Shenandoah S2-1H
Flowback Report
EP 98

REV	DATE	REASON FOR ISSUE	AUTHOR	APPROVER
0	04/06/2026	SS2-1H Flowback report, including flowback reuse risk assessment	AC	MK

Contents

Attachment

Attachment A Flowback Assessment Report (EHS 2026)

1 Introduction

Tamboran B2 Ltd (Tamboran) was granted approval for the *TAM1-3 Beetaloo Basin Shenandoah South E&A Program Environment Management Plan* on 23 May 2024.

The Shenandoah S2-1H (SS2-1H) well was stimulated between 23 December 2025 through 1 April 2026. In accordance with the Northern Territory (NT) Petroleum (Environment) Regulation 2016 (PER), a report on the quality of hydraulic flowback fluid (Section 37A) and produced water (Section 37B) must be submitted to the Minister within six (6) months of flowback occurring.

In addition, flowback water from the SS2-2H well was reused for the stimulation of the Shenandoah S2-1H well. In accordance with ministerial condition 15 of the TAM1-3 approval notice, the first well where flowback fluid is reused, a risk assessment of the returned flowback fluid is to be complete.

The following section satisfies the above regulatory reporting requirements.

2 Reporting Requirements

2.1 Ministerial Condition 15 Reuse of flowback water

TAM1-3 ministerial condition 15 requires:

*Within 60 days of completion of well flowback operations for the **first well** where flowback fluid has been reused, the interest holder must provide to onshoregas.DEPWS@nt.gov.au a risk assessment of the returned flowback fluid following the reuse, which must be:*

a) prepared by a suitably qualified person; and
b) prepared in accordance with the monitoring wastewater analytes specified in section C.8 of the Code.

Appendix A provide the Shenandoah S2-1H risk assessment, including assessment of the reuse of flowback water from Shenandoah S2-2H well in the stimulation of S2-1H. The flowback reuse risk assessment completed by EHS (2026) confirmed that there was no unacceptable risks calculated for the re-use of flowback water exposure scenario. Flowback re-use, with the approved site activities and associated management controls, did not identify any further action required that is not already described in the EMP.

2.2 37A Report about flowback fluid

In accordance with section 37A, Tamboran is required to provide certain information relating to chemicals or Naturally Occurring Radioactive Material (NORM) found within flowback fluid within six (6) months of commencing flowback operations. The information required under section 37A of the PER, is provided in Table 1.

Table 1 37A Report about flowback fluid

Reporting requirement	Shenandoah S2-1H information
(a) The identity of any chemical or NORM found in the flowback fluid	Characterisation of the flowback was completed with the analytes listed in the Code of Practice: Onshore Petroleum Activities in the Northern Territory (Code of Practice) - C.8 Wastewater chemistry analytes (refer Attachment A).
(b) The concentration of any chemical or NORM found in the flowback fluid	Characterisation of the flowback was completed for the analytes listed in the Code of Practice - C.8 Wastewater chemistry analytes. The results of the flowback analysis is provided in *Appendix B* of the EHS Flowback Assessment report (refer Attachment A).

Reporting requirement	Shenandoah S2-1H information
(c) Details regarding how any chemical or NORM has been or will be managed	Flowback from SS2-1H, including chemical and NORM constituents, are stored within a double lined, 13 ML enclosed wastewater tank located on SS2 well site as per the Code of Practice. The enclosed tank has continuous leak detection and level monitoring. The waste storage area on the well site has been constructed to bund 110% of the largest tank onsite. As detailed in section 3.8.3 of the TAM1-3 EMP, ongoing management of the flowback storage is underway with options for either reuse and/or evaporation. Stimulation of the SS2-1H well included reuse of the flowback water from SS2-2H well. Where evaporation is considered, the tank may be opened to allow evaporation. Wet season and dry season freeboard requirements will be in place (i.e. 1.3 m wet season and 0.3 m dry season) were this is to occur. At completion of SS2 activities, flowback will be evaporated and then transported offsite to a licenced wastewater handling facility for final disposal.
(d) Details regarding how any chemical or NORM has been or will be transported	At this stage, flowback from SS2-1H will remain onsite within the 13ML wastewater tank with options for reuse on future stimulation activities. Stimulation of the SS2-1H well included reuse of the flowback water from SS2-2H well. Controls to reuse were in accordance with TAM1-3 EMP. In accordance with ministerial condition 15, the reuse of flowback has been assessed within 60 days of completing flowback operations. Results of the reuse flowback on human health and avian confirm no unacceptable risks (refer Appendix A). At completion of regulated activities on SS2 well site, flowback and any associate chemical and NORM constituents, will be transported by licenced listed water transport provider, in accordance with the NT *Waste Management and Pollution Control Act* 1998.
(e) Details regarding how any chemical or NORM has been or will be treated	Flowback, including chemical and NORM constituents, are currently stored in an enclosed tank and are monitored. The TAM1-3 EMP allows for flowback to be reused or treated in open wastewater tanks to reduce the volume of flowback through evaporation.
(f) Details regarding any action proposed to be taken to prevent any chemical or NORM spill	A spill management plan and emergency management plan have been implemented, as a part of the approved TAM1-3 EMP. Actions implemented to prevent the spill of chemical or NORM from flowback water include: • Use of double lined enclosed tanks • Use of secondary containment for all transfer points • Use of continuous leak detection and level monitoring on wastewater tank fluid levels with alarms • Well site pad that is fully bunded to contain 110% of the volume of the largest tank

Reporting requirement	Shenandoah S2-1H information
	• Routine (daily during wet season and weekly during dry season) site inspections • Procedures in place to manage significant rainfall events.
(g) Details of the emergency contingency plan included in the environment management plan to which the activity relates	An emergency management plan (TBN-HSE-MP-05) was developed, as a part of the TAM1-3 EMP. Contingent plans include: • Response processes for onsite and offsite spills • Onsite wastewater transfer equipment to transfer wastewater in case of a spill • First response civil equipment onsite to contain a spill
(h) The requirements in relation to the management of any chemical or NORM of the prescribed chemical legislation	The management of flowback wastewater is conducted in accordance with the approved TAM1-3 E&A EMP and the *Code of Practice for Onshore Petroleum Activities in the Northern Territory*. This includes requirements to manage the environmental risks associated with generation, storage, treatment and disposal. All flowback wastewater is classified as a listed waste under the *Waste Management and Pollution Control Act 1998*. Transport and disposal of flowback must be undertaken in accordance with this Act. The NORM levels observed are consistent with historical assessments, indicating the levels within the flowback do not meet the limits as described in the NT Radiation Protection Regulation 2007

2.3 37B Report about produced water

In accordance with section 37B, Tamboran is required to provide certain information relating to chemicals or NORM found within produced water within 6 months of produced water being extracted. The information required under section 37B of the PER, is provided in Table 2.

Table 2 Report about produced water

Reporting requirement	Shenandoah S2-1H information
(a)The identity of any chemical or NORM found in the flowback fluid	N/A - no produced water has been encountered during the Shenandoah S2-1H flowback activities.
(b)The concentration of any chemical or NORM fund in the flowback fluid	N/A- no produced water has been encountered during the Shenandoah S2-1H flowback activities.
(c) Details regarding how any chemical or NORM has been or will be managed	N/A - no produced water has been encountered during the Shenandoah S2-1H flowback activities.
(d) Details regarding how any chemical or NORM has been or will be transported	N/A - no produced water has been encountered during the Shenandoah S2-1H flowback activities.

Reporting requirement	Shenandoah S2-1H information
(e) Details regarding how any chemical or NORM has been or will be treated	N/A - no produced water has been encountered during the Shenandoah S2-1H flowback activities.
(f) Details regarding any action proposed to be taken to prevent any chemical or NORM spill	N/A - no produced water has been encountered during the Shenandoah S2-1H flowback activities.
(g) Details of the emergency contingency plan included in the environment management plan to which the activity relates	N/A - no produced water has been encountered during the Shenandoah S2-1H flowback activities.
(h) The requirements in relation to the management of any chemical or NORM of the prescribed chemical legislation	N/A - no produced water has been encountered during the Shenandoah S2-1H flowback activities.

ATTACHMENT A

Shenandoah S2-1H
Flowback Assessment Report

Flowback Assessment

Shenandoah S2-1H
Northern Territory, Australia

Prepared for:

Tamboran Resources

Prepared by:

EHS Support

June 2026

Document Control

PROJECT DETAILS

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22/05/2026	0	Draft Flowback Assessment of Shenandoah S2-1H
01/06/2026	1	Finalise Flowback Assessment of Shenandoah S2-1H

Table of Contents

List of Tables

List of Figures

List of Appendices

Acronyms

ADWG	Australian Drinking Water Guidelines
ALARP	As Low As Reasonably Practical
ALM	Adult Lead Model
ANZG	Australian and New Zealand Guidelines
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999
ATSDR	Agency for Toxic Substances and Disease Registry
Bq	Becquerel
BTEX	benzene, toluene, ethylbenzene, and xylene
CEM	Conceptual Exposure Model
CSIRO	Commonwealth Scientific and Industrial Research Organisation
E&A	Exploration & Appraisal
ED	exposure duration
EF	exposure frequency
EMP	Environmental Management Plan
EP	Exploration Permit
HI	hazard index
HIL	Health Investigation Level
HQ	hazard quotient
mSv	millisievert
NEPC	National Environment Protection Council
NHMRC	National Health and Medical Research Council
NORM	naturally occurring radioactive materials
NT	Northern Territory
PbB	blood lead
RBSL	risk-based screening level
RSL	Regional Screening Level
SMP	Spill Management Plan
TRV	Toxicity Reference Value
TRW	Technical Review Workshop
USEPA	United States Environmental Protection Agency
WHO	World Health Organization
WWMP	Wastewater Management Plan

Units of Measure

Area	
ha	hectare
m^2	square metres
Density	
kg/m^3	kilograms per cubic metre
Electrical Conductance	
µS/cm	microsiemen per centimetre
dS/m	decisiemen per metre
mS/cm	millisiemen per centimetre
mV	millivolt
Length	
µm	micrometres
cm	centimetres
km	kilometres
m	metres
mm	millimetres
Mass	
µg	micrograms
g	grams
kg	kilograms
mg	milligrams
t	metric tonnes
Concentration by Mass	
µg/kg	microgram per kilogram
mg/kg	milligram per kilogram

Pressure	
kPa	kilopascals
Pa	Pascals
Temperature	
°C	degrees Celsius
K	kelvin
Velocity	
m/s	metres per second
Volume	
µL	microlitres
cL	centilitres
cm^3	cubic centimetre
GL	gigalitre
L	litres
m^3	cubic metre
mL	millilitres
ML	megalitre
Concentration by Volume	
µg/L	microgram per litre
mg/L	milligram per litre
ppmv	parts per million by volume
ppbv	parts per billion by volume

1 Introduction

Tamboran Resources ("Tamboran B2 Pty Ltd") is conducting an exploration and appraisal program within Exploration Permit (EP) 98, EP76 and EP117 in the Beetaloo Sub-basin of the broader McArthur Basin in the Northern Territory (NT) (**Figure 1**).

EHS Support PTY Ltd ("EHS Support") was engaged to perform a risk assessment on flowback water from Shenandoah S2-1H well which was advanced and hydraulically stimulated within EP98. Flowback water from well Shenandoah S2-2H was reused as makeup water for the stimulation of well Shenandoah S2-1H.

Therefore, this risk assessment was completed to satisfy Condition 15 of the Approval for TAM1-3: Beetaloo Basin Shenandoah South Exploration & Appraisal (E&A) Program Environment Management Plan ("TAM1-3 EMP"; Tamboran, 2024). Approval Condition 15 states: *Within 60 days of completion of well flowback operations for the first well where flowback fluid has been reused, the interest holder must provide to onshoregas.DEPWS@nt.gov.au a risk assessment of the returned flowback fluid following the reuse, which must be:*

> *a) prepared by a suitably qualified person; and*
> *b) prepared in accordance with the monitoring wastewater analytes specified in section C.8 of the Code.*

Additionally, this assessment provides a report on quality of hydraulic flowback fluid and produced water in accordance with Regulation 37A and 37B under part 3A (reporting requirements for hydraulic fracturing) of the Northern Territory *Petroleum (Environment) Regulations* (2016), and of the Code of Practice (NT, 2025a). Regulation 37A states: *A report under subregulation (2) must be accompanied by a full human health risk assessment relating to any chemical found in the flowback fluid.* Flowback fluid is defined as: *fluid that is a mixture of hydraulic fracturing fluid and formation fluid that is allowed to flow from the well following hydraulic fracturing*. Regulation 37B states: *(1) An interest holder in relation to an activity that includes hydraulic fracturing must give the Minister a report about produced water within 6 months of the produced water being extracted. Produced water is defined as: naturally occurring water that is extracted from the geological formation following hydraulic fracturing.* No produced water was generated for Shenandoah S2-1H.

Flowback fluid was generated because of stimulation activities completed on the Shenandoah S2-1H well on the Shenandoah S2 well site. The stimulation activities were completed under the conditions of the approval for TAM1-3 EMP. This assessment leverages information from the following documents in addition to TAM1-3 EMP (Tamboran, 2024):

- TAM1-3 Modifications 1, 2, 3, 4, 5 and 8 – Beetaloo Sub-basin Shenandoah South E&A Program Environment Management Plan (TAM1-3): Regulation 22 – chemical risk assessment update (Tamboran, 2025).
- Beetaloo Exploration and Appraisal Program - Hydraulic Fracturing Chemical Risk Assessment, Rev 11, prepared for Tamboran Resources (AECOM, 2025).
- Stimulation Chemical Risk Assessment (EHS Support, 2023).
- Shenandoah S-1H Flowback Wastewater Assessment (EHS Support, 2024).
- Flowback Assessment Beetaloo Sub-basin Project Area (EHS Support, 2025).

2 Conceptual Exposure Model

In development of Tamboran's EMPs, potential exposures to humans and the environment to flowback water were evaluated (Tamboran, 2024; Tamboran, 2025). Multiple mitigation measures and control measures were specified within the EMPs and associated Spill Management Plans (Appendix F of EMP TAM1-3) and Wastewater Management Plan (Appendix G of EMP TAM1-3) to reduce residual risks from exposure to flowback water to As Low As Reasonably Practical (ALARP). The Conceptual Exposure Model (CEM) for flowback water for Shenandoah S2-1H discussed below is consistent with the CEM developed for Shenandoah S-1H (EHS Support, 2024), Shenandoah S2-2H (EHS Support, 2025), and future wells drilled in the Velkerri shale within the Shenandoah South E&A Project Area.

Appendix A depicts the general well pad layout for the EPs as presented in EMP TAM1-3, including the Shenandoah S2 well pad. A combination of enclosed and open above-ground tanks are used to manage flowback water and will vary between well pads based on season. Volume of flowback per well was estimated approximately 10.8 megalitres (ML) in EMP TAM1-3 (Tamboran, 2024). Shenandoah S2-1H generated approximately 4.5 ML of flowback water which is within the range of flowback production from Shenandoah S2-2H (4.5 ML) and Shenandoah S-1H (2 ML).

Flowback storage are double lined with impermeable membranes and leak detection systems (Tamboran, 2024; Tamboran 2025). Flowback water is conveyed from the wells along the flowlines to tanks located on the well pad and managed in up to three tanks. The tank storage area is surrounded by a bund to provide secondary containment for water storages. Should a catastrophic tank failure occur, the bund area is of sufficient capacity to retain 110 percent of the largest storage tank capacity. Further, depending upon well site conditions, the entire well pad area (up to approximately 5.5 hectares [ha]) is bunded with a berm ranging from 300 millimetres to greater than one metre (m). The well pad is compacted during construction to reduce permeability to limit potential vertical migration of spilled materials.

In Tamboran's EMPs, flowback disposal consisted of either off-site transport to a licenced facility by truck or potential recycling of flowback water as makeup water for hydraulic stimulation activities (Tamboran, 2024). Shenandoah S2-1H is the first well to have flowback water generated from a previously stimulated well (Shenandoah S2-2H) used as makeup water for hydraulic stimulation activities.

Mechanical evaporation to enhance evaporation and reduce volume of the flowback water from hydraulic stimulation activities was evaluated in the EMP (Tamboran, 2024). According to the EMP, evaporator units will be equipped with automated wind speed and direction cut-off mechanisms to stop operations during periods of moderate (i.e., 11–16 knots) to minimise potential drift of wastewater outside of the storage tanks during mechanical evaporation. At this time, Tamboran is not planning on conducting mechanical evaporation.

Human receptors identified in the EMP with potential exposure to flowback water stored in tanks or during re-use and off-site disposal activities included oil and gas workers (Tamboran, 2024). Potentially complete exposure pathways include incidental ingestion and dermal contact with flowback during re-use and off-site disposal activities. Should disposal off-site occur, it is expected to be completed in approximately 14 days assuming 3 ML of water trucked to Hydrera facility using 65,000-litre trucks at Tennant Creek. Activities associated with hydraulic fracturing stimulation are assumed to occur for 20 days (5 days per week for 1 month; Tamboran, 2024). Because the length of exposure is longer for recycling of flowback water scenario, this exposure pathway will be conservatively evaluated and is protective of off-site worker exposure.

As stated previously, Tamboran is not planning on conducting mechanical evaporation; however, inhalation of mist during mechanical evaporation was conservatively retained as a potentially complete exposure scenario.

Well pads are fenced and flowback tanks are either enclosed or have raised walls to minimise fauna access to flowback water (Tamboran, 2024; Tamboran, 2025). The typically hypersaline characteristic of flowback water is a deterrent for avian receptors and other fauna from consuming and interacting with wastewater. Based on previous lack of observations of avian receptors contacting flowback water in open top tanks and hypersaline nature of flowback water, potential exposure to avian receptors is considered low; however, as a conservative measure, potential exposure to avian receptors via incidental ingestion was evaluated in this risk assessment.

Management controls and mitigation measures outlined in the EMP are used to minimise potential for releases, including catastrophic failure, from storage tanks. A recent CSIRO study on the fate of geogenic chemicals in flowback water also found the majority of organic geogenic compounds rapidly degraded in surface facilities (e.g., flowback tanks and storage ponds; Lupton, et al., 2024). As a conservative measure, however, evaluation of potential release of liquids to soils within the containment area was performed and exposure to terrestrial receptors was included in this flowback risk assessment.

3 Data Used in the Risk Assessment

Samples of flowback water from the Shenandoah S2-1H well were evaluated in this risk assessment. Fourteen samples were collected from 23 December 2025 through 1 April 2026. **Appendix B**, **Table B-1** presents the analytical data from the flowback water sampling.

Based on the CEM (**Section 2**), the point of exposure for human receptors is flowback water used as make up water for hydraulic stimulation of future wells. While mechanical evaporation is not currently planned by Tamboran, the point of exposure of inhalation of mist from the flowback tanks during mechanical evaporation was also considered in this assessment. For avian receptors, the point of exposure is flowback water stored in open-top tanks during evaporation. The terrestrial assessment also evaluates releases of flowback water from these tanks.

4 Human Health Risk Assessment

To evaluate potential human health hazards associated with the flowback data, a Tier 1 screening assessment was performed. The objective of the Tier 1 assessment was to identify chemicals of low human health concern that did not require additional chemical risk assessment in a Tier 2 assessment. Chemicals that warranted a Tier 2 assessment were quantitatively evaluated based on potential complete exposure scenarios for human receptors discussed above. Consistent with the NT Radiation Protection Act (2004), an evaluation of potential exposure to radionuclides in flowback water was conducted in addition to the Tier 1 and Tier 2 assessments of chemicals in flowback water. **Appendix C** presents the Tier 1 and Tier 2 assessments of chemicals and radiological parameters in flowback water for Shenandoah S2-1H.

4.1 Tier 1 Screening Assessment

Analytical data of flowback water was compared to human health risk-based screening levels (RBSLs) using the National Water Quality Management Strategy Australian Drinking Water Guidelines (ADWG; 2011, updated June 2025). Where Australian guidelines were not available, international guidelines were used to supplement the risk-based levels including World Health Organization (WHO) Guidelines for drinking-water quality (WHO, 2022) and United States Environmental Protection Agency (USEPA) Regional Screening Levels (RSLs) for tap water (November 2024, and as updated).

Appendix C, **Table C-1** presents the Tier 1 screening assessment of flowback data. The following chemicals exceeded RBSLs:

- Toluene
- Arsenic
- Barium
- Boron
- Chromium (III + VI)
- Lead
- Manganese
- Molybdenum
- Nickel
- Selenium
- Strontium
- Formaldehyde
- >C10-C16 Fraction (F2 minus Naphthalene)
- >C16-C34 Fraction (F3)
- Gross beta activity minus K40
- Gross alpha activity

A quantitative Tier 2 evaluation of these chemicals was completed, except for radiological parameters and lead. Evaluation of potential exposure to radiological parameters and lead is included in the following sections.

Concentrations of ammonia, chloride and total dissolved solids exceed the ADWG for aesthetics; however, there is insufficient data to develop a health-based guideline. Therefore, these chemicals were not assessed in the quantitative Tier 2 evaluation.

4.1.1 Radiological Exposure

The alternative RBSLs for gross alpha and gross beta are only generic screening values (0.5 Becquerels per litre [Bq/L]). Consistent with the ADWG (National Health and Medical Research Council [NHMRC], 2025), if these RBSLs are exceeded, a more detailed assessment is triggered. As outlined in the assessment framework under ADWG for radiological exposures, an order-of-magnitude higher radiological exposure is acceptable as the natural background is higher than the screening level, and thresholds for active intervention have been established at corresponding doses 10 to 50 times higher than the corresponding screening value.

In samples of assessed flowback, gross alpha was detected above the detection limit in only one sample (11.4 Bq/L). Gross beta ranged from 4.43 Bq/L to 4.48 Bq/L (**Appendix B**). Gross beta activity is corrected for potassium-40 (K40) because K40 is a natural beta emitter. As potassium does not accumulate in the body despite intake (NHMRC, 2025), gross beta – K40 activity was used to assess potential exposures to gross beta in flowback water. Gross beta - K40 activity ranged from 2.46 Bq/L to 2.81 Bq/L. While gross beta – K40 activity was less than an order-of-magnitude greater than the ADWG of 0.5 Bq/L, the maximum detection of gross alpha exceeded this level. Therefore, further evaluation of the available radionuclide results was performed.

Analysis of radionuclides was not completed for the flowback water, except for radium-226 (Ra-226), radium-228 (Ra-228) and K40 (**Appendix C**, **Table C-1**). The source of gross alpha and gross beta -K40 activity was assumed to be Ra-226 and Ra-228. Using the methodology in the ADWG (NHMRC, 2025), an annual dose was calculated for Ra-226 and Ra-228, assuming individual radionuclides consumed in water based on annual residential water consumption of drinking water (750 litres per year [L/year], NHMRC, 2025) and worker water consumption (0.00208 L/year; Tamboran, 2023) and the maximum radionuclide concentration (**Appendix C**, **Table C-2**). The recommended Guideline total annual dose is 1 millisievert per year (mSv/year) for radioactivity in drinking water. The recommended dose considers the total estimated dose per year from all radionuclides in drinking water (exclusive of K40). Using the annual water consumption of drinking water for residential receptors, the total dose did not exceed the recommended Guideline of 1 mSv/year in drinking water, nor did the total dose calculated using worker annual water consumption exceed 1 mSv/year. Assuming the source of gross alpha and gross beta in the flowback water is Ra-226 and Ra-228, a worker would need to consume 215 L/year of flowback water to equal 1.1 mSv/year. Background exposure to radionuclides is around 2.5 mSv/year and exposures greater than 10 mSv/year pose potential risks that warrant action. Given that the annual dose calculated using worker exposure assumptions is significantly less than 1 mSv/year (0.000003 mSv/year) and ingestion of flowback water by a worker is multiple orders of magnitude less than 215 L/year, no additional action is warranted.

Further reduction of concentrations is also anticipated if blending with bore water occurs as part of re-use of flowback as makeup water. Precipitation of naturally occurring radioactive materials (NORMs) typically occurs in the flowback tank and accompany non-NORM solids that were produced with the flowback, rather than remaining dissolved in flowback water (Australian Radiation Protection and Nuclear Safety Agency [ARPANSA], 2008). Residual solids within the frac tank will be managed in accordance with the EMP TAM1-3.

4.1.2 Lead Exposure

The evaluation of lead is accomplished differently from other chemicals because of lead's unique toxicological properties. Lead does not have Australian-, WHO- or USEPA-established toxicity values; therefore, a quantitative estimate of risk from exposure to lead cannot be performed in the same manner as for other constituents. Lead produces noncancer adverse effects. Some potential effects of lead toxicity include encephalopathy, neurologic impacts, hypertension, decreased fertility, and bone health (Agency for Toxic Substances and Disease Registry [ATSDR], 2007). The generally accepted methodology is to estimate blood lead (PbB) levels based on media exposures (i.e., exposure point concentrations) and compare the estimated PbB levels to PbB levels considered to be protective of adverse health effects.

The USEPA Adult Lead Model (ALM; USEPA, 2009) was developed to predict the probability that the PbB level for a fetus carried by a woman exposed to lead in soils. This model can be adjusted to calculate potential exposures to lead from other media (e.g., flowback water). However, ALM guidance states that the exposure duration (ED) should be sufficiently long to allow PbB concentrations to approach quasi-steady state (USEPA, 2016). Based on estimates of the first order elimination half-life for lead in blood of approximately 30 days for adults (Rabinowitz, et al., 1976; Chamberlain et al., 1978), a constant lead intake rate over a duration of 90 days would be expected to achieve a PbB concentration that is sufficiently close to a quasi-steady state (USEPA, 2003). This is the minimum ED (ED is also used as the averaging time in the

ALM) to which this methodology should be applied. A minimum frequency of exposure of one day per week is also recommended (USEPA, 2003). Therefore, the minimum amount of exposure necessary for the ALM to be used to predict PbB levels in fetuses of adult workers in flowback water is at least once per week for at least 13 consecutive weeks.

Based on the above assumptions regarding the elimination half-life of lead in blood, the Technical Review Workshop (TRW) recommends that the ALM should not be applied to scenarios in which the exposure frequency (EF) is infrequent (USEPA, 2003). The EF for workers potentially exposed to flowback water during reuse is 20 days/year. This exposure is too infrequent to be evaluated in the ALM. Therefore, exposure of future workers exposed to flowback during re-use activities is considered to be insignificant and is not evaluated quantitatively in this risk assessment.

