IN THE OFFICE OF THE STATE ENGINEER
OF THE STATE OF NEVADA

IN THE MATTER OF APPLICATIONS 53987 THROUGH 53992, INCLUSIVE, AND APPLICATIONS 54003 THROUGH 54021, INCLUSIVE, FILED TO APPROPRIATE THE UNDERGROUND WATERS OF CAVE VALLEY, DELAMAR VALLEY, DRY LAKE VALLEY, AND SPRING VALLEY (HYDROGRAPHIC BASINS 180, 181, 182 AND 184), LINCOLN COUNTY AND WHITE PINE COUNTY, NEVADA.	)	**SOUTHERN NEVADA WATER AUTHORITY'S PROPOSED RULING ON REMAND**

GENERAL

I. DESCRIPTION OF REMAND ORDER

On March 22, 2012, the State Engineer issued Rulings 6164 through 6167. In those Rulings, the State Engineer granted the Southern Nevada Water Authority (the "Applicant") Water Right Applications 53987 to 53992, 54003 to 54015, 54019, and 54020, subject to certain conditions, including compliance with monitoring, management and mitigation plans.[1] The State Engineer also denied Applications 54016 to 54018, and 54021, based on findings that the issuance of those water rights would conflict with existing rights.[2]

The Protestants appealed these rulings to the Seventh Judicial District Court. In an order entered on December 13, 2013 (the "Remand Order"), the district court remanded the matter of Applications 53987 through 53992, inclusive, and Applications 54003 through 54021, inclusive, to the State Engineer for further consideration. Specifically, the Remand Order mandated:

> 1. The addition of Millard and Juab counties, Utah in the mitigation plan so far as water basins in Utah are affected by pumping of water from Spring Valley Basin, Nevada;
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> 2. A recalculation of water available from Spring Valley assuring that the basin will reach equilibrium between discharge and recharge in a reasonable time;
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> 3. Defining standards, thresholds or triggers so that mitigation of unreasonable effects from pumping of water are neither arbitrary nor capricious in Spring Valley, Cave Valley, Dry Lake Valley and Delamar Valley, and;
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> 4. Recalculation of the appropriations from Cave Valley, Dry Lake and Delamar Valley to avoid over appropriation or conflicts with down-gradient, existing water rights.[3]

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[1] Exhibit No. SE_140, pp. 216-18; Exhibit No. SE_141, pp. 169-70; Exhibit No. SE_142, pp. 163-64; Exhibit No. SE_143, pp. 161-62.
[2] Exhibit No. SE_140, p. 216.
[3] Exhibit No. SE_118, p. 23.

By letter dated September 12, 2016, counsel for the Great Basin Water Network, et al., ("GBWN") asserted that no additional hearing was necessary to comply with the instructions in the Remand Order.[4] On September 14, 2016, the State Engineer held a Status Conference regarding the Applications.[5] Other parties at the Status Conference did not agree with GBWN that an additional hearing was unnecessary.[6] On October 3, 2016, the State Engineer issued the Interim Order on Pre-Hearing Scheduling and determined that an additional administrative hearing was necessary to provide the parties the opportunity to fully address the issues in the Remand Order.[7]

II. PRE-HEARING MOTIONS

The Corporation of the Presiding Bishop of the Church of Jesus Christ of Latter-Day Saints, on behalf of Cleveland Ranch ("CPB"), filed with the State Engineer a motion regarding discovery and mandatory presentations of proposed written testimony.[8] SNWA filed a motion regarding schedule, proper parties and offer of exhibits.[9] The Confederated Tribes of the Goshute Reservation ("CTGR") filed a motion to dismiss for failure to join United States Department of the Interior ("DOI") Bureaus.[10] Finally, GBWN filed a joinder to CTGR's motion to dismiss.[11] Timely oppositions and replies were filed to all of the motions.

The State Engineer, on November 28, 2016, issued the Notice of Hearing and Interim Order. The State Engineer denied CPB's motion for pre-hearing discovery and written direct testimony, holding that expert witnesses would be required to submit written reports.[12] The State

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[4] Exhibit No. SE_120, p. 2.
[5] Exhibit No. SE_120, p. 1.
[6] Exhibit No. SE_120, p. 2.
[7] Exhibit No. SE_120.
[8] Exhibit No. SE_133, p. 2.
[9] Exhibit No. SE_133, p. 6.
[10] Exhibit No. SE_133, p. 3.
[11] Exhibit No. SE_133, p. 3.
[12] Exhibit No. SE_133, p. 3.

Engineer also denied CTGR's motion to dismiss, holding that the participation of the DOI Bureaus was not essential, and that the law does not require joinder of a party in the absence of a formal protest to an application by that party.[13] Once the DOI Bureaus stipulated to withdraw their protests, they were no longer parties, and joinder was not necessary.[14] As to SNWA's motion regarding scheduling, proper parties, and offer of exhibits, the State Engineer found that SNWA had dropped its objection as to proper parties.[15] Further, the State Engineer denied, in part, and granted, in part, SNWA's offer of exhibits.[16] The State Engineer identified five other documents which were also admitted as exhibits.[17]

On August 18, 2017, SNWA filed two motions in limine. SNWA's first motion in limine sought to exclude portions of Exhibit CPB 19 and related testimony.[18] SNWA argued that the identified portions of the exhibit and related testimony should be excluded because: (1) water budgets, sustainability, safe yield, and the State Engineer's calculation of the perennial yield of Spring Valley are outside the scope of the remand hearing; (2) the legal question of whether ET capture is required under Nevada law has already been decided and is therefore outside the limited scope of the remand hearing; and (3) issues related to alleged impacts that SNWA's pumping might have on Cleveland Ranch have already been decided and are outside the limited scope of the remand hearing.[19]

SNWA's second motion in limine sought to exclude the majority of Exhibit GBWN 281, the entirety of Exhibits GBWN 282, 290, and 292, and the related testimony. SNWA argued that

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[13] Exhibit No. SE_133, p. 5.
[14] Exhibit No. SE_133, p. 5.
[15] Exhibit No. SE_133, p. 6.
[16] Exhibit No. SE_133, pp. 6-7.
[17] Exhibit No. SE_133, p. 7.
[18] Exhibit No. SE_157, p. 6-7.
[19] Exhibit No. SE_157, pp. 6-8.

these reports or the portions thereof should be excluded because: (1) recharge and discharge estimates were determined in the previous hearing; (2) projected drawdown and model impacts in Spring Valley were outside the scope of the remand hearing; (3) the construction of the model was determined in the previous hearing; (4) an equilibrium analysis in the White River Flow System was not included in the Remand Order; (5) interbasin flow calculations were determined in the prior hearing; (6) Dr. Myers is not an expert in 3M plans; (7) Dr. Myers is not an expert in Nevada water rights; and (8) Dr. Myers is not an expert in the field of biology for wetlands.[20]

CPB also filed two motions in limine. The first sought to exclude Exhibit SNWA 608 and 609, including all related testimony of Don Barnett.[21] CPB argued that these exhibits did not contain a written report with expert opinions as mandated by the State Engineer's Notice of Hearing and Interim Order.[22] CPB's second motion in limine sought to exclude testimony and evidence relating to SNWA's ET capture scenario consisting of 101 wells.[23] CPB argued that testimony during the hearing should be limited to the points of diversion described in the applications.[24] Timely oppositions and replies were filed to all of the motions.

On December 13, 2017, the State Engineer denied all the motions in limine, except the State Engineer did order that the testimony of Don Barnett be limited to that of a factual witness.[25]

III. HEARING

Consistent with the State Engineer's finding that an additional administrative hearing was necessary to provide the parties the opportunity to fully address the issues included in the Remand

[20] Exhibit No. SE_157, pp. 10-12.
[21] Exhibit No. SE_157., pp. 5-6.
[22] Exhibit No. SE_157, pp. 5-6.
[23] Exhibit No. SE_157, p. 2.
[24] Exhibit No. SE_157, pp. 2.
[25] Exhibit No. SE_157.

Order, the State Engineer conducted a hearing between September 25, 2017 and October 6, 2017. The 2017 hearing was presided over by Hearing Officer Joseph-Taylor. Counsel for the Applicant and representatives for the Applicant were present, and presented evidence in support of its position. Certain Protestants appeared through counsel and put on evidence in support of their claims. Those Protestants were the Great Basin Water Network (GBWN), the Confederated Tribes of the Goshute Reservation, Duckwater Shoshone Tribe, and Ely Shoshone Tribe (the Tribes), and the Corporation of the Presiding Bishop of The Church of Jesus Christ of Latter-Day Saints (CPB). Millard and Juab Counties, Utah, were also represented by counsel during the hearing, but did not present a case. During the hearing, both Applicant and the Protestants had ample opportunity for direct examination and cross-examination.

IV. SCOPE

As noted previously, the Remand Order entered by the District Court which precipitated the instant proceedings was limited in scope. Specifically, the District Court directed the State Engineer to: (1) add Millard and Juab counties, Utah, into the mitigation plan to the extent that those counties are affected by the pumping of water from the Spring Valley Basin in Nevada; (2) recalculate the water available for appropriation from Spring Valley in order to assure that equilibrium can be reached within a reasonable time; (3) define standards, thresholds or triggers so that unreasonable effects can be mitigated; and (4) recalculate the appropriations from Cave Valley, Dry Lake and Delamar Valley to avoid over appropriations or conflicts with down-gradient, existing water rights. Beyond these four issues, the Remand Order did "not disturb the findings of the Engineer."[26] Accordingly, other than the four issues specifically remanded, all

[26] Exhibit No. SE_118, p. 23.

other findings in Rulings 6164, 6165, 6166, and 6167, have not been overturned and remain valid. Finally, although the State Engineer is fully complying with the Remand Order, the State Engineer has not had an opportunity to challenge or appeal the Remand Order, and is not waiving its right to challenge the Remand Order.

FINDINGS OF FACT

I. INCLUSION OF MILLARD AND JUAB COUNTIES

The District Court's first remand instruction required the State Engineer to include "Millard and Juab counties, Utah in the mitigation plan so far as water basins in Utah are affected by pumping of water from Spring Valley Basin, Nevada."[27] The reason for this remand instruction is that while Snake Valley, Utah (which includes Millard and Juab counties) is monitored by six wells and sixteen monitoring sites, this valley was not specifically mentioned as a mitigation site.[28]

The State Engineer recognizes the importance of protecting resources in Utah and will insist on the necessary safeguards to achieve that end. In section III below, the State Engineer explains in detail how the Applicant's Monitoring, Management, and Mitigation Plans ("3M Plan") include Millard and Juab counties, Utah, and thereby comply with the District Court's first remand instruction. The 3M Plan for Spring Valley specifically includes Snake Valley, Utah, and includes the portions of Millard and Juab counties in Utah that are potentially affected by the approval of Applicant's water rights in Spring Valley, Nevada.

[27] Exhibit No. SE_118, p. 23.
[28] Exhibit No. SE_118, p. 8.

II. WATER AVAILABLE TO APPLICANT FOR APPROPRIATION IN SPRING VALLEY

The District Court remanded Ruling 6164 for:

> A recalculation of water available for appropriation from Spring Valley assuring that the basin will reach equilibrium between discharge and recharge in a reasonable time.[29]

The District Court explained that "the amended award [should have] *some prospect* of reaching equilibrium."[30] The District Court acknowledged that "time to reach equilibrium is not a valid reason to *deny* the grant of water."[31] The Court, however, found that a failure to demonstrate that equilibrium will be reached within a reasonable period of time "may very well be a reason to *limit* the appropriation below the calculated E.T."[32] The State Engineer finds that on remand the District Court directed the State Engineer to determine what quantity of water can be awarded to the Applicant – without denying the applications. The State Engineer also finds that the District Court instructed the State Engineer to assure the permitted award will have some prospect of reaching a new equilibrium within a reasonable period of time.

The District Court's remand was based on the District Court's evaluation of evidence in the 2011 record that pertained to whether Spring Valley would reach a new equilibrium in a reasonable amount of time based on the prior award (in Ruling 6164) of 61,127 acre feet to the Applicant. The District Court determined that the evidence in the 2011 administrative record showed that after 200 years, "SNWA will likely capture . . . 84% of the E.T."[33] Here, the District

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[29] Exhibit No. SE_118, p. 23. This instruction has been referred to as the "ET Capture Rule" or "Equilibrium Analysis" during the remand proceedings.
[30] Exhibit No. SE_118, p. 13 (emphasis added).
[31] Exhibit No. SE_118, p. 11 (emphasis added).
[32] Exhibit No. SE_118, p. 11 (emphasis added).
[33] Exhibit No. SE_118, p. 12. On remand evidence was introduced demonstrating that the average capture rate for pumping in groundwater basins is 85%. Exhibit No. SNWA_619, p. 110. This means that SNWA's 84% capture value is well within the average range for groundwater development projects in the United States.

Court relied on a statement in Applicant's District Court Answering Brief that referenced evidence from a groundwater model simulation in the BLM's Draft Environmental Impact Statement ("DEIS") for Applicant's project.[34] The DEIS model simulation depicted pumping using a wellfield configuration that included 81 wells that were distributed throughout Spring Valley – not just the 15 points of diversion that are included in the Applicant's remanded permits.[35] In addition, the DEIS model simulation depicted pumpage of the 91,224 afa of water that the Applicant applied for, not the 61,127 afa that was actually permitted by the State Engineer in Ruling 6164.[36] The District Court then used the 84 percent value from the DEIS model simulation to conclude that "SNWA pumping and evapotranspiration removes 70,977 afa from the basin with no equilibrium in sight. That is 9,780 afa more than SNWA's grant."[37]

The State Engineer finds that the way the District Court evaluated the 2011 evidence is instructive as to how the State Engineer should consider the 2017 evidence to assure the permitted award will have some prospect of reaching a new equilibrium within a reasonable period of time. Also, given this District Court conclusion, coupled with the District Court's conclusion that time to reach equilibrium is not a valid reason to *deny* a water right application, but may be a reason to *limit* an award, the State Engineer finds that the District Court directed that the maximum reduction

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[34] SNWA's Answering Br. to CPB, p. 20, Millard Co., Utah et al. v. King, CV-1204048 (7th Jud. Dist. Ct. Nev. Apr. 12, 2013); *see also* Exhibit No. GBWN_110, p. ES-51; 2017 Transcript, Vol.4 p. 981:3-24 (Burns) (discussing DEIS and Remand Order).

[35] Exhibit No. GBWN_110, p. 3.3-103; 2017 Transcript, Vol.4 p. 984:1-21 (Burns).

[36] 2017 Transcript, Vol.4 p. 986:20-24 (Burns).

[37] Exhibit No. SE_118, p. 11. At the remand hearing, a witness for SNWA described the calculations used by the District Court. *See* 2017 Transcript, Vol.4 p. 988:2-20 (Burns). To arrive at the 9,780 afa value of uncaptured ET, the District Court simply multiplied the approved pumping duty (61,127 afa) by 16% (the percentage of groundwater ET that remains uncaptured in the DEIS preferred alternative model simulation) to arrive at a figure of 9,780 afa of uncaptured ET after 200 years. The Court then added the quantity of uncaptured ET (9,780 afa) to the approved project pumping (61,127 afa) to arrive at the 70,977 afa estimate of total withdrawals from the basin attributable to SNWA's project (the actual value is 70,907, not 70,977. The difference between the actual value and the value reported by the District Court appears to be an inadvertent error).

in the award to the Applicant be, at most, 9,780 afa. Further, because the District Court's instructions specifically indicate that the State Engineer is to "recalculate" the quantity of water awarded, the State Engineer finds that the award on remand may be up to and including the 61,127 afa granted in Ruling 6164, if the evidence assures the award on remand has some prospect of reaching a new equilibrium between discharge and recharge in a reasonable time.

A. Unintended Consequences of Strict Application of District Court's Remand Instruction

As an initial matter, the Applicant and Protestant presented evidence to comply with this remand instruction but disagreed over whether the consideration of this remand instruction should be limited to the Applicant's initial 15 wells. The remand hearing provided the State Engineer with the opportunity to hear testimony from expert witnesses related to how the District Court's new rule regarding equilibrium should be implemented. At the hearing, the Protestants advocated for an interpretation of the District Court's remand instruction that would require the State Engineer to only consider the Applicant initial 15 wells when determining on a basin-wide scale, whether equilibrium can be reached in 200 years. That unduly narrow interpretation does not answer the Court's question and raises a number of policy and practical concerns that are discussed below.

The State Engineer's Office has not required applicants to perform an equilibrium analysis or provide assurances that their pumping will show some prospect of reaching equilibrium between discharge and recharge in a reasonable time. This fact was acknowledged by expert witnesses testifying for both the Applicant and Protestants. Mr. Burns, SNWA's expert witness, testified that he was not aware of any groundwater projects in Nevada that were designed to fully capture

groundwater discharge via evapotranspiration ("ET") (i.e. groundwater used by plants).[38] Dr. Myers, GBWN's expert witness, testified that a demonstration that a project will reach equilibrium conditions has not previously been required under Nevada law.[39] On cross-examination, Dr. Jones, CPB's expert witness, was unable to point to a single groundwater project in either Nevada or Utah[40] that was required to demonstrate full capture of groundwater used by plants as a condition of approval.[41]

In their expert report, Dr. Jones and Dr. Mayo made reference to a quote by Dr. Bredehoeft to support their contention that "[q]uantifying the safe yield of an aquifer system using a water budget analysis is fundamentally flawed."[42] Dr. Bredehoeft's quote criticized the use of water budgets to set the perennial yield of groundwater basins but also noted that "[t]he laws governing the development of groundwater in Nevada as well as several other states are based on the idea that pumping within a groundwater basin shall not exceed recharge."[43] Both Dr. Myers and Dr. Jones agreed that Dr. Bredehoeft's quote is an admission by Dr. Bredehoeft that his recommended approach of limiting appropriations based on an equilibrium analysis does not reflect the current

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[38] 2017 Transcript, Vol.4 p. 992:12-19 (Burns).
[39] 2017 Transcript, Vol.9 p. 1851:19-20 (Myers) ("Oh, I – I – I would agree that it's never been required specifically").
[40] 2017 Transcript, Vol.4 pp. 948:5-949:1 (Barnett) (noting that Nevada and Utah are geologically and climatically very similar and, thus, have similar water regulations and policies).
[41] 2017 Transcript, Vol.6 p. 1266:2-9 (Jones). On re-direct Dr. Jones did identify language contained in a single State Engineer decision, Ruling 3486, that could be interpreted a requiring an applicant to show that project pumping will capture groundwater used by plants. However, the State Engineer has reviewed Ruling 3486 and determined that the applications in question were not denied due to a failure to demonstrate full capture of groundwater used by plants within a reasonable period of time but, instead, were denied on the basis that existing pumping in the basin already exceeded the calculated perennial yield. *See* State Engineer Ruling 3486, p. 6, dated Jan. 11, 1988, official records in the Office of the State Engineer ("A substantial basin-wide overdraft on the groundwater reservoir exists in Pahrump Valley as the net pumping draft continues to exceed the perennial yield. . . . The present basin-wide overdraft within Pahrump Valley will create a sustained depletion of stored groundwater and continued static water level declines. . . . The granting of [the applications] would allow an additional appropriation of 857 acre-feet annually, creating an additional burden and stress upon the Pahrump Valley Ground Water Basin which would further aggravate the basin-wide overdraft.").
[42] Exhibit No. CPB_019, p. 16.
[43] Exhibit No. CPB_019, p. 13.

state of the law in Nevada.[44] Based on this testimony and evidence, and the State Engineer's expertise, it is clear that the District Court's remand instruction requires the implementation of a new administrative rule for Nevada water rights.

1. Maintaining the Orderly Administration of Water Resources

An overly strict application of the new rule would completely disrupt the way the State Engineer currently administers water basins in Nevada. Experts for both CPB and GBWN posit that the State Engineer's practice of calculating a perennial yield and estimating the water available for appropriation in groundwater basins based on a water budget analysis should be radically altered.[45] Protestant's experts advocate an overly strict application of the District Court's remand instruction that would eliminate the State Engineer's basin-wide water budget approach in favor of individual determinations of water availability made on a case-by-case basis.[46]

Dr. Jones, CPB's expert witness, admitted during testimony that the use of the approach advocated by him and Dr. Mayo would require the State Engineer to perform an individualized equilibrium analysis for every submitted application.[47] Dr. Jones stated that there should not be a perennial yield assigned to each basin, but rather a sustainable yield developed independently for each water rights application.[48] Dr. Jones conceded that, from an administrative efficiency standpoint, implementing such a system would be challenging.[49] He suggested that one solution

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[44] 2017 Transcript, Vol.6 p. 1267:14-18 (Jones) ("Q. . . . So by that statement Dr, Bredehoeft's acknowledging that the laws in Nevada are not based on his equilibrium idea; right? A: [by Dr. Jones] In 1982 I would – yeah, I would assume that's what he is saying."); 2017 Transcript, Vol.9 p. 1849:8-13 (Myers) ("Q. So, it's pretty clear, is it not, that Judge – that Dr. Bredehoeft was recognizing that in Nevada the rule has been that pumping within a groundwater basin shall not exceed the recharge, that's been the law that's been applied in Nevada? A. [by Dr. Myers] That is the law that's been applied.").
[45] Exhibit No. CPB_019, pp. 9-17
[46] Exhibit No. CPB_019, pp. 9-17.
[47] 2017 Transcript, Vol.6 p. 1313:5-14 (Jones).
[48] 2017 Transcript, Vol.6 p. 1314:15-24 (Jones).
[49] 2017 Transcript, Vol.6 p. 1313:14-16 (Jones).

would be to exempt small appropriations from the requirement, but could not define what quantity of water would qualify for such treatment.[50]

Dr. Myers, GBWN's expert witness, also agreed that his concept of sustainable yield would require the State Engineer to make a separate determination of the quantity of water available for appropriation based on the individual well configuration for each submitted application.[51] However, Dr. Myers did not provide any details regarding how such a process could be implemented.

Eliminating the long-established practice of using a water budget to establish a perennial yield for each basin runs counter to the specific and recent direction from the Nevada Legislature. In 2017, the Legislature specifically directed the State Engineer to establish a water budget for each groundwater basin in Nevada that can be relied upon by the public.[52] The water budget must include "an estimate of the amount of groundwater that is available for appropriation in the basin."[53] A major purpose behind this legislative requirement is to "provide the needed certainty in water availability."[54] The enforcement of a rule that requires determinations regarding how much water is available for appropriation to be made on a case-by-case basis, as advocated by the

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[50] 2017 Transcript, Vol.6 pp. 1313:24-1314:2 (Jones). The State Engineer notes that the process propounded by Protestants' experts could raise concerns related to fairness and due process. Without standards to make such determinations, or the existence of a rational basis to explain why "small" appropriations should be exempted from the rule, let alone the absence of any statutory authority, this approach could expose the State Engineer to charges of ad-hoc decision making.
[51] 2017 Transcript, Vol.9 p. 1880:6-21 (Myers).
[52] 2017 Nev. Stat. ch 517, 3496.
[53] 2017 Nev. Stat. ch. 517, § 1 at 3497.
[54] *Hearing on SB 47 Before the A. Comm. On Natural Resources, Agriculture, and Mining* (May 4, 2017) (statement of Susan Juetten, Great Basin Resource Watch); *see also Hearing on SB 47 Before the S. Comm. On Natural Resources* (April 13 4, 2017) (statement of Jason King, P.E., Nevada State Engineer) ("By doing this, you can see basin by basin how much water is available"); *Hearing on SB 231 Before the S. Comm. On Natural Resources* (Mar. 23, 2017) (statement of Erika Castro, Progressive Leadership Alliance of Nevada) ("We believe this bill is one way to . . . provide more certainty in knowing the amount of water that is actually available.").

Protestant's experts, runs counter to this legislative goal of providing transparency, and a degree of certainty, in the appropriation process.

Accordingly, the State Engineer finds that an overly strict application of the District Court's remand instruction would eliminate the basin-wide water budget approach in favor of individual determinations of water availability made on a case-by-case basis, and would cause a complete disruption to the administration of water resources in Nevada.

2. Maintaining Principles of Prior Appropriation

The State Engineer is also concerned that the implementation of an appropriation scheme based on the approach recommended by Protestant's experts would conflict with Nevada's established prior appropriation system. CPB expert Dr. Jones acknowledged that the appropriation system Dr. Mayo and he proposed would favor property owners whose property is located nearer to ET discharge zones over property owners whose property is located farther from such areas.[55]

The adoption of Nevada's prior appropriation system represented a specific rejection of the common law doctrine of riparian rights. Under the riparian rights system, water rights are allocated to property owners based on the proximity of the water source to their property.[56] In 1885, the Nevada Supreme Court expressly overruled the common law doctrine of riparian rights in favor of prior appropriation.[57] In doing so, the Court recognized that the doctrine of riparianism was in conflict with the realities of Nevada's climate and geography.[58] The Nevada common law principle of prior appropriation was statutorily codified in 1905 (for surface water) and 1931 (for

[55] 2017 Transcript, Vol.6 p. 1315:1-11 (Jones).
[56] *Vansickle v. Haines*, 7 Nev. 249, 260 (1872).
[57] *Jones v. Adams*, 19 Nev. 78, 84-88, 6 P. 442, 444-448 (1885).
[58] *Reno Smelting, Milling & Reduction Works v. Stevenson*, 20 Nev. 269, 282, 21 P. 317, 322 (1889) ("Our conclusion is that the common-law doctrine of riparian rights is unsuited to the condition of our state.").

groundwater) and remains in full force and effect today. Nevada is not unique in this regard, as virtually all western states have adopted the prior appropriation doctrine.

