97G1354
Scott Lawrence (02) 6640 1375
Pacific Highway Office
Scott_Lawrence@rta.nsw.gov.au

Director General
Department of Planning
GPO Box 39
SYDNEY NSW 2001

Attention: Dinuka McKenzie

**PACIFIC HIGHWAY UPGRADE –WARRELL CREEK TO URUNGA UPGRADE ADDENDUM TO SUBMISSIONS REPORT – FAUNA CROSSING STRUCTURES**

Dear Dinuka,

As you are aware the Department of Environment, Climate Change & Water (DECCW), now known as Office of Environment & Heritage (OEH) provided a comments on the Warrell Creek to Urunga Pacific Highway Upgrade Environmental Assessment Submissions Report and Preferred Project Report, November 2010 (reference SO2/01634).

In response to OEH's comments on the proposed fauna connectivity measures the RTA has undertaken further consultation with OEH to progress this matter and I am pleased to advise that a mutually agreeable outcome has been reached. The updated locations of fauna/combined structures along with minimum dimensions are provided in Table 1 of Attachment 1 to this letter. This table highlights the changes from what was proposed in the Submission Report (November 2010) and provides more information on dedicated and combined fauna structures as well as design constraints for some culvert and bridge structures.

The revised fauna structures and locations and the additional consultation with OEH focused the importance of strategically designing and positioning fauna connectivity structures and achieving value for money. There are number of locations where because of the large fill heights and long culvert lengths (co-located with relatively small drainage structures) it was agreed with OEH it would be more beneficial to minimise investment in these structures and transfer savings to the construction of a bridge at Dalhouse Creek. Refer to Attachment 2, OEH letter 12 May 2011. It is considered that a bridge at Dalhouse Creek will optimise biodiversity connectivity in a high conservation area.

As outlined in Table 1 attached the RTA has committed to replacing the originally proposed 4 x 2100 x 1200 box culvert at Dalhouse Creek with bridge structure that has a minimum span length of 15 metres. Based on preliminary survey the bridge at this location should be able to provide at least 3 metres unhindered fauna passage on both sides of Dalhouse Creek.

In addition to the bridge at Dalhouse Creek the RTA has increased the size of 12 combined fauna structures, including replacing 2400 x 2400 box culvert with a minimum 4.0 metre high x 9.0 metre wide arch structure at chainage 32930, as well as committing to a bridge crossing at chainage 37950 (minimum 15 meter length).

The structures at chainage 17205, chainage 19820, chainage 30855 and chainage 40500 have not changed from what was proposed in the Submission Report, November 2011 as both OEH and the RTA consider that these structures are not likely to provide optimal biodiversity connectivity due to their long lengths and the restricted opportunity to substantially increase the height and width of these structures.

Table 1 was provided to OEH to seek agreement on the revised fauna structures and locations. Attachment 3 provides the e-mail advice received back from OEH.

In terms of progressing a suitable fauna crossing structures at chainage 19350 as per OEH's request I can confirm that the RTA will investigate what potential improvements can be made during the detailed design to help improve connectivity between the Chainage 19150 and 19820

Should you require further information, please contact the Scott Lawrence of my Office on (02) 6640 1375

