

Appendix C - Assessment of feasibility of construction methodology

Condabri Lateral - Crossings

Watercourse crossing	Location	Crossing type (Stream Order)	Known MNES to occur in catchment	Suitable micro habitat for MNES species	Geotechnical suitability	Ecological constraints for HDD work area	Cost of construction methodology		Infrastructure constraints	Determination if Horizontal Directional Drilling is reasonably possible.	Suitable construction technique	
							Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
Tributary of Condamine River	KP 1.92	Minor (2)	Murray Cod	No	Limited geotechnical information available	Extensive protected Regional Ecosystem 'Not to of concern' 11.5.1a' surrounds crossing.	\$350,000	\$3,750,000	None	<p>Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes.</p> <p>HDD pad would require 1-2ha of clearing sensitive vegetation. This is not reasonably possible as Environmental Authority does not allow for clearing of remnant vegetation without approval.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures to protect aquatic values can be implemented for a fraction of the cost of HDD which will impact sensitive vegetation.</p> <p>Crossing will occur in dry creek.</p> <p>HDD not reasonably possible due to ecological and cost effectiveness of mitigation measures for open cut versus HDD.</p>	Open cut	Open cut
Tributary of Condamine River	KP 6.100	Minor (1)	None	No	Limited geotechnical information available	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	<p>Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>Crossing will occur in dry creek.</p> <p>HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD.</p>	Open cut	Open cut
Tributary of Condamine River	KP 7.510	Major Waterway	Murray Cod	Yes - Wet season	Limited geotechnical information available	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	<p>Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>Crossing will occur in dry creek.</p> <p>HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD.</p>	Open cut	No construction during high flow, wait until flows reduce.
Condamine River	KP12.900	Major Waterway	Murray Cod	Yes	Geotechnical investigations have determined this site suitable for HDD	Small strip of endangered Regional Ecosystem south side of crossing,	\$965,000	\$12,100,000	None	<p>Crossing expected to be wet at time of crossing during dry season.</p> <p>Feasible for drill pad to be set up behind and avoid impact on ground truthed sensitive vegetation.</p> <p>Due to size, cultural heritage and land owner constraints and the possible impact to Murray Cod this site will be HDD.</p>	HDD	HDD

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							Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
Columboola Creek	KP 25.800	Major Waterway	Murray Cod	Yes - Wet season	Younger Kumbarilla and Tertiary sandstones have variable quartz. Variability indicates unpredictable drilling conditions	Regrowth 11.3.25 within riparian area	\$350,000	\$4,900,000	None	Due to variability of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions. Break outs result in drilling mud being released into a watercourse and impacting on ecosystems up and downstream. HDD not reasonably possible due to geotechnical constraints and prohibitive costs.	Open cut	No construction during high flow, wait until flows reduce.
Tributary to Columboola Creek	KP 30.09	Minor (1)	Murray Cod	No	Younger Kumbarilla and Tertiary sandstones have variable quartz. Variability indicates unpredictable drilling conditions	Riparian zone on both sides of crossing	\$350,000	\$3,750,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Due to variability of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions. Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures to protect aquatic values can be implemented for a fraction of the cost of HDD Crossing will occur in dry creek. HDD not reasonably possible due to geotechnical constraints and cost effectiveness of mitigation measures for open cut versus HDD.	Open cut	Open cut
Tributary to Columboola Creek	KP 31.27	Minor (2)	Murray Cod	No	Younger Kumbarilla and Tertiary sandstones have variable quartz. Variability indicates unpredictable drilling conditions	Riparian zone on both sides of crossing	\$350,000	\$3,750,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Due to variability of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions. Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures to protect aquatic values can be implemented for a fraction of the cost of HDD Crossing will occur in dry creek. HDD not reasonably possible due to geotechnical constraints and cost effectiveness of mitigation measures for open cut versus HDD.	Open cut	Open cut

