Board of Supervisors
Santa Cruz County

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April 15, 2026

Kerwin S. Dewberry
Forest Supervisor
Coronado National Forest
300 W. Congress Street
Tucson, Arizona 85701

RE: Follow-Up Comments and Recommendations on the Final Environmental Impact Statement for the South32 Hermosa Critical Minerals Project

Dear Forest Supervisor Dewberry,

Santa Cruz County submitted comments on the Draft Environmental Impact Statement (DEIS) for the South32 Hermosa Critical Minerals Project dated June 10, 2025. The comments focused on fire and emergency services, wildlife access and trail connectivity, air quality, and water resources, including Water Treatment Plant discharges, baseline groundwater quality, surface water conditions, monitoring transparency, hydrologic modeling, and downstream watershed impacts.

The Final Environmental Impact Statement (FEIS) includes several changes and additional information related to the DEIS. Santa Cruz County's focus is to ensure that monitoring, response, verification, and communication are clearly defined so that environmental conditions can be effectively managed over time and inform real-world outcomes, including community health.

Fire and Emergency Services

The FEIS partially addresses Santa Cruz County's concerns regarding fire and emergency services but provides limited clarity regarding specific mitigation measures, emergency response coordination, and operational resource commitments necessary to reduce wildfire risk and support adequate local emergency response capacity.

Therefore, Santa Cruz County recommends that the U.S. Forest Service ensure that fire and emergency response measures include clearly defined mitigation actions, coordination protocols, and resource commitments, along with established triggers for response, defined responsibilities among agencies, and mechanisms for evaluating and communicating response effectiveness over time.

Wildlife and Equestrian Crossing Structures and Associated Connectivity Features

The FEIS partially addresses Santa Cruz County's concerns regarding wildlife and equestrian access and trail connectivity (undercrossings). While the addition of dedicated wildlife and equestrian access crossings that may support equestrian use represents an improvement, the FEIS does not clearly ensure safe, continuous, and dedicated equestrian trail connectivity or fully evaluate potential impacts to the local recreation economy.

Therefore, Santa Cruz County recommends that the U.S. Forest Service ensure that wildlife and equestrian access crossings (including undercrossings) are designed and implemented to provide safe, continuous, and dedicated equestrian connectivity, and that performance is evaluated over time with appropriate adjustments to maintain functionality and minimize impacts to recreation and the local economy.

Air Quality

The FEIS acknowledges that construction and operational activities associated with the Hermosa Project will generate localized air quality impacts, including fugitive dust, vehicle emissions, and particulate matter associated with mining, material handling, and transportation corridors. These impacts may affect nearby communities including Patagonia, transportation corridors within Santa Cruz County, and the broader regional airshed, including the Nogales area.

The FEIS indicates that air quality modeling was conducted and compared against National Ambient Air Quality Standards (NAAQS), and that the selected alternative is not expected to exceed applicable standards. The FEIS also identifies that Alternative 3, which relied more heavily on continued use of Harshaw Road, resulted in modeled exceedances of PM10 and PM2.5 standards. Selection of the Proposed Action, including construction and use of the Primary Access Road, reduces reliance on Harshaw Road and reduces modeled dust impacts to nearby communities.

Santa Cruz County previously recommended deployment of a permanent air quality monitoring network near Patagonia, Nogales, and along transportation corridors, including monitoring for PM10, PM2.5, and particulate-associated metals such as manganese, zinc, and lead. These recommendations were intended to support identification of localized or episodic air quality changes that may occur during construction, haul traffic operations, and wind-driven dust events.

Air quality impacts associated with mining and transportation activities may occur intermittently and may be influenced by weather conditions, seasonal factors, and operational phases. These types of episodic conditions may not be fully captured through modeling alone or through monitoring limited to regulatory compliance thresholds.

Therefore, Santa Cruz County recommends that the U.S. Forest Service ensure that operational plans include publicly available real-time or near real-time monitoring in areas of potential community exposure and be paired with clearly defined trigger conditions, corrective actions, verification procedures, and transparent public reporting, so that localized and episodic impacts are not only detected, but also addressed, evaluated, and communicated over time. Additional detail regarding areas partially addressed requiring final resolution and these recommendations is provided in Appendix 1.

Water Resources

The FEIS modifies the discharge strategy associated with Water Treatment Plant 2 (WTP2), transitioning from concentrated discharge and Rapid Infiltration Basin scenarios toward a distributed discharge approach that includes Harshaw Creek, Goldbaum Canyon, Mowry Wash, and additional infiltration and recharge locations. This approach reduces concentration of discharge within Harshaw Creek while expanding the geographic footprint of receiving environments and potential areas of hydrologic interaction.

The FEIS incorporates additional baseline groundwater data and confirms constituents of concern including antimony, arsenic, beryllium, cadmium, fluoride, lead, nickel, selenium, thallium, and uranium. The FEIS further confirms that groundwater quality variability is influenced by natural mineralization, historic mining activities, and weathering of mineralized rock.

The FEIS provides additional information regarding Water Treatment Plant 1 (WTP1) and Alum Gulch conditions, including treatment processes and regulatory compliance requirements. Alum Gulch remains listed as impaired

for lead and additional parameters. Monitoring, reporting, and receiving environment evaluation remain generally described.

The FEIS expands groundwater plume modeling, metals mobilization analysis, and hydrologic evaluation, including additional modeling related to mine void groundwater conditions and potential plume behavior. Monitoring commitments are referenced across multiple resource areas; however, monitoring locations, monitoring frequency, trigger thresholds, and reporting mechanisms remain generally described and appear to be deferred to future permitting and operational planning.

The FEIS also expands hydrologic and flooding analysis. The distributed discharge approach and expanded watershed footprint increase the importance of monitoring receiving environments, downstream conditions, and potential groundwater interactions.

Santa Cruz County requests that the U.S. Forest Service require that monitoring includes key receiving-environment locations, including downstream surface waters, sediment interaction zones, and groundwater transition areas, to validate modeled conditions under varying hydrologic and geochemical conditions.

Santa Cruz County further recommends that monitoring at these locations be paired with clearly defined trigger thresholds and corresponding response actions. These actions may include increased sampling frequency, evaluation of contributing factors, and appropriate operational or management adjustments to address observed changes.

Cross-Cutting Observations

Across multiple water resource topics, the FEIS places substantial emphasis on treatment plant compliance, predictive modeling, and permit-based monitoring. Water quality risk may also arise from interaction with mineralized sediments, saturation of historically intermittent channels, redox and pH shifts affecting metal mobility, hyporheic exchange and infiltration, seasonal or storm-driven transport processes, and mobilization of naturally occurring or legacy mining metals.

These types of environmental responses may develop gradually or episodically and may not be fully captured by monitoring limited to treatment plant outfalls. Monitoring focused solely on facility compliance may not fully characterize downstream or long-term watershed conditions.

Monitoring, Response, and Coordination

Monitoring programs are most effective when paired with clearly defined thresholds, response actions, and verification procedures. Santa Cruz County recommends that the U.S. Forest Service ensure that monitoring programs identify key monitoring locations, establish trigger thresholds, define responsible entities for response, and include follow-up evaluation to confirm effectiveness.

Santa Cruz County requests that the U.S. Forest Service ensure that these monitoring, response, and verification elements are clearly defined and incorporated into project implementation and permitting processes, including coordination with applicable regulatory agencies and timely public notification.

Santa Cruz County further requests that these elements be clearly defined as part of the decision and permitting framework to ensure that monitoring and response systems are established in advance of project implementation.

Santa Cruz County recommends that the U.S. Forest Service require the use of transparent monitoring practices, including publicly accessible data, clear documentation of methods, and independent or third-party verification to support confidence in monitoring results.

Santa Cruz County also notes the importance of clear and coordinated communication among involved agencies and the project proponent as monitoring and implementation activities move forward. Establishing and implementing defined communication protocols, roles, and responsibilities will help ensure that information related to environmental conditions is conveyed to the public in a timely, accurate, and consistent manner. Santa Cruz County requests that coordination among the Arizona Department of Environmental Quality, the U.S. Forest Service, and South32 align communication protocols and provide clear points of contact for public inquiries and public-facing information sharing.

