

Interest holder	Tamboran B2 Pty Ltd	EMP Title	Beetaloo Sub-basin Shenandoah South E&A Program EMP	Unique EMP ID	TAM1-3	Mod #	13	Date	30/06/2026																																																																																																																
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Current EMP text									Amended EMP text											
Kyalla 117: gravel pit SSGP1 (former gravel pit A)		117	52	333877.96	8135080.04	2.50	5.0	7.50	Kyalla 117: gravel pit SSGP1 (former gravel pit A)		117	52	333877.96	8135080.04	2.50	5.0	7.50			
Kyalla 117: gravel pit SSGP2 (former gravel pit 3)		117	53	362753.93	8135089.25	6.25	-	6.25	Kyalla 117: gravel pit SSGP2 (former gravel pit 3)		117	53	362753.93	8135089.25	6.25	-	6.25			
Shenandoah S2: well pad, access track and associated infrastructure		98	53	355291	8140676	-	29.50	29.50	Shenandoah S2: well pad, access track and associated infrastructure		98	53	355291	8140676	-	29.50	29.50			
Shenandoah S B: well pad, access track(s), laydown and associated infrastructure		117	53	345035	8135464	-	23.30	23.30	Shenandoah S B: well pad, access track(s), laydown and associated infrastructure		117	53	345035	8135464	-	23.30	23.30			
Shenandoah S C: well pad, access track(s) and associated infrastructure		117	53	343471	8133330	-	17.30	17.30	Shenandoah S C: well pad, access track(s) and associated infrastructure		117	53	343471	8133330	-	17.30	17.30			
Gathering line: Kyalla 117 N2 to/from Shenandoah S2 (start to end)		117 & 98	53	356274 355060	8137505 8140071	-	4.50	4.50	Gathering line (12 m wide): Kyalla 117 N2 to/from Shenandoah S2 (start to end)		117 & 98	53	356274 355060	8137505 8140071	-	4.50	5.40			
Gathering line: Shenandoah S B to / from Shenandoah S C (start to end)		117	53	345035 343442	8135461 8133331	-	4.11	4.11	Gathering line (8 m wide): Shenandoah S B to / from Shenandoah S C (start to end)		117	53	345035 343442	8135461 8133331	-	4.11	3.21			
Shenandoah N A: well pad, camp pad, access track(s) and associated infrastructure		98	53	356687	8163762	-	12.00	12.00	Shenandoah N A: well pad, camp pad, access track(s) and associated infrastructure		98	53	356687	8163762	-	12.00	12.00			
Seismic: Shenandoah South Line A (13.00 km)**		117	53	337174.05 346089.96	337174.05 8128616.75	-	6.50	6.50	Seismic: Shenandoah South Line A (13.00 km)**		117	53	337174.05 346089.96	337174.05 8128616.75	-	6.50	6.50			
Seismic: Shenandoah South Line B (12.50 km)**		98 & 117	53	341094.69 349560.21	341094.69 8131483.21	-	6.50	6.50	Seismic: Shenandoah South Line B (12.50 km)**		98 & 117	53	341094.69 349560.21	341094.69 8131483.21	-	6.50	6.50			
Seismic: Shenandoah South Line C (12.50 km)**		98 & 117	53	338588.93 347420.93	338588.93 8129410.23	-	6.25	6.25	Seismic: Shenandoah South Line C (12.50 km)**		98 & 117	53	338588.93 347420.93	338588.93 8129410.23	-	6.25	6.25			
Seismic: Shenandoah access track(s) seismic line(s) (39.00 km)**		98 & 117	53	332988 356365	332988 8150204	-	-	-	Seismic: Shenandoah access track(s) seismic line(s) (39.00 km)**		98 & 117	53	332988 356365	332988 8150204	-	-	-			
Total clearing (ha)						20.40	119.26	139.66	Total clearing (ha)						20.40	119.26	139.66			
*Universal Transverse Mercator geographic coordinate system is Geocentric Datum of Australia 94. **Footprint area for 2D seismic based on 5 m wide seismic lines.									*Universal Transverse Mercator geographic coordinate system is Geocentric Datum of Australia 94. **Footprint area for 2D seismic based on 5 m wide seismic lines.											
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Current EMP text				Amended EMP text					
Infrastructure	Existing (ha)	New (ha)	Infrastructure	Existing (ha)	New (ha)				
Kyalla 117 N2			Kyalla 117 N2						
Well pad	5.25	3.80	Well pad	5.25	3.80				
Camp pad (increase of 0.50 ha is contingency)	1.00	0.50	Camp pad (increase of 0.50 ha is contingency)	1.00	0.50				
Helipad	0.50		Helipad	0.50					
Access track, including turn ins and passing bays	0.9		Access track, including turn ins and passing bays	0.9					
Laydown/ storage/ contingent			Laydown/ storage/ contingent						
Fence line and firebreak	4.00		Fence line and firebreak	4.00					
Gathering lines: Kyalla 117 N2 to / from Shenandoah S2		4.50	Gathering lines: Kyalla 117 N2 to / from Shenandoah S2 (12 m wide)		5.40				
Gravel pit(s): SSGP1 (2.50 ha) & SSGP2 (6.25 ha)	8.75	5.00 (SSGP1)	Gravel pit(s): SSGP1 (2.50 ha) & SSGP2 (6.25 ha)	8.75	5.00 (SSGP1)				
Subtotal	~20.40	13.8	Subtotal	~20.40	14.70				
Shenandoah S2			Shenandoah S2						
Well pad	-	12.00	Well pad	-	12.00				
Camp pad	-	1.00	Camp pad	-	1.00				
Helipad	-	-	Helipad	-	-				
Access track, including turn ins and passing bays	-	7.50	Access track, including turn ins and passing bays	-	7.50				
Laydown/ storage/ contingent	-	5.00	Laydown/ storage/ contingent	-	5.00				
Fence line and firebreak	-	4.00	Fence line and firebreak	-	4.00				
Gathering lines: Kyalla 117 N2 to / from Shenandoah S2	Included under Kyalla 117 N2 totals		Gathering lines: Kyalla 117 N2 to / from Shenandoah S2	Included under Kyalla 117 N2 totals					
Subtotal	-	34.50	Subtotal	-	29.50				
Shenandoah S B			Shenandoah S B						
Well pad	-	12.00	Well pad	-	12.00				
Camp pad	-	1.00	Camp pad	-	1.00				
Helipad	-	0.50	Helipad	-	0.50				
Access track, including turn ins and passing bays	-	3.30	Access track, including turn ins and passing bays	-	3.30				
Laydown/ storage/ contingent	-	2.50	Laydown/ storage/ contingent	-	2.50				
Fence line and firebreak	-	4.00	Fence line and firebreak	-	4.00				
Gathering lines: Shenandoah S B to / from Shenandoah S C	-	4.11	Gathering lines: Shenandoah S B to / from Shenandoah S C	-	3.21				
Gravel pit(s)	-	-	Gravel pit(s)	-	-				
Subtotal		27.41	Subtotal		26.51				
Shenandoah S C			Shenandoah S C						
Well pad	-	7.50	Well pad	-	7.50				
Camp pad	-	-	Camp pad	-	-				
Helipad	-	0.50	Helipad	-	0.50				
Access track, including turn ins and passing bays	-	3.30	Access track, including turn ins and passing bays	-	3.30				
Laydown/ storage/ contingent	-	2.50	Laydown/ storage/ contingent	-	2.50				
Fence line and firebreak	-	4.00	Fence line and firebreak	-	4.00				
Gathering lines: Shenandoah S B to / from Shenandoah S C	Included under Shenandoah S B totals		Gathering lines: Shenandoah S B to / from Shenandoah S C	Included under Shenandoah S B totals					

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Current EMP text				Amended EMP text					
Gravel pit(s)	-	-		Gravel pit(s)	-	-			
Subtotal		17.80		Subtotal		17.80			
Shenandoah N A				Shenandoah N A					
Well pad	-	3.00		Well pad	-	3.00			
Camp pad	-	1.00		Camp pad	-	1.00			
Helipad	-	-		Helipad	-	-			
Access track, including turn ins and passing bays	-	6.00		Access track, including turn ins and passing bays	-	6.00			
Laydown/ storage/ contingent	-	-		Laydown/ storage/ contingent	-	-			
Fence line and firebreak	-	2.00		Fence line and firebreak	-	2.00			
Gathering lines	-	-		Gathering lines	-	-			
Gravel pit(s)	-	-		Gravel pit(s)	-	-			
Subtotal	-	12.00		Subtotal	-	12.00			
TOTAL	20.40	100.51		TOTAL	20.40	100.51			
3.6.6 Gathering network construction and abandonment Gathering lines will be constructed as required to facilitate the transfer of high volumes of fluid and produced hydrocarbons safely and efficiently between well pads to a centralised storage area to enable centralised management and fluid recycling (Figure 15). The gathering lines will be constructed at the following locations: - Shenandoah S B to / from Shenandoah S C: ~4.108 km (4.11 ha) - Kyalla 117 N2 to / from Shenandoah S2: ~4.5 km (4.50 ha) Gathering lines will be constructed, operated, maintained and abandoned in line with the <i>"Code of Practice Upstream Polyethylene Gathering Networks – CSG Industry Version 5.0"</i>, August 2019 (APGA 2019). Up to two (2) buried low-pressure (~1,500 kPag) 6-inch polyethylene gathering lines will be utilised; one managing water and one managing hydrocarbons. A single co-mingled gathering line may also be utilised where practicable. The timing of installation will be dependent on positive well test results and the planned well testing schedule of each location. It is anticipated that Shenandoah S2 will be constructed first. As the project progresses Shenandoah S2 and/or Shenandoah S B will become centralised sites to manage produced hydrocarbons and wastewater. Two centralised sites provides greater flexibility for fluids recycling, storage and management. Fluids transferred in the gathering network may include: - Drilling and completion fluids - Flowback fluid and produced water - Groundwater for pipeline hydrotesting, purging and operational raw water supply (i.e. to reduce the amount of groundwater extraction bores drilled). Beneficial outcomes of installing and operating a gathering network include: - Ability to utilise existing installed wastewater containment and wastewater treatment capacity - Reduced land clearing for storage tanks at each well site - Reduction in potential environmental impacts and risk from contaminant spills / releases - Increased capability and capacity for recycling and reuse of fluids between well sites reducing groundwater take - Reduced wastewater disposal volumes and truck movements - Reduced capital and operational costs				3.6.7 Gathering network construction and abandonment Gathering lines will be constructed as required to facilitate the transfer of high volumes of fluid and produced hydrocarbons safely and efficiently between well pads to centralised storage areas to enable centralised management and fluid recycling (Figure 15). Low pressure gathering lines (design pressures of less than 2,000 kPag for water service and 1,600 kPag for gas service) will be constructed, operated, maintained and abandoned in line with the <i>"Code of Practice Upstream Polyethylene Gathering Networks – CSG Industry, Version 6.0, September 2024 (APGA 2024). High pressure gas gathering lines (design pressures greater than 1,600 kPag) will be constructed, operated, maintained and abandoned in line with AS2885 Pipeline Systems - High Pressure. Buried gathering lines will be used to transfer fluids, such as raw water, flowback, completion, drilling wastewater and hydrocarbons between the well sites. A single co-mingled gathering line may be used where practicable.</i> The timing of installation will be dependent on positive well test results and the planned well testing schedule of each location. It is anticipated that Shenandoah S2 will be constructed first. As the project progresses Shenandoah S2 will initially be the centralised site to manage produced hydrocarbons and wastewater. Two centralised sites provides greater flexibility for fluids recycling, storage and management. Fluids transferred in the gathering network may include: - Drilling and completion fluids - Flowback fluid and produced water - Groundwater for pipeline hydrotesting, purging and operational raw water supply (i.e. to reduce the amount of groundwater extraction bores drilled) - hydrocarbons. Beneficial outcomes of installing and operating a gathering network include: - Ability to use existing installed wastewater containment and wastewater treatment capacity - Reduced land clearing for storage tanks at each well site - Reduction in potential environmental impacts and risk from contaminant spills / releases - Increased capability and capacity for recycling and reuse of fluids between well sites reducing groundwater take - Reduced wastewater disposal volumes and truck movements - Reduced capital and operational costs					

