

Meeting Minutes

Hermosa Advisory Panel Meeting #15

Wednesday, July 20, 12p-2p

Wild Horse Inn - 309 W McKeown Ave, Patagonia

11:15 Video presentation sponsored by Patagonia Area Resource Alliance: “Water Management Concerns Related to Hermosa Mine” with opportunity for follow up questions (optional for panelist participation)

Below are follow up questions panelists asked of PARA after their presentation:

- Marcelino Varona: Please describe/explain the 3 requested compliance testing stations you have asked for downstream of the point of discharge
- Carolyn Shafer: PARA requested these in their appeal, which we believe are important to monitor (recommended by hydrologists). Also asked for monthly monitoring, instead of once every 3 months. Does that answer your question?
- Marcelino Varona: Yes. Most important to me that we don't disrupt quality of life/drinking water of Patagonia citizens. I understand your appeal outcome then says that South32 does not have to have these points of compliance and that they will only have to test every 3 months.
- Carolyn Shafer: That is what the appeals board confirmed. ADEQ says they can do conceptual points of compliance; they have establish one conceptual point of compliance 9 miles downstream on property South32 doesn't own.
- Angie Donelson: Can you define conceptual? What does it mean for ADEQ?
- Carolyn Shafer: It means, “someday maybe we'll put it in.” They have no way of defining it.
- Marcelino Varona: What does that mean now? Do we have to do something with modeling to make sure there are points of compliance? Or does this concern evaporate since appeal says they can do conceptual points of compliance?
- Carolyn Shafer: PARA is discussing and may take to the next step of appeal. To answer your question, I don't know how we'll get [points of compliance] or what the vehicle is but it is important to get them.
- Liz Collier: From watching video, it appears Patagonia Lake could be polluted by the runoff and overflow.

- Damian Rawoot: They are connected and part of the same system.
- Liz Collier: That's one of the most popular summer lakes in the whole state.
- Carolyn Shafer: Then there's the fish. And a significant amount of that water is released to Rio Rico. There are water rights to Rio Rico from water discharged from Patagonia Lake.
- Fritz Sawyer: You have a water treatment plant geared to meet drinking water standards by permit. Generally, treatment plants will have redundancy and continuous monitoring. Water discharge is cleaner than what's already in the creek. You're going to hold South32 accountable for what's already in the creek that's already been polluted? Should only hold them accountable for what they're going to release.
- Carolyn Shafer: It's not just about treating water; it is also about the quantity of water being released. That by itself is going to have impacts. And they can't stop it since they lack a temporary water holding pond.
- Fritz Sawyer: They do have a pond.
- Carolyn Shafer: Not big enough for this volume.
- Fritz Sawyer: They have redundancy, standby generators, and whatnot. You hold them accountable for what they're releasing into the creek bed. Don't have a problem with looking at what's downstream, but I can show you where it has been polluted.
- Ben Lomeli: Water is not held to drinking standards, it's held to industry standards. Agree with you as far as redundancy. Certainly, they should have continuous monitoring at each of these points of compliance with their technology, so we know if something's wrong. Even with redundancy something could go wrong. That's the value of collecting baseline data to know what you have to start with. Not going to hold them accountable for what's already there, only for differences above and beyond that. And there is not just contamination due to historical mining, there are also natural sources of contamination.
- Marcelino Varona: What do you mean natural sources?
- Ben Lomeli: The geology itself can produce acidity just by flow through certain rocks. Has to be part of the baseline.
- Fritz Sawyer: I disagree. You hold them accountable for what's released at the point of discharge. Not downstream.
- Ben Lomeli: We have to see what is downstream before they discharge.
- Fritz Sawyer: Why hasn't someone already done that?

- Ben Lomeli: That's our question, that's what we're looking for. You can't do it if you don't have points of compliance. If you start monitoring points of compliance now, then you'll know what to hold them accountable for and what not.
- Ruth Ann LeFebvre: Does South32 not want to do 3 points of compliance?
- Carolyn Shafer: No, they don't
- Marcelino Varona: As water is released, we need to get baseline data. Want to make sure there's continuous monitoring of what's going into drinking water. Concern is, at what point do we hold South32 accountable?
- Fritz Sawyer: That comes from the point of discharge at the boundary.
- Marcelino Varona: How many miles is from the point of discharge to the town?
- Ben Lomeli: Quantity increase flushes stuff out from soils that may already be there. By not monitoring, we do not know the baseline.
- Fritz Sawyer: Don't hold them accountable for Mother Nature.
- Ben Lomeli: It's not Mother nature if there's 10 extra CFS in discharge
- Damian Rawoot: It wouldn't occur if that water wasn't being released. Look forward to have some colleagues who are working with South32 on water monitoring to share what we're thinking about a fair baseline. Setting baseline data is critical for the panel and community to discuss what South32 is responsible for.
- Marcelino Varona: End result is, if the appeal was denied, how do we get baseline data and compliance wells put in place for the term of accountability?
- Ruth Ann LeFebvre: Good Neighbor Agreement
- Damian Rawoot: Could be a discussion with South32. If it fails in the appeals process that means it won't be regulated, so it then comes to community and this panel.
- Marcelino Varona: I'm not convinced the panel has standing to administer a Good Neighbor Agreement. I think it has to come from the Town of Patagonia.
- John Fanning: You talked about what's in the water, what about the volume of water released?
- Carolyn Shafer: Roughly 6.5 million gallons of water per day

- Ben Lomeli: More water than all Rio Rico and Nogales uses in one day.
- Tomas Goode (enters at end of discussion): Information about monitoring is available on the South32 Hermosa website; see Seeps and Springs catalog. This gives you an idea as to what's in the creek now.
- Fritz Sawyer: Can I ask you to put the updated water quality analysis in there, last one's from 2020.
- Tomas Goode: We have 2021 update going up, labs are slow. Will be updated within next month.
- Ben Lomeli: Is there baseline monitoring already up on Harshaw Creek between the point of discharge and Patagonia?
- Tomas Goode: Just the places where it flows
- Ben Lomeli: Any groundwater monitoring?
- Tomas Goode: In this case we're just looking where it flows. For our Seeps and Springs catalog, there are 83 sites. Along Harshaw, there are 2 locations with continuous flow information, upstream of Turner property.

The regular meeting of the Hermosa Advisory Panel was called to order at 12:00 pm on July 20, 2022, at the Wild Horse Inn on 309 W McKeown Ave, Patagonia by Angie Donelson.

Attendance

- Meeting Facilitators: Angie Donelson, Robin Breault
- South 32 Hermosa Advisory Panel Members: Carolyn Shafer, Chris Young, Damian Rawoot, Fritz Sawyer, Guillermo Valencia, Linda Shore, Liz Collier, Marcelino Varona, Michael Young, Olivia Ainza-Kramer, Ruth Ann LeFebvre, John Fanning
- South32 Hermosa Advisory Panel Members Absent: Gerry Isaac
- South32: Communities Specialist Melanie Lawson, Principal Hydrogeologist Tomas Goode, Human Resources Manager Skyliie Estep, Head of External Affairs Judy Brown, Communications Director Jenny Fiore-Magaña
- Scribe: Lizbeth Perez

12:00 Review Agenda and Acceptance/Amendments to Meeting Minutes (June)

-Angie Donelson: minutes reflects changes Fritz Sawyer's addition of question to map in Appendix D for context.

Minutes accepted.

12:10 Panelists: Report Updates

- Patagonia Area Resource Alliance (Carolyn Shafer)
 - Water quality appeals board affirmed permit issued to South32, PARA taking next steps for additional appeal (See PARA handout, Appendix A)
- Patagonia Flood and Flow Committee (Carolyn Shafer)
 - Flood and Flow is in the middle of some large projects (see Flood and Flow Committee handout, Appendix B).
 - One is flood control project feasibility study; the Flood and Flow Committee is very involved in designing the scope of work. Working with county on project, South32 is paying for feasibility study.
 - Second is drought response plan, given climate crisis and our years of drought. University of Arizona working with committee to gather data and design drought response plan.
 - Also, requesting South32 involve Flood and Flow Committee in designing flood plain permit that South32 will need from county for Cross Creek Connector.
- The Nature Conservancy (Damian Rawoot)
 - Preserve manager announced his retirement. Hired new staff, Aaron, who may come in August to attend meeting. He has already navigated community engagement piece and may take a more active role on Flood and Flow Committee.
 - Would like to work with Angie and Melanie on having Nature Conservancy staff who are working with South32 come present on what they are doing and their collaboration.

12:20 Notice of non-hazardous incident at South32 Melanie Lawson

- During exploratory drilling this week, South32 hit a void/fracture. Caused drilling water and lead products to exit the mountain and hit Harshaw Creek. Went ½ mile north into the creek channel.
- South32 paused drilling work, doing clean up in coordination with the Forest Service and ADEQ. Expect cleanup to be completed by weekend.
- No South32 employees or contractors harmed. Material non-hazardous, does not pose safety threat to humans or flora/fauna.
- Ben Lomeli: Any equipment damaged?
- Melanie Lawson: Not that I'm aware of.

12:25 Alternative uses of discharge/questions about water discharge in Harshaw Creek: Melanie Lawson and Tomas Goode

- Melanie Lawson presented the roadmap for alternative uses of discharge and Tomas Goode presented four options for the panel based on South32's crowdsourcing challenge (see Appendix C).