Santa Cruz County recommends that monitoring parameters, trigger thresholds, and compliance measures be maintained at levels that are at least as protective as current permits, protocols, standards, and practices. As regulatory frameworks, guidance, or permit conditions evolve, it is important that such changes do not result in a reduction in the level of environmental or public health protection, and that monitoring and response systems continue to provide equal or greater protective value over time.

Areas Partially Addressed Requiring Final Resolution (see Appendix 2)
Monitoring specificity, receiving environment monitoring, and reliance on predictive modeling remain partially addressed in the FEIS. Monitoring details related to location-specific monitoring, monitoring frequency, parameter-specific monitoring, trigger thresholds, adaptive management responses, and public reporting remain generally described.

Risk-Based Monitoring and Validation Framework (Conceptual) (see Appendix 3)
Santa Cruz County recommends a risk-based monitoring framework focused on early detection, validation of modeled conditions, and adaptive management. Elements of a HACCP-informed risk-based monitoring framework typically include:

1. Hazard Identification
2. Critical Control Points
3. Monitoring Parameters and Frequency
4. Early Warning Triggers
5. Corrective Actions
6. Verification and Validation
7. Documentation and Transparency

Recommended Monitoring Focus Areas

- Treatment Plant Effluent Quality
- Outfall Mixing Zones
- Sediment and Hyporheic Zone Monitoring
- Shallow Groundwater Sentinel Wells
- Downstream Trend Monitoring

Treatment Plant Effluent Quality
Covered under the Arizona Department of Environmental Quality (ADEQ) aquifer protection permits.

Outfall Mixing Zones
Monitoring upstream and downstream of discharge locations may support evaluation of immediate receiving environment response, including turbidity, metals, and channel stability.

Sediment and Hyporheic Monitoring
Monitoring of sediment porewater, redox conditions, dissolved oxygen, and sediment metals may support evaluation of mobilization potential and geochemical changes.

Groundwater Sentinel Wells
Monitoring of shallow groundwater near receiving environments may support early detection of infiltration-related changes.

Downstream Trend Monitoring
Monitoring at downstream locations may support long-term trend analysis, including metals concentrations and sediment conditions.

Transparency, Reporting, and Oversight
In addition to the monitoring and response framework, clear transparency, reporting, and oversight mechanisms are important to ensure that monitoring results are accessible, verifiable, and trusted by the public and decision-makers.

Santa Cruz County requests:

- Public-facing data dashboards in real-time (parameter defined)
- Written watershed monitoring, response, verification, and validation plan
- Clearly defined early warning triggers
- Corrective action protocols
- Independent quality assurance and quality control (QA/QC) validation
- Annual technical review
- Technical advisory coordination

Therefore, Santa Cruz County recommends that the U.S. Forest Service ensure that monitoring includes key receiving-environment locations and is supported by clearly defined trigger thresholds, corrective actions, verification procedures, and transparent reporting, to validate modeled conditions, address potential changes, and support ongoing understanding of downstream environmental and community health conditions over time. Additional detail regarding these recommendations is provided in Appendix 2.

Conclusion

Santa Cruz County recognizes the improvements included in the FEIS that address the technical foundation provided. However, opportunities remain to require monitoring specificity, field-based validation, adaptive management triggers, and transparency within receiving environments.

A complementary airshed monitoring and response framework informed by HACCP principles, focused on areas of potential community exposure, continuous and event-based monitoring, defined trigger thresholds, corrective actions to mitigate dust and particulate-associated metals, independent validation, and transparent public reporting, would close the loop between predictive modeling and real-world air quality conditions.

A complementary watershed monitoring and response framework informed by HACCP principles, focused on critical control points, early warning indicators, corrective actions, independent validation, and transparent public reporting, including public-facing data dashboards integrating compliance and watershed monitoring results, would close the loop between prediction and performance. Such an approach would strengthen long-term protection of surface water and groundwater resources while supporting adaptive management, regulatory coordination, and public confidence as the project advances.

Santa Cruz County also recognizes the importance of understanding how environmental conditions may relate to community health and quality of life. The University of Arizona Zuckerman College of Public Health Community Health Impact Assessment (HIA) provides an important opportunity to establish baseline conditions and evaluate potential outcomes over time. Santa Cruz County encourages coordination between environmental monitoring

programs and ongoing health assessment efforts to ensure that environmental data, monitoring results, and community health information are aligned and mutually informative.

Monitoring, response, verification, communication, and coordination with community health efforts create a complete system that connects environmental conditions to real-world outcomes and helps ensure transparent, adaptive, and protective project implementation. These elements are important to ensure that the technical foundation of the FEIS is effectively implemented, validated, and maintained over time, including appropriate independent verification.

Santa Cruz County's intent is to ensure that the technical foundation established in the FEIS is supported by clearly defined implementation mechanisms that define how conditions are monitored, evaluated, and managed in practice.

Santa Cruz County requests that the U.S. Forest Service ensure that a coordinated and clearly defined system for monitoring, response, verification, and communication is established and implemented as part of project approval and permitting, so that environmental conditions are not only monitored, but effectively managed over time in a manner that protects environmental resources and supports community health.

Santa Cruz County looks forward to continued coordination with the U.S. Forest Service, South32, and regulatory agencies as the project moves forward.

Sincerely,

Rudy Molera, Chairman, on behalf of the
Santa Cruz County Board of Supervisors

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Appendix 1 — Air Quality Comments

Air Quality — Santa Cruz County DEIS Comments
Santa Cruz County DEIS Comment
Santa Cruz County noted that the DEIS concludes that changes in air quality would foreseeably occur from the Hermosa Critical Minerals Project. The County stated that localized emissions during construction and operation would occur at the mine site and along transportation corridors.

Santa Cruz County further noted that these emissions could potentially impact:
- Town of Patagonia
- Transportation corridors within Santa Cruz County
- Other nearby communities within the County
- The already burdened regional airshed in Nogales

Santa Cruz County specifically identified concerns related to:
- Increased ambient PM10 emissions from dust
- Vehicle emissions from construction and haul traffic
- Airborne chemicals associated with mining activities
- Coarse particulate matter (PM10)
- Fine particulate matter (PM2.5)
- Potential airborne heavy metals associated with PM2.5

The County further noted that increases in PM10 and PM2.5, including potential heavy metal components, could result in negative health impacts to nearby communities and cumulative impacts to the regional airshed.

The DEIS conducted ambient air quality modeling and compared results to National Ambient Air Quality Standards (NAAQS). The DEIS concluded:
- PM10 and PM2.5 standards would not be exceeded for the No Action Alternative
- PM10 and PM2.5 standards would not be exceeded for Alternative 2 — Proposed Action
- If exceedances occurred, they would be localized

However, Santa Cruz County noted that:
- Alternative 3 — Modified Proposed Action exceeded NAAQS for PM10 and PM2.5
- These exceedances were associated with continued use of Harshaw Road
- The Tailings Storage Facility location contributed to modeled exceedances

Based on these findings, Santa Cruz County recommended:
- Construction and use of the Primary Access Road (PAR) to avoid dust impacts to Patagonia
- Avoidance of continued reliance on Harshaw Road where feasible

Santa Cruz County further recommended that a permanent air quality monitoring network be deployed:
- Near Patagonia
- Near Nogales
- Along impacted transportation routes

The County also recommended that monitoring include:
- PM10
- PM2.5
- Airborne heavy metals
- Manganese
- Zinc
- Lead
- Other particulate-associated metals

Santa Cruz County further requested that:
- Monitoring data be available in real time
- Public access to monitoring data be provided
- Monitoring results be used to trigger mitigation actions

Examples of potential mitigation actions identified by Santa Cruz County included:
- Dust suppression during windy events
- Dust suppression during heavy traffic
- Rerouting truck operations
- Adaptive operational changes based on monitoring results

FEIS Response

The FEIS addresses air quality impacts in:
Volume 1 — Chapter 3.5 Air Quality
- Section 3.5.1 Affected Environment
- Section 3.5.2 Environmental Consequences
- Section 3.5.2.1 Construction Impacts
- Section 3.5.2.2 Operations Impacts
- Section 3.5.3 Cumulative Effects
- Supporting Air Quality Modeling Technical Appendices

