

## **Agenda**

### **Hermosa Advisory Panel Meeting #11 Wednesday, March 16, 12p-2p**

**Wild Horse Inn - 309 W McKeown Ave, Patagonia**

- 12:00      Review Agenda
- 12:10      Acceptance/Amendments to Meeting Minutes (February)
- 12:15      Panelists: Report Updates
- Patagonia Area Resource Alliance
  - The Nature Conservancy
- 12:25      Guest Speaker: Ben Lomeli, Hydrologist and President, Friends of the Santa Cruz River - Local Hydrologic Conditions
- 1:25      Workforce Development Alignment: Dr. Robin Breault
- 1:50      South32 Updates: Melanie Lawson
- South32 routes brochure
  - Community Open House
  - Consultant progress/panel role in Social Impact Opportunity Assessment, Local Procurement
- 2:00      Wrap Up and Looking Ahead: April 20 meeting
- Purple sheet reflection/evaluation

## Minutes

### Heramosa Advisory Panel Meeting #11

Wednesday, March 16, 12p-2p

The meeting of the Heramosa Advisory Panel was called to order at 12:05 pm on March 16, 2022, at the Wild Horse Inn on 309 W McKeown Ave, Patagonia by Angie Donelson.

#### Attendance

- Meeting Facilitators: Angie Donelson, Robin Breault
- South32 Heramosa Advisory Panel Members: Carolyn Shafer, Chris Young, Damian Rawoot, Fritz Sawyer, John Fanning, Linda Shore, Liz Collier, Marcelino Varona, Maritza Cervantes, Ruth Ann LeFebvre
- South32 Heramosa Advisory Panel Members Absent: Guillermo Valencia, Olivia Ainza-Kramer, Michael Young
- South32: Melanie Lawson
- Scribe: Lizbeth Perez

#### 12:05           **Review Agenda**

#### 12:07           **Acceptance/Amendments to Meeting Minutes (February)**

- Ruth Ann LeFebvre: Wanted clarification on when South32 would do detailed traffic studies.
- Melanie Lawson: Feasibility study will look at ADOT requirements for SR 83 with projected traffic as part of a yearlong process. Will start next month and conclude around Spring/Summer 2023
- Ruth Ann LeFebvre: We wouldn't talk about options until the study is done?
- Melanie Lawson: I'll check and see at what point along panel's process that study will kick off. The panel can be a review body for the study and make sure things like winery tourism and relevant information is considered in that study process.
- **Minutes approved**

#### 12:11           **Panelists: Report Updates**

- Patagonia Area Resource Alliance
  - See Handout (Appendix A) - contains update on PARA's aquifer protection permit appeal
  - Fritz Sawyer: On PARA newsletter, I saw they wanted Heramosa to monitor downstream. What for?

- Carolyn Shafer: For whatever happens downstream. That area is known to have pollutants from historical mining. There is also the question about volume of water flowing through Harshaw Creek and the impact that will have. There are many public and private wells downstream, so those are reasons we asked for monitoring.
- Fritz Sawyer: Why, if Hermosa is meeting their permit?
- Carolyn Shafer: Agency accepted South32 permit, but we're asking them to reconsider due to public health concerns. That's why hearings are ongoing. PARA also had concerns about the County Board of Supervisor's last agenda stated that they were going to donate land to South32 in exchange for an easement for a road. The Board of Supervisors pulled it off agenda because it was worded incorrectly; we will continue to monitor.
- The Nature Conservancy
  - Conversing with South32 about monitoring water quantity and quality on the reserve. They have engaged PARA, Tucson Audubon, Friends of Sonoita Creek, and different groups locally about coordinating monitoring efforts. Not sure what it will look like, but Nature Conservancy is willing to be central repository for data as well as organizing it to be useful for other audiences.
  - Internally, Nature Conservancy is in a strategic planning process. Focal area is sky island region that stretches from northern Mexico through here up to Phoenix and Prescott. Two top priorities are protecting freshwater resources and landscape connectivity. There is nexus with mining on both fronts: water usage and quality and large-scale impacts.