Yours sincerely,

Robert (Bob) Higgins
General Manager Pacific Highway 23/5/11

Encl.
Cc Brett Nudd

# Table 1: Update to Submissions Report Warrell Creek to Urunga - Fauna crossings comparison/ revisions May 2011

| Submissions report (November 2010) | | | | Proposed crossings after discussion with DECCW | | | Comments |
|---|---|---|---|---|---|---|---|
| Approximate Chainage | Fauna crossing type | Proposed structure | Indicative size and configuration | Approximate Chainage | Proposed structure | Indicative size and configuration | |
| 3760 | Incidental | Culvert over Stony Creek | 3 x 3600 x 3600 | 3800 | Box Culvert | 7 x 4200 x 3600 | Increased opening.<br>Size revised to meet hydraulic requirements.<br>Current location coincides with watercourse. |
| 5760 | Incidental | Box Culvert | 3000 x 1200 | 5760 | Box Culvert | 3000 x 1200 | No change. |
| 6320 | Dedicated | Fauna corridor under bridge over Warrell Creek | Bridge 230m total length | 6320 | Bridge | 230m total length | No change.<br>Corridor listed is under southern end span of bridge.<br>Unhindered passage is provided (refer to Note 1). |
| 6450 | Dedicated | Bridge over Warrell Creek | Bridge | 6450 | Bridge | (-) | No change.<br>Northern span of bridge over Warrell Creek detailed above.<br>Unhindered passage is provided (refer to Note 1). |
| 6510 | Dedicated | Fauna corridor under bridge over Warrell Creek | Bridge | 6510 | Bridge | (-) | Location is part of bridge over Warrell Creek detailed above.<br>No change.<br>Corridor listed is under northern end span.<br>Unhindered passage is provided (refer to Note 1). |
| 8115 | Incidental | Box Culvert | 2400 x 1200 | 8115 | Box Culvert | 2400 x 1200 | No change. |

# Table 1: Update to Submissions Report Warrell Creek to Urunga - Fauna crossings comparison/ revisions May 2011

| Submissions report (November 2010) | | | | Proposed crossings after discussion with DECCW | | | Comments |
|---|---|---|---|---|---|---|---|
| Approximate Chainage | Fauna crossing type | Proposed structure | Indicative size and configuration | Approximate Chainage | Proposed structure | Indicative size and configuration | |
| 8450 | Incidental | Box Culvert | 14 x 3600 x 1800 | 8450 | Box Culvert | 14x3600x1800 | No change. |
| 9220 | Incidental | Box Culvert | 14 x 3600 x 2100 | 9220 | Box Culvert | 14 x 3600 x 2100 | No change. |
| 13285 | Combined | Box Culvert | 2400 x 1200 | 13285 | Box Culvert | 2400x2400 | Culvert height increased for improved fauna connectivity.<br>Fill height approximately 7m.<br>Length of culvert under highway is 54 m and under Old Coast Road is 29m.<br>Daylight between highway and Old Coast Road. |
| 14555 | Combined | Box Culvert | 2400 x 1200 | 14555 | Box Culvert | 2400x1200 | No change.<br>Fill height is approximately 3m to road level.<br>The culvert height has not been increased to 2400, as this would require lifting the road level.<br>Culvert length under highway (approximately 45m) and Old Coast Road is approximately 73m in total. Daylight between highway and Old Coast Road. |
| 16630 | Combined | Box Culvert | 3x3600x1200 | 16630 | Box Culvert | 2x 3600x2400 | Size increased for improved fauna connectivity.<br>Fill height is approximately 15m and requires verges at lower tier.<br>Culvert length is approximately 106m.<br>Reduction in length is not achievable without 15 high retaining walls, so has not been adopted. |
| 17205 | Combined | Box Culvert | 2400 x 1500 | 17205 | Box Culvert | 2400x1500 | No change<br>Fill height is approximately 15m and culvert is running at around 70 degrees to match the existing watercourse.<br>Length approximately 93m.<br>Reduction in length is not achievable without 15m high retaining walls, so |