4.2 Tier 2 Quantitative Assessment

A Tier 2 assessment was completed for workers potentially exposed to chemicals in flowback identified in the Tier 1 assessment. Potentially complete exposure pathways were consistent with the EMP and included incidental ingestion and dermal contact with flowback during re-use or disposal activities. As stated previously, Tamboran is not planning on conducting mechanical evaporation; however, inhalation of mist during mechanical evaporation was also considered a complete pathway.

Cumulative risks were calculated and specifically refers to the summation of risks for each receptor across exposure pathways, routes of exposure (e.g., ingestion, inhalation, dermal contact), and chemicals. Exposure assumptions used in the Tier 2 assessment were consistent with those used in the EMP to evaluate worker exposure to stimulation chemicals (AECOM, 2025; **Appendix C**, **Table C-3**). For the worker potentially exposed to flowback water during re-use activities, the stimulation period is assumed to be 1 month, with work occurring 5 days per week. For the mechanical evaporation scenario, a worker is assumed to be within the vicinity of the tanks at the Site for 1 hour per day, 5 days per week, for 6 months of year or during the wet season (or 120 days).

Threshold (noncarcinogenic) risk estimates were based on the ratio of the intake of each constituent for each exposure pathway and exposure route divided by the appropriate toxicity criteria to produce a hazard quotient (HQ). The HQs for all exposure pathways for each constituent were summed for each receptor to produce a hazard index (HI). The target hazard level of noncarcinogenic risk estimates is an HI of 1 (enHealth, 2012a; NEPC, 2013); cumulative HI greater than 1 indicate the potential for adverse health effects.

For non-threshold (carcinogenic) risk estimates, risks are identified as the additional probability of an individual developing cancer over a lifetime as a result of exposure. Cumulative cancer risks were calculated by summing the individual constituent cancer risk estimates for the exposure pathways for each receptor. The target risk level of carcinogenic risk estimates is 1 in 100,000 or 10^{-5} (enHealth, 2012a; NEPM, 2013).

Risk estimates for the worker exposed to flowback during re-use activities is presented on **Appendix C**, **Table C-4**. **Table C-5** presents risk estimates for workers during use of mechanical evaporators to facilitate evaporation of flowback water. Neither estimated cancer risk or HI exceeded the respective thresholds for the worker exposed to flowback water during reuse activities (**Appendix C**, **Table C-4**). Estimated cancer risk also did not exceed the threshold of 10^{-5} for inhalation of mists during mechanical evaporation. However, the HI of 2 for inhalation of mists during mechanical evaporation exceeded the threshold of 1 at 4, with primary contribution from barium (2) and manganese (1) (**Appendix C**, **Table C-5**). For manganese, the inhalation toxicity value is based on inhalation of dust, not water. Therefore, the calculated noncancer hazard quotient of 1 for manganese is an overestimation due to different toxicokinetics between the exposure medium.

It is a common approach within Australia to further assess noncancer hazards exceeding 1; however, when an HI is between 1 and 10 it does not imply that risks are unacceptable but rather that there is some erosion of the conservatism inherent in the assumptions of the calculation of the HI (enHealth, 2012a). While it was conservatively assessed, mechanical evaporation is also not currently planned for Shenandoah S2-1H flowback water; therefore, while the HI slightly exceeded the target level of 1 for this scenario, no further action is needed. The primary exposure pathway to flowback water for human receptors is workers potentially exposed to flowback water during reuse of flowback water as makeup water in future stimulation activities. Risk estimates for this scenario were *de minimis,* therefore no further action is needed.

5 Avian Risk Assessment

According to the EMPs, multiple mitigation measures are in place to limit potential fauna interaction with flowback water (Tamboran, 2024; Tamboran, 2025); however, as a conservative measure, an avian risk assessment was completed to evaluate potential exposure of avian receptors to chemicals detected above screening criteria in flowback water samples.

Laboratory analyses of these wastewater samples for inorganic, organic, and radionuclide analytes was completed pursuant to the monitoring wastewater chemistry analytes specified in Section C.8 of the Code of Practice (NT, 2025b).

Consistent with the avian risk assessment completed for the stimulation chemical risk assessment (EHS Support, 2023), this avian risk assessment conducted on the flowback/produced water samples included the following two steps:

1. Screening Assessment – Identify chemicals of low ecological concern that do not require additional evaluation in the risk assessment process based on a comparison to the Australian and New Zealand Guidelines for Fresh & Marine Water Quality (ANZG, 2018) trigger values or, absent such values, alternative screening criteria as noted in **Appendix D**; and
2. Quantitative Risk Evaluation – Identify chemicals that are a concern for avian receptors and therefore require an additional evaluation to characterise the potential risks. The potential exposure was assessed using a quantitative evaluation of the potentially complete avian exposure pathway and the screening assessment.

5.1 Tier 1 Screening Assessment

The screening assessment consisted of a focused evaluation of the potential risks to avian receptors if exposed to chemicals detected in flowback water samples (**Appendix D Table D-1**). The objective of the screening assessment was to identify chemicals of low concern to avian receptors that do not require additional evaluation in the risk assessment process.

The screening assessment used freshwater trigger values (ANZG, 2018) which are deemed to be protective of aquatic species such as fish, invertebrates, and algae assuming chronic, continual, and prolonged contact with surface water at a 95 percent protection level. In instances where no trigger values were available, alternative screening criteria were employed and are noted as such in **Appendix D**. This approach is inherently considered highly conservative given the following:

- In toxicological testing, aquatic species are more sensitive than terrestrial species to chemicals due to their emersion within the fluid, additional modes of action (e.g., impacts on gill function) and the potential for secondary stressors to impact health; and
- Even if exposed, avian receptors will have limited periods of duration in contact with the fluids. Roosting, breeding, and continuous access will not occur on the water body; therefore, contact will be episodic in nature and possibly only involve ingestion during dry periods.

Chemicals detected in the flowback/produced water samples with concentrations exceeding the conservatively adopted water quality criteria were carried through the quantitative risk evaluation. The detected chemicals analysed in the wastewater samples that had concentrations exceeding the conservatively adopted water quality criteria and that may pose a potential risk to avian receptors include:

- Ammonia as N
- Nitrogen (Total)
- Silver
- Total Phosphorus as P (Organic Phosphate as P)
- Vanadium
- Zinc
- >C10-C16 Fraction (F2 minus Naphthalene)
- >C16-C34 Fraction (F3)

Gross alpha, gross beta-K40 and Ra-226 exceed the alternative screening criteria which is the ANZG guideline value for agricultural waters (i.e., irrigation). The primary risk from radiological exposure in agricultural waters is due to human consumption, rather than to animals (ANZG, 2023). Therefore, these radiological parameters are not assessed in the Tier 2 assessment for avian receptors. **Appendix D**, **Table D-1** presents the results of the Tier 1 screening level assessment.

5.2 Tier 2 Quantitative Risk Assessment

Potential exposure of avian receptors to the chemicals of concern in the flowback/produced water samples was quantitatively assessed for representative avian species that were previously evaluated in the flowback risk assessments (EHS Support, 2024 and 2025). The potential avian exposure pathway was assessed based on the potential ingestion of flowback/produced water by avian receptors using standard methods and in accordance with the methodologies used in the previous avian risk assessments.

Potential dietary intake of water containing these chemicals was compared to toxicity reference values (TRVs) developed specifically for avian wildlife. Exposure assumptions for the dietary intake and TRV development were designed to be conservative to reduce uncertainty in the quantitative risk estimates. The potential risks were estimated using a chemical-specific HQ. As with the human health risk assessment, an HI is the sum of the HQs on an avian species-specific basis. A potential HI threshold level of less than 1 indicates there are no unacceptable exposures to the avian species.

Appendix D, **Table D-2** through **Table D-7** present the detailed calculations and outcomes of the quantitative risk evaluation for the target avian species. **Table 5-1** summarises the results of the quantitative risk evaluation and includes a short-term (21-day) and long-term (1-year) scenario of fluid exposure that aligns with the current approach of off-site transportation, re-use, and management of fluids and a possible future scenario with possible longer-term storage on-site. The HIs for all the assessed avian species were orders of magnitude less than the threshold HI of 1 for the 21-day scenario exposure scenarios and did not exceed the HI target of 1 under the longer-term on-site storage scenario. Given the hypersaline nature of the flowback water and sufficient surface water resources in the vicinity of well pads except during periods of water scarcity of the dry season (i.e., limited 3 to 6 months per year), it is unlikely that avian receptors would ingest the flowback water stored in open top tanks. There were therefore no unacceptable exposures to the avian species from potential ingestion of chemicals in flowback/produced water.

Table 5-1 Hazard Indices for Target Avian Species Exposed to Flowback Water

Avian Species	Hazard Index for 21 Days of Storage	Hazard Index for 1 Year of Storage
Crested Pigeon	3E-02	6E-01
Willie Wagtail	4E-02	7E-01
Peaceful Dove	4E-02	6E-01
Cattle Egret	3E-02	5E-01
Brown Honeyeater	4E-02	7E-01

6 Terrestrial Risk Assessment

This terrestrial soil risk assessment was conducted assuming chemicals detected in flowback water samples would ultimately be incorporated into soils within the bund that could pose an exposure risk to terrestrial receptors. To assess a potential release of liquids to soil within the containment area, concentrations of chemicals in soil that would result from a release of flowback/produced water to soil within the bunded area were calculated. These concentrations were compared, where possible, to ecological soil screening criteria.

6.1 Calculation of Chemical Concentrations in Soil

This terrestrial risk assessment evaluated the potential for a release of flowback from the tank to the bunded area soils. The vertical depth of associated infiltration from this hypothetical release was estimated as 1 m based on modelling (EHS Support, 2023). Using this information, the bunded well pad area (approximately 4.5 ha) and the depth of infiltration of the volume of affected soil with the bund area were calculated at 45000 cubic metres (m^3). Maximum and median concentrations of detected chemicals in flowback/produced water from the sampled flowback/produced water samples were used to determine their respective maximum and median concentrations in soils (C_{soil}) according to Equation 1 below.

$$C_{soil} = C_{wat} \times V_{tank} / M_{Soil} / D_{soil} \qquad \text{Eq. 1}$$

Where:

- C_{wat} = maximum detected concentration of chemical in wastewater from four wells
- Vtank = volume of the largest enclosed storage tank in the event of a complete release (litres [L])
- Msoil = mass of soil (4.5 x 10+4 m^3)
- Dsoil = bulk density of soil (1,350 kilograms per cubic metre [kg/m^3])

The volume of flowback water in the tank, which is the maximum storage volume for one of the tanks within the bunded area on the Site is approximately 5 ML (5 x 10^{+6} L) (correspondence from Tamboran). For uncovered tanks containing flowback, freeboard is increased to account for accumulation of precipitation. A maximum volume of 5 ML was used in the calculation of soil concentrations.

6.2 Tier 1 Screening Assessment

Chemical calculated maximum and median soil concentrations are presented in **Appendix E**, **Table E-1**. These concentrations reflect a range of chemical concentrations potentially expected in the 1-m stratum of soil adjacent to the enclosed storage tanks as a result of a release from a tank. Ecological soil screening levels defined by ASC NEPM (2013) were used to determine a ratio of the calculated concentration in soil to screening criteria. In certain instances, where NEPM values were not available, other data available from the European Union, the USEPA, or background threshold values for the McArthur Basin surficial soils were used as the screening level.

To determine whether the maximum or median soil concentrations exceeded the screening level, a ratio of the soil concentration to the screening levels was calculated. If the ratio exceeded 1, the estimated concentration for the chemical exceeded the screening level. Calculated ratios for the maximum concentration and median concentration of bromine slightly exceeded 1 at 2.4 and 1.7, respectively. Given that the predicted soil concentration was based on a potential maximum flowback volume it is unlikely that a potential release to soils within the bunded area of stored flowback water would result in an unacceptable level of ecological risks.

7 Assessment of BTEX

In addition to the risk evaluations, assessment of benzene, toluene, ethylbenzene, and xylene (BTEX) in flowback water was conducted pursuant to Section B.5 of the Code of Practice (NT, 2025b). Section B.5 states that recycled produced water used in hydraulic fracturing fluids must not contain BTEX levels greater than those expected in produce water from the well being drilled, or in the event BTEX levels expected in produced water are unknown, then BTEX levels in water cannot exceed levels prescribed in Table 8 of Section B.5.

Table 7-1 presents a comparison of the results from the flowback data to the BTEX levels in water used for stimulation and drilling fluids from Table 9 in Section B.5 of the Code of Practice (NT, 2025). Results for BTEX did not exceed the Code of Practice thresholds, therefore conditions set forth in Section B.5 of the Code of Practice regarding BTEX are satisfied.

Table 7-1 BTEX Evaluation

Chemical	ANZG (99% Protection Level) (µg/L)	Maximum Concentration (µg/L)
Benzene	600	1
Toluene	180	38
Ethylbenzene	80	< 2
Xylene	200	< 2

Table Notes:
% = percent
µg/L = micrograms per litre
< = less than limit of detection
ANZG = Australian and New Zealand Guidelines

8 37A Report About Flowback Water

The reporting requirements under Section 37A of the *Petroleum (Environment) Regulations (2016)* have been incorporated into this document. For clarity, **Table 8-1** provides a summary of how each of these elements have been addressed.

Table 8-1 Regulation 37A Flowback fluid Report Required Information

Requirement	
(a) the identity of any chemical or NORM found in the flowback fluid;	Refer to: **Appendix B**, Table B-1
(b) the concentration of any chemical or NORM found in the flowback fluid;	
(c) details regarding how any chemical or NORM has been or will be managed;	Control measures for flowback water are described in the *Conceptual Exposure Model* section. Based on screening-level and quantitative risk assessment results, additional management measures are not required to mitigate risks to human health or ecological receptors from chemicals in flowback. The calculated total radiological dose calculated using worker annual water consumption was significantly below the Guideline of 1 mSv/year. Therefore, no special handling measures are required for NORM.
(d) details regarding how any chemical or NORM has been or will be transported;	If flowback water is required to be transported, it will be transported by a licensed waste transporter in compliance with the WWMP (Appendix G of TAM1-3 EMP; Tamboran, 2024) and the Code of Practice. As per above, based on the low levels of radionuclides in the water, it does not meet the generally accepted threshold for NORM, and therefore does not require special handling measures for transport.
(e) details regarding how any chemical or NORM has been or will be treated;	Water treatment is not required for chemicals or NORM.
(f) details regarding any action proposed to be taken to prevent any chemical or NORM spill;	Control measures for flowback water are described in the *Conceptual Exposure Model* section. Wastewater storage, management, and spill handling is otherwise detailed in the SMP and WWMP (Appendices F and G) of approved TAM1-3 EMP.
(g) details of the emergency contingency plan included in the environment management plan to which the activity relates;	In the event of a spill, the most current version of the SMP (Appendix F) under TAM1-3 EMP will be used.
(h) the requirements in relation to the management of any chemical or NORM of the prescribed chemical legislation.	In accordance with approved TAM1-3 EMP, activities that involved wastewater and chemical storage will be aligned with the SMP (Appendix F of TAM1-3 EMP) and the WWMP (Appendix G of TAM1-3 EMP).
2A A report under subregulation (2) must be accompanied by a full human health risk assessment relating to any chemical found in the flowback fluid.	This report includes a human health risk assessment. It is considered that human health exposure pathways are incomplete with respect to potential environmental contamination events from flowback fluids.

Table Notes:
EMP = Environmental Management Plan
NORM = normally occurring radioactive material
WWMP = wastewater management plan
SMP = spill management plan

9 38A Report About Produced Water

In accordance with Petroleum Regulations, the following presents the required information for produced water, as applicable at this stage of the project. No produced water was generated from Shenandoah S2-1H, therefore, produced water from Shenandoah S2-1H is not being managed. **Table 9-1** presents the required information detailed in Regulation 37B. A full human health risk assessment was not undertaken at this time.

Table 9-1 Regulation 37B Produced Water Report Required Information

Requirement	
(a) the identity of any chemical or NORM found in the produced water;	No produced water occurred to date.
(b) the concentration of any chemical or NORM found in the produced water;	No produced water occurred to date.
(c) details regarding how any chemical or NORM has been or will be managed;	If produced water occurs, it will be managed in compliance with the WWMP (Appendix G of TAM1-3 EMP; Tamboran, 2024)
(d) details regarding how any chemical or NORM has been or will be transported;	If produced water occurs and it is required to be transported, it will be transported by a licensed waste transporter in compliance with the WWMP (Appendix G of TAM1-3 EMP; Tamboran, 2024) and the Code of Practice.
(e) details regarding how any chemical or NORM has been or will be treated;	If produced water occurs, it will be managed and treated in accordance with WWMP (Appendix G of TAM1-3 EMP; Tamboran, 2024) and the Code of Practice.
(f) details regarding any action proposed to be taken to prevent any chemical or NORM spill;	Wastewater storage, management, and spill handling is detailed in the SMP and WWMP (Appendices F and G) of approved TAM1-3 EMP (Tamboran, 2024).
(g) details of the emergency contingency plan included in the environment management plan to which the activity relates;	In the event of a spill, the most current version of the SMP (Appendix F) under TAM1-3 EMP will be used.
(h) the requirements in relation to the management of any chemical or NORM of the prescribed chemical legislation.	In accordance with approved TAM1-3 EMP, activities that involved wastewater and chemical storage will be aligned with the SMP (Appendix F of TAM1-3 EMP) and the WWMP (Appendix G of TAM1-3 EMP).

Table Notes:
EMP = Environmental Management Plan
NORM = normally occurring radioactive material
WWMP = wastewater management plan
SMP = spill management plan

10 Conclusions

Pursuant to Condition 15 of the EMP TAM1-3 approval (NT, 2024) and in accordance with Regulation 37A and 37B under part 3A of the *Northern Territory Petroleum (Environment) Regulations (2016)*, a risk assessment of flowback water from the hydraulic fracturing phase of well Shenandoah S2-1H was conducted. This assessment included determination of potential risk to human and avian receptors exposed to flowback. An assessment was also conducted of a potential release of flowback water to soils within the bunded area. As noted above, the risk evaluation methods used are consistent with those used for the EMP and the hydraulic fracturing fluid risk assessment conducted prior to approval of the activities at the Shenandoah S2 well site (Origin, 2021; Tamboran, 2023; EHS Support, 2023; Tamboran, 2024; Tamboran, 2025; AECOM, 2025) and previous flowback risk assessments for Shenandoah S-1H and Shenandoah S2-2H (EHS Support, 2024 and 2025).

Potentially complete exposure pathways for humans were identified during reuse of flowback water as make-up water for future stimulation activities and off-site disposal activities. Mechanical evaporation was also conservatively assessed in this assessment; however, Tamboran is not currently planning on utilising mechanical evaporation for flowback water. Because exposure to flowback water was longer for the reuse scenario than the off-site disposal scenario, the reuse scenario was evaluated in the Tier 2 assessment for human receptors. There were no unacceptable risks calculated for the re-use of flowback water exposure scenario. With respect to re-use of flowback water, and the approved Site activities and associated management controls, no further action is recommended.

This risk assessment conducted for the avian receptors potentially exposed to flowback water concluded there is no unacceptable risk to these receptors potentially exposed to chemicals in the assessed flowback water samples. Therefore, with respect to avian use of flowback water from wells and the approved Site activities and associated management controls, no further action is recommended.

Likewise, a screening assessment was performed to determine the potential risk to terrestrial receptors exposed to soils affected by flowback water based on a hypothetical release scenario. The assessment consisted of a screening level evaluation to determine if a further quantitative risk assessment would be required to assess the potential risk to terrestrial receptors. This screening level risk assessment concluded that no chemicals detected in the flowback water at their maximum or median concentrations, under a hypothetical maximum release scenario, would result in soil levels above screening criteria protective of terrestrial receptors, except for bromine. Given that the predicted soil concentration was based on a potential maximum flowback volume it is unlikely that a potential release to soils within the bunded area of stored flowback water would result in an unacceptable level of ecological risks; therefore, with the approved Site activities and associated management controls (e.g., maintenance of measures outlined in the EMP), no further action is recommended.

These findings are consistent with the flowback risk assessments completed for Shenandoah S-1H and Shenandoah S2-2H which also concluded that there were no unacceptable risks to human or avian receptors (EHS Support, 2024 and 2025). This risk assessment satisfies the requirement 3(a) of Regulation 37A and 37B of the Petroleum (Environment) Regulations 2016 (NT, 2025).

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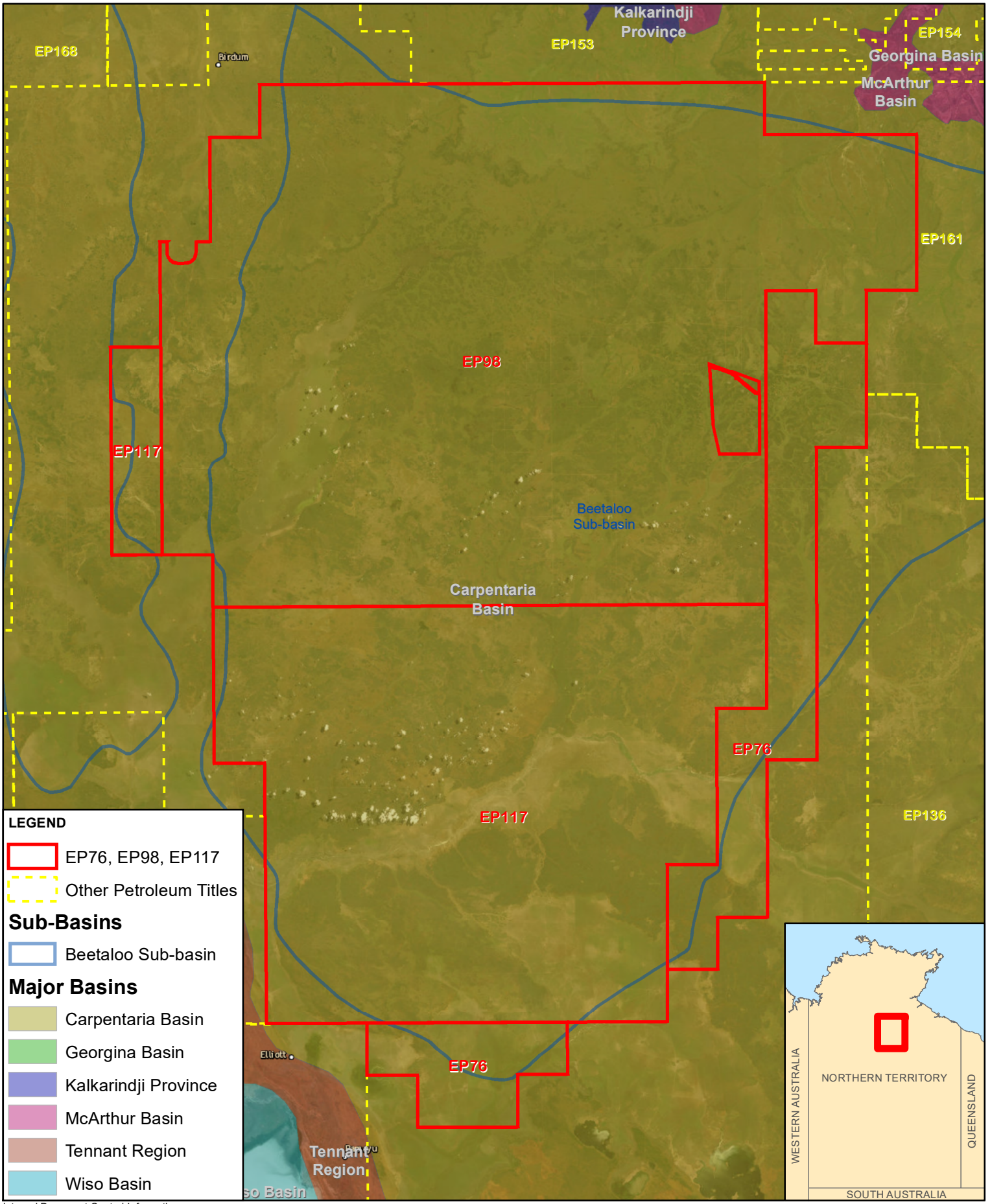
Figures



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Tamboran Exploration Permits

0 4.75 9.5 19 28.5 38 Kilometers
1 cm = 9 km [Page Size: A4]

Tamboran - Beetaloo Sub-Basin Flowback Assessment

EHS Support

Figure 1

CREATED BY:	D. Barnes
APPROVED BY:	C. Peterson
PROJECT REF. NO:	PTY.05635
MAP PROJECTION:	Transverse Mercator
GRID/DATUM:	GDA 1994 MGA Zone 53
SCALE:	1:866,894
AERIAL IMAGE SOURCE:	ESRI Basemaps

