

## **ATTACHMENT F**

**UBWR Revised Responses to Comments of the  
U.S. Bureau of Land Management and National Park Service on  
the Lake Powell Pipeline Final License Application Documents  
(January 17, 2019)**

Revised Responses to  
U.S. Bureau of Land Management Comments  
On the Lake Powell Pipeline  
Final License Application Documents  
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## **INTRODUCTION AND OVERVIEW**

The Utah Board of Water Resources (UBWR) appreciates the participation of the U.S. Bureau of Land Management (BLM) in the Lake Powell Pipeline (LPP) (FERC Project No. 12966) Integrated Licensing Process (ILP). UBWR is committed to working with the BLM in fulfilling its statutory obligations in this licensing proceeding. In late 2016, UBWR received comments from the BLM on the Final License Application (FLA) submittal. Comment responses were filed with the Federal Energy Regulatory Commission (FERC) on March 31, 2017. Subsequent discussions were held through 2017 and 2018 with the BLM regarding remaining questions related to the original comments. This table and accompanying document provide updated responses as developed in coordination with the BLM. Responses with **bold** text represent actual revisions made to the License Application filed with FERC.

Comment # Label	Original BLM Comment	Original UDWRe Response	UDWRe March 31, 2017 Response	Additional BLM Comment	BLM Reviewer	UDWRe Updated Response
BLM General 6	This paragraph cites studies/data that are now quite old. – for example, TDS from the Paria River collected from 1976 to 2002. I’m sure there is data that is much more recent – that should be included in this analysis to make it more accurate.	Comment was not included in the table of responses, so it was not addressed.	<p>Section 5.1.7, Chapter 5, Exhibit E of the License Application submitted on May 2, 2016 and which replaces the PLP, is revised to read: <b>Lake Powell water quality at depths of 100 to 150 feet near the water intake site has pH ranging from 6.9 to 8.4 units, dissolved oxygen concentrations ranging from 1.7 to 11.0 mg/L, and total dissolved solids (TDS) concentrations ranging from 371 to 653 mg/L (USBR 2016).</b></p> <p>The second sentence in Section 5.1.7, Chapter 5, Exhibit E of the License Application is revised to read: <b>The Paria River at the Highway 89 crossing has a mean TDS concentration of 1,218 mg/L (238 samples collected from 1976 to 2016) and maximum recorded TDS concentration of 3,876 mg/L during the same time period.</b></p> <p>The fifth sentence in Section 5.1.7, Chapter 5, Exhibit E of the License Application is revised to read: <b>The Virgin River at the Highway 9 crossing near Hurricane, Utah has a mean TDS concentration of 1,542 mg/L and extremes ranging from 362 to 2,964 mg/L based on data collected from 1982 through 2002 (UDEQ 2016).</b></p>	Third paragraph - isn't there something more current than 2002?	Lorraine Christian	<p>Section 5.1.7, Chapter 5, Exhibit E of the License Application submitted on May 2, 2016 and which replaces the PLP, is revised to read: <b>Lake Powell water quality at depths of 100 to 150 feet near the water intake site has pH ranging from 6.9 to 8.4 units, dissolved oxygen concentrations ranging from 1.7 to 11.0 mg/L, and total dissolved solids (TDS) concentrations ranging from 371 to 653 mg/L (USBR 2016).</b></p> <p>The second sentence in Section 5.1.7, Chapter 5, Exhibit E of the License Application is revised to read: <b>The Paria River at the Highway 89 crossing has a mean TDS concentration of 1,218 mg/L (238 samples collected from 1976 to 2016) and maximum recorded TDS concentration of 3,876 mg/L during the same time period.</b></p> <p>The fifth sentence in Section 5.1.7, Chapter 5, Exhibit E of the License Application is revised to read: <b>The Virgin River at the Highway 9 crossing near Hurricane, Utah has a mean TDS concentration of 1,517 mg/L and extremes ranging from 362 to 2,964 mg/L based on data collected from 1982 through 2013 (UDEQ 2016). TDS data were last collected, analyzed and reported by UDEQ at this site on September 16, 2013.</b></p>
BLM General 10	3rd line of 1st paragraph [Section 5.2.2 in PLP]: It isn’t just “Commission staff” that identified resources potentially having cumulative impacts. It would also be cooperating agencies such as the BLM (it is up to us to determine what resources could be cumulatively affected since we are the land managing agency). 3rd line of 2nd paragraph: “Temporal scope of the cumulative effects focused on the use of Colorado River water or alternative water supplies” ... cumulative effects could also occur from construction and operation of the LPP facilities, not just from water use. Please revise this discussion accordingly.	Comment was not included in the table of responses, so it was not addressed.	<p>The cooperating agencies are added as identifying resources as having potential cumulative effects. The second sentence in the first paragraph of Section 5.2.2, Chapter 5, Exhibit E of the License Application, which was filed on May 2, 2016 and which replaces the PLP, is revised to read: <b>For any resource that FERC staff and cooperating agencies identify as potentially having cumulative effects, the temporal scope will look 30 to 50 years into the future, based on the potential term of a new license and ROW grants, concentrating on the effect on the resource from reasonably foreseeable future actions.</b></p> <p>The second sentence in the second paragraph of Section 5.2.2, Chapter 5, Exhibit E of the License Application is revised to read: <b>The temporal scope of the cumulative effects analysis is focused on: 1) the use of Colorado River water or alternative water supplies in the KCWCD and WCWCD service areas to meet municipal and industrial (M&amp;I) demands from 2025 through 2060; and 2) construction and operation of the LPP when combined with the resource impacts of other projects from 2025 through 2060.</b></p>	1st paragraph - insert "past, present and" before "reasonably foreseeable".	Lorraine Christian	<p>The cooperating agencies are added as identifying resources as having potential cumulative effects. The second sentence in the first paragraph of Section 5.2.2, Chapter 5, Exhibit E of the License Application, which was filed on May 2, 2016 and which replaces the PLP, is revised to read: <b>For any resource that FERC staff and cooperating agencies identify as potentially having cumulative effects, the temporal scope will look 50 years into the future, based on the potential term of a new license and ROW grants, concentrating on the effect on the resource from past, present and reasonably foreseeable future actions.</b></p> <p>The second sentence in the second paragraph of Section 5.2.2, Chapter 5, Exhibit E of the License Application is revised to read: <b>The temporal scope of the cumulative effects analysis is focused on: 1) the use of Colorado River water or alternative water supplies in the KCWCD and WCWCD service areas to meet municipal and industrial (M&amp;I) demands from 2025 through 2060; and 2) construction and operation of the LPP when combined with the resource impacts of other projects from 2025 through 2060.</b></p>
BLM 70	Overall, the entire Alternatives section does not appropriately address impacts on BLM public lands. This major shortfall has been previously discussed with the State, and included major comments on Alternatives Report 22.	UDWRe’s view is that that the proper content of Chapter 3 of Exhibit E does not include a discussion of the impacts on BLM-Administered lands but rather a description of the Proposed Action and Alternatives considered.	<p>This and other comments related to the alternatives were discussed in the meeting between BLM and UDWRe on March 17, 2017.</p> <p>BLM clarified that the analysis of the effects of the No Lake Powell Water Alternative in particular appears to be presented in a manner that leads the reader to the singular conclusion that the Proposed Action is the only reasonable and environmentally sensitive alternative.</p> <p>UDWRe clarified in the meeting that while the License Application and supporting documents have been developed to facilitate their use in preparing the NEPA document for this project, Exhibit E and the various Study reports are in fact not NEPA documents. They constitute the UBWR’s proposal and associated information required by FERC to be submitted as part of FERC’s Integrated Licensing Proposal process. When the preparation of the EIS begins, the FERC’s EIS contractor will consider the information presented in these documents, as well as other information provided by BLM and the other Cooperating Agencies and other sources, and conduct their own independent effects analysis. FERC and the Cooperating Agencies will then review the EIS contractor’s work and ensure that the analysis and content of the EIS fully meets their needs and follows CEQ and their agencies’ respective NEPA guidance.</p>	We understand that Exhibit E is not a NEPA document. But the entire Alternatives section does not appropriately inform the discussion as it currently sits. This major shortfall has been previously discussed with the State, and included major comments on the State's Alternatives Report 22.	Joe Incardine	See the response to BLM Comment No. 70 in the Updated Extended Narrative Responses to BLM Comments.
BLM 364	Must include RATIONALE for why the “Highway Alternative” is included in the NEPA document. Must go into detail about the Kaibab Tribe’s Referendum for this, and detail of resource impacts, positive and negative, comparative to other Alternatives.	FERC’s Scoping Document 2, issued in 2008, stated that several parties, including the Kaibab Tribe, requested that that the EIS consider a pipeline route across the Kaibab-Paiute Indian Reservation, and FERC required the EIS to do so. The Tribe’s ‘referendum’ is addressed to ethnographic resources, sensitive plants, and other study reports. Details of impacts are included in the appropriate study plan.	<p>Regarding the rationale for including the alternatives, the EIS to be prepared for FERC and the cooperating agencies will describe the rationale for why the Existing Highway Alternative, Southeast Corner Alternative and other alternatives are included. This discussion will be included in Chapter 2 - Proposed Action and Alternatives and Section 2.4 Other Alternatives (as appropriate).</p> <p>As discussed in the meeting between BLM and UDWRe on March 17, 2017, the PLP is a preliminary environmental document, but not a NEPA document, that was prepared to meet FERC's regulations under 18 CFR 5.16 of the Integrated Licensing Process (ILP). Chapter 3 of the PLP describes the alternatives to be considered. The PLP was then used to prepare Exhibit E of the License Application, which replaces the PLP in FERC's Integrated Licensing Process (ILP), and which is also an environmental document , but again not a NEPA document, prepared to meet FERC's regulations under 18 CFR 5.18 of the ILP. FERC and its EIS contractor will use Exhibit E of the License Application, as one of the documents in the preparation of the EIS, but will prepare an independent analysis for the EIS. Also please see the response to BLM No.70 for a partial response to BLM No.364.</p> <p>FERC's Scoping Document 2, issued in August 2008, includes Section 6.0 EIS Outline, which identifies Chapter 2 - Proposed Action and Alternatives and Section 2.4 Other Alternatives (as appropriate) where the rationale for why the alternatives are included in their NEPA document will be presented. FERC's Scoping Document 2 and the Kaibab Band of Paiute Indians' Resolution K-30-12 Permission for LPP to Cross Kaibab Indian Reservation Lands are attached as PDF files for BLM and FERC convenience. The comparison of resource effects of the Proposed Action and Alternatives on resources, positive and negative, will be included in Section 5.1 Comparison of Effects of Proposed Action and Alternatives in Chapter 5 of the DEIS, as shown in Section 6.0 EIS Outline in FERC's Scoping Document 2.</p>	Same discussion as made in other comments, that the RATIONALE for why the “Highway Alternative” is included remains insufficient, and requires more detail.	Joe Incardine	Please see the updated response to BLM Comment No. 70 in the Updated Extended Narrative Responses to BLM Comments, which addresses BLM Comment No. 364.

Comment # Label	Original BLM Comment	Original UDWRe Response	UDWRe March 31, 2017 Response	Additional BLM Comment	BLM Reviewer	UDWRe Updated Response
BLM 381	Proposed Action and Alternatives – description of the SE Alt: Needs to discuss land ownership for this as well as each Alternative. Must discuss the RATIONALE for why each Alternative is included in the NEPA document. Specific to the SE Alt: BLM originally advocated for an Alternative to stay within the existing BLM-designated Navajo-McCullough transmission corridor. This important point is not mentioned.	FERC’s Scoping Document 2, issued in 2008, stated that several parties, including the Kaibab Tribe, requested that that the EIS consider a pipeline route across the Kaibab-Paiute Indian Reservation, and FERC required the EIS to do so.	Regarding land ownership, Table 3-15 in Chapter 3, Exhibit E of the License Application, (Table 3-16 in the PLP reviewed by BLM) shows the acreage of land ownership by federal, state and local government agency, as well as for private land, for the various segments of the LPP penstock alignment under the Southeast Corner Alternative. We believe this is the type of land ownership information that BLM wants to ensure is included in the License Application.  Regarding the inclusion of the rationale for each alternative, please see the responses to BLM Comment No.s 70 and 364.  Finally we agree that, regarding the SE Alternative, it is important to specifically identify BLM's advocacy of an alternative to stay within the BLM designated Navajo-McCullough transmission corridor. That statement is added to the end of Section 3.4.1 Alternative Alignment Features, Chapter 3, Exhibit E of the License Application which is revised to read: <b>The LPP Southeast Corner alternative features consist of five systems, four of which would be the same as described for the Proposed Action in Section 3.1.1: Water Intake, Water Conveyance, KWCWD, and Electrical Transmission. A portion of the Hydro System would be unique to the Southeast Corner alternative, as described in the following subsections. Under this alternative, LPP features would be located within the BLM’s designated utility corridor and follow the Navajo-McCullough transmission line across the Kaibab-Paiute Indian Reservation. BLM originally advocated for an Alternative to stay within the existing BLM-designated Navajo-McCullough transmission corridor.</b>	Same discussion as made in other comments, that the RATIONALE for why the “Southeast Corner Alternative” is included remains insufficient, and requires more detail.	Joe Incardine	Please see the response to BLM Comment No. 70 in the Updated Extended Narrative Responses to BLM Comments, which addresses BLM Comment No. 381.
BLM 463	There is no discussion in this section on biological soil crusts (cryptobiotic soils). This needs to be added since these soils would be disturbed/removed along much of the pipeline corridor.	A discussion of cryptobiotic soils has been added to the text.	Information on and discussion of biological soil crusts is added in several locations of the License Application. Please see the response to BLM Comment No. 463 in the attached Narrative Response document.	1st paragraph of revised text (for Subsection 5.3.1.1.6.1): Correct the spelling of "Mojave". Also, please note that biological soil crusts are also associated with sandy soils, not just gypsum soils. Last sentence of new text - please correct this to read "... and where actively grazed by livestock, the soil crusts may be broken and trampled in some areas." Just because livestock graze an area doesn't mean that crusts are damaged everywhere, as this implies. New second paragraph for Subsection 5.3.1.2.2.4 - Note that damage to soil crusts would not just occur from penstock construction, but also construction of power lines, roads, and staging areas. Vermilion Soils are not gypsum soils are they? Seems like they would be more sandy soils. Also, there needs to be substantially more analysis in this section - it's pretty sparse right now (although I do appreciate your adding this section). Last new paragraph (for Section 5.3.1.2.4.4) - damage to soil crusts would not just occur from penstock construction, but also construction of power lines, roads, and staging areas. Also, why would there be disturbance to more soil crusts in the Existing Highway alternative, versus the Proposed Action, when the alignment in the Existing Highway alternative would be in an area of previous disturbance? Seems like it should be the other way around.	Lorraine Christian	Please see the updated response to BLM Comment No. 463 in the Updated Extended Narrative Responses to BLM Comments.
BLM 523	Second paragraph, first sentence. “Existing gravel pits on public and private lands...” Please identify where these locations are. Can't say “the Existing Highway Alternative would have no significant effects resulting from spoil material disposal” until it is known where these locations are.	Refer to the response to BLM Comment 474.	Gravel pit sources are now identified through response to BLM Comment No. 522 in the first paragraph of section 5.3.1.2.4.7, Chapter 5, Exhibit E of the License Application, which has replaced the PLP in the FERC licensing process. Please see the response to BLM Comment No. 522 which provides that information.	Mostly okay - I recommend identifying that the three commercial gravel pits referenced (B-1, B-3 and B-5) are all existing pits. Also, would the 50 acres of disturbance be NEW disturbance ... this is important to state one way or the other.	Lorraine Christian	Please see the updated response to BLM Comment No. 522 in the Updated Extended Narrative Responses to BLM Comments.
BLM 539	Important Structures and Mineral Resources. Remember that this section (5.3.1) is impacts of the project on geology and soils not the impacts to the project FROM GEOLOGY/SOILS or impacts from the project on other resources. Thus, remove the part of this sub-section that discusses “Important Structures.”	Refer to the responses to BLM Comments 470 and 472.	Please refer to the response to BLM Comment No. 473 for an explanation of the content of Section 5.3 and partial response to BLM Comment No. 539.  This comment points out the difference between the information required to be submitted by FERC as part of the License Application process, which will be utilized in the preparation of the DEIS, and the actual NEPA analysis that will be performed during preparation of the DEIS.  Edit requested is incorporated. The fifth sentence in Section 5.3.1.2.8.6 is revised to read: <b>Therefore, no measurable or significant effects would occur.</b>	1st paragraph - this format for the impacts analysis makes no sense to me, but if it's what FERC requires, we will wait and work with FERC to see what is in the EIS. Remainder of comment response is okay. (Note: Was this section heading revised to be "Structures and Important Mineral Resources" as has been done elsewhere?)	Lorraine Christian	The heading of Section 5.3.1.2.8.6 in Chapter 5, Exhibit E of the License Application is revised to read: <b>Structures and Important Mineral Resources.</b>

Comment # Label	Original BLM Comment	Original UDWR Response	UDWR March 31, 2017 Response	Additional BLM Comment	BLM Reviewer	UDWR Updated Response
BLM 541	"Borrow materials for the Warner Valley Reservoir embankment dam would be supplied from local gravel pits and other material sources in the St. George metropolitan area." Where are these locations? They need to be identified NOW.	Refer to the responses to BLM Comments 474 and 523.	The locations of the borrow materials pits are provided. The text in Section 5.3.1.2.8.7, Chapter 5, Exhibit E of the License Application is revised to read: <b>Borrow materials for the Warner Valley Reservoir embankment dam would be supplied from local gravel pits and other material sources in the St. George metropolitan area. Three commercial gravel pits (see B-4, B-5 and B-6 on attached Figure 2-6) would have available rock materials to meet borrow needs for the embankment dam. There would be no measurable effects and no significant effects on borrow materials supplied from St. George area sources.</b>	Okay, except the edit made elsewhere ("...There would be no measurable or significant effects on ..." was not made here, and it should be.	Lorraine Christian	The last sentence of revised Section 5.3.1.2.8.7 in Chapter 5, Exhibit E is further revised to read: <b>There would be no measurable or significant effects on borrow materials supplied from St. George area sources.</b>
BLM 657	<ul style="list-style-type: none"><li>• 4th bullet in list: Add that all refueling should be done at least ¼ mile from any stream.</li><li>• 5th bullet in list: Describe where this "land applied disposal" would occur.</li><li>• 6th bullet in list: Need to identify what would be done with the sediment that would be captured by this silt</li></ul>	Temporary land application system using surface sprinklers would be used for land disposal. If dewatering is required during excavation, water would be pumped into a portable reservoir prior to discharge. If sufficient volume accumulates, water would be pumped into a temporary sprinkler system and sprinklers would discharge the water to land application/evaporation.	Please see the attached Extended Narrative document for the response to BLM Comment No. 657.	4th bullet: If the UDWR response is "... both practices <u>have been</u> incorporated into the License Application" then I am satisfied with the response. (Thank you!) The remainder of the comment/comment responses - okay.	Lorraine Christian	Both practices have been incorporated into the License Application. The statement identifying the Chapter 5, Exhibit E revisions "...and is revised to read:" means that the License Application now incorporates the revisions, indicated by <b>bolded</b> text referenced to a specific section number.
BLM 658	2nd line references operation and maintenance of powerlines, but more impacts could occur from construction of these transmission lines – please add that to the analysis. 6th/7th lines: Need to identify the location(s) of these water discharges in order to have an accurate impacts analysis.	Refer to the responses to BLM Comments 467 and 468.	Additional analysis is included about the minimal to no-effects of the construction of powerlines on water quality. The following sentences are added as a new last paragraph to section 5.3.4.2.2.3, Chapter 5, Exhibit E of the License Application: <b>All construction of transmission lines would occur well away from streams or washes and BMPs would be used to contain any runoff should a rain event occur during construction. BMPs such as filter berms, silt fence or straw wattles would be implemented to eliminate any effects of the runoff on water quality.</b>  A general description of the location of discharges is provided. The third sentence of the first paragraph of Section 5.3.4.2.2.3, Chapter 5, Exhibit E of the License Application is revised to read: <b>However, operation and maintenance of the proposed pipelines would include occasional water discharges at low points in the pipeline and/or penstock profile that would be determined during the design phase of the LPP that would have the potential to affect natural surface water features in the LPP area.</b>	Thanks for adding this additional analysis. I would suggest defining/quantifying what is meant by "well away from streams or washes" ... just how far are you talking about? Would this be 1/4 mile from perennial streams and 100 feet from dry washes, as we have added elsewhere?	Lorraine Christian	Transmission line towers must be spaced within design lengths determined by the line voltage and sag requirements to meet safety standards. A 1/4-mile minimum distance from a perennial stream would not be feasible because the span between transmission towers on either side of a perennial stream would be 1/2-mile, which exceeds safety standards for transmission line sag design. The new paragraph added to Section 5.3.4.2.2.3, Chapter 5, Exhibit E of the License Application is moved to the last paragraph of Section 5.3.4.2.2.1, Chapter 5, Exhibit E and is revised to read: <b>Transmission Line Construction</b> (new heading) <b>Transmission line tower construction would occur at least 100 feet from perennial streams and dry drainages, and span lengths would meet or exceed safety standards for transmission line sag design. BMPs such as filter berms, silt fence or straw wattles would be used to manage runoff from tower sites should a rain event occur during construction.</b>
BLM 668	3rd/4th lines on page: The analysis of impacts should include an analysis with mitigations built in. Then impacts would be substantially less than stated here. (Or are none proposed?) Please explain how a facility would be proposed without mitigations to prevent violating surface water quality standards. Sounds like this is just trying to over-estimate impacts of this alternative. 5th/6th lines on page: Delete "and the organisms inhabiting the river" – remember that this is not the aquatic resources section).	The text has been revised to include additional mitigation for construction. Other effects, such as generation of RO brines, would result in approximately 2,000 acres of land that would be permanently repurposed for evaporation ponds; reduction in recharge to groundwater would reduce recharge to the Virgin River; no mitigation measures have been identified that could be applied to these effects. The suggested edit from the second paragraph from the above comment has been incorporated.	The effects of the No Lake Powell Water Alternative were discussed during the meeting between BLM and UDWR on March 17, 2017. Based on these discussions we understand that BLM's primary concern is that USGS documents cited in the analysis of changes to urban groundwater recharge appear to contradict the conclusions of the groundwater impact analysis in the environmental report. The impact analysis for the alternative is based on localized recharge of the shallow subsurface soils in the vicinity of the urban irrigation and describes the potential effects of changes to this groundwater resource from the alternative. UDWR agrees with BLM that these site-specific changes in groundwater conditions are not in total agreement with conditions described in the two USGS reports. We recognize these differences do exist and suggest the cited USGS documents describe groundwater conditions at a different scale than is described in the impact analysis for the alternative as the reason for the differences. In addition to the response below, please refer to the attached Narrative Response document for the response to this comment and BLM comment No. 694.  The following sentence is added as the first sentence of section 5.3.4.2.5 No Lake Powell Water Alternative, Chapter 5, Exhibit E of the License Application: <b>The effects of the No Lake Powell Water Alternative presented below are localized, anthropomorphic changes imposed in addition to other natural and man-made conditions described in other reports.</b>	Thank you for the clarification. While I do understand that your analysis is "based on localized recharge" of groundwater, the analysis in Section 5.3.4.2.5 discusses the Virgin River stream (even in the St. George area) as a whole. I still question whether residential watering would "result in violation of applicable water quality standards for temperature and cause substantial degradation of surface water quality. This would be a significant effect on water quality in the Virgin River." The majority of recharge to the river is from upstream of St. George, so this analysis still seems inaccurate. Or we might possibly need to see the data/monitoring on which this conclusion is based. Maybe at this point we should just agree to disagree, and work with FERC on the water analysis for the EIS.	Lorraine Christian	Please see the response to BLM Comment No. 668 in the Updated Extended Narrative Response to BLM Comments.
BLM 678	NEW SUB-SECTION: There needs to be a sub-section on analysis of impacts from the No Action Alternative (which is currently missing) - please add.	A new subsection with header "NO ACTION ALTERNATIVE" has been added (See Section 5.4.4.4.5). There will be no impact under the No Action Alternative.	An explanation is added regarding no cumulative effects. Section 5.3.4.4.5 - No Action Alternative, Chapter 5, Exhibit E of the License Application is revised to read: <b>The No Action Alternative would have no cumulative effects on surface water quality in Lake Powell and the Colorado River downstream from Glen Canyon Dam, in streams and ephemeral drainages crossed by the LPP action alternatives, and in Sand Hollow Reservoir. No federal action authorizing diversion of water from the Colorado River would occur with this alternative and thus existing conditions would continue to evolve subject to natural or other anthropogenic influences and factors.</b>  Please see the response to BLM Comment No. 667 for an explanation of the difference between the No Action and No Lake Powell Water alternatives.	Okay, except delete "to evolve" from this new text.	Lorraine Christian	Section 5.3.4.2.5, Chapter 5, Exhibit E of the License Application is revised to read: <b>The No Action Alternative would have no cumulative effects on surface water quality in Lake Powell and the Colorado River downstream from Glen Canyon Dam, in streams and ephemeral drainages crossed by the LPP action alternatives, and in Sand Hollow Reservoir. Federal action authorizing diversion of water from the Colorado River would not occur and existing conditions would continue subject to natural or other anthropogenic influences and factors.</b>

Comment # Label	Original BLM Comment	Original UDWRe Response	UDWRe March 31, 2017 Response	Additional BLM Comment	BLM Reviewer	UDWRe Updated Response
BLM 680	NEW SUB-SECTION: There needs to be a sub-section on analysis of impacts from the No Action Alternative (which is currently missing) – please add.	The text has been revised to address the comment.	An explanation of why there would be no cumulative effects is added. Section 5.3.4.5.5 - No Action Alternative, Chapter 5, Exhibit E of the License Application is revised to read: <b>The No Action Alternative would have no short-term or long-term unavoidable adverse effects on surface water quality in Lake Powell and the Colorado River downstream from Glen Canyon Dam, in streams and ephemeral drainages crossed by the LPP action alternatives, and in Sand Hollow Reservoir. No federal action would occur with this alternative and thus existing conditions would continue to evolve subject to natural or other anthropogenic influences and factors.</b>	Okay, except delete "to evolve" from this new text.	Lorraine Christian	Section 5.3.4.5.5, Chapter 5, Exhibit E of the License Application is revised to read: <b>The No Action Alternative would have no short-term or long-term unavoidable adverse effects on surface water quality in Lake Powell and the Colorado River downstream from Glen Canyon Dam, in streams and ephemeral drainages crossed by the LPP action alternatives, and in Sand Hollow Reservoir. Federal action authorizing diversion of water from the Colorado River would not occur and existing conditions would continue subject to natural or other anthropogenic influences and factors.</b>
BLM 704	Last line: This is not the aquatic resources section, so remove this reference to impacts on aquatic resources.	The comment appears to apply to Section 5.3.5.5.4. The suggested edit has been incorporated to that section.	<p>The effects of the No Lake Powell Water Alternative were discussed during the meeting between BLM and UDWRe on March 17, 2017. Based on these discussions we understand that BLM’s primary concern is that USGS documents cited in the analysis of changes to urban groundwater recharge appear to contradict the conclusions of the groundwater impact analysis in the environmental report. The impact analysis for the alternative is based on localized recharge of the shallow subsurface soils in the vicinity of the urban irrigation and describes the potential effects of changes to this groundwater resource from the alternative. UDWRe agrees with BLM that these site-specific changes in groundwater conditions are not in total agreement with conditions described in the two USGS reports. We recognize these differences do exist and suggest the cited USGS documents describe groundwater conditions at a different scale than is described in the impact analysis for the alternative as the reason for the differences. In addition to the response below, please refer to attached Narrative Response document for the response to this comment and BLM comment No. 694.</p> <p>The following sentence is added as the first sentence of section 5.3.5.5.4, No Lake Powell Water Alternative, Chapter 5, Exhibit E of the License Application: <b>The effects of the No Lake Powell Water Alternative presented below are localized, anthropomorphic changes imposed in addition to other natural and man-made conditions described in other reports.</b></p>	I do appreciate the clarification provided here, and discussed at our March meeting. I still question the characterization of impacts being "major" - maybe at this point we should just agree to disagree, and then we can work with FERC on the EIS analysis.	Lorraine Christian	<p>Additional data and analyses demonstrating the projected effects of the No Lake Powell Water Alternative on groundwater resources in the St. George metropolitan area are presented in the response to BLM Comment No. 668 in the Updated Extended Narrative Response to BLM Comments.</p> <p>The text in in the first two sentences of Section 5.3.5.5.4, Chapter 5, Exhibit E of the License Application is revised to read: <b>The No Lake Powell Water Alternative would have no short-term unavoidable adverse effects on groundwater resources. It would have measurable long-term unavoidable adverse effects on groundwater resources in the St. George metropolitan area resulting from eliminating outdoor irrigation with potable water.</b></p>
BLM 708	1st line on page: Please edit as follows: “... including Buckskin Gulch is, in part, managed as a wilderness ...” 3rd line on page: Please edit as follows: “... not in a wilderness study area and would be adjacent to ...” 11th line on page: Should be “floodplain” rather than “floodway.” 1st complete paragraph on page: <ul style="list-style-type: none"><li>• 3rd line: End of line should read “... the Paria Canyon- Vermilion Cliffs Wilderness are”.</li><li>• 4th line: This statement is inaccurate (on the condition of the Paria River riparian area). Also, this is not correct terminology – the BLM (as well as USFS and NRCS) use “functioning condition” terminology” (i.e., “properly functioning,” “functional-at risk,” “nonfunctional,” and “unknown”), not “impaired” – see Technical Reference TR 1737-15 – Riparian Area Management.</li></ul>	The suggested edits from the first, second, and third paragraphs of the above comment have been incorporated. The terminology used for riparian function analysis was identified in the approved study plan, which was developed in consultation with BLM and addressed BLM review comments.	Although in the paragraph preceding the referenced text there is a brief description of the riparian environment at the Paria River crossing, the subject of this section is the aquatic resources in the stream and the referenced text is referring to the stream functionality, and not the riparian area functionality, and the associated aquatic resources. In order to make the "functionality" reference clear, the second sentence of the 3rd paragraph of section 5.3.6.1.6.2, Chapter 5, Exhibit E of the License Application is revised as follows: <b>The functionality of reaches of the river above the Paria Canyon wilderness (Primitive) areas is known to be impaired as a result of grazing and other human uses.</b>	The revised text is still incorrect - the revised text needs to read "The functionality of reaches of the river above the Paria Canyon-Vermilion Cliffs Wilderness is known to be impaired ..."	Lorraine Christian	The second sentence of the 3rd paragraph of section 5.3.6.1.6.2, Chapter 5, Exhibit E of the License Application is revised to read: <b>The functionality of reaches of the river above the Paria Canyon-Vermilion Cliffs Wilderness is known by BLM to be impaired as a result of grazing and other human uses.</b>
BLM 717	Why is there no discussion of Kanab Creek, the Virgin River, and Sand Hollow Reservoir in this analysis [5.3.6.2.2], since they were introduced in Section 5.3.6.1.6? Please add this discussion (even if no impact, they should be mentioned).	UDWRe’s view is that the text with regards to the first part of the comment is appropriate. The text has been revised to address the second part of the comment.	Please see the attached Extended Narrative document response to BLM Comment 716, for the response to BLM Comment No. 717.	The comment listed here as BLM 717 is not the actual BLM 717 comment (BLM 716 was listed instead). I therefore cannot comment on whether the response is okay.	Lorraine Christian	A third paragraph in Section 5.3.6.2.2, Chapter 5, Exhibit E is added to read: <b>The Proposed Action construction and operation would have no measurable effects on aquatic resources in Kanab Creek as the creek at the crossing is an intermittent stream and only flows briefly through this portion of Kanab Creek Canyon during precipitation runoff events. The Proposed Action would have no measurable effects on aquatic resources in the Virgin River or Sand Hollow Reservoir. The Proposed Action terminates at Sand Hollow Reservoir, more than 3 miles from the Virgin River, and LPP water would be conveyed from Sand Hollow Reservoir to the Quail Creek Water Treatment Plant for treatment. The Sand Hollow Hydro Station tailrace channel would be constructed in the dry during a drawdown of Sand Hollow Reservoir by WCWCD. Constructing the tailrace would involve excavating a channel through the sandstone bedrock approximately 170 feet long at an average 30 feet wide. LPP water delivered from Sand Hollow Hydro Station would have approximately the same dissolved oxygen concentration and water temperature as Sand Hollow Reservoir and would have no measurable effect on aquatic resource habitat in the reservoir.</b>