**12:20            Guest Speaker: Ben Lomeli, Hydrologist and President, Friends of the Santa Cruz River - Local Hydrologic Conditions**

- Angie distributed Ben's biography and an informational handout Ben prepared (Appendix B). She asked the panel to document their questions throughout his presentation on a sheet Robin passed out to panelists (see questions documented as Appendix C). Those questions include: What traits and values discussed here are important for our good neighbor agreement? What are your big takeaway questions? How do local conditions inform what we need to know next about mitigation and dewatering strategies?
- Ben: Goal of his presentation: to provide an overview of local conditions, identify potential impacts and potential ways to address them in a Good Neighbor Agreement. As president of the Friends of the Santa Cruz River, he explained the goal of that organization is to maintain local water resources, health, and public safety in perpetuity using best management practices.
- Ben presented slides on the geologic history of the area. Explained that land downstream (following Harshaw Creek to Patagonia Lake) has more vegetation than the upstream (fracture rock area near

the proposed dewatering site). Important to consider how dewatering/potential chemical changes to water in runoff could impact these areas, including recreational areas such as Patagonia Lake.

- Fritz Sawyer: Where's the mine discharge area? Are they going to discharge water (from dewatering) right off the mine property?
- Ben Lomeli: Mine is discharging near the top end; yes.
- Fritz Sawyer: So, the mine discharges 4000 gallons a minute...
- Ben Lomeli: 4,500
- Fritz Sawyer: They say it's going to infiltrate before it gets to the town?
- Ben Lomeli: It might, somewhat. Harshaw Creek has mostly bedrock, so it's going to mostly flow down the creek until it reaches that flatter area where it joins Sonoita Creek. There you have some storage capacity. Harshaw Creek will probably perennialize. There will probably be a lot of flow through there on a year-round basis.
- Marcelino Varona: I am concerned about flooding potential of Harshaw Creek into Patagonia from the dewatering process.
- Ben Lomeli: If Harshaw Creek perennializes and starts flowing all the time, that will not cause flooding by itself. Concern is that when it's raining and you have flooding. If we have had rains that saturate soil, that's where question arises of flooding.
- Linda Shore: I live in Red Rock. When we moved there in 2016, long before dewatering, we were trapped for 2.5 days inside house just because of monsoon. Water was running 10 ft deep through Harshaw.
- Ben Lomeli: Harshaw, like most of the headwaters in this part of the basin, can't percolate much. It's all runoff most of the time.
- Liz Collier: During hard rain, it's not unusual to have to shut down roads because the creek that runs underneath SR82, the bridge before you get to Patagonia, floods.
- Marcelino Varona: Still trying to understand the concern of flooding in Patagonia. How does flow that's going on right now in Harshaw combined with the dewatering of the mine and the rain, impact the potential of flooding?