N

Appendix A Supplemental Information

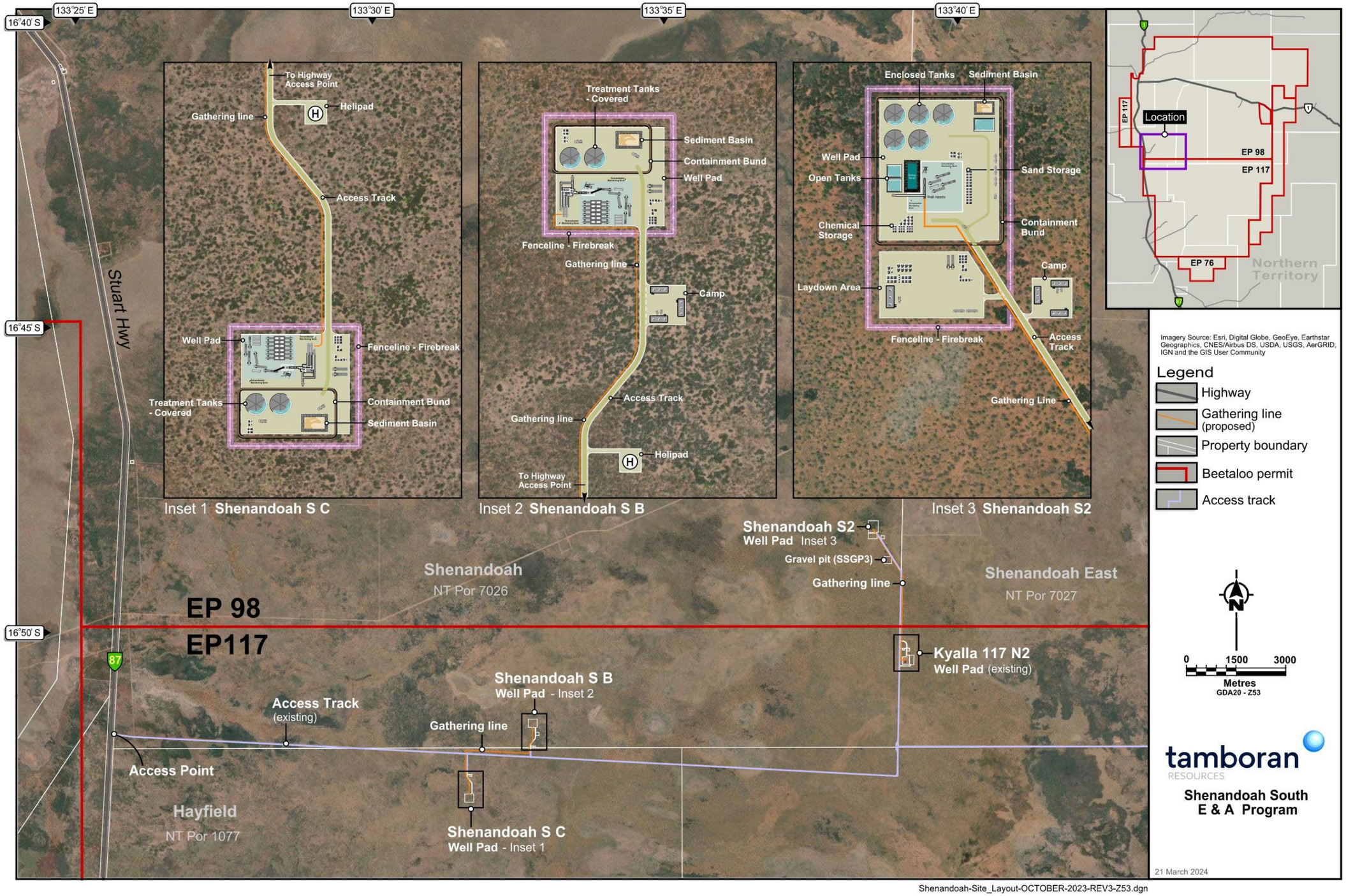

Figure 22: General site layout for new E&A well pads – Shenandoah S2, S B and S C

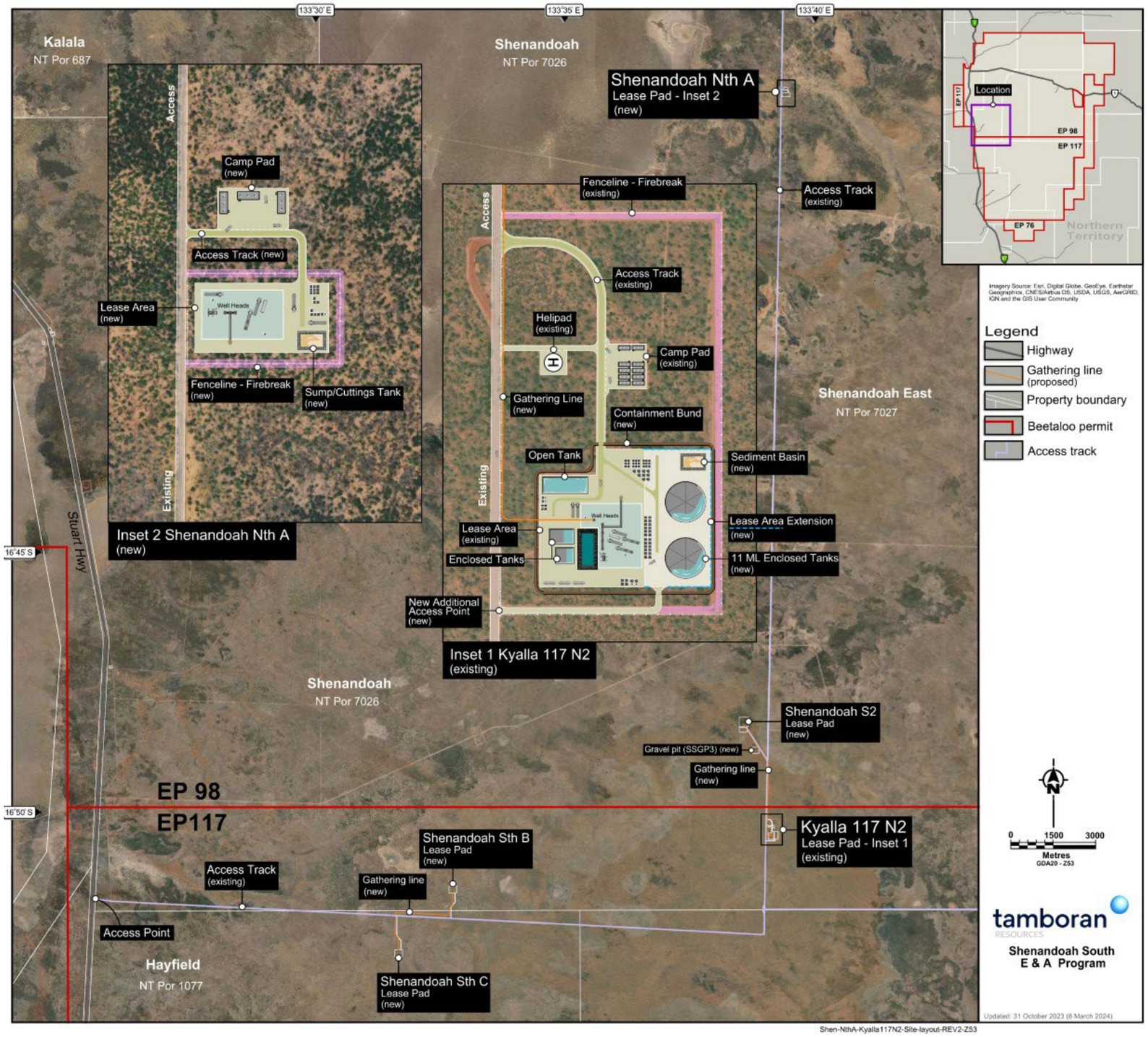

Figure 23: Generalised site layout for new E&A well pad Shenandoah N A and existing Kyalla 117 N2, including increased well pad

Appendix B Analytical Data

Table B-1 Sheandoan S2-1H Flowback Water Analytical Data
Shenandoah S2-1H Flowback Water Assessment
Tamboran

			BTEX								Explosives		Halogenated Benzenes	Herbicides	Inorganics						
			Naphthalene (VOC)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	2,4-Dinitrotoluene	Nitrobenzene	Hexachlorobenzene	Dinoseb	Total Phosphorus as P (Organic Phosphate as P)	Silicon as SiO2	Nitrite + Nitrate as N	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3
			mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL			0.005	1	2	2	2	2	2	1	4	2	0.5	50	0.005	0.1	0.002	1	1	1	1
Field ID	**Location Code**	**Date**																			
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**	<0.005	1	38	<2	<2	<2	<2	39	<4	<2	<1.2	<50	1.04	194	0.019	796	<1	<1	796
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**																			
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**	<0.005	<1	13	<2	<2	<2	<2	13	<4	<2	<2.4	<90	1.14	202	0.009	607	<1	<1	607
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**	<0.005	<1	9	<2	<2	<2	<2	9	<4	<2	<2.4	<90	1.25	211	0.011	489	<1	<1	489
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**																			
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**																			
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**	<0.005	<1	<2	<2	<2	<2	<2	<1	<4	<2	<0.5	<50	1.11	197	<0.002	399	<1	<1	399
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**																			
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**	<0.005	<1	2	<2	<2	<2	<2	2	<4	<2	<0.5	<50	0.877	210	<0.002	342	<1	<1	342
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**																			
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**	<0.005	<1	<2	<2	<2	<2	<2	<1	<4	<2	<0.5	<50	0.923	182	<0.002	314	<1	<1	314
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**																			
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**	<0.005	<1	<2	<2	<2	<2	<2	<1	<4	<2	<0.5	<50	0.783	171	0.015	310	<1	<1	310
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**																			
Statistics																					
Number of Results			7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Number of Detects			0	1	4	0	0	0	0	4	0	0	0	0	7	7	4	7	0	0	7
Minimum Concentration			<0.005	<1	<2	<2	<2	<2	<2	<1	<4	<2	<0.5	<50	0.783	171	<0.002	310	<1	<1	310
Minimum Detect			ND	1	2	ND	ND	ND	ND	2	ND	ND	ND	ND	0.783	171	0.009	310	ND	ND	310
Maximum Concentration			<0.005	<1	38	<2	<2	<2	<2	39	<4	<2	<2.4	<90	1.25	211	0.019	796	<1	<1	796
Maximum Detect			ND	1	38	ND	ND	ND	ND	39	ND	ND	ND	ND	1.25	211	0.019	796	ND	ND	796
Average Concentration *			ND	1	15.5	ND	ND	ND	ND	15.75	ND	ND	ND	ND	1.01757143	195.285714	0.0135	465.285714	ND	ND	465.285714
Geometric Average *			0.0025	0.55204476	3.66558065	1	1	1	1	2.73364111	2	1	0.443502685	29.5716127	1.00598292	194.804223	0.00432298	438.920486	0.5	0.5	438.920486
Median Concentration *			0.0025	0.5	2	1	1	1	1	2	2	1	0.25	25	1.04	197	0.009	399	0.5	0.5	399
Standard Deviation *			0	0.17496355	12.5210028	0	0	0	0	12.9913629	0	0	0.414778033	9.03507903	0.15202712	13.5194493	0.00683329	167.592801	0	0	167.592801
Geometric Standard Deviation *			1.0	1.27449623	3.97014591	1	1	1	1	5.34603179	1	1	2.004971264	1.30412843	1.1646521	1.07336511	3.61877785	1.3949592	1	1	1.3949592
95% UCL (Student's-t) *			0.0025	0.6999311	18.4818037	1	1	1	1	18.7558326	2	1	0.876063588	37.3501276	1.12922822	205.215116	0.01316159	588.374768	0.5	0.5	588.374768
% of Detects			0%	14%	57%	0%	0%	0%	0%	57%	0%	0%	0%	0%	100%	100%	57%	100%	0%	0%	100%
% of Non-Detects			100%	86%	43%	100%	100%	100%	100%	43%	100%	100%	100%	100%	0%	0%	43%	0%	100%	100%	0%

Notes:

* A Non Detect Multiplier of 0.5 has been applied for calculations.

% = percent

µg/L = micrograms per litre

Bq/L = Bequerels per litre

mg/L = milligrams per litre

PAH = polycyclic aromatic hydrocarbons

TPH = total petroleum hydrocarbons

TRH = total recoverable hydrocarbons

UCL = upper confidence limit

Table B-1 Sheandoan S2-1H Flowback Water Analytical Data
Shenandoah S2-1H Flowback Water Assessment
Tamboran

			Inorganics															Metals			
			Ammonia as N	Anions Total	Bromide	Bromine	Cations Total	Chloride	Cyanide Total	Fluoride	Ionic Balance	Kjeldahl Nitrogen Total	Nitrate (as N)	Nitrite (as N)	Nitrogen (Total)	Reactive Phosphorus as P (Orthophosphate as P)	Total Dissolved Solids (Lab)	Total Suspended Solids (Lab)	Aluminium	Antimony	Arsenic	Barium
			mg/L	meq/L	µg/L	µg/L	meq/L	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL			0.005	0.01	10	100	0.01	1	0.004	0.1	0.01	0.025	0.002	0.002	0.025	0.001	10	5	0.005	0.0002	0.0002	0.0005
Field ID	**Location Code**	**Date**																			
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**	13.1	226	109,000	91,500	193	7,350	<0.004	1.2	7.98	24.3	0.019	<0.002	24.3	0.052	12,400	51	0.015	0.0004	**0.0959**	**10.2**
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**																				
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**	12.3	247	130,000	136,000	276	8,250	<0.004	1.2	5.55	22.7	0.009	<0.002	22.7	0.097	20,200	72	0.204	0.0008	**0.0786**	**17.6**
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**	14.7	304	134,000	205,000	310	10,400	<0.004	1.1	0.98	32.7	0.006	0.005	32.7	0.043	24,600	238	0.282	0.0021	**0.0609**	**14.9**
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**																				
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**																				
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**	24.9	415	154,000	175,000	452	14,400	<0.004	1	4.3	44.1	<0.002	<0.002	44.1	0.074	33,700	152	0.108	<0.0005	**0.0369**	**28.2**
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**																				
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**	26.5	484	268,000	297,000	494	16,900	<0.004	1	1.03	45.4	<0.002	<0.002	45.4	0.137	36,500	131	0.075	<0.0005	**0.0189**	**50.2**
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**																				
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**	28.6	489	218,000	202,000	560	17,100	<0.004	0.9	6.8	43.6	<0.002	<0.002	43.6	0.066	50,600	112	<0.005	<0.0005	**0.0184**	**55.2**
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**																				
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**	21.6	526	221,000	213,000	643	18,400	<0.004	1	10	38.2	0.015	<0.002	38.2	0.013	37,500	110	<0.005	<0.0005	**0.0103**	**49.7**
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**																				
Statistics																						
Number of Results			7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Number of Detects			7	7	7	7	7	7	0	7	7	7	4	1	7	7	7	7	5	3	7	7
Minimum Concentration			12.3	226	109000	91500	193	7350	<0.004	0.9	0.98	22.7	<0.002	<0.002	22.7	0.013	12400	51	<0.005	0	0.01	10.2
Minimum Detect			12.3	226	109000	91500	193	7350	ND	0.9	0.98	22.7	0.006	0.005	22.7	0.013	12400	51	0.015	0.0004	0.0103	10.2
Maximum Concentration			28.6	526	268000	297000	643	18400	<0.004	1.2	10	45.4	0.019	0.005	45.4	0.137	50600	238	0.282	0.002	0.096	55.2
Maximum Detect			28.6	526	268000	297000	643	18400	ND	1.2	10	45.4	0.019	0.005	45.4	0.137	50600	238	0.282	0.0021	0.0959	55.2
Average Concentration *			20.2428571	384.428571	176285.714	188500	418.285714	13257.1429	ND	1.05714286	5.23428571	35.8571429	0.01225	0.005	35.8571429	0.06885714	30785.7143	123.714286	0.1368	0.0011	0.0457	32.2857143
Geometric Average *			19.2104246	365.819389	167989.719	178193.285	388.162172	12522.502	0.002	1.05196107	3.87300518	34.6648375	0.0039644	0.0012585	34.6648375	0.05671122	28256.3526	111.510312	0.03311677	0.00042786	0.03470794	26.9733783
Median Concentration *			21.6	415	154000	202000	452	14400	0.002	1	5.55	38.2	0.006	0.001	38.2	0.066	33700	112	0.075	0.00025	0.0369	28.2
Standard Deviation *			6.29463652	114.81769	54909.5732	59969.6352	151.267704	4207.51272	0	0.10497813	3.14982928	8.79201864	0.00675821	0.00139971	8.79201864	0.03692242	11754.5649	56.31725	0.10060475	0.00063455	0.03077016	17.6135036
Geometric Standard Deviation *			1.39023292	1.38143518	1.36345268	1.4156673	1.49328241	1.41604661	1	1.10414424	2.43075373	1.30694071	3.45532274	1.75625895	1.30694071	2.01041482	1.54541121	1.58875062	6.35486979	2.14607865	2.18349957	1.87250819
95% UCL (Student's-t) *			24.8659725	468.756781	216614.221	232544.885	529.38475	16347.3637	0.002	1.13424437	7.54768763	42.3144683	0.01239216	0.00259945	42.3144683	0.09597493	39418.891	165.076665	0.17231805	0.00108033	0.06829924	45.2220068
% of Detects			100%	100%	100%	100%	100%	100%	0%	100%	100%	100%	57%	14%	100%	100%	100%	100%	71%	43%	100%	100%
% of Non-Detects			0%	0%	0%	0%	0%	0%	100%	0%	0%	0%	43%	86%	0%	0%	0%	0%	29%	57%	0%	0%

Notes:
* A Non Detect Multiplier of 0.5 has been applied for calculations.
% = percent
µg/L = micrograms per litre
Bq/L = Bequerels per litre
mg/L = milligrams per litre
PAH = polycyclic aromatic hydrocarbons
TPH = total petroleum hydrocarbons
TRH = total recoverable hydrocarbons
UCL = upper confidence limit

Table B-1 Sheandoan S2-1H Flowback Water Analytical Data
Shenandoah S2-1H Flowback Water Assessment
Tamboran

			Metals																		
			Beryllium	Boron	Cadmium	Chromium (III+VI)	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Molybdenum	Nickel	Potassium	Selenium	Silver	Strontium	Thorium	Tin	Uranium	Vanadium
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	µg/L	mg/L
EQL			0.0001	0.005	0.00005	0.0002	0.0001	0.0005	0.002	0.0001	0.0005	0.00004	0.0001	0.0005	0.02	0.0002	0.0001	0.001	0.1	0.0002	0.05	0.0002
Field ID	**Location Code**	**Date**																				
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**	<0.0001	***13.8***	<0.00005	0.715	0.0006	0.0113	28.4	0.0057	**2.26**	<0.00004	**0.097**	0.0078		0.0011	0.0004	17.4	0.2	0.0003	<0.05	0.0021
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**																				
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**	<0.0001	***19.4***	<0.0002	0.122	0.0004	0.012	14.8	0.0015	**4.34**	<0.00004	**0.0651**	0.0103		<0.002	0.0001	30	0.9	<0.005	<0.1	0.0029
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**	0.0001	***19.9***	<0.0002	0.239	0.0025	0.156	33.2	**0.0531**	**4.65**	<0.00004	***0.171***	**0.0351**		<0.002	0.0013	37.3	0.3	<0.005	0.1	0.0097
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**																				
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**													70.4							
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**	<0.0001	***17.7***	<0.0002	0.0518	0.0014	0.012	22.8	0.0006	**6.29**	<0.00004	**0.0645**	0.0109		0.005	0.0006	87.2	<0.1	<0.005	<0.1	0.0018
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**													185							
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**	0.0001	***21.2***	<0.0002	0.0209	<0.0002	0.002	31	<0.0002	**8.6**	<0.00004	0.0274	0.0023		0.004	0.0007	118	<0.1	<0.005	<0.1	0.0007
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**													92.7							
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**	<0.0001	***18.5***	<0.0002	0.0084	<0.0002	0.003	18.9	<0.0002	**8.39**	<0.00004	0.0236	<0.0005		0.003	<0.0001	125	<0.1	<0.005	<0.1	<0.0005
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**													95							
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**	<0.0001	***18.7***	<0.0002	0.0066	<0.0002	<0.001	9.62	<0.0002	**7.5**	<0.00004	0.0236	0.0008		0.003	<0.0001	131	<0.1	<0.005	<0.1	<0.0005
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**																				
Statistics																						
Number of Results			**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**4**	**7**	**7**	**7**	**7**	**7**	**7**	**7**
Number of Detects			**2**	**7**	**0**	**7**	**4**	**6**	**7**	**4**	**7**	**0**	**7**	**6**	**4**	**5**	**5**	**7**	**3**	**1**	**1**	**5**
Minimum Concentration			**<0**	**13.8**	**<0**	**0.007**	**<0**	**<0.001**	**9.62**	**<0**	**2.26**	**<0**	**0.024**	**<0.001**	**70.4**	**0.001**	**<0**	**17.4**	**<0.1**	**0**	**<0.05**	**<0.001**
Minimum Detect			**0.0001**	**13.8**	**ND**	**0.0066**	**0.0004**	**0.002**	**9.62**	**0.0006**	**2.26**	**ND**	**0.0236**	**0.0008**	**70.4**	**0.0011**	**0.0001**	**17.4**	**0.2**	**0.0003**	**0.1**	**0.0007**
Maximum Concentration			**<0**	**21.2**	**<0**	**0.715**	**0.003**	**0.156**	**33.2**	**0.053**	**8.6**	**<0**	**0.171**	**0.035**	**185**	**0.005**	**0.001**	**131**	**0.9**	**<0.005**	**<0.1**	**0.01**
Maximum Detect			**0.0001**	**21.2**	**ND**	**0.715**	**0.0025**	**0.156**	**33.2**	**0.0531**	**8.6**	**ND**	**0.171**	**0.0351**	**185**	**0.005**	**0.0013**	**131**	**0.9**	**0.0003**	**0.1**	**0.0097**
Average Concentration *			**0.0001**	**18.4571429**	**ND**	**0.16624286**	**0.001225**	**0.03271667**	**22.6742857**	**0.015225**	**6.00428571**	**ND**	**0.06745714**	**0.0112**	**110.775**	**0.00322**	**0.00062**	**77.9857143**	**0.46666667**	**0.0003**	**0.1**	**0.00344**
Geometric Average *			**6.0951E-05**	**18.3162525**	**8.2034E-05**	**0.05348041**	**0.00036359**	**0.00692215**	**20.9869932**	**0.00083045**	**5.51537159**	**0.00002**	**0.05224792**	**0.00391668**	**103.48727**	**0.0021286**	**0.00024605**	**61.3753755**	**0.11897828**	**0.00184669**	**0.05**	**0.0012456**
Median Concentration *			**0.00005**	**18.7**	**0.0001**	**0.0518**	**0.0004**	**0.0113**	**22.8**	**0.0006**	**6.29**	**0.00002**	**0.0645**	**0.0078**	**93.85**	**0.003**	**0.0004**	**87.2**	**0.05**	**0.0025**	**0.05**	**0.0018**
Standard Deviation *			**2.2588E-05**	**2.16521668**	**2.6245E-05**	**0.23694706**	**0.00083642**	**0.05241599**	**8.10266069**	**0.01820391**	**2.18343672**	**0**	**0.04936696**	**0.01117276**	**43.9176716**	**0.00148365**	**0.00042294**	**45.2540268**	**0.28891069**	**0.00076984**	**0.02082483**	**0.00307081**
Geometric Standard Deviation *			**1.36770203**	**1.13574554**	**1.62434064**	**5.04464394**	**3.46171511**	**5.35167695**	**1.51352768**	**9.32566656**	**1.55582956**	**1**	**2.040643**	**4.89201712**	**1.42679058**	**1.91184984**	**3.45974166**	**2.12572375**	**2.95652938**	**2.10000071**	**1.44846265**	**3.46799081**
95% UCL (Student's-t) *			**8.0875E-05**	**20.047393**	**0.00010856**	**0.34026936**	**0.00135717**	**0.06661137**	**28.6253101**	**0.02211278**	**7.60791761**	**0.00002**	**0.10371486**	**0.01784158**	**162.452121**	**0.00367539**	**0.00076777**	**111.222675**	**0.44076278**	**0.00275113**	**0.06886629**	**0.00478394**
% of Detects			**29%**	**100%**	**0%**	**100%**	**57%**	**86%**	**100%**	**57%**	**100%**	**0%**	**100%**	**86%**	**100%**	**71%**	**71%**	**100%**	**43%**	**14%**	**14%**	**71%**
% of Non-Detects			**71%**	**0%**	**100%**	**0%**	**43%**	**14%**	**0%**	**43%**	**0%**	**100%**	**0%**	**14%**	**0%**	**29%**	**29%**	**0%**	**57%**	**86%**	**86%**	**29%**

Notes:
* A Non Detect Multiplier of 0.5 has been applied for calculations.
% = percent
µg/L = micrograms per litre
Bq/L = Bequerels per litre
mg/L = milligrams per litre
PAH = polycyclic aromatic hydrocarbons
TPH = total petroleum hydrocarbons
TRH = total recoverable hydrocarbons
UCL = upper confidence limit

Table B-1 Sheandoan S2-1H Flowback Water Analytical Data
Shenandoah S2-1H Flowback Water Assessment
Tamboran

			Metals	NA	Organic		Organochlorine Pesticides															
			Zinc	Formaldehyde	Dissolved Organic Carbon	Total Organic Carbon	Other organochlorine pesticides EPAVic	4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT	DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II
			mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.001	0.1	1	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2	0.5	0.5	0.5	0.5
Field ID	**Location Code**	**Date**																				
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**	0.026	**2.7**	352	331	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<2.0	<1.2	<1.2	<1.2	<1.2
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**																				
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**	0.033	<1.0	261	288	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**	0.044	<1.0	216	224	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**																				
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**																				
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**	0.099	0.1	203	204	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**																				
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**	0.022	**2.3**	181	196	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**																				
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**	0.37	**2**	168	177	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**																				
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**	0.139	0.1	168	174	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.5	<0.5	<0.5	<0.5
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**																				
Statistics																						
Number of Results			7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Number of Detects			7	5	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration			0.022	0.1	168	174	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.5	<0.5	<0.5	<0.5
Minimum Detect			0.022	0.1	168	174	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration			0.37	2.7	352	331	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4
Maximum Detect			0.37	2.7	352	331	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *			0.10471429	1.44	221.285714	227.714286	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geometric Average *			0.06364216	0.60894803	214.037571	221.664809	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	1.05347252	0.44350269	0.44350269	0.44350269	0.44350269
Median Concentration *			0.044	0.5	203	204	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1	0.25	0.25	0.25	0.25
Standard Deviation *			0.11554308	1.03470394	61.3274916	55.215718	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.09035079	0.41477803	0.41477803	0.41477803	0.41477803
Geometric Standard Deviation *			2.60197008	3.70424895	1.28315888	1.25482757	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	1.08585151	2.00497126	2.00497126	2.00497126	2.00497126
95% UCL (Student's-t) *			0.18957526	1.9313701	266.327881	268.267642	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	1.12350128	0.87606359	0.87606359	0.87606359	0.87606359
% of Detects			100%	71%	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% of Non-Detects			0%	29%	0%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Notes:

* A Non Detect Multiplier of 0.5 has been applied for calculations.
% = percent
µg/L = micrograms per litre
Bq/L = Bequerels per litre
mg/L = milligrams per litre
PAH = polycyclic aromatic hydrocarbons
TPH = total petroleum hydrocarbons
TRH = total recoverable hydrocarbons
UCL = upper confidence limit

Table B-1 Sheandoan S2-1H Flowback Water Analytical Data
Shenandoah S2-1H Flowback Water Assessment
Tamboran

