

Appendix F

Comments

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May 5, 2006

VIA EMAIL: (klblack@lc.usbr.gov)
AND FIRST CLASS MAIL

Kevin Black, Engineering Division
Bureau of Reclamation, Phoenix Area Office
6150 W. Thunderbird Road
Glendale, AZ 85306-4001

**Re: Review of draft Report of Findings for the North Central
Arizona Water Supply Study (4/19/2006 version)**

Dear Kevin:

I found the draft report generally very well drafted. My comments are:

1. I suggest page numbers on the final report.
2. Regarding Section II.1.1, second paragraph, the Havasupai Tribe is not “in Grand Canyon National Park.” The Reservation and the Park share a common boundary of many, many miles in the Grand Canyon.
3. Regarding Section II.2.2.1 “Tribal Communities”, under the section on Havasupai, the report notes that the Tribe’s primary reason for participating in the Study is to assure protection of the R Aquifer springs and seeps. This is true and should be kept in the final report. Similarly, the following page accurately states the Tribe’s longstanding position that it “cannot tolerate any decrease in the natural flow of Havasu Springs and other canyon springs and seeps.” This must remain in the final report.
4. Regarding Section 11.7.1 “Tribal Communities”, under Havasupai Tribe, there is an accurate quote that reads: “The Tribe is opposed to any importation of outside surface water in to the project the area, **unless**, it brings meaningful protections for permanent ground water limitations and management.” This accurately reflects the Tribe’s position and must remain in the final report.
5. Regarding Section II.7.2 “Non-tribal Communities”, under City of Williams, it discusses that the City and the Tribe have entered into agreement regarding regional groundwater management and water conservation and that the City of Williams “supports the principal that there should be no decrease in the natural flow of Havasu Springs.”

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Letter to Kevin Black, Bureau of Reclamation
Re: Review of draft Report of Findings for the North Central Arizona Water Supply
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This must remain the final report and, if you would like, I would be happy to send you a copy of the Agreement between the Tribe and the City.

6. Regarding Section III.1 “Projected Population and Study Area”, a table lists the projected population of the Havasupai Tribe, but the Tribe is not discussed in Section II.2.1 “Tribal Demands”. Is there a reason for the report not to project demands for the Havasupai Tribe?

7. Regarding Table III.1-3, it seems to us that the projected population for the City of Williams, population of 4826 in year 2050, is very low. For example, On May 17, 2005, the Arizona Republic reprinted that “life is changing rapidly” in Williams.

“Subdivision plats are expected to be approved by the end of this year for more than 1,200 homes, that will more than double the 1,100 dwellings within city limits.”

“That housing subdivision is one of seven of more than 40 acres working their way through Williams city government, Wells said.”

“Because we are so hemmed in by Forest Service land, the thinking is that we can only be 8,000 to 10,000 population max. Which means that we would need another two producing wells to the three we already have”, quoting Wells.

Enclosed is a copy of the article from the Arizona Republic. The draft Report’s projected populations for Williams appears unjustifiably low.

8. Regarding Section III.3.1 “Havasupai Tribe”, I would ask that the word “vital” be inserted between the words “Of” and “importance” to read: “Of vital importance to the Havasupai Tribe, with or without a federal regional project, is the introduction of groundwater management regulation.”

9. Regarding IV.1.8 “R Aquifer”, the first paragraph indicates that development of the R Aquifer is “complicated by its depth . . . and . . . potential impacts to significant water resources on the edges of the project area, principally: spring flows in the Havasu Canyon . . .”. The fact is, development of the R Aquifer is complicated both because of its potential impacts to water resources and its impacts on the people of the Havasupai Tribe who have lived in the Village of Supai for centuries. While the Tribe does have

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concerns about environmental degradation caused by R Aquifer development, the
Havasupai people fight for aquifer protection to ensure their survival as a Tribe.

Thank you for this opportunity to comment on the draft report. If other
participants object to the language I have highlighted in this comment letter, the Tribe's
position is that the highlighted language must remain in the final report and other
participants are free to suggest additional language, but the Tribe's preferred language
should remain.

Yours Very Truly,



Michael C. Shiel

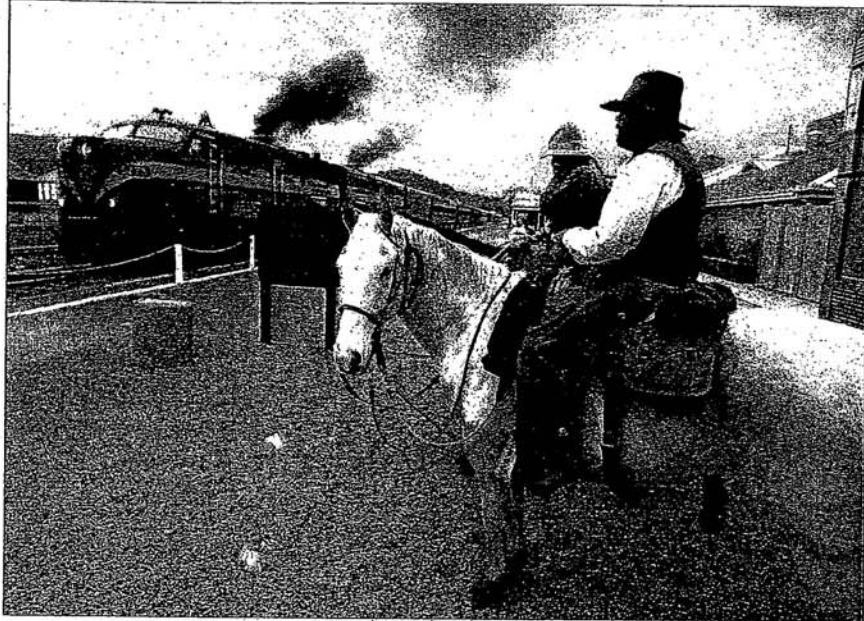
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cc: Tommy Siyuja, Chairman
Havasupai Tribal Council Members
Robert McCraig, Bureau of Reclamation (via e-mail: RMCCAIG@do.usbr.gov)

Freedom Report 8/1/10 Page

Williams' grand vision

Canyon gateway rides amusement park plan



Photos by Michael Ging/The Arizona Republic

Cowboys "Badger" (foreground) and "Shiloh" put on a show for people on the train leaving for the South Rim of the Grand Canyon. Williams hopes to become northern Arizona's entertainment capital.

By Mark Shaffer
Republic Flagstaff Bureau

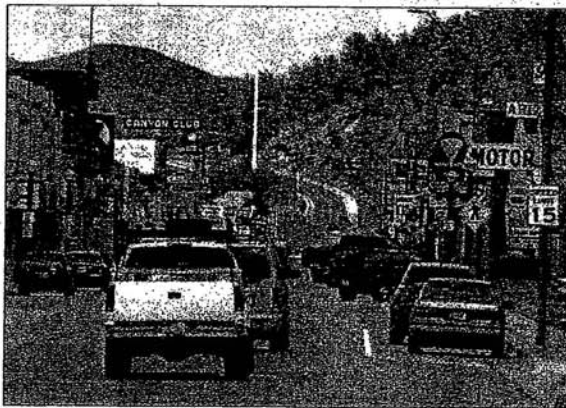
WILLIAMS — As high winds whipped downslope from Bill Williams Mountain through the empty streets of the Route 66 business district, Ray DeBerge's thoughts were in a much better place.

Like dreaming of the day that tourists snake in the narrow aisles of his century-old Western-wear store to buy the straw and felt cowboy hats he had just rearranged.

A year ago, that notion would have drawn a big laugh, back when all the area lakes were dry and city officials kept their fingers crossed that they wouldn't come up dry drilling a well. And city officials remember when there were many empty storefronts, the lingering effects of being the last town bypassed by Interstate 40. But life is changing rapidly in this city, population 3,000, where pine tree meets prairie and the biggest celebration honors mountain men.

Williams is the closest incorporated community to the Grand Canyon, 59 miles away. It's on the fast track to taking advantage of that in a big way.

See WILLIAMS Page A10



Along Bill Williams Avenue, Williams' main thoroughfare, businesses worry that a big amusement park will hurt downtown.

Williams has big plans

Some projects under way or planned for Williams

- Grand Canyon-Railway RV Park
- Arizona Territory
- Railroad museum
- Wild West theme park
- Grand Canyon tour helipads

azcentral.com

For a primer on the Grand Canyon, including a photo tour, go to travel.azcentral.com.

WILLIAMS City has a grand vision

From Page A1

To wit:
 ■ Gov. Janet Napolitano recently signed a bill to create an amusement park district in Williams for a proposed 1,000-acre park, which would be a mix of Disneyland, country music and Six Flags Magic Mountain. A 160-acre park with a theme of territorial Arizona also is on the drawing boards.

■ Groundbreaking on a \$20 million railroad museum, anticipated to be one of the best of its kind in the country, is scheduled for early next year.

■ Subdivision plats are expected to be approved by the end of this year for more than 1,200 homes that will more than double the 1,100 dwellings within city limits.

■ An air tour company is negotiating for a landing area in Williams, the first of several such companies expected to locate in the area.

■ Grand Canyon Railway, which is based in Williams, had a record 210,000 riders last year and is on pace to break that mark this year. The railway also has proposed its line as a primary entry point into the national park to alleviate auto congestion on the South Rim.

But it's the amusement parks and all the talk of growth that is the main subject of discussion around town.

As 82-year-old Myra Buford took the last bites of lasagna and canned peaches on her plate at a senior-citizens center luncheon, she joked disdainfully about the new Williams.

"I guess we're all going to have to start wearing Mickey Mouse hats," Buford said.

Ruby Collins, 74, who has lived in Williams for 43 years, said her concerns are much more specific.

"I just hope the water around here holds up," Collins said.

"You can plan to do things all you want, but our water situation here has always put a damper on that." A glut of rain and snow during the past eight months has filled reservoirs in the Williams area, and local officials said the surface water should meet the city's needs for the next two to three years.

Susan Day Scherz, superintendent of the Williams Unified School District, said the district's enrollment and budget have declined in recent years.

"Even with that we are pretty close to capacity. All of this would bring about a radical change in our schools," Scherz said. Meanwhile, the sound of bulldozers and other earthmoving equipment resonates through the western part of the city as the first stage of the construction begins.

"I wish we were talking

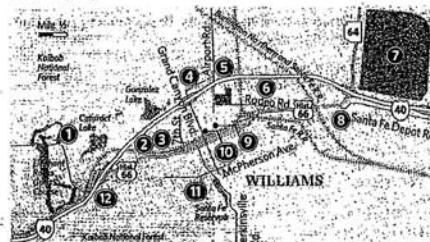


Photos by Michael Cing/The Arizona Republic

Passengers board the Grand Canyon Railway at a depot in Williams for its morning trip to the South Rim of the canyon. Williams is the closest incorporated community to the natural wonder 59 miles away.

Williams: Small city, big plans

After years of being a sleepy city that Interstate 40 bypassed two decades ago, Williams is on the verge of becoming the entertainment capital of northern Arizona. A theme park, a railroad museum and numerous developments are its future. Some projects under way or planned:



- | | | |
|--|--|-----------------------------------|
| 1. 100-acre housing subdivision. | 5. 60-acre townhome subdivision. | 9. Railroad museum. |
| 2. Grand Canyon Railway RV Park, 30 acres. | 6. 20-acre housing subdivision. | 10. Tour helpads. |
| 3. 40-acre housing subdivision. | 7. Unnamed theme park combining country music, Disneyland and Six Flags Magic Mountain themes. | 11. 60-acre housing subdivision. |
| 4. 100-acre housing subdivision. | 8. Arizona Territory, late-1800s theme park. | 12. 245-acre housing subdivision. |

Source: City of Williams

Tony Bostos/The Arizona Republic

about industry, solid jobs and production being behind this," said Flora Hall, a downtown curio-shop manager. "I'm not sure amusement is the way to go, but you take what you can get in Williams."

Plans are going along swimmingly for one of those planned amusement areas, an Arizona Territory theme park, said Charles Jolinka, a spokesman for the Keethler Co. of Scottsdale. The company purchased the 160 acres southeast of the

intersection of I-40 and Arizona 64 last November.

Jolinka said the company has proper zoning in place, has determined a water source and anticipates having a design and feasibility study completed within 60 days by Leisure and Recreational Concepts Inc. of Dallas. After that, the group will begin raising the capital for the Arizona Territory park, which is expected to cost \$32 million to \$35 million.

