Agenda V2

Santa Cruz County Advisory Panel Meeting
March 15, 2023

Wild Horse Restaurant, 309 McKown Avenue, Patagonia, AZ

Timing	Focus	Task/Action	Who
11:15 *15 min*	Lunch is served		
11:30 *30 min*	Panel/Facilitator Meeting	Facilitator Orientation	Panel/Catherine /Joanne
12:00 *5 min*	Welcome		Catherine
12:05 *2 min*	February Minutes	Approve	Catherine
12:07 *3 min*	Update to County Supervisors	Select representative	Catherine
12:10 *15 min*	Project Updates • Road and Transportation • Panel Budget • Cross Creek Area Road • South32 Website	Share information, Q & A	South32 Panel
12:25 *20 min*	Track out – Part 2	Presentation on Panel questions	South32
12:45 *10 min*	Community Group Updates		Panel Members
12:55 *60 min*	Water Update	Share information, Q & A	Ty Ferre
1:55 *5 min*	Wrap Up	Identify/Confirm next steps	Catherine
2:00	End		All

Meeting Minutes

Santa Cruz County Advisory Panel Meeting
March 15, 2023
Wild Horse Restaurant, 309 McKown Avenue, Patagonia

1. **Meeting called to order at 12:04 pm - Catherine**
2. **February Minutes - Catherine**

   Moved by Linda/Second by Liz

   Discussion: There were several errors that did not get corrected so the February minutes will be approved at the March meeting.

3. **County Supervisor's Meeting – Catherine:**

   Melanie got a request from the county manager to do a brief update on the panel, at the March 21, County Supervisors' meeting. It is at 9:30 am. The proposal is to have Catherine prepare a brief comment and share this with the County Supervisors, as a representative of the Panel.

   Discussion: The Panel agreed that their response to the Supervisors was to direct Melanie to invite them to attend the next Panel meeting and encourage them to review the minutes on the South32 website.

Attendance:

Meeting Facilitators (Interfuse Associates):
Catherine Tornbom, Joanne Lamb

South32 Hermosa:
Melanie Lawson, Tomas Goode, Matt Novak

Panel Members Present:
Elizabeth Collier, John Fanning, Ruth Ann LeFebvre, Ben Lomeli, Fritz Sawyer, Carolyn Shafer, Linda Shore, Olivia Ainza-Kramer, Guillermo Valencia, Marcelino Varona,

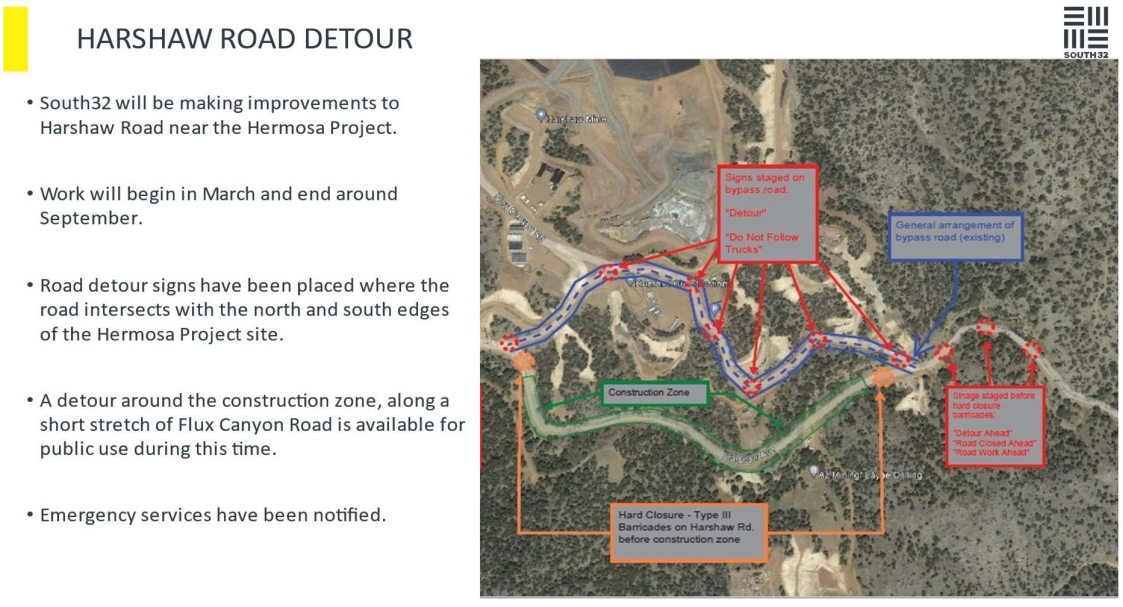
Panel Members Absent:
Maureen De La Ossa, Damien Rawoot, Christopher Young, Michael Young,

Consultants/Guests/Visitors:
Nohe Garcia, Ty Ferre, Aaron Mrotek

4. **Project Updates:**

   4.1. **Road and Transportation - Melanie:**

   4.1.1. **Harshaw Road Detour:** This information was published in the newspaper. South32 will be making improvements to this section of Harshaw Road, and the work will begin in about two weeks. Just part of the road will be closed with a detour up the hill. It does not go onto site or cross into the security gate. South32 has used this detour a few times in the past. Emergency services and the residents have been notified.



Questions/Answers:

Linda: Is it the detour of what I called the new entrance, and it will go out to the old? So, is it between the two existing entrances?

Melanie: Yes, you will be traveling up the hill to the new entrance and then down the hill to the old entrance.

Linda: And what are you doing to Harshaw Road?

Melanie: There will be some grading improvements, culvert installation and beyond that I am not sure. This work will start in about two weeks and last until October 1.

4.1.2 Cross Creek Area:

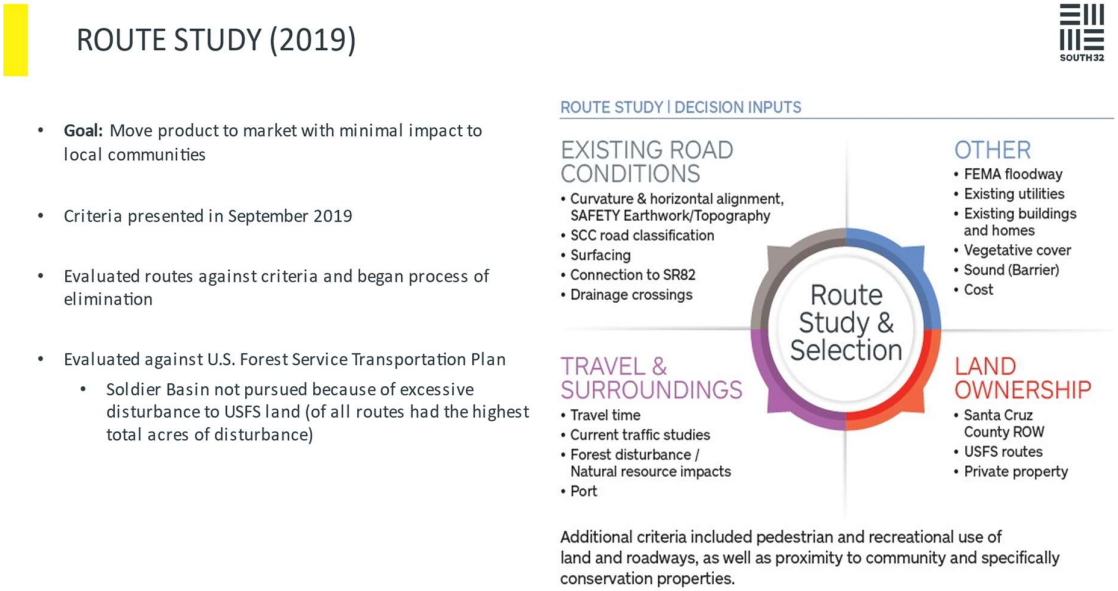
The land transfer was completed, and the deed was recorded last week. South32 retains a non-exclusive easement to construct and then use the road. The ADOT encroachment permit and the floodplain use permit will be submitted in the coming months. The construction timeline and schedule are currently being developed.

Questions/Answers:

Fritz: *That's going to include the traffic study?*

Melanie: I believe so. The traffic study is part of what will be submitted to ADOT. Hunter will be the contractor. This is the company that completed phases 1-3 of the Town of Patagonia Road improvement projects. From my perspective, they were easy to work with and they worked well with the town.

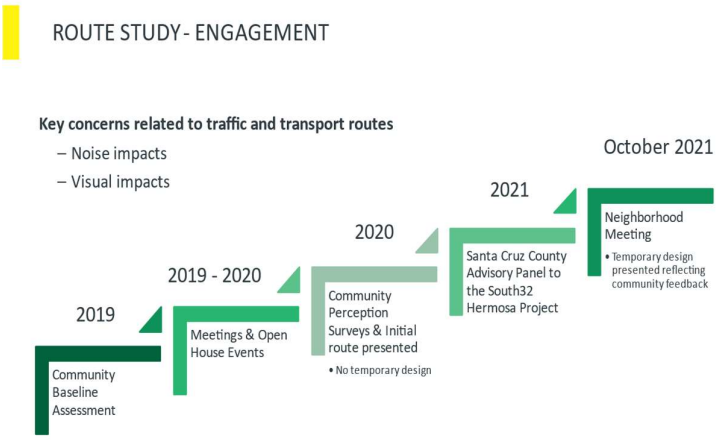
4.1.3 Road Alternative: There is an alternative that's just south of Flux Canyon. This slide [below] and the rest of the slides show the background of the route study. They were presented at the Board of Supervisors meeting last year. The goal is



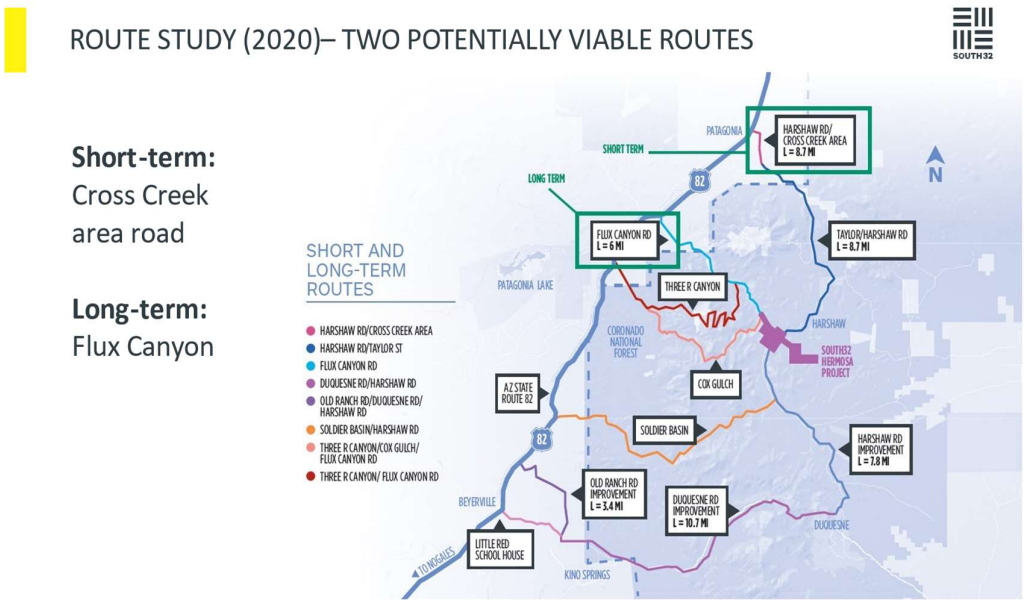
to move with minimal impact in the local community.

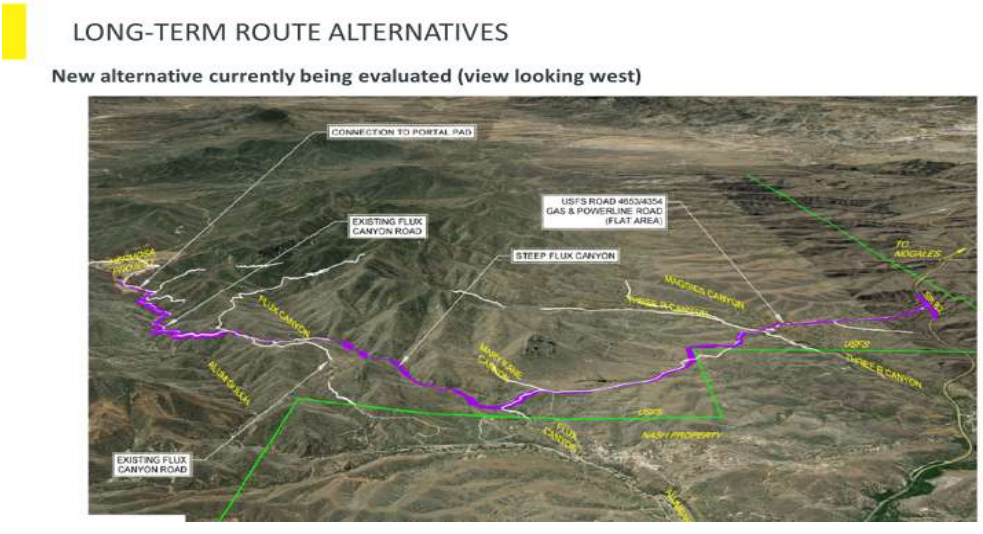
As part of that route study, South32 looked at the US Forest Service transportation plan, land ownership, and FEMA flood plain. All these varied factors were inputs into that route study. It started in 2019 with a series of public engagements, open houses, and individual meetings conducted with neighbors for feedback. In 2020, we first communicated the cross-creek connector. The company went back to the study to re-evaluate and then later communicated the

temporary short-term route along Cross Creek and a long-term route which we communicated at the time would be near Flux Canyon. We've continued to communicate this to date.



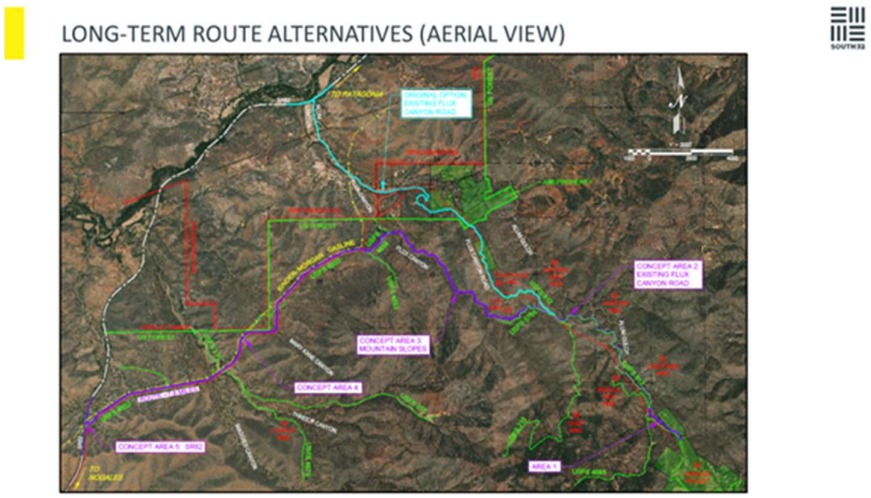
The map [below] shows the eight routes that were evaluated. South32 chose Flux Canyon as the long-term preference. And Harshaw and Cross Creek as the short-term preference.





There is now a new long-term option. The route [shown left] was chosen after getting feedback from residents in Flux Canyon. The alternative does not go through Flux

Canyon Road for the entirety of connecting to Highway 82. It follows the gas line closely. This is an aerial view looking west towards Nogales.



In the slide above the blue line is the Flux Canyon Road, the previously communicated long-term route preference. The new alternative is in purple which connects partly to Flux Canyon Road and closely follows the Kinder Morgan gas line and connects to SR82 further towards Nogales

Questions/Answers:

Linda: Is this the new proposed long term?

Melanie**:** It's the new proposed long-term route alternative. Both routes would cross US Forest Service lands and therefore require a federal permitting process. Once we submit a plan to the Forest Service, there will be public scoping and comments.

Liz: Where does it come out on 82? Can you give us a landmark or marker?

Melanie: I'll add a mile marker. We do want feedback on what should be considered so if there's anything that we need to adjust, we will consider it.

Carolyn: Your decision between the two long term alternatives will be input from the community, or are there some other factors?

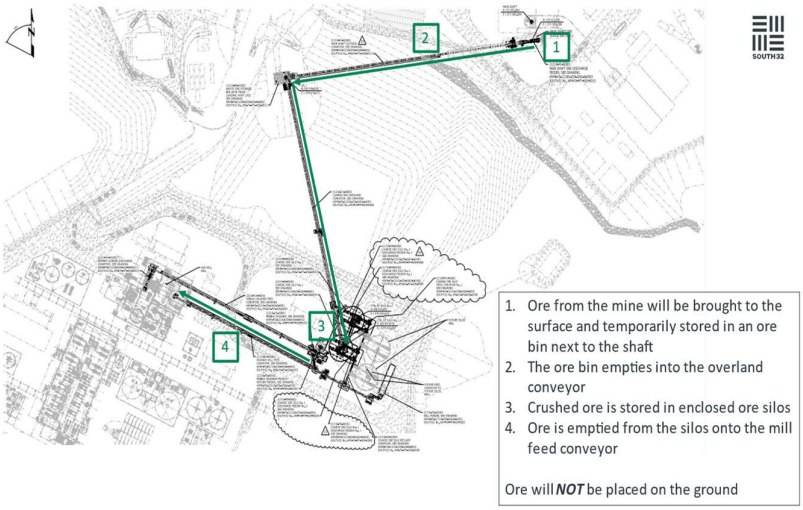
Melanie: There's other criteria like engineering, but the public input will be a big a big part of it and was the driver in finding a different alternative and resources. I will email out the survey link. It's basically a one question survey with an open question text box. You can say: I hike in this area; I live near here or and point to specific things.

4.2 Panel Budget – Melanie:

The original technical budget commitment for the Panel was $175,000 to be used on an as needed basis. To date we've spent $19,950. South32 will pay for the GNA Consultant as part of the technical assistance budget.

5. Track Out – Matt Novak:

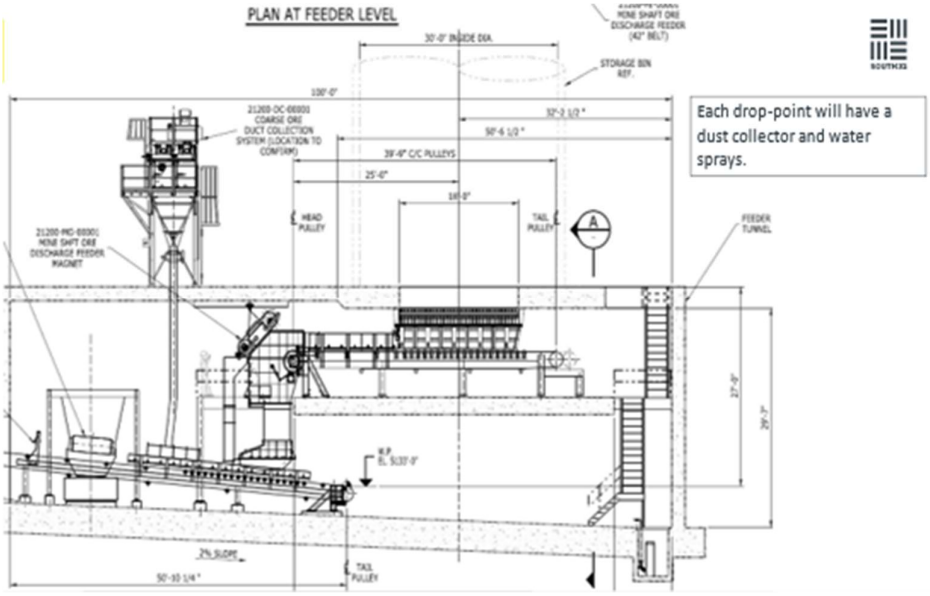
The focus of Matt's presentation was on track out and the associated risks. To start, he talked about the system, how it works, and what product concentration will be going through the system.



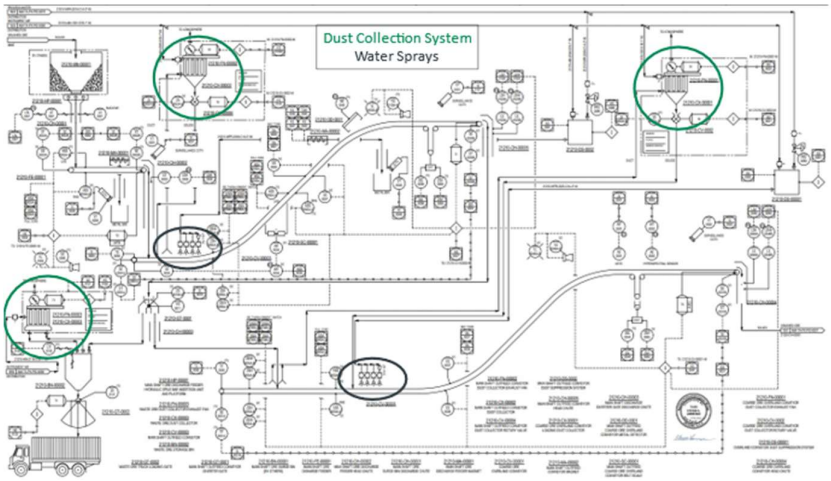
This picture [above] is an aerial plot plan of where the main shaft is on the property. This line traces the overland conveyor that takes ore to the processing plant. The ore will go directly from shafts to conveyor belts and then directly into the closed silos. We're not going to put the ore on the ground, at any point. It will be kept in the system to mitigate any dust exposure, keep things intact, easily processable, and relatively short residence time on the surface.

