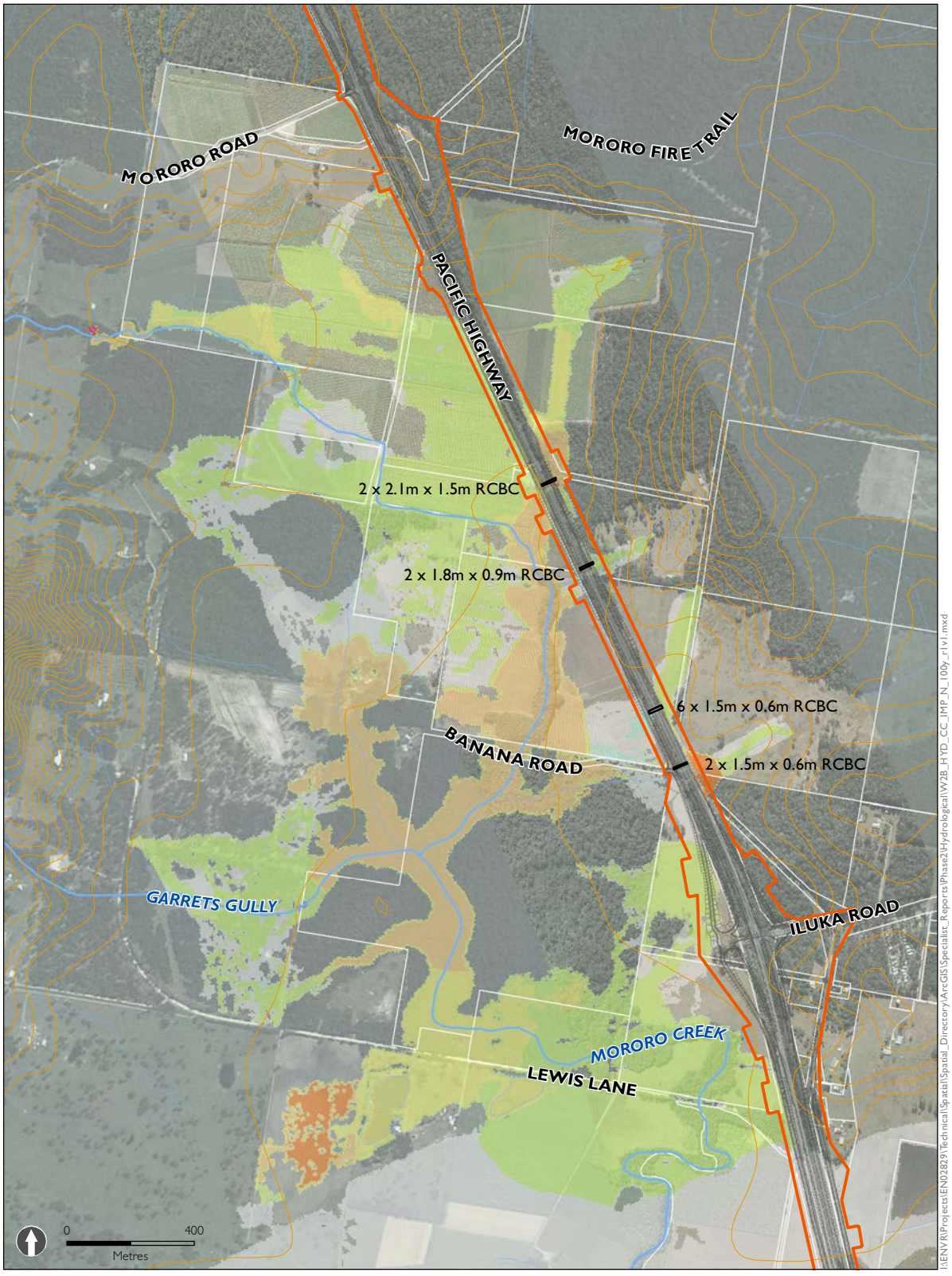
7.4.11. Mororo Creek

A map of the Mororo Creek flood impacts under climate change conditions in the 100 year ARI event are presented in Figure 7-45.

A localised area upstream of the two 1.5 metre by 0.6 metre box culverts experiences impacts of up to 190 millimetres in the 100 year ARI flood under climate change conditions. This is within project flood level impact objectives. Other areas of impact are consistent with the current climate scenario.

In summary, the flood assessment under climate change conditions indicates that the structure capacity of the project is sufficient to meet the flood design objectives for both flood immunity and flood level impacts under these conditions.

Figure 7-45 Flood impacts under 100 year ARI climate change scenario: Clarence River North Arm and Mororo Creek



7.4.12. Tabbimoble Creek

At the proposed 55 metre bridge over creek north of the Tullymorgan-Jackybulbin Road / Pacific Highway intersection (on the upstream project boundary), under existing conditions the predicted impact is about zero millimetres in the 100 year ARI flood. Under climate change conditions, at the same location, the predicted impact is about 60 millimetres (see Figure 7-46).

There is a potential for climate change to reduce the design flood immunity of the project through increasing flood levels. The flood modelling carried out under climate change conditions indicates that the predicted peak 100 year ARI flood levels with the upgrade would be around 200 millimetres higher under climate change conditions (see Figure 7-46) at the 55 metre bridge. However, the project would still meet the design flood immunity objectives at this location under climate change conditions. The detailed design phase should consider the need for maintaining the 300 millimetres clearance under the bridge deck required for debris passage.