Comment # Label	Original BLM Comment	Original UDWRe Response	UDWRe March 31, 2017 Response	Additional BLM Comment	BLM Reviewer	UDWRe Updated Response
BLM 718	General Comment: Why is there no discussion of Kanab Creek, the Virgin River, and Sand Hollow Reservoir in this analysis, since they were introduced in Section 5.3.6.1.6? Please add this discussion (even if no impact, they should be mentioned).	UDWRe’s view is that the text is appropriate.	Please see the response to BLM Comment No. 472 for an explanation of the differences between Exhibit E in the License Application and NEPA documents.  Please see the Extended Narrative document for the response to BLM Comment No. 718.	Thank you for adding this. Note that the sentence "The Proposed Action operation would have no measurable effects on aquatic resources in Kanab Creek ... typically has no flow" is essentially repeated in the second paragraph. It is more appropriate in the second paragraph since the first only discusses construction effects. Thus, I suggest deleting it from the first paragraph.	Lorraine Christian	Please see the updated response for BLM 718 in the Updated Extended Narrative Responses to BLM Comments.
BLM 720	General Comment: Why is there no discussion of Kanab Creek, the Virgin River, and Sand Hollow Reservoir in this analysis, since they were introduced in Section 5.3.6.1.6? Please add this discussion (even if no impact, they should be mentioned).	UDWRe’s view is that the text is appropriate.	There is a discussion of the effects on the Virgin River in Section 5.3.6.2.5. A sentence is added to the end of Section 5.3.6.2.5 - No Lake Powell Water Alternative, Chapter 5, Exhibit E of the License Application as follows: <b>The No Lake Powell Water Alternative would have no effect on Kanab Creek or Sand Hollow Reservoir.</b>	Need to add a justification/explanation on WHY no effect. Can't just say no effect without a rationale.	Lorraine Christian	A second paragraph is added to Section 5.3.6.2.5 - No Lake Powell Water Alternative, Chapter 5, Exhibit E of the License Application, incorporating the last sentence previously added to the section, as follows: <b>Aquatic resources in Kanab Creek and Sand Hollow Reservoir would not be directly or indirectly affected by operation of the No Lake Powell Water Alternative. Kanab Creek is more than 57 miles away from the St. George metropolitan area communities where residential outdoor watering with potable water would be eliminated under this alternative. The decreased groundwater discharge to the Virgin River would occur in a different hydrologic drainage basin than the Kanab Creek hydrologic drainage basin. Sand Hollow Reservoir is an off-stream reservoir supplied by diversions from the Virgin River upstream from the St. George metropolitan area, and there is no residential development tributary to Sand Hollow Reservoir. There would be no changes to the hydrology or water quality in Kanab Creek or Sand Hollow Reservoir under the No Lake Powell Water Alternative. The No Lake Powell Water Alternative would have no effects on aquatic resources in Kanab Creek or Sand Hollow Reservoir.</b>
BLM 721	NEW SUB-SECTION: There needs to be a sub-section on analysis of impacts from the No Action Alternative (which is currently missing) – please add.	The text has been revised to address the comment.	The differences between the No Action Alternative and the No Lake Powell Water Alternative were discussed in the meeting between BLM and the proponent on March 17, 2017. Please see the response to BLM No. 667 in the attached Narrative response document for a partial response to BLM No. 721. An explanation of why there would be no effects is added. Section 5.3.6.2.6 - No Action Alternative, Chapter 5, Exhibit E of the License Application is revised to read: <b>The No Action Alternative would have no effect on aquatic resources in the LPP study area as there would be no federal action requiring a water pipeline crossing of the Paria River and there would be no pipeline water releases to the Paria River which could risk aquatic biota transfer to the river. Existing aquatic resource conditions would continue to evolve subject to natural or other anthropogenic influences and factors.</b>  Regarding the comparison of effects between the No Action Alternative and the No Lake Powell Water Alternative, the latter alternative would involve implementation of additional and different water supply development and conservation measures than the No Action Alternative. As a result, the effects would be different between the two alternatives.	Okay with new text. I would suggest, to make the analysis in the EIS more clear, that Sec. 5.3.6.2.6 describe (here) the differences between the No Lake Powell Water alternative, and the No Action alternative - this would then more clearly demonstrate WHY the effects of the two alternatives, which seem so similar, are in fact different.	Lorraine Christian	Please see the response to BLM 721 in the Updated Extended Narrative Responses to BLM Comments.
BLM 722a	3rd complete bullet on page: Revise end of BMP to read “... an upland area at least ¼ mile from the stream channel in order to isolate potential contaminants and prevent spills on soil and prevent contaminating stream substrates.” 4th complete bullet on page: End of line should read “... on upland areas at least ¼ mile from the stream channel within spill...”.	The suggested edits from the first, second, fourth, and fifth paragraphs from the above comment have been incorporated.	Please see the attached Extended Narrative document for the response to BLM Comment No. 722a.	1st paragraph of response: If the UDWR response is "... both practices <u>have been</u> incorporated into the License Application" then I am satisfied with the response.	Lorraine Christian	Both practices have been incorporated into the License Application. The statement identifying the Chapter 5, Exhibit E revisions "...and is revised to read:" means that the License Application now incorporates the revisions, indicated by <b>bolded</b> text referenced to a specific section number.
BLM 724	2nd sentence: Need to discuss/expand on this more ... what is the basis for this conclusion? (Right now it is an unsubstantiated claim.)	The cumulative effects of the No Lake Powell Water Alternative, which would eliminate residential outdoor watering, would reduce non-sewered return flows to the Virgin River throughout the St. George metropolitan area, which is analyzed in the final Alternatives Development study report. The reduced flow, combined with water diversions from the Virgin River, would have significant adverse cumulative effects on aquatic resources.	The effects of the No Lake Powell Water Alternative were discussed during the meeting between BLM and UDWRe on March 17, 2017. Based on these discussions we understand that BLM’s primary concern is that USGS documents cited in the analysis of changes to urban groundwater recharge appear to contradict the conclusions of the groundwater impact analysis in the environmental report. The impact analysis for the alternative is based on localized recharge of the shallow subsurface soils in the vicinity of the urban irrigation and describes the potential effects of changes to this groundwater resource from the alternative. UDWRe agrees with BLM that these site-specific changes in groundwater conditions are not in total agreement with conditions described in the two USGS reports. We recognize these differences do exist and suggest the cited USGS documents describe groundwater conditions at a different scale than is described in the impact analysis for the alternative as the reason for the differences. In addition to the response below, please refer to attached Narrative Response document for the response to this comment and BLM comment No. 694.  The following sentence is added as the first sentence of section 5.3.6.4.4, No Lake Powell Water Alternative, Chapter 5, Exhibit E of the License Application: <b>The effects of the No Lake Powell Water Alternative presented below are localized, anthropomorphic changes imposed in addition to other natural and man-made conditions described in other reports.</b>	There is no response to either Comment No. 694 or this comment in the Extended Narrative Response document.	Lorraine Christian	Section 5.3.6.4.4, No Lake Powell Water Alternative, Chapter 5, Exhibit E of the License Application is revised to read: <b>The No Lake Powell Water Alternative would have no measurable short-term cumulative effects on aquatic resources when combined with past, present and reasonably foreseeable future interrelated actions. The reduced return flows from eliminating residential outdoor irrigation (see Section 5.3.6.2.5) could have significant long-term indirect cumulative effects on aquatic resources in the Virgin River when combined with the past, present and reasonably foreseeable effects of water diversion throughout the St. George metropolitan area.</b>  Please see the updated response to BLM Comment No. 668 and BLM Comment No. 694 in the Updated Extended Narrative Responses to BLM Comments for additional clarification regarding BLM Comment No. 724.



Comment # Label	Original BLM Comment	Original UDWRe Response	UDWRe March 31, 2017 Response	Additional BLM Comment	BLM Reviewer	UDWRe Updated Response
BLM 725	NEW SUB-SECTION: There needs to be a sub-section on analysis of impacts from the No Action Alternative (which is currently missing) – please add.	The text has been revised to address the comment.	An explanation of the effects is added. Section 5.3.6.4.5 - No Action Alternative, Chapter 5, Exhibit E of the License Application is revised to read: <b>The No Action Alternative would have no measureable cumulative effects on aquatic resources in the LPP study area. No federal action authorizing diversion of water from the Colorado River would occur and thus existing conditions would continue to evolve subject to natural or other anthropogenic influences and factors.</b>  For an explanation of the differences between the No Action and No Lake Powell Water Alternatives please see the response to BLM Comment No. 667.	Okay (except delete "to evolve").	Lorraine Christian	Section 5.3.6.4.5, Chapter 5, Exhibit E of the License Application is revised to read: <b>The No Action Alternative would have no measureable cumulative effects on aquatic resources in the LPP study area. Federal action authorizing diversion of water from the Colorado River would not occur and existing conditions would continue subject to natural or other anthropogenic influences and factors.</b>
BLM 767	Recommend a simple summary table with the following columns: Species/Status/Effects Determination (break out the species determination and critical habitat determinations)/Detailed Rationale	Your comment has been noted.	The requested summary table is incorporated into the appropriate section. Section 5.3.7.2.1.2, Chapter 5, Exhibit E of the License Application is a subsection describing the significance criteria identified for federal sensitive species and state/local agencies species of concern. The significance criteria are identified to determine if the effects of the Proposed Action and alternatives on sensitive aquatic species and their habitat would be significant or not significant.  BLM Comment No. 770 requests the text of Section 5.3.7.2, Chapter 5, Exhibit E of the License Application be reorganized to more clearly present the results of the environmental effects analysis for special status aquatic species. Section 5.3.7.2, Chapter 5, Exhibit E of the License Application is reorganized as requested by BLM in BLM Comment No. 770 and is provided in the attached Extended Narrative document.	1st paragraph - okay 2nd paragraph - not pertinent to BLM 767, so delete this text.	Lorraine Christian	The second paragraph of the March 31, 2017 Response is deleted. Response to BLM 767 is as follows: The requested summary table is incorporated into the appropriate section. Section 5.3.7.2.1.2 Chapter 5, Exhibit E of the License Application is a subsection describing the significance criteria identified for federal sensitive species and state/local agencies species of concern. The significance criteria are identified to determine if the effects of the Proposed Action and alternatives on sensitive aquatic species and their habitat would be significant or not significant.
BLM 768	1st paragraph after bullet list, 5th line: "USFWS 2010o" is an incorrect citation – please correct. Is this comment referencing USFWS 2010p)? 2nd paragraph after bullet list, 3rd line: In this usage, spelling should be "effect" (not "affect"). 2nd paragraph after bullet list, 8th line: I think "USFWS 2010o" is an incorrect citation – please correct. 3rd paragraph after bullet list, 5th line: I think "USFWS 2010o" is an incorrect citation – please correct.	The text has been revised to address the comment.	Please see the Extended Narrative document for the response to BLM Comment No. 768.	X- good with the changes incorporated in the Extended Narrative Attachment A that was provided; not sure why that is not reflected in column F in this table.	Christine Fletcher Lorraine Christian	Comment noted.
BLM 770	Do not have a section on "Potential Effects and Alternatives Eliminated from Further Analysis." Instead, organize this entire analysis the way the other resource sections are: 5.3.7.2.2 Proposed Action 5.3.7.2.2.1 Construction Effects 5.3.7.2.2.2 Operations and Maintenance Effects 5.3.7.2.2.3 Effects Determination 5.3.7.2.3 Existing Highway Alternative 5.3.7.2.3.1 Construction Effects 5.3.7.2.3.2 Operations and Maintenance Effects 5.3.7.2.3.3 Effects Determination 5.3.7.2.4 Southeast Corner Alternative 5.3.7.2.4.1 Construction Effects 5.3.7.2.4.2 Operations and Maintenance Effects 5.3.7.2.4.3 Effects Determination 5.3.7.2.5 No Lake Powell Water Alternative 5.3.7.2.5.1 Construction Effects 5.3.7.2.5.2 Operations and Maintenance Effects 5.3.7.2.5.3 Effects Determination 5.3.7.2.6 No Action 5.3.7.2.6.1 Construction Effects 5.3.7.2.6.2 Operations and Maintenance Effects 5.3.7.2.6.3 Effects Determination The "effects determination" sub-section for each alternative would then discuss the overall effects of each alternative (which is what will go into the Biological Assessment). Thus, all of the text in Sections 5.3.7.2.2.1 through 5.3.7.2.2.8 would be merged into the overall analysis of impacts by alternative, and each statement on "potential effects from LPP Project" features being "eliminated from further analysis" would be deleted. Note: There are no "transmission line alternatives" ... construction and operation of transmission lines is built into each of the separate alternatives.	The document was organized and written in accordance with FERC guidance.	Please see the Extended Narrative Response document for the response to BLM Comment No. 770.	This is MUCH better. However, there are still some "issues" with the organization. For example, note that this is Section 5.3.7.2.2.1 Proposed Action, yet the Extended Narrative Response document includes discussions/text on all the other alternatives as well. Since the section is for the Proposed Action, those other paragraphs should be removed from here and placed in their own separate sub-sections.	Lorraine Christian	The reorganized and simplified sections in the response to BLM Comment No. 770 are included in the Updated Extended Narrative Responses to BLM Comments.

Comment # Label	Original BLM Comment	Original UDWRe Response	UDWRe March 31, 2017 Response	Additional BLM Comment	BLM Reviewer	UDWRe Updated Response
BLM 774	2nd complete bullet on page: What would be done with the silt fence and the sediment that it traps? Need to identify that here. 4th complete bullet on page: Revise end of BMP to read "... an upland area at least ¼ mile from the stream channel in order to isolate potential contaminants and prevent spills on soil and prevent contaminating stream substrates." 5th complete bullet on page: End of line should read "... on upland areas at least ¼ mile from the stream channel within spill ..." 6th complete bullet on page: Where would this "land applied" watering occur? Need to identify those area(s) NOW. 7th complete bullet on page: What would be done with the silt fence and the sediment that it traps? Need to identify that here. Last line on page: There is no "UBWR 2015a" citation included in Sec. 5.3.7.6 – please add it.	The suggested edits from the second and third paragraphs of the above comment have been incorporated. The land application would occur in areas approved by the landowners and/or administrators. Where the dewatering would be required and hence where the land application area(s) would be located are unknown at this time. The text has been revised to address the various items in the comment.	Please see the attached Extended Narrative document for the response to BLM Comment No. 774.	2nd paragraph of response: If the UDWR response is "... both practices <u>have been</u> incorporated into the License Application" then I am satisfied with the response.	Lorraine Christian	Both practices have been incorporated into the License Application. The statement identifying the Chapter 5, Exhibit E revisions "...and is revised to read:" means that the License Application now incorporates the revisions, indicated by bolded text referenced to a specific section number.
BLM 795	NEW SUB-SECTION: There needs to be a sub-section on analysis of impacts from the No Action Alternative (which is currently missing) – please add.	The text has been revised to address the comment.	An explanation of why there will be no unavoidable adverse effects is added. The following sentence is added to the end of Section 5.3.7.5.5 - No Action Alternative, Chapter 5, Exhibit E of the License Application: <b>There would be no Federal action undertaken as part of the No Action Alternative and therefore there would be no cumulative effect on special status aquatic species.</b>	New text needs to be revised to address "unavoidable adverse effects" rather than "cumulative effects." Thus, please rewrite the new (added) text to read " There would be no Federal action undertaken as part of the No Action Alternative and therefore there would be no unavoidable adverse effects on special status aquatic species."	Lorraine Christian	The last sentence of Section 5.3.7.5.5, Chapter 5, Exhibit E of the License Application is revised to read: <b>There would be no Federal action undertaken as part of the No Action Alternative and there would be no unavoidable adverse effects on special status aquatic species.</b>

# EXTENDED NARRATIVES

## **BLM 70**

Rationales for including the action alternatives as described in Sections 3.1, 3.3, 3.4 and 3.5 of Chapter 3, Exhibit E of the License Application are added to the appropriate locations in Chapter 3.

- 1) Add a new subsection 3.1.4 at Chapter 3 of the License Application, to read:  
**3.1.4 Rationale for the Proposed Action**

**The State believes the Proposed Action would accomplish the following:**

- **Develop additional water supplies legally available from the Colorado River System to meet the water demands of the existing and projected future population of Washington and Kane counties through 2060, with a necessary margin of safety, while maximizing the use of existing available and identified water supplies.**
- **Diversify the primary municipal and industrial (“M&I”) water sources for the counties**
- **Add resiliency and reliability to the water delivery system to address the risk of variability associated with water supplies and the water delivery system.**
- **Develop clean, renewable energy sources**

**The EIS analysis will fully inform the agencies and the Kaibab Band of Paiute Indians as to the comparative benefits and adverse effects of the alternatives.**

- 2) Revise the title for Section 3.3 Description of Existing Highway Alternative in Chapter 3 of the License Application to read: 3.3 Description of Existing Highway **Action** Alternative.
- 3) Add a new subsection 3.3.3 at Chapter 3 of the License Application, to read:  
**3.3.3 Rationale for Including the Existing Highway Action Alternative**

**Several parties, including the Kaibab Band of Paiute Indians, commented during the 2008 scoping period that the EIS should consider pipeline route alternatives across the Kaibab-Paiute Indian Reservation. FERC responded in its August 21, 2008 Scoping Document 2 (SD2) to include an alternative pipeline route across the Kaibab-Paiute Indian Reservation in the NEPA process. This decision was affirmed in FERC’s Study Plan Determination issued on January 21, 2009. Subsequently on May 17, 2012, the Kaibab Band of Paiute Indians passed “Resolution of the Governing Body of the Kaibab Band of Paiute Indians K-30-12, Permission for Lake Powell Pipeline Project To Cross Kaibab Indian Reservation Lands”. By means of this Resolution, the Tribal Council determined to permit and give consent for the LPP to cross the Kaibab-Paiute Indian Reservation following Highway 389, in exchange for appropriate compensation to the Tribe. The EIS analysis will fully inform the agencies and the Kaibab Band of Paiute Indians as to the comparative benefits and adverse effects of the alternatives.**

- 4) Revise the title for Section 3.4 Description of Southeast Corner Alternative in Chapter 3 of the License Application to read: 3.4 Description of Southeast Corner **Action** Alternative

- 5) Add a new subsection 3.4.3 in Chapter 3 of the License Application, to read: **3.4.3 Rationale for Including the Southeast Corner Action Alternative**

**The Southeast Corner Action Alternative maximizes the distance the LPP coincides with the Navajo-McCullough Energy Corridor and conforms with FERC's SD2 decision to include alternatives that cross the Reservation. The Tribe, however, has not yet endorsed this alignment through issuance of a Tribal Council Resolution as it has for the Existing Highway Action Alternative. The EIS analysis will fully inform the agencies and the Kaibab Band of Paiute Indians as to the comparative benefits and adverse effects of the Proposed Action and the alternatives.**

- 6) Revise the title for Section 3.5 Description of No Lake Powell Water Alternative in Chapter 3 of the License Application to read: 3.5 Description of No Lake Powell Water **Action** Alternative
- 7) Add a new subsection 3.5.3 in Chapter 3 of the License Application, to read: **3.5.3 Rationale for Including the No Lake Powell Water Action Alternative**

**Several parties commented during the 2008 scoping period that alternative sources of water such as pumping from aquifers or building new reservoirs should be considered. In contrast, Washington County commented that the high cost of treating high concentrations of total dissolved solids in the Virgin River caused by La Verkin Hot Springs would need to be considered by FERC in evaluating alternative sources of water. In response to these comments, FERC committed to examine in the EIS the most likely ways for the sponsoring water districts to develop water supplies apart from a Lake Powell water source, and to consider the comparable water quality and treatment costs of the alternatives.**

## **BLM 463**

Information on and discussion of biological soil crusts is added to several sections as follows:

A new subsection, 5.3.1.1.6.1 Biological Soil Crusts, is added within Section 5.3.1.1.6, Chapter 5, Exhibit E of the License Application as follows:

### **5.3.1.1.6.1 Biological Soil Crusts.**

**Biological soil crusts, also referred to as cryptobiotic, cryptogamic, microbiotic, or cyanobacterial-lichen soil crusts occur along portions of the LPP alignments. The soil crusts consist of lichens, mosses, and algae usually binding a matrix of clay, silt, and sand soil particles together. Biological soil crusts are formed by living organisms and their by-products, creating a surface crust of soil particles bound together by organic materials (USDA 1997). Biological soil crusts occur in the Colorado Plateau and Mojave Desert ecological regions, and they play an important ecological role in the functioning of soil stability and erosion, water infiltration, atmospheric nitrogen fixation, nutrient contributions to plants, soil-plant-water relations, seedling germination, and plant growth (BLM 1999). Biological soil crusts documented along the LPP alignments are generally associated with the presence of gypsum soils, and in some places sandy soils.**

**Gypsum minerals occur in specific rock types and soils derived from gypsum-bearing rocks west of The Cockscomb geological feature. Gypsum rock types and gypsiferous soils are not known to occur east of The Cockscomb. The Kane County soil survey including location of gypsum soils is pending publication for BLM Kanab Field Office-administered land, state land and private land between the GSENM west boundary and Kanab. Soil surveys for areas within administrative boundaries of GSENM, Arizona Strip Field Office, Kaibab-Paiute Indian Reservation, and St. George Field Office are completed and identify gypsiferous soils. Gypsiferous soils consisting of Clayhole, Gypsiorthids and Saido soils identified within Arizona Strip Field Office administrative boundaries correlate 100 percent with delineated microbiotic soil data (BLM 2014).**

A new second paragraph is added to Section 5.3.1.2.2.4 Expandable, Collapsible or Subsiding Soils or Rocks in Chapter 5, Exhibit E of the License Application as follows:

**There are approximately 657 acres of potential biological soil crusts within the Proposed Action rights-of-way, including areas that would be affected by the water conveyance system pipeline, hydroelectric system penstock, hydroelectric system facility sites, reservoir, transmission lines, staging areas, and access roads (Table 5-14A). The Proposed Action would cross through large gypsiferous soil areas with potential biological soil crusts in common with the other action alternatives. Proposed Action impacts on potential biological soil crusts would be long-term and represent approximately 12 percent of the total soils area disturbed by construction activities within LPP rights-of-way. Where actively grazed by livestock, the soil crusts may already be broken and trampled in some areas.**

New second and third paragraphs are added to Section 5.3.1.2.4.4 Expandable, Collapsible or Subsiding Soils or Rocks in Chapter 5, Exhibit E of the License Application, as follows:

**There are approximately 833 acres of potential biological soil crusts within the Existing Highway Alternative Action rights-of-way, including areas that would be affected by the water conveyance system pipeline, hydroelectric system penstock, hydroelectric system facility sites, reservoir, transmission lines, staging areas, and access roads (Table 5-14A). The Proposed Action would cross through large gypsiferous soil areas with potential biological soil crusts in common with the other action alternatives. Proposed Action impacts on potential biological soil crusts would be long-term and represent approximately 17 percent of the total soils area disturbed by construction activities**

**within LPP rights-of-way. Where actively grazed by livestock, the soil crusts may already be broken and trampled in some areas.**

**The Existing Highway Alternative alignment across the Kaibab-Paiute Indian Reservation would be constructed on the north side of Highway 389 and north of the Arizona Department of Transportation (ADOT) right-of-way (ROW). The 150-foot wide LPP construction ROW would be located north of and outside of the ADOT Highway 389 ROW because ADOT does not have authority to grant a utility ROW within their Highway 389 ROW across the Kaibab-Paiute Indian Reservation. Soils that can form biological soil crusts are more prevalent closer to the Vermilion Cliffs, which contain gypsum minerals. Erosional processes occurring along the gypsum-bearing Vermilion Cliffs have deposited gypsum minerals in large areas of down-gradient soils that promote formation of biological soil crusts. Soils containing more than five percent gypsum, including Clayhole and Gypsiorthids, are prevalent along Highway 389 and the Existing Highway Alternative alignment. Therefore, the Existing Highway Alternative construction would disturb significant areas of gypsiferous soils, which potentially form biological soil crusts, north of the Highway 389 ROW.**

Additional Reference:

**BLM. 2014. Proposed Lake Powell Pipeline Right-of-Way AZA-034941, Map showing Microbiotic Soil Crusts, Saline Soils, and Compactible Soils. USDI-Bureau of Land Management, Arizona Strip Field Office. Map created February 25, 2014.**

**Table 5-14A**  
**Construction Impacts on Gypsiferous Soils and Potential Biological Soil Crusts<sup>1</sup> Within**  
**LPP Rights-of-Way<sup>2</sup>**

<b>Administrative Boundary Area<sup>3</sup>/ LPP Right-of-Way Component</b>	<b>Proposed Action (approximate acres)</b>	<b>Existing Highway Alternative (approximate acres)</b>
<b>Kanab Field Office Administrative Boundary Area<sup>3</sup></b>		
Water Conveyance System Pipeline	55	55
Hydroelectric System Penstock	59	59
Hydroelectric System Facility	13	13
Transmission Line	0	0
Access Road	0	0
<b>Subtotal Impact Area (acres)</b>	<b>127</b>	<b>127</b>
<b>Arizona Strip Field Office Administrative Boundary Area<sup>3</sup></b>		
Hydroelectric System Penstock	30	33
Hydroelectric System Facility	0	0
Transmission Line	0	0
Access Road	7	0
<b>Subtotal Impact Area (acres)</b>	<b>37</b>	<b>33</b>
<b>Kaibab-Paiute Indian Reservation Administrative Boundary Area<sup>4</sup></b>		
Hydroelectric System Penstock	0	180
Hydroelectric System Facility	0	0
Transmission Line	0	0
Access Road	0	0
<b>Subtotal Impact Area (acres)</b>	<b>0</b>	<b>180</b>
<b>St. George Field Office Administrative Boundary Area<sup>3</sup></b>		
Hydroelectric System Penstock	173	173
Hydroelectric System Facility	2	2
Transmission Line <sup>5</sup>	55	55
Access Road	2	2
Reservoir	261	261
<b>Subtotal Impact Area (acres)</b>	<b>493</b>	<b>493</b>
<b>TOTAL IMPACT AREA (acres)</b>	<b>657</b>	<b>833</b>

**Notes:**

<sup>1</sup>Gypsiferous soils identified in NRCS-published soil surveys containing  $\geq 5$  percent gypsum and have potential for developing biological soil crusts or are documented to have biological soil crusts (BLM 2014)

<sup>2</sup>LPP Rights-of-Way include construction rights-of-way for pipelines (150 feet wide), penstocks (150 feet wide), hydroelectric system facilities (facility footprint plus 100-foot wide buffer), transmission lines (100 feet wide), access roads (30 feet wide), staging areas (footprint plus 100-foot wide buffer), and reservoirs (reservoir facility footprint plus 100-foot wide buffer)

<sup>3</sup>Administrative boundaries include BLM-administered land, state lands, and private lands where they occur

<sup>4</sup>Administrative boundary includes all land within Kaibab-Paiute Indian Reservation boundary

<sup>5</sup>Includes two temporary construction staging areas with impacts on gypsiferous soils along one transmission line in the St. George Field Office administration boundary area