The primary crusher is underground. The ore at this point will be about two to three inches in size. At each travel point, there are control sprays and dust collectors, plus the conveyors will be sprayed to keep everything wet to prevent dust. The ore is dumped into the 1200-ton silos. They are made out of concrete and are like a grain silo.

This is the front end where the shaft comes up from the mine [below]. The point of all this is when we extract the ore and bring it to the surface. We're doing everything we can to prevent any release of that material from anywhere. We have controls in place, any bins and silos are covered drop points from conveyor to conveyor or conveyor to storage device that has a combination of dust collectors and sprays.

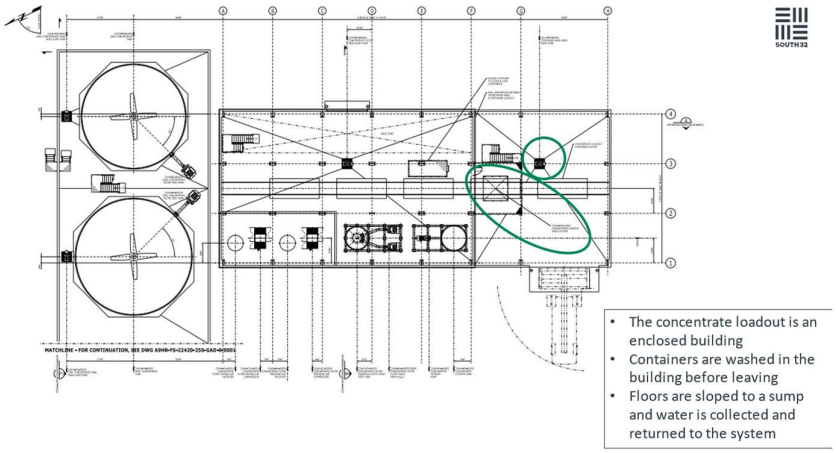


This photo [below] shows our engineering drawing of the piping and instrumentation diagram. Our dust collection systems are highlighted in the green and black circles.



Question: On a hot day it gets windy. How do we protect the stuff that's being transferred on the conveyors?

When we bring the ore up from the ground it is going to be relatively coarse. The main mill that we've selected is an aggregate mill. So instead of using steel balls, we're relying on the rock itself as the grinding medium. We're using the larger rocks to crush the smaller rocks. That inherently is one protection. These are relatively short conveyors, especially in terms of processing plants. So, 500 feet is the total distance the rock will overland traverse. Certainly, it's going to get quite hot and windy. But we will wet it first and the time period between being sprayed and that spray potentially evaporating to become a dusting problem is going to be short. We will be monitoring this closely.



Comment: *Monitoring and publishing the results is something that might be integrated into the Good Neighbor Agreement.*

Question: On the outside chance that the monitoring reveals that there is sufficient drying out can you add more sprayers along the 500 feet?

Yes. There will be a base rate for the sprays. The control room operators are always going to be monitoring the base rate. There will be control points that will sound the alarm, if needed, and the control room operator will increase that spray rate.

Question: *We get sudden dust devils that are hard to control. I'm wondering if there's any cheap way to you know to protect for dust, like tarps or add surfactants to the water to keep it wet? And most surfactants have the PFA is PFOA is that right?*

There will not be the use of surfactants for dust control at this point in the process. From a processing standpoint, it changes the water chemistry and would add a chemical to the water needing additional engineering.

Question: *Where's the water coming from that you're going to use for the spraying system?*

It will be mostly the groundwater depressurization wells. We want to use clean water so that we're not plugging the sprayers and diminishing the effect of this phase.

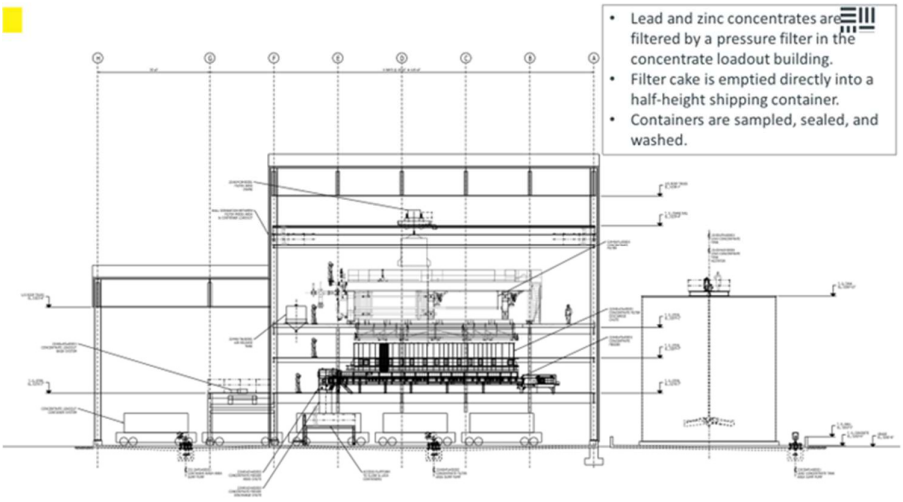
Question: *Will that be water after it goes through the treatment plant or before?*

We have inputs from both. We have the choice to use one or the other. WTP 2 or the dewatering well water

Question: *What should we be concerned about leaving the mine? What kind of minerals or substances are we talking about?*

As the material comes up from the mine, it's going to be about four and a half percent zinc, a bit of iron and iron sulfide. As far as things to be concerned about, I would say lead minerals, zinc minerals, iron minerals, and then fine particulates. In coal country, they talk about black lung. In hardrock mining we're very aware of silicosis. You get these fine particulates in your lungs, they start to harden up and cause actual harm. This isn't just about vehicle traffic on and off the site, but personally protecting ourselves when we're there, and the communities from blowing dusts.

Coming up out of the mine, at about four and a half percent, the ore goes through the processing plant to make a mineral concentrate that gets shipped as our product. So those are our lead concentration, which is up to about 70% and then the zinc concentrate, which is 53% zinc.



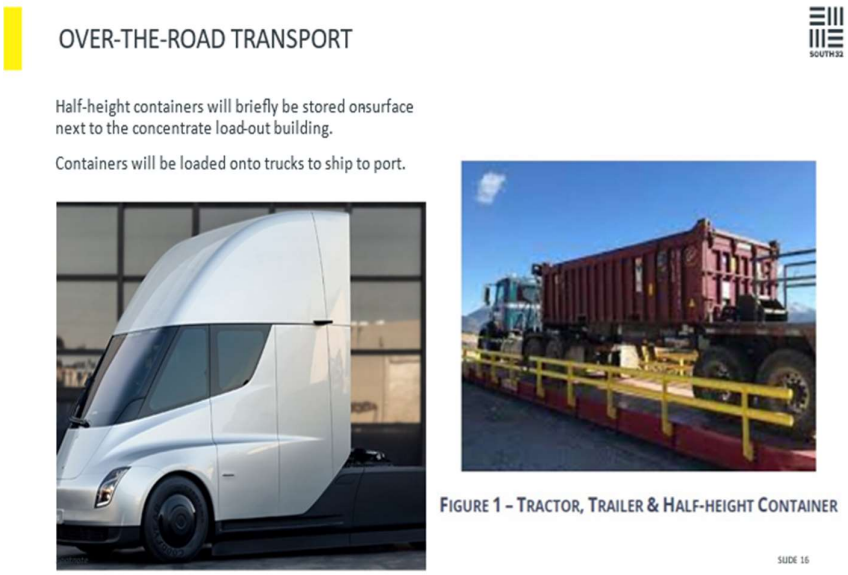
The filter cake drops straight into a half pipe container. Someone will take a product sample, to test for moisture and quality, moisture so that we ensure that it's safe for ship cargo holds. And then it is closed and sealed. Next is a truck and container wash. This is done within a covered building. All that water is blended into the sump pump on that concrete container and then goes back into the water recirculation that's used for processing.

Question: What is the volume in the container?

Each container is about 22 tons.

Question: There was an estimate at one time that 85 of those containers per day will ship out.

Yes, and this is what the half-height containers look like. [See below]



Comment: There's about 40 of those vehicles coming through Nogales during the day. And these are specially designed for concentrates. They are a lot better than the old gondolas that were used.

Question: This brings up a question regarding toxic chemicals during shipping with the train accident in Ohio followed by the toxic release recently on I-10. What chemicals are shipping in and out, how often, and what contingency plans are in place? This is something we can include in the GNA.

We will not have nitric acid on site (referring to the recent accident on I-10). For track out, there is extremely limited exposure to the vehicles or to the surrounding surface that you would get with a surface or concentrated stockpiles, which are pretty common at some of the neighboring mines. The vehicles as they go through are not going to be kicking off these minerals, by design, so that we're not taking that out of the property.

All these dust collection systems are also considered safety systems. These are critical controls for us. If we don't do this safely, we don't process. We have real time monitors to make sure that we know when there is a problem. If any of the systems in the building fails, for instance, one of the feeders is not working correctly, or the trailer was not working correctly, if the pump in that building is not keeping up, the alarms sound in the control room.

We'll have a control room on the site with two or 3 three operators. If an operator needs to see something right away, or wants to take an action from the site, they will work with someone on the ground to make corrective actions. They have the authority to shut down a process if it is not working properly.

6. **Community Group Updates – See attached reports from PARA and Flood & Flow Committee**

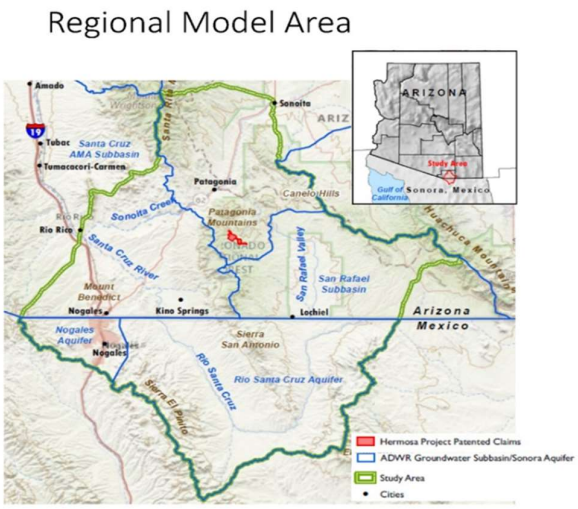
7. **Hydrology Update #2 – Dr. Ty Ferré**

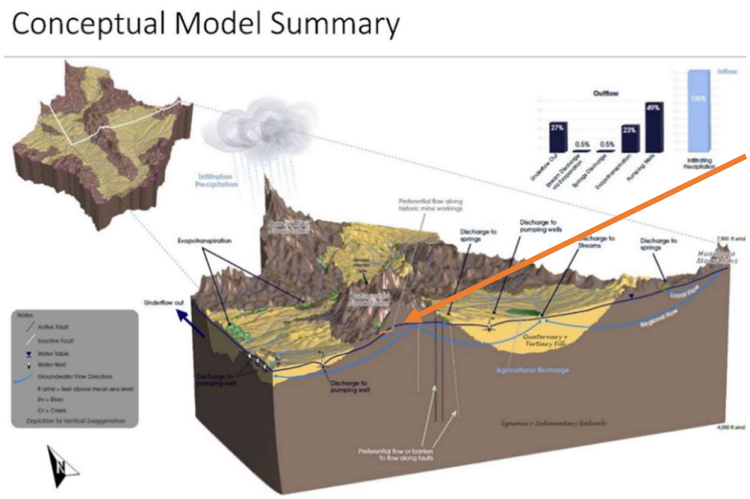
[Note: The purpose of this discussion was to review the conceptual model prepared by Newfields. The images as presented with the watermarks are as detailed as the company can share at this point.]

I see my role as a translator between you folks, the mine, and the mine consultants. Making sure that what they do in a technical sense is communicated in a way that is impactful and meaningful.

To remind you, there are three models that have been referred to or discussed: first, is a highly technical small-scale model for internal use only by South32 for their planning about pumping; second, the Clear Creek study which focused on surface water/groundwater interaction; and third, this regional model prepared by Newfields to evaluate the possible interactions of the mine water management with the larger hydrologic system. After reviewing the conceptual model report, I feel that it is a very complete report on data collection created for hydrologists. They've done their homework.

This slide [right] shows the model area of the region.





This slide [left] is a cross-section through the mountains, cutting through just south of where the South32 patented claims are [see the arrow pointing to the orange mark]. We have water that is going underground and is flowing at different depths. We have some shallow flow, we have some deeper flow, we have flow that is coming towards this region in here. We have this kind of closed area here. We have some other flow that's coming out towards us now. It's flowing out this way, we see that some water under flows out of the basin. This would be an example of why it's not necessarily a watershed map, as this is not really the end of a watershed. They have used the watershed to define the limits of what they're modeling. If you were to pump water from the area you want to mine, does this tell you where you would expect to see impact? If we think that water is flowing this way, and water is flowing that way, if I pump water from where there is a natural divide, we'd expect that we wouldn't have as much impact on that side as we have on this. Okay, so this is what we call a conceptual model. Conceptually, we can see where the dewatering is going to have potentially more impact.

Comment: We want to see how dewatering effects groundwater in Harshaw Creek, Red Rock Acres, and Sonoita Creek.

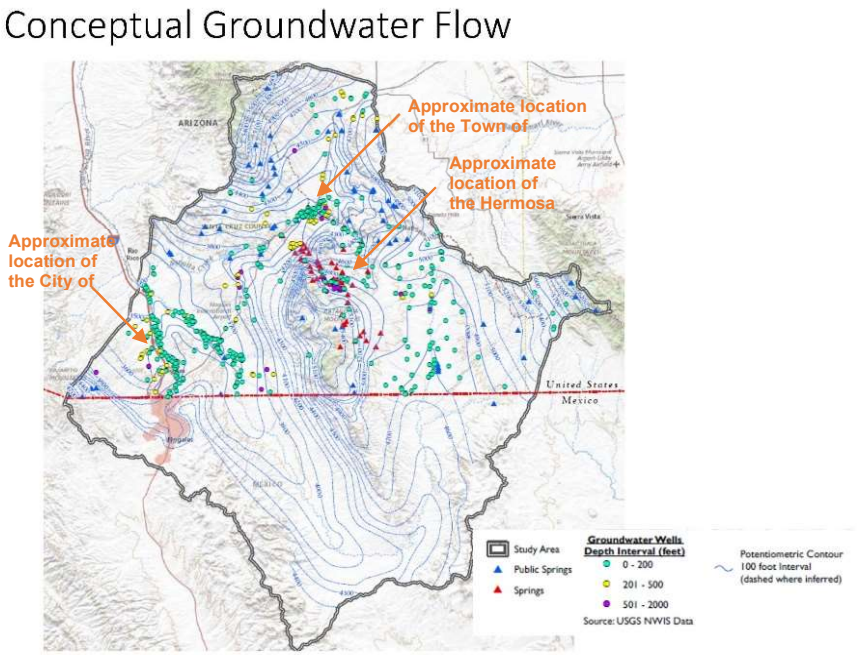
This slide [below] shows the water level surface. This is the kind of raw data hydrologists use to calibrate their test models. Models need to be able to predict water level distributions. The other way to look at this is that this map tells you where water is flowing. So, like a topographic map, you can think of water flowing downhill across these contours. Once they take water out of the system, this map will change. Once the model is built, and once the model is running, there will be updates to see where water is running and where there may be some depression.

Question: Can you point out the mine site on this slide? Where is Patagonia? Nogales? [See the arrows pointing to the locations]

Question: Are the blue lines the flow of the groundwater?

Ty: The blue lines are the elevation of groundwater. It's not a depth to groundwater.

Tomas: The blue and red triangles are groundwater seeps or springs where we think the water table intercepts the surface.



Question: How often does that change? What year was this made?

Ty: There is mention of the system being largely steady state. It's a deep system, low recharge rate. The question is when monitored over time, what changes might there be in the wells.

Question: And the contours of the groundwater level with a V shaped pointing downstream tells you which way the groundwater is, right?

Ty: It looks like a “v” or “u” shape, you can see from the topography, that it is a mountainous area. You have water shedding off both sides and then moving through the drainages. It's going from higher numbers towards lower numbers.

Question: It looks like it comes back up.

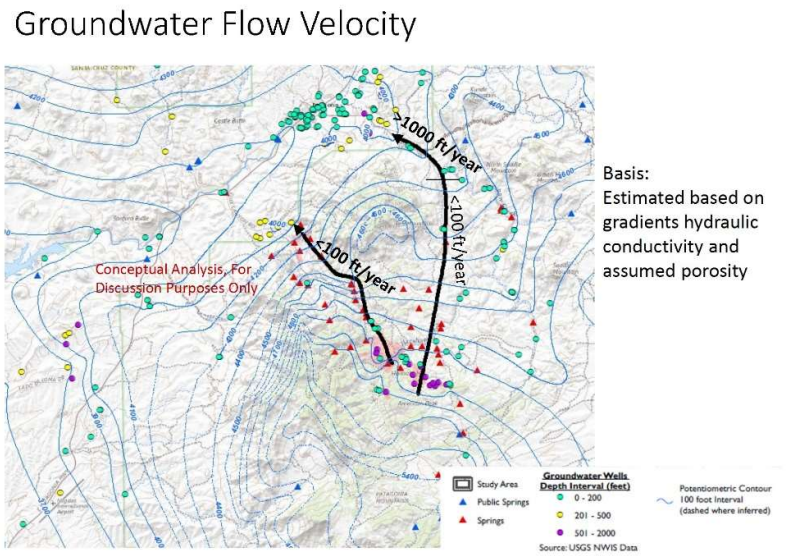
Ty: Yes. This is a complex waterflow system.

Question: As you've said, this is not a system that recharges very quickly at all. In fact, I understand it's quite ancient water. So, is there anything in this model that is addressing monitoring the groundwater itself? My concern is we dry the mountain out.

Ty: Yes, there are a couple of things that they cover in their report but let me try to address it now. There are a few things that will control how fast the water level drops, the first one is how hard you pump and how easy it is for that water to come from other areas to satisfy that need from dewatering. And then also how much water can be held in a volume of the aquifer. What's not addressed yet is what's the plan for monitoring these changes. It is helpful to know what stage we are at: first stage, the data collection that they're using to conceptualize and build their model; second stage, build a model; third stage, discuss the assumptions that go into building the model; fourth, make predictions about what will happen in the future. We are at the first stage. At the fourth stage is when you can think critically about where we should be making measurements to test the response of this model of the system.

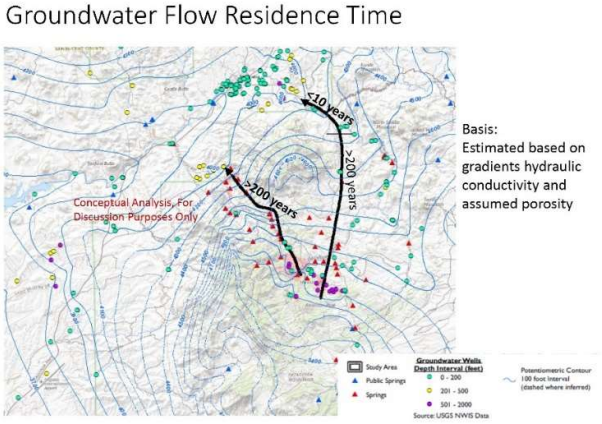
On this slide [below right] Hermosa is approximately where the arrows begin and it is approximately six to seven miles to the end of the arrows. There's an important note on the side that it's based on gradients. That indicates how fast water moves and the force

that's driving it. Then, how easy is it for water to move through that system given the slope of the hill. For example, you can have a big hill, but if your axle is poorly greased, it's not going to go very fast. So, we have these two things that are taken together. And then they have something else in here, it's assumed velocity. And it is a little bit of a detail, but I want to throw it out to you. When we talk about how quickly water moves, it's a little bit different than how fast solutes move through the system. But this velocity number does affect the speed with which solutes move.



The important thing is that we have flows in through here that are relatively slow. So, if that's 4000 feet, then we're looking at about 40 years of travel time. So, wherever you want to look, you can think about the flow arrow, which tells you the path that it will take. And then we can do calculations on how long it takes to move. Why might that matter? If you're concerned about any contaminants that might be in the water and where they might be moving. How long would it be before you can see the impact? Say there is a spill – it's not like it is going to spill today and going to be here tomorrow. On the other side, it stays around for a long time. So, once it's in the system, it stays for a long time. So, it's just to give you a concept of the time basis that we're talking about in these systems.