Included in the project is an

824-room hotel, Jolinka said. It would be the largest hotel in Williams. The city has about 1,500 hotel rooms.

The Keethler Co. also owns 239 acres southwest of downtown Williams at the base of Bill Williams Mountain. Jolinka said 280 homes are on the drawing board to be built in that area starting Sept. 1. Work on the water system well at Arizona Territory also is expected to begin on that date.

That housing subdivision is one of seven of more than 40 acres working their way through Williams city government, Wells said.

"We've had more housing planning activity here during the last year than all the years combined in Williams' history," Wells said. "Because we are so hemmed in by Forest Service land, the thinking is that we can only be 8,000 to 10,000 population max. Which means that we would need another two producing water wells to the three we already have."

The Arizona State Railroad Museum is closest to getting off the ground.

Last month, the group behind the theme park agreed to provide up to \$19 million in guaranteed private bonds for the museum, which are expected to cost about \$20 million.

Al Richmond, president of the museum's foundation, said construction is expected to begin by the end of the year on the 15-acre museum site, donated by Grand Canyon Railway and adjacent to the railway terminal in downtown Williams.

"The downtown business community was saying that these theme parks would drag all of the business out of town," Richmond said.

"We were very happy when they showed this kind of commitment to the downtown area."

The railway station and museum also could be future neighbors of a helipad for Maverick Helicopters of Las Vegas, which wants to use Williams as a base for daily tour flights over the nearby red-rock country of Sycamore Canyon, Oak Creek Canyon and Sedona.

"They are catering to an upper-tier market and want to tie in to passengers returning in the afternoons on the trains from the Grand Canyon," Wells said.

"The city's preference is for them to use our airport north of downtown because of possible noise issues in downtown."

"But this is a very promising venture, and they have talked about using fixed-wing aircraft in their tour flights also."

All of which is music to the ears of Dave Chambers, president of Grand Canyon Railway.

Chambers said the railway recently added 100 rooms to its Fray Marcos Hotel, just made an offer for 14 additional coach cars and is expecting a 10 percent increase in passengers this year to about 230,000.

"We just keep adding trains," Chambers said.

Reach the reporter at mark.shaffer@arizona-republic.com or (602) 444-8057.

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**NRCE Comments for the North Central Arizona Water Supply Study
Preliminary Draft on behalf of the Havasupai Tribe**

1. **Page 37, line 19** – The previous subsections under the main Section II.4 heading, which provide an overview of the N-, and C-Aquifers, each contain a listing of the issues associated with using those aquifers to meet the study’s water needs. A similar listing in the R-M aquifer subsection would clarify the major issues associated with this aquifer. Among the issues that should be included are:
 - The R-M aquifer flow system is poorly understood
 - The yields from R-M aquifer wells are highly variable
 - The depth to water in the R-M aquifer is on the order of 3000 feet which means drilling wells is very expensive
 - Pumping from the R-M aquifer will likely impact flows from springs in the Grand Canyon and Havasu Springs
 - Any withdrawal from the R-M aquifer is considered by the Havasupai Tribe to have an impact on its water rights and water resources.

2. **Page 46, line 1** – The hilltop well is completed in the R-M aquifer. The last part of this sentence “...,which leads the tribe to suspect there is possible a different recharge mechanism for this aquifer” should more appropriately be restated as “...,which leads the tribe to suspect there is possibly a different recharge mechanism for the aquifer at this location.”

3. **Page 72, line 28** – This section deals with the projected response in-lieu of a Federal Response for the City of Williams. It was stated previously (Page 50, line 12) that the Tribe has an agreement with the city that the “City of Williams supports the principle that there should be no decrease in the natural flow of Havasu Springs.” The following sentence should be inserted on line 28. “However, any such development local to the Williams area would need to be consistent with the agreement between the Havasupai Tribe and the City of Williams.” Additionally, since any long term pumping in the R-M aquifer has been shown in models to result in decreased flows from Havasu Spring, the sentence that was included under the Valle and Tusayan subsections (with slight wording change) could appropriately be inserted here, “Continued pumping however would be controversial from the perspectives of the Grand Canyon National Park, environmental community, and the Havasupai Tribe.”

4. **Page 81, line 20** – Based on previous studies of the R-M aquifer summarized in this draft report, inclusion of R-M aquifer wells as one of the potential water sources ignores all the stated findings. Modeling studies summarized in Section II.3 conclude that “long term pumping from the R-M aquifer system will result in decreased flows from Havasu Springs” and “that Havasu Springs captures the vast majority of the regional Redwall-Muav flows.” Although it is stated that any R-M aquifer development would need to be consistent with the agreement between the City of Williams and the Havasupai Tribe, studies are indicating that there is likely very little or no development potential available. Additionally, any withdrawal from the R-M aquifer is considered by the tribe to have an impact on its water rights and water resources. The Havasupai Tribe cannot tolerate any decrease in the natural flow of Havasu Springs and other canyon springs and seeps. It is suggested that R-M aquifer wells be removed as a potential water source in this study due to the likelihood that it cannot be developed given the above stated constraints.

June 26, 2006

Kevin Black
Bureau of Reclamation
Phoenix Area Office
6150 W. Thunderbird Road
Glendale, Arizona 85306-4001

Subject: **Comments on the June 16, 2006 draft of the *Preliminary Draft North Central Arizona Water supply Study, Report of Findings.***

Mr. Black,

The objective of this memorandum is to provide comments from the Navajo Department of Water Resources on the June 16, 2006 draft of the *Preliminary Draft North Central Arizona Water supply Study, Report of Findings*. This draft represents a vastly improved document from the one that was distributed in May by the Bureau of Reclamation (Reclamation). It again provides ample justification to move forward with feasibility level study of the North Central Water Supply Project.

Comment Number 1. Page vii. Glossary, and Page 2. Introduction

In the glossary the definition of the “Study Area” is worded slightly differently than in Section I.2. The unlabeled figure on Page 2 includes Leupp, Winslow, and nearly all of the Hopi Reservation. Is this the correct figure of the Study Area, or will there be a figure with a boundary delineating the study area?

The Demand Area is referred to as a subset of the Study Area. Is the Demand Area delineated in any figure?

Comment Number 2. Page 31, II. 4. Surface Water and Ground Water Supply Sources Overview

Throughout this section the surface water description is inadequate. Some general reference should be included regarding the overall average annual depleted and undepleted flows of the Colorado River, the Little Colorado River and its major tributaries. This information can readily be found in

the Western Navajo Hopi Water Supply Study (HDR, 2005) and in the Little Colorado River System Inventory of Water Use (September 1994, ADWR).

Whether the surface water drainages are young or mature is not relevant to anything. What is relevant to this study is the potential water supply, its reliability and potential for development.

Comment Number 3. Page 41, II.5 Ground water and Surface Water Legal Overview

This section misses at least one important issue. Tribal water rights are not necessarily governed by Arizona water law. Some reference to federally reserved water rights should be included in this introductory paragraph and described later in the section. Reclamation is familiar with a memorandum provided for the Red Lake Irrigation Project Water Conservation and Management Plan that may be a useful reference.

Water law governing wastewater effluent is a relatively minor topic that may be adequately addressed in a separate paragraph.

Comment Number 4. Page 44, Table II.7-1

This table and others (for instance Table V.1-1) have values that include five significant figures. The total use values did not print out.

Comment Number 5. Page 44, Tribal Communities

At NNDWR's request a comment was added in this section that NTUA has a progressive rate structure. The intention of this comment was to get some clarity on Reclamation's use of the phrase "progressive" and "relatively progressive" rate structure as it is applied to the City of Flagstaff, NTUA and other utilities.

Comment Number 6. Page 46, Non-Tribal Communities

It should be noted that the City of Page, which is in the Upper Basin, is utilizing surface water allocated under the Upper Basin Compact for use

within the Upper Basin of Arizona. The credit referred to is a return flow credit which indicates that a portion of the water diverted by the City of Page returns to the Colorado River system upstream from Lees Ferry.

The community of LeChee, which is also in the Upper Basin, is also utilizing surface water that is accounted for as an Upper Basin water depletion.

Comment Number 7. Page 53, Table II.8-1, Page 54 Table II. 8-2, and Page 56 III. Projected Demands and Future Without a Federal Project in the Study Area

One of the greatest benefits of the North Central Arizona Water Supply Project is that it will reduce the volume of water hauling in the region. ADWR was working on a memorandum of general water hauling rates in the region. These rates should be included in Table II.8-1.

It is also important to include an estimate of the volume of projected water hauling with and without a federal project.

Comment Number 8. Page 60, Table III.2-2

The Western Navajo Hopi Water Supply Study includes assumptions regarding the ramping up of the per capita water use. Tetra Tech's report assumes more rapid ramping of the per capita water use for the LeChee area. This more rapid ramping is justified due to LeChee's close proximity to the City of Page, and the progress on the Page LeChee Water Supply Project.

Comment Number 9. Page 61, III.2.2 Non-Tribal Demands

This section notes that Flagstaff's per capita water use rate is between 120 and 130 gallons per capita per day. Flagstaff has a very successful water conservation program and should be commended. However, in this report it should be noted that this relatively low per capita water use rate is influenced by the relatively large population of non-full time residents and dormitories at NAU. This situation may not apply to other communities in the region.

Comment Number 10. Page 66, III.2.3 Water Conservation

Everyone should encourage water conservation. However, for the Tribal communities additional conservation that results in lower net per capita water use rates may be extremely difficult to achieve, and potentially contrary to the establishing a permanent homeland for these communities.

Comment 11. Page 68 III.3.1 Tribal Communities

Ground water is the most heavily utilized and dependable municipal water source for the Navajo Nation. It is important for the Navajo Nation that municipal and domestic ground water withdrawal in the future remain within sustainable limits to ensure an adequate supply of water for future generations of Navajo people. It is essential that this water source be protected. Industrial water is also needed to enable the Navajo Nation to become a permanent homeland where the Navajo people may find their livelihoods. As noted in the Western Navajo Hopi Water Supply Study, and in Figure II. 4-5 of this report, depending on the demand assumptions, some portions of the Navajo and Coconino Aquifers that supply Navajo communities risk unsustainable withdrawals within the next few decades. Consequently, the preferred alternative described in that exhaustive study included the development of additional surface water supplies. The importation of water it is a very high priority to develop a supplemental sustainable source of surface water for use in the Little Colorado River and Mainstem Colorado River Basins.

Comment 12. Page 70, III.3.2 Non-Tribal Communities

The last paragraph describes the City of Flagstaff's recent efforts to develop C-aquifer ground water. The City of Flagstaff has been informed by the Navajo Nation Department of Justice that the Navajo Nation is extremely concerned with the implications of this proposed development. In addition to Indian Trust Asset issues, the City's efforts also raise very significant ESA challenges.

Comment 13. Page 75, IV.1 Potential Sources Considered

This section should be redrafted. The heading of this section is misleading and should be renamed. It is not just about the potential sources

considered, but how the potential sources were matched to the specific demand centers. The process that was used is critical and should be clearly explained. At the end of the sentence that begins on Line 5 the list of potential sources considered should be listed (Lake Powell, Lake Mead, LCR surface water, LCR Alluvium, Roaring Springs, Potable C-aquifer, Non-potable C-aquifer, and R-M aquifer).

Then, instead of referring to “professional discretion,” a new paragraph should be crafted describing the process that was used for the first iteration. This section should be reworded to include a more systematic presentation of why options were deleted for the demand centers, and consequently were not subjected to additional evaluation.

Another paragraph should be crafted describing the process that was used for the second iteration. The second iteration was largely based on a comparison of the appraisal level field costs of the various components. The components were then grouped into three distinct alternatives. The three alternatives may then become candidates for further feasibility level evaluation.

Comment 14. Page 75, IV.1.1 Lake Powell

This section is very important and it needs to be completely re-drafted.

First, a new paragraph should begin at line 29 with a section describing each of the “distinct categories.” Based on the current draft language the three categories are: 1) Upper Basin Diversion out of Lake Powell, 2) Upper Basin Diversion below Lake Powell and above Lees Ferry, and 3) Lower Basin Diversions. It is not clear what the second two categories have to do with a section entitled “Lake Powell.”