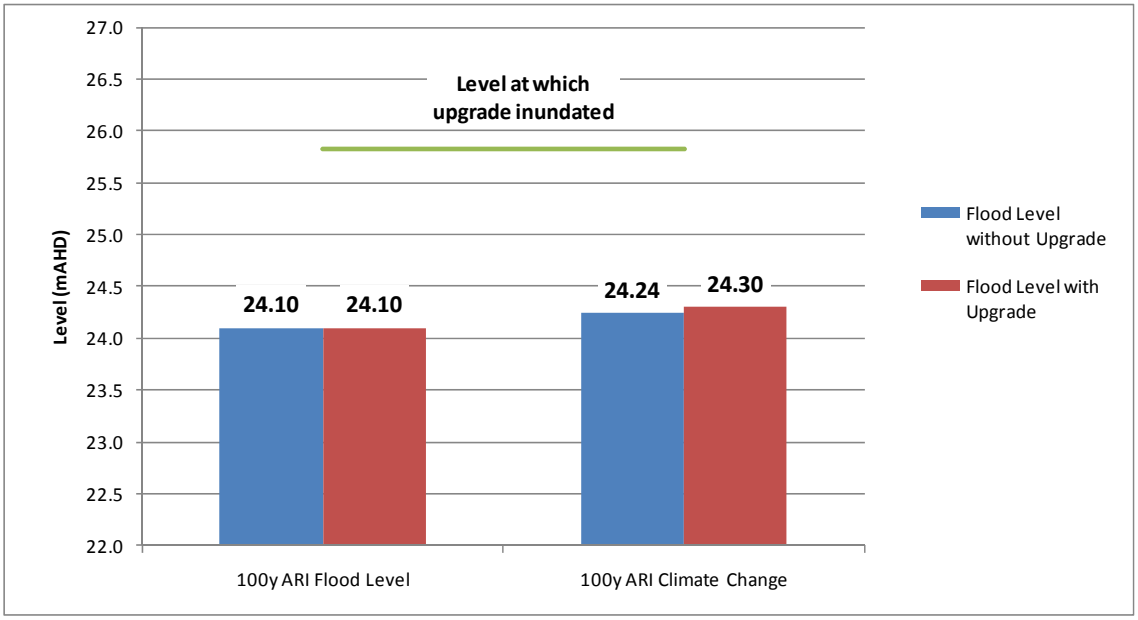


Figure 7-46 Flood impacts 100 year ARI event at bridge at station 102.85 under existing and climate change scenarios

At the proposed 100 metre bridge over Tabbimoble Creek (on the upstream project boundary), under existing conditions the project is predicted to decrease flood levels by 180 millimetres in the 100 year ARI flood. Under climate change conditions, at the same location, the project causes a decrease in flood levels of 30 millimetres (see Figure 7-47).

There is a potential for climate change to reduce the design flood immunity of the project through increasing flood levels. The flood modelling carried out under climate change conditions indicates that the predicted peak 100 year ARI flood levels with the upgrade would be around 290 millimetres higher under climate change conditions (see Figure 7-47) at the 100 metre bridge. However, the project would still meet the design flood immunity objectives at this location under climate change conditions. The detailed design phase should consider the need for maintaining the 300 millimetres clearance under the bridge deck required for debris passage.