The record in this case clearly indicates that well location is a primary factor in the time it takes for groundwater pumping to capture water that naturally discharges from plants within a basin.[59] An overly strict application of the remand instruction would disproportionately favor water applicants who own property adjacent to areas of natural discharge, or who have the right to access such property, as confirmed by Dr. Jones's testimony.[60] Accordingly, the State Engineer finds that the practical effect of strictly applying the remand instruction, as advocated by the Protestants, would be to reintroduce principles of riparianism into Nevada's groundwater law – principles that were specifically rejected by the Nevada judiciary over 130 years ago.

3. Maintaining the Ability to Effectively Develop Water

The District Court's remand instruction should be applied in a way that maintains Nevada's ability to place its limited water resources to beneficial use. Evidence was presented at the remand hearing that an overly strict application of the District Court's remand instruction might limit the ability of appropriators to fully develop groundwater resources. These challenges are highlighted by evidence presented about the San Luis Closed Basin project located in southern Colorado and evidence regarding Nevada's unique geographic setting.

a. The San Luis Closed Basin Project

The Closed Basin project is the only project in the western United States specifically designed and intended to capture water used by plants. The project was built by the United States Bureau of Reclamation to salvage water used by plants in the San Luis basin in order to augment

[59] 2017 Transcript, Vol.6 p. 1315:10-11 (Jones).
[60] 2017 Transcript, Vol.6 p. 1315:6-9 (Jones).

the flows of the Rio Grande river and assist the United States in meeting its 1906 treaty obligations to Mexico.[61] The project originally anticipated capturing 104,000 afa of groundwater.[62] The project consists of 170 salvage wells located within the groundwater discharge area of the basin and are drilled to shallow depths of between 85 and 110 feet.[63] The first wells were drilled in the early 1980s and the project was fully built by the mid-1990s.[64]

Unfortunately, the Closed Basin project has not proven to be a success. Mr. Burns, the Applicant's expert witness, testified that, at its height, the project delivered only 40,000 afa of water to the Rio Grande and that it currently produces between 15,000 and 20,000 afa.[65] Dr. Mayo, CPB's expert witness, testified that from a water management perspective, the project "was just a total disaster."[66] Both experts identified problems with the project, including the poor quality of water and unnecessary conflicts that resulted from placing the wells directly within the ET discharge area.[67] Both experts agreed that, although the most expeditious way to capture water discharged by plants is to place wells within the discharge area, water quality and other operational concerns dictate that it would be preferable to place the Applicant's production wells on the alluvial fans outside of the discharge area.[68]

The lesson learned from the Closed Basin project is that a trade-off exists between the rapidity with which a groundwater development project is able to capture water used by plants and the need to meet the operational goals of a project. Placing wells in the discharge area will decrease

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[61] Exhibit No. SNWA_611, p. 2.
[62] Exhibit No. SNWA_611, pp. 2-3; 2017 Transcript, Vol.4 pp. 1022:23-1023:2 (Burns).
[63] Exhibit No. SNWA_611, p. 5.
[64] Exhibit No. SNWA_611, p. 5.
[65] 2017 Transcript, Vol.4 p. 1023:3-7; pp. 1025:24-1026:3 (Burns).
[66] 2017 Transcript, Vol.6 p. 1232:23 (Mayo).
[67] 2017 Transcript, Vol.4 pp. 1029:14-1030:7 (Burns); 2017 Transcript, Vol.6 p. 1231:16-22.
[68] 2017 Transcript, Vol.6 p. 1233:6-9 (Mayo).

the time required for the basin to achieve a new equilibrium but may result in poor water quality and increase the likelihood that unreasonable effects will manifest. By contrast, placing the wells on the alluvial fan reduces the likelihood of encountering these operational problems but significantly increases the time required for the basin to reach a new equilibrium condition. Accordingly, the State Engineer finds that if the remand instruction is applied in an overly strict manner, as advocated by the Protestants, less productive, less efficient, and more expensive wells would be required to meet the project's operational needs.

b. Geographic Setting in Nevada

Dr. Jones, an expert witness for CPB, discussed at length the geography of the Spring Valley basin and how that geography limits the ability to fully capture groundwater used by plants. In particular, Dr. Jones noted that because Spring Valley is a long and narrow basin, full capture of groundwater used by plants, while possible, may be impractical to achieve.[69] However, the geography of Spring Valley is not particularly unique within Nevada. In 1896, Major Clarence Dutton famously described the mountain ranges of Nevada as resembling "an army of caterpillars crawling northward."[70] These ranges create especially long and narrow valleys throughout the state. Combined with Dr. Jones's testimony regarding the difficulty of capturing the groundwater used by plants in long and narrow basins, it is clear that overly strict enforcement of the District Court's equilibrium rule in Nevada could effectively eliminate the opportunity for Nevadans to fully develop and beneficially use the state's limited water resources.[71]

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[69] 2017 Transcript, Vol.6 p. 1195:6-10 (Jones).
[70] Clarence E. Dutton, *Mount Taylor and the Zuni Plateau*, 105-198 (1896) (located in Volume III of Report of the Secretary of the Interior; being part of the Message and Documents Communicated to the Two Houses of Congress at the Beginning of the First Session of the Forty ninth Congress in Five Volumes, United States Government Printing Office).
[71] *See* NRS 534.020 (evidencing a clear legislative intent favoring the development and use of Nevada's limited groundwater resources).

This problem was highlighted in Dr. Myers's testimony. Dr. Myers, a GBWN expert, noted that within the basins that make up the central carbonate flow system,[72] there is approximately 580,000 afa of groundwater recharge occurring.[73] Currently, there is approximately 100,000 afa of groundwater development within these basins.[74] Dr. Myers testified that this means that the central carbonate flow system is not fully appropriated and water remains available for beneficial use.[75] Dr. Myers, however, also reported that existing pumping in the basins has not reached equilibrium and, based on his computer models, shows no prospect of doing so over the course of the next 250 years.[76] If the remand instruction were applied strictly at the time those appropriations were requested, the development of these water resources could not have been approved. The State Engineer finds that application of the remand instruction in an overly strict manner would run counter to the long-established intent of Nevada water law – the maximization of the beneficial use of the state's limited water resources. An overly strict application of the rule could also stymie economic development efforts throughout the state since economic development in an arid state like Nevada is closely tied to the ability to develop adequate water resources.

4. <u>Capturing Groundwater That Is Currently Used by Plants Will Not Kill All Plants in Spring Valley.</u>

In addition, the State Engineer must make clear that groundwater development in Nevada does not come at the expense of killing off all plants. The District Court stated in the Remand Order that "death of most of the phreatophytes is a trade-off for the beneficial use of water."[77] In

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[72] *See* Exhibit No. GBWN_281, p. 6 (depicting the area and basins making up the central carbonate flow system ("CCFS")).
[73] 2017 Transcript, Vol.9 p. 1894:8-9 (Myers).
[74] 2017 Transcript, Vol.9 p. 1894:10-11 (Myers).
[75] 2017 Transcript, Vol.9 p. 1894:12-14 (Myers).
[76] 2017 Transcript, Vol.9 p. 1894:15-16; p. 1895:9-13 (Myers).
[77] Exhibit No. SE_118, p. 10.

making this statement, the District Court relied on the State Engineer's statement in the 2013 Answering Brief that was filed with the District Court, that "the idea behind the capture of ET is that pumping will lower the water table until the top of the aquifer is below the root zone of phreatophytes and evapotranspiration will cease."[78] Protestants initially pointed to the District Court's statement to claim the SNWA project will completely eliminate all plants in Spring Valley and cause an ecological disaster.[79] However, groundwater development in Spring Valley will capture only the groundwater that plant communities utilize, not the considerable surface water or precipitation that those plant communities will continue to receive. The State Engineer finds, and Protestants' experts conceded in testimony, that the evidence does not indicate the SNWA project will completely dry up the basin or result in the death to all plant communities.

First, plants communities currently exist in Spring Valley that are outside the area where groundwater is discharged by plants (aka the "groundwater discharge area"). These plants utilize surface water runoff from mountains and precipitation. The SWNA project will not capture either of these sources of water. Second, the State Engineer previously adopted the Applicant's estimate that the *total* average discharge from plants in the groundwater discharge area of Spring Valley is 174,500 afa, and the District Court did not disturb this finding.[80] Also, the State Engineer previously found that the groundwater utilized by plants in the main groundwater discharge area in Spring Valley is 84,100 afa, and the District Court did not disturb that finding.[81] Accordingly, within the primary groundwater discharge area in Spring Valley, the total quantity of discharge

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[78] Nev. State Engineer's Answering Br., pp. 53-54, Millard Co., Utah et al. v. King, CV-1204049 (7th Jud. Dist. Ct. Nev. Apr. 15, 2013).
[79] *See e.g*. Exhibit No. GBWN_297, p. 13 (assertion that SNWA's pumping will "completely dry[] all wetlands and springs within Spring Valley.").
[80] State Engineer Ruling 6164, p. 73, dated Mar. 22, 2012, official records in the Office of the State Engineer Ruling ("Ruling 6164").
[81] Ruling 6164, p.73.

from plants is approximately 174,500 afa, and only 84,100 afa of this total is derived from the groundwater aquifer. The remaining 90,400 afa of plant discharge comes from surface water runoff and precipitation, two sources that will not be captured by the SNWA project.[82] Even if the groundwater table is lowered below the root zone of plants in Spring Valley, and groundwater can no longer be utilized by plant communities, those plant communities will continue to receive more than 90,000 afa of precipitation.[83]

Mr. Marshall, the Applicant's expert, testified that certain plants are considered facultative phreatophytes, which are plants that can utilize both ground and surface water supplies.[84] When these plant communities lose access to groundwater they generally "reduce in their total cover and [will be] replaced over time by plants that are more advantaged in their ecology and are able to do better just on precipitation."[85] Dr. Huntington, another of Applicant's expert witnesses, testified that he has personally observed the continued existence of healthy shrub communities in basins in Nevada that have experienced decades of groundwater development and groundwater level declines.[86]

Specific evidence was provided from the San Luis Closed Basin project in Colorado that healthy transitions in plant communities can occur in response to groundwater development and lower groundwater levels. The Cooper, et al. (2006) study indicates that the lowering of the water table in some locations can actually improve the soil conditions for certain plant communities.[87] The Cooper, et al. (2006) provides substantial evidence that even where a purposeful and concerted

[82] 2017 Transcript Vol.4 p. 1035:2-14 (Burns).
[83] 2017 Transcript, Vol.4 p. 1035:2-4 (Burns).
[84] 2017 Transcript, Vol.3 pp. 584:13 – 585:8 (Marshall).
[85] 2017 Transcript, Vol.3 587:20-24 (Marshall); Exhibit No. SNWA_507 p. 6-90.
[86] 2017 Transcript Vol.1 pp. 225:15 – 226:1 (Huntington).
[87] Exhibit No. SNWA_620, p. 32.

effort is made to fully capture groundwater that is utilized by plants, viable plant communities can remain, and not all phreatophytes are eliminated.

Even the Protestants experts admitted that project pumping will not completely dry up the basin.[88] When specifically asked whether all phreatophytes will die in Spring Valley as predicted in his expert rebuttal report,[89] Dr. Myers, GBWN's expert witness, admitted that "no they won't, they won't all die in Spring Valley."[90] Dr. Roundy, CPB's expert witness, admitted that his expert report's prediction that certain plant species would be "doomed" by project pumping was nothing more than hyperbole designed to "keep people awake," nor did he intend that statement to be believed as true.[91]

While the District Court did not provide specific instruction to the State Engineer regarding this issue, it is imperative that the State Engineer correct the apparently widespread misconception that salvaging groundwater used by plants will result in ecological disaster. The State Engineer therefore finds that there is no evidence in the record to support any contention that the capture of groundwater in Spring Valley that was formerly used by plants will result in death to all plant communities in Spring Valley, or that phreatophytes must be *completely* eliminated to achieve full ET capture. Furthermore, there is substantive evidence in the 2011 and 2017 administrative records that existing plant communities can successfully transition to healthy and sustainable plant communities because considerable precipitation and surface water will remain available.

This testimony indicates that the approach advocated by the Protestants would lead to several unintended consequences including severely restricting the ability of Nevadans to

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[88] 2017 Transcript, Vol.9 p. 1861:22 – 1862:3 (Myers); 2017 Transcript, Vol.9 p.1876:18-21 (Myers).
[89] Exhibit No. GBWN_297, p.13.
[90] 2017 Transcript, Vol.9 p. 1876:18-21 (Myers).
[91] 2017 Transcript, Vol.7 p. 1463:17-22 (Roundy).

maximize the beneficial use of the State's limited water resources. To avoid these unintended consequences, the State Engineer finds that the District Court's instruction should be applied in a manner that carefully harmonizes the new rule with existing laws, regulations, and policies.[92]

For these reasons, the State Engineer finds that an overly strict application of the District Court's remand instruction is not needed to protect the environment in Spring Valley, and that careful consideration should be given to how the District Court's remand instruction is implemented, in order to avoid unintended consequences regarding the orderly administration of water resources, the principles of prior appropriation, and the effective development of water resources.

B. Applicant's Evidence of Equilibrium Between Discharge and Recharge in a Reasonable Time

In response to this part of the District Court remand instruction, the Applicant utilized a previously developed groundwater model (the "Central Carbonate Rock Province" or "CCRP Model") to run simulations of various project pumping scenarios. The State Engineer previously found that the CCRP Model provides a reliable tool to examine the potential effects of project pumping on the groundwater system, but acknowledged that the CCRP Model is a regional scale model that contains certain limitations and uncertainties which must be must be kept in mind when interpreting the model results.[93] The District Court did not disturb this finding.

The Applicant's experts provided a summary of the CCRP Model's limitations and uncertainties in their model scenario report.[94] These limitations result primarily from the regional

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[92] *See* ANTONIN SCALIA & BRYAN A. GARNER, READING LAW: THE INTERPRETATION OF LEGAL TEXTS 180-82 (2012) (stating that where possible new rules should be interpreted in a way that renders them compatible with, not contradictory to, existing laws, regulations, and policies).
[93] Exhibit No. SE_140, p. 128.
[94] Exhibit No. SNWA_475, p. 7-1.

scale of the CCRP Model and the lack of aquifer response data associated with large volumes of pumping in Spring Valley. The Applicant's expert witness, Mr. Andrew Burns, best described the model's regional scale as follows, "the only way to look at it is if you think of yourself at a model [node][95] in the groundwater discharge area of Spring Valley. And we know that the dimensions of the model cell is 1,000 meters by 1,000 meters." Mr. Burns continued:

> And so that's about 3300 feet by 3300 feet. And so when you look out at the landscape while your [sic] standing out there in Spring Valley, if you can imagine, . . . you look 1650 feet in front of you or to the right or left or behind you, you might see that there's a meadow to your right that's sustained by [a] shallow groundwater system that's sourced by ditches conveying surface water.
>
> You might go to your front and see a small stand of greasewood or rabbit brush or some phreatophyte. You might even see to your right a single spring coming out of the ground. Behind you you might find a large stand of greasewood.
>
> Where you stand we know in some places in Spring Valley that the basin fill is on the order of one and a half to two kilometers deep because – and we know this because we've done gravity surveys to map depth to basin. And by basin I mean the top of the carbonate rocks below the basin fill.
>
> And so what I'm describing are a lot of details in a local setting within a model cell.
>
> And for regional model those features aren't represented – or at least they're distilled, they are represented but they're distilled into a regional value. So for ET, that model will represent all that variation with a single [extinction] depth, for example, a single head value.[96]

In other words, the size of the scale of the model cells is very large and each cell can only provide a single, average, value for groundwater head and ET extinction depth[97] that does not reflect the diversity that actually exists within that cell boundary.

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[95] A model node is the center of a model cell.
[96] 2017 Transcript, Vol.4 pp. 994:16-995:21 (Burns).
[97] *See* Exhibit No. SNWA_475, p. 7-1 ("Extinction depth is defined as the depth below the land surface at which ET ceases.")

CPB's experts also used the CCRP model in their analysis, and they attempted to address this limitation in the model issue by simply splitting each CCRP model cell into 49 smaller cells to improve the model's resolution.[98] Under this method, each of the 49 smaller cells either "simply inherited properties directly from the grid cells of the Regional Model" or the values of the larger cells were linearly interpolated to the smaller cells.[99] However, SNWA's groundwater model expert, Ms. Warda Drici, concluded this effort to "telescope" the model did not improve the accuracy of how the model predicts the quantity of groundwater that will be captured which is currently utilized by plants.[100] CPB experts Dr. Jones and Dr. Mayo agreed, stating in their expert report that "[a]lthough there is a slight deviation in the early years, the [original and telescoped] models produce essentially the same output."[101] The State Engineer finds that, for the purposes of analyzing the capture of groundwater used by plants, the effort to telescope the model has no practical utility and does nothing to improve the accuracy of model predictions.

The experts agreed that the CCRP model is the best tool available for projecting future equilibrium between discharge and recharge in a reasonable time despite its limitations. Accordingly, the State Engineer finds that groundwater modeling using the CCRP model is an appropriate method for addressing the District Court's remand instruction to recalculate the award based on assuring some prospect of reaching equilibrium between discharge and recharge in a reasonable time.

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[98] Exhibit No. CPB_019, pp. 21-22.
[99] Exhibit No. CPB_019, p. 22.
[100] 2017 Transcript, Vol.4 p. 1002:1-8 (Drici).
[101] Exhibit No. CPB_019, p. 24.

1. Groundwater Model Was Properly Updated

Prior to running a new model simulation in response to the District Court's remand instruction, the Applicant updated the groundwater model that was used in 2011. According to the Applicants' experts, the update was needed to align the model with the subsequent factual findings that were made by the State Engineer in Ruling 6164.[102] In particular, the 2011 model simulated groundwater discharge from plants in Spring Valley to be 75,000 afa, but the State Engineer found in Ruling 6164 that the groundwater discharge from plants in Spring Valley is 84,100 afa. Also, the 2011 model simulated 91,224 afa of groundwater pumpage, which was the quantity of water that was requested by the Applicant. In Ruling 6164, the State Engineer awarded only 61,127 afa to be pumped.[103]

To adjust the value of groundwater utilized by plants, the Applicant found that it was necessary to modify the recharge efficiencies for the Great Salt Lake region, of which Spring Valley is a part.[104] Accordingly, the recharge factor was increased from 1.000 to 1.095, an increase of 9.5 percent.[105] Dr. Myers, GBWN's expert witness, challenged this modification. He claimed that the adjustment in recharge efficiency "would bias the model to allow more capture within Spring Valley faster."[106] Dr. Myers, however, testified that he had not calculated the level of bias that he was alleging, but described it as "slight."[107] Dr. Myers also stated that he could not run the model supplied by the Applicant, even though CPB experts could, and Myers only based his conclusion of model bias on the description of the model included in the Applicant's expert

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[102] Exhibit No. SNWA_475, p. 3-1.
[103] Exhibit No. SNWA_475, p. 2-1 (Table 2-1).
[104] Exhibit No. SNWA_475, p. 3-2; 2017 Transcript, Vol.4 p. 1002:20-24 (Drici).
[105] Exhibit No. SNWA_475, p. A-4 (Table A-4).
[106] Exhibit No. GBWN_297, p. 10.
[107] 2017 Transcript, Vol.9 p. 1919:6-9 (Myers).

reports.[108] On cross-examination, Dr. Myers testified that he did not object to the use of the model for this purpose, despite his disagreement regarding the change to the recharge efficiency.[109]

Ms. Drici, the Applicant's modeling expert, disagreed with Dr. Myers's claim. Ms. Drici testified that the adjustment to the model's recharge efficiency was "relatively small" and that the new value for recharge efficiency falls within the range of the original estimates.[110] When asked whether she believed her adjustment biased the model, Ms. Drici responded that it did not because it did not affect anything else in the model.[111] Ms. Dirci also noted that Dr. Myers's recommended approach would be "going backwards."[112]

CPB's experts, who, unlike Dr. Myers, loaded and ran the model, agreed with the Applicant's expert that the model updates are valid and that the updated CCRP model is the best available tool to evaluate the capture of groundwater utilized by plants, and the time to reach equilibrium.

Based on the evidence in the record, and considering that Dr. Myers lacked the technical ability to actually load and run the model, the State Engineer finds that: (1) the adjustment to the recharge efficiencies of the Great Salt Lake Desert basins was appropriate, (2) the new estimate for recharge efficiency is well within the range of previous estimates, and (3) no bias exists in the update because the adjustment was slight and it will not materially affect the model results.

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[108] 2017 Transcript, Vol.9 p. 1919:14-19 (Myers).
[109] 2017 Transcript, Vol.9 p. 1919:20-22 (Myers) ("Q. But you do not object to the use of the model to calculate capture of ET in ET capture scenario? A. No.").
[110] 2017 Transcript, Vol.4 p. 1003:4-8 (Drici).
[111] 2017 Transcript, Vol.4 p. 1006:2-6 (Drici).
[112] 2017 Transcript, Vol.4 p. 1006:7-12 (Drici).

2. Applicant's model simulation demonstrates equilibrium in reasonable time and no groundwater mining.

The Applicant developed a model scenario for the express purpose of determining whether a pumping regime can be designed for project pumping in order fully capture groundwater that is currently utilized by plants, within a reasonable period of time. To isolate the effect of project pumping, the Applicant ran both a baseline scenario and an ET capture scenario.[113] ET capture refers to the capture of the groundwater that is currently used by plants. The ET capture scenario simulated pumping of the 61,127 afa of water awarded to the Applicant in Ruling 6164 according to the approved staged development schedule.[114] Similar to the model scenario relied on by the District Court, the ET Capture scenario added 86 wells, spread throughout Spring Valley's primary groundwater ET discharge area, along with the 15 wells identified as the points of diversion for each of the Applicant's pending applications.[115] The Applicant selected four point-in-time intervals for reporting results – the start of full production and 75, 100, and 200 years after the start of full production.[116]

Simulation results show that, initially, project pumping captures the majority of groundwater from transitional storage in the basin. There is, however, a relatively rapid transition so that after 75 years, 96 percent of project pumping is attributable to capturing only the groundwater that is currently utilized by plants.[117] After 100 years the capture rate increases to 97 percent, and after 200 years it reaches 98 percent.[118] The same results show that after 75 years,

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[113] Exhibit No. SNWA_475, pp. 4-1-4-2.
[114] Exhibit No. SNWA_475, p. 4-3 (Table 4-1).
[115] Exhibit No. SNWA_475, p. 4-4 (Figure 4-2).
[116] Exhibit No. SNWA_475, p. 5-1
[117] Exhibit No. SNWA_475, p. 6-2 (Table 6-1).
[118] Exhibit No. SNWA_475, p. 6-2 (Table 6-1).

less than 3 percent of project pumping is attributable to the capture of transitional storage.[119] That number decreases to less than 3 percent after 100 years and less than 2 percent after 200 years.[120] This percentage far exceeds what would be required to assure some prospect of equilibrium.

The Applicant's experts testified that the ET capture scenario projected that if 61,127 afa were awarded to the Applicant, Spring Valley would reach equilibrium between discharge and recharge in a reasonable time. CPB experts also agreed that the ET capture scenario presented by the Applicant's experts demonstrated a projection of equilibrium in Spring Valley in a reasonable time.[121] Finally, GBWN's expert agreed that "they [the Applicant] did show that using their model in this regime that they could come to equilibrium or essentially to equilibrium."[122] Therefore, the State Engineer finds that evidence from the 2017 remand hearing, including the Applicant's ET capture scenario, assures that there is some prospect that equilibrium between discharge and recharge in Spring Valley can occur in a reasonable time, even if the award for the Applicant's permits is recalculated to be 61,127 afa.

The Applicant also used the ET capture scenario to show the total quantity of groundwater storage that would be captured in the 200-year model simulation period.[123] Even though testimony at the hearing established that the primary groundwater aquifer in Spring Valley is generally between one and a half and two kilometers deep (approx. 5,000 to 6,500 feet),[124] the recoverable storage reservoir can be considered the top 100 feet of saturated basin fill.[125] In Spring Valley,

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[119] Exhibit No. SNWA_475, p. 6-2 (Table 6-1).
[120] Exhibit No. SNWA_475, p. 6-2 (Table 6-1).
[121] 2017 Transcript, Vol.4 p. 1014:9-15 (Drici); 2017 Transcript, Vol.6 p. 1325:11-15 (Jones) ("Q. So you would agree with me that a 98 percent report of ET capture rate results in project pumping reaching an equilibrium between recharge and discharge after 200 years? A. [by Dr. Jones] Within the uncertainty of the model, yes.").
[122] 2017 Transcript, Vol.8 p. 1710:13-15 (Myers).
[123] Exhibit No. SNWA_475, p.6-3.
[124] 2017 Transcript, Vol.4 p. 1015:11-15 (Drici).
[125] 2017 Transcript, Vol.4 p. 1015:16-20 (Drici).

between 4.79 million acre-feet and 8.57 million acre-feet are estimated to exist in just the top 100 feet of the groundwater aquifer.[126] The Applicant's experts compared this quantity of storage to how much of this storage water is projected to be captured.

Applicant's experts concluded that the ET capture scenario shows that only 9 to 17 percent of the top 100 feet of storage would be captured in the 200-year model simulation.[127] The Applicant's experts concluded that this percentage of projected capture of storage does not constitute groundwater mining.[128] CPB and GBWN experts agreed that the removal of water from transitional storage is not groundwater mining.[129] The State Engineer finds that the Applicant's ET capture scenario accurately projects that only 9 and 17 percent of the top 100 feet of storage will be captured over 200 years, and that the capture of only 9 and 17 percent does not constitute groundwater mining.[130]

C. Protestants' Evidence of Equilibrium Between Discharge and Recharge in a Reasonable Time

CPB's experts performed model simulations to examine "if the proposed SNWA pumping scheme will ever reach an equilibrium state and to determine what impact the aquifer pumping will have on groundwater storage and CPB water rights."[131] Like the Applicant, CPB adjusted the model to correspond to the quantity of water rights that was approved in Ruling 6164.[132]

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[126] Exhibit No. SNWA_475, p. 6-3.
[127] 2017 Transcript, Vol.4 p. 1017:11-13 (Drici); Exhibit No. SNWA_617, p. 14.
[128] 2017 Transcript, Vol.4 p. 1017:17-22 (Drici).
[129] 2017 Transcript, Vol.6 p. 1309:6-8 (Jones); 2017 Transcript, Vol.9 p. 1904:19-24 (Myers).
[130] Exhibit No. SE_140, p.56 (defining groundwater mining as pumping in excess of the perennial yield).
[131] Exhibit No. CPB_019, p. 18.
[132] Exhibit No. CPB_019, p. 25.