Watercourse crossing	Location	Crossing type (Stream Order)	Known MNES to occur in catchment	Suitable micro habitat for MNES species	Geotechnical suitability	Ecological constraints for HDD work area	Cost of construction methodology		Infrastructure constraints	Determination if Horizontal Directional Drilling is reasonably possible.	Suitable construction technique	
							Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
Unnamed	KP37.55	Minor (2)	None	No	Younger Kumbarilla and Tertiary sandstones have variable quartz. Variability indicates unpredictable drilling conditions	Riparian zone on both sides of crossing	\$350,000	\$3,750,000	None	<p>Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes.</p> <p>Due to variability of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures to protect aquatic values can be implemented for a fraction of the cost of HDD</p> <p>Crossing will occur in dry creek.</p> <p>HDD not reasonably possible due to geotechnical constraints and cost effectiveness of mitigation measures for open cut versus HDD.</p>	Open cut	Open cut
Dogwood Creek	KP44.81	Major Waterway	Murray Cod	Yes - Wet season	Younger Kumbarilla and Tertiary sandstones have variable quartz. Variability indicates unpredictable drilling conditions	Of concern Regional Ecosystem 11.7.4, 11.5.4a and 11.3.4 on north and south sides of the creek. High habitat value.	\$965,000	\$12,100,000	None	<p>Due to variability of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream and springs.</p> <p>Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures to protect aquatic values can be implemented for a fraction of the cost of HDD which will impact sensitive vegetation.</p> <p>HDD not reasonably practical due to ecological constraints, prohibitive cost of HDD and geotechnical constraints</p>	Open cut	No construction during high flow, wait until flows reduce.
Tributary to Dogwood Creek	KP 50.27	Minor (2)	Murray Cod	No	Younger Kumbarilla and Tertiary sandstones have variable quartz. Variability indicates unpredictable drilling conditions	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	<p>Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes.</p> <p>Due to variability of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>Crossing will occur in dry creek.</p> <p>HDD not reasonably possible due to geotechnical constraints</p>	Open cut	Open cut

Watercourse crossing	Location	Crossing type (Stream Order)	Known MNES to occur in catchment	Suitable micro habitat for MNES species	Geotechnical suitability	Ecological constraints for HDD work area	Cost of construction methodology		Infrastructure constraints	Determination if Horizontal Directional Drilling is reasonably possible.	Suitable construction technique	
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										and cost effectiveness of mitigation measures for open cut versus HDD.		
Tributary to Dogwood Creek	KP 52.15	Minor (2)	Murray Cod	No	Younger Kumbarilla and Tertiary sandstones have variable quartz. Variability indicates unpredictable drilling conditions	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	<p>Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes.</p> <p>Due to variability of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>Crossing will occur in dry creek.</p> <p>HDD not reasonably possible due to geotechnical constraints and cost effectiveness of mitigation measures for open cut versus HDD.</p>	Open cut	Open cut
Tributary to Dogwood Creek	KP 52.18	Minor (2)	Murray Cod	No	Younger Kumbarilla and Tertiary sandstones have variable quartz. Variability indicates unpredictable drilling conditions	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	<p>Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes.</p> <p>Due to variability of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>Crossing will occur in dry creek.</p> <p>HDD not reasonably possible due to geotechnical constraints and cost effectiveness of mitigation measures for open cut versus HDD.</p>	Open cut	Open cut

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							Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
Tributary to Bottle Tree Creek	KP56.2	Minor (1)	Murray Cod	No	Younger Kumbarilla and Tertiary sandstones have variable quartz. Variability indicates unpredictable drilling conditions	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000		<p>Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes.</p> <p>Due to variability of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>Crossing will occur in dry creek.</p> <p>HDD not reasonably possible due to geotechnical constraints and cost effectiveness of mitigation measures for open cut versus HDD.</p>	Open cut	Open cut
Tributary to Bottle Tree Creek	KP58.00	Minor (2)	Murray Cod	No	Younger Kumbarilla and Tertiary sandstones have variable quartz. Variability indicates unpredictable drilling conditions	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000		<p>Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes.</p> <p>Due to variability of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>Crossing will occur in dry creek.</p> <p>HDD not reasonably possible due to geotechnical constraints and cost effectiveness of mitigation measures for open cut versus HDD.</p>	Open cut	Open cut
L Tree Creek	KP61.40	Major Waterway	Murray Cod	Yes - we season	Younger Kumbarilla and Tertiary sandstones have variable quartz. Variability indicates unpredictable drilling conditions	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$4,900,000	None	<p>Due to variability of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>HDD not reasonably practical due geotechnical and prohibitive</p>	Open cut	No construction during high flow, wait until flows reduce.