			Organochlorine Pesticides							PAH												
			Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Benzo(b+j+k)fluoranthene	3-methylcholanthrene	7,12-dimethylbenz(a)anthracene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a) pyrene	Benzo(b+j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.5	0.5	0.5	0.5	0.5	0.5	2	0.001	2	2	1	1	1	1	0.5	0.001	1	1	1	1
Field ID	**Location Code**	**Date**																				
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<2.0	<0.0024	<95	<95	<1.2	<1.2	<1.2	<1.2	<1.2	<0.0476	<1.2	<47.6	<1.2	<1.2
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**																				
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<0.0047	<94	<94	<2.4	<2.4	<2.4	<2.4	<2.4	<0.0472	<2.4	<47.2	<2.4	<2.4
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<0.0047	<94	<94	<2.4	<2.4	<2.4	<2.4	<2.4	<0.0472	<2.4	<47.2	<2.4	<2.4
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**																				
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**																				
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.0010	<2	<2	<1.0	<1.0	<1.0	<1.0	<0.5	<0.0010	<1.0	<1.0	<1.0	<1.0
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**																				
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.0010	<2	<2	<1.0	<1.0	<1.0	<1.0	<0.5	<0.0010	<1.0	<1.0	<1.0	<1.0
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**																				
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.0010	<2	<2	<1.0	<1.0	<1.0	<1.0	<0.5	<0.0010	<1.0	<1.0	<1.0	<1.0
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**																				
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.0010	<2	<2	<1.0	<1.0	<1.0	<1.0	<0.5	<0.0010	<1.0	<1.0	<1.0	<1.0
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**																				
Statistics																						
Number of Results			7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Number of Detects			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2	<0.001	<2	<2	<1	<1	<1	<1	<0.5	<0.001	<1	<1	<1	<1
Minimum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration			<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<0.005	<95	<95	<2.4	<2.4	<2.4	<2.4	<2.4	<0.048	<2.4	<47.6	<2.4	<2.4
Maximum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geometric Average *			0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	1.05347252	0.00088169	5.21518722	5.21518722	0.65904246	0.65904246	0.65904246	0.65904246	0.44350269	0.00261154	0.65904246	2.61154361	0.65904246	0.65904246
Median Concentration *			0.25	0.25	0.25	0.25	0.25	0.25	1	0.0005	1	1	0.5	0.5	0.5	0.5	0.25	0.0005	0.5	0.5	0.5	0.5
Standard Deviation *			0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.09035079	0.00080793	22.847096	22.847096	0.30904725	0.30904725	0.30904725	0.30904725	0.41477803	0.01146469	0.30904725	11.4646929	0.30904725	0.30904725
Geometric Standard Deviation *			2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	1.08585151	1.98781181	6.73338052	6.73338052	1.46814898	1.46814898	1.46814898	1.46814898	2.00497126	6.74515271	1.46814898	6.74515271	1.46814898	1.46814898
95% UCL (Student's-t) *			0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	1.12350128	0.00172196	37.565835	37.565835	0.94126643	0.94126643	0.94126643	0.94126643	0.87606359	0.01884885	0.94126643	18.8488508	0.94126643	0.94126643
% of Detects			0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% of Non-Detects			100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Notes:

* A Non Detect Multiplier of 0.5 has been applied for calculations.
% = percent
µg/L = micrograms per litre
Bq/L = Bequerels per litre
mg/L = milligrams per litre
PAH = polycyclic aromatic hydrocarbons
TPH = total petroleum hydrocarbons
TRH = total recoverable hydrocarbons
UCL = upper confidence limit

Table B-1 Sheandoan S2-1H Flowback Water Analytical Data
Shenandoah S2-1H Flowback Water Assessment
Tamboran

			PAH								Phenols												
			Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Benzo(a)pyrene TEQ calc (Zero)	PAHs (Sum of total)	3&4-Methylphenol (m&p-cresol)	2,3,5,6-Tetrachlorophenol	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol	2,4-Dinitrophenol	2,6-Dichlorophenol	2,3,4,5 & 2,3,4,6-Tetrachlorophenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
EQL			1	1	1	1	1	1	0.0005	0.5	4	0.002	2	2	2	4	0.1	2	0.002	2	4	4
Field ID	**Location Code**	**Date**																				
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<0.0006	<0.6	<4	<0.002	<2	<2	<2	<5	<0.1	<2	<0.002	<2	<4	<4
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**																				
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<0.0012	<1.2	<5	<0.002	<2	<2	<2	<4	<0.1	<2	<0.005	<2	<4	<4
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<0.0012	<1.2	<5	<0.002	<2	<2	<2	<4	<0.1	<2	<0.005	<2	<4	<4
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**																				
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**																				
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.0005	<0.5	<4	<0.002	<2	<2	<2	<4	<0.1	<2	<0.002	<2	<4	<4
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**																				
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.0005	<0.5	<4	<0.002	<2	<2	<2	<4	<0.1	<2	<0.002	<2	<4	<4
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**																				
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.0005	<0.5	<4	<0.002	<2	<2	<2	<4	<0.1	<2	<0.002	<2	<4	<4
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**																				
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.0005	<0.5	<4	<0.002	<2	<2	<2	<4	<0.1	<2	<0.002	<2	<4	<4
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**																				
Statistics																						
Number of Results			7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Number of Detects			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration			<1	<1	<1	<1	<1	<1	<0.001	<0.5	<4	<0.002	<2	<2	<2	<4	<0.1	<2	<0.002	<2	<4	<4
Minimum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration			<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<0.001	<1.2	<5	<0.002	<2	<2	<2	<5	<0.1	<2	<0.005	<2	<4	<4
Maximum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geometric Average *			0.65904246	0.65904246	0.65904246	0.65904246	0.65904246	0.65904246	0.00032952	0.32952123	2.13166312	0.001	1	1	1	2.06478237	0.05	1	0.00129926	1	2	2
Median Concentration *			0.5	0.5	0.5	0.5	0.5	0.5	0.00025	0.25	2	0.001	1	1	1	2	0.05	1	0.001	1	2	2
Standard Deviation *			0.30904725	0.30904725	0.30904725	0.30904725	0.30904725	0.30904725	0.00015452	0.15452363	0.22587698	0	0	0	0	0.17496355	6.9389E-18	0	0.00067763	0	0	0
Geometric Standard Deviation *			1.46814898	1.46814898	1.46814898	1.46814898	1.46814898	1.46814898	1.46814898	1.46814898	1.10606202	1	1	1	1	1.08121345	1	1	1.51276327	1	1	1
95% UCL (Student's-t) *			0.94126643	0.94126643	0.94126643	0.94126643	0.94126643	0.94126643	0.00047063	0.47063322	2.30875319	0.001	1	1	1	2.1999311	0.05	1	0.00192626	1	2	2
% of Detects			0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% of Non-Detects			100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Notes:

* A Non Detect Multiplier of 0.5 has been applied for calculations.
% = percent
µg/L = micrograms per litre
Bq/L = Bequerels per litre
mg/L = milligrams per litre
PAH = polycyclic aromatic hydrocarbons
TPH = total petroleum hydrocarbons
TRH = total recoverable hydrocarbons
UCL = upper confidence limit

Table B-1 Sheandoan S2-1H Flowback Water Analytical Data
Shenandoah S2-1H Flowback Water Assessment
Tamboran

			Phenols									Phthalates	Radionuclides						SVOCs	TPH		
			4,6-Dinitro-2-methylphenol	4,6-Dinitro-o-cyclohexyl phenol	4-chloro-3-methylphenol	4-Nitrophenol	Cresol Total	Pentachlorophenol	Phenol	Phenols (halogenated) EPAVic	Phenols (non-halogenated) EPAVic	Bis(2-ethylhexyl) phthalate	Gross Beta Activity - K40	Gross alpha activity	Gross beta activity	Potassium-40	Radium-226	Radium-228	Hexachlorophene	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction
			µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	Bq/L	Bq/L	Bq/L	Bq/L	Bq/L	Bq/L	µg/L	µg/L	µg/L	µg/L
EQL			50	50	4	50	0.004	2	4	2	4	10	0.1	0.05	0.1	0.0006	0.01	0.05	0.1	20	50	100
Field ID	**Location Code**	**Date**																				
SS2-1H Water Sample	BET-PW006	23 Dec 2025	<50	<50	<4	<50	<0.012	<2	<4	<5	<5	<10							<9.4	710	807,000	407,000
SS2-1H Water Sample	BET-PW006	23 Dec 2025															0.28	<0.116				
SS2-1H Water Sample	BET-PW006	30 Dec 2025	<90	<90	<4	<90	<0.024	<5	<4	<9	<9	<10							<1.9	100	175,000	603,000
SS2-1H Water Sample	BET-PW006	06 Jan 2026	<90	<90	<4	<90	<0.024	<5	<4	<9	<9	<10							<1.9	90	87,100	268,000
SS2-1H Water Sample	BET-PW006	06 Jan 2026											2.81	<4.88	4.48		2.4	0.51				
SS2-1H Water Sample	BET-PW006	30 Dec 2025											2.46	<4.56	4.43	2.23	1.7	0.34				
SS2-1H (EPT-Set1)	BET-PW006	17 Mar 2026	<50	<50	<4	<50	<0.004	<2	<4	<2	<4	<10							<0.1	40	560	780
SS2-1H (EPT-Set1)	BET-PW006	17 Mar 2026											<1.98	<16.2	<7.08	5.85	3.43	0.791				
SS2-1H (EPT - Set 2) - Water	BET-PW006	24 Mar 2026	<50	<50	<4	<50	<0.004	<2	<4	<2	<4	<10							<0.1	50	480	180
SS2-1H (EPT - Set 2) - Water	BET-PW006	24 Mar 2026											<1.8	<9.52	<4.4	2.94	3.45	0.85				
SS2-1H (EPT - Set 3) - Water	BET-PW006	31 Mar 2026	<50	<50	<4	<50	<0.004	<2	<4	<2	<4	<10							<0.1	60	610	800
SS2-1H (EPT - Set 3) - Water	BET-PW006	31 Mar 2026											<2.80	<12.2	<5.46	3.01	5.18	1.14				
SS2-1H (EPT - Set 4) - Water	BET-PW006	01 Apr 2026	<50	<50	<4	<50	<0.004	<2	<4	<2	<4	<10							<0.1	50	620	700
SS2-1H (EPT - Set 4) - Water	BET-PW006	01 Apr 2026											<2.33	11.4	<5.11		2.4	1.04				
Statistics																						
Number of Results			7	7	7	7	7	7	7	7	7	7	6	6	6	4	7	7	7	7	7	7
Number of Detects			0	0	0	0	0	0	0	0	0	0	2	1	2	4	7	6	0	7	7	7
Minimum Concentration			<50	<50	<4	<50	<0.004	<2	<4	<2	<4	<10	<1.8	<4.56	<4.4	2.23	0.28	<0.116	<0.1	40	480	180
Minimum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.46	11.4	4.43	2.23	0.28	0.34	ND	40	480	180
Maximum Concentration			<90	<90	<4	<90	<0.024	<5	<4	<9	<9	<10	2.81	<16.2	<7.08	5.85	5.18	1.14	<9.4	710	807000	603000
Maximum Detect			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.81	11.4	4.48	5.85	5.18	1.14	ND	710	807000	603000
Average Concentration *			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.635	11.4	4.455	3.5075	2.69142857	0.7785	ND	157.142857	153052.857	182922.857
Geometric Average *			29.5716127	29.5716127	2	29.5716127	0.00390408	1.29926322	2	1.75178466	2.603142	5	1.46891111	4.96144927	3.20216377	3.27788444	2.0793358	0.50184888	0.22192365	87.2010531	7430.3882	9100.93369
Median Concentration *			25	25	2	25	0.002	1	2	1	2	5	1.2825	5.43	3.135	2.975	2.4	0.791	0.05	60	620	800
Standard Deviation *			9.03507903	9.03507903	0	9.03507903	0.00437059	0.67763093	0	1.53197218	1.09730654	0	0.74076771	3.20126364	0.89571084	1.38644104	1.42836999	0.361281	1.57204533	226.634652	273987.87	228928.675
Geometric Standard Deviation *			1.30412843	1.30412843	1	1.30412843	2.22871738	1.51276327	1	1.95873589	1.42518781	1	1.54585348	1.80306056	1.31322492	1.42562974	2.41500735	2.62060559	5.99066997	2.48169291	20.8710433	27.7995443
95% UCL (Student's-t) *			37.3501276	37.3501276	2	37.3501276	0.00863856	1.92625957	2	3.33944745	3.59163448	5	2.23021852	8.48015436	4.05934762	5.13889982	3.74049935	0.94091538	2.12602216	323.595382	354284.101	351060.235
% of Detects			0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	33%	17%	33%	100%	100%	86%	0%	100%	100%	100%
% of Non-Detects			100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	67%	83%	67%	0%	0%	14%	100%	0%	0%	0%

Notes:

* A Non Detect Multiplier of 0.5 has been applied for calculations.
% = percent
µg/L = micrograms per litre
Bq/L = Bequerels per litre
mg/L = milligrams per litre
PAH = polycyclic aromatic hydrocarbons
TPH = total petroleum hydrocarbons
TRH = total recoverable hydrocarbons
UCL = upper confidence limit

Table B-1 Sheandoan S2-1H Flowback Water Analytical Data
Shenandoah S2-1H Flowback Water Assessment
Tamboran

			TPH		TRH						
			C29-C36 Fraction	C10-C36 Fraction (Sum)	C6-C10 Fraction (F1)	C6-C10 (F1 minus BTEX)	>C10-C16 Fraction (F2)	>C10-C16 Fraction (F2 minus Naphthalene)	>C16-C34 Fraction (F3)	>C34-C40 Fraction (F4)	>C10-C40 Fraction (Sum)
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			50	50	20	20	100	100	100	100	100
Field ID	**Location Code**	**Date**									
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**	<2,860	1,210,000	500	460	1,220,000	1,220,000	14,900	<2,860	1,230,000
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**									
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**	730	779,000	110	100	650,000	650,000	147,000	170	797,000
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**	250	355,000	110	100	322,000	322,000	43,500	<100	366,000
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**									
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**									
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**	60	1,400	40	40	930	930	390	<100	1,320
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**									
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**	<50	660	60	60	340	340	<100	<100	340
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**									
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**	80	1,490	80	80	950	950	360	<100	1,310
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**									
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**	<50	1,320	50	50	860	860	240	<100	1,100
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**									
Statistics											
Number of Results			**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**
Number of Detects			**4**	**7**	**7**	**7**	**7**	**7**	**6**	**1**	**7**
Minimum Concentration			**<50**	**660**	**40**	**40**	**340**	**340**	**<100**	**<100**	**340**
Minimum Detect			**60**	**660**	**40**	**40**	**340**	**340**	**240**	**170**	**340**
Maximum Concentration			**<2860**	**1210000**	**500**	**460**	**1220000**	**1220000**	**147000**	**<2860**	**1230000**
Maximum Detect			**730**	**1210000**	**500**	**460**	**1220000**	**1220000**	**147000**	**170**	**1230000**
Average Concentration *			**280**	**335552.857**	**135.714286**	**127.142857**	**313582.857**	**313582.857**	**34398.3333**	**170**	**342438.571**
Geometric Average *			**134.175836**	**17982.6944**	**92.5314815**	**88.9794806**	**13093.1671**	**13093.1671**	**2065.74788**	**96.1496825**	**15670.404**
Median Concentration *			**80**	**1490**	**80**	**80**	**950**	**950**	**390**	**50**	**1320**
Standard Deviation *			**490.748075**	**448617.291**	**150.888525**	**137.603393**	**435274.489**	**435274.489**	**50193.0435**	**477.698564**	**456887.069**
Geometric Standard Deviation *			**4.41093654**	**24.3135937**	**2.16912871**	**2.10220143**	**29.8166739**	**29.8166739**	**16.7878131**	**3.25500865**	**28.4143666**
95% UCL (Student's-t) *			**731.860022**	**665041.222**	**246.534832**	**228.206097**	**633271.559**	**633271.559**	**66355.8655**	**615.132911**	**678000.701**
% of Detects			**57%**	**100%**	**100%**	**100%**	**100%**	**100%**	**86%**	**14%**	**100%**
% of Non-Detects			**43%**	**0%**	**0%**	**0%**	**0%**	**0%**	**14%**	**86%**	**0%**

Notes:
* A Non Detect Multiplier of 0.5 has been applied for calculations.
% = percent
µg/L = micrograms per litre
Bq/L = Bequerels per litre
mg/L = milligrams per litre
PAH = polycyclic aromatic hydrocarbons
TPH = total petroleum hydrocarbons
TRH = total recoverable hydrocarbons
UCL = upper confidence limit

Appendix C Human Health Risk Assessment

Table C-1
Human Health Tier 1 Screening Assessment
Shenandoah S2-1H Flowback Water Assessment
Tamboran

			BTEX							Explosives		Halogenated Benzenes	Herbicides	Inorganics					
			Naphthalene (VOC)	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	2,4-Dinitrotoluene	Nitrobenzene	Hexachlorobenzene	Dinoseb	Total Phosphorus as P (Organic Phosphate as P)	Silicon as SiO2	Nitrite + Nitrate as N	Alkalinity (Bicarbonate as CaCO3)	Alkalinity (Carbonate as CaCO3)	Alkalinity (Hydroxide) as CaCO3
			mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL			0.005	1	2	2	2	2	2	1	4	2	0.5	50	0.005	0.1	0.002	1	1	1
ADWG 2025 Aesthetic					25	3			20											
ADWG 2025 Health				**1**	**800**	**300**	**600**	**600**	**600**											
WHO (2022) Drinking Water Guidelines [1]																				
USEPA RSLs			*0.00012*								*0.24*	*0.14*	*0.0098*	*15*						
Field ID	**Location Code**	**Date**																		
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**	<0.005	1	38	<2	<2	<2	<2	39	<4	<2	<1.2	<50	1.04	194	0.019	796	<1	<1
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**																		
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**	<0.005	<1	13	<2	<2	<2	<2	13	<4	<2	<2.4	<90	1.14	202	0.009	607	<1	<1
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**	<0.005	<1	9	<2	<2	<2	<2	9	<4	<2	<2.4	<90	1.25	211	0.011	489	<1	<1
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**																		
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**																		
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**	<0.005	<1	<2	<2	<2	<2	<2	<1	<4	<2	<0.5	<50	1.11	197	<0.002	399	<1	<1
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**																		
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**	<0.005	<1	2	<2	<2	<2	<2	2	<4	<2	<0.5	<50	0.877	210	<0.002	342	<1	<1
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**																		
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**	<0.005	<1	<2	<2	<2	<2	<2	<1	<4	<2	<0.5	<50	0.923	182	<0.002	314	<1	<1
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**																		
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**	<0.005	<1	<2	<2	<2	<2	<2	<1	<4	<2	<0.5	<50	0.783	171	0.015	310	<1	<1
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**																		

Statistics

Number of Results	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Number of Detects	0	1	4	0	0	0	0	4	0	0	0	0	7	7	4	7	0	0
Minimum Concentration	<0.005	<1	<2	<2	<2	<2	<2	<1	<4	<2	<0.5	<50	0.783	171	<0.002	310	<1	<1
Minimum Detect	ND	1	2	ND	ND	ND	ND	2	ND	ND	ND	ND	0.783	171	0.009	310	ND	ND
Maximum Concentration	<0.005	<1	38	<2	<2	<2	<2	39	<4	<2	<2.4	<90	1.25	211	0.019	796	<1	<1
Maximum Detect	ND	1	38	ND	ND	ND	ND	39	ND	ND	ND	ND	1.25	211	0.019	796	ND	ND
Average Concentration *	ND	1	15.5	ND	ND	ND	ND	15.75	ND	ND	ND	ND	1.01757143	195.285714	0.0135	465.285714	ND	ND
Geometric Average *	0.0025	0.55204476	3.66558065	1	1	1	1	2.73364111	2	1	0.443502685	29.5716127	1.00598292	194.804223	0.00432298	438.920486	0.5	0.5
Median Concentration *	0.0025	0.5	2	1	1	1	1	2	2	1	0.25	25	1.04	197	0.009	399	0.5	0.5
Standard Deviation *	0	0.17496355	12.5210028	0	0	0	0	12.9913629	0	0	0.414778033	9.03507903	0.15202712	13.5194493	0.00683329	167.592801	0	0
Geometric Standard Deviation *	1.0	1.27449623	3.97014591	1	1	1	1	5.34603179	1	1	2.004971264	1.30412843	1.1646521	1.07336511	3.61877785	1.3949592	1	1
95% UCL (Student's-t) *	0.0025	0.6999311	18.4818037	1	1	1	1	18.7558326	2	1	0.876063588	37.3501276	1.12922822	205.215116	0.01316159	588.374768	0.5	0.5
% of Detects	0%	14%	57%	0%	0%	0%	0%	57%	0%	0%	0%	0%	100%	100%	57%	100%	0%	0%
% of Non-Detects	100%	86%	43%	100%	100%	100%	100%	43%	100%	100%	100%	100%	0%	0%	43%	0%	100%	100%

* A Non Detect Multiplier of 0.5 has been applied.

Table C-1
Human Health Tier 1 Screening Assessment
Shenandoah S2-1H Flowback Water Assessment
Tamboran

			Inorganics																Metals	
			Alkalinity (total) as CaCO3	Ammonia as N	Anions Total	Bromide	Bromine	Cations Total	Chloride	Cyanide Total	Fluoride	Ionic Balance	Kjeldahl Nitrogen Total	Nitrate (as N)	Nitrite (as N)	Nitrogen (Total)	Reactive Phosphorus as P (Orthophosphate as P)	Total Dissolved Solids (Lab)	Total Suspended Solids (Lab)	Aluminium	Antimony
			mg/L	mg/L	meq/L	µg/L	µg/L	meq/L	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
EQL			1	0.005	0.01	10	100	0.01	1	0.004	0.1	0.01	0.025	0.002	0.002	0.025	0.001	10	5	0.005	0.0002
ADWG 2025 Aesthetic				0.5					250									600		0.2	
ADWG 2025 Health										**0.08**	**1.5**			**50**	**3**						**0.003**
WHO (2022) Drinking Water Guidelines [1]																					
USEPA RSLs																				*20*	
Field ID	**Location Code**	**Date**																			
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**	796	13.1	226	109,000	91,500	193	7,350	<0.004	1.2	7.98	24.3	0.019	<0.002	24.3	0.052	12,400	51	0.015	0.0004
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**																			
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**	607	12.3	247	130,000	136,000	276	8,250	<0.004	1.2	5.55	22.7	0.009	<0.002	22.7	0.097	20,200	72	0.204	0.0008
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**	489	14.7	304	134,000	205,000	310	10,400	<0.004	1.1	0.98	32.7	0.006	0.005	32.7	0.043	24,600	238	0.282	0.0021
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**																			
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**																			
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**	399	24.9	415	154,000	175,000	452	14,400	<0.004	1	4.3	44.1	<0.002	<0.002	44.1	0.074	33,700	152	0.108	<0.0005
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**																			
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**	342	26.5	484	268,000	297,000	494	16,900	<0.004	1	1.03	45.4	<0.002	<0.002	45.4	0.137	36,500	131	0.075	<0.0005
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**																			
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**	314	28.6	489	218,000	202,000	560	17,100	<0.004	0.9	6.8	43.6	<0.002	<0.002	43.6	0.066	50,600	112	<0.005	<0.0005
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**																			
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**	310	21.6	526	221,000	213,000	643	18,400	<0.004	1	10	38.2	0.015	<0.002	38.2	0.013	37,500	110	<0.005	<0.0005
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**																			
Statistics																					
Number of Results			**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**
Number of Detects			**7**	**7**	**7**	**7**	**7**	**7**	**7**	**0**	**7**	**7**	**7**	**4**	**1**	**7**	**7**	**7**	**7**	**5**	**3**
Minimum Concentration			**310**	**12.3**	**226**	**109000**	**91500**	**193**	**7350**	**<0.004**	**0.9**	**0.98**	**22.7**	**<0.002**	**<0.002**	**22.7**	**0.013**	**12400**	**51**	**<0.005**	**0**
Minimum Detect			**310**	**12.3**	**226**	**109000**	**91500**	**193**	**7350**	**ND**	**0.9**	**0.98**	**22.7**	**0.006**	**0.005**	**22.7**	**0.013**	**12400**	**51**	**0.015**	**0.0004**
Maximum Concentration			**796**	**28.6**	**526**	**268000**	**297000**	**643**	**18400**	**<0.004**	**1.2**	**10**	**45.4**	**0.019**	**0.005**	**45.4**	**0.137**	**50600**	**238**	**0.282**	**0.002**
Maximum Detect			**796**	**28.6**	**526**	**268000**	**297000**	**643**	**18400**	**ND**	**1.2**	**10**	**45.4**	**0.019**	**0.005**	**45.4**	**0.137**	**50600**	**238**	**0.282**	**0.0021**
Average Concentration *			**465.285714**	**20.2428571**	**384.428571**	**176285.714**	**188500**	**418.285714**	**13257.1429**	**ND**	**1.05714286**	**5.23428571**	**35.8571429**	**0.01225**	**0.005**	**35.8571429**	**0.06885714**	**30785.7143**	**123.714286**	**0.1368**	**0.0011**
Geometric Average *			**438.920486**	**19.2104246**	**365.819389**	**167989.719**	**178193.285**	**388.162172**	**12522.502**	**0.002**	**1.05196107**	**3.87300518**	**34.6648375**	**0.0039644**	**0.0012585**	**34.6648375**	**0.05671122**	**28256.3526**	**111.510312**	**0.03311677**	**0.00042786**
Median Concentration *			**399**	**21.6**	**415**	**154000**	**202000**	**452**	**14400**	**0.002**	**1**	**5.55**	**38.2**	**0.006**	**0.001**	**38.2**	**0.066**	**33700**	**112**	**0.075**	**0.00025**
Standard Deviation *			**167.592801**	**6.29463652**	**114.81769**	**54909.5732**	**59969.6352**	**151.267704**	**4207.51272**	**0**	**0.10497813**	**3.14982928**	**8.79201864**	**0.00675821**	**0.00139971**	**8.79201864**	**0.03692242**	**11754.5649**	**56.31725**	**0.10060475**	**0.00063455**
Geometric Standard Deviation *			**1.3949592**	**1.39023292**	**1.38143518**	**1.36345268**	**1.4156673**	**1.49328241**	**1.41604661**	**1**	**1.10414424**	**2.43075373**	**1.30694071**	**3.45532274**	**1.75625895**	**1.30694071**	**2.01041482**	**1.54541121**	**1.58875062**	**6.35486979**	**2.14607865**
95% UCL (Student's-t) *			**588.374768**	**24.8659725**	**468.756781**	**216614.221**	**232544.885**	**529.38475**	**16347.3637**	**0.002**	**1.13424437**	**7.54768763**	**42.3144683**	**0.01239216**	**0.00259945**	**42.3144683**	**0.09597493**	**39418.891**	**165.076665**	**0.17231805**	**0.00108033**
% of Detects			**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**0%**	**100%**	**100%**	**100%**	**57%**	**14%**	**100%**	**100%**	**100%**	**100%**	**71%**	**43%**
% of Non-Detects			**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**100%**	**0%**	**0%**	**0%**	**43%**	**86%**	**0%**	**0%**	**0%**	**0%**	**29%**	**57%**

* A Non Detect Multiplier of 0.5 has been applied.