Unlike the Applicant, however, CPB only included in its model simulation the 15 previously approved wells.[133] For the following reasons, the State Engineer finds that, for the purposes of recalculating water available for appropriation based on assuring some prospect of equilibrium in reasonable time, model scenarios with additional wells can be considered, and those scenarios have more weight than model projections with only the 15 initial wells from the Applicant's applications. First, the District Court did not restrict its review of the 2011 evidence to only the initial 15 points of diversion when it conducted its future equilibrium analysis. Second, the location of wells is the critical factor in considering whether some prospect of equilibrium between discharge and recharge can be assured. Third, all experts agree that it is not reasonable to conclude that after 200 years, the Applicant's project will only utilize 15 points of diversion and model limitations make it inappropriate to consider only 15 points of diversion. Fourth, unlike a conflicts analysis, the analysis of future equilibrium is a basin-wide inquiry and not a well-to-well inquiry. Fifth, the determination of equilibrium should be based on what water can be *ultimately* captured, not what will be *initially* captured. Sixth, and finally, the District Court directed that the equilibrium analysis required on remand could be a reason to limit, but not deny, a water right application.

[133] Exhibit No. CPB_025, p.10. CPB's model simulation also included a simulation period from 200 to 2,000 years. Exhibit No. CPB_019, p. 25. CPB's expert admitted that "[t]he time range for the 2000-year simulation is far beyond any reasonable water resource planning and management horizon." Exhibit No. CPB_025, p. 12. The State Engineer agrees that given the limitations of the groundwater model, and the fact that a 2000-year simulation period is well outside any reasonable planning horizon, CPB's 2000-year predictions are subject to an unreasonably high level of uncertainty. Accordingly, the State Engineer finds that CPB's evidence based on 2,000-year simulations has little weight and only the evidence from 200-year simulations will be considered

1. The District Court did not restrict its review of the 2011 evidence to only the initial 15 points of diversion when it conducted its future equilibrium analysis.

At no point did the District Court state or imply that, in examining the equilibrium issue, analysis should be limited to the initial 15 project wells. In fact, in issuing this instruction, the District Court specifically relied upon a groundwater model prediction that simulated pumping from 81 wells.[134] The groundwater model prediction relied upon by the District Court was prepared in accordance with the Environmental Impact Statement process conducted by the federal government. That process evaluated several alternatives for the ultimate buildout of the project recognizing that "a tiered NEPA process can be used for multi-phased projects when specific locations and design elements have not been defined for all phases."[135]

While the Applicant has indicated that it intends to use the 15 initial wells for stage one pumping, aquifer response data and other information generated from first stage pumping will determine the ultimate project design. The District Court's reliance on a model prediction that simulated pumping from more than the 15 initial wells was a recognition of this reality. Given the District Court's own willingness to recognize the reality that the ultimate project design will change over time, the State Engineer finds that, similarly, he is not limited to analyzing model predictions using simulations that only include the 15 initial well locations.

2. The location of wells is the critical factor in considering whether some prospect of equilibrium between discharge and recharge can be assured.

There is substantial evidence in the record that the project configuration will have the greatest impact on reaching equilibrium. The District Court's Remand Order appears to indicate

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[134] Exhibit No. SE_118, p. 12.
[135] Exhibit No. GBWN_110, p. 2-1.

that the District Court believed that the State Engineer could balance the water budget simply by reducing the quantity of water awarded to the Applicant by 9,780 afa, to 51,347 afa. Substantial evidence presented at the remand hearing, however, indicates that merely reducing the quantity of water awarded to the Applicant will have little impact on the time it takes for the basin to reach a new equilibrium state. In addition, the evidence presented at the remand hearing demonstrates that time to reach equilibrium is predominantly a function of well design and project layout rather than a function of the quantity of water being pumped.

For instance, CPB ran a series of model simulations with fractional levels of project pumping ranging from 90 percent of the approved pumping volume (54,977 afa) to 10 percent of the approved pumping volume (6,108 afa). While the percentage of ET captured slightly increased with reduced pumping volumes, none of the fractional pumping scenarios achieved an ET capture rate higher than 83 percent.[136] As noted by CPB's experts "no matter how much the pumping is reduced, none of the fractional pumping scenarios reach equilibrium."[137] CPB's experts thus concluded that "changing the pumping rate has little impact on the outcome."[138]

The Applicant's model simulation increased and varied the number and locations of project wells to demonstrate that greater ET capture can occur with different project configurations. By contrast, CPB's model simulations relied exclusively on the 15 well locations identified in SNWA's applications, but varied the level of pumping to determine whether lowering the pumping volume would increase ET capture. The results of these various model simulations support the general consensus of the experts who testified at the remand hearing that well location, not the

[136] Exhibit No. CPB_025, p. 14.
[137] Exhibit No. CPB_025, p. 14.
[138] Exhibit No. CPB_025. p. 15.

quantity of water pumped, is the significant variable for ET capture. Because the State Engineer finds well location is the primary factor in an equilibrium analysis, the State Engineer finds that the consideration of model scenarios that vary the locations of the simulated wells is proper in assuring whether some prospect exists for reaching a new equilibrium state in response to a particular quantity of pumping.

3. The Project Configuration Will Be Markedly Different After 200-Years.

Both the Applicant's and the Protestants' experts agreed that it is unreasonable to assume the ultimate project configuration will be limited to the initial 15 wells. The Applicant's expert, Mr. Watrus, noted that using 101 wells to pump 61,127 afa of water, as simulated in the ET Capture model scenario, would not be an unusual situation for a municipal water provider.[139] For comparison, he noted that in the Las Vegas Valley, the Applicant uses a network of 68 production wells to produce approximately 40,000 afa of groundwater.[140] Mr. Watrus also noted that in Coachella Valley, California, the municipal water provider uses over a hundred wells to produce 115,000 afa of groundwater, and in El Paso, Texas, the water utility uses 170 wells to produce approximately 80,000 afa of groundwater.[141]

Mr. Watrus further testified that:

> We intend to start Stage 1 with these 15 points of diversion. But . . . I expect that during this time frame, we will be filing change applications. I wish we were so good that we could drill a well and it would come in perfect. That's not been my experience.
>
> So we envision, as we learn more about how this system behaves, how it responds to pumping, that we'll file change applications and that – one, to comply with the permit terms of making sure that there is no conflict with existing rights, that the

[139] 2017 Transcript, Vol.4 p.1009:7-10 (Watrus).
[140] 2017 Transcript, Vol.4 p.1009:12-14 (Watrus).
[141] 2017 Transcript, Vol.4 p.1009:15-19 (Watrus).

> project is environmentally sound, and that it doesn't result in an unreasonable lowering of the water table.
>
> So Stage 1 development, we would focus on the southern part where these 15 points of diversion, we would learn from Stage 1 development, and manage our operations, our activities, in response to those conditions.[142]

CPB's expert, Dr. Jones, testified that given his experience regarding what happens in projects of this size, it is not realistic to believe that after 200 years the proposed project would only be pumping water from the initial 15 wells.[143] Likewise, Dr. Myers, GBWN's expert witness, agreed with this proposition stating that "I don't suggest that you're limited to 15 wells, I do believe you end up with a distributed [pumping] program, that's why I presented that in my testimony of a distributed option."[144]

Further, one drawback to using long-term model simulations to make determinations about the availability of water for appropriation is that pumping conditions rarely remain static throughout the simulation period as assumed by the models. With respect to the model simulations run by both CPB and the Applicant, pumping is simulated as occurring for the entire 200 years of the simulation (1) on a continuous basis, (2) at the maximum permissible pumping duty from the respective stage of development, and (3) from unchanged well locations. None of the experts who testified at the remand hearing believe that these are realistic assumptions. Also, the resolution of the CCRP model does not reflect the diversity of the individual plant communities within each model cell.

Because substantial evidence in the record so clearly indicates that, during subsequent stages of pumping, the project will change and additional wells will be developed, the State

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[142] 2017 Transcript, Vol.5 pp. 1071:10 – 1072:3 (Watrus).
[143] 2017 Transcript, Vol.6 pp.1323:22 – 1324:8 (Jones).
[144] 2017 Transcript, Vol.9 p.1911:2-5 (Myers).

Engineer finds that it is not realistic to evaluate the issue of whether the basin can reach a new equilibrium within a reasonable period of time using model scenarios that limit project pumping to the initial 15 wells locations for the entire 200 years of the simulation period.

4. Unlike a conflicts analysis, analysis of future equilibrium is a basin-wide inquiry, not a well-to-well inquiry.

The Protestants point to previous statements by the State Engineer that he is limited to reviewing the applications as submitted and not analyzing some hypothetical future project to support their contention that the project should be denied. However, the Protestants are taking the State Engineer's prior statements out of context. The State Engineer's prior statements were made in the context of performing a conflicts analysis (i.e. determining whether pumping at a particular well will conflict with other water rights)[145] and are not applicable to the District Court's separate requirement for an assurance of some prospect of a new basin-wide equilibrium within a reasonable period of time.

An equilibrium analysis requires a basin-wide approach that looks at how the whole aquifer will respond to a particular level of pumping over an extended period of time. Because the District Court's remand instruction asks the State Engineer to consider a multi-decadal period of time (i.e. the District Court used a 200-year timeframe) to recalculate the water available for appropriation,[146] the State Engineer finds that it would be improper for him to restrict his analysis solely to the initial well sites within the basin.

Protestants argue that is it unfair for the State Engineer to consider the Applicant's ET Capture model scenario since it includes wells not identified in the applications before the State

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[145] *See* NRS 533.370.
[146] Exhibit No. SE_118, p.23.

Engineer and no conflicts analysis has been performed with respect to the simulated wells.[147] This ignores the fact that before any additional wells can be developed, change applications will need to be filed. Prior to approval of any change applications, the State Engineer will be required to perform a full conflicts analysis. During that process, Protestants will have a full opportunity to participate and provide evidence to the State Engineer.

The task presented to the State Engineer on remand is to determine what quantity of groundwater water is available to be appropriated in the Spring Valley basin while assuring that the permitted award will have some prospect of reaching a new equilibrium within a reasonable period of time. The State Engineer was *not* instructed to re-open or revise his prior conflicts analysis. Because a conflicts analysis and an equilibrium analysis are two very different types of inquiries, and because any future change applications will require a full conflicts analysis be performed before approval, the State Engineer finds that Protestants' arguments lack merit.

5. The Determination of Perennial Yield should be Based on What Water can be *Ultimately* Captured, not What Will be *Initially* Captured.

In making its determination that the approval of the Applicant's permits in Spring Valley should be remanded, the District Court relied heavily on the State Engineer's statement in Ruling 6164 that "[p]erennial yield is ultimately limited to the maximum amount of natural discharge that can be salvaged for beneficial use."[148] The word *ultimate* is commonly defined as "furthest or farthest" and "ending a process or series."[149] This means that any recalculation of the water available for appropriation in Spring Valley should be evaluated at the end of the staged development process, not during the initial stages of groundwater development. The State

[147] 2017 Transcript, Vol.10., p.2017:8-19 (Hejmanowski).
[148] Exhibit No. SE_140, p.56 (emphasis added).
[149] THE RANDOM HOUSE COLLEGE DICTIONARY 1425 (Rev. Ed. 1984).

Engineer's prior approval of the Applicant's permits required the water to be developed in stages.[150]

The purpose for this requirement is to allow the State Engineer time to evaluate real-world data regarding how the aquifer will respond to project pumping, including data that indicates how water levels in the aquifer are stabilizing or otherwise progressing towards the achievement of a new equilibrium state. This data provides a positive feedback mechanism that will help determine the ultimate build-out of the project. Staged pumping also provides a safety-valve that allows the State Engineer to slow or halt subsequent pumping stages. Because the determinations of perennial yield and water available for appropriation are based on how much natural discharge can *ultimately* be salvaged, the State Engineer finds that he is not limited to analyzing only the *initial* 15 well locations identified in the Applications.

6. The Equilibrium Analysis may be a Reason to Limit, but not Deny, a Water Right Application.

In the Remand Order, the District Court stated only that time to reach equilibrium "may very well be a reason to limit the appropriation below the calculated E.T."[151] Importantly, the District Court also determined that there is up to 61,127 afa of groundwater available for appropriation in Spring Valley.[152] Based on the District Court's finding that the Applicant's pumping, combined with uncaptured ET, was withdrawing 9,780 afa more water than is available, at a minimum the applicant is entitled to an award of 51,347 afa.

All the parties agree with the District Court that groundwater is available for appropriation in Spring Valley. CPB's attorney stated that CPB has "never denied that there's water available

[150] Exhibit No. SE_140, pp.216-17.
[151] Exhibit No. SE_118, p.11.
[152] Exhibit No. SE_118, p.10.

for appropriation [in Spring Valley]."[153] Dr. Mayo and Dr. Jones, CPB's expert witnesses, agreed that there is water available for appropriation in Spring Valley.[154] Likewise, Dr. Myers, GBWN's expert, when asked if there is an amount of water available for appropriation in Spring Valley stated unequivocally "I absolutely believe that there is."[155] These statements are inconsistent with the Protestants' argument that the applications should be denied based on the equilibrium analysis.

Despite Dr. Mayo's agreement that there is water available for appropriation in Spring Valley, he argues in his expert report that because there is no reduced quantity of pumping from the 15 PODs that results in achieving equilibrium within a reasonable period of time, the Spring Valley applications should be denied outright.[156] This recommendation, however, conflicts with the express direction of the District Court that an application cannot be denied on this basis.[157]

GBWN's attorney stated that he believes that the evidence in the record shows "that the applications can't be granted."[158] However, this conflicts with the evidence provided by his own expert witness who recommended that some water should be approved initially with additional amounts approved "after the first amount has been shown to come to equilibrium without deleterious impacts."[159]

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[153] 2017 Transcript, Vol.1 p. 30:20-21 (Hejmanowski).
[154] 2017 Transcript, Vol.6 p. 1309:9-15 (Mayo and Jones). Dr. Mayo and Dr. Jones also agreed that, using the State Engineer's definition of groundwater mining from Ruling 6164, the project does not constitute groundwater mining. 2017 Transcript, Vol.6 p. 1307:3-15 (Mayo and Jones).
[155] 2017 Transcript, Vol.9 p.1858:13-15 (Myers). Dr. Myers also agreed that, using the State Engineer's definition of groundwater mining from Ruling 6164, the project does not constitute groundwater mining. 2017 Transcript, Vol.9 p.1858:13-15 (Myers).
[156] Exhibit No. CPB_25, p.21; 2017 Transcript, Vol.6 p.1252:19-21 (Jones) ("Q. Did you make a recommendation in your report that these applications should be denied? A. [by Dr. Jones] Yes.").
[157] Exhibit No. SE_118, p.13.
[158] 2017 Transcript, Vol.1 p.36:17-24
[159] Exhibit No. GBWN_297, p.7.

On remand, none of the Protestants provided a clear recommendation or a proposed recalculation of the water available for appropriation in Spring Valley based on the District Court's instructions. Because substantial evidence in the record does not support denial of the applications, and because the direction of the District Court was not to deny the applications, but rather to recalculate the water available for appropriation, the State Engineer finds that requests by the Protestants to deny the permits lacks merit.

D. Recalculating the Water Available for Appropriation in Spring Valley

As noted above, the District Court directed the State Engineer to recalculate the award to the Applicant to assure that some prospect exists that Spring Valley's groundwater basin will reach equilibrium within a reasonable period of time. The State Engineer incorporates by reference, and re-adopts, all Findings of Fact and Conclusions of Law included within Ruling 6164 that Spring Valley basin's perennial yield is 84,000 afa,[160] and after subtracting existing committed groundwater resources in Spring Valley of 18,873 afa, and reserving 4,000 afa for future economic development in the basin, 61,127 afa of groundwater remains available for appropriation in Spring Valley.[161]

The Applicant's ET Capture model simulation assures some prospect that equilibrium between discharge and recharge can be achieved in a reasonable time. Based on this analysis, the State Engineer finds that 61,127 afa should be awarded to the Applicant in the pending applications.

The State Engineer's finding is supported by the requirement of staged development. The Applicant's experts noted that under staged development, prior to and during the first stage of

[160] Ruling 6164, p.90.
[161] Ruling 6164, p.215.

pumping, additional data will be gathered that will provide better information regarding the aquifer's response to large-scale pumping.[162] The State Engineer has already mandated that the Applicant update the groundwater model for Spring Valley as this new data becomes available. The updated model will be used to refine estimates of equilibrium. When combined with the implementation of the Spring Valley 3M Plan, staged development will ensure that the basin's water levels will stabilize or otherwise progress toward a new equilibrium condition in response to project pumping. Accordingly, the State Engineer concludes that, to the extent the equilibrium analysis may be a reason to limit the appropriation in the future, the reduction should occur at the final, or ultimate stage, of the staged development process. Based on this, the State Engineer finds that 61,127 afa of groundwater remains available for appropriation in Spring Valley by the Applicant.

III. DEFINING STANDARDS, THRESHOLDS OR TRIGGERS SO MITIGATION OF UNREASONABLE EFFECTS IS NOT ARBITRARY AND CAPRICIOUS

In Rulings 6164, 6165, 6166 and 6167, the State Engineer approved 15 of the Applicant's water right applications based, in part, on the Applicant's compliance with specific monitoring, management and mitigation plans. The District Court remanded those rulings for the State Engineer to "[d]efine standards, thresholds or triggers so that mitigation of unreasonable effects from pumping of water are neither arbitrary nor capricious in Spring Valley, Cave Valley, Dry Lake Valley and Delamar Valley."[163] The State Engineer finds that to comply with this instruction, the Applicant's 3M plans must identify a standard for what constitutes an unreasonable effect to

[162] Transcript, Vol.4 p.1018:14-21 (Burns).
[163] Exhibit No. SE_118 at p. 23.

water rights and environmental resources, and provide objective thresholds and triggers to avoid unreasonable effects as to not be arbitrary and capricious.

After the District Court entered the Remand Order, the Nevada Supreme Court decided *Eureka County v. State Engineer*, which identified principles for what a monitoring, management, and mitigation plan must have to comply with Nevada water law. The Supreme Court held that if the State Engineer approves an application based on a 3M plan, the decision must be based on presently known substantial evidence,[164] and must be sufficiently explained and supported to allow for judicial review.[165] Approval of a 3M plan must also be based on evidence in the record that demonstrates that mitigation would be successful and adequate to fully protect those existing rights.[166] The State Engineer finds that, in addition to complying with the District Court's remand instruction, Applicant's 3M plans must also meet the requirements the Nevada Supreme Court established in *Eureka County v. State Engineer*.

A. Applicant's Evidence Regarding Standards, Thresholds or Triggers to Avoid Unreasonable Effects.

The Applicant presented many evidentiary documents to comply with the remand instruction regarding standards, thresholds or triggers to avoid unreasonable effects. The main exhibit is an expert report entitled *Technical Analysis Report Supporting the Spring Valley and Delamar, Dry Lake, and Cave Valleys, Nevada, 3M Plans*, ("Technical Analysis Report").[167] The Technical Analysis Report was prepared to provide the rationale and evidentiary support for the *SNWA Monitoring, Management, and Mitigation Plan for Spring Valley, Nevada*, ("Spring Valley

[164] *Eureka County v. State Engineer*, 131 Nev. Adv. Op. 84, 14, 359 P.3d 1114, 1120 (2015).
[165] *Eureka County v. State Engineer*, 131 Nev. Adv. Op. 84, 15, 359 P.3d 1114, 1120-21 (2015).
[166] *Eureka County v. State Engineer*, 131 Nev. Adv. Op. 84, 15-16, 359 P.3d 1114, 1121 (2015).
[167] Exhibit No. SNWA_507.

3M Plan"),[168] and the *SNWA Monitoring, Management, and Mitigation Plan for Delamar, Dry Lake, and Cave valleys, Nevada*, ("DDC 3M Plan").[169] The Spring Valley 3M Plan and the DDC 3M Plan are collectively referred to as the "3M Plans." The Applicant asked the State Engineer to approve the 3M Plans and make compliance with the 3M Plans an express condition in the Applicant's water right permits.[170] The Applicant presented the following witnesses who prepared the Technical Analysis Report and the 3M Plans: (1) James Prieur, an expert in hydrogeology; (2) Zane Marshall, an expert in biological resources; and (3) Lisa Luptowitz, a factual witness.[171]

Due to the sheer robustness of the Applicant's 3M Plans, implementation and consistent enforcement of the 3M Plan was a topic of discussion during the hearing. The Applicant was clear that providing resources to assist the State Engineer's office in carrying out the 3M Plans was acceptable to the Applicant. Indeed, Mr. Marshall stated that "[the Applicant] would be willing to provide resources . . . that would be necessary to oversee and insure the plan is implemented in the way the State Engineer sees fit."[172] The State Engineer recognizes that water users have funded the State Engineer's office in the past. As such funds may be available in the future, the State Engineer finds that the 3M Plan would not cause an undue burden on the State Engineer's office.

1. Identification of Analysis Area and Resources

The 3M Plans defined an analysis area which encompasses the basins where the points of diversion for Applicant's water right applications are located (the "project basins"), and adjacent basins.[173] The analysis area was initially delineated based on likelihood of interbasin flow as

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[168] Exhibit No. SNWA_592.
[169] Exhibit No. SNWA_593; 2017 Transcript, Vol.2 p. 334:13-15 (Prieur).
[170] 2017 Transcript, Vol.2 p. 334:18-20 (Prieur).
[171] 2017 Transcript, Vol.2 pp 323:20-324:3.
[172] 2017 Transcript, Vol.3 P. 737:18-22 (Marshall)
[173] Exhibit No. SNWA_592, p.1-3; Exhibit No. SNWA_593, p. 1-3; Exhibit No. SNWA_507 p.4-1 - 4-4.

presented in Rulings 6164-6167.[174] The area was then refined by considering analyses of potential effects from the Applicant's Groundwater Development Project ("GDP"), a 2011 effects analysis, the Bureau of Land Management ("BLM") Final Environmental Impact Statement ("FEIS") for the GDP, and the U.S. Fish and Wildlife Service's Biological Opinion for the GDP ("USFWS BO").[175] Based on this information, the Applicant determined that the analysis area for the development of the 3M Plans should be the four project basins and four adjacent areas: northern Hamlin Valley, southern Snake Valley, southern White River Valley, and Pahranagat Valley.

Protestants did not challenge the Applicant's delineation of the analysis area that was considered for the development of the 3M Plans. The State Engineer finds that the 3M Plan has established an objective and logical approach to delineate the analysis area. The State Engineer further finds that the analysis area used in the Technical Analysis Report and 3M Plans is sound, based on the likelihood of interbasin flow and the potential effects from GDP pumping.

a. <u>Water Resources</u>

The water resources that were analyzed by the Applicant to develop the 3M Plans were selected using the following objective criteria: (1) occurrence within the analysis area, (2) water right seniority, and (3) likelihood of hydraulic connection with the producing aquifer where GDP production wells will be installed.[176] As discussed in the Technical Analysis Report and the testimony of Mr. Prieur, water rights and domestic wells within the analysis area were identified using NDWR and Utah Division of Water Rights on-line databases.[177] The Applicant applied the above criteria to determine which of the compiled water rights to include in the 3M Plan analysis.

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[174] Exhibit 507 p. 4-1 – 4-3; 2017 Transcript, Vol.2 p. 359-364 (Marshall).
[175] Exhibit 507 p. 4-1 – 4-4; 2017 Transcript, Vol.2 p. 359-364 (Marshall).
[176] Exhibit No. SNWA_507 p.4-5.
[177] Exhibit No. SNWA_507 p. 4-7.

Based on extensive analysis conducted to date, the Applicant concluded that hydrologic resources in the mountain block are not hydraulically connected to the producing aquifer or susceptible to GDP pumping effects.[178] The Protestants did not challenge this conclusion. The Applicant also concluded that reservoir water rights are associated with impoundments that collect intermittent precipitation runoff are not hydraulically connected to the producing aquifer, and therefore not susceptible to GDP pumping effects.[179] The State Engineer finds that the Applicant appropriately excluded those water rights from the 3M Plan analysis.

The 3M Plans include all other water rights that are senior to the Applicant's applications because they have an application filing date prior to October 17, 1989.[180] But the Applicant's Technical Analysis Report recognizes that "[i]n the event it is determined that SNWA is responsible for mitigation to junior water rights [i.e. rights with post-October, 17, 1989 filing dates], those rights may be included in the 3M Plans."[181]

Based on the Applicant's reasoned and objective approach, and the lack of any competing evidence from Protestants, the State Engineer finds the 3M Plans include the proper water rights. The inclusion and consideration of these rights in the 3M Plan will ensure that they are protected from unreasonable effects of the Applicant's GDP pumping.

b. Environmental Resources

Environmental resources within the analysis area were identified using a variety of data-rich sources.[182] The Applicant also applied the above criteria to determine which of the identified

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[178] Exhibit No SNWA_507 p. 4-5 – 4-6.
[179] Exhibit No. SNWA_507 p. 4-5.
[180] Exhibit No. SNWA_507 p. 4-5 – These include certificated, decreed, permitted, vested, and reserved water rights, and domestic wells (Exhibit 507 p 4-7).
[181] Exhibit No. SNWA_507 p. 4-5.
[182] Exhibit No. SNWA_507 p. 4-7.

environmental resources to include in their 3M analysis. Based on extensive analysis conducted to date, the Applicant concluded that environmental resources outside the area where plants utilize groundwater ("groundwater discharge areas") are not hydraulically connected to the producing aquifers and are not susceptible to GDP pumping effects.[183] The Protestants did not provide any evidence challenging this conclusion. The State Engineer finds it appropriate that the Applicant excluded the environmental resources outside the groundwater discharge areas from their analysis. Environmental resources located within the groundwater discharge areas were included in the analysis, as they may be hydraulically connected to the producing aquifers and could potentially be affected by GDP pumping.[184] The State Engineer finds the Applicant's selection of which environmental resources to include in their analysis for the development of the 3M plans was sound, appropriate, and thorough.