- Tomas Goode: Partnered with Unearthed who vetted submissions for most practical options, then reviewed by a team of South32 personnel to refine list further. Lastly, interviewed participants to get additional ideas and approaches.
- Linda Shore: How many submissions were submitted?
- Melanie Lawson: 21 initially, and some were incomplete so the list got smaller through the vetting process.
- Linda Shore: Are these all the submissions or just the ones that went through screening?
- Tomas Goode: These are submissions that went through the screening.
- Carolyn Shafer: Many in the community would oppose the eco resort option; something similar was widely opposed recently in Patagonia.
- Linda Shore: Part of the reason they are opposed is due to water concerns. This would be a different water source. This is a potential solution that should be considered assuming you can answer the question of who would pay for an eco resort?
- Tomas Goode: Good question, could be handled by management company, but be town owned.
- Fritz Sawyer: Can people file water rights on surface water once it's in the creek? If they can, what happens to those after mine life?
- Tomas Goode: Good question. Water will flow until mine stops operating. I can see ways where it could work. Good question, but I don't have answer. As I understand, there's a lot of water running across Forest Service land, is that South32's water still? Questions are yet to be answered.
- Carolyn Shafer: Did some research on aquifer reinjection method due to concerns about discharge and concerns about removing water from a fragile system (see Appendix D). Please include as potential solution on list of considerations.
- Angie Donelson: Sierra Vista used similar recharge technology when I worked there as city government representative to the San Pedro Partnership; could consult with Sierra Vista.
- Tomas Goode: Prior to working with South32, worked with company that designed and operated recharge facilities. While it is an ideal alternative in some respects, it is the least ideal in other respects (sedimentary basin different than Sierra Vista, and high cost). Also raises question of who owns and operates it come with this option.
- Fritz Sawyer: Is there a way to bank it? Can we do something like what they do with Central Arizona Project in Rio Rico?

- Tomas Goode: With regard to recharge within Santa Cruz County, there may or may not be incentive for recharging based on where you recharge.

1:10 Review Charter and panel work ahead

- Angie Donelson: handed out panel reflection activity. Panelists took five minutes to complete as follows:
 - 1. What community needs and values are important to me?**
 - I am still concerned about the dewatering process, coupled with monitoring, as it impacts the town of Patagonia. Also, discussion of the modeling process.
 - Respect different opinions. Keep an open mind. Respect for existing town/community and their values – do no harm
 - Water preservation for our community
 - To have clean drinking water and assure that groundwater will not be depleted by any actions of community or South32. Traffic that is not overwhelming.
 - Honesty, respect
 - Safety of residents of Patagonia (water safety/flood potential); job opportunities; enable issues or questions to be addressed that reflect values held by Santa Cruz County
 - The economic and environmental future of Santa Cruz County
 - That the mine/project will not negatively impact the long term sustainability/viability of Patagonia and the surrounding community. That ecological values of the region are not lost or negatively impacted.
 - Need for honesty, open communication, practical solutions to long term problems.
 - 2. Are these needs being met? Why or why not?**
 - Today's discussion was eventful. Yet there are many up in the air questions/concerns about the monitoring process from dewatering. Also, the modeling is not complete. We need more information from the professor.
 - Yes, panel members seem to be cordial with each other
 - Yes, very transparent and informative.
 - Not at this point, since the company has not started drilling
 - Mostly; personality
 - Yes...love the presentations, although tense at times, love the information prior to the main meeting
 - I think enough information is being provided to make intelligent decisions. At least with the water issue so far.
 - I appreciate the amount of time the panel has spent discussing water issues, as they tie to the above. On occasion I am concerned we are discussing issues we don't always understand and sometimes it feels like South32 wants opinions from the panel we aren't qualified to provide.
 - Yes. I am exposed to ideas and opinions generated by people outside my normal day to day contacts and I appreciate that.
 - 3. If not, what do I need to continue to serve on the panel?**
 - I am doing just fine!
 - It is all going well...

- I believe that transparency has been achieved as much as could be
- Keep up the great work
- We should be clear about what South32 wants from the panel, decision-wise.

- Angie Donelson: Next, as part of our discussion about the charter review, we will discuss how the panel wants to proceed with public statements. Melanie Lawson and Carolyn Shafer will be sharing more about Carolyn's recent statement to the Arizona Water Quality Appeals board (see Appendix E for the written statement provided by Carolyn Shafer and the link to the audio recording).

- Melanie Lawson: Individuals can make public statements on behalf of themselves. However, as indicated in the charter, public statements on behalf of the panel should be written by the facilitator and approved ahead of time by the full panel. South32 views this statement as being on behalf of the panel members; we believe it should have gone through that process first.

- Carolyn Shafer: I made this statement on behalf of PARA. At the beginning of my written statement, it states I am speaking as a member of PARA. In the last paragraph, I very carefully referenced documents from panel that are public. It is my understanding that part of reason this panel exists is so that, as community members, the panel can inform the community what the panel is exploring. I stand by every statement made by this panel discussing water concerns. I believe I stayed well within the goal of the charter, Section 2 # 4, which is to share the findings and discussion from the panel with the community. The charter does say individual panel members may make comments to media or in public forums on behalf of themselves or the stakeholders they represent. My document clearly says I am speaking as a board member of PARA.

- Liz Collier: Does South32 object?

- Melanie Lawson: Company's view is that the last statement in that broader statement is speaking on behalf of panel and thus should've followed the charter about public statements.

- Ruth Ann LeFebvre: Is that a matter of interpretation then?

- Melanie Lawson: That's what we're discussing. Does the charter need to be revised? How do we handle this as an advisory panel?

- Carolyn Shafer: Or is it a problem at all?

- Angie Donelson: We are starting to see differing opinions: how do we meet different interests and potentially address accountability in the charter? This is the topic we would like to have for further discussion: potential charter revisions. Keep in mind South 32 needs also to agree to charter changes after seeing your recommendations. They wrote and issued the charter before you were added as panelists.

- Angie Donelson presented PowerPoint slides, "Review of the Charter for the Santa Cruz County Advisory Panel on the South 32 Hermosa Project" (Appendix F).

- Ruth Ann LeFebvre: When will South32 provide panel projected employment information for their workforce plan?
- Melanie Lawson: Feasibility phase takes place Spring/Summer 2023; likely around that time.
- Ruth Ann LeFebvre: Where is the ADOT study on the Cross Creek Connector?
- Melanie Lawson: Have to finish engineering and design on some of the local permitting. That all gets submitted to ADOT and they start their process.
- Ruth Ann LeFebvre: When do you forecast submitting so ADOT can begin their public process and so the panel will have input?
- Melanie Lawson: Fall 2022
- Linda Shore: So, you will, by the end of October, have submitted all required South32 information to ADOT to begin the process?
- Melanie Lawson: Potentially; I will give you update on timelines.
- Ruth Ann LeFebvre: Is the panel to use ADOT's public comment process or will the panel have a discussion on that?
- Melanie Lawson: Need to respect each agency's public comment process. If the panel would like to make specific feedback with regard to the ADOT schedule, we can come back to panel for that.
- Ruth Ann LeFebvre: Seems like lot of timeline and implementation depends on the permit. If it's such a long process, why hasn't it started?
- Tomas Goode: Many studies are underway and required before we can submit a complete permit.
- Ruth Ann LeFebvre: Understand, but it seems like with your connections you should be able to speed it up.
- Fritz Sawyer: This is going fast compared to mines I've worked at.
- Judy Brown: We have a lot of private land but are surrounded by federal Forest Service land; we are able to do some things faster, compared to mines operating on public land.
- Marcelino Varona: Between August and October, we are expected to make a recommendation about alternative uses of water other than discharge. Will we also be incorporating impacts we are concerned about, as we discussed last month, using Professor Ty's different models?
- Angie Donelson: That's the plan. He'll be back to answer questions.
- Marcelino Varona: Don't see how he can answer our questions so soon.

- Tomas Goode: We can answer things incrementally. Hope to answer some questions you have that don't need a model directly. Some questions are more nuanced and we can't present answers until some other things are complete. Some of your questions are readily answerable, some have to wait.
- Marcelino Varona: Speaking for myself, I was disturbed when I found out some of these models were already created by South32. I thought we'd have input with them with Professor Ty. Want to make sure when we make recommendations with Ty that our facilitator can help us work independently with Ty without outside influence from South32.
- Linda Shore: My understanding is Ty is taking our questions and examining whether existing models can answer them. We're not creating the model, just creating input to run through the model.
- Angie Donelson: That is certainly one piece. Tomas, since you are working on these issues with Ty, can you explain more?
- Tomas Goode: Correct. One value of having Ty Ferre as an intermediary is he can review model to see if your questions can be answered by the model. He can identify if a given model will answer a question effectively. However, there may be other questions that may not answered well by the model. That may require changes to the model or answering them without a model. He provides that insight so you can have your questions answered and understand what questions can be answered by the model.
- Angie Donelson: He's also been asked by South32 to evaluate the technical proficiency of existing model to answer panelist questions. That is something South32 has added to Ty's scope of work.

2:00 Wrap Up and Looking Ahead: Aug 17 meeting

- Angie Donelson: next meeting, will pick up with discussion of the charter.

Today we learned more about the alternative uses of discharge and perspectives on how we might improve our charter...

How are you feeling so far? What could improve?

- OK. I was concerned about South32's reaction to Carolyn's comments.
- Much better...missed a meeting, so some information is hard to understand. Emails with the information are very helpful. Loved the 11a informational meeting. Contentious but very helpful!
- Good.
- Great. Clear understanding of members.
- Feeling OK. We jumped around different topics – modeling – charter – water remediation. Tends to fracture the meeting flow
- Somewhat frustrated. South32 transparency.
- Today was a little difficult. Other than Tomas' presentation I felt many of the discussions did not help the group. Limit discussion time between attendees.
- Good. Today was a good day of knowledge.

What do we need to address next?