Table C-1
Human Health Tier 1 Screening Assessment
Shenandoah S2-1H Flowback Water Assessment
Tamboran

				Metals																
				Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium (III+VI)	Cobalt	Copper	Iron	Lead	Manganese	Mercury	Molybdenum	Nickel	Potassium	Selenium	Silver	Strontium	Thorium
				mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L
EQL				0.0002	0.0005	0.0001	0.005	0.00005	0.0002	0.0001	0.0005	0.002	0.0001	0.0005	0.00004	0.0001	0.0005	0.02	0.0002	0.0001	0.001	0.1
ADWG 2025 Aesthetic											1	0.3		0.05								
ADWG 2025 Health				**0.01**	**2**	**0.06**	**4**	**0.002**	**0.05**		**2**		**0.005**	**0.1**	**0.001**	**0.05**	**0.02**		**0.004**	**0.1**		
WHO (2022) Drinking Water Guidelines [1]																						
USEPA RSLs										*0.006*		*14*									*12*	
Field ID	**Location Code**	**Date**																				
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**		0.0959	10.2	<0.0001	13.8	<0.00005	0.715	0.0006	0.0113	28.4	0.0057	2.26	<0.00004	0.097	0.0078		0.0011	0.0004	17.4	0.2
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**																				
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**		0.0786	17.6	<0.0001	19.4	<0.0002	0.122	0.0004	0.012	14.8	0.0015	4.34	<0.00004	0.0651	0.0103		<0.002	0.0001	30	0.9
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**		0.0609	14.9	0.0001	19.9	<0.0002	0.239	0.0025	0.156	33.2	0.0531	4.65	<0.00004	0.171	0.0351		<0.002	0.0013	37.3	0.3
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**																				
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**																70.4				
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**		0.0369	28.2	<0.0001	17.7	<0.0002	0.0518	0.0014	0.012	22.8	0.0006	6.29	<0.00004	0.0645	0.0109		0.005	0.0006	87.2	<0.1
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**																185				
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**		0.0189	50.2	0.0001	21.2	<0.0002	0.0209	<0.0002	0.002	31	<0.0002	8.6	<0.00004	0.0274	0.0023		0.004	0.0007	118	<0.1
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**																92.7				
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**		0.0184	55.2	<0.0001	18.5	<0.0002	0.0084	<0.0002	0.003	18.9	<0.0002	8.39	<0.00004	0.0236	<0.0005		0.003	<0.0001	125	<0.1
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**																95				
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**		0.0103	49.7	<0.0001	18.7	<0.0002	0.0066	<0.0002	<0.001	9.62	<0.0002	7.5	<0.00004	0.0236	0.0008		0.003	<0.0001	131	<0.1
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**																				
Statistics																						
Number of Results				7	7	7	7	7	7	7	7	7	7	7	7	7	7	4	7	7	7	7
Number of Detects				7	7	2	7	0	7	4	6	7	4	7	0	7	6	4	5	5	7	3
Minimum Concentration				0.01	10.2	<0	13.8	<0	0.007	<0	<0.001	9.62	<0	2.26	<0	0.024	<0.001	70.4	0.001	<0	17.4	<0.1
Minimum Detect				0.0103	10.2	0.0001	13.8	ND	0.0066	0.0004	0.002	9.62	0.0006	2.26	ND	0.0236	0.0008	70.4	0.0011	0.0001	17.4	0.2
Maximum Concentration				0.096	55.2	<0	21.2	<0	0.715	0.003	0.156	33.2	0.053	8.6	<0	0.171	0.035	185	0.005	0.001	131	0.9
Maximum Detect				0.0959	55.2	0.0001	21.2	ND	0.715	0.0025	0.156	33.2	0.0531	8.6	ND	0.171	0.0351	185	0.005	0.0013	131	0.9
Average Concentration *				0.0457	32.2857143	0.0001	18.4571429	ND	0.16624286	0.001225	0.03271667	22.6742857	0.015225	6.00428571	ND	0.06745714	0.0112	110.775	0.00322	0.00062	77.9857143	0.46666667
Geometric Average *				0.03470794	26.9733783	6.0951E-05	18.3162525	8.2034E-05	0.05348041	0.00036359	0.00692215	20.9869932	0.00083045	5.51537159	0.00002	0.05224792	0.00391668	103.48727	0.0021286	0.00024605	61.3753755	0.11897828
Median Concentration *				0.0369	28.2	0.00005	18.7	0.0001	0.0518	0.0004	0.0113	22.8	0.0006	6.29	0.00002	0.0645	0.0078	93.85	0.003	0.0004	87.2	0.05
Standard Deviation *				0.03077016	17.6135036	2.2588E-05	2.16521668	2.6245E-05	0.23694706	0.00083642	0.05241599	8.10266069	0.01820391	2.18343672	0	0.04936696	0.01117276	43.9176716	0.00148365	0.00042294	45.2540268	0.28891069
Geometric Standard Deviation *				2.18349957	1.87250819	1.36770203	1.13574554	1.62434064	5.04464394	3.46171511	5.35167695	1.51352768	9.32566656	1.55582956	1	2.040643	4.89201712	1.42679058	1.91184984	3.45974166	2.12572375	2.95652938
95% UCL (Student's-t) *				0.06829924	45.2220068	8.0875E-05	20.047393	0.00010856	0.34026936	0.00135717	0.06661137	28.6253101	0.02211278	7.60791761	0.00002	0.10371486	0.01784158	162.452121	0.00367539	0.00076777	111.222675	0.44076278
% of Detects				100%	100%	29%	100%	0%	100%	57%	86%	100%	57%	100%	0%	100%	86%	100%	71%	71%	100%	43%
% of Non-Detects				0%	0%	71%	0%	100%	0%	43%	14%	0%	43%	0%	100%	0%	14%	0%	29%	29%	0%	57%

* A Non Detect Multiplier of 0.5 has been applied.

Table C-1
Human Health Tier 1 Screening Assessment
Shenandoah S2-1H Flowback Water Assessment
Tamboran

			Metals			NA	Organic		Organochlorine Pesticides											
			Tin	Uranium	Vanadium	Zinc	Formaldehyde	Dissolved Organic Carbon	Total Organic Carbon	Other organochlorine pesticides EPAVic	4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	Chlordane (cis)	Chlordane (trans)	d-BHC	DDD	DDT
			mg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.0002	0.05	0.0002	0.001	0.1	1	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2
ADWG 2025 Aesthetic						3															
ADWG 2025 Health				**20**			**0.5**							**0.3**		**2**					**9**
WHO (2022) Drinking Water Guidelines [1]													*0.03*								
USEPA RSLs			*12*		*0.086*	*6*					*0.046*	*0.0072*			*0.025*		*3.6*	*10*	*0.00073*	*0.032*	
Field ID	**Location Code**	**Date**																			
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**	0.0003	<0.05	0.0021	0.026	2.7	352	331	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<2.0
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**																			
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**	<0.005	<0.1	0.0029	0.033	<1.0	261	288	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**	<0.005	0.1	0.0097	0.044	<1.0	216	224	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**																			
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**																			
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**	<0.005	<0.1	0.0018	0.099	0.1	203	204	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**																			
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**	<0.005	<0.1	0.0007	0.022	2.3	181	196	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**																			
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**	<0.005	<0.1	<0.0005	0.37	2	168	177	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**																			
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**	<0.005	<0.1	<0.0005	0.139	0.1	168	174	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**																			

Statistics

Number of Results	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Number of Detects	1	1	5	7	5	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	0	<0.05	<0.001	0.022	0.1	168	174	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2
Minimum Detect	0.0003	0.1	0.0007	0.022	0.1	168	174	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<0.005	<0.1	0.01	0.37	2.7	352	331	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4
Maximum Detect	0.0003	0.1	0.0097	0.37	2.7	352	331	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *	0.0003	0.1	0.00344	0.10471429	1.44	221.285714	227.714286	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geometric Average *	0.00184669	0.05	0.0012456	0.06364216	0.60894803	214.037571	221.664809	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	0.44350269	1.05347252
Median Concentration *	0.0025	0.05	0.0018	0.044	0.5	203	204	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	1
Standard Deviation *	0.00076984	0.02082483	0.00307081	0.11554308	1.03470394	61.3274916	55.215718	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.41477803	0.09035079
Geometric Standard Deviation *	2.10000071	1.44846265	3.46799081	2.60197008	3.70424895	1.28315888	1.25482757	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	2.00497126	1.08585151
95% UCL (Student's-t) *	0.00275113	0.06886629	0.00478394	0.18957526	1.9313701	266.327881	268.267642	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	0.87606359	1.12350128
% of Detects	14%	14%	71%	100%	71%	100%	100%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
% of Non-Detects	86%	86%	29%	0%	29%	0%	0%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

* A Non Detect Multiplier of 0.5 has been applied.

Table C-1
Human Health Tier 1 Screening Assessment
Shenandoah S2-1H Flowback Water Assessment
Tamboran

			Organochlorine Pesticides										PAH							
			DDT+DDE+DDD	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	g-BHC (Lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Benzo(b+j+k)fluoranthene	3-methylcholanthrene	7,12-dimethylbenz(a)anthracene	Acenaphthene	Acenaphthylene	Anthracene	Benzo(a)anthracene	Benzo(a) pyrene
			µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	2	0.001	2	2	1	1	1	1	0.5
ADWG 2025 Aesthetic																					
ADWG 2025 Health										**10**	**0.3**		**300**								**0.01**
WHO (2022) Drinking Water Guidelines [1]				*0.03*				*0.6*													
USEPA RSLs					*100*		*110*					*0.0014*					*530*	*530*	*1800*	*0.03*	
Field ID	**Location Code**	**Date**																			
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<2.0	<0.0024	<95	<95	<1.2	<1.2	<1.2	<1.2	<1.2
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**																			
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<0.0047	<94	<94	<2.4	<2.4	<2.4	<2.4	<2.4
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<0.0047	<94	<94	<2.4	<2.4	<2.4	<2.4	<2.4
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**																			
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**																			
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.0010	<2	<2	<1.0	<1.0	<1.0	<1.0	<0.5
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**																			
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.0010	<2	<2	<1.0	<1.0	<1.0	<1.0	<0.5
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**																			
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.0010	<2	<2	<1.0	<1.0	<1.0	<1.0	<0.5
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**																			
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<2.0	<0.0010	<2	<2	<1.0	<1.0	<1.0	<1.0	<0.5
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**																			
Statistics																					
Number of Results			**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**
Number of Detects			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Minimum Concentration			**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<0.5**	**<2**	**<0.001**	**<2**	**<2**	**<1**	**<1**	**<1**	**<1**	**<0.5**
Minimum Detect			**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Maximum Concentration			**<2.4**	**<2.4**	**<2.4**	**<2.4**	**<2.4**	**<2.4**	**<2.4**	**<2.4**	**<2.4**	**<2.4**	**<2.4**	**<0.005**	**<95**	**<95**	**<2.4**	**<2.4**	**<2.4**	**<2.4**	**<2.4**
Maximum Detect			**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Average Concentration *			**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Geometric Average *			**0.44350269**	**0.44350269**	**0.44350269**	**0.44350269**	**0.44350269**	**0.44350269**	**0.44350269**	**0.44350269**	**0.44350269**	**0.44350269**	**1.05347252**	**0.00088169**	**5.21518722**	**5.21518722**	**0.65904246**	**0.65904246**	**0.65904246**	**0.65904246**	**0.44350269**
Median Concentration *			**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**1**	**0.0005**	**1**	**1**	**0.5**	**0.5**	**0.5**	**0.5**	**0.25**
Standard Deviation *			**0.41477803**	**0.41477803**	**0.41477803**	**0.41477803**	**0.41477803**	**0.41477803**	**0.41477803**	**0.41477803**	**0.41477803**	**0.41477803**	**0.09035079**	**0.00080793**	**22.847096**	**22.847096**	**0.30904725**	**0.30904725**	**0.30904725**	**0.30904725**	**0.41477803**
Geometric Standard Deviation *			**2.00497126**	**2.00497126**	**2.00497126**	**2.00497126**	**2.00497126**	**2.00497126**	**2.00497126**	**2.00497126**	**2.00497126**	**2.00497126**	**1.08585151**	**1.98781181**	**6.73338052**	**6.73338052**	**1.46814898**	**1.46814898**	**1.46814898**	**1.46814898**	**2.00497126**
95% UCL (Student's-t) *			**0.87606359**	**0.87606359**	**0.87606359**	**0.87606359**	**0.87606359**	**0.87606359**	**0.87606359**	**0.87606359**	**0.87606359**	**0.87606359**	**1.12350128**	**0.00172196**	**37.565835**	**37.565835**	**0.94126643**	**0.94126643**	**0.94126643**	**0.94126643**	**0.87606359**
% of Detects			**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
% of Non-Detects			**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

* A Non Detect Multiplier of 0.5 has been applied.

Table C-1
Human Health Tier 1 Screening Assessment
Shenandoah S2-1H Flowback Water Assessment
Tamboran

				PAH											Phenols					
			Benzo(b+j)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	Benzo(a)pyrene TEQ calc (Zero)	PAHs (Sum of total)	3&4-Methylphenol (m&p-cresol)	2,3,5,6-Tetrachlorophenol	2,4,5-Trichlorophenol	2,4,6-Trichlorophenol	2,4-Dichlorophenol	2,4-Dimethylphenol
			mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L
EQL			0.001	1	1	1	1	1	1	1	1	1	1	0.0005	0.5	4	0.002	2	2	2	4
ADWG 2025 Aesthetic																			2	0.3	
ADWG 2025 Health																			**20**	**200**	
WHO (2022) Drinking Water Guidelines [1]																					
USEPA RSLs				*120*	*2.5*	*25*	*0.025*	*800*	*290*	*0.25*	*0.12*	*120*	*120*			*1400*		*1200*			*360*
Field ID	**Location Code**	**Date**																			
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**	<0.0476	<1.2	<47.6	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<0.0006	<0.6	<4	<0.002	<2	<2	<2	<5
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**																			
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**	<0.0472	<2.4	<47.2	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<0.0012	<1.2	<5	<0.002	<2	<2	<2	<4
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**	<0.0472	<2.4	<47.2	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<0.0012	<1.2	<5	<0.002	<2	<2	<2	<4
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**																			
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**																			
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**	<0.0010	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.0005	<0.5	<4	<0.002	<2	<2	<2	<4
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**																			
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**	<0.0010	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.0005	<0.5	<4	<0.002	<2	<2	<2	<4
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**																			
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**	<0.0010	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.0005	<0.5	<4	<0.002	<2	<2	<2	<4
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**																			
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**	<0.0010	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.0005	<0.5	<4	<0.002	<2	<2	<2	<4
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**																			
Statistics																					
Number of Results			**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**
Number of Detects			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Minimum Concentration			**<0.001**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<0.001**	**<0.5**	**<4**	**<0.002**	**<2**	**<2**	**<2**	**<4**
Minimum Detect			**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Maximum Concentration			**<0.048**	**<2.4**	**<47.6**	**<2.4**	**<2.4**	**<2.4**	**<2.4**	**<2.4**	**<2.4**	**<2.4**	**<2.4**	**<0.001**	**<1.2**	**<5**	**<0.002**	**<2**	**<2**	**<2**	**<5**
Maximum Detect			**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Average Concentration *			**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**
Geometric Average *			**0.00261154**	**0.65904246**	**2.61154361**	**0.65904246**	**0.65904246**	**0.65904246**	**0.65904246**	**0.65904246**	**0.65904246**	**0.65904246**	**0.65904246**	**0.00032952**	**0.32952123**	**2.13166312**	**0.001**	**1**	**1**	**1**	**2.06478237**
Median Concentration *			**0.0005**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.5**	**0.00025**	**0.25**	**2**	**0.001**	**1**	**1**	**1**	**2**
Standard Deviation *			**0.01146469**	**0.30904725**	**11.4646929**	**0.30904725**	**0.30904725**	**0.30904725**	**0.30904725**	**0.30904725**	**0.30904725**	**0.30904725**	**0.30904725**	**0.00015452**	**0.15452363**	**0.22587698**	**0**	**0**	**0**	**0**	**0.17496355**
Geometric Standard Deviation *			**6.74515271**	**1.46814898**	**6.74515271**	**1.46814898**	**1.46814898**	**1.46814898**	**1.46814898**	**1.46814898**	**1.46814898**	**1.46814898**	**1.46814898**	**1.46814898**	**1.46814898**	**1.10606202**	**1**	**1**	**1**	**1**	**1.08121345**
95% UCL (Student's-t) *			**0.01884885**	**0.94126643**	**18.8488508**	**0.94126643**	**0.94126643**	**0.94126643**	**0.94126643**	**0.94126643**	**0.94126643**	**0.94126643**	**0.94126643**	**0.00047063**	**0.47063322**	**2.30875319**	**0.001**	**1**	**1**	**1**	**2.1999311**
% of Detects			**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**
% of Non-Detects			**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

* A Non Detect Multiplier of 0.5 has been applied.

Table C-1
Human Health Tier 1 Screening Assessment
Shenandoah S2-1H Flowback Water Assessment
Tamboran

				Phenols													Phthalates	Radionuclides		
				2,4-Dinitrophenol	2,6-Dichlorophenol	2,3,4,5 & 2,3,4,6-Tetrachlorophenol	2-Chlorophenol	2-Methylphenol	2-Nitrophenol	4,6-Dinitro-2-methylphenol	4,6-Dinitro-o-cyclohexyl phenol	4-chloro-3-methylphenol	4-Nitrophenol	Cresol Total	Pentachlorophenol	Phenol	Phenols (halogenated) EPAVic	Phenols (non-halogenated) EPAVic	Bis(2-ethylhexyl) phthalate	Gross Beta Activity - K40	Gross alpha activity	Gross beta activity
				mg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L	µg/L	µg/L	µg/L	µg/L	Bq/L	Bq/L	Bq/L
EQL				0.1	2	0.002	2	4	4	50	50	4	50	0.004	2	4	2	4	10	0.1	0.05	0.1
ADWG 2025 Aesthetic							0.1													0.5	0.5	
ADWG 2025 Health							**300**								**10**				**10**			
WHO (2022) Drinking Water Guidelines [1]																						
USEPA RSLs				*0.039*		*0.24*	*91*							*1.5*		*5800*						
Field ID	**Location Code**	**Date**																				
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**		<0.1	<2	<0.002	<2	<4	<4	<50	<50	<4	<50	<0.012	<2	<4	<5	<5	<10			
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**																				
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**		<0.1	<2	<0.005	<2	<4	<4	<90	<90	<4	<90	<0.024	<5	<4	<9	<9	<10			
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**		<0.1	<2	<0.005	<2	<4	<4	<90	<90	<4	<90	<0.024	<5	<4	<9	<9	<10			
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**																		2.81	<4.88	4.48
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**																		2.46	<4.56	4.43
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**		<0.1	<2	<0.002	<2	<4	<4	<50	<50	<4	<50	<0.004	<2	<4	<2	<4	<10			
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**																		<1.98	<16.2	<7.08
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**		<0.1	<2	<0.002	<2	<4	<4	<50	<50	<4	<50	<0.004	<2	<4	<2	<4	<10			
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**																		<1.8	<9.52	<4.4
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**		<0.1	<2	<0.002	<2	<4	<4	<50	<50	<4	<50	<0.004	<2	<4	<2	<4	<10			
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**																		<2.80	<12.2	<5.46
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**		<0.1	<2	<0.002	<2	<4	<4	<50	<50	<4	<50	<0.004	<2	<4	<2	<4	<10			
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**																		<2.33	11.4	<5.11
Statistics																						
Number of Results				**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**6**	**6**	**6**
Number of Detects				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**2**
Minimum Concentration				**<0.1**	**<2**	**<0.002**	**<2**	**<4**	**<4**	**<50**	**<50**	**<4**	**<50**	**<0.004**	**<2**	**<4**	**<2**	**<4**	**<10**	**<1.8**	**<4.56**	**<4.4**
Minimum Detect				**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**2.46**	**11.4**	**4.43**
Maximum Concentration				**<0.1**	**<2**	**<0.005**	**<2**	**<4**	**<4**	**<90**	**<90**	**<4**	**<90**	**<0.024**	**<5**	**<4**	**<9**	**<9**	**<10**	**2.81**	**<12.2**	**<5.46**
Maximum Detect				**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**2.81**	**11.4**	**4.48**
Average Concentration *				**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**ND**	**2.635**	**11.4**	**4.455**
Geometric Average *				**0.05**	**1**	**0.00129926**	**1**	**2**	**2**	**29.5716127**	**29.5716127**	**2**	**29.5716127**	**0.00390408**	**1.29926322**	**2**	**1.75178466**	**2.603142**	**5**	**1.46891111**	**4.96144927**	**3.20216377**
Median Concentration *				**0.05**	**1**	**0.001**	**1**	**2**	**2**	**25**	**25**	**2**	**25**	**0.002**	**1**	**2**	**1**	**2**	**5**	**1.2825**	**5.43**	**3.135**
Standard Deviation *				**6.9389E-18**	**0**	**0.00067763**	**0**	**0**	**0**	**9.03507903**	**9.03507903**	**0**	**9.03507903**	**0.00437059**	**0.67763093**	**0**	**1.53197218**	**1.09730654**	**0**	**0.74076771**	**3.20126364**	**0.89571084**
Geometric Standard Deviation *				**1**	**1**	**1.51276327**	**1**	**1**	**1**	**1.30412843**	**1.30412843**	**1**	**1.30412843**	**2.22871738**	**1.51276327**	**1**	**1.95873589**	**1.42518781**	**1**	**1.54585348**	**1.80306056**	**1.31322492**
95% UCL (Student's-t) *				**0.05**	**1**	**0.00192626**	**1**	**2**	**2**	**37.3501276**	**37.3501276**	**2**	**37.3501276**	**0.00863856**	**1.92625957**	**2**	**3.33944745**	**3.59163448**	**5**	**2.23021852**	**8.48015436**	**4.05934762**
% of Detects				**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**0%**	**33%**	**17%**	**33%**
% of Non-Detects				**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**67%**	**83%**	**67%**

* A Non Detect Multiplier of 0.5 has been applied.

Table C-1
Human Health Tier 1 Screening Assessment
Shenandoah S2-1H Flowback Water Assessment
Tamboran

				Radionuclides			SVOCs	TPH					TRH							
				Potassium-40	Radium-226	Radium-228	Hexachlorophene	C6-C9 Fraction	C10-C14 Fraction	C15-C28 Fraction	C29-C36 Fraction	C10-C36 Fraction (Sum)	C6-C10 Fraction (F1)	C6-C10 (F1 minus BTEX)	>C10-C16 Fraction (F2)	>C10-C16 Fraction (F2 minus Naphthalene)	>C16-C34 Fraction (F3)	>C34-C40 Fraction (F4)	>C10-C40 Fraction (Sum)
				Bq/L	Bq/L	Bq/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
EQL				0.0006	0.01	0.05	0.1	20	50	100	50	50	20	20	100	100	100	100	100
ADWG 2025 Aesthetic																			
ADWG 2025 Health																			
WHO (2022) Drinking Water Guidelines [1]													*15,000 aliphatic*	*15,000 aliphatic*	*90 aromatic 300 aliphatic*	*90 aromatic 300 aliphatic*	*90 aromatic 300 aliphatic*		
USEPA RSLs							*6*												
Field ID	**Location Code**	**Date**																	
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**				<9.4	710	807,000	407,000	<2,860	1,210,000	500	460	1,220,000	1,220,000	14,900	<2,860	1,230,000
SS2-1H Water Sample	**BET-PW006**	**23 Dec 2025**		0.28	<0.116													
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**				<1.9	100	175,000	603,000	730	779,000	110	100	650,000	650,000	147,000	170	797,000
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**				<1.9	90	87,100	268,000	250	355,000	110	100	322,000	322,000	43,500	<100	366,000
SS2-1H Water Sample	**BET-PW006**	**06 Jan 2026**		2.4	0.51													
SS2-1H Water Sample	**BET-PW006**	**30 Dec 2025**	2.23	1.7	0.34													
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**				<0.1	40	560	780	60	1,400	40	40	930	930	390	<100	1,320
SS2-1H (EPT-Set1)	**BET-PW006**	**17 Mar 2026**	5.85	3.43	0.791													
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**				<0.1	50	480	180	<50	660	60	60	340	340	<100	<100	340
SS2-1H (EPT - Set 2) - Water	**BET-PW006**	**24 Mar 2026**	2.94	3.45	0.85													
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**				<0.1	60	610	800	80	1,490	80	80	950	950	360	<100	1,310
SS2-1H (EPT - Set 3) - Water	**BET-PW006**	**31 Mar 2026**	3.01	5.18	1.14													
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**				<0.1	50	620	700	<50	1,320	50	50	860	860	240	<100	1,100
SS2-1H (EPT - Set 4) - Water	**BET-PW006**	**01 Apr 2026**		2.4	1.04													
Statistics																			
Number of Results			**4**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**
Number of Detects			**4**	**7**	**6**	**0**	**7**	**7**	**7**	**4**	**7**	**7**	**7**	**7**	**7**	**6**	**1**	**7**
Minimum Concentration			**2.23**	**0.28**	**<0.116**	**<0.1**	**40**	**480**	**180**	**<50**	**660**	**40**	**40**	**340**	**340**	**<100**	**<100**	**340**
Minimum Detect			**2.23**	**0.28**	**0.34**	**ND**	**40**	**480**	**180**	**60**	**660**	**40**	**40**	**340**	**340**	**240**	**170**	**340**
Maximum Concentration			**3.01**	**5.18**	**1.14**	**<9.4**	**710**	**807000**	**603000**	**<2860**	**1210000**	**500**	**460**	**1220000**	**1220000**	**147000**	**<2860**	**1230000**
Maximum Detect			**5.85**	**5.18**	**1.14**	**ND**	**710**	**807000**	**603000**	**730**	**1210000**	**500**	**460**	**1220000**	**1220000**	**147000**	**170**	**1230000**
Average Concentration *			**3.5075**	**2.69142857**	**0.7785**	**ND**	**157.142857**	**153052.857**	**182922.857**	**280**	**335552.857**	**135.714286**	**127.142857**	**313582.857**	**313582.857**	**34398.3333**	**170**	**342438.571**
Geometric Average *			**3.27788444**	**2.0793358**	**0.50184888**	**0.22192365**	**87.2010531**	**7430.3882**	**9100.93369**	**134.175836**	**17982.6944**	**92.5314815**	**88.9794806**	**13093.1671**	**13093.1671**	**2065.74788**	**96.1496825**	**15670.404**
Median Concentration *			**2.975**	**2.4**	**0.791**	**0.05**	**60**	**620**	**800**	**80**	**1490**	**80**	**80**	**950**	**950**	**390**	**50**	**1320**
Standard Deviation *			**1.38644104**	**1.42836999**	**0.361281**	**1.57204533**	**226.634652**	**273987.87**	**228928.675**	**490.748075**	**448617.291**	**150.888525**	**137.603393**	**435274.489**	**435274.489**	**50193.0435**	**477.698564**	**456887.069**
Geometric Standard Deviation *			**1.42562974**	**2.41500735**	**2.62060559**	**5.99066997**	**2.48169291**	**20.8710433**	**27.7995443**	**4.41093654**	**24.3135937**	**2.16912871**	**2.10220143**	**29.8166739**	**29.8166739**	**16.7878131**	**3.25500865**	**28.4143666**
95% UCL (Student's-t) *			**5.13889982**	**3.74049935**	**0.94091538**	**2.12602216**	**323.595382**	**354284.101**	**351060.235**	**731.860022**	**665041.222**	**246.534832**	**228.206097**	**633271.559**	**633271.559**	**66355.8655**	**615.132911**	**678000.701**
% of Detects			**100%**	**100%**	**86%**	**0%**	**100%**	**100%**	**100%**	**57%**	**100%**	**100%**	**100%**	**100%**	**100%**	**86%**	**14%**	**100%**
% of Non-Detects			**0%**	**0%**	**14%**	**100%**	**0%**	**0%**	**0%**	**43%**	**0%**	**0%**	**0%**	**0%**	**0%**	**14%**	**86%**	**0%**

* A Non Detect Multiplier of 0.5 has been applied.