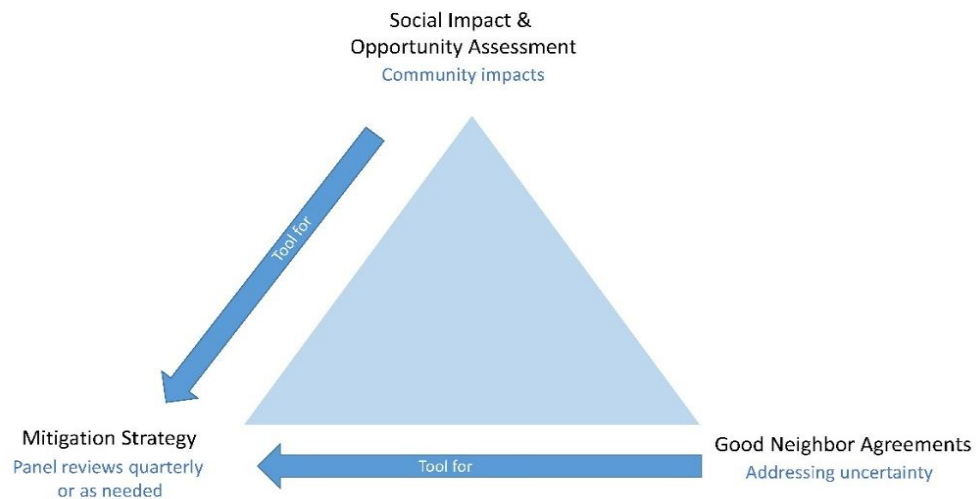
- Linda Shore: Harshaw is dry right now. I would assume when the dewatering starts to happen the ground becomes saturated immediately, so it floods when we get rain.
- Marcelino Varona: I need an answer because I can't support something if it's going to flood out the town. Need to see the model.
- Melanie Lawson: That is good framing for a study we did with town of Patagonia and which Ty Ferre presented at a prior meeting. Study looked at mine discharge combined with a potential 2, 10, 50, 100-year storm event. It projected an inch of additional discharge. It would be good to look back at that study.
- Carolyn Shafer: There's an additional study that would also have – the one PARA commissioned that had a different model and raised specific concerns. I believe that has been shared with group but we can share that again.
- Angie Donelson: These are all good questions for our next meeting with Ty, please write them down. One of main points of what Ty has told us is we need to raise our questions about what you want, and then modeling can address your questions.
- Ben continued with his presentation: He discussed the soil profile of the area. Bedrock holds very little water. We have a lot of bedrock here, and the only water there is in cracks, faults, fractures.
- Damian Rawoot: Much of our area lacks topsoil layers – we have soils that have a little organic matter and there's subsurface soil, and then it's bedrock.
- Ben Lomeli: Up Patagonia Mountain, the top layers are thinner, mostly bedrock. The top layer is important when it comes to rain and runoff. Time of year is also important – with the monsoon, the layers become wet and saturated with more storm activity. And with climate change, we have more and more storms of higher intensity, and less storms of the gentle soaking types. Intense storms causes erosion of top layers.
- Conditions underground also create impacts – pumping for dewatering causes a cone of depression. With time, the cone of depression gets larger and there will be less flows to streams and wells. Monitoring shows there has been a drop in water levels. Those are supposed to be monitored by USGS every 5 years, but they have not been monitored that often.
- Marcelino Varona: We should consider compensating Ben to help us along with professor Ty Ferre to make sure we don't miss local conditions.
- Angie Donelson: All of this is good information, and we will document his presentation and your questions about it to connect what Ty will be doing next as to helping us identify dewatering

mitigation strategies. However, Ben was clear he did not want to take a stipend from the panel. He came as a volunteer and representative of Friends of the Santa Cruz River.

**1:25 Workforce Development Alignment: Dr. Robin Breault (findings from scope of work commissioned by the panel)**

- Angie: Explained how Robin’s findings are organized around a framework that is more current and assets-focused than a traditional Strengths, Weaknesses Opportunities and Threats analysis: Strengths Opportunities Aspirations and Resources (SOAR). This framework helps frame actionable work and proactive mitigation strategies. She reminded the panel this work fits within the “triangle” of the panel’s planned work for 2022, referenced in the January 2022 year-end report on the panel’s activities:

**South 32 Panel Planned Work in 2022**



- Dr. Robin Breault: Shared what she heard from interviews/research (see also SOAR analysis in Appendix D), and explained that the goal for this meeting and next will be to identify: How might South32 job descriptions be crosswalked with workforce skills needed throughout the region?
- Robin connected these findings to five new economies (based on automation and technology); panelists read about this in their assigned homework readings:
  - The Readiness Economy: Roles like cybersecurity experts and software engineers will be in demand, but so will project managers and other organizers of work.
  - The Logistics Economy: There will likely also be growth in advanced manufacturing, and the Internet of Things will become more critical to creating supply chains that are efficient and

resilient.