# Table 1: Update to Submissions Report Warrell Creek to Urunga - Fauna crossings comparison/ revisions May 2011

| Submissions report (November 2010) | | | | Proposed crossings after discussion with DECCW | | | Comments |
|---|---|---|---|---|---|---|---|
| Approximate Chainage | Fauna crossing type | Proposed structure | Indicative size and configuration | Approximate Chainage | Proposed structure | Indicative size and configuration | |
| | | | | | | | has not been adopted. |
| 17720 | Dedicated | Box Culvert | 2400 x 2400 | 17720 | Box Culvert | 3000 X 3000 | Culvert size increased for improved fauna connectivity.<br>Fill height is approximately 6.5m.<br>Length is approximately 44m. |
| 18515 | Combined | Box Culvert | 2400 x 1200 | 18515 northbound and 18695 southbound | Box Culvert | 2400x2400 | Culvert size increased.<br>Fill height approximately 8m.<br>Length is 40m northbound and 30m southbound.<br>Carriageway separation is about 55m.<br>Culvert across southbound carriageway moved to 18695 to minimise number of culverts and improve culvert skew.<br>Increased length of fauna fencing is required between northbound and southbound culverts. |
| 19350 | Incidental | Circular Culvert | 750 | 19350 | Pipe Culvert | 750 | No change. |
| 19820 | Combined | Box Culvert | 5 x 2400 x 2100 | 19820 | Box Culvert | 5 x 2400 x 2100 | No Change<br>Fill height is approximately 14 m, requiring verges at lower tier.<br>Culvert length is approximately 97 m across proposed highway and 30m across existing highway with daylight in between.<br>Reduction in length is not achievable without 14 m high retaining walls, so has not been adopted. |
| 20880 | Dedicated | Fauna corridor under bridge over Boggy Creek | Bridge | 20800 | Bridge | Total length 96m | No change.<br>Bridges over Boggy Creek.<br>Fauna corridor under southern end span.<br>Unhindered passage is provided (refer to Note 1) |

# Table 1: Update to Submissions Report Warrell Creek to Urunga - Fauna crossings comparison/ revisions May 2011

| Submissions report (November 2010) | | | | Proposed crossings after discussion with DECCW | | | Comments |
|---|---|---|---|---|---|---|---|
| Approximate Chainage | Fauna crossing type | Proposed structure | Indicative size and configuration | Approximate Chainage | Proposed structure | Indicative size and configuration | |
| 20880 | Dedicated | Bridge over Boggy Creek | Bridge | 20880 | Bridge | Total length 96m | No change.<br>Bridge over Boggy Creek.<br>Fauna corridor under northern end span.<br>Without creek re-alignment it is unlikely to achieve 3m unhindered passage on the northern abutment. Bridge pier layout has been designed to avoid placing piers directly into the 'low flow' watercourse. To achieve 3m unhindered passage on the northern abutment the piers would be required to be placed into the 'low flow' watercourse (assuming the creek was not realigned). Detail on the exact pier configuration and passage whether 3m unhindered fauna passage can be achieved on the northern abutment will be finalised as part of the detailed design in consultation with DPI (Fisheries) and Office of Environment & Heritage (OEH) |
| 21740 | Dedicated | Fauna corridor under bridge over Cow Creek | Bridge | 21740 | Bridge | Total length 122m | No change.<br>Fauna corridor under northern and southern end span.<br>Unhindered passage is provided (refer to Note 1). |
| 21740 | Dedicated | Bridge over Cow Creek | Bridge | 21740 | Bridge | Total length 122m | No change.<br>Fauna corridor under northern and southern end span.<br>1m wide unhindered fauna passage would be required. |
| 23040 | Dedicated | Fauna corridor under bridge over Deep Creek | Bridge | 23040 | Bridge | Bridge over Deep Creek | No change.<br>Unhindered passage is provided (refer to Note 1). |