The FEIS confirms:
- Construction and operational activities would generate PM10 and PM2.5 emissions
- Fugitive dust from construction and transportation corridors would occur
- Localized air quality impacts are expected during construction and operations
- Ambient air quality modeling was conducted
- Modeled emissions were compared to NAAQS thresholds

The FEIS further confirms:
- Alternative 3 — Modified Proposed Action would result in higher emissions
- Increased emissions under Alternative 3 were associated with Harshaw Road use
- Tailings Storage Facility location contributed to higher modeled emissions

The FEIS identifies Alternative 2 — Proposed Action as the selected alternative, which includes:
- Construction and use of the Primary Access Road (PAR)
- Reduced reliance on Harshaw Road
- Reduced modeled dust impacts to Patagonia

The FEIS also identifies mitigation measures including:
- Dust suppression
- Watering of roads
- Speed limits
- Traffic management
- Construction best management practices

The FEIS further states that:
- Emissions would be regulated through ADEQ air permits
- Compliance with NAAQS would be required
- Monitoring would occur through permit requirements

However, the FEIS provides limited additional detail regarding:
- Permanent air monitoring network near Patagonia
- Permanent air monitoring near Nogales
- Monitoring along transportation corridors
- Monitoring for airborne heavy metals
- Real-time public data availability
- Operational triggers based on monitoring results
- Adaptive mitigation tied to monitoring data

While the FEIS acknowledges dust control measures and regulatory compliance, it largely defers monitoring network design and adaptive mitigation measures to permitting and operational phases.

Assessment
Status: **Partially Addressed**
The FEIS addressed:
- Air quality impacts from construction and operations
- PM10 and PM2.5 emissions
- Air dispersion modeling
- Comparison to NAAQS thresholds
- Identification of Alternative 3 exceedances
- Selection of Alternative 2 with Primary Access Road
- Dust mitigation measures
- Regulatory compliance requirements

However, the FEIS did not fully address:
- Permanent air monitoring network
- Monitoring near Patagonia
- Monitoring near Nogales
- Monitoring along transportation corridors
- Monitoring for airborne heavy metals
- Real-time public data availability
- Adaptive mitigation triggers
- Operational response protocols

These details were largely deferred to permitting and operational phases.

Planning Considerations

Santa Cruz County's air quality comments focused on transportation corridor impacts, regional cumulative effects, and potential health risks associated with particulate matter and airborne metals. While the FEIS addresses air quality impacts through modeling and regulatory compliance, additional clarity regarding monitoring, mitigation, and adaptive management may improve understanding and management of potential localized impacts.

The FEIS indicates that dust suppression and operational mitigation measures would be implemented and that compliance with regulatory standards would be required. However, many implementation details related to monitoring locations, monitoring frequency, and adaptive mitigation measures appear to be deferred to permitting and operational phases.
Because air quality impacts from construction, haul traffic, and mining operations are often episodic and influenced by weather conditions, traffic patterns, and operational phases, reliance solely on modeled averages and regulatory thresholds may not fully capture localized or short-duration impacts affecting nearby communities.

Santa Cruz County's DEIS comments recommended a monitoring network capable of identifying localized changes in air quality and triggering mitigation actions. This type of approach is consistent with risk-based and adaptive management frameworks commonly applied in environmental planning and operational management.

Potential planning and coordination considerations may include:

Monitoring Network Considerations

Additional coordination during permitting and operations may help clarify monitoring locations such as:

- Patagonia and surrounding communities
- Transportation corridors, including Harshaw Road and Primary Access Road
- Downwind monitoring locations based on prevailing wind conditions
- Deployment of low-cost PM monitors tied to public-facing data dashboards in real-time
- Mine site boundary monitoring
- Regional background monitoring near Nogales

Establishing baseline conditions prior to full operations may also help distinguish between existing regional conditions and potential project-related changes.

Monitoring Parameters

Monitoring parameters that may assist in identifying localized impacts could include:

- PM10
- PM2.5
- Wind speed and direction
- Total suspended particulates
- Airborne metals associated with particulate matter, including:
- Manganese
- Zinc

• Lead
• Other particulate-associated metals

These parameters align with concerns identified in Santa Cruz County's DEIS comments and may help evaluate both dust-related and potential metal-associated particulate impacts.

Adaptive Mitigation Considerations

Because particulate emissions may occur during specific operational conditions, monitoring results could be used to support adaptive mitigation measures, such as:
• Increased dust suppression during elevated particulate events
• Additional watering of haul roads during windy conditions
• Temporary adjustment of haul truck operations during high dust events
• Traffic rerouting during elevated particulate conditions
• Enhanced dust control during construction phases
• Additional dust control measures at material handling and tailings areas

These types of adaptive responses may help reduce localized impacts and provide operational flexibility during changing conditions.

Transparency and Public Access

Santa Cruz County's DEIS comments also recommended that monitoring data be made available in real time. Public access to monitoring data may:
• Improve transparency and public confidence
• Assist in identifying localized changes in air quality
• Help distinguish project-related impacts from background conditions
• Support adaptive operational responses

Coordination with South32 and regulatory agencies during permitting and operations may help determine appropriate methods for data sharing and public access.

Cumulative Regional Considerations

Because Santa Cruz County identified potential cumulative impacts to the regional airshed, particularly in the Nogales area, coordination regarding regional monitoring and cumulative analysis may help:
• Establish baseline regional conditions
• Identify potential cumulative impacts
• Distinguish between project-related and existing regional emissions
• Support long-term air quality planning and management

Given the potential for localized and cumulative air quality impacts, continued coordination during permitting and operations may help ensure that monitoring, mitigation, and operational adjustments are implemented as needed to protect nearby communities and regional air quality conditions.

These considerations are consistent with the Santa Cruz County DEIS recommendations and may complement regulatory compliance requirements by supporting adaptive, performance-based air quality management during construction and operations.

Appendix 2 — Water Quality Comments

Comment 1 — Water Quality of Discharges from WTP2

Santa Cruz County DEIS Comment

Santa Cruz County requested clarification and evaluation regarding discharges from Water Treatment Plant 2 (WTP2) into Harshaw Creek and other downstream locations. Specifically, the County noted that discharges from WTP2 would include treated groundwater from wells and underground workings, underdrain water from potentially acid generating (PAG) stockpiles, collected runoff from non-potentially acid generating (NPAG) stockpiles, other process waters, and drainage water from historic mine workings.

The County further identified that discharge to Harshaw Creek would occur under each alternative, with a maximum projected flow of approximately 9.4 cubic feet per second (4,200 gallons per minute) under Alternative 1. Under Alternatives 2 and 3, approximately 4,500 gallons per minute would be treated, with approximately two-thirds of the flow routed to either Rapid Infiltration Basins (Alternative 2) or to Goldbaum Canyon and Mowry Wash (Alternative 3). The County also noted that Goldbaum Canyon flows into Harshaw Creek and ultimately Sonoita Creek, while Mowry Wash flows into the Santa Cruz River.

Santa Cruz County requested clarification of discharge volumes, water quality considerations, and downstream hydrologic implications.

FEIS Response

The FEIS addresses this concern in Volume 1, Chapter 3.17 (Water Resources), including Sections 3.17.2 Surface Water Resources, 3.17.3 Groundwater Resources, and 3.17.4 Environmental Consequences.

The FEIS confirms that WTP2 discharge sources include:

- Treated groundwater from mine dewatering
- Underdrain water from tailings and waste rock facilities
- Collected runoff from stockpiles
- Process water
- Historic mine drainage where applicable

The FEIS further confirms that total WTP2 discharge volumes are expected to be approximately 4,500 gallons per minute. Rather than concentrating discharge primarily within Harshaw Creek, the FEIS identifies distribution of treated water across multiple discharge locations, including:

- Harshaw Creek
- Rapid Infiltration Basins (Alternative 2)
- Goldbaum Canyon
- Mowry Wash
- Additional infiltration and recharge locations

The FEIS explains that this distributed discharge approach was developed to reduce concentrated impacts to Harshaw Creek and to minimize hydrologic and water quality impacts to any single watershed.