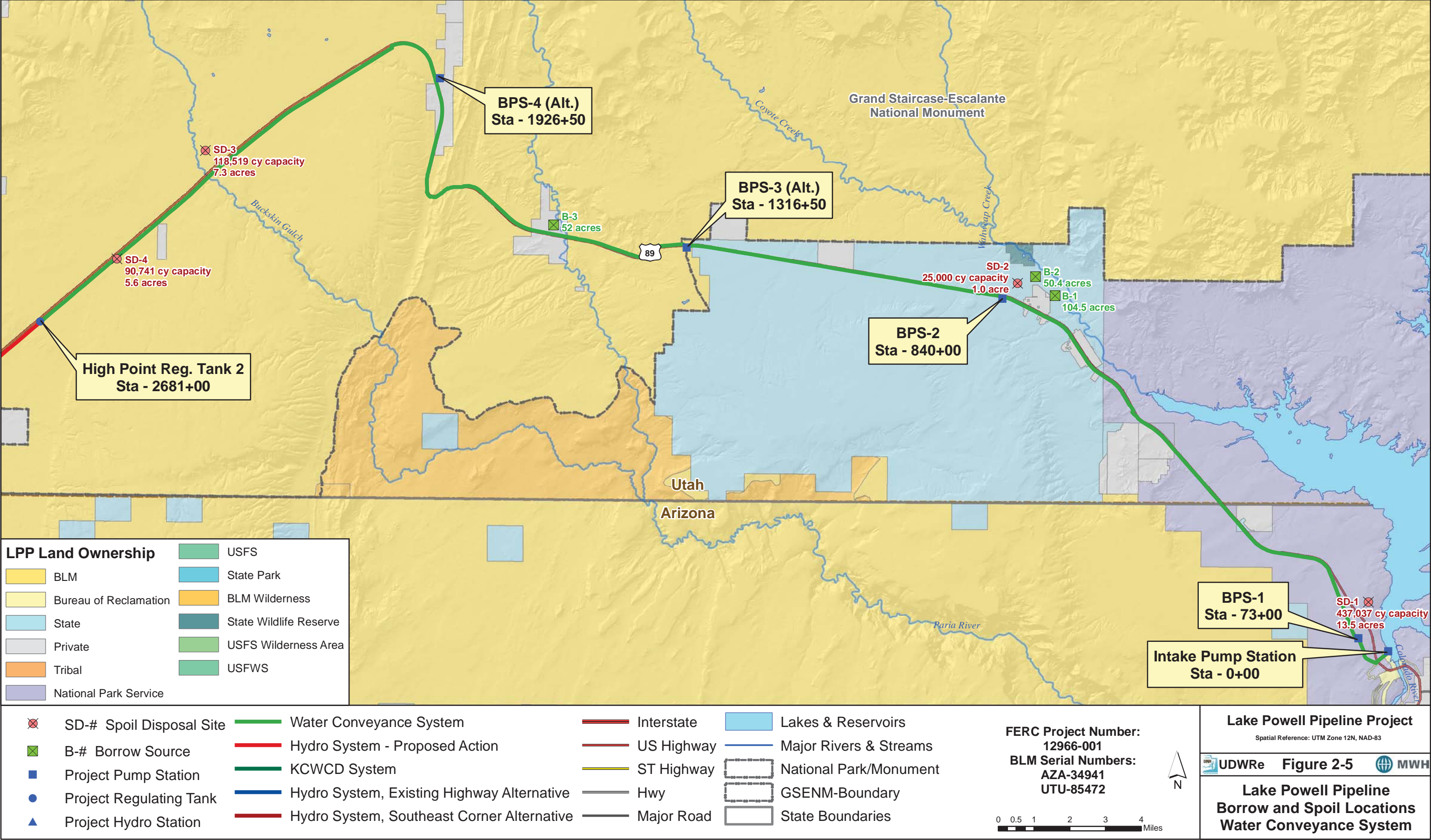


**BLM 522**

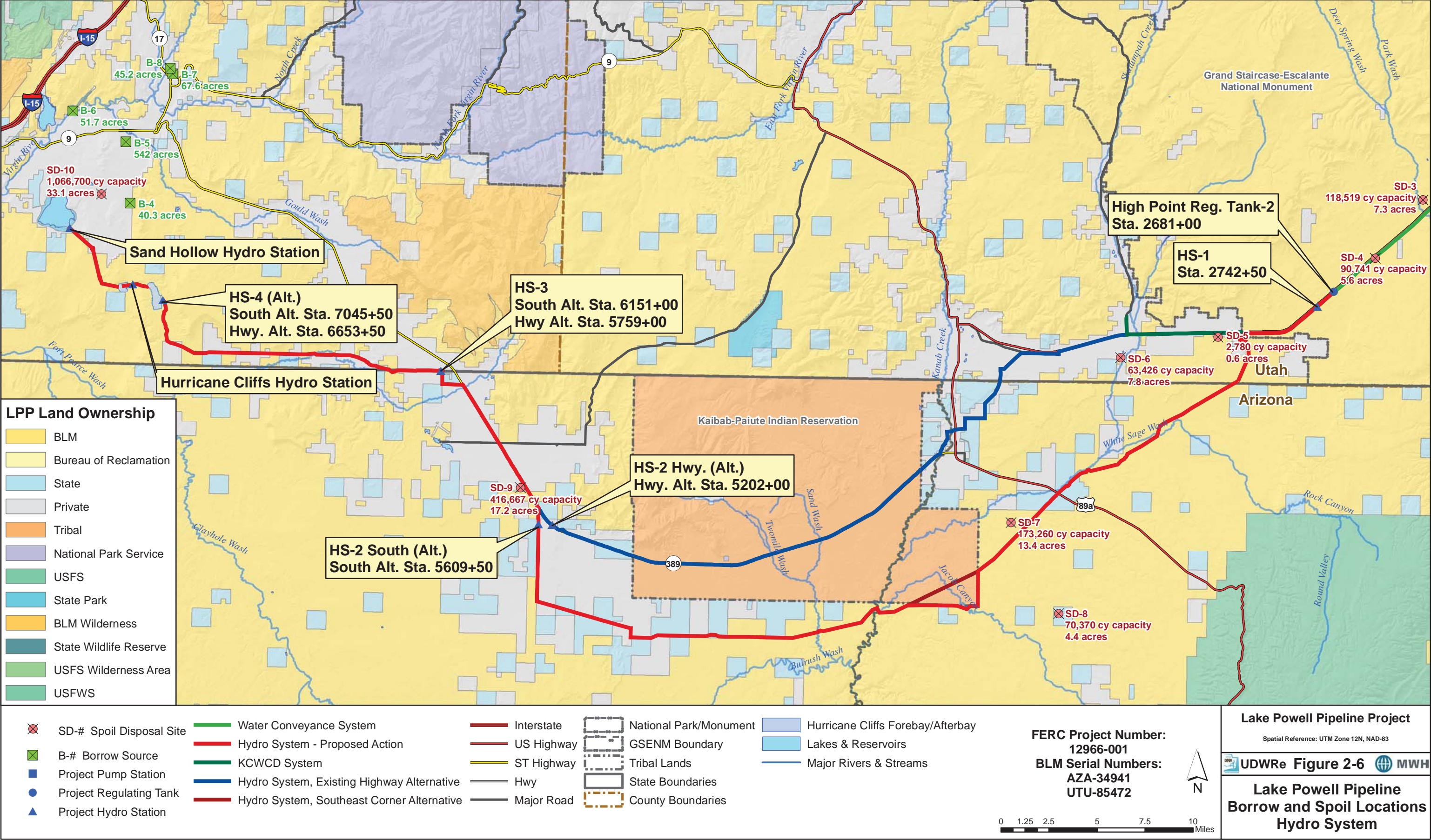
The first paragraph in Section 5.3.1.2.4.7, Chapter 5, Exhibit E of the License Application is revised to read: **The Existing Highway Alternative could have measurable effects on borrow material development for pipeline and penstock bedding. Rock excavated along the alignment and from road cuts that would be suitable for crushing and bedding would meet 42.2 percent of the pipeline and penstock bedding requirements (assuming 75 percent of blasted rock is usable for pipe bedding), and approximately 1,223,300 cubic yards of bedding material would need to be developed from excavated soil along the alignment. If there is insufficient suitable soil for this volume of bedding, the deficit would need to be imported from commercial gravel pits. If the volume of soil suitable for bedding is insufficient to meet the needs of bedding construction, the Existing Highway Alternative would require expanding or developing additional gravel resources by as much as 1.223 million cubic yards to meet construction demands for the LPP pipeline and penstock alignments. If this occurs, the bedding material requirements and the associated land disturbance under the Existing Highway Alternative would be a significant effect on existing commercial gravel pits and currently undisturbed land areas suitable for producing construction bedding materials. Three existing commercial gravel pits (see B-1 and B-3 on attached Figure 2-5, and see B-5 on attached Figure 2-6) would have available rock materials to meet borrow needs for pipeline and penstock bedding. Fifty acres in the three commercial gravel pits would be newly disturbed: 7 acres in pit B-1; 6 acres in gravel pit B-3; and 37 acres in gravel pit B-5.**

The second paragraph in Section 5.3.1.2.4.7 is revised to read: **The volumes of material generated (neat lines excluding expansion) in cubic yards are summarized below:**

• Blastable	732,800
• Rippable	1,655,300
• Mixed Soil over Blastable	452,400 (293,600 soil – 158,800 rock)
• Mixed Soil over Rippable	599,700 (389,200 soil – 210,500 rock)
• Excavatable	2,696,400







## **BLM 668**

The fifth paragraph of Section 5.3.4.2.5, Chapter 5, Exhibit E of the License Application is revised to read: **Therefore, the No Lake Powell Water Alternative may indirectly result in violation of applicable surface water quality standards for temperature and cause substantial degradation of surface water quality for beneficial uses. This would be a significant effect on water quality in the Virgin River.**

The following sections in this comment response contain additional evaluation of No Lake Powell Water Alternative effects on Virgin River flows and temperatures.

### ***Virgin River Flows***

Natural Virgin River mean monthly flows are significantly reduced in the reach downstream from Washington Fields Diversion, especially during June through February (Table 1). Mean monthly flows then successively increase after that reach because of irrigation return flows and non-sewered residential outdoor irrigation return flows (Table 1). UDWR agrees the majority of groundwater recharge into the overall Virgin River basin and discharge to the Virgin River occurs upstream from the St. George metropolitan area. Residential outdoor irrigation non-sewered return flows, however, along with secondary water return flows constitute a significant portion of Virgin River flow during the months of June through February in the reach downstream from the Washington Fields Diversion.

Table 1 Virgin River Daily Simulation Model Flow Results for 2052 with Existing Facilities and Projected Climate Change												
Location on Virgin River	Virgin River Mean Monthly Flows (cfs) for Water Year Months											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Highway 9 Bridge	96	95	116	112	132	235	296	253	103	92	97	103
Washington Fields Diversion	11	9	30	36	46	149	210	167	17	6	11	17
South Mall Drive Bridge	40	46	75	78	100	199	253	201	46	31	36	43
Interstate 15 Bridge	58	68	110	118	149	259	291	231	68	47	52	60
Utah/Arizona State Line	61	76	117	123	154	262	291	231	68	47	52	61
<b>Note:</b> Data is summarized from simulated mean monthly flows from UDWR's Virgin River Daily Simulation Model shown in Table 5-24 in Section 5.3.3.2.2.2, Chapter 5, Exhibit E of the License Application.												

### ***Virgin River Recharge from Non-Sewered Return Flows***

An analysis of Washington County urban area soil depths indicates that 59 percent of the soils within the urban areas comprised by the six St. George metropolitan area cities have shallow soils with depths to bedrock less than 5 feet. The 1977 soil survey indicates all soils within the urban area are classified as well-drained or excessively well-drained, which means water flows through the soils quickly. The bedrock in the Washington County urban areas is characterized in the 1977 soil survey as being relatively flat and gently sloping toward the south. The Virgin River is the low point in the valley and surface water, shallow subsurface water, and discharging groundwater all flow to the river. Therefore, water applied to outdoor landscapes drains quickly through the relatively shallow soils to the bedrock, where it flows vertically and then laterally across the bedrock surface toward the Virgin River.

UDWR reported potable water use for 2010 is 41,875 acre-feet, including 23,542 acre-feet of residential indoor use and commercial, institutional and industrial/stock water purposes. Subtracting the 23,542 acre-feet from the total 41,875 acre-feet yields 18,333 acre-feet of estimated residential outdoor potable water use in 2010. A portion of the commercial, institutional, and industrial/stock water use (4,401 acre-feet) is estimated to also be used for outdoor watering. UDWR hydrologists estimate that 50 percent of the residential outdoor potable water use is consumed through evapotranspiration, surface evaporation, and storage as soil moisture. The remaining 50 percent (9,167 acre-feet) is estimated by UDWR to be non-



sewered return flow to the Virgin River (i.e. shallow subsurface water or “groundwater”). This non-sewered return flow to the Virgin River equals an average of 12.7 cfs continuous flow throughout 2010.

These 50 percent values are consistent with data in the Soil Conservation Service 1977 Soil Survey of Washington County and the Utah Agricultural Experimental Station 2011 Crop and Wetland Consumptive Use and Open Water Surface Evaporation for Utah Final Report. The 2011 Utah Agricultural Experiment Station report estimates evapotranspiration in the St. George area to average 37.9 inches of water per year (3.16 feet per year average for turfgrass). The 2015 residential outdoor watering area in urban Washington County as analyzed using GIS data is estimated at 3,371 acres. Projecting the 2010 estimated residential outdoor water use to 2015 results in 21,466 acre-feet per year, and the total water use in feet (21,466 acre-feet per year/3,371 acre) is 6.37 feet per year. Therefore, the estimated value of residential outdoor water use returning as non-sewered return flow to the Virgin River is 3.21 feet per year (6.37 feet minus 3.16 feet of evapotranspiration), which equals the UDWRe estimate of 50 percent of outdoor water use returning as non-sewered return flow to the Virgin River.

#### ***Effects of No Lake Powell Water Alternative Operation on Virgin River Flows***

UDWRe hydrologists project that by 2050 the 50 percent non-sewered return flow to the Virgin River will be reduced to 30 percent due to a decrease in water applied to outdoor landscapes as water conservation measures are implemented. Projecting the 2010 potable water use to 2052 (when LPP water is estimated to be fully consumed by the projected population) results in projected total potable water use of 130,245 acre-feet per year, including 73,521 acre-feet per year for indoor residential use and commercial, institutional, and industrial/stock water purposes. Using the same computations as used for 2010 and a 30 percent non-sewered return flow rate, the recharge occurring as residential outdoor non-sewered return flow to the Virgin River is projected at 17,017 acre-feet per year, equivalent to 23.5 cfs continuous flow throughout 2052.

Residential outdoor watering in the St. George metropolitan area generally occurs from March through October, and depending on the return flow distance to the Virgin River from application of residential landscape irrigation, a lag time for non-sewered return flows ranging from two to four months is expected to occur. Calculating non-sewered return flows from residential outdoor potable water use to occur from June through February, the 17,017 acre-feet discharged to the Virgin River would be a continuous flow of 35.0 cfs. Approximately 30 percent of the urban St. George metropolitan area that generates non-sewered return flows to the Virgin River occurs upstream from the Washington Fields Diversion; therefore, approximately 24.5 cfs (70 percent of 35.0 cfs) would return to the Virgin River as non-sewered return flow downstream of Washington Fields Diversion from June through February.

Under the No Lake Powell Water Alternative, the non-sewered return flows to the Virgin River would be reduced by eliminating residential outdoor watering. Table 2 demonstrates the potential effect of removing non-sewered return flows to the Virgin River during the June through February period under the No Lake Powell Water Alternative.

**Table 2**  
**Effects of No Lake Powell Water Alternative Operation on Removing Non-Sewered Return Flows by Eliminating Residential Outdoor Irrigation with Potable Water Using Virgin River Daily Simulation Model Flow Results for 2052 with Existing Facilities and Projected Climate Change**

Location on Virgin River	Estimated Virgin River Mean Monthly Flows (cfs) for Water Year Months <sup>1</sup>											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Highway 9 Bridge <sup>2</sup>	85	84	105	101	121	235	296	253	92	81	86	92
Washington Fields Diversion <sup>3</sup>	4	2	23	29	39	149	210	167	10	*3	4	10
South Mall Drive Bridge <sup>4</sup>	21	27	56	59	81	199	253	201	27	12	17	24
Interstate 15 Bridge <sup>5</sup>	33	43	85	93	124	259	291	231	43	22	27	35
Utah/Arizona State Line <sup>6</sup>	36	51	92	98	129	262	291	231	43	22	27	36

**Notes:**

- <sup>1</sup> Assumes effects of No Lake Powell Water Alternative operation occur on non-sewered return flows to Virgin River from June through February
- <sup>2</sup> Assumes 30 percent of 35 cfs non-sewered return flows from residential outdoor potable water use occurs upstream of Washington Fields Diversion
- <sup>3</sup> Virgin River flow would be zero; however, estimated outdoor use of potable water for commercial, institutional and industrial/livestock water purposes of 13,670 acre-feet per year in 2052 would occur at a 30 percent non-sewered return flow rate, resulting in approximately 2 cfs (20 percent of 8.5 cfs) of non-sewered return flow to the Virgin River between La Verkin and the Utah/Arizona state line from June through February
- <sup>4</sup> Assumes 20 percent of 35 cfs non-sewered return flows from residential outdoor potable water use occurs between Washington Fields Diversion and South Mall Drive Bridge
- <sup>5</sup> Assumes 55 percent of 35 cfs non-sewered return flows from residential outdoor potable water use occurs between Washington Fields Diversion and Interstate 15 Bridge
- <sup>6</sup> Assumes 70 percent of 35 cfs non-sewered return flows from residential outdoor potable water use occurs between Washington Fields Diversion and Utah/Arizona State Line

***Effects of No Lake Powell Water Alternative Operation on Virgin River Temperatures***

Water applied to residential outdoor landscapes that discharge as non-sewered return flow is affected by soil temperatures. The Natural Resources Conservation Service (NRCS) classifies the St. George metropolitan area as having thermic soil characteristics, where the mean annual soil temperature is 15°C (59°F) or higher but lower than 22°C (71°F), and the difference between mean summer and mean winter soil temperatures is more than 5°C (41°F) at a depth of approximately 20 inches. The temperature of water delivered from Quail Creek Water Treatment Plant during the outdoor irrigation season (March through October) ranges from 11.1°C (52°F) to 25.9°C (79°F) and is not expected to increase during distribution through underground piping. When the potable water is applied to outdoor landscapes during the outdoor irrigation season, the temperature increases upon contact with vegetation and near surface soil. Outdoor water use that infiltrates into the soil and becomes shallow subsurface water during the high air temperature months (June through September) is cooled by the lower soil temperatures (<22°C, <71°F), especially in soils deeper than 15 to 20 inches.

Virgin River water temperature data at USGS gage 09413500 (Virgin River near St. George, Utah) show a range of 15.5°C (60°F) to 28.7°C (84°F) during the months June through September. The non-sewered return flow of residential outdoor potable water use during these months acts to cool the shallow subsurface water to between 15°C (59°F) and 22°C (71°F). When this water discharges to the Virgin River, it cools the river flow through mixing, especially during periods when the river water temperatures are above 22°C (71°F).

Elimination of residential outdoor watering under the No Lake Powell Water Alternative would reduce the non-sewered return flow to the Virgin River by an estimated 77 to 80 percent, and would increase river water temperatures compared to baseline conditions. The temperature increases would be highest in the reach downstream from the Washington Fields Diversion where the river flow would be <5 cfs in July and August (Table 2). The Virgin River at these extremely low flows would be more vulnerable to heating by direct sunlight and high air temperatures.

The Utah water quality standard for temperature in the Virgin River downstream from Quail Creek Diversion Dam is 20°C (68°F). Under baseline conditions, measured Virgin River water temperatures at the Utah/Arizona state line have been below 20°C (68°F) during 46 percent of the sampling events between October 1969 and June 2017. Water temperature measurements during the same period at the same site have been below 20°C (68°F) 16 percent of the sampling events during the months June through September. The reduced river flows downstream of Washington Fields Diversion under the No Lake Powell Water Alternative could experience increased water temperatures above the Utah water quality standard for temperature during the months of July and August and likely during other months.



#### **BLM 694**

The effects of the No Lake Powell Water Alternative were discussed during the meeting between BLM and UDWRe on March 17, 2017. Based on these discussions we understand that BLM's primary concern is that USGS documents cited in the analysis of changes to urban groundwater recharge appear to contradict the conclusions of the groundwater impact analysis in the environmental report. The impact analysis for the alternative is based on localized recharge of the shallow subsurface soils in the vicinity of the urban irrigation and describes the potential effects of changes to this groundwater resource from the alternative. UDWRe agrees with BLM that these site-specific changes in groundwater conditions are not in total agreement with conditions described in the two USGS reports. We recognize these differences do exist and suggest the cited USGS documents describe groundwater conditions at a different scale than is described in the impact analysis for the alternative as the reason for the differences.

The following sentence is added as the first sentence of Section 5.3.5.2.5, Chapter 5, Exhibit E of the License Application: **The effects of the No Lake Powell Water Alternative presented below are localized, anthropomorphic changes imposed in addition to other natural and man-made conditions described in other reports.**

The Groundwater-Surface Water Interactions paragraph in Section 5.3.5.2.5.1, Chapter 5, Exhibit E of the License Application is revised to read: **The No Lake Powell Water Alternative would lead to an elimination of culinary water use for outdoor landscapes that would then in turn reduce groundwater discharge to surface water (i.e. Virgin River and its tributaries) throughout the urban portion of the St. George metropolitan area. The reduced groundwater discharge to surface waters would result in less groundwater-surface water interactions in the St. George metropolitan area and that could lead to reduced flows in the Virgin River and its tributaries.**

**BLM 718**

The following two paragraphs added to Section 5.3.6.2.2, Chapter 5, Exhibit E of the License Application: **The Proposed Action construction would have no measurable effects on aquatic resources in Kanab Creek, the Virgin River, and Sand Hollow Reservoir. Construction would be performed during one of the periods when Kanab Creek is dry and has no surface flow. The Proposed Action would have no short term effects on aquatic resources in the Virgin River during construction because no construction would be performed in or near the river. Proposed Action construction would terminate at the east shoreline of Sand Hollow Reservoir, more than four miles from the Virgin River. Proposed Action construction would have no measurable effects on aquatic resources in Sand Hollow Reservoir because construction would be performed above the reservoir water surface along the east shoreline, with BMPs and SCPs for sediment control in place to avoid sediment recruitment to the reservoir.**

**The Proposed Action operation would have no measurable effects on aquatic resources in Kanab Creek, the Virgin River, and Sand Hollow Reservoir. Temporary discharges from the penstock into Kanab Creek during some years to drain the adjacent penstock segment would persist less than one week during a period when the creek typically has no flow and no aquatic resources are present. The Proposed Action operation would not directly discharge any LPP water into the Virgin River, and the LPP would have no measurable effect on Virgin River flows throughout the St. George metropolitan area. The Proposed Action flows into Sand Hollow Reservoir during operation would have marginally lower TDS concentrations, similar dissolved oxygen concentrations, and similar water temperatures resulting in no measurable effects on aquatic resources in the reservoir.**

**BLM 721**

Section 5.3.6.2.6 - No Action Alternative, Chapter 5, Exhibit E of the License Application is revised to read:

**The No Action Alternative would not supply water from Lake Powell to Washington County or Kane County. WCWCD's water supply from the Virgin River would be completely used by approximately 2028 and no additional water would be available to meet growing population demands, even with existing water conservation measures. Potable water shortages would occur each year following 2028. Residential outdoor watering and resulting shallow subsurface recharge and then discharge to the Virgin River from non-sewered return flows within the St. George metropolitan area would continue, maintaining riverine aquatic resource habitat conditions.**

**The No Action Alternative would have no effect on aquatic resources in the LPP study area as there would be no federal action requiring a water pipeline crossing of the Paria River and there would be no pipeline water releases to the Paria River which could risk aquatic biota transfer to the river. Existing aquatic resource conditions would continue subject to natural or other anthropogenic influences and factors.**

**The No Lake Powell Water Alternative would not supply water from Lake Powell to Washington County or Kane County, the same as the No Action Alternative. The No Lake Powell Water Alternative constitutes four primary actions:**

- 1) eliminate residential outdoor watering with potable water by repurposing the conserved water for indoor use only**
- 2) maximize treatment of wastewater effluent in an expanded wastewater reuse plant and reverse osmosis treatment for potable water use**
- 3) divert high-TDS Virgin River water at the Washington Fields Diversion and reverse osmosis treatment for potable water use**
- 4) construct an expanded Warner Valley Reservoir to store reuse effluent and diverted Virgin River water with high TDS concentrations prior to reverse osmosis treatment for potable water use**

**These actions would significantly reduce discharge from non-sewered return flows to the Virgin River in the St. George metropolitan area. Reduced discharge would reduce Virgin River streamflow during summer and fall months, reduce Virgin River streamflow downstream from the Washington Fields Diversion, and decrease the weighted usable aquatic resource habitat within the Virgin River flowing through the St. George metropolitan area.**

## **BLM 770**

The requested section re-organization of the aquatic special status species section is provided. All of the following sections, text and tables comprise the re-organized and simplified insert from Section 5.3.7.2 through Section 5.3.7.3, Chapter 5, Exhibit E of the License Application.

### **5.3.7.2 Environmental Effects**

This section analyzes LPP Project effects on federally listed threatened and endangered aquatic species and designated critical habitat, federal sensitive species, and state and local agency aquatic species of concern.

#### **5.3.7.2.1 Effects Determinations and Significance Criteria.**

*NO CHANGE IS PROPOSED FOR THIS SECTION*

#### **5.3.7.2.2 Proposed Action.**

##### ***5.3.7.2.2.1 Threatened, Endangered and Candidate Species.***

#### **Apache Trout**

Apache trout (*Oncorhynchus apache*) is historically and currently distributed in rivers and streams that would not be directly or indirectly affected by Proposed Action or LPP alternative construction or operation. The Verde River and several tributary streams including North Canyon on the Kaibab National Forest are the closest habitat and location of known populations, which extend into southern Coconino County south of the Grand Canyon. The Proposed Action and LPP alternative features would cross through the northern half of Coconino County north of the Grand Canyon. The Proposed Action and LPP alternative construction and operation would have no effect on Apache trout or its habitat. Potential effects of the Proposed Action and LPP alternatives on Apache trout and its habitat are eliminated from further analysis.

#### **Kanab Ambersnail**

Kanab ambersnail (*Oxyloma haydeni kanabensis*) is currently distributed in three known locations, including two springs within the Grand Canyon and at springs near Three Lakes six miles north of Kanab, Utah. The Proposed Action and LPP alternative construction would not occur within ten miles of any known Kanab ambersnail population. Proposed Action and LPP alternative operation would not measurably affect Colorado River flows in the Grand Canyon and would not affect the spring flows at known population locations. The Proposed Action and LPP alternative construction and operation would have no effect on Kanab ambersnail or its habitat. Potential effects of the Proposed Action and LPP alternatives on Kanab ambersnail and its habitat are eliminated from further analysis.

#### **Colorado River Listed Species**

##### ***Construction Effects***

Construction activities in Lake Powell would occur at the Water Intake System approximately 2,100 feet northwest of Glen Canyon Dam on the right bank of the reservoir. These construction activities would include completion of six horizontal borings with a six-foot diameter micro-tunnel boring machine (MTBM) at three elevations within Lake Powell. Each time the MTBM completes a tunnel excavation through the Navajo sandstone bedrock, the MTBM breakthrough would cause approximately 0.5 cubic yard of sandstone rock to fall into Lake Powell. The MTBM would be attached to a cable and hoisted up through the water to a barge for transport to Wahweap Marina and reuse for excavating the next tunnel at the intake site.

The four Colorado River federally listed fish species include bonytail chub (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*). Two of these species (Colorado pikeminnow and razorback sucker) are documented in Lake Powell in the San Juan arm, near the San Juan River confluence with the reservoir. Critical habitat for Colorado pikeminnow, humpback chub, and razorback sucker is designated in the San Juan arm of Lake Powell at Neskahai Canyon, approximately 83 river miles upstream from the LPP water intake site, and extends upstream into the San Juan River. Critical habitat for bonytail chub and humpback chub is designated in the upper Colorado River approximately 139 river miles upstream from the LPP water intake site, and extends upstream in the Colorado River. The minimum distance of at least 83 miles from the water intake site to documented occurrence of these species in Lake Powell supports the conclusion that LPP construction activities would have no effect on the listed species. The minimum distance of at least 83 miles from the water intake site to their critical habitat supports the conclusion that LPP construction activities would have no effect on the designated critical habitats.

Downstream releases from Lake Powell through Glen Canyon Dam to the Colorado River in Glen Canyon would occur during the LPP water intake construction. The MTBM breakthrough from the Navajo sandstone bedrock tunnel excavations into the reservoir would not result in measurable turbidity or other water quality effects in the Colorado River downstream of Glen Canyon Dam. There would be no effect on the Colorado River federally listed fish species or their designated critical habitat downstream from Glen Canyon Dam.

The reach of the lower Paria River which maintains perennial stream flow without interruption and contains suitable habitat for federally listed aquatic species is located miles downstream from Highway 89 where the Proposed Action and alternative alignments would cross the river. The federally listed aquatic species known to inhabit the lower Paria River is razorback sucker (*Xyrauchen texanus*). The Paria River is listed as a perennial stream by the U.S. Geological Survey (USGS), however, the USGS streamflow records for the Paria River at Highway 89 demonstrate the river has sustained periods during the summer months when there is no flow. The only potential effect of the temporary construction on the Paria River would be changes in water quality that could affect fish and habitat in downstream reaches. Construction of the pipeline crossing of the Paria River at Highway 89 would be performed during the summer period when there is no flow or low flow to avoid effects on surface water quality (turbidity and sediment transport). If the Paria River has low flows during the temporary construction of the pipeline crossing, then a temporary cofferdam would be constructed to divert the flow to another part of the 340-foot wide river bottom to avoid active construction in the flowing portion of the river. The Paria River channel bed and banks would be restored to original conditions following the temporary construction activities. Construction of transmission lines across the lower Paria River would have no effect on razorback chub or its designated critical habitat. The LPP construction would have no effect on razorback chub or its critical habitat in the lower Paria River. More detailed stream flow information, data and analyses are provided in the final Surface Water Resources Study Report (UBWR 2016a). More detailed water quality information, data and analyses are provided in the final Surface Water Quality Study Report (UDWRe 2016b)

### ***Operations and Maintenance Effects***

The proposed LPP diversions and depletion from Lake Powell could potentially affect federally listed aquatic resource species and critical habitats in the Colorado River downstream from Glen Canyon Dam. The federally listed species with critical habitat downstream of Glen Canyon Dam include bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker. Measurable changes in Glen Canyon Dam releases and water quality could affect these listed species and their designated critical habitat.

UDWRe contracted with the Department of the Interior's designated expert agency, the Bureau of Reclamation (Reclamation) to simulate the potential effects of the LPP diversions and depletion from

Lake Powell on reservoir levels, Glen Canyon Dam releases, and water quality in Lake Powell and in releases from Glen Canyon Dam. Reclamation performed multiple hydrologic modeling runs using their long-term planning model, CRSS. The results of these model runs were provided to UDWR for use in its planning studies for the LPP to determine potential effects on the hydrology of the Colorado River system. Reclamation also provided water quality modeling results to UDWR for use in its planning studies for the LPP to determine potential effects on water quality of the Colorado River system. The results of hydrologic and water quality modeling runs are summarized in Section 5.3.3 and Section 5.3.4 of this Chapter 5, Exhibit E of the License Application.

**Summary of Potential Hydrologic Effects - Lake Powell Elevations.** The LPP operations effects on Lake Powell elevations under DNF inflow hydrology at the 90<sup>th</sup>, 50<sup>th</sup> and 10<sup>th</sup> percentile probabilities would be within the normal operation fluctuations of the reservoir. There would be no measurable effects on the federally listed Colorado River fishes or their designated critical habitat upstream of the LPP water intake site. The LPP operations effects on Lake Powell elevations under CC inflow hydrology at the 90<sup>th</sup> and 50<sup>th</sup> percentile probabilities would be within the normal operation fluctuations of the reservoir. There would be no measurable effects on the federally listed Colorado River fishes or their designated critical habitat upstream of the LPP water intake site. The LPP operations effects on Lake Powell elevations under CC inflow hydrology at the 10<sup>th</sup> percentile probability would be substantially below the minimum power pool elevation because of the effect of CC inflow hydrology, and these conditions would affect designated critical habitat for the federally listed Colorado River fish in the San Juan arm of Lake Powell and at the confluence of the Dirty Devil River with the Colorado River.

**Summary of Potential Hydrologic Effects - Glen Canyon Dam Releases.** Flow release differences under DNF inflow hydrology would be within normal operation release fluctuations and there would be no measurable flow effects on the federally listed Colorado River fishes or their designated critical habitat downstream from Glen Canyon Dam. Flow release differences under CC inflow hydrology between the Proposed Action and No Action alternative would be within normal operation release fluctuations and there would be no measurable flow effects on the federally listed Colorado River fishes or their designated critical habitat downstream from Glen Canyon Dam.

**Summary of Potential Water Quality Effects – Lake Powell and Glen Canyon Dam Releases. -** Reclamation water quality modeling of Lake Powell and Glen Canyon Dam releases demonstrate that the water quality effects of the Proposed Action and LPP alternatives would not be measurable, especially within the variation of conditions resulting from Glen Canyon Dam water releases. Reclamation water quality modeling results indicate that the Proposed Action and LPP alternatives would not measurably or adversely affect water quality in the Colorado River downstream from Glen Canyon Dam. The Proposed Action and LPP alternatives would have no effect on the four listed fish species in the Colorado River and would have no effect on their critical habitat. The potential water quality effects of the Proposed Action and LPP alternatives on the listed aquatic species and their critical habitat in the Colorado River are eliminated from further analysis.