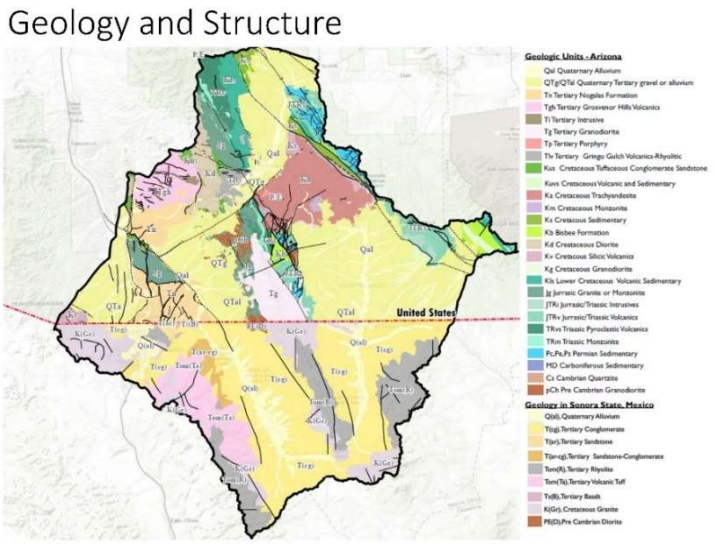
Question: Well, you're only looking at the groundwater, not looking at the dewatering at the surface, being discharged onto the surface. You are going to need to deal with both.



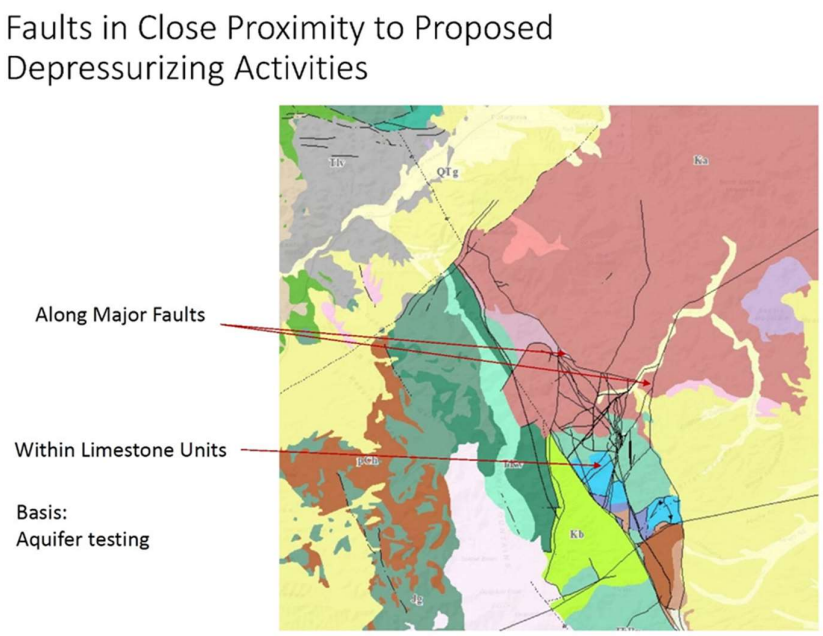
Ty: This is a groundwater model. Let's hold that. This slide [left] is about residence time. If you know the velocity, you know the distance. This is saying it's going to take about 200 years to get to this point and then another 10 years to the final point. This is where it's important for you to think about both the path that it takes and how fast it's moving in each region. It can vary quite a bit. Because hydraulic conductivity can vary by an order of magnitude. It can be hundreds or thousands of times higher or lower in one place versus another.

There are potential vulnerabilities in different locations on the path. Depending on what is put in the model, somebody's pumping at their house may not show up on this scale. But if there was another big groundwater user, then they would presumably change the water distribution. Now, once they start the monitoring, that map is going to change, and you're going to want to have all these maps updated.

Okay, then we have things like geology and structure [right]. Each one of these colors generally represents a different hydraulic conductivity. You can imagine now why something that's flowing along here in the yellow and enters the red, why it might speed up, or why it might slow down. And this is an important thing that they put into the models to try to represent the system. Based on geologic maps, the modeler can surmise which regions may be like each other. They also try to take any pumping tests (or other information) to estimate the property for that unit.



In this slide [below left] it shows that there are a lot of faults in this region which could be either conductive or restrictive to flow.



Question: When you start doing dewatering, what is that going to do to the stability of the region?

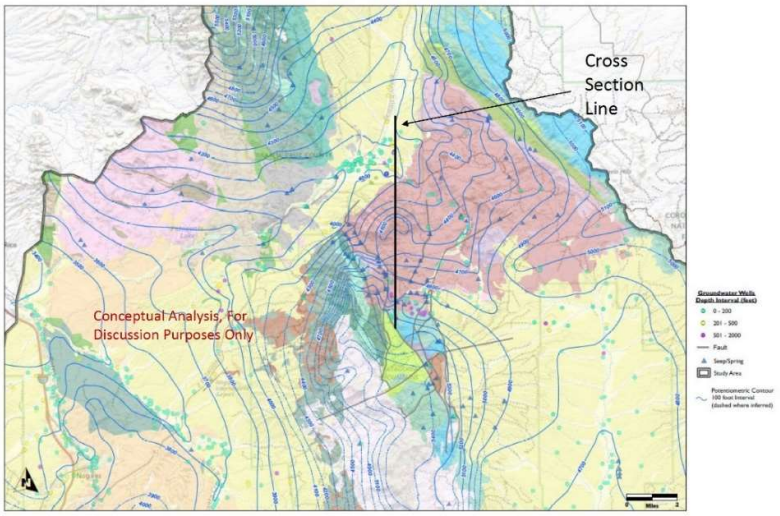
Ty: It depends. If you dewater by one meter, one meter of water pressure is not that much in terms of the rock, rock pressure, and stress. If you dewater by 100 meters that's something to consider.

Tomas: I'd like to make a clarifying comment. Some of these faults may be millions of years old. So, while they're on the map showing the geologic relationships, from a functional hydrologic standpoint, they may be completely sealed off and the same as the surrounding rock. The fault has been offset and that offset could have happened millions of years ago. There's not necessarily a significant hydrologic correlation between faults and flow changes. However, there are many places where these faults are hydrologically functional.

Question: Are they being modeled as a homogenous medium?

Tomas: The faults are not modeled as discrete units, but they can be modeled as discretized units with a difference in permeability.

Groundwater Flow with Geology

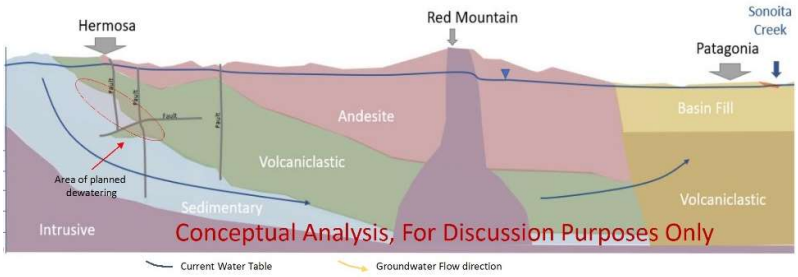


Ty: They may not be active faults, but the reason that we need to have them in a hydrologic model, is that there could be crushed material that would increase the porosity and make it easier for water to flow in that region. Or you may have an impermeable unit that has been shifted up against a more permeable unit. In that case, the fault becomes impermeable.

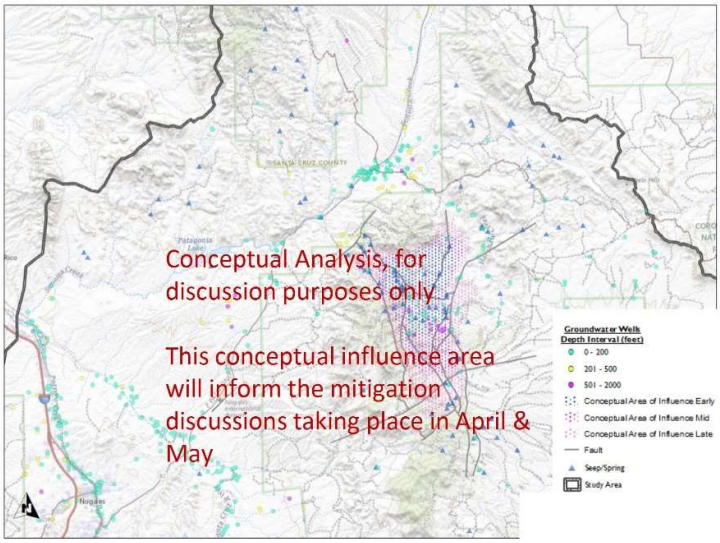
This slide [right] will help us to understand how they're conceptualizing this. For instance, if we think that water is going to flow right across this boundary what we see here is a very, very steep gradient. That means that it takes a steep gradient to drive water through that unit. They are representing this as a relatively low permeability unit. The reason for the overlay is that there are clues about how geology should be represented.

This slide [right] is a long cross section. This helps to explain the area of influence on the next slide.

Groundwater Flow in Cross Section



Conceptual Area of Influence



This slide [left] shows the area they are dewatering.

The three layers of color show that over time dewatering will continue to have influence. If you want to keep the water really low at the mine, the lowered water surface will cause water to flow towards the dewatering. As a result, you have to continually pump. At first, they will take a lot of water out and have a steep impact. Over time, it's going to become less steep and move father out.

Question: Is this the "Cone of Depression."

Ty: The "Cone" only happens in homogeneous areas. Basically, this is the area conceptually in which the water table has been lowered. Also, this is not a cone, not a

circle. The simple representations sometimes show an ice cream cone shape that spreads out. This is spreading in preferential directions which has to do with the geology. This is a conceptual understanding of how that depressurization will occur. Expect the biggest change near the wells. And that change is going to move farther and farther away from the wells with time, becoming shallower and shallower with progression of time and distance.

Question: The other thing is that there seems to be dewatering impacts into the San Rafael.

Ty: The model will make predictions three or five years out. With groundwater monitoring, they will collect dynamic data and determine if and where the model needs to be reconceptualized or revised. Depressurization can be complicated. Depends on geology, it depends on all sorts of things.

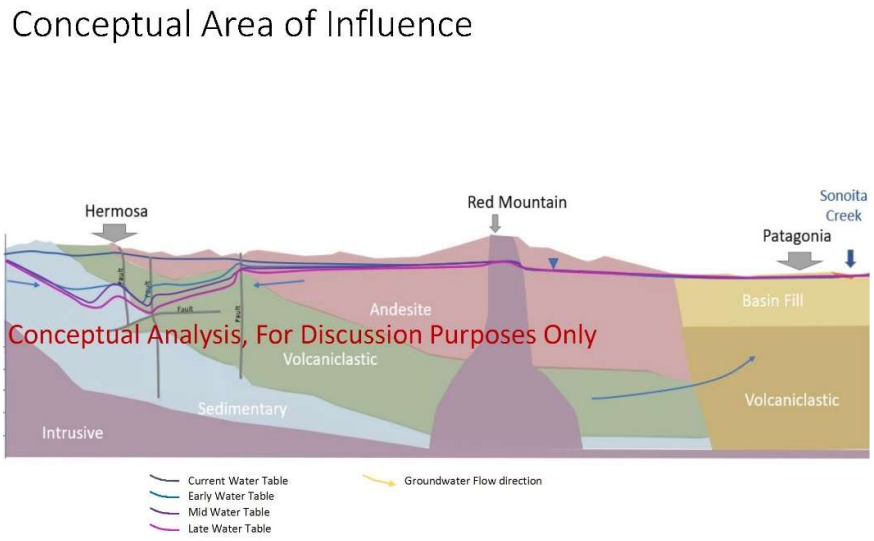
Question: When we look into the future, 5 or 10 years, even more, there are other mines coming into the same area. How are they going to be coordinating that data to update? Because then you have multiple perturbations.

Ty: Guessing where other mines might get approved, and what their pumping rates might be, is not something we can do in this analysis. Once this model is built you could model potential interaction.

Question: The other question that comes to my mind, it's an exceptionally large region we're modeling; what's the resolution?

Ty: It will depend. You can have one region that's high resolution and one that is not. You can now do nesting models. If you were to try to model this entire system at very fine resolution, you don't have the data to do it.

This slide [right] shows a conceptual model of how the dewatering will progress with time in a cross section.

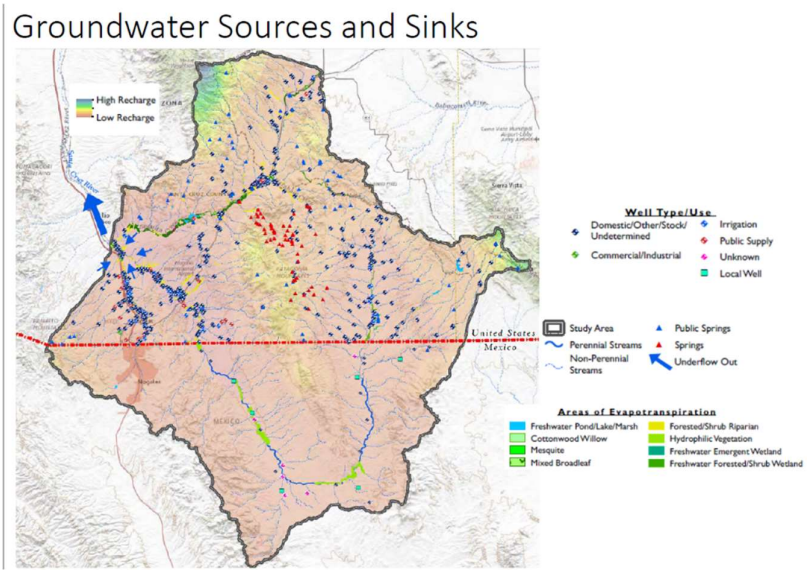


Question: What are early, mid and late?

Ty: This is intentionally conceptual. It's saying that we don't know if this is a year, five years, 10 years at this point. When the predictive model is built, time will be estimated. That's how we can know how quickly the changes will impact the system. Because at this point, we don't have anything that can make predictions.

Question: We have heard that the mine life may be 20 years or 50 years. How does that fit it?

Ty: Yes. The most useful thing about models is that they're "what if" machines. Once you have that working model in hand you can make different runs. For example: what if the mine lasts 50 years versus 20 years?

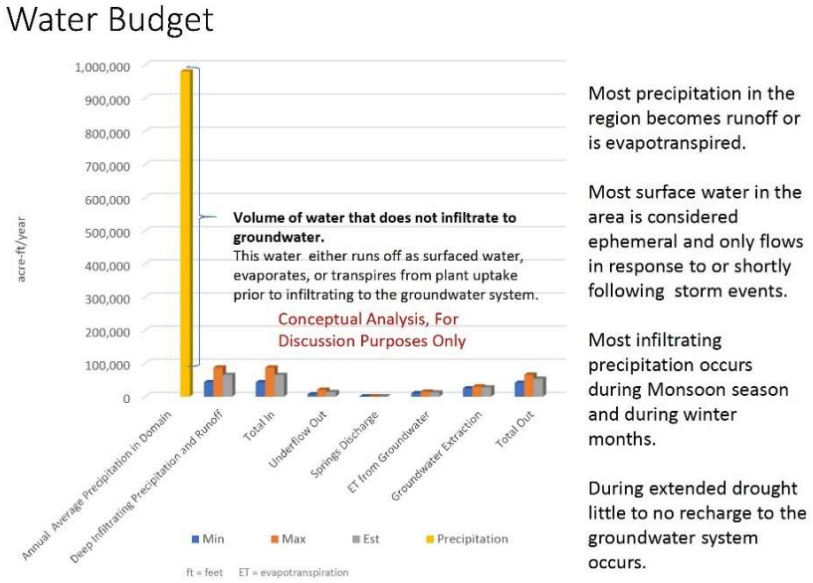


This slide [left] shows the location of the springs and wells. This data, together with those predicted dewatering and predicted pathways from the mine, is where you will identify the impacts of dewatering.

Overlaid on this is high and low recharge areas. Recharging is highly localized. It's basically in the highlands where there can be snow along with some of the streams. Other than that, we have little recharge in this area which means the background water level is not changing every month. Even with big rainfall, much of that water runs off and does not affect groundwater.

This slide [right] informs us further about how this system works. The yellow bar is all the precipitation that the area gets. The other bars are things that happen in the subsurface. Very little water gets down to the groundwater. If you make a big change it takes a long time to recover.

When the model is built it will tell you the best estimates of time for recharge of the water table depending on the place.



Most precipitation in the region becomes runoff or is evapotranspired.

Most surface water in the area is considered ephemeral and only flows in response to or shortly following storm events.

Most infiltrating precipitation occurs during Monsoon season and during winter months.

During extended drought little to no recharge to the groundwater system occurs.

Question: Is there any coupling with climate change?

Ty: There is not.

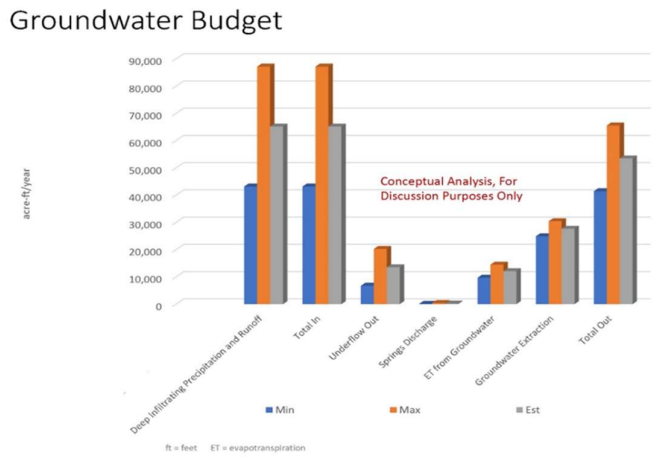
Comment: That's important. It's undeniable that we are in the 20th year of drought. The bottom-line on the slide shows that drought has an effect. Things are changing I see that as a critical factor.

Ty: And these are changing. This is where predictions with uncertainty come in with modeling. There are three categories of outcomes that are a part of uncertainty: what things are fine, and you don't have to worry about them, what parts show that uncertainty might matter, and what things are a problem regardless of the answer.

Question: And measuring those outcomes is critical for what ifs. What if we hit a key marker?

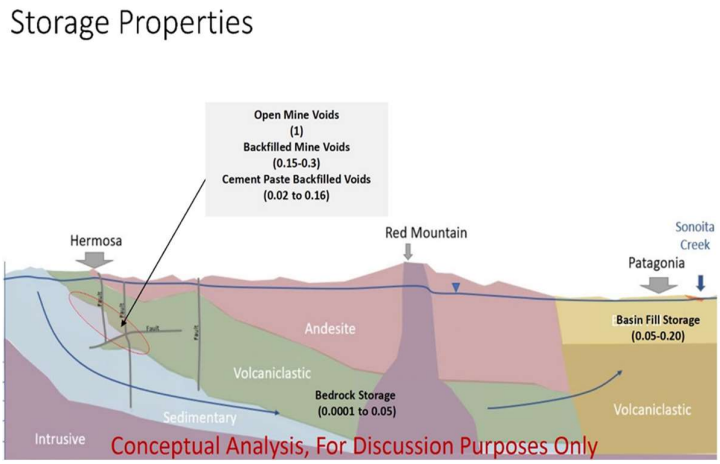
Ty: Let's say five models were built. Or, one model, with five different climate scenarios. Let's imagine that 50 years from now, the model says there's going to be a problem. If we wait 50 years and there's a problem, we could say, "oh, look, this was the right model."

Tomas: One of the things also associated with that type of evaluation is looking at the potential influence associated with the operation of the depressurization system. There's potential for mitigation of the impacts. When we see that there's going to be a potential problem in the future, we can identify what to do about it now in order to avoid it.



Ty: This slide [left] is breaking the water budget down a little bit more. One of the things we're concerned about is spring discharge because it's important for the ecology in the area. But in terms of modeling, it's a tiny thing. It's one thing to say our model is performing well over this giant area. But that can have compensating errors. As the model is built, what measure of a specific part will indicate it is doing well?

This is the last slide [right]. The mine is not in the business of taking water out of the ground. If they could do all of this without having to pump any water, they would be happier than all of us. They need to dewater so that they can get access to do the mine work.



So, if you have low storage capacity, that means that you can drop the water table far by taking only a little bit of water out. But to dewater effectively, this means you are going to dewater a bigger area. In the model, you characterize the aquifer storage as low as possible to predict how depressurization impacts are going to move through time.

This slide is telling us that to get one cubic centimeter of water out, you need to have 10,000 cubic centimeters of rock. That's a low storage in bedrock, but then you need to consider the backfilled mine voids. To refill that, you need to put more water back in than you took out. Initially, you are taking water out of rock with low storage capacity, then you're refilling into something that has higher storage capacity.

Comment: We've been told several times that the backfill would be the same conductivity as the parent material

Ty: This isn't conductivity. This is storage capacity. There are two types of backfill mine voids, and then there's cement paste backfill. I know some of it is going to be backfill paste which has lower porosity, and therefore it doesn't take as much water when you fill it. Another aspect of this to consider is that we have a series of what ifs. What if these are the properties? What if we pumped at this rate? What if we use this mitigation? What

if we stopped pumping? What will it look like in 20 years? We can start to make predictions with the model with a grain of salt. Always keep a grain of salt.

