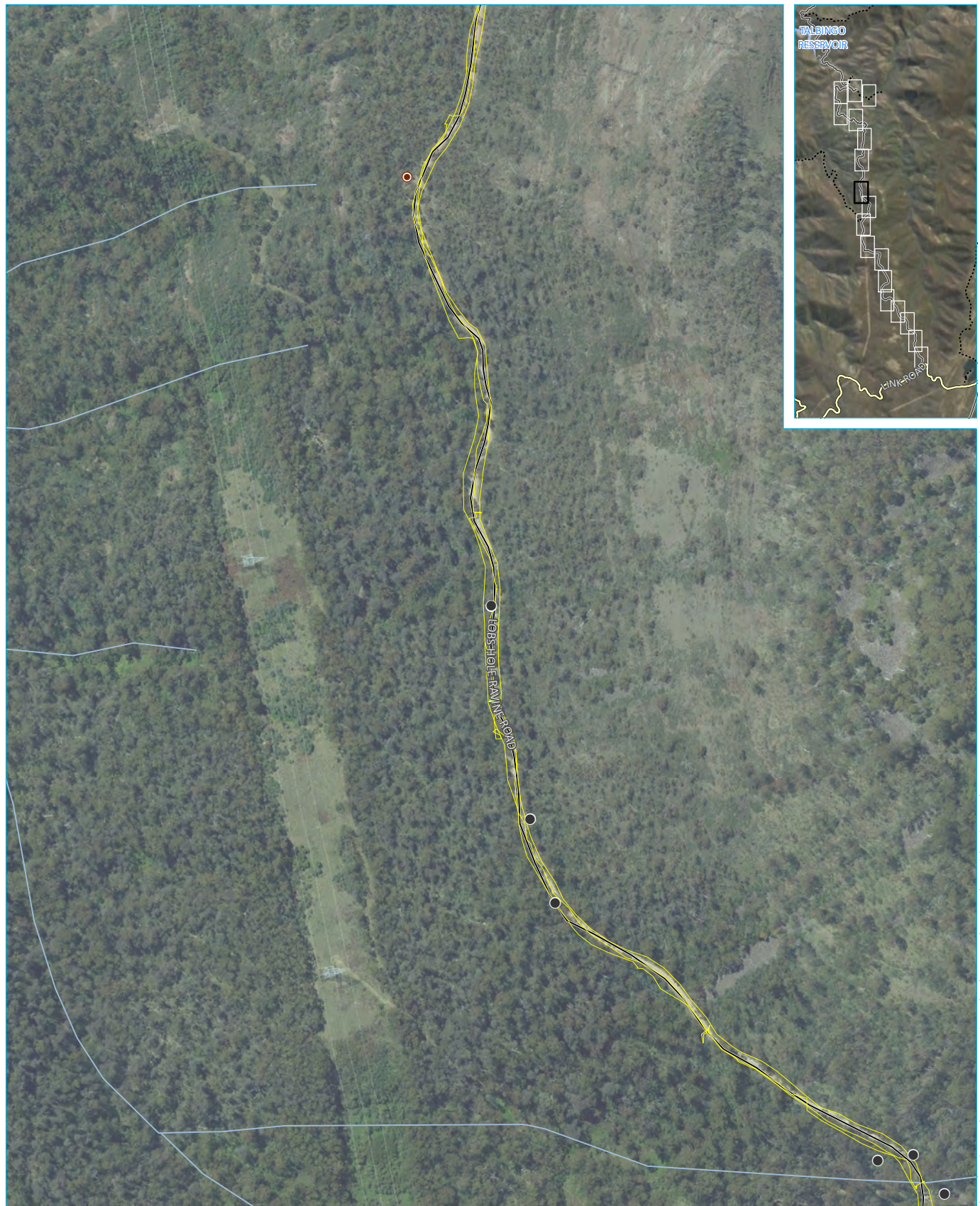
- Dangerous tree
- ▲ Owl survey
- Arboreal trapping
- Watercourse/drainage line
- Local road
- Fauna survey transect
- Spotlighting