# Table 1: Update to Submissions Report Warrell Creek to Urunga - Fauna crossings comparison/ revisions May 2011

| Submissions report (November 2010) | | | | Proposed crossings after discussion with DECCW | | | Comments |
|---|---|---|---|---|---|---|---|
| Approximate Chainage | Fauna crossing type | Proposed structure | Indicative size and configuration | Approximate Chainage | Proposed structure | Indicative size and configuration | |
| 24305 | Incidental | Box Culvert | 2700 x 900 | 24305 | Box Culvert | 2700x900; crosses local service road not upgrade. | No change. |
| 25255 | Combined | Box Culvert | 2400 x 2400 | 25255 | Box Culvert | 2400x2400<br><br>Not continued under local service road. | No change.<br>Fill height is approximately 4.6m.<br>Length is 42m under highway and 37m under existing highway with daylight in between. Underpass cannot continue under the local service road, unless the service road is regraded. This would need an adjustment of the proposed boundary. Therefore it is not proposed to have the underpass extend under the local road. |
| 26535 | Combined | Box Culvert | 5 x 3600 x 1200 | 26535 | Box Culvert | 4 x 3600 x 1200<br>Plus 1 x 3600 x 2400 | Increase one cell to 2400 height for improved fauna connectivity.<br>Fill height is approximately 4.5m.<br>Length approximately 18m and 52m day light between highway and local service road.<br>Minor level adjustment required to local service road to accommodate increased height. |
| 27845 | Incidental | Pipe Culvert | 4X1200 | 27848 | Pipe Culvert | 4x 1200 | No Change |

# Table 1: Update to Submissions Report Warrell Creek to Urunga - Fauna crossings comparison/ revisions May 2011

| Submissions report (November 2010) | | | | Proposed crossings after discussion with DECCW | | | Comments |
|---|---|---|---|---|---|---|---|
| Approximate Chainage | Fauna crossing type | Proposed structure | Indicative size and configuration | Approximate Chainage | Proposed structure | Indicative size and configuration | |
| 28275 | Incidental | Pipe Culvert | 3x 1200 | 28275 | Pipe culvert | 2x1800 | Increased height.<br>Culvert modified to 2x1800 because of drainage considerations |
| 28565 | N/A | N/A | 2 x 2400 x 1200 | 28565 | Box Culvert | 3600x3000 | Originally 2 x 2400 x 1200 box culvert (for drainage) this structure has been increased to 3600 x3000 box culvert to serve as a combined fauna/drainage structure.<br>Fill height is approximately 5.0m.<br>Length is approximately 53m long. Not feasible to daylight in the median without significant cost (narrow median width)<br>Fauna fence would be provided to assist usage of this structure |
| 29650 | N/A | N/A | N/A | 29650 | Bridge over McGraphs Creek Floodplain No.1 | Approximate length 100m | Unhindered fauna passage is able to be provided on the northern and southern banks (refer to Note 1)<br>Fauna fence would be provided to assist usage of this structure |
| 30855 | Combined | Box Culvert | 2100 x 900 | 30855 | Box Culvert | 2100 x 900 | No change<br>Fill height is approximately 12 m.<br>Length is approximately 110 m.<br>Culvert located in transition zone to wider separations and batters overlap, as a result there is no opening in the median.<br>Due large fill heights it is not possible to daylight culverts in the median.<br>Because of large fill heights retaining walls would be required to reduce culvert length this is not considered a reasonable option at this location given larger fauna crossing structure (bridge) at CH 31510 |

# Table 1: Update to Submissions Report Warrell Creek to Urunga - Fauna crossings comparison/ revisions May 2011

| Submissions report (November 2010) | | | | Proposed crossings after discussion with DECCW | | | Comments |
|---|---|---|---|---|---|---|---|
| Approximate Chainage | Fauna crossing type | Proposed structure | Indicative size and configuration | Approximate Chainage | Proposed structure | Indicative size and configuration | |
| 31510 | Combined | Box Culvert | 4 x 2100 x 1200 | 31510 | Bridge over Dalhouse Creek | Minimum 15.0m span | Replace box culverts with Bridge to improve fauna connectivity.<br>Unhindered fauna passage is likely to be provided on the northern and southern banks (refer to Note 1) |
| 32075 | Combined | Box Culvert | 2400 x 1200 | 31930 Northbound<br>31750 Southbound | Box Culvert | 2400 x 2400 | Culvert size increased to improve fauna connectivity<br>Design modified to utilise wide separation between carriageways for open drain and culvert crosses the northbound and southbound carriageway separately, because the existing watercourse runs in the median.<br>Fill height is approximately 6m.<br>Length of culvert is approximately 50m across each carriageway. |
| 32780 | Dedicated | Box Culvert | 2400 x 2400 | 32930 | Arch | Minimum height 4.0m<br>Minimum span 9.0m | Replaced box culvert with arch structure.<br>Location moved to 32930<br>Fill height approximately 10 m.<br>Length is approximately 62m.<br>Hydrology at this location would need to be reviewed to confirm dry passage for most times of the year is available for fauna. |
| 33395 | Incidental | Circular Culvert | 3 x 1200 | 33395 | Box Culvert | 3000x2400 | Size increased for drainage purposes |
| 33880 | Incidental | Box Culvert | 2400 x 1200 | 33940 | Box Culvert | 2400x1200 | Note the location shift to avoid the spider orchid.<br>No change in size. |
| 34380 | Combined | Box Culvert | 3 x 2700 x 1200 | 34450 | Box Culvert | 3600 x 2400 | Single cell box culvert adopted with increased height to suit combined crossing for fauna.<br>Note the location shift to avoid the spider orchid.<br>Fill height is approximately 8m.<br>Length is approximately 68m. |