Interest holder	Tamboran B2 Pty Ltd	EMP Title	Beetaloo Sub-basin Shenandoah South E&A Program EMP	Unique EMP ID	TAM1-3	Mod #	13	Date	30/06/2026
Current EMP text				Amended EMP text					
Centralised flaring and hydrocarbon management to minimise light pollution from multiple sources. Gathering lines will be located adjacent to access tracks within existing disturbed areas where practicable. In some cases, an above-ground gathering line for fluid transfer may be utilised instead of a buried gathering lines. Above ground gathering lines will be temporary and typically used for several months before being purged and decommissioned. Where aboveground water gathering lines are used, these will be designed, constructed and maintained in accordance with " <i>Code of Practice Upstream Polyethylene Gathering Networks – CSG Industry Version 5.0</i> ", August 2019 (APGA 2019). This includes being designed to withstand the ambient temperature, have material that is fire resistant (such as High Density Polyethylene (HDPE)), be in cleared right of way, which are maintained to reduce woody vegetation and fuel load accumulation and will be stock proof. Prior to operation, gathering lines will be hydrostatically tested to ensure they are not leaking and can operate at the required pressure. The following methodology for gathering line installation is extracted from APGA, 2019. 3.6.6.1 Material selection and design Materials used for the construction of the gathering network will comply with section 3 of the APGA Code of Practice for Upstream Polyethylene Gathering Networks (PEGN Code). HDPE 100 (or equivalent) will be used for all pipelines, due to their high toughness, excellent resistance to slow crack growth and rapid crack propagation. They also have an inherent resistance to water and chemicals. HDPE pipelines are the material of choice for many water, wastewater, gas and other applications as evidenced through their day to day use throughout society. PE pipes shall be manufactured in accordance with AS/NZS 4130 and shall be third party certified by a JAS-ANZ accredited certifier under the StandardsMark, GasMark or WaterMark schemes or equivalent. Marking and product traceability shall be in accordance with the Standard. Appendix A of AS/NZS 4130 shall be used as the basis for demonstrating conformity. Pipes for Gathering Networks shall be Series 1 conforming to AS/NZS 4130. A design, risk assessment and testing regime, inline with the PEGN code, will ensure suitable material selection and selection of facility overpressure protection equipment to reduce the probability of leaks to ALARP. 				Centralised flaring and hydrocarbon management to minimise light pollution from multiple sources. Gathering lines will be located adjacent to access tracks within existing disturbed areas where practicable. In some cases, an above-ground gathering line for fluid transfer may be used instead of a buried gathering lines. Above ground gathering lines will be temporary and typically used for several months before being purged and decommissioned. Where aboveground water gathering lines are used, these will be designed, constructed and maintained in accordance with " <i>Code of Practice Upstream Polyethylene Gathering Networks – CSG Industry Version 6.0</i> ", September 2024 (APGA 2024). This includes being designed to withstand the ambient temperature in cleared right of way, which are maintained to reduce woody vegetation and fuel load accumulation and will be stock proof. Prior to operation, gathering lines will be hydrostatically tested to ensure they are not leaking and can operate at the required pressure. The following methodology for gathering line installation is extracted from APGA, 2024. 3.6.7.1 Material selection and design – low pressure gathering system Materials used for the construction of the low-pressure gathering network will comply with section 3 of the APGA Code of Practice for Upstream Polyethylene Gathering Networks (PEGN Code). HDPE (or equivalent) will be used for all pipelines, due to their high toughness, excellent resistance to slow crack growth and rapid crack propagation. They also have an inherent resistance to water and chemicals. The material chosen for the pipelines are the material of choice for many water, wastewater, gas and other applications as evidenced through their day to day use throughout society. The pipes shall be manufactured in accordance with AS/NZS 4130 and shall be third party certified by a JAS-ANZ accredited certifier under the StandardsMark, GasMark or WaterMark schemes or equivalent. Marking and product traceability shall be in accordance with the Standard. Appendix A of AS/NZS 4130 shall be used as the basis for demonstrating conformity. Pipes for Low pressure Gathering Networks shall be Series 1 conforming to AS/NZS 4130. A design, risk assessment and testing regime, inline with the PEGN code, will ensure suitable material selection and selection of facility overpressure protection equipment to reduce the probability of leaks to ALARP. 3.6.7.2 Material Selection & Design - High Pressure Gas Gathering Systems The materials used in high pressure gas gathering networks in addition to the associated manufacturing processes and quality assurance practices must meet the requirements of AS2885. The pipeline design, installation methodology and testing procedures also must comply with AS2885. The use of Spoolable Composite Pipelines (SCPs) offer several key advantages over traditional carbon steel pipelines including inherent resistance to internal and external corrosion and significantly faster construction durations. 					

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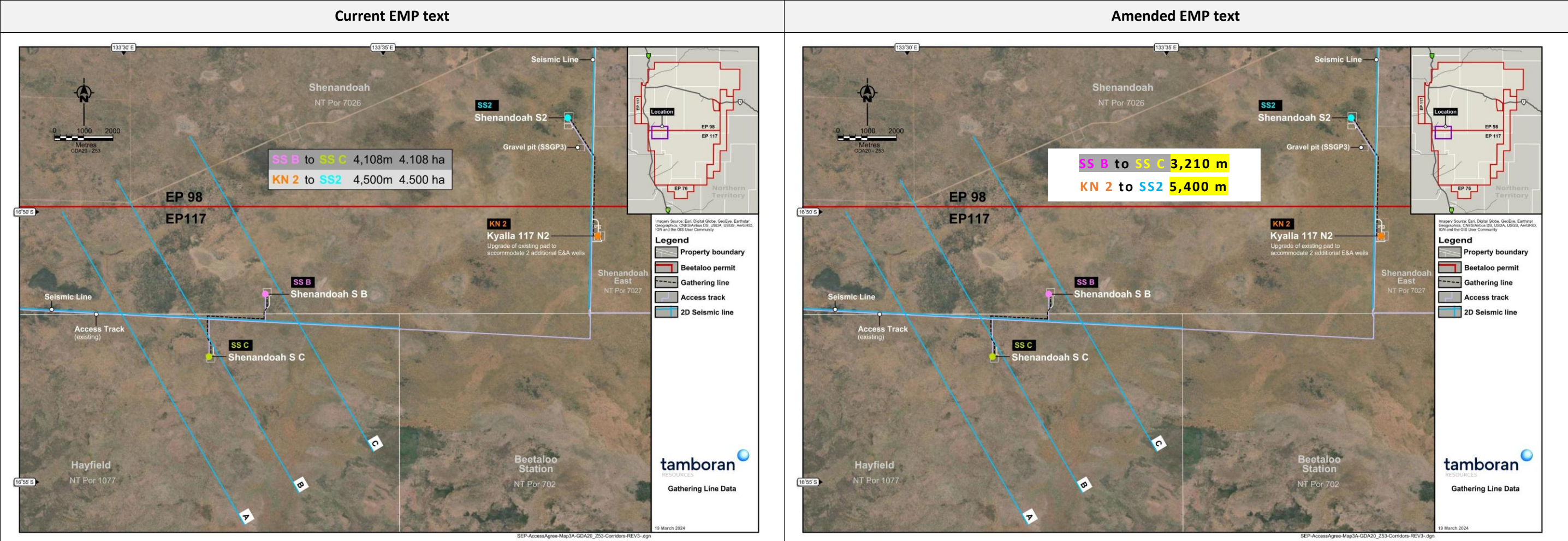


Figure 15: Gathering lines between the well sites

3.11 Chemical and fluid management

3.11.1 Chemical types and quantities

Table 19: Estimated chemical volume and storage used in the drilling and stimulation process at each site

As per ES table

3.12.2 Drilling fluids, muds, cuttings and cement returns

The following section provides an overview of the management summary associated with waste drilling fluids, muds, cuttings and cement returns.

3.12.2.1 Sump design

Drilling fluids that will be recovered after use and reused, all drilling fluids, including cuttings, muds and cement returns, will be directed to the drilling sump on each site. The drilling sump is designed to accommodate the drilling of multiple wells. Waste drilling fluids may also be transferred and stored on-site in wastewater tanks or to sumps/ tanks on other approved sites to ensure sufficient capacity is always in place to accommodate the freeboard requirements.

An overview of the drilling sump design is provided in Appendix D. Each sump surface will be rolled and compacted, with a Coletanche liner (or equivalent). Coletanche is a composite liner consisting of five different layers:

Figure 15: Gathering lines between the well sites

3.11 Chemical and fluid management

3.11.1 Chemical types and quantities

Table 19: Estimated chemical volume and storage used in the drilling and stimulation process at each site

As per ES table

3.12.2 Drilling fluids, muds, cuttings, sand and cement returns

The following section provides an overview of the management summary associated with waste drilling fluids, muds, cuttings and cement returns. This also includes the management of returned sands during well cleanup.

3.12.2.1 Sump design

Drilling fluids that will be recovered after use and reused, all drilling fluids, including cuttings, muds, sand and cement returns, will be directed to the drilling sump on each site. The drilling sump is designed to accommodate the drilling of multiple wells and returned sands during well cleanup. Waste drilling fluids may also be transferred and stored on-site in wastewater tanks or to sumps/ tanks on other approved sites to ensure sufficient capacity is always in place to accommodate the freeboard requirements.

An overview of the drilling sump design is provided in Appendix D. Each sump surface will be rolled and compacted, with a Coletanche liner (or equivalent). Coletanche is a composite liner consisting of five different layers:

Interest holder	Tamboran B2 Pty Ltd	EMP Title	Beetaloo Sub-basin Shenandoah South E&A Program EMP	Unique EMP ID	TAM1-3	Mod #	13	Date	30/06/2026
Current EMP text				Amended EMP text					
• A highly resistant anti-root film able to withstand puncturing by vegetation or rough substrates. • Glass fleece which ensures dimensional stability. • A non-woven geotextile reinforced structure which is highly resistant to tearing and puncturing. • An elastomeric bitumen binder ensures that the geotextile is waterproof and resistant to ageing. • A coating of sand ensures that workers can move on the surface in all weather conditions to carry out maintenance work. It also provides a rough surface which allows coverage of the membrane by soil. The Coletanche liner product data sheet is provided in Appendix D, which demonstrates it complies with the Code requirements C.4.1.2. Coletanche is anticipated to be used based upon the following: • easily installed and shaped to fit sump geometry • high resistance to tearing/puncturing and to hydrostatic pressures • low water permeability, with a 4 x10-14 m/s permeability • can withstand high temperature fluctuations. In some circumstances, a conventional HDPE liner may be used. Where a HDPE (or alternative) liner is used, the liner specification shall meet or exceed the Code requirements (cl C.4.1.2). 3.12.2.2 Volume and quality Approximately 3,000 m3 (750 m3 per E&A well) of waste drilling solids (cuttings, muds (water based) and cement returns) and approximately 4.5 ML (1.5 ML of wastewater per E&A well) of drilling and completion fluids will be generated at each of the Shenandoah South sites and Kyalla 117 N2 site. This estimate is based on engineering calculations and observed drilling waste volumes recorded during the existing wells at the sites. Drilling fluids and muds are saline, with sodium and potassium-based salts used as a weighting agent and formation inhibitor. Other compounds, such as barite (barium sulfate) and polymer-based compounds are also utilised during drilling process. Drill cuttings waste will largely reflect the quality of the rock overburden and target shale formations. Drilling fluids and solids (cuttings, muds and cements returns) may be removed periodically from the sump between wells, or as required to maintain the safe operating level of the sump. Drilling fluids and solids may be transferred to lined tank/ pit (in accordance with section C.4.1.2 of the Code), disposed of in accordance with section 3.13 of this EMP. 3.12.2.3 Drilling muds, cuttings and cement returns disposal Drilling material may either be disposed of during operations (i.e. between the drilling each E&A well to accommodate storage volume requirements) or upon completion of drilling/well testing operations (with the potential for on-site storage of material in in accordance with section C.4.1.2 of the Code). Prior to the disposal of drilling waste material, a suitably qualified third-party will test the dried material and determine whether the material is suitable to be disposed of on the well pad (or within the approved disturbance area) using a ‘mix, bury and cover’ approach (as per C.4.1.2 of the Code). ‘Mix, bury and cover’ involves the mixing of dried drilling waste material with the soil located within the drilling sump batters to reduce the concentration of any potential contaminants to an acceptable level. The material is then track-rolled and approximately 300mm of clean material placed over the top. An additional 150 mm of topsoil is added to the sump upon remediation of the entire well site. DEPWS will be consulted if on-site disposal is proposed, with a regulation 22 approval submitted to authorise the activity. If the material is unsuitable for on-site disposal (such as the moisture content is too high or the material is incompatible with surrounding soils or the analysis of the material indicates it is inappropriate for on-site disposal (as per C.4.1.2 of the Code), the material may be left in-situ across the wet season to allow for the material to dry during the subsequent dry season or be transported off-site. If on-site disposal is not feasible, all solid material) will be transported off-site to				• A highly resistant anti-root film able to withstand puncturing by vegetation or rough substrates. • Glass fleece which ensures dimensional stability. • A non-woven geotextile reinforced structure which is highly resistant to tearing and puncturing. • An elastomeric bitumen binder ensures that the geotextile is waterproof and resistant to ageing. • A coating of sand ensures that workers can move on the surface in all weather conditions to carry out maintenance work. It also provides a rough surface which allows coverage of the membrane by soil. The Coletanche liner product data sheet is provided in Appendix D, which demonstrates it complies with the Code requirements C.4.1.2. Coletanche is anticipated to be used based upon the following: • easily installed and shaped to fit sump geometry • high resistance to tearing/puncturing and to hydrostatic pressures • low water permeability, with a 4 x10-14 m/s permeability • can withstand high temperature fluctuations. In some circumstances, a conventional HDPE liner may be used. Where a HDPE (or alternative) liner is used, the liner specification shall meet or exceed the Code requirements (cl C.4.1.2). 3.12.2.2 Volume and quality Approximately 3,000 m3 (750 m3 per E&A well) of waste drilling solids (cuttings, muds (water based), sands and cement returns) and approximately 4.5 ML (1.5 ML of wastewater per E&A well) of drilling and completion fluids will be generated at each of the Shenandoah South sites and Kyalla 117 N2 site. This estimate is based on engineering calculations and observed drilling waste volumes recorded during the existing wells at the sites. Drilling fluids and muds are saline, with sodium and potassium-based salts used as a weighting agent and formation inhibitor. Returned sands are inert solid form. Other compounds, such as barite (barium sulfate) and polymer-based compounds are also utilised during drilling process. Drill cuttings waste will largely reflect the quality of the rock overburden and target shale formations. Drilling fluids and solids (cuttings, muds, returned sands and cement returns) may be removed periodically from the sump between wells, or as required to maintain the safe operating level of the sump. Drilling fluids and solids may be transferred to lined tank/ pit (in accordance with section C.4.1.2 of the Code), disposed of in accordance with section 3.13 of this EMP. 3.12.2.3 Drilling muds, cuttings and cement returns disposal Drilling material may either be disposed of during operations (i.e. between the drilling each E&A well to accommodate storage volume requirements) or upon completion of drilling/well testing operations (with the potential for on-site storage of material in in accordance with section C.4.1.2 of the Code). Prior to the disposal of drilling waste material, a suitably qualified third-party will test the dried material and determine whether the material is suitable to be disposed of on the well pad (or within the approved disturbance area) using a ‘mix, bury and cover’ approach (as per C.4.1.2 of the Code). ‘Mix, bury and cover’ involves the mixing of dried drilling waste material with the soil located within the drilling sump batters to reduce the concentration of any potential contaminants to an acceptable level. The material is then track-rolled and approximately 300mm of clean material placed over the top. An additional 150 mm of topsoil is added to the sump upon remediation of the entire well site. DEPWS will be consulted if on-site disposal is proposed, with a regulation 22 approval submitted to authorise the activity. If the material is unsuitable for on-site disposal (such as the moisture content is too high or the material is incompatible with surrounding soils or the analysis of the material indicates it is inappropriate for on-site disposal (as per C.4.1.2 of the Code), the material may be left in-situ across the wet season to allow for the material to dry during the subsequent					