Second, the sentence that begins on line 34 does not make any sense at all.

Finally, a more logical presentation of this material would be to suggest that there are two general sources of water: 1) water allocated to the Upper Colorado Basin and 2) water allocated to the Lower Colorado River Basin. There are two potential points of diversion: 1) the Upper Colorado Basin, and 2) the Lower Colorado River Basin. And, there are two potential places of use: 1) the Upper Basin, and 2) the Lower Basin. This paradigm creates eight distinct categories of surface water development in the Demand Area:

1. Upper Basin allocation of water diverted in the Upper Basin and used in the Upper Basin.
2. Upper Basin allocation of water diverted in the Upper Basin and used in the Lower Basin
3. Upper Basin allocation of water diverted in the Lower Basin and used in the Upper Basin.
4. Upper Basin allocation water diverted in the Lower Basin and used in the Lower Basin.
5. Lower Basin allocation of water diverted in the Upper Basin and used in the Upper Basin.
6. Lower Basin allocation of water diverted in the Upper Basin and used in the Lower Basin
7. Lower Basin allocation of water diverted in the Lower Basin and used in the Upper Basin.
8. Lower Basin allocation water diverted in the lower basin and used in the lower basin.

Each of these distinct categories raises various technical, environmental, and compact compliance issues. Distinct Categories #1 and #8 raise the fewest compact compliance issues. Distinct Category #6, which was recently considered in the context of the Black Mesa Alternative Water Supply Study, needs some specific explanation in the context of this particular study. The letter drafted by John Weldon may be a useful citation. The other distinct categories are less relevant in the context of this particular study.

Comment 15. Page 76, IV.1.1 Lake Powell

Once and for all Reclamation should make it abundantly clear that the proposed Jackass Canyon Intake was not to have been located within the Grand Canyon National Park.

A new paragraph should begin on Line 5. This section is describing the cost implications of the various intake locations with respect to the distinct categories described above.

Comment 16. Page 77, IV.1.2 Lake Mead

Lake Mead could be an option under “Distinct Categories” 5, 6, 7, and 8.

The Phrase on Line 3 “The primary thought” should be deleted and the facts and conclusions of the matter should just be clearly stated. The readers are not intended to be clairvoyant.

This section should include a rough description of the overall lift to the demand area, and the total distance to the demand area so that the decision to not include it for further evaluation can be reinforced in the text. For instance, it appears from Table IV.1-2 that the most comparable Lake Mead option is \$100 million more expensive than the most comparable Lake Powell option, and it still fails to serve any Navajo communities.

Comment 17. Page 78, IV.I.3 Little Colorado River Surface Water Tributaries Off the Mogollon Mesa

This section should reference reports produced since 1977. For instance, ADWR completed a series of reports in 1994. Reclamation completed the Appraisal Level Assessment Three Canyon Water Supply Project Arizona in March 1998. And the Western Navajo Hopi Water Supply Study was completed in 2005.

Comment 18. Page 78, IV.I.4 Little Colorado River Alluvium

In addition to questions regarding its sustainability, the LCR alluvium presented water quality concerns, and it would require between 70 and 140 wells to produce 17,000 acre-feet during a two-year period.

Comment 19. Page 80, IV.I.6 C Aquifer Fresh Water Areas

The monikers “Fresh Water Areas” and “Impaired (saline) Water Areas” should be renamed. Perhaps they can be designated as potable and non-potable, or high quality and low quality.

Comment 20. Page 101, Lake Intake

For Alternative 1 the Reclamation recommends three 18-inch bores with 12-inch diameter pipes having a 24 cfs capacity. For Alternative 2 the Reclamation recommends seven 12-inch diameter pipes with 56 cfs capacity. And for Alternative 3 the Reclamation recommends eight 8-inch bores with 12-inch diameter pipes having 64 cfs capacity. However, for the Page LeChee Water Supply Project report dated June 2004 Reclamation recommended six 48-inch diameter bores with 27-inch diameter pipes with a total capacity of 19 cfs. If three 18-inch bores with 12-inch diameter pipes can supply 24 cfs, why did Reclamation recommend six 48-inch diameter bores with 27-inch diameter pipes to supply 19cfs? The June 2004 Reclamation report differed significantly from a Reclamation-funded study of the Page LeChee Intake by Tetra Tech in 2003.

The June 2004 Page LeChee report by Reclamation indicates that the intake pumping head is between 600 and 700 feet, this draft Reclamation report indicates the pumping head is 300 feet.

Comment 21. Page 103, V.1.6 Excavation and Backfill

Reclamation is recommending an average depth of 4 feet. However, for a similar water supply project in New Mexico Reclamation insisted on a much greater depth. Does Reclamation have an adequate justification for the 4-foot value for Arizona that differs from the project in New Mexico?

In September 2001 for the Peer Review of the Western Navajo Pipeline, Reclamation specified common excavation at \$2.00 per CY and Rock at \$8.00 per CY. This document uses a weighted value of \$10 CY for 60 percent rock and 40 percent common excavation. Does Reclamation have an adequate justification for this current value?

On Page C-9, the Excavation is 100 percent rock. However, the weighted unit cost is still \$10 CY.

Is Reclamation assuming that a Vermere Trencher will be used for this excavation?

Reclamation assumes that embedment material will be needed at a cost of \$30 per cubic yard. This selection adds almost 10 percent to the cost of the water line from Lake Powell to Cameron. The need for this material and its cost requires additional justification.

Comment 22. Page 103, Pumping Plants

PUMPLT can sometimes produce odd results. The 17 cfs Tuba City Lateral has a total of 230 feet of head in Alternative 2, 482 feet of head in Alternative 1, and 410 feet in Alternative 3. The 1.38 cfs Bitter Springs Spur has a total of 693 feet of head in Alternative 2, 705 feet of head in Alternative 1, and 639 feet in Alternative 3. These results are then reflected in the three different pump cost estimates. Is the different total head correct? It is possible that these results are a function of the excess energy available from pressure in the main line. But, the figures in Appendix D do not make that explanation seem plausible.

Comment 23. Page 104, V.1.8 Power

In a March 2005 Reclamation cost estimate on a similar project in New Mexico, Reclamation specified 69 KV wooden pole transmission lines with and optical ground wires at \$108,530 per mile. In this report on Page 104 the Reclamation states that the unit cost is \$150,000 per mile. However, in the cost estimating spread sheets Reclamation uses \$200,000 per mile. On Page C-2, the description states \$150,000 per mile, but the unit price is \$200,000.

Comment 24. Page 104, V.1.9 Storage Tanks

The storage requirements for the tribal nodes are for three days of storage, not three hours of storage.

Comment 25. Page 104, V.1.12 Water Treatment

The project cost estimates for the Lake Powell options and other surface water options should include appropriate water treatment.

Comment 26. Page 109, V.2.3 Cost per AF

The unit cost per acre-foot for all entities is the total project field cost divided by the total demand. But in all fairness, some unit costs should be lower or higher, depending on the alternative, the distance from the water source, or annual demands. For example, for Alternative 2, Flagstaff should reasonably have a higher unit cost per acre-foot than Cameron because Flagstaff is further from Lake Powell. For Alternative 3, Williams and the Grand Canyon Village should have higher unit costs than the Navajo Chapters or Flagstaff. The NNDWR 1999 Technical Memorandum on the North Central Water Supply Project may provide some guidance on this matter.

Comment 27. Page 110, Table V.2-7 Annual Demand and Costs by Alternative for Study Area Demand Centers

A more reasonable approach to cost allocation is to distribute the costs by the percent of capacity used by each demand center for each reach. The current approach presented by Reclamation inadvertently penalizes a community like Cameron for the cost associated with the pipeline to Williams. As the overall capacity of the reach between Lake Powell and Cameron increases, the unit cost of the water supply for Cameron should decrease, not increase. The results presented in Table V.2-7 are counter intuitive.

Comment 28. Page C-2 and C-7, Estimate Worksheet

The costs of the water tanks on C-2 are different from the costs of the water tanks on C-7. Was this worksheet truly checked and peer reviewed?

The table indicates that 3 percent of the construction cost is \$8,780,000 and 1 percent of the construction cost is \$3,010,000. What value of construction cost could possibly generate this result?

The table on C-2 indicates that the total mileage for the power lines is 18 miles, the table on C-7 indicates 118 miles, and the table on C-14 indicates 35 miles. These lengths do not seem to conform with the total pipe lengths. What do these lengths correspond with?

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August 8, 2006
Kevin Black
Bureau of Reclamation
Phoenix Area Office
6150 W. Thunderbird Road
Glendale, Arizona 85306-4001

Subject: **Comments on the August 8, 2006 draft of the *Preliminary Draft North Central Arizona Water supply Study, Report of Findings.***

Mr. Black,

The objective of this memorandum is to provide comments from the Navajo Department of Water Resources on the August 8, 2006 draft of the *Preliminary Draft North Central Arizona Water supply Study, Report of Findings*. This draft represents a vastly improved document from the ones that were distributed in May and June by the Bureau of Reclamation (Reclamation). It again provides ample justification to move forward with feasibility level study of the three alternatives described that could become the North Central Water Supply Project.

Comment Number 1. Page vii. Glossary, and Page 2. Introduction

In the glossary the definition of the “Study Area” is still worded slightly differently than in Section I.2. The still unlabeled figure on Page 2 includes Leupp, Winslow, and nearly all of the Hopi Reservation. Is this the correct figure of the Study Area, or will there be a different figure with a boundary delineating the study area?

The Demand Area is referred to as a subset of the Study Area. Is the Demand Area delineated in any figure? The demand area should be clarified in Section 1.

Comment Number 2. Page 32, II. 4. Surface Water and Ground Water Supply Sources Overview

Throughout this section the surface water description continues to be very inadequate. How can surface water be ruled out as a water supply source if no meaningful information nor assessment is included? Reclamation should refer to the findings in *Hydrology of the Little Colorado River System, Special Report to the Settlement Committee, In Re The General*

Adjudication of the Little Colorado River System and Source, Arizona Department of Water Resources, October 1989. On page 4-34 of ADWR's report ADWR states that "Under present conditions, the Clear Creek watershed offers the best potential for providing dependable annual flows to potential downstream users on the Little Colorado River System." Some general reference should be included regarding the overall average annual depleted and undepleted flows of the Colorado River, the Little Colorado River and its major tributaries. This information can readily be found in the Western Navajo Hopi Water Supply Study (HDR, 2005) and in the Little Colorado River System Inventory of Water Use (September 1994, ADWR).

Whether the surface water drainages are young or mature is not relevant to anything. It is meaningless drivel. What is relevant to this study are the potential water supply, its reliability and potential for development.

Comment Number 3. Page 7, Population of Non-Tribal Communities (Year 2000)

It may be worth noting the tribal population in these "Non-Tribal" communities. According to the U.S. census 2000, the following communities include the following percentages of Native Americans:

City of Flagstaff	10 percent
Grand Canyon Village	18 percent
Kachina Village	4 percent
Mountaineer	7 percent
Page	26 percent
Tusayan	15 percent

Comment Number 4. Page 44, II.5 Ground water and Surface Water Legal Overview

This section continues to miss at least one very important issue. It refers to "two bodies of law." However, Tribal water rights are not necessarily governed by Arizona water law. Some reference of federally reserved water rights should be included in this introductory paragraph and elaborated later in the section. Reclamation is familiar with a memorandum provided for the Red Lake Irrigation Project Water Conservation and Management Plan that may be a useful reference.

Comment Number 5. Page 54, Tusayan

One valuable source of water related information for Tusayan (and other communities in that area) is the *Draft Environmental Impact Statement for Tusayan Growth* June 20, 1997. The Tusayan system, and other systems, are described in greater detail on Pages 12 and 106 of that document.

Comment Number 6. Page 57, Table II.8-1, Page 54 Table II. 8-2, and Page 56 III. Projected Demands and Future Without a Federal Project in the Study Area

One of the greatest benefits of the North Central Arizona Water Supply Project is that it will reduce the volume of water hauling in the region. ADWR has information on general water hauling rates in the region. These rates should be included in Table II.8-1.