- The Remote Economy: A growing dependence on remote work, data, software, and networks will drive change.
- The Automated Economy: Employers will prioritize automation over hiring back workers. Jobs developing—and driving—automation will thrive. Projections reveal 25% of the jobs in this region will be automated in 10 years.
- The Green Economy: The nation’s energy system was slowly but steadily shifting to renewables. Ambitious climate goals and incentives are likely to speed the shift. Ecotourism and nature-based economy included here too.
- These opportunities align with community needs and South32 needs. Goal is to make these more accessible, especially to youth, beginning in middle school.
- Boundaries between high school and community college are becoming blurred – youth can come out of high school with dual enrollment and certifications, having most of their 2-year degrees completed. This can be supplemented with work-based learning experience (job shadows, industry visits, internships, apprenticeships).
- In interviews, stakeholders identified needs for:
  - basic professionalism (how do you show up, what does it mean to have job, communicating, working on teams)
  - skilled trades that aligns with mining needs as well as rest of industry.
  - Logistics and automation (engineering, digital jobs, networking, AI, cyber). Can drill down further as we have more detailed job descriptions and we can start to cross reference even more.
- Next meeting: panelists will have time to interact with what we learned and recommend next steps/actions for addressing workforce challenges.

**1:56**

**South32 Updates: Melanie Lawson**

- **Final South32 routes brochure** – distributed to the panel. Available on Hermosa website.
- **Community Open House** – panel is invited to attend on the 24<sup>th</sup>.
- **Consultant progress**/panel role in Social Impact Opportunity Assessment, Local Procurement. Consultant will provide some homework to the panel in late April/attend the May panel meeting to provide a progress update.

## 2:00 **Wrap Up and Looking Ahead: April 20 meeting**

- Angie and Robin distributed a Survey - responses:

### **Today we learned more about local hydrologic conditions and opportunities for potential workforce collaboration...How are you feeling so far and how can we improve?**

- Feeling great except you forgot the cookies again! More dialogue on the models
- Very important perspective on local hydrology and workforce issues
- Good. Overwhelmed but excited. Things are OK, I trust the process.
- Tired and frustrated. Could improve by cutting Ben's speech to the last half hour.
- OK. Can you add Ben Lomeli to the citizens committee? I would like to have his expertise on local conditions.
- We need the models!
- I personally feel very excited at learning about the South32 situation. I would like to see more open minds amongst the panel. Improvement: I would limit presentation length.
- Still learning. But really enjoying the presentations. Would be nice to bring us "newbies" up to date on some of the info. Would be great to have a site visit.
- Good. Vet presenters' content a little more.
- Feel like we paused along the way. Going back instead of moving forward or in a circle. Let's move forward : )

### **What water related issues do we need to address next with Dr. Ty Ferre?**

- Impacts of dewatering
- Integrated water model
- What can we expect regarding real world impacts to Harshaw Creek as dewatering commences?
- A local model that represents the goals, local conditions in the Patagonia mountains. I am also interested in long term mitigations.
- Need detail on water modeling examples.
- He needs to address our questions.
- When we decide the problems, what solutions are there? What did other mines do successfully?
- Model? Impact of monsoons?
- How do we participate in modeling?
- I'm not even sure where we stand with water related issues as a group.

### **What do we need to address next as it relates to workforce issues?**

- How can investments be leveraged for broader impact?
- How to partner with business in Santa Cruz County
- Work force training programs through local provisional community college. Build a training center?
- Is foundational infrastructure improvement work under way?
- Breakdown of jobs.
- Analysis of what skills are already addressed in our community. What do we need to create?



- Workforce development meetings with all school districts. Job training center at SCVUSD35
- What jobs are needed? When do workforce training?
- We need to address what skills are needed now, not just focus on high school students and future training. How can we start with adults now?

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

- 3 (3)
- 4 (2)
- 5 (5)

- **Agenda for Next Meeting**

Panel will address an alternative uses of water for dewatering roadmap with Tomas Goode and Dr. Ty Ferre and workforce development recommendations with Dr. Robin Breault.