- We need to be clear if panel members can say things/repeat things that are in public domain (minutes, docs, presentations). Plus next steps on work with Ty.
- Continue with presentations, videos, and 11a meeting. I am incredibly ignorant on some of the topics but am catching up. Thank you!
- Continue along the timeline.
- Continuation of water model and questions.
- Water remediation: community should have input on this.
- Model on dewatering
- According to the timeline, we need to speed up water simulation process
- 1) Mine vehicle “mine mind” track out. 2) Generation of AMO with the mine during operations and closure

How well have you felt heard so far? (0-5, with 0 not at all and 5 very well)

- 4 (6)
- 5 (2)

Appendix A
INFORMATION for the Santa Cruz County Advisory Panel on Hermosa Project
Presented by Panelist Carolyn Shafer as a PARA Board Member
July 20, 2022

These are three sources for information relative to water issues in the Sonoita Creek Watershed that I recommend:

- The [Town of Patagonia “Sonoita Creek Flood & Flow Committee”](#) (“F&F”) which conducts (currently via Zoom) monthly public meetings the second Thursday of each month at 10 a.m.
- [Friends of Sonoita Creek](#) (“FOSC”)
- [Patagonia Area Resource Alliance](#) (“PARA”)

UPDATE: PARAs Appeal of Aquifer Protection Permit (APP)
Issued by AZ Dept of Environmental Quality to South32

On July 7, the Water Quality Appeals Board held a hearing for the parties to address the Board. The Board then upheld the Judge’s recommendation and on July 8 issued an Order affirming ADEQ’s Decision to Grant to Intervenor Arizona Minerals Inc. an Aquifer Protection Permit (APP) Significant Amendment Hermosa Project – Trench Camp Property.

PARA is consulting with lawyers about next steps.

MINING COMPANY ACTIVITY in the Sonoita Creek Watershed

21st Century Industrialized Mining

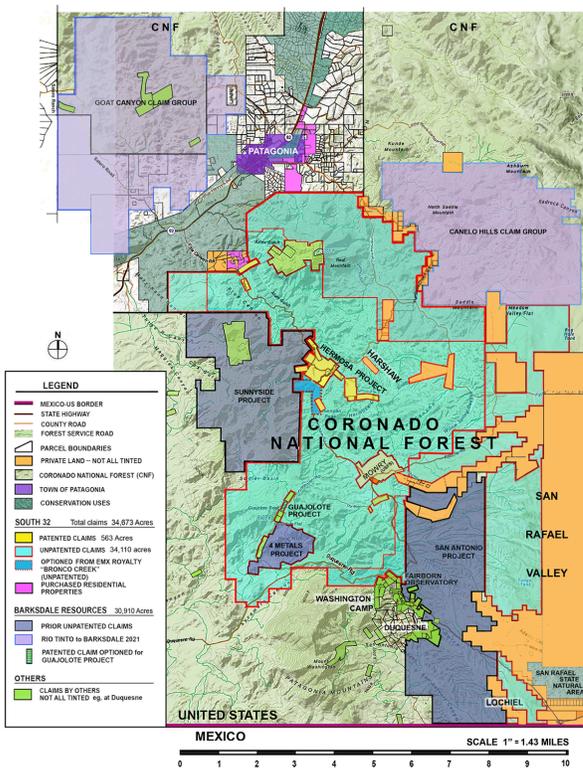
The Trump Administration severely weakened federal environmental protections.

The State of Arizona is identified by the mining industry as the 2nd friendliest mining jurisdiction in the world because of weak environmental protections and mining company favoritism.

The Patagonia Mountains and Sonoita Creek Watershed are currently imperiled by proposed industrial mining operations totaling 74,597 acres (104.5 square miles) of claims by:

- South32 (an Australian mining company) Hermosa Project - 563 patented acres, 34,391 acres of unpatented claims on USFS public lands.
- Barksdale Resources (a Canadian exploratory company) with multiple project areas: Sunnyside, San Antonio, 4 Metals, Canelo Hills, Goat Canyon - 39,643 acres of unpatented claims on USFS public lands.
- 732 acres of unpatented claimed public lands by others.

This watershed will also be impacted by mining activity proposed by Hudbay (a Canadian mining company) at its Rosemont project in the Santa Rita Mountains.



MAP 1 PARCELS-CLAIMS-OWNERS in the PATAGONIA + SANTA RITA MTS
 August 2021
 This map is intended for general reference use only. Information shown on this map is compiled from numerous sources and may not be complete or accurate.
 © Patagonia Area Resource Alliance 2021
 www.PatagoniaAlliance.org

PATAGONIA AREA RESOURCE ALLIANCE collaborates with Strategic Partners to protect the water, land and wildlife of the Patagonia Mountains and the Sonoita Creek Watershed from the negative impacts of modern industrialized mining, works to assure that any mining activities meet the highest science-based standards of protection of our region’s natural assets, and supports the expansion of the nature-based restorative economy that depends on the remarkable biodiversity and cultural heritage of our region.

**Town of Patagonia Flood & Flow Committee Update
for the Santa Cruz County Advisory Panel on Hermosa Project
Presented by Panelist Carolyn Shafer as a Flood & Flow Committee Member
July 20, 2022**

The [Town of Patagonia “Sonoita Creek Flood & Flow Committee”](#) (“F&F”) which conducts (currently via Zoom) monthly public meetings the second Thursday of each month at 10 a.m. [Here is a link for the July 14, 2022 Committee meeting.](#)

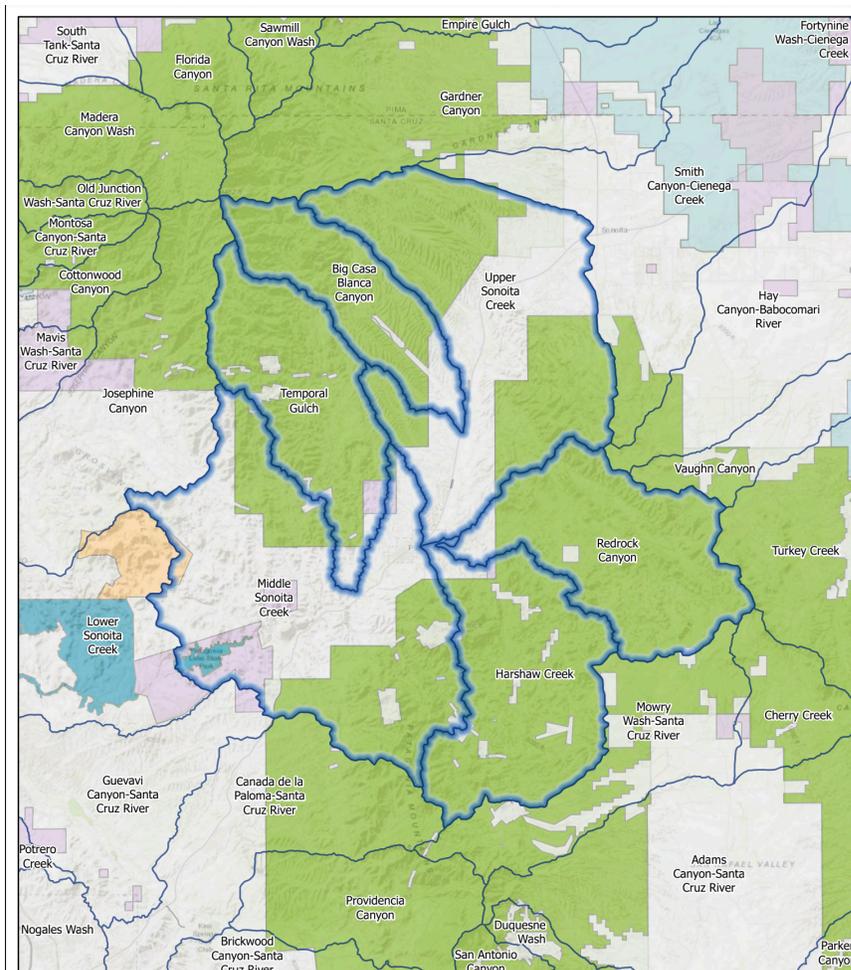
CURRENT PROJECTS

Patagonia Regional Flood Control Project Feasibility Study (a feasibility study designed by the Town, administered by the County, and funded by South32): this project is in the process of defining the scope of the project in order to determine timeline and project cost.

Floodplain Permit for South32’s Cross Creek Connector Road: the Town is asking to work with South32 during the process of the design of the road and the drafting of a floodplain permit application to the county.

Drought Response Planning for Water Resilient Communities: the University of Arizona is working with the Town to gather data prior to designing a drought preparedness plan.