**Interbasin Transfer of LPP Water to Tributaries.** Interbasin transfer of LPP water from Lake Powell to tributaries such as the Paria River with downstream federally listed species and designated critical habitat could occur through a pipeline and could result in transfer of undesirable and invasive aquatic organisms from the upper Colorado River basin to the Paria River basin. However, no LPP water would be discharged into the Paria River or any of its tributary streams as part of regular operation. All of the LPP water conveyed through the pipeline would flow into Sand Hollow Reservoir for the specific purpose of providing municipal and industrial (M&I) raw water supply for treatment in a water treatment facility and distribution as culinary water. The LPP would be designed to avoid transfer of aquatic organisms from Lake Powell to tributaries crossed by the pipeline. The intake water would be dosed with an EPA-approved molluscicide in the intake tunnels and passed through 25-micron filters in the intake pump

station (or other approved action would be taken) to remove undesirable and invasive aquatic organisms from the diverted water. Inspection and maintenance shutdowns of the LPP during two weeks in January each year could result in temporary release of LPP water to the Paria River through a manual drain valve at the Highway 89 crossing. This temporary water release to the Paria River could occur at 5 cfs for 4.5 days during winter periods with historical river flows at the Highway 89 gage ranging from 20 to 260 cfs and would not result in measurable flow changes in the lower Paria River where razorback sucker and designated critical habitat occur. There would be no measurable effects on razorback sucker or designated critical habitat in the lower Paria River from LPP operation and maintenance resulting from potential interbasin transfer of water, and no effects from invasive aquatic species resulting from pipeline drainage release of LPP water in the Paria River.

**Paria River Effects.** The LPP would not deliver or discharge any water to the Paria River under daily operations. Inspection and maintenance shutdowns of the LPP during two weeks in January each year could result in temporary release of LPP water to the Paria River through a manual drain valve at the Highway 89 crossing. This temporary water release to the Paria River could occur at 5 cfs for 4.5 days during winter periods with historical river flows at the Highway 89 gage ranging from 20 to 260 cfs and would not result in measurable flow changes in the lower Paria River where razorback sucker and designated critical habitat occur. There would be no measurable effects on razorback sucker or designated critical habitat in the lower Paria River from LPP operation and maintenance temporary drainage water releases from the pipeline.

### ***Effects Summary***

LPP construction would have no measurable effects on documented occurrence of federally listed fish species or their designated critical habitat at a minimum of 83 river miles upstream of the water intake site. LPP construction would have no measurable effects on documented occurrence of federally listed fish species or their designated critical habitat downstream of Glen Canyon Dam. LPP operation and maintenance would have no measurable effects on documented occurrence of federally listed fish species or their designated critical habitat at a minimum of 83 river miles upstream of the water intake site. LPP operation and maintenance would have no measurable effects on documented occurrence of federally listed fish species or their designated critical habitat downstream of Glen Canyon Dam. LPP operation and maintenance would have no measurable effects on razorback sucker or its designated critical habitat in the lower Paria River.

### **Virgin River Listed Species**

#### ***Construction Effects***

LPP construction would have no effect Virgin River listed species including Virgin River chub (*Gila seminuda* (=robusta)) and woundfin (*Plagopterus argentissimus*) or their designated critical habitat because the construction activities would terminate at the east edge of Sand Hollow Reservoir with construction of the Sand Hollow Hydro Station. The LPP construction activities at Sand Hollow Reservoir would be more than four miles east of the Virgin River.

#### ***Operations and Maintenance Effects***

Critical habitat for Virgin River chub (*Gila seminuda* (=robusta)) and woundfin (*Plagopterus argentissimus*) in the Virgin River would not be directly or indirectly affected by the LPP operation. LPP operation would supply raw water to Sand Hollow Reservoir for conveyance to and treatment in the Quail Creek Water Treatment Plant before distribution throughout the WCWCD service area. Following use in homes, businesses and institutions, the wastewater would be treated in wastewater treatment facilities and then further treated in the wastewater reclamation facility for reuse as secondary irrigation water. This water would be stored in existing and approved reservoirs in the St. George metropolitan area and used for outdoor watering. UDWR has modeled the Virgin River using the Virgin River Daily Simulation Model (VRDSM) for future scenarios involving no LPP water and with LPP water to determine the



potential for return flows to the Virgin River that could potentially affect designated critical habitat and riparian areas. The VRDSM results indicate that LPP return flows to the Virgin River would be within the measurement accuracy of the USGS gages on the Virgin River and changes in river flows would not be measurable. The VRDSM model results demonstrate no measurable changes (increases or decreases) in streamflows from the USGS gage at Virgin to the USGS gage near the Utah-Arizona state line by comparison of base case (full utilization of Virgin River water rights with current facilities) and LPP water deliveries to Sand Hollow Reservoir. Flow duration curves at key simulation nodes in the Virgin River compared between the future without the LPP and future with the LPP are statistically identical, indicating there would be no measurable difference in return flows to the river (see Section 5.3.3.2.2.2 in this chapter). The LPP operation would have no effect on Virgin River chub or woundfin and would have no effect on critical habitat for Virgin River chub and woundfin. A detailed description and analysis of the VRDSM model results is included in the final Surface Water Resources Study Report (UDWRe 2016a).

### ***Effects Summary***

LPP construction would have no direct or indirect effects on federally listed fish species or their critical habitat in the Virgin River. LPP operation would have no direct effects on federally listed fish species or their critical habitat in the Virgin River. LPP operation would not have any measurable indirect effects on federally listed fish species or their critical habitat in the Virgin River.

### ***5.3.7.2.2.2 Sensitive Species and Species of Concern.***

#### **Paria River Fishes**

##### ***Construction Effects***

The reach of the lower Paria River which maintains perennial stream flow without interruption and contains suitable habitat for aquatic sensitive species and aquatic species of concern is located miles downstream from Highway 89 where the Proposed Action and alternative alignments would cross the river. The sensitive and aquatic species of concern known to inhabit the lower Paria River include flannemouth sucker (*Catostomus latipinnis*), bluehead sucker (*Catostomus discobolus*) and speckled dace (*Rhinichthys osculus reliquus*). The Paria River is listed as a perennial stream by the U.S. Geological Survey (USGS), however, the USGS streamflow records for the Paria River at Highway 89 demonstrate the river has sustained periods during the summer months when there is no flow. The only potential effect of the temporary construction on the Paria River would be changes in water quality that could affect fish and habitat in downstream reaches. Construction of the pipeline crossing of the Paria River at Highway 89 would be performed during the summer period when there is no flow or low flow to avoid effects on surface water quality (turbidity and sediment transport). If the Paria River has low flows during the temporary construction of the pipeline crossing, then a temporary cofferdam would be constructed to divert the flow to another part of the 340-foot wide river bottom to avoid active construction in the flowing portion of the river. The Paria River channel bed and banks would be restored to original conditions following the temporary construction activities. Construction of transmission lines across the lower Paria River would have no effect on flannemouth sucker, bluehead sucker or speckled dace. The transmission lines would span across the Paria River canyon from towers constructed more than 200 feet from the canyon edge. The LPP construction would have no effect on flannemouth sucker, bluehead sucker and speckled dace or their habitat in the lower Paria River. More detailed stream flow information, data and analyses are provided in the final Surface Water Resources Study Report (UBWR 2016a). More detailed water quality information, data and analyses are provided in the final Surface Water Quality Study Report (UDWRe 2016b).

##### ***Operations and Maintenance Effects***

The LPP would not deliver or discharge any water to the Paria River under daily operations. Inspection and maintenance shutdowns of the LPP during two weeks in January each year could result in temporary release of LPP water to the Paria River through a manual drain valve at the Highway 89 crossing. This

temporary water release to the Paria River could occur at 5 cfs for 4.5 days during winter periods with historical river flows at the Highway 89 gage ranging from 20 to 260 cfs and would not result in measurable flow changes in the lower Paria River where sensitive and aquatic species of concern including flannelmouth sucker, bluehead sucker and speckled dace occur. There would be no measurable effects on flannelmouth sucker, bluehead sucker and speckled dace or their habitat in the lower Paria River from LPP operation and maintenance temporary drainage water releases from the pipeline.

### ***Effects Summary***

LPP construction would have no measurable effect on aquatic sensitive species and aquatic species of concern or their habitat in the lower Paria River. LPP operation and maintenance would have no measurable effects on aquatic sensitive species and aquatic species of concern or their habitat in the lower Paria River.

### **Virgin River Fishes**

#### ***Construction Effects***

LPP construction would have no effect Virgin River aquatic sensitive species and aquatic species of concern including desert sucker (*Castastomus clarkia*) and Virgin spinedace (*Lepidomeda mollispinus*) or their crucial habitat because the construction activities would terminate at the east edge of Sand Hollow Reservoir with construction of the Sand Hollow Hydro Station. The LPP construction activities at Sand Hollow Reservoir would be more than four miles east of the Virgin River.

#### ***Operations and Maintenance Effects***

Crucial habitat for desert sucker (*Castastomus clarkia*) and Virgin spinedace (*Lepidomeda mollispinus*) in the Virgin River would not be directly or indirectly affected by the LPP operation. LPP operation would supply raw water to Sand Hollow Reservoir for treatment in the Quail Creek Water Treatment Plant before distribution throughout the WCWCD service area. Following use in homes, businesses and institutions, the wastewater would be treated in wastewater treatment facilities and then further treated in the wastewater reclamation facility for reuse as secondary irrigation water. This water would be stored in existing and approved reservoirs in the St. George metropolitan area and used for outdoor watering. The UDWRe has modeled the Virgin River using the Virgin River Daily Simulation Model (VRDSM) for future scenarios involving no LPP water and with LPP water to determine the potential for return flows to the Virgin River that could potentially affect designated critical habitat and riparian areas. The VRDSM results indicate that LPP return flows to the Virgin River would be within the measurement accuracy of the USGS gages on the Virgin River and changes in river flows would not be measurable. The VRDSM model results demonstrate no measurable changes (increases or decreases) in streamflows from the USGS gage at Virgin to the USGS gage near the Utah-Arizona state line by comparison of base case (full utilization of Virgin River water rights with current facilities) and LPP water deliveries to Sand Hollow Reservoir. Flow duration curves at key simulation nodes in the Virgin River compared between the future without the LPP and future with the LPP are statistically identical, indicating there would be no measurable difference in return flows to the river (see Section 5.3.3.2.2.2 in this chapter). The LPP operation would have no effect on crucial habitat for desert sucker and Virgin spinedace. A detailed description and analysis of the VRDSM model results is included in the final Surface Water Resources Study Report (UDWRe 2016a).

### ***Effects Summary***

LPP construction would have no effects on aquatic sensitive species and aquatic species of concern or their crucial habitat in the Virgin River. LPP operation would have no direct effects on aquatic sensitive species and aquatic species of concern or their crucial habitat in the Virgin River. LPP operation would not have any measurable indirect effects on aquatic sensitive species and aquatic species of concern or their crucial habitat in the Virgin River.

### **5.3.7.2.3 Existing Highway Alternative.**

#### ***5.3.7.2.3.1 Threatened, Endangered and Candidate Species.***

The Existing Highway Alternative would have the same construction and operation and maintenance effects on federally listed threatened, endangered and candidate species as described for the Proposed Action in Section 5.3.7.3.2.1.

#### ***5.3.7.2.3.2 Sensitive Species and Species of Special Concern.***

The Existing Highway Alternative would have the same construction and operation and maintenance effects on aquatic sensitive species and aquatic species of concern as described for the Proposed Action in Section 5.3.7.3.2.2.

### **5.3.7.2.4 Southeast Corner Alternative.**

#### ***5.3.7.2.4.1 Threatened, Endangered and Candidate Species.***

The Southeast Corner Alternative would have the same construction and operation and maintenance effects on federally listed threatened, endangered and candidate species as described for the Proposed Action in Section 5.3.7.3.2.1.

#### ***5.3.7.2.4.2 Sensitive Species and Species of Special Concern.***

The Southeast Corner Alternative would have the same construction and operation and maintenance effects on aquatic sensitive species and aquatic species of concern as described for the Proposed Action in Section 5.3.7.3.2.2.

### **5.3.7.2.5 No Lake Powell Water Alternative.**

#### ***5.3.7.2.5.1 Threatened, Endangered and Candidate Species.***

The No Lake Powell Water Alternative construction could have direct effects on Virgin River chub (*Gila seminuda* (=robusta)) and woundfin (*Plagopterus argentissimus*) and their designated critical habitat in the Virgin River from pipeline crossings and upgrade of the Washington Fields diversion.

The No Lake Powell Water Alternative operation could have significant indirect effects on Virgin River chub and woundfin *and their designated critical habitat* in the Virgin River from reduced non-sewered return flows resulting from eliminating residential outdoor irrigation.

Virgin River chub in the Virgin River from Hurricane, Utah to the Utah-Arizona state line could be adversely affected by reduced streamflows, increased stream temperatures, and changes in food supply resulting from eliminating residential outdoor irrigation. Virgin River streamflows in the St. George metropolitan area would be reduced during the summer and fall months because of the reduced groundwater recharge from eliminating residential outdoor irrigation. Critical habitat for the Virgin River chub could be adversely affected by reduced streamflows and a diminished riparian corridor along both sides of the river. These effects could adversely affect Virgin River chub and its designated critical habitat.

Woundfin in the Virgin River from Hurricane, Utah to the Utah-Arizona state line could be adversely affected by reduced streamflows, increased stream temperatures, and changes in food supply resulting from eliminating residential outdoor irrigation. Virgin River streamflows in the St. George metropolitan area would be reduced during the summer and fall months because of the reduced groundwater recharge from eliminating residential outdoor irrigation. Critical habitat for woundfin could be adversely affected by reduced streamflows and a diminished riparian corridor along both sides of the river. These effects could adversely affect woundfin and its designated critical habitat.

#### **5.3.7.2.5.2 Sensitive Species and Species of Special Concern.**

The No Lake Powell Water Alternative construction could have direct effects on desert sucker (*Catostomus clarkii*) and Virgin spinedace (*Lepidomeda mollispinus*) and their crucial habitat in the Virgin River from pipeline crossings and upgrade of the Washington Fields diversion.

The No Lake Powell Water Alternative operation could have significant indirect effects on desert sucker and Virgin spinedace and their crucial habitat in the Virgin River from reduced non-sewered return flows resulting from eliminating residential outdoor irrigation.

Desert sucker in the Virgin River from Hurricane, Utah to the Utah-Arizona state line could be adversely affected by reduced streamflows, increased stream temperatures, and changes in food supply resulting from eliminating residential outdoor irrigation. Virgin River streamflows in the St. George metropolitan area would be reduced during the summer and fall months because of the reduced groundwater recharge from eliminating residential outdoor irrigation. Crucial habitat for desert sucker could be adversely affected by reduced streamflows and a diminished riparian corridor along both sides of the river. These effects could adversely affect desert sucker and its crucial habitat.

Virgin spinedace in La Verkin Creek and the Virgin River from Hurricane, Utah to the Utah-Arizona state line could be adversely affected by reduced streamflows, increased stream temperatures, and changes in food supply resulting from eliminating residential outdoor irrigation. Virgin River streamflows in the St. George metropolitan area would be reduced during the summer and fall months because of the reduced groundwater recharge from eliminating residential outdoor irrigation. Crucial habitat for Virgin spinedace could be adversely affected by reduced streamflows and a diminished riparian corridor along both sides of the river. These effects could adversely affect Virgin spinedace and its crucial habitat.

#### **5.3.7.2.6 No Action Alternative.**

The No Action Alternative would have no effects on the Colorado River federally listed species or their designated critical habitats. The No Action Alternative would have no effects on razorback sucker and its designated critical habitat in the lower Paria River. The No Action Alternative would have no effects on aquatic sensitive species or aquatic special status species or their habitats in the lower Paria River. The No Action Alternative would have no effects on Virgin River chub and woundfin or their designated critical habitat. The No Action Alternative would have no effects on desert sucker and Virgin spinedace or their crucial habitat in the Virgin River corridor.

### **5.3.7.3 Protection, Mitigation and Enhancement Measures**

#### **5.3.7.3.1 Proposed Action.**

The Proposed Action construction and operation would have no measurable effect on listed aquatic species or their designated critical habitat in the Colorado River, Paria River and Virgin River. No conservation measures for protection of these species and designated critical habitat have been identified. The Proposed Action construction and operation would have no measurable effects on sensitive aquatic species or their crucial habitat. No protection, mitigation or enhancement measures have been identified.

#### **5.3.7.3.2 Existing Highway Alternative.**

The Existing Highway Alternative construction and operation would have no measurable effect on listed aquatic species or their designated critical habitat in the Colorado River, Paria River and Virgin River. No conservation measures for protection of these species and designated critical habitat have been identified. The Existing Highway construction and operation would have no measurable effects on sensitive aquatic

species or their crucial habitat. No protection, mitigation or enhancement measures for protection of these species or their crucial habitat have been identified.

#### **5.3.7.3.3 Southeast Corner Alternative.**

The Southeast Corner Alternative construction and operation would have no measurable effect on listed aquatic species or their designated critical habitat in the Colorado River, Paria River and Virgin River. No conservation measures for protection of these species and designated critical habitat have been identified. The Southeast Corner construction and operation would have no measurable effects on sensitive aquatic species or their crucial habitat. No protection, mitigation or enhancement measures for protection of these species or crucial habitat have been identified.

#### **5.3.7.3.4 No Lake Powell Water Alternative.**

There are no conservation measures that would mitigate the potential significant, long-term, adverse indirect effects of the No Lake Powell Water Alternative on Virgin River chub and woundfin. Populations of these listed species could decrease in size and health within the Virgin River in the St. George metropolitan area. There are no mitigation measures to avoid, minimize or reduce the significant, permanent, adverse indirect effects of the No Lake Powell Water Alternative on desert sucker and Virgin spinedace. Populations of these species of concern could decrease in size and health within the Virgin River and its tributary streams in the St. George metropolitan area.

#### **5.3.7.3.5 No Action Alternative.**

No protection, mitigation, or enhancement measures would be implemented with the No Action Alternative.

Revised Responses to  
National Park Service Comments  
On the Lake Powell Pipeline  
Final License Application Documents  
January 17, 2019

## **Introduction and Overview**

The Utah Board of Water Resources (UBWR) appreciates the participation of the National Park Service (NPS) in the Lake Powell Pipeline (LPP) (FERC Project No. 12966) Integrated Licensing Process (ILP). UBWR is committed to working with the NPS in fulfilling its statutory obligations in this licensing proceeding. In late 2016, UBWR received comments from the NPS on the Final License Application (FLA) submittal. Comment responses were filed with the Federal Energy Regulatory Commission (FERC) on March 31, 2017. Subsequent discussions were held through 2017 and 2018 with the NPS regarding remaining questions related to the original comments. This table and accompanying document provide updated responses as developed in coordination with the NPS. Responses with bold text represent actual revisions made to the License Application filed with FERC.



Comment # Label	NPS Original Commenter	Original NPS Comment	UDWRe March 31, 2017 Response	Additional NPS Comment	Additional NPS Comment Reviewer	UDWRe Updated Response
NPSCmt1	ELJ - NPS Glen Canyon National Recreation Area	<p>"The National Park Service +C2:F62has completed its review of the Environmental Analysis accompanying the Preliminary Licensing Proposal for the Lake Powell Pipeline, FERC Project No. P-12966. We appreciate having the opportunity to provide you with our thoughts and comments about how this project may affect units of the National Park System. Please see our attached comments located in Appendix A.</p> <p>Preliminary issues of concern include:</p> <ul style="list-style-type: none"> <li>•Adequacy of water modeling regarding Glen Canyon National Recreation Area, Lake Powell levels and associated resource effects</li> <li>• Insufficient information provided regarding Aquatic Invasive Species (AIS) due to missing appendix</li> <li>• Efficacy of the AIS treatment protocols and the possibility of AIS introduction into other water bodies</li> <li>• Adequacy of noise and night sky analysis</li> <li>• Potential effects to Zion from Lake Powell Pipeline-related growth</li> <li>• Adequacy of information regarding effects to cultural resources, and impacts to the Old Spanish Trail"</li> </ul> <p>NPS Comment Disposition The UDWR response contains the following contradictions and inaccuracies:</p> <p>1) Contradiction: The UDWR response states that National Parks will not be directly impacted; however, the following sentence states that GLCA will be impacted by short-term noise. If GLCA is impacted by short-term noise, then this is a direct effect to a National Park Service unit.</p> <p>2) The intake and pumping station operations, if operating at the noise levels indicated in the PLP, will be heard within the GLCA; this, in addition to the short-term noise will also have a direct impact on the National Park Service unit.</p> <p>3) GSENM should not be included in this UDWR response to the NPS as GSENM is not a unit of the NPS. The NPS requests that UDWR revise their comment response and the corresponding text in the PLP to address the above points.</p>	<p>We are responding below to each numbered comment shown under the NPS comment disposition.</p> <p>1) NPS is correct that the GLCA would be directly affected by short-term construction noise of the pipeline, pump station construction, and transmission line construction. Noise abatement measures would be implemented to control construction equipment noise at the source (mufflers, etc.) to minimize short-term noise effects on GLCA.</p> <p>2) The noise from the operation of the intake pumping station and BPS-1 will be heard in limited portions of the GLCA and the level of noise and potential impacts is revised in the License Application and explained as follows. LPP operation would involve pumping water with electric-motor driven pumps at the Water Intake Pump Station (IPS) and Booster Pump Station One (BPS-1). Additional baffling materials would be installed within the interior walls of the IPS to control the noise levels at the IPS boundary fence to 45 dBA or lower. Additional baffling materials would be installed within the interior walls of the BPS-1 to control the noise levels at the BPS-1 boundary fence to 45 dBA or lower. The 45 dBA noise level at these LPP pump station boundary fences is consistent with research regarding chronic noise effects from industrial sources on wildlife cited in the literature review in Biol. Rev. (2016), 91:982-1005 "A synthesis of two decades of research documenting the effects of noise on wildlife" by Shannon, et al. and specifically by Blickley, et al. (2012) in Conservation Biology 26(3):461-471 "Experimental Evidence for the Effects of Chronic Anthropogenic Noise on Abundance of Greater Sage-Grouse at Leks." The long-term effects of 45 dBA noise levels at the fenced boundaries of IPS and BPS-1 on wildlife would be negligible, and minor long-term effects would occur on GLCA sound levels. Figure 5-213a shows the operating noise contours around IPS and BPS-1.</p> <p>Sections 5.3.18.1 and 5.3.18.2, Chapter 5, Exhibit E of the License Application addressing the noise affected environment and environmental effects analyses are updated with this information. The first paragraph in Section 5.3.18.1.4, Chapter 5, Exhibit E of the License Application is revised to read: <b>The mechanical equipment within each facility would be housed in noise attenuating buildings. Noise levels from IPS and BPS-1 on NPS-administered land operating within sound attenuating enclosures would not be greater than 45 dBA outside the perimeter fencing. Figure 5-213a (see attached PDF file to NPS Comment No. 1) shows the operating noise contours around IPS and BPS-1. Noise levels from facilities not on NPS-administered land (pump stations BPS-2, BPS-3 (Alt.) and BPS-4 (Alt.) and all hydro stations) operating within sound attenuating enclosures would not be greater than 60 dBA outside the perimeter fencing. 3) Potential noise effects on GLCA-administered land are analyzed separately from noise effects on GSENM-administered land.</b></p> <p>The pump stations would include design input by a qualified noise control engineer, along with noise measurements conducted jointly by a qualified acoustical engineer and NPS staff, during initial pump station construction and testing, to make sure that low frequency tones and other potentially unreasonable noises are not audible on the lake or other visitor sites surrounding the pump station enclosures.</p> <p>UDWRe understands GSENM is not a unit of NPS.</p>	<p>Thank you. We appreciate the change in IPS and BPS-1 maximum fenceline noise level to 45 dBA in order to minimize potential for chronic noise effects on wildlife, as well as long-term effects to GLCA sound levels. In part because A-weighted noise levels discount low frequency contributions, we respectfully suggest additional measures to ensure pump station noise is not problematic and unreasonable. We suggest pump station design by a qualified noise control engineer, along with noise measurements conducted jointly by a qualified acoustical engineer and NPS staff, during initial pump station construction and testing, to ensure that low frequency tones and other potentially unreasonable noises are not audible on the lake or other visitor sites surrounding the pump station enclosures. Applicable standards may include 36 CFR 2.12 (a)(1)(ii) unreasonable noise criteria, ANSI/ASA S12.9-2016/Part 7, and others to be determined. If a qualified acoustical engineer or NPS staff identify unreasonable noise during construction, additional noise mitigation treatments should be added to prevent noise impacts on park visitors.</p>	E. Janicki	<p>The final paragraph of the UDWRe March 31, 2017 Response is revised as follows:</p> <p>The pump stations would include design input by a qualified noise control engineer, along with noise measurements conducted jointly by a qualified acoustical engineer and NPS staff, during initial pump station construction and testing, to make sure that low frequency tones and other potentially unreasonable noises are not audible on the lake or other visitor sites surrounding the pump station enclosures. Applicable standards may include 36 CFR 2.12 (a)(1)(ii) unreasonable noise criteria, ANSI/ASA S12.9-2016/Part 7, and others to be determined by NPS and UDWRe. If NPS acoustical engineering staff identify unreasonable noise during construction, UDWRe will discuss with NPS additional noise treatments that may be added to prevent noise impacts on park visitors.</p>
NPSCmt8	ELJ - NPS Glen Canyon National Recreation Area	The text states that the first pipeline segment as being buried "in a former road alignment on NPS land". The NPS requests clarification on which former road alignment is being referred to in this statement. Portions of the former Highway 89 road alignment are locations on GLCA lands, this particular road is associated with the building of the dam and the establishment of Page, Arizona and is eligible for the National Register of Historic Places. The NPS request additional identification and analysis of the "former road alignment" to consider whether there will be any effects to a National Register of Historic Places eligible property, and if necessary, recommends best management practices and mitigations to minimize impacts.	This comment was specifically discussed at the meeting between NPS and UDWRe on Feb. 1, 2017. Action item #13 from the meeting notes states that "NPS will review the issues and consider solutions that may be available and consult further with UDWRe".	NPS Cultural resources staff is reviewing and commenting on the recently received Class III inventory for this project. The NPS will further address the eligibility of the former road alignment in the comments on the Class III inventory. Until the finalization of the Class III inventory, impact analyses related to cultural resources can not (and will not be) sufficient in the licensing application analysis.	E. Janicki	BLM has received NPS comments on the Draft Class III report. The Final Class III Report was submitted to FERC for the license application on January 5, 2018.
NPSCmt9	ELJ - NPS Glen Canyon National Recreation Area	The text states that the first pipeline segment as being buried "in a former road alignment on NPS land". The NPS requests clarification on which former road alignment is being referred to in this statement. Portions of the former Highway 89 road alignment are location on GLCA lands, this particular road is associated with the building of the dam and the establishment of Page, Arizona and is eligible for the National Register of Historic Places. The NPS requests additional identification and analysis of the "former road alignment" to consider whether there will be any effects to a National Register of Historic Places eligible property, and is necessary, recommends best management practices and mitigations to minimize impacts.	Please see the response to NPS Comment No. 8.	See NPS response to number 8.	E. Janicki	See updated response to NPS Comment No. 8.
NPSCmt11	ELJ - NPS Glen Canyon National Recreation Area	The NPS requests additional analysis on the required 8.1 and 10.1 acres of proposed construction ROW. The acreages have been identified for staging and will likely cause adverse impact to natural and cultural resources. The park request that Utah state project management team meet with the park to identify locations/construction plans and measurements for the proposed staging areas to clearly identify impacts to NPS resources within the park.	We believe that impacts to NPS resources were clarified in the NPS meeting with UDWRe held on Feb. 1, 2017. In particular, we clarified that the size and locations of staging areas have been minimized to the greatest extent practicable. Based on a subsequent review and analysis requested by NPS and performed by UDWRe, the actual disturbance would be less than 8.1 and 10.2 acres, given the 100-foot wide buffer on the perimeter of each staging area that would remain undisturbed, leaving 6.0 and 8.0 acres, respectively, of disturbance. These areas comprise the smallest practical size that would maintain the safety of workers and the public. Both of the areas have been surveyed for natural and cultural resources. The effects analysis are included in sections 5.3.19 and 5.3.20, Chapter 5, Exhibit E of the License Application and also in the Class III report which the DOI agencies and tribes will have the opportunity to review.	OK. As project planning and ROW permitting moves forward, the NPS will be interested in reviewing and providing best management practices, mitigations, and crafting ROW permit conditions to help minimize impacts to resources within the ROW.	E. Janicki	Comment noted. UDWRe has worked with NPS to develop best management practices and mitigations in the revised BLM Plan of Development and NPS ROW Permit Application, and will continue to work with NPS through the EIS and ROW permitting process.
NPSCmt12	ELJ - NPS Glen Canyon National Recreation Area	The NPS requests additional analysis on the required 8.1 and 10.1 acres of proposed construction ROW. The acreages have been identified for staging, grubbing, and clearing and will likely cause adverse impact to natural and cultural resources. The park request the Utah state project management team meet with the park to identify locations and measurements/construction plans for the proposed staging areas to clearly identify impacts to NPS resources within the park.	Please see response to NPS Comment No. 11.	Please see NPS response to number 11.	E. Janicki	See updated response to NPS Comment No. 11.
NPSCmt15	ELJ - NPS Glen Canyon National Recreation Area	The NPS requests additional analysis on the required 14 acres of proposed ROW for pump station 1. The acreages have been identified for location and operation of the pump station and will likely cause adverse impact to natural and cultural resources. The park request that Utah state project management team meet with the park to identify locations/construction plan and measurement for the proposed pump station location and operation areas to clearly identify impacts to NPS resources within the park.	<p>Following the meeting between NPS and UDWRe on Feb. 1, 2017, UDWRe completed additional analysis into the land requirements for Booster Pump Station 1 (BPS-1) located on NPS-administered land. The intent of this review was to determine if the potential disturbance area of BPS-1 can be reduced from the areas shown in Chapter 3, Exhibit E of the License Application. The 16.0 acres of disturbance for BPS-1 listed in the License Application includes 2.5 acres for the access road and a 100-foot wide buffer planned for the perimeter around BPS-1 site. The 100-foot wide buffer area would not be disturbed, therefore the disturbed area for BPS-1 as proposed would in fact be 12.0 acres not including the access road. The land area required for BPS-1 could potentially be reduced by approximately 2.8 acres if the landscape berm on the east side of the BPS-1 site is eliminated. The berm is one of three berms, each approximately 9 feet high, added to the BPS-1 site to mitigate visual impacts. Without the landscape berm on the east side of the site, the BPS-1 site area would disturb 9.3 acres. UDWRe has determined that the disturbance area for proposed BPS-1 site is the smallest size practical to maintain worker and public safety. The BPS-1 area has been surveyed for special status species and cultural resources and the results have been included in the documents filed with FERC as part of the Final License Application and also in the Class III report which will be submitted to NPS, the other DOI agencies and the tribes for review.</p> <p>NPS requested additional discussion regarding options to co-locate the infrastructure during preparation of the updated ROW application.</p>	OK. Impact analyses in the EIS will help determine which option (berms, less visual impact, greater disturbed area or no berms, greater visual impact, less disturbed area) would be preferable to the NPS.	E. Janicki	See updated response to NPS Comment No. 11.
NPSCmt16	ELJ - NPS Glen Canyon National Recreation Area	<p>The NPS requests clarification in the text regarding the transmission line and as to whether it is a new transmission line, or a co-location on existing infrastructure, both of which will require the issuance of a ROW permit.</p> <p>The NPS also requests additional analysis for the location and access to any portion of the transmission line where it is located on NPS lands and require for the ROW permitting process. The NPS requests that UDWR conduct additional analysis on the necessity of access routes to consider minimizing the creation of new access routes for construction and administration of the LPP and utilize existing park roads, existing administrative access routes, and routes identified per Off Road Vehicles Management Plan and Environmental Impact Statement (ORVEIS) to reduce the amount of adverse impacts on park resources within the ROW.</p>	Please see the attached Narrative Response document for the response to NPS Comment No. 16.	OK. Follow up requested by the NPS to discuss options to co-locate the infrastructure within an existing transmission or distribution line ROW (not necessarily on the same infrastructure -- just the same alignment) or potentially upgrading existing infrastructure to be able to accommodate the new transmission line. These discussion can occur as the preparation for submitting an updated ROW application is underway. No additional changes requested at this time.	E. Janicki	Comment noted. Transmission line alignments use existing utility ROWs as feasible. See updated response to NPS Comment No. 11.
NPSCmt26	ELJ - NPS Glen Canyon National Recreation Area	<p>The NPS request that UDWR provide additional analysis on the effects of the pipeline on the old highway 89 alignment as portions of the former Highway 89 road alignment are located on GLCA lands and is eligible for the National Register of Historic Places.</p> <p>NPS requests that UDWR update the text to acknowledge that any development of alternate water sources for grazing purposes on Glen Canyon land would need site-specific National Environmental Policy Act (NEPA) analysis prior to development and would need to adhere to the Glen Canyon Grazing Management Plan.</p>	<p>Regarding the effects of the LPP on the former Highway 89 alignment please see the response to NPS Comment No. 8.</p> <p>The LPP would not provide any alternate sources of water for livestock watering on GLCA.</p>	OK. See NPS response on comment number 8	E. Janicki	See updated response to NPS Comment No. 8. Mitigation of impacts to range Improvements are discussed in the revised BLM Plan of Development.
NPSCmt27	RS - IMR-NR	The chosen project noise impact threshold of 60 A-weighted decibels (dBA) is high and arguably inappropriate as a long-term (continuous) noise threshold for visitors and wildlife in GLCA. According to section 5.3.18.2.1.3, this threshold is based on an outdated standard, ANSI S12.40-1990, which has been withdrawn and suspended by other more applicable standards, including American National Standards Institute (ANSI)/Acoustical Society of America (ASA) S12.9 Part 5 and ANSI/ASA S12.100-2014. We strongly suggest a revised noise analysis that better considers impacts to GLCA natural ambient sound levels, to visitors, and to wildlife.	Please see the Narrative Response document for the response to NPS comment No. 27.	NPS has reviewed the revised noise analysis in the March 31, 2017 comment response and agrees with the 45 dBA limit at the intake and BPS-1 boundary fences. NPS asks for clarifying language stating that the noise level would be at 45 dBA at the inner fence at the intake station or 50 feet from the intake station, whichever is closer, and at 45 dBA at 50 feet from the pump station.	E. Janicki	Please see the revised Extended Narrative document for the response to NPS comment No. 27.
NPSCmt28	ELJ - NPS Glen Canyon National Recreation Area	<p>The text states that facility noise levels would be 70 decibels (dB) or less at 500 feet from the facility. This noise level is in violation Code of Federal Regulations (CFR) for sound (36 CFR 2.12(a)(1) which prohibits motorized equipment or machinery (such as an electric generating plant, motor vehicle, motorized toy, audio device) from exceeding 60 decibels measured on the A-weighted scale at 50 feet. The NPS requests that this level of noise impact to the soundscape need to be further analyzed with respect to visitor experience, effect on wildlife including birds, and in the context of the CFR violation. The NPS requests additional analysis and discussion of measures which will need to be implemented to muffle sounds from the intake and pump stations to be within acceptable levels per the CFR.</p> <p>The NPS also requests that mitigations be included requiring that all machinery and equipment have proper muffling systems in place and functioning and that equipment, vehicles, tools, and machinery will not be left idling or running unless necessary for safety reasons for if actively being used to complete a work-task to reduce noise-related impacts.</p>	<p>Additional text regarding noise mitigating measures and noise analysis is included in the License Application and existing language addressing NPS concerns is referenced. The text in Section 3.1.3.1.7, Chapter 3, Exhibit E of the License Application is revised to read: <b>Potential facility noise levels would be estimated during facility design, and features would be incorporated to minimize normal operational noise levels with an objective of no more than 45 A-weighted decibels (dBA) or less at the boundary of the facility.</b> In addition, please see the response to NPS Comment No. 27 and No. 105.</p> <p>In addition, the text also contains the following sentence: "Construction equipment would be operated conservatively, which means the operator would take special care not to throttle the engine excessively and would keep engine speed as low as possible. In addition, the operator would not leave the equipment running or idling needlessly."</p> <p>Please see UDWRe's response to NPS Comment No. 1 regarding design of pump stations.</p>	Thank you. We appreciate the change in IPS and BPS-1 maximum boundary noise level to 45 dBA. In part because A-weighted noise levels discount low frequency contributions, we respectfully suggest additional measures to ensure pump station noise is not problematic and unreasonable. We suggest pump station design by a qualified noise control engineer, along with noise measurements conducted jointly by a qualified acoustical engineer and NPS staff, during initial pump station construction and testing, to ensure that low frequency tones and other potentially unreasonable noises are not audible on the lake or other visitor sites surrounding the pump station enclosures. Applicable standards may include 36 CFR 2.12 (a)(1)(ii) unreasonable noise criteria, ANSI/ASA S12.9-2016/Part 7, and others to be determined. If a qualified acoustical engineer or NPS staff identify unreasonable noise during construction, additional noise mitigation treatments should be added to prevent noise impacts on park visitors.	E. Janicki	In addition to the UDWRe March 31, 2017 response to NPS Comment No. 28, please see the updated response to NPS Comment No. 1.
NPSCmt31	ELJ - NPS Glen Canyon National Recreation Area	The NPS requests additional text specific to NPS administered lands be added; currently, only text specific to BLM is present.	Please see the Narrative Response document for the response to NPS Comment No. 31.	Please edit the new language in the Narrative Response Document to eliminate "horse and ATV trailer loading and unloading ramps" (we currently don't have these so nothing needs to be done about them) and "mountain bike trails" (we only allow bicycle use on perm GMP roads -- so long as the construction or operation of the pipeline is not impacting park GMPs roads, then bicycle use is not an issue -- unless the park promulgates new regulations to establish bike trails off of GMP roads that would be within the project area between now and the start of construction). Please delete "Field Office" from the last sentence.	E. Janicki	NPS Comment No. 31 and subsequent disposition was addressed in the UDWRe March 31, 2017 Narrative Response document.

