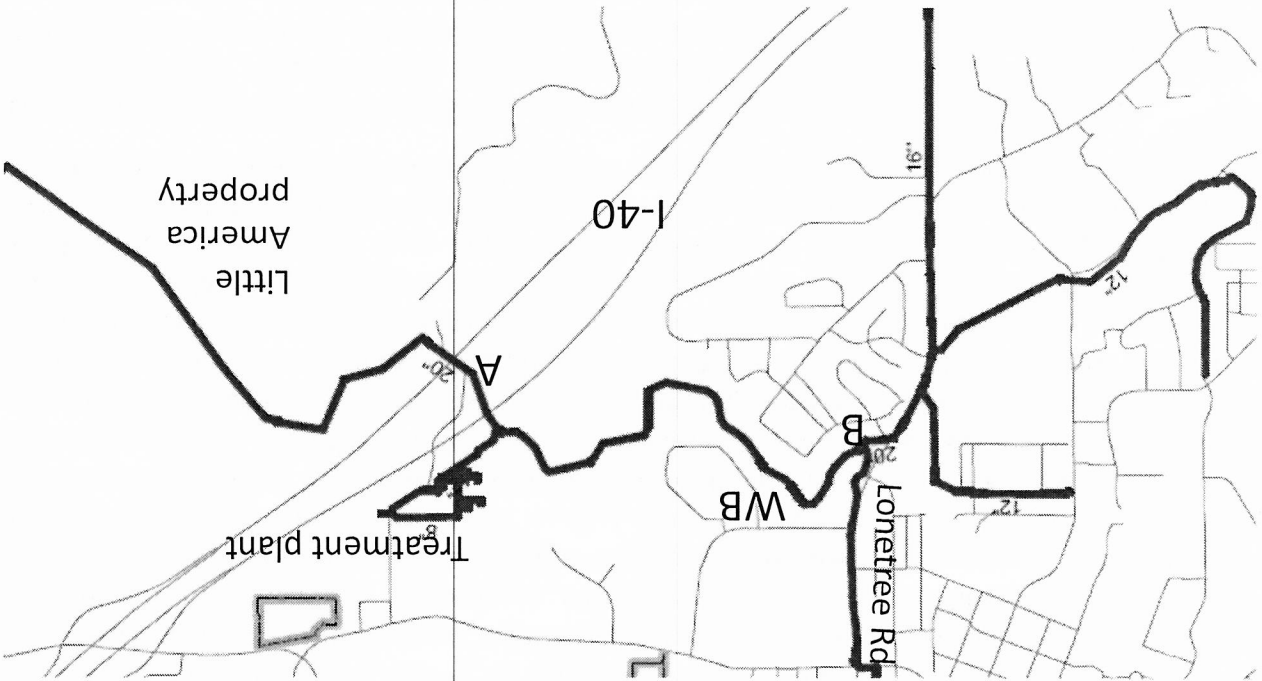


Discharging reclaimed water into Sinclair Wash

Paul Beier¹, on behalf of ForRio



Map of proposed project area. A = current discharge point for reclaimed water. B = proposed new discharge point (about 1.0 creek miles upstream from A). WB = Willow Bend Environmental Education Center. Thick lines = City of Flagstaff reclaimed water lines; the 20' line from A to B runs under the FUTS trail that follows Sinclair Wash.

Background

The City of Flagstaff (City) has an agreement (2011-2030) with AGFD to release "a minimum of a weekly hourly average of 100 gallons per minute (gpm) of reclaimed wastewater from the Rio de Flag Wastewater Treatment Facility into the Rio de Flag for the purposes of wildlife habitat restoration." This water is currently released into the Rio de Flag at point A, where the Rio passes under I-40. Because the terrain here is flat, the water spreads both north of I-40 (maintaining a large marsh) and south of I-40 (maintaining a small pond), before flowing east across Little America property. Above ground flow persists for about a mile downstream³, despite the broad floodplain of alluvium that can absorb water.