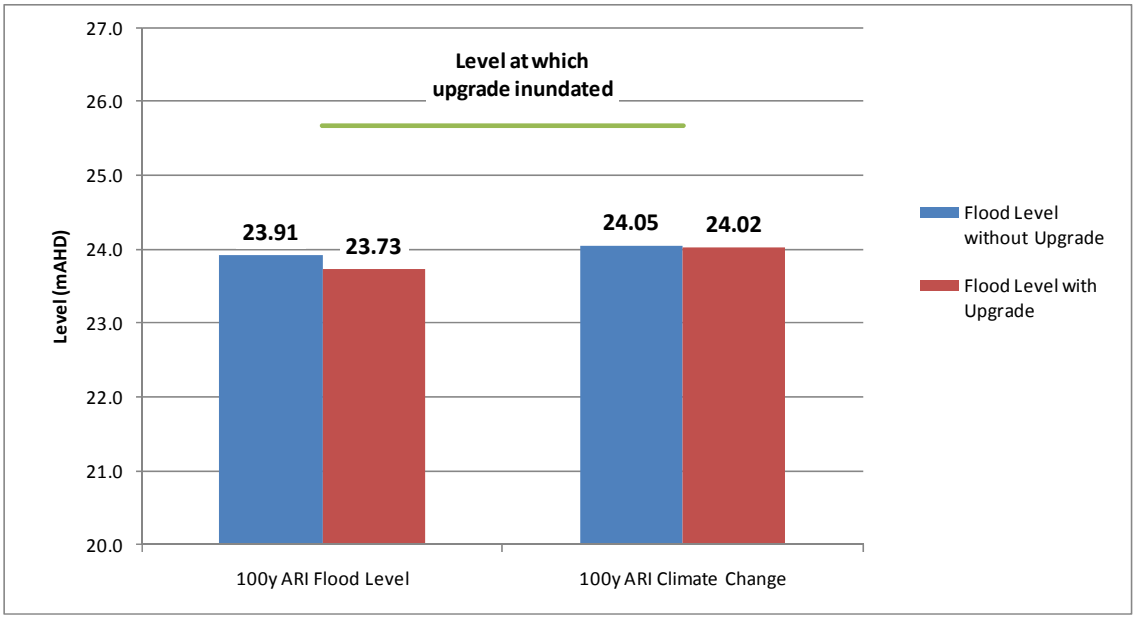


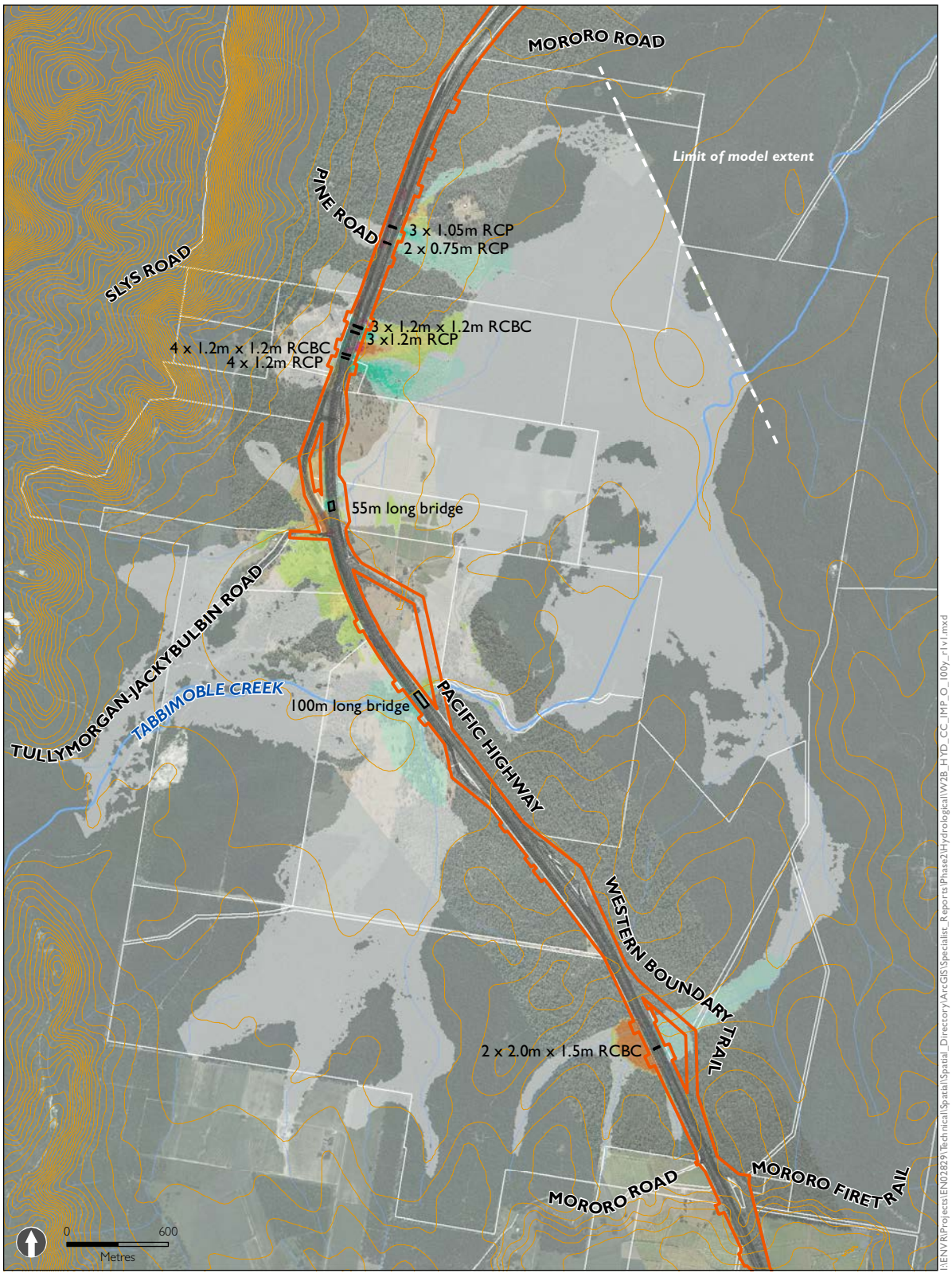
Figure 7-47 Flood impacts 100 year ARI event at Tabbimoble Creek bridge at station 101.54 under existing and climate change scenarios

A map of the Tabbimoble Creek flood impacts under climate change conditions in the 100 year ARI event are presented in Figure 7-48.

Areas experiencing impact under climate change conditions are consistent with the areas experiencing impact under current climate conditions for the 100 year ARI flood event.

In summary, the flood assessment under climate change conditions indicates that the structure capacity of the project is sufficient to meet the flood design objectives for both flood immunity and flood level impacts under these conditions.

Figure 7-48 Flood impacts under 100 year ARI climate change scenario: Tabbimoble Creek



7.4.13. Tabbimoble Floodway No. 1

At the proposed 65 metre bridge crossing (on the upstream project boundary), under existing conditions the predicted impact is about 105 millimetres in the 100 year ARI flood. At the same location under climate change conditions, the project is predicted to decrease flood levels by 40 millimetres (see Figure 7-49).

There is a potential for climate change to reduce the design flood immunity of the project through increasing flood levels. The flood modelling carried out under climate change conditions indicates that the predicted peak 100 year ARI flood levels with the upgrade would be around 90 millimetres higher under climate change conditions (see Figure 7-49) at the 65 metre bridge. However, the project would still meet the design flood immunity objectives at this location under climate change conditions. The detailed design phase should consider the need for maintaining the 300 millimetres clearance under the bridge deck required for debris passage.