Fauna survey locations

Snowy 2.0  
Ecology RTS  
Modification 1  
3.2 g







Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)

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GDA 1994 MGA Zone 55

# KEY

- Dangerous tree
- ▲ Owl survey
- Koala songmeter
- Watercourse/drainage line
- Local road
- Fauna survey transect
- Spotlighting

Fauna survey locations

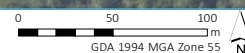
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Ecology RTS  
Modification 1  
3.2 h







Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)



# KEY

- Dangerous tree
- ▲ Owl survey
- Watercourse/drainage line
- Local road
- ..... Vehicular track
- Fauna survey transect
- Bird survey
- Spotlighting

Fauna survey locations

Snowy 2.0  
Ecology RTS  
Modification 1  
3.2 i



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Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)

#### KEY

- |                             |                       |
|-----------------------------|-----------------------|
| ● Dangerous tree            | Fauna survey transect |
| ▲ Owl survey                | — Bird survey         |
| ■ Arboreal trapping         | — Spotlighting        |
| — Watercourse/drainage line |                       |
| — Local road                |                       |
| ..... Vehicular track       |                       |

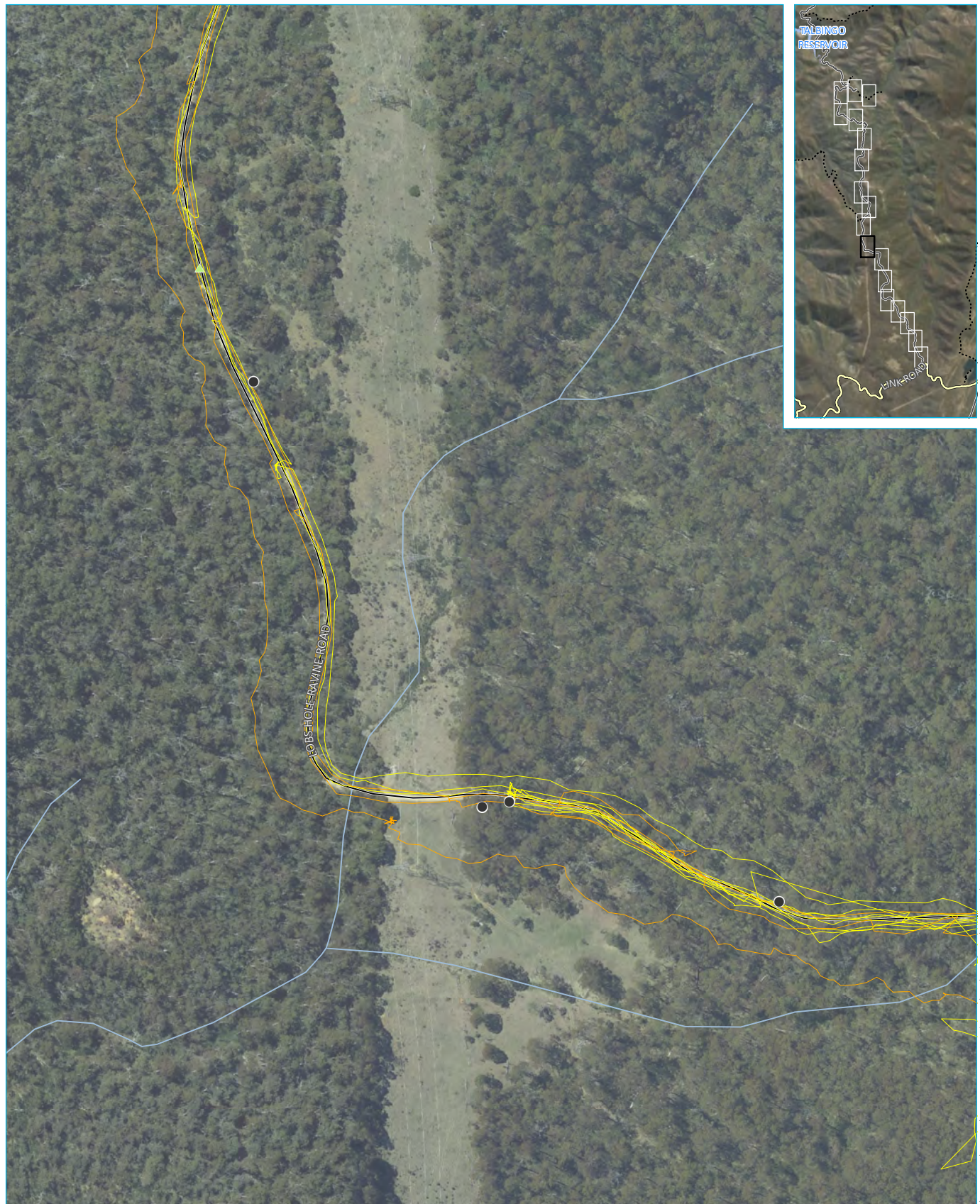
Fauna survey locations

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Ecology RTS  
Modification 1  
3.2 j



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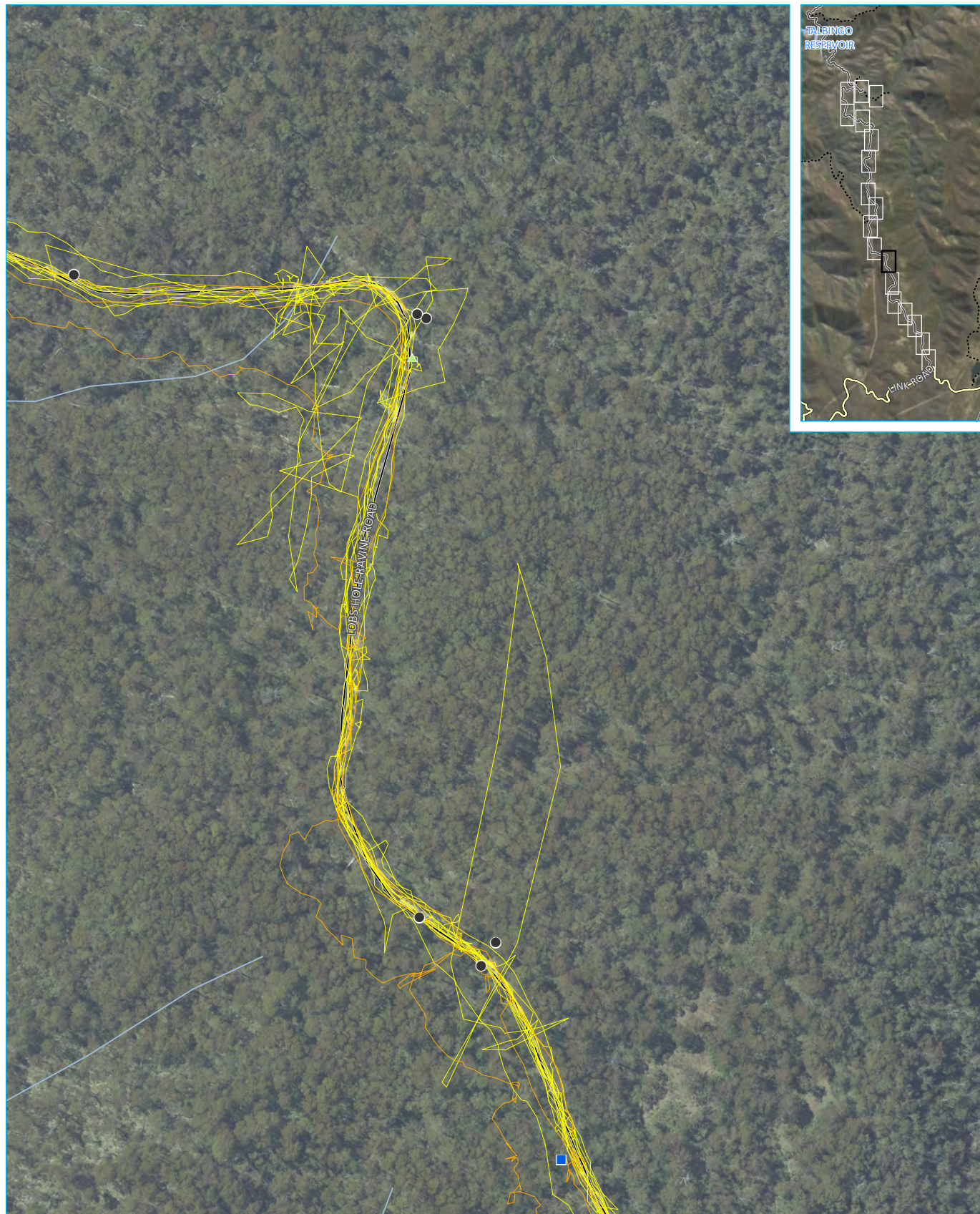
- Dangerous tree
- ▲ Owl survey
- Watercourse/drainage line
- Local road
- Fauna survey transect
- Bird survey
- Spotlighting