US Forest Service Recognized Town of Patagonia Municipal Supply Watershed (128,000 acres)



GOALS

1. Receive input on alternative/beneficial uses of water that align with community values

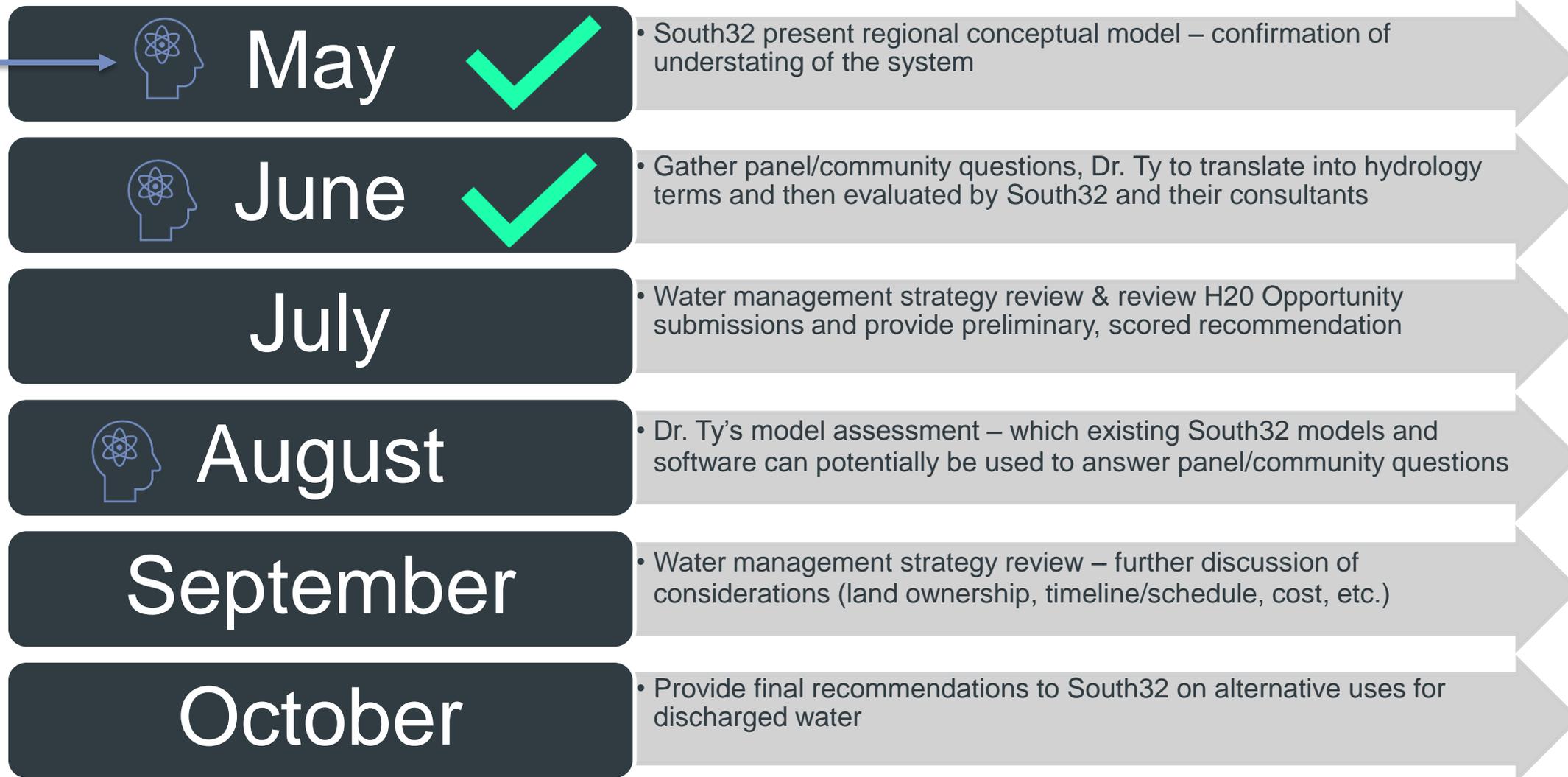
- To achieve this, the panel requested additional information to increase understanding of groundwater and surface water management
- Panel voted/agreed to retain the assistance of a third-party hydrologic intermediary, Dr. Ty Ferre

2. Develop water management plan with panel recommendations that aligns with community preferences and priorities

- Plan can be ongoing and can be reviewed regularly– can develop additional specific goals to address community concerns and questions
- The input on alternative/beneficial uses of water can be “part 1” of this plan

ROADMAP VISUAL

Involves Dr. Ty Ferre as reviewer & third-party hydrologic intermediary



SOUTH32 HERMOSA

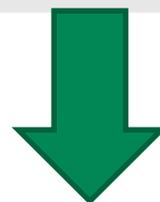
H2O Opportunity Overview
July 2022



CONTENTS

- Review IAP2 Spectrum
- Recap of South32 groundwater management
 - Truescapes Video
- Groundwater management “buckets”
- Overview of UnEarthed H2O Opportunity Challenge & Process
- Review five submissions

IAP2 spectrum



developed by the international association for public participation

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives and/or solutions.	To obtain public feedback on analysis, alternatives and/or decision.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision-making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

GROUNDWATER MANAGEMENT (RECAP)

South32 Hermosa is permitted to discharge up to 4,500 gpm into Harshaw Creek (beginning mid-2023)

- 4,500 gpm is the maximum permitted amount
- State of Arizona permits
 - > AZPDES permit
 - > APP permit



WATER MANAGEMENT OVERVIEW

Storage / Recharge

- Retention ponds or wetlands
- Rapid Infiltration Basin



Consume water

- Agriculture
- Vineyard



Divert water

- Alternative discharge locations



THE CHALLENGE

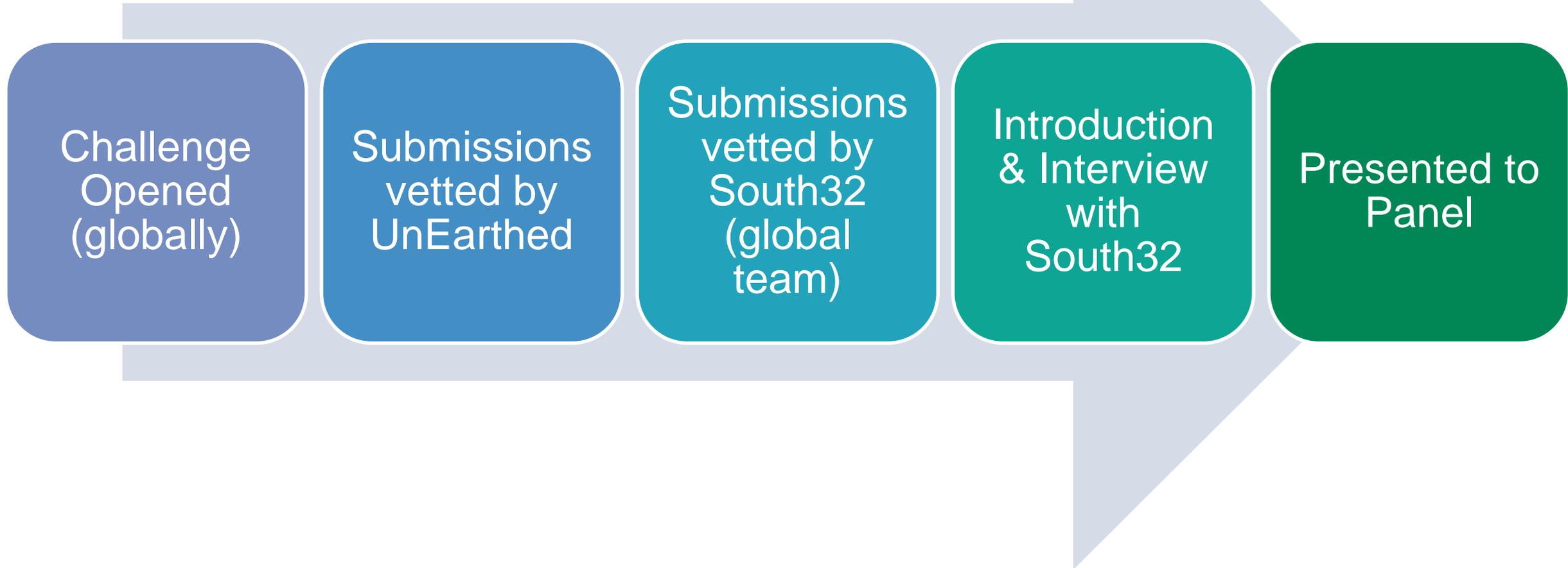
As part of the project planning process, South32 aims to optimize the design of the Hermosa Project to minimize any potential impact on the environment and local community. Working alongside the Santa Cruz County and Patagonia residents, South32 are reviewing aspects of the development, including water management.

The top of the deposit is situated more than 1,000 feet (305 meters) below ground, and in order to access the deposit safely, water sitting from 100 feet (31 meters) below the surface will need to be moved (dewatered). South32 and the local community have expressed a desire for this water to be used or repurposed in such a way as to better benefit the community at large. Consequently, South32 would like to unearth and explore novel ideas and proposals for the use of this water that could provide greater benefits over the existing water-use plans.

This challenge invites individuals, groups and companies from around the world to put forward new ideas and innovative proposals that could assist South32 in achieving our goal to provide a beneficial use of the discharge water from the Hermosa Project.

Do you have an idea or solution for the beneficial use of water?