# Table 1: Update to Submissions Report Warrell Creek to Urunga - Fauna crossings comparison/ revisions May 2011

| Submissions report (November 2010) | | | | Proposed crossings after discussion with DECCW | | | Comments |
|---|---|---|---|---|---|---|---|
| Approximate Chainage | Fauna crossing type | Proposed structure | Indicative size and configuration | Approximate Chainage | Proposed structure | Indicative size and configuration | |
| 34380 | Combined | Box Culvert | 3 x 2700 x 1200 | 34450 | Box Culvert | 3600x3600 | Culvert height increased to improve fauna connectivity<br>Fill height is approximately 8m.<br>Length is approximately 68m. |
| 34380 | Combined | Box Culvert | 3 x 2700 x 1200 | 34450 | Box Culvert | 3000x3000 | Culvert height increased to improve fauna connectivity<br>Fill height is approximately 8m.<br>Length is approximately 68m. |
| 34615 | Incidental | Box Culvert | 3 x 2700 x 1200 | 34780 | Box Culvert | 3600 x 2100 | Single cell box culvert adopted for drainage purposes<br>Note the location shift to avoid the spider orchid.<br>Increased height is benefit to fauna crossing.<br>Culvert length approximately 56m. Fill height approx 6m |
| 35095 | Combined | Box Culvert | 23 x 3600 x 3000 | 35095 | Box Culvert | 23x3600x3000 | No change.<br>Culvert length approximately 50m. |
| 36905 | Combined | Box Culvert | 2 x 2400 x 1200 | 36905 | Box Culvert | 2x2400x1200 | No change.<br>Fill height is approximately 3m. Fill height would need to be increased to accommodate a higher culvert.<br>Culvert length is approximately 53m. |
| 37950 | Dedicated | Dry corridor | 2400 x 2400 | 37950 | Bridge | 15 m minimum length | Placement of a bridge at this location.<br>Unhindered passage is provided (refer to Note 1). |
| 38330 | Combined | Box Culvert | 2 x 3000 x 1500 | 38330 | Box Culvert | 2x3000x1500 | No change.<br>Fill height is approximately 1m. Fill height would have to be increased for the northbound carriageway to accommodate a higher culvert.<br>Carriageways have wide separation.<br>Culvert length is approximately 28m across southbound carriageway and |

# Table 1: Update to Submissions Report Warrell Creek to Urunga - Fauna crossings comparison/ revisions May 2011

| Submissions report (November 2010) | | | | Proposed crossings after discussion with DECCW | | | Comments |
|---|---|---|---|---|---|---|---|
| Approximate Chainage | Fauna crossing type | Proposed structure | Indicative size and configuration | Approximate Chainage | Proposed structure | Indicative size and configuration | |
| | | | | | | | 37m across southbound carriageway. |
| 39990 | Incidental | Box Culvert | 17 x 3300 x 2100 | 39990 | Box Culvert | 17x3300x2100 | No change. |
| 40500 | Combined | Box Culvert | 9 x 3000 x 2100 | 40500 | Box Culvert | 9 x 3000 x 2100 | No change<br>Fill height approximately 3.5m<br>Length of culvert is approximately 48m under proposed highway and 17m under existing highway realignment, with daylight t in between.<br>Uncertain whether dry passage would be able to be achieved for most of the year at this location. |