Fauna survey locations

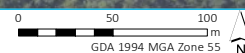
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Ecology RTS  
Modification 1  
3.2 k







Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)



# KEY

- |                             |                       |
|-----------------------------|-----------------------|
| ● Dangerous tree            | Fauna survey transect |
| ▲ Owl survey                | — Bird survey         |
| ■ Arboreal trapping         | — Spotlighting        |
| — Watercourse/drainage line |                       |
| — Local road                |                       |

Fauna survey locations

Snowy 2.0  
Ecology RTS  
Modification 1  
3.2 I

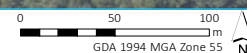


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Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)



#### KEY

- |                             |                       |
|-----------------------------|-----------------------|
| ● Dangerous tree            | Fauna survey transect |
| ▲ Owl survey                | — Bird survey         |
| ■ Arboreal trapping         | — Spotlighting        |
| — Watercourse/drainage line |                       |
| — Local road                |                       |

Fauna survey locations

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Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)

#### KEY

- Dangerous tree
- ▲ Owl survey
- Watercourse/drainage line
- Local road
- Fauna survey transect
- Bird survey
- Spotlighting

Fauna survey locations

Snowy 2.0  
Ecology RTS  
Modification 1  
3.2 n







Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)

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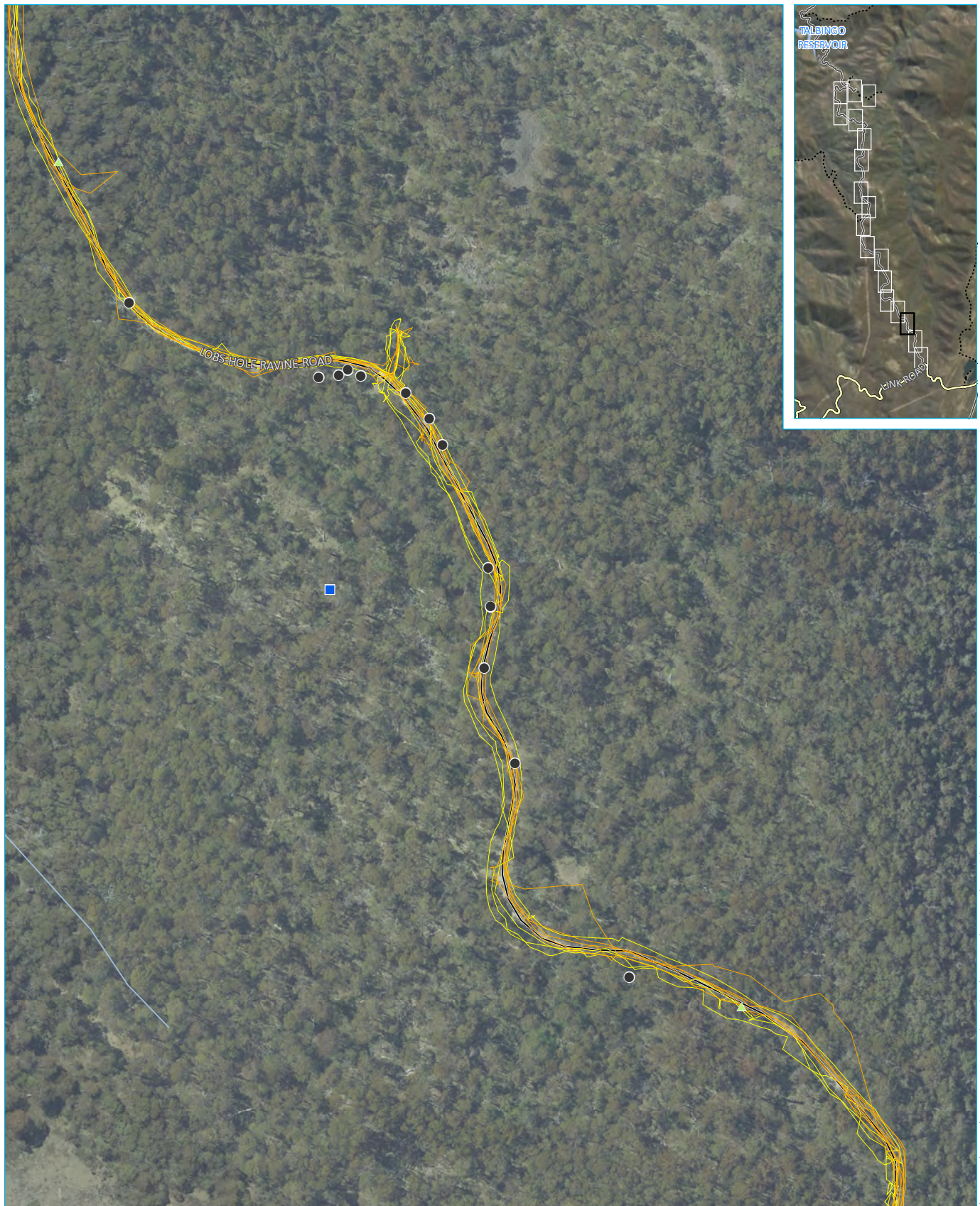
- Dangerous tree
- ▲ Owl survey
- ⊙ Koala songmeter
- Arboreal trapping
- Watercourse/drainage line
- Local road
- Fauna survey transect
- Bird survey
- Spotlighting

Fauna survey locations

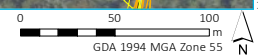
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Modification 1  
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Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)



#### KEY

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|-----------------------------|-----------------------|
| ● Dangerous tree            | Fauna survey transect |
| ▲ Owl survey                | — Bird survey         |
| ■ Arboreal trapping         | — Spotlighting        |
| — Watercourse/drainage line |                       |
| — Local road                |                       |

Fauna survey locations

Snowy 2.0  
Ecology RTS  
Modification 1  
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Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)