It is also important to include an estimate of the volume of projected water hauling with and without a federal project. For instance, on page 109 of the Tusayan Draft EIS it states that “IN 1995 WATER USE IN TUSAYAN TOTALED 54.3 MILLION GALLONS. 30 PERCENT WAS HAULED FROM WILLIAMS AND 23 PERCENT WAS HAULED FROM GRAND CANYON NATIONAL PARK FOR AN ESTIMATED 4,800 TRUCK LOADS.” This is very important information for this study. How much do they spend on water hauling? Water hauling is not just a Navajo Nation issue, but it is a regional issue.

Comment Number 7. Page 65, III.2.3 Water Conservation

Everyone should encourage water conservation. However, for the Tribal communities additional conservation that results in lower net per capita water use rates may be extremely difficult to achieve, and potentially contrary to the establishing a permanent homeland for these communities.

Comment Number 8. Page 68 III.3.1 Tribal Communities

In this draft, the second paragraph is still incomplete. Ground water is the most heavily utilized and dependable municipal water source for the Navajo Nation. It is important for the Navajo Nation that municipal and domestic ground water withdrawal in the future remain within sustainable

limits to ensure an adequate supply of water for future generation of Navajo people. It is essential that this water source be protected. Industrial water is also needed to enable the Navajo Nation to become a permanent homeland where the Navajo people may find their livelihoods. As noted in the Western Navajo Hopi Water Supply Study, and in Figure II. 4-5 of this report, depending on the demand assumptions, some portions of the Navajo and Coconino Aquifers that supply Navajo communities risk unsustainable withdrawals within the next few decades. Consequently, the preferred alternative described in that exhaustive study included the development of additional surface water supplies. The importation of water it is a very high priority to develop a supplemental sustainable source of surface water for use in the Little Colorado River and Mainstem Colorado River Basins.

Comment Number 9. Page 70, III.3.2 Non-Tribal Communities

The last paragraph describes the City of Flagstaff's recent efforts to develop C-aquifer ground water. The City of Flagstaff has been informed by the Navajo Nation Department of Justice that the Navajo Nation is extremely concerned with the implications of this proposed development. In addition to Indian Trust Asset issues, the City's efforts also raise very significant ESA challenges.

Comment Number 10. Page 77, III.4 Summary

The summary should include some brief outline of the water hauling issues in the region.

Comment Number 11. Page 75, IV.1 Potential Sources Considered for Demand Centers

This section still needs to some redrafting. The heading of this section IV.1.1 is misleading and should be renamed. As Reclamation suggests, a more suitable title would be "Mainstem Colorado River above the Grand Canyon." However, it is not clear why the Grand Canyon is used as the line of demarcation and not Lees Ferry.

Another paragraph should be crafted describing the process that was used for the second iteration of selection. The second iteration was largely

based on a comparison of the appraisal level field costs of the various components. The components were then grouped into three distinct alternatives. The three alternatives will then become candidates for further feasibility level evaluation.

Comment Number 12. Page 75, IV.1.1 Lake Powell

This section is very important and it needs major re-drafting. The heading of this section IV.1.1 is misleading and should be renamed. As Reclamation suggests, a more suitable title would be “Mainstem Colorado River above the Grand Canyon.” However, it is not clear why the Grand Canyon is used as the line of demarcation and not Lees Ferry.

Second, the sentence that begins on line 43 “Since any diversion out of Lake Powell itself would be from the upper basin, while the vast majority of uses of this water in a North Central Arizona study area would be in the lower basin, the diversion of any water which would be counted against the Upper Basin apportionment is a matter of interpretation of the law of the river and the subject of negotiations that would have to occur between the upper and lower basin state.” does not make any sense at all. This section is very important. It is critical that Reclamation, whom some consider to be the water master in the Lower Basin, gets it straight.

Comment Number 13. Page 77, IV.1.2 Lake Mead

For consistency, this section should be referred to as “Diversion below the Grand Canyon, Lake Mead.”

Comment Number 14. Page 78, IV.I.3 Little Colorado River Surface Water Tributaries Off the Mogollon Mesa

This section should reference much more authoritative reports produced since 1977. For instance, ADWR completed important reports in 1989 and 1994. Reclamation completed the Appraisal Level Assessment Three Canyon Water Supply Project Arizona in March 1998. And the Western Navajo Hopi Water Supply Study was completed in 2005.

Comment Number 15. Page 85, Table IV.1.1-2 Preliminary Cost Estimate

In the next draft, the corrected values should be included in Table IV.1-2.

Comment Number 16. Page 95, Formulation of Alternatives

Each of the three alternatives should be designated by its own subheading with a descriptive name and written description. The biggest difference between Alternative 1 and Alternative 2 is the use of the C-aquifer. The implications of that difference should be described. For instance, is the C-aquifer sustainable? What is the relative cost of acquiring the related water rights? Are there ESA and ITA issues? It would also be useful to include tables in this section that separately tabulate the costs of the components that go into each alternative.

Comment Number 17. Page 105, Intake

After Reclamation adjusted the numbers from the July draft (and assuming that these numbers are correct), they still appear to be significantly different from the numbers in the *Page-LeChee Water Supply - Part 1, Concept Design Study - Report of Finding*, June 2004. One suspects that the values in the 2004 report may not be as correct as they should be, and that Reclamation should update that 2004 report accordingly.

Comment Number 18. Page 106, Pipelines

Reclamation assumes that 100 percent of this water line will require 500 foot head class pipe. Is that a bit conservative?

Comment Number 19. Page 108, V.1-9 Storage Tanks

This paragraph indicates that the storage tanks are based on a three-day supply. However, in the cost sheets the same tank dimensions are used for Alternatives #1, #2 and #3. This result makes no sense. Also, is Reclamation really suggesting that Tuba City really needs a water tank that is 500 feet in diameter and 25 feet high? These curiously large tanks have added more than \$20 million to the field cost of the Lake Powell to Cameron pipeline for no apparent reason.

Comment Number 20. Page 109, V.1.12 Water Treatment

This project cost estimate for the Lake Powell options should include water treatment.

Comment Number 20. Page 112, V.1.17 Project Costs

It would be very helpful to have the costs of the components that make up each alternative listed as follows:

Table x.x Summary of the Total Field Costs for Each Alternative.

Alternative	Field Cost (Millions)
Alternative 1	
Lake Powell to Cameron Pipeline	\$230
C-aquifer to Flagstaff	\$160
Williams Well Field	\$54
Grand Canyon Gallery	\$27
Total	\$471
Alternative 2	
Lake Powell to Flagstaff Pipeline	\$540
Williams Well Field	\$54
Grand Canyon Gallery	\$27
Total	\$621
Alternative 3	
Lake Powell to Flagstaff, Williams and Grand Canyon Pipeline	\$650
Total	\$650

Comment Number 21. Page 117, Impacts

The impacts of the project on water hauling in the region should be noted.

Comment Number 22. Page 115, Table V.2-7 Annual Demand and Costs by Alternative for Study Area Demand Centers

A more reasonable approach to cost allocation is to distribute the costs by the percent of capacity used by each demand center for each reach. This current approach inadvertently penalizes a community like Cameron for the cost of the pipeline to Williams. As the overall capacity of the reach between Lake Powell and Cameron increases, the unit cost of the water supply for Cameron should decrease, not increase. The results in this table are counter intuitive.

**North Central Water Advisory Supply Study (NCWASS)
Draft Appraisal Report June 16, 2006
Hopi Tribe Comments**

JR = Joelynn Roberson

Comment No.	Section	Page	Line	Reviewer	Comment
1	II.1.1	5	16	JR	Hopi Tribe's Village of Upper Moenkopi and Lower Village of Moencopi
2	II.1.1	5	28-34	JR	The Hopi Reservation is located in Northeastern Arizona, on a parcel of land surrounded by the Navajo Reservation. Hopi is comprised of two non-contiguous parcels - lands within the Hopi 1882 Reservation and lands in and around the Moenkopi Villages which are within the area of the Navajo Reservation created by the Act of June 14, 1934, 48 Stat. 960 (1934), commonly referred to as 'the 1934 Act' and 'the 1934 Act Reservation'. In 1992, after years of litigation initiated by the Hopi Tribe to determine its rights and interests in the 1934 Act Reservation, along with what was then referred to as the Moenkopi Administrative Area, was transferred to the jurisdiction of the Hopi Tribe as part of the Hopi Reservation. ¹⁸ (Lynelle Hartway) The Moenkopi District is an island consisting of two villages, Upper Moenkopi and Lower Moencopi; located 45 miles from the Hopi Reservation. The two villages of Moenkopi currently use the N-aquifer water for both domestic and community needs. The Hopi Villages, both the Upper Village of Moenkopi and Lower Village of Moencopi have a population of 1500. The two distinct villages are residential and agricultural year round. The two villages of the Moenkopi District future expansion will be both residential and economic development both north/south of the Moenkopi Wash.

¹⁸ This land transfer also affected the local and area BIA offices that had federal oversight jurisdiction over the lands. Before the transfer of jurisdiction, the management responsibility for the Landfill resided with the BIA Navajo Regional Office (NRO). After 1992, that responsibility was transferred to the BIA Western Regional Office.

Appendix F—Comments

3	Table II.1-1	6	6	JR	<p>Hopi Tribe Moenkopi 1000 Lower Village of Moenkopi 100 year round residents; future development south of Moenkopi Wash will be estimated at 30 plus homes; and economic development.</p>
4	II.2.2.1	14	19-36	<p>LH use of information Provided in a paper written by Lynelle Hartway; JR</p>	<p>• “When the sacred springs at Moenkopi are no longer able to support life, and the last person leaves the old village, it marks the beginning of the end times for all peoples.” – Hopi Prophecy</p> <p>• The Upper Village of Moenkopi and the Village of Moenkopi (Lower) are situated about 90 miles northeast of Flagstaff and adjacent to Tuba City in Northeastern Arizona on the Hopi Reservation. The Hopi Villages represent some of the oldest continuously occupied areas in the United States. Archaeological studies have shown that indigenous peoples have inhabited this area of what is now Northeastern Arizona since at least 1150 B.C. The culture and lifestyle of the Hopi people, including those living at Moenkopi, is known and honored throughout the world. The two Villages have a combined population of about 1,500 Hopi Tribal members, whose observance of their ancient culture and ceremonial cycle is still very active today. As indicated by the Hopi prophecy quoted above, their culture, along with their water source, is of fundamental importance to the Hopi people. Environmental stewardship, as required by Maasau, the Lord of the Fourth World, is the foundation of all Hopi beliefs. The Hopi’s believe that their sacred homeland was given to them in trust by Maasau in exchange for their commitment to live according to principles established by him and to protect the Hopi way of life and environment. In Hopi philosophy, the health and safety of the Hopi people is indistinguishable from the health and safety of the environment.</p> <p>Both of the Villages at Moenkopi obtain their water supply from the Navajo sandstone and Kayenta formation members of the N-Aquifer. The N-Aquifer is the main source of drinking</p>

water for the area, and it discharges water at numerous springs, seeps, and wells across the Hopi Reservation and most notably, at several springs within the Villages at Moenkopi. Due to the exceptional nature of the N-Aquifer's water quality and its importance to the Hopi people, the Hopi Tribal Council specifically addressed the Aquifer in the Tribe's water quality standards, giving it a special designation. Hopi Tribal Council Resolution H-107-97 classified certain Hopi ground water, including the ground water supplying the drinking water needs of the Hopi Villages at Moenkopi, as a "unique water," of the Tribe, which classification includes, "The N-aquifer and all areas recharging the N-aquifer. The N-aquifer includes water bearing units of the Navajo Sandstone, the Kayenta Formation, the Wingate Sandstone, and all springs emanating from these units." This designation is mirrored in the Navajo Nation Water Quality Standards, enacted through the Resources Committee of the Navajo Nation Council, which contain an anti-degradation policy for the protection and maintenance of "unique waters." Included within the definition of unique waters are ground water sources that have exceptional cultural, ecological, and/or recreational significance due to the nature of their flora, fauna, water quality, aesthetic value, or wilderness characteristics. The N-Aquifer is such an exceptional water source.

Village inhabitants depend on this pristine body of water for drinking water. N-Aquifer wells, springs, and seeps provide drinking water for residences, schools, community centers, and businesses. Moenkopi residents also rely on it to irrigate subsistence crops of corn, squash, and beans. In a very real sense, the N-Aquifer water, provides a basis for their subsistence and livelihood, as well as constituting a central ingredient to their cultural and religious practice. The area of land containing and surrounding the Tuba City Landfill is hydraulically upgradient from the Villages' sacred springs (which are the surface N-aquifer waters), the Villages' wells, and the Villages' traditional croplands. Daily cultural activities of

the Hopi are dependent on the harvesting of plants and herbs for the preparation of many Hopi foods and religious activities. Local animal life, both wild and domesticated, is associated with critical cultural activities and fundamental to clan families (extended families).