CROWDSOURCING CHALLENGE (PROCESS)



THE SUBMISSIONS - EHS



1. EHS Support - Passive infrastructure to deliver water for mid-stream and downstream beneficial uses

Overview:

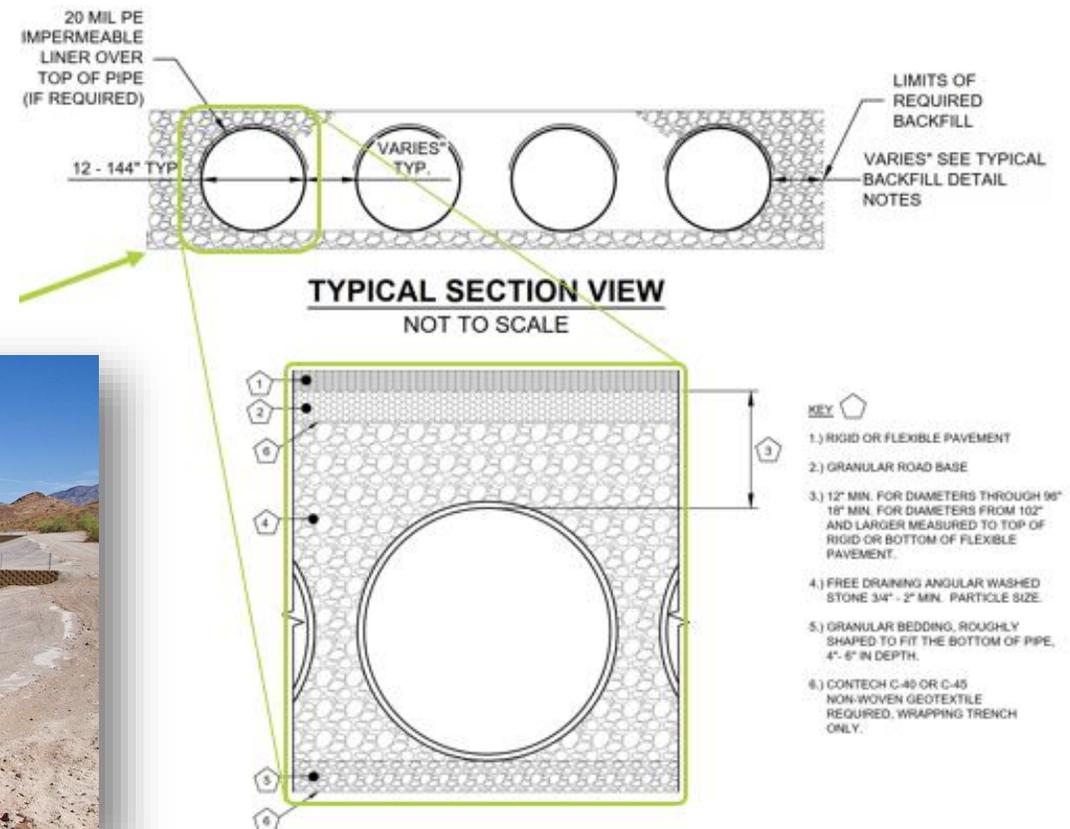
Designed to keep water in the community, supplement the natural environment, and eliminate and enhance flood control

Flow control structures to promote natural flow and provide buffer during storm events

Enhance infiltration and keep water within the watershed

Considerations:

- Land ownership & permitting process
- Closure
 - Remain in place with no required monitoring/oversight



THE SUBMISSIONS – ECO RESORT



2. Hermosa Patagonia Eco Resort

Overview:

Water-based ecotourism resort, off-grid installation of a water neutral, net zero carbon and sustainable development

- Ground source heat pumps for heating and hot water and photovoltaic cells for electricity and battery storage.

Glamping tents, restaurant/café, farm shop, vegetable garden, wetland habitats for community and tourists

Considerations:

- Land ownership & permitting process
- Operator – who runs it?
- Closure plan
- Biology / species introduction with new habitat



THE SUBMISSIONS – COOE (AQUICULTURE PONDS)



3. Aquiculture Ponds

Overview:

Build a sequence of ponds to grow algae, fish and/or crustaceans and a wetland system.

Wetland system could be stocked by ~~excess~~ fish and open for recreational fishing and supplement ecotourism attractions.

Algae can be harvested to make downstream products such as biodiesel or protein and salt-licks as a food supplement for cattle.

Considerations:

- Land ownership & permitting process
- Operator – who runs it?
- Closure plan
- Biology / species introduction with new habitat



THE SUBMISSIONS – UKWAZI, INNOVATIVE WATER SOLUTIONS



4. Innovative Water Solutions

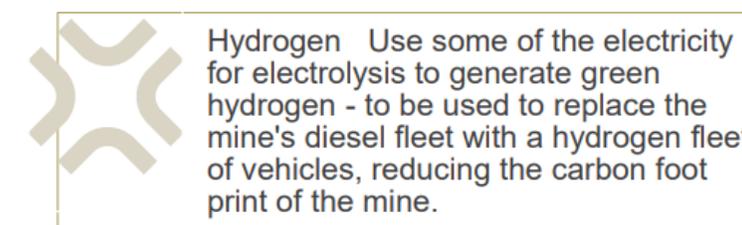
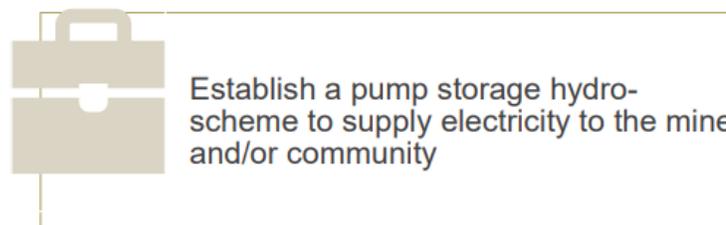
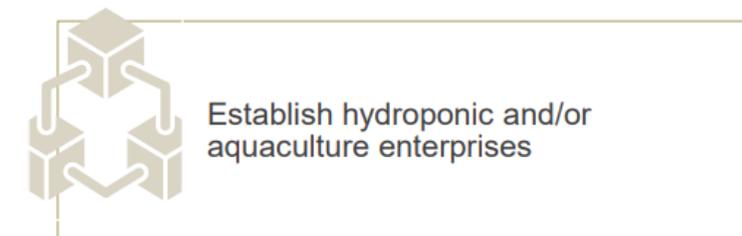
Overview:

Integrated water management services through a variety of options:

- Create a wetland to encourage ecotourism and enhance existing hiking trails and bird viewing
- Hydroponic farming and aquaculture enterprises
- Hydro-pump storage electricity

Considerations:

- Land ownership & permitting process
- Operator – who runs it?
- Closure plan
- Biology / species introduction with new habitat





Aquifer Reinjection Scheme for Excess Mine Water: Design Methodology and Outcomes

Grace Yungwirth¹, Ed Austin², Martin Preene³, Flann Corcoran¹, Joanna Birch¹

¹*Golder Associates (UK) Ltd., Suite 9.10, 20 Eastbourne Terrace, London, W2 6LG, UK,
Gyungwirth@golder.com, fcorcoran@golder.com, jbirch@golder.com*

²*Golder Associates (UK) Ltd., Sirius Building, The Clocktower, South Gyle Crescent,
Edinburgh, EH12 9LB, UK, eaustin@golder.com*

³*Preene Groundwater Consulting, 18 Berry Lane, Horbury, Wakefield, West Yorkshire,
WF4 5HD, UK, mp@preene.com*

Abstract Groundwater reinjection systems represent a potential technique in mine water management to: (1) reduce the need for surface discharge or other management processes for excess mine water; and (2) reduce stress on local groundwater resources caused by net abstraction of groundwater. Reinjection systems, through managed aquifer recharge, can help achieve a more sustainable development whereby clean water is returned to the local catchment.

This case study illustrates a method for quantifying requirements for reinjection arrays as part of a mine water management system, where aquifer characteristics including groundwater depth, permeability and lateral extent will vary.

Key words Mine Water, Reinjection, groundwater, sustainability, managed aquifer recharge

Introduction

The controlled reinjection (RI) of water to an aquifer, or managed aquifer recharge, can provide an opportunity for improvements to sustainability in mine operations by reducing the discharge to surface of groundwater arising from dewatering, thus minimising the wastage of finite water resources. Such schemes are not without their challenges, however. The choice of land available for RI at mine properties is often limited, with uncertain and variable characteristics and properties related to topography, groundwater depth, expected RI well performance, and receiving aquifer permeability.

Such RI schemes commonly make use of multiple RI well arrays within the mine property. A successful scheme will require site-specific data to inform the design to achieve the water management objectives. Site-specific challenges must be addressed in the design of the RI testing programme which will feed into the design calculations. This paper presents a case study based on a mine in Europe to demonstrate the challenges associated with the design, testing and assessment of a RI scheme.

Reinjection Scheme Concept

The objective of a groundwater RI scheme is to route excess clean water sourced from mine water sources to a RI wellfield so that it can be injected and returned to the local aquifer system. Appropriate mine water sources are typically clean groundwater sourced from dewatering activities. Dirty mine water, or “contact water”, would be managed by a separate system and is not considered in this discussion.

RI Test Design Considerations

Key factors in the design of a hydrogeologic test programme for a RI system include:

1. A hydrogeology test methodology tailored and adapted to site conditions;
2. Availability of adequate monitoring locations (water levels and climate records);
3. Careful control of the water delivery system to ensure consistent inflow rates;
4. Avoidance of air intrusion within injected water; and
5. Sufficiently long RI test duration.

1. Hydrogeology Test Methodology Tailored and Adapted to Site Conditions

Factors to consider when designing an appropriate hydrogeology test programme include:

- (a) Using all testor monitoring locations to characterise heterogeneous aquifers;
- (b) Considering use of conventional testing techniques (e.g. packer or pumping tests), which may be more practical to undertake than injection testing to supplement the aquifer test dataset;
- (c) Allowing for site topography and access in the layout of the test array; and
- (d) Allowing for access to a water supply to feed the test array during RI testing. This includes routing of supply piping, sourcing water from pumping wells distant enough not to affect the RI test results, and sourcing water of similar quality to that to be used in the permanent RI system.

2. Availability of Adequate Monitoring Locations (Water Levels and Climate Records)

Installation of monitoring wells is a cost to the project and may not be considered of high value to an operator trying to minimise drilling costs. However, monitoring at the RI wells alone may not be sufficient to determine aquifer performance, particularly in space-limited or bounded environments. Monitoring locations separate to the RI wells can be incorporated into the permanent performance monitoring system of the RI wellfield, thereby limiting project cost. Adequate pre- and post-test monitoring data should also be collected along with seasonal and test-specific rainfall records to understand both the unsaturated depth to groundwater and the effect of rain events on the natural and induced groundwater table.