The FEIS also states that treated water discharged from WTP2 would be required to meet applicable regulatory standards, including Arizona Pollutant Discharge Elimination System (AZPDES) permit requirements, Aquifer Protection Permit requirements, and applicable water quality standards. Treatment processes described include solids removal, pH adjustment, metals precipitation, and selenium treatment.

Assessment
Status: Fully Addressed
The FEIS addresses Santa Cruz County's concerns by:

- Confirming discharge sources
- Confirming anticipated discharge volumes
- Modifying discharge strategy to reduce impacts to Harshaw Creek
- Identifying additional discharge and infiltration locations
- Confirming treatment and regulatory compliance requirements

The FEIS response represents a substantive modification to the project's discharge approach and addresses the County's request for clarification regarding water quality and hydrologic impacts.

Planning Considerations
While the FEIS addresses the County's concerns regarding concentrated discharge to Harshaw Creek, the distributed discharge approach introduces additional planning considerations, including:

- Expanded monitoring needs across multiple watersheds
- Potential groundwater recharge impacts in multiple locations
- Broader geographic footprint of potential water quality effects
- Increased importance of coordinated monitoring and reporting

These considerations may warrant continued coordination between Santa Cruz County, the Forest Service, and South32 during project implementation.

Comment 2 — Baseline Groundwater Quality
Santa Cruz County DEIS Comment
Santa Cruz County noted that the DEIS referenced the Groundwater Baseline Characterization Report (NewFields 2024b), which compared groundwater quality from area wells to Arizona aquifer water quality standards and U.S. Environmental Protection Agency drinking water standards. Constituents of concern identified in the DEIS included antimony, arsenic, beryllium, cadmium, fluoride, lead, nickel, selenium, thallium, and uranium. The DEIS indicated that arsenic and lead were the most common constituents reported above standards.

The DEIS also stated that groundwater quality in the area is influenced by natural geology, weathering, historic mine workings, and acid rock drainage. Santa Cruz County highlighted the importance of understanding baseline groundwater conditions and identifying potential risks to water quality.

FEIS Response
The FEIS addresses baseline groundwater quality conditions in Volume 1, Chapter 3.17 (Water Resources), specifically within:

- Section 3.17.3 Groundwater Resources
- Section 3.17.3.1 Affected Environment
- Section 3.17.3.2 Groundwater Quality

The FEIS confirms that groundwater baseline conditions were evaluated using data from monitoring wells within the analysis area, including data from the Groundwater Baseline Characterization Report and additional monitoring conducted after the DEIS.
The FEIS confirms that constituents of concern in baseline groundwater conditions include:

- Antimony
- Arsenic
- Beryllium
- Cadmium
- Fluoride
- Lead
- Nickel
- Selenium
- Thallium
- Uranium

The FEIS further confirms that arsenic and lead remain the most commonly detected constituents above drinking water standards in the analysis area.
The FEIS explains that elevated concentrations are largely attributable to:

- Naturally mineralized geology
- Historic mining activities
- Weathering of mineralized rock
- Acid rock drainage from historic workings

The FEIS also indicates that baseline groundwater quality varies spatially across the analysis area and that monitoring wells have been established to characterize both shallow alluvial aquifers and deeper bedrock aquifers.

Additional baseline monitoring data collected after publication of the DEIS were incorporated into the FEIS analysis to further refine baseline groundwater quality conditions.

Assessment
Status: Fully Addressed
The FEIS addresses Santa Cruz County's comment by:

- Confirming baseline groundwater constituents of concern
- Confirming arsenic and lead as most common exceedances
- Expanding baseline monitoring dataset
- Clarifying natural versus historic mining influences
- Identifying spatial variability in groundwater quality

The FEIS provides additional technical detail and expanded baseline characterization compared to the DEIS.

Planning Considerations
Baseline groundwater quality conditions are important for Santa Cruz County because they establish the reference point for future monitoring and impact evaluation. The FEIS indicates that groundwater quality in the area is already influenced by naturally occurring mineralization and historic mining activities, which may complicate future attribution of water quality changes.

This underscores the importance of:

- Long-term groundwater monitoring
- Transparent reporting of results
- Clear distinction between baseline conditions and project-related impacts

- Continued coordination between Santa Cruz County, the Forest Service, and South32

These considerations will be important for ongoing groundwater protection and community transparency during project implementation.

Comment 3 — Alum Gulch and WTP1 Discharge
Santa Cruz County DEIS Comment
Santa Cruz County noted that Alum Gulch is listed as impaired on Arizona's 2024 Impaired Waters List for lead, with a Total Maximum Daily Load required. The County also noted additional impairments for cadmium, copper, pH, and zinc.

The County further noted that water treatment at Water Treatment Plant 1 (WTP1) consists of pH adjustment and liquid-solid separation and that treated water may either be discharged to Alum Gulch, used for construction and dust suppression, or routed to WTP2.
Santa Cruz County requested additional clarification in the FEIS regarding:

- WTP1 treatment train and treatment capacity
- Anticipated final water quality from WTP1
- Effluent limits for WTP1 discharge
- Monitoring parameters and monitoring frequency
- Public access to monitoring results

The County specifically identified important parameters for monitoring including:

- pH
- Lead
- Cadmium
- Copper
- Zinc

The County also noted that discharge monitoring results did not appear to be publicly available and requested greater transparency.

FEIS Response
The FEIS addresses Alum Gulch and WTP1 discharges in:
Volume 1 — Chapter 3.17 Water Resources

- Section 3.17.2 Surface Water Resources
- Section 3.17.2.2 Water Quality
- Section 3.17.4 Environmental Consequences
- Supporting Appendix — Water Quality Technical Reports

The FEIS confirms:

- Alum Gulch remains listed as impaired for lead and other constituents
- Existing impairment is primarily associated with historic mining activities and natural mineralization
- WTP1 treatment includes pH adjustment and solids removal
- Treated water may be:
    - Discharged to Alum Gulch
    - Routed to WTP2

- Used for construction or dust suppression

The FEIS also states that WTP1 discharges would be regulated under applicable permits and must meet applicable water quality standards.

The FEIS further indicates that monitoring of surface water quality would continue during operations and that discharge water would be required to meet regulatory standards prior to release.

However, the FEIS provides limited additional detail regarding:

- Specific WTP1 treatment capacity
- Detailed treatment train description
- Specific effluent limits
- Monitoring frequency
- Public access to real-time monitoring data

While the FEIS references regulatory permitting and compliance requirements, it largely defers detailed effluent limits and monitoring requirements to future permitting processes.

Assessment

Status: Partially Addressed

The FEIS addressed:

- Alum Gulch impairment status
- Existing water quality conditions
- WTP1 general treatment approach
- Regulatory compliance requirements

However, the FEIS did not fully address:

- Detailed WTP1 treatment train description
- Specific effluent limits
- Monitoring frequency
- Public transparency of monitoring data
- Clear summary of discharge quality expectations

These details were largely deferred to permitting and operational phases.

Planning Considerations

Because Alum Gulch is already impaired, additional clarity on discharge quality and monitoring is particularly important. The limited detail in the FEIS suggests that:

- Final water quality protections will rely heavily on permit conditions
- Monitoring transparency may require coordination with South32 and regulatory agencies
- Santa Cruz County may wish to request continued coordination during permitting and operations

Given the impaired status of Alum Gulch, continued monitoring and transparency will be important to ensure protection of downstream water quality and to distinguish between baseline conditions and potential project-related changes.

Comment 4 — Harshaw Creek Water Quality and WTP2 Monitoring
Santa Cruz County DEIS Comment
Santa Cruz County noted that baseline surface water sampling within the Harshaw Creek watershed indicated average pH values of approximately 7.5 and relatively high total dissolved solids (TDS) concentrations of approximately 920 mg/L prior to mine dewatering beginning in August 2023. The DEIS also indicated elevated concentrations of aluminum, manganese, nickel, and zinc relative to other metals within the watershed. Upper Harshaw Creek is impaired for copper and pH, although a Total Maximum Daily Load has been completed.

Santa Cruz County further noted that Water Treatment Plant 2 (WTP2) includes two treatment circuits: one for solids removal, pH adjustment, and metal precipitation, and a second circuit to remove selenate using ion exchange and electroreduction. The DEIS indicated that discharge monitoring reports showed all effluent limits were met and that Table 3.17-7 identified effluent limits and applicable Arizona surface water quality standards.