¹ Full disclosure, I live in the project area and I am an IMBY (in by back yard – please!)
² Some of this allocation, up to a weekly hourly average of 50 gpm, may be required for Francis Short Pond "when available to maintain sufficient water levels during summer months." The agreement states that some or all of the 50 gpm (for Francis Short Pond) could come from the 100 gpm weekly hourly average commitment to Picture Canyon.
³ As a trail runner, I have run along the Rio east of I-40 at least once a week during 2006-2017. Typically, much more than 100 gpm is flowing, and the flow continues for about 1 mile. In May and June there is often zero discharge for 1-4 days (during May-June 2006-2013, there would sometimes be no discharge for > 1 week, despite the Agreement with AGFD that started in 2011). Even during these times the marsh remained wet, and the pond

The proposal is to move the release point to B – or some location between B and A. This would give a perennial flow to up to 1 mile of Sinclair Wash from somewhere near Lone Tree Road to I-40. The advantages of discharge at point B would be (1) better riparian vegetation (willows and cottonwoods) occurs in the B to A reach than in the reach east of A. With more water this vegetation would improve, with added benefit for wildlife, (2) amenity value for the many people using the FUTS on this reach, and Sawmill County Park on the canyon rim above it. I suspect that the amenity value of an urban stream in an otherwise streamless City is millions of dollars. Martin Ince has characterized the B-A section of the Sinclair Wash FUTS as his favorite mile of the FUTS. It is used by hundreds of walkers, trail runners, bikers, and birdwatchers every day⁴. Willow Bend Environmental Education Center (see map) conducts educational programs here. This canyon is the best birding hotspot in the City, being the only place in Flagstaff where lazuli buntings, blue grosbeaks, and gray catbirds are regularly seen. It also has population of locally rare plants such as red columbine, wild hops, deers' ears, Arizona honeysuckle, wild grape, dogbane, mountain camas Unlike the privately-owned reach east of I-40, the B-A reach, including the steep slopes on both sides, is City of Flagstaff Open Space. The flat area along the north rim of the canyon (from Willow Bend to Lone Tree Road) is Sawmill County Park, which commands a superb view of about a quarter mile of the wash.

The main potential risk of the project would be that the water flow might not sustain the wetlands at I-40. I believe this risk is low because the floodplain is narrower and rockier than the floodplain east of I-40. My belief is supported by a Seepage Study that USGS conducted for the City in 2010, which suggested about half as much seepage between B and A than in the reach east of A. But the 2010 study was a quick-and-dirty effort, and we need further evidence that moving the outflow would not dry up the wetlands. Furthermore, we do not really know if 100 gpm discharged at point A can sustain the two wetlands, because in fact the flow over the last few years has averaged over 500,000 gallons per day (~350 gpm) during the last few years, despite decreasing releases over time (S. Camp, email 27 Jul 2017).

In May 2017, Rick Miller and I discussed this idea with Utilities Director Brad Hill, Assistant director Erin Young, engineer Ryan Roberts, and regulatory compliance manager Steve Camp. Utilities staff was receptive to this idea. Ryan Roberts would like to conduct a pilot release so that we could verify how well minimum flows of 100gpm (averaged over the week) would sustain the wetlands and provide amenity value. (But somebody would have to pay for the water and for dechlorinating reclaimed water).

Developing a Proposal

The next step would be to write a proposal, which would address not only the motivations (above: wildlife value and amenity value) but also the following key issues:

never completely dried out. Since 2014, I have seen no zero-discharge periods > 72 hours, and the Rio channel

remains wet almost to Herold Ranch Road.

⁴ As a regular trail runner, I estimate that the number of human users of the B to A reach is at least 50 times that of the reach east of A. Little America does allow non-motorized use of that reach, but few people use it.

Engineering Options

- Option 1: tap into the 20" reclaimed water line at Lone Tree Road and discharge the AGFD water at that point. The discharge facility would consist of a pipe tap, a valve, a dechlorinator, a short pipe, and a monitoring well. A big concern is that this option would probably release no more than 100 gpm (averaged over the week) unless someone pays for larger flows. In other words, the City would continue to discharge excess reclaimed water (without chlorine) at point A, rather than chlorinate it, pump it upstream, and have the water dechlorinated at Lone Tree Road. I need to ask questions about this.
 - Up front costs: The facility would cost about \$1,000 if done by a non-City entity. If done by the City, the cost would be much more (maybe \$250,000) because the City would build to high standards.
 - Maintenance costs: weekly water quality monitoring (see Regulatory Issues, below), daily flow recording (could be done by a water meter hooked up to a recording device?).
- Option 2: take the water from the current discharge point and install a new pipe that would take the water up canyon to release the water. Because this water is not chlorinated, no dechlorinator would be needed. Currently excess dechlorinated water not needed by customers is released "free" at point A.
 - Under option 2, can this same excess water be released at point B? The discharge pipe at point A seems to be about 16" – what size pipe would we need to accommodate peak flow?
 - On Google Maps, the elevation at the treatment plant (2092 m) seems to be exactly the elevation where Sinclair Wash crosses Lone Tree Road. I need a precise measurement of both elevations to determine if a pump would be needed. I need a better estimate of the cost of installing pipe, and any permitting issues involved. If we got a Heritage Grant to build this, how much money would we need? Who would have to give us permission to dig a trench?
 - Up-front costs: Trenching for the pipe, the pipe itself, and perhaps a pump. A party other than the City could probably use cheap PVC (with a lifespan of about 12 years) and a shallow trench. City installation would be much more costly.
 - Maintenance costs: pump, cost of operating pump, repairs to pipe