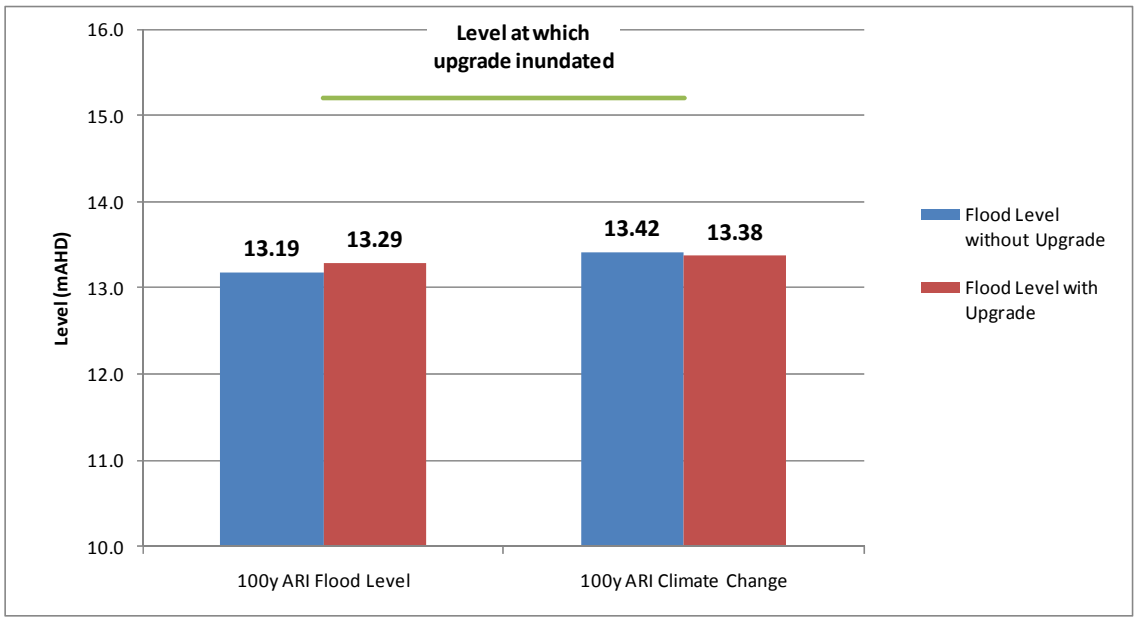


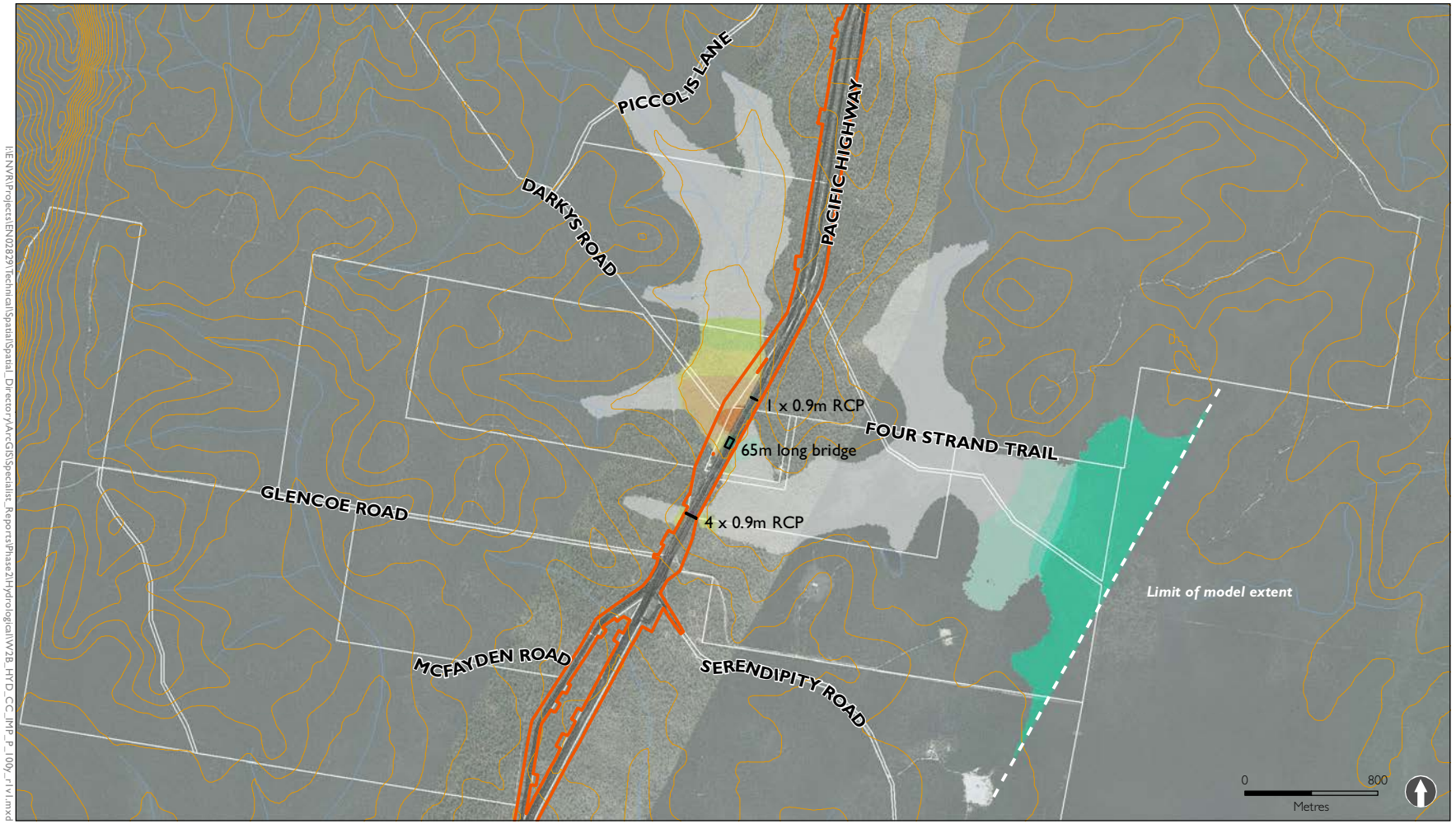
Figure 7-49 Flood impacts 100 year ARI event at bridge at station 115.27 under existing and climate change scenarios

A map of the Tabbimoble Floodway flood impacts under climate change conditions in the 100 year ARI event are presented in Figure 7-50.

Upstream of the project boundary, the maximum flood impact experienced under climate change conditions for the 100 year ARI flood event is 75 millimetres (previously around 70 millimetres under current climate conditions).

In summary, the flood assessment under climate change conditions indicates that the structure capacity of the project is sufficient to meet the flood design objectives for both flood immunity and flood level impacts under these conditions.