% = percent
µg/L = micrograms per litre
Bq/L = Bequerels per litre
mg/L = milligrams per litre
PAH = polycyclic aromatic hydrocarbons
TPH = total petroleum hydrocarbons
TRH = total recoverable hydrocarbons

Environmental Standards

NHMRC, June 2025, ADWG 2025 Aesthetic
NHMRC, June 2025, ADWG 2025 Health
USEPA. 2024. Regional Screening Levels. November
WHO. 2022. Guidelines for Drinking Water Quality. Fourth edition incorporating th first and second addenda.

1/ WHO Guidelines for TPH fractions are not established because taste and odor thresholds are lower than health-based values.
However, WHO developed health-based group values providing guidance as to tolerable levels of aromatic and aliphatic hydrocarbon fractions in drinkng water (WHO, 2008).
Analysis of aliphatic and aromatic fractions for petroleum hydrocarbon was not performed. Therefore, the following application of levels was followed:
- TPH C6-C10 (F1) aromatic - assumed to be total BTEX concentration
- TPH C6-C10 (F1) minus BTEX - assumed to be aliphatic portion of TPH fraction
-Consistent with NEPM guidance, concentrations of higher TPH fractions were assumed to be 80 percent aliphatic and 20 percent aromatic fractions.

Table C-2
Radionuclide Annual Dose Calculations
Shenandoah S2-1H Flowback Water Assessment
Tamboran

Radionuclide	Dose/unit	Max Conc[1]	Drinking Water Exposure Scenario		Worker Exposure Scenario	
			Ing/year	Dose/year	Ing/year	Dose/year
	(mSv/Bq)	(Bq/L)	(L/year)	(mSv/year)	(L/year)	(mSv/year)
Radium 226	2.8E-04	5.18	750	1.1E+00	0.00208	3.0E-06
Radium-228	6.9E-04	1.14	750	5.9E-01	0.00208	1.6E-06
			Total dose/year	1.1E+00	**Total dose/year**	3.0E-06

Notes:
Bq/L = becquerel per litre
Conc = concentration
L = litre
L/year = litre per year
mSv/Bq = millisievert per becquerel
mSv/year = millisievert per year
1/ Radium-226 & Radium-228 assumed to be source of gross beta and gross alpha activity in assessed flowback water.

Table C-3
Human Receptor Exposure Assumptions
Shenandoah S2-1H Flowback Water Assessment
Tamboran

Media	Exposure Route	Parameter Code	Parameter Definition	Units (a)	Parameter Value - Agricultural Worker	Source (b)
Water	Ingestion	IR	Ingestion rate	mL/day	0.005	Origin, 2022
		EF	Exposure frequency	day/yr	20	Origin, 2022
		ED	Exposure duration	yr	0.083	Origin, 2022
		RBA	Relative bioavailability factor	unitless	chemical-specific	(f) enHealth, 2012
		BW	Body weight	kg	78	enHealth, 2012
		LT	Lifetime	yr	79	(f) enHealth, 2012
		AT-NC	Averaging time - noncancer	days	30	enHealth, 2012
		AT-C	Averaging time - cancer	days	25,550	enHealth, 2012
		CF	Conversion factor	kg/mg	1.0E-06	enHealth, 2012
	Dermal	SA	Surface area for contact (exposed)	cm^2/day	2,300	Origin, 2022
		EF	Exposure frequency	day/yr	20	Origin, 2022
		ED	Exposure duration	yr	0.083	Origin, 2022
		BW	Body weight	kg	78	(f) enHealth, 2012
		LT	Lifetime	yr	79	enHealth, 2012
		AT-NC	Averaging time - noncancer	days	30	enHealth, 2012
		AT-C	Averaging time - cancer	days	25,550	enHealth, 2012
		ET	Exposure Time	hr/day	1	Origin, 2022
		CF	Conversion factor	kg/mg	1.0E-06	enHealth, 2012
	Inhalation	EF	Exposure frequency	day/yr	120	Origin, 2022
		ED	Exposure duration	yr	1	Origin, 2022
		AT-NC	Averaging time - noncancer	days	365	enHealth, 2012
		AT-C	Averaging time - cancer	days	25550	enHealth, 2012
		ET	Exposure Time	hr/day	1	Origin, 2022
		EMF	Driftable aerosol emission factor	L/m3	2.5E-03	Origin, 2022
		AAF	Aerosol Inhalation bioavailability	unitless	1.0E+00	Origin, 2022

Notes:
a/ Units:
l/hr = litres per hour
hr/day = hours per day
day/yr = days per year
yr = year
kg = kilogram
cm^2 = square centimetre
cm/h = centimetre per hour
l/cm^3 = litre per cubic centimetre
cm^2/day = square centimetre per day
mg soil/cm^2 skin = milligrams soil per square centimetre skin
kg/mg = kilogram per milligram

b/ References:
enHealth. (2012). Australian Exposure Factor Guidance. enHealth Subcommetee of the Australian Health Protection Principal Committee, Canberra, Australia.
Origin 2021. ORI6-3:Beetaloo Sub-basin Kyalla 117 N2 Multi-Well Drilling, Stimulation and Well Testing Program Envrionment Management Plan, EP117. 11 February 2021.
d/ Exposed body surface area is the time weighted average of head, forearms, hands, lower legs, and feet.
Forearms are considered 45% of arm surface area; lower leg is considered 40% of leg surface area (USEPA, 2016).
e/ Adherence factor calculated for exposed body part surface area is the time weighted average of head, forearms, hands, lower legs, and feet.
f/ Male exposure factor used based on enHealth recommendation.

Table C-4
Risk Estimates for Flowback Worker During Re-Use
Shenandoah S2-1H Flowback Water Assessment
Tamboran

Exposure to Flowback Water																
Constituent Name	CAS No.	EPC[1] Flowback Water	Toxicity[2]				ABS[3]	Oral Intake	Oral Intake	DAevent	Dermal Intake		Excess Cancer Lifetime Risk		Hazard Quotient	
		CW (mg/L)	CSFo 1/(mg/kg-day)		RfDo mg/kg-day			LADDoral	CADDoral	(ug/cm2-event)	LADDderm	CADDderm	Incidental Ingestion	Dermal	Incidental Ingestion	Dermal
Arsenic	7440-38-2	0.05	1.5E+00	I	3.0E-04	I	1	1.9E-10	1.6E-07	6.6E-05	1.3E-10	1.1E-07	2.9E-10	1.9E-10	5.4E-04	3.6E-04
Barium	7440-39-3	32.3	NA	NA	2.0E-01	ADWG	1	1.3E-07	1.1E-04	7.0E-02	1.3E-07	1.1E-04	NA	NA	5.7E-04	5.7E-04
Boron	7440-42-8	18.5	NA	NA	1.3E-01	ADWG	1	7.7E-08	6.5E-05	1.8E-02	3.5E-08	2.9E-05	NA	NA	5.0E-04	2.2E-04
Chromium	18540-29-9	0.17	1.6E-01	I	9.0E-04	I	1	6.9E-10	5.8E-07	3.3E-04	6.4E-10	5.4E-07	1.1E-10	1.0E-10	6.5E-04	6.0E-04
Manganese	7439-96-5	6.00	NA	NA	2.5E-02	ADWG	1	2.5E-08	2.1E-05	6.0E-03	1.2E-08	9.7E-06	NA	NA	8.4E-04	3.9E-04
Molybdenum	7439-98-7	0.07	NA	NA	5.0E-03	I	1	2.8E-10	2.4E-07	1.1E-04	2.2E-10	1.8E-07	NA	NA	4.7E-05	3.6E-05
Nickel	7440-02-0	0.01	NA	NA	5.0E-03	ADWG	1	4.7E-11	3.9E-08	2.9E-06	5.6E-12	4.7E-09	NA	NA	7.9E-06	9.5E-07
Selenium	7782-49-2	0.0032	NA	NA	8.5E-02	ADWG	1	1.3E-11	1.1E-08	3.2E-06	6.2E-12	5.2E-09	NA	NA	1.3E-07	6.1E-08
Strontium	7440-24-6	77.99	NA	NA	1.0E-01	I	1	3.2E-07	2.7E-04	1.2E-01	2.4E-07	2.0E-04	NA	NA	2.7E-03	2.0E-03
Toluene	108-88-3	15.50	NA	NA	2.2E-01	ADWG	1	6.5E-08	5.4E-05	7.8E-01	1.5E-06	1.3E-03	NA	NA	2.4E-04	5.7E-03
Formaldehyde	50-00-0	1.44	2.1E-02	C	1.5E-01	ADWG	1	6.0E-09	5.1E-06	2.9E-03	5.5E-09	4.6E-06	1.3E-10	1.1E-10	3.4E-05	3.1E-05
>C10-C16 Fraction (F2 minus Naphthalene) Aromatic	E1790674	62.72	NA	NA	4.0E-02	CRCCARE	1	2.6E-07	2.2E-04	9.7E+00	1.9E-05	1.6E-02	NA	NA	5.5E-03	3.9E-01
>C10-C16 Fraction (F2 minus Naphthalene) Aliphatic	E1790668	250.87	NA	NA	1.0E-01	CRCCARE	1	1.0E-06	8.8E-04	NA	NA	NA	NA	NA	8.8E-03	NA
>C16-C34 Fraction (F3) Aromatic	E1790676	6.88	NA	NA	3.0E-02	CRCCARE	1	2.9E-08	2.4E-05	NA	NA	NA	NA	NA	8.1E-04	NA
>C16-C34 Fraction (F3) Aliphatic	E1790670	27.52	NA	NA	2.0E+00	CRCCARE	1	1.1E-07	9.7E-05	NA	NA	NA	NA	NA	4.8E-05	NA
													Total Risk	**9E-10**	**Total HI**	**4E-01**

Notes:

1/ EPC is average concentration in flowback samples. For petroleum hydrocarbon fractions, concentrations were assumed to be 80-percent aliphatic and 20 percent aromatic fractions.

2/ Sources of toxicity values:

CRCCARE - Friebel, E & Nadebaum, P 2011, Health screening levels for petroleum hydrocarbons n soil and groundwater. Part 1: Technical development document, CRC CARE Technical Report no. 10, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.

ADWG - NHMRC, NRMMC. (2011). Australian Drinking Water Guidelines Paper 6 National Water Quality Management Strategy. National Health and Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra. Updated June 2025

USEPA. 2024. Regional Screening Levels. November. Toxicity sources. Available online at:https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables

Including I (IRIS), P (PPRTV), X (PPRTV Appendix), C (California EPA) toxicological profiles and databases.

WHO. 2022. Guidelines for drinking-water quality. Fourth edition incorporating the first and second addenda

Toxicity data for chromium VI used to calculate potential cancer risk and noncancer hazard for total chromium.

3/ Consistent with enHealth guidance a default value of 1 used for the ABS values.

$$Oral\ Intake = \frac{EPC\ x\ IR\ x\ EF\ x\ ED\ x\ CFwater}{BW\ \times AT}$$

$$Dermal\ Intake = \frac{DAevent\ x\ EV\ x\ EF\ x\ ED\ x\ SAexp\ x\ Kp\ x\ ET\ x\ CFwater}{BW\ \times AT}$$

Exposure assumptions presented for oral and dermal intake equations on Table C-3.

ADWG = Australian Drinking Water Guidelines
CAS = Chemical Abstracts Service
CADD = chronic average daily dose
CRCCARE - Cooprerative Reserch Centre for Contamination Assessment and Remediation of the Environment
CSFo = oral cancer slope factor
CW = concentration in water
EPC = exposure point concentration
HI = hazard index
LADD = lifetime average daily dose
mg/l = milligrams per litre
mg/kg/day = milligrams per kilograms per day
NA = not applicable
RfDo = oral reference dose
ug/cm2-event = microgram per square centimetre per event

Table C-5
Risk Estimates for Worker During Mechanical Evaporation
Shenandoah S2-1H Flowback Water Assessment
Tamboran

Exposure to Flowback Water										
Constituent Name	CAS No.	EPC[1] Flowback Water	Toxicity[2]				Inhalation Intake[3]		Excess Cancer Lifetime Risk	Hazard Quotient
		CW (mg/L)	IUR 1/(ug/m3)		RfCi (mg/m3)		LADDinh	CADDinh	Inhalation	Inhahlation
Arsenic	7440-38-2	0.05	4.3E-03	I	1.0E-03	NEPM	2.2E-05	1.6E-06	9.6E-08	1.6E-03
Barium	7440-39-3	32.29	NA	NA	5.0E-04	H	1.6E-02	1.1E-03	NA	2.2E+00
Boron	7440-42-8	18.46	NA	NA	7.0E-01	NEPM	9.0E-03	6.3E-04	NA	9.0E-04
Chromium	18540-29-9	0.17	1.1E-02	I	1.0E-04	NEPM	8.1E-05	5.7E-06	8.9E-07	5.7E-02
Manganese	7439-96-5	6.00	NA	NA	1.5E-04	I	2.9E-03	2.1E-04	NA	1.4E+00
Molybdenum	7439-98-7	0.07	NA	NA	2.0E-03	A	3.3E-05	2.3E-06	NA	1.2E-03
Nickel	7440-02-0	0.01	2.6E-04	C	2.0E-05	NEPM	5.5E-06	3.8E-07	1.4E-09	1.9E-02
Selenium	7782-49-2	0.00	NA	NA	2.1E-02	NEPM	1.6E-06	1.1E-07	NA	5.3E-06
Strontium	7440-24-6	77.99	NA	NA	NA	NA	3.8E-02	2.7E-03	NA	NA
Toluene	108-88-3	15.50	NA	NA	5.0E+00	I	7.6E-03	5.3E-04	NA	1.1E-04
Formaldehyde	50-00-0	1.44	7.4E-06	I	7.0E-03	I	7.0E-04	4.9E-05	5.2E-09	7.0E-03
>C10-C16 Fraction (F2 minus Naphthalene) Aromatic	E1790674	62.72	NA	NA	2.0E-01	CRCCARE	3.1E-02	2.1E-03	NA	1.1E-02
>C10-C16 Fraction (F2 minus Naphthalene) Aliphatic	E1790668	250.87	NA	NA	1.0E+00	CRCCARE	1.2E-01	8.6E-03	NA	8.6E-03
>C16-C34 Fraction (F3) Aromatic	E1790676	6.88	NA	NA	2.0E-01	CRCCARE	3.4E-03	2.4E-04	NA	1.2E-03
>C16-C34 Fraction (F3) Aliphatic	E1790670	27.52	NA	NA	1.0E+00	CRCCARE	1.3E-02	9.4E-04	NA	9.4E-04
								Total Risk/HI	**1E-06**	**4E+00**

Notes:

CADD = chronic average daily dose
CAS = Chemical Abstracts Service
CW = concentration in water
EPC = exposure point concentration
HI = hazard index
IUR = inhalation unit risk
LADD = lifetime average daily dose
mg/L = milligrams per litre
mg/m3 = milligram per cubic metre
NA = not applicable
RfCi = inhalation reference concentration

$$Inhalation\ Intake = \frac{EPC\ x\ \ x\ EF\ x\ ED\ x\ ET\ x\ EMF \times AAF}{AT \times 24}$$

1/ EPC is average concentration in flowback samples. For petroleym hydrocarbon fractions, concentrations were assumed to be 80-percent aliphatic and 20 percent aromatic fractions.

2/ Sources of toxicity values:

CRCCARE - Friebel, E & Nadebaum, P 2011, Health screening levels for petroleum hydrocarbons n soil and groundwater. Part 1: Technical development document, CRC CARE Technical Report no. 10, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.

NEPM - National Environment Protection Council (NEPC). (2013). National Environment Protection (Assessment of Site Contamination) Measure

USEPA. 2024. Regional Screening Levels. November. Toxicity sources. Available online at:https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables.
Including IRIS (I), ATSDR (A), PPRTV (P), HEAST (H) and California EPA (C) toxicological profiles and databases.

WHO. 2022. Guidelines for drinking-water quality. Fourth edition incorporating the first and second addenda

Toxicity data for chromium VI used to calculate potential cancer risk and noncancer hazard.

3/ Exposure assumptions for inhalation intake presented on Table C-3.

Appendix D Avian Risk Assessment

Table D-1
Tier 1 Avian Screening Assessment
Shenandoah S2-1H Flowback Water Assessment
Tamboran

Chemical	Unit	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Detect	Maximum Detect	Average	Geometric Average	Median	Standard Deviation	Geometric Standard Deviation	95% UCL (Student's-t) *	% of Detects	% of Non-Detects	Freshwater Trigger Value by Protection Level (% Species)				Alternative SW Screening Criteria	Reference
																99%	95%	90%	80%		
Benzene	µg/L	7	1	<1	1	<1	1	0.571	0.55	0.5	0.175	1.27	0.7	14%	86%	600	950	1300	2000		
Toluene	µg/L	7	4	<2	2	38	38	9.29	3.67	2	12.5	3.97	18.5	57%	43%	110	180	230	330		
Total BTEX	µg/L	7	4	<1	2	39	39	9.21	2.73	2	13.0	5.35	18.8	57%	43%	NC	NC	NC	NC		
Total Phosphorus as P (Organic Phosphate as P)	mg/L	7	7	0.783	0.783	1.25	1.25	1.0176	1.01	1.04	0.152	1.16	1.1	100%	0%	NC	NC	NC	NC	0.01	b
Silicon as SiO2	mg/L	7	7	171	171	211	211	195	195	197	13.5	1.07	205	100%	0%	NC	NC	NC	NC		
Nitrite + Nitrate as N	mg/L	7	4	<0.002	0.009	0.019	0.019	0.0081	0.0043	0.009	0.007	3.62	0.013	57%	43%	NC	NC	NC	NC		
Alkalinity (Bicarbonate as CaCO3)	mg/L	7	7	310	310	796	796	465	439	399	168	1.39	588	100%	0%	NC	NC	NC	NC		
Alkalinity (total) as CaCO3	mg/L	7	7	310	310	796	796	465	439	399	168	1.39	588	100%	0%	NC	NC	NC	NC		
Ammonia as N	mg/L	7	7	12.3	12.3	28.6	28.6	20.24	19.21	21.6	6	1.39	24.9	100%	0%	0.24	0.72	1.2	2.3		
Anions Total	meq/L	7	7	226	226	526	526	384	366	415	115	1.38	469	100%	0%	NC	NC	NC	NC	NC	
Bromide	µg/L	7	7	109000	109000	268000	268000	176286	167990	154000	54910	1.36	216614	100%	0%	NC	NC	NC	NC	NC	
Bromine	µg/L	7	7	91500	91500	297000	297000	188500	178193	202000	59970	1.42	232545	100%	0%	NC	NC	NC	NC		
Cations Total	meq/L	7	7	193	193	643	643	418	388	452	151	1.49	529	100%	0%	NC	NC	NC	NC	NC	
Chloride	mg/L	7	7	7350	7350	18400	18400	13257	12523	14400	4208	1.42	16347	100%	0%	NC	NC	NC	NC	NC	
Fluoride	mg/L	7	7	0.9	0.9	1.2	1.2	1.0571	1.0520	1	0.105	1.10	1.13	100%	0%	1300	3100	4800	8200		
Ionic Balance	%	7	7	0.98	0.98	10	10	5.23	3.8730	5.55	3	2.43	7.55	100%	0%	NC	NC	NC	NC	NC	
Kjeldahl Nitrogen Total	mg/L	7	7	22.7	22.7	45.4	45.4	35.9	34.7	38.2	9	1.31	42.3	100%	0%	350	350	350	350		
Nitrate (as N)	mg/L	7	4	<0.002	0.006	0.019	0.019	0.0074	0.0040	0.006	0.007	3.46	0.012	57%	43%	NC	NC	NC	NC	NC	
Nitrite (as N)	mg/L	7	1	<0.002	0.005	0.005	0.005	0.0016	0.0013	0.001	0.001	1.76	0.0026	14%	86%	NC	NC	NC	NC	0.02	j
Nitrogen (Total)	mg/L	7	7	22.7	22.7	45.4	45.4	35.9	34.7	38.2	9	1.31	42.3	100%	0%	NC	NC	NC	NC	0.35	b
Reactive Phosphorus as P (Orthophosphate as P)	mg/L	7	7	0.013	0.013	0.137	0.137	0.0689	0.0567	0.066	0.037	2.01	0.096	100%	0%	NC	NC	NC	NC	NC	
Aluminium	mg/L	7	5	<0.005	0.015	0.282	0.282	0.0984	0.0331	0.075	0.101	6.35	0.172	71%	29%	NC	NC	NC	NC	NC	
Antimony	mg/L	7	3	0	0.0004	0.002	0.0021	0.0006	0.0004	0.00025	0.001	2.15	0.001	43%	57%						
Arsenic	mg/L	7	7	0.01	0.0103	0.096	0.0959	0.0457	0.0347	0.0369	0.031	2.18	0.068	100%	0%						
Barium	mg/L	7	7	10.2	10.2	55.2	55.2	32.3	27.0	28.2	18	1.87	45.2	100%	0%						
Beryllium	mg/L	7	2	<0	0.0001	<0	0.0001	0.0001	0.000061	0.00005	0.000	1.37	0.000081	29%	71%						
Boron	mg/L	7	7	13.8	13.8	21.2	21.2	18.5	18.3	18.7	2	1.14	20.0	100%	0%						
Chromium (III+VI)	mg/L	7	7	0.007	0.0066	0.715	0.715	0.1662	0.0535	0.0518	0.237	5.04	0.34	100%	0%	NC	NC	NC	NC		
Cobalt	mg/L	7	4	<0	0.0004	0.003	0.0025	0.0007	0.0004	0.0004	0.001	3.46	0.0014	57%	43%						
Copper	mg/L	7	6	<0.001	0.002	0.156	0.156	0.0281	0.0069	0.0113	0.052	5.35	0.067	86%	14%						
Iron	mg/L	7	7	9.62	9.62	33.2	33.2	22.7	21.0	22.8	8	1.51	28.6	100%	0%						
Lead	mg/L	7	4	<0	0.0006	0.053	0.0531	0.0087	0.0008	0.0006	0.018	9.33	0.022	57%	43%						
Manganese	mg/L	7	7	2.26	2.26	8.6	8.6	6.00	5.5154	6.29	2	1.56	7.6	100%	0%	NC	NC	NC	NC	2000	a
Molybdenum	mg/L	7	7	0.024	0.0236	0.171	0.171	0.0675	0.0522	0.0645	0.049	2.04	0.1	100%	0%						
Nickel	mg/L	7	6	<0.001	0.0008	0.035	0.0351	0.0096	0.0039	0.0078	0.011	4.89	0.018	86%	14%						
Potassium	mg/L	4	4	70.4	70.4	95	95	111	103	93.85	44	1.43	162.5	100%	0%						
Selenium	mg/L	7	5	0.001	0.0011	0.005	0.005	0.0026	0.0021	0.003	0.001	1.91	0.0037	71%	29%	5	11	18	34		
Silver	mg/L	7	5	<0	0.0001	0.001	0.0013	0.0005	0.0002	0.0004	0.000	3.46	0.00077	71%	29%	0.00002	0.00005	0.0001	0.0002		
Strontium	mg/L	7	7	17.4	17.4	131	131	78.0	61.4	87.2	45	2.13	111.2	100%	0%	NC	NC	NC	NC	1500	d
Thorium	µg/L	7	3	<0.1	0.2	0.9	0.9	0.2286	0.1190	0.05	0.289	2.96	0.4	43%	57%	NC	NC	NC	NC	NC	
Tin	mg/L	7	1	0	0.0003	<0.005	0.0003	0.0022	0.0018	0.0025	0.001	2.10	0.0	14%	86%	73	73	73	73		
Uranium	µg/L	7	1	<0.05	0.1	<0.1	0.1	0.0536	0.0500	0.05	0.021	1.45	0.1	14%	86%	0.5	0.5	0.5	0.5		h
Vanadium	mg/L	7	5	<0.001	0.0007	0.01	0.0097	0.0025	0.0012	0.0018	0.003	3.47	0.0	71%	29%	NC	NC	NC	NC	0.006	h
Zinc	mg/L	7	7	0.022	0.022	0.37	0.37	0.1047	0.064	0.044	0.116	2.60	0.2	100%	0%	0.0024	0.008	0.015	0.031		
Formaldehyde	mg/L	7	5	0.1	0.1	2.7	2.7	1.1714	0.609	0.5	1	3.70	1.9	71%	29%	NC	NC	NC	NC	1610	c
Dissolved Organic Carbon	mg/L	7	7	168	168	352	352	221	214	203	61	1.28	266	100%	0%	NC	NC	NC	NC		
Total Organic Carbon	mg/L	7	7	174	174	331	331	228	222	204	55	1.25	268	100%	0%	NC	NC	NC	NC		
Gross Beta Activity -K40	µg/L	6	2	<1.8	2.46	2.81	2.81	1.6208	1.47	1.2825	1	1.55	2.2	33%	67%	NC	NC	NC	NC	0.5	d
Gross alpha activity	Bq/L	6	1	<4.56	11.4	<16.2	11.4	5.8467	4.96	5.43	3	1.80	8.5	17%	83%	NC	NC	NC	NC	0.5	d
Gross beta activity	Bq/L	6	2	<4.4	4.43	<7.08	4.48	3.32	3.20	3.135	1	1.31	4.1	33%	67%	NC	NC	NC	NC		
Potassium-40	Bq/L	4	4	2.23	2.23	5.85	5.85	3.51	3.28	2.975	1	1.43	5.1	100%	0%	NC	NC	NC	NC		
Radium-226	Bq/L	7	7	0.28	0.28	5.18	5.18	2.69	2.08	2.4	1	2.42	3.7	100%	0%	NC	NC	NC	NC	5	d
Radium-228	Bq/L	7	6	<0.116	0.34	1.14	1.14	0.676	0.5018	0.791	0.361	2.62	0.9	86%	14%	NC	NC	NC	NC	2	d
C6-C9 Fraction	µg/L	7	7	40	40	710	710	157	87.2	60	227	2.48	324	100%	0%	NC	NC	NC	NC		
C10-C14 Fraction	µg/L	7	7	480	480	807000	807000	153053	7430	620	273988	20.9	354284	100%	0%	NC	NC	NC	NC		