Santa Cruz County requested:

- Updated discharge monitoring results
- Clarification regarding parameters monitored
- Monitoring frequency
- Effluent limits and actual discharge levels
- Public access to ongoing monitoring data

The County identified important monitoring parameters including:

- pH
- Copper
- Aluminum
- Manganese
- Nickel
- Zinc

Santa Cruz County also recommended that monitoring results be made readily available to the community to ensure transparency and early detection of potential impacts.

FEIS Response
The FEIS addresses Harshaw Creek water quality and WTP2 monitoring in:
Volume 1 — Chapter 3.17 Water Resources

- Section 3.17.2 Surface Water Resources
- Section 3.17.2.2 Surface Water Quality
- Section 3.17.4 Environmental Consequences
- Updated Tables and Appendix Water Quality Technical Reports

The FEIS confirms:

- Baseline Harshaw Creek water quality conditions remain consistent with DEIS findings
- Elevated TDS concentrations and naturally elevated metals occur within the watershed
- Aluminum, manganese, nickel, and zinc remain elevated relative to other constituents
- Upper Harshaw Creek remains impaired for copper and pH

The FEIS also confirms the WTP2 treatment process, including:

- Solids removal
- pH adjustment
- Metal precipitation
- Selenium removal through ion exchange and electroreduction

The FEIS provides updated monitoring data indicating that:

- Effluent limits continue to be met
- Discharge concentrations remain below regulatory standards
- Several parameters remain non-detect or below detection limits

The FEIS also confirms that monitoring will continue during project operations and that discharge must comply with regulatory permit requirements.

However, the FEIS provides limited additional detail regarding:

- Monitoring frequency
- Real-time or public availability of monitoring results
- Detailed summary of ongoing monitoring reporting mechanisms

While the FEIS references permit-required monitoring and regulatory oversight, the document largely defers detailed monitoring protocols and reporting transparency to permit implementation and operational phases.

Assessment

Status: Partially Addressed

The FEIS addressed:

- Baseline Harshaw Creek water quality conditions
- WTP2 treatment process
- Continued compliance with effluent limits
- Continued monitoring commitments

However, the FEIS did not fully address:

- Monitoring frequency
- Public access to monitoring results
- Detailed reporting mechanisms
- Clear ongoing transparency commitments

These details are deferred to permitting and operational requirements.

Planning Considerations

Because Harshaw Creek already exhibits elevated baseline metals and is partially impaired, continued monitoring and transparency are particularly important. The FEIS indicates that compliance with water quality standards is expected, but additional clarity regarding monitoring transparency may still be beneficial.

Planning considerations include:

- Long-term monitoring of Harshaw Creek
- Transparent reporting to the public
- Coordination with ADEQ and regulatory agencies
- Early detection of water quality trends

These considerations may warrant continued coordination between Santa Cruz County, the Forest Service, and South32 during project implementation.

Comment 5 — Surface Discharge Locations and Groundwater Monitoring
Santa Cruz County DEIS Comment
Santa Cruz County noted that approximately 60 monitoring wells exist within the analysis area and that groundwater levels fluctuate seasonally due to monsoon and winter precipitation patterns. The County further noted that groundwater mounding and infiltration could occur from Rapid Infiltration Basin (Alternative 2) discharges or from direct discharge to Goldbaum Canyon and Mowry Wash (Alternative 3).

Santa Cruz County recommended that carefully selected monitoring wells be used within the potential impact areas to evaluate groundwater changes resulting from infiltration and mounding. The County further recommended that monitoring results be made readily available to the community to support transparency and allow corrective actions if necessary.

FEIS Clarification — Discharge Approach
The FEIS modified the discharge approach from the DEIS. While the DEIS evaluated Rapid Infiltration Basins (Alternative 2), the FEIS moved away from the use of Rapid Infiltration Basins and instead relies on **surface discharge locations**.

The FEIS identifies three primary discharge pathways:
- Harshaw Creek
- Goldbaum Canyon (which ultimately flows to Harshaw Creek and Sonoita Creek)
- Mowry Wash (which ultimately flows to the Santa Cruz River)

Under the FEIS, treated water from WTP2 would be discharged to these surface drainage systems rather than to engineered Rapid Infiltration Basins.

Although Rapid Infiltration Basins are no longer proposed, the FEIS acknowledges that infiltration into shallow alluvial groundwater and potential groundwater mounding may still occur through natural stream channel infiltration and alluvial recharge.

FEIS Response
The FEIS addresses surface discharge infiltration and groundwater monitoring in:
Volume 1 — Chapter 3.17 Water Resources
- Section 3.17.3 Groundwater Resources
- Section 3.17.4 Environmental Consequences
- Groundwater Modeling Technical Appendix

The FEIS confirms:
- Surface discharge into Harshaw Creek, Goldbaum Canyon, and Mowry Wash

- Infiltration into alluvial groundwater systems
- Groundwater recharge and localized groundwater mounding potential
- Groundwater modeling conducted to evaluate infiltration effects
- Existing monitoring wells within the analysis area
- Continued groundwater monitoring during operations

The FEIS also states that:

- Groundwater levels and water quality will be monitored
- Monitoring will evaluate infiltration impacts
- Adaptive management may be implemented if unexpected groundwater effects occur

However, the FEIS provides limited detail regarding:

- Monitoring well locations specific to discharge areas
- Monitoring frequency
- Public access to monitoring data
- Specific monitoring parameters

These details are largely deferred to permit conditions and operational monitoring plans.

Assessment

Status: Partially Addressed

The FEIS addressed:

- Removal of Rapid Infiltration Basins
- Use of surface discharge locations
- Groundwater infiltration analysis
- Monitoring commitments
- Adaptive management framework

However, the FEIS did not fully address:

- Specific monitoring well placement near discharge points
- Monitoring frequency
- Public transparency commitments
- Detailed monitoring parameters

These elements were deferred to operational and permitting phases.

Planning Considerations

The FEIS shift from Rapid Infiltration Basins to surface discharge locations changes the risk profile but does not eliminate groundwater considerations. Surface discharge into Harshaw Creek, Goldbaum Canyon, and Mowry Wash may still result in:

- Alluvial groundwater recharge
- Localized groundwater mounding
- Metal mobilization within channel sediments
- Downstream groundwater migration

Because these discharge locations ultimately connect to regional groundwater and surface water systems, continued monitoring and transparency remain important.

Santa Cruz County may wish to continue coordination regarding:

- Monitoring well placement near discharge locations
- Monitoring frequency and reporting
- Adaptive management triggers
- Public transparency of monitoring data

These considerations will be important for protecting groundwater resources and maintaining community confidence during project implementation.

Comment 6 — Water Quality Monitoring at Surface Discharge Locations
Santa Cruz County DEIS Comment
Santa Cruz County noted that under the DEIS, approximately 1,500 gallons per minute of treated water from Water Treatment Plant 2 (WTP2) could be discharged at individual locations, including Rapid Infiltration Basins under Alternative 2 or direct surface discharge to Goldbaum Canyon and Mowry Wash under Alternative 3. The County noted that similar water quality concerns identified for Harshaw Creek would apply to these discharge locations.

Santa Cruz County recommended that effluent monitoring be conducted at each discharge location and that results be made readily available to the community to ensure transparency and allow corrective action if unexpected impacts occur.

FEIS Clarification — Surface Discharge Approach
The FEIS modified the DEIS approach by moving away from Rapid Infiltration Basins and instead relying on surface discharge at three primary locations:

- Harshaw Creek
- Goldbaum Canyon
- Mowry Wash

Under the FEIS, treated water from WTP2 would be discharged to these surface drainage systems, where infiltration, sediment interaction, and downstream transport may occur.

FEIS Monitoring Framework
The FEIS indicates that water quality monitoring will primarily occur through regulatory permit requirements associated with treatment plant discharges. These monitoring requirements are generally tied to Arizona Pollutant Discharge Elimination System (AZPDES) permits and include monitoring at treatment plant outfalls prior to discharge.

Monitoring is primarily associated with:

- WTP1 discharge to Alum Gulch
- WTP2 discharge to Harshaw Creek (treatment plant outfall)

However, the FEIS does not clearly identify separate, location-specific monitoring frameworks for the additional surface discharge locations at Goldbaum Canyon and Mowry Wash, nor for downstream reaches where infiltration and sediment interaction may occur.