Figure 7-50 Flood impacts under 100 year ARI climate change scenario: Tabbimoble Floodway No. 1



7.4.14. Oakey Creek

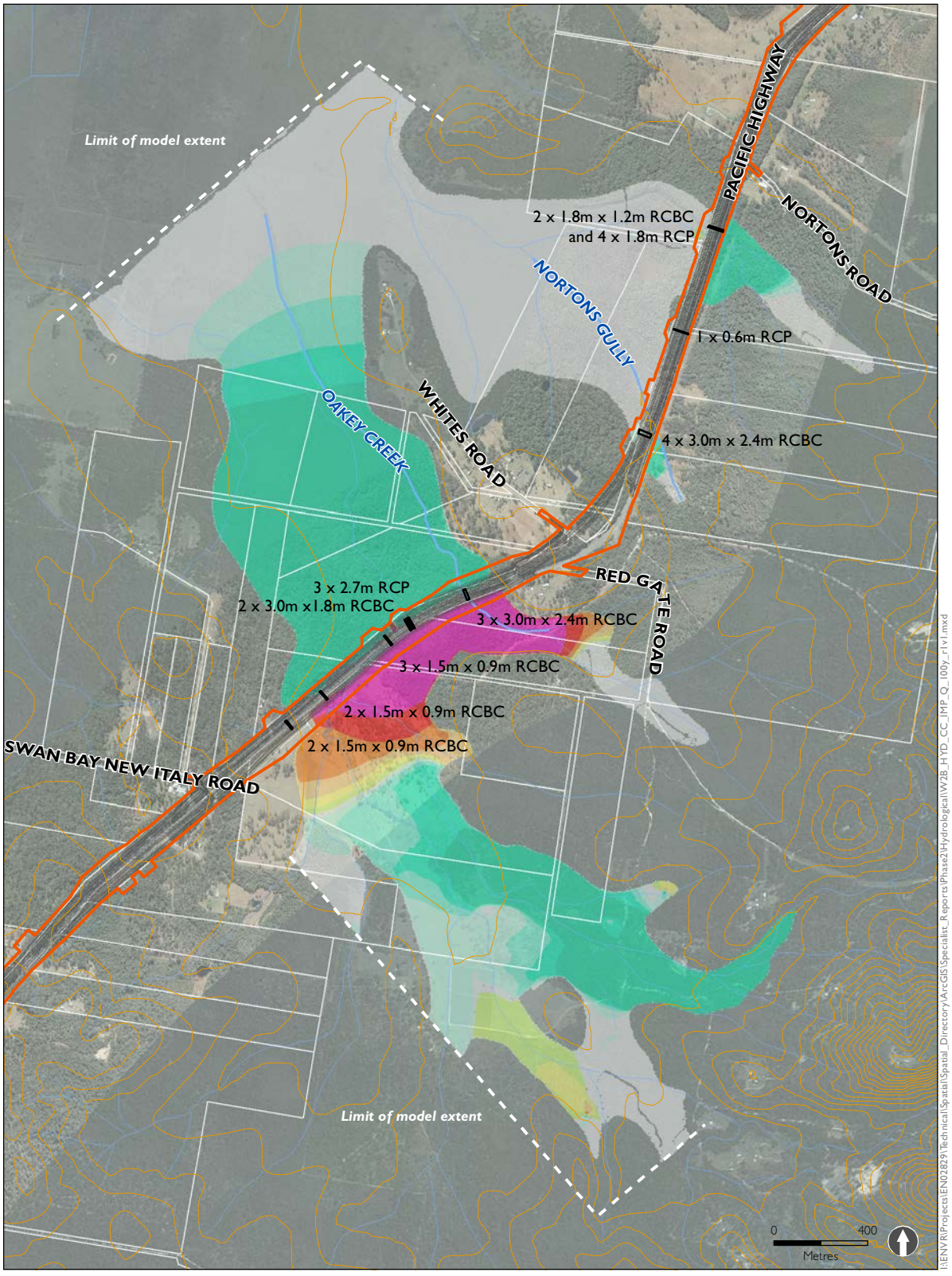
A map of the Oakey Creek flood impacts under climate change conditions in the 100 year ARI event are presented in Figure 7-51.

An area of approximately 0.2 square kilometres upstream of the project boundary experiences impacts between 250 and 390 millimetres under climate change conditions in the 100 year ARI flood event (previously an area of 0.04 square kilometres under existing climate conditions). This is within flood level impact objectives.

A shed located upstream of the project experiences impacts of up to 115 millimetres under climate change conditions in the 100 year ARI flood event. This is above the flood level impact objectives; however, the likelihood of the shed being located there in 2100 must be considered.

In summary, the flood assessment under climate change conditions indicates that the structure capacity of the project is sufficient to meet the flood design objectives for both flood immunity and flood level impacts under these conditions.

Figure 7-51 Flood impacts under 100 year ARI climate change scenario: Oakey Creek



7.4.15. Mid Richmond River

At the proposed 100 metre span bridge over Tuckombil Canal (on the upstream project boundary), under existing conditions the predicted impact is about zero millimetres in the 20 year ARI flood. Under climate change conditions, at the same location, the project is predicted to decrease flood levels by 40 millimetres (see Figure 7-52).