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							Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
										cost constraints.		
Tin Hut Creek	KP 63.52	Major (3)	Murray Cod	No	Younger Kumbarilla and Tertiary sandstones have variable quartz. Variability indicates unpredictable drilling conditions	Protected RE 11.5.21 north and south of creek	\$350,000	\$4,900,000	None	<p>Due to variability of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream.</p> <p>Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>HDD not reasonably practical due geotechnical, ecological and prohibitive cost constraints.</p>	Open cut	No construction during high flow, wait until flows reduce.
Bottle Tree Creek	KP 67.1	Major (3)	Murray Cod	No	Younger Kumbarilla and Tertiary sandstones have variable quartz. Variability indicates unpredictable drilling conditions	High Value Regrowth north and south of creek	\$350,000	\$4,900,000		<p>As the vegetation is High Value Regrowth (HVR) it is ecologically preferential not to clear on both sides of the crossing for HDD additional work areas.</p> <p>Due to variability of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream.</p> <p>HDD not reasonably practical due geotechnical, ecological and prohibitive cost constraints.</p>	Open cut	No construction during high flow, wait until flows reduce.
Tributary to Bottle Tree Creek	KP68.75	Major (3)	Murray Cod	No	Younger Kumbarilla and Tertiary sandstones have variable quartz. Variability indicates unpredictable drilling conditions	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$4,900,000		<p>Due to variability of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream.</p> <p>HDD not reasonably practical due geotechnical and prohibitive cost constraints.</p>	Open cut	No construction during high flow, wait until flows reduce.

Mainline - Crossings

Watercourse crossing	Location	Crossing Type (Stream)	Known MNES to occur in	Supports habitat for MNES	Geotechnical suitability	Ecological constraints for	Cost of construction methodology	Infrastructure constraints	Determination if Horizontal Directional Drilling is reasonably possible.	Suitable construction technique
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		order)	catchment	species		HDD work area	Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
Tributary to Dogwood Creek	KP13.30	Minor (1)	None	No	Quartz rich rocks thus quite abrasive and hard. A long process for drilling	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	<p>Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>Crossing will occur in dry creek.</p> <p>HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD.</p>	Open cut	Open cut
Cockatoo Creek	KP75.51	Major Waterway	Fitzroy River Turtle/ Salt pipewort	No	Quartz rich rocks thus quite abrasive and hard. A long process for drilling	High value regrowth on south side of crossing. RE 11.9.7 north of creek and within riparian area	\$350,000	\$4,900,000	None	<p>Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval.</p> <p>HDD not reasonably practical due to ecological constraints</p>	Open cut	No construction during high flow, wait until flows reduce.
Ross Creek South	KP117.35	Major (4)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	RE 11.3.4 south side of creek RE 11.12.6b north of creek	\$350,000	\$4,900,000	None	<p>Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream.</p> <p>Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval.</p> <p>HDD not reasonably practical due to ecological and geotechnical constraints.</p>	Open cut	No construction during high flow, wait until flows reduce.
Ross Creek North	KP119.55	Major (3)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	RE 11.3.4 within riparian areas and meets remnant conditions.	\$350,000	\$4,900,000	None	<p>Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream.</p> <p>Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval.</p> <p>HDD not reasonably practical due to ecological and geotechnical constraints.</p>	Open cut	Open cut
Tributary to Ross Creek	KP120.17	Minor (1)	None	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	Regrowth RE 11.12.2b south of creek	\$350,000	\$3,750,000	None	<p>Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes.</p> <p>Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p>	Open cut	Open cut