**INFORMATION for the Santa Cruz County Advisory Panel on Hermosa Project  
Presented by Panelist Carolyn Shafer as a PARA Board Member  
March 16, 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**

**WRITTEN CLOSING ARGUMENTS DEADLINE:** Judge Shedden changed the deadline to submit written closing arguments from March 7 to March 21. The change was because the hearing transcripts were publicly available later than anticipated. The Judge anticipates that after receiving the written closing arguments, he will take about two months to review the matter before making his recommendation to the AZ Water Quality Appeals Board which will then then render its final decision.

The hearing on the Appeal was held before Office of Administrative Hearing Judge Thomas Shedden beginning on January 10, 2022 and ending on January 21. 2022.

**PARA’s requests for modification of the permit are reasonable and scientifically based:**

- Points of Compliance (*key location/s where levels of contamination or exposure can be screened*) be constructed before any mine dewatering activity.
- A system of early warning Points of Compliance with minimum monthly monitoring.
- Baseline data (*collection of prior information*) must be collected for a minimum of one full year before any large discharge.
- Background data on stream sediments in lower Harshaw Creek must be collected in advance of any significant discharge.
- All compliance monitoring and background data collected must be released to the public.
- A complete hydrologic study (*study of water*) must be conducted on the effect of the Hermosa Mine discharge to Harshaw Creek on downstream drinking water aquifers.

## Biography of Ben Lomeli, Hydrologist CFM:

Present: President of Friends of the Santa Cruz River, US BLM Hydrologist (Retired) – Tucson Field Office; responsible for Soil, Water and Air program (*all watershed, water rights, groundwater and riparian resource conservation/management tasks*) in the BLM’s Gila District. Consulting Hydrologist, Certified Floodplain Manager, IBWC SEACF, SCC FCD Advisory Board, Santa Cruz River Researcher Days Steering Committee, PEER (*Public Employees for Environmental Responsibility*) BOD, Advisory Committee of Community Water Coalition of Southern Arizona.

Past: Sustainability Teacher, Cochise College – Santa Cruz Campus.  
Middle School Math and Science Teacher, Mexicayotl Academy  
Water Resources Manager, Rick Engineering Company  
Chief Hydrologist, Greg Carlson Engineering, L.L.C.  
Senior Hydrologist, Collins/Piña => Tetra Tech Engineering  
Tucson Area Hydrologist, San Pedro Riparian Conservation Area, US BLM  
Water Resources Specialist Arizona Department of Water Resources  
Hydrologist, Kaibab NF, USFS  
President, Friends of the Santa Cruz River – (FOSCR)

B.S. Watershed Hydrology/Natural Resources Management - University of Arizona.  
Consulting Hydrologist and Natural Resources Scientist with over 48 years working experience, both in government and in the private sector. Special Emphasis in Engineering, Water Rights, Riparian Ecosystems, Flood Control, Riverine Morphology, Grazing Systems, Erosion Control, Site and Water Development, Groundwater, and International Issues.

Born and raised in Santa Cruz County, (SCC). Volunteer in several community aspects. Volunteering for FO SCR since 1996 because he believes now is the time to address many quality-of-life issues for future generations in this area that is one of the last great places to be discovered. It deserves our attention to insure environmentally sound and economically viable development decisions that promote sustainable land use practices.

*“In order to make positive changes on the ground, there must first be positive changes in people’s hearts. We must therefore concentrate on building partnerships wherever possible!”*

# Santa Cruz County Advisory Panel on South 32 Hermosa Project

March 16, 2022 - Presentation Handout

By Ben Lomeli [lomeliben@gmail.com](mailto:lomeliben@gmail.com)

**Geologic Origin:** Block & Fault, Graben/geologic trough; Geologic Map & Time Scale, **Fractured rock hydrologic system**; stable isotope studies (O, H, S, etc.), other “tracers”; Mountain front recharge.