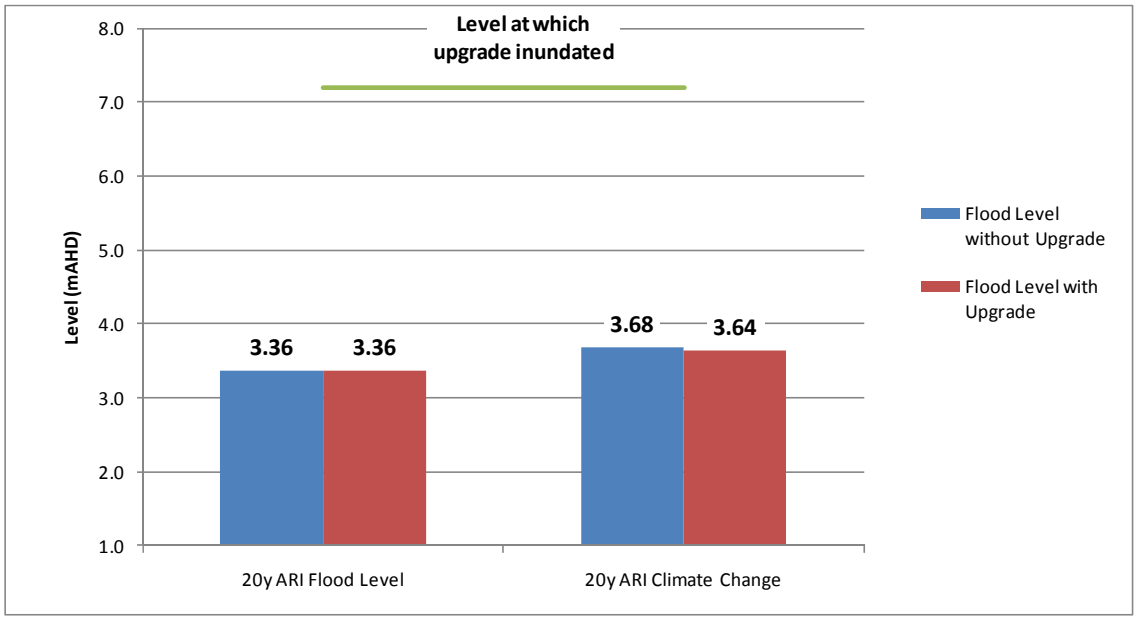


Figure 7-52 Flood impacts 100 year ARI event at bridge over Tuckombil Canal at station 130.11 under existing and climate change scenarios

At the proposed 60 metre span bridge over the left floodplain of Tuckombil Canal/Evans River (on the upstream project boundary), under existing conditions the predicted impact is about 10 millimetres in the 20 year ARI flood. Under climate change conditions, at the same location, the predicted impact is about 15 millimetres (see Figure 7-53).

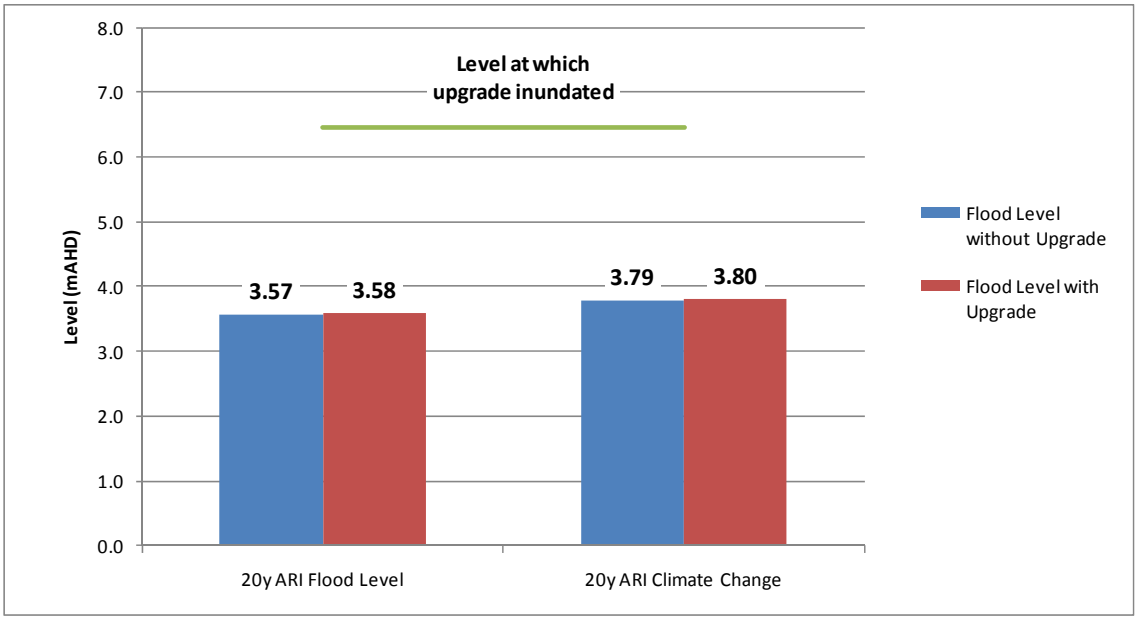


Figure 7-53 Flood impacts 100 year ARI event at bridge at station 131.07 under existing and climate change scenarios

At the proposed 10 metre bridge crossing (on the upstream project boundary), under existing conditions the predicted impact is about 15 millimetres in the 20 year ARI flood. Under climate change conditions, at the same location, the predicted impact is about 25 millimetres (see Figure 7-54).