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							Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
										Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD.		
Cracow Creek	KP138.17	Minor (2)	Fitzroy River Turtle	No	Limited geotechnical information available	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD.	Open cut	Open cut
Unnamed Tributary	KP148.40	Minor (2)	Fitzroy River Turtle	No	Limited geotechnical information available	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	Crossing scheduled to be undertaken in the dry season and wet season crossing will be avoided. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD.	Open cut	Open cut
Tributary to Horse Creek	KP149.150	Minor (2)	Fitzroy River Turtle	No	Limited geotechnical information available	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD and ecological constraints.	Open cut	Open cut
Horse Creek	KP150.29	Major (3)	Fitzroy River Turtle	No	Limited geotechnical information	HVR within riparian section with regrowth patches.	\$350,000	\$4,900,000	None	Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval.	Open cut	No construction during high flow, wait until

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Unnamed Tributary	KP152.30	Minor (1)	Fitzroy River Turtle	No	Limited geotechnical information available	Grass	\$350,000	\$4,900,000	None	HDD not required as feature does not contain characteristics of a watercourse.	Open cut	Open Cut
Unnamed Tributary	KP152.70	Minor (1)	Fitzroy River Turtle	No	Limited geotechnical information available	Grass	\$350,000	\$4,900,000	None	HDD not required as feature does not contain characteristics of a watercourse.	Open cut	Open Cut
Delusion Creek	KP154.73	Major (4)	Fitzroy River Turtle	No	Limited geotechnical information available	RE 11.3.25 surrounding watercourse. Mapped as HVR with in remnant sate	\$350,000	\$4,900,000	None	Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD and ecological constraints.	Open cut	No construction during high flow, wait until flows reduce.
Oxtrack Creek	KP164.27	Major (4)	Fitzroy River Turtle	No	Limited geotechnical information available	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$4,900,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD.	Open cut	No construction during high flow, wait until flows reduce.
Unnamed tributary	KP184.24	Minor (2)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	RE 11.12.1/11.3.25 surrounding watercourse.	\$350,000	\$3,750,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a	Open cut	Open cut

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Pump Creek	KP189.23	Major (4)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$4,900,000	None	Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions. Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval. Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream. HDD not reasonably possible due to geotechnical constraints.	Open cut	No construction during high flow, wait until flows reduce.
Twenty Mile Creek	KP191.33	Major (4)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	RE 11.11.15/ 11.11.15/11.11.10/ 11.3.25 surrounding watercourse.	\$350,000	\$4,900,000	None	Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions. Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream. HDD not reasonably possible due to geotechnical constraints.	Open Cut	No construction during high flow, wait until flows reduce.
Tributary to Prospect Creek	KP198.84	Minor (2)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions. Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to geotechnical constraints.	Open Cut	Open Cut
Prairie Creek	KP220.54	Major (4)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$4,900,000	None	Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions. Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream.	Open Cut	No construction during high flow, wait until flows reduce.

Watercourse crossing	Location	Crossing Type (Stream order)	Known MNES to occur in catchment	Supports habitat for MNES species	Geotechnical suitability	Ecological constraints for HDD work area	Cost of construction methodology		Infrastructure constraints	Determination if Horizontal Directional Drilling is reasonably possible.	Suitable construction technique	
							Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
					fractured					HDD not reasonably possible due to geotechnical constraints.		
Unnamed Tributary	KP234.91	Minor (2)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	<p>Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes.</p> <p>Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>Crossing will occur in dry creek.</p> <p>HDD not reasonably possible due to geotechnical constraints.</p>	Open cut	Open cut
Unnamed tributary	KP235.66	Major (3)	Fitzroy River Turtle	No	Young alluvial sediments indicate gravel possibly being present	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$4,900,000	None	<p>Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes.</p> <p>Crossing will occur in dry creek.</p> <p>HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD</p>	Open cut	Open cut
Tributary of Kroombit Creek west	KP244.62	Minor (1)	Fitzroy River Turtle	No	Young alluvial sediments indicate gravel possibly being present	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	<p>Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>Crossing will occur in dry creek.</p> <p>HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD</p>	Open cut	Open cut
Kroombit Creek West	KP 245.29	Major (6)	Fitzroy River Turtle	No	Young alluvial sediments gravel suspected being present	Riparian zone on top of banks. Minimal clearing through zone.	\$965,000	\$12,100,000	None	<p>Site has a high possibility of having gravel present during HDD drilling causing the operation to become unstable and increase risk of break out.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD</p>	Open cut	No construction during high flow, wait until flows reduce.