What This Means — Monitoring Framework

Location	Monitoring Framework Identified in FEIS
WTP1 (Alum Gulch)	AZPDES Outfall Monitoring
WTP2 (Harshaw Creek Outfall)	AZPDES Outfall Monitoring
Goldbaum Canyon	No specific monitoring framework identified
Mowry Wash	No specific monitoring framework identified
Downstream Harshaw Creek	No dedicated monitoring framework identified
Alluvial Groundwater Near Discharge Points	No location-specific monitoring framework identified

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Potential Monitoring Gap

While treatment plant compliance ensures water quality at the point of discharge, surface discharge into natural channels may introduce additional processes not captured by treatment plant monitoring, including:

- Interaction with naturally mineralized sediments
- Metal mobilization from historic mining deposits
- Infiltration into shallow alluvial groundwater
- Channel-specific water quality changes
- Variable dilution and concentration during intermittent flow

These processes occur after treatment plant discharge and may vary by location depending on geology, sediment composition, and hydrology.

Because the FEIS does not clearly establish monitoring at each discharge location, these potential downstream effects may not be fully captured by treatment plant monitoring alone.

Assessment

Status: Partially Addressed

The FEIS addressed:

- Treatment plant monitoring requirements
- Regulatory compliance through AZPDES permits
- Surface discharge water quality expectations

However, the FEIS did not clearly address:

- Monitoring at each surface discharge location
- Downstream surface water monitoring
- Groundwater monitoring specific to discharge locations
- Public transparency of location-specific monitoring results

These elements appear to be deferred to future permitting or operational planning.

Planning Considerations

Surface discharge at multiple locations introduces variability in hydrologic and geochemical conditions that may influence water quality after discharge. Monitoring at individual discharge locations may help identify:

- Localized water quality changes
- Sediment-related metal mobilization
- Groundwater infiltration effects
- Downstream watershed impacts

Given that these discharge locations ultimately connect to Harshaw Creek, Sonoita Creek, and the Santa Cruz River watershed, additional monitoring clarity may be beneficial.

Santa Cruz County may wish to continue coordination regarding:

- Location-specific monitoring
- Monitoring frequency
- Reporting transparency
- Adaptive management triggers

These considerations would help ensure that surface discharge impacts are identified early and managed appropriately during project implementation.

Comment 7 — Infiltration of Discharged Water and Potential Metal Mobilization
Santa Cruz County DEIS Comment
Santa Cruz County noted that discharge from Water Treatment Plant 1 (WTP1) into Alum Gulch is expected to be relatively small and unlikely to create persistent surface flows, with water expected to infiltrate or evaporate within a short distance. However, discharge from Water Treatment Plant 2 (WTP2) into Harshaw Creek, estimated at approximately 9.4 cubic feet per second during peak conditions, is expected to create persistent flow for several miles, resulting in evapotranspiration and infiltration into underlying groundwater systems.

Santa Cruz County further noted that infiltration of treated discharge water through creek channels may mobilize metals present in sediments from natural mineralization or historic mining activity. The DEIS indicated that leaching tests suggested infiltration could increase concentrations of barium, selenium, uranium, and potentially antimony in groundwater, although not expected to exceed Arizona water quality standards.
Santa Cruz County recommended periodic monitoring of these constituents in surrounding wells near discharge locations, including:

- Barium
- Selenium
- Uranium
- Antimony

The County also recommended that monitoring results be made available to the community for transparency.

FEIS Response
The FEIS addresses infiltration and metal mobilization in:
Volume 1 — Chapter 3.17 Water Resources

- Section 3.17.2 Surface Water Quality
- Section 3.17.3 Groundwater Resources
- Section 3.17.4 Environmental Consequences
- Geochemistry and Groundwater Modeling Appendices

The FEIS confirms:

- Surface discharge into Harshaw Creek, Goldbaum Canyon, and Mowry Wash
- Infiltration into alluvial groundwater systems along these channels
- Potential interaction between treated discharge water and naturally mineralized sediments
- Groundwater modeling conducted to evaluate potential mobilization of metals

The FEIS further indicates that:

- Some constituents such as selenium, uranium, and antimony may increase slightly in localized groundwater
- Concentrations are not expected to exceed regulatory standards
- Impacts are expected to remain localized
- Monitoring will occur as part of regulatory compliance and operational monitoring

However, the FEIS provides limited clarity regarding:

- Monitoring locations specific to infiltration zones
- Monitoring frequency
- Specific parameter lists tied to infiltration-related mobilization
- Public availability of monitoring data

The FEIS largely relies on modeling results and general monitoring commitments rather than establishing a location-specific infiltration monitoring framework.

What This Means — Monitoring Framework

Potential Impact Area	Monitoring Framework Identified in FEIS
WTP1 Discharge (Alum Gulch)	AZPDES Outfall Monitoring
WTP2 Discharge (Treatment Plant Outfall)	AZPDES Outfall Monitoring
Harshaw Creek Infiltration Zone	No specific monitoring framework identified
Goldbaum Canyon Infiltration Zone	No specific monitoring framework identified
Mowry Wash Infiltration Zone	No specific monitoring framework identified
Alluvial Groundwater Recharge Areas	No location-specific monitoring framework identified
Metal Mobilization Monitoring Wells	Not specifically identified

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Potential Monitoring Gap

While modeling indicates that increases in certain constituents may remain below regulatory standards, infiltration into natural channel sediments may introduce additional processes not fully captured by modeling, including:

- Metal mobilization from historic mine sediments
- Variable geochemical reactions along different channels
- Alluvial groundwater recharge interactions
- Seasonal hydrologic variability
- Long-term accumulation effects

Because monitoring at infiltration zones is not clearly defined, these potential impacts may not be fully captured by treatment plant monitoring alone.

Assessment

Status: Partially Addressed
The FEIS addressed:

- Infiltration modeling
- Potential metal mobilization analysis
- Expected compliance with water quality standards
- General monitoring commitments

However, the FEIS did not clearly address:

- Monitoring specific to infiltration zones
- Monitoring frequency
- Parameter-specific monitoring for mobilized metals
- Public transparency of monitoring data

These elements appear to be deferred to operational or permitting phases.

Planning Considerations
Surface discharge infiltration represents a key pathway for potential groundwater impacts, particularly in areas with naturally mineralized geology and historic mining activity. Monitoring near infiltration zones may be important to evaluate:

- Metal mobilization trends
- Groundwater recharge chemistry
- Seasonal variability in infiltration effects
- Long-term groundwater quality changes

Because discharge locations ultimately connect to regional groundwater and downstream watersheds, continued coordination regarding monitoring and transparency may be beneficial.

Santa Cruz County may wish to continue coordination regarding:

- Monitoring well placement near infiltration zones
- Monitoring frequency
- Reporting transparency
- Adaptive management triggers

These considerations will help ensure that infiltration-related impacts are identified early and managed appropriately during project implementation.

Comment 8 — Tailings Storage Facility (TSF) Leachate Risk and Groundwater Monitoring
Santa Cruz County DEIS Comment
Santa Cruz County noted that if Tailings Storage Facilities (TSF1, TSF2, or Alternative TSF3) were to leach water into the groundwater table, either through liner failure or underdrain capture limitations, leachate concentrations could potentially exceed water quality standards. The DEIS indicated that leachate concentrations would most likely exceed water quality standards for antimony and lead, and may also exceed background levels for barium and fluoride.

Santa Cruz County recommended that groundwater monitoring be conducted in carefully selected wells surrounding the TSF locations to evaluate potential leachate impacts. The County also recommended that monitoring results be made available to the community for transparency.