Comment # Label	NPS Original Commenter	Original NPS Comment	UDWRe March 31, 2017 Response	Additional NPS Comment	Additional NPS Comment Reviewer	UDWRe Updated Response
NPSCmt33	ELJ - NPS Glen Canyon National Recreation Area	General Comment: The language used in this section implies that if an activity is within a ROW, then it is unregulated unless otherwise identified. The NPS is responsible for the resources within the ROW and needs to act accordingly to protect them to the extent possible. The NPS requests that the text be changed to indicate that if travel is needed within the ROW, single-lane routes shall be established which all vehicular travel must adhere to. If additional areas are needed to be accessed outside of an established single-lane travel route, especially for survey purposes, this should be achieved on foot. The NPS requests coordination efforts with UDWR to identify appropriate activities within the ROW.  Please also revise this section to indicate that specific activities allowed within the ROW on NPs lands will be identified in the terms of the ROW permit.	Please see the attached Narrative Response document for the response to NPS Comment No. 33.	For the first paragraph of revised text, please include the NPS in the last sentence along with the BLM.  For the second paragraph of revised text, please edit the 4th sentence to include the concept that inventory for sensitive biological species must be recent (I need to follow up with our biologist to determine what the appropriate interval between inventories would be so that the information is considered "up to date" and is relevant).	E. Janicki	NPS Comment No. 33 and subsequent disposition was addressed in the UDWRe March 31, 2017 Narrative Response document.
NPSCmt36	ELJ - NPS Glen Canyon National Recreation Area	On NPS lands, locally sourced plants removed for construction shall be salvaged and replanted within all disturbed areas within the construction ROW. In addition, it should be noted that any salvage, plantings, or re-seedings shall be conducted using varieties that are genetically the same as the local plant populations per NPS Management Policies (2006) Section 4.4.1.2 Please update the text to reflect this.	Change made. The following sentence is added to the end of the fifth paragraph of Section 3.1.3.2.8 Restoration, Chapter 3, Exhibit E of the License Application: <b>On NPS administered lands, locally sourced plants removed for construction shall be salvaged as practicable and replanted within all disturbed areas within the construction ROW. In addition, any planting of salvaged plants, plantings, or re-seedings shall be conducted using varieties that are genetically the same as the local plant populations per NPS Management Policies (2006) Section 4.4.1.2.</b>	OK. Additional process note: Reseedings can also be done, however, seedings must be local genetic variants and significant notice is required to allow for seed production.	E. Janicki	Reclamation and reseeded of disturbed lands are described in the revised BLM Plan of Development and NPS ROW Permit Application.
NPSCmt39	RS - IMR-NR	The NPS requests a completed Class III archeological inventory report to provide meaningful comment on this chapter in terms of cultural resource management.	BLM will provide a copy of the draft Class III Report to NPS for review and comment.	Class III inventory report received and reviewed by Glen Canyon staff. Comments have been provided and passed on to the regional office for consolidation with other agency comments on the Class III inventory.	E. Janicki	See updated response to NPS Comment No. 8.
NPSCmt47	ELJ - NPS Glen Canyon National Recreation Area	The NPS requests the following additional topics for inclusion in the cumulative impacts analysis: infestation of non-native mussels in Lake Powell, potential future water pipeline project (Central Arizona Water Pipeline Project, Bureau of Reclamation lead), global climate change/regional drought conditions, ongoing Utah or Arizona Departments of Transportation road work, GLCA Off-road Vehicle Management Plan, South Central Communication Fiber Optic project/ROW (US 89)	Please see the attached Narrative Response document for the response to NPS Comment No. 47.	Regarding the Glen Canyon ORVEIS, the FEIS was published in 2017 (not 2016). ROD and regulation are still pending. Also, please consider visitor use and experience and recreation resources as impact topics to be considered for cumulative impacts.	E. Janicki	Please see the revised Narrative Response document for the response to NPS Comment No. 47.
NPSCmt51	ELJ - NPS Glen Canyon National Recreation Area	The NPS requests that global climate change be analyzed for cumulative impacts to surface water as global climate change (regional drought) would have a cumulative impact on surface water levels when considered with additional water withdrawals from Lake Powell.	Please see the Extended Narrative document for the response to NPS Comment No. 51.	OK, NPS to review and provide any additional comments in the impact analysis portion of the EIS.	E. Janicki	Please see the revised attached Narrative Response document for the response to comment NPS No. 51.
NPSCmt59	ELJ - NPS Glen Canyon National Recreation Area	The NPS requests the following additional topics for inclusion in the cumulative impacts analysis: infestation of non-native mussels in Lake Powell, potential future water pipeline project (Central Arizona Water Pipeline Project, Bureau of Reclamation lead), global climate change/regional drought conditions, ongoing Utah or Arizona Departments of Transportation road work, GLCA Off-road Vehicle Management Plan, South Central Communication Fier Optic project/ROW (US 89)	Please see the Extended Narrative document for the response to NPS Comment No. 59.	OK, NPS to review and provide any additional comments in the impact analysis portion of the EIS.	E. Janicki	Please see the revised attached Narrative Response document for the response to comment NPS No. 59.
NPSCmt61	MA - NPS Glen Canyon National Recreation Area	Zebra mussels (D. polymorpha) are not present in Lake Mead. Please correct this inaccuracy in the text.	Change made. The first paragraph of Section 5.3.6.1.5 LPP Intake Pump Station and Invasive Species Management, Chapter 5, Exhibit E of the License Application is revised to read: <b>The proposed LPP water diversion from Lake Powell increases the probability that invasive mussel species could be transferred (biota transfer) to other drainages. The concerns relating to the effect of the quagga mussel (Dreissena bugensis) in Lake Mead are well documented. This problem has significantly affected operation of local domestic water intakes at the Lake, has resulted in the temporary closure of the Cold Water Fish Hatchery at Lake Mead, affected surface water withdrawals for the Central Arizona Project and the California water system, and has had a real effect on recreational use of the resources throughout the western United States and Canada.</b>	That fixes the problem. Note that when genus and species is written, it should be italicized or underlined.	M. Anderson	Comment noted.
NPSCmt65	MA - NPS Glen Canyon National Recreation Area	Early stages of Dreissena veligers will pass through a 100-micron filter and a filter of that size is not sufficient. The NPS requests that UDWR reconsider the filter size or potentially the tactic for preventing larval stage mussels from entering the system.	UDWRe is adjusting the filter size that would be utilized down to 25 microns. The last paragraph of Section 5.3.6.1.5.1 - Invasive Species Management in Chapter 5, Exhibit E of the License Application is revised to include the following sentence: <b>Filters with a filter size of 25-microns would be used on each pump discharge pipe to remove biological materials (including residual dead mussel veligers) that pass through the fish screens and intake tunnels.</b>	Ok, 25 micron may be smaller than necessary. 50micron would probably get all veligers.	M. Anderson	The revised last paragraph of Section 5.3.6.1.5.1 - Invasive Species Management in Chapter 5, Exhibit E of the License Application is further revised to include the following sentence: <b>Filters with a filter size of 25-50 microns would be used on each pump discharge pipe to remove biological materials (including residual dead mussel veligers) that pass through the fish screens and intake tunnels.</b>
NPSCmt75	JS - NPS Glen Canyon National Recreation Area	Eriogonum corymbosum var. nilesii is a candidate species - this suggests that Federal Energy Regulatory Commission (FERC) or UDWR will have to consult with the United States Fish and Wildlife Service through Section 7 on NPS lands and where federal funding is included. The NPS requests additional analysis as it relates to this candidate species.	UDWRe researched the most current USFWS candidate species list on the USFWS website ( <a href="https://www.fws.gov/ endangered/what-we-do/cnor.html">https://www.fws.gov/ endangered/what-we-do/cnor.html</a> ) and the Nevada Buckwheat is not listed as a candidate species. As a result, consultation with USFWS is not necessary for this species. Please see the attached PDF file for the September 24, 2014 Federal Register Notice on USFWS' determination to not list Eriogonum corybosum var. nilesii (Las Vegas buckwheat).	OK - The Eriogonum has been dropped as a candidate	J. Spence	Comment noted.
NPSCmt86	ELJ - NPS Glen Canyon National Recreation Area	The NPS requests that clarification language be added to the text to describe that on NPS lands, experimental, non-essential populations must be treated as threatened species (see Endangered Species Act Section 10j).	Please see the Extended Narrative document for the response to NPS Comment No. 86.	The NPS was not requesting additional information in the original comment. Rather, a change to the text to recognize the 10j experimental populations must be treated as "Threatened" inside NPS units.	E. Janicki	NPS Comment No. 86 and subsequent disposition was addressed in the UDWRe March 31, 2017 Narrative Response document. See the revised Preliminary Draft Biological Assessment for further discussion.
NPSCmt87	JS - NPS Glen Canyon National	The NPS requests that the 47 species on the GLCA special status species wildlife listed be included as this table lacks information from GLCA.	Please see the attached Narrative Response document for the response to comment NPS No. 87.	The table is still missing species from the list previously provided. List will be provided again.	J. Spence	NPS Comment No. 87 and subsequent disposition was addressed in the UDWRe March 31, 2017 Narrative Response document.
NPSCmt95	MA - NPS Glen Canyon National Recreation Area	Lone Rock beach does not officially close in the winter. Please update the text with this information.	The text is updated with the information on the winter status of the Lone Rock Beach.  The second to last sentence of the Lone Rock Recreation Area text in Section 5.3.13.1.1.1 Glen Canyon National Recreation Area, Chapter 5, Exhibit E of the License Application is revised to read: <b>Lone Rock is officially closed to the public during the winter months, but Lone Rock Beach is not officially closed in the winter (Hughes 2009).</b>	The only annual closure at Lone Rock is to launching vessels between November and April; the area and beach remain open all year long.	M. Anderson	The revised second to last sentence (see UDWRe March 31, 2017 Response) of the Lone Rock Recreation Area text in Section 5.3.13.1.1.1 Glen Canyon National Recreation Area, Chapter 5, Exhibit E of the License Application is further revised to read: <b>Vessel launching at Lone Rock is closed between November and April, but Lone Rock area and beach is open all year (Hughes 2009).</b>
NPSCmt101	ELJ - NPS Glen Canyon National Recreation Area	The NPS requests additional analysis to evaluate the necessity of proposed new "roads" for access purposes and to identify alternatives that utilize existing routes. GLCA requests additional coordination with UDWR to identify needs that can be fulfilled by existing roads and routes to reduce new administrative access roads to the extent possible to minimize disturbance, to protect resources, and to reduce unauthorized public vehicular use on roads and routes that are not authorized in the General Management Plan or in the Off-road Vehicles Management Plan (Record of Decision pending).	Please see the attached Extended Narrative document for the response to NPS Comment No. 101.	OK - The NPS requests continuing coordination in the identification of access routes as some socially created routes and duplicate administrative routes will be naturalized or closed, pending the ORVEIS Record of Decision.	E. Janicki	See updated response to NPS Comment No. 11.
NPSCmt105	ELJ - NPS Glen Canyon National Recreation Area	CFR regulations state sound not to exceed 60 dBA at 50 feet. All constructing equipment and noise will exceed that (although temporary effects). The NPS requests that the text describe how this noise impact will be mitigated.	Additional text as to how the noise would be mitigated is provided. A third sentence is added to the end of the first paragraph in Section 5.3.18.2.1, Chapter 5, Exhibit E of the License Application and reads: <b>Noise standards for NPS-administered lands within Glen Canyon National Recreation Area and Pipe Spring National Monument are defined in 36 CFR 2.12(a)(1), which specifies that operating motorized equipment or machinery exceeding a noise level of 60 dBA at 50 feet is prohibited.</b>  The NPS-requested noise mitigation measures to reduce construction equipment noise within GLCA are included in a new first paragraph in Section 5.3.18.3.1, Chapter 5, Exhibit E of the License Application, which reads: <b>Noise mitigation during construction would be required on NPS-administered land in Glen Canyon National Recreation Area to minimize noise effects on visitors, wildlife and the park environment. Noise mitigation measures would include: UDWRe specifying newer, less noisy equipment; use mufflers on all construction equipment air intake and exhaust cycles to control source noise; install shields on equipment or use equipment with built-in shields (e.g., compressors, etc.); dampen metal surfaces to absorb noise; install temporary noise shields or barriers along work areas; provide equipment operation training focused on achieving lower noise levels during equipment operation; require equipment maintenance programs focused on controlling equipment noise sources; restrict work hours; UDWRe specifying the type of helicopter used during transmission tower construction; and establish flight routes to minimize noise disturbance on sensitive receptors.</b>	OK. Not asking for a change, but as a note, I am working with the aviation coordinator at Glen Canyon to see if there are any requirements that need to be met for air delivery of equipment within the park (see 36 CFR 2.17) . Please also note the proximity of the air delivery activities to the Page airport and ongoing air tours in the area.	E. Janicki	See updated response to NPS Comment No. 11.
NPSCmt106	RS - IMR-NR	Table 5-159 includes ambient sound levels for urban and suburban areas which are rarely found in the project area. It omits ambient sound levels for quieter rural areas typical of GLCA and nearby public lands. The NPS requests inclusion of site-specific ambient sound levels from the geospatial data found at this website: <a href="https://irma.nps.gov/DataStore/Reference/Profile/2217356">https://irma.nps.gov/DataStore/Reference/Profile/2217356</a> . Natural ambient sound levels in the vicinity of the intake pump station and BPS-1 are estimated at 24-25 dBA, while existing ambient sound levels are estimated at 35-38 dBA. We request that these ambient sound levels be disclosed as measures of the affected environment in these areas.	Please see the Narrative Response document for the response to NPS Comment No. 106.	Thank you. We appreciate the inclusion of natural ambient and existing ambient sound levels in Table 5-156.	R. Stanley	Comment noted.
NPSCmt107	RS - IMR-NR	A background level cutoff if <50 dB is too high to accurately assess impacts on quiet areas. We request that the NPS geospatial ambient model be used to estimate background sound level. The data is publicly available at this website: <a href="https://irma.nps.gov/DataStore/Reference/Profile/2217356">https://irma.nps.gov/DataStore/Reference/Profile/2217356</a> . Natural ambient sound levels in the vicinity of the intake pump station and BPS-1 are estimated 24-25 dBA, while existing ambient sound levels are estimated at 35-38 dBA. We request that these ambient sound levels be disclosed as measured of the affected environment.	Please see the Extended Narrative document for the response to NPS Comment No. 107.	Thank you. We appreciate the inclusion of ambient sound levels from the NPS geospatial ambient model in Table 5-157. We respectfully request that the "peak levels" attributable to wind be clarified to ensure the dominant noise source is not microphone flow-induced noise (wind turbulence) and the requirements of ANSI 12.9-2013 Part 3, section 6.3 (b) maximum wind velocity are met.	R. Stanley	Please see the revised attached Narrative Response document for the response to comment NPS No. 107.

Comment # Label	NPS Original Commenter	Original NPS Comment	UDWRe March 31, 2017 Response	Additional NPS Comment	Additional NPS Comment Reviewer	UDWRe Updated Response
NPSCmt108	RS - IMR-NR	The chosen project noise impact threshold of 60 dBA is high and arguably inappropriate as a long-term (continuous) noise threshold for visitors and wildlife in GLCA. The standard, ANSI S12.40-1990, has been withdrawn and superseded by more applicable standards, including ANSI/ASA S12.9 Part 5 and ANSI/ASA S12.100-2004. We request a more robust noise analysis that better considers audibility of long-term noise from project facilities (pump stations and hydro stations) to GLCA wildlife and visitors. In a previous NPS comment, it was noted that wildlife responses to noise began at about 40 dBA. We request that you please reference the following citation and use our noise impact spreadsheet at this URL: <a href="http://onlinelibrary.wiley.com/doi/10.1111/brv.12207/supinfo">http://onlinelibrary.wiley.com/doi/10.1111/brv.12207/supinfo</a> [Shannon, G., M.F. McKenna, et al. (2015) "A synthesis of two decades of research documenting the effects of noise on wildlife." Biological Reviews DOI: 10.1111/brv.12207]	Please see the Extended Narrative document for the response to NPS Comment No. 108.	Thank you. We appreciate the offer to strengthen the noise effects analysis.	R. Stanley	Comment noted.
NPSCmt109	RS - IMR-NR	The chosen project noise impact threshold of 60 dBA is highly and arguably inappropriate as a compatible use threshold at the perimeter fencing of project facilities (pump stations and hydro stations). The publicly available NPS geospatial ambient sound level model provides estimates of 24-25 dBA for natural ambient sound levels, and estimates of 35-38 dBA for existing ambient sound level in the vicinity of the intake pump station and BPS-1. We request additional noise mitigation of project facilities (pump stations and hydro stations) to further reduce noise levels and the area of audible impacts on NPS lands.	Please see the response to NPS Comment No. 27 for revisions made to Section 5.3.18.2.1.3, Chapter 5, Exhibit E of the License Application. Additionally, the response to NPS Comment No. 27 provides revisions made to Section 3.1.3.1.7, Chapter 3, Exhibit E of the License Application, with 45 dBA sound levels at the boundary fences of IPS and BPS-1, eliminating the need for additional noise mitigation measures on these pump stations to reduce noise levels and the area of audible effects on NPS-administered lands in GLCA. Please see UDWRe's response to NPS Comment No. 1 regarding design of pump stations.	Thank you. We appreciate the change in IPS and BPS-1 maximum boundary noise level to 45 dBA. In part because A-weighted noise levels discount low frequency contributions, we respectfully suggest additional measures to ensure pump station noise is not problematic and unreasonable. We suggest pump station design by a qualified noise control engineer, along with noise measurements conducted jointly by a qualified acoustical engineer and NPS staff, during initial pump station construction and testing. If a qualified acoustical engineer or NPS staff identify unreasonable noise during construction, additional noise mitigation treatments should be added to prevent noise impacts on park visitors, according to 36 CFR 2.12 (a)(1)(ii).	R. Stanley	In addition to the UDWRe March 31, 2017 response to NPS Comment No. 109, please see the updated response to NPS Comment No. 1.
NPSCmt110	RS - IMR-NR	The statement that noise from access roads can be dismissed because existing traffic noise is 85 dBA along much of the project is extraordinary, as this noise level likely assumes a very close distance and a relatively brief maximum noise level. It would not accurately represent longer term noise impacts over greater distances. We respectfully request that you include a more detailed analysis of how noise from highways would compare with access roads, including other metrics, e.g. L10 and L50, distance, vehicle type, and traffic count assumptions for the comparison.	Please see the Extended Narrative document for the response to NPS Comment No. 110.	We appreciate the additional analysis, which compares counts of annual averaged daily traffic volumes versus expected construction traffic. We respectfully suggest any additional analysis include both equivalent-continuous sound levels and maximum sound levels.	R. Stanley	Please see the revised attached Narrative Response document for the response to comment NPS No. 110.
NPSCmt111	RS - IMR-NR	A 90 dBA impact threshold outside human occupied structures is very high. We respectfully request analysis of indoor noise impacts, including speech interference. This is especially important near NPS structures where interpretive activities with visitors may occur. If speech interference is expected to occur, we would request further mitigation of noise to minimize impacts on visitors.	Please see the Extended Narrative document for the response to NPS Comment No. 111.	We respectfully request analysis of indoor and outdoor speech interference, if speech interference may occur. NPS current uses a raised voice speech interference threshold of 52 dBA for outdoor interpretive programs (U.S. Environmental Protection Agency, 1974)	R. Stanley	NPS Comment No. 111 and subsequent disposition was addressed in the UDWRe March 31, 2017 Narrative Response document.
NPSCmt113	RS - IMR-NR	The NPS requests further analysis regarding withdrawals and what withdrawals might indicate about the variation/fluctuations in reservoir levels that will occur in addition to what already exists from normal operations and climate change. The effects, including cumulative effects, to cultural resources along the reservoir shoreline need to be considered and addressed in this document.	Please see the Extended Narrative document for the response to NPS Comment No. 113.	<p>NPS asks for additional clarification as to whether the cumulative effects between the action and no action are indeed the same, and if so, how.</p> <p>NPS asks for additional clarification on the influence of climate change on cumulative effects.</p> <p>The NPS understands that the "No Action" alternative assumes the existing water right is being utilized. However, the on-the-ground conditions today are that the water right is not currently being utilized. Therefore, effects from a utilization are not being seen on the ground. The "No Action" alternative should reflect present day conditions (that being the ~86,000 a-f which is not currently being utilized anywhere in the system). We understand that the modeling for the "No Action" alternative is assuming the utilization of the ~86,000 a-f at undisclosed locations within the watershed. The analysis does not reflect what changes would be seen between the current conditions today (water right not currently being utilized) with the Action Alternative (water right being utilized and withdrawn at a disclosed location). Perhaps, multiple scenarios under the "No Action" alternative which depicts the current on the ground conditions (water right not being utilized) as well as the utilization of the 86,000 a-f water right could help more accurately demonstrate what the true on-the-ground impacts will be of utilizing the existing water right compared to the on-the-ground conditions of the right not being utilized today. If absent the multiple scenarios, a statement in the EIS document which discloses very clearly that the current on-the-ground (no utilization) condition is not being represented in the "No Action" alternative should be included for clarity for the readers and to prevent confusion.</p>	E. Janicki	Please see the response to NPS Comment No. 51 in the revised Narrative Response document for a discussion on assumptions regarding use of the State of Utah's water rights in the various alternatives. Please see the response to NPS Comment No. 51 in the revised Narrative Response document to review the hydrological modeling performed by Reclamation on Lake Powell and for clarification regarding cumulative effects on surface water resources under climate change conditions. Please see the revised Narrative Response document for the response to NPS Comment No. 113 for clarification on cultural resources along the Lake Powell shoreline.
NPSCmt114	MW	Based on NPS calculations, diversion to the LPP may account for 1-2 ft drop in head at Lake Powell, which could dramatically affect hydropower production. This in turn, may trigger basinwide drought contingency plans that release water from other upstream reservoirs to maintain minimum pool elevations in Lake Powell. Thus, the effects of diversion through the LPP could potentially affect reservoir elevations at, and releases from, Flaming Gorge, Navajo, and Aspinall. Please ensure analyses models extended drought conditions and reports the effects to Lake Powell elevations and the frequency and duration that Lake Powell is at or below minimum power pool. Per NPS comments dated July 5, 2012, we encourage additional analyses that include possible severe future hydrologic conditions within the Colorado River watershed (extremely low inflow and low lake level conditions.) NPS Comment Disposition - The modeling, analysis, and discussion of the effects of the LPP withdrawals on LP elevations is incomplete. The current modeling effort only evaluated 3 years of LPP withdrawals with the 2007 Interim Guidelines in effect (modeled LPP depletions began in 2024, the 2007 Interim Guideline expire in 2026). LPP depletions in 2024 were only 15,468 AF (and not much greater by 2026); full build-out (86,249 AF) was not until 2048/2049. So, the LPP at full build-out, under the current operating regime (i.e., the 2007 Interim Guideline), was never modeled or analyzed. BOR report states that the effects of the LPP will be greatest at full build-out. Recent modeling by Colorado West Slope water users suggested that small differences in LPP elevations in critical years could cause (or increase the frequency and duration) LP to fall below minimum power pool elevation because either the inflow hydrology coupled with the antecedent reservoir content was insufficient to maintain LP elevations above minimum power pool in that year, or because a slightly lower elevation triggered a different Operating Tier under the Interim Guidelines and the subsequent releases under the new tier causes LP to drop below power pool. Thus, a 1-2 foot drop in LP elevation associated with the LPP withdrawals (esp. at full buildout) could trigger a different Operating Tier under the Interim Guidelines, cause LP to fall below minimum power pool when otherwise it may not have (or at least not for as long or as often) and thus trigger Drought Response at Upper Basin CRSPA reservoirs. [BOR held all demands (except reasonably foreseeable project) constant at 2015 levels in order to model just the effects of the LPP. If these (increasing) demands were included, the likelihood of LP falling below minimum power pool may be even greater, even without the LPP.]	Please see the Extended Narrative document for the response to NPS Comment No. 114.	<p>The March 31, 2017 comment response resolves questions regarding the CRSS modeling assumptions on future depletions and 2007 Interim Guidelines operations.</p> <p>NPS asks for additional clarification on cumulative effects on upstream reservoirs under a 10 percentile scenario.</p> <p>NPS asks that the discussion on modeling uncertainties in the U.S. Bureau of Reclamation modeling attachment be included in the comment response.</p>	E. Janicki	Please see the revised attached Narrative Response document for the response to comment NPS No. 114.
NPSCmt115	MW	Refer to the following Document: Attachment 4 PLP Lake Powell Pipeline Project, Responses to Participant Comments on PLP and Draft Study Reports  NPS Comment Disposition - Comparing the effects of the LPP on annual and monthly mean flows (especially in the context of USGS gage accuracy), or annual flow duration curves is misleading. Just because annual flow duration curves are "nearly identical" with or without LPP, or because annual and monthly mean flows are within gage accuracy doesn't necessarily mean there is no effect on flow; rather, it may suggest that the wrong metrics are being used to evaluate the effects of the project. The condition, trend, abundance, and diversity of biotic resources (e.g., fisheries, aquatic macroinvertebrates, food web dynamics, riparian/wetland vegetation, available/useable habitat) and abiotic resources (e.g., thermal loading, channel and sediment dynamics, number or duration of zero-flow or low-flow days) are often determined by daily flow, not annual or monthly mean flows. Table 4-3 and figure 4-6 (Study Report 18) show that there is consistently less water in the system (in terms of monthly mean flow) March through June (and generally more in the remaining months) with the LPP than without. If these patterns hold, they would likely be more pronounced for daily flows. What are the effects of these consistent, and presumably long-term, changes in flow patterns? The USGS gage data for the Virgin River near St. George, UT, (Appendix I, Page 1; Study 18), states that there is "[N]o flow at time in some years." Here too, the duration and frequency of no-flow (and even extreme low-flow) events are not adequately reflected or captured by annual and monthly means, and annual flow duration curves; nor should they be ignored because of gage accuracy. From the data and analyses provided, it is not possible to determine if the project would alter the frequency or duration of no-flow or extreme low flow event.	Please see the Extended Narrative document for the response to NPS Comment No. 115.	NPS requests additional metrics (e.g., 10-day, 30-day, and 90-day low flows) be added to the Virgin River flow effects section. NPS would like the evaluation to include an assessment on magnitude, timing, and duration of flow effects.	E. Janicki	Please see the revised attached Narrative Response document for the response to comment NPS No. 115.

