

## APPENDIX 17B-1-V2.4

---

### AQUATIC ECOLOGY

- Summary of creek crossing mitigation measures for the proposed southern CSM water supply pipeline



## APPENDIX 17B-1-V2.4

### Summary of creek crossing mitigation measures for the proposed southern CSM water supply pipeline

Site	Recommended pipeline crossing		Recommended road crossing		Fish salvage required?	Water quality monitoring required?	Description of required rehabilitation	Minimum width of planted riparian vegetation
	Dry conditions	Wet conditions	Dry conditions	Wet conditions				
2	Open cut	Isolate with steel plates.	Use existing road and culvert.	Use existing road and culvert.	Required only at pipeline crossing in wet conditions.	Required only at pipeline crossing in wet conditions.	Replace sand, boulders and cobbles (clean) in bed when finished. To compensate remove one pipe culvert and replace with a series of box culverts.	20 m
4	Open cut	Isolate with steel plates and sand bags.	Use existing ford.	Isolate with steel plates and install culvert if required.	Required at both pipeline and road crossings in wet conditions.	Required at both pipeline and road crossings in wet conditions if flowing.	To rehabilitate wash gravel, plant riparian vegetation and instream vegetation. Erosion control required. Install culvert at road crossing if required.	Left bank 20 m, right bank 5 m.
5	Open cut or drill	Drill or isolate with steel plates and pump.	Bridge required due to high banks and wide channel.	Isolate and bridge.	Required at both pipeline and road crossings in wet conditions.	Required at both pipeline and road crossings in wet conditions.	Re-vegetate banks and rehabilitate bed and in-stream habitat.	15 m
6	Open cut or drill	Drill or isolate with steel plates and pump.	Bridge	Isolate with steel plates.	Required at both pipeline and road crossings in wet conditions.	Required at both pipeline and road crossings in wet conditions.	Re-vegetate banks and rehabilitate bed and in-stream habitat.	Left bank 30 m, right bank 20 m.
7	Open cut	Isolate with steel plates.	Use existing and create temporary ford	Use existing and create temporary single span	Required at both pipeline and road crossings in wet	Required at both pipeline and road crossings in wet	Rehabilitate bed and bank habitat including re-vegetation. Place any fallen trees into stream	20 m

Site	Recommended pipeline crossing		Recommended road crossing		Fish salvage required?	Water quality monitoring required?	Description of required rehabilitation	Minimum width of planted riparian vegetation
	Dry conditions	Wet conditions	Dry conditions	Wet conditions				
			if required.	bridge or box culvert only if necessary.	conditions.	conditions.	to provide habitat. Vegetation in channel indicates that site will not flow for long.	
8	Open cut	Isolate with steel plates.	Use existing and create temporary ford if required.	Use existing and create single span bridge or box culvert if required. Unlikely to flow for long periods or hold water.	Required at both pipeline and road crossings in wet conditions.	Required at both pipeline and road crossings in wet conditions.	Rehabilitate bed with boulders, cobbles, gravel, etc. Erosion control required. Rehabilitate banks as compensation. Unlikely to flow for long periods or hold water.	15 m
9	Open cut, preferably west of highway.	Water likely to be deep and difficult to isolate. Drill so as to not disturb riparian vegetation. Or isolate with flume or coffer dam.	Use existing bridge and ford downstream (east) of bridge	Use existing bridge.	Required at pipeline crossing in wet conditions if isolated.	Required at pipeline crossing in wet conditions in both cases.	Replace boulders, cobbles and logs in bed when finished. Stabilise banks using seeded sediment mats, planting and placing cobbles and boulders. Preferred crossing at west of highway, as banks are not as steep.	50 m
10	Open cut. Banks are steep, slightly less steep east of the bridge.	Isolate with steel plates or flume.	Use existing. Create temporary ford east of bridge if required.	Use existing bridge. Create temporary single span bridge or culvert only if required.	Required at pipeline crossing in wet conditions. Only required at road crossing in wet conditions if a culvert is required.	Required at pipeline crossing in wet conditions. Only required at road crossing in wet conditions if crosses creek.	Stabilise banks with seeded soil wrap, re-vegetation and or boulders (not concrete). Preferred pipeline crossing east of bridge as banks are not as steep.	Left bank 30 m, right bank 20 m.