Watercourse crossing	Location	Crossing Type (Stream order)	Known MNES to occur in catchment	Supports habitat for MNES species	Geotechnical suitability	Ecological constraints for HDD work area	Cost of construction methodology		Infrastructure constraints	Determination if Horizontal Directional Drilling is reasonably possible.	Suitable construction technique	
							Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
Kroombit Creek	KP246.10	Major (6)	Fitzroy River Turtle	No	Young alluvial sediments gravel suspected being present	Riparian zone on top of banks. Minimal clearing through zone.	\$965,000	\$12,100,000	None	Site has a high possibility of having gravel present during HDD drilling causing the operation to become unstable and increase risk of break out. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. HDD not reasonably possible due to unstable deep gravel conditions and cost effectiveness of mitigation measures for open cut versus HDD	Open cut	No construction during high flow, wait until flows reduce.
Callide Creek	KP249.2	Major Waterway	Fitzroy River Turtle	Yes - after high flow events No construction during breeding season (Sep - Oct) of Fitzroy River Turtle	Young alluvial sediments gravel suspected being present	Riparian zone on top of banks. Minimal clearing through zone.	\$965,000	\$12,100,000	None	Site has a high possibility of having gravel present during HDD drilling causing the operation to become unstable and increase risk of break out. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. HDD not reasonably possible due to unstable deep gravel conditions and cost effectiveness of mitigation measures for open cut versus HDD	Open cut Avoid nesting season (September to October)	No construction during high flow, wait until flows reduce.
Tributary to Callide Creek	KP252.30	Major (3)	Fitzroy River Turtle	No	Young alluvial sediments indicate gravel possibly being present	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$4,900,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD	Open cut	Open cut
Unnamed	KP254.80	Major (3)	Fitzroy River Turtle	No	Young alluvial sediments indicate gravel possibly being present	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$4,900,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD	Open cut	Open cut
Tributary of	KP256.00	Minor (2)	Fitzroy River	No	Young alluvial	Riparian zone on top of banks.	\$350,000	\$3,750,000	None	Crossing scheduled to be undertaken in the dry season and wet	Open cut	Open cut

Watercourse crossing	Location	Crossing Type (Stream order)	Known MNES to occur in catchment	Supports habitat for MNES species	Geotechnical suitability	Ecological constraints for HDD work area	Cost of construction methodology		Infrastructure constraints	Determination if Horizontal Directional Drilling is reasonably possible.	Suitable construction technique	
							Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
Callide Creek			Turtle		sediments indicate gravel possibly being present	Minimal clearing through zone.				season crossing will be avoided. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD		
Tributary to Oaky Creek	KP263.77	Minor (2)	Fitzroy River Turtle	No	Young alluvial sediments indicate gravel possibly being present	Grassy woodlands	\$350,000	\$3,750,000	None	HDD not required as feature does not have the characteristics of a watercourse	Open cut	Open cut
Collards Creek	KP273.28	Major (3)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	Heavily vegetated remnant RE 11.11.15/ 11.3.25/11. 11.4/11.11.4a surrounding crossing	\$350,000	\$4,900,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions. Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream. Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to ecological and geotechnical constraints. Cost effectiveness of mitigation measures for open cut versus HDD.	Open cut	Open cut
Unnamed Tributary	KP 274.78	Major (3)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	Heavily vegetated remnant RE 11.11.15/ 11.3.25/11. 11.4/11.11.4a surrounding crossing	\$350,000	\$4,900,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions. Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream.	Open cut	Open cut