# Extended Narratives

## NPS Comment No. 27

A revised noise analysis is incorporated setting a sound volume within GLCA at the IPS and BPS-1 boundary fences of no more than 45dBA, and for BPS-2, BPS-3(Alt.) and BPS-4(Alt.) outside the GLCA, setting the volume at the boundary fence at no more than 60dBA. The second paragraph in Section 3.1.3.1.7, Chapter 3, Exhibit E of the License Application is revised to read: **The Water Intake Pumping Station (IPS) and Booster Pump Station – 1 (BPS-1) proposed for operation on NPS administered lands would be enclosed and utilize design features (e.g., acoustical louvers, noise absorbing panels and interior baffling) to minimize operational noise levels. The proposed IPS and BPS-1 would be designed with features incorporated to minimize normal operational sound levels with an objective of a sound level of 45 A-weighted decibels (dBA) at each pump station inner boundary fence, or 50 feet from the facility, whichever is closer. The 45 dBA sound level at the IPS and BPS-1 boundary fences is consistent with the research findings of Blickley, J.L. et al. (2012), which is cited in Shannon, G. et al. (2016).**

The new third paragraph in Section 3.1.3.1.7 is revised to read: **BPS-2, BPS-3 (Alt.), BPS-4 (Alt.) and the hydroelectric generating stations would be enclosed and utilize design features (e.g., acoustical louvers and noise absorbing panels) to minimize operational sound levels. Pressure reducing station valves at the hydroelectric generating stations would be fully enclosed in vaults. Potential facility sound levels would be estimated during facility design, and features would be incorporated to minimize normal operational sound levels with an objective of 60 dBA or less at the boundary of each facility.**

Section 3.7, Chapter 3, Exhibit E of the License Application is revised to include the following two references:

**Blickley, J.L., D. Blackwood, and G.L. Patricelli. 2012. Experimental Evidence for the Effects of Chronic Anthropogenic Noise on Abundance of Greater Sage-Grouse at Leks. Conservation Biology 26(3):461-471.**

**Shannon, G., M.F. McKenna, L.M. Angeloni, K.R. Crooks, K.M. Fristrup, E. Brown, K.A. Warner, M.D. Nelson, C. White, C. Briggs, S. McFarland, and G. Wittemyer. 2016. A synthesis of two decades of research documenting the effects of noise on wildlife. Biological Reviews 91:982-1005.**

The three paragraphs comprising Section 5.3.18.2.1.3, Chapter 5, Exhibit E of the License Application, are revised to read:

**Recent studies of noise effects on wildlife summarized in the literature review by Shannon, G., et al. (2016) indicates 45 dBA is the lowest sound level at which construction noise effects on wildlife are demonstrated to occur in natural rural habitats such as those in GLCA. Construction noise effects for the IPS and BPS-1 would occur over a longer period of time (up to 2 years) than the pipeline construction that would occur over one month per mile of construction. The 45 dBA noise level at the IPS and BPS-1 construction sites is considered an appropriate significance threshold for chronic construction noise in GLCA, based on the research results of Blickley, J.L., et al. (2012). The research results published by Blickley, J.L., et al. (2012) included construction traffic noise, for which wildlife demonstrated a biological response of changes in abundance, distribution and**

occupancy at and above 45 dBA sound levels in natural rural habitats. The 45 dBA sound level as a significance threshold for pipeline construction is consistent with the American National Standards Institute (ANSI) and Acoustical Society of America (ASA) S12.9 Part 5 (ASA 1998) and ANSI/ASA S12.100-2014 (ASA 2014).

Recent studies of noise effects on wildlife are summarized in a literature review by Shannon, G., et al. (2016), which cites specific research by Blickley, J.L., et al. (2012) demonstrating adverse effects on wildlife occupancy and abundance at chronic anthropogenic noise levels of 45 dBA and above in natural rural habitats. The chronic anthropogenic noise level of 45 dBA is considered appropriate as a significance threshold at and above which adverse effects could occur on wildlife in natural rural habitats within GLCA. The 45 dBA sound level at the boundary of the IPS would decay to GLCA ambient sound levels of 35 to 38 dBA in GLCA within approximately 150 feet. The 45 dBA sound level at the boundary of the BPS-1 would decay to GLCA ambient sound levels of 35 to 38 dBA in GLCA within approximately 200 feet. The 45 dBA sound level at the IPS and BPS-1 boundaries is consistent with the American National Standards Institute (ANSI) and Acoustical Society of America (ASA) S12.9 Part 5 and ANSI/ASA S12.100-2014 (ASA 2014).

Section 5.3.18.6, Chapter 5, Exhibit E of the License Application is revised to include the following four references:

- American National Standards Institute (ANSI) and Acoustical Society of America (ASA). 1998. Quantities and Procedures for Description and Measurement of Environmental Sound – Part 5: Sound Level Descriptors for Determination of Compatible Land Use. ANSI/ASA S12.9 – 1998/Part 5. New York, NY.
- \_\_\_\_\_. 2014. Methods to Define and Measure the Residual Sound in Protected Natural and Quiet Residential Areas. ANSI/ASA S12.100-2014. Melville, NY.
- Blickley, J.L., D. Blackwood, and G.L. Patricelli. 2012. Experimental Evidence for the Effects of Chronic Anthropogenic Noise on Abundance of Greater Sage-Grouse at Leks. *Conservation Biology* 26(3):461-471.
- Shannon, G., M.F. McKenna, L.M. Angeloni, K.R. Crooks, K.M. Fristrup, E. Brown, K.A. Warner, M.D. Nelson, C. White, C. Briggs, S. McFarland, and G. Wittemyer. 2016. A synthesis of two decades of research documenting the effects of noise on wildlife. *Biological Reviews* 91:982-1005.

## **NPS Comment No. 47**

The requested changes regarding cumulative effects are incorporated into Chapter 5, Exhibit E of the License Application. This comment response addresses the types of actions that are included in the cumulative effects analysis. Please see the response to NPS Comment No. 59 in this revised Narrative Response document for changes to the cumulative effects analysis.

The following new sections are added to Chapter 5, Exhibit E of the License Application in Section 5.2.3.11.

**5.2.3.11.5 Global Climate Change/Regional Drought Conditions.** UDWR contracted Reclamation to prepare an analysis of climate change effects on the Virgin River basin, incorporating Reclamation's work on the Colorado River Basin Water Supply and Demand Study (Reclamation 2012) and the SECURE Water Act Section 9503(c) Report to Congress (Reclamation 2016). The Virgin River basin report prepared by Reclamation projects a 3 percent decrease in Virgin River streamflow resulting from climate change during the period 2025 through 2054, which translates to a potentially larger decrease in WCWCD water system yield via diversions from the Virgin River (Reclamation 2014). This result demonstrates the vulnerability of diverting existing water supplies from the Virgin River for population in the St. George metropolitan area and the WCWCD need to diversify their water supply with the LPP to make sure future water supplies meet future population demands. The SECURE Water Act Section 9503(c) Report to Congress projects a 5 to 7 percent chance that Upper Basin shortages in coming decades could exceed 25 percent of the requested depletion in any one year (Reclamation 2016). These results are incorporated into the CRSS modeling with climate change inflow hydrology performed by Reclamation on the LPP under a contract with UDWR. Therefore, the climate change modeling results presented in Section 5.3.3.2.2.1, Chapter 5, Exhibit E of the License Application and in Final Study Report 18, Surface Water Resources, Section 4.3.1.1 and Appendix 2 Reclamation Colorado River Model Report represent the conditions projected to occur under climate change/regional drought conditions in Lake Powell and the Virgin River basin diversions serving the St. George metropolitan area population. The climate change conditions in Lake Powell could combine with other interrelated actions on the Colorado River and LPP diversions to result in cumulative effects on the following resources:

- Air Quality
- Aquatic Resources
- Archaeological and Historic-Era Resources
- Land Use Plans and Conflicts (Floodplains)
- Recreation Resources
- Special Status Aquatic Species
- Socioeconomic Resources (Energy Resources)
- Surface Water Quality
- Surface Water Resources
- Visual Resources
- Wetlands and Riparian Resources

**5.2.3.11.6 Utah Department of Transportation (UDOT) Projects.** UDOT has long range plans to widen portions of Highway 89 from the Utah-Arizona state line to Kanab, Utah within the LPP study area. The widening would involve adding one lane in multiple segments to build a 2+1 corridor (two lanes in one direction, one lane in the other direction). Some widened highway

segment construction would occur during LPP construction pending available funding, with potential short-term cumulative effects on the following resources:

- Air Quality
- Archaeological and Historic-Era Resources
- Ethnographic Resources
- Noise
- Paleontological Resources
- Recreation Resources (including visitor use and experience)
- Socioeconomics (Energy Resources)
- Special Status Plant Species
- Special Status Wildlife Species
- Transportation
- Vegetative Communities
- Visual Resources
- Wetlands and Riparian Resources
- Wildlife Resources

**5.2.3.11.7 GLCA Off-road Vehicle Management Plan.** NPS completed an Off-road Vehicle (ORV) Management Plan and Final EIS in 2017 for Glen Canyon National Recreation Area, and a Record of Decision is pending. The plan and FEIS describe five alternatives for managing off-road use and on-road use of off-highway vehicles (OHVs) and street-legal all-terrain vehicles (ATVs) and assesses impacts that could result from continuing current management (the no action alternative) or implementation of any of the action alternatives within Glen Canyon National Recreation Area (GLCA). Under the NPS preferred alternative involving mixed use, resources would be protected and visitor experience enhanced by identifying and designating specific areas capable of supporting off-road use while prohibiting such uses in areas where resources and values may be at risk. Proposed designated ORV routes and GMP roads that would overlap with LPP construction include routes near Glen Canyon substation, northwest of the Page Port of Entry, south/southwest of Greenhaven, west of Greenhaven, southwest of Stud Horse Point, and south of Blue Pool Wash, all accessed from Highway 89. The following resources potentially affected by the proposed ORV routes and GMP roads have the potential for cumulative effects on resources with the LPP construction:

- Archaeological and Historic-Era Resources
- Geology and Soil Resources
- Ethnographic Resources
- Noise
- Paleontological Resources
- Recreation Resources (including visitor use and experience)
- Socioeconomics
- Special Status Plant Species
- Special Status Wildlife Species
- Vegetative Communities
- Wildlife Resources

**5.2.3.11.8 South Central Communications Fiber Optic Project.** This recently completed project resulted in placement of a fiber optic cable along the south side of Highway 89 between Kanab and Page. The cable is generally located five feet from the fence line toward Highway 89 and has



approximately 40 inches of cover. The cable alignment was adjusted in specific locations to avoid sensitive plant species. The cable has an overhead crossing over one drainage and is buried immediately adjacent to the existing roadway in other locations to cross drainage features. The following resources affected by the fiber optic cable project have the potential for cumulative effects on resources with the LPP:

- Archaeological and Historic-Era Resources
- Ethnographic Resources
- Paleontological Resources
- Special Status Plant Species
- Special Status Wildlife Species
- Vegetative Communities
- Wetlands and Riparian Resources
- Wildlife Resources

The following new section is added to Chapter 5, Exhibit E of the License Application following Section 5.2.3.11:

#### ***5.2.3.12 Other Considered Actions***

##### **5.2.3.12.1 Non-Native Quagga Mussel Infestation in Lake Powell.**

The presence of nonnative quagga mussel (*Dreissena bugensis*) in Lake Powell was first confirmed in 2013 and infestation was documented near Glen Canyon Dam in 2014. Average veliger density in southern Lake Powell ranged from 2 to 38 per liter in 2016, with veliger density at Glen Canyon Dam ranging from 1 to 45 per liter in 2016 (NPS 2017). Section 3.1.1.1.2 in Chapter 3, Exhibit E of the License Application presents that water entering the intake system would be dosed with a molluscicide (operations conducted in compliance with NPS Management Policies for pesticide use) and passed through a 25-50 micron self-cleaning filter on the pump discharge line to remove aquatic invasive species parts and eggs. This would remove aquatic invasive species from the LPP and prevent distribution of aquatic invasive species by the LPP, resulting in no environmental effects from non-native species in other waters. Therefore, the LPP would not have potential cumulative effects with non-native quagga mussel infestation in Lake Powell.

##### **5.2.3.12.2 Central Arizona Water Pipeline Project.**

The Bureau of Reclamation (Reclamation) was leading a planning study for a water pipeline from the Colorado River to serve Page, Flagstaff, Coconino County, Navajo Nation and the Hopi Tribe when Congress cut the federal budget in 2014 and the non-federal partners were recommended to fund at least 30 percent of the study. The City of Flagstaff decided to not fund their share of the study and Reclamation put the study completion on hold in 2014. The City of Flagstaff also has no rights to Colorado River water and would have to purchase rights from another entity to receive water from a pipeline diverting water from the Colorado River. Therefore, the proposed project would not be implemented in the reasonably foreseeable future and there would be no cumulative effects with the LPP.

##### **5.2.3.12.3 Arizona Department of Transportation (ADOT) Projects**

ADOT has three projects planned, under construction, or recently completed near Page involving Highway 89 and Highway 89A. These include the completed landslide repair 25 miles south of Page, culvert extension along Highway 89 near Bitter Springs 25 miles south of Page, and culvert



**extension along Highway 89A between Marble Canyon and Jacob Lake. These projects would not combine with LPP effects to result in potential cumulative effects on resources. Therefore, there would be no potential cumulative effects resulting from ADOT planned projects in the LPP area.**

## **NPS Comment No. 51**

The State of Utah (State) contracted with the U.S. Bureau of Reclamation (Reclamation) to have Reclamation perform Lake Powell Pipeline (LPP) simulations using the Colorado River System Simulation (CRSS) model. The model simulates impacts on Lake Powell storage levels and streamflow effects on the Colorado River downstream of Lake Powell with a monthly time step. For additional information on CRSS modeling of Lake Powell and Glen Canyon Dam releases see Appendix 2, Reclamation Colorado River Modeling Report, in the April 2016 Final Surface Water Resources Study Report; and Section 5.3.3.2.3.1, Chapter 5, Exhibit E of the License Application.

This comment response addresses the following:

- Effects on Lake Powell water levels from LPP operations under natural flow and climate change conditions
- Sensitivity of Lake Powell water level effects regarding assumption that under the No Action Alternative the State would not use its water right elsewhere

### **Lake Powell Lake Levels for the No Action Alternative and Proposed Action – CRSS Direct Natural Flow**

The CRSS model runs assume under No Action that the State's water is not diverted and remains in Lake Powell, with all other reasonably foreseeable diversions held constant at 2015 quantities. Under the No Action, State water gradually accumulates in Lake Powell, similar to other unused Upper Basin allocations under the assumed operations, whereas under the Proposed Action, the CRSS model diverts the State's water through the Lake Powell Pipeline (LPP). The No Action Alternative assumption isolates the effect of adding a new project (LPP) to the mix of existing and reasonably foreseeable depletions in the Colorado River system. This assumption and associated CRSS modeling was used to evaluate impacts on all other resources, such as water quality and aquatic species.

Average Lake Powell elevations differences that would be experienced under the full CRSS simulation period (2015-2060) and under full LPP diversions (2048-2060) are shown in Table 1 in this response. Elevation changes shown in Table 1 in this response reflect the No Action Alternative assumption that the State of Utah would not use its water right.

**Table 1 (NPS Comment No. 51). Average End-of-Year Changes in Lake Powell Reservoir Elevation Under Natural Inflows**

Percentile	Changes in Reservoir Elevation Under Natural Inflows (feet) <sup>1</sup>					
	Entire CRSS Simulation Period (2015-2060)			CRSS Simulation Period Under Full LPP Diversions (2048-2060) <sup>2</sup>		
	No Action Alternative	Proposed Action	Difference	No Action Alternative	Proposed Action	Difference
90 <sup>th</sup> Percentile	3680.6	3680.4	-0.2	3683.9	3683.6	-0.3
50 <sup>th</sup> Percentile	3638.5	3637.1	-1.4	3646.4	3643.3	-3.1
10 <sup>th</sup> Percentile	3563.6	3559.9	-3.7	3575.5	3567.2	-8.2

Note:

<sup>1</sup> Elevation differences in Lake Powell would be on an average annual basis and would not be absolute or instantaneous. Figure 5-91 and Table 5-25 in Exhibit E of the License Application show additional information on lake elevation differences in CRSS simulations between LPP diversions and the No Action Alternative.

<sup>2</sup> Percentiles calculated from 2048 through 2060 under a full diversion of UBWR water (86,249 acre-feet) in Proposed Action only. The full delivery of LPP water commences in 2048 under direct natural flow conditions (see April 2016 Water Resources Final Study Report in the License Application). Changes in reservoir elevation between 2015 and 2047, when Proposed Action would not be at capacity, would be less.

All elevations for the three percentiles under the Action and No Action Alternatives would be within Lake Powell's normal operating range (elevations 3,490 to 3,700 feet mean sea level) as established by Reclamation. Even under other operational scenarios, the 50<sup>th</sup> and 90<sup>th</sup> percentile or 50 and 90 percent probability reservoir elevation differences would also be within anticipated operational ranges. Such scenarios include:

- reservoir elevation differences resulting from equalizing releases made by Reclamation to transfer water to Lake Mead
- reservoir elevation differences that occur when high flow releases from Glen Canyon Dam have been made during two to three day periods for sediment management downstream of Glen Canyon Dam

#### **Lake Powell Lake Levels for the No Action Alternative and Proposed Action – CRSS Climate Change**

The projected effects of climate change on Lake Powell reservoir elevations were also modeled in CRSS by Reclamation. In this analysis, the State's water is not used in the No Action Alternative and water gradually accumulates in Lake Powell. Average Lake Powell elevations differences that would occur under climate change conditions during the full CRSS simulation period (2015-2060) and under full LPP diversions (2048-2060) are shown in Table 2 in this response.

**Table 2 (NPS Comment No. 51). Average End-of-Year Changes in Lake Powell Reservoir Elevation Under Climate Change**

Percentile	Changes in Reservoir Elevation Under Climate Change (feet) <sup>1</sup>					
	Entire CRSS Simulation Period (2015-2060)			CRSS Simulation Period Under Full LPP Diversions (2049-2060) <sup>2</sup>		
	No Action Alternative	Proposed Action	Difference	No Action Alternative	Proposed Action	Difference
90 <sup>th</sup> Percentile	3677.4	3677.1	-0.3	3676.8	3675.9	-0.9
50 <sup>th</sup> Percentile	3610.3	3608.4	-2.0	3601.7	3597.3	-4.4
10 <sup>th</sup> Percentile	3430.7	3429.8	-0.9	3411.4	3409.7	-1.7

Note:

<sup>1</sup> Elevation differences in Lake Powell would be on an average annual basis and would not be absolute or instantaneous. Figure 5-92 and Table 5-25 in Exhibit E shows the lake elevation differences under climate change in CRSS simulations between LPP diversions and the No Action Alternative.

<sup>2</sup> Percentiles calculated from 2049 through 2060 under a full diversion of UBWR water (86,249 acre-feet) in Proposed Action only. The full delivery of LPP water commences in 2049 under climate change conditions (see April 2016 Water Resources Final Study Report in the License Application). Changes in reservoir elevation between 2015 and 2048, when Proposed Action would not be at capacity, would be less.

Elevations for the 90<sup>th</sup> and 50<sup>th</sup> percentiles would be within Lake Powell's normal operating range (elevations 3,490 to 3,700 feet mean sea level). Full LPP depletions under climate change at the 10<sup>th</sup> percentile for both the No Action Alternative and proposed action would cause average reservoir elevations to be below Lake Powell's normal operating range. The overriding cause of the low reservoir elevations at the 10<sup>th</sup> percentile would be climate change as these elevations are not reached under natural inflow conditions (see Table 1 in this response).

#### **No Action Alternative Sensitivity Analysis**

As mentioned, the No Action alternative assumes that if the LPP is not developed, Utah's unallocated water would not be used by the State. In the absence of LPP, however, it is likely that the State of Utah would use its water right elsewhere, and the water would not revert back to the U.S. government and would not enter Lake Powell. Such a project upstream from Lake Powell has not been defined. A sensitivity analysis was completed to examine the effects of this assumption only on Lake Powell water levels. The results of this sensitivity analysis were not directly applied to impact analyses for other resources.

For the sensitivity analysis, CRSS model results for the No Action Alternative were adjusted to remove the 86,249 acre-feet per year from Lake Powell inflows. Lake elevation differences between LPP diversions (full diversion volume) and the No Action Alternative under this assumption would be -0.6, -0.7, and -1.1 feet for the 90<sup>th</sup> percentile, 50<sup>th</sup> percentile, and 10<sup>th</sup> percentile, respectively (see Table 3 in this response). Sensitivity analysis results under climate change conditions are shown in Table 4 in this response.

This analysis demonstrates that the LPP effects on Lake Powell water levels are sensitive to the assumption that the State's water right would not be used and would accumulate in Lake Powell. If the State uses its water right elsewhere in the No Action Alternative then effects of LPP on

Lake Powell water levels would be minimal under most conditions. Similar to the CRSS analysis, full LPP depletions under climate change at the 10th percentile under this sensitivity analysis (Table 4) for both the No Action Alternative and proposed action would cause average reservoir elevations to be below Lake Powell's normal operating range. The overriding cause of the low reservoir elevations at the 10<sup>th</sup> percentile would be climate change.

**Table 3 (NPS Comment No. 51). Sensitivity Analysis Results – Average End-of-Year Changes in Lake Powell Reservoir Elevation Under Direct Natural Flow**

Percentile	Changes in Reservoir Elevation Under Natural Inflows (feet) <sup>1</sup>					
	<i>CRSS Analysis (Utah's Water Right Diverted Only in Proposed Action) – Simulation Period Under Full LPP Diversions (2048-2060)<sup>2</sup></i>			<i>Sensitivity Analysis (Utah's Water Right Diverted in Both No Action Alternative and Proposed Action) – Simulation Period Under Full LPP Diversion (2048-2060)<sup>2</sup></i>		
	No Action Alternative	Proposed Action	Difference	No Action Alternative	Proposed Action	Difference
90 <sup>th</sup> Percentile	3683.9	3683.6	-0.3	3684.2	3683.6	-0.6
50 <sup>th</sup> Percentile	3646.4	3643.3	-3.1	3644.1	3643.3	-0.7
10 <sup>th</sup> Percentile	3575.5	3567.2	-8.2	3568.3	3567.2	-1.1

Note:

<sup>1</sup> Elevation differences in Lake Powell would be on an average annual basis and would not be absolute or instantaneous.

<sup>2</sup> Percentiles calculated from 2048 through 2060 under a full diversion of UBWR water (86,249 acre-feet). The full delivery of LPP water commences in 2048 under direct natural flow conditions (see April 2016 Water Resources Final Study Report in the License Application). Changes in reservoir elevation between 2015 and 2047, when Proposed Action would not be at capacity, would be less.

**Table 4 (NPS Comment No. 51). Sensitivity Analysis Results – Average End-of-Year Changes in Lake Powell Reservoir Elevation Under Climate Change**

Percentile	Changes in Reservoir Elevation Under Climate Change (feet) <sup>1</sup>					
	<i>CRSS Analysis (Utah's Water Right Diverted Only in Proposed Action) – Simulation Period Under Full LPP Diversions (2049-2060)<sup>2</sup></i>			<i>Sensitivity Analysis (Utah's Water Right Diverted in Both No Action Alternative and Proposed Action) – Simulation Period Under Full LPP Diversion (2049-2060)<sup>2</sup></i>		
	No Action Alternative	Proposed Action	Difference	No Action Alternative	Proposed Action	Difference
90 <sup>th</sup> Percentile	3676.8	3675.9	-0.9	3676.5	3675.9	-0.6
50 <sup>th</sup> Percentile	3601.7	3597.3	-4.4	3598.2	3597.3	-0.9
10 <sup>th</sup> Percentile	3411.4	3409.7	-1.7	3412.8	3409.7	-3.0

Note:

<sup>1</sup> Elevation differences in Lake Powell would be on an average annual basis and would not be absolute or instantaneous.

<sup>2</sup> Percentiles calculated from 2049 through 2060 under a full diversion of UBWR water (86,249 acre-feet). The full delivery of LPP water commences in 2049 under climate change conditions (see April 2016 Water Resources Final Study Report in the License Application). Changes in reservoir elevation between 2015 and 2048, when Proposed Action would not be at capacity, would be less.

## **NPS Comment No. 59**

The following sections in Chapter 5, Exhibit E of the License Application are revised to incorporate cumulative effects of global climate change/regional drought conditions, Utah Department of Transportation (UDOT), GLCA Off-Road Vehicle Management Plan, and South Central Fiber Optic project/ROW with implementation of the LPP.

### **Surface Water Resources**

A new paragraph is added after the third paragraph in Section 5.3.3.4.1, Chapter 5, Exhibit E of the License Application and reads:

**Reclamation's updated CRSS model of the LPP prepared for UDWR in 2015 incorporates climate change inflow hydrology. The climate change inflow hydrology simulation results show a 90 percent probability that Lake Powell elevation with LPP full depletion would average 3675.9 feet MSL in any one year between 2049 and 2060, 0.9 feet below the No Action CRSS modeled elevation. The climate change simulation results show a 50 percent probability that Lake Powell elevation with LPP full depletion would average 3597.3 feet MSL in any one year between 2049 and 2060, 4.4 feet below the No Action CRSS modeled elevation. The cumulative effects of climate change inflow hydrology and LPP full depletion at the 90th and 50th percentiles would not be significant on Lake Powell elevations and other associated resources.**

**The LPP Proposed Action could have cumulative effects on surface water resources under climate change conditions at the 10th percentile when combined with interrelated actions including:**

- **Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead EIS and ROD**
- **Operation of Glen Canyon Dam EIS and ROD**
- **Interim Surplus Criteria EIS and ROD**
- **Bureau of Reclamation and National Park Service LTEMP EIS and ROD**

**The climate change simulation results show a 10 percent probability that Lake Powell elevation with LPP full depletion would average 3409.7 feet MSL in any one year between 2049 and 2060, 1.7 feet below the LPP No Action CRSS-modeled elevation. Elevations at the 10th percentile of climate change inflow hydrology conditions for both the No Action Alternation and Proposed Action would be below Lake Powell's normal operating range. The climate change inflow hydrology would be the primary cause of the lowered reservoir elevation in Lake Powell, and the combination of LPP depletions and one or more of the other interrelated actions could result in a significant cumulative effect.**

### **Surface Water Quality**

Cumulative effects on surface water quality at Lake Powell are discussed in the response to NPS Comment No. 113 in this revised Narrative Response document.

### **Aquatic Resources**

The first paragraph in Section 5.3.6.4.1, Chapter 5, Exhibit E of the License Application is revised to read: **The Proposed Action would have no measurable long-term effects on aquatic resources and therefore would have no measurable long-term cumulative effects on aquatic resources when combined with past, present and reasonably foreseeable future interrelated actions. The LPP Proposed Action could have cumulative effects on aquatic resources in Lake Powell under climate change conditions at the 10th percentile when combined with interrelated actions including:**

- Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead EIS and ROD
- Operation of Glen Canyon Dam EIS and ROD
- Interim Surplus Criteria EIS and ROD
- Bureau of Reclamation and National Park Service LTEMP EIS and ROD

Low reservoir elevations below Lake Powell's normal operating range, resulting from 10th percentile climate change inflow hydrology conditions as modeled by Reclamation, would be lowered further by the combination of the LPP Proposed Action depletions and one or more of the listed interrelated actions. The climate change inflow hydrology would be the primary cause of the lowered reservoir elevation in Lake Powell, and the combination of LPP depletions and one or more of the other interrelated actions would further lower the reservoir level by 1.7 feet at the 10th percentile of climate change inflow conditions. Indirect cumulative effects on aquatic resources and their habitat in Lake Powell would include increased water temperatures, decreased dissolved oxygen concentrations, and decreased usable habitat area. These cumulative effects could be significant.

#### **Special Status Aquatic Species**

The first paragraph in Section 5.3.7.4.1, Chapter 5, Exhibit E of the License Application is revised to read: **The Proposed Action would have no measurable long-term effects on special status aquatic resources and therefore would have no measurable long-term cumulative effects on special status aquatic resources when combined with past, present and reasonably foreseeable future interrelated actions. The LPP Proposed Action could have cumulative effects on special status aquatic resources in Lake Powell under climate change conditions at the 10th percentile when combined with interrelated actions including:**

- Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead EIS and ROD
- Operation of Glen Canyon Dam EIS and ROD
- Interim Surplus Criteria EIS and ROD
- Bureau of Reclamation and National Park Service LTEMP EIS and ROD

Low reservoir elevations below Lake Powell's normal operating range, resulting from 10th percentile climate change inflow hydrology conditions as modeled by Reclamation, would be lowered further by the combination of the LPP Proposed Action depletions and one or more of the listed interrelated actions. The climate change inflow hydrology would be the primary cause of the lowered reservoir elevation in Lake Powell, and the combination of LPP depletions and one or more of the other interrelated actions would further lower the reservoir level by 1.7 feet at the 10th percentile of climate change inflow conditions. Indirect cumulative effects on special status aquatic resources and their habitat in Lake Powell would include increased water temperatures, decreased dissolved oxygen concentrations, and decreased usable habitat area. These cumulative effects could be significant.