Economic development designed to build a stable local economy is desperately needed on the Hopi Reservation and in Moenkopi.

According to the last census data, 13.9 percent of Moenkopi households live under the poverty level. The Arizona Department of Economic Security has determined that the average unemployment rate for the Hopi Reservation in 2002 was 22.6 percent. This is over four times the Arizona and national rates of joblessness.

“Tuba City Landfill, Moenkopi, Hopi Reservation Arizona Clean Closure v. Other available methods of remediation” Lynelle Hartway, Assistant General Counsel, Hopi Tribe, 2003

5 11.7.1 45 4-24

- The two Moenkopi Villages have current contamination threats on the local drinking water sources, issues upgradient located in Tuba City, AZ, north of Moenkopi. The current identified areas of contamination are: Leaking Underground Storage Tank (LUST) located under the Tuuvi Café (formerly known as the Tuba City Truck Stop Café; current clean up efforts are under an EPA Administrative Order on the current owners of the two gas stations, Thriftway and Super Fuels); the Davis Chevrolet Underground Storage Tank (currently being addressed by the Navajo Nation UST program); and the Tuba City Landfill (The Hopi Tribe’s preferred alternative is Clean Closure of the 28 acres of the landfill). These areas of contamination are a threat to the current drinking water, N-aquifer wells and springs, for the members of both the Upper and Lower Villages of Moenkopi. It is of vital importance for the two villages of Moenkopi to secure a future long term self sustaining source of drinking water for the local communities.

verification that the Hopi Tribe purchased the land from Cibola Irrigation District ?

6	Table II.8-2	54	2		<p>Upper Village of Moenkopi Water Rates per month is \$35.00 using 3” Moenkopi Day School water rates per month is \$500.00 using 4” Other Businesses water rates pay \$100.00 2” The Upper Village of Moenkopi sewer discharges into the Tuba City Waste Lagoon maintained by Navajo Tribal Utility Authority (NTUA). The Upper Village of Moenkopi pays a lump sum of \$2,632.14 per month for disposal of the waste.</p> <p>The Lower Village of Moenkopi does not charge the village members a monthly water fee; water comes from the local spring, which goes through a chlorination system before domestic use. There are five watering points within the Lower Village of Moenkopi, of which the village members haul water to and from their homes; therefore, the 10-35 gpd quote from the Hopi Western Navajo Water Supply Study.</p>
7	III.2.1	59	14	JR	<p>Double check with HWNWSS with demand numbers; it has yet to change</p>
8	III.2.3	65	5-8	JR	<p>Hopi and Navajo representatives expressed concern that their conservation practices were an imposition of limited water availability, citing the lack of economic development to produce the economies of scale necessary to develop regional supplies and a dispersed water demand.</p>
9	III.2.3	66	1-6		
10	III.3.1	68	31-37	JR	<p>The demand area by the two villages of Moenkopi is south of Tuba City (growing both residentially and economically with new buildings). The reports on the viability of continued use of the N-aquifer have come from the Hopi Tribe and USGS; however, the viability of use is not the only issue, the continued threat of three known ground water contamination to the existing N-aquifer can affect the current drinking source any day. Therefore, the viability of the N-aquifer being the sole source of drinking water would counter the discussion of conservation due to the eminent threat of contamination. The Hopi Tribe is taking efforts to secure other sources</p>

Appendix F—Comments

11	III.3.1	69	11- 12	JR	<p>of drinking water; however, this will take time and funding, such as this current study.</p> <p>In the statement, is this referencing the C-aquifer well located on the Hart Ranches? Or is this in reference to the existing, but not developed C-aquifer well located in Moenkopi? Please clarify.</p> <p>If this is in reference to the existing C-aquifer well located in Moenkopi the tribe would need to have a more clear discussion on this matter of information.</p>
12	Table V.2-10	112	2	JR	<p>2,396.7 gals per month with average \$35 residential monthly charge; \$100-500 per business/school</p>
13	V.3	113	26- 27	JR	<p>The Hopi Villages of Upper Moenkopi and Lower Village of Moenkopi,</p>

From: "Pratt, Sue" <spratt@coconino.az.gov>
To: Kevin Black" <klblack@lc.usbr.gov>, "Robert McCaig"
<RMCCAIG@do.usbr.gov>
Date: 6/29/06 9:18AM
Subject: RE: NCAWSS Draft Report of Findings

Kevin-

Unfortunately I haven't had a chance to study the formal review, although I did skim it and had intended providing any additional comments after the TAC meeting today. The only initial comment I have is that I'm cited as the source for the Williams community description and that is incorrect-my comments regarding that description were that I think it is erroneous. I'll find page number for that.

You had asked about the wells at Bellemont-I know that the developer of Flagstaff Meadows subdivision has developed wells for that project and created a utility company to run the water system. I don't know anything about any wells that Camp Navajo may have developed. If Camp Navajo has developed wells they are separate and apart from the wells serving the new residential subdivision on the north side of I-40.

Also, I hope you were able to get clarification from Tusayan and Grand Canyon National Park regarding sale of water from the Park to Tusayan.

Sue

Sue E. Pratt, AICP
Assistant Director
Coconino County Community Development
2500 N. Fort Valley Road, Bldg. #1
Flagstaff, AZ 86001
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phone 928-226-2700
fax 928-226-2701

-----Original Message-----

From: Kevin Black [mailto:klblack@lc.usbr.gov]
Sent: Wednesday, June 28, 2006 8:33 AM
To: Pratt, Sue; Robert McCaig
Subject: NCAWSS Draft Report of Findings

Appendix F—Comments

Sue,

Does Coconino County have any additional comments to be included in the formal review?

Report attached

Kevin Black, Sr.
NCAWSS Manager



COCONINO COUNTY
ARIZONA
COMMUNITY DEVELOPMENT DEPARTMENT

William L. Towler, AICP
Director

July 7, 2006

Kevin Black, Sr.
NCAWSS Manager
Engineering Division
Phoenix Area Office
Bureau of Reclamation
Sent via email kblack@lc.usbr.gov

RE: North Central Arizona Water Supply Study Report of Findings

Dear Kevin:

Coconino County appreciates the opportunity to review and comment on the most recent draft of the North Central Arizona Water Supply Study Report of Findings. As you know I provided a number of comments, corrections, and suggestions with the earlier drafts, so the following official comments included in this letter are intended to re-state some of our substantive comments, and provide some additional corrections or editing comments. Given the size of the document, and the limited turn-around for review and comments, these should not be considered to be all-inclusive. Furthermore, the County representatives on the Water Advisory Council will provide additional comments with their review.

Overall, one of our primary issues is with how this plan addresses the ability to meet future needs of unincorporated areas of the County that rely on hauled water, primarily those areas along the Highway 64 corridor between Williams and Tusayan/Grand Canyon. A footnote (#117) associated with the map for Alternative 3 (page 95) concludes that “the non-inclusion of a pipeline through the Williams Grand Canyon corridor could result in local water users pooling resources to develop additional wells into the R Aquifer in lieu of continuing to haul water.” We believe that this is a possible future scenario in any of the alternatives and should

be identified as an overriding issue with all of the alternatives and not merely reduced to a footnote status in this one alternative.

There are clearly concerns that if water is made available via a pipeline, it could result in a “boom” in growth, which may not be desirable. However, there are alternative concerns as well, particularly given that the anticipated life of the plan is 50 years. During that time period it may become appropriate and/or necessary for those areas to have a local water source that does not involve water hauled from distant communities. If a pipeline is not available the result could be new wells being drilled in the area where the source is the R aquifer, as is noted in the footnote mentioned above. We believe that if the alternatives do not address a pipeline or area wells, then any further evaluation must include an analysis of the impacts on the continued reliance on hauled water in these areas, and whether or not that is truly viable in the long-term.

In the most recent draft, it appears that the only discussion of a pipeline along the State Route 64 corridor is related to Alternative 6 (pg.99) which proposed a pipeline from Grand Canyon National Park to Williams providing water from Roaring Springs. This never appeared to be a serious proposal and furthermore previous County comments relating to not taking a formal position on a pipeline along this corridor was more general and not limited to this proposal. We continue to take the position that any future project that is intended to meet the demands of outlying areas needs to have a full assessment of how these areas may obtain their water.

The following comments are specific to certain parts of the plan and changes recommended are primarily related to accuracy. These refer to page numbers for the 6/16/06 version. Since the document will go through a full editing, we will try not to address typos or wordsmith with these comments.

Acronyms-pages ix-x

CWAC—current name is Coconino Plateau Water Advisory Council so the more accurate acronym is CPWAC-but should be under WAC in acronyms as well, as that is how it is more generally referred to.

TAG-Technical Advisory Group—the organizational documents for the CPWAC call it the Technical Advisory Committee TAC, so you may want to include an *aka* to address both.

Page 2-map The map seems to be misleading as it extends beyond the study area to the east, but does not include Havasupai to the west. Some clarification on demand area/study area relationship with the map would be helpful.

Page 5 lines 9-10 The wording makes it sound like the unincorporated areas are tied into the water distribution system of incorporated communities. The wording should clarify that these areas rely on hauled water, and local water companies.

Page 6 Section II.1.2 Non tribal communities

Lines 18-22 address non-tribal communities in unincorporated areas, the list provided includes some small subdivisions that are not large enough to be considered communities, and are already included in census figures for other areas. Examples include Pitman Valley and Garland Prairie which are included in the Parks CDP, also Munds Park is a CDP with specific population data (current population is 1250). We recommend a listing of “Flagstaff Ranch, Forest Highlands, Bellemont (including Camp Navajo), Red Lake, and Gray Mountain.” The rest could be deleted. There has never been any discussion of Mormon Lake, so presumably that community is not within the study area.

Page 8 line 5-to be completely accurate, the sentence should say by “city and town, CDP, census tract, block group, and tribe....”

Page 8 line 10-it is probably an overstatement to say that Coconino County “is one of the most sparsely populated counties in the U.S.” it would be preferable to state that “it is very sparsely populated.”

Page 16 lines 13 and 14 (Bellemont) The sentence that states “plans are on hold for future units at this time” should be updated to reflect that “Plans for Unit 3 with an additional 276 units are being processed by Coconino County as of the date of this report (July 2006).”

Page 17 Other Small Communities

Line 44 states that this is identifying communities outlying Flagstaff, which is not accurate. It includes subdivisions that are not communities, and includes some areas that are outlying Williams. If it is left in it needs to be corrected and could include the list recommended on page 6 notes above, which addresses small communities study-area wide, not just surrounding Flagstaff.

Page 18 Parks

Line 7 should be corrected to reflect the location is west of Bellemont (not east).

Page 18 Williams

The footnote refers to comments made by me, which is not correct. I am not the source of this description and in earlier drafts have questioned its accuracy-I recommend getting a more accurate description from City of Williams representatives.

Page 18 Valle

Line 30 should reflect that it is an airplane museum (not airport).

Page 18 Tusayan

Line 39 should be corrected to reflect only one gas station.

Page 18 It would be appropriate to include a description of other outlying communities for the Williams demand area, similar to page 17 for Flagstaff. This would include Highway 64 Corridor (Red Lake, Howard Mesa, Woodland Ranch).

Page 46 Bellemont lines 29 and 30. Camp Navajo and the Flagstaff Meadows subdivision may both have wells in the C Aquifer, but they do not share those wells. Flagstaff Meadows is served by its own water company Utility Source LLC. Also, the reference to 650 units is not accurate, as of the date of this draft there are 326 platted lots, and 276 under review.

Page 47 lines 17-18. This reference to the County Comprehensive Plan is pertinent countywide and not just to Doney Park.

Page 49 Other Small Communities

Once again, while the reference states that these are communities outlying Flagstaff, the list includes some that are in the Parks or Williams area, or are subdivisions not worthy of inclusion in this list. Furthermore, the list includes areas that are served by hauled water, individual wells, and small private systems, so any reference here would need to be expanded in order to be accurate and complete.