Watercourse crossing	Location	Crossing Type (Stream order)	Known MNES to occur in catchment	Supports habitat for MNES species	Geotechnical suitability	Ecological constraints for HDD work area	Cost of construction methodology		Infrastructure constraints	Determination if Horizontal Directional Drilling is reasonably possible.	Suitable construction technique	
							Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
										<p>Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>Crossing will occur in dry creek.</p> <p>HDD not reasonably possible due to ecological and geotechnical constraints. Cost effectiveness of mitigation measures for open cut versus HDD.</p>		
Unnamed Tributary Creek	KP277.56	Minor (1)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	RE 11.11.15/11.11.15/11.11.15 /11.11.4 surrounding crossing.	\$350,000	\$3,750,000	None	<p>Crossing scheduled to be undertaken in the dry season and wet season crossing will be avoided.</p> <p>Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream.</p> <p>Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>Crossing will occur in dry creek.</p> <p>HDD not reasonably possible due to ecological and cost geotechnical constraints.</p>	Open cut	Open cut
Bell Creek	KP284.45	Major (3)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	RE 11.3.25 surrounding watercourse. Intact riparian vegetation with woody understory.	\$965,000	\$12,100,000	None	<p>Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval.</p> <p>Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream.</p> <p>HDD not reasonably possible due to ecological and geotechnical constraints</p>	Open cut	Open cut
Unnamed Tributary	KP289.86	Minor (1)	Fitzroy River Turtle	No	Limited geotechnical information	RE 11.12.6/11.12.1 surrounding crossing.	\$350,000	\$3,750,000	Callide Infrastructure Corridor (CIC)	<p>Crossing scheduled to be undertaken in the dry season and wet season crossing will be avoided.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing.</p>	Open cut	Open cut

Watercourse crossing	Location	Crossing Type (Stream order)	Known MNES to occur in catchment	Supports habitat for MNES species	Geotechnical suitability	Ecological constraints for HDD work area	Cost of construction methodology		Infrastructure constraints	Determination if Horizontal Directional Drilling is reasonably possible.	Suitable construction technique	
							Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
					available					<p>More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval.</p> <p>CIC licence corridor mandated by DEEDI allocates a 50m ribbon in which pipeline construction activities may occur. Additional work area required for HDD pad is not feasible under this constraint.</p> <p>Crossing will occur in dry season with open cut.</p> <p>HDD is not reasonably possible due to the inability to acquire additional work area and ecological constraints.</p>		
Sand Gully	KP294.85	Minor (2)	Fitzroy River Turtle	No	Limited geotechnical information available	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	Callide Infrastructure Corridor (CIC)	<p>Crossing scheduled to be undertaken in the dry season and wet season crossing will be avoided.</p> <p>Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD.</p> <p>CIC licence corridor mandated by DEEDI allocates a 50m ribbon in which pipeline construction activities may occur. Additional work area required for HDD pad is not feasible under this constraint.</p> <p>Crossing will occur in dry season with open cut.</p> <p>HDD is not reasonably possible due to the inability to acquire additional work area.</p>	Open cut	Open cut
Harper Creek	KP309.97	Major (3)	Fitzroy River Turtle	No	Limited geotechnical information available	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$4,900,000	Callide Infrastructure Corridor (CIC)	<p>CIC licence corridor mandated by DEEDI allocates a 50m ribbon in which pipeline construction activities may occur. Additional work area required for HDD pad is not feasible under this constraint.</p> <p>HDD is not reasonably possible due to the inability to acquire additional work area.</p>	Open Cut	No construction during high flow, wait until flows reduce.
Calliope River	KP302.19	Major (5)	Fitzroy River Turtle	No	Limited geotechnical information available	Riparian zone on top of banks. Minimal clearing through zone.	\$965,000	\$12,100,000	Callide Infrastructure Corridor (CIC)	<p>CIC licence corridor mandated by DEEDI allocates a 50m ribbon in which pipeline construction activities may occur. Additional work area required for HDD pad is not feasible under this constraint.</p> <p>HDD is not reasonably possible due to the inability to acquire additional work area.</p>	Open cut	No construction during high flow, wait until flows reduce.
Sandy Creek	KP318.09	Minor (2)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	Callide Infrastructure Corridor (CIC)	<p>CIC licence corridor mandated by DEEDI allocates a 50m ribbon in which pipeline construction activities may occur. Additional work area required for HDD pad is not feasible under this constraint.</p> <p>Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions.</p> <p>Break outs result in drilling mud being released into watercourse</p>	Open cut	Open cut