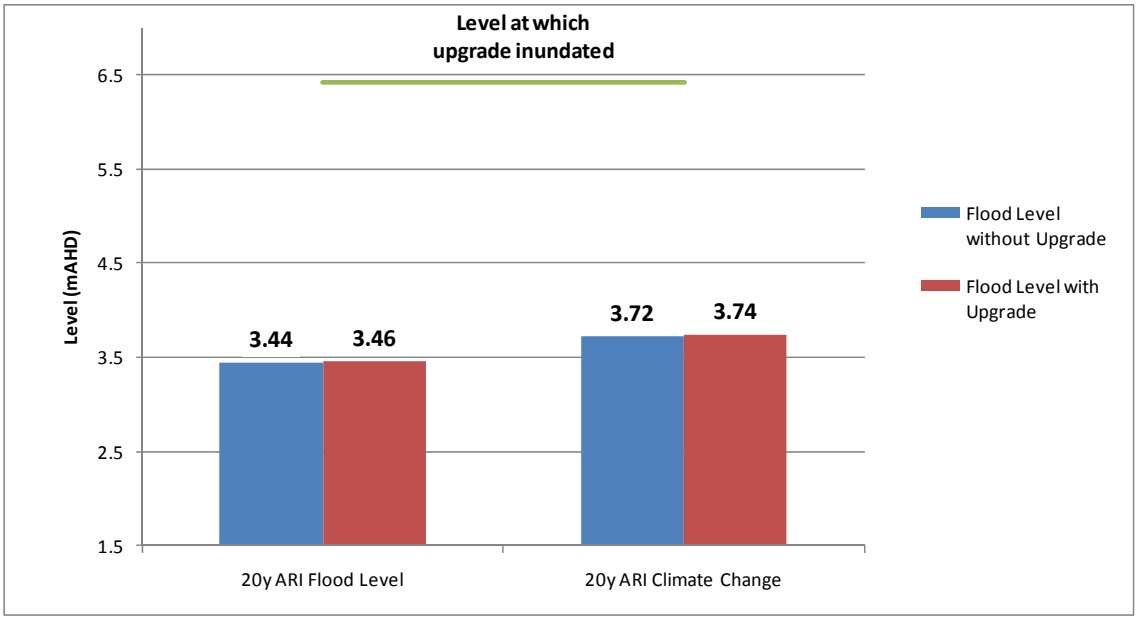


Figure 7-54 Flood impacts 100 year ARI event at bridge at station 136.67 under existing and climate change scenarios

At the proposed 60 metre span bridge to convey floodwaters on the right floodplain of the Richmond River (on the upstream project boundary), under existing conditions the predicted impact is about five millimetres in the 20 year ARI flood. Under climate change conditions, at the same location, the predicted impact is about 20 millimetres (see Figure 7-55).

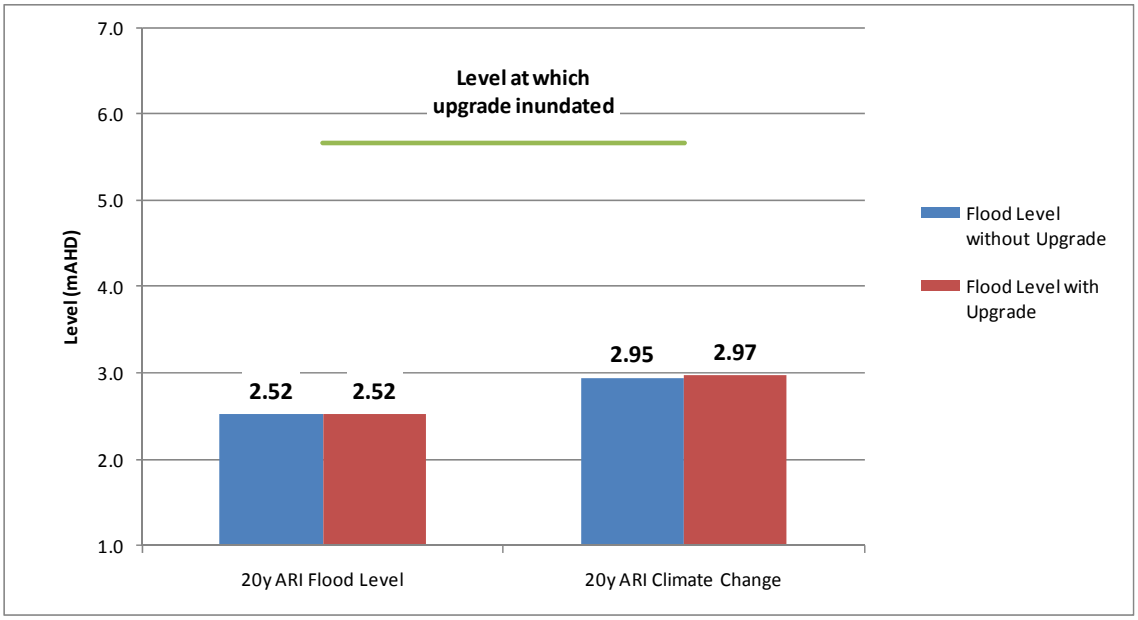


Figure 7-55 Flood impacts 100 year ARI event at bridge at station 145.11 under existing and climate change scenarios

At the proposed bridge over the Richmond River (on the upstream project boundary), under existing conditions the predicted impact is about 10 millimetres in the 20 year ARI flood. Under climate change conditions, at the same location, the predicted impact is about 20 millimetres (see Figure 7-56).