#### KEY

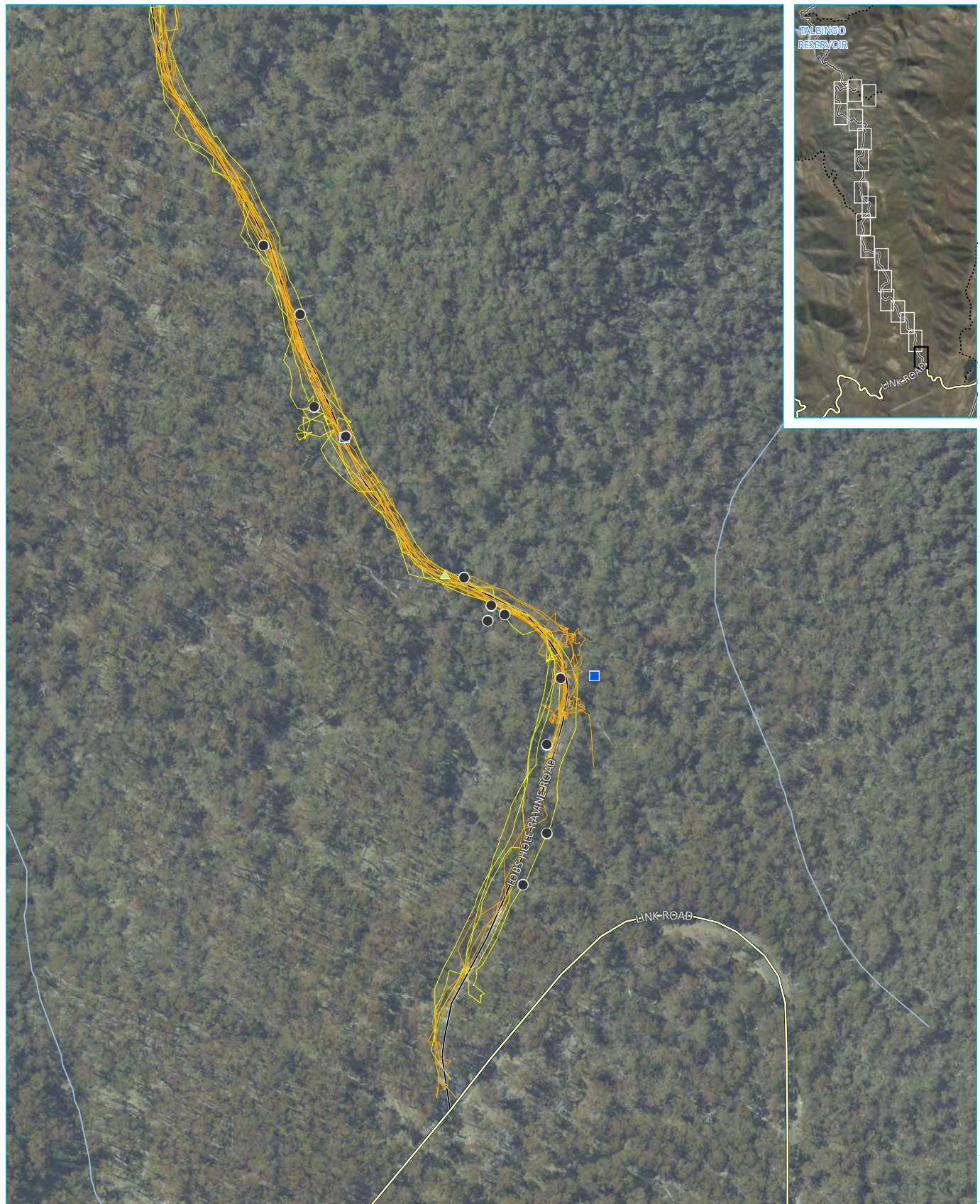
- Dangerous tree
- ▲ Owl survey
- Watercourse/drainage line
- Local road
- Fauna survey transect
- Bird survey
- Spotlighting

Fauna survey locations

Snowy 2.0  
Ecology RTS  
Modification 1  
3.2 q







Source: EMM (2019); Snowy Hydro (2019); PhotoMapping (2018); SMEC (2019); DFSI (2017); GA (2015); LPMA (2011)

## KEY

- Dangerous tree
- ▲ Owl survey
- Arboreal trapping
- Watercourse/drainage line
- Main road
- Local road
- Fauna survey transect
- Bird survey
- Spotlighting

Fauna survey locations

Snowy 2.0  
Ecology RTS  
Modification 1  
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