The County specifically identified the following constituents for monitoring:

- Antimony
- Lead
- Barium
- Fluoride

FEIS Response

The FEIS addresses Tailings Storage Facility groundwater risk in:
Volume 1 — Chapter 3.17 Water Resources

- Section 3.17.3 Groundwater Resources
- Section 3.17.4 Environmental Consequences
- Geochemistry and Tailings Facility Technical Appendices

The FEIS confirms:

- Tailings Storage Facilities will include liner systems
- Underdrain collection systems will be installed
- Seepage capture and return systems will be implemented
- Groundwater modeling evaluated potential seepage impacts
- Some constituents, including antimony and lead, may be present in leachate under worst-case scenarios

The FEIS further indicates:

- Seepage is expected to be captured by engineered controls
- Groundwater impacts are expected to be localized
- Monitoring wells are expected to be used to detect potential seepage
- Adaptive management would be implemented if impacts are detected

However, the FEIS provides limited detail regarding:

- Specific monitoring well locations around TSF facilities
- Monitoring frequency
- Parameter-specific monitoring requirements
- Public transparency of monitoring results

The FEIS largely relies on engineering controls and general monitoring commitments rather than establishing a detailed, TSF-specific monitoring framework.

What This Means — Monitoring Framework

Potential Impact Area	Monitoring Framework Identified in FEIS
TSF Liner Performance	Engineering design controls
TSF Underdrain Collection	Engineering capture system
TSF Groundwater Monitoring Wells	General monitoring referenced

Potential Impact Area	Monitoring Framework Identified in FEIS
TSF-Specific Monitoring Locations	Not clearly identified
TSF-Specific Monitoring Frequency	Not clearly identified
Antimony Monitoring Near TSF	Not clearly specified
Lead Monitoring Near TSF	Not clearly specified
Barium Monitoring Near TSF	Not clearly specified
Fluoride Monitoring Near TSF	Not clearly specified
Public Reporting of TSF Monitoring	Not clearly specified

Potential Monitoring Gap

While engineered controls reduce the likelihood of seepage, tailings facilities represent a long-term groundwater risk due to:

- Liner degradation over time
- Extreme precipitation events
- Construction defects or settlement
- Long-term operational and closure conditions

If seepage occurs, early detection through groundwater monitoring is critical. Without clearly defined monitoring protocols, detection of low-level seepage may be delayed.

Assessment

Status: Partially Addressed

The FEIS addressed:

- TSF liner design
- Underdrain capture systems
- Groundwater modeling
- General monitoring commitments

However, the FEIS did not clearly address:

- TSF-specific monitoring well placement
- Monitoring frequency
- Parameter-specific monitoring requirements
- Public transparency commitments

These elements appear to be deferred to future permitting or operational monitoring plans.

Planning Considerations

Tailings Storage Facilities represent one of the longer-term groundwater risk components of the project. While engineering controls reduce risk, monitoring is important to detect:

- Slow seepage
- Long-term liner degradation
- Groundwater plume development
- Changes in groundwater chemistry

Santa Cruz County may wish to continue coordination regarding:

- Monitoring well placement near TSF facilities
- Monitoring frequency
- Reporting transparency
- Adaptive management triggers

These considerations will help ensure early detection and management of potential TSF-related groundwater impacts during project operations and long-term closure conditions.

Comment 9 — Mine Void Leachate and Groundwater Plume Monitoring
Santa Cruz County DEIS Comment
Santa Cruz County noted that modeling of groundwater flow into and through mine void spaces was conducted to evaluate potential groundwater quality impacts associated with waste rock, wall rock, and cement paste backfill. The DEIS indicated that modeling predicted that antimony, arsenic, and lead could occur at concentrations above water quality standards or Maximum Contaminant Levels in groundwater.

The DEIS further indicated that the antimony plume would generally be confined to deeper bedrock layers and was not expected to impact private water supply wells. However, Santa Cruz County recommended that groundwater monitoring include these constituents to ensure that plumes remain confined and do not impact private wells.

Santa Cruz County recommended monitoring for:
- Antimony
- Arsenic
- Lead

The County further recommended that monitoring results be made available to the community for transparency.

FEIS Response
The FEIS addresses mine void groundwater interactions and potential plume development in:
Volume 1 — Chapter 3.17 Water Resources
- Section 3.17.3 Groundwater Resources
- Section 3.17.4 Environmental Consequences
- Groundwater Modeling Technical Appendices
- Geochemical Modeling Analysis

The FEIS confirms:
- Groundwater flow into underground mine workings will likely occur
- Water-rock interactions within mine voids may alter groundwater chemistry
- Modeling predicts potential increases in antimony, arsenic, and lead concentrations
- Plumes are expected to remain confined to deeper bedrock aquifers
- Private wells are generally located in shallower alluvial aquifers and are not expected to be impacted

The FEIS further indicates:
- Groundwater monitoring will occur during operations

- Modeling suggests impacts are localized
- Adaptive management may occur if monitoring identifies unexpected plume migration

However, the FEIS provides limited detail regarding:

- Monitoring well placement specific to predicted plume areas
- Monitoring frequency
- Parameter-specific monitoring requirements for mine void plume constituents
- Public transparency of monitoring data

The FEIS largely relies on modeling results and general monitoring commitments rather than establishing a specific mine void plume monitoring framework.

What This Means — Monitoring Framework

Potential Impact Area	Monitoring Framework Identified in FEIS
Mine Void Groundwater Plume Modeling	Conducted and described
Predicted Antimony Plume	Modeled but monitoring framework not clearly defined
Predicted Arsenic Plume	Modeled but monitoring framework not clearly defined
Predicted Lead Plume	Modeled but monitoring framework not clearly defined
Monitoring Wells Near Mine Voids	General monitoring referenced
Plume-Specific Monitoring Wells	Not clearly identified
Monitoring Frequency	Not clearly identified
Private Well Monitoring	Not clearly specified
Public Reporting of Monitoring Results	Not clearly specified

Potential Monitoring Gap

While modeling suggests that groundwater plumes will remain confined to deeper bedrock layers, uncertainties remain related to:

- Fractured bedrock pathways
- Variable groundwater flow conditions
- Long-term mine closure conditions
- Hydraulic connectivity between bedrock and alluvial aquifers
- Seasonal groundwater variability

Because these factors may influence plume migration over time, monitoring near predicted plume areas may be important for early detection of unexpected groundwater impacts.

Assessment

Status: Partially Addressed

The FEIS addressed:

- Groundwater modeling for mine voids
- Predicted plume constituents
- Expected plume confinement
- General monitoring commitments

However, the FEIS did not clearly address:

- Monitoring well placement near predicted plume areas
- Monitoring frequency
- Parameter-specific monitoring requirements
- Public transparency of monitoring data

These elements appear to be deferred to future permitting or operational monitoring plans.

Planning Considerations

Mine void groundwater chemistry changes represent a longer-term groundwater risk, particularly during:

- Active mining operations
- Post-closure flooding of mine workings
- Long-term geochemical equilibration

Monitoring near predicted plume areas may help evaluate:

- Plume migration
- Changes in groundwater chemistry
- Hydraulic connectivity between aquifers
- Long-term groundwater quality trends

Santa Cruz County may wish to continue coordination regarding:

- Monitoring well placement near predicted plume areas
- Monitoring frequency
- Reporting transparency
- Adaptive management triggers

These considerations may help ensure that potential mine void groundwater impacts are detected early and managed appropriately during project operations and long-term closure conditions.

Comment 10 — Flooding Potential and 100-Year Flood Event Analysis

Santa Cruz County DEIS Comment

Santa Cruz County noted that the DEIS evaluated flooding potential in Harshaw Creek and Sonoita Creek using 2-year, 10-year, and 50-year storm events. The DEIS indicated that peak flows for these storm events were significantly greater than projected discharge from Water Treatment Plant 2 (WTP2), and therefore concluded that discharge would not increase flooding risk.

Santa Cruz County noted that the Federal Emergency Management Agency uses the 100-year flood event as the standard for floodplain management and insurance mapping. The County also noted that the DEIS did not evaluate the 100-year flood event or consider additional discharges from Rapid Infiltration Basins (Alternative 2) or surface discharge locations under Alternative 3.

Santa Cruz County further noted that increasing intensity of storm events and changing precipitation patterns could affect flood behavior. The County recommended that the FEIS evaluate the 100-year storm event and incorporate discharge scenarios associated with the selected alternative to better evaluate potential flooding risks.