Page 50 Williams

Line 21/22 refers to impact fees and implies that these are all for water development, verification of what the fees are for, or what percentage of

the fees are for water development, would make this information more meaningful.

Page 50 South Rim Grand Canyon-Tusayan
Lines 34 and 36 should strike the “Village of” wording.
Line 38 should include “hailed water” as a source.

Page 52 Other Dispersed Population
Line 24 is footnoted (#72) which once again refers to a list that is not accurate or inclusive. It would be better to just eliminate the footnote.
Line 28 refers to the standpipe sales in gallons for 2005, this information would be more helpful if it identified what percentage of overall water use/sales for the city this amounted to.
Line 29-31 refers to restriction of standpipe sales to non-residents. This should be clarified further-first verification of these statements is necessary. For example, Bellemont standpipe sales are only made to non-residents. Also, since a good portion of standpipe sales go to commercial water haulers who in turn sell to non-residents, how did these restrictions affect those sales, if at all?

Page 70 City of Flagstaff
Line 22/23 refers to the possibility of Flagstaff losing its “adequate water supply” designation if ground water levels decline. It would be helpful to know what the significance of loss of this designation would mean for future development.

Page 72 South Grand Canyon/Tusayan
Lines 36 and 38 should strike the “Village of” wording.

Page 73 Lines 15 through 23 references previous sales of water from Grand Canyon National Park to Tusayan. This states that the ability to make sales is a policy level decision, rather than legislative, and cites the re-sale of water by Tusayan as the reason it no longer occurs. The matter is not as simplistic as this reference implies, and additional information such as what the federal legislation allows, and what the agreement can include, would be necessary for understanding all of the complexities.

Page 95 Footnote #117, as mentioned at the beginning of this letter, the caveat related to concerns with not including a pipeline or local option for the Highway 64 corridor is relevant to all alternatives.

Page 99 Line 33 starts discussion of a pipeline within the Highway 64 corridor. However, it appears to be discussed only in the context of Alternative 6, rather than in general. Further consideration and exploration of the impacts of such a pipeline should be considered for the other alternatives as well.

Page 99 Lines 35-37 reference the County perspective, this should be clarified that the County's perspective as stated is related to a pipeline in general and not specifically for Alternative 6. Basically, the County is not at a point to take a position one way or another on the desirability or undesirability of a pipeline in this corridor, but does support further review of the issues surrounding such a proposal for reasons previously stated.

Page 114 line 9 refers to Valle, but is probably meant to be Fort Valley.

Once again, we appreciate the opportunity to provide comments and look forward to continuing our participation with the next phases of this process.

Sincerely,

Sue E. Pratt, AICP
Assistant Director

Coconino Plateau Water Advisory Council

NCAWSS Draft Report of Findings

Comments from Barry J. Baker, Tusayan Representative

Regarding page 73, lines 15 through 25

It would be advisable to get a statement from GCNP as to the “official reason” that water being supplied from the Park to Tusayan was ended. I have only been able to find one written statement as to the denial of further sales of water: “Tusayan’s requests for water during the period 1973-1976 were denied because the Park determined alternative sources of water were available”.

The Park’s authority to sell water to Tusayan was resolved 8/18/1979 by the NPS Act for Administration (PL 91-183, 84 Statute 825 which authorized the Secretary of the Interior to “...contract for the sale or lease of services and resources (including water) available within an area of the National Park System to public or private parties which provide public accommodations to persons visiting the park area, if he (the Secretary) determines that reasonable sources are not available.”

Subsequently, restrictions were added:

1. Must provide public accommodations or services within the immediate vicinity of an area of the national park system to persons visiting the area; and
2. Has demonstrated to the Secretary that there are no reasonable alternatives by which to acquire or perform the necessary services, resources or water.

And then additional conditions:

1. The services provided by the applicant are of direct benefit to the park, or to the National Park Service for the direct or indirect benefit of park visitors:
2. It has been determined that the applicant has no reasonable alternatives to the use of park resources or services:
3. Effects of use of the resource or service on the park’s environment, administration, management, and protection, and visitors have been examined, and these effects have been determined to be acceptable;
4. When it is determined that the use of water by the applicant will be in accordance with laws and regulations governing ownership and use of Federal water Rights;
5. Reasonable charges based on prevailing rates for similar services or resource uses have been set;

6. An application docket containing a draft of the special use permit, background materials and recommendations has been received by the Washington Office for submission to appropriate congressional committees for review and concurrence prior to any legally or morally binding commitments; and

7. The permitted use is revocable and terminable within a specified period of time and no permanent property rights are conveyed to the user for any resource or water within an area of the National Park Service.

Then in 1976 the law was again amended as follows:

1. In subsection (e), after ‘within and area of the national park system.’ insert ‘as long as such activity does not jeopardize or unduly interfere with the primary natural historic resource of the area involved’.

In 1978 the Standards of Implementation (the 7 items just described above) were rescinded and replaced by the following 7 conditions:

1. The services provided by the applicant are of direct benefit to the park, or the National Park Service for the direct or indirect benefit of park visitors:

2. It has been determined that the applicant has no reasonable alternative to the use of park resources or services:

3. Effects of use of the resource or service on the park’s environment, administration, management and protection, and visitors have been determined to be acceptable. The environmental impact statement prepared if required according to NPS Guidelines for Environmental Assessment and statements:

4. When it is determined that the use of water by the applicant will be in accordance with laws and regulations governing ownership and use of Federal water and rights.

5. Charges have been established for services, resource or water use that permit full recovery of the full cost of the government of providing the services, resource or water use in accord with 31 U.S.C. 483a and OMB Circular A-25.

6. An application docket containing a draft of the special use permit, background materials and recommendations has been received by the Washington Office for submission to appropriate congressional committees for review and concurrence prior to consummating any legally or morally binding commitments. The application docket should reflect multi-binding commitments. The application docket should reflect multi-disciplinary regional involvement and clearance of the proposed application;

7. The permitted use is for a short term period (one year or less) and is revocable at the discretion of the Secretary at any time without compensation and no permanent property rights are conveyed to the user for any resource or water within an area of the National Park Service. Water use agreements provide for

National Park Service review and approval of planned development by the applicant that would create increased water demands.

Then on May 10, 1978 Special Directive 78-2 stated:

1. The environmental impacts must be assessed and an environmental impact statement prepared, as required according to National Park Service guidelines. The cost of this effort should be the responsibility of the applicant.
2. The application docket containing the draft of the special use permit must receive both park and Regional concurrence prior to submission to the Washington Office for Congressional committee review.
3. The permitted use for a short time period is defined as one year or less and is revocable at any time.

And again in 1978 an amendment was added to the Park's enabling legislation (40 Stat. 1177 (16 U.S.C. 222 that gave the Secretary of the Interior "....right of immediate termination...."

There has been additional congressional discussion of the matter and in each circumstance it can be easily determined that the focus is to provide the government complete control and make it politically impossible for Tusayan to consider the use of park water in other than possibly a short term emergency.

In my opinion, if Tusayan were to consider utilizing water from the park, new legislation providing for a permanent supply without unreasonable restrictions would have to be crafted and even then Tusayan would still need a back-up water resource should the political winds blow a different direction.

I submit that the comments in the NCAWSS Draft Report of Findings should include the facts of the complications in the political process and not make simplified assumptions as to the ease of Tusayan receiving water from the park.

Barry J. Baker
Tusayan

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Comments from the City of Flagstaff

39	19,20,21	Would like to see the breakdown of 310,000 acre-feet projected for 2100. Where is it going?
63	28,29,30	A reduction of 20 percent is easy in a community that has wasteful water use habits. Flagstaff has a strong water conservation program. It would be hard for Flagstaff to gain an additional 20 percent reduction without eliminating industrial uses and initiating stronger regulations that will meet public opposition.
66	28,29,30,31	A reduction of 20 percent is easy in a community that has wasteful water use habits. Flagstaff has a strong water conservation program. It would be hard for Flagstaff to gain an additional 20 percent reduction without eliminating industrial uses and initiating stronger regulations that will meet public opposition.
70	22,23	This is a true statement that many people do not realize the consequences of.
70	39	\$8,500,000, not \$15,000,000.
92	36	Include why Flagstaff dropped out of the matrix for the R-Aquifer option.
104	17	Is this really necessary?
108	21	325,829 or 325,851?
116	12	typo - aspen not sspen
122	44	typo - known not know
Appendix C		Suggest using Alternative numbers that match those in Section IV.

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Comments Received From the Grand Canyon Trust

From: "Nikolai Ramsey" <nramsey@grandcanyontrust.org>
To: "Kevin Black" <klblack@lc.usbr.gov>
Date: 8/4/06 4:06PM
Subject: Regional Water Report of Findings - some comments

Again, great presentation Kevin. Here are the four comments that I made to you during the lunch break:

1. I think we need to put into the report conservation numbers at 20 percent of the total water use, not just the change from present use to future use.
2. We need to state directly in the report that Flagstaff is being used as an example and that the 20 percent action should apply to other communities as well.
3. The original North Central Arizona Water Supply Study did conclude that Colorado River importation was the preferred water supply alternative. However, this conclusion was written into the report without a supporting vote of the regional water group that developed the report. River importation was almost unilaterally "boosted" into existence by DWR's representative at the time, the infamous Dennis Sundie (dismissed by DWR shortly after publication of this report).
4. My recollection is that no one (including me) has argued that water conservation alone will meet future demand needs in this region. As suggested in our RMI report, the solution, if it exists, will necessarily include several supply mechanisms: surface water, ground water, Colo R water (maybe!), and water conservation.

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United States Department of the Interior



NATIONAL PARK SERVICE
GRAND CANYON NATIONAL PARK
P.O. Box 129
GRAND CANYON, ARIZONA 86023

L54 (GRCA 8211)

July 10, 2006

Mr. Kevin Black
Bureau of Reclamation
Phoenix Area Office
Phoenix, Arizona 85069

Dear Mr. Black:

Comments on Bureau of Reclamation Draft North Central Arizona Water Supply Study-Report of Findings From Grand Canyon National Park

The following comments are provided to the Bureau of Reclamation (BOR) as part of our review of the Draft Summary of Findings.

General Comments:

Overall the report is thorough, well presented and is consistent with the concepts presented to and discussed by the Water Resources Council Advisory Group.

Specific Comments:

1. Page 6, Lines 19-22: The current populations of the smaller communities presented here should be included in this report as they are available, and will help establish the growth spurt the area of Flagstaff is currently experiencing.

2. Pg. 7, Table II.1-2: GCNP population seems low, especially if you consider seasonal influx of staff and visitation. Let's assess and make more accurate estimate of this population.
3. Pg. 18, lines 41-43: There are few Concessionaire or NPS staff that actually live in Tusayan rather than in Park housing. Also, the NPS is continuing to move a lot of staff positions to Flagstaff (over 135 expected) in the coming years.
4. Pg. 19, lines 23-25: Change to read "R-Aquifer system will result in decreased flows from Havasu Springs and smaller springs under the South Rim of the Grand Canyon."
5. Pg. 25, line 25: The Hopi "economic" development could be reworded to state that "future economic development ...presents a real challenge for the Hopi Tribe due to the lack of infrastructure."
6. Pg. 26, lines 35-39: Consider revising the City of Page section/discussion to include the same general information provided to the reader as given about Tusayan in lines 33-43.
7. Page 33-39: We will check this information with the staff hydrologist to see if new information from the C/R-Aquifer can be provided for this effort to answer some of the questions raised in the C/R Aquifer sections within GCNP.
8. Pg. 48-49: Discussion of Flagstaff communities should utilize recent information on development and development projections for the small communities around Flagstaff, such as Flagstaff Ranch, Forest Highlands, Pine Canyon, etc. to improve accuracy of the projections and to incorporate expected growth figures.
9. Pg.51, lines 15-17, and 28-30: Request that the last sentence end at "life cycle.", and remove remainder of sentence on "pipeline maintenance" as this is not an accurate statement. For lines 28-30, please change water reserve to 14 days in the summer, 30 days in the winter; and note that a pipeline break in the **summer season** could be highly disruptive.
10. Pg. 58, Table III.1-3: GCNP questions these projections as growth rate seems beyond our most optimistic expectations for GCNP and Tusayan, given the NPS policies on housing and visitation trends and the limited land base of Tusayan.
11. Pg. 60: Tribal growth projections also seem to be high given current land development and expected infrastructure progression. Also, what is the expected income generating source(s) that would bring this level of growth to the reservations?
12. Pg. 61-62: Ditto above comment regarding Tusayan, GCNP, Valle, etc. as projected.
13. Pg. 63, line19-24: The maintenance "problem" for the GCNP water system as expressed in this paragraph should be revised with more accurate figures and realized maintenance requirements. Please contact Dave Wellborn (928) 638-3019, or 7673 for an accurate assessment of GCNP water system and function.