2. Method for Developing 3M Plans

The Technical Analysis Report and testimony of Mr. Prieur and Mr. Marshall explain the methodology that was used to develop the 3M Plans. The goal was to develop a 3M plan that avoids unreasonable effects from GDP pumping by setting objective standards and thresholds, quantitative triggers, and specific mitigation actions to avoid those unreasonable effects.[185] The 3M Plans use a systematic process to define unreasonable effects and establish thresholds, triggers, and monitoring, management, and mitigation actions.[186] Section 3.1 of the Technical Analysis Report describes the process for defining and including in the 3M Plans the following:

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[183] Exhibit No. SNWA_507 p. 4-6.
[184] Exhibit No. SNWA_507 pp. 4-5 – 4-6.
[185] Exhibit No. SNWA_507 p. 1-1; Exhibit No. SNWA_592, p. 1-1; Exhibit No. SNWA_593, p. 1-1; 2017 Transcript, Vol.2 pp. 336:18-337:11 (Prieur); 2017 Transcript, Vol.2 pp 337:24-340:6 (Marshall).
[186] Exhibit No. SNWA_507 pp. 3-1 – 3-2.

unreasonable effects, objective thresholds, buffers above the unreasonable effects, preemptive action, mitigation triggers, mandated mitigation actions, proactive investigation triggers, discretionary management actions, and monitoring activities.[187] The State Engineer finds that this process is consistent with Nevada Supreme Court guidance, recent literature regarding responsible development of groundwater resources, and global 3M plans and groundwater management programs.[188]

Mr. Prieur and Mr. Marshall provided testimony that the 3M Plans are resource-based, meaning that they are based on the characteristics of, and empirical data from, the hydrologic and environmental resources themselves instead of model simulations that have limitations and uncertainty.[189] The hydrologic investigation triggers are based on the empirical data of water elevations in wells and flow data in springs and streams, and hydrologic mitigation triggers are based on each water right's permitted diversion rate. The environmental investigation and mitigation triggers are based on these same hydrologic triggers, as well as empirical data from the environmental resources themselves. Mr. Prieur testified that because the 3M Plans are based upon the characteristics of the resources, they are more responsive to the changes in conditions that could impact a resource.[190]

Protestants claimed a basin-specific groundwater model should have been used to establish standards when mitigation would occur.[191] The Protestants provided testimony that a numerical model should be required to create mitigation triggers.[192]

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[187] Exhibit No. SNWA_507 pp. 3-1 – 3-2.
[188] Exhibit No. SNWA_507 pp. 3-1, 3-2, 3-4, 3-7.
[189] 2017 Transcript, Vol.2 pp. 344:24 – 345:1; 346:23 – 347:5; and 396:21-22 (Prieur); Exhibit No. SNWA_599, p. 10.).
[190] 2017 Transcript, Vol.2 p. 396:21-22 (Prieur).
[191] Exhibit No. CTGR_018, p. 17.
[192] 2017 Transcript, Vol.6 p. 1206:6-7 (Mayo); 2017 Transcript, Vol.7 p. 1528:21-23 (Reich).

The State Engineer finds that the resource-based approach in the 3M Plans focuses management and mitigation efforts to locations where such actions may be required, rather than relying upon model predictions.[193] The 3M Plans are more responsive when based upon the characteristics of the resource itself.[194] The 3M Plans will be effective, even if change applications are approved for points of diversion in the GDP because the Applicant's approach, and objective standards, triggers, and mitigation actions, are applicable regardless of where points of diversion are located. Current and future modeled drawdown predictions can inform implementation of management and mitigation actions before triggers are reached, but the triggers at specific resources will ultimately control whether mitigation actions are required.

Also, the regional groundwater model that is considered the best available modeling tool for understating the hydrological effect of the GDP "does not have the level of accuracy required to predict absolute values at specific points in time (especially decades or centuries into the future)."[195] Mr. Prieur stated that such regional models are good tools for their purpose – assessing general, long-term drawdown – but do not reflect aquifer response data or local hydrogeologic features.[196] Site-specific locations require a level of accuracy greater than regional models. As discussed earlier in this Ruling, Mr. Burns explained the limitations of regional groundwater models and how the large cell sizes average site-specific data, making regional groundwater models inapplicable for determining site-specific impacts.[197]

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[193] 2017 Transcript, Vol.2 p. 346:15-17 (Prieur).
[194] 2017 Transcript, Vol.2 p. 396:21-22 (Prieur); 2017 Transcript, Vol.2 p. 372:15-17 (Marshall).
[195] Exhibit No. SNWA_478, p. 3.3-90.
[196] 2017 Transcript, Vol.2 p. 396:17-20 (Prieur).
[197] 2017 Transcript, Vol.4 pp. 994:16 – 995:21 (Burns).

For example, Dr. Jones testified that Cleve Creek provides recharge to the groundwater system, but this dynamic was not included in the model.[198] Not including the creeks in the model would influence how the model predicts impacts.[199] Furthermore, surface water losses are not included in the model.[200] Dr. Jones also testified that the whole alluvial fan is contained within a small number of grid cells, meaning that certain details are not represented in the model.[201] Dr. Jones further stated that making site-specific predictions will have a very large degree of uncertainty.[202] Dr. Myers acknowledged that to create a local scale model, the aquifer must be stressed to gather the necessary aquifer response data.[203] Stressing the aquifer is an important factor in improving the accuracy of a numerical model.[204] To do this, however, Dr. Myers testified that the Applicant must be awarded a sufficient amount of water to properly stress the aquifer under the staged development approach.[205] This has not happened yet. For these reasons, the State Engineer finds that current model predictions are not as useful as the 3M Plans' resource-based approach for establishing standards, thresholds, or triggers.

Finally, the record indicates that the Applicant's experts have far more experience developing 3M Plans than Protestants' experts. Mr. Prieur has decades of experience developing water resource 3M plans. When asked about his background in developing 3M Plans, Dr. Myers testified that he had not written a 3M Plan and has only reviewed some.[206] Both Dr. Jones and Dr.

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[198] 2017 Transcript, Vol.6 p. 1352:8-20 (Jones).
[199] 2017 Transcript, Vol.6 p. 1353:6-9 (Jones).
[200] 2017 Transcript, Vol.6 p. 1355:3-5, 17 (Jones).
[201] 2017 Transcript, Vol.6 p. 1354:17-20 (Jones).
[202] 2017 Transcript, Vol.6 p. 1359:18-20 (Jones).
[203] 2017 Transcript, Vol.9 pp. 1936:24-1937:2 (Myers).
[204] 2017 Transcript, Vol.6 p. 1360:5-8 (Jones).
[205] 2017 Transcript, Vol.9 pp. 1934:20-1935:1 (Myers).
[206] 2017 Transcript, Vol.9 p. 1843:20-21 (Myers).

Mayo for CPB testified that they did not have any experience developing 3M Plans.[207] In addition, none of the Protestants' three witnesses have ever worked as a water resource manager, while the Applicant's experts have vast experience in that area.[208] Mr. Reich, a CPB expert witness, did demonstrate experience and knowledge in developing 3M plans, and he initially claimed that Applicant's 3M Plans should have been developed based on numerical models. But Mr. Reich's initial opinion was based on only a cursory review of Applicant's 3M Plans, and during cross-examination, he agreed that establishing triggers with a resource-based approach is better than using models.[209]

After assessing witness testimony and other relevant evidence, the State Engineer finds that the Applicant's resource-based approach is appropriate, and the use of a regional model, as urged by Protestants, to set triggers and thresholds is an inferior approach.

B. 3M Plan Components

The 3M Plans contain the following components: 1) unreasonable effects; 2) monitoring; 3) thresholds; 4) triggers; 5) investigations; 6) management actions; 7) mitigation actions; 8) mitigation action planning; 9) reporting requirements; and 10) opportunities for public input. Each component is briefly discussed below in the following sub-sections. Further detailed analysis is presented in following sections as they relate to specific resources.

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[207] 2017 Transcript, Vol.6 p. 1247:12-18 (Jones and Mayo).
[208] 2017 Transcript, Vol.6 p. 1247:19-24 (Jones and Mayo); 2017 Transcript, Vol.9 p. 1847:12-13 (Myers).
[209] 2017 Transcript, Vol.8 pp. 1646:4 – 1647:7 (Reich).

1. Objective Standards for Unreasonable Effects

A 3M plan must define an unreasonable effect.[210] The 3M Plans define unreasonable effects to hydrologic and environmental resources in the analysis area, and set standards, thresholds and triggers to avoid those unreasonable effects.[211] The 3M Plans define unreasonable effects, with respect to hydrologic and environmental resources, as effects that: 1) conflict with existing rights or protectable interests in existing domestic wells; 2) jeopardize the continued existence of federally threatened and endangered species; 3) cause extirpation of native aquatic-dependent special status animal species from a hydrographic basin's groundwater discharge area; 4) cause elimination of habitat types from a hydrographic basin's groundwater discharge area; and 5) cause excessive loss of shrub cover that results in extensive bare ground.[212] Each definition for an unreasonable effect was described in more detail in the Technical Analysis Report and in the testimony of Mr. Marshall and Mr. Prier.[213]

For existing water rights, Mr. Prieur explained that an unreasonable effect includes "a conflict with a quantity of water that's been approved for certain beneficial use associated with that existing water right . . . a conflict with a protectable interest of a domestic well . . . [or] an unreasonable lowering of the water table that causes unreasonable increased economic cost to pump water."[214] For environmental resources, Mr. Marshall explained that avoiding jeopardy to federally threatened and endangered (listed) species avoids impairing a listed species' ability to

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[210] Exhibit No. SE_118 at 18 ("…without knowing the impacts to existing water right holders and not having a clear standard to identify impacts, conflicts or unreasonable environmental effects so that mitigation may proceed in a timely manner.").
[211] 2017 Transcript, Vol.2 pp. 340:12-24 and 367:2-15 (Prieur, Marshall); Exhibit No SNWA_507 p. 2-2.
[212] Exhibit No. SNWA_507 p 2-2; Exhibit No. SNWA_592, p 1-2; Exhibit 593, p 1-2.
[213] 2017 Transcript, Vol.2 pp. 366-371 (Marshall); 2017 Transcript, Vol.2 p. 340 (Prieur); Exhibit No SNWA_507 p. 2-3 – 2-4.
[214] 2017 Transcript, Vol.2 p. 340:12-24 (Prieur).

survive or recover consistent with the Endangered Species Act (ESA).[215] Further, avoiding extirpation of native aquatic-dependent special status animal species and elimination of habitat types (mesic, shrubland, terrestrial woodland, and lake[216]) ensures that GDP pumping does not cause loss of those species and habitats from the hydrographic basin groundwater discharge areas.[217] Avoiding excessive loss of shrub cover that results in excessive bare ground also avoids soil erosion and air quality impacts that may result from such conditions.[218]

Although certain wildlife are not identified in the unreasonable effects definition, their needs are protected by avoiding unreasonable effects to existing water rights, federally listed species and native aquatic-dependent special status animal species because these other wildlife species are generally co-located with species expressly addressed in the 3M Plan and the habitat types that these other wildlife species use.[219] The Protestants took issue with some of the standards for unreasonable effects, but their criticisms did not consider how the various components of the 3M Plans are designed to work together. The Applicant's evidence demonstrated why the definition of unreasonable effects should not be taken in isolation.[220] Existing water rights, federally-listed species, native aquatic-dependent special status animal species, and habitats all coincide throughout the analysis area. As testified by Mr. Marshall, when it comes to the standards for unreasonable effects, "the whole is greater than the sum of the parts."[221]

The State Engineer finds that the 3M Plans define unreasonable effects in accordance with Nevada water law and as directed by the Remand Order. Specifically, the State Engineer finds

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[215] 2017 Transcript, Vol.2 p 367:23-368:15370:8 (Marshall); Exhibit No. SNWA_507, p. 2-3.).
[216] Exhibit No. SNWA_507 p 2-3, 5-9 – 5-10.
[217] 2017 Transcript, Vol.2 p 368:16-369:17 (Marshall); Exhibit No. SNWA_507, pp. 2-3 – 2-4.
[218] 2017 Transcript, Vol.2 p 367:23369:18-370:8 (Marshall); Exhibit No. SNWA_507, p. 2-4.).
[219]Exhibit No. SNWA_592, p.3-15; Exhibit No. SNWA_593, p. 3-16; Exhibit No. SNWA_507 pp.2-3 to 2-4.
[220] 2017 Transcript, Vol.2 p. 371:20-24 (Marshall).
[221] 2017 Transcript, Vol.2 p. 371:23-24 (Marshall).

that Applicant's definition of standards for unreasonable effects is consistent with statutory requirements to protect existing water rights, protectable interests in existing domestic wells, the public interest, and environmental soundness as has been previously defined by this Office. The definitions specified in the 3M Plans are neither arbitrary nor capricious as they are based on sound science, standard industry practice, and objective standards. However, the State Engineer finds that this definition of unreasonable effects may not be applicable for other water rights in other hydrographic areas in Nevada, which have different rights, resources, and conditions, and are not subject to the Remand Order.

2. Monitoring Requirements

The record reflects that the 3M Plan includes monitoring requirements that are designed to activate triggers, conduct investigations, inform management and mitigation actions, and assess management and mitigation efficacy.[222] The record also reflects that the monitoring plan provides representative hydrologic and environmental data to (1) characterize and quantify hydrologic and environmental conditions during both the baseline period prior to and during GDP pumping, (2) detect and measure drawdown propagation from GDP pumping, (3) signal activation of investigation and mitigation triggers, (4) conduct investigations, (5) calibrate and refine predictive tools, (6) determine management and mitigation actions to be implemented, given site-specific conditions, (7) assess management and mitigation efficacy, and (8) identify management and mitigation modifications needed to meet goals and requirements.[223]

The record also reflects that monitoring is focused on specific hydrologic and environmental parameters necessary to document baseline conditions and signal activation of

[222] Exhibit No. SNWA_507, p. 3-6.
[223] Exhibit No. SNWA_592, p. 2-1; Exhibit No. SNWA_593, p. 2-1.

triggers. The 3M Plans incorporate long-term hydrologic and environmental data into the monitoring program to document decades of historical baseline conditions.[224]

3. Thresholds and Triggers

The 3M Plans establish thresholds above the defined unreasonable effects to provide buffers and reduce the risk of ever reaching those unreasonable effects and mitigation triggers at the thresholds by promptly implementing mitigation actions before reaching an unreasonable effect.[225] The Applicant presented extensive testimony and evidence regarding the thresholds and triggers in the 3M Plans that are set to avoid and eliminate unreasonable effects. The 3M Plans and Technical Analysis Report define a trigger as a quantitative hydrologic or environmental parameter value that prompts action.[226]

The record shows that establishing a trigger based on a specific value does not adjust for trends or reoccurring patterns, such as seasonality, in the baseline data set. However, linking quantitative triggers to the baseline dataset accounts for trends and seasonal variations, which are more responsive in accounting for variation in natural hydrologic conditions.[227] Like the thresholds, the triggers are set above an unreasonable effect, in order to avoid reaching that unreasonable effect.

The record shows that two different triggers are required in the 3M Plan: investigation triggers and mitigation triggers.[228] As a best management practice, the 3M Plans include proactive

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[224] Exhibit No. SNWA_507, p. 6-93; 2017 Transcript, Vol.2 p. 343:2-3 (Prieur).
[225] Exhibit No. SNWA_507, p. 3-2.
[226] Exhibit No. SNWA_507, p. 3-4; Exhibit No. SNWA_592, p. 3-1; Exhibit No. SNWA_593, p. 3-1.
[227] Exhibit No. SNWA_507, p. 3-5.
[228] Exhibit No. SNWA_507, p. 3-4; Exhibit No. SNWA_592, p. 3-1; Exhibit No. SNWA_593, p. 3-1.

investigation triggers above mitigation triggers with the express purpose of helping to avoid activating those mitigation triggers and supporting responsible groundwater development.

Investigation triggers require investigation actions and may prompt discretionary management and preemptive implementation of mitigation prior to ever hitting a mitigation trigger.[229] As described in the Technical Analysis Report, this approach provides a variety of benefits, including increased protection to sensitive resources, enhanced ability to determine cause, condition, and significance of observed changes, and the provision of additional data and analyses to inform management and mitigation actions.[230] As described in Section 10.5.2 of the Technical Analysis Report, the Applicant will notify the State Engineer if investigation triggers are activated.[231]

4. <u>Investigations</u>

As noted above, activating an investigation trigger prompts an investigation. The 3M Plans also state that the State Engineer may request the Applicant begin an investigation if the State Engineer deems an investigation necessary or if an existing water right holder notifies the State Engineer of an impact to the water right holder's water source.[232] The 3M Plans detail investigation methodologies that will be undertaken after an investigation trigger is activated.[233] The purpose of conducting investigations is to determine cause, condition, and significance of observed changes in order to inform management and mitigation actions.[234] The 3M Plans require the Applicant to report investigation findings to the State Engineer.[235]

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[229] Exhibit No. SNWA_507, p. 3-5; Exhibit No. SNWA_592, p. 3-3; Exhibit No. SNWA_593, p. 3-4.
[230] Exhibit No. SNWA_507, p. 3-4.
[231] Exhibit No. SNWA_592, p. 5-1; Exhibit No. SNWA_593, p. 5-1; Exhibit No. SNWA_507, p. 10-35.
[232] Exhibit No. SNWA_507, p. 3-12; Exhibit No. SNWA_592, p. 3-7; Exhibit No. SNWA_593, p. 3-8.
[233] Exhibit No. SNWA_592, pp. 3-7 – 3-8, 3-15 – 3-16; Exhibit No. SNWA_593, pp. 3-8 – 3-9.
[234] Exhibit No. SNWA_507, p. 3-5; Exhibit No. SNWA_592, p. 3-7; Exhibit No. SNWA_593, p. 3-8.
[235] Exhibit No. SNWA_592, p. 5-1; Exhibit No. SNWA_593, p. 5-1.

5. Management Actions

The record shows that the 3M Plans employ discretionary management actions that are used as best management practices.[236] The record also shows that the purpose of implementing management actions is to avoid or minimize the risk of activating mitigation triggers and support responsible groundwater development.[237] Management actions may be implemented based on investigation findings or as a regular part of Applicant's GDP operations. Numerous management actions for hydrologic and environmental resources that are known to be effective and available are provided within the 3M Plans.[238] The State Engineer finds that inclusion of discretionary management actions in the 3M Plans demonstrates the 3M Plans' will assure responsible groundwater development.

Mr. Prieur testified and the record reflects that adaptive management is a key element in the 3M Plans.[239] The Technical Analysis Report notes that adaptive management does not mean trial and error, hypothesis testing, or delayed decision making, or that the triggers and actions established in the 3M Plans will change. Instead, adaptive management reduces uncertainty, increases responsiveness to changing conditions, and enhances management and mitigation efficacy.[240]

The Protestants critiqued the management actions by claiming that the 3M Plan places management actions solely under the Applicant's control. The State Engineer finds that this criticism is not sound. First, the 3M Plan includes management actions before any unreasonable

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[236] Exhibit No. SNWA_507, p. 3-5. Exhibit No. SNWA_592, p. 3-3; Exhibit No. SNWA_593, p. 3-4.
[237] Exhibit No. SNWA_507, p. 3-5; Exhibit No. SNWA_592, p. 3-3; Exhibit No. SNWA_593, p. 3-4.
[238] Exhibit No. SNWA_507, p. 3-5; Exhibit No. SNWA_592, pp. 3-8 – 3-9; Exhibit No. SNWA_593, pp. 3-9 – 3-10.
[239] 2017 Transcript, Vol.2 pp. 345:18 – 346:12 (Prieur).
[240] Exhibit No. SNWA_507, p. 3-6.

effect has occurred. Second, management actions in the 3M Plans are discretionary, and actions that are part of the Applicant's regular GDP operations should be within the Applicant's control. If a management action requires access to private land, permission related to a water right holder's well, or permission on federal land, the Applicant will need to go through the proper permission channels as mandated by various regulations. If management actions entail preemptive implementation of mitigation actions, the Applicant will need to follow the process outlined for mitigation implementation as discussed in Section 3.2.4 in the Technical Analysis Report.

6. Mitigation Actions

The 3M Plans require the Applicant to implement mitigation actions within 30 days of the activation of a mitigation trigger that is caused by the Applicant's groundwater pumping.[241] The record further shows that mitigation actions may be implemented preemptively if data trends indicate that the activation of a mitigation trigger is imminent, or to avoid or minimize the risk of activating hydrologic and environmental mitigation triggers.[242]

For instance, the record shows that mitigation actions may be implemented preemptively prior to pumping operations for resources close to the GDP PODs or for highly sensitive resources.[243] The decision to preemptively implement mitigation actions at an existing water right prior to pumping will be dependent upon the results of a water resource assessment, the probability of effects, the sensitivity of resource, and the hydrogeologic setting.[244] Numerous effective and

[241] Exhibit No. SNWA_507, p. 3-21; Exhibit No. SNWA_592, p. 3-14; Exhibit No. SNWA_593, p. 3-13.
[242] Exhibit No. SNWA_507, p. 3-5; Exhibit No. SNWA_592, p. 3-3; Exhibit No. SNWA_593, p. 3-4.
[243] Exhibit No. SNWA_507, pp. 3-5 – 3-6; Exhibit No. SNWA_592, p. 3-3; Exhibit No. SNWA_593, p. 3-4.
[244] Exhibit No. SNWA_507, p. 6-9; Exhibit No. SNWA_592, p. 3-17.

available mitigation actions are required in the 3M Plans for each specified hydrologic and environmental resource.[245]

7. Mitigation Action Planning

Mitigation planning is required by the 3M Plans before any mitigation trigger is activated. In advance of the activation of a mitigation trigger, mitigation planning requires purchasing equipment, establishing contracts, and obtaining landowner permissions and permits.[246] The State Engineer finds that the 3M Plans' requirement for mitigation planning will ensure that mitigation is implemented no later than 30 days after a mitigation trigger is activated. The mitigation planning will also ensure that the mitigation is not carried out in a way that is arbitrary or capricious, as the planning will ensure the best mitigation action is taken given the specific circumstances.

The State Engineer understands the concerns of water right holders regarding mitigation actions that may be conducted for their water rights. The primary concern conveyed during the hearing was that water rights holders want to know and have input into what mitigation actions may be planned or conducted for their water rights.[247] As Mr. Prieur testified, multiple mitigation actions are identified in the 3M Plans because there are a number of different actions that can provide the quantity of water assigned to a water right, and implementation of individual mitigation actions for a specific water right will depend upon the conditions and characteristics of the water right and site, if mitigation is needed.[248] The State Engineer finds that the 3M Plans are strengthened by including a number of different mitigation actions that are effective and available to the Applicant.

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[245] Exhibit No. SNWA_507, p. 3-6.
[246] Exhibit No. SNWA_592, p. 5-1; Exhibit No. SNWA_593, p. 5-1.
[247] 2017 Transcript, Vol.10 pp. 2022:21-24, 2023:1-3 (Hejmanowski).
[248] 2017 Transcript, Vol.6 pp. 853:11-13, 854:16-18 (Prieur).

The record also shows that the 3M Plans properly address the logistics of implementing mitigation actions directly associated with water rights. First, the 3M Plans purposely include adaptive and proactive management of GDP pumping to minimize the risk of activating mitigation triggers at existing water right locations. Second, as discussed above, prior to any mitigation trigger activation, the Applicant must request landowner permissions and permits which will necessitate landowner and water right holder involvement.[249] The 3M Plans state that the Applicant must initiate temporary and long-term mitigation actions with access agreements with existing water right holders.[250] Third, the Applicant is required to submit mitigation plans in three different ways to ensures communication and transparency: 1) investigation findings that inform management and mitigation plans will be included in the annual data reports; 2) management and mitigation actions planned for each year will be included in the annual operation plans; and 3) planned mitigation actions will be described in the memoranda notifications of mitigation trigger activation.[251] Finally, the 3M Plans make the State Engineer the final decision maker regarding mitigation.[252] The State Engineer finds that the processes required in the 3M Plans ensure landowner and water right holder involvement and provide an effective approach to implementing mitigation actions either preemptively or if a mitigation trigger is activated.