#### **Vegetation Resources**

A new paragraph is inserted after the fourth paragraph in Section 5.3.8.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action would have direct cumulative effects on vegetative communities when combined with the direct effects of UDOT Highway 89 widening projects. Vegetation removed for LPP construction combined with vegetation permanently removed for UDOT Highway 89 widening construction would increase the disturbance of**

**vegetation communities along the parallel corridors. These cumulative effects would not be significant because of the relatively large amount of surrounding vegetation communities that would not be disturbed by the construction activities. These cumulative effects would be long-term because revegetation of the LPP alignment with shrub species could take 20 to 30 years.**

A new paragraph is inserted after the fourth paragraph in Section 5.3.8.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action would have direct cumulative effects on vegetative communities when combined with the direct effects of the South Central Communications Fiber Optic Project in the Highway 89 ROW from Kanab to Page. Vegetation removed for LPP construction combined with vegetation permanently removed for the South Central Communications Fiber Optic Project construction would increase the disturbance of vegetation communities along the parallel corridors. These cumulative effects would not be significant because of the relatively large amount of surrounding vegetation communities that would not be disturbed by the construction activities. These cumulative effects would be long-term because revegetation of the LPP alignment with shrub species could take 20 to 30 years.**

#### **Wetland and Riparian Resources**

The first paragraph in Section 5.3.9.4.1, Chapter 5, Exhibit E of the License Application is revised to read: **The Proposed Action could have unmeasurable cumulative effects on wetland and riparian resources when combined with past, present and reasonably foreseeable future actions involving operations of Glen Canyon Dam. These potential minor cumulative effects could occur on wetland and riparian resources in Lake Powell and the Colorado River downstream from Glen Canyon Dam. The Proposed Action could have unmeasurable cumulative effects when combined with the effects of climate change and past, present and reasonably foreseeable future actions involving operations of Glen Canyon Dam. These potential minor cumulative effects could occur on wetland and riparian resources in Lake Powell and the Colorado River downstream from Glen Canyon Dam.**

A new paragraph is inserted after the first paragraph in Section 5.3.9.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action could have minor cumulative effects on riparian resources when combined with the effects of UDOT Highway 89 widening projects. These potential minor cumulative effects could occur on riparian resources along the parallel alignments of Highway 89 and would be short-term if construction occurred during the same periods.**

A new paragraph is inserted after the first paragraph in Section 5.3.9.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action could have minor cumulative effects on riparian resources when combined with the effects of the South Central Communications Fiber Optic Project. These potential minor cumulative effects could occur on riparian resources along the parallel alignments where the fiber optic cable construction resulted in riparian vegetation removal and would be short-term until removed riparian vegetation is restored to previous functions.**

#### **Special Status Plant Species**

A new paragraph is inserted after the third paragraph in Section 5.3.10.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action could have minor cumulative effects on special status plant species when combined with the effects of UDOT Highway 89 widening projects. These potential long-term cumulative effects could occur on special status plant species along the parallel alignments of the LPP and Highway 89 widened segments until the LPP disturbed area is revegetated with the special status plant species.**



A new paragraph is inserted after the third paragraph in Section 5.3.10.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action could have minor cumulative effects on special status plant species when combined with the effects of the South Central Communications Fiber Optic Project. These potential long-term cumulative effects could occur on special status plant species along the parallel alignments where the fiber optic cable construction resulted in special status plant species removal and would be long-term until removed special status plant species are restored to pre-construction conditions.**

#### **Wildlife Resources**

A new paragraph is inserted after the third paragraph in Section 5.3.11.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action could have minor cumulative effects on wildlife resources when combined with the effects of UDOT Highway 89 widening projects. These potential short-term and long-term cumulative effects could occur on wildlife resources along the parallel alignments of the LPP and Highway 89 widened segments until the LPP disturbed area is revegetated to pre-construction conditions.**

A new paragraph is inserted after the third paragraph in Section 5.3.11.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action could have minor cumulative effects on wildlife resources when combined with the effects of UDOT Highway 89 widening projects. These potential short-term and long-term cumulative effects could occur on wildlife resources along the parallel alignments of the LPP and Highway 89 widened segments until the LPP disturbed area is revegetated to pre-construction conditions.**

A new paragraph is inserted after the third paragraph in Section 5.3.11.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action could have minor cumulative effects on wildlife resources when combined with the effects of the GLCA pending Off-Road Vehicle Management Plan and LPP construction. These potential short-term cumulative effects could occur on wildlife resources in the Ferry Swale area during LPP transmission line construction and at the intersection of GLCA GMP roads with the LPP alignment construction. There would be no measurable long-term cumulative effects on wildlife resources from LPP construction and the GLCA pending Offroad Vehicle management plan.**

A new paragraph is inserted after the third paragraph in Section 5.3.11.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action could have minor cumulative effects on wildlife resources when combined with the effects of the South Central Communications Fiber Optic Project. These potential long-term cumulative effects could occur on wildlife resources along the parallel alignments where the fiber optic cable construction resulted in shrub species removal and would be long-term until shrub species are restored to pre-construction conditions.**

#### **Special Status Wildlife Resources**

A new paragraph is inserted after the third paragraph in Section 5.3.12.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action could have minor cumulative effects on special status wildlife species when combined with the effects of UDOT Highway 89 widening projects. These potential short-term and long-term cumulative effects could occur on special status wildlife species along the parallel alignments of the LPP and Highway 89 widened segments until the LPP disturbed area is revegetated to pre-construction conditions.**

A new paragraph is inserted after the third paragraph in Section 5.3.12.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action could have minor cumulative effects on special status wildlife species when combined with the effects of the GLCA pending Off-Road Vehicle**

**Management Plan and LPP construction. These potential short-term cumulative effects could occur on special status wildlife species in the Ferry Swale area during LPP transmission line construction and at the intersection of GLCA GMP roads with the LPP alignment construction. There would be no measurable long-term cumulative effects on special status wildlife species from LPP construction and the GLCA pending Off-road Vehicle management plan.**

A new paragraph is inserted after the third paragraph in Section 5.3.12.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action could have minor cumulative effects on special status wildlife species when combined with the effects of the South Central Communications Fiber Optic Project. These potential long-term cumulative effects could occur on special status wildlife species along the parallel alignments where the fiber optic cable construction resulted in special status wildlife species habitat removal and would be long-term until habitats are restored to preconstruction conditions.**

#### **Recreation Resources**

A new paragraph is inserted after the third paragraph in Section 5.3.13.4.1, Chapter 5, Exhibit E of the License Application and reads: **The LPP Proposed Action could have cumulative effects on recreation resources under climate change conditions at the 10th percentile when combined with interrelated actions including:**

- **Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead EIS and ROD**
- **Operation of Glen Canyon Dam EIS and ROD**
- **Interim Surplus Criteria EIS and ROD**
- **Bureau of Reclamation and National Park Service LTEMP EIS and ROD**

**Low reservoir elevations below Lake Powell's normal operating range, resulting from 10th percentile climate change inflow hydrology conditions as modeled by Reclamation, would be lowered further by the combination of the LPP Proposed Action depletions and one or more of the listed interrelated actions. The climate change inflow hydrology would be the primary cause of the lowered reservoir elevation in Lake Powell, and the combination of LPP depletions and one or more of the other interrelated actions would further lower the reservoir level by 1.7 feet at the 10th percentile of climate change inflow conditions. Cumulative effects on recreation resources in Lake Powell would include effects to marinas and other lake-side concessions and reduced surface area for lake-base recreation activities. These cumulative effects could be significant.**

A new paragraph is inserted after the third paragraph in Section 5.3.13.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action could have minor cumulative effects on recreation resources when combined with the effects of UDOT Highway 89 widening projects. These potential short-term cumulative effects could occur on recreation resources at specific recreation access locations along the parallel alignments of the LPP and Highway 89 widened segments until the LPP construction is completed and access is restored to pre-construction conditions.**

#### **Transportation**

A new paragraph is inserted after the third paragraph in Section 5.3.15.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action could have minor cumulative effects on transportation when combined with the effects of UDOT Highway 89 widening projects. These potential short-term cumulative effects could occur on Highway 89 traffic and infrastructure in specific locations along the parallel alignments of the LPP and Highway 89 widened segments until**

the LPP construction is completed. Minor traffic delays could occur on Highway 89 in areas where highway widening and LPP construction traffic are coincident.

#### **Visual Resources**

A new paragraph is inserted before the first paragraph in Section 5.3.16.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action could have cumulative effects on visual resources under climate change conditions at the 10th percentile when combined with interrelated actions including:**

- **Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead EIS and ROD**
- **Operation of Glen Canyon Dam EIS and ROD**
- **Interim Surplus Criteria EIS and ROD**
- **Bureau of Reclamation and National Park Service LTEMP EIS and ROD**

Low reservoir elevations below Lake Powell's normal operating range, resulting from 10th percentile climate change inflow hydrology conditions as modeled by Reclamation, would be lowered further by the combination of the LPP Proposed Action depletions and one or more of the listed interrelated actions. The climate change inflow hydrology would be the primary cause of the lowered reservoir elevation in Lake Powell, and the combination of LPP depletions and one or more of the other interrelated actions would further lower the reservoir level by 1.7 feet at the 10th percentile of climate change inflow conditions. Cumulative effects on visual resources at Lake Powell would include increased color, line, form and texture contrasts along the exposed shoreline of the reservoir. These cumulative effects could be significant.

A new paragraph is inserted after the new first paragraph in Section 5.3.16.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action would have short-term cumulative effects on visual resources when combined with the effects of UDOT Highway 89 widening projects. These potential short-term cumulative effects of contrasts in color, line, form and texture would occur at coincident construction locations along the parallel alignments of the LPP and Highway 89 widened segments. The potential cumulative effects on visual resources would occur until the LPP coincident construction with Highway 89 widening is completed.**

#### **Air Quality**

The first paragraph in Section 5.3.17.4.1, Chapter 5, Exhibit E of the License Application is revised to read: **The Proposed Action could have minor cumulative effects on air quality under climate change conditions at the 10th percentile when combined with interrelated actions including:**

- **Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead EIS and ROD**
- **Operation of Glen Canyon Dam EIS and ROD**
- **Interim Surplus Criteria EIS and ROD**
- **Bureau of Reclamation and National Park Service LTEMP EIS and ROD**

Low reservoir elevations below Lake Powell's normal operating range, resulting from 10th percentile climate change inflow hydrology conditions as modeled by Reclamation, would be lowered further by the combination of the LPP Proposed Action depletions and one or more of the listed interrelated actions. The climate change inflow hydrology would be the primary cause of the lowered reservoir elevation in Lake Powell, and the combination of LPP depletions and one or more of the other interrelated actions would further lower the reservoir level by 1.7 feet at the 10th percentile of climate change inflow conditions. Cumulative effects on air quality in Lake Powell

could include increased fugitive dust along the exposed shoreline of the reservoir. These minor cumulative effects would not be significant.

A new paragraph is inserted after the new first paragraph in Section 5.3.17.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action could have minor cumulative effects on air quality when combined with the effects of UDOT Highway 89 widening projects. These potential short-term cumulative effects could increase fugitive dust and equipment emissions at coincident construction locations along the parallel alignments of the LPP and Highway 89 widened segments. The potential cumulative effects on air quality could occur until the LPP coincident construction with Highway 89 widening is completed and disturbed soils are revegetated.**

### **Archaeological and Historic-era Resources**

Cumulative effects on archaeological and historic-era resources at Lake Powell are discussed in the response to NPS Comment No. 113 in this revised Narrative Response document.

A fifth bullet is added to the first paragraph in Section 5.3.19.4, Chapter 5, Exhibit E of the License Application and reads:

- **UDOT Highway 89 Widening Projects**

A new subsection is added to Section 5.3.19.4, Chapter 5, Exhibit E of the License Application and reads: **5.3.19.4.5 UDOT Highway 89 Widening Projects. Highway 89 parallel to the LPP alignment has been widened under past actions and further widening is planned, which would affect previously identified sites and sites determined eligible for NRHP listing. Construction disturbance of cultural resource sites along the LPP alignment and Highway 89 where widening activities would occur would have cumulative effects on cultural resources. These cumulative effects on cultural resource sites would be significant.**

### **Ethnographic Resources**

Cumulative effects on ethnographic resources at Lake Powell are discussed in the response to NPS Comment No. 113 in this revised Narrative Response document.

The first paragraph in Section 5.3.20.4.1, Chapter 5, Exhibit E of the License Application is revised to read: **The Proposed Action combined with UDOT Highway 89 Widening Projects would have no known direct cumulative effects on identified sites important to the tribes. The Proposed Action combined with UDOT Highway 89 Widening Projects would have long-term indirect cumulative effects on identified sites, cultural landscapes and regions important to tribes throughout the Colorado River basin.**

A new paragraph is inserted after the first paragraph in Section 5.3.20.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action combined with GLCA pending Off-road Vehicle Management Plan would have no known direct cumulative effects on identified sites important to the tribes. The Proposed Action combined with GLCA pending Off-road Vehicle Management Plan would have long-term indirect cumulative effects on identified sites, cultural landscapes and regions important to tribes throughout the Colorado River basin.**

A new paragraph is inserted after the first paragraph in Section 5.3.20.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action combined with the South Central Communications Fiber Optic Project would have no known direct cumulative effects on identified sites important to the tribes. The Proposed Action combined with the South Central Communications Fiber Optic Project would have long-term indirect cumulative effects on**

identified sites, cultural landscapes and regions important to tribes throughout the Colorado River basin.

### **Paleontological Resources**

A new paragraph is inserted before the first paragraph in Section 5.3.21.4.1, Chapter 5, Exhibit E of the License Application and reads: **The Proposed Action combined with UDOT Highway 89 Widening Projects would have no known direct cumulative effects on paleontological sites. The Proposed Action combined with UDOT Highway 89 Widening Projects could have long-term indirect cumulative effects on paleontological sites where coincident construction occurs.**

### **Energy Resources**

The fifth bullet in the second paragraph in Section 5.3.22.4, Chapter 5, Exhibit E of the License Application is revised to read:

- **Bureau of Reclamation and National Park Service LTEMP EIS and ROD**

A new paragraph is added after the third paragraph in Section 5.3.22.4, Chapter 5, Exhibit E of the License Application and reads: **The LPP Proposed Action could have cumulative effects on energy resources under climate change conditions at the 10<sup>th</sup> percentile when combined with interrelated actions including:**

- **Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead EIS and ROD**
- **Operation of Glen Canyon Dam EIS and ROD**
- **Interim Surplus Criteria EIS and ROD**
- **Bureau of Reclamation and National Park Service LTEMP EIS and ROD**

**Low reservoir elevations below Lake Powell's normal operating range, resulting from 10<sup>th</sup> percentile climate change inflow hydrology conditions as modeled by Reclamation, would be lowered further by the combination of the LPP Proposed Action depletions and one or more of the listed interrelated actions. The climate change inflow hydrology would be the primary cause of the lowered reservoir elevation in Lake Powell, and the combination of LPP depletions and one or more of the other interrelated actions would further lower the reservoir level by 1.7 feet at the 10<sup>th</sup> percentile of climate change inflow conditions. Cumulative effects on energy resources associated with Lake Powell would include suspended hydroelectric generation during the period the reservoir is below the minimum power pool elevation. These cumulative effects on energy resources could be significant.**

A new paragraph is added after the third paragraph in Section 5.3.22.4, Chapter 5, Exhibit E of the License Application and reads: **The LPP Proposed Action combined with UDOT Highway 89 Widening Projects would have short-term negligible cumulative effects on energy resources. Construction equipment consumption of fuel during construction of the LPP and Highway 89 would result in negligible cumulative effects on energy resources during the period of coincident construction.**

A new paragraph is added after the third paragraph in Section 5.3.22.4, Chapter 5, Exhibit E of the License Application and reads: **The LPP Proposed Action combined with GLCA pending Off-road Vehicle Management Plan could have short-term minor cumulative effects on socioeconomics. ORV rentals, use of trails and guided tours would be temporarily suspended in the Ferry Swale area during transmission line construction to protect public safety and avoid conflicts in using the same access roads. ORV rentals, use of trails and guided tours involving GLCA GMP roads intersecting**

**with the LPP alignment construction would be temporarily re-routed around active construction areas and could lead to voluntary avoidance of affected roads. These short-term cumulative effects on socioeconomics would not be significant.**

### **NPS Comment No. 107**

The first paragraph and Table 5-157 in Section 5.3.18.1.2.1, Chapter 5, Exhibit E of the License Application are revised to read: **A field investigation was performed to collect existing ambient sound level data along the LPP alternative alignments in July 2009. Recorded peak sound levels were generally below 70 dBA except at roadways with vehicular traffic, which were as high as 89 dBA. Field-measured existing ambient sound levels were typically at or below 52 dBA except near roadways or waterways. Table 5-157 details the existing ambient sound level field data gathered in the region. The approximate locations of field data measurements collected along the LPP area of potential effect are shown in Figures 5-210 (Water Conveyance System Decibel Contours), 5-211 (Hydro System Decibel Contours), 5-212 (Water Conveyance System Transmission Decibel Contours), and 5-213 (Hydro System Transmission Decibel Contours). Additionally, NPS provided existing ambient sound level data for NPS-administered land at locations shown in Table 5-157.**

**Table 5-157**  
**LPP Existing Ambient Sound Level Measurement Field Data**

**Page 1 of 2**

<b>Location</b>	<b>Existing Ambient Level (dBA)</b>	<b>Peak Level (dBA)</b>	<b>Comments</b>
<b>Water Conveyance System (see Figures 5-210, 5-212 and 5-213a for sound level measurement locations)</b>			
LPP Water Intake Pump Station Site	36 <sup>a</sup>	66	Vehicle traffic on Highway 89, wind
LPP BPS-1 Site	35 <sup>a</sup>	66	Vehicle traffic on Highway 89, wind
Unnamed wash east of Blue Pool Wash at LPP crossing	31 <sup>a</sup>	54	Vehicle traffic on Highway 89, wind
Blue Pool Wash at LPP crossing	31 <sup>a</sup>	62	Vehicle traffic on Highway 89, wind
"Wetland" West of Blue Pool Wash at LPP crossing	30 <sup>a</sup>	54	Vehicle traffic on Highway 89, wind
2nd wash east of Big Water at LPP crossing	32 <sup>a</sup>	64	Vehicle traffic on Highway 89, wind
Unnamed wash at GSENM trailhead east of Paria River at LPP crossing	<50	68	Vehicle traffic on Highway 89, wind
Paria River south side at LPP crossing alternative	54	70	Vehicle traffic on Highway 89, wind
<b>Hydro System (see Figures 5-211 and 5-213 for sound level measurement locations)</b>			
Johnson Canyon Wash at LPP crossing	51	64	Vehicle traffic on Highway 89, wind
White Sage Wash access road in AZ	<50	64	Sound caused by wind
Jacob Canyon at LPP crossing on Southeast Corner Alternative	51	79	Sound caused by wind
Jacob Canyon at LPP crossing on SE corner Kaibab-Paiute Indian Reservation – Proposed Action	<50	51	Slight sound caused by wind
Jacob Canyon at confluence with Kanab Creek at LPP crossing – Proposed Action	<50	64	Sound caused by wind
Bitter Seeps Wash at LPP crossing for Proposed Action	<50	<50	No wind
Kanab Creek at LPP crossing of Existing Highway Alternative	<50	<50	No wind
Cottonwood Creek at LPP crossing on Kaibab-Paiute Indian Reservation - Existing Highway Alternative	<50	68	Vehicle traffic on Highway 389
Two-Mile Wash at LPP crossing on Kaibab-Paiute Indian Reservation - Existing Highway Alternative	<50	59	Vehicle traffic on Highway 389
Two-Mile Wash at Toroweap Road crossing	<50	60	Sound caused by wind
Unnamed wash E. of Two-Mile Wash at LPP crossing on Kaibab-Paiute Indian Reservation - Existing Highway Alternative	51	89	Vehicle traffic on Highway 389; sound caused by wind
Unnamed wash west of Pipe Springs at LPP crossing on Kaibab-Paiute Indian Reservation - Existing Highway Alternative	<50	78	Vehicle traffic on Highway 389



**Table 5-157**  
**LPP Existing Ambient Sound Level Sound Level Measurement Field Data**

**Page 2 of 2**

<b>Location</b>	<b>Existing Ambient Level (dBA)</b>	<b>Peak Level (dBA)</b>	<b>Comments</b>
Short Creek at LPP crossing in Colorado City	52	64	Proximity to Highway 389 traffic influenced sound levels
Short Creek at LPP crossing in Canaan Gap area (East Crossing)	<50	62	Measureable sound caused by wind
Short Creek at LPP crossing in Canaan Gap area (West Crossing)	<50	51	Slight sound caused by wind
Hydro System (see Figures 5-211 and 5-213 for sound level measurement locations)			
Unnamed wash south of Hurricane Cliffs forebay site at LPP crossing	<50	53	Slight sound caused by wind
Gould Wash at TL crossing	<50	50	Slight sound caused by wind
Sand Hollow Reservoir West Dam	66	72	Measureable sound caused by wind
Hurricane West substation site	68	77	Measureable sound caused by wind
<p>Notes:</p> <p><sup>a</sup>NPS geospatial existing ambient model used to estimate existing ambient sound levels in GLCA, available at: <a href="https://irma.nps.gov/DataStore/Reference/Profile/2217356">https://irma.nps.gov/DataStore/Reference/Profile/2217356</a></p> <ol style="list-style-type: none"> <li>1. All sound level measurements recorded on a Realistic Sound Level Meter. All sound level measurements recorded in dBA.</li> <li>2. Vehicle traffic sounds are generated by mobile sources. Sound generated by wind is considered temporary.</li> <li>3. Existing ambient sound levels were recorded over a 30-second period.</li> <li>4. Peak sound levels recorded represent maximum sound generated over the 30-second period of measurement. Peak levels attributed to wind is not microphone flow-induced noise (wind turbulence) and the requirements of ANSI 12.9-2013 Part 3, section 6.3 (b) maximum wind velocity were met.</li> <li>5. Data collected on 7/23/2009 and 7/24/2009 (MWH 2009).</li> <li>6. TL = Transmission Line</li> </ol>			

### **NPS Comment No. 110**

Further explanation on how noise from highways compare with access roads is provided as requested. The first bullet in the first paragraph in Section 5.3.18.2.2, Chapter 5, Exhibit E of the License Application is revised to read: **Existing traffic noise is 85 dBA along much of the LPP alignment, including Highway 89 through Glen Canyon National Recreation Area and Grand Staircase-Escalante National Monument. The noise created from LPP temporary construction access road use parallel to the highways would be inconsequential relative to the highway noise. The LPP alignment construction access road parallel to Highway 89 in GLCA would be within 40 to 70 feet of the existing pavement edge. Average annual daily traffic (AADT) at the Utah/Arizona state line is 3,130 comprised primarily of semi-trucks with trailers, over-sized recreational vehicles, and tour buses. The LPP construction traffic would be approximately 28 AADT consisting of pickup trucks (average 75 dBA), pipeline delivery trucks (average 76 dBA, peak 90 dBA), water trucks (average 76 dBA, peak 90 dBA), and service trucks (average 76 dBA, peak 90 dBA) (see Table 5-155). LPP temporary construction access road traffic noise would have lower sound levels than the Highway 89 traffic. Therefore, LPP temporary access road traffic noise is not analyzed further.**

### **NPS Comment No. 113**

NPS Comment No. 113 requests further analysis regarding how LPP withdrawals would affect Lake Powell levels and cultural resources along the shoreline. Please see the response to NPS Comment No. 51 in the revised Narrative Response document for a discussion on assumptions regarding use of the State of Utah's water rights in the various alternatives. Please see the response to NPS Comment No. 51 in this revised Narrative Response document to review the hydrological modeling performed by Reclamation on Lake Powell and for clarification regarding cumulative effects on surface water resources under climate change conditions. The below response and associated text changes address comments regarding cultural resources.

The effects analysis for archaeological and historic-era resources is presented in Section 5.3.19.2, Chapter 5, Exhibit E of the License Application. The effects analysis for ethnographic resources is presented in Section 5.3.20.2, Chapter 5, Exhibit E of the License Application.

#### *Archaeological and Historic-era Resources Direct Effects*

A new sentence is added to the first paragraph in Section 5.3.19.2.1, Chapter 5, Exhibit E of the License Application and reads: **Potential effects of the LPP diversion from Lake Powell on cultural resources along the reservoir shoreline would be negligible, as resulting reservoir elevations would be within the monthly normal operations elevations.**

#### *Archaeological and Historic-era Resources Cumulative Effects*

A new paragraph is added before the first paragraph in Section 5.3.19.4, Chapter 5, Exhibit E of the License Application and reads: **The LPP Proposed Action would have indirect cumulative effects on cultural resources along the Lake Powell shoreline under climate change conditions at the 10th percentile when combined with interrelated actions including:**

- **Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead EIS and ROD**
- **Operation of Glen Canyon Dam EIS and ROD**
- **Interim Surplus Criteria EIS and ROD**
- **Bureau of Reclamation and National Park Service LTEMP EIS and ROD**

**Low reservoir elevations below Lake Powell's normal operating range, resulting from 10th percentile climate change inflow hydrology conditions as modeled by Reclamation, would be lowered further by the combination of the LPP Proposed Action depletions and one or more of the listed interrelated actions. The climate change inflow hydrology would be the primary cause of the lowered reservoir elevation in Lake Powell, and the combination of LPP depletions and one or more of the other interrelated actions would further lower the reservoir level by 1.7 feet at the 10th percentile of climate change inflow conditions. These cumulative effects on cultural resources along the Lake Powell shoreline could be significant.**

#### *Ethnographic Resources Direct Effects*

A new sentence is added to the first paragraph in Section 5.3.20.2.1, Chapter 5, Exhibit E of the License Application and reads: **Potential effects of the LPP diversion from Lake Powell under the Proposed Action on cultural resources along the reservoir shoreline would be negligible, as resulting reservoir elevations would be within the monthly normal operations elevations.**

A new sentence is added to the first paragraph in Section 5.3.20.2.2, Chapter 5, Exhibit E of the License Application and reads: **Potential effects of the LPP diversion from Lake Powell under the Existing Highway Alternative on cultural resources along the reservoir shoreline would be negligible, as resulting reservoir elevations would be within the monthly normal operations elevations.**

*Ethnographic Resources Cumulative Effects*

A new paragraph is added after the first paragraph in Section 5.3.20.4.1, Chapter 5, Exhibit E of the License Application and reads: **The LPP Proposed Action would have indirect cumulative effects on cultural resources along the Lake Powell shoreline under climate change conditions at the 10th percentile when combined with interrelated actions including:**

- **Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead EIS and ROD**
- **Operation of Glen Canyon Dam EIS and ROD**
- **Interim Surplus Criteria EIS and ROD**
- **Bureau of Reclamation and National Park Service LTEMP EIS and ROD**

**Low reservoir elevations below Lake Powell's normal operating range, resulting from 10th percentile climate change inflow hydrology conditions as modeled by Reclamation, would be lowered further by the combination of the LPP Proposed Action depletions and one or more of the listed interrelated actions. The climate change inflow hydrology would be the primary cause of the lowered reservoir elevation in Lake Powell, and the combination of LPP depletions and one or more of the other interrelated actions would further lower the reservoir level by 1.7 feet at the 10th percentile of climate change inflow conditions. These cumulative effects on cultural resources along the Lake Powell shoreline could be significant.**

## **NPS Comment No. 114**

This comment response addresses assumptions regarding the surface water resource modeling, and provided additional information regarding Glen Canyon Dam release temperature impacts.

### **Surface Water Modeling Assumptions**

The U.S. Bureau of Reclamation (Reclamation) was contracted by UDWR to model the effects of LPP depletions (or withdrawals) on Lake Powell elevations. Reclamation is recognized as the U.S. Government's expert agency in operation and modeling of the Colorado River, Lake Powell and Glen Canyon Dam. Reclamation's LPP modeling results should be interpreted with consideration to the model assumptions. Reclamation's CRSS modeling of Lake Powell elevations for the LPP assumes that no new projects or depletions will occur in the Upper Basin (i.e., the Colorado River upstream of Glen Canyon Dam) by holding depletions constant at 2015 levels. Reclamation states in their CRSS report on LPP prepared for UDWR: "This model assumption adopts a rigorous definition of what reasonably foreseeable future depletions are in the Upper Basin and is consistent with DOI NEPA Implementing Regulations. Under this approach, a reasonably foreseeable future depletion is one which has state legislation, or a tribal resolution or Federal Indian water settlement, or a Federal finding of no significant impact (FONSI) or record of decision (ROD). These are the criteria of certainty that a future depletion would occur at a particular time and place.

It is recognized that the Upper Basin States may develop their compact allocated Colorado River water and that depletions may increase above 2015 levels in the future. The LPP alternatives modeling, however, is conservative and takes the strictest approach to defining what is included and excluded for the cumulative impact analysis required by the Council on Environmental Quality regulations at 40 CFR 1508.7 (Reclamation. 2015. Draft Lake Powell Pipeline Hydrologic Modeling. Prepared for UDWR by U.S. Bureau of Reclamation, Upper Colorado Region, Salt Lake City, Utah. Prepared by Katrina Grantz, Ph.D. September 2015. 24 pp.).

The 2007 Interim Guidelines EIS modeling and ROD were applied by Reclamation to the CRSS modeling for the LPP. The CRSS model runs with LPP depletions implement the Interim Guidelines through 2026 and revert to the 2007 Interim Guidelines Final EIS No Action Alternative for model years 2027 through 2060 because that is the reasonably foreseeable operation. CRSS model runs by Reclamation with LPP depletions at 86,249 acre-feet per year and the current operating regime (i.e., 2007 Interim Guidelines) were not performed or analyzed because such conditions are not in the reasonably foreseeable future. The LPP effects of 86,249 acre-feet per year depletion (full development of current UBR water rights for LPP) from Lake Powell are evaluated under post-Interim Guidelines operational policies because this condition is reasonably foreseeable and consistent with the 2007 Interim Guidelines FEIS and ROD.

During the UDWR and NPS meeting on February 1, 2017, clarification of 1) "recent modeling by Colorado West Slope water users", 2) who the referenced Colorado West Slope water users are, and 3) if copies of the referenced modeling results/reports are available, was requested by UDWR. The NPS response to this request is that Malcom Wilson, BOR, has the federal version of the Colorado West Slope Water Users Report. Malcom Wilson supervised and reviewed the CRSS modeling performed and updated for the LPP by Katrina Grantz, Ph.D., Reclamation Hydrologist. The CRSS modeling for LPP incorporated all reasonably foreseeable future depletions (withdrawals) in the Upper Basin and is consistent with DOI NEPA Implementing Regulations, as stated in Reclamation's report prepared for UDWR.

### **Surface Water Impacts – Direct Natural Inflow Hydrology**

NPS Comment No. 114 incorrectly assumes the 2007 Interim Guidelines operations extend beyond 2026 and when combined with potentially low Lake Powell elevations and the LPP full depletions, could trigger either a different Operating Tier and/or Drought Response at Upper Basin CRSPA reservoirs, resulting in the reservoir elevation to drop below the minimum power pool of 3490 feet MSL. As stated earlier in this response, the 2007 Interim Guidelines operations are in effect through 2026, and the FEIS No Action Alternative operations are in effect from 2027 through 2060. Both of these conditions are incorporated into the CRSS model on the LPP prepared by Reclamation for UDWR. The annual LPP depletions would be 15,468 acre-feet from 2024 through 2026, and subtracting this quantity from the lowest 10th percentile data point (3552.0 feet MSL) for Lake Powell end-of-December water elevations for the 2007 Interim Guidelines Preferred Alternative (Appendix R, Attachment C: CRSS Model Outputs, Figure BA-3 on page Att. C-2; and Appendix A, Attachment B: CRSS Model Documentation, Table Att. B-1 on page Att. B-3, 2007 FEIS Colorado River Interim Guidelines), the resulting Lake Powell elevation would be 3551.8 feet MSL. This elevation value is 61.8 feet above the Lake Powell minimum power pool elevation established by Reclamation. Therefore, the LPP depletions during the 2007 Interim Guidelines operations would not trigger a different Operating Tier, Drought Response at Upper Basin CRSP reservoirs (3525 feet MSL threshold elevation in Lake Powell), or decrease Lake Powell elevation below the minimum power pool elevation of 3490 feet MSL.