**Hydrologic Setting/Location:** Harshaw Cr., Sonoita Cr. (“**Blue Heaven**”), Patagonia Lake, Coal Springs (T&E GTM), Santa Cruz River, Rio Rico Potable Well Field, Carmen, Tubac and beyond, (Gila River, Colorado River). Will not directly affect Nogales but could affect SCR pumping station if contamination of San Rafael Valley occurs.

**Hydrologic Concepts:** Water is a Newtonian non-compressible fluid.

The Hydrologic Cycle:

Groundwater vs. surface water:

Both flow rates governed by physics laws: Conservation of mass, momentum, and energy

Groundwater Basin vs. Watershed

Flow rates Ft/day vs. FPS

Groundwater Flow Equation: Darcy’s Law ( $Q = KA \, dh/dl$ )

where: Q = rate of water flow (volume per time)

- K = hydraulic conductivity (**Effective porosity in Ft<sup>3</sup>/day/Ft<sup>2</sup>**).
- A = column cross sectional area
- dh/dl = hydraulic gradient, (*change in head over the length*).

Surface Runoff Equation: ( $Q=CIA$ ) for peak flow (CFS) from a watershed. **Top 4”** of soil & **Antecedent moisture conditions** important factors.

Open Channel Basic Equation: ( $Q=AV$ ) for (CFS); Manning’s Equation:  $Q= (1.49/n)AR^{2/3}VS$

Surface water/groundwater Interactions/drawdowns

Perennial/Interrupted/Intermittent/Ephemeral Flows

Hydro-, Meso-, Xeric-Riparian Ecosystems

Infiltration/percolation/recharge

**Water Resources at Risk:** Quantity & Quality.

- Quantity:

Volume of a sphere:  $V = \frac{4}{3}\pi r^3$  OR:  $(4\pi r^3)/3$

**1 Cubic Foot (CF) ~ 4 Basketballs; = 7.4805 gallons; water weighs 62.4 lbs./Cubic Foot.**

**1 Cubic Foot per Second (1 CFS) ~ 4 Basketballs/s; = 7.4805 gallons/s; = 62.4 lbs./second.**

**10 CFS ~ 40 basketballs/s = 74.805 (~75) gallons/s; 624 lbs./second!!**

**10 CFS = (10 x 60 sec/min x 7.4805 G/Ft<sup>3</sup>) = 4,488.3 GPM, or 37,440 lbs./minute; = 53,913,600 lbs./Day!!**

For Comparison:

Firehose flows depend on size of hose and pump pressure.

Typical Flows for hand lines:

1-inch hose 30–60 GPM; 1.5-inch hose 125 GPM; 1.75-inch hose 200 GPM.

AMI would discharge up to **4,500 gallon per minute** (gpm); or approximately **6.48 million gallons per day\*** (mgd).

Gallons per Capita per Day (GPCD): (*Actual 2017 AMA Municipal Conservation Program Report 2019*)

City of Nogales, AZ ..... 137 GPCD \*[47,299.27 *Nogalenses/day*]

Rio Rico Utilities Inc. .... 90 GPCD \*[72,000 *Rio Ricans/day*]

Nogales, Sonora ..... 45 GPCD (est.) \*[144,000 *“Sonorenses”/day*]

**Temporary groundwater mound** created with additional ~10 CFS for 4-5 years. **Then Dried out?**

- Flows in Harshaw Creek (31 Mi.<sup>2</sup> [19,880 acres]); increased by ~10 CFS.
- Increased flooding probabilities possible during natural high-runoff events in Harshaw & Sonoita Creek (270 Mi.<sup>2</sup>). “Average” not representative of “effective”. (Mean, Mode, Median).
- 20-year drought.
- Climate Change predictions = drier and hotter future, with less frequent rains, but with more intense storms, = higher peak flows.

**Long-term dewatering** eventually reduces/eliminates mountain-front groundwater recharge, (*Higher elevations receive higher precipitation*), Decreases groundwater gradients and flow rates, lowers water tables and well levels, worsens any existing water shortages, Reduces/eliminates perennial (base) flows in streams, Riparian Habitat losses, (shallow roots). Less vegetative ground cover causes higher peak flows and higher soil erosion. Isotopes show mountain front/block recharge origin. Climate Change exacerbated.