3. Careful Control of Water Delivery System to Ensure Consistent Inflow Rates

Feeding the RI wells by gravity may present challenges in maintaining a constant and controlled flow rate during the test period, particularly in locations of varying topography. Upstream control of hydraulic head on the feed pipeline may be required. In the current case study, this challenge was addressed by using a header tank placed near to the RI test wells. This acted as a buffer to short-term changes in flow rates from the water source, as well as mechanism for more discrete control of the driving heads.

4. Avoidance of Air Intrusion Within Injected Water

Entrained air within the RI well feed water can promote well clogging by leading to air entrainment in the RI well pack or precipitation of dissolved minerals causing well clogging

(Pyne, 1994). Both have the effect of reducing well efficiency. This can be mitigated by fitting valves and outlets that allow flushing of the feed lines and headworks of air prior to introduction of the water to the RI test well. Sealed headworks, if used, require additional care to control air within the system. Drop tubes should be installed within the RI wells to minimise turbulent flow causing air entrainment when the water is injected.

5. Sufficiently Long RI Test Duration

Test duration should ideally be sufficient to (a) observe the effects of any hydraulic boundaries, (b) observe superposition effects from adjacent RI wells, and (c) assess changes in well performance over time. Often it is not possible to run long term tests during preliminary design phases, however, they should be planned to run for as long as practicable. Access to water supply to feed the injection wells may factor into the test duration planning. Longer term assessment can continue during commissioning of the RI arrays which can lead to design revisions during construction.

Case Study – Reinjection System Testing and Design for Mine Water Management

This paper examines the process of developing a clean water RI scheme on a mine site in Europe. The practical challenges associated with the RI test site included the following:

- The aquifer to be dewatered and reinjected into is a fractured rock aquifer which had not previously been characterised in detail;
- Expected aquifer anisotropy and heterogeneity;
- Space-limiting topography within mine property, causing challenges for well placement and limited access to test locations;
- Placement of wells is limited laterally necessitating linear array layouts;
- Limited thickness of unsaturated zone at some locations, resulting in constraints on water level rise during reinjection; and
- Challenging logistics for water delivery to the RI test sites requiring a complex network of piping.

The testing programme was designed to address these challenges as discussed below.

RI Test Array Construction and Hydrogeology Testing

A series of RI wells were constructed to test the RI area. These wells were expected to be utilised for both testing and as part of the site permanent RI system. Wells were drilled at 300 mm diameter to a depth of either 150 to 300 m below ground level, dependant on geology, and completed with filter packs and 200 mm diameter well screens. To observe groundwater level response, monitoring wells were constructed near to the RI wells to equivalent depths. Where possible, the RI wells were located in pairs to form array locations. Typically the test arrays were constructed along a valley side road as indicated in Figure 1.

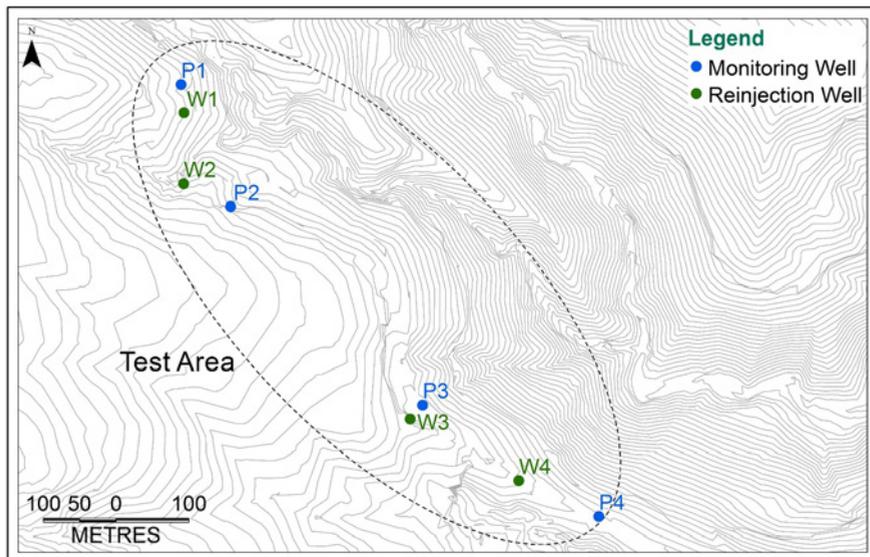


Figure 1: Plan view of typical layout of reinjection test arrays.

As the area had not yet been hydrogeologically characterised, a series of hydrogeologic tests were undertaken in both the RI wells and monitoring wells. A summary of the testing performed is presented in Table 1. Water for the testing activities was sourced from groundwater abstraction wells distant to the test array transmitted by 100 mm diameter pipe.

Typical results from the RI testing are presented in the Analysis and Evaluation Section below.

Analysis and Evaluation

A summary of results from all tests conducted is as follows:

- Packer Tests: estimated bulk K of 10^{-6} m/s to 10^{-8} m/s;
- Well performance: specific capacity of up to 7.5 m³/hr/m for abstraction and 4.5 m³/hr/m for injection; and
- Aquifer analyses: estimated T of up to 400 m²/d.

Typical results from the RI testing are presented in Figure 2 and Figure 3.

In several of the tests the results suggested the presence of hydraulic barrier boundary conditions. Some tests also showed incomplete recovery of groundwater levels with recovery to levels significantly higher than pre-test conditions, suggesting the filling of storage in a bounded aquifer. Both of these observations are potentially problematic for an RI system as groundwater levels could rise more quickly than anticipated or the volume of water which can be injected could be limited by the filling of bounded aquifer storage. RI well performance could also be impacted by weather conditions. Heavy rainfall events during the test

period were shown to influence shallow groundwater levels. Higher groundwater levels reduce both the available injection head and the thickness of the unsaturated zone, which can make injection wells less effective.

Table 1 Hydrogeologic Test Phases Conducted

Hydrogeology Test Type	Test Description	Analysis and Evaluation
Monitoring Well Testing		
In-situ packer tests	Falling head and constant rate tests during construction	Analysed to obtain aquifer parameters – Transmissivity (T) & Hydraulic Conductivity (K)
Reinjection Well Testing		
Step Tests	To assess capacities and sustainable pumping rates for subsequent tests	Analysed to obtain aquifer parameters – T & K Well performance assessment
Constant Rate Pumping Tests with Recovery	Minimum of 24 hours pumping from RI wells.	Analysed to obtain aquifer parameters – T & K, to assess boundary conditions, and well performance
Injection Step Tests	To assess capacities and sustainable injection rates for subsequent tests	Analysed to obtain aquifer parameters – T & K Well performance assessment
Constant Rate Injection Test with Recovery	Continuous and constant gravity-fed injection of pumped groundwater into RI wells for minimum of 48 hours	Analysed to obtain aquifer parameters – T & K, to assess boundary conditions, and well performance

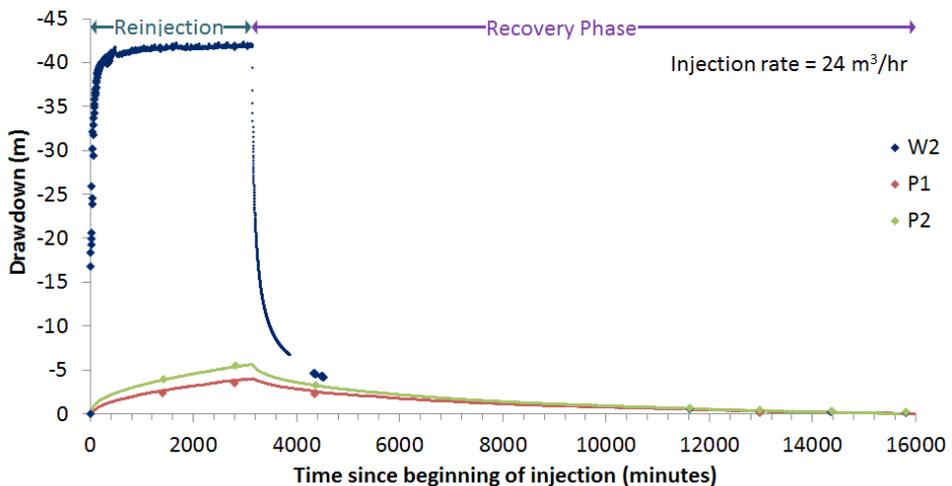


Figure 2: Typical Reinjection Test with Recovery Phase – negative drawdown indicates water level rise.

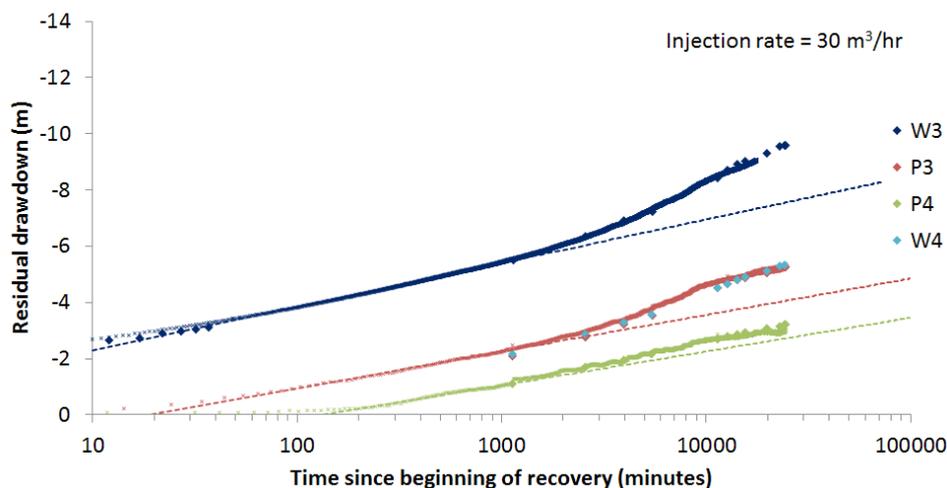


Figure 3: Typical Plot of ReInjection Test Recovery Phase as residual drawdown versus time (log scale) – negative drawdown indicates water level rise.