FEIS Response
The FEIS addresses flooding and hydrologic impacts in:
Volume 1 — Chapter 3.17 Water Resources

- Section 3.17.3 Surface Hydrology
- Section 3.17.4 Environmental Consequences
- Hydrologic Modeling Technical Appendix

The FEIS confirms:

- Surface discharge from WTP2 is small relative to storm flows
- Peak storm flows in Harshaw Creek and Sonoita Creek remain significantly larger than discharge volumes
- Discharge flows are not expected to materially increase flood risk
- Surface discharge locations include Harshaw Creek, Goldbaum Canyon, and Mowry Wash

However, the FEIS provides limited clarity regarding:

- Evaluation of the 100-year flood event
- Flood modeling incorporating distributed discharge locations
- Consideration of climate variability or increased storm intensity
- Floodplain changes related to persistent discharge flows

The FEIS continues to rely primarily on comparisons between discharge volumes and storm flow magnitudes rather than presenting a detailed 100-year flood modeling analysis.

What This Means — Flood Analysis Framework

Flood Analysis Element	Addressed in FEIS
2-Year Storm Event Analysis	Addressed
10-Year Storm Event Analysis	Addressed
50-Year Storm Event Analysis	Addressed
100-Year Flood Event Analysis	Not clearly addressed
Distributed Discharge Location Flood Modeling	Not clearly addressed
Goldbaum Canyon Flood Analysis	Not clearly addressed
Mowry Wash Flood Analysis	Not clearly addressed
Climate-Driven Storm Intensity Consideration	Limited discussion
Persistent Flow Floodplain Effects	Not clearly addressed

Potential Flood Risk Considerations
While discharge volumes are small relative to large storm events, additional considerations may include:

- Persistent baseflow conditions in normally ephemeral channels
- Channel erosion from sustained flows
- Sediment transport and deposition changes
- Localized flooding near discharge points
- Floodplain behavior changes during combined storm and discharge events

Because the FEIS relies primarily on volume comparisons rather than detailed modeling, these localized effects may not be fully evaluated.

Assessment
Status: Partially Addressed
The FEIS addressed:

- Relative discharge magnitude compared to storm flows
- General flooding risk evaluation
- Surface discharge hydrology discussion

However, the FEIS did not clearly address:

- 100-year flood event modeling
- Flood modeling at individual discharge locations
- Climate variability impacts on flooding
- Combined storm and discharge scenarios

These elements appear to be only partially evaluated.

Planning Considerations
Surface discharge into ephemeral channels may create new baseflow conditions that alter hydrologic behavior over time. While discharge volumes are relatively small compared to major storm events, localized hydrologic changes may still occur.

Santa Cruz County may wish to continue coordination regarding:

- 100-year flood modeling
- Localized discharge point evaluation
- Climate resilience considerations
- Channel stability and erosion monitoring

These considerations may help ensure that potential flood and hydrologic impacts are fully understood and managed during project implementation.

Final Conclusion — Water Resources Review

Overall Summary
Santa Cruz County's review of the FEIS focused on water quality, groundwater protection, surface discharge impacts, tailings storage facility risks, mine void interactions, metals mobilization, and flood potential. The FEIS provides substantial technical analysis, strong baseline characterization, and multiple engineered mitigation measures that address many of the County's concerns.
Overall, the FEIS demonstrates:

- Strong baseline groundwater and surface water characterization
- Robust engineering controls, including water treatment and tailings containment
- Modeling of groundwater flow, infiltration, and plume behavior
- A distributed surface discharge approach to reduce concentrated impacts

These elements represent a solid technical foundation for water resource protection.
However, across multiple water-related comments, several consistent themes emerge regarding long-term monitoring, metals mobilization, and watershed-based protection.

Common Monitoring Themes Identified

Monitoring Focused Primarily at Treatment Facilities
The FEIS monitoring framework is largely focused on:

- Water Treatment Plant 1
- Water Treatment Plant 2
- Permit compliance locations

Limited location-specific monitoring is identified for:

- Harshaw Creek downstream reaches
- Goldbaum Canyon discharge location
- Mowry Wash discharge location
- Alluvial groundwater recharge areas
- Tailings facility perimeter groundwater
- Mine void plume areas

This results in a monitoring framework that is primarily facility-based rather than watershed-based.

Heavy Reliance on Modeling
The FEIS relies extensively on modeling to evaluate:

- Groundwater plume migration
- Tailings seepage risk
- Metals mobilization potential
- Infiltration and recharge
- Flood potential

While modeling is an important planning tool, long-term monitoring to validate modeled conditions is limited in specificity. Field-based monitoring is important to confirm that actual conditions align with model predictions over time.

Limited Monitoring Specificity and Transparency
Across multiple water resource topics, the FEIS references monitoring commitments but provides limited detail regarding:

- Monitoring well locations
- Monitoring frequency
- Parameter-specific monitoring
- Trigger thresholds
- Adaptive management responses
- Public availability of monitoring data

These elements are generally deferred to permitting and operational phases. Clear monitoring frameworks and transparency provisions can support early detection of potential issues and enhance long-term water resource protection.

Metals Mobilization and Watershed Interaction Considerations

A recurring theme across the water resource comments is that the FEIS places substantial emphasis on treatment plant compliance and predictive modeling, while providing less clarity regarding field-based monitoring where discharged water interacts with natural systems. This distinction is important because water quality risk is not limited to effluent chemistry at the point of discharge. Potential risks may also arise from downstream interaction with mineralized sediments, shifts in redox and pH conditions, infiltration into shallow alluvial groundwater, and seasonal or pulse-driven transport processes.

These types of environmental responses may develop gradually or episodically and may not be fully captured by monitoring limited to treatment plant outfalls. As a result, a monitoring framework focused solely on compliance at treatment facilities may not fully characterize downstream or long-term conditions.

A strengthened adaptive management and monitoring approach may include consideration of critical control points within receiving environments, where early indicators of metals mobilization, groundwater plume development, or unexpected hydrologic responses could be detected. Monitoring at these locations would complement facility-based compliance monitoring and support early detection, adaptive management, and long-term watershed protection.

Overall Assessment

The FEIS provides a strong technical foundation for water resource protection, including comprehensive baseline characterization, engineering controls, and predictive modeling. However, across multiple water resource topics, monitoring commitments are generally:

- Facility-based rather than watershed-based
- Model-reliant rather than validation-focused
- General rather than location-specific
- Limited in transparency and reporting detail

These observations do not indicate that impacts are expected, but rather highlight opportunities to strengthen long-term monitoring and validation of modeled conditions.

Conclusion

The FEIS provides a comprehensive evaluation of potential water resource impacts and incorporates important mitigation measures. Continued coordination regarding location-specific monitoring, validation of modeled conditions, and transparency of monitoring results may further strengthen long-term water resource protection.

These recommendations are intended to complement existing regulatory frameworks and support proactive, transparent, and adaptive resource management as the project advances.

Appendix 3

Risk-Based Monitoring and Adaptive Management Conceptual Framework

Purpose
This appendix outlines a conceptual risk-based monitoring and adaptive management framework informed by HACCP principles.

Risk Context
Even when treatment plant discharge meets permit requirements, sustained discharge into intermittent or mineralized systems may result in:

- Redox changes
- Sediment–water interaction
- Mobilization of naturally occurring metals
- Increased hyporheic exchange
- Groundwater infiltration
- Episodic storm-driven transport

Example Critical Control Points
CCP-1 Treatment Plant Effluent

Monitoring:
- Flow
- pH
- Conductivity
- Turbidity
- Dissolved metals

CCP-2 Outfall Mixing Zones

Monitoring:
- Upstream/downstream sampling
- Turbidity
- Metals
- Channel stability

CCP-3 Sediment and Hyporheic Monitoring

Monitoring:
- Porewater sampling
- Redox
- Dissolved oxygen
- Sediment metals

CCP-4 Groundwater Sentinel Wells

Monitoring:
- Sentinel wells
- Groundwater elevation
- Metals

CCP-5 Downstream Trend Monitoring

Monitoring:
- Downstream stations
- Metals trends
- Sediment sampling

Early Warning Triggers

- Increasing metals trends
- Redox changes
- Turbidity increases
- Groundwater trend changes

Corrective Actions

- Adjust discharge
- Stabilize sediments
- Modify outfalls
- Expand monitoring

Verification and Transparency

- Public dashboards
- Annual review
- Independent validation