8. Reporting Requirements

The 3M Plans require the Applicant to report to the State Engineer at various points throughout each year and GDP operations.[253] Reporting includes: quarterly hydrologic monitoring

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[249] Exhibit No. SNWA_592, p.5-1; Exhibit No. SNWA_593, p. 5-1.
[250] Exhibit No. SNWA_592, p.3-14; Exhibit No. SNWA_593, p. 3-15.
[251] Exhibit No. SNWA_592, p.5-1; Exhibit No. SNWA_593, p. 5-1.
[252] Exhibit No. SNWA_507 p. 1-2; 2017 Transcript, Vol.6 p. 853:21-24 (Prieur).
[253] Exhibit No. SNWA_592, p.5-1; Exhibit No. SNWA_593, p. 5-1; Exhibit No. SNWA_507 pp.10-34 to 35; Exhibit No. SNWA_ 599 p.14.

data submittals, including notification of any hydrologic investigation trigger activation; annual environmental monitoring data submittals, including notification of any environmental investigation trigger activation; annual monitoring data reports that describe data and activities performed over the past year, investigation findings, implemented management and mitigation actions, and mitigation efficacy assessments; and operation plans that describe activities planned for the next year, including anticipated pumping distribution and any planned management and mitigation actions. Groundwater flow model output will also be provided when the model is updated every 5-8 years or as requested by the NSE. If a mitigation trigger is activated, a memorandum will be submitted within 30 days that describes the mitigation trigger and corresponding planned mitigation action(s). The State Engineer finds that these reporting requirements are sufficient to keep the State Engineer informed and actively engaged as to the status of the Applicant's GDP.

Protestants argued that SNWA should be required to share monitoring data with water right holders whose water rights are listed in the 3M Plans, and notify water right holders if an investigation or mitigation trigger associated with their water right is activated. The 3M Plans state that once the Applicant submits the monitoring data, annual reports, and trigger notifications to the State Engineer, the State Engineer will distribute information among parties as needed.[254] However, the State Engineer finds that the Applicant is further required to directly notify water rights holders if a mitigation trigger is activated at their water right or a proxy monitor well specifically associated with their water right, unless a water right holder requests that notification be provided only by the State Engineer's Office.

[254] Exhibit No. SNWA_592, p 5-1; Exhibit No. SNWA_593, p 5-1.

9. Opportunities for Public Input

Protestants claim that the opportunities for public input are not adequate in the 3M Plans. However, the State Engineer finds that the 3M Plans include sufficient opportunities for public participation throughout the various phases of the water rights process including opportunity for input on the 3M Plans themselves. Evidence presented shows that there has been past public input, there is current public input, and there will be future public input.[255] Public input occurs during water application protests, water right hearings, and public comments. Future opportunities occur during change applications for any of Applicant's wells. All reported information that is required by the 3M Plan will be submitted to the State Engineer and will be made publicly available through means such as a website.

Public input opportunities are also provided as part of the federal environmental compliance processes. Ms. Luptowitz testified that public input was is a key requirement of the NEPA process, as federal agencies are required to solicit public input as they develop the NEPA documents.[256] The NEPA process that has been conducted for the BLM's FEIS included public scoping. Public meetings and comments on the Draft EIS were substantial, and 16 federal, state, and local agencies served as cooperating agencies for the EIS.[257] The NEPA process also included government-to-government consultation with 28 Indian tribes and bands.[258] Additional NEPA compliance will be conducted in the future, as specific well sites are identified.[259] Ms. Luptowitz testified that some of the water right protestants are also cooperating agencies for the NEPA

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[255] 2017 Transcript, Vol.2 p. 385:14-16 (Luptowitz); 2017 Transcript, Vol.4 pp. 861:24 – 862:8 (Marshall); Exhibit No. SNWA_599 p. 8, 12-14.
[256] 2017 Transcript, Vol.2 p. 385:14-16 (Luptowitz).
[257] Exhibit No. GBWN_298, p. 1-16, 1-19, 1-11.
[258] 2017 Transcript, Vol.3 p. 637:16 – 638:12(Luptowitz); Exhibit No. GBWN_298, p. 1-11.
[259] 2017 Transcript, Vol.2 p. 383:20-24 (Luptowitz).

process, and thus have an opportunity to participate in the development of those compliance documents as well.[260] Further, SNWA invited the Tribes to provide input and participate in mitigation pertaining to the Swamp Cedar ACEC.[261]

The State Engineer finds that public input is properly included in the 3M Plans. The Applicant considered previous public input when developing the 3M Plans. For example, the Cleveland Ranch monitoring sites were selected in consensus with the State Engineer and Protestant CPB – the Cleveland Ranch owner.[262] The Swamp Cedar Area of Critical Environmental Concern (ACEC) was selected as an area of focus in the Spring Valley 3M Plan in-part due to Tribal concerns identified during the 2011 water rights hearing.[263] At the hearing, the Applicant invited the Tribes to provide input and participate in mitigation pertaining to the Swamp Cedar ACEC.[264] The record reflects that CTGR recommended public review of data reports[265] and the Applicant was receptive of this recommendation.[266] The State Engineer finds that the 3M Plans must require public comment periods for reports submitted by the Applicant and that sufficient opportunities for public input are required by the 3M Plans. The State Engineer also finds that the 3M Plans must require input from the Tribes regarding mitigation to the Swamp Cedar ACEC.

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[260] 2017 Transcript, Vol.2 p. 385:17-20 (Luptowitz).
[261] 2017 Transcript, Vol.10 p. 2064 (Taggart).
[262] Exhibit No. SNWA_507 pp. 6-34 to 35.
[263] 2017 Transcript, Vol.4 pp. 893:21 to 894:1 (Marshall).
[264] 2017 Transcript, Vol.10 p. 2064 (Taggart).
[265] Exhibit No. CTGR_018 p. 26.
[266] Exhibit No. SNWA_599 p. 13.

C. Standards, thresholds and triggers to protect existing water rights.

The 3M Plans include requirements to protect existing water rights by avoiding or eliminating conflicts with existing water rights or with protectable interests in existing domestic wells.[267]

1. Management Categories

The 3M Plans establish Management Categories which group water rights according to the distance to the nearest Applicant well, and hydraulic connection with the producing aquifer.[268] Category A is for water rights within 3 miles of the nearest Applicant well. Due to the relative proximity, the 3M Plans require that for Category A water rights a mitigation plan be in place before Applicant pumping begins, or that mitigation be preemptively implemented prior to pumping as a proactive measure.[269] Category B is for the water rights that are further than 3 miles but less than 10 miles from the nearest point of Applicant well. Category B water rights will be monitored directly at the water right, or at a proxy monitor well in the vicinity of the existing rights which can detect propagation of drawdown.[270] Category C is for water rights greater than 10 miles away from the nearest Applicant well within the same hydrographic basin.[271] Category D is for water rights in an adjacent basin. For Management Categories C and D water rights, the 3M Plan requires an intermediate well located between the existing water right and the Applicant's well to detect and measure propagation of drawdown.[272] Finally, Category E is for water rights that are

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[267] 2017 Transcript, Vol.2 pp 397:12 – 398:8 (Prieur).
[268] 2017 Transcript, Vol.2 p. 398:16-21 (Prieur); Exhibit No. SNWA_507, pp. 3-15 – 3-16.
[269] Exhibit No. SNWA_592, p. 3-14; Exhibit No. SNWA_593, p. 3-15; 2017 Transcript, Vol.2 p. 399:1513-16 (Prieur).
[270] Exhibit No. SNWA_507, pp. 3-16 – 3-17; Exhibit No. SNWA_592, pp. 2-11 – 2-12; Exhibit No. SNWA_593, pp. 2-7 – 2-8; 2017 Transcript, Vol.2 pp. 400:24 – 401:1 3 (Prieur).
[271] 2017 Transcript, Vol.2 p. 401:23-24 (Prieur).
[272] Exhibit No. SNWA_507, pp. 3-16 and 3-18; Exhibit No. SNWA_592, pp. 2-11 and 2-13; Exhibit No. SNWA_593, pp. 2-7 and 2-9; 2017 Transcript, Vol.2 pp. 401:23-24, 402:6-10, and 403:12-1713 (Prieur).

not hydraulically connected with the producing aquifer in which the Applicant's wells will be installed.[273]

Protestants argue that the distances used to identify the Management Categories was arbitrary. However, the Protestants did not provide a reasonable alternative management program or classification like the 3M Plans' Management Category approach. The State Engineer finds that using 3 and 10 miles to separate the Management Categories is a reasonable approach to manage existing water rights over a large distance because it will allow a scientifically adequate distance between Management Categories. These distances are not arbitrary nor capricious, as the Applicant has demonstrated sound reasoning for selecting these distances.

2. Predevelopment Baseline

The 3M Plans require the Applicant to collect data from specific locations within and in the vicinity of the project basins and incorporate that data into a baseline dataset to characterize the variability in natural conditions.[274] Continuous data has been collected by the Applicant since 2006.[275] The Applicant will also add new monitoring locations and create additional baseline data by comparing locations with established baseline with the new locations. The data from monitoring has been sent to the State Engineer in annual reports which have been incorporated into a baseline dataset.[276] Mr. Prieur testified that the Applicant would use a program, such as the USGS Series SEE, to compare variations between wells, a method that would assist in evaluating a departure from baseline conditions.[277] If one site experiences a departure but the other site

[273] Exhibit No. SNWA_507, p. 3-18; Exhibit No. SNWA_592, p. 2-13; Exhibit No. SNWA_593, p. 2-9; 2017 Transcript, Vol.2 p. 405:1-4 (Prieur).
[274] 2017 Transcript, Vol.2 p. 354:15-18 (Prieur).
[275] 2017 Transcript, Vol.2 p. 354:22-23 (Prieur).
[276] 2017 Transcript, Vol.2 p. 353:13-19 (Prieur); *See* Exhibits SNWA_516-527.
[277] 2017 Transcript, Vol.2 p. 413:4-5 (Prieur).

behaves normally, there is an indication that there may be an impact present due to pumping.[278] Mr. Prieur further testified that the current baseline is long enough to establish triggers, especially if the period of time between now and when the project pumping begins is taken into account.[279]

The Protestants raised concerns over whether the baseline adequately represented the natural conditions upon which investigation triggers are based.[280] CPB argues that the baseline hydrographs in the Technical Analysis Report and 3M Plans exhibit a decreasing trend because the baseline utilized is too short.[281] CPB presented the Palmer Hydrologic Drought Index ("PHDI") as a tool to show drought and wet cycle framework.[282] CPB argues that data acquisition at some locations began at the end of an extremely moist year but was followed by numerous abnormally dry years, the result of which is a downward trend in most of the hydrographs.[283] Mr. Prieur testified that local, long-term monitoring of specific reference sites within the project basins provide data that directly reflects local conditions, as opposed to the PHDI.[284] Mr. Prieur stated that the final baseline would also take into account climate variability, which makes the Applicant's baseline more valuable than the PHDI,[285] ultimately concluding that the proposed baseline is better at determining current climatic conditions.

The State Engineer finds that the 3M Plans utilize sound methods in formulating a baseline record. The State Engineer finds that the combination of existing data and future data will be incorporated into the baseline, showing the natural variations within the project basins and creating

[278] 2017 Transcript, Vol.2 pp. 413:22 – 414:2 (Prieur).
[279] 2017 Transcript, Vol.2 pp. 409:23 – 410:1 (Prieur).
[280] Exhibit No. CPB_Exh_025, p. 22.
[281] Exhibit No. CPB_Exh_025, p. 22.
[282] Exhibit No. CPB_Exh_025, p. 22.
[283] Exhibit No. CPB_Exh_025, p. 22.
[284] 2017 Transcript, Vol.2 p. 412:4-6 (Prieur).
[285] 2017 Transcript, Vol.2 p. 412:13-15 (Prieur).

a sufficient baseline. The State Engineer finds that the 3M Plans use a scientifically sound method for incorporating new monitoring locations using the USGS Series SEE. The State Engineer further finds that the Office of the State Engineer will certify that a baseline is representative prior to the beginning of project pumping.

3. Investigation Triggers

Triggers are based on a specific value linked to the behavior of the baseline record. Triggers for hydrologic resources are (1) a quantitative fixed trigger which is related to a specific value, such as a permitted water right diversion rate, or (2) a quantitative trigger linked to the behavior of the baseline data record, which accounts for variation in natural hydrologic conditions.[286] Similarly, CTGR states that triggers should be "based on hydrologic parameters that may be indirectly related to changes in the environmental system."[287] Mr. Prieur testified that every water right or proxy well has a defined, objective investigation trigger.[288] The Applicant presented Dr. Singh, an expert in statistical analyses, to explain the method used for identifying investigation triggers.[289] Dr. Singh assisted in developing triggers using the Seasonally Adjusted Linear Regression method, or SALR, which creates a lower control limit based on three standard deviations below the SALR model.[290] The method identifies whether a dataset contains seasonal variations and applies those variations to the lower control limit. An investigation trigger is activated when the real-time data is below the lower control limit calculated by the SALR for six continuous months.[291] Mr. Prieur testified that the six-month timeframe was chosen to identify

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[286] Exhibit No. SNWA_507, p. 3-5Exhibit No. SNWA_592, pp. 3-2 – 3-3; Exhibit No. SNWA_593, pp. 3-2 – 3-3.
[287] Exhibit No. CTGR_018, p. 20.
[288] 2017 Transcript, Vol.2 p. 422:15-18 (Prieur).
[289] 2017 Transcript, Vol.1 p. 236:1-2 (Singh).
[290] 2017 Transcript, Vol.1 p. 241:11-12 (Singh).
[291] Exhibit No. SNWA_507, p. 3-10; Exhibit No. SNWA_592, p. 3-5; Exhibit No. SNWA_593, p. 3-6.

whether a change is meaningful or if there is a seasonal aberration that occurs for several months but then returns to baseline conditions.[292] Mr. Prieur also testified and the record shows that USGS data usually takes about six months to finalize.[293] The record shows that an investigation trigger does not rise to the level of an unreasonable effect, nor does it necessarily equal a mitigation trigger. Investigation triggers are management tools used to avoid mitigation triggers and unreasonable effects.

Testifying on behalf of GBWN, Dr. Myers stated that the SALR method did not correlate with existing atmospheric conditions.[294] Although he indicated that the SALR method is reasonable, he testified that autocorrelation is needed.[295] This was based on his review of the Technical Analysis Report which showed a downward trend for many of the Applicant's hydrographs. The State Engineer finds that the SALR method is statistically sound, repeatable, and in accordance with industry standards for setting investigation triggers. The State Engineer finds that the SALR method is a scientifically sound method to determine investigation triggers at locations which have a baseline dataset. By applying the SALR method, the triggers and thresholds identified in the 3M Plan are based upon substantial evidence and in accordance with industry standards, and therefore are not arbitrary nor capricious.

The Protestants also questioned the six-month timeframe and instead proposed six weeks or even six days.[296] Mr. Prieur indicated that for wells that have quarterly monitoring, a six month timeframe will yield three data points, which is generally needed to determine if a trend is

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[292] 2017 Transcript, Vol.2 p. 419:2-4 (Prieur).
[293] Exhibit No. SNWA_507, p. 3-11; 2017 Transcript, Vol.2 p. 419:7-10 (Prieur).
[294] 2017 Transcript, Vol.9 p. 1761:9-17 (Myers).
[295] 2017 Transcript, Vol.9 p. 1762:19-20 (Myers).
[296] 2017 Transcript, Vol.4 p. 842:2-3 (CPB cross examination by Hejmanowski).

present.[297] Mr. Prieur also testified that the investigation process and implementation of management actions can be shortened if data shows that impacts are imminent.[298] The record shows that some 3M Plans require one year before taking any action.[299] The State Engineer finds a six month observation period to determine whether an investigation trigger is activated is reasonable, due to the data acquisition requirements and seasonal variables described above, and because the exclusive activation of an investigation trigger is not an indication that immediate mitigation would occur or that an unreasonable effect is imminent. However, the State Engineer reserves the right to take action at any time he deems appropriate to initiate an investigation.

4. Investigations

Investigations are required after the activation of an investigation trigger or at the request of the State Engineer. An investigation is to determine the cause, significance, and condition of the location with an activated investigation trigger.[300] Once an investigation is completed, the findings are presented to the State Engineer at the end of each quarter.[301]

The Protestants argued that there is no time limit for the Applicant to complete an investigation and because of this, harm will come to existing water rights and environmental resources.[302] The State Engineer does not agree. The Applicant is required to present quarterly reports to the State Engineer detailing when an investigation trigger has been activated and what findings were made from the investigation. The time to complete an investigation may vary depending on the resource and situation. Management actions that may result from investigation

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[297] 2017 Transcript, Vol.4 p. 842:20-23 (Prieur).
[298] Exhibit No. SNWA_507, p. 3-5; Exhibit No. SNWA_592, p. 3-3; Exhibit No. SNWA_593, p. 3-4; 2017 Transcript, Vol.4 p. 843:8-13 (Prieur).
[299] Exhibit No. SNWA_507, p. 3-11.
[300] 2017 Transcript, Vol.2 p. 404:9-11 (Prieur).
[301] Exhibit No. SNWA_507, p. 10-35.
[302] 2017 Transcript, Vol. 10, p. 2022:2-16 (Hejmanowski).

findings are discretionary, and unless a mitigation trigger has been activated under the 3M Plans, no unreasonable effect has occurred.

The Protestants also criticized the 3M Plans because water right holders and property owners are not notified of an investigation,[303] nor do they receive the investigation report.[304] CPB used the U.S. Department of the Interior's Adaptive Management Technical Guide to argue that without stakeholder involvement, an adaptive management process is unlikely to be effective.[305] Mr. Prieur testified that the State Engineer has the option to notify a water right holder that an investigation trigger has been activated.[306] Furthermore, Mr. Prieur testified that the Applicant is not averse to notifying the water right holders of investigation triggers, even though the State Engineer ultimately controls the 3M Plans.[307] Mr. Prieur also indicated that the Applicant will initially contact a water right holder to assess the condition of the water source.[308] Mr. Marshall testified that if the Applicant requires access to a water right holder's property, the property owner would be notified.[309]

The State Engineer finds that investigations are best management practices which provide data on the cause, condition, and significance of a resource. The State Engineer finds that the investigation methodology is acceptable to determine departures from baseline conditions and keep the State Engineer's office adequately informed as to the status of the GDP project.

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[303] 2017 Transcript, Vol.4 p. 839:17-19 (Prieur).
[304] 2017 Transcript, Vol.4 p. 847:4-9 (Marshall).
[305] Exhibit No. SNWA_541, p. iv; 2017 Transcript, Vol.4 pp. 860:13 – 861:21.
[306] 2017 Transcript, Vol.2 pp. 839:24 – 840:2 (Prieur).
[307] 2017 Transcript, Vol.2 p. 840:13-17 (Prieur).
[308] 2017 Transcript, Vol.4 p. 840:9-10 (Prieur).
[309] 2017 Transcript, Vol.4 p. 850:5-7 (Marshall).

5. Management Actions

The record demonstrates that the 3M Plans contain management actions for the applicable existing water rights. As discussed in the Technical Analysis Report, the purpose of implementing management actions is to avoid or minimize the risk of the activation of mitigation triggers and support responsible groundwater development.[310] The specific management actions are dependent upon the risk of impact, the significance of the change, the potential of the mitigation trigger being reached, and the sensitivity of the resource.[311] The examples provided in the 3M Plans show that the factors control which management action would be utilized for a specific existing water right.[312]

Mr. Prieur explained that preemptive mitigation is included as a management action to deal with uncertainty if there is a potential influence from pumping on a nearby or sensitive water resource.[313] The 3M Plans require the design and installation of a preemptive mitigation action prior to the initiation of project pumping for specific rights.[314] General examples, as described by Mr. Prieur, include installing a pump in an artesian well, installing a shallow well equipped with a solar panel near a spring, or having ready temporary water at the water resource.[315] The State Engineer questioned Mr. Prieur about a reserved right and a stockwater right which are within a mile of one of the Applicant's wells.[316] Mr. Prieur testified that due to the proximity of these rights to the Applicant's wells, monitoring occurs directly at these sites and a plan for preemptive

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[310] Exhibit No. SNWA_507, pp. 3-6 to 3-7.
[311] Exhibit No. SNWA_507, p. 3-13.
[312] Exhibit No. SNWA_507, pp. 3-5 and 3-13 – 3-14; Exhibit No. SNWA_592, pp. 3-8 – 3-9; Exhibit No. SNWA_593, pp. 3-9 – 3-10.
[313] 2017 Transcript, Vol.2 p. 438:10-12 (Prieur).
[314] 2017 Transcript, Vol.2 p. 438:12-15 (Prieur).
[315] 2017 Transcript, Vol.2 p. 438:16-21 (Prieur).
[316] 2017 Transcript, Vol.4 p. 939:16-21 (Prieur).

implementation of mitigation would be in place prior to initiation of GPD pumping operations beginning as identified for Management Category A water rights in the Spring Valley 3M Plan.[317] The State Engineer finds that management actions specified in the 3M Plan will be effective to avoid unreasonable effect as they will provide tools to the Applicant that are necessary to avoid reaching an unreasonable effect. The State Engineer further finds that the management actions conform to best management practices and industry standards.

6. Mitigation Triggers

Mitigation triggers are required to signal that thresholds have been crossed, and require mitigation actions to avoid unreasonable effects and comply with Nevada water law.[318] The 3M Plans establish specific mitigation triggers for hydrologic resources to ensure that the triggers are neither arbitrary nor capricious. For existing water rights, the mitigation trigger is set in reference to the ability of an existing water right to receive the permitted diversion rate and/or annual duty and is designated to protect the volume of water committed to beneficial use.[319]

a. Water Resource Assessment

Because the mitigation trigger is resource-based, the 3M Plans require the Applicant to conduct a Water Resource Assessment before the groundwater pumping project begins. Mr. Prieur explained that the Water Resource Assessment provides the Applicant with the ability to have a snapshot of the conditions of the infrastructure and construction associated with each water right at a time close to beginning project operations.[320] The Water Resource Assessment would be

[317] 2017 Transcript, Vol.4 p. 939:9-15 (Prieur).
[318] Exhibit No. SNWA_507, p. 3-4; Exhibit SNWA_592, p 3-1; Exhibit SNWA_593, p 3-2.
[319] Exhibit No. SNWA_507, p. 3-21.
[320] 2017 Transcript, Vol.2 pp. 449:22 – 450:1 (Prieur).

conducted at least three years prior to the initiation of the project.[321] Mr. Prieur also testified that access to a water resource would be required in order to perform the assessment, and if the existing water right holder did not provide access, the Applicant would request that the State Engineer facilitate entry or conduct the Water Resource Assessment with staff of the State Engineer's Office.[322] If the Applicant is unable to gain access and gather the necessary information, the 3M Plans set the mitigation trigger associated with the diversion rate until other data is available.[323]

The Applicant has experience conducting studies similar to the Water Resource Assessment. The Applicant provided an exhibit entitled *Field Guide to Spring Valley Monitoring Program Springs*, which details many of the springs present in Spring Valley.[324] This exhibit provides substantial information for each spring and the State Engineer concludes that the Applicant will add to the already-existing information after conducting the Water Resource Assessment.

The Protestants questioned why the Water Resource Assessment is not completed already.[325] Mr. Prieur testified that the goal of the Water Resource Assessment is to determine the conditions of a particular resource immediately prior to pumping.[326] Performing the Water Resource Assessment now would not provide the Applicant with the necessary representative data which is required under the 3M Plans.[327] The Protestants also claim that triggers are not actually created because the Water Resource Assessment has not been completed.[328] Mr. Prieur testified

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[321] 2017 Transcript, Vol.2 p. 450:2-3 (Prieur).
[322] 2017 Transcript, Vol.2 p. 451:2-7 (Prieur).
[323] 2017 Transcript, Vol.4 p. 910:8-11 (Prieur).
[324] Exhibit No. SNWA_601.
[325] Exhibit No. CTGR_022, p. 16.
[326] 2017 Transcript, Vol.2 p. 450:19-21 (Prieur).
[327] 2017 Transcript, Vol.2 p. 450:21-22 (Prieur).
[328] Exhibit No. CTGR_022, p. 16.

that the mitigation triggers are linked to the resource itself via the water right assigned to a particular resource.[329] Likewise, the investigation triggers are linked to the baseline data, not the physical conditions of a particular site.[330] The State Engineer finds the Protestants' claims and characterizations of the Water Resource Assessment misguided. The State Engineer agrees with the Applicant that the Water Resource Assessment is a tool to characterize conditions of resource sites prior to groundwater pumping and this Assessment need not be conducted to inform the decisions the State Engineer is making herein.

b. Groundwater Rights

Mr. Prieur initially identified two types of underground existing water rights: those where the well and pumping system have the capacity to produce greater than the permitted diversion rate; and those where the well and pumping system cannot produce the permitted diversion rate.[331] Primarily, the specific capacity of the well is used to determine what the functional well column or saturated column is needed in the well to produce the diversion rate.[332]

Mr. Prieur explained that the mitigation trigger for a well producing at or above its permitted diversion rate is the static water level needed to produce the water right at its diversion rate, plus either a 10 percent or 10-foot buffer, whichever is greater.[333] Mr. Prieur then identified the mitigation trigger for a well producing less than the permitted diversion rate is the same as the

[329] 2017 Transcript, Vol.2 p. 451:13-17 (Prieur).
[330] 2017 Transcript, Vol.2 p. 451:18-20 (Prieur).
[331] Exhibit No. SNWA_507, p. 3-22; Exhibit No. SNWA_592, p. 3-11; Exhibit No. SNWA_593, p. 3-12; 2017 Transcript, Vol.2 p. 428:9-13 (Prieur).
[332] 2017 Transcript, Vol.2 pp. 429:23 – 430:2 (Prieur).
[333] Exhibit No. SNWA_507, p. 3-24; 2017 Transcript, Vol.2 p. 431:15-17 (Prieur).

investigation trigger.[334] Activating these mitigation triggers would require the Applicant to implement mitigation actions to ensure the existing water right holder is made whole.[335]

The 3M Plans also establish a mitigation trigger based on power usage for an existing underground water right. This occurs when a lowering of the static water level is caused by the Applicant and results in an unreasonable increase in the economic costs associated with increased power usage.[336] The Applicant presented evidence that if power usage increases more than 25 percent over that of the base period before the Applicant began pumping, the existing underground water user would be compensated for that increase in power costs.[337]

Dr. Myers criticized the 3M Plan for drawing a distinction between an existing groundwater right that can produce over the permitted diversion rate and one that produces below the permitted diversion rate, claiming that such a distinction is discriminatory.[338] However, after the Applicant questioned Dr. Myers' understanding of the reasoning behind this distinction, Dr. Myers conceded that there is a legitimate reason to treat these two types of underground water rights differently.[339] The State Engineer finds that the 3M Plan creates a reasonable and logical distinction between the ability of various wells to produce different quantities of water for the 3M Plan's purposes.