Interest holder	Tamboran B2 Pty Ltd	EMP Title	Beetaloo Sub-basin Shenandoah South E&A Program EMP	Unique EMP ID	TAM1-3	Mod #	13	Date	30/06/2026
Current EMP text				Amended EMP text					
an alternative suitable exploration location or a licenced facility. Off-site disposal will be undertaken in accordance with the NT Waste Management and Pollution Control Act 1998. All fluids collected in the drilling sumps (including rainwater) will either be evaporated in the sump or transferred to wastewater tanks for storage and evaporation. The use of evaporation is the main mechanism used to reduce the volume down to as low as possible. The residual concentrated liquid waste stream will be disposed of off-site at a licenced facility in accordance with the NT Waste Management and Pollution Control Act 1998. The sumps will be operated with sufficient freeboard available to accommodate the total rainfall anticipated based on a 1:1,000-year ARI for the duration the sump is in operation. As per the calculations within the WWMP (Appendix G), this equates to a 1.3 m wet season freeboard and a 0.3 m of dry season freeboard. 3.12.2.4 Monitoring Wastewater volumes within the mud sumps will be monitored daily during operations. Once drilling has finished, sump levels will be monitored weekly during the dry season and daily during the wet season. Monitoring may be undertaken via physical inspection, remote cameras or sensor. The wastewater balance and storage curves will be updated weekly to ensure sufficient freeboard in compliance with the Code. Drilling mud and cuttings will be sampled prior to disposal and characterised in accordance with requirements set out in section 3.13.2.2. 3.12.2.5 Drilling waste composting/soil conditioner trial To investigate the potential future re-use of drilling cuttings and solid waste material, a small trial to create a suitable compost/ soil conditioner for use in rehabilitation may be undertaken on a well pad. This objectives of the trial will be designed to: • Confirm whether the material can be successfully composted/ blended into a suitable compost/ soil conditioner to support future rehabilitation (such as gravel pit void backfilling). • Develop the required procedures and know-how for future larger scale disposals. • Build capacity with local traditional owners to take over the activity in the future. • Obtain the required information to support future approvals. Material generated under this approval will be either sent to a licenced landfill or additional approvals sought for onsite disposal as per cl C.4.1.2 of the Code. The trial will involve the following steps: • The trial will only be undertaken during the dry season (May to September), with any storage beyond this point to require lining and covers to prevent leachate formation and run off. • A dedicated trial area will be located on either the formed well pad/ laydown yard and will be demarcated and signed. The size of the trial area will typically be no greater than 50 m x 50 m, at either Kyalla 117 N2 or Shenandoah S2. • The trial area will be a compacted clay liner or geomembrane type liner meeting the requirements of clause B.4.16.2(h) and C.4.1.2 (b) of the code. • The trial area will be bunded (using available material onsite) and graded to prevent both run-on and run-off of stormwater. • Approximately 1 – 200 m3 of dried drilling waste (moisture content <20%) will be transferred to the trial area and stored in stockpiles. In the unlikely event free liquids are encountered, they will be cleaned up immediately and recorded as per the spill management plan.				dry season or be transported off-site. If on-site disposal is not feasible, all solid material) will be transported off-site to an alternative suitable exploration location or a licenced facility. Off-site disposal will be undertaken in accordance with the NT Waste Management and Pollution Control Act 1998. All fluids collected in the drilling sumps (including rainwater) will either be evaporated in the sump or transferred to wastewater tanks for storage and evaporation. The use of evaporation is the main mechanism used to reduce the volume down to as low as possible. The residual concentrated liquid waste stream will be disposed of off-site at a licenced facility in accordance with the NT Waste Management and Pollution Control Act 1998. The sumps will be operated with sufficient freeboard available to accommodate the total rainfall anticipated based on a 1:1,000-year ARI for the duration the sump is in operation. As per the calculations within the WWMP (Appendix G), this equates to a 1.3 m wet season freeboard and a 0.3 m of dry season freeboard. 3.12.2.4 Monitoring Wastewater volumes within the mud sumps will be monitored daily during operations. Once drilling has finished, sump levels will be monitored weekly during the dry season and daily during the wet season. Monitoring may be undertaken via physical inspection, remote cameras or sensor. The wastewater balance and storage curves will be updated weekly to ensure sufficient freeboard in compliance with the Code. Drilling mud and cuttings will be sampled prior to disposal and characterised in accordance with requirements set out in section 3.13.2.2. 3.12.2.5 Drilling waste composting/soil conditioner trial To investigate the potential future re-use of drilling cuttings and solid waste material, a small trial to create a suitable compost/ soil conditioner for use in rehabilitation may be undertaken on a well pad. This objectives of the trial will be designed to: • Confirm whether the material can be successfully composted/ blended into a suitable compost/ soil conditioner to support future rehabilitation (such as gravel pit void backfilling). • Develop the required procedures and know-how for future larger scale disposals. • Build capacity with local traditional owners to take over the activity in the future. • Obtain the required information to support future approvals. Material generated under this approval will be either sent to a licenced landfill or additional approvals sought for onsite disposal as per cl C.4.1.2 of the Code. The trial will involve the following steps: • The trial will only be undertaken during the dry season (May to September), with any storage beyond this point to require lining and covers to prevent leachate formation and run off. • A dedicated trial area will be located on either the formed well pad/ laydown yard and will be demarcated and signed. The size of the trial area will typically be no greater than 50 m x 50 m, at either Kyalla 117 N2 or Shenandoah S2. • The trial area will be a compacted clay liner or geomembrane type liner meeting the requirements of clause B.4.16.2(h) and C.4.1.2 (b) of the code. • The trial area will be bunded (using available material onsite) and graded to prevent both run-on and run-off of stormwater. • Approximately 1 – 200 m3 of dried drilling waste (moisture content <20%) will be transferred to the trial area and stored in stockpiles. In the unlikely event free liquids are encountered, they will be cleaned up immediately and recorded as per the spill management plan.					