Watercourse crossing	Location	Crossing Type (Stream order)	Known MNES to occur in catchment	Supports habitat for MNES species	Geotechnical suitability	Ecological constraints for HDD work area	Cost of construction methodology		Infrastructure constraints	Determination if Horizontal Directional Drilling is reasonably possible.	Suitable construction technique	
							Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
										and impacting on ecosystems downstream. HDD is not reasonably possible due to the inability to acquire additional work area and geotechnical constraint.		
Alarm Creek	KP314.38	Major (3)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	Riparian zone on top of banks. Minimal clearing through zone.	\$965,000	\$12,100,000	Callide Infrastructure Corridor (CIC)	CIC licence corridor mandated by DEEDI allocates a 50m ribbon in which pipeline construction activities may occur. Additional work area required for HDD pad is not feasible under this constraint. Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions. Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream. HDD is not reasonably possible due to the inability to acquire additional work area and geotechnical constraint.	Open cut	Open cut
Gravel Creek	KP325.45	Major (3)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	Riparian zone on top of banks. Minimal clearing through zone.	\$965,000	\$12,100,000	Callide Infrastructure Corridor (CIC)	CIC licence corridor mandated by DEEDI allocates a 50m ribbon in which pipeline construction activities may occur. Additional work area required for HDD pad is not feasible under this constraint. Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions. Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream. HDD is not reasonably possible due to the inability to acquire additional work area and geotechnical constraint.	Open cut	No construction during high flow, wait until flows reduce.
Larcom Creek	KP327.85	Major (4)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	Riparian zone on top of banks. Minimal clearing through zone.	\$965,000	\$12,100,000	Callide Infrastructure Corridor (CIC)	CIC licence corridor mandated by DEEDI allocates a 50m ribbon in which pipeline construction activities may occur. Additional work area required for HDD pad is not feasible under this constraint. Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions. Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream. HDD is not reasonably possible due to the inability to acquire additional work area and geotechnical constraint.	Open cut	No construction during high flow, wait until flows reduce.
Larcom Creek West	KP334.61	Major Waterway	Fitzroy River Turtle	Yes - after high flow events No construction during	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	Riparian zone on top of banks. Minimal clearing through zone.	\$965,000	\$12,100,000	Gladstone State Development Area (GSDA) - Materials and transport services	GSDA licence corridor mandated by DEEDI allocates a 50m ribbon in which pipeline construction activities may occur. Additional work area required for HDD pad is not feasible under this constraint. Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring	Open cut	No construction during high flow, wait until flows reduce.

Watercourse crossing	Location	Crossing Type (Stream order)	Known MNES to occur in catchment	Supports habitat for MNES species	Geotechnical suitability	Ecological constraints for HDD work area	Cost of construction methodology		Infrastructure constraints	Determination if Horizontal Directional Drilling is reasonably possible.	Suitable construction technique	
							Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
				breeding season (Sep - Oct) of Fitzroy River Turtle	fractured				corridor	during drill in these conditions. Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream. HDD is not reasonably possible due to the inability to acquire additional work area and geotechnical constraint.		
Tributary to Larcom Creek West	KP335.96	Minor (1)	Fitzroy River Turtle	No	Palaeozoic sedimentary rock present significantly folded, jointed and fractured	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	Gladstone State Development Area - Materials and transport services corridor	Crossing scheduled to be undertaken in the dry season and wet season crossing will be avoided. Due to folds and potential fractures of the geotechnical conditions and size of pipe there is an elevated risk of a break out occurring during drill in these conditions. Break outs result in drilling mud being released into watercourse and impacting on ecosystems downstream. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. GSDA licence corridor mandated by DEEDI allocates a 50m ribbon in which pipeline construction activities may occur. Additional work area required for HDD pad is not feasible under this constraint. Crossing will occur in dry season with open cut. HDD is not reasonably possible due to the inability to acquire additional work area, geotechnical constraints and cost.	Open cut	Open cut
Tributary to Larcom Creek	KP 347.99	Minor (1)	Fitzroy River Turtle	No	Limited geotechnical information available	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	Gladstone State Development Area - Materials and transport services corridor	Crossing scheduled to be undertaken in the dry season and wet season crossing will be avoided. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. CIC licence corridor mandated by DEEDI allocates a 50m ribbon in which pipeline construction activities may occur. Additional work area required for HDD pad is not feasible under this constraint. Crossing will occur in dry season with open cut. HDD is not reasonably possible due to the inability to acquire additional work area.	Open cut	No construction during high flow, wait until flows reduce.