The Protestants presented a report, entitled *Drawdown "Triggers": A Misguided Strategy for Protecting Groundwater-Fed Streams and Springs* by M.J. Currell, which criticizes using

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[334] 2017 Transcript, Vol.2 p. 432:19-20 (Prieur); Exhibit SNWA_507 p. 3-25.
[335] 2017 Transcript, Vol.2 pp. 432:21 – 433:2 (Prieur).
[336] NRS § 534.110(4) – "In determining a reasonable lowering of the static water level in a particular area, the State Engineer shall consider the economics of pumping water for the general type of crops growing and may also consider the effect of using water on the economy of the area in general."' 2017 Transcript, Vol.2 p. 436:14-17 (Prieur).
[337] 2017 Transcript, Vol.2 p. 436:19-23 (Prieur) SNWA Exhibit No.507, pp.3-25-29.
[338] Exhibit No. GBWN/WPC_297, p. 44; 2017 Transcript, Vol.9 p. 1954:8-12 (Myers).
[339] 2017 Transcript, Vol.9 p. 1955:5-13 (Myers).

drawdown as a trigger.[340] Mr. Prieur identified a letter to the editor providing a technical review of the Currell article by Mr. Harrington,[341] in which Mr. Harrington provided a framework arguing that drawdown triggers are an appropriate management strategy if deployed correctly.[342] Mr. Currell responded, conceding that if baseline data is established with which drawdown can be compared, then establishing triggers based on drawdown is appropriate.[343] By not providing Mr. Currell's response, the Protestants' argument regarding triggers is misleading. The State Engineer finds that drawdown triggers can be used and the 3M Plans' use of drawdown triggers adheres to industry standards. Here, the State Engineer further finds that the drawdown triggers employed by the 3M Plans are correctly within the guidelines of the industry. The drawdown triggers specified in the 3M Plan are defined and objective triggers which will be able to be monitored in a non-arbitrary fashion. Therefore, these triggers will be effective in ensuring that mitigation of unreasonable effects are neither arbitrary or capricious.

Dr. Myers commented that the Applicant should be responsible for any and all additional costs due to a lowering of the static water level.[344] The State Engineer finds this argument unavailing because groundwater appropriations must allow for a reasonable lowering of the static water level as directed in NRS 534.110(4). The State Engineer finds that the 3M Plans provide a proper standard whereby the Applicant will assure or mitigate an existing groundwater right holder appropriately and in an manner that is neither arbitrary nor capricious due to the defined triggers and thresholds set by the 3M Plan.

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[340] Exhibit No. GBWN/WPC_289; 2017 Transcript, Vol.2 p. 433:17-19 (Prieur).
[341] 2017 Transcript, Vol.2 p. 434:17-20 (Prieur).
[342] Exhibit No. SNWA_602; 2017 Transcript, Vol.2 pp. 434:23 – 435:1 (Prieur).
[343] Exhibit No. SNWA_603; 2017 Transcript, Vol.2 p. 435:15-20 (Prieur).
[344] Exhibit No. GBWN/WPC_297, p. 44.

c. Spring / Stream Rights

Mr. Prieur testified that the 3M Plans require investigation and mitigation triggers for spring and stream rights in the same manner as was done for underground rights. He identified that the categories were based on whether the spring or stream right is consistently above the permitted diversion rate or if it is consistently below the permitted diversion rate.[345] For springs and streams which are consistently above the permitted diversion rate, the mitigation trigger is set at a flow of 10 percent above the permitted diversion rate.[346] For springs and streams which are consistently below the permitted diversion rate, as with under-producing groundwater wells described above, the investigation trigger is the mitigation trigger.[347] If a mitigation trigger is activated, the 3M Plans require the Applicant to ensure the existing spring or stream water right holder is made whole.[348]

The 3M Plans also have mitigation triggers in place for springs and streams that exhibit intermittent flow. Mr. Prieur testified that intermittent water sources are dry over long periods of time and because of that, are difficult to quantify.[349] However, the 3M Plan states that these intermittent water sources would be compared to regional hydrologic conditions within close proximity.[350] By doing this, the 3M Plan establishes a method that when regional conditions are such that the spring or stream should be able to flow but it is not flowing due to Applicant's pumping, mitigation actions would ensure that right holder is made whole.[351] The State Engineer finds that the 3M Plans have established defined mitigation triggers for spring and stream rights

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[345] 2017 Transcript, Vol.2 p. 443:5-9 (Prieur).
[346] 2017 Transcript, Vol.2 p. 444:4-10 (Prieur).
[347] 2017 Transcript, Vol.2 p. 445:12-18 (Prieur).
[348] 2017 Transcript, Vol.2 p. 445:18-19 (Prieur).
[349] 2017 Transcript, Vol.2 p. 446:1-3 (Prieur).
[350] 2017 Transcript, Vol.2 p. 446:6-8 (Prieur).
[351] 2017 Transcript, Vol.2 p. 446:9-18 (Prieur).

which are neither arbitrary nor capricious. These mitigation triggers and thresholds will allow the Applicant to avoid unreasonable effects to existing water rights in a nonarbitrary fashion.

The State Engineer finds that activation of an investigation or mitigation trigger does not signify that an unreasonable effect has occurred. The purpose of the triggers is to avoid unreasonable effects. The State Engineer therefore finds that the Applicant's approach to triggers will avoid unreasonable effects and ensure compliance with Nevada law and the Remand Order. The State Engineer also finds that by using both investigation and mitigation triggers, there will be a reduced risk of approaching, let alone causing, unreasonable effects.

7. Mitigation Actions

The 3M Plans require the Applicant to implement mitigation within 30 days.[352] The 3M Plans provide numerous mitigation actions that are known to be effective and available to the Applicant.[353] The mitigation actions will ensure that existing water right holders have continued access to their permitted water for the legally-approved beneficial use, or ensure that the existing water right holder is made whole.

The record reflects that the Applicant owns a substantial number of water rights and other resources which may be used for mitigation.[354] Dr. Myers criticized the mitigation effectiveness by stating that providing mitigation water would only add to the drawdown and the only way to properly mitigate would be to transfer mitigation water from another basin. The testimony of Mr. Prieur shows that the Spring Valley 3M Plan requires other means of mitigating rights beyond

[352] Exhibit No. SNWA_592, p. 5-1; Exhibit No. SNWA_593, p. 5-1.
[353] Exhibit No. SNWA_507, pp. 3-28 – 3-30.
[354] Exhibit No. SNWA_507 pp. 6-10 to 6-11, 6-21 to 6-22, 6-39 to 6-40, 6-47, 6-53, 7-23, 8-14, 8-22 to 8-23, 9-9, 9-21 to 9-22.

simply delivering mitigation water to an existing water right holder.[355] Mr. Prieur explained that redevelopment or rehabilitation of a well could be used to increase the effectiveness and efficiency of the well.[356] This action would utilize the existing water right holder's water right, but would make the means of delivery more efficient.[357] Dr. Myers also agreed that this use of replacement water would not increase the discharge from the aquifer through wells.[358]

Mr. Prieur testified about the Applicant's extensive experience in mitigating for large water development projects in southern Nevada.[359] Mr. Prieur specifically identified one such program for the Town of Blue Diamond, Nevada which was very susceptible to drought conditions.[360] There, the Applicant established triggers which signal management actions such as well re-habilitation or lowering of pumps to maintain a continuous water supply to the town.[361] Mr. Prieur further testified that the Applicant delivers the daily water needed to the more than 2 million inhabitants and visitors of Las Vegas in a reliable and consistent manner.[362] Mr. Prieur also testified that the Applicant has a long history of stewardship and dedication to long-term sustainable use of the aquifer system in southern Nevada.[363] He then identified an award given to the Applicant from the Groundwater Foundation which acknowledges the Applicant's conservation and groundwater management programs.[364]

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[355] 2017 Transcript, Vol.2 p. 453:14-16 (Prieur).
[356] 2017 Transcript, Vol.2 p. 453:17-24 (Prieur).
[357] 2017 Transcript, Vol.2 p. 454:19-21 (Prieur).
[358] 2017 Transcript, Vol.9 p. 1954:5-7 (Myers).
[359] 2017 Transcript, Vol.2 p. 347:11-16 (Prieur).
[360] 2017 Transcript, Vol.2 p. 348:5-8 (Prieur).
[361] 2017 Transcript, Vol.2 p. 348:10-13, 440:2-5 (Prieur).
[362] 2017 Transcript, Vol.2 pp. 348:24 – 349:3 (Prieur).
[363] 2017 Transcript, Vol.2 p. 348:15-17 (Prieur).
[364] Exhibit No. SNWA_610; 2017 Transcript, Vol.2 p. 349:6-9 (Prieur).

Through testimony and review of the record, the State Engineer finds that the Applicant has presented substantial and credible evidence of its ability to successfully implement effective mitigation. The separate 3M plans that the Applicant already has in place in southern Nevada show continued success, and demonstrate the Applicant's ability to continue operating those plans in conformity with its intended goals. The State Engineer finds that the 3M Plans include effective and specific mitigation actions for water rights which will be taken if a mitigation trigger is activated. Also, the State Engineer finds that taking action within 30 days of activating a mitigation trigger is a reasonable and responsive time frame. Further, the State Engineer finds that the 3M Plans properly include or require the necessary data to establish representative baselines for hydrologic resources, determine departure from the baseline conditions, signal activation of triggers, and inform adaptive management and mitigation. Finally, the State Engineer finds that the presently known substantial evidence of mitigation complies with the principles in *Eureka I*.

D. Spring Valley

1. Protection of Existing Water Rights in Spring Valley

The Spring Valley 3M Plan protects existing rights based on the standards, thresholds and triggers described above. The Spring Valley 3M Plan contains a monitoring network for wells, springs and streams.[365] The Spring Valley 3M Plan uses numerous monitoring devices to monitor 134 existing water rights and 18 domestic wells and further requires that each of these existing rights be protected.[366] The Protestants did not contest that all water rights are included in the plan. The State Engineer finds that all existing water rights are properly protected by the Spring Valley 3M Plan because defined standards, threshold and triggers apply to each water right, which will

[365] Exhibit No. SNWA_507, p. 10-8 – 10-13; Exhibit No. SNWA_592, p. 2-3 – 2-9.
[366] Exhibit No. SNWA_592, p. 2-10.

guarantee that mitigation of unreasonable effects from the Applicant's GDP pumping are neither arbitrary nor capricious.

2. Cleveland Ranch Area

CPB owns three main properties in Spring Valley: Rogers Ranch, Cleveland Ranch, and the Cleveland Ranch South Unit.[367] To demonstrate the effectiveness of the Spring Valley 3M Plan for protecting CPB's water rights, the Applicant presented evidence regarding the potential for impacts to CPB water rights and the ability to effectively mitigate such impacts, if any.

The Applicant presented evidence that water rights at the Rogers Ranch and the Cleveland Ranch South Unit will not be impacted by pumping from the Applicant's wells.[368] Rogers Ranch is located across Spring Valley, far north of the nearest Applicant well.[369] The water rights at Rogers Ranch are surface water rights that are piped to the ranch from Negro Creek.[370] The evidence indicated there is little to no likelihood that the surface flows in Negro Creek will be affected by pumping at any of the Applicant's wells.[371] The evidence presented also indicated the water rights at the Cleveland Ranch South Unit come from sources that will not be impacted by pumping at any of the Applicant's wells.[372] Accordingly, the State Engineer finds there is little to no likelihood of impact from pumping at Applicant's wells on CPB's water rights at the Rogers Ranch and the Cleveland Ranch South Unit.

For Cleveland Ranch, the Applicant identified three types of water rights that are used by CPB at Cleveland Ranch: (1) direct surface water diversions from Cleve, Indian, Freehill, and

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[367] Exhibit No. SNWA_507, p. 6-29; Exhibit No. SNWA_592, p. 2-26; 2017 Transcript, Vol.2 p. 492:4 – 494:6 (Prieur).
[368] 2017 Transcript, Vol.2 p. 566:16-19 (Prieur).
[369] Exhibit No. SNWA_507, p. 6-29; 2017 Transcript, Vol.2 p. 492:4-9 (Prieur).
[370] 2017 Transcript, Vol.2 p. 561:18-24 (Prieur).
[371] 2017 Transcript, Vol.2 pp. 566:21 – 567:5 (Prieur).
[372] 2017 Transcript, Vol.2 pp. 568:8 – 570:24 (Prieur).

Stevens creeks; (2) spring water rights; and (3) a supplemental underground water right which is junior in priority to the Applicant's applications.[373]

a. Direct Surface Water Diversion to Cleveland Ranch

Undisputed evidence showed that the dominant water feature in the Cleveland Ranch area is Cleve Creek. Cleve Creek flows year-round, with higher flows in the spring run-off period.[374] A century-old record of flow is available for Cleve Creek based on data from a USGS gauging station.[375] Cleve Creek is also the most significant source of water for Cleveland Ranch.[376] Significantly, witnesses for the Applicant and Protestants agreed that groundwater pumping will not impact surface flows of Cleve Creek.[377] This conclusion is based on evidence that the creek's elevation is hundreds of feet above the groundwater level.[378] As such, changes in groundwater level cannot affect the creek.[379] The State Engineer agrees and finds that groundwater pumping will not impact surface flows of Cleve Creek, or the other surface waters that are diverted directly to Cleveland Ranch, or any CPB property.

b. Spring Water Rights at Cleveland Ranch

Mr. Prieur identified the following sources of water for the spring water rights at Cleveland Ranch: (1) precipitation; (2) secondary recharge from surface irrigation water; and (3) mountain block recharge and Cleve Creek infiltration.[380] The State Engineer finds that the Applicant accurately identified the water sources for the springs on Cleveland Ranch, and that Applicant's

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[373] 2017 Transcript, Vol.2 p. 503:8-13 (Prieur).
[374] Exhibit No. SNWA_507 p. 6-31.
[375] Exhibit No. SNWA_507 p. 6-28; 2017 Transcript, Vol.2 p. 494:8-22 (Prieur).
[376] 2017 Transcript, Vol.2 p. 504:5-6 (Prieur); 2017 Transcript, Vol.6 p. 1344:17-20 (Mayo).
[377] 2017 Transcript, Vol.2 p. 513:1-4 (Prieur); 2017 Transcript, Vol.6 p. 1344:14-16 (Mayo).
[378] 2017 Transcript, Vol.6 p. 1349:17-19 (Mayo).
[379] 2017 Transcript, Vol.6 p. 1344:14-16 (Mayo).
[380] 2017 Transcript, Vol.2 p. 511:1-20 (Prieur).

groundwater pumping cannot impact the precipitation that occurs at Cleveland Ranch, or at any CPB property.[381]

Mr. Prieur provided a conceptual flow model for the hydrology of the Cleveland Ranch springs. Mr. Prieur testified that Cleveland Ranch is underlain by a series of clay layers that have low vertical hydraulic conductivity and low vertical leakage, creating a barrier to retard vertical water movement downward.[382] Mr. Prieur concluded that secondary recharge from irrigation practices comes from ditch and reservoir losses and recharge from irrigated fields.[383] Percolation of this secondary recharge downward is limited by the clay layers beneath the ranch.[384] The secondary recharge daylights down-gradient, where the clay layers meets the ground surface, in the form of springs.[385] The State Engineer finds Applicant's conceptual model that underlying clay layers control the flow of secondary recharge to springs on the ranch is reasonable.

Mr. Prieur concluded that the primary factor that controls spring flow on the ranch is the continuation of the irrigation practices that generate secondary recharge.[386] He also concluded that even if the Applicant's groundwater pumping impacts the groundwater level beneath the clay layers that underlie the ranch, those groundwater level declines will not impact the ability of secondary recharge from irrigation practices to provide source water for springs on the Cleveland Ranch.[387] The State Engineer agrees and finds that the primary factor that controls spring flow on the ranch is the continuation of the irrigation practices, and even the Applicant's groundwater

[381] 2017 Transcript, Vol.3 p. 517:14-20 (Prieur).
[382] Exhibit No. SNWA_597, p. 18; 2017 Transcript, Vol.2 p. 517:4-9 (Prieur).
[383] 2017 Transcript, Vol.2 p. 512:21-24 (Prieur).
[384] 2017 Transcript, Vol.2 p. 517:4-6 (Prieur).
[385] 2017 Transcript, Vol.2 p. 511:14-20 (Prieur).
[386] 2017 Transcript, Vol.2 pp. 517:20 – 518:7 (Prieur).
[387] 2017 Transcript, Vol.2 pp. 515:1-4, 518:8-12 (Prieur).

pumping will not impact the ability of secondary recharge from irrigation practices to provide source water for springs on the Cleveland Ranch.

The other sources of water for springs at Cleveland Ranch are mountain block recharge and Cleve Creek infiltration. Mountain block recharge is water that percolates higher on the mountains to the west of Cleveland Ranch and migrates easterly and down-gradient toward the ranch.[388] Similarly, Cleve Creek infiltration migrates easterly and down-gradient toward the ranch. Cleve Creek's hydraulics are well understood. Cleve Creek is underlain by coarser alluvial material.[389] Throughout the whole movement of Cleve Creek on the alluvial fan, there is infiltration through the stream bed,[390] and these losses continue until the water moves close to or onto Cleveland Ranch.[391] Moving away from the mountain block and alluvial fan, the finer-grained material and lacustrine deposits that form the clay layers below Cleveland Ranch prevent or retard the downward movement of this water.[392]

Mr. Prieur explained that a controlling feature for the contribution of mountain block recharge and Cleve Creek infiltration to springs in this area is the high energy depositional environment of the alluvial fan near the mountain block where coarser material exists that has a high vertical hydraulic gradient that will allow downward movement of water. This condition exists to the west of the clay layers that underlie Cleveland Ranch because the alluvial material grades to finer material towards the valley floor.[393] Mr. Prieur explained that the alluvial fan aquifer is an unconfined unit based on data from a similar region in Spring Valley[394] and data from

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[388] 2017 Transcript, Vol.3 p. 532:6-12 (Prieur).
[389] 2017 Transcript, Vol.3 p. 533:12-14 (Prieur).
[390] Exhibit No. CPB_011, p. 14; 2017 Transcript, Vol.3 p. 533:20-22 (Prieur).
[391] 2017 Transcript, Vol.3 p. 534:2-4 (Prieur).
[392] 2017 Transcript, Vol.3 p. 532:6-17 (Prieur).
[393] 2017 Transcript, Vol.3 p. 529:3-12 (Prieur).
[394] 2017 Transcript, Vol.3 p. 537:7-10 (Prieur).

a specific deep exploration borehole.[395] The water table in the unconfined alluvial fan is above the upper layer of the clay deposits.[396] Mountain recharge and water infiltrating from Cleve Creek flows easterly on top of this water table and towards the lower elevation.[397] When the water moves above the clay layers, and where the clay layers reach ground surface on Cleveland Ranch, this water daylights as springs.[398] This continuous flow in this shallow alluvial environment is readily replenished by annual recharge events.[399]

Mr. Prieur then concluded that the only potential from impact to springs on Cleveland Ranch from the Applicant's pumping would be if the Applicant's pumping caused the water table in the alluvial aquifer to decline below the clay layer interface, thereby causing mountain block recharge and Cleve Creek infiltration to recharge the deeper groundwater area. Mr. Prieur then identified the uncertainties associated with this potential impact.[400] He testified that the exact water table elevation and the intercept location with the clay layers remain uncertain.[401] Mr. Prieur also stated that the relative contribution to the Cleveland Ranch springs from secondary recharge, mountain block recharge and Cleve Creek infiltration is unknown, and, even if the potential impact occurs, the irrigation practices on the ranch will play a significant role in how that impact affects spring flow on the ranch.[402]

The State Engineer finds that the Applicant's conceptual model for the hydrology at Cleveland Ranch is sound and that the only potential for impact from the Applicant's groundwater

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[395] 2017 Transcript, Vol.4 p. 859:1-4 (Prieur).
[396] 2017 Transcript, Vol.3 p. 540:9-11 (Prieur).
[397] 2017 Transcript, Vol.3 p. 540:12-15 (Prieur).
[398] 2017 Transcript, Vol.3 p. 540:17-19 (Prieur).
[399] 2017 Transcript, Vol.3 p. 560:7-10 (Prieur).
[400] 2017 Transcript, Vol.3 pp. 540:3 – 541:12 (Prieur).
[401] 2017 Transcript, Vol.3 p. 541:17-20 (Prieur).
[402] 2017 Transcript, Vol.3 p. 543:18-20 (Prieur).

pumping on the spring water rights at Cleveland Ranch is if the Applicant's pumping causes the water table in the alluvial aquifer to decline below the clay layer interface, thereby causing mountain block recharge and Cleve Creek infiltration to recharge the deeper groundwater area. While this impact is possible, the evidence indicates that this impact is not likely. Nonetheless, as described below, the Spring Valley 3M Plan requires effective mitigation if unlikely impact occurs.

c. Supplemental groundwater right

The only groundwater right that CPB owns in Spring Valley is a supplemental groundwater right that is junior in priority to the Applicant's water rights.[403] While pumping at the Applicant's well may impact the water levels at CPB's well, CPB's water right was granted subject to a reasonable lowering of the static water level,[404] and its well is deep enough to continue to be effective. Nonetheless, as described below, the Spring Valley 3M Plan requires effective mitigation if this groundwater right is impacted.

d. CPB's evidence of impacts to existing water rights

1. Isotopic Age of Water

Dr. Mayo, Protestant CPB's expert, opined that the Applicant's understanding of the hydrology at Cleveland Ranch is incorrect. Dr. Mayo claimed that clay layers are not preventing the upward movement of old groundwater to the springs on Cleveland Ranch.[405] His opinion was based on the isotopic age of the water.[406] Dr. Mayo stated that isotopic water samples from springs show the water has a mixed age of around 1,200 years, and therefore came from a deeper aquifer

[403] 2017 Transcript, Vol.2 p. 503:14-16 (Prieur).
[404] *See* NRS 534.110(4).
[405] 2017 Transcript, Vol.6 p. 1282:5-7 (Mayo).
[406] 2017 Transcript, Vol.6 p. 1215:13-15 (Mayo).

and not surface recharge.[407] Based on this water chemistry data, he claimed groundwater pumping would impact the springs.[408]

On cross-examination, Dr. Mayo testified that only Bastian Creek Spring has water that is age-dated at 1,200 years old, but it is not located on Cleveland Ranch.[409] Also, Dr. Mayo could not confirm that the age dating for water at Bastian Creek Spring was not influenced by water from a nearby geophysical borehole that would taint the age dating for water from the spring. [410] Dr. Mayo also failed to mention or consider other, local isotopic evidence that he claimed he was unaware of, even though he worked as a faculty committee member on the research effort that generated that isotopic evidence.[411] Dr. Mayo also admitted that he did not complete a critical correction in age dating (i.e. determining whether the tested water had flowed through carbonate rocks), and this correction affects the results of isotopic analysis.[412] Ultimately, Dr. Mayo conceded that the springs on Cleveland Ranch do not contain old water.[413] He also conceded, when asked by the State Engineer's staff, that his methodology involving the age of water is not part of the accepted methods for determining the hydrologic impacts from pumping like the Theis equation or numerical models.[414] For these reasons, the State Engineer finds that Dr. Mayo's opinions that are based on isotopic evidence have no weight in determining whether impacts will occur, or whether impacts can be mitigated.

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[407] Exhibit No. CPB_025, p. 27; 2017 Transcript, Vol.6 p. 1216:5-11 (Mayo).
[408] 2017 Transcript, Vol.6 pp. 1218:23 – 1219:5 (Mayo).
[409] 2017 Transcript, Vol.6 pp. 1287:24 – 1288:12 (Mayo).
[410] 2017 Transcript, Vol.6 p. 1296 (Mayo).
[411] Exhibit No. SNWA_281, p. 66; 2017 Transcript, Vol.6 p. 1300:16-20 (Mayo).
[412] 2017 Transcript, Vol.6 pp. 1291:22 – 1292:1 (Mayo).
[413] 2017 Transcript, Vol.6 p. 1301:16-18 (Mayo).
[414] 2017 Transcript, Vol.6 p. 1385:13-22 (Mayo).

2. Dr. Mayo's Cartoons

Dr. Mayo also supported his opinions with conceptual diagrams of the alluvial and carbonate rock system.[415] Dr. Mayo testified that the diagram was not to scale and did not represent a specific location, but he used the diagram to explain his opinion of how the Applicant's pumping would impact Cleveland Ranch.[416] In fact, the diagram was severely misleading and was not representative of the actual groundwater flow system. Dr. Mayo conceded that the diagram portrayed Applicant's wells as being much deeper than anticipated, and, more importantly, that Applicant's wells would cause a drawdown of up to 1,800 feet. Yet, no model prediction comes close to that magnitude of drawdown,[417] and Dr. Mayo admitted that if there were less drawdown, his results would have been different.[418] Dr. Mayo conceded that his diagram did not depict recharge in a post-pumping scenario, even though surface water recharge is a critical factor in Cleve Creek hydrology.[419] Also, Dr. Mayo did not include a monitoring well in his diagram,[420] even though the Spring Valley 3M Plan requires monitoring wells and he agreed that if one were present, it would detect the cone of depression before any impact.[421] Ultimately, Dr. Mayo agreed that his diagram did not represent the details of Spring Valley and did not represent the details at Cleve Creek or Cleveland Ranch.[422] Given the inaccuracies and exaggerations in Dr. Mayo's supporting documentation, the State Engineer finds that Dr. Mayo's opinions have little weight in determining whether impacts will occur, or whether impacts can be mitigated.