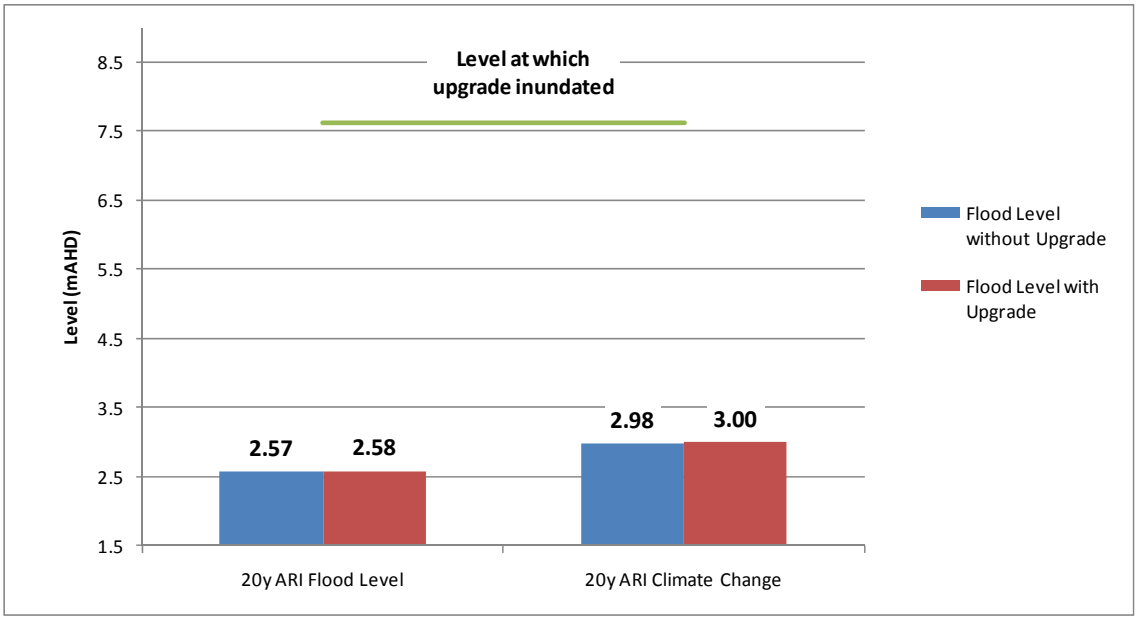


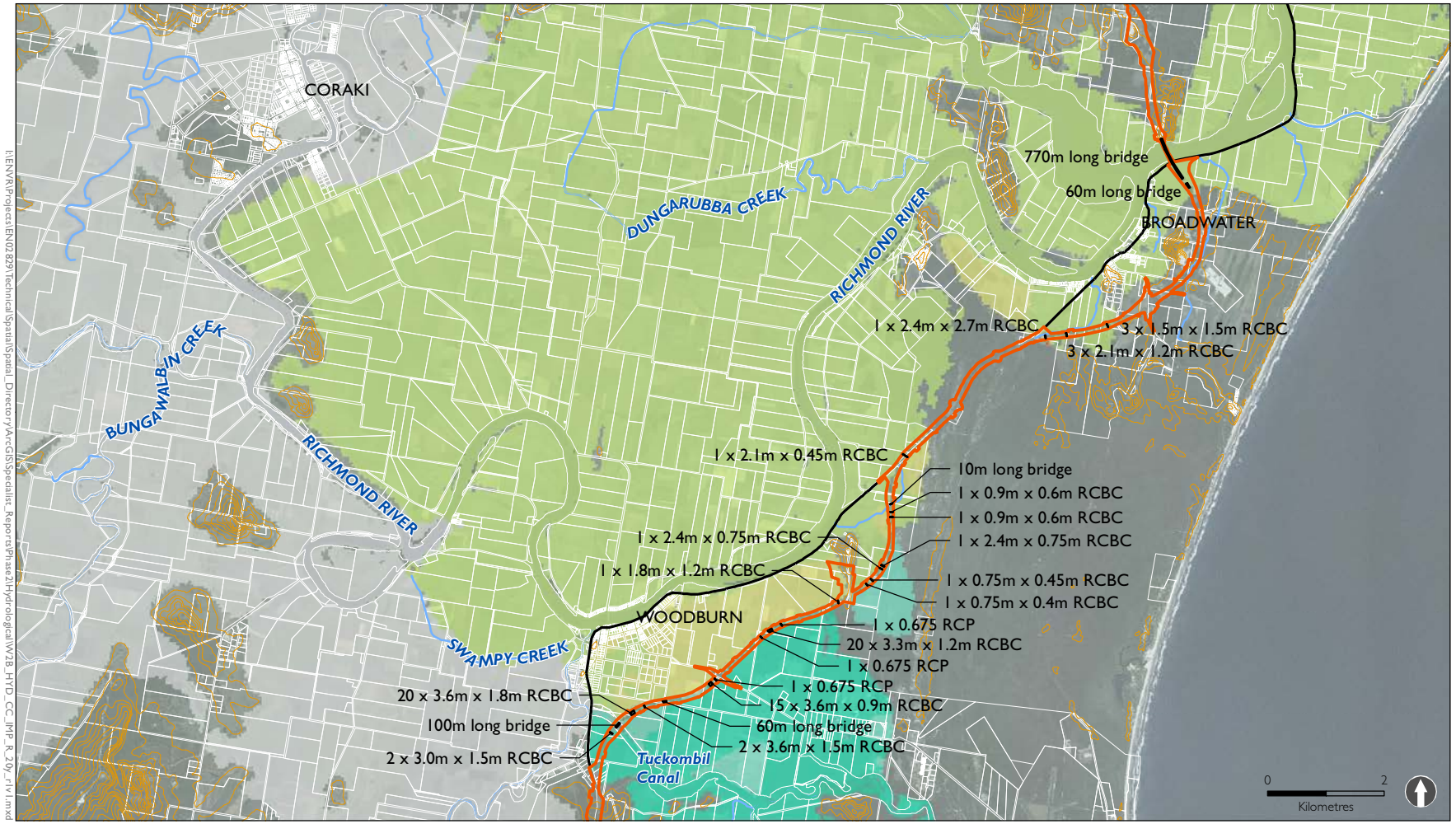
Figure 7-56 Flood impacts 100 year ARI event at bridge over Richmond River at station 145.29 under existing and climate change scenarios

There is a potential for climate change to reduce the design flood immunity of the project through increasing flood levels. The flood modelling indicates that the predicted peak 20 year ARI flood levels with the project under climate change conditions would increase by about 270 millimetres near Woodburn.

- These required increases in embankment height would be considered further as part of the adaptive approach to climate change that is proposed for the project
- This estimated increase in embankment height has not been incorporated into the road design. However, the project boundaries have been designed so as to provide adequate space should road embankment heights be increased in the future.

A map of the Mid Richmond River flood impacts under climate change conditions in the 20 year ARI event are presented in Figure 7-57.

Figure 7-57 Flood impacts under 20 year ARI climate change scenario: Mid Richmond River



The project

Existing Pacific Highway

10m ground level contours (indicative)

Flood impacts - m

-0.075-0.050-0.025-0.005 0.005 0.025 0.050 0.075 0.150