The 2007 Interim Guidelines operations between 2027 and 2060 would be as described for the FEIS No Action Alternative and ROD. LPP depletions from Lake Powell would gradually increase from 15,648 acre-feet annually in 2027 to 86,249 acre-feet annually in 2048, depending on the growing demand for M&I water from the LPP. The 10th percentile average No Action Alternative and Proposed Action elevations in Lake Powell during a period of full LPP depletions (2048-2060) would be 3568.3 feet MSL and 3567.2 feet MSL, respectively (corrected for not storing UBWR's water right in Lake Powell – see responses to NPS Comment No. 51 in this revised Narrative Response document regarding UBWR depletion of their water right from Lake Powell) These elevations would be over 75 feet above the Lake Powell minimum power pool elevation. Therefore, the LPP full depletion during the post-Interim Guidelines operating period would not trigger a Drought Response at Upper Basin CRSP reservoirs (3525 feet MSL threshold elevation in Lake Powell) or decrease Lake Powell elevation below the minimum power pool elevation of 3490 feet MSL.

The most conservative analysis of the combined effect of LPP full depletion and post-Interim Guidelines operation on Lake Powell elevations involves subtracting the LPP full depletion difference (1.1 feet, corrected for not storing UBWR's water right in Lake Powell – see responses to NPS Comment No. 51 in this revised Narrative Response document) from the lowest 10th percentile data point (3544.5 feet MSL) for Lake Powell end-of-December water elevations for the 2007 Interim Guidelines No Action Alternative (Appendix R, Attachment C: CRSS Model Outputs, Figure BA-3 on page Att. C-2; and Appendix A, Attachment B: CRSS Model Documentation, Table Att. B-1 on page Att. B-3, 2007 FEIS Colorado River Interim Guidelines). The resulting Lake Powell elevation at 10 percent probability would be 3543.4 feet MSL, which is 53.4 feet above the Lake Powell minimum power pool elevation. Therefore, the LPP full depletion during the post-Interim Guidelines operating period would not trigger a Drought Response at Upper Basin CRSP reservoirs (3525 feet MSL threshold elevation in Lake Powell) or decrease Lake Powell elevation below the minimum power pool elevation of 3490 feet MSL.

Reclamation's 2015 updated report on CRSS modeling of LPP prepared for UDWR acknowledges potential future depletions by Upper Basin states to utilize their full allocations could decrease Lake

Powell elevations; however, these future depletions are not in the reasonably foreseeable future consistent with DOI NEPA Implementing Regulations.

### **Surface Water Impacts – Climate Change Hydrology**

Reclamation's updated CRSS model of LPP prepared for UDWR in 2015 incorporates climate change inflow hydrology. The climate change inflow hydrology simulation results show a 90 percent probability that Lake Powell elevation with LPP full depletion would average 3675.9 feet MSL in any one year between 2049 and 2060, 0.60 feet below the No Action CRSS modeled elevation (corrected for UBWR full depletion of their water right – see responses to NPS Comment No. 51 in this revised Narrative Response document). The climate change simulation results show a 50 percent probability that Lake Powell elevation with LPP full depletion would average 3597.3 feet MSL in any one year between 2049 and 2060, 0.9 feet below the No Action CRSS modeled elevation (corrected for UBWR full depletion of their water right – see responses to NPS Comment No. 51 in this revised Narrative Response document). The 90th and 50th percentiles of Lake Powell elevations with LPP full depletion would not result in elevations below the minimum power pool.

The climate change simulation results show a 10 percent probability that Lake Powell elevation with LPP full depletion would average 3409.7 feet MSL in any one year between 2049 and 2060, 3.0 feet below the LPP No Action CRSS-modeled elevation of 3412.8 feet MSL (corrected for UBWR full depletion of their water right – see responses to NPS Comment No. 51 in this revised Narrative Response document). Therefore, the 10th percentile of CRSS modeled Lake Powell elevations with climate change inflow hydrology and full LPP depletions would trigger a Drought Response at Upper Basin CRSP reservoirs (3525 feet MSL threshold elevation in Lake Powell) and decrease Lake Powell elevation below the minimum power pool elevation of 3490 feet MSL. It is important to note that the predominate driver of this cumulative effect are the reduced inflows resulting from the most extreme projections of climate change. The 10th percentile CRSS model runs with climate change inflow hydrology but without LPP full depletions would still trigger a Drought Response at Upper Basin CRSP reservoirs and decrease Lake Powell elevation below the minimum power pool (see Figure 7 in Appendix 2, Reclamation Colorado River Modeling Report, in the Water Resources Final Study Report). The same scenario would occur when elevations are corrected for UBWR full depletion of their water right (see response to NPS Comment No. 51 in this revised Narrative Response document).

## **Surface Water Quality Impacts**

The following sections of Exhibit E, Chapter 5 (as amended by the March 31, 2017 Submission of Responses to Department of the Interior Agency Comments) are amended as follows.

### ***5.3.4.2 Environmental Effects***

#### **5.3.4.2.2 Proposed Action.**

##### ***5.3.4.2.2.3 Operations and Maintenance Effects.***

### **Lake Powell and Lower Colorado River Water Quality Effects**

#### ***Glen Canyon Dam Releases***

Modeled release results from Glen Canyon Dam for the No Action alternative and Proposed Action pipeline simulations were evaluated for effects on temperature, TDS, and dissolved oxygen concentrations. Simulated mean dam release temperatures for hydrology Trace 59 (a trace is a potential future reservoir inflow scenario) for the period 2045 to 2060 indicate that generally in the Proposed Action pipeline scenario, dam release temperatures are slightly colder in winter and spring months (colder by approximately 0.1°C) and slightly warmer (warmer by approximately 0.1°C) in summer and fall months compared with the No Action alternative scenario (Reclamation 2016). Hydrology Trace 59 was selected for evaluation as it covers a broad range of wet and dry conditions at Lake Powell (Reclamation 2016). When evaluated with an additional 99 hydrology traces, changes in median seasonal temperatures are less than 0.1°C (Figure 5-94A).

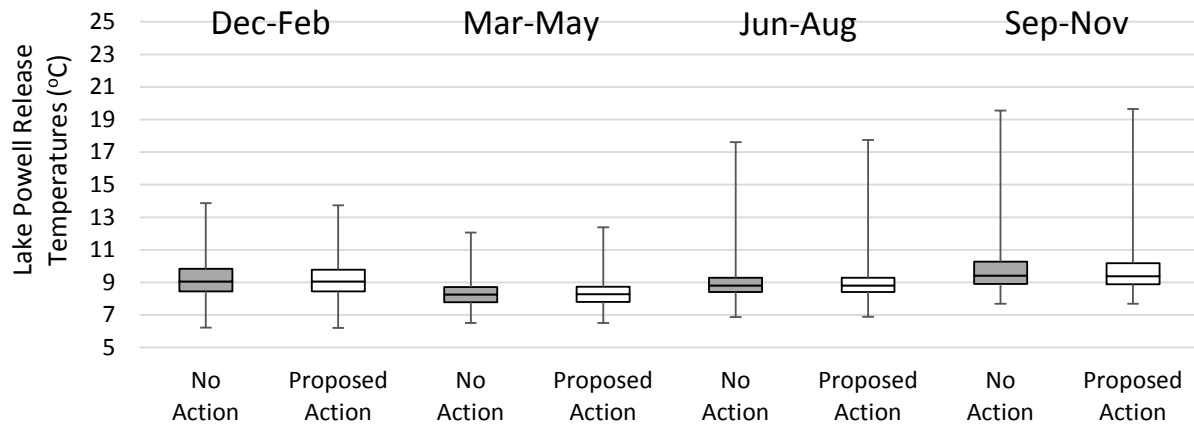
Glen Canyon Dam release temperatures often peak in October and simulated results show that when the reservoir is at or near full pool elevations, as was the case from 2050 to 2056, water temperatures of releases from the dam for the Proposed Action scenario were colder than in the No Action alternative scenario. The release temperatures from the dam in the pipeline scenarios are colder when the reservoir is near full capacity because of the removal of warm water from the upper, warm layer of the reservoir by the pipeline. Simulated release temperatures for the Proposed Action scenario were warmer than the No Action alternative scenario during summer and fall months when reservoir pool elevations were below full pool.

The largest differences between the Proposed Action scenario and the No Action alternative scenario for all 100 traces coincided with drier conditions and lower reservoir pool elevations (see 10<sup>th</sup> percentile temperatures in Figure 5-94B). Temperatures in wetter conditions (50<sup>th</sup> and 90<sup>th</sup> percentiles) are driven more by higher reservoir inflows and elevations, and less by small diversions. On average, the Trace 59 modeled results for the Proposed Action compared with the No Action alternative are within 0.1°C for the 2045-2060 period. For individual years, differences of up to 0.71°C were predicted (Reclamation 2016). For all 100 traces, average temperature changes between the Proposed Action and the No Action Alternative range between -0.1°C and 0.2°C. For individual months, differences range between -1.9°C and 0.5°C.

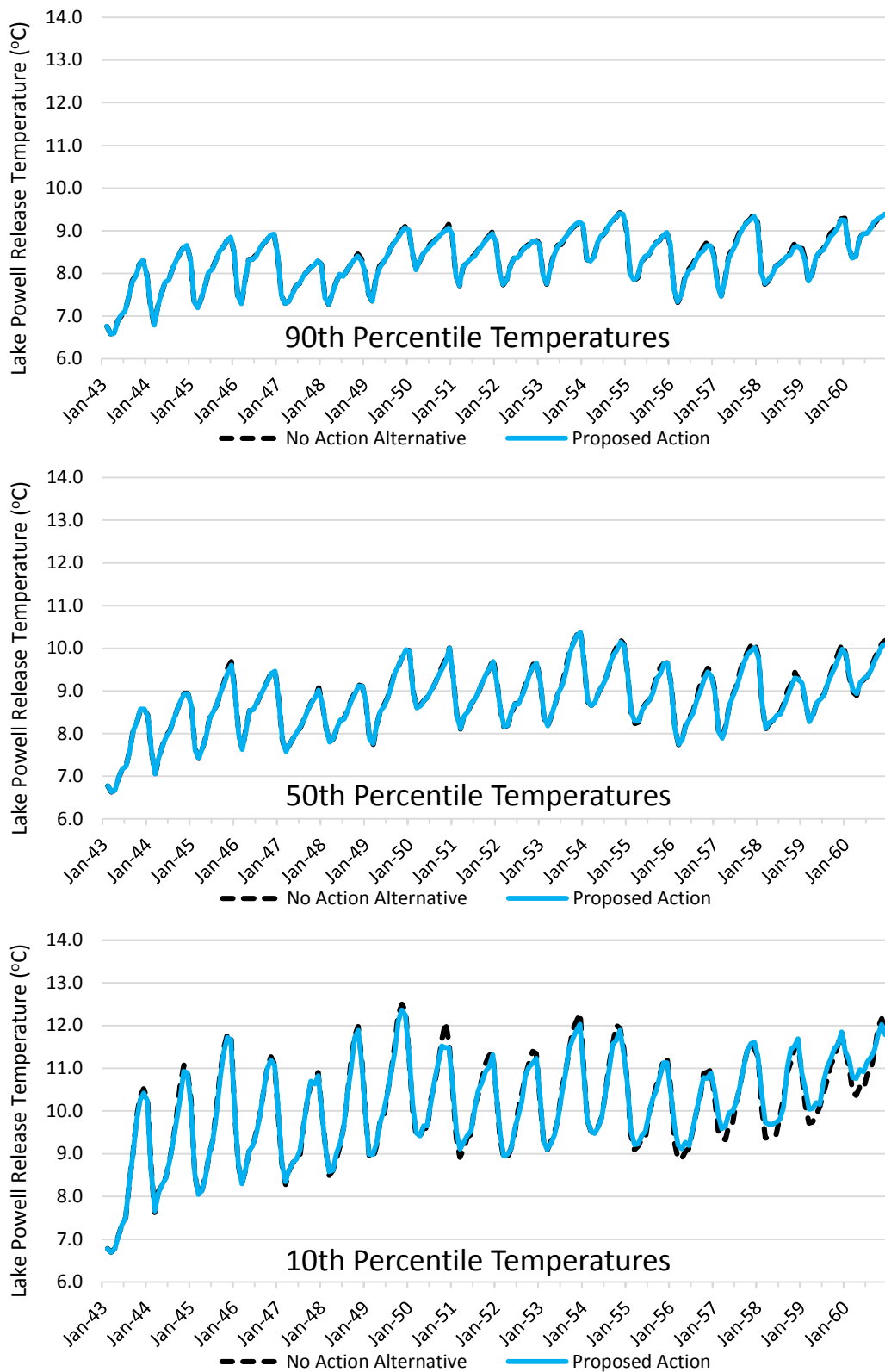
TDS results from the No Action alternative and Proposed Action models indicate that the average release TDS concentrations from 2045-2060 for the results of the three models would all be within 0.7 mg/L of each other. The Proposed Action average TDS values would be slightly higher than the No Action alternative (Reclamation 2016).



Dissolved oxygen results from the No Action alternative and Proposed Action models indicate that the average release dissolved oxygen concentrations from 2045-2060 for the two models would not vary (Reclamation 2016).



**Figure 5-94A. Seasonal Glen Canyon Dam Release Temperatures for the LPP Proposed Action**  
 (Note: Box plots represent the range of 100 hydrology traces; horizontal line = median; lower extent of box = 25th percentile; upper extent of box = 75th percentile; lower whisker = minimum; upper whisker = maximum.)



**Figure 5-94B. Glen Canyon Dam Release Temperature Percentiles for the LPP Proposed Action**

#### **5.3.4.4 Cumulative Effects**

##### **5.3.4.4.1 Proposed Action.**

The Proposed Action would have minimal short-term effects on surface water quality during construction. Therefore, there would be no measurable cumulative effects of the LPP alternatives on surface water quality when combined with other past, present, and reasonably foreseeable future actions. The unmeasurable short-term cumulative effects would not be significant.

The Proposed Action could have minimal long-term cumulative effects on surface water quality in Lake Powell and Glen Canyon Dam releases when combined with the following past, present, and reasonably foreseeable future actions during operations:

- Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead EIS and ROD
- Operation of Glen Canyon Dam EIS and ROD
- Interim Surplus Criteria EIS and ROD
- Bureau of Reclamation and National Park Service LTEMP EIS and ROD

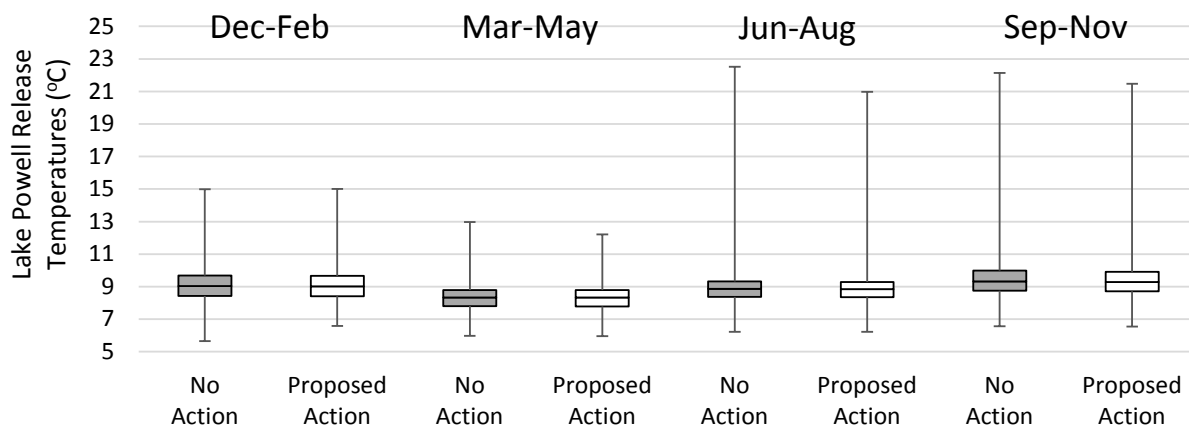
These interrelated actions determine the elevation, storage, release, operational timing, and volume of water in Lake Powell and release rates, release volumes, and operational timing of Glen Canyon Dam releases to the Colorado River. The Proposed Action would have minimal effects on surface water quality in Lake Powell, and when combined with these interrelated actions, there would be long-term minimal cumulative effects on surface water quality. Similarly, the Proposed Action would have minimal effects on Glen Canyon Dam release water quality and when combined with these interrelated actions, there would be long-term minimal cumulative effects on surface water quality. These long-term cumulative effects would not be physically measurable in Lake Powell and Glen Canyon Dam releases. However, these unmeasurable long-term cumulative effects would result from depletions up to 86,249 acre-feet per year from Lake Powell, and there would be minimal cumulative effects on Bureau of Reclamation operations and other actions implemented by the U.S. Department of the Interior. These cumulative effects on surface water quality would not be significant.

The LPP Proposed Action could have cumulative effects on surface water quality under climate change conditions at the 10th percentile when combined with interrelated actions including:

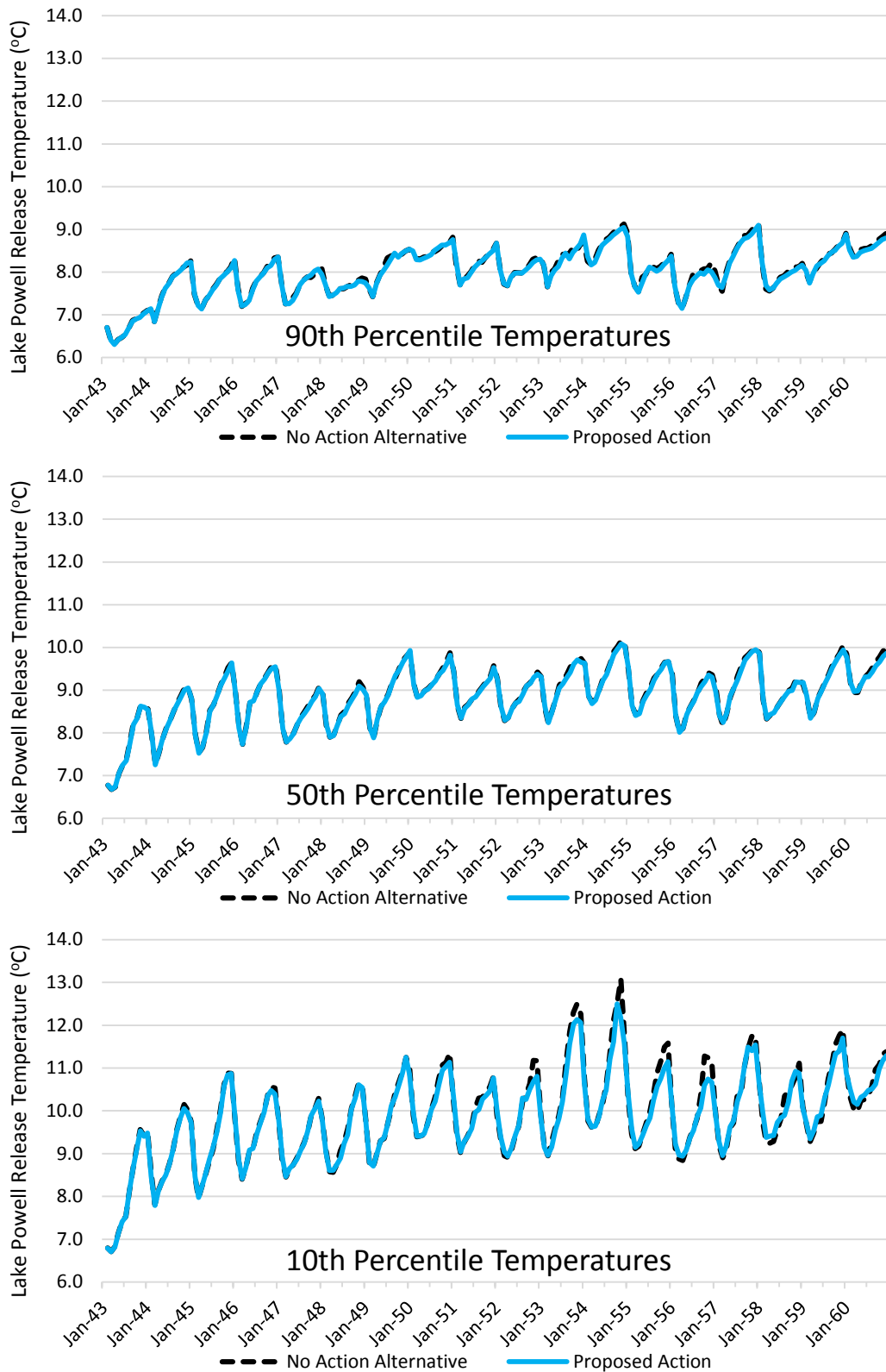
- Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lake Powell and Lake Mead EIS and ROD
- Operation of Glen Canyon Dam EIS and ROD
- Interim Surplus Criteria EIS and ROD
- Bureau of Reclamation and National Park Service LTEMP EIS and ROD

Low reservoir elevations below Lake Powell's normal operating range, resulting from 10th percentile climate change inflow hydrology conditions as modeled by Reclamation, would be lowered further by the combination of the LPP Proposed Action depletions and one or more of the listed interrelated actions. The climate change inflow hydrology would be the primary cause of the lowered reservoir elevation in Lake Powell, and the combination of LPP depletions and one or more of the other interrelated actions would further lower the reservoir level by 1.7 feet at the 10th percentile of climate change inflow conditions. Cumulative effects on surface water quality in Lake Powell would include increased and decreased water temperatures (Figure 5-94C), decreased

dissolved oxygen concentrations, and increased TDS concentrations. These cumulative effects would be significant.



**Figure 5-94A. Seasonal Glen Canyon Dam Release Temperatures for the LPP Proposed Action**  
 (Note: Box plots represent the range of 100 hydrology traces; horizontal line = median; lower extent of box = 25th percentile; upper extent of box = 75th percentile; lower whisker = minimum; upper whisker = maximum.)



**Figure 5-94D. Glen Canyon Dam Release Temperature Percentiles for the LPP Proposed Action Under Climate Change**

## **NPS Comment No. 115**

Flow duration data and curves from the Virgin River Daily Simulation Model (VRDSM) developed by UDWR demonstrate no to minimal differences between the future without the LPP and future with the LPP in the Virgin River. A flow duration curve is a cumulative frequency curve that shows the percent of time specified discharges are equaled or exceeded during a given period. It combines in one curve the flow characteristics of a stream throughout the range of discharge, regardless of the sequence of occurrence. If the streamflow during the period on which the flow duration curve is based represents the long-term flow of the stream, the curve may be considered a probability curve and used to estimate the percent of time that a specified discharge will be equaled or exceeded in the future (USGS 1959). The Virgin River flows used in the flow duration curve analysis represent historical flow data from the period 1941 through 2013 (72 years). These flow data are corrected for projected decreases in Virgin River streamflow resulting from climate change modeled by Reclamation for UDWR. The minimal differences between comparisons of the VRDSM flow duration curves are caused by timing of the simulated return flows between the future without the LPP and future with the LPP. The LPP would convey the water into Sand Hollow Reservoir, which would be transferred to the Washington County Water Conservancy District (WCWCD) Quail Creek Water Treatment Plant for treatment to meet future M&I water demands. No LPP water would flow directly into the Virgin River; after use for M&I purposes, some return flows would flow into the Virgin River through a variety of pathways.

The VRDSM flow duration curves represent long-term Virgin River flows and are considered a robust data set for probability curves used to estimate the percent of time a specified discharge would be equaled or exceeded in the future. The VRDSM flow duration curves are not annual curves; they represent the continuum of flow conditions in the Virgin River based on 72 years of daily flow data. For example, the flow duration curve data for VRDSM node QX29 in the Virgin River at the Utah-Arizona state line (Figure 4-13 in Final Study Report 18, Surface Water Resources, and Figure 5-88 in Section 5.3.3.2.2.2, Chapter 5, Exhibit E of the License Application) demonstrate a 70 percent probability of 53 cfs with the LPP and 48 cfs under No Action (without the LPP) at any point in time. Virgin River flows at the Utah-Arizona state line are downstream of where LPP indirect return flows would enter the river, and it would appear the estimated 5 cfs increase in flow with the LPP return flows in this example could improve the condition, trend, abundance, and diversity of biotic resources (e.g., fisheries, aquatic macroinvertebrates, food web dynamics, riparian/wetland vegetation, available/usable habitat) and abiotic resources (thermal loading capacity, channel and sediment dynamics, dissolved oxygen concentrations, other water quality parameters). However, the 5 cfs flow increase in this example is within the accuracy rating for USGS gage number 09413500 at the state line (ranging from 8 cfs in the low flow months of July and August to 45 cfs in the high flow month of April) and every month throughout the year. The U.S. government's expert agency on stream gaging (USGS) recognizes the difficulty in making exact, accurate measurements of streamflows in open, natural channels and would consider the 5 cfs increase in this example to be within the measurement accuracy of the stream gage.

Sixty-six percent of the flow duration curve data with the LPP show Virgin River flows would be equal to or slightly greater than No Action (without LPP return flows) for all VRDSM nodes (QX21, QX26, QX27, QX28, and QX29) shown in the analyses. Thirty-four percent of the flow duration curve data with No Action (without LPP return flows) are slightly greater than with the LPP for all VRDSM nodes shown in the analyses, and all of these data represent a range from 1 percent to 27 percent of the flow probabilities (the higher end of stream flows). All of the differences between the flow probabilities with the LPP and without the LPP for all the VRDSM nodes shown in the analyses are within the accuracy rating of the closest downstream USGS stream gage. Therefore, the effects of minor simulated increases

or decreases in flow between with the LPP and without the LPP (No Action) are not measurable in the Virgin River.

NPS Comment No. 115 references Table 4-3 and Figure 4-6 in Final Study Report 18, Surface Water Resources (same as Table 5-24 and Figure 5-79, respectively, in Section 5.3.3.2.2.2, Chapter 5, Exhibit E of the License Application), which show VRDSM simulated mean monthly flow differences of 14 cfs in March, 17 cfs in April, and 11 cfs in May between No Action (future without LPP) and with LPP indirect return flows at VRDSM node QX21. The mean monthly flows during these months demonstrate the annual spring runoff period, with streamflows under the No Action (without LPP) and with the LPP greater than 200 cfs, which coincides with the period when WCWCD diverts a large portion of their water rights into off-stream storage reservoirs (Quail Creek and Sand Hollow) to help meet demands for M&I water throughout the year. It is important to note that VRDSM node QX21 is at the Highway 9 bridge over the Virgin River, corresponds to USGS gage number 09408150, and is upstream of any of the VRDSM simulated return flows from the use of LPP water. All of the simulated mean monthly flow differences between the No Action (without LPP) and with LPP return flows at VRDSM node QX21 are within the accuracy rating for USGS gage number 09408150. The simulated mean monthly flow results show the magnitude of flows occurring during each month throughout the period of record (72 years). Figure 4-7 in Final Study Report 18, Surface Water Resources (same as Figure 5-80 in Section 5.3.3.2.2.2, Chapter 5, Exhibit E of the License Application) is the flow duration curve for VRDSM node QX21, representing 72 years of daily flow data and probability of Virgin River flow at any point in time.

Using the same example as described earlier in this response, the QX21 flow duration curve data demonstrate a 70 percent probability of 86 cfs with the LPP and 86 cfs under No Action (without the LPP) at any point in time. At 98 percent probability, the QX21 flow duration curve data demonstrate 86 cfs with the LPP and 86 cfs under No Action (without the LPP) at any point in time. At 25 percent probability, the QX21 flow duration curve data demonstrate 86 cfs with the LPP and 88 cfs under No Action (without the LPP) at any point in time. The 2 cfs difference at 25 percent probability in this example is within the accuracy rating for USGS gage number 09408150, and the flow difference is not measurable. The effects of the simulated flow differences between LPP indirect return flows and No Action (without the LPP) on biotic resources and abiotic resources associated with the Virgin River would be negligible.

NPS Comment No. 115 identifies a statement in USGS documentation for gage number 09413500 Virgin River Near St. George, UT under the heading Extremes for Period of Record: “[N]o flow at times in some years.” The comment correctly identifies that simulated mean monthly flows do not adequately reflect or capture the duration and frequency of no-flow or extreme low flow events. However, the 72 years of daily streamflow data at USGS gage 09413500 (VRDSM node QX29) do capture the duration and frequency of these events in the flow duration curve data, which is a probability curve. The graph of flow duration curves in Figure 4-13 in Final Study Report 18, Surface Water Resources (same as Figure 5-88 in Section 5.3.3.2.2.2, Chapter 5, Exhibit E of the License Application), demonstrates that the Virgin River streamflow approaches zero cfs between 99 percent and 100 percent of the time. This means that less than 1 percent of the time during the 72 years of daily streamflow data, the Virgin River flows as simulated by the VRDSM approach or equal zero cfs at the Utah-Arizona state line. The flow duration curve data show 3 cfs flow at 100 percent with the LPP and 3 cfs flow at 100 percent under No Action (without the LPP), with no difference between the two modeled scenarios. The 3 cfs daily flow probability represents an average of specific daily flow events between zero cfs and 6 cfs over the period of record. The occurrence of these extreme low flow or no-flow days less than 1 percent of the time demonstrates they are infrequent and of short duration, which is why the USGS notes “no flow at times in some years” under

the heading Extremes for Period of Record at gage number 09413500. The flow duration curves for VRDSM node QX29 show the same 3 cfs low-flow values with the LPP and without the LPP return flows, which proves it is possible to determine the LPP would not alter the frequency or duration of no-flow or extreme low-flow events that occur less than one percent of the time during the 72-year period of daily stream flow data.

Changes in Virgin River low flows can also be evaluated using extreme value design flows, such as 7Q10, 10Q10 and 30Q10 low flow values. The following paragraph and table is added to the end of in Section 5.3.3.2.2.2, Chapter 5, Exhibit E of the License Application:

**Changes in low flows at various Virgin River gage locations were evaluated using extreme value design flows, such as 7Q10, 10Q10 and 30Q10 low flow values. These extreme value design flows are the annual minimum 7, 10 or 30-day average flow whose probability of not being exceeded is 1 in 10 years. The U.S. Environmental Protection Agency’s DFLOW program was used with output from the Virgin River Daily Simulation Model to calculate low flows for futures with and without the Lake Powell Pipeline (see Table 5-24a). All river locations show the same or higher low flows under alternatives that include the Lake Powell Pipeline.**

**Table 5-24a. Changes in Virgin River Low Flows**

Location	Virgin River Daily Simulation Model Node	Future Without LPP (Base Case)			Future With the LPP (Proposed Action)		
		7Q10 (cfs)	10Q10 (cfs)	30Q10 (cfs)	7Q10 (cfs)	10Q10 (cfs)	30Q10 (cfs)
Virgin River above Quail Creek	QX20	27	29	33	27	29	33
Virgin River below Quail Creek	QX21	27	29	33	43	44	51
Virgin River below Washington Fields Diversion	QX26	0	0	0	0	0	0
Virgin River below Bloomington Bridge	QX27	16	16	17	23	23	24
Virgin River below Santa Clara River	QX28	25	25	23	34	35	36
Virgin River at UT-AZ State Line	QX29	27	27	29	37	37	38

**USGS (United States Geological Survey). 1959. Manual of Hydrology: Part 2. Low Flow Techniques, Flow-Duration Curves. Geological Survey-Water Supply Paper 1542-A. 33 pp.**

**U.S. Environmental Protection Agency (EPA). 2017. DFLOW 4.0. Available at: <https://www.epa.gov/waterdata/dflow>.**