Notes:

SKM has prepared this information in accordance with the scope of work outlined by the RTA. The indicative size and configuration of culverts would be further refined during the detailed design phase. SKM assumes no responsibility for any inaccuracies or omissions in the data or for use of this data in any other context or for any other purpose or by third parties.

1) The bridges detailed above appear to have a 3m unhindered passage for fauna, with the exception of the northern abutment at Boggy Creek. Note that this has been determined from limited survey data and will need to be confirmed during the detailed design.
2) Multiple culverts with non-matching cell heights impacts on the construction cost. The optimum construction cost scenario includes an odd number of cells maximising the use of link slabs.
3) For incidental crossing some rationalisation of the culvert configurations was undertaken following the initial design to eliminate smaller multiple pipes susceptible to blockage in preference to single larger size pipe or box culverts.

NSW GOVERNMENT | Office of Environment & Heritage

Our reference: DOC 11/22122
Contact : Simone Garwood

Scott Lawrence
RTA Pacific Highway Office
PO Box 546
Grafton 2460.

Dear Mr Lawrence,

**Re: Biodiversity Connectivity - Warrell Creek to Urunga Pacific Highway Upgrade**

Thank you for the opportunity to meet with yourself on the 1st April and 6 May 2011 to discuss biodiversity connectivity associated with the Warrell Creek to Urunga Pacific Highway Upgrade.

In regards to our most recent meeting on the 6 May 2011, the Office of Environment and Heritage (OEH) reiterates the importance of strategically designing and positioning biodiversity connectivity structures to increase the probability that they will be effective.

Where the likely effectiveness of some of these connectivity structures is questionable (eg. co-located with small drainage structures), OEH agrees that it will be more beneficial to minimise the investment in these structures and transfer those cost savings to the construction of a bridge at Dalhousie Creek. OEH considers a bridge at Dalhousie Creek will optimise biodiversity connectivity in a high conservation area (on the understanding that adequate fauna passage will be provide between the mean high water flow and toe of the scour protection).

In relation to the structures located at the chainages listed below, OEH therefore supports the proposal to revert back to the original design parameters as outlined in the attachment of your e-mail dated 5 May 2011 (EN02286_Fauna_crossing_culverts May 2011), in order to deliver cost savings which can be reinvested in a bridge at Dalhousie Creek:

- Chainage 17205;
- Chainage 19820;
- Chainage 30855; and
- Chainage 40500.

OEH considers that the structures at the above locations are not likely to provide optimal biodiversity connectivity due to their length (>100m) and the restricted opportunity to substantially increase the height and width of these structures.

In accordance with the discussions on the 6 May 2011, OEH understands that the RTA will also be investigating opportunities to implement the following mitigation strategies:

The Department of Environment, Climate Change and Water is now known as the
Office of Environment and Heritage, Department of Premier and Cabinet

Locked Bag 914, Coffs Harbour NSW 2450
Federation House Level 7, 24 Moonee Street,
Coffs Harbour NSW 2450
Tel: (02) 6651 5946 Fax: (02) 6651 6187
ABN 30 841 387 271
www.environment.nsw.gov.au

- to increase the height of the structure at Chainage 28565 preferably to 3m, but as a minimum 2.4m and adopt this as a minimum design standard;
- to increase the size of the culvert located south of chainage 9350;
- on the basis that the length of the crossing at Chainage 17720 is less than 50m, OEH considers that a 3m x 3m box culvert would be sufficient thus reducing the need for an arched culvert; and
- the opportunity to remove the dedicated underpass at Chainage 32780 and revise the design of the next drainage structure to the north as a combined 9m x 4m arched fauna/drainage culvert. However, OEH highlights that the hydrology at this location would need to be reviewed in order to determine the adequacy of dry fauna passage on the ledges within the arched culvert.