Question: Once you get the answers to the model, then it seems like you have more questions. And then another model that you must do. It seems like this is endless.

Ty: You're right. In every sort of reasonable modeling project, I think, you have a stage where you do conceptual modeling. You're gathering information, you're trying to think about the entire system, drawing arrows and thinking about the way things move. And then you build a numerical model. The new model opens new questions. The hope is that it's driving you to ask more focused questions. The more you know about something, the more you can ask. But you get to a certain point where you say we know enough to decide, or to build contingencies. This is why GNA's are valuable. We have a mitigation strategy identified and we all agree that if we see this outcome, this is what we're going to do for it.

Question: Yes. So, to that point, we say okay and go ahead and there's a mitigation factor in the GNA. Whose job is it to rerun the model? To confirm that?

Ty: That it is something that must be agreed upon. It's a question that's come up over and over. How often will they recalibrate the model? When we say recalibrate, it might be reconceptualized. There's no point doing it in six months because you don't have enough data. But if we wait 20 years it is too late. The nature of the responses of these things is that you have relatively large impacts at first, and then it slows down. I think within five years you can do a recalibration and reconsideration of the model; then maybe again at 10 years, and then maybe again after 20 years. You will begin to get sense of what's going to happen in the system early on so that you're not going to be totally surprised.

Question: Are you familiar with the electromagnetic flyovers that were done for the Nogales and Rio Rico quadrants? I don't know what it would cost, but it sure seems that the more correct your structure geologically the better for building the model.

Ty: I don't know this area, and other people will know it much better than I do. You know, as hydrologists, we are always the poor cousins of every other geoscience. Often, the way that we get good data is when it is collected from something else. It could be that it would be useful. It is a good question. Thank you everyone.

8. **Wrap-Up – Catherine:**

   8.1. Meeting agenda: The tentative April meeting agenda items will include, in addition to the normal agenda items: a discussion of hydrology with Ty; and follow up on the Track out by a South32-Hermosa representative.

   8.2. Meeting time: The lunch will be served at 11:30 a.m. to accommodate the meeting starting on time at 12:00 noon.

   8.3. Meeting location: According to the Charter there was not a 2/3 majority with the vote we took in March to determine the meeting location. Motion by Linda, second by Liz, to meet in Patagonia in April. Motion failed.

   Motion by Marcelino, second by [unknown] to meet in Nogales in April. Motion passes. We will meet at the Santa Cruz Provisional Community College.

5 Attachments:

1 – South32 Hermosa Route Discussion Slides

2 – Flood & Flow Update

3 – PARA Update

4 – Dr. Ty Ferré's Briefing Slides

Attachment 1

South32 Hermosa
Briefing Slides

Facilitation Provided by Interfuse Associates
www.interfuseassociates.com
Catherine@interfuseassociates.com

SOUTH32 HERMOSA

Project Overview
March 2023

HARSHAW ROAD DETOUR

- South32 will be making improvements to Harshaw Road near the Hermosa Project.
- Work will begin in March and end around September.
- Road detour signs have been placed where the road intersects with the north and south edges of the Hermosa Project site.
- A detour around the construction zone, along a short stretch of Flux Canyon Road is available for public use during this time.
- Emergency services have been notified.

CROSS CREEK AREA ROAD

Land transfer was completed last week.

South32 retains a non-exclusive easement to construct and then use the road.

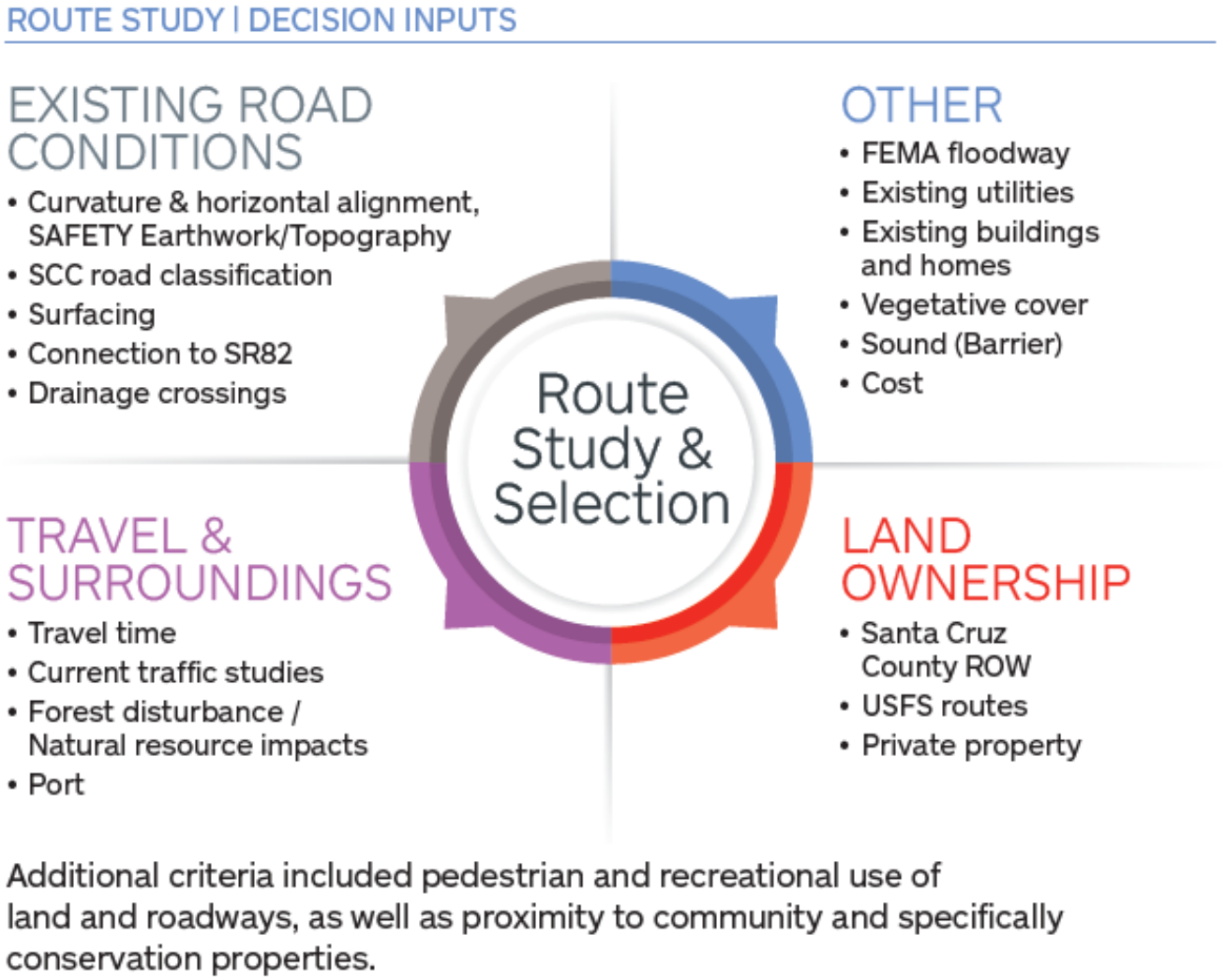
<u>Putting a plan together:</u>

- Walk with Red Rock Acres neighbors
- Dates for permit submissions
  - ADOT encroachment permit
  - Floodplain use permit
- Construction schedule

Hunter will be the contractor (completed phases 1-3 of Town of Patagonia road improvement projects)

ROUTE STUDY (2019)

- **Goal:** Move product to market with minimal impact to local communities
- Criteria presented in September 2019
- Evaluated routes against criteria and began process of elimination
- Evaluated against U.S. Forest Service Transportation Plan
  - Soldier Basin not pursued because of excessive disturbance to USFS land (of all routes had the highest total acres of disturbance)

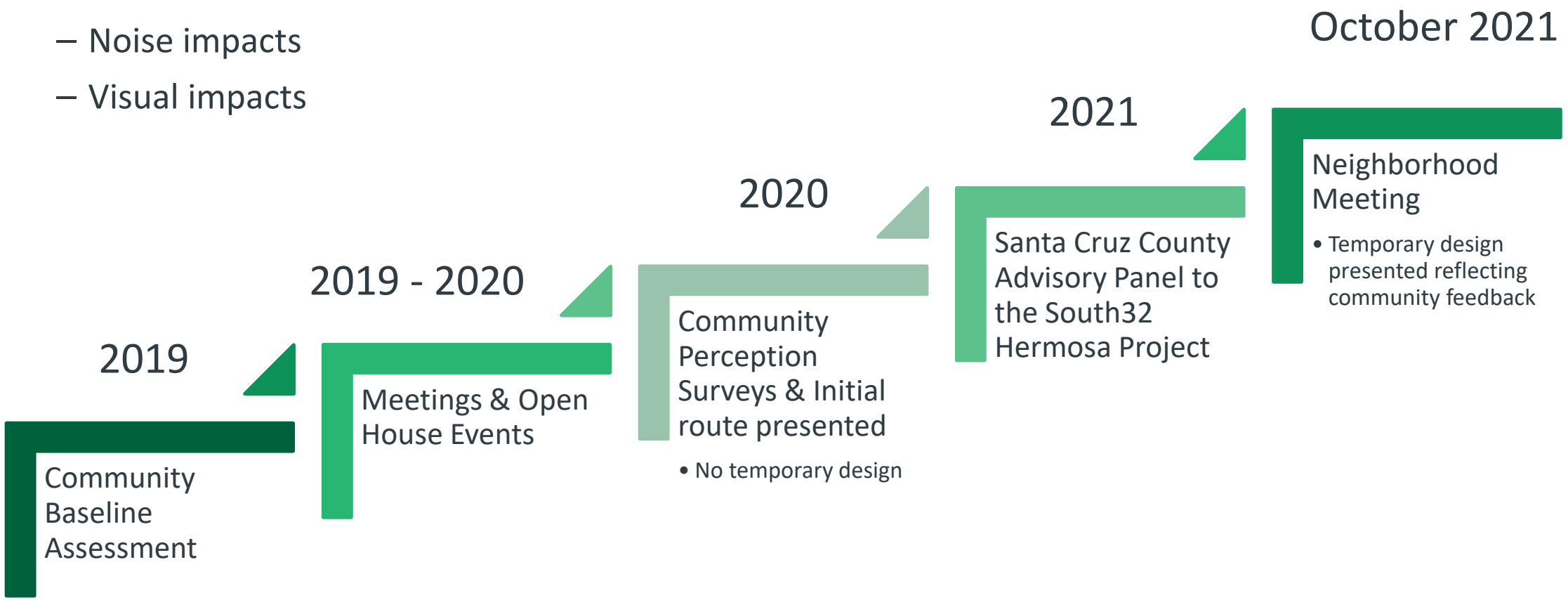


Additional criteria included pedestrian and recreational use of land and roadways, as well as proximity to community and specifically conservation properties.

ROUTE STUDY - ENGAGEMENT

Key concerns related to traffic and transport routes

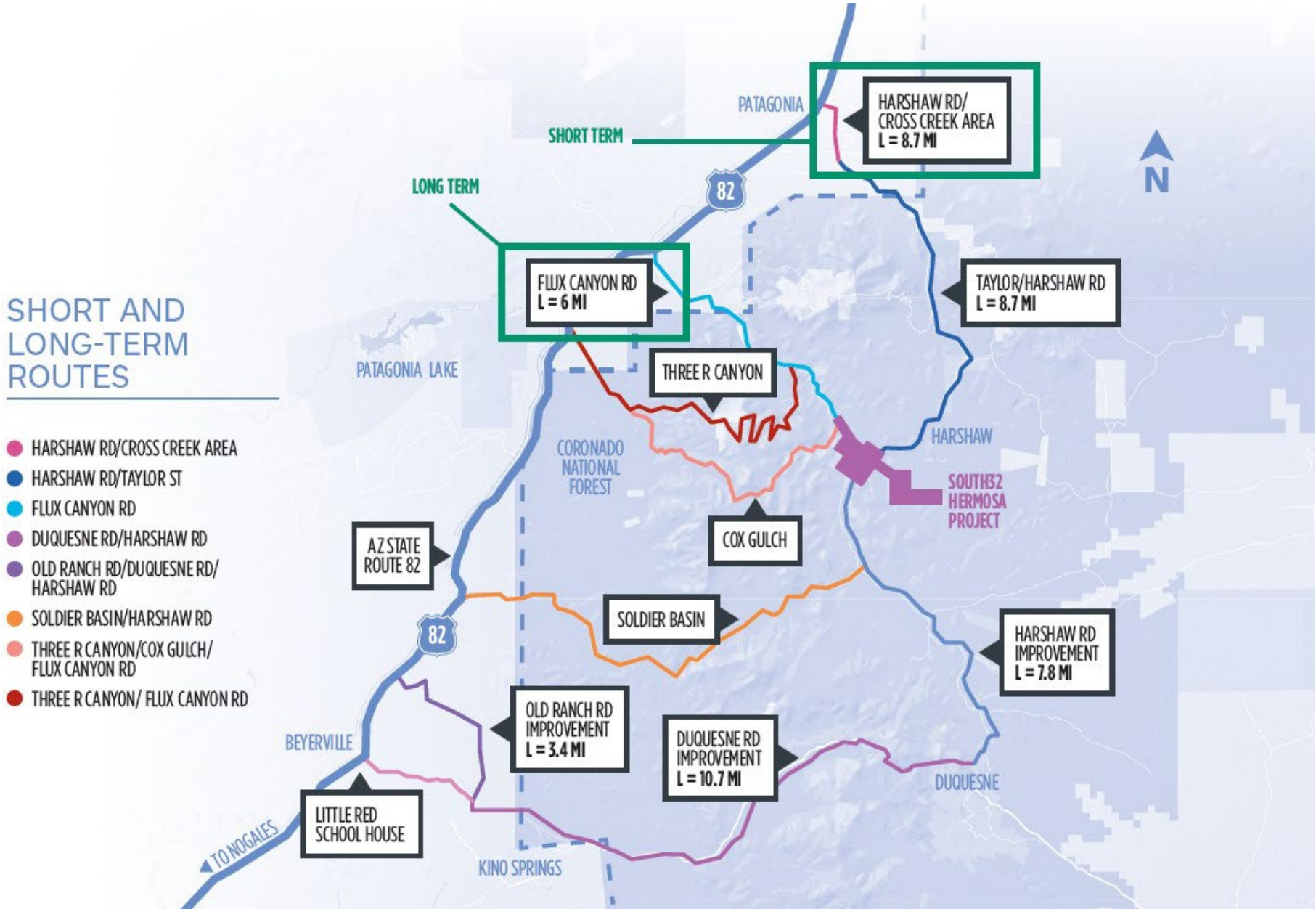
- Noise impacts
- Visual impacts



ROUTE STUDY (2020) – TWO POTENTIALLY VIABLE ROUTES

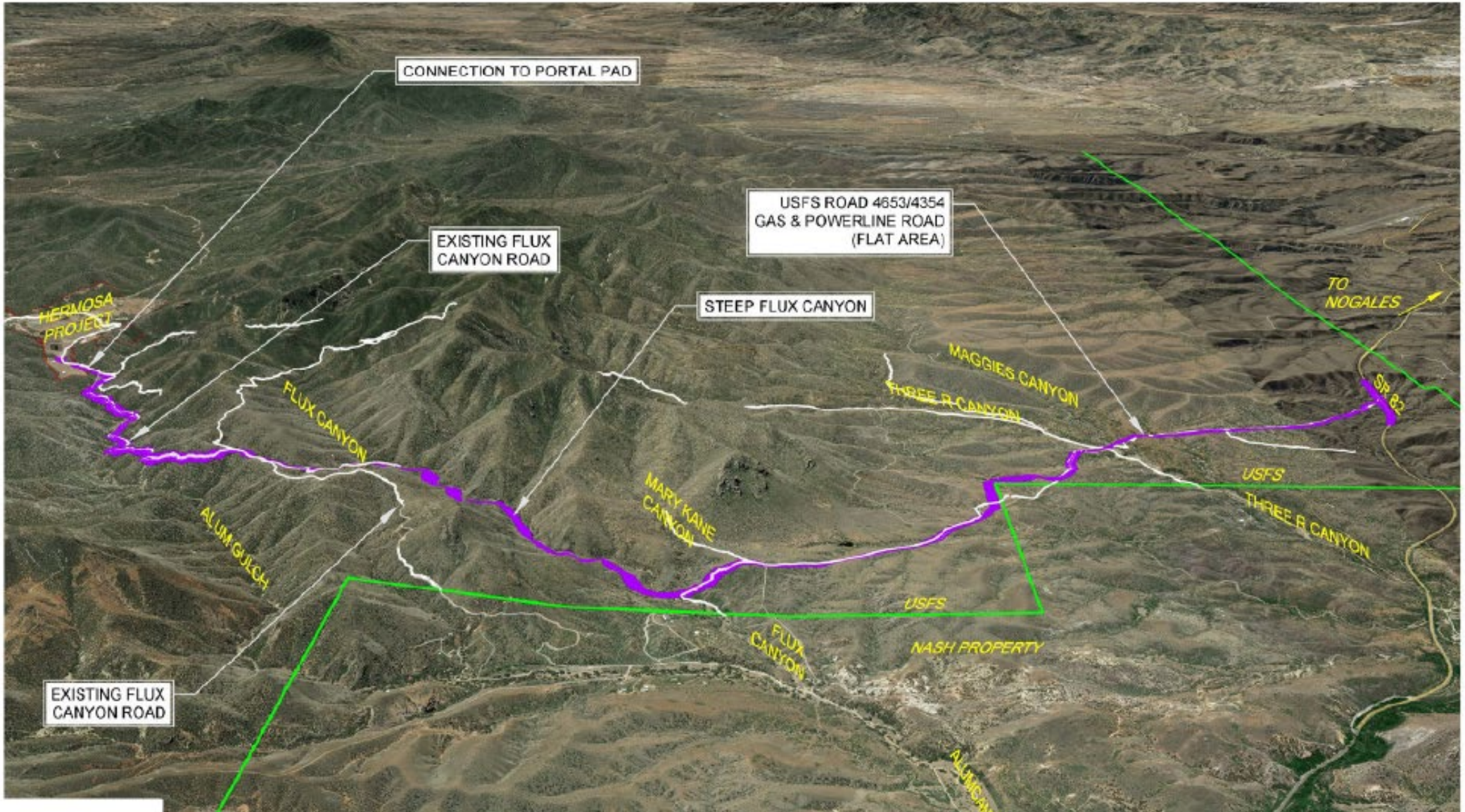
Short-term:
Cross Creek area road

Long-term:
Flux Canyon

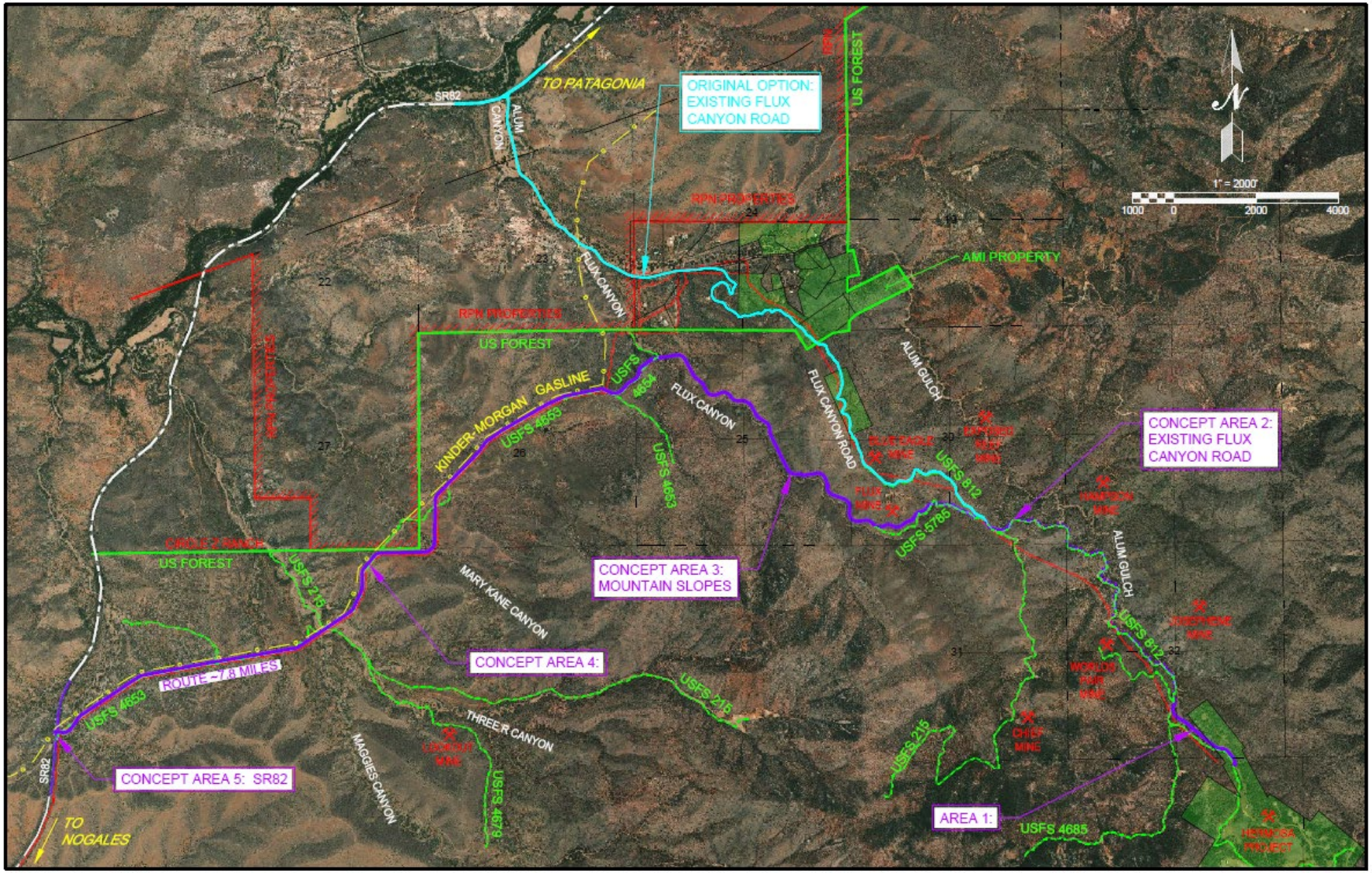


LONG-TERM ROUTE ALTERNATIVES

New alternative currently being evaluated (view looking west)