Interest holder	Tamboran B2 Pty Ltd	EMP Title	Beetaloo Sub-basin Shenandoah South E&A Program EMP	Unique EMP ID	TAM1-3	Mod #	13	Date	30/06/2026																																
Current EMP text				Amended EMP text																																					
- Organic manure will be trucked in and stored on the trial pad in small stockpiles (~500 m3). If manure is used, this will be sourced from local cattle stations in the region to reduce the risk of introducing weeds. - Waste material will be blended with manure using a front end loader/ tractor/bob cat onsite at several different ratios (such as 1 part waste: 1 part manure etc.). - The material will be stockpiled in windows/ static piles to allow aerobic composting for ~60 – 90 days. - The material will be turned/worked monthly. - The material will be tested in accordance with the suite in Table 9 of the Code. - A selection of material (~1 m3) will be used in large pots/ bags to assess the re-establishment of vegetation, with a seed mix and additional nutrients (specifically nitrogen) added where required. This will be left open over the wet season, with observation taken. - Upon completion of the trial, the material will be either a) returned to the sump b) stockpiled on a liner with a cover or c) trucked offsite to a licenced landfill. - The trial area will have all potential contaminated material removed, with validation testing confirming concentrations of contaminants of concern (notably EC, chlorides, barium and strontium) are consistent with background soil levels. - A simple report will be generated at the end of the trial summarising the trial results.				- Organic manure will be trucked in and stored on the trial pad in small stockpiles (~500 m3). If manure is used, this will be sourced from local cattle stations in the region to reduce the risk of introducing weeds. - Waste material will be blended with manure using a front end loader/ tractor/bob cat onsite at several different ratios (such as 1 part waste: 1 part manure etc.). - The material will be stockpiled in windows/ static piles to allow aerobic composting for ~60 – 90 days. - The material will be turned/worked monthly. - The material will be tested in accordance with the suite in Table 9 of the Code. - A selection of material (~1 m3) will be used in large pots/ bags to assess the re-establishment of vegetation, with a seed mix and additional nutrients (specifically nitrogen) added where required. This will be left open over the wet season, with observation taken. - Upon completion of the trial, the material will be either a) returned to the sump b) stockpiled on a liner with a cover or c) trucked offsite to a licenced landfill. - The trial area will have all potential contaminated material removed, with validation testing confirming concentrations of contaminants of concern (notably EC, chlorides, barium and strontium) are consistent with background soil levels. - A simple report will be generated at the end of the trial summarising the trial results.																																					
3.21 Waste Management Table 30: Waste and disposal methods <table><tr><th>Activity</th><th>Disposal method</th></tr><tr><td>Sewage, grey and stormwater</td><td>Treatment: Grey water and sewage treated and disposed of on-site in an approved, portable treatment system accordance with Department of Health Code of Practice for small on-site sewage and sullage treatment systems and disposal for reuse of sewage effluent. Sewage treated will be surface irrigated to a dedicated, fenced area. The area will be left vegetated, with no clearing required. Sludge removed from site and disposed of at an appropriately licenced facility. 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Interest holder	Tamboran B2 Pty Ltd	EMP Title	Beetaloo Sub-basin Shenandoah South E&A Program EMP	Unique EMP ID	TAM1-3	Mod #	13	Date	30/06/2026
Current EMP text				Amended EMP text					
Timber pallets (skids)	Recycled: Recycled at an approved facility			Timber pallets (skids)	Recycled: Recycled at an approved facility				
Vehicle tyres	Disposal: Disposed of at an approved landfill			Vehicle tyres	Disposal: Disposed of at an approved landfill				
Oily rags, oil-contaminated material, filters and any hydrocarbon material	Recycled/disposal: Oil from machinery or encountered during drilling. Collected in suitable containers for disposal at approved landfill or recycled at an approved recycling facility.			Oily rags, oil-contaminated material, filters and any hydrocarbon material	Recycled/disposal: Oil from machinery or encountered during drilling. Collected in suitable containers for disposal at approved landfill or recycled at an approved recycling facility.				
Condensate waste	Recycled/disposal: Condensate oil incidentally encountered during drilling/ flowback will be collected in self-bunded storage pods/tanks for disposal at approved landfill or recycled at an approved recycling facility.			Condensate waste	Recycled/disposal: Condensate oil incidentally encountered during drilling/ flowback will be collected in self-bunded storage pods/tanks for disposal at approved landfill or recycled at an approved recycling facility.				
Flowback	Recycled, treatment and disposal: Highly saline wastewater collected in a series of open and closed tanks. Where possible, flowback will be used as stimulation make up fluid to reduce raw water requirements. Where flowback cannot be recycled, it will be evaporated on-site using mechanical evaporators and then disposed of off-site at a licenced facility interstate. Flowback wastewater includes returned sand and shales during well clean up.			Flowback	Recycled, treatment and disposal: Highly saline wastewater collected in a series of open and closed tanks. Where possible, flowback will be used as stimulation make up fluid to reduce raw water requirements. Where flowback cannot be recycled, it will be evaporated on-site using mechanical evaporators and then disposed of off-site at a licenced facility interstate. Flowback wastewater includes returned sand and shales during well clean up.				
Exploration well drill cuttings, muds and fluids	Treatment and disposal: Saline fluids and solids stored within a lined sump. Fluids segregated from muds and cuttings. Solids dried out, with liquids evaporated. Solids tested and disposed of on-site or off-site depending on hazard. Fluids transported off-site to a licenced facility interstate.			Exploration well drill cuttings, muds and fluids	Treatment and disposal: Saline fluids and solids stored within a lined sump. Fluids segregated from muds and cuttings. Solids dried out, with liquids evaporated. Solids tested and disposed of on-site or off-site depending on hazard. Fluids transported off-site to a licenced facility interstate.				
Groundwater extraction bore drilling cutting and muds (cuttings mixed with drilling fluids)	Disposal: Freshwater cuttings and drilling muds with low hazard. Disposed of on-site in accordance with the <i>Minimum Construction Requirements for Waters Bores in Australia</i> for water bore drilling practices.			Groundwater extraction bore drilling cutting and muds (cuttings mixed with drilling fluids)	Disposal: Freshwater cuttings and drilling muds with low hazard. Disposed of on-site in accordance with the <i>Minimum Construction Requirements for Waters Bores in Australia</i> for water bore drilling practices.				
Ro Reject	Disposal: Captured in bunded poly tanks and periodically transferred to a wastewater tank.			Ro Reject	Disposal: Captured in bunded poly tanks and periodically transferred to a wastewater tank.				
Low point drain water	Disposal: Tested for compliance and either released to the ground within the right of way or captured and stored as wastewater in an enclosed tank			Low point drain water	Disposal: Tested for compliance and either released to the ground within the right of way or captured and stored as wastewater in an enclosed tank				
Spill contaminated soils and water	Disposal: All contaminated material (solids and liquids) will be disposed of off-site at a licenced facility.			Spill contaminated soils and water	Disposal: All contaminated material (solids and liquids) will be disposed of off-site at a licenced facility.				
Stormwater	Discharged/recycled/disposal: All stormwater will be collected on-site in a designated sediment retention system. Stormwater will be tested and either released off-site or recovered and either recycled within the drilling process or disposed of at a licenced wastewater treatment facility in accordance with the <i>NT Waste Management and Pollution Control Act 1998</i> .			Stormwater	Discharged/recycled/disposal: All stormwater will be collected on-site in a designated sediment retention system. Stormwater will be tested and either released off-site or recovered and either recycled within the drilling process or disposed of at a licenced wastewater treatment facility in accordance with the <i>NT Waste Management and Pollution Control Act 1998</i> .				
				Waste return sand	Re-use/Disposal: Returned sand (solids) from stimulation/flowback activities will have fluid removed and rinsed with raw (groundwater) water prior to transfer to the sump.				

Interest holder	Tamboran B2 Pty Ltd	EMP Title	Beetaloo Sub-basin Shenandoah South E&A Program EMP			Unique EMP ID	TAM1-3	Mod #	13	Date	30/06/2026		
Current EMP text						Amended EMP text							
3.26.1 Groundwater monitoring						3.26.1 Groundwater monitoring							
.....													
Table 34: Monitoring program summary						Table 34: Monitoring program summary							
Monitoring program	Purpose	Monitoring points	Parameters	Frequency	Investigation thresholds	Reference document	Monitoring program	Purpose	Monitoring points	Parameters	Frequency	Investigation thresholds	Reference document
.....													
Drill cuttings, fluid and muds characterisation	Characterise the quality of drill cuttings, fluids and muds to determine disposal options	Drilling sump – as determined by a suitably qualified third-party	Table 9 of the Code (NORMs), Particle size distribution, bulk density	Prior to disposal	N/A	Code C.5.2	Drill cuttings, fluid, returned sands and muds characterisation	Characterise the quality of drill cuttings, fluids, returned sands and muds to determine disposal options	Drilling sump – as determined by a suitably qualified third-party	Table 9 of the Code (NORMs), Particle size distribution, bulk density	Prior to disposal	N/A	Code C.5.2
		Drilling sump/liner	Visual	Daily during wet season Weekly at other times					Drilling sump/liner	Visual	Daily during wet season Weekly at other times		

Appendices

Appendix F Spill Management Plan						Appendix F Spill Management Plan					
Appendix A Chemical volumes per well and storage areas (based on maximum 3 wells per pad)						Appendix A Chemical volumes per well and storage areas (based on maximum 3 wells per pad)					
NOTE: In accordance with the Code, a chemical risk assessment has been completed on all listed chemicals, which have been verified to not be toxic and persistent and bioaccumulative.						NOTE: In accordance with the Code, a chemical risk assessment has been completed on all listed chemicals, which have been verified to not be toxic and persistent and bioaccumulative.					
Material name	Typical volume	Maximum volume	Unit	Storage area	Hazardous (Y/N)	Material name	Typical volume	Maximum volume	Unit	Storage area	Hazardous (Y/N)
.....											
TEQ-LUBE II - lubricant (25322-6-3)	14,400	43,200	kg	Drilling chemical storage area	Yes	TEQ-LUBE II - lubricant (25322-6-3)	14,400	43,200	kg	Drilling chemical storage area	Yes
TEQ-LUBE II - lubricant (39464-69-2)	14,400	43,200	kg	Drilling chemical storage area	Yes	TEQ-LUBE II - lubricant (39464-69-2)	14,400	43,200	kg	Drilling chemical storage area	Yes
NEW-THIN - Polymeric thinner	4,680	14,040	kg	Drilling chemical storage area	No	TEQ-DEFOAM 1538	1,693 726	5,079 2,178	Kg	Drilling chemical storage area	Yes
.....						NEW-THIN - Polymeric thinner	4,680	14,040	kg	Drilling chemical storage area	No
General operation chemicals						General operation chemicals					
Diesel	250	750	KL	Diesel storage tanks	Yes	Diesel	250	750	KL	Diesel storage tanks	Yes
Hydraulic oil	1,000	3,000	L	Workshop	Yes	Hydraulic oil	1,000	3,000	L	Workshop	Yes
Engine oil	1,000	3,000	L	Workshop	Yes	Engine oil	1,000	3,000	L	Workshop	Yes
Degreasers	100	300	L	Workshop	Yes	Degreasers	100	300	L	Workshop	Yes
Waste drilling fluids	2,500	7,500	m³	Drilling mud sump	Yes	Waste drilling fluids	2,500	7,500	m³	Drilling mud sump	Yes
Completion fluids	1.4	4.2	ML	Drilling mud sump	No	Completion fluids	1.4	4.2	ML	Drilling mud sump	No
Condensate	10	10	KL	Drilling chemical storage area	Yes	Condensate	10	10	KL	Drilling chemical storage area	Yes
Flowback	~10.8 ML per well		ML	Flowback tanks	Yes	Flowback	~10.8 ML per well		ML	Flowback tanks	Yes
Proppants*						Proppants*					
100 mesh sand	91,000	273,000	kg	Stimulation chemical storage area	No	Waste return sand	50 per well		tonne	Drilling mud sump	No
Quartz or organophilic phyllosilicate- proppant	1,084	3,252	L	Stimulation chemical storage area	No						
40/70 sand	1,650,000	4,950,000	kg	Stimulation chemical storage area	No	100 mesh sand	91,000	273,000	kg	Stimulation chemical storage area	No

Interest holder			Tamboran B2 Pty Ltd			EMP Title	Beetaloo Sub-basin Shenandoah South E&A Program EMP		Unique EMP ID	TAM1-3	Mod #	13	Date	30/06/2026	
Current EMP text							Amended EMP text								
	30/50 sand	610,000	1,830,000	kg	Stimulation chemical storage area	No		Quartz or organophilic phyllosilicate- proppant	1,084	3,252	L	Stimulation chemical storage area	No		
	Silicon dioxide (quartz/sand) 100% Sand	4,757,614	14,272,842	kg	Stimulation chemical storage area	No		40/70 sand	1,650,000	4,950,000	kg	Stimulation chemical storage area	No		
	Silicon dioxide (quartz/sand) 40/70	5,435,287	16,305,860	kg	Stimulation chemical storage area	No		30/50 sand	610,000	1,830,000	kg	Stimulation chemical storage area	No		
* Proppants are sand which is inert. They do not require special chemical bunding but are co-located in the stimulation chemical storage area, within the well pad bund. Residual proppant from a stimulation campaign is often used to assist with chemical spills on the well pad, where contaminated spill material is removed.								Silicon dioxide (quartz/sand) 100% Sand	4,757,614	14,272,842	kg	Stimulation chemical storage area	No		
Cleaning chemicals and spill response								Silicon dioxide (quartz/sand) 40/70	5,435,287	16,305,860	kg	Stimulation chemical storage area	No		
	Soda ash – sodium carbonate	3,750	11,250	kg	Stimulation chemical storage area - spill response for acid spills	Yes	* Proppants are sand which is inert. They do not require special chemical bunding but are co-located in the stimulation chemical storage area, within the well pad bund. Residual proppant from a stimulation campaign is often used to assist with chemical spills on the well pad, where contaminated spill material is removed.								
	Flush fluid - distillates (petroleum), hydrotreated	1,500	4,500	L	Stimulation chemical storage area - Equipment cleaning	Yes	Cleaning chemicals and spill response								
								Soda ash – sodium carbonate	3,750	11,250	kg	Stimulation chemical storage area - spill response for acid spills	Yes		
								Flush fluid - distillates (petroleum), hydrotreated	1,500	4,500	L	Stimulation chemical storage area - Equipment cleaning	Yes		
Appendix E Chemical Risk Assessment AECOM Australia Pty Ltd. 2025. <i>Beetaloo Exploration and Appraisal Program - Hydraulic Fracturing Chemical Risk Assessment</i> , Rev 11, prepared for Tamboran Resources, 28 March 2025. Appendix E.1 - EHS Support. 2023. <i>Hydraulic Stimulation Chemical Risk Assessment – Tamboran Resources Northern Territory Tenements</i> , Prepared for Condor Energy, January 2024. Appendix E.2 – AECOM Australia Pty Ltd. 2024b. <i>Beetaloo Exploration and Appraisal Program – Chemical Risk Assessment</i> , prepared for Fusion Technologies (Australia) Pty Ltd, 5 September 2024. Appendix E.3 – AECOM Australia Pty Ltd. 2026. <i>Beetaloo Exploration and Appraisal Program – Chemical Risk Assessment</i> , prepared for Tamboran Resources Pty Ltd, 24 May 2026.							Appendix E Chemical Risk Assessment AECOM Australia Pty Ltd. 2025. <i>Beetaloo Exploration and Appraisal Program - Hydraulic Fracturing Chemical Risk Assessment</i> , Rev 11, prepared for Tamboran Resources, 28 March 2025. Appendix E.1 - EHS Support. 2023. <i>Hydraulic Stimulation Chemical Risk Assessment – Tamboran Resources Northern Territory Tenements</i> , Prepared for Condor Energy, January 2024. Appendix E.2 – AECOM Australia Pty Ltd. 2024b. <i>Beetaloo Exploration and Appraisal Program – Chemical Risk Assessment</i> , prepared for Fusion Technologies (Australia) Pty Ltd, 5 September 2024. Appendix E.3 – AECOM Australia Pty Ltd. 2026. <i>Beetaloo Exploration and Appraisal Program – Chemical Risk Assessment</i> , prepared for Tamboran Resources Pty Ltd, 24 May 2026. Appendix E.4 – AECOM Australia Pty Ltd. 2026. <i>Beetaloo Exploration and Appraisal Program – Chemical Risk Assessment</i> , prepared for Tamboran Resources Pty Ltd, 25 June 2026.								