OEH confirms that the inclusion of a bridge structure at Dalhousie Creek is the priority biodiversity connectivity strategy and if this cannot be achieved OEH would appreciate the opportunity to revisit the location and design of all fauna connectivity structures associated with the project.

If you have any questions, or wish to discuss this matter further please do not hesitate to contact Simone Garwood on 66598219.

Yours sincerely

**BRETT NUDD**
**Manager North Coast Region**
**Environment Protection and Regulation Group**
**Office of Environment and Heritage**
**Department of Premier and Cabinet**

10 MAY 2011

**From:** Simone Garwood [Simone.Garwood@environment.nsw.gov.au]
**Sent:** Tuesday, 17 May 2011 12:16 PM
**To:** LAWRENCE Scott B
**Cc:** HIGGINS Bob G; Craig Harre; FENNER Roger D; EASTWOOD Mark; Brett Nudd
**Subject:** RE: WC2U - biodiversity connectivity
Hi Scott,

Thank you for your reply and clarification on the structures at Ch: 19350 and Ch: 32780. OEH acknowledges the site constraints at Chainage 19350 and agrees with the conclusion provided below. However, as discussed, the location of connectivity structures at Ch: 19820 is not ideal and is not likely to be effective. Thus we would appreciate the RTA's continued efforts to assist with investigating any potential improvements or options during the detailed design to help improve connectivity between the Chainage 19150 and 19820 as this area falls within a sub regional corridor and provides and important linkage.

Regards
Simone.

---

**From:** LAWRENCE Scott B [mailto:Scott_LAWRENCE@rta.nsw.gov.au]
**Sent:** Monday, 16 May 2011 9:27 PM
**To:** Garwood Simone; Nudd Brett
**Cc:** HIGGINS Bob G; Harre Craig; FENNER Roger D; EASTWOOD Mark
**Subject:** RE: WC2U - biodiversity connectivity

Hi Simone,

As discussed with regard to upgrading the structure at CH 19350 I can advise that fill heights on the south bound carriageway do not allow for a 2.4m high structure without substantially 'digging-in" the culvert. Additionally the natural surface grade under the south bound carriageway is approximately 10% and ramps up to approximately 20% on the western side of the carriageway creating substantial additional clearing impacts if a box culvert was to be located here to allow 10:1 or even 4:1 grade into the culvert. If a smaller culvert were able to be provide along the natural ground level (1.5m high) there would still be a need for additional clearing and a large amount of scour protection would be required because of grade of the culvert at this location. On balance I don't believe upgrading the currently proposed 950 pipe culvert to a combined drainage/fauna structure at this location is reasonable outcome for fauna.

In terms of CH 32780 and OEH suggestion has been adopted and reflected in the table previously sent. The dedicated structure has been moved CH 32930 as a combined drainage fauna structure (arch 4.0m high x 9.0m wide) with a note that hydrology at this location would need to be reviewed during detailed design to confirm dry passage of fauna for most times of the year.

Trust this addresses your queries.

Regards and thanks

Scott Lawrence
Environmental Services Manager
Pacific Highway

21 Prince Street Grafton
NSW 2460
Mob: 0419 248 583
Ph: (02) 6640 1375

---

**From:** Simone Garwood [mailto:Simone.Garwood@environment.nsw.gov.au]
**Sent:** Friday, 13 May 2011 3:20 PM
**To:** LAWRENCE Scott B; Brett Nudd
**Cc:** HIGGINS Bob G; Craig Harre; FENNER Roger D; EASTWOOD Mark
**Subject:** RE: WC2U - biodiversity connectivity

**Importance:** High

Hi Scott,

Thankyou for the RTA's time taken on this matter and to review the projects connectivity structures in consultation with OEH. We acknowledge the efforts made to achieve a bridge structure at Dalhousie Creek and environmental outcome it will achieve.