LONG-TERM ROUTE ALTERNATIVES (AERIAL VIEW)



YOUR FEEDBACK IS REQUESTED

1. Visit the Patagonia office over the next four weeks

- Maps of both routes available
- Please provide comments – share feedback on considerations, other activity in the area

2. Complete a short survey

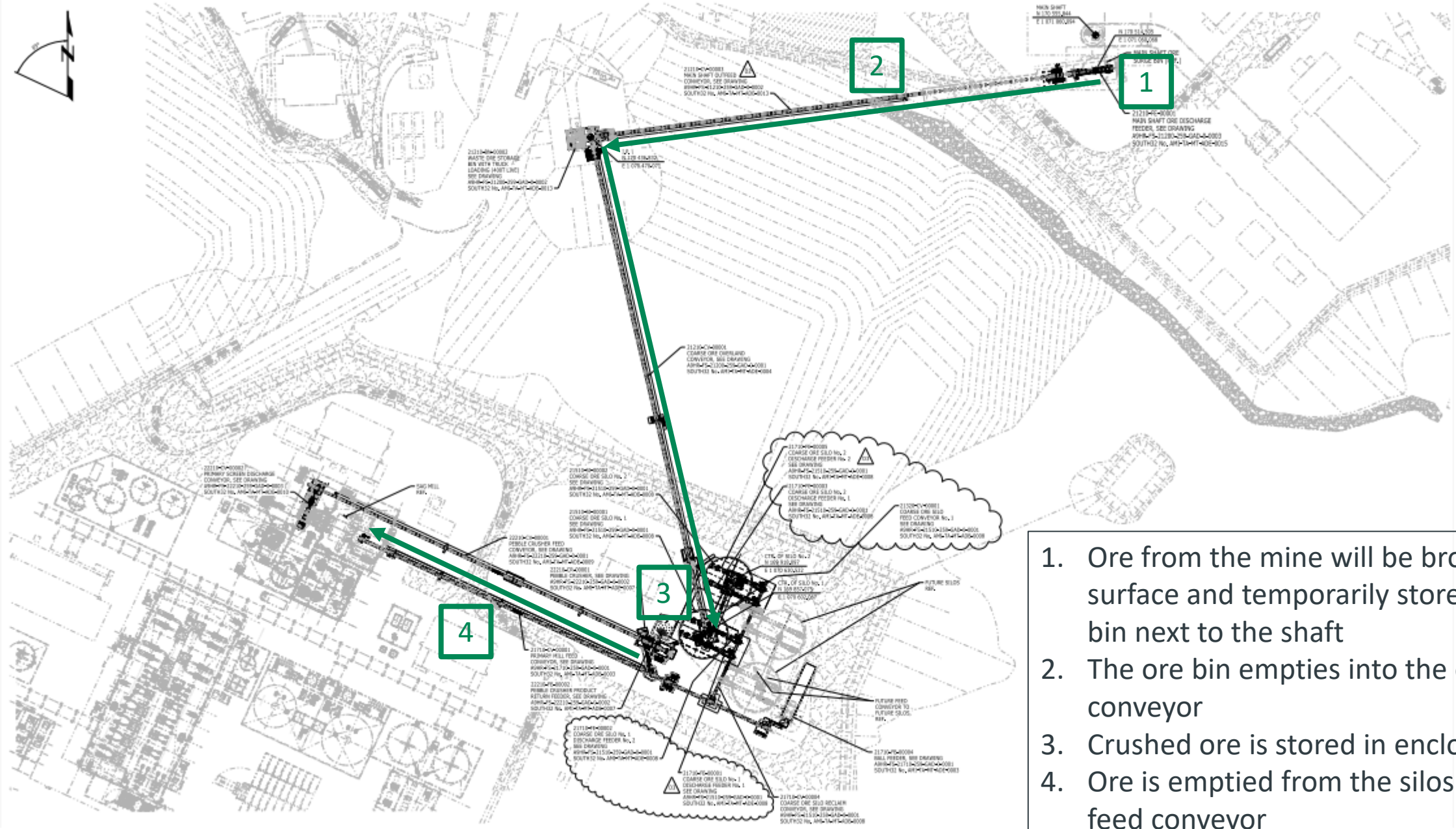
- (ADD LINK)

3. Email askhermosa@south32.net

Please remember that both routes would cross US Forest Service lands and therefore require a federal permitting process which will include public scoping and comment periods.

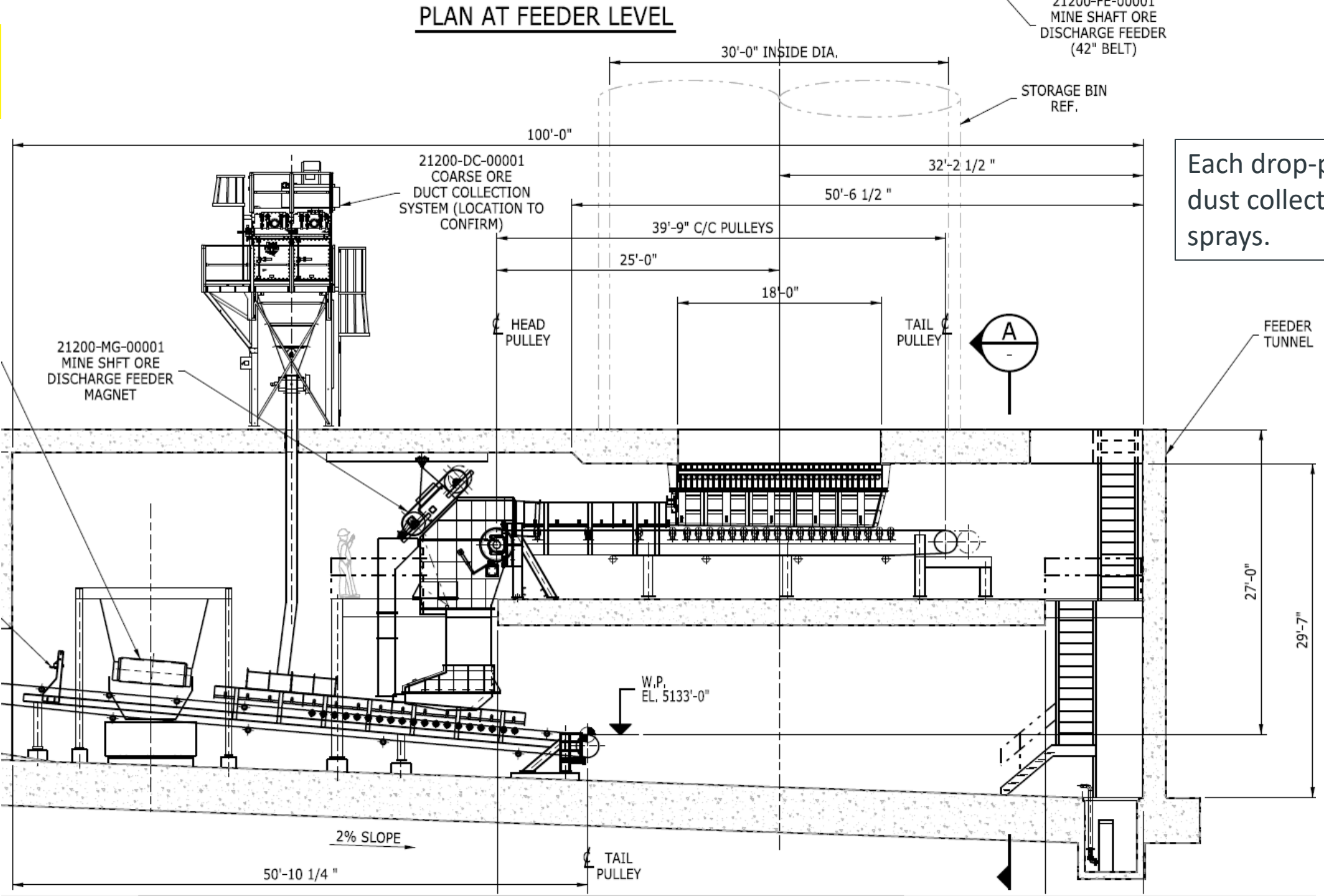
TRACK OUT DISCUSSION

March 2023



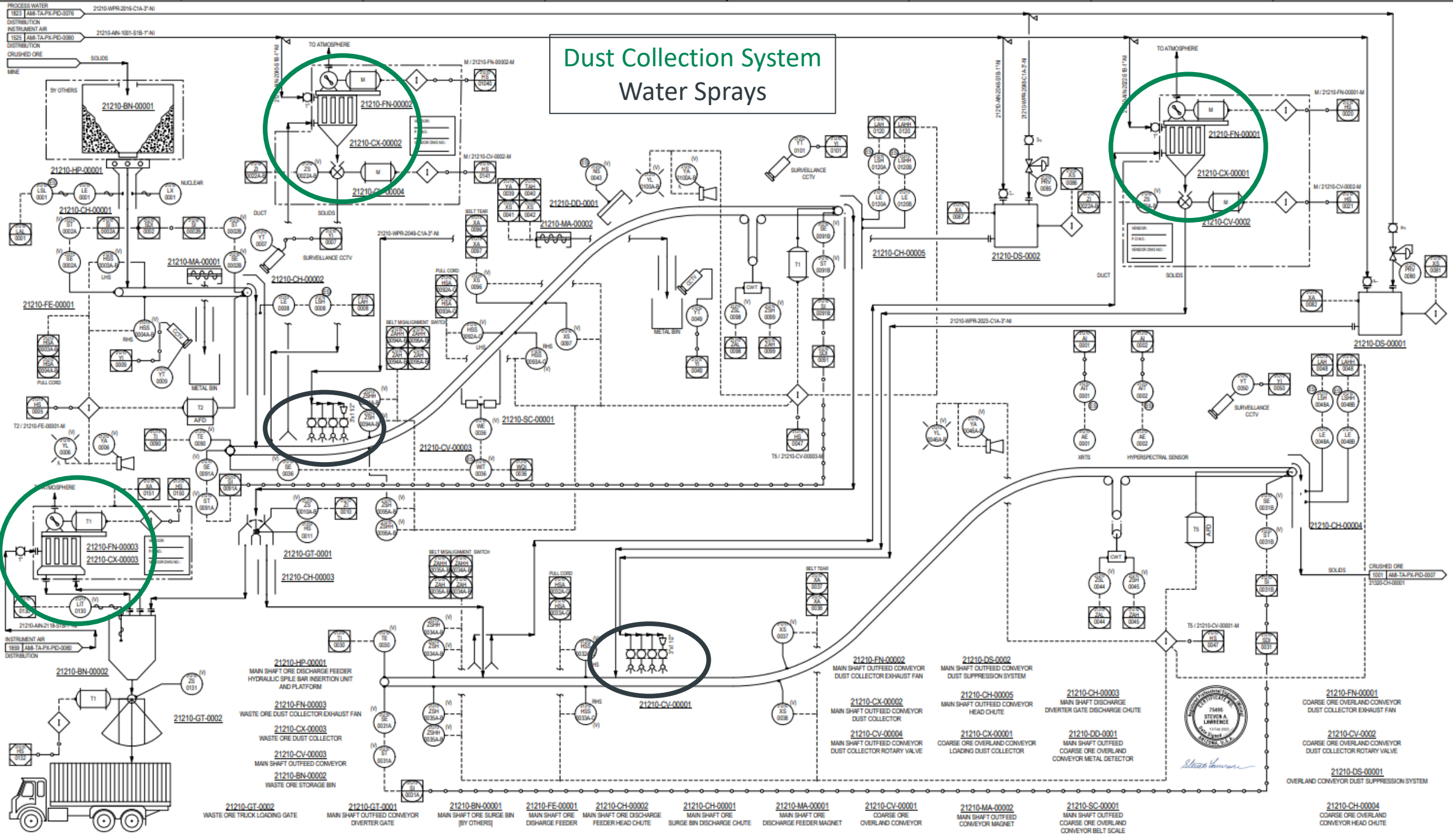
1. Ore from the mine will be brought to the surface and temporarily stored in an ore bin next to the shaft
2. The ore bin empties into the overland conveyor
3. Crushed ore is stored in enclosed ore silos
4. Ore is emptied from the silos onto the mill feed conveyor

Ore will ***NOT*** be placed on the ground



Each drop-point will have a dust collector and water sprays.

Dust Collection System
Water Sprays



21210-HP-00001
MAIN SHAFT ORE DISCHARGE FEEDER HYDRAULIC SPILE BAR INSERTION UNIT AND PLATFORM

21210-FN-00003
WASTE ORE DUST COLLECTOR EXHAUST FAN

21210-CX-00003
WASTE ORE DUST COLLECTOR

21210-CV-00003
MAIN SHAFT OUTFEED CONVEYOR

21210-BN-00002
WASTE ORE STORAGE BIN

21210-FN-00002
MAIN SHAFT OUTFEED CONVEYOR DUST COLLECTOR EXHAUST FAN

21210-CX-00002
MAIN SHAFT OUTFEED CONVEYOR DUST COLLECTOR

21210-CV-00004
MAIN SHAFT OUTFEED CONVEYOR DUST COLLECTOR ROTARY VALVE

21210-DS-0002
MAIN SHAFT OUTFEED CONVEYOR DUST SUPPRESSION SYSTEM

21210-CH-00005
MAIN SHAFT OUTFEED CONVEYOR HEAD CHUTE

21210-CX-00001
COARSE ORE OVERLAND CONVEYOR LOADING DUST COLLECTOR

21210-CH-00003
MAIN SHAFT DISCHARGE DIVERTER GATE DISCHARGE CHUTE

21210-DD-0001
MAIN SHAFT OUTFEED COARSE ORE OVERLAND CONVEYOR METAL DETECTOR

21210-FN-00001
COARSE ORE OVERLAND CONVEYOR DUST COLLECTOR EXHAUST FAN

21210-CV-0002
COARSE ORE OVERLAND CONVEYOR DUST COLLECTOR ROTARY VALVE

21210-DS-00001
OVERLAND CONVEYOR DUST SUPPRESSION SYSTEM

21210-GT-0002
WASTE ORE TRUCK LOADING GATE

21210-GT-0001
MAIN SHAFT OUTFEED CONVEYOR DIVERTER GATE

21210-BN-00001
MAIN SHAFT ORE SURGE BIN [BY OTHERS]

21210-FE-00001
MAIN SHAFT ORE DISHARGE FEEDER

21210-CH-00002
MAIN SHAFT ORE DISCHARGE FEEDER HEAD CHUTE

21210-CH-00001
MAIN SHAFT ORE SURGE BIN DISCHARGE CHUTE

21210-MA-00001
MAIN SHAFT ORE DISCHARGE FEEDER MAGNET

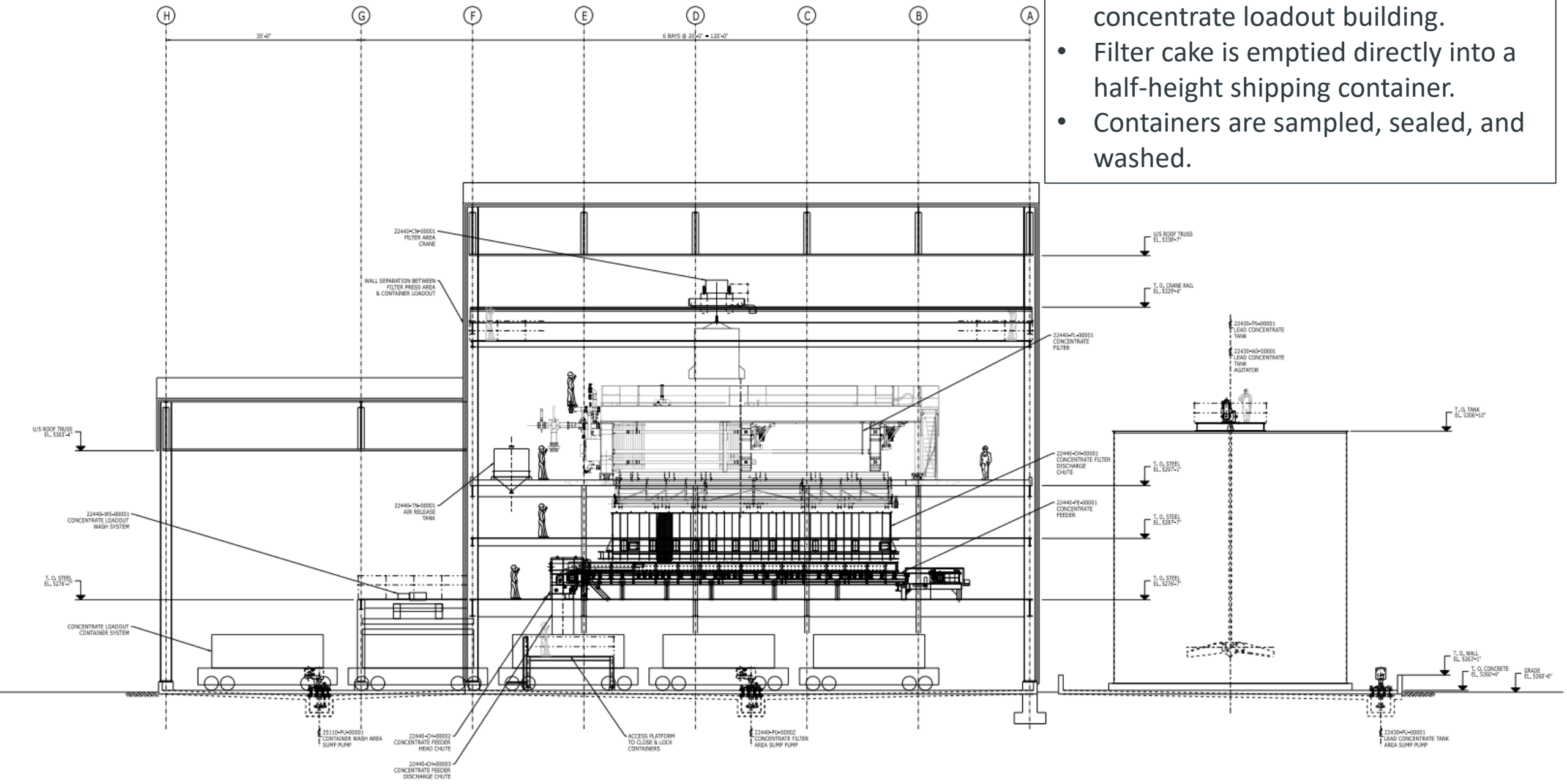
21210-CV-00001
COARSE ORE OVERLAND CONVEYOR

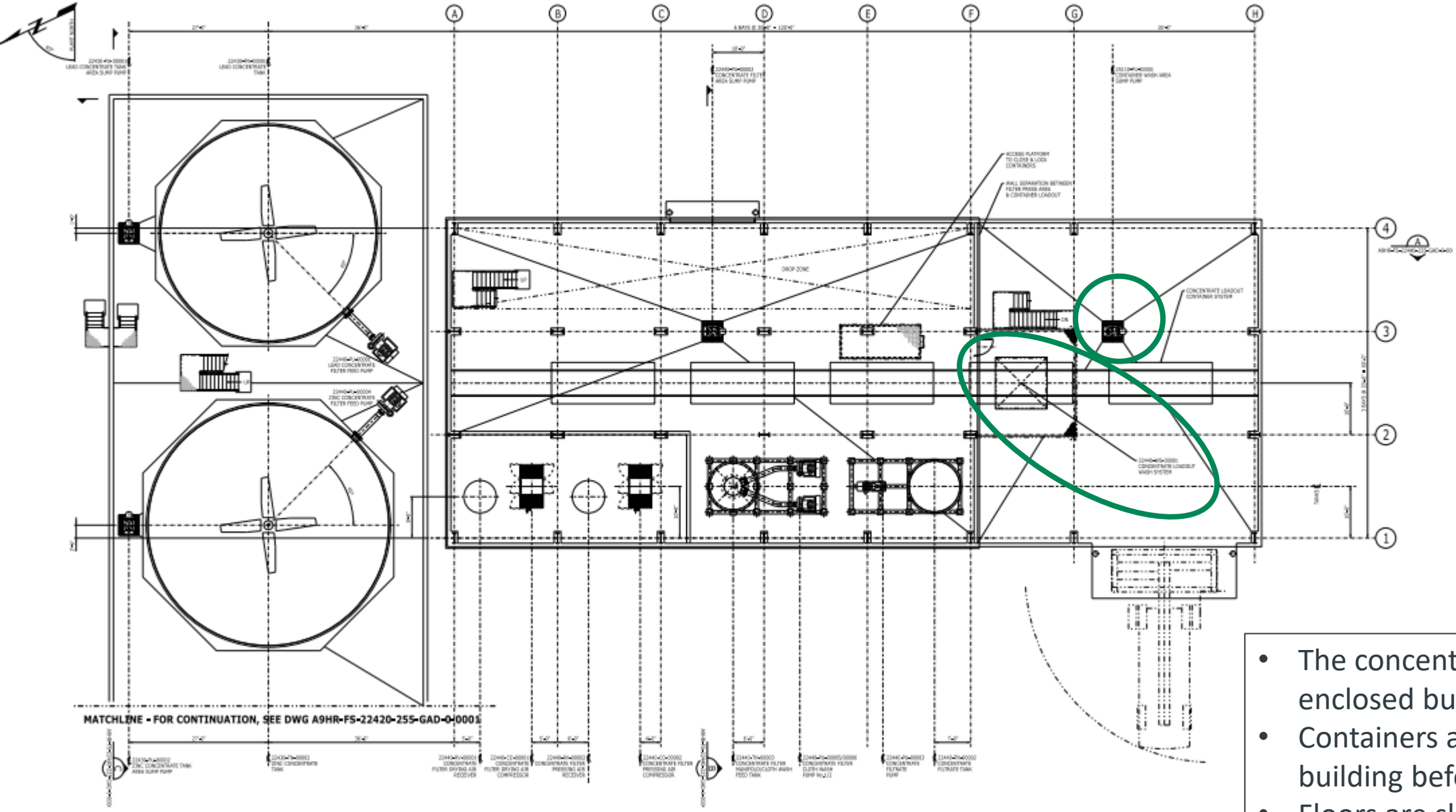
21210-MA-00002
MAIN SHAFT OUTFEED CONVEYOR MAGNET

21210-SC-00001
MAIN SHAFT OUTFEED COARSE ORE OVERLAND CONVEYOR BELT SCALE

21210-CH-00004
COARSE ORE OVERLAND CONVEYOR HEAD CHUTE

- Lead and zinc concentrates are filtered by a pressure filter in the concentrate loadout building.
- Filter cake is emptied directly into a half-height shipping container.
- Containers are sampled, sealed, and washed.