Beetaloo Exploration and Appraisal Program - Hydraulic Fracturing Chemical Risk Assessment

TEQ-DEFOAM 1538

25-June-2026
Commercial-in-Confidence

Beetaloo Exploration and Appraisal Program - Hydraulic Fracturing Chemical Risk Assessment

TEQ-DEFOAM 1538

Client: Tamboran B2 Pty Ltd

ABN: 42 105 431 525

Prepared by

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25 June 2026

Job No.: 60788134

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Quality Information

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Originator Cindy Cheung, Tiffany Teo

Checker/s Simon Muniandy

Verifier/s Michael Archer

Revision History

Rev	Revision Date	Details	Approved	
			Name/Position	Signature
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0	23-Jun-2026	Final	Michael Archer Technical Director	

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1.0 Introduction

Tamboran B2 Pty Ltd (Tamboran) commissioned AECOM Australia Pty Ltd (AECOM) to perform a Chemical Risk Assessment (CRA) for the products proposed to be used in Tamboran's Exploration and Appraisal Program in the Beetaloo Basin. This assessment is an addendum to, and should be read in conjunction with, the *AECOM (2025) Beetaloo Exploration and Appraisal Program - Hydraulic Fracturing Chemical Risk Assessment* for a complete understanding of the CRA methodology and approach utilised in this report.

1.1 Scope

The CRA was undertaken to assess the potential human health and environmental risks of the following Baker Hughes drilling fluid product proposed to be used during the drilling event:

- TEQ-DEFOAM 1538

The chemical composition of TEQ-DEFOAM is presented in **Table 1**. The Safety Data Sheet (SDS) is presented in **Appendix C**.

Table 1 Chemical Composition

CAS #	Chemical Name	% (w/w)
64771-72-8	Hydrocarbons, C14-C17, n-alkanes, <2% aromatics	60 - 70
64771-72-8	Hydrocarbons, C10-C14, n-alkanes, isoalkanes, <2% aromatics	20 - 30

1.2 Approach

This risk assessment aligns with the *Northern Territory Government, Department of Environment, Parks and Water Security, Environment Management Plan Content Guideline, 2021* (herein referred to as DEPWS 2021) and is in accordance with requirements of the *Petroleum (Environment) Regulations 2016* (herein referred to as the Regulations).

The methods used for this CRA also follow the guidance provided by the *Department of the Environment and Energy, Exposure Draft - Chemical Risk Assessment Guidance Manual: for chemicals associated with coal seam gas extraction, 2017* (DoEE, 2017) and the methodology adopted for the CRA is in general accordance with the following:

- Australian Industrial Chemicals Introduction Scheme (AICIS) (formerly National Industrial Chemicals Notifications and Assessment Scheme (NICNAS)), National Assessment of Chemicals Associated with Coal Seam Gas Extraction in Australia, 2017 (herein referred to as NICNAS 2017), which includes the approach outlined in the National Chemical Risk Assessment Guidance Manuals published by the National Environment Protection Council (NEPC)
- enHealth, Environmental Health Risk Assessment, Guidelines for Assessing Human Health Risks from Environmental Hazards, 2012
- *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as amended 2013 (ASC NEPM); Schedule B4, Site-specific health risk assessment methodology.

This CRA comprised the following tasks:

- Hazard assessment. An evaluation of the environmental hazard of the chemical additives in the drilling fluid systems, based on their environmental persistence, bioaccumulation and aquatic toxicity properties. Also included was an evaluation of potential human health effects (i.e. genotoxicity, carcinogenicity, reproductive toxicity, oral toxicity, inhalation toxicity, dermal toxicity, chronic repeated dose toxicity).
- Exposure assessment. An evaluation of surface and sub-surface exposure pathways and mass balance calculation to identify the amount of each chemical additive of the drilling fluid system.

- Screening and validation processes via Tier 1 and Tier 2 assessments. Determination of chemicals known to be of low concern, and identification of chemicals for further risk assessment.
 - Tier 1: using published information about each chemical proposed to be used in the drilling fluid systems.
 - Tier 2: A quantitative evaluation of the potential risks to human health associated with the drilling activities using toxicity values and quantitative estimates of chemical intake, based on the identification of complete exposure pathways using generic field level information and hazard identification.

2.0 Tier 1 Screen

2.1 Tier 1 Screen Methodology

The screening process for the chemicals in the human health assessment is consistent with the approach outlined in DoEE (2017) and Appendix C of DEPWS (2021).

The following general approach was used to screen the chemicals of potential concern (COPCs):

- If the chemicals are found on any of the following national or international lists of substances applicable to chemicals associated with coal seam gas extraction as being of low concern, then a Tier 2 assessment was deemed not to be warranted.
 - AICIS Inventory Multi-tiered Assessment and Prioritisation (IMAP) Tier 1 Lists
 - National Assessment of Chemicals Associated with Coal Seam Gas Extraction in Australia, Technical Report Number 11. Chemicals of low concern for human health based on initial assessment of hazards (NICNAS 2017)
 - USEPA High Production Volume (Indicator 1)¹
 - European Chemicals Agency (ECHA) Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Annex IV².
- If the chemical was listed as a low concern chemical and the Persistence, Bioaccumulation and Toxicity (PBT) assessment, conducted as per DEPWS (2021) guidance, did not identify a PBT substance, a Tier 2 assessment was deemed not to be warranted.
- If the chemical was not listed as a chemical of low concern (i.e. due to not being previously evaluated by national/international agencies) but was not a PBT substance and no human health hazard was identified, then a Tier 2 assessment was deemed not to be warranted.

The outcome of the Tier 1 assessment identifies the chemicals of low human health and environmental concern for which no further management or mitigation is considered necessary.

2.2 Outcome of Tier 1 Screen

The chemicals from TEQ-DEFOAM listed in **Table 1** have been assessed by AICIS under the IMAP framework and were identified to be of low concern to human health.

However, it is to be noted that these chemicals were identified to be potentially P and T (i.e., the chemicals potentially meet the criteria of being persistent *and* toxic). The PBT assessment is summarised in

Therefore, based on the Tier 1 screening, hydrocarbons, C14-C17, n-alkanes, <2% aromatics and hydrocarbons, C10-C14, n-alkanes, isoalkanes, <2% aromatics chemicals were identified to require a Tier 2 assessment:

The Tier 1 screening is provided in **Appendix A**, the chemical toxicological profiles are provided in **Appendix B** and the drilling fluid SDS is provided in **Appendix C**.

¹ The US EPA High Production Volume (HPV) chemicals are those which are manufactured in or imported into the US in amounts ≥ 1 million pounds/year. Indicator 1 denotes those chemicals not considered a candidate for testing, based on a preliminary US EPA review indicating testing would not further our understanding of the chemical's properties (NICNAS 2017).

² Annex IV of the European REACH regulation (i.e. Registration; Evaluation; Authorisation; and restriction of Chemicals) contains a list of substances exempt from registration on the basis that they are considered to cause minimum risk due to their intrinsic properties (NICNAS 2017).

Table 2 and presented in **Appendix A**.

Therefore, based on the Tier 1 screening, hydrocarbons, C14-C17, n-alkanes, <2% aromatics and hydrocarbons, C10-C14, n-alkanes, isoalkanes, <2% aromatics chemicals were identified to require a Tier 2 assessment:

The Tier 1 screening is provided in **Appendix A**, the chemical toxicological profiles are provided in **Appendix B** and the drilling fluid SDS is provided in **Appendix C**.

Table 2 PBT assessment of TEQ-DEFOAM

Substance	P/vP Criteria Fulfilled*	B/vB Criteria Fulfilled*	T Criteria Fulfilled*	Overall Conclusion
Hydrocarbons, C14-C17, n-alkanes, <2% aromatics and Hydrocarbons, C10-C14, n-alkanes, isoalkanes, <2% aromatics 64771-72-8	Yes, not expected to be biodegradable.	No. There is consistent empirical and predicted evidence to suggest that the following components of gas oils and kerosenes have the potential for high bioaccumulation with BAF/BCF values greater than 5000. However, most of these components are not expected to biomagnify (relative to their concentration in the diet) in aquatic or terrestrial food webs, largely because the combination of metabolism (albeit slow), growth dilution, and low dietary assimilation efficiency of these components allows the elimination rate to exceed the uptake rate when exposure occurs from the diet only (Environment Canada 2014).	Yes. Chronic toxicity data <0.1 mg/L, these chemicals do meet the screening criteria for toxicity.	Potentially P and T. Not B

*Please refer to individual toxicity profiles in Appendix B for more information.

3.0 Tier 2 Screen

3.1 Tier 2 Screen Methodology

The purpose of the risk characterisation portion of the assessment is to provide a conservative estimate of the potential risk resulting from exposure to the COPCs that may occur during drilling and hydraulic fracturing activities. The risk characterisation evaluates the toxicity of the COPC and characterises the risk of the chemical assessed for specific exposure pathways identified below.

A two-stage process is employed during risk characterisation. First, risk ratios are developed for the chemical for potentially complete exposure pathways associated with applicable release scenarios. For the assessment of the overall potential for adverse human health effects posed by simultaneous exposure to multiple chemicals, the estimated daily intake of the chemicals by inhalation and direct contact (ingestion and dermal) were compared to tolerable daily intakes to calculate an individual hazard quotient (HQ) and then summed for all constituents into a hazard index (HI). The identification of toxicity values undertaken in this risk assessment has followed DoEE (2017), NICNAS (2017) and enHealth (2012) guidance. The toxicity values selected for this assessment were from Level 1 or 2 sources such as NICNAS (2017), AICIS and ECHA REACH databases.

Consistent with Australian risk assessment methodologies, if the HI is less than or equal to 1, then no adverse health effects are likely associated with exposures and no risk / hazard reduction measures are required. There should be no need for further management controls on the chemical additional to those already in place (DoEE, 2017).

However, if the total HI is greater than 1, adverse health effects may be possible and therefore the assumptions inherent in the risk characterisation process warrant further evaluation via Tier 2 analysis.

3.2 Conceptual Exposure Model

Based on the risk mitigation measures identified in the NT Government *Scientific Inquiry into Hydraulic Fracturing in the Northern Territory*, the *Code of Practice for Onshore Petroleum Activities* (the Code) in the Northern Territory and mitigation measures outlined by Tamboran in its Environmental Management Plans (EMPs), no potentially complete exposure pathways were identified for the drilling chemicals to impact groundwater that is used for beneficial purposes in the project area. AECOM understands that the specific controls implemented by Tamboran focused on the protection of aquifers follow industry standard practice and include:

- the physical vertical separation distances of 1,400 m between the aquifer and target formation to prevent any migration of drilling fluid to aquifer units
- the horizontal separation distance between the exploration well and the closest groundwater extraction bores of at least 1 km, as per the Code
- use of double lined wastewater tanks with leak detection
- implementation of spill management plan
- use of enclosed tanks and freeboard requirements
- mandatory secondary containment requirements.

In addition to the above, AECOM understands that the specific controls implemented by Tamboran during the use of drilling fluids include:

- Carrying over drilling fluids between wells, to minimise waste and additional volume generated.
- Use of a centrifuge to reduce volume and waste generated.
- Physical well barriers – three cemented casings, verified through cement bond logging (CBL), pressure testing, etc. Well design and barriers are in accordance with cl B.4.3 of the Code.
- All drilling fluid will be in mud tanks with closed top, with minimal exposure (if any) to evaporation

Potential exposures to the chemicals at the project area were therefore assessed to be limited to the above ground storage and handling of the chemicals and associated (liquid and solid) drilling waste.

The Tier 2 assessment evaluated the toxicity of the individual chemicals and characterised the potential cumulative exposure risks of the total fluid mixtures to workers. The methodology incorporated an assessment of potential exposures to the workers, with the following identified as the only potentially complete exposure pathways for the drilling fluid:

- Incidental ingestion and dermal contact of drilling fluid by Workers during drilling operations.