Site	Recommended pipeline crossing		Recommended road crossing		Fish salvage required?	Water quality monitoring required?	Description of required rehabilitation	Minimum width of planted riparian vegetation
	Dry conditions	Wet conditions	Dry conditions	Wet conditions				
11	Open cut	Isolate with steel plates.	Use existing or temporary ford.	Use existing highway culvert. Temporary single span bridge or culvert if necessary.	Required at pipeline crossing in wet conditions. Only required at road crossing in wet conditions if a culvert is required.	Required at pipeline crossing in wet conditions. Only required at road crossing in wet conditions if crosses creek.	Rehabilitate bed and banks with vegetation. Erosion control required. Place any fallen trees in channel to provide habitat.	20 m
12	Open cut	Isolate with steel plates.	Use existing or temporary ford.	Use existing and create temporary single span bridge or box culvert only if required.	Required at pipeline crossing in wet conditions. Only required at road crossing in wet conditions if a culvert is required.	Required at pipeline crossing in wet conditions. Only required at road crossing in wet conditions if crosses creek.	Rehabilitate banks with boulders, vegetation and sediment mats if required. Place any fallen trees in channel to provide habitat.	25 m
13	Open cut immediately adjacent to cumvert.	Immediately adjacent to culvert. Don't cross when flowing. Once flow subsides, pipeline area will drain quickly. Difficult to isolate, could divert flow with pumps, but this would also be difficult.	Use existing culvert and ford downstream from culvert.	Use existing culvert.	Required at pipeline crossing only if isolate.	Required at pipeline crossing only if isolate or pump water.	Rehabilitate banks vegetation and bed habitat. Replace boulders and cobbles with excavated or washed ones. Place any fallen trees in pool to provide habitat.	30 m

Site	Recommended pipeline crossing		Recommended road crossing		Fish salvage required?	Water quality monitoring required?	Description of required rehabilitation	Minimum width of planted riparian vegetation
	Dry conditions	Wet conditions	Dry conditions	Wet conditions				
15	Open cut	Sandbag pool to isolate construction area.	Use existing or ford next to culvert.	Use existing	Required at pipeline crossing if isolated.	Required at pipeline crossing if isolated.	Remediation including revegetation.	Left bank 30 m, right bank 40 m.
16	Open cut	Isolate with steel plates.	Use existing ford.	Temporary single span bridge or box culvert.	Required at both pipeline and road crossings in wet conditions.	Required at both pipeline and road crossings in wet conditions.	Rehabilitate including re-vegetation of bed, banks and bend habitats. Stay as close to road as possible.	20 m
17	Open cut	Isolate with steel plates.	Use existing ford.	Temporary single span bridge or box culvert.	Required at both pipeline and road crossings in wet conditions.	Required at both pipeline and road crossings in wet conditions.	Erosion control measures to be used. Stabilise banks when complete. Rehabilitate bed and re-vegetate banks.	10 m
18	Open cut	Isolate with steel plates.	Use existing ford.	Temporary culvert.	Required at both pipeline and road crossings in wet conditions.	Required at both pipeline and road crossings in wet conditions.	Rehabilitate bed and banks with re-vegetation and filling bed with sandy material.	10 m
22	Open cut	Isolate and open cut.	Use existing	Use existing, temporary culvert if required.	Required at pipeline crossing in wet conditions if isolate.	Required at pipeline crossing in wet conditions if isolate. Required at road crossing in wet conditions if culvert.	Rehabilitate riparian vegetation and stream bed.	5 m
Frank Creek	Open cut	Isolate and open cut.	Temporary ford	Temporary culvert if required.	Required at pipeline crossing in wet conditions if isolate.	Required at pipeline crossing in wet conditions if isolate. Required at road	Rehabilitate riparian vegetation and stream bed.	10 m



Site	Recommended pipeline crossing		Recommended road crossing		Fish salvage required?	Water quality monitoring required?	Description of required rehabilitation	Minimum width of planted riparian vegetation
	Dry conditions	Wet conditions	Dry conditions	Wet conditions				
						crossing in wet conditions if culvert.		

1 Small ephemeral stream, not expected to flow for very long after rain