- The concentrate loadout is an enclosed building
- Containers are washed in the building before leaving
- Floors are sloped to a sump and water is collected and returned to the system

OVER-THE-ROAD TRANSPORT

Half-height containers will briefly be stored on-surface next to the concentrate load-out building.

Containers will be loaded onto trucks to ship to port.

FIGURE 1 – TRACTOR, TRAILER & HALF-HEIGHT CONTAINER

Footnote

WEBSITE

We’ve launched the Hermosa specific website!

You can visit the new website here: www.south32hermosa.com.

Partnering with our community

South32 is committed to promoting the well-being of Santa Cruz County residents and understanding community needs and concerns throughout the development of the Hermosa Project.

For this reason, South32 invested resources to set up and have an independent party facilitate a community advisory panel comprised of community leaders with diverse perspectives and strong networks. The Santa Cruz County Advisory Panel on the South32 Hermosa Project works to:

- Advise South32 on aspects of their project development that impact communities in Santa Cruz County, Arizona.
- Identify goals and priorities that could benefit both the larger community and South32.

You can read **the advisory panel’s charter** or visit the **News & Resources page** to read their agendas and meeting minutes.

COMMUNITY ADVISORY PANEL MINUTES

Agenda Minutes 15 June 2022

Hermosa Advisory Panel Charter Updated 2022

Agenda Minutes February 2022

View All →


SOUTH32

Attachment 2

Town of Patagonia
Flood & Flow Committee Update

Facilitation Provided by Interfuse Associates
www.interfuseassociates.com
Catherine@interfuseassociates.com

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
March 15, 2023

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.

CURRENT PROJECTS

This is a summary report of Flood & Flow (F&F) Committee activity during March 2023.

1. With respect to the Patagonia Regional Flood Control Project Feasibility Study, Chairperson and Town Engineer Bill O'Brien advises that there have been discussions about funding and who would fund the study took place. Tomas with South32 said he would have Melanie call Ron to verify South32's commitment to fund. Bill said the Flood Mitigation Team would get together and discuss the progress of Phase 1.

2. With respect to the flood control permit application by South32, Carolyn advises that South32 Melanie Lawson advises that the title issues have not yet been resolved so the flood plain permit application has not yet been submitted to the County. An update after the meeting, confirmed that a Special Warranty Deed was filed and the land transfer is complete. South32 has retained the services of Hunter Contracting for road construction. South32 will share the flood plain permit application with the Town at the same time it files the application with the County.

3. With respect to the UofAZ Water Resources Research Center's work with the Town on preparing a Drought Responsible Plan for a Water Resilient Community, Ashley Hullinger gives a brief update on the project including the agenda for the March 22 meeting.

4. With respect to the meeting with the Coronado National Forest, Carolyn advises that the WRAP (Watershed Restoration Action Plan) Team will now be Tucson Audubon Howard Buchanan, Borderlands Tess Wagner, and PARA Carolyn Shafer. The process of drafting a WRAP will take multiple years. The next meeting with the Coronado Forest Service will be in either April or May depending upon the FS's availability.

The next Committee meeting is scheduled for April 13, 2023.

Attachment 3

PARA Update

Facilitation Provided by Interfuse Associates
www.interfuseassociates.com
Catherine@interfuseassociates.com

INFORMATION for the Santa Cruz County Advisory Panel on Hermosa Project
Presented by Panelist Carolyn Shafer as a PARA Board Member
March 15, 2023

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")

UPDATES:

AQUIFER PROTECTION PERMIT: The Court heard Oral Arguments from PARA, ADEQ and AMI during a March 7 virtual hearing (I have a recording of the one hour meeting and will share with anyone who wants to listen to it). It is expected that the Judge will rule on PARA's Motion to Stay any discharge of treated water into the Harshaw Creek until the Appeal itself is concluded.

All parties have filed Briefs with respect to the Appeal issue. The Court will assign a Hearing Date for Oral Arguments. See previous updates for background information or visit PARA's website (www.PatagoniaAlliance.org) and sign up for newsletter updates.

ARIZONA POLLUTANT DISCHARGE ELIMINATION SYSTEM (AZPDES) PERMIT: On Friday, March 10, ADEQ released its decision regarding the permit renewal. That document is being reviewed by PARA during the 30-day comment period that started on Friday.

The 2018 AZPDES permit had an expiration date of January 7, 2023 so the mining company filed a request to renew the permit. Comments were filed by PARA and other organizations. The agency has not yet filed its responses to the comments and the status of the permit is unknown. See previous updates for background information or visit PARA's website (www.PatagoniaAlliance.org) and sign up for newsletter updates

BIODIVERSITY IN THE HEART OF THE SKY ISLANDS: PARA will be releasing a film which will illustrate the unique biodiversity of all of the Sky Islands area with a focus on the Patagonia Mountains and along Sonoita Creek. The film's narrator is Wildlife Biologist/Naturalist/Ethnobotanist Vincent Pinto, a renowned expert on biodiversity He has been inspiring people from all walks of life about the natural world since 1987, particularly in the Sky Islands region. The film will create a composite image of what flora and fauna of the area currently looks like—contrasting this with likely scenarios should full-scale mining occur without sufficient oversight and mining company accountability to the community. The film will include the stark impacts of such mining activity on the water and wildlife and the people who live and recreate in this unique biologically- diverse area. The film will be shown on March 24 at the Tin Shed Theater in Patagonia and on March 26 at The Loft in Tucson. Additional showings will be scheduled during May in other locations in Santa Cruz County (Nogales Oasis Cinema and more), Cochise County, and Pima County.

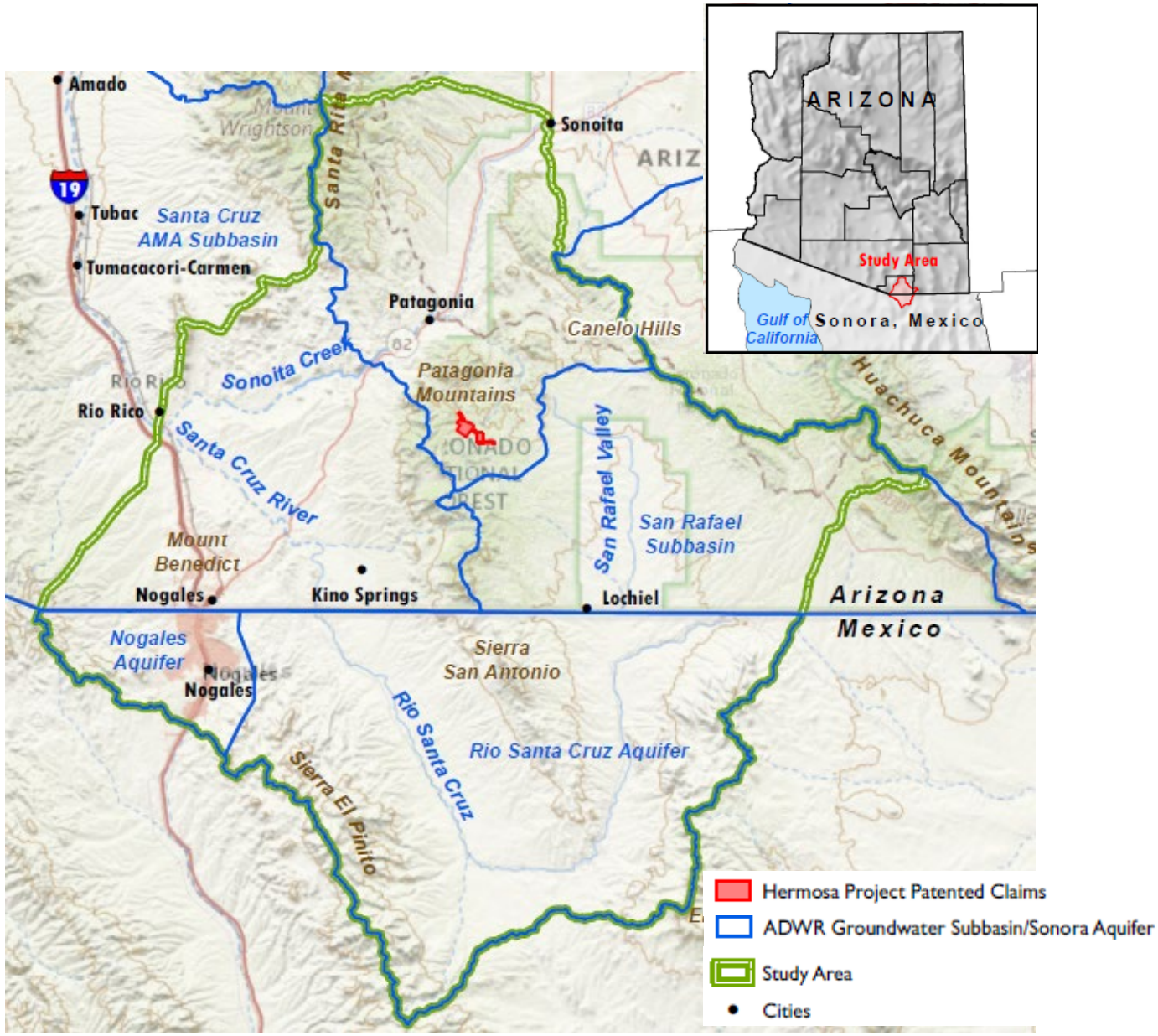
PATAGONIA AREA RESOURCE ALLIANCE collaborates with Strategic Partners to protect the water, land and wildlife of the Patagonia Mountains and the Sonoita Creek Watershed from the negative impacts of modern industrialized mining, works to assure that any mining activities meet the highest science-based 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.

Attachment 4

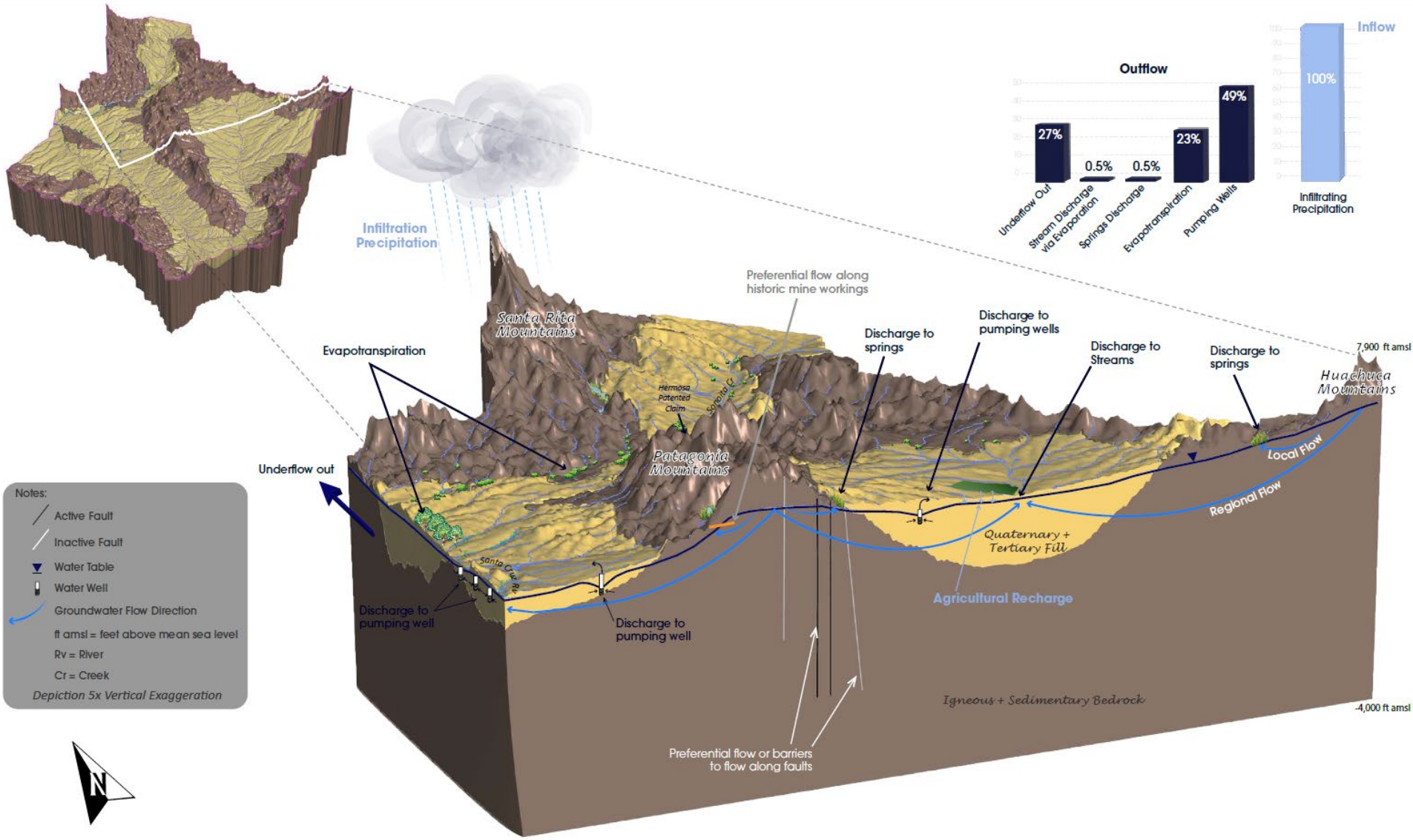
Dr Ferre' Briefing Slides

Facilitation Provided by Interfuse Associates
www.interfuseassociates.com
Catherine@interfuseassociates.com