These scenarios are also deemed protective of the following scenario due to the less frequent and short duration of these exposures occurring:

- Worker exposure during a spill (i.e., a coupling breaks on a tank and releases product onto the worker) or leak scenarios.

Exposure parameters were selected based on a combination of default assumptions for workers from ASC NEPM, enHealth (2012) and site-specific information from Tamboran (i.e. if personal protective equipment is used). Exposure parameters are provided in **Appendix A** and toxicological profiles are provided in **Appendix B**.

3.3 Chemicals of Potential Concern

Exposure point concentrations (EPC) for the chemicals were provided to AECOM by the chemical provider (Baker Hughes). It was conservatively assumed that 100% of the mass of the chemicals injected into the well will be present in the fluid. The EPCs are presented in **Appendix A**.

A summary of the chemical and its EPC that require further assessment is presented in **Table 3**.

Table 3 Chemicals requiring further assessment (Tier 2) – TEQ DEFOAM

CAS #	Chemical Name	EPC (mg/L)
64771-72-8	Hydrocarbons, C14-C17, n-alkanes, <2% aromatics	200
64771-72-8	Hydrocarbons, C10-C14, n-alkanes, isoalkanes, <2% aromatics	85.7

Toxicity reference values (TRVs) were selected to be consistent with the TRVs used in the National Assessment of Chemicals Associated with Coal Seam Gas Extraction in Australia (NICNAS 2017) and benchmarked with other regulator approved CRAs of similar operations in the Bowen, Surat and Beetaloo Basins.

3.4 Outcome of Tier 2 Screen

For the assessment of the overall potential for adverse human health effects posed by exposure to the chemical, the estimated daily intake of the COPC (via incidental ingestion and dermal contact) was compared to tolerable daily intakes to calculate an individual hazard quotient (HQ) and then summed for all COPC into a hazard index (HI). It is noted that in this instance, the HQ will be the same as the HI as there is only one COPC.

Consistent with Australian risk assessment methodologies, if the HI is less than or equal to 1, then no adverse health effects are likely associated with exposures. However, if the total HI is greater than 1, health effects cannot be ruled out and therefore the assumptions inherent in the risk characterisation process warrant further evaluation.

A summary of the estimated HI for the workers that are relevant to the assessment of potential exposure to the COPC in drilling fluid, based on the available data is presented in **Table 4**. The Tier 2 screening risk calculations are provided in **Appendix A**.

Table 4 Risk associated with potential exposure to Workers

Receptor and Pathway	Threshold Hazard Index
	100% Mass Return
Worker Exposure	
Ingestion of chemicals via incidental contact	3.5E-04
Dermal exposure to chemicals via incidental contact	2.4E-04
Total Hazard Index	5.9E-04

The following can be concluded from the Tier 2 screening:

- The estimated HI associated with potential exposure to COPC identified in drilling fluid, where TEQ-DEFOAM is used and assuming 100% mass recovery, is below the target 1, hence, potential risks are considered to be acceptable.

Further, based on the margin of safety in the risk estimate, the risk to workers will remain acceptably low even if the duration of work exceeds the assumed one month period (up to 365 days/year).

This conclusion is consistent with the previous AICIS assessment of these chemicals under the IMAP framework which concluded that they are of low concern to human health.

4.0 Chemical Transport, Storage and Handling

AECOM understands that Tamboran aligns its transport, storage, and handling of hazardous chemicals with WHS Regulations, and the prescribed chemical legislation including all obligations and duties for storage and handling of hazardous chemicals and eliminating risks to workers from potential exposure and the potential requirements for health monitoring.

The following prescribed chemical legislation, as defined by the Petroleum (Environment) Regulations 2016, are recommended to be followed as it relates to the transport, storage, and handling of drilling, stimulation and hydraulic fracturing chemicals:

- *Medicines, Poisons and Therapeutic Goods Act 2012 and Medicines, Poisons and Therapeutic Goods Regulations 2014*
- *Dangerous Goods Act 1998*
- *Water Act 1992*
- *Waste Management and Pollution Control Act 1998*
- *Work Health and Safety (National Uniform Legislation) Act 2011*
- *Radiation Protection Act 2004.*

5.0 References

AECOM (2025) Beetaloo Exploration and Appraisal Program - Hydraulic Fracturing Chemical Risk Assessment, Beetaloo Sub-basin, NT, 20 June 2025.

DoEE (2017). Department of the Environment and Energy, Exposure Draft - Chemical Risk Assessment Guidance Manual: for chemicals associated with coal seam gas extraction, 2017

enHealth (2012). Environmental Health Risk Assessment, Guidelines for Assessing Human Health Risks from Environmental Hazards, 2012

ASC NEPM (2013). *National Environment Protection (Assessment of Site Contamination) Measure 1999*, as amended 2013; Schedule B4, Site-specific health risk assessment methodology

NEPC (2009). National Chemical Risk Assessment Guidance Manuals.
<https://www.nepc.gov.au/projects/chemical-risk-assessment-guidance-manuals>

NICNAS (2017). National Industrial Chemicals Notification and Assessment Scheme, National Assessment of Chemicals Associated with Coal Seam Gas Extraction in Australia, 2017

NT Government Scientific Inquiry into Hydraulic Fracturing in the Northern Territory, Draft Final Report, December 2017

DEPWS (2021). Northern Territory Government, Department of Environment, Parks and Water Security, Environment Management Plan Content Guideline, 2021

Appendix A

Tier 1 and Tier 2 Risk Screen Calculations

Chemical Name	CAS Number	Volume or Mass of Chemical (L or kg)	Concentration in Injected Fluid (mg/L)	Parent Compound Purpose	Ecotoxicity ¹	Toxicity ²	Biodegradation ^{1,3}	Bioaccumulative ¹	Tier 1 Screening Assessment	Discussion	Tier 2 Assessment Worker Ingestion Risk	Tier 2 Assessment Worker Dermal Risk	Hazard Quotient	Outcome of Tier 2 Worker Risk Assessment ¹	
Hydrocarbons, C14-C17, n-alkanes, <2% aromatics	64771-72-8	1,693	200	Defoamer	Chronic: C10-C12 isoparaffinic range indicated an effect NOEC = 0.025 mg/l	Based on Chronic: Very High	Yes	No	Tier 2	A Tier 1 Human Health Assessment for this chemical has been conducted by NICNAS which concluded that this chemical was identified as low concern to human health. However, the risk was classified as very high based on chronic data. The exposure concentration is above the respective ecotoxicity values. A Tier 2 assessment is required.	3.51E-04	2.35E-04	5.87E-04	Based on the calculated HQ the chemical is of low concern for workers (refer to individual toxicity profile and risk calculations for further detail).	
Hydrocarbons, C10-C14, n-alkanes, isoalkanes, <2% aromatics	64771-72-8	726	86	Defoamer	Chronic: C10-C12 isoparaffinic range indicated an effect NOEC = 0.025 mg/l	Based on Chronic: Very High	Yes	No	Tier 2	A Tier 1 Human Health Assessment for this chemical has been conducted by NICNAS which concluded that this chemical was identified as low concern to human health. However, the risk was classified as very high based on chronic data. The exposure concentration is above the respective ecotoxicity values. A Tier 2 assessment is required.	1.51E-04	1.01E-04	2.51E-04	Based on the calculated HQ the chemical is of low concern for workers (refer to individual toxicity profile and risk calculations for further detail).	
													Total Risk	5.9E-04	The chronic health risks associated with potential exposure to COPC identified in drilling fluid, where TEQ Defoam is used and assuming 100% mass recovery are considered to be acceptable.

Notes
1 - Please refer to the individual toxicity profiles for further detail.
2 - Toxicity assessed using NT (2021)
3 - Biodegradation assessed as per NT (2021) and DoEE (2017)

Toxicity and Dermal Absorption Parameters

C = calculated from chronic value, Ch = chronic value adopted

CAS#	Chemical	Oral/Dermal Exposures				Inhalation Exposures			Threshold Chronic TC or RfC (mg/m³)	NOAEC or LOAEC (mg/m³)	NOAEL or LOAEL (mg/kg bw/d)	UF	Reference	
		Threshold Chronic TDI or RfD (mg/kg/day)	Dermal Permeability (cm/hr)	Reference	Inhalation Unit Risk (ug/m³)⁻¹	Non-Threshold Slope Factor (mg/kg/day)⁻¹								
COPC in Hydraulic Fracturing Fluid Injected into Well														
64771-72-8	Hydrocarbons, C14-C17, n-alkanes	2	D	5.32E-01	EPI				7.8	converted from RFD		200	100	ECCC (2024)
64771-72-8	Hydrocarbons, C10-C14, n-alkanes, isoalkanes	2	D	5.32E-01	EPI				7.8	converted from RFD		200	100	ECCC (2024)

Notes:

D - Derived (refer to individual Toxicity Profiles)

References:

ECCC, 2024, Gas Oils and Kerosenes with Uses in Products Available to Consumers Group

Exposure to Chemicals via Incidental Ingestion of Drilling fluid

Chronic Exposures

Chronic Exposures					Exposure Calculations (RME)						
General Data/ Equations					Units	Ingestion of drilling fluid by Workers					
Exposure Parameters											
Exposure Frequency (EF)					days/year	20	Assume work 5 days per week for 1 month (site-specific information from Tamboran)				
Exposure Duration (ED)					years	0.083	Works will be complete in one month (site-specific information from Tamboran).				
Body Weight (BW)					kg	78	Average male and female adults as per enHealth 2012				
Averaging Time - NonThreshold (ATc)					days	25550	USEPA 1989 and CSMS 1996				
Averaging Time - Threshold (ATn)					days	30.42	USEPA 1989 and CSMS 1996				
Ingestion Rate (IRw)					L/day or L/hr	0.005	Assume Incidental ingestion of 5 ml (1 tsp) of fluid per day during drilling.				
Bioavailability (B)					-	100%	Assume 100% bioavailability via ingestion of chemicals in water.				
Intake Factor = $\frac{IRw \cdot B \cdot EF \cdot ED}{BW \cdot AT}$					L/kg/day	4.2E-09 3.5E-06	NonThreshold Threshold				
Daily Intake from Water = Concentration in Water x Intake Factor (ref: USEPA 1989) NonThreshold Risk = Daily Intake from Water for NonThreshold Effects x Slope Factor Hazard Quotients = (Daily Intake from Water for Threshold Effects/ADI)											
Chemical		Toxicity Data			Concentration	Daily Intake		Calculated Risk			
		Non-Threshold Slope Factor	Chronic Threshold TDI	Background Intake (% Chronic TDI)	Chronic TDI Allowable for Assessment (TDI-Background)	in Water	NonThreshold	Threshold	NonThreshold Risk	Chronic Hazard Quotient	
		(mg/kg-day) ⁻¹	(mg/kg/day)		(mg/kg/day)	(mg/L)	(mg/kg/day)	(mg/kg/day)	(unitless)	(unitless)	
64771-72-8	Hydrocarbons, C14-C17, n-alkanes		2.0E+00		2.0E+00	200.00	8.4E-07	7.0E-04	--	3.5E-04	
64771-72-8	Hydrocarbons, C10-C14, n-alkanes, isoalkanes		2.0E+00		2.0E+00	85.70	3.6E-07	3.0E-04	--	1.5E-04	
	Total Risk (mixture)									3.51E-04	

Note:
This scenario is deemed protective of the following scenarios due to the less frequent and short duration of exposures:
- Worker exposure during a spill (i.e.a couple breaks on a tank and releases product onto the worker) or leak scenarios