- Water Quality: (Physical, chemical, & biological).

Lessens with depth & down valley; Higher “lift” costs. Deeper = older H<sub>2</sub>O (connate)

Contaminates can *disperse* faster than groundwater flows,

Heavy metals = many human health risks; Tend to bind to soils & flushed with higher flows, also affect plants and wildlife. Local historic and recent contamination examples,

Community potable water supplies vulnerable.

In its past assessments, 303(d) lists, ADEQ’s Nonpoint Source Annual Reports, and many other sources, ADEQ has long listed the full length of Harshaw Creek, from its headwaters to Sonoita Creek, spanning 14.4 miles (file no. 15050301-025) as impaired for copper and pH.5 Indeed, a large portion of Harshaw Creek (and its unnamed tributary) has been listed as impaired for copper and pH since 1992.

## SYSTEM MODEL NEEDED

Truly understanding this fractured rock hydrologic system requires an integrated hydrologic model to assess the complex groundwater-surface water dynamics and to evaluate the real long-term risks of dewatering and contaminant transport from WTP2 and Harshaw Creek to all downstream drinking water wells and riparian ecosystems.

“Point data” analysis based on averages can be very misleading. Not representative of the actual system interactions over time.

Baseline assessment and data needed to characterize existing conditions.

**Models:** “Similarity” implies that the model is accurately representative of the prototype or system and can be used to predict the performance of the system. Geometric, dynamic, true to scale in length, area, and volume”. (PE 17-42).

Boundary Conditions, Calibration, Sensitivity Analysis.

“A FULL integrated modeling study is required to assess the concurrent and closely coupled impacts of mine dewatering and long-term discharge to Harshaw Creek”. (Lacher & Prucha Report). “[t]he complex relationships between groundwater and surface water in this system clearly mandate the use of a fully integrated hydrologic model. No other predictive tool will be able to evaluate the rapid feedbacks between the various hydrologic system components and simulate the transport of chemical constituents within the surface and subsurface flows.” (Lacher & Prucha Report).

The system model should include climate change predictions.

## **Good Neighbor Traits and Concepts (Values):**

A Good Neighbor:

- Respects everyone and everything, is honest, honorable, fair, just, trustworthy, truthful, transparent, accountable, helpful, reliable, ethical, considerate, compassionate, wise, “gentle & kind”, and maybe even generous.
- Never risks negative socio-economic impacts to community water resources and ecosystems.
- Good Neighbors always operate in GOOD FAITH, look out for, protect, and take care of each other.

## **Good Neighbor Hydrologic Criteria:**

- Baseline Data needed (Starting point in time).
- Implement BADCTs & BMPs to detect and protect our water resources in perpetuity (Truly sustainable).
- **Integrated hydrologic model of fractured rock hydrogeologic system.**
- **Multiple actual (not “conceptual”) Points of Compliance (POCs) for early detection should be located directly and immediately downstream of potentially contaminating activities (not miles away) and should be monitored frequently!! (Monthly?).**

(Want to know ASAP to prevent costlier environmental and socio-economic impacts).

“Significantly more frequent and more spatially distributed compliance monitoring will be needed to ensure the health and safety of all downstream water users.” (Lacher & Prucha Report).

- A **Contingency Plan** with **specific mitigation actions** in case anything goes wrong.
- **“A clever person solves a problem; a wise person avoids it”**. Albert Einstein.
- Apply and practice the **“Precautionary Principle”** and **“Full life-cycle costing”**.