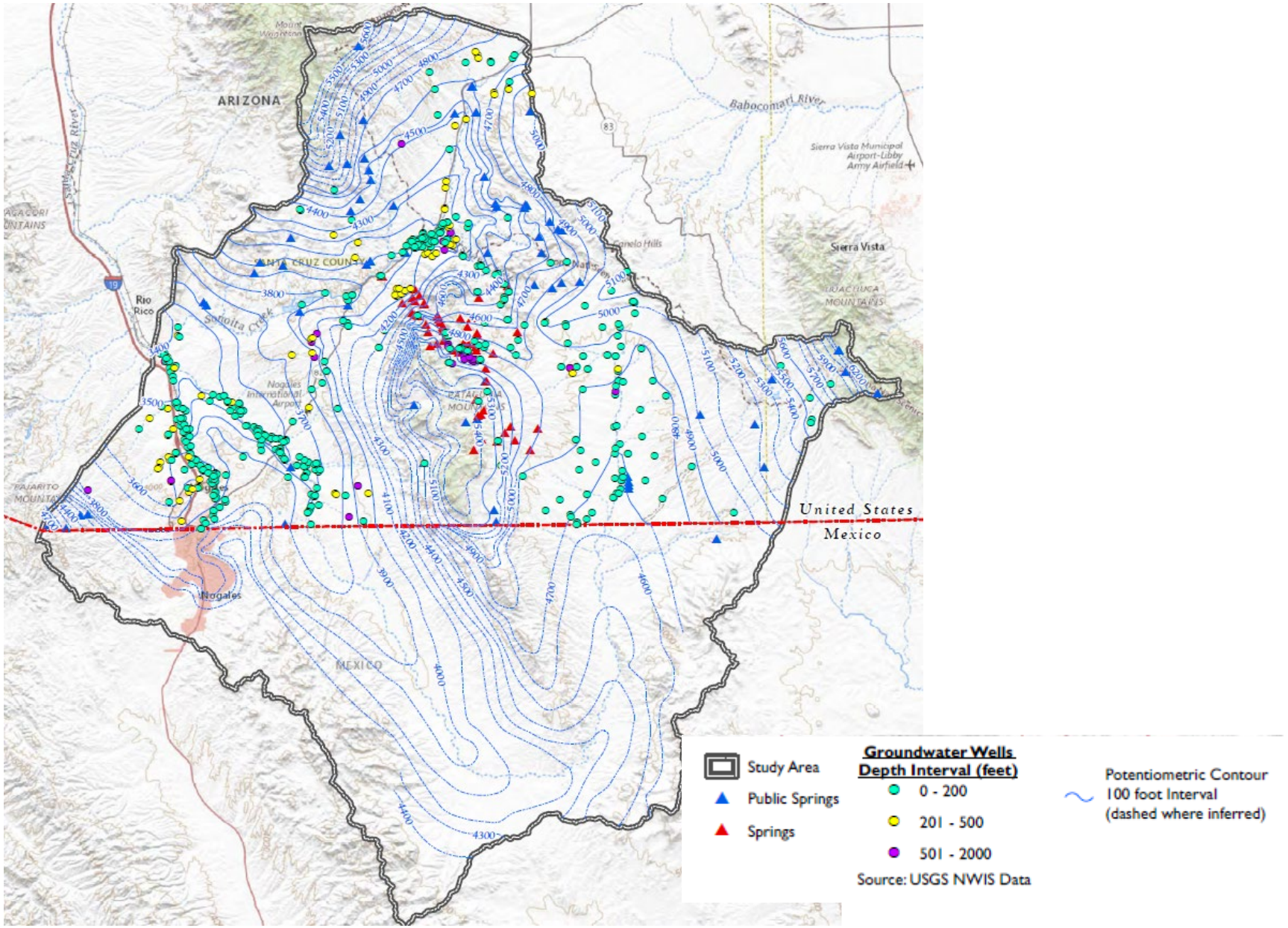
Regional Model Area



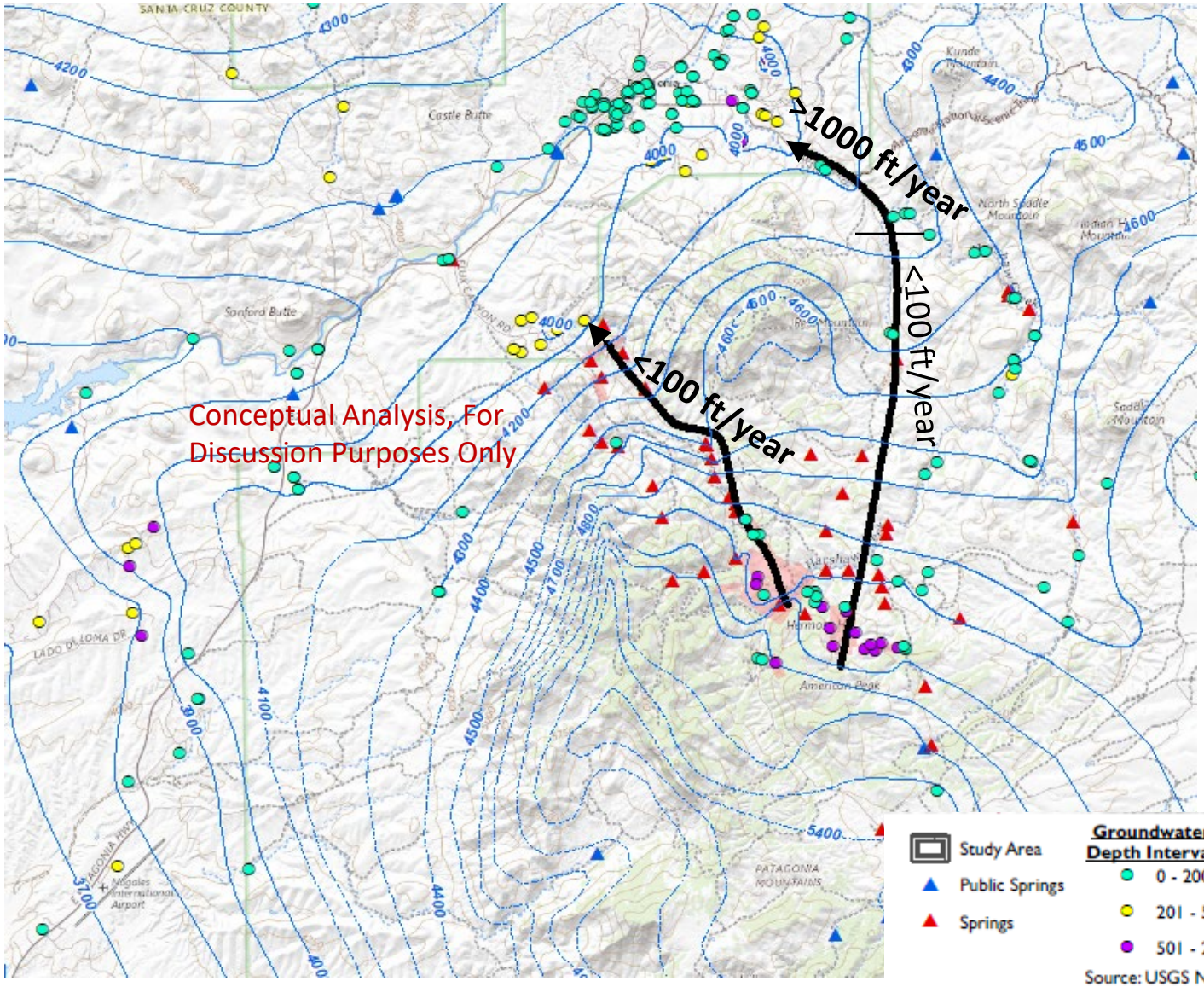
Conceptual Model Summary



Conceptual Groundwater Flow

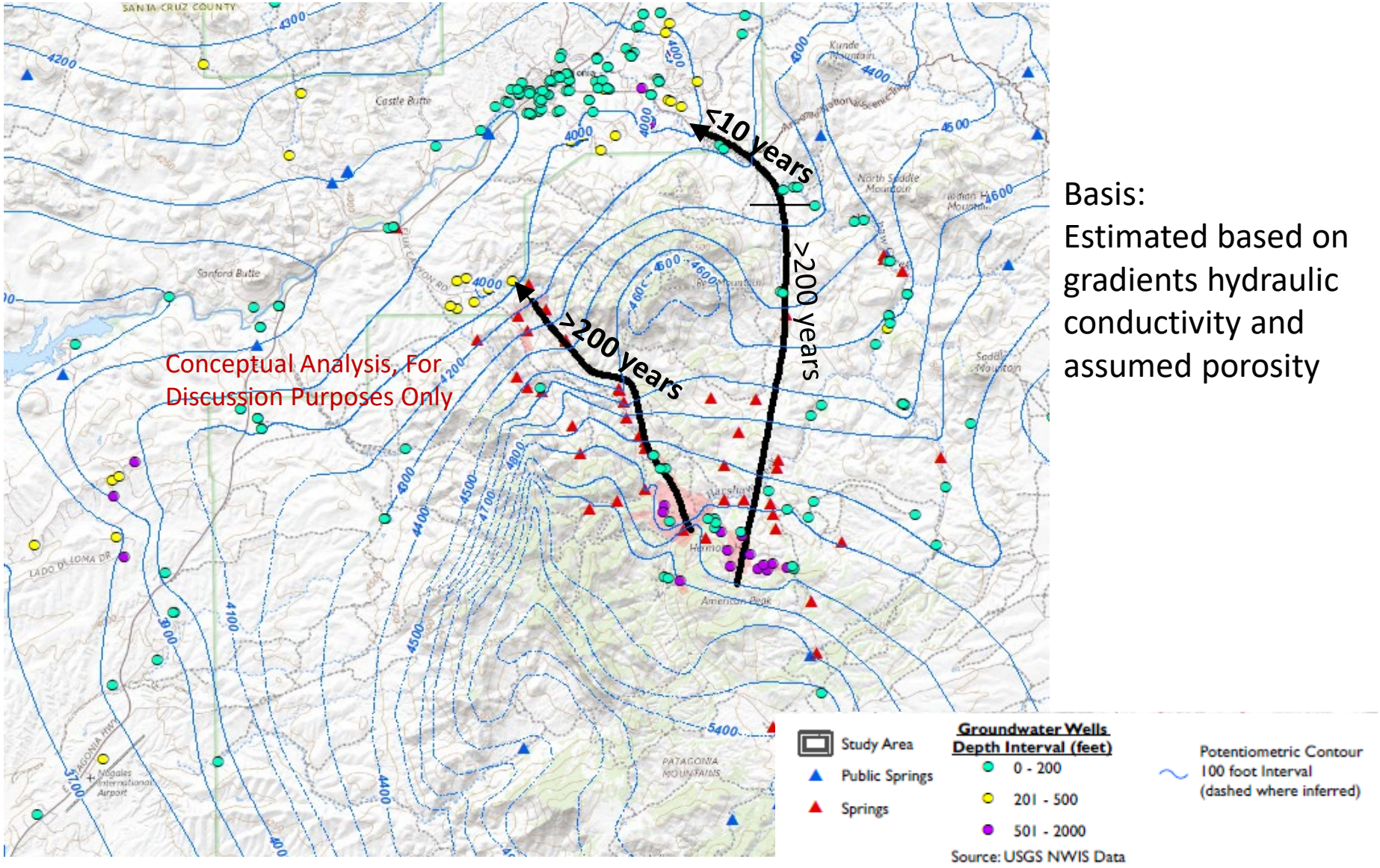


Groundwater Flow Velocity



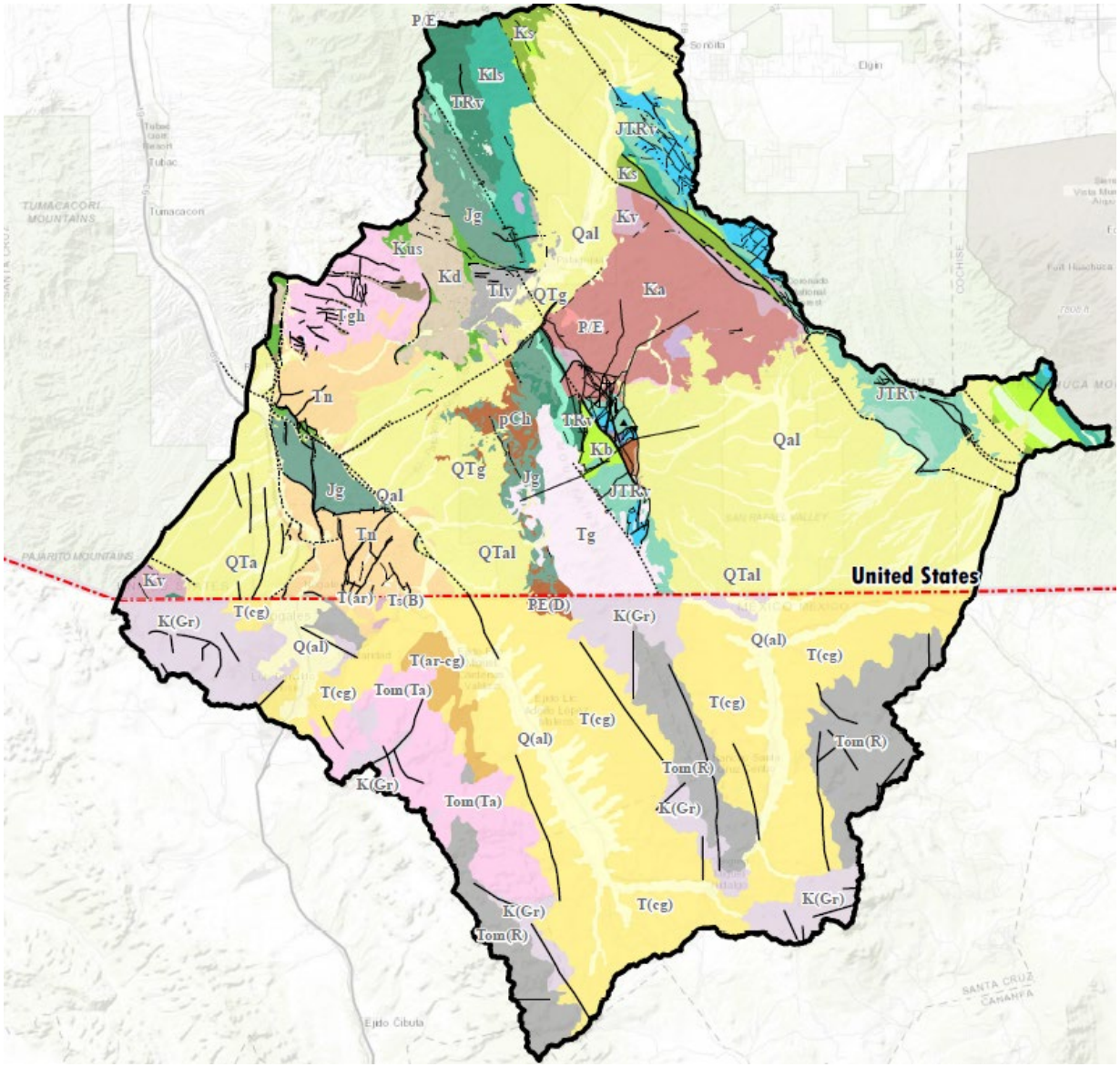
Basis:
Estimated based on gradients hydraulic conductivity and assumed porosity

Groundwater Flow Residence Time



Basis:
Estimated based on gradients hydraulic conductivity and assumed porosity

Geology and Structure



Geologic Units - Arizona

- Qal Quaternary Alluvium
- QTg/QTal Quaternary Tertiary gravel or alluvium
- Tn Tertiary Nogales Formation
- Tgh Tertiary Grosvenor Hills Volcanics
- Ti Tertiary Intrusive
- Tg Tertiary Granodiorite
- Tp Tertiary Porphyry
- Tlv Tertiary Gringo Gulch Volcanics-Rhyolitic
- Kus Cretaceous Tuffaceous Conglomerate Sandstone
- Kuvs Cretaceous Volcanic and Sedimentary
- Ka Cretaceous Trachyandesite
- Km Cretaceous Monzonite
- Ks Cretacous Sedimentary
- Kb Bisbee Formation
- Kd Creataceous Diorite
- Kv Cretacous Silicic Volcanics
- Kg Cretaceous Granodiorite
- Kls Lower Cretaceous Volcanic Sedimentary
- Jg Jurrasic Granite or Monzonite
- JTRi Jurrasic/Triassic Intrusives
- JTRv Jurrasic/Triassic Volcanics
- TRvs Triassic Pyroclastic Volcanics
- TRm Triassic Monzonite
- Pc,Pe,Ps Permian Sedimentary
- MD Carboniferous Sedimentary
- Cs Cambrian Quartzite
- pCh Pre Cambrian Granodiorite

Geology in Sonora State, Mexico

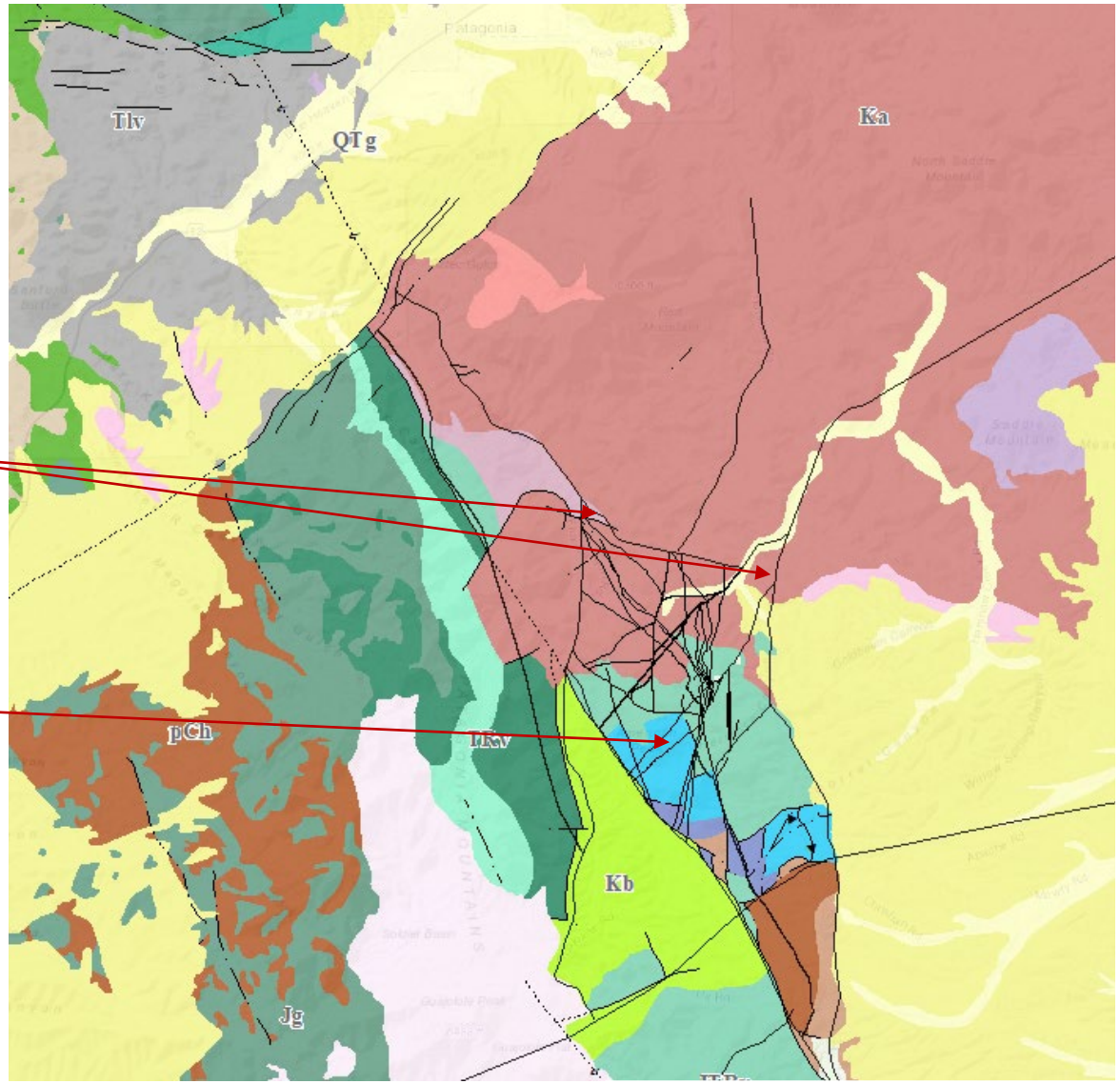
- Q(al), Quaternary Alluvium
- T(cg),Tertiary Conglomerate
- T(ar),Tertiary Sandstone
- T(ar-cg),Tertiary Sandstone-Conglomerate
- Tom(R),Tertiary Rhyolite
- Tom(Ta),Tertiary Volcanic Tuff
- Ts(B),Tertiary Basalt
- K(Gr), Cretaceous Granite
- PE(D),Pre Cambrian Diorite