Dermal Exposure to Chemicals via Contact of Drilling Fluid

Chronic Exposures

Chronic Exposures		Exposure Calculations (RME)										
General Data/ Equations		Units	Dermal Contact with Drilling Fluid by Workers									
Exposure Parameters												
Exposure Frequency (EF)	days/year	20	Assume work 5 days per week for 1 month									
Exposure Duration (ED)	years	0.083	Maximum duration of the operation. Works will be complete in one month (site-specific information from Tamboran).									
Body Weight (BW)	kg	78	Average male and female adults as per enHealth 2012									
Averaging Time - NonThreshold (ATc)	days	25550	USEPA 1989 and CSMS 1996									
Averaging Time - Threshold (ATn)	days	30.42	USEPA 1989 and CSMS 1996									
Event Frequency (EV)	(events/day)	1										
Surface Area (SAw)	cm ²	2300	Hands and forearms exposed (enHealth 2012) Occupational HSE would require long pants and closed shoes on Australian work sites; forearms conservatively included									
Event Duration (tevent)	hr/event	1	Assume contact with fluid for 1 hour per event									
Conversion Factor (CF)	L/cm ³	1.E-03	Conversion of units									
$CDI_{Der,w} = \frac{DA_{event} * SA * EV * EF * ED}{365 \frac{days}{year} * AT * BW}$		mg/kg/day	calculated Chronic Daily Intake via dermal contact with fluid									
$DA_{event} = Cw * Kp * t_{event} * CF$		mg/cm ² -event	calculated Dermal absorbed dose per event per unit exposed skin area									
Daily Intake from Water = Concentration in Water x Dermal Permeability x Intake Factor (ref: USEPA 1989, 2004) NonThreshold Risk = Daily Intake from Water for NonThreshold Effects x Slope Factor Hazard Quotients = (Daily Intake from Water for Threshold Effects/ADI)												
Chemical	Toxicity Data		Concentration	DAevent	Chronic Daily Intake		Calculated Risk					
	Non-Threshold Slope Factor	Chronic Threshold TDI	Background Intake (% chronic TDI)	Chronic TDI Allowable for Assessment (TDI-Background)	Dermal Permeability (Kp)	in Water (Cw)	DAevent	CDI _{der,w} NonThreshold	CDI _{der,w} Threshold	NonThreshold Risk	Chronic Hazard Quotient	
	(mg/kg-day) ⁻¹	(mg/kg/day)		(mg/kg/day)	(cm/hr)	(mg/L)	mg/cm ² -event	(mg/kg/day)	(mg/kg/day)	(unitless)	(unitless)	
64771-72-8	Hydrocarbons, C14-C17, n-alkanes		2.0E+00		2.0E+00	5.3E-1	200.00	1.06E-01		4.7E-04	--	2.4E-04
64771-72-8	Hydrocarbons, C10-C14, n-alkanes, isoalkanes		2.0E+00		2.0E+00	5.3E-1	85.70	4.56E-02		2.0E-04	--	1.0E-04
Total Risk (mixture)												2.4E-04

Note:
This scenario is deemed protective of the following scenarios due to the less frequent and short duration of exposures:
- Worker exposure during a spill (i.e.a couple breaks on a tank and releases product onto the worker) or leak scenarios

Summary of Risk to Workers - Drilling Fluid
Exposure fo Target Chemicals - Theoretical Data

Receptor/Exposure Pathway	Calculated HI
	100% Mass Return
<u>Use of Drilling Fluid in Hydraulic Fracturing</u>	
<u>Planned Recipe</u>	
Workers	
Ingestion of Chemicals via Incidental Contact with Drilling Fluid	3.51E-04
Dermal Exposure to Chemicals via Incidental Contact with Drilling Fluid	2.35E-04
Total Risk	5.87E-04

Appendix B

Toxicological Profiles

Toxicity Summary - Hydrocarbons, C14-C17, n-alkanes and hydrocarbons, C10-C14, n-alkanes, isoalkane

Chemical and Physical Properties ^{1,2,3,4}	
CAS number	64771-72-8
Molecular formula	UVCB
Molecular weight	142 g/mol
Solubility in water	<10 mg/L
Density	0.8 g/cm ³
Melting point	-42 to -69 °C
Boiling point	150 to 450 °C
Vapour pressure	191 Pa
Henry's law constant	No data available
Explosive potential	No data available
Flammability potential	No data available
Colour/Form	Expected to be liquids at ambient temperatures.
Overview	Paraffins (petroleum), normal C5-20 is a complex combination of normal paraffins obtained by a selective adsorption process using a solid adsorbent such as a molecular sieve. It consists of straight chain saturated hydrocarbons having carbon numbers predominantly in the range of C5 through C20 and boiling in the range of 35°C to 345°C (95°F to 653°F). A Tier 1 Human Health assessment for this chemical has been conducted by NICNAS which concluded that it was low concern to human health and thus required no further assessment.
Environmental Fate ^{1,2}	
Soil/Water/Air	The environmental fate and behaviour of gas oils and kerosenes, including environmental distribution, persistence, and bioaccumulation, are the same as those for Industry-restricted Gas oils and Kerosenes, which are discussed in ECCC (2023). When petroleum substances are released into the environment, the major fate processes include dissolution in water, volatilization, adsorption, biodegradation and photodegradation. These processes will cause changes in the composition of these substances. Biodegradation almost always occurs when petroleum mixtures are released in the environment. Studies have found populations of bacteria and other organisms (for example, fungi and yeasts) that are capable of degrading petroleum hydrocarbons in both fresh and marine waters and sediments, as well as soils. Due to the complex interaction of components within a mixture that impacts their physical-chemical properties and behaviour, it is difficult to predict the fate of a complex mixture.
Human Health Toxicity Summary ^{1,2,3}	
Chronic Repeated Dose Toxicity	In a dermal National Toxicology Program (NTP) study, B6C3F1 mice (5/sex/dose) were treated with JP-5 diluted in 95% ethanol at 0, 5 000, 10 000, 20 000, 30 000 or 40 000 mg/kg bw/day for 14 consecutive days (NTP 1986). All mice in the highest dose group and all female mice in the second highest dose group died before study termination. Starting at 10 000 mg/kg bw/day, treated mice lost weight. At the site of application (shaved back), scaly skin, hair loss, and microscopic lesions indicative of skin irritation and inflammation were observed. However, other tissues did not undergo microscopic examination. A no observed adverse effect level (NOAEL) of 5 000 mg/kg bw/day was determined on the basis of body weight loss at 10 000 mg/kg bw/day.

	In a short-term dermal study, New Zealand White rabbits (5/sex/dose) were treated with undiluted straight-run kerosene (CAS RN 8008-20-6) at 0, 200, 1000, or 2000 mg/kg bw/day for 6 hours/day, 3 days/week, for 4 weeks (API 1985 as cited in API 2010a, 2010b; US EPA 2011a). The site of application was occluded. Skin irritation was slight at the low dose and moderate at the mid and high doses. In the high-dose group, 1 male and 1 female died, which the study authors considered to be a treatment-related effect. Treatment-related clinical signs included thinness, lethargy, and wheezing. Reduced body weight gain and body weight loss were observed in the mid- and high-dose groups, respectively. Decreases in haematological parameters (for example, red blood cell [RBC] count, haematocrit, and haemoglobin) were observed in male rabbits starting at the lowest dose. Differences in organ weights occurred in both sexes, including significant increases in the absolute and relative weight of the spleen and adrenal glands in the females. The authors considered the adrenal weight increases to be stress-related. On the basis of the 13% reduction in RBC count in males and the organ weight changes in females, a lowest observed adverse effect level (LOAEL) of 200 mg/kg bw/day, the lowest dose tested, was identified.
Carcinogenicity	Seven of the gas oil and kerosene substances are classified as Category 1B “may cause cancer” (CAS RNs 64741-91-9, 64742-13-8, 64742-14-9, 64742-38-7, 64742-46-7, and 64742-79-6) or Category 2 “suspected of causing cancer” (CAS RN 64741-77-1) (EC 2004, 2008). However, the European Commission (Regulation EC No. 1272/2008, Annex VI) states that classification as a carcinogen does not apply to these gas oils and kerosenes if the refining history is known and if the substance(s) from which they are produced can be shown not to be carcinogenic. This is typically demonstrated if the substance contains less than 0.1% individual carcinogens (for example, benzene) and/or less than 3% w/w DMSO-extractable total PAC content (EC 2004, 2008; Clark et al. 2013; CONCAWE 2022). The gas oils found in products available to consumers are expected to be highly refined and contain minimal amounts of DMSO-extractable PAC content.
Mutagenicity/ Genotoxicity	Not expected to be genotoxic.
Reproductive Toxicity / Developmental Toxicity/Teratogenicity	Reproductive parameters were assessed separately in male and female rats after sub-chronic exposure to undiluted JP-8 by gavage (Mattie et al. 2000; as described above). In the first study, male SD rats were administered undiluted JP-8 by gavage at 0, 750, 1500, or 3000 mg/kg bw/day for 70 days before mating with naïve females. Treatment continued during cohabitation. No effects were reported on sperm parameters, pregnancy rate, or gestation length. In the second study, female SD rats were treated by gavage with 0, 325, 750, or 1500 mg/kg bw/day of undiluted JP-8 for 90 days pre-mating and throughout mating with naïve males, gestation, and lactation. No effects were reported on pregnancy rate, gestation length, litter size, or percent of live pups. Offspring born to the treated dams were weighed on postnatal day (PND) 1, 4, 14, 21, and 90. While there were no remarkable differences on PND 1, mid- and high-dose pups weighed significantly less than controls (by 8% to 9% and just over 11%, respectively) on PND 4. By PND 21, only high-dose pup body weights remained significantly lower than controls, and by PND 90, body weights were similar across all groups. Overall, the study authors concluded that JP-8 did not appear to be a reproductive toxicant as no adverse effects on reproductive parameters were observed at doses up to 3000 mg/kg bw/day in male rats and 1500 mg/kg bw/day in female rats. The authors identified a developmental NOAEL of 750 mg/kg bw/day in the female rat study on the basis of a reduction in pup body weight at 1500 mg/kg bw/day.
Acute Toxicity	The available acute toxicity data demonstrate that hydrocarbon solvent substances tested in the C14-C20 Aliphatic Hydrocarbon Solvents (≤2% aromatics) Category did not demonstrate acute toxicity at the limit dose by the oral, dermal, and inhalation routes of exposure.
Irritation	Not expected to be skin and eye irritants.
Sensitisation	Not expected to be sensitizers.

Health Effects Summary	The C14-C20 Aliphatic Hydrocarbon Solvents ($\leq 2\%$ Aromatics) Category substances may possess properties indicating hazard for human health (aspiration and possible skin defatting with repeated exposure).
Key Study/Critical Effect for Screening Criteria	A LOAEL of 200 mg/kg bw/day was selected as the most relevant critical effect level to characterize the risk from both short- and long-term dermal exposures to subgroup 1 substances. This effect level was identified on the basis of decreased RBC count (in males) and increased spleen and adrenal weights (in females) after dermal exposure to undiluted kerosene in a 28-day rabbit study (API 1985 as cited in API 2010). This effect level was considered to be protective of similar systemic effects observed in a longer-term dermal study in rats exposed to HDS kerosene (Breglia et al. 2014) and of other systemic effects observed by the dermal route (that is, local axonopathy after treatment with dearomatized and aromatic white spirits) (Verkkala et al. 1984). No oral TRV apply. A Tier 1 Human Health Assessment for this chemical has been conducted by NICNAS which concluded that it was low concern to human health and thus required no further assessment.
Ecological Toxicity⁴	
Aquatic Toxicity	Category members are not expected to exhibit acute toxic effects to aquatic organisms at or below the limit of water solubility. High treatment loading water-accommodated-fractions from substances in this category, as well as analogue substances from the C9C14 Aliphatic Hydrocarbon Solvents ($\leq 2\%$ aromatics) Category, fail to cause acute mortality and/or effects to both freshwater and marine fish, invertebrates, and algae (at nominal loadings >1000 mg/l). Chronic studies with a substance in the C10-C12 isoparaffinic range indicated an effect (NOEC = 0.025 mg/l), but isoparaffins in the C11-C13 range did not. In chronic invertebrate studies, no effects were observed up to 1 and 5 mg/l (highest loading tested) for the C11-C13 and C13-C16 carbon ranges (CAS RN: 90622-58-5, 64742-47-8) respectively. The lack of acute or chronic aquatic toxicity, for the C14-C20 carbon range, is likely due to the low water solubility of their constituent chemicals.
Determination of PNEC aquatic	On the basis that the data consists of long term results, an assessment factor of 10 has been applied to the lowest reported chronic effect concentration of 0.025 mg/L. The PNEC _{aquatic} was calculated to be 0.0025 mg/L.
Current Regulatory Controls	
Australian Hazard Classification	No data available.
Australian Occupational Exposure Standards	No data available.
International Occupational Exposure Standards	No data available.
Australian Food Standards	No data available.
Australian Drinking Water Guidelines	No data available.
Aquatic Toxicity Guidelines	No data available.
PBT Assessment^{2,3,4}	
P/vP Criteria fulfilled?	Yes, not expected to be biodegradable.
B/vB criteria fulfilled?	No. There is consistent empirical and predicted evidence to suggest that the following components of gas oils and kerosenes have the potential for high bioaccumulation with BAF/BCF values greater than 5000. However, most of these components are not expected to biomagnify (relative to their concentration in the diet) in aquatic or terrestrial food webs, largely because the combination of metabolism (albeit slow), growth dilution, and low dietary assimilation efficiency of these components allows the elimination rate to exceed the uptake rate when exposure occurs from the diet only (Environment Canada 2014).