14. Pg. 68, lines 20-23: When completed, GCNP will be glad to assess the paragraph and provide information as needed.
15. Pg. 73, lines 1-3: Please remove inaccurate assessment of GCNP pipeline maintenance needs as per previous comments above. GCNP options are okay as written.
16. Pg. 73, lines 15-25: Please remove the detail of historic water use issue as written in lines 16-23, and replace with “GCNP has the statutory authority to sell water to the town of Tusayan and the Park is willing to consider implementation of an agreement to do so, as one method to help reduce the town’s reliance on the pumping of the R-Aquifer.”
17. Table III.2-5, Pg. 75: Why are Tribal and GCNP water use values not calculated as the other locations/populations in the table rows (e.g. 2050 projected, minus current use = unmet demand)?
18. Pg. 76, Section IV.1.1: We agree with the BOR assessment that placing water withdrawal operations within the Glen or Marble Canyon’s would be problematic, from a wide range of concerns and environmental issues.
19. Pg. 120: GCNP favors the options of water withdrawals from Lake Powell, and secondarily from Lake Mead, versus pumping stations within the Glen or Grand Canyons. Use of, or improvements to, existing pumping locations from Lake Powell on the Navajo Nation, or proposed and in use from the National Recreation Area, are preferred over C/R-Aquifer depletion and draw-down options. A Lake Mead to Peach Springs and Williams is also a possible pipeline route to be considered along Interstate 40 and Route 66. Therefore, GCNP is in favor of Alternative 1-A or B, and Alternative II-A to Williams, with a Peach Springs connection/diversion.
20. Is it possible to consider having the city of Flagstaff use the \$10-15 million proposed for aquifer withdrawals and pipeline from a ranch near Winslow, AZ and back to Flagstaff, for efforts to bring Lake Powell water from Cameron to Flagstaff? Has this already been considered by the Advisory Group?

This concludes GCNP’s initial comments on this Draft document. We look forward to expanding our comments as our technical staff becomes more involved in the review process, and as the draft plan development continues.

Sincerely,

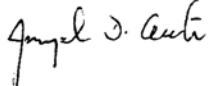
\s\

Joseph F. Alston
Superintendent

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This concludes initial comments on this Draft document. Once again, we look forward to expanding our comments as our technical staff becomes more involved in the review process, and as the draft plan development continues.

Sincerely,



Joseph F. Alston
Superintendent

Grand Canyon National Park comments to BOR, Oct. 1, 2006:

Page 93, Section III.3.2 (Future Without Project) * The change proposed by GCNP in their July letter which starts, "GCNP has the statutory authority*", will remain in the document.

Page 100, Section IV.1.5, (Potential Sources Considered) * Replace the last sentence with the following * "While the 2001 appraisal study only considered meeting the needs of the NPS, the BOR team identified an opportunity to evaluate the potential for this supply source to meet the future demands of the Tusayan area (essentially the Grand Canyon/Tusayan Demand Center as defined in this study) and even the Williams Demand Center. However, as further discussed later in this report, subsequent to the first iteration of complete plans, Grand Canyon National Park provided input to the BOR team that the Park has no statutory authority to provide Roaring Springs water to Williams and would require Congressional authorization to provide such authority. However, the Park was doubtful they would ever seek or obtain such authority due to potential conflicts with the parks mission or purpose, environmental concerns, and unfavorable flow and cost projections. Therefore, providing water to Williams from Roaring Springs was determined to be unrealistic. See GCNP Comments dated August 23, 2006."

Page 120 (this is the equivalent of the "page 98 comment in the NPS 8/23/06 letter)* To the figure caption, add the following footnote * Based on input provided by Grand Canyon National Park subsequent to the initial phase of plan formulation described in this section, the Park indicated Congressional authorization would be required to provide water to Williams from Roaring Springs, and the Park expressed doubt they would ever find reason to seek such authority. As discussed in the following section, this alternative therefore fails the completeness test.

Page 121, Table IV.2-1 * Demand vs Supply Source Matrix (second iteration)

No changes to this table.

Page 122, Section IV.3 (Initial Evaluation of the Alternatives). First full paragraph after the "Completeness" discussion, delete everything after the second sentence ("Alternative 5 was flawed by*" and replace with, For Alternative 6, a significant completeness issue was identified. While it was theorized by the study team during the initial plan formulation that sufficient water was potentially present from a Roaring Springs source to meet the demands of the Williams Demand Center, Grand Canyon National Park has indicated that they have no statutory authority to provide water to an entity such as Williams and are doubtful they would ever seek, nor obtain such authority from Congress. This is primarily due to potential conflicts with the parks mission, purpose as well as environmental concerns and unfavorable flow and cost projections. This was the only feature which distinguished Alternative 1 from Alternative 6, so there was no point in retaining Alternative 6 for further evaluation.

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Comments From Bill Plummer

From: <plummernw@aol.com>
To: <klblack@lc.usbr.gov>
Date: 7/5/06 11:10AM
Subject: Kevin,

Kevin,

Sorry for the delay in responding on the NCAWSS report, I lost my notes for a time. I basically looked at the portion relating to the City of Page. Following are my brief comments:

Page 57 -- The reference to the new pumping plant environmental analysis should be an EA not EIS. As to the reference to "new pumping plant" we need to be careful not to imply that the new one is a replacement plant because it isn't. Page will no doubt continue to use the existing plant to its capacity when possible.

Page 80 -- My notes are vague here, I believe there should be an "an" somewhere in the reference.

Page 86 -- The dividing point between the upper basin and the lower basin is "Lee Ferry" not "Lees Ferry."

Hope this helps. I obviously didn't read the entire draft.

Regards, Bill

Check out AOL.com today. Breaking news, video search, pictures, email and IM. All on demand. Always Free.

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DJBills review comments, NCAWSS draft Report of Findings, 6-16-2006 version.

Topics reviewed: Current conditions in the study area

II.1.2 Non-tribal communities

II.2 Economic and social conditions

II.2.2.2 Non-tribal communities

II.3 Ground water and geology overview

II.4 Surface-water and ground water supply sources

overview

II.7 Current water supply

II.7.2 non-tribal

Page 17, lines 26-31. Insert at page 17, line 10. The discussion appears to be alphabetical water providers and Forest Highlands is out of order.

Page 19, line 30, editorial. "...and recreational uses. The ground water flow....".

Page 20, lines 32-33. "...into an underlying limestone aquifer along fractures and faults."

Page 20 lines 42-44. This last sentence in the paragraph should have the following reference (Bills and others, in press) or (Donald Bills, hydrologist, USGS, written commun. 2006). This information is interpretive and would not have appeared in Flynn and Bills (2002).

Page 21, lines 7-9. I suggest you consider the following changes and addition to the text. "Ground water discharge as base flow from the C aquifer to the Little Colorado River occurs from Salado Spring near St. Johns to Joseph City. C aquifer springs also occur in Silver Creek and the lower reaches of Chevelon and Clear Creeks. R-M aquifer springs that discharge in the lower 13 miles of the Little Colorado River maintain the base flow of this reach of the river and represent a regional drain for much of the north flowing ground water in the Little Colorado River Basin.

Page 21, lines 32-36. The 400 million acre-feet figure is consistent with Cooley and others (1969), McGavock and others (1986), and Hart and others (2002). The 1 billion acre-feet figure seems a bit high and might be worth some additional explanation. Did Ward really develop some new information post 2001-2002 when he collaborated with Hart and others (2002) to come up with this very high

estimate? If the estimate is really based on information in Hart and others 2002 as suggested, there is nothing in Hart and others that would support it.

Page 22, lines 40-46 and page 23, lines 1-2. I think you need to clarify that the model by Leake and others (2005) was designed to evaluate only the “project” withdrawals impacts and does not reflect the combined effects of current withdrawals in the LCRB and (or) other future planned withdrawals from the c aquifer.

Page 24, lines 27-43 and Page 28, lines 1-4. None of these geologic units are encountered in boreholes south of the Grand Canyon and have no bearing on the occurrence and movement of ground water in the C and R-M aquifer systems south of Grand Canyon. As a result they do not really warrant this complete of a description here. To date all of the boreholes that penetrate the Precambrian basement rocks underlying the southern Colorado Plateau in North Central Arizona encounter granite or granite rubble (Bills and others, in press).

Page 25, Figure II.3-1. This figure **IS NOT** from Bills and Flynn (2002). As such it needs another reference. Or, you could use the correct figure from Bills and Flynn (2002). The figurer caption indicated that the C aquifer and the R-M aquifer are “delineated” on the figure, they are not. The stratigraphic section omits volcanic rocks, the Schnebly Hill Formation, and the Martin formation which are all important hydro-stratigraphic units in the study area of this report.

The Kaibab Limestone underwent a name change in the mid-1990’s as a result of work by Sorauf and Billingsley (1991). The correct nomenclature is now the Kaibab Formation. You will need to search the draft and update the name for every occurrence where it is valid.

Page 28, line 9. I suggest that you consider the following change.
“...unconformably on the tilted and eroded Grand Canyon Super Group at the Grand Canyon and on Precambrian Granites in the rest of the study area.”

Page 28, lines 15-21. The Temple Butte Formation is encountered at both the South rim of the Grand Canyon and at the Mogollon Rim where it interfingers with and grades into the Martin Formation. In fact south of the Grand Canyon the Temple Butte and Martin are used interchangeably. Neither the Temple Butte nor Martin Formations have been encountered by wells on the Coconino Plateau (Bills and others, in press).

Page 28, line 22. A description of the Muav Limestone is missing from this draft. The Muav Limestone makes up half or more of the R-M aquifer. There are places

toward the western part of the Grand Canyon where the Muav limestone is the only water-bearing zone of the aquifer. I would suggest that you add a discussion of the Muav lithology here.

Page 29, line 11. The Schnebly Hill Formation is missing from this draft. The Schnebly hill Formation is a significant component of the C aquifer especially near and south of Flagstaff. The Geologic was formally named based on work by Blakey (1979 and 1990), Blakey and others (1989), and Elston and DiPaolo (1979). The Schnebly hill Formation is distinct from the Hermit Shale of the Grand Canyon and represents a transition phase between the Coconino Sandstone and the Supai Group. The contact between the Schnebly Hill and the Coconino is gradational and the contact between the Schnebly Hill and the Supai Group is erosional. In some areas near Flagstaff and to the south and west of Flagstaff the Schnebly Hill Formation is the principal water-bearing zone of the C aquifer. You should consider adding a discussion of Schnebly Hill geology and lithology here.

Page 29, lines 19-21. I suggest you consider the following change (“...facies change in the underlying Schnebly Hill Formation that resembles the Coconino sandstone. The Coconino Sandstone is conformably overlain by the Toroweap formation to the west. To the east, the Coconino sandstone is unconformably overlain by the Kaibab Formation.”

Page 29, lines 27-31. I suggest you delete the sentence starting with “Further east and south...” and modify the remaining two sentences as follows. “these sandstones are virtually indistinguishable from the underlying Coconino Sandstone. The Toroweap Formation also thins to extension to the east and south of Flagstaff.”

Page 29, lines 33-34. Suggest the following change. “The Kaibab Formation rests unconformably on the Toroweap Formation or the Coconino Sandstone and is exposed at lands surface along the Grand Canyon and much of the adjacent Kaibab and Coconino Plateaus.”

Page 30, figure II.3.4 There are two figure captions. I suggest that you remove the one titled Figure 2. I also suggest that you add the Sedona Arch, discussed in the text, to this figure and move the figure reference to the base of the map changed as follows: “modified after Pierce, 2001.”

Page 31, lines 19-21. I would suggest rewording these two sentences as follows. “Figure 3 represents the overall trends in the geologic column in the Grand Canyon Region. In general, there are some localized exceptions to the general trends along the Grand Canyon,...”