With regards to the error in our letter dated 10 May 2011, I wish to correct that the chainage should read **19350** not 9350. On the basis of the combined fauna/culvert at Ch: 19820 being reverted back to the original design, we thought any remaining costs savings would be well spent in upgrading the drainage structure at Chainage at 19350 and for this to be upgrade to a combined fauna culvert. Based on corridors and habitats, we consider the opportunity to implement fauna connectivity structure at Chainage 19350 would be much more effective than a combined structure at Chainage **19820**.

We note that there was no change or feedback on OEH's recommendation for the RTA to investigate the opportunity to remove the dedicated fauna underpass at Ch: 32780 and revise the design of the next drainage structure to the north as a combined 9m x 4m arched fauna/drainage culvert, pending hydrology and effective portion of dry passage.

Therefore, it would be appreciated if the RTA could clarify whether there are opportunities to revise the structures at Chainages 19350 and 32780.

Happy to further discuss

Kind Regards
Simone.

---

**From:** LAWRENCE Scott B [mailto:Scott_LAWRENCE@rta.nsw.gov.au]
**Sent:** Thursday, 12 May 2011 6:35 PM
**To:** Nudd Brett
**Cc:** HIGGINS Bob G; Harre Craig; Garwood Simone; FENNER Roger D; EASTWOOD Mark
**Subject:** RE: WC2U - biodiversity connectivity
**Importance:** High

All,

Please see attached final revised fauna crossing locations for WC2U.

With the potential cost savings identified from last Friday's meeting and as outlined in your letter 10 May 2011 (attached) we were able to provide a bridge over Dalhouse Creek with a minimum span length of 15 meters. I note through previous discussions with Simone that OEH letter attached has an error with reference to increasing the size of the culvert south of CH 9350 and this has not been included in the revised fauna crossing structure and locations

We were also able to accommodate an increase in the culvert size at CH 28565 to a 3600 wide x 3000 high combined drainage fauna structure,

I have attached the full list of fauna crossing structures dedicated, combined and incidental. with the changes highlighted since our last meeting (6th May 2011). Changes from the Submission Report dated November 2010.are also provided in this attachment.

I can confirm that the bridge structure at 37950 (dry corridor) will stay as a bridge with a minimum 15 meter span.

To allow WC2U Draft CoAs to progress could you please confirm OEH agreement to the proposed structures and locations provided in the second attachment. Your earliest attention to this matter is appreciated.

If you have any questions please feel free to call me.

Regards and thanks

Scott Lawrence
Environmental Services Manager
Pacific Highway

21 Prince Street Grafton
NSW 2460
Mob: 0419 248 583
Ph: (02) 6640 1375

---

**From:** Brett Nudd [mailto:Brett.Nudd@environment.nsw.gov.au]
**Sent:** Tuesday, 10 May 2011 12:44 PM
**To:** LAWRENCE Scott B
**Cc:** Craig Harre; Simone Garwood
**Subject:** WC2U - biodiversity connectivity

Scott – a letter to confirm your discussions with Simone and Craig last Friday regarding the biodiversity connectivity strategy for Warrell Ck to Urunga.

Happy to discuss

Regards Brett

Brett Nudd I Manager North Coast Region I Environment Protection and Regulation Group I Office of Environment and Heritage I Telephone 02 66402501 / 66598250 I Mobile 0428985173 I

contain confidential and/or privileged information.
If you are not the intended recipient, please notify the sender and then delete it immediately.
Any views expressed in this email are those of the individual sender except where the sender expressly and with authority states them to be the views of the Office of Environment and Heritage, NSW Department of Premier and Cabinet.

PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL



---

This email is intended for the addressee(s) named and may contain confidential and/or privileged information.
If you are not the intended recipient, please notify the sender and then delete it immediately.
Any views expressed in this email are those of the individual sender except where the sender expressly and with authority states them to be the views of the Office of Environment and Heritage, NSW Department of Premier and Cabinet.

PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS EMAIL