Our ref: DOC20/34072-9
Your ref: SSI-7474

Mick Fallon
Senior Planning Officer
Transport Assessments
mick.fallon@planning.nsw.gov.au

Dear Mick

Inland Rail Narrabri to North Star – Submissions Preferred Infrastructure Report – Hydrology and Flooding

Thank you for your email dated 9 December 2019 to the Biodiversity and Conservation Division (BCD) of the Department of Planning, Industry and Environment inviting comments on the Submissions Preferred Infrastructure Report (SPIR) for the Inland Rail Narrabri to North Star (N2NS) project.

In addition to the response BCD provided to you on 20 January 2020 regarding biodiversity and Aboriginal cultural heritage, we have now completed a review of the Flood Study Report (Appendix E) and associated attachments. BCD's hydrology and flooding recommendations are provided in **Attachment A** and detailed comments are provided in **Attachment B**. If you require any further information regarding this matter, please contact Renee Shepherd, Acting Senior Team Leader, via 6883 5355 or renee.shepherd@environment.nsw.gov.au.

Yours sincerely

29 January 2020

Debbie Love
Acting Director North West
Biodiversity and Conservation Division

Cc: Alexander Scott, Team Leader, Transport Assessments, Planning and Assessment Group

Enclosure: Attachments A and B

Planning, Industry & Environment

Attachment A

BCD's Recommendations

Inland Rail Narrabri to North Star – Submissions Preferred Infrastructure Report

Hydrology and Flooding

1. Provide BCD with spatial data of areas affected by watercourse instability in the rail corridor vicinity, and land that may be affected by residual erosion risks.

2. Consideration should be given to implementing erosion threshold guidelines outlined in the *Floodplain Management Plan for the Gwydir Valley Floodplain 2016*.

3. Section 6.2 should state that landholder consultation will occur where land is impacted by increased afflux and flood duration.

4. Identification of erosion instability areas (both riparian and floodplain) in the vicinity of the rail corridor (up to 100 metres) that have the potential to be affected by residual erosion risks should be included as recommended further work in section 6.2. Landholder consultation should also be undertaken as part of this work to identify erosion sites and solutions.

Planning, Industry & Environment

Attachment B

BCD's Detailed Comments

Inland Rail Narrabri to North Star – Submissions Preferred Infrastructure Report

Hydrology and Flooding

1. Refined hydrological and hydraulic modelling have been undertaken

Recognition is given to the earlier BCD (former OEH) comments regarding the EIS Flood Study Report, and further comments provided in April 2018. The comments included concerns raised in relation to the need to provide better modelling and spatial data (flood extents and changes to flood levels, velocities and duration) to better assess impacts for affected areas both upstream and downstream of the rail corridor.

These concerns for the most part have been addressed in the SPIR report with refined methodologies adopted for both:

- hydrology modelling (calibrated runoff routing [RORB]) with design flows subject to model parameter sensitivity testing and validation against regional design flow estimates and earlier modelling work undertaken by GHD in 2017), and
- hydraulic modelling (2D flood flow [TUFLOW]) modelling incorporating rail formations, bridges and culverts for the range of adopted design flows: 39% AEP, 10% AEP, 1% AEP and .05% AEP).

The refined modelling is supported with detailed mapping of modelling results including existing conditions showing simulated flood extents, depth, velocity and duration, as well as changes to flood extent, depth, velocity and duration due to design rail formations, road crossings, culverts and bridges. BCD has no further recommendations.

2. Concerns regarding erosion and maximum allowable velocity thresholds have not been addressed

Previous BCD concerns regarding erosion affecting watercourse instability and new erosion of cropping areas downstream of rail structures have not been addressed. Later concerns raised about Flood Management Objectives (FMOs) and the Requirements Analysis, Allocation and Traceability Matrix (RAATM) maximum allowable velocity thresholds in the draft SPIR report, dating back to May 2019, also remain. Requested spatial data of areas affected by watercourse instability in the vicinity of rail corridors and land use which can be affected by residual erosion risks has not been provided.

Although scour protection measures for culverts is a priority for ARTC, the design of culverts is focussed on meeting allowable afflux criteria, with velocities at culvert outlets exceeding 2.5m/s being common. Re-design of structures to deal with outlet velocities associated with residual erosion risks is deemed to be too cost prohibitive. BCD through its involvement with DPIE Water in the development of rural floodplain management plans has in previous feedback indicated that consideration should be given to the erosion threshold guidelines outlined in the *Floodplain Management Plan for the Gwydir Valley Floodplain 2016*. These thresholds highlight the need to

minimise the impact on soil erodibility by considering ground cover. As an example, velocities in general should not exceed 0.5 m/s although this would be subject to site specific assessment of soils and erodibility – whereas in vegetated riparian zones velocities of up to 1 m/s may be allowed.

Recommendation 1

Provide BCD with spatial data of areas affected by watercourse instability in the rail corridor vicinity, and land that may be affected by residual erosion risks.

Recommendation 2

Consideration should be given to implementing erosion threshold guidelines outlined in the *Floodplain Management Plan for the Gwydir Valley Floodplain 2016*.

3. Further work regarding landholder consultation and erosion instability areas should be added to section 6.2

BCD notes and supports ARTC's approach to deal with locations where modelling has identified non-compliance with building afflux criteria (10mm) including the need for landowner consultation and re-design of rail structures (where afflux exceeds 10cm). The recognition for the need for landowner consultation where agricultural land is impacted by increased afflux and flood duration is also supported but there needs to be a confirmation of this additional work in section 6.2.

The need for further work should also include the identification of erosion instability areas (riparian and floodplain) in the vicinity of the rail corridor (up to 100 metres) which have the potential to be affected by residual erosion risks. This should be supplemented by landowner consultation to raise awareness and assist in identifying solutions.

Recommendation 3

Section 6.2 should state that landholder consultation will occur where land is impacted by increased afflux and flood duration.

Recommendation 4

Identification of erosion instability areas (both riparian and floodplain) in the vicinity of the rail corridor (up to 100 metres) that have the potential to be affected by residual erosion risks should be included as recommended further work in section 6.2. Landholder consultation should also be undertaken as part of this work to identify erosion sites and solutions.