Faults in Close Proximity to Proposed Depressurizing Activities

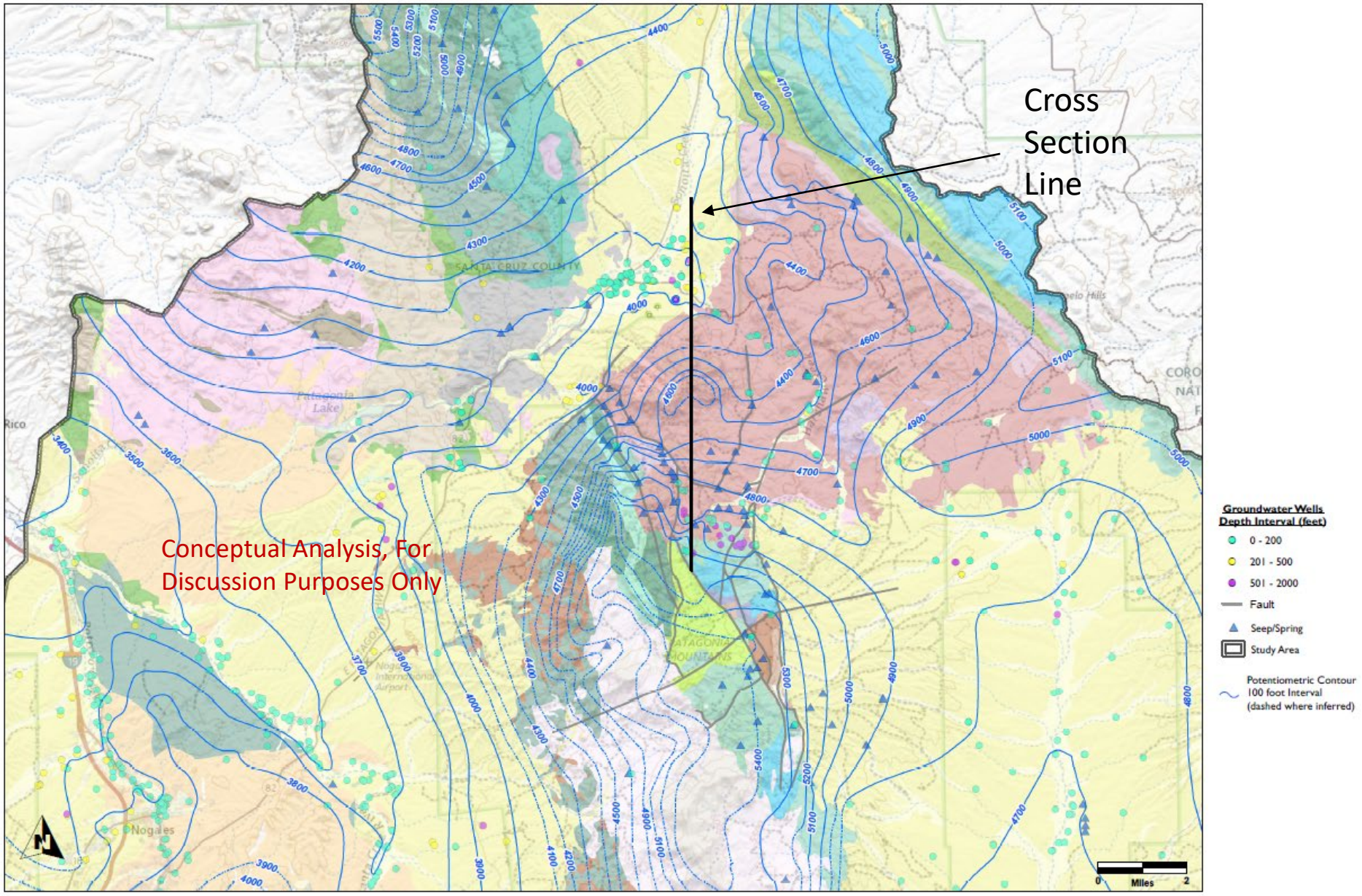
Along Major Faults

Within Limestone Units

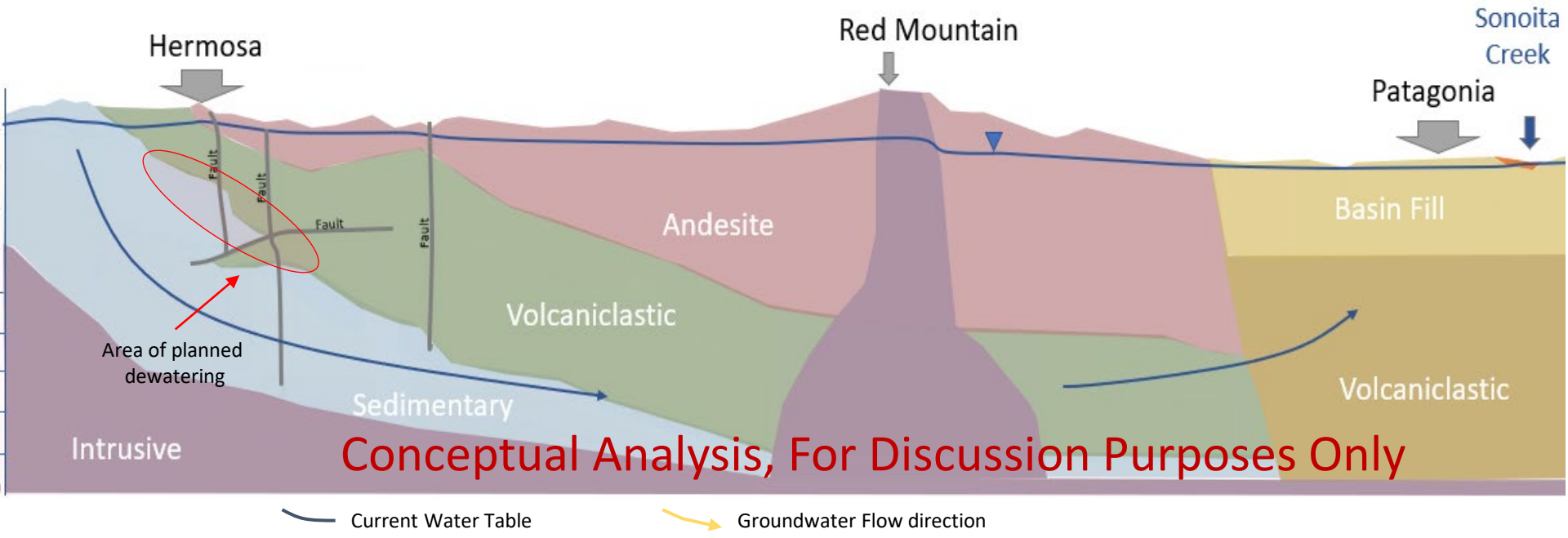
Basis:
Aquifer testing



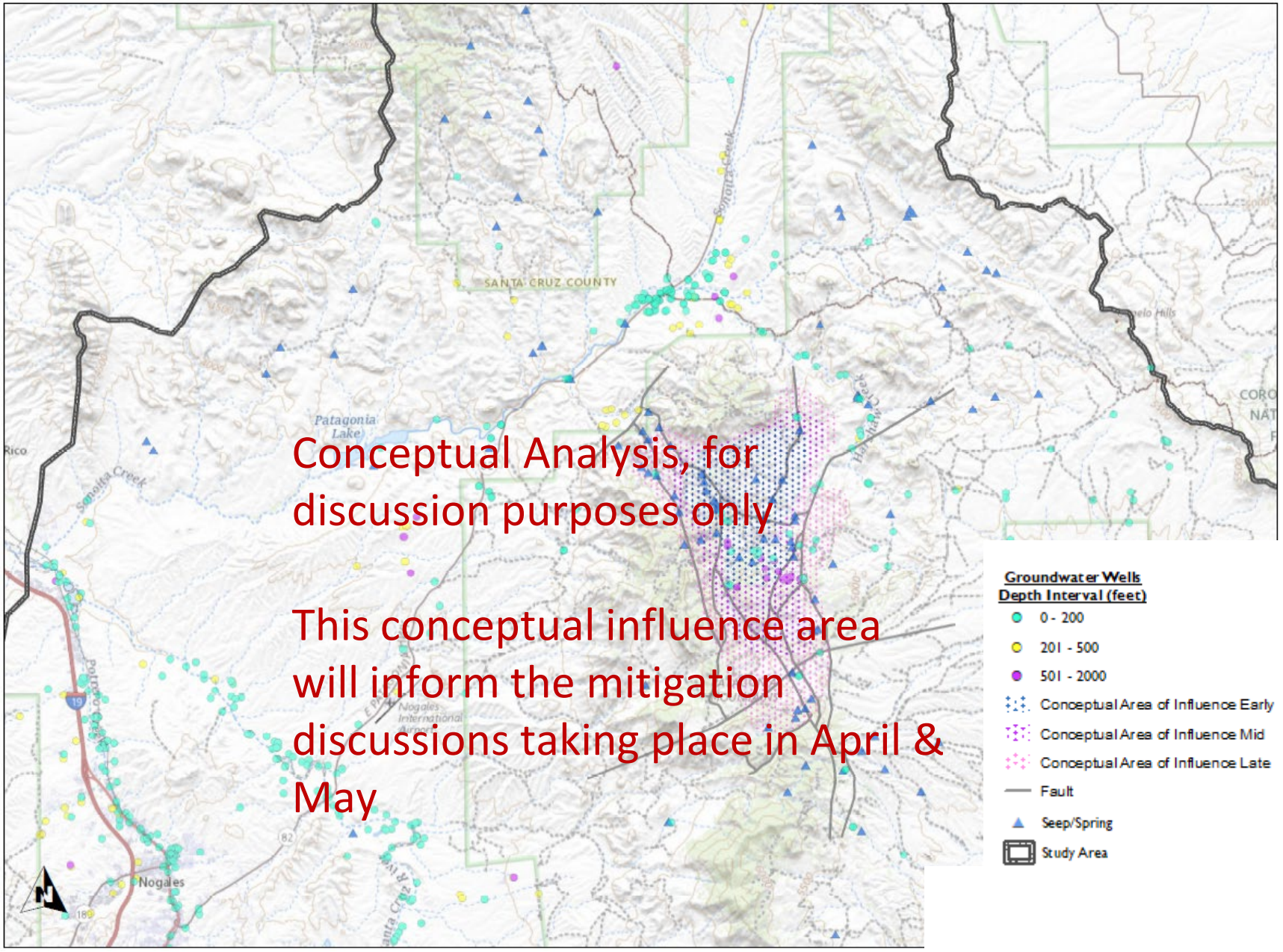
Groundwater Flow with Geology



Groundwater Flow in Cross Section



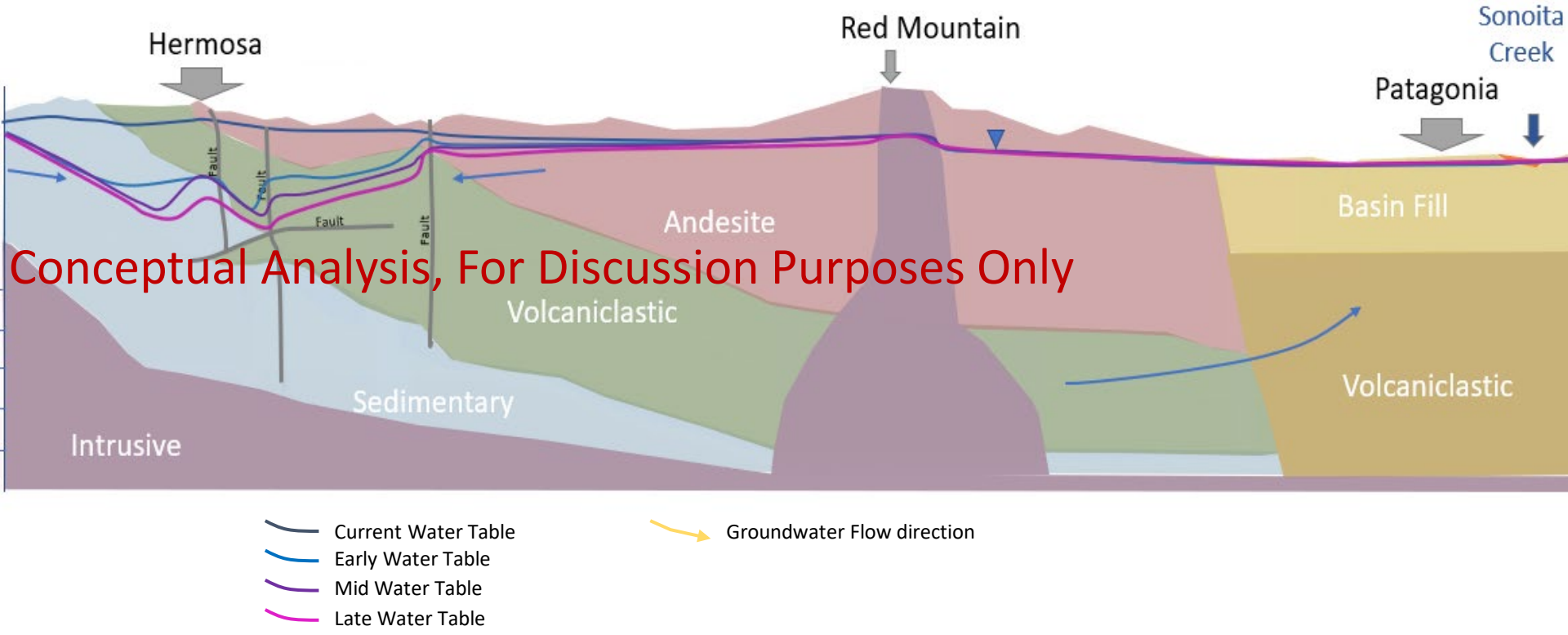
Conceptual Area of Influence



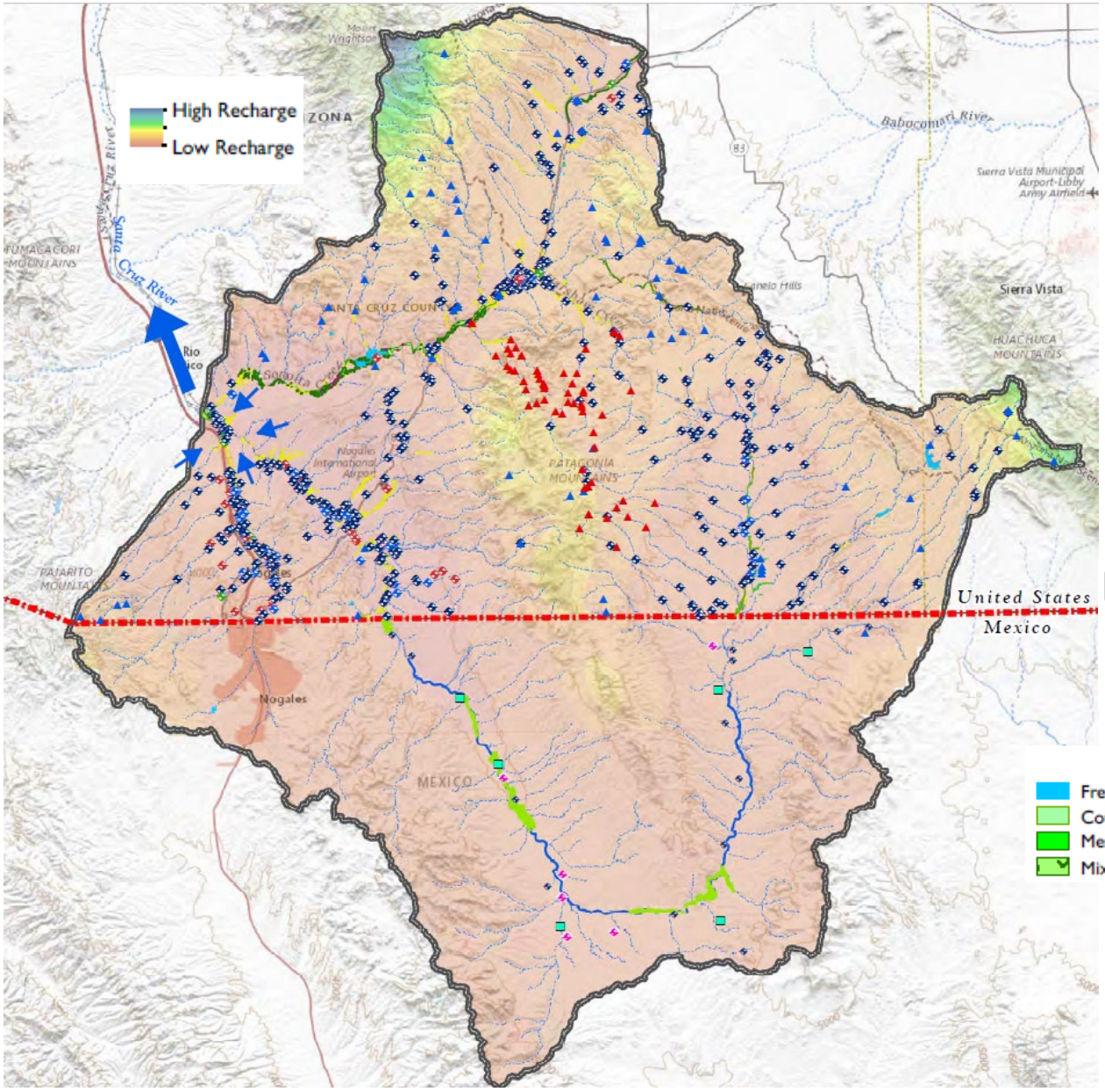
Conceptual Analysis, for discussion purposes only

This conceptual influence area will inform the mitigation discussions taking place in April & May

Conceptual Area of Influence



Groundwater Sources and Sinks



Well Type/Use

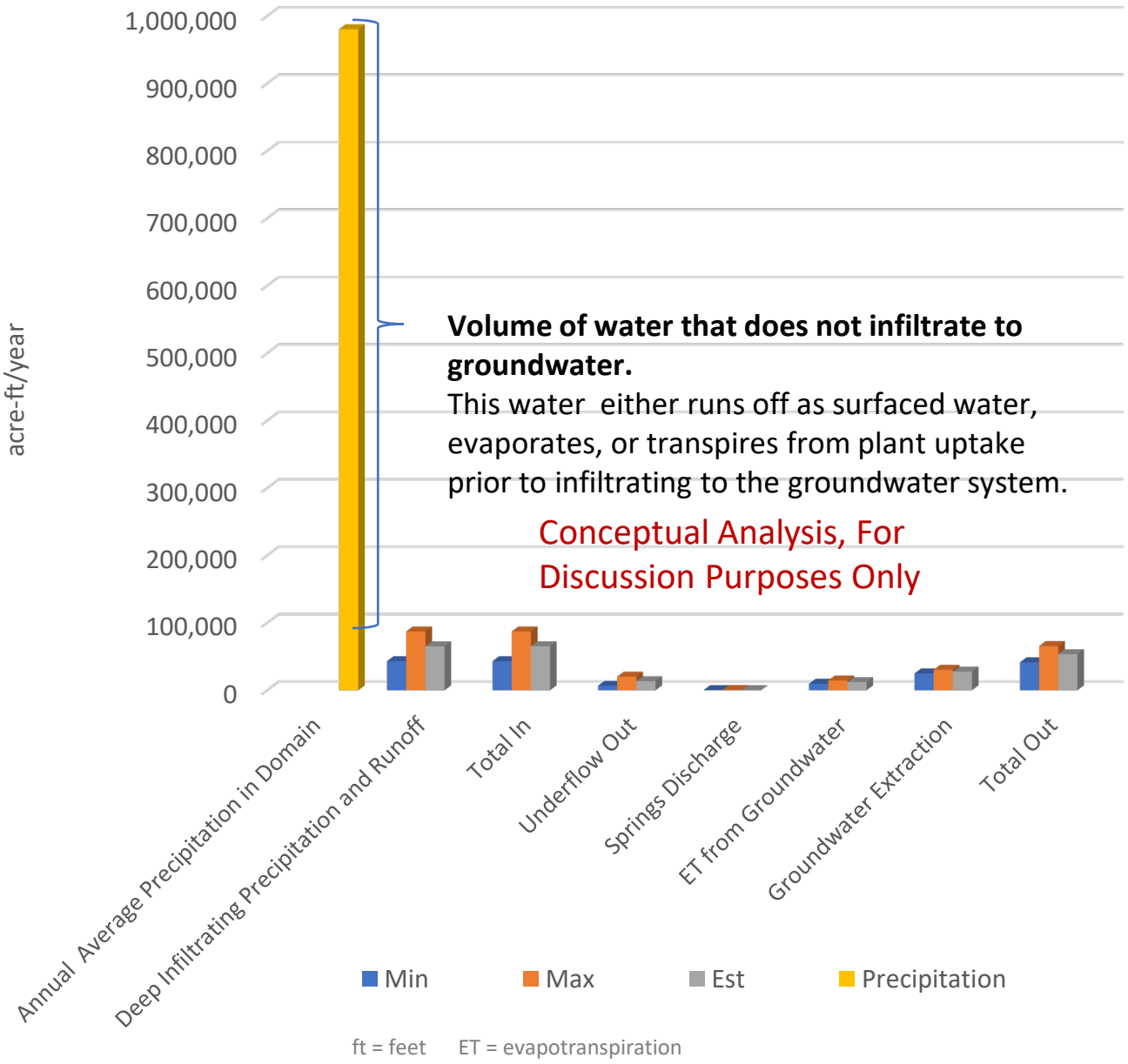
- Domestic/Other/Stock/ Undetermined
- Commercial/Industrial
- Irrigation
- Public Supply
- Unknown
- Local Well

- Study Area
- Perennial Streams
- Non-Perennial Streams
- Public Springs
- Springs
- Underflow Out

Areas of Evapotranspiration

- Freshwater Pond/Lake/Marsh
- Cottonwood Willow
- Mesquite
- Mixed Broadleaf
- Forested/Shrub Riparian
- Hydrophilic Vegetation
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland

Water Budget



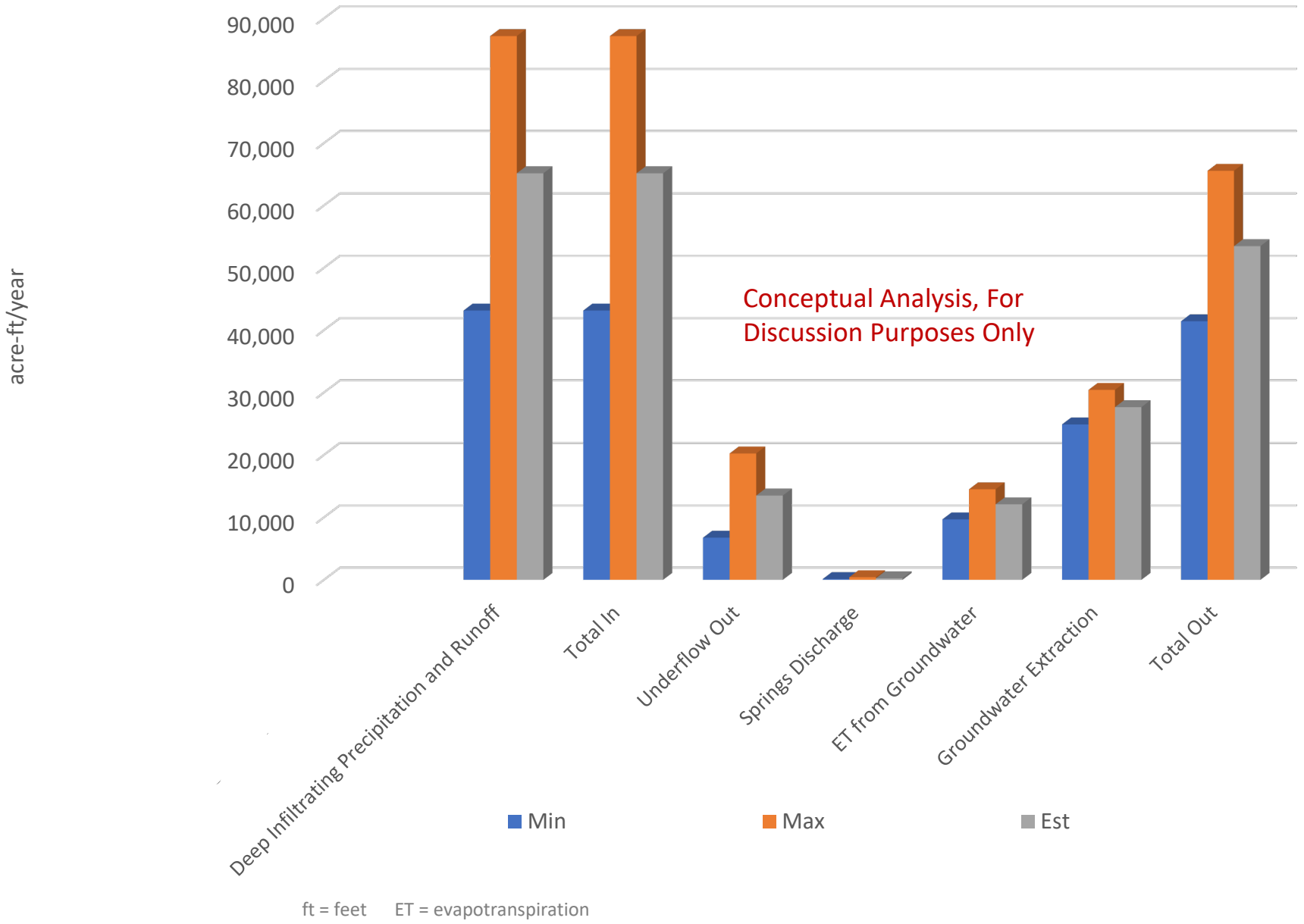
Most precipitation in the region becomes runoff or is evapotranspired.

Most surface water in the area is considered ephemeral and only flows in response to or shortly following storm events.

Most infiltrating precipitation occurs during Monsoon season and during winter months.

During extended drought little to no recharge to the groundwater system occurs.

Groundwater Budget



ft = feet ET = evapotranspiration

Storage Properties