Regulatory Issues & Administration

- AZPDES, Arizona Pollutant Discharge Elimination System, requires an "Aquifer Protection Permit" for discharge into the waters of the US (which includes Sinclair Wash and the Rio de Flag). The City has a "general permit" covering multiple facilities. If the project is undertaken by another entity, that entity would need an individual permit to cover the one facility. The cost of an individual permit is \$250/y, runs up to 5 years (renewable).
- The permit holder must identify a location where a monitoring well could be located downstream of the discharge point, and ADEQ could require the permit holder to install a monitoring well at that location. It is quite unlikely that ADEQ will require a physical well. The City has several conceptual wells in its permit, but a physical monitoring well is required only when flow exceeds 500,000 gallons per day.

- The permit holder must record flow daily, and sample for chlorine once a week. The samples only have a 15-minute hold time. The City has a laboratory within 15 minutes. An outside entity could use Norwest Analytical to run the samples. (Pine Canyon apparently runs a "dechlorination waterfall" that fails to dechlorinate, but there seem to be no consequences to their failures.)
- Who will own the discharge permit? Pine Canyon has their own discharge permit; they could help us learn about permit issues (John Schraan 233 (213?) 3804. Perhaps Willow Bend could own the permit, even though they do not own the land. Perhaps Forio could own the permit. The City could include the new facility under their existing permit, but in that case the costs would increase tenfold or more. Perhaps another entity could initially own the permit, and then after a few years could donate the facility to the City?

Water Supply

The first issue is to determine the desired flow. We need to determine if 100 gpm, or some higher flow is needed to (1) maintain the wetlands at I-40, and (2) provide human visitors (FUTS users, Sawmill Park users) with the perception that "Flagstaff has a flowing Rio and I like it." Pilot studies would provide the best possible answers. Ideally a pilot study for question 1 would occur in April-May-June of a dry year, when discharged flow can be controlled. Observational studies during snowmelt (January-March) – if coupled with accurate flow measurements – could provide answers to the second question, but perhaps not the first question.

The current Inter-Governmental Agreement (IGA) with AGFD runs another 13 years (2011-2030). In 2030 there would have to be a new agreement, or some entity would have to purchase reclaimed water from the City. City Utilities staff indicated this project would be eligible for the lowest rates (\$1.32 per thousand gallons, which translates to \$69,379/year for the 100 gpm base flow⁶). The City actually discharges much more than 100 gpm most of the time (I will ask for records for the last few years) because the supply of reclaimed water exceeds the demand of the customers (Snowbowl, NAV, golf courses, etc.). But demand for reclaimed water could increase dramatically, such that the 100 gpm average is all we'd get for the next 13 years, with no guaranteed flow after 2030.

One possible supply option is that within a few years the Utilities Department intends to start a study (or perhaps actions?) related to recharge of the C aquifer (from which we pump). The City might decide that this project would be a good part of the City's aquifer recharge program. Also, the City Council could mandate (and pay for) environmental flows. I believe that if we can get this flow started by 2019 and Flagstaff citizens and tourists got used to having a perennial stream in Flagstaff, by 2030 there will be broad political support and willingness to pay for this perennial stream because it will obviously be worth MUCH more than \$70,000/year.

⁵ This seems like a superb cost-cutting idea. This idea was not discussed in our meeting with the City. Please check my math: 100 gpm * 60 minutes/hour * 24 hours/day * 365 days/year * \$1.32 / 1000 gallons.