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[415] 2017 Transcript, Vol.6 p. 1271:1-10 (Mayo).
[416] 2017 Transcript, Vol.6 p. 1275:10-12 (Mayo).
[417] 2017 Transcript, Vol.6 p. 1278:1-6 (Mayo).
[418] 2017 Transcript, Vol.6 p. 1279:16-19 (Mayo).
[419] 2017 Transcript, Vol.6 p. 1382:8-12 (Mayo).
[420] 2017 Transcript, Vol.6 p. 1277:4-6 (Mayo).
[421] 2017 Transcript, Vol.6 p. 1280:8-9 (Mayo).
[422] 2017 Transcript, Vol.6 p. 1282:9-12 (Mayo).

3. Recharge Flows Toward Stress

While the Applicant's expert, Mr. Priuer, concluded that mountain block recharge and Cleve Creek infiltration could replenish the deeper aquifer beneath Cleveland Ranch, Dr. Mayo disagreed.[423] He believed shallow water will not find its way hundreds of feet below the top of the water surface and recharge the deeper portions of the system.[424] But, the State Engineer's staff pointed out that a new stress caused by drawdown in the deeper portions of the system would induce annual recharge to flow towards that stress.[425] Dr. Mayo agreed. State Engineer staff then questioned whether water continuously recharges the area in question, and Dr. Mayo admitted that water is added every single day, but complete recharge would occur over a period of time.[426] Dr. Mayo also agreed that younger water would replace older water pumped to the extent the volume of younger recharge water is greater than the volume of older pumped water.[427]

4. Model Predictions

CPB also relied on numerical model predictions to support its analysis of potential impacts, and a claim of groundwater mining. Dr. Jones testified based on model results that were generated with the Applicant's numerical model. As the State Engineer has found previously, that model is a regional model and has very limited value in making local scale predictions. In fact, Dr. Jones admitted that the most significant factor in the hydrology of Cleveland Ranch – the surface flow from Cleve Creek – is not included in the model.[428] Cleve Creek is a local feature that is not required to be included in a functioning regional model, but to make local scale predictions in the

[423] 2017 Transcript, Vol.6 p. 1365:17-23 (Mayo).
[424] 2017 Transcript, Vol.6 pp. 1365:23 – 1366:3 (Mayo).
[425] 2017 Transcript, Vol.6 p. 1387:5-7 (Mayo).
[426] 2017 Transcript, Vol.6 p. 1385:4-9 (Mayo).
[427] 2017 Transcript, Vol.6 p. 1387:11-13 (Mayo).
[428] 2017 Transcript, Vol.6 p. 1358:12-20 (Jones).

Cleveland Creek area, Cleve Creek is critical. Other local features that generate water from springs are also not included in the model. Accordingly, the State Engineer find that Dr. Jones' opinions based on these model predications are not credible.

e. 3M Plan Requirements at Cleveland Ranch

The 3M Plan requires monitoring at Cleveland Ranch to address the potential for impacts from the propagation of drawdown from Applicant's wells. Cleve Creek has a USGS gauge which provides ongoing monitoring of creek flows.[429] Additional monitoring is required at two springs.[430] A spring on the Cleveland Ranch South Unit has a required flume-measurement that measures continuous discharge.[431] Additional monitor wells are located between the South Unit and the northernmost Applicant well. At Rogers Ranch, South Millick Spring is monitored with a continuous piezometer and a flume is installed.[432]

Monitoring is required between the Applicant's wells and Cleveland Ranch. Bastian South well is located approximately six miles south of Cleveland Ranch and one mile north of the closest Applicant well.[433] Bastian North is located about two miles from that well and provides static water levels during the non-irrigation season.[434] The BLM Cleve Creek Well is located approximately five and one-half miles from the Applicant's well.[435] SPR7029M and SPR7029M2 were completed at different depths to measure the vertical flow paths on the alluvial fan.[436] The record reflects that these two wells are located approximately six miles from Applicant's well.[437]

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[429] 2017 Transcript, Vol.2 p. 494:8-22 (Prieur).
[430] 2017 Transcript, Vol.2 p. 496:4-12 (Prieur).
[431] 2017 Transcript, Vol.2 p. 496:17-19 (Prieur).
[432] 2017 Transcript, Vol.2 p. 492:12-15 (Prieur).
[433] 2017 Transcript, Vol.2 p. 498:19-21 (Prieur).
[434] 2017 Transcript, Vol.2 pp. 498:24 – 499:2 (Prieur).
[435] 2017 Transcript, Vol.2 p. 499:3-4 (Prieur).
[436] 2017 Transcript, Vol.2 p. 495:3-22 (Prieur).
[437] Exhibit No. SNWA_597, p. 15.

The Applicant also has sentinel monitor wells SPR7030M and SPR7030M2 which are located on the Cleveland South Unit, roughly six and one-half miles from Applicant's well.[438] Finally, SPR7031Z is located next to the spring on the South Unit about seven miles from Applicant's well.[439] The State Engineer finds that these robust monitoring devices can effectively monitor drawdown from the Applicant's GDP, and aid in ensuring that unreasonable effects are avoided.

Mr. Prieur testified that a small amount of drawdown at Bastian South well would signal a divergence or departure from baseline and activate an investigation trigger.[440] Next, static water levels at Bastian North could be compared to see if there is a significant drawdown or change from season to season.[441] After five and one-half miles, the other monitor wells would be monitored to detect departure from the baseline data.[442] The State Engineer finds that due to the distance between the Applicant's wells and Protestant CPB's property and grazing allotments, sufficient monitoring locations are present which will detect propagation of drawdown with sufficient time to implement the Spring Valley 3M Plan.

The 3M Plan contains specific thresholds and triggers to protect CPB water rights based on this monitoring. The 3M Plan requires numerous mitigation actions if drawdowns from the GDP affect existing water rights on Cleveland Ranch. These mitigation actions include lining the creek and ditch beds,[443] piping water directly onto the ranch from other sources,[444] using portions

[438] 2017 Transcript, Vol.2 p. 499:8-11 (Prieur).
[439] 2017 Transcript, Vol.2 p. 499:12-15 (Prieur).
[440] 2017 Transcript, Vol.2 p. 501:10-15 (Prieur).
[441] 2017 Transcript, Vol.2 p. 501:17-20 (Prieur).
[442] 2017 Transcript, Vol.2 p. 502:5-13 (Prieur).
[443] 2017 Transcript, Vol.3 p. 555:8-17 (Prieur).
[444] 2017 Transcript, Vol.3 p. 558:19-23 (Prieur).

of Cleve Creek which the Applicant owns,[445] or placing production wells along the alluvial fan to pump groundwater to the ranch.[446]

As stated previously, the State Engineer has found that the only potential for impact from the Applicant's groundwater pumping on the water rights at Cleveland Ranch is if the Applicant's pumping causes the water table in the alluvial aquifer to decline below the clay layer interface, thereby causing mountain block recharge and Cleve Creek infiltration to recharge the deeper groundwater area. The 3M Plan requires mitigation actions to replace this contribution of water to the springs on Cleveland Ranch. Specifically, the plan requires the Applicant to line Cleve Creek and deliver more water to Cleveland Ranch to replace mountain block recharge or Cleve Creek infiltration. In addition to lining Cleve Creek, the Applicant is required to take other actions to ensure CPB receives its water right at Cleveland Ranch. Accordingly, the State Engineer finds that these actions would be effective in ensuring the GDP pumping does not conflict with CPB's existing water rights.

3. Shoshone Ponds and Pahrump Poolfish

In Spring Valley, there is one federally listed endangered species called the Pahrump poolfish, which is located at Shoshone Ponds. Mr. Marshall testified that the Pahrump poolfish habitat at Shoshone Ponds is managed by the BLM and NDOW, and very little active management has occurred since the ponds were constructed decades ago.[447] While the Spring Valley 3M Plan requires the Applicant to avoid an unreasonable effect to the species from GDP pumping, neither the State Engineer nor the Applicant have control over habitat management or population numbers.

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[445] Exhibit No. SNWA_507, p. 6-29; 2017 Transcript, Vol.3 pp. 555:23 – 556:9 (Prieur).
[446] 2017 Transcript, Vol.3 p. 559:5-8 (Prieur).
[447] 2017 Transcript, Vol.2 pp.473:12-15 (Marshall); Exhibit No. SNWA_507 p. 6-60.).

Mr. Prieur explained that the area underlying the ponds is comprised of clays and sand deposits,[448] meaning the ponds are perched on top of the clay layers.[449] Mr. Prieur provided his opinion that groundwater pumping would not have a direct effect on the ponds themselves.[450] The only effects, if any, would be to the artesian flow coming from the wells.[451]

The unreasonable effect which the 3M Plan avoids for the Pahrump Poolfish is jeopardizing the continued existence of the species.[452] The 3M Plan's approach is to protect the existing water rights, which in turn protects the Pahrump poolfish habitat at Shoshone Ponds.[453] The Technical Analysis Report demonstrates that a stable Pahrump poolfish population of sufficient size to help downlist the species under the Endangered Species Act can be maintained at Shoshone Ponds from a discharge of 3.3 gallons per minute (gpm).[454] The existing water right at the Shoshone NDOW Well (Permit Number 27768) is over three times that flow (12.39 gpm). The existing water right at the Shoshone NDOW Well (Permit Number 27768) (12.39 gpm) is over three times the flow necessary to maintain a stable Pahrump poolfish population at the Shoshone Ponds. The investigation trigger is activated if artesian flow rate of the Shoshone NDOW Well is less than 15 gpm with no flow valve restrictions for a continuous period of 6 months.[455] In the event that the Applicant cannot install instrumentation in the Shoshone NDOW Well, Shoshone Well #2 is located 100 feet away, has a similar completion depth, and will be used as a monitor site.[456] If the investigation trigger is activated, the 3M Plan requires the Applicant to conduct an investigation,

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[448] 2017 Transcript, Vol.2 p. 482:9-12 (Prieur).
[449] 2017 Transcript, Vol.2 p. 483:1-3 (Prieur).
[450] 2017 Transcript, Vol.2 p. 484:2-7 (Prieur).
[451] 2017 Transcript, Vol.2 p. 484:7-9 (Prieur).
[452] Exhibit No. SNWA_592, p. 3-28.
[453] Exhibit No. SNWA_592, p. 3-28.
[454] Exhibit No. SNWA_507, p 6-65.
[455] Exhibit No. SNWA_592, p. 3-30.
[456] Exhibit No. SNWA_507, p. 6-76; Exhibit No. SNWA_592, p. 3-30.

and management actions to protect the existing water right and/or Pahrump poolfish as specified in the Spring Valley 3M Plan.[457]

The 3M Plan mitigation trigger is activated if the artesian flow rate of the Shoshone NDOW Well is less than 13.5 gpm with no flow valve restrictions for a continuous period of six months.[458] The 13.5 gpm trigger provides a 10 percent buffer above the existing water right of 12.39 gpm and allows time to implement mitigation actions to avoid an unreasonable effect.[459] If a mitigation trigger is activated, the 3M Plan requires that within 30 days the Applicant will implement existing water right mitigation as well as Pahrump poolfish mitigation actions as specified in the Spring Valley 3M Plan. The mitigation actions will ensure that the water supply is available at Shoshone Ponds to continue to support a Pahrump poolfish population of sufficient size to help recover the species.[460] The Spring Valley 3M Plan also details that the Applicant will contribute to other Pahrump poolfish habitat or population management efforts in collaboration with BLM, NDOW, and USFWS if deemed necessary by the State Engineer.[461] The Technical Analysis Report provides evidence that the mitigation actions will be effective, and Mr. Marshall testified that the mitigation actions will be effective in his expert opinion, partially based on previous actions that have been successful at this location. Mr. Marshall's testimony also demonstrated the Applicant's commitment to collaborate with the BLM and NDOW in order to ensure the habitats are maintained for the Pahrump poolfish.[462]

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[457] Exhibit No. SNWA_592, p. 3-30.
[458] Exhibit No. SNWA_592, p. 3-30.
[459] Exhibit No. SNWA_507, p. 6-79.
[460] Exhibit No. SNWA_592, pp. 3-29 – 3-30.
[461] Exhibit No. SNWA_592, p. 3-29 – 3-30; Exhibit No. SNWA_592, pp. 3-29 – 3-30.
[462] 2017 Transcript, Vol.2 p. 490:23 (Marshall); Exhibit No. SNWA_507 p. 6-82.

Protestants criticized the Spring Valley 3M Plan because they claimed that it did not evaluate the water chemistry and the needs of the fish.[463] Mr. Marshall testified that that criticism is mistaken, because the 3M Plan calls for providing the same water via pump, rather than artesian pressure, if necessary.[464] Furthermore, the Technical Analysis Report provides extensive information and references indicating that the species is hardy and has survived and reproduced in habitats that vary widely in their environmental characteristics, including water chemistry.[465]

The State Engineer finds that protecting this water right will protect the resource because the evidence shows that the Pahrump poolfish will continue to survive in this location so long as the habitats are supplied with water. The 3M Plan has adequately defined standards, thresholds, and triggers so that unreasonable effects to the Pahrump poolfish from the GDP pumping can be mitigated or avoided. The State Engineer finds that these triggers are neither arbitrary or capricious as the triggers are defined, objection and easily observable. The State Engineer further finds that the 3M Plan will be successful in protecting the existing water rights in this area, which in turn will protect the Pahrump poolfish habitat. The State Engineer finds that the Spring Valley 3M Plan has identified effective mitigation actions that will avoid an or eliminate unreasonable effects to the federally listed endangered Pahrump poolfish because similar actions have been successful in the past.

4. Mesic Habitat and Native Aquatic-Dependent Special Status Animal Species

The Technical Analysis Report and 3M Plan describe mesic habitat as being composed of spring, seep, pond, wetland/meadow, marsh, and stream components that are often intermixed to

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[463] Exhibit No. GBWN_297, pp. 46-47.
[464] 2017 Transcript, Vol.2 p. 481:7-13 (Marshall); Exhibit No. SNWA_592, p. 3-31.
[465] Exhibit No. SNWA_507, pp. 6-58 and 6-65.

form complexes.[466] The Technical Analysis Report further states that mesic habitats in the Spring Valley groundwater discharge area are maintained by "a variety of natural and human-made factors,… [including] spring discharge, surface-water runoff from surrounding areas and mountains, subsurface inflow from the mountains, shallow groundwater, precipitation, water diversions, well outflow, and irrigation."[467] Mr. Marshall testified that the mesic habitat largely occurs in areas that have been enhanced by human activities like diversion works, ditches, and sub-irrigation for ranching.[468] The northern leopard frog, a native aquatic-dependent special status animal species, inhabits mesic habitat in the Spring Valley groundwater discharge area.[469] The Spring Valley 3M Plan manages mesic habitat and northern leopard frogs together. The State Engineer finds this to be a logical and reasonable approach for this habitat and species, based on the co-occurrence of the species and the habitat.

The Technical Analysis Report, Spring Valley 3M Plan, and Mr. Marshall's testimony reflect that the mesic habitat and northern leopard frog strategy focuses on Management Block 3, Applicant's McCoy Creek Property, and existing water rights. Management Block 3 is a focus because approximately half of the mesic habitat in the Spring Valley groundwater discharge area is located there, and the Management Block 3 habitat provide seasonal and long-term needs for the northern leopard frog.[470] The McCoy Creek Property is crucial because it encompasses over 900 acres of mesic habitat, supports all life stages and large numbers of northern leopard frogs, and together with associated Applicant water rights provides the Applicant with substantial

[466] Exhibit No. SNWA_507, p 5-4; Exhibit No. SNWA_592, p. 2-44.
[467] Exhibit No. SNWA_507, p. 5-4.
[468] 2017 Transcript, Vol.3 p. 572:20-24 (Marshall).
[469] 2017 Transcript, Vol.3 p. 576:20-577:2 (Marshall); Exhibit No. SNWA_592, p. 3-31.
[470] Exhibit No. SNWA_507, pp. 682 to 6-83.

integrated resource management opportunities.[471] As explained by Mr. Marshall, this approach "is consistent with the approach that Fish and Wildlife Service takes under Section Ten 10 of the [ESA] in habitat conservation planning… to insure the protection of a block of habitat for listed species or sensitive species while allowing some impact in other areas."[472] In addition to these areas, mesic habitat and northern leopard frogs occur in various locations within the Spring Valley groundwater discharge area where existing water rights occur.[473] The State Engineer finds that based on environmental and hydrologic data, the 3M Plan's strategy of focusing on Management Block 3, the Applicant's McCoy Creek Property, and existing water rights is a rational and logical scope for monitoring to avoid unreasonable effects to mesic habitat and northern leopard frogs.

The unreasonable effects which the 3M Plan avoids for mesic habitat and northern leopard frog are the elimination of the habitat type, and extirpation of the native aquatic-dependent special status animal species from the Spring Valley groundwater discharge area.[474] The Spring Valley 3M Plan establishes quantitative investigation and mitigation triggers for mesic habitat and northern leopard frogs. Investigation triggers are established at sentinel monitor wells SPR7029M, SPR7029M2, SPR7030M, SPR7030M2, and SPR7044M, which detect change in water levels near the south end of Management Block 3.[475] The investigation trigger is activated if the water level falls outside of the baseline. If an investigation trigger is activated at one of the sentinel wells, the 3M Plan requires the Applicant to conduct an investigation, and management actions may be implemented for existing water rights and/or mesic habitat and northern leopard frogs at McCoy

[471] Exhibit No. SNWA_507, p. 4-6.
[472] 2017 Transcript, Vol.3 p. 579:14-22 (Marshall).
[473] Exhibit No. SNWA_507, pp. 5-13 to 5-14.
[474] Exhibit No. SNWA_592, p. 3-31.
[475] Exhibit No. SNWA_592, p. 3-33.

Creek Property as specified in the 3M Plan.[476] If a mitigation trigger is activated at any existing water right in Management Block 3, the 3M Plan requires that within 30 days the Applicant will implement existing water right mitigation as well as mesic habitat and the northern leopard frogs mitigation in Management Block 3 and McCoy Creek Property.[477]

The State Engineer finds that the number of existing water rights that support mesic habitat and northern leopard frogs in Management Block 3 and other areas in Spring Valley, and the Applicant's ownership of McCoy Creek Property and associated water rights, make this approach effective. The State Engineer finds that the water right mitigation described above will ensure that the water is available to continue to support mesic habitat and northern leopard frogs, and the environmental mitigation will enhance mesic habitat for the benefit of northern leopard frogs and other wildlife species. The Technical Analysis Report provides evidence that the various mitigation actions will be effective, and Mr. Marshall testified that the detailed mitigation actions in the Spring Valley 3M Plan will be effective in his expert opinion.[478]

Protestant CTGR claimed that the Spring Valley 3M Plan improperly uses the northern leopard frog "as an indicator species for mesic habitat ecosystem viability."[479] On cross-examination, Protestant CTGR's expert witness, Dr. Reich, stated that he did not know whether the Spring Valley 3M plan did in fact use the northern leopard frog as an indicator species.[480] Mr. Marshall testified that this critique is a misrepresentation of the plan.[481] Mr. Marshall stated that the northern leopard frog is included in the 3M Plan because it is a native aquatic-dependent special

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[476] Exhibit No. SNWA_592, p. 3-23, 3-31, and 3-33.
[477] Exhibit No. SNWA_592, p. 3-24, 3-33.
[478] 2017 Transcript, Vol.2 p. 372:11-14 (Marshall); 2017 Transcript, Vol.3 p. 579:11-1216 (Marshall); Exhibit SNWA_507 p. 6-90.
[479] Exhibit No. CTGR_022, p. 11.
[480] 2017 Transcript, Vol.7 p. 1581 (Reich).
[481] 2017 Transcript, Vol.3 p. 577:14-15 (Marshall).

status animal species, and the plan focuses on conserving the habitat where there are known locations of the northern leopard frog – but the northern leopard frog is not an indicator species.[482] The rebuttal report by Protestant CPB's expert Dr. Roundy states that "the main concerns are that [Applicant] pumping will reduce forage production and stock water availability on spring-fed localized areas within their BLM allotments."[483] However, as detailed above, CPB's mesic habitat will not be affected by groundwater pumping, as it is largely supplied by irrigation and sub-irrigation water.

Protestants also criticized that the 3M Plan could allow the Applicant to dry up the valley as long as McCoy Creek Property remains for the northern leopard frog.[484] Specifically, Protestant CTGR stated that "what occurs to mesic habitat and native aquatic dependent special species outside of the Applicant's owned McCoy Creek Property becomes irrelevant," and "the Applicant's [Technical Analysis Report] anticipates that only the McCoy Creek Property remains viable."[485] The State Engineer finds this argument to be inconsistent with the Spring Valley 3M Plan. Mr. Marshall responded to that critique, stating that "mesic habitat across the valley have multiple supplies of water, [including] mountain front runoff" and "also doesn't contemplate the protection of existing water rights across the valley and the protection they provide for springs and surface waters that supports mesic habitat."[486]

Protestant CPB also claimed that GDP pumping could "dewater" mesic habitat on Cleveland Ranch, and claimed a six-month continuous deficit would result in a "major loss of

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[482] 2017 Transcript, Vol.3 p. 577:14-21 (Marshall).
[483] Exhibit No. CPB_026 p. 5.
[484] Exhibit No. CTGR_022, p.12.
[485] Exhibit No. CTGR_022, pp. 12-13.
[486] 2017 Transcript, Vol.3 p. 580:1311-17 (Marshall).

forage, stock water, and wildlife habitat."[487] As discussed in detail above, the State Engineer is has found that the water supplied to the mesic habitat at Cleveland Ranch is largely surface irrigation water associated with existing water rights on Cleve Creek. This water is not susceptible to pumping effects, and that the spring discharge on Cleveland Ranch comes partially from secondary recharge of the irrigation water which is protected by the underlying clay layers. As such, so long as CPB continues its historic irrigation practice, the mesic habitat will not be effected.

The Spring Valley 3M Plan's triggers and actions to avoid or eliminate conflict with the spring existing water rights on Cleveland Ranch, thereby providing protection for the mesic habitat which relies on this water. The Applicant's rebuttal report to Dr. Roundy states that "protection of the existing water rights under the 3M Plan ensures that the mesic habitat supported by those water rights can be maintained, provided CPB continues suitable irrigation and grazing practices that support the habitat."[488] Protestant CPB's expert, Dr. Roundy, stated in his report that "if [groundwater] withdrawal does not reduce water availability . . . then impacts to wetlands, meadows, and obligate phreatophytes should be limited."[489] Protestant CPB's expert also agreed during the hearing that if there are no impacts to Cleveland Ranch existing water rights, "you don't have a problem."[490]

The State Engineer finds that the concerns regarding mesic habitat on CPB ranchlands are resolved by the Spring Valley 3M Plan, in part because the stream irrigation water rights will not be affected by the Applicant's GDP pumping. The State Engineer further finds that the Spring Valley 3M Plan established quantitative triggers and identified mitigation actions that will avoid

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[487] CPB Exhibit_023, p. 3.
[488]Exhibit SNWA_598, p. 11.
[489] Exhibit No. CPB_022, p. 7.
[490] 2017 Transcript, Vol.7 1443:17-1444:7 (Roundy); Exhibit No. CPB_022, p.7.

the defined unreasonable effects to mesic habitat and the native aquatic-depended special status animal species northern leopard frog.

5. Shrubland Habitat

The Technical Analysis Report and Spring Valley 3M Plan describe shrubland habitat in the Spring Valley groundwater discharge area as being composed of facultative phreatophytic shrub species (which typically use groundwater as a secondary water source after precipitation) as well as shrub species that rely solely on precipitation.[491] During the 2011 hearing, there was much evidence and discussion about facultative phreatophytic shrubs and the shrubland plant transitions that may occur from GDP pumping.[492] That evidence remains in the record and is incorporated into this opinion.

At the remand hearing, Mr. Marshall testified that if facultative phreatophytes lose access to groundwater, it is expected that they will "reduce in their total cover and [be] replaced over time by plants that are more advantaged in their ecology and are able to do better just on precipitation."[493] Protestant CPB's expert Dr. Roundy agreed that "transitions can happen in a healthy fashion."[494] Mr. Marshall explained that this plant transition concept is counter to the notion that all phreatophytes will die off, as had been stated by Protestants.[495] All protestants confirmed that the idea that all shrubs will die as a result from the Applicant's GDP pumping is erroneous.[496]

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[491] Exhibit No. SNWA_507 p. 5-8; Exhibit No. SNWA_592, p. 3-34.
[492] Exhibit No. SE_140, pp. 187 and 191.
[493] 2017 Transcript, Vol.3 587:20-24 (Marshall); Exhibit No. SNWA_507 p. 6-90.
[494] 2017 Transcript, Vol 7 p. 1448:7-9 (Roundy).
[495] 2017 Transcript, Vol.3 pp. 615-:21 – 616:5 (Marshall); Transcript, Vol.10 pp. 2046:13 – 2047:24 (Taggart); Exhibit No. SE_118 p. 10.
[496] 2017 Transcript, Vol.7 pp. 1463-1465 (Roundy); 2017 Transcript, Vol.9 pp. 1876:18-21 (Myers); 2017 Transcript, Vol.6 pp. 1312:4-22 (Jones).