Table D-1
Tier 1 Avian Screening Assessment
Shenandoah S2-1H Flowback Water Assessment
Tamboran

Chemical	Unit	Number of Results	Number of Detects	Minimum Concentration	Minimum Detect	Maximum Detect	Maximum Detect	Average	Geometric Average	Median	Standard Deviation	Geometric Standard Deviation	95% UCL (Student's-t) *	% of Detects	% of Non-Detects	Freshwater Trigger Value by Protection Level (% Species)				Alternative SW Screening Criteria	Reference
																99%	95%	90%	80%		
C15-C28 Fraction	µg/L	7	7	180	180	603000	603000	182923	9101	800	228929	27.8	351060	100%	0%	NC	NC	NC	NC		
C29-C36 Fraction	µg/L	7	4	<50	60	<2860	730	371	134	80	491	4.4	732	57%	43%	NC	NC	NC	NC		
C10-C36 Fraction (Sum)	µg/L	7	7	660	660	1210000	1210000	335553	17983	1490	448617	24.3	665041	100%	0%	NC	NC	NC	NC		
C6-C10 Fraction (F1)	µg/L	7	7	40	40	500	500	136	92.5	80	151	2.2	247	100%	0%	NC	NC	NC	NC		
C6-C10 (F1 minus BTEX)	µg/L	7	7	40	40	460	460	127	89.0	80	138	2.1	228	100%	0%	NC	NC	NC	NC	500	f
>C10-C16 Fraction (F2)	µg/L	7	7	340	340	1220000	1220000	313583	13093	950	435274	29.8	633272	100%	0%	NC	NC	NC	NC		
>C10-C16 Fraction (F2 minus Naphthalene)	µg/L	7	7	340	340	1220000	1220000	313583	13093	950	435274	29.8	633272	100%	0%	NC	NC	NC	NC	500	f
>C16-C34 Fraction (F3)	µg/L	7	6	<100	240	147000	147000	29491	2066	390	50193	16.8	66356	86%	14%	NC	NC	NC	NC	640	f
>C34-C40 Fraction (F4)	µg/L	7	1	<100	170	<2860	170	264	96.1	50	478	3.3	615	14%	86%	NC	NC	NC	NC	NC	
>C10-C40 Fraction (Sum)	µg/L	7	7	340	340	1230000	1230000	342439	15670	1320	456887	28.4	678001	100%	0%	NC	NC	NC	NC		

Table D-1
Tier 1 Avian Screening Assessment
Shenandoah S2-1H Flowback Water Assessment
Tamboran

Notes

< less than limit of reporting
°C = degrees Celsius
µg/L = micrograms per liter
Bq/L = becquerel per litre
BTEX = benzene, toluene, ethylbenzene, xylene
CaCO3 = calcium carbonate
meq/L = milliequivalents per litre
mg/L = milligrams per litre
NC = no criteria
PAH = polycyclic aromatic hydrocarbons
SO4 2- = sulfate
TEQ = toxic equivalence quotient
USEPA = United States Environmental Protection Agency

WATER QUALIY SCREENING CRITERIA EXCEEDANCE KEY

Results underlined exceeds Freshwater Trigger Value 80%
Results in italic exceeds Freshwater Trigger Value 90%
Results shaded exceeds Freshwater Trigger Value 95%
Results in bold red exceeds Freshwater Trigger Value 99%
Bold Green exceeds alternative screening criterion

ALTERNATIVE WATER SCREENING CRITERIA NOTES

NC - No appropriate screening criterion
1 - API Publication 4709 September 2001. Frequently Asked Questions About TPH Analytical Methods for Crude Oil
a - Major ions of concern for livestock drinking water quality - https://www.waterquality.gov.au/sites/default/files/documents/anzecc-armcanz-2000-guidelines-vol1.pdf
b - Default trigger values for physical and chemical stressors for Tropical Australia for slightly disturbed ecosystems(Table 3.3.4). FW Lakes and Reservoirs. https://www.waterquality.gov.au/sites/default/files/documents/anzecc-armcanz-2000-guidelines-vol1.pdf
c - Chronic aquatic life water quality criterion from Hohreiter DW1, Rigg DK.Derivation of ambient water quality criteria for formaldehyde. Chemosphere. 2001. Chemosphere. Nov;45(4-5):471-86. https://www.ncbi.nlm.nih.gov/pubmed/11680743
d - Trigger values for radioactive contaminants for irrigation water. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. https://www.waterquality.gov.au/sites/default/files/documents/anzecc-armcanz-2000-guidelines-vol1.pdf
e - Australian and New Zealand Guidelines for Fresh and Marine Water Quality Screening Benchmarks (October 2000) from (From Oak Ridge National Laboratory - Risk Assessment Information System) https://rais.ornl.gov/tools/eco_search.php
with Contaminated Soil and Groundwater. California Regional Water Quality Control Board. INTERIM FINAL - November 2007. Table F4-b, Freshwater Criterion Region 2 Basin Plan
g - Guidelines for chemical compounds in water found to cause tainting of fish flesh and other aquatic organisms - https://www.waterquality.gov.au/sites/default/files/documents/anzecc-armcanz-2000-guidelines-vol1.pdf
h - Freshwater trigger value with unknown level of species protection.
i - Default short-term trigger value for irrigation (Table 4.2.10). https://www.waterquality.gov.au/sites/default/files/documents/anzecc-armcanz-2000-guidelines-vol1.pdf
j - USEPA Region 4 Chronic Freshwater Value (March 2018) (From Oak Ridge National Laboratory - Risk Assessment Information System) https://rais.ornl.gov/tools/eco_search.php
k - USEPA Region 6 Chronic Freshwater Value (August 2020) (From Oak Ridge National Laboratory - Risk Assessment Information System) https://rais.ornl.gov/tools/eco_search.php
l - USEPA Region 3 Freshwater BTAG (2015) (From Oak Ridge National Laboratory - Risk Assessment Information System)
m - USEPA Region 5 RCRA Surface Water (2003) (From Oak Ridge National Laboratory - Risk Assessment Information System)
n - USEPA ESBs Final Chronic Value (2003) (From Oak Ridge National Laboratory - Risk Assessment Information System)

Table D-2
Avian Receptor Summary
Shenandoah S2-1H Flowback Water - Avian Risk Assessment
Tamboran

Common Name	Scientific Name	Body Mass								Drinking WIR (L/day)[3,4]
		Sex[1]	N	Mean (kg)	Standard Deviation (kg)	Min (kg)	Max (kg)	Location	Source ID[2]	Mean
Crested Pigeon	*Ocyphaps lophotes*	**B**	**21**	**0.204**	**---**	**0.142**	**0.26**	**Australia**	**515a**	**0.020**
Willie Wagtail	*Rhipidura leucophrys picata*	**B**	**13**	**0.0201**	**---**	**0.0145**	**0.0255**	**Australia**	**518a**	**0.004**
Peaceful Dove	*Geopelia placida*	**B**	**38**	**0.0478**	**---**	**0.035**	**0.065**	**Australia**	**515a**	**0.008**
Cattle Egret	*Bubulcus ibis*	M	27	0.372	---	0.296	0.46	FL, USA	1207	0.0304
Cattle Egret	*Bubulcus ibis*	**F**	**59**	**0.36**	**---**	**0.27**	**0.512**	**FL, USA**	**1207**	**0.0298**
Brown Honeyeater	*Lichmera indistincta*	M	37	0.0118	0.0015	0.009	0.015	Australia	517	0.0030
Brown Honeyeater	*Lichmera indistincta*	**F**	**15**	**0.0106**	**0.0021**	**0.008**	**0.014**	**Australia**	**517**	**0.0028**

Notes:

[1] Sex: M, Male; F, Female; B, Both

[2] Body mass statistics compiled in Dunning (2008); Original source documents based on Source ID in Dunning (2008) include: Dunning. J. 2008. CRC Handbook of Avian Body Masses 2nd Edition. CRC Press; 2 edition Boca Raton : CRC Press, [2008].

515a. Higgins, P.J. and S.J.J.F. Davies. 1996. *Handbook of Australian, New Zealand and Antarctic birds.* Oxford University Press, Melbourne, Australia. Volume 3.

518a. Higgins, P.J. , J.M. Peter, and S.J. Cowling. 2006. *Handbook of Australian, New Zealand and Antarctic birds.* Oxford University Press, Melbourne, Australia. Volume 7.

1207. Telfair, R.C. 1994. *Cattle Egret (Bubulcus ibis) In The Birds of North America.* A. Poole and F. Gill (editors). The Birds of North America, Inc , Philadelphia, PA, and The American Ornithologists' Union, Washington, DC. Number 113.

517. Higgins, P.J., J.M. Peter, and W.K. Steele. 2001. *Handbook of Australian, New Zealand and Antarctic birds.* Oxford University Press, Melbourne, Australia. Volume 5.

[3] Drinking WIR based on the allometric relationship developed by Calder and Braun (1983). *Scaling of osmotic regulation in mammals and birds.* Am J Physiol. 1983 May;244(5): R601-6., where WIR (L/day) = 0.059 x BW $(Kg)^{0.67}$

[4] Proposed WIR shown in bold, estimated based on the arithmetic mean of female or combined body mass; WIR may be estimated based on other body mass statistics depending on the appropriate exposure scenario.

--- = no data
BW = body weight
N = number
kg = kilogram
L = litre
WIR = water ingestion rate

Table D-3
Crested Pigeon
Shenandoah S2-1H Flowback Water - Avian Risk Assessment
Tamboran

Constituent Name	CAS No.	Mammal NOAEL (mg/kg-day)	Mammal NOAEL Test Animal		Avian NOAEL [1] (mg/kg-day)	Avian NOAEL Test Animal			Avian Receptor Crested Pigeon	
			Animal	Body Weight (kg)		Animal	Body Weight (kg)		Body Weight (kg)	Derived TRV
Ammonia (ECHA - Ammonia, anhydrous)	7664-41-7	250	Rat	0.35	NA	NA	NA		0.204	2.9E+02
Silver	7440-22-4	30	Rat	0.35	NA	NA	NA		0.204	3.4E+01
Total Phosphorus as P (Organic Phosphate as P)	7723-14-0	1000	Rat	0.35	NA	NA	NA		0.204	1.1E+03
Nitrogen (Total)	7727-37-9	6.7	Rat	0.35	NA	NA	NA		0.204	7.7E+00
Vanadium	7440-62-2	0.21	Rat	0.35	11.38	Mallard Duck	1.58		0.204	1.9E+01
Zinc	7440-66-6	13	Rat	0.35	15	White Leghorn Hen	1.766		0.204	2.6E+01
>C10 - C16 Fraction minus Naphthalene (ECHA: Surrogate as hydrocarbons, C9-16, hydrotreated, dearomatized)	93763-35-0	750	Rat	0.35	NA	NA	NA		0.204	8.6E+02
>C16 - C34 Fraction F3 (ECHA: Surrogate hydrocarbons, C18-C24, iso-alkanes <2% aromatics)	EC 940-734-7	50	Rat	0.35	NA	NA	NA		0.204	5.7E+01

Notes:
[1] - If an avian NOAEL was not available, the mammal NOAEL was used to derive the TRV for the avian receptor.
a -Oak Ridge National Laboratory. 1996. Toxicological Benchmarks for Wildlife: 1996 Revision. Risk Assessment Program Health Sciences Research Division Oak Ridge, Tennessee 37831
b- USEPA Ecological Screening Levels for Cobalt. Interim Final OSWER Directive 9285.7-67 https://www.epa.gov/sites/default/files/2015-09/documents/eco-ssl_cobalt_.pdf
ADWG = Australian Drinking Water Guidelines
CAS = Chemical Abstracts Service
ECHA = European Chemical Agency
kg = kilogram
mg = milligram
NA = not applicable
ND = no data available
NOAEL = No observed adverse effect level
NOAELtest = No observed adverse effect level test animal - mg/kg/day
TRV = toxicity reference value

$$Derived\ TRV = NOAEL_{test} * \left(\frac{Body\ Weighttest}{Body\ WeightAvian}\right)^{(1/4)}$$

Exposure Route	Parameter Code	Parameter Definition	Units (a)	Parameter Value	Source (b)
Ingestion	IR	Ingestion rate	L/day	0.020	Table B-1
	$EF_{shortterm}$	Exposure frequency	day/yr	21	BPJ
	$EF_{longterm}$	Exposure frequency	day/yr	365	BPJ
	ED	Exposure duration	yr	1	BPJ
	BW	Body weight	kg	0.204	Table B-1
	AT-NC	Averaging time - noncancer	days	365	BPJ

Notes:
a/ Units:
L/day = litres per day
day/yr = days per year
yr = year
kg = kilogram
b/ Source:
BPJ = Best Professional Judgement

Table D-3
Crested Pigeon
Shenandoah S2-1H Flowback Water - Avian Risk Assessment
Tamboran

Constituent Name	CAS No.	EPC [1]	Toxicity	Short-Term Storage (21 days)		Long-Term Storage (1 year)	
				Total Intake (mg/kg/day)	Hazard Quotient	Total Intake (mg/kg/day)	Hazard Quotient
		Average CW (mg/L)	TRVs		Ingestion		Ingestion
Ammonia (ECHA - Ammonia, anhydrous)	7664-41-7	20.2429	2.86E+02	1.2E-01	4.1E-04	2.02E+00	7.1E-03
Silver	7440-22-4	0.0005	3.43E+01	2.6E-06	7.6E-08	4.56E-05	1.3E-06
Total Phosphorus as P (Organic Phosphate as P)	7723-14-0	1.018	1.14E+03	5.8E-03	5.1E-06	1.01E-01	8.9E-05
Nitrogen (Total)	7727-37-9	35.857	7.67E+00	2.1E-01	2.7E-02	3.57E+00	4.7E-01
Vanadium	7440-62-2	0.003	1.90E+01	1.5E-05	7.6E-07	2.52E-04	1.3E-05
Zinc	7440-66-6	0.105	2.57E+01	6.0E-04	2.3E-05	1.04E-02	4.1E-04
>C10 - C16 Fraction minus Naphthalene (ECHA: Surrogate as hydrocarbons, C9-16, hydrotreated, dearomatized)	93763-35-0	313.580	8.58E+02	1.8E+00	2.1E-03	3.13E+01	3.6E-02
>C16 - C34 Fraction F3 (ECHA: Surrogate hydrocarbons, C18-C24, iso-alkanes <2% aromatics)	EC 940-734-7	29.490	5.72E+01	1.7E-01	3.0E-03	2.94E+00	5.1E-02
				Cumulative:	**3E-02**	**Cumulative:**	**6E-01**

Notes:
ADWG = Australian Drinking Water Guidelines
BW = body weight
CAS = Chemical Abstracts Service
CW = concentration in water
ECHA = European Chemical Agency
ED = exposure duration
EF = exposure frequency
EPC = exposure point concentration
IR = ingestion rate
mg/kg/day = milligrams per kilograms per day
mg/L = milligrams per litre
NA = not available/applicable
TRV = toxicity reference value
1 - EPC is average concentration presented in Attachment A. If constituent was not detected, 1/2 the detection limit was used to calculate the average.

$$Total\ Intake = \frac{EPC\ \times IR\ \times EF\ \times ED}{BW\ \times ED\ x\ 365^{\ days}/_{year}}$$

$$Hazard\ Quotient = \frac{Total\ Intake\ \left(\frac{mg}{kg-day}\right)}{TRV\ \left(\frac{mg}{kg-day}\right)}$$

Table D-4
Willie Wagtail
Shenandoah S2-1H Flowback Water - Avian Risk Assessment
Tamboran

Constituent Name	CAS No.	Mammal NOAEL (mg/kg-day)	Mammal NOAEL Test Animal		Avian NOAEL[1] (mg/kg-day)	Avian NOAEL Test Animal		Avian Receptor Willie Wagtail	
			Animal	Body Weight (kg)		Animal	Body Weight (kg)	Body Weight (kg)	Derived TRV
Ammonia (ECHA - Ammonia, anhydrous)	7664-41-7	250	Rat	0.35	NA	NA	NA	0.0201	5.11E+02
Silver	7440-22-4	30	Rat	0.35	NA	NA	NA	0.0201	6.13E+01
Total Phosphorus as P (Organic Phosphate as P)	7723-14-0	1000	Rat	0.35	NA	NA	NA	0.0201	2.04E+03
Nitrogen (Total)	7727-37-9	6.7	Rat	0.35	NA	NA	NA	0.0201	1.37E+01
Vanadium	7440-62-2	0.21	Rat	0.35	11.38	Mallard Duck	1.58	0.0201	3.39E+01
Zinc	7440-66-6	13	Rat	0.35	15	White Leghorn Hen	2	0.0201	4.59E+01
>C10 - C16 Fraction minus Naphthalene (ECHA: Surrogate as hydrocarbons, C9-16, hydrotreated, dearomatized)	93763-35-0	750	Rat	0.35	NA	NA	NA	0.0201	1.53E+03
>C16 - C34 Fraction F3 (ECHA: Surrogate hydrocarbons, C18-C24, iso-alkanes <2% aromatics)	EC 940-734-7	50	Rat	0.35	NA	NA	NA	0.0201	1.02E+02

Notes:
ADWG = Australian Drinking Water Guidelines
CAS = Chemical Abstracts Service
ECHA = European Chemical Agency
kg = kilogram
mg = milligram
NA = not applicable
NOAEL = No observed adverse effect level
NOAELtest = No observed adverse effect level test animal
TRV = toxicity reference value
1/ If an avian NOAEL was not available, the mammal NOAEL was used to derive the TRV for the avian receptor.

$$Derived\ TRV = NOAEL_{test} * \left(\frac{Body\ Weighttest}{Body\ WeightAvian}\right)^{(1/4)}$$

Exposure Route	Parameter Code	Parameter Definition	Units (a)	Parameter Value	Source (b)
Ingestion	IR	Ingestion rate	L/day	0.004	Table B-1
	$EF_{shortterm}$	Exposure frequency	day/yr	21	BPJ
	$EF_{longterm}$	Exposure frequency	day/yr	365	BPJ
	ED	Exposure duration	yr	1	BPJ
	BW	Body weight	kg	0.0201	Table B-1
	AT-NC	Averaging time - noncancer	days	365	BPJ

Notes:
a/ Units:
L/day = litres per day
day/yr = days per year
yr = year
kg = kilogram
b/ Source:
BPJ = Best Professional Judgement

Table D-4
Willie Wagtail
Shenandoah S2-1H Flowback Water - Avian Risk Assessment
Tamboran

Constituent Name	CAS No.	EPC [1]	Toxicity	Short-Term Storage (21 days)		Long-Term Storage (1 year)	
				Total Intake (mg/kg/day)	Hazard Quotient	Total Intake (mg/kg/day)	Hazard Quotient
		CW (mg/L)	TRVs		Ingestion		Ingestion
Ammonia (ECHA - Ammonia, anhydrous)	7664-41-7	20.2429	5.11E+02	2.5E-01	4.9E-04	4.3E+00	8.5E-03
Silver	7440-22-4	0.0005	6.13E+01	5.6E-06	9.2E-08	9.8E-05	1.6E-06
Total Phosphorus as P (Organic Phosphate as P)	7723-14-0	1.018	2.04E+03	1.3E-02	6.1E-06	2.2E-01	1.1E-04
Nitrogen (Total)	7727-37-9	35.857	1.37E+01	4.4E-01	3.2E-02	7.7E+00	5.6E-01
Vanadium	7440-62-2	0.003	3.39E+01	3.1E-05	9.2E-07	5.4E-04	1.6E-05
Zinc	7440-66-6	0.105	4.59E+01	1.3E-03	2.8E-05	2.2E-02	4.9E-04
>C10 - C16 Fraction minus Naphthalene (ECHA: Surrogate as hydrocarbons, C9-16, hydrotreated, dearomatized)	93763-35-0	313.580	1.53E+03	3.9E+00	2.5E-03	6.7E+01	4.4E-02
>C16 - C34 Fraction F3 (ECHA: Surrogate hydrocarbons, C18-C24, iso-alkanes <2% aromatics)	EC 940-734-7	29.490	1.02E+02	3.6E-01	3.6E-03	6.3E+00	6.2E-02
				Cumulative:	**4E-02**	**Cumulative:**	**7E-01**

Notes:
ADWG = Australian Drinking Water Guidelines
BW = body weight
CAS = Chemical Abstracts Service
CW = concentration in water
ECHA = European Chemical Agency
ED = exposure duration
EF = exposure frequency
EPC = exposure point concentration
IR = ingestion rate
mg/kg/day = milligrams per kilograms per day
mg/L = milligrams per litre
TRV = toxicity reference value
1 - EPC is average concentration presented in Attachment A. If constituent was not detected, 1/2 the detection limit was used to calculate the average.

$$Total\ Intake = \frac{EPC\ \times IR\ \times EF\ \times ED}{BW\ \times ED\ x\ 365\ ^{days}/_{year}}$$

$$Hazard\ Quotient = \frac{Total\ Intake\ \left(\frac{mg}{kg-day}\right)}{TRV\ \left(\frac{mg}{kg-day}\right)}$$

Table D-5
Peaceful Dove
Shenandoah S2-1H Flowback Water - Avian Risk Assessment
Tamboran

Constituent Name	CAS No.	Mammal NOAEL (mg/kg-day)	Mammal NOAEL Test Animal		Avian NOAEL [1] (mg/kg-day)	Avian NOAEL Test Animal		Avian Receptor Peaceful Dove	
			Animal	Body Weight (kg)		Animal	Body Weight (kg)	Body Weight (kg)	Derived TRV
Ammonia (ECHA - Ammonia, anhydrous)	7664-41-7	250	Rat	0.35	NA	NA	NA	0.0478	4.11E+02
Silver	7440-22-4	30	Rat	0.35	NA	NA	NA	0.0478	4.93E+01
Total Phosphorus as P (Organic Phosphate as P)	7723-14-0	1000	Rat	0.35	NA	NA	NA	0.0478	1.64E+03
Nitrogen (Total)	7727-37-9	6.7	Rat	0.35	NA	NA	NA	0.0478	1.10E+01
Vanadium	7440-62-2	0.21	Rat	0.35	11.38	Mallard Duck	1.58	0.0478	2.73E+01
Zinc	7440-66-6	13	Rat	0.35	15	White Leghorn Hen	2	0.0478	3.70E+01
>C10 - C16 Fraction minus Naphthalene (ECHA: Surrogate as hydrocarbons, C9-16, hydrotreated, dearomatized)	93763-35-0	750	Rat	0.35	NA	NA	NA	0.0478	1.23E+03
>C16 - C34 Fraction F3 (ECHA: Surrogate hydrocarbons, C18-C24, iso-alkanes <2% aromatics)	EC 940-734-7	50	Rat	0.35	NA	NA	NA	0.0478	8.22E+01

Notes:
ADWG = Australian Drinking Water Guidelines
CAS = Chemical Abstracts Service
ECHA = European Chemical Agency
kg = kilogram
mg = milligram
NA = not applicable
NOAEL = No observed adverse effect level
NOAELt = No observed adverse effect level test animal
TRV = toxicity reference value
1/ If an avian NOAEL was not available, the mammal NOAEL was used to derive the TRV for the avian receptor.

$$Derived\ TRV = NOAEL_{test} * \left(\frac{Body\ Weighttest}{Body\ WeightAvian}\right)^{(1/4)}$$

Exposure Route	Parameter Code	Parameter Definition	Units (a)	Parameter Value	Source (b)
Ingestion	IR	Ingestion rate	L/day	0.008	Table B-1
	$EF_{shortterm}$	Exposure frequency	day/yr	21	BPJ
	$EF_{longterm}$	Exposure frequency	day/yr	365	BPJ
	ED	Exposure duration	yr	1	BPJ
	BW	Body weight	kg	0.0478	Table B-1
	AT-NC	Averaging time - noncancer	days	365	BPJ