RI testing suggests that long-term RI may be possible for clean water disposal at the project site. RI into an individual RI well is likely to affect the performance of nearby RI wells in an array of multiple RI wells. Longer duration RI trials were recommended to further investigate the presence of barrier boundary conditions and well performance.

Design Calculations and Key Performance Factors

Design calculations for the array of multiple RI wells proposed for the full scheme were based on the principle of superposition of drawdown (Preene *et al.* 2016), using best-case (where the rise in groundwater levels resulting from a given injection rate was relatively low) and worst-case (where the rise in groundwater levels resulting from the same injection rate was higher) responses to RI extrapolated from field test data from individual wells. Specific drawdown curves from RI data were extrapolated to two years of injection to support the development of these scenarios. Using this method, various RI well array layouts were considered for the short- and long-term phases of mine operation, which had differing water management requirements. A highest permissible groundwater level was applied in the design as a constraint on injection rates and well spacing. The highest permissible groundwater level was typically set to avoid water levels close to the RI wells rising to within 10 m of ground level.

The method identified the likely number of RI wells and well spacing required to enable RI at the desired rate in various phases of the mine operation under best- and worst-case scenarios. In the course of the design an understanding was developed of the optimal balance between RI well numbers and spacing.

Several performance factors proved to be key to the design calculation and should be assessed during the testing phase. These are summarised in Table 2.

Table 2: *Reinjection Scheme Key Performance Factors*

Aquifer Characteristics	Wellfield Design Criteria
<ul style="list-style-type: none"> • Pre-injection depth to groundwater table • Hydraulic conductivity and anisotropy • Aquifer lateral extent • Presence and location of hydraulic boundary conditions • Aquifer response to weather events 	<ul style="list-style-type: none"> • Well efficiency and rate of decrease over time • Potential range of suitable well spacing • Potential well interaction/ superposition effects

Ongoing monitoring and assessment on commissioning should be used to refine the system design and for maintenance and operational control.

Conclusions

Reinjection wellfields can be used to limit the amount of groundwater to be managed by other means within the mine water management plan. This paper has discussed design of a testing programme to determine design parameters for a Reinjection array. The case study discussed demonstrates the successful testing and assessment of a reinjection scheme in a complex and anisotropic aquifer dominated by discrete features. Design of the reinjection system based on this test work must consider key performance factors including aquifer characteristics and wellfield performance criteria. System design calculations should consider available land constraints and incorporate best- and worst-case scenarios for well and aquifer conditions.

References

- Preene, M. Roberts, T.O.L. and Powrie, W. (2016). *Groundwater Control – Design and Practice*, 2nd Edition. Construction Industry Research and Information Association, CIRIA Report C750, London.
- Pyne, R D G (1994). *Groundwater Recharge and Wells: A Guide to Aquifer Storage Recovery*. Lewis Publishers, Boca Raton.

**Consolidated Appeals 21-004 Chris Werkhoven and
21-006 Patagonia Area Resource Alliance
Aquifer Protection Permit No. 512235/LTF**

10 a.m., July 7, 2022 virtual meeting of the Arizona Water Quality Appeal Board

NOTE: I intend to participate in this virtual meeting as this is a matter of significant importance to protect and enhance the public health and the environment. Unfortunately, both internet service and phone service can be unreliable in Patagonia, AZ. In an abundance of caution, I am forwarding this statement on behalf of Patagonia Area Resource Alliance to be a part of the official record in the event that technology does not cooperate at the appointed time for the hearing and I am unable to personally read the statement. Thank you.

REVISED STATEMENT

Greetings. I am Carolyn Shafer, a Board Member of Patagonia Area Resource Alliance (PARA) which is a non-profit organization working to protect the waters of an area recognized by scientists as one of the top regions in the world most in need of protection for species survival.

I did not intend for this statement to be shared before today's hearing; what I am about to speak has been modified from the version shared by the Clerk of this Board. I have asked the Clerk of this Board to suggest that the members of this Board consider establishing procedures for these public hearings that allow those of us in rural communities with unreliable internet to submit our statements in writing and that the statements will be treated confidentially until the meeting is in process.

With a 10 minute time limit to speak today, I reference and incorporate PARA's documents filed in this matter especially the Findings of Fact, Conclusions of Law, and Post-Hearing Memorandum. I will focus on one of the many reasons this proposed permit is arbitrary, unreasonable, and unlawful.

There is nothing in Title 49 of the AZ Administrative Code that authorizes "conceptual" Point Of Compliance (POC) in issuing an Aquifer Protection Permit (APP). The entire purpose of the POC requirement prescribed by ARS 49-244 is to monitor down gradient aquifers in the event there is an unanticipated discharge of pollutants. Under 49-244, this requirement is mandatory and not subject to ADEQ's discretion: I quote from the statute: "the director **shall** designate a point or points of compliance for each facility receiving a permit under this article." Quoting further the article states that POCs "**shall** be a vertical plane down gradient of the facility that extend through the uppermost aquifers underlying the facility." It cannot reasonably be concluded that the reference in 49-244 to a "vertical plane" that must be "extended through the uppermost aquifer" contemplates a conceptual POC. (emphasis added)

Arizona's APP Program is based on federal statute 40 CFR Part F. Nothing in the federal program defines or permits "conceptual" points of compliance. Rather, 40 CFR 264.95 requires EPA to "specify the point of compliance at which ground water protection standard of Section 264.92 applies and at which monitoring must be conducted." It is impossible to demonstrate water quality standards are being met at a POC if the POC is not, in fact, installed.

ADEQ's conclusions that an APP permit need not include an actual POC and its failure to require the installation of at least one actual POC in the Permit is arbitrary, unreasonable, and based upon a technical judgment that is clearly invalid.

Appellant Patagonia Area Resource Alliance respectfully requests that the Water Quality Appeals Board remands this APP Permit to ADEQ so that ADEQ can meet its statutory obligations to:

- (a) analyze and require the installation of one or more actual points of compliance and delineate a lawful pollutant management area protective of drinking water sources in the down gradient Harshaw Creek and Sonoita Creek alluvial aquifers,
- (b) require AMI to prepare a full hydrologic study demonstrating that the multiple facilities at the Hermosa Mine Property will not cause or contribute to a violation of Aquifer Water Quality Standards in the Harshaw Creek and Sonoita Creek alluvial aquifers,
- (c) require AMI to complete appropriate contingency planning,
- (d) increase the frequency of discharge monitoring at Outfall 002, and
- (e) comply with all applicable standards and requirements of Arizona's APP program, including those that will require ADEQ to ensure that AMI's facilities will be designed and operated with the best available demonstrated control technology, including in the design of WTP2, so that these facilities will achieve the greatest degree of discharge reduction achievable.

AMI is an intervenor in this Appeal. AMI is a wholly owned subsidiary of South32, an Australian mining company. South32 is sponsoring a county wide advisory panel to inform the public about some of its proposed activities. The current panel discussions include the dewatering activities under this APP permit. The feedback from the members of the panel includes many concerns about the dewatering and there are suggestions from the panel members that South32 should demonstrate its intention to be a good neighbor by conducting frequent and multiple monitoring, to prepare a full hydrologic study, to prepare contingency plans, to formalize the responsibility for long term monitoring as well as to address other water concerns raised by panel members. This hearing before the WQAB is an opportunity for AMI/South32 to respond to the expressed wishes of the people of this region by advising ADEQ that AMI/South32 supports this Appellant's requested modification of the APP Permit.

Thank you for the opportunity to speak truth to power.

Link to audio recording of Carolyn Shafer's public statement:

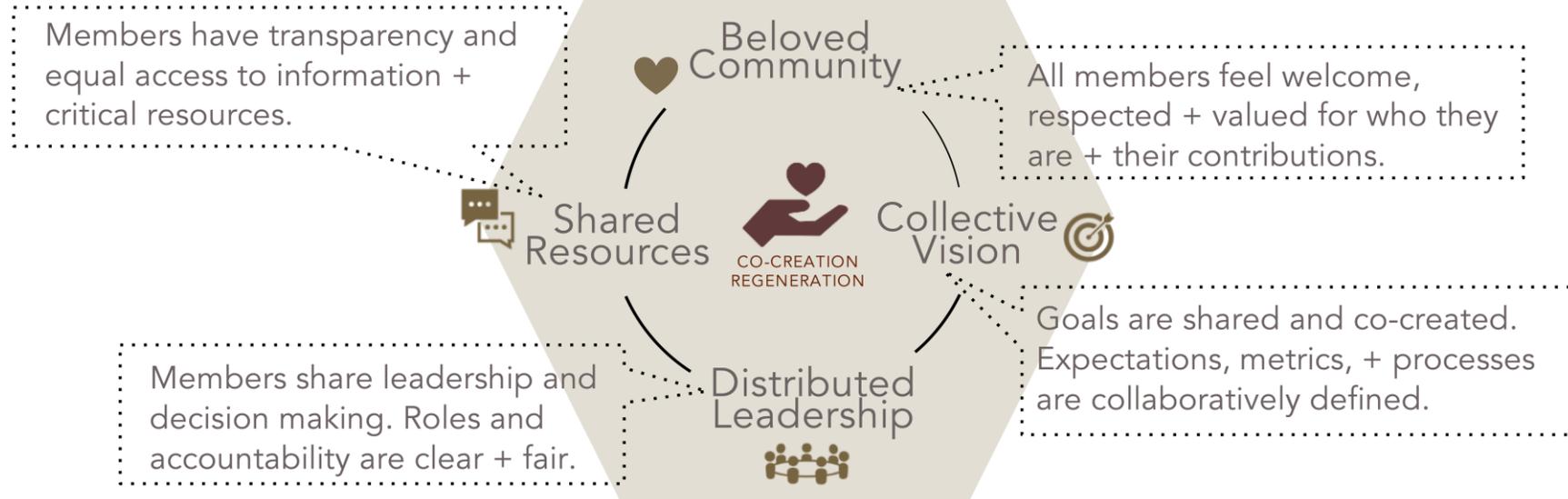
<https://doa.az.gov/sites/default/files/WQAB%20Meeting%207.7.22.mp3>

Statement starts at 9:27.