T criteria fulfilled?	Yes. Chronic toxicity data <0.1 mg/L, these chemicals do meet the screening criteria for toxicity.
Overall conclusion	Potentially P and T. Not B

References

1. Australian Industrial Chemicals Introduction Scheme (AICIS) online database. IMAP, Tier I Assessment for Paraffins, petroleum, normal C5-20, Retrieved 2026: <https://www.industrialchemicals.gov.au/>.
2. ECCC, 2024, Gas Oils and Kerosenes with Uses in Products Available to Consumers Group, Environment and Climate Change Canada, Health Canada, May 2024. Retrieved 2026: <https://www.canada.ca/en/environment-climate-change/services/evaluating-existing-substances/draft-assessment-gas-oils-kerosenes-products-available-consumers-group.html>.
3. ECCC, 2023. Assessment: industry restricted gas oils and kerosenes, Environment and Climate Change Canada, Health Canada. Retrieved 2026: <https://www.canada.ca/en/environment-climate-change/services/evaluating-existing-substances/assessment-twenty-six-industry-restricted-gas-oils-kerosenes.html>.
4. OECD (2011) SIDS Initial Assessment Profile on C14-C20 Aliphatic [<2% aromatic] Hydrocarbon Solvents Category. Available at: <https://hpvchemicals.oecd.org/UI/handler.axd?id=d6342bcd-0243-4b72-9dda-01b9395d3948>.

Appendix C

Safety Data Sheet

Section 1. Identification

Product identifier : TEQ-DEFOAM 1538

Product code : 9183DF

ADG : -

Product type : Liquid.

Identified uses : Defoamer

Supplier's details : Baker Hughes, Australia
631 Karel Avenue,
Jandakot,
Western Australia 6164,
Australia

Tel: 08 6595 7100

Emergency telephone number : CHEMTREC Emergency Telephone Numbers (Asia Pacific Region):

- Australia: (02) 9037 2994
 - Brunei: +(65)-31581349 (Mandarin/English)
 - China: 4001-204937 (Mandarin) *
 - Hong Kong: 800-968-793 (Cantonese) *
 - Indonesia: 001-803-017-9114 (Bahasa Indonesian) *
 - Japan: 0800-300-5842 (Japanese)
 - Malaysia: 1-800-815-308 (Bahasa Malay) *
 - New Zealand: 9801 0034
 - Philippines: 1-800-1-116-1020 (Tagalog) *
 - PNG: +(61) 2 9037 2994
 - Singapore: 800-101-2201 (Mandarin) *
 - South Korea: 00-308-13-2549 (Korean) *
 - Taiwan: 00801-14-8954 (Mandarin) *
 - Thailand: 001-800-13-203-9987 (Thai) *
 - Vietnam: +(84)-838012436 (Vietnamese)
-
- UK: +(44) 870-820-0418
 - USA: +(1) 703-527-3887 (CHEMTREC International 24 hour)
- * Number can only be dialled in-country

Section 2. Hazard(s) identification

Classification of the substance or mixture : ASPIRATION HAZARD - Category 1

GHS label elements

Hazard pictograms :



GHS08

Signal word : DANGER

Hazard statements : H304 - May be fatal if swallowed and enters airways.

Precautionary statements

Section 2. Hazard(s) identification

Prevention	: Not applicable.
Response	: IF SWALLOWED: Immediately call a POISON CENTER or doctor. Do NOT induce vomiting.
Storage	: Not applicable.
Disposal	: Dispose of contents and container in accordance with all local, regional, national and international regulations.
Precautionary statements (Code)	: -, -, P301 + P310, P331, -, P501
Supplemental label elements	: Repeated exposure may cause skin dryness or cracking.

Other hazards which do not result in classification : None known.

Additional information

Mixing of chemicals may create a reaction hazardous to one's health, to the environment, or a potential fire hazard.

Section 3. Composition and ingredient information

Substance/mixture : Mixture

Ingredient name	% (w/w)	Identifiers
Hydrocarbons, C14-C17, n-alkanes, <2% aromatics	60 - 70	CAS: 64771-72-8
Hydrocarbons, C10-C14, n-alkanes, isoalkanes, <2% aromatics	20 - 30	CAS: 64771-72-8

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified and hence require reporting in this section.

The total concentration of ingredients in this product, reported or not in this section, is 100%.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact	: Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Continue to rinse for at least 15 minutes. Check for and remove any contact lenses. Get medical attention.
Inhalation	: Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway.
Skin contact	: Wash skin thoroughly with soap and water or use recognised skin cleanser. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.
Ingestion	: Wash out mouth with water. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Section 4. First aid measures

- Inhalation** : No known significant effects or critical hazards.
- Skin contact** : Defatting to the skin. May cause skin dryness and irritation.
- Ingestion** : May be fatal if swallowed and enters airways.

Over-exposure signs/symptoms

- Eye contact** : No specific data.
- Inhalation** : No specific data.
- Skin contact** : irritation, dryness, cracking
- Ingestion** : Adverse symptoms may include the following: nausea or vomiting

Indication of immediate medical attention and special treatment needed, if necessary

- Notes to physician** : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.
- Specific treatments** : No specific treatment.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Firefighting measures

Extinguishing media

- Suitable extinguishing media** : Use an extinguishing agent suitable for the surrounding fire.
- Unsuitable extinguishing media** : None known.

- Specific hazards arising from the chemical** : In a fire or if heated, a pressure increase will occur and the container may burst.
- Hazardous thermal decomposition products** : No specific data.

- Special protective actions for fire-fighters** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

- Hazchem code** : -

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

- For non-emergency personnel** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.
- For emergency responders** : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

- Environmental precautions** : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Section 6. Accidental release measures

Methods and material for containment and cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

- Protective measures** : Put on appropriate personal protective equipment (see Section 8). Do not swallow. Avoid contact with eyes, skin and clothing. Avoid breathing vapour or mist. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Advice on general occupational hygiene** : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.
- Conditions for safe storage, including any incompatibilities** : Store in accordance with local regulations. Store in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10). Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls and personal protection

The information in this section contains generic advice and guidance. Information is provided based on typical anticipated uses of the product. Additional measures might be required for bulk handling or other uses that could significantly increase worker exposure or environmental releases.

Control parameters

Occupational exposure limits

None.

Biological exposure indices

No exposure indices known.

- Appropriate engineering controls** : Good general ventilation should be sufficient to control worker exposure to airborne contaminants.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Section 8. Exposure controls and personal protection

- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
- Eye/face protection** : Wear chemical safety goggles. When transferring material wear face-shield in addition to chemical safety goggles.
- Skin protection**
- Hand protection** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers.
- Body protection** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Other skin protection** : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory protection** : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties and safety characteristics

The conditions of measurement of all properties are at standard temperature and pressure unless otherwise indicated.

Information on basic physical and chemical properties

Appearance

- Physical state** : Liquid. [Clear.]
- Colour** : Colourless.
- Odour** : Hydrocarbon.
- Odour threshold** : Not available.
- pH** : Not available.
- Melting point/freezing point** : <-1°C
- Boiling point or initial boiling point and boiling range** : 228 to 258°C (442.4 to 496.4°F)
- Flash point** : Closed cup: 97°C (206.6°F) [ASTM D 93]
- Evaporation rate** : Not available.
- Flammability (solid, gas)** : May be combustible at high temperature.
- Lower and upper explosion limit/flammability limit** : Not available.
- Vapour pressure** : Not available.
- Relative vapour density** : Not available.
- Relative density** : 0.8 to 0.9 (20°C)

Section 9. Physical and chemical properties and safety characteristics

Solubility(ies) :

Media	Result
water	Not soluble

Partition coefficient: n-octanol/water : Not applicable.

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Not available.

Explosive properties : Not available.

Oxidising properties : Not available.

Other information

Pour point : Not available.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : No specific data.

Incompatible materials : Reactive or incompatible with the following materials: oxidising materials.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result
Not available.	

Conclusion/Summary : No known significant effects or critical hazards.

Irritation/Corrosion

Skin : No known significant effects or critical hazards.

Eyes : No known significant effects or critical hazards.

Respiratory : No known significant effects or critical hazards.

Respiratory or skin sensitization

Skin : No known significant effects or critical hazards.

Respiratory : No known significant effects or critical hazards.

Germ cell mutagenicity

Product/ingredient name	Result
Not available.	

Conclusion/Summary : No known significant effects or critical hazards.

Carcinogenicity

Product/ingredient name	Result
Not available.	
Product/ingredient name	Result
Not available.	

Conclusion/Summary : No known significant effects or critical hazards.

Reproductive toxicity

Product/ingredient name	Result
Not available.	

Conclusion/Summary : No known significant effects or critical hazards.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Hydrocarbons, C14-C17, n-alkanes, <2% aromatics ASPIRATION HAZARD - Category 1

Hydrocarbons, C10-C14, n-alkanes, isoalkanes, <2% aromatics ASPIRATION HAZARD - Category 1

Information on likely routes of exposure

Not available.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.
Inhalation : No known significant effects or critical hazards.
Skin contact : Defatting to the skin. May cause skin dryness and irritation.
Ingestion : May be fatal if swallowed and enters airways.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.
Inhalation : No specific data.
Skin contact : irritation,dryness,cracking
Ingestion : Adverse symptoms may include the following:,nausea or vomiting

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Product/ingredient name	Result
Not available.	

General : Prolonged or repeated contact can defat the skin and lead to irritation, cracking and/ or dermatitis.

Product/ingredient name	Result
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Not available.

Carcinogenicity : No known significant effects or critical hazards.**Mutagenicity** : No known significant effects or critical hazards.**Reproductive toxicity** : No known significant effects or critical hazards.**Numerical measures of toxicity****Acute toxicity estimates**

Product/ingredient name	Oral (mg/kg)	Dermal (mg/kg)	Inhalation (gases) (ppm)	Inhalation (vapours) (mg/l)	Inhalation (dusts and mists) (mg/l)
N/A					

Section 12. Ecological information**Toxicity** : No known significant effects or critical hazards.

Not available.

Persistence and degradability

Product/ingredient name	Result
Not available.	

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
Not available.			

Bioaccumulative potential

Not available.

Mobility in soil**Soil/water partition coefficient** : Not available.**Other adverse effects** : No known significant effects or critical hazards.**Section 13. Disposal considerations**

Disposal methods : Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information**International transport regulations**

Regulatory information	UN number	Proper shipping name	Transport hazard class(es)	PG*	Label
ADR/RID	Not regulated.	-	-	-	
ADG	Not regulated.	-	-	-	
IMDG	Not regulated.	-	-	-	

Section 14. Transport information

IATA	Not regulated.	-	-	-	
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PG* : Packing group

Regulatory information	Environmental hazards	Additional information
ADR/RID Class	No.	<u>Hazchem code</u> -
ADG Class	No.	<u>Hazchem code</u> -
IMDG Class	No.	-
IATA Class	No.	-

Additional information**: A • in the Hazchem code indicates that Alcohol Resistant Foam is the preferred extinguishing medium. If not available, use the extinguishing medium indicated by the number in the Hazchem code.

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments : Not available.

Section 15. Regulatory information

Standard for the Uniform Scheduling of Medicines and Poisons

Not regulated.

Model Work Health and Safety Regulations - Scheduled Substances

References : National Code of Practice for the Control of Workplace Hazardous Substances.

National Code of Practice for the Labelling of Workplace Substances.
National Code of Practice for the Preparation of Material Safety Data Sheets.
Approved Criteria for Classifying Hazardous Substances.

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

National inventory

Section 15. Regulatory information

Australia inventory (AIC) : All components are listed or exempted.

Section 16. Any other relevant information

History

Date of printing : 14 May 2026.

Date of issue/Date of revision : 14 May 2026

Date of previous issue : No previous validation

Version : 1

Key to abbreviations :

- ADG = Australian Dangerous Goods
- ADR = The European Agreement concerning the International Carriage of Dangerous Goods by Road
- ATE = Acute Toxicity Estimate
- BCF = Bioconcentration Factor
- GHS = Globally Harmonized System of Classification and Labelling of Chemicals
- IATA = International Air Transport Association
- IBC = Intermediate Bulk Container
- IMDG = International Maritime Dangerous Goods
- LogPow = logarithm of the octanol/water partition coefficient
- MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
- N/A = Not available
- SGG = Segregation Group
- SUSMP = Standard Uniform Schedule of Medicine and Poisons
- UN = United Nations

Procedure used to derive the classification

Classification	Justification
ASPIRATION HAZARD - Category 1	Expert judgment

References : Not available.

✓ Indicates information that has changed from previously issued version.

Disclaimer

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