Appendix C

Questions from Ben Lomeli's presentation on local hydrologic conditions

	<b>What did you learn about local conditions that could potentially inform mitigation and dewatering strategies?</b>	<b>What is important for our Good Neighbor Agreement?</b>	<b>What else do you need to know?</b>
1	Learn that mitigation may not be possible, since dewatering cannot be stopped once started. Additional water would erode banks more and cause additional flooding	There must be some way in which dewatering would stop in a potential flood event	
2	Can we do monitoring with dewatering?	A clear understanding of dewatering contamination responsibilities	A clear understanding of upcoming models
3	Will the Newfields dewatering models deal with the sheet flow (stream flow) and the potential of flooding in Patagonia?		
4	What happens during monsoon with flow? Model?	Transparency, mutual respect, good faith	For those of us relatively new to the panel, is there a way to catch us up to some of the information that has already been presented over the past few years? Need to know more about the "model."
5	How little alluvium there is in this system...not a lot of material in Harshaw and Sonoita Creek to absorb water	What happens if something "bad" happens? The GNA should outline roles and responsibilities of various scenarios. Should XYZ happen, then South32, Town of Patagonia, Santa Cruz County will...	If X happens, what does it mean for Y? For example, if Harshaw Creek perennializes, what does it mean for the Town of Patagonia?
6	We need an integrated model such as Lacker and Prucha's report. South32's report was responsive to a narrow question.	Monitoring at multiple locations in Harshaw for 10 miles from discharge point with monthly testing and public reporting. Page 3 of Ben's handout.	Mitigation for when issues occur
7	How close to the stream with the wells be? Will they potentially eat the stream?		Do the models contain options for solutions?
8	General geography of area; it was nice to see the presentation show local landmarks and route of Harshaw/Sonoita Creeks Conditions in Patagonia with topsoil on top of bedrock. How does this change our existing model?	Groundwater contamination and money in the bank to mitigate pollution Strategies for what happens when mine quits dewatering or mine depletes water resources at the end of operations	I would like to see a fracture rock hydrologic system model that represents local conditions in Patagonia Effect of dewatering and dryout on vegetation and wildlife. What mitigation can the mine take to eliminate extreme conditions?

	<b>What did you learn about local conditions that could potentially inform mitigation and dewatering strategies?</b>	<b>What is important for our Good Neighbor Agreement?</b>	<b>What else do you need to know?</b>
9	Harshaw will flow not on a lot of storage capacity due to bedrock The effects of long term dewatering decrease groundwater and flow lowers water table and wells. Knew this but also in handout. Models: boundary conditions, calibration, sensitivity analysis.	That it is legal and parties are accountable.	How will climate change affect the whole hydrologic process, can we model it?
10	Confusion over drying up streams with cone of depression and flooding with discharge. How to get the balance? With discussion of riparian vegetation and recreation – what should be considered and included from this in the beneficial use discussion?	Water quality monitoring – led by The Nature Conservancy as central repository (per Damian Rawoot’s comments). Agreement on standards/criteria to measure against for water quality (BADCT)	Recommendations on locations for infiltration mechanisms Current baseline data from orgs – Friends of Sonoita Creek? What are current contamination levels?
11	Angie’s comments: - Can modeling be conducted of contaminant transport risk, given differences in surface and subsurface water flows? - What are the impacts of climate change (especially relating to top soil, as the region gets dryer) - Fractionated rock in some areas – what are the down or upstream impacts of additional water?	If USGS wells show drop in levels in the area – why aren’t they monitoring every five years (how can we get USGS to monitor that frequently)? - How are larger land use changes in the county (housing impacts for example) potentially impacting the model?	If evaporation is up to 980 inches/year, can we recapture some of that? How?



## Workforce Opportunities

*How might S32 job descriptions be cross-walked with workforce skills needed throughout the region?*

What skills are needed across the community in all industries?

Immediate	2-5 years
<ul style="list-style-type: none"> <li>• Basic professionalism</li> <li>• Work experience</li> <li>• Skilled trades</li> <li>• Drivers - CDL</li> </ul>	<ul style="list-style-type: none"> <li>• Logistics</li> <li>• Engineering</li> <li>• Digital Jobs - Networking, AI, Cyber</li> </ul>