**Review of the Charter
for the Santa Cruz County Advisory Panel
on the South 32 Hermosa Project**

7/20/22

FOUNDATIONAL ELEMENTS FOR COLLECTIVE ACTION



Do you feel these elements are present in the Panel's work and supported by the current charter?

If not, what would you like to see reflected in the charter to ensure our processes and procedures support these elements?

July 2021 roadmap

DRAFT TIMELINE – Panel work completed 6.16.21
Clarify water concerns; consider options for alternative uses other than discharge

June 2021 meeting - Most panel questions relate to: 1) Groundwater; 2) Mine dewatering and water use impact on groundwater 3) Recharge/contamination. Additional questions raised about 4) Flood risk 5) Surface water/groundwater relationships 6) Impacts to area outside mine footprint/broader landscape

Easier to address

July: Consider Strategy to Address These Sets of Questions

2021 Sonoita Creek Watershed Conservation Plan (June 2020)



- Groundwater
- Mining recharge and contamination
- Flood risk



PARA Review of S32 Pre-Feasibility Study



SCC Study on Nature Tourism



June	July	August	September	October	November	December
<i>Panel: clarify water concerns to recommend alternative uses other than discharge</i>	<i>S 32 Pre-Feasibility Study</i>	<i>Panel: clarify workforce & transportation concerns</i> <i>S 32 Social impact assessment scoping</i>	<i>Panel workgroup recommendations</i>	<i>S 32 NewFields dewatering options</i>	<i>S 32 Economic impact assessment scoping</i>	<i>Facilitator report on panel activities</i>

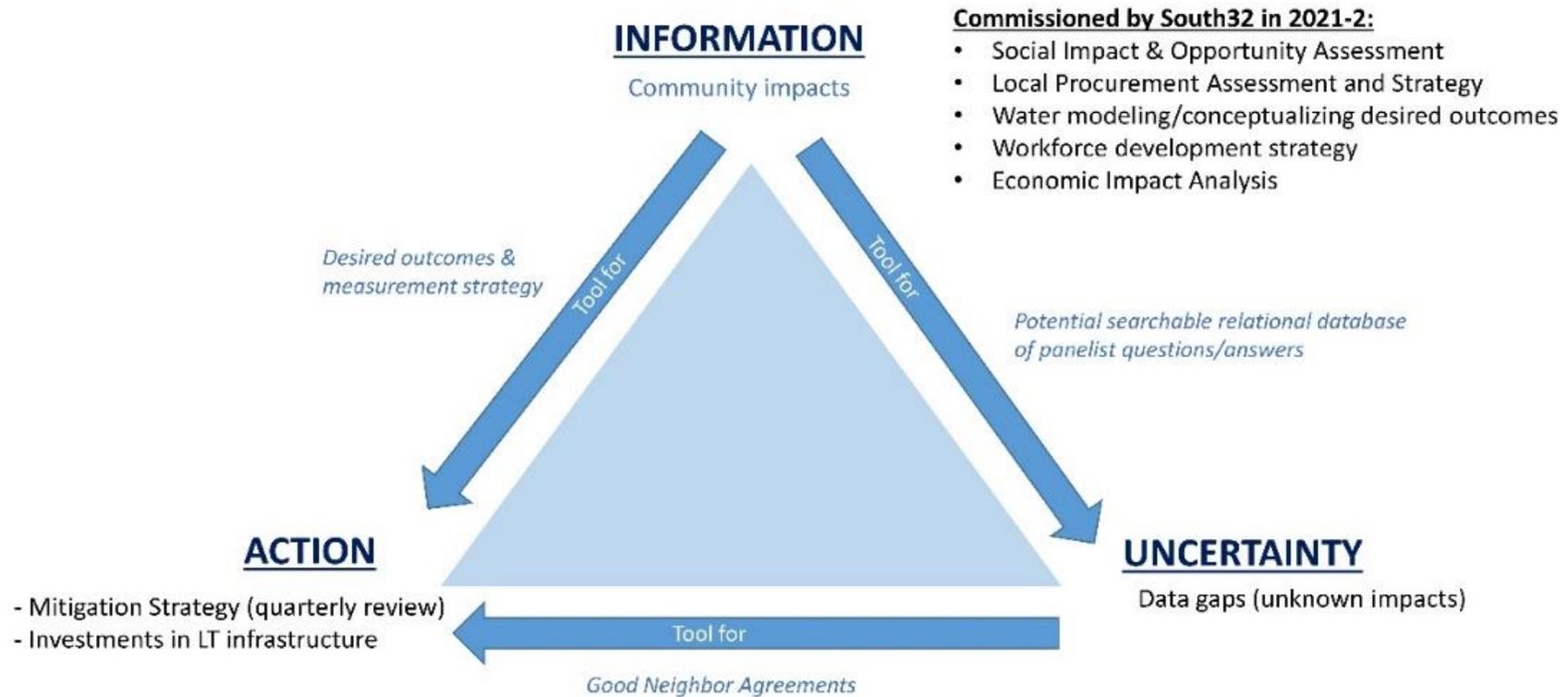
Harder to address

- Mine dewatering/water use impact on groundwater
- Relationships between surface water & groundwater
- Impacts to area outside mine footprint

The reality...delayed timeline

4/20/22

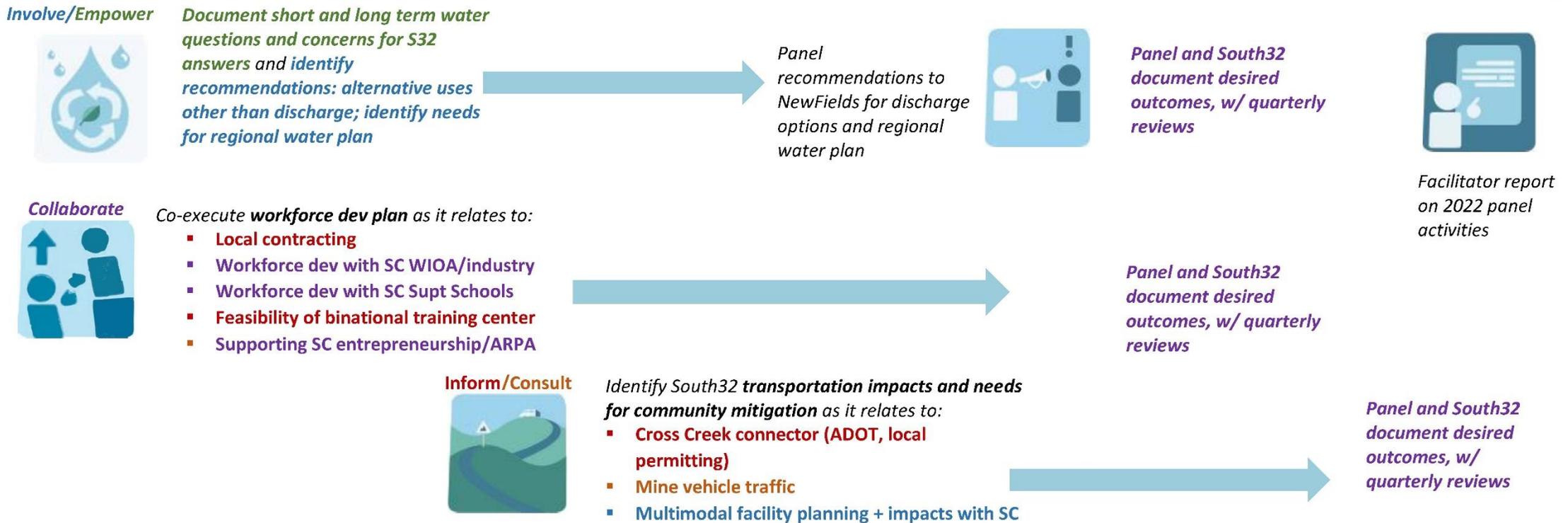
South 32 Panel Planned Work in 2022



Hermosa timeline – panel planned activities: July - December 2022 in light of continuum of public participation



Empower: Participate in community meetings to connect interested groups with the panel and bring forward their questions to facilitate outcomes desired by the panel
 Collaborate: Participate in developing solutions and monitoring for accountability
 Involve: Identify alternatives through participating in meetings, doing homework and own research, responding to surveys, participating in temporary workgroups
 Consult: Provide South32 feedback as to alternatives course of action during meetings, homework, surveys
 Inform: Share information through panelist networks



Facilitator report on 2022 panel activities

Document questions/answers as raised by panel for water, workforce and transportation issues and explore potential of GNA as tool for addressing them

Spectrum of public participation

developed by the international association for public participation

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives and/or solutions.	To obtain public feedback on analysis, alternatives and/or decision.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision-making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.