Page 31, lines 23-27. Suggest the following changes. “Other trends to note are 1) that the younger rocks (higher in the geologic column) tend to be dominated by continental depositional units whereas the older rocks (lower in the geologic column) tend to be dominated by marine units, 2) marine and continental shelf deposits prominent at the Grand Canyon thin and interfinger south and eastward as these units encounter the continental margin.”

Page 31, line 30. “...the area was dominated continental and erosional processes.”

Page 31, lines 42-43. “...drainages intersect the ground water flow systems.”

Page 32, lines 1-3. “There are internal drainages on the Coconino Plateau, the result of continuing extensional processes and quaternary volcanic activity, where surface-water infiltration recharges the ground water flow systems locally.”

Page 32, lines 6-8. “...and the R-M aquifer. The third aquifer system, the N Aquifer, is higher in the stratigraphic section than the C aquifer or the R-M aquifer and only occurs...”

Page 32, line 9. “...the Little Colorado River and perched water-bearing zones in the volcanic rocks and the Kaibab Formation.”

Page 32, lines 11-42. Because of the use of figures on recharge, withdrawals, and storage this section needs appropriate references (Cooley and others, 1969; Lopez and Hoffmann, 1997; and Truini and Macy, 2006) unless you determined these values yourselves.

Page 32, lines 17-18. “Yields of the N aquifer are generally dependable ranging from tens to more than 1,000 gpm and the quality of the water is good.”

Page 32, line 19-20. “...southwestern and southeastern portions of the aquifer discharging to Moenkopi Wash, springs in incised southwest trending drainages, along the Echo Cliffs at the western margin of the Black Mesa Basin, and in Chinle Creek.”

Page 32, lines 23-25. Springs discharge, wells pump or withdrawal. It is not clear in this sentence whether you are talking about springs, wells, or a combination of the two. For all three of these options individually, the estimate of 7,000 is very low. Can you reference it? The add on at the end of the sentence about not all of the springs being measured makes the value even more uncertain because it suggests that significant sources of discharge are not accounted for.

Page 32, line 33. I suggest that you delete this line. With an estimated 180-400 million acre-feet in storage and yields of more than 1,000 gpm underlying at least three states (or even just the Black Mesa Basin), I would not consider the N aquifer to be of limited extent.

Page 32, line 44. “Alluvial Aquifer and Other Perched Water-Bearing Zones” I suggest adding other perched water-bearing zones to this section because they are at least as important, if not more so, to local and domestic water users and deserve consideration as a source of more regional water supply if only to be able to say they were evaluated and discounted because of their limited areal extent and low yields. In at least one case however (like the alluvium of the Little Colorado River valley), there is a perched water-bearing zone that is helping to meet water demand for municipal use. This would be the Inner Basin Aquifer that is used as part of the water supply for the City of Flagstaff.

I also suggest that you consider moving this entire section (page 32, lines 44-46 and page 33, lines 1-17) to Page 32, line 10 before the N aquifer. Ground water flow systems are typically discussed from top to bottom and it is out of sequence here and with the rest of the section.

Page 32, line 46. “... Most of these streams exist in incised canyons.”

Page 33, line 10. “...from the underlying C aquifer at the middle and upstream end of the drainage.”

Page 33, lines 18-19. Here is a suggested paragraph you could add to the end of this section on other perched water-bearing zones.

“Perched water-bearing zones are also encountered in volcanic rocks and the Kaibab Formation to the north, west, and south of Flagstaff. These water-bearing zones are relatively small and discontinuous in the subsurface with yields to wells of a few to a few 10’s of gpm (Bills and others 2000). Recharge to these water-bearing zones is by infiltration from the surface and is entirely dependant on annual precipitation. As a result, the availability of water from these zones can be highly variable from year to year. Water resources from these units are only suited for limited low volume uses such as local domestic and livestock use.” The one exception to these conditions is the Inner Basin aquifer of San Francisco Mountain. This water-bearing zone is contained in glacial outwash and volcanic rocks of San Francisco Mountain, can yield up to several hundred gpm to wells, but has been fully developed by the City of Flagstaff as one of its sources of water supply.”

Page 33, lines 26-28. Suggest the following changes. "...underlying upper and middle parts of the Supai Group... the Toroweap Formation is generally absent in the eastern and northern parts of the Little Colorado River Basin and the Kaibab Formation thins to extension to the east."

Page 33, line 30. I suggest that you consider adding the following lead sentence to this paragraph. "The C aquifer is dry to the west of Flagstaff coincident with the northeast-southwest trending Mesa Butte Fault (Bills and others, in press)."

Page 33, line 37. "...source of recharge for the water-bearing units of the C aquifer. Ground water movement...."

Page 33, line 40. "...through dissolution (Bills and others, 2000 and Monroe and others, 2004)

The original reference for this statement is Bills and others (2000). Monroe and others (2004) applied it to the Grand Canyon springs. Does the reference here apply to the study area or the Grand Canyon Specifically?

Page 33, line 42. "nest" should be "next".

Page 35, line 4-5. "...to as much as 500 gpm (Victor and Montgomery, 2000; Bills and others in press).

Bills and others (in press) inventoried several new wells unavailable to Victor and Montgomery (2000) that are capable of more than 500 gpm.

Page 35, lines 13-15. This paragraph needs a reference unless you determined these values in the course of your study. I would suggest the following: Cooley and others, 1969; McGavock and others, 1986, and (or) Bills and others, 2000.

Page 35, line 17. "The C aquifer is partly to fully saturated east of the Mesa Butte Fault..."

Page 35, line 23. "190,000 acre-feet per year (ac-ft/yr)..."

Page 37, lines 6-7. Suggest the following changes. "the C aquifer is assumed to be in a transient state with current uses and spring discharges (Bills and others, in press)."

"Current withdrawals have already impacted base flow of the Little Colorado River. Additional pumping..."

Page 37, lines 14-15. "recharge areas and at increasing depths." "the Study area is located at the downstream end of the c aquifer flow system,..."

Page 37, line 19. R aquifer, Redwall aquifer, Limestone aquifer, R-M aquifer. The Redwall-Muav aquifer has gone by many names in the last few decades as investigators try to come to grips with its occurrence and flow. Cooley and others (1969) called it the Redwall aquifer based on its occurrence under the Black Mesa Basin and assuming the Redwall Limestone was the principal, and in some cases the only, water-bearing unit. McGavock and others (1986) referred to it as the Limestone aquifer recognizing the fact that several of the Mississippian, Devonian, and Cambrian limestones underlying southern Coconino County were water-bearing and hydraulically connected. Victor and Montgomery (2000) refer to it as the Redwall aquifer or R aquifer based on its occurrence is a few wells on the Coconino Plateau and discharge of springs from the base of the Redwall Limestone along the South Rim of the Grand Canyon. A more thorough study of spring discharge along the South Rim of the Grand Canyon by Monroe and others (2004) determined that the spring horizon from limestone units migrated deeper into the stratigraphic section as you move westward along the south rim. Bills and Flynn (2002) and Bills and others (in press) have determined, based on more recently drilled wells, that the deep limestone aquifer underlying much of the Coconino Plateau, and the study area of this ROF, is a true multiple aquifer system with the principal water bearing zones occurring in both the Redwall and Muav limestones with hydraulic connectivity to other underlying units. As a result, and to reduce confusion, I would suggest that you consider using the R-M aquifer here and throughout the report, unless the aquifer name is related to a direct quote or reference.

Page 37, line 22-23. "...commonly called the Redwall-Muav aquifer (R-M aquifer). The R-M aquifer is comprised of..."

Page 37, line 25. "Temple Butte/Martin Formation, and the Cambrian age Muav Limestone."

Page 37, line 27. "The primary water producing units are the Redwall and Muav Limestones to the north and the Redwall limestone and Temple Butte/Martin Formation to the south.

Page 37, line 34. I would suggest that you consider adding the following sentences to further define the occurrence and flow of water in the R-M aquifer.

"Recent regional studies indicate a local ground water mound coincident with the South Rim of the Grand Canyon and trending east-west. This ground water mound affects recharge and flows of many of the small south Rim springs and seeps that issue from the R-M aquifer. Regional structure, the Cataract Syncline and the Mesa Butte Fault, control and direct most of the regional ground water

flow in the R-M aquifer to major discharge areas on the lower Little Colorado River and in Cataract Canyon to the north, and in the upper reaches of the Verde River to the south (Bills and others, in press; Wirt and others, 2005).

Page 37, line 39. Suggest the following change and addition. “Grand Canyon (Monroe and others, 2004; Bills and others in press), water quality is generally good to poor. The poor quality waters of the R-M aquifer appear to be the result of leakage from overlying units, solution of limestones within the flow system, and upwelling of ancient water from underlying units (Bills and others, in press; Dr. Laura Crossey, Professor, University of New Mexico, written commun. may be published by now...).”

Page 38, line 4. “...Redwall Limestone, Temple Butte/Martin Formation, Muav Limestone, and Tapeats Sandstone....”

Page 39, line 1. “the R-M aquifer is generally fully saturated and confined on both sides of the Mesa Butte Fault.”

Page 39, line 38-42. I would suggest the following changes tot his text. “million ac-ft (Hart and others, 2002). Other estimates range from 400 million ac-ft (Cooley and others, 1969; McGavock and others, 1986) to maybe 1 billion ac-ft (Ward, 2002).”

“...mining of the waters of the C aquifer (withdrawing water from storage that is not replaced) would have...”

Page 41, lines 1-13. Suggest that you change this part of the text as follows.

Estimated average annual water-budget components for the Coconino Plateau with the C aquifer and the R-M aquifer assumed to be in a state of dynamic equilibrium would be:

Total precipitation	8,700,000 ac-ft/y
Inflows	
Natural recharge to the regional ground water flow system (C aquifer and R-M aquifer combined)	300,000 ac-ft/yr
Underflow from the east	7,000 ac-ft/y
Total inflow	307,000 ac-ft/y

Outflows

Ground water discharge	300,000 ac-ft/y
Evapotranspiration from ground water flow systems	7,000 ac-ft/y
Runoff from the watershed	200,000 ac-ft/y
Estimated evaporation from the watershed	8,200,000 ac-ft/y

(Bills and others, in press).

Since about the mid-1980’s ground water flow systems of the Coconino Plateau have been in a transient state owing to ground water withdrawals from the C and R-M aquifers. In the 2002 calendar year, one of the driest years on record (National Weather Service, ?), no runoff occurred on the Coconino Plateau, recharge to ground water flow systems was likely zero owing to high evapotranspiration rates, and ground water withdrawals by wells were about 20,000 ac-ft. As a result, significant ground water level declines of as much as 200 ft. were recorded in municipal supply well fields and regionally water levels declines ranged from one foot to a few 10’s of feet (City of Flagstaff Utilities Department, 2004; Bills and others, in press). The Coconino Plateau represents only a portion of the ROF study area. However, current conditions in the study area water shed and ground water flow systems are expected to be similar.

Page 46, Lines 24-32. It is “Arizona National Guard, Camp Navajo (Camp Navajo)”, not “Camp Navajo Army Depot”.

There was one pre-existing well drilled into the C aquifer by the U.S. Army on the Depot when it was taken over by the Arizona National Guard. This pre-existing well has not been used for several decades. The Arizona National Guard recently (2002) completed a second deep well into the C aquifer on Camp Navajo that is currently used to supplement its water supply (Randy Wilkerson, hydrologist, Camp Navajo, oral commun. 2006). The Belmont Truck Stop and Utility Source LLC have recently (2002 to 2006) completed 4 deep wells in to the C aquifer, three at the Truck Stop and one to the east of Flagstaff Meadows. Two of these wells are currently in use with the shallow wells owned by Utility Source LLC to supply the Truck Stop and Flagstaff Meadows. One deep is currently unused and another is currently being developed and plumbed as a 300 gpm supply (Ron MCCleve, Owner, Utility Source LLC, oral commun. 2005).

Page 46, line 18. “Kachina Village relies 100 percent on wells developed in the C aquifer.”

Page 46, lines 29-30. “Munds Park/Pinewood relies 100 percent on ground water provided by Arizona Water Company from wells developed in the C aquifer.”

Page 46, lines 33-36. Consider adding the following to the end of this paragraph.
“Most of these areas are dependent on water from shallow wells developed in perched water-bearing zones. A few of these areas, such as Lockett Ranch, Cedar Valley, and Saskan Ranch, have developed wells into the c aquifer as a source of water supply.”