Notes:
a/ Units:
L/day = litres per day
day/yr = days per year
yr = year
kg = kilogram
b/ Source:
BPJ = Best Professional Judgement

Table D-5
Peaceful Dove
Shenandoah S2-1H Flowback Water - Avian Risk Assessment
Tamboran

Constituent Name	CAS No.	EPC [1]	Toxicity	Short-Term Storage (21 days)		Long-Term Storage (1 year)	
				Total Intake (mg/kg/day)	Hazard Quotient	Total Intake (mg/kg/day)	Hazard Quotient
		CW (mg/L)	TRVs		Ingestion		Ingestion
Ammonia (ECHA - Ammonia, anhydrous)	7664-41-7	20.2429	4.11E+02	1.9E-01	4.6E-04	3.3E+00	7.9E-03
Silver	7440-22-4	0.0005	4.93E+01	4.2E-06	8.6E-08	7.4E-05	1.5E-06
Total Phosphorus as P (Organic Phosphate as P)	7723-14-0	1.018	1.64E+03	9.4E-03	5.7E-06	1.6E-01	1.0E-04
Nitrogen (Total)	7727-37-9	35.857	1.10E+01	3.3E-01	3.0E-02	5.8E+00	5.2E-01
Vanadium	7440-62-2	0.003	2.73E+01	2.3E-05	8.6E-07	4.1E-04	1.5E-05
Zinc	7440-66-6	0.105	3.70E+01	9.7E-04	2.6E-05	1.7E-02	4.6E-04
>C10 - C16 Fraction minus Naphthalene (ECHA: Surrogate as hydrocarbons, C9-16, hydrotreated, dearomatized)	93763-35-0	313.580	1.23E+03	2.9E+00	2.4E-03	5.0E+01	4.1E-02
>C16 - C34 Fraction F3 (ECHA: Surrogate hydrocarbons, C18-C24, iso-alkanes <2% aromatics)	EC 940-734-7	29.490	8.22E+01	2.7E-01	3.3E-03	4.7E+00	5.8E-02
				Cumulative:	**4E-02**	**Cumulative:**	**6E-01**

Notes:
ADWG = Australian Drinking Water Guidelines
BW = body weight
CAS = Chemical Abstracts Service
CW = concentration in water
ECHA = European Chemical Agency
ED = exposure duration
EF = exposure frequency
EPC = exposure point concentration
IR = ingestion rate
mg/kg/day = milligrams per kilograms per day
mg/L = milligrams per litre
NA = not available/applicable
TRV = toxicity reference value
1 - EPC is average concentration presented in Attachment A. If constituent was not detected, 1/2 the detection limit was used to calculate the average.

$$Total\ Intake = \frac{EPC\ \times IR\ \times EF\ \times ED}{BW\ \times ED\ x\ 365\ ^{days}/_{year}}$$

$$Hazard\ Quotient = \frac{Total\ Intake\ \left(\frac{mg}{kg-day}\right)}{TRV\ \left(\frac{mg}{kg-day}\right)}$$

Table D-6
Cattle Egret
Shenandoah S2-1H Flowback Water - Avian Risk Assessment
Tamboran

Constituent Name	CAS No.	Mammal NOAEL (mg/kg-day)	Mammal NOAEL Test Animal		Avian NOAEL [1] (mg/kg-day)	Avian NOAEL Test Animal		Avian Receptor Cattle Egret	
			Animal	Body Weight (kg)		Animal	Body Weight (kg)	Body Weight (kg)	Derived TRV
Ammonia (ECHA - Ammonia, anhydrous)	7664-41-7	250	Rat	0.35	NA	NA	NA	0.36	2.48E+02
Silver	7440-22-4	30	Rat	0.35	NA	NA	NA	0.36	2.98E+01
Total Phosphorus as P (Organic Phosphate as P)	7723-14-0	1000	Rat	0.35	NA	NA	NA	0.36	9.93E+02
Nitrogen (Total)	7727-37-9	6.7	Rat	0.35	NA	NA	NA	0.36	6.65E+00
Vanadium	7440-62-2	0.21	Rat	0.35	11.38	Mallard Duck	1.58	0.36	1.65E+01
Zinc	7440-66-6	13	Rat	0.35	15	White Leghorn Her	1.766	0.36	2.23E+01
>C10 - C16 Fraction minus Naphthalene (ECHA: Surrogate as hydrocarbons, C9-16, hydrotreated, dearomatized)	93763-35-0	750	Rat	0.35	NA	NA	NA	0.36	7.45E+02
>C16 - C34 Fraction F3 (ECHA: Surrogate hydrocarbons, C18-C24, iso-alkanes <2% aromatics)	EC 940-734-7	50	Rat	0.35	NA	NA	NA	0.36	4.96E+01

Notes:
ADWG = Australian Drinking Water Guidelines
CAS = Chemical Abstracts Service
ECHA = European Chemical Agency
kg = kilogram
mg = milligram
NA = not applicable
NOAEL = No observed adverse effect level
NOAELtest = No observed adverse effect level test animal
TRV = toxicity reference value
1/ If an avian NOAEL was not available, the mammal NOAEL was used to derive the TRV for the avian receptor.

$$Derived\ TRV = NOAEL_{test} * \left(\frac{Body\ Weighttest}{Body\ WeightAvian}\right)^{(1/4)}$$

Exposure Route	Parameter Code	Parameter Definition	Units (a)	Parameter Value	Source (b)
Ingestion	IR	Ingestion rate	L/day	0.0298	Table B-1
	$EF_{shortterm}$	Exposure frequency	day/yr	21	BPJ
	$EF_{longterm}$	Exposure frequency	day/yr	365	BPJ
	ED	Exposure duration	yr	1	BPJ
	BW	Body weight	kg	0.36	Table B-1
	AT-NC	Averaging time - noncancer	days	365	BPJ

Notes:
a/ Units:
L/day = litres per day
day/yr = days per year
yr = year
kg = kilogram
b/ Source:
BPJ = Best Professional Judgement

Table D-6
Cattle Egret
Shenandoah S2-1H Flowback Water - Avian Risk Assessment
Tamboran

Constituent Name	CAS No.	EPC[1]	Toxicity	Short-Term Storage (21 days)		Long-Term Storage (1 year)	
				Total Intake (mg/kg/day)	Hazard Quotient	Total Intake (mg/kg/day)	Hazard Quotient
		CW (mg/L)	TRVs		Ingestion		Ingestion
Ammonia (ECHA - Ammonia, anhydrous)	7664-41-7	20.2429	2.48E+02	9.6E-02	3.9E-04	1.7E+00	6.7E-03
Silver	7440-22-4	0.0005	2.98E+01	2.2E-06	7.3E-08	3.8E-05	1.3E-06
Total Phosphorus as P (Organic Phosphate as P)	7723-14-0	1.018	9.93E+02	4.8E-03	4.9E-06	8.4E-02	8.5E-05
Nitrogen (Total)	7727-37-9	35.857	6.65E+00	1.7E-01	2.6E-02	3.0E+00	4.5E-01
Vanadium	7440-62-2	0.003	1.65E+01	1.2E-05	7.3E-07	2.1E-04	1.3E-05
Zinc	7440-66-6	0.105	2.23E+01	5.0E-04	2.2E-05	8.7E-03	3.9E-04
>C10 - C16 Fraction minus Naphthalene (ECHA: Surrogate as hydrocarbons, C9-16, hydrotreated, dearomatized)	93763-35-0	313.580	7.45E+02	1.5E+00	2.0E-03	2.6E+01	3.5E-02
>C16 - C34 Fraction F3 (ECHA: Surrogate hydrocarbons, C18-C24, iso-alkanes <2% aromatics)	EC 940-734-7	29.490	4.96E+01	1.4E-01	2.8E-03	2.4E+00	4.9E-02
				Cumulative:	**3E-02**	**Cumulative:**	**5E-01**

Notes:
ADWG = Australian Drinking Water Guidelines
BW = body weight
CAS = Chemical Abstracts Service
CW = concentration in water
ECHA = European Chemical Agency
ED = exposure duration
EF = exposure frequency
EPC = exposure point concentration
IR = ingestion rate
mg/kg/day = milligrams per kilograms per day
mg/L = milligrams per litre
NA = not available/applicable
TRV = toxicity reference value
1 - EPC is average concentration presented in Attachment A. If constituent was not detected, 1/2 the detection limit was used to calculate the average.

$$Total\ Intake = \frac{EPC\ \times IR\ \times EF\ \times ED}{BW\ \times ED\ x\ 365\ ^{days}/_{year}}$$

$$Hazard\ Quotient = \frac{Total\ Intake\ \left(\frac{mg}{kg-day}\right)}{TRV\ \left(\frac{mg}{kg-day}\right)}$$

Table D-7
Brown Honeyeater
Shenandoah S2-1H Flowback Water - Avian Risk Assessment
Tamboran

Constituent Name	CAS No.	Mammal NOAEL (mg/kg-day)	Mammal NOAEL Test Animal		Avian NOAEL [1] (mg/kg-day)	Avian NOAEL Test Animal		Avian Receptor Brown Honeyeater	
			Animal	Body Weight (kg)		Animal	Body Weight (kg)	Body Weight (kg)	Derived TRV
Ammonia (ECHA - Ammonia, anhydrous)	7664-41-7	250	Rat	0.35	NA	NA	NA	0.0106	6.0E+02
Silver	7440-22-4	30	Rat	0.35	NA	NA	NA	0.0106	7.2E+01
Total Phosphorus as P (Organic Phosphate as P)	7723-14-0	1000	Rat	0.35	NA	NA	NA	0.0106	2.4E+03
Nitrogen (Total)	7727-37-9	6.7	Rat	0.35	NA	NA	NA	0.0106	1.6E+01
Vanadium	7440-62-2	0.21	Rat	0.35	11.38	Mallard Duck	1.58	0.0106	4.0E+01
Zinc	7440-66-6	13	Rat	0.35	15	White Leghorn Hen	1.766	0.0106	5.4E+01
>C10 - C16 Fraction minus Naphthalene (ECHA: Su	93763-35-0	750	Rat	0.35	NA	NA	NA	0.0106	1.8E+03
>C16 - C34 Fraction F3 (ECHA: Surrogate hydrocar	EC 940-734-7	50	Rat	0.35	NA	NA	NA	0.0106	1.2E+02

Notes:
ADWG = Australian Drinking Water Guidelines
CAS = Chemical Abstracts Service
ECHA = European Chemical Agency
kg = kilogram
mg = milligram
NA = not applicable
NOAEL = No observed adverse effect level
NOAELtest = No observed adverse effect level test animal
TRV = toxicity reference value
1/ If an avian NOAEL was not available, the mammal NOAEL was used to derive the TRV for the avian receptor.
2/ LOAEL for copper used.

$$Derived\ TRV = NOAEL_{test} * \left(\frac{Body\ Weighttest}{Body\ WeightAvian}\right)^{(1/4)}$$

Exposure Route	Parameter Code	Parameter Definition	Units (a)	Parameter Value	Source (b)
Ingestion	IR	Ingestion rate	L/day	0.0028	Table B-1
	$EF_{shortterm}$	Exposure frequency	day/yr	21	BPJ
	$EF_{longterm}$	Exposure frequency	day/yr	365	BPJ
	ED	Exposure duration	yr	1	BPJ
	BW	Body weight	kg	0.0106	Table B-1
	AT-NC	Averaging time - noncancer	days	365	BPJ

Notes:
a/ Units:
L/day = litres per day
day/yr = days per year
yr = year
kg = kilogram
b/ Source:
BPJ = Best Professional Judgement

Table D-7
Brown Honeyeater
Shenandoah S2-1H Flowback Water - Avian Risk Assessment
Tamboran

Constituent Name	CAS No.	EPC [1]	Toxicity	Short-Term Storage (21 days)		Long-Term Storage (1 year)	
				Total Intake (mg/kg/day)	Hazard Quotient	Total Intake (mg/kg/day)	Hazard Quotient
		CW (mg/L)	TRVs		Ingestion		Ingestion
Ammonia (ECHA - Ammonia, anhydrous)	7664-41-7	20.2429	6.0E+02	3.1E-01	5.1E-04	5.4E+00	8.9E-03
Silver	7440-22-4	0.0005	7.2E+01	7.0E-06	9.7E-08	1.2E-04	1.7E-06
Total Phosphorus as P (Organic Phosphate as P)	7723-14-0	1.018	2.4E+03	1.5E-02	6.5E-06	2.7E-01	1.1E-04
Nitrogen (Total)	7727-37-9	35.857	1.6E+01	5.5E-01	3.4E-02	9.5E+00	5.9E-01
Vanadium	7440-62-2	0.003	4.0E+01	3.8E-05	9.7E-07	6.7E-04	1.7E-05
Zinc	7440-66-6	0.105	5.4E+01	1.6E-03	3.0E-05	2.8E-02	5.1E-04
>C10 - C16 Fraction minus Naphthalene (ECHA: Su	93763-35-0	313.580	1.8E+03	4.8E+00	2.7E-03	8.3E+01	4.6E-02
>C16 - C34 Fraction F3 (ECHA: Surrogate hydrocar	EC 940-734-7	29.490	1.2E+02	4.5E-01	3.7E-03	7.8E+00	6.5E-02
				Cumulative:	**4E-02**	**Cumulative:**	**7E-01**

Notes:
ADWG = Australian Drinking Water Guidelines
BW = body weight
CAS = Chemical Abstracts Service
CW = concentration in water
ECHA = European Chemical Agency
ED = exposure duration
EF = exposure frequency
EPC = exposure point concentration
IR = ingestion rate
mg/kg/day = milligrams per kilograms per day
mg/L = milligrams per litre
NA = not available/applicable
TRV = toxicity reference value
1 - EPC is average concentration presented in Attachment A. If constituent was not detected, 1/2 the detection limit was used to calculate the average.

$$Total\ Intake = \frac{EPC\ \times IR\ \times EF\ \times ED}{BW\ \times ED\ x\ 365\ ^{days}/_{year}}$$

$$Hazard\ Quotient = \frac{Total\ Intake\ \left(\frac{mg}{kg-day}\right)}{TRV\ \left(\frac{mg}{kg-day}\right)}$$

Appendix E Terrestrial Risk Assessment

Table E-1
Summary of Terrestrial Tier 1 Screening Evaluation
Shenandoah S2-1H Flowback Water Assessment
Tamboran

Chemical	Unit	max	median	Maximum Detected Concentration in Water (mg/L or Bq/L)	Maximum Calculated Concentration in Soil (mg/kg)	Soil Screening Level (mg/kg)	Note	Maximum Concentration/ Soil Screening Level Ratio	Median Detected Concentration in Water (mg/L)	Median Calculated Concentration in Soil (mg/kg)*	Soil Screening Level (mg/kg)	Note	Median Concentration/ Soil Screening Level Ratio
>C10-C16 Fraction (F2 minus Naphthalene)	µg/L	1220000	950	1220	1.0E+02	120	1	8.40E-01	0.95	7.8E-02	120	1	6.5E-04
>C10-C16 Fraction (F2)	µg/L	1220000	950	1220	1.0E+02	120	1	8.40E-01	0.95	7.8E-02	120	1	6.5E-04
>C10-C40 Fraction (Sum)	µg/L	1230000	1320	1230	1.0E+02	NV		NA	1.32	1.1E-01	NV		NA
>C16-C34 Fraction (F3)	µg/L	147000	390	147	1.2E+01	300	2	4.00E-02	0.39	3.2E-02	300	2	1.1E-04
Alkalinity (Bicarbonate as CaCO3)	mg/L	796	399	796	6.6E+01	NV		NA	399	3.3E+01	NV		NA
Alkalinity (total) as CaCO3	mg/L	796	399	796	6.6E+01	NV		NA	399	3.3E+01	NV		NA
Aluminium	mg/L	0.282	0.075	0.282	2.3E-02	NV		NA	0.075	6.2E-03	NV		NA
Ammonia as N	mg/L	28.6	21.6	28.6	2.4E+00	NV		NA	21.6	1.8E+00	NV		NA
Antimony	mg/L	0.002	0.00025	0.002	1.6E-04	0.27	3	6.10E-04	0.00025	2.1E-05	0.27	3	7.6E-05
Arsenic	mg/L	0.096	0.0369	0.096	7.9E-03	40	4	2.00E-04	0.0369	3.0E-03	40	4	7.6E-05
Barium	mg/L	55.2	28.2	55.2	4.5E+00	820	5	5.50E-03	28.2	2.3E+00	820	5	2.8E-03
Boron	mg/L	21.2	18.7	21.2	1.7E+00	5.7	6	3.10E-01	18.7	1.5E+00	5.7	6	2.7E-01
Bromide	µg/L	268000	154000	268	2.2E+01	50	7	4.40E-01	154	1.3E+01	50	7	2.5E-01
Bromine	µg/L	297000	202000	297	2.4E+01	10	18	2.40E+00	202	1.7E+01	10	18	1.7E+00
C10-C14 Fraction	µg/L	807000	620	807	6.6E+01	NV		NA	0.62	5.1E-02	NV		NA
C10-C36 Fraction (Sum)	µg/L	1210000	1490	1210	1.0E+02	NV		NA	1.49	1.2E-01	NV		NA
C15-C28 Fraction	µg/L	603000	800	603	5.0E+01	NV		NA	0.8	6.6E-02	NV		NA
C6-C10 (F1 minus BTEX)	µg/L	460	80	0.46	3.8E-02	180	2	2.10E-04	0.08	6.6E-03	180	2	3.7E-05
C6-C10 Fraction (F1)	µg/L	500	80	0.5	4.1E-02	NV		NA	0.08	6.6E-03	NV		NA
C6-C9 Fraction	µg/L	710	60	0.71	5.8E-02	NV		NA	0.06	4.9E-03	NV		NA
Chloride	mg/L	18400	14400	18400	1.5E+03	NV		NA	14400	1.2E+03	NV		NA
Chromium (III+VI)	mg/L	0.715	0.0518	0.715	5.9E-02	100	8	5.90E-04	0.0518	4.3E-03	100	8	4.3E-05
Cobalt	mg/L	0.003	0.0004	0.003	2.5E-04	NV		NA	0.0004	3.3E-05	NV		NA
Copper	mg/L	0.156	0.0113	0.156	1.3E-02	20	9	6.40E-04	0.0113	9.3E-04	20	9	4.7E-05
Dissolved Organic Carbon	mg/L	352	203	352	2.9E+01	NV		NA	203	1.7E+01	NV		NA
Fluoride	mg/L	1.2	1	1.2	9.9E-02	120	5	8.20E-04	1	8.2E-02	120	5	6.9E-04
Formaldehyde	mg/L	2.7	0.5	2.7	2.2E-01	NV		NA	0.5	4.1E-02	NV		NA
Gross alpha activity	Bq/L	11.4	5.43	11.4	9.4E-01	NV		NA	5.43	4.5E-01	NV		NA
Gross beta activity	Bq/L	4.48	3.135	4.48	3.7E-01	NV		NA	3.135	2.6E-01	NV		NA
Gross Beta Activity -K40	Bq/L	2.81	1.2825	2.81	2.3E-01	NV		NA	1.2825	1.1E-01	NV		NA
Iron	mg/L	33.2	22.8	33.2	2.7E+00	19566	10	1.40E-04	22.8	1.9E+00	19566	10	9.6E-05
Kjeldahl Nitrogen Total	mg/L	45.4	38.2	45.4	3.7E+00	NV		NA	38.2	3.1E+00	NV		NA
Lead	mg/L	0.053	0.0006	0.053	4.4E-03	470	16	9.30E-06	0.0006	4.9E-05	470	16	1.1E-07
Manganese	mg/L	8.6	6.29	8.6	7.1E-01	4300	11	1.60E-04	6.29	5.2E-01	4300	11	1.2E-04
Molybdenum	mg/L	0.171	0.0645	0.171	1.4E-02	9.9	12	1.40E-03	0.0645	5.3E-03	9.9	12	5.4E-04
Nickel	mg/L	0.035	0.0078	0.035	2.9E-03	5	13	5.80E-04	0.0078	6.4E-04	5	13	1.3E-04
Nitrate (as N)	mg/L	0.019	0.006	0.019	1.6E-03	NV		NA	0.006	4.9E-04	NV		NA
Nitrite (as N)	mg/L	0.005	0.001	0.005	4.1E-04	NV		NA	0.001	8.2E-05	NV		NA
Nitrite + Nitrate as N	mg/L	0.019	0.009	0.019	1.6E-03	NV		NA	0.009	7.4E-04	NV		NA
Nitrogen (Total)	mg/L	45.4	38.2	45.4	3.7E+00	NV		NA	38.2	3.1E+00	NV		NA
Potassium	mg/L	185	93.85	185	1.5E+01	NV		NA	93.85	7.7E+00	NV		NA
Potassium-40	Bq/L	5.85	2.975	5.85	4.8E-01	NV		NA	2.975	2.4E-01	NV		NA
Radium-226	Bq/L	5.18	2.4	5.18	4.3E-01	NV		NA	2.4	2.0E-01	NV		NA
Radium-228	Bq/L	1.14	0.791	1.14	9.4E-02	NV		NA	0.791	6.5E-02	NV		NA
Reactive Phosphorus as P (Orthophosphate as P)	mg/L	0.137	0.066	0.137	1.1E-02	NV		NA	0.066	5.4E-03	NV		NA
Selenium	mg/L	0.005	0.003	0.005	4.1E-04	0.52	18	7.90E-04	0.003	2.5E-04	0.52	18	4.7E-04
Silicon as SiO2	mg/L	211	197	211	1.7E+01	NA		NA	197	1.6E+01	NA		NA
Silver	mg/L	0.001	0.0004	0.001	8.2E-05	4.2	3,5,18	2.00E-05	0.0004	3.3E-05	4.2	3,5,18	7.8E-06
Strontium	mg/L	131	87.2	131	1.1E+01	95	5	1.10E-01	87.2	7.2E+00	95	5	7.6E-02
Thorium	µg/L	0.9	0.05	0.0009	7.4E-05	NV		NA	0.00005	4.1E-06	NV		NA
Toluene	µg/L	38	2	0.038	3.1E-03	0.15	17	2.10E-02	0.002	1.6E-04	0.15	17	1.1E-03
Total Phosphorus as P (Organic Phosphate as P)	mg/L	1.25	1.04	1.25	1.0E-01	NV		NA	1.04	8.6E-02	NV		NA
Total BTEX	µg/L	39	2	0.039	3.2E-03	NV		NA	0.002	1.6E-04	NV		NA

Table E-1
Summary of Terrestrial Tier 1 Screening Evaluation
Shenandoah S2-1H Flowback Water Assessment
Tamboran

Chemical	Unit	max	median	Maximum Detected Concentration in Water (mg/L or Bq/L)	Maximum Calculated Concentration in Soil (mg/kg)	Soil Screening Level (mg/kg)	Note	Maximum Concentration/ Soil Screening Level Ratio	Median Detected Concentration in Water (mg/L)	Median Calculated Concentration in Soil (mg/kg)*	Soil Screening Level (mg/kg)	Note	Median Concentration/ Soil Screening Level Ratio
Total Dissolved Solids (Lab)	mg/L	50600	33700	50600	4.2E+03	NV		NA	33700	2.8E+03	NV		NA
Total Organic Carbon	mg/L	331	204	331	2.7E+01	NV		NA	204	1.7E+01	NV		NA
Total Suspended Solids (Lab)	mg/L	238	112	238	2.0E+01	NV		NA	112	9.2E+00	NV		NA
Vanadium	mg/L	0.01	0.0018	0.01	8.2E-04	NV		NA	0.0018	1.5E-04	NV		NA
Zinc	mg/L	0.37	0.044	0.37	3.0E-02	15	15	2.00E-03	0.044	3.6E-03	15	15	2.4E-04

Notes:

µg/L = micograms per litre
Bq/L = Bequerel per litre
BTEX = Benzene, Toluene, Ethylbenzene, and Xylene
ECHA = European Chemical Agency
mg/kg = milligrams per kilogram
mg/L = milligrams per litre
NEPM = National Environment Protection Measures
NA = not applicable
NV = No readily available screening criterion
PNEC = predicted no effect concentration
TPH = total petroleum hydrocarbons
UCL = upper confidence limit
USEPA = United States Environmental Protection Agency

1 = NEPM. 2011. Guideline on Investigation Levels for Soil and Groundwater. National Environment Protection
2 = NEPM. 2011. Guideline on Investigation Levels for Soil and Groundwater. National Environment Protection
3 = USEPA 2018. Region 4 Ecological Risk Assessment Supplemental Guidance. Table 3 Region 4 Soil Screening Values
4 = NEPM 2011. Guideline on Investigation Levels for Soil and Groundwater. National Environment Protection
5 = USEPA 2018. Region 4 Ecological Risk Assessment Supplemental Guidance. Table 3 Region 4 Soil Screening Values
6 = ECHA 2020. Boron Predicted no effect concentration (PNEC) in soil for terrestrial species.
7 = ECHA 2020. NOAEL as concentration in food source for Wistar Han rat
8 = NEPM 2011. Guideline on Investigation Levels for Soil and Groundwater. National Environment Protection
9 = NEPM 2011. Guideline on Investigation Levels for Soil and Groundwater. National Environment Protection
10 = Background threshold value based on 95 percent upper confidence limit (UCL) of mean for McArther Basin surficial
11 = USEPA 2007. Ecological Soil Screening Levels for Manganese Interim Final OSWER
12 = ECHA 2020. Molybdenum predicted no effect concentration (PNEC) in soil for terrestrial species. Hazard
13 = NEPM 2011. Guideline on Investigation Levels for Soil and Groundwater. National Environment Protection
14 = NEPM 2011. Guideline on Investigation Levels for Soil and Groundwater. National Environment Protection
15 = NEPM 2011. Guideline on Investigation Levels for Soil and Groundwater. National Environment Protection
16 = NEPM 2011. Guideline on Investigation Levels for Soil and Groundwater. National Environment Protection
17 = USEPA 2018. Region 4 Ecological Risk Assessment Supplemental Guidance. Table 3 Region 4 Soil
18 = USEPA 2018. Region 4 Ecological Risk Assessment Supplemental Guidance. Table 3 Region 4 Soil
19= ECHA 2020 Propylene glycol Predicted no effect concentration (PNEC) in soil for terrestrial species.