Woleebee Lateral - Crossings

Watercourse crossing	Location	Crossing Type (Stream order)	Known MNES to occur in	Supports habitat for MNES	Geotechnical suitability	Ecological constraints for	Cost of construction methodology	Infrastructure constraints	Determination if Horizontal Directional Drilling is reasonably possible.	Suitable construction technique
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		order)	catchment	species		HDD work area	Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
Yuleba Creek	KP1.18	Minor (2)	Murray Cod	No	No geotechnical information available	None	\$350,000	\$3,750,000	None		Open cut	No construction during high flow, wait until flows reduce.
Unnamed Tributary	KP4.85	Major Waterway	Murray Cod	Yes - wet season	No geotechnical information available	RE 11.3.25/11.5.1 surrounding crossing	\$350,000	\$4,900,000	Combabula state forest	Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval. HDD not reasonably possible due ecological and state forest additional work area constraints.	Open cut	No construction during high flow, wait until flows reduce.
Unnamed Tributary	KP 5.76	Minor (2)	Murray Cod	No	No geotechnical information available	RE 11.3.25/11.5.1 surrounding crossing	\$350,000	\$3,750,000	Combabula state forest	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Not feasible for required HDD pad to avoid 1-2ha clearing of sensitive vegetation. Environmental Authority does not allow for clearing of remnant vegetation without approval. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due ecological and state forest additional work area constraints.	Open cut	Open cut
Unnamed Tributary	KP6.90	Minor (1)	Murray Cod	No	No geotechnical information available	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD	Open cut	Open cut
Tchanning Creek	KP38.18	Minor (2)	Murray Cod	No	No geotechnical information available	RE 11.7.7 /11.7.4/11.5.1 surrounding crossing	\$350,000	\$3,750,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD	Open Cut	Open Cut
Tributary of Ramyard Creek	KP48.75	Minor (1)	None	No	No geotechnical	Riparian zone on top of banks.	\$350,000	\$3,750,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction	Open cut	Open cut

Watercourse crossing	Location	Crossing Type (Stream order)	Known MNES to occur in catchment	Supports habitat for MNES species	Geotechnical suitability	Ecological constraints for HDD work area	Cost of construction methodology		Infrastructure constraints	Determination if Horizontal Directional Drilling is reasonably possible.	Suitable construction technique	
							Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
					information available	Minimal clearing through zone.				to will wait till flow recedes. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD		
Tributary to Hellhole creek	KP52.85	Minor (1)	Fitzroy River Turtle	No	No geotechnical information available	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD	Open cut	Open cut
Tributary of Juandah Creek	KP65.35	Minor (1)	Fitzroy River Turtle	No	No geotechnical information available	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD	Open Cut	Open Cut
Tributary of Juandah Creek West	KP65.48	Major (3)	Fitzroy River Turtle	No	No geotechnical information available	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Prohibitive cost of HDD versus open - cut for minor bed crossing. More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD	Open cut	Open cut
Tributary of Juandah Creek	KP66.50	Major (3)	Fitzroy River Turtle	No	No geotechnical information available	Riparian zone on top of banks. Minimal clearing through zone.	\$350,000	\$3,750,000	None	Crossing scheduled in the dry season and wet season conditions expect dry conditions and only very short lived flows. Construction to will wait till flow recedes. Prohibitive cost of HDD versus open - cut for minor bed crossing.	Open cut	No construction during high flow, wait until flows reduce.

Watercourse crossing	Location	Crossing Type (Stream order)	Known MNES to occur in catchment	Supports habitat for MNES species	Geotechnical suitability	Ecological constraints for HDD work area	Cost of construction methodology		Infrastructure constraints	Determination if Horizontal Directional Drilling is reasonably possible.	Suitable construction technique	
							Open - Cut	HDD			Dry to low flow conditions	Moderate to high flow conditions
										More effective mitigation measures can be implemented for a fraction of the cost of HDD. Crossing will occur in dry creek. HDD not reasonably possible due to cost effectiveness of mitigation measures for open cut versus HDD		