Importantly, 90,000 acre feet of precipitation reaches the Spring Valley groundwater discharge area annually, which is utilized by shrubs in addition to other sources of water such as surface water runoff.[497] The record reflects that viable shrubland communities exist in areas where groundwater is naturally deep, as well as in areas where groundwater depth has increased due to pumping. As testified by Mr. Marshall, shrubland habitat occurs throughout Delamar and Dry Lake valleys where depth to groundwater is greater than the maximum plant rooting depth.[498] Additionally, Dr. McLendon testified in 2011 that "throughout the Great Basin… greasewood [is found] on sites where the water table is relatively near the surface, [as well as on sites where] depth to water is beyond the rooting zone… [where they] receive most of their supplemental moisture from surface flow that puddles in a depression… [which] can be fairly large [such as a greasewood] flat."[499] The Applicant's expert Dr. Huntington testified that "in many basins [in Nevada] that have been pumped for decades," he has continued to see "healthy shrub communit[ies]."[500] The State Engineer's finding in Ruling 6164 that "viable plant and wildlife communities will remain" still stands.[501]

The Spring Valley 3M Plan focuses on shrubland habitat in Management Blocks 1 and 2, which encompass the GDP wells. Management Block 3 is managed to avoid conflicts with existing water rights and preserving mesic habitat as discussed above, which also protects the intertwining shrubland habitat.[502]

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[497] 2017 Transcript, Vol.3 616:6-14 (Marshall).
[498] Exhibit SNWA_598 p. 5; 2017 Transcript, Vol.3 p. 588:13-19 (Marshall).
[499] 2011 Transcript, Vol.8 p. 1660:6-14 (McLendon).
[500] 2017 Transcript, Vol.1 pp. 225:15 – 226:1 (Huntington).
[501] Exhibit No. SE_140, p. 191.
[502] Exhibit No. SNWA_507 p. 6-92; Exhibit No. SNWA_592, p. 3-35.

Mr. Prieur testified that Management Blocks 4 and 5 are over 20 miles away from the closest proposed production wells.[503] The 3M Plan states that unreasonable effects to shrubland habitat in Management Block 4 are unlikely due to distance from GDP wells and triggers and actions in Management Blocks 1-3. However, the 3M Plan's approach to shrublands applies to Management Block 4 if a specified hydrologic investigation trigger in Management Block 2 or 3 respectively signals propagation of drawdown due to GDP pumping.[504] The Protestants criticized the Spring Valley 3M Plan for not having enough monitor wells, specifically in Management Block 3, to detect propagation of drawdown going north. Dr. Myers proposes to have a transect of monitoring wells extending across Spring Valley spaced at no more than about a mile.[505] He bases this on his conclusion that there are a lot of heterogeneities which may create the potential for preferential flows.[506] Mr. Prieur, however, identified there are sufficient monitor wells to protect senior water rights in Spring Valley.[507] Dr. Myers agreed that a monitoring well would detect propagation of drawdown if the well is located on the proper flow path.[508]

The State Engineer finds that focusing on Management Blocks 1 and 2 and extending the approach to Management Block 4 in the event of drawdown propagation is a sound approach to avoiding unreasonable effects to shrubland habitat as drawdown will be noticed in Management Blocks 1 and 2 long before it ever reaches Block 4. This finding is based on environmental data and the location of the GDP wells, and the distance and time available to implement baseline monitoring for Management Block 4 if necessary.

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[503] 2017 Transcript, Vol.6 p. 661:13-14 (Prieur).
[504] Exhibit No. SNWA_592, p.2-48 and 3-34 – 3-35; Exhibit No. SNWA_507 p. 6-92.
[505] 2017 Transcript, Vol.8 p. 1745:4-8 (Myers).
[506] 2017 Transcript, Vol.8 p. 1745:11-13 (Myers).
[507] 2017 Transcript, Vol.2 p. 467:7-9 (Prieur).
[508] 2017 Transcript, Vol.9 p. 1938:14 (Prieur).

The unreasonable effects which the 3M Plan avoids for shrubland habitat are the elimination of the habitat type from the Spring Valley groundwater discharge area, and excessive loss of shrub cover that results in extensive bare ground.[509] The Technical Analysis Report, 3M Plan, and Mr. Marshall's testimony reflect that the strategy is to maintain shrubland habitat within the baseline range of variation for shrub cover.[510] The Applicant used over 30 years of remotely-sensed Normalized Difference Vegetation Index data (NDVI, a proxy for vegetation cover) to determine the baseline threshold. The State Engineer finds that establishing the threshold within the baseline range of variation is a sound approach to avoiding unreasonable effects to shrubland habitat.

Mr. Marshall testified the 3M Plan's use of two trigger parameters at different spatial scales (NDVI at a landscape scale; percent live shrub cover at a local scale) "makes the plan very robust in terms of understanding the changes that are occurring in the plant community."[511] Detailed testimony was given by Mr. Marshall, Dr. Huntington, and Ms. Brandt, and detailed documentary evidence was submitted, regarding the monitoring sample design and the process to derive the necessary data and quantify shrub cover in the groundwater discharge area.[512] The 3M Plan also includes installation of piezometers to monitor shallow groundwater conditions in shrubland habitat.[513] The State Engineer finds the complimentary use of remotely-sensed data and ground vegetation data, and the use of shrubland piezometer data, to be an effective approach for monitoring and managing shrubland habitat in the groundwater discharge area.

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[509] 2017 Transcript, Vol.3 592:13-19 (Marshall); Exhibit No. SNWA_592, p.3-34.
[510] Exhibit No. SNWA_507 p. 6-103; Exhibit No. SNWA_592, p. 3-35.
[511] 2017 Transcript, Vol.3 609:12-17 (Marshall).
[512] 2017 Transcript, Vol 3 593:10-601:10.
[513] Exhibit No. SNWA_592, pp. 2-20, 2-23, 2-29.

The Spring Valley 3M Plan establishes quantitative investigation and mitigation triggers for shrubland habitat using a prediction interval formula.[514] An investigation trigger is activated if (1) the mean annual NDVI for medium-density shrubland or low-density shrubland falls below the medium-density or low-density shrubland 95 percent lower control limit of the prediction interval for NDVI, respectively, or (2) the mean percent live shrub cover falls below the medium-density or low-density shrubland 95 percent lower control limit for percent live shrub cover.[515] If an investigation trigger is activated, the 3M Plan requires the Applicant to conduct an investigation, and based on findings may implement management actions for shrubland habitat as specified in the 3M Plan.[516]

A mitigation trigger is activated if (1) the mean annual NDVI falls below the low-density shrubland 95 percent lower control limit for NDVI for 5 years, or (2) if mean percent live shrub cover falls below the low-density shrubland 95 percent lower control limit for percent live shrub cover for five years.[517] The 3M Plan's five-year time frame allows for the natural variability in shrub reproduction, germination, establishment, and growth rates, provides time for the plants to respond to changes in the environment, and is used by Federal land managers in their revegetation and restoration activities.[518] If a mitigation trigger is activated, the 3M Plan requires that within 30 days the Applicant will implement shrubland habitat mitigation as specified in the 3M Plan.[519] Mitigation actions include appropriate implementation of vegetation restoration techniques, assessment of mitigation efficacy, and continued implementation as necessary to achieve

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[514] Exhibit No. SNWA_592, pp.3-35 to 3-37.
[515] Exhibit No. SNWA_592, p.3-39.
[516] Exhibit No. SNWA_592, pp.3-38 - 3-39.
[517] Exhibit No. SNWA_592, p.3-39.
[518] Exhibit No. SNWA_507, pp. 6-108 – 6-109; 2017 Transcript, Vol.3 p. 604:1-20 (Marshall).
[519] Exhibit No. SNWA_592, p.340.

successful mitigation.[520] The Technical Analysis Report describes how the Applicant has extensive experience and a proven track record in environmental restoration, and Mr. Marshall testified that the mitigation actions will be effective in his expert opinion.[521] The State Engineer finds that the substantial evidence presented demonstrates that the specific actions outlined in the 3M Plan and testimony will be effective to avoid any unreasonable effects to the shrubland habitats.

CPB's expert report concedes that for shrubland habitat, "the overall forage production across [Cleveland Ranch's Bastian Creek Allotment] is very low."[522] The Applicant presented evidence that the forage value in shrubland habitat is largely derived from precipitation dependent plants, which are not affected by an increase in depth to water.[523] As stated in Protestant CPB's expert witness Dr. Roundy's testimony, "for the plants that grow on precipitation only, groundwater pumping should not affect them."[524] During cross examination of Protestant CPB's expert witness, the expert admitted that he had not reviewed protestant's grazing permits for forage values before making his conclusions.[525] The witness also stated that in some instances, improvement of forage value of grazing allotments is possible.[526] As such, the State Engineer fins that the Applicant's GDP will not adversely affect the forage value of plants in the groundwater discharge area.

Regarding shrubland mitigation, Protestant CPB's expert stated that shrubland restoration is "difficult and possible."[527] Mr. Marshall testified to the Applicant's successful track record of

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[520] 2017 Transcript, Vol.3 609:21-612:12 (Marshall); Exhibit No. SNWA_507 pp. 6-109 – 6-113; Exhibit No. SNWA_592, p.3-40; Exhibit No. SNWA_598 p.10.
[521] Exhibit No. SNWA_507 pp. 6-109 – 6-113; 2017 Transcript, Vol.3 p. 614:3 (Marshall).
[522] Exhibit No. CPB_26 p. 4.
[523] 2017 Transcript, Vol.4 p. 890:11-20 (Marshall); Exhibit No. SNWA_598 pp. 5-8.
[524] 2017 Transcript, Vol.7 p. 1469:17-18 (Roundy).
[525] 2017 Transcript, Vol.7 p. 1467:2-5 (Roundy).
[526] 2017 Transcript, Vol.7 p, 1468:16-19 (Roundy).
[527] 2017 Transcript, Vol.7 p. 1470:7 (Roundy).

vegetation restoration, citing restoration activities conducted after significant disturbance in the Las Vegas Valley and Coyote Spring Valley, Nevada.[528] The State Engineer finds that the Applicant has organizational experience in implementing shrubland mitigation actions. The State Engineer also finds that the Spring Valley 3M Plan established quantitative triggers and identified mitigation actions that will effectively avoid unreasonable effects to shrubland habitat.

6. Terrestrial Woodlands Habitat

The terrestrial woodland habitat in the Spring Valley groundwater discharge area is also referred to as swamp cedars. As discussed in the Technical Analysis Report and Spring Valley 3M Plan, swamp cedars is a name with historical and cultural significance, but biologically speaking the habitat is not a true swamp and the trees are not cedars, they are junipers.[529] The Technical Analysis Report and Mr. Marshall's testimony describe Rocky Mountain juniper as a species with a broad ecological range that typically does not rely on groundwater, but does tend to occur in places where it gets some supplemental moisture.[530] The Spring Valley 3M Plan focuses specifically on the Swamp Cedar Area of Critical Environmental Concern ("ACEC") because approximately 40 percent of the terrestrial woodland habitat in the Spring Valley groundwater discharge area is located in the ACEC, and the area was designated as an ACEC by the BLM for its cultural resources and its unique plant community. The ACEC is also an area of special cultural significance, as presented by Protestant CTGR in the 2011 water rights hearing.[531] In addition to the ACEC, the terrestrial woodland habitat occurs in various locations within the Spring Valley

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[528] 2017 Transcript, Vol.3 611:20-22 (Marshall); Exhibit No. SNWA_502 6-109 to 6-113.
[529] Exhibit No. SNWA_592, p. 2-48; Exhibit No. SNWA_507 p. 6-114.
[530] Exhibit No. SNWA_507, p. 5-8; 2017 Transcript, Vol.3 pp. 618:22 – 619:19 (Marshall).
[531] Exhibit No. SNWA_507, pp. 6-114 – 6-115; Exhibit No. SNWA_592, p. 3-41; 2017 Transcript, Vol.3 p. 618:1-15 (Marshall).

groundwater discharge area where existing water rights exist.[532] The State Engineer finds that focusing on the Swamp Cedar ACEC and existing water rights is a sound approach to avoiding unreasonable effects to terrestrial woodland habitat.

Evidence was presented on the soil composition and hydrogeology of the Swamp Cedar ACEC. Mr. Prieur testified regarding lithologic logs from a well and an exploratory borehole east of the ACEC that indicate the presence of a clay layer approximately 30 to 60 feet thick underlying the area.[533] In addition, a shallow hand auger test on the adjacent Osceola Property showed a lithology of clay and silty clay sediments observed to be saturated at approximately 8 feet.[534] Mr. Prieur also testified that the soils in this area have a high water retention ability, meaning precipitation or surface water would be held much better than in a coarse sand that would drain the area, and the underlying tight clay soils would retard or prevent the influence of groundwater drawdown from the producing aquifer.[535] Mr. Marshall testified that the white soils in the Swamp Cedar ACEC area reflect a drainage area that is collecting precipitation and surface water runoff, which could be the source of supplemental moisture for the trees.[536] The Protestants did not provide any additional information about the soils or hydrogeology of the Swamp Cedar ACEC area to dispute these findings. The State Engineer finds that given the local hydrologic characteristics of the area, GDP pumping will not likely affect the supplemental water supplied to the swamp cedars from surface runoff.

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[532] Exhibit No. SNWA_507, p. 5-3 and 6-87.
[533] 2017 Transcript, Vol.3 p. 621:13-20 (Prieur).
[534] Exhibit No. SNWA_507, p. 6-115.
[535] 2017 Transcript, Vol.3 622-623:11-21 (Prieur).
[536] 2017 Transcript, Vol.3 pp. 629:21 – 630:18 (Marshall).

The 3M Plan requires remote sensing and ground vegetation data to monitor the tree cover in the Swamp Cedar ACEC. The 3M Plan's monitoring network for the ACEC also includes three existing monitoring wells and one precipitation station which are used to evaluate the relationship between precipitation, shallow groundwater, and the underlying groundwater pumping aquifer.[537] The Protestant CPB's expert recognized that the Applicant used 30 years of data to determine the threshold limit and trigger, "which is good science," and that they should be able to monitor tree cover "quite well with their approach."[538] During testimony, Protestant CPB's expert, Dr. Roundy, stated that he believed that it was possible to manage a population of trees such as in the Swamp Cedar ACEC so that the stand of trees is maintained in its current size.[539] The State Engineer finds the use of remotely-sensed NDVI data and ground vegetation data, along with hydrologic data, to be a rational and effective approach for monitoring and managing terrestrial woodland habitat in the groundwater discharge area. The State Engineer finds that this approach defines triggers for the environmental resources in an objective and scientifically-founded way, and will ensure that any mitigation of unreasonable effects will not be carried out arbitrarily or capriciously.

The unreasonable effect which the 3M Plan avoids for terrestrial woodland habitat is the elimination of the habitat type from the Spring Valley groundwater discharge area. The 3M Plan requires the Applicant to maintain the terrestrial woodland habitat within the baseline range of variation for tree cover. The threshold established in the 3M Plan is "the lower limit of the baseline percent range of cover within the Swamp Cedar ACEC."[540]

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[537] Exhibit No. SNWA_592, p. 2-22.
[538] 2017 Transcript, Vol.7 pp. 1425:9-11 and 1425:24 – 1426:1 (Roundy).
[539] 2017 Transcript, Vol.7 1477:19-24 (Roundy)
[540] Exhibit No. SNWA_507, p. 6-121; Exhibit No. SNWA_592, p. 3-43.

The Spring Valley 3M Plan establishes quantitative investigation and mitigation triggers for terrestrial woodland habitat within the Swamp Cedar ACEC. The investigation trigger is activated if annual tree cover area for the Swamp Cedar ACEC, compared to the baseline maximum tree cover area, falls within five percent of the lower limit of the baseline percent range in cover.[541] If the investigation trigger is activated, the 3M Plan requires the Applicant to conduct an investigation, and based on findings management actions may be implemented for terrestrial woodland habitat as specified in the 3M Plan.[542] These management actions include preemptive implementation of mitigation to avoid activating the mitigation trigger.[543]

The mitigation trigger is activated if annual tree cover area for the Swamp Cedar ACEC, compared to the baseline maximum tree cover area, falls below the lower limit of the baseline percent range in cover for a period of five consecutive years as a result of GDP pumping.[544] The five-year time frame, which is based partially on BLM guidelines, allows for the natural variability in tree reproduction, germination, establishment, and growth rates, and provides time for the trees to respond to changes in the environment.[545] If the mitigation trigger is activated, the 3M Plan requires that within 30 days the Applicant will implement terrestrial woodland habitat mitigation as specified in the 3M Plan.[546] The Applicant has committed to take mitigation actions to ensure that the tree stand stays within the historical range of historical variation by adding trees to the population or enhancing the vigor of the existing trees.[547] In areas where terrestrial woodland

[541] Exhibit No. SNWA_592, p. 3-45.
[542] Exhibit No. SNWA_592, p. 3-45.
[543] Exhibit No. SNWA_592, pp. 3-42 and 3-46.
[544] Exhibit No. SNWA_592, p. 3-45.
[545] Exhibit No. SNWA_507, pp. 6-123; 2017 Transcript, Vol.3 p. 627:16-24 (Marshall).
[546] Exhibit SNWA_592, p. 3-46.
[547] 2017 Transcript, Vol.3 628:6-12 (Marshall).

habitat is influenced by springs, streams or irrigation, the habitat is protected by the triggers and management and mitigation actions for existing water rights.

Protestant CPB's expert Dr. Roundy erroneously claimed the Applicant "didn't specifically state they would count mature trees . . . I thought that was kind of an oversight."[548] However, the Spring Valley 3M Plan requires that mature trees are counted as part of the ground tree plot monitoring.[549] Protestant CPB's expert report also incorrectly cited Dr. McLendon's 2011 expert report[550] as saying that groundwater withdrawal below 10 feet could "doom [the Rocky Mountain juniper population] to extinction."[551] But this statement does not occur in Dr. McLendon's report. On cross examination, Protestant CPB's expert witness admitted that his report "used hyperbole" because he "[has] to keep people awake" and overstated the potential effect of GDP pumping on the swamp cedars.[552]

The State Engineer finds that the Applicant has organizational experience in implementing vegetation mitigation actions, that the Applicant considered Tribal concerns when focusing their approach on maintaining a viable tree population within the Swamp Cedar ACEC. The State Engineer also finds that the Spring Valley 3M Plan established quantitative and scientifically reasoned triggers and identified mitigation actions that will avoid unreasonable effects to terrestrial woodland habitat. The State Engineer also finds that the co-location of existing water rights and terrestrial woodland habitat reduces the risk of approaching unreasonable effects to terrestrial woodland habitat.

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[548] 2017 Transcript, Vol.7 p. 1460:19-22 (Roundy).
[549] Exhibit No. SNWA_507, p. 6-121; Exhibit No. SNWA_592, p. 2-51.
[550] Exhibit No. SNWA_598, p. 8.
[551] Exhibit No. SNWA_598, p. 8; Exhibit No. CPB_22, p. 4.
[552] 2017 Transcript, Vol.7 pp. 1463:22 – 1464:3 (Roundy).

7. Cultural Resources

The Swamp Cedar ACEC has a cultural significance to Tribal Protestants: Confederated Tribes of the Goshute Reservation, Duckwater Shoshone Tribe, and Ely Shoshone Tribe.[553] In addition to the swamp cedars, the Tribal Protestants identified other locations within Spring Valley that have cultural significance, including village sites and "Tribal Cultural Areas" used for traditional hunting and fishing grounds, ceremonies, gathering areas, and other cultural uses.[554] Not all of these culturally significant areas are within the GDP's groundwater discharge area.[555]

In Ruling 6164, the State Engineer addressed the Tribal Protestants concerns regarding alleged impacts to reserved groundwater rights finding that "there are essentially no predicted impacts to the Tribal Protestants' reserved lands" and that there was no evidence the groundwater system was connected to sacred water sources.[556] The State Engineer further finds that these determinations were not disturbed by the Remand Order.[557] The State Engineer's undisturbed findings within Ruling 6164 are, therefore, still valid and incorporated herein by reference.

Also in Ruling 6164, the State Engineer determined that "Federal permitting processes protect tribal cultural interests that relate to Spring Valley and adjacent basins," and found that the State Engineer "does not have jurisdiction to review the actions of the BLM or [Bureau of Indian Affairs] in complying with" federal law, including the National Historic Preservation Act.[558] Like the findings that the Applicant's GDP would not impact the Tribal Protestants' existing rights, the State Engineer finds that these determinations regarding Federal responsibility and oversight

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[553] 2017 Transcript, Vol.7 pp. 1588:9-11 (Steele).
[554] 2017 Transcript, Vol.7 pp. 1495:15-23 (Sanford); Exhibit No. CTGR_22.
[555] Exhibit No. CTGR_22; Exhibit No. SNWA_599
[556] Ruling 6164, pp. 143-44.
[557] Remand Order Exhibit No. SE_118, p. 23.
[558] Ruling 6164, p. 161.

regarding "protect[ing] tribal cultural interests" were not disturbed by the Remand Order.[559] Therefore, these determinations from Ruling 6164 are also still valid and controlling, and incorporated herein by reference.

Nevertheless, the State Engineer finds the record from the 2017 hearing contains additional evidence regarding the federal statutes, regulations, and executive orders relevant to protecting cultural resources.[560] The State Engineer understands that the Federal regulatory and statutory schemes to protect tribal cultural resources include, for example, the NEPA and the NHPA.[561] The Applicant presented evidence that it had entered into a Programmatic Agreement among the Department of Interior, BLM, Nevada, the Nevada State Historic Preservation Officer, the Advisory Council on Historic Preservation, and the Applicant (hereinafter "Programmatic Agreement"), under which the Applicant and the BLM have ongoing duties in accordance with federal statutes and regulations to continue to monitor and mitigate or avoid unreasonable effects to properties of religious or cultural significance.[562] Specifically, the Programmatic Agreement details the processes through which the BLM and Applicant will comply with tiered NEPA and NHPA with regard to culturally significant resources.[563]

The Tribal Protestants similarly provided evidence regarding culturally significant resources and the Tribal Protestants' efforts under the federal processes designed to protect such resources.[564] The Tribal Protestants' consultant, Dr. Sanford, testified that he prepared documents to nominate an area in Spring Valley surrounding a grove of swamp cedars as a Tribal Cultural

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[559] Remand Order Exhibit No. SE_118, p. 23.
[560] 2017 Transcript, Vol.3 pp. 633:12-634:10, 635:4-636:1; 643:9-22 (Luptowitz).
[561] 42 U.S.C. § 4321 et seq. (NEPA); 54 U.S.C. § 300101 et seq. (NHPA).
[562] Exhibit No. SNWA_481
[563] Exhibit No. SNWA_481; 2017 Transcript, Vol. 2 pp. 383:3-6, Vol. 3 pp. 635:4-636:1, 636:10-638:22 (Luptowitz).
[564] 2017 Transcript, Vol.7 pp. 1483:13-1485:3 (Sanford).

Property ("TCP") for listing on the National Register of Historic Places and that the TCP was listed on the National Register.[565] Dr. Sanford further testified that the Tribal Protestants were continuing to seek additional federal recognition for culturally significant areas.[566]

The State Engineer acknowledges the BLM's authority with respect to protecting cultural resources in connection with the GDP as part of the right-of-way it approved for the GDP in 2013.[567] Dr. Sanford also testified that his efforts to have the TCP listed on the National Register required BLM involvement.[568] The BLM is the lead Federal agency that evaluated the GDP for environmental compliance and issued and prepared an EIS.[569] The BLM also established the Swamp Cedar ACEC on the federal lands it is responsible for managing.[570]

The State Engineer has no authority or jurisdiction to determine whether the Federal scheme in place and those processes to which Applicant has agreed pursuant to including the Programmatic Agreement are sufficient to address the Tribal Protestants' concerns for cultural resources under Federal law. Still, the evidence presented by the Tribal Protestants and the Applicant supports the State Engineer's 2011 findings that Federal processes are in place to protect tribal cultural interests, and as evidenced by the Tribal Protestants' success indicate the Federal processes are working to do just that with the 2017 National Register listing of the TCP. To the extent cultural resource preservation can be managed at the State level, the Nevada State Historic Preservation Officer is a signatory to the Programmatic Agreement.[571] The State Engineer finds that parallel timelines for the Federal environmental compliance and the state water rights

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[565] 2017 Transcript, Vol.7 pp. 1485:10-12, 1494:6-8 (Sanford).
[566] 2017 Transcript, Vol.7 pp. 1494:9-19 (Sanford).
[567] Exhibit No. SNWA_481.
[568] 2017 Transcript, Vol.7 pp. 1489:16-22 (Sanford).
[569] Exhibit No. SNWA_478.
[570] 2017 Transcript, Vol.3 617:18-618:19 (Marshall).
[571] Exhibit No. SNWA_481.

processes are reasonable and acceptable given the varying requirements and protections of both processes. Finally, the State Engineer finds that the Federal compliance processes, although distinct the State water rights process, in conjunction with the 3M Plan sufficiently address Tribal protestants concerns for cultural resources.[572]

E. Northern Hamlin/Southern Snake

1. Conceptual Flow Model

In Ruling 6164, the State Engineer found that the amount of interbasin flow from southern Spring Valley through Limestone Hills into northern Hamlin Valley ranges from 4,000 to 12,000 acre-feet annually (afa).[573] Mr. Prieur established that the primary flow path for groundwater movement from Spring Valley into Hamlin Valley is through the Limestone Hills.[574] The faulting present in the Limestone Hills allows water to move through secondary features preferentially and at a quicker rate than in the core block itself.[575] Because of the hydrologic and hydraulic characteristics of the sediments associated with surrounding areas, groundwater can only flow through the Limestone Hill area.[576]

Mr. Prieur relied upon two reports in creating his conceptual interbasin flow model,[577] one of which by Dr. Hurlow who is "more or less the father" of the region.[578] Prior estimates of flow moving through the faulted structures of the Limestone Hills were 4,000 to 12,000 afa.[579] The groundwater flow then meets the groundwater flow-path from southern Hamlin Valley and moves

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[572] 2017 Transcript, Vol.3 pp. 385:21-9 (Luptowitz).
[573] Exhibit No. SE_140, pp. 84-85.
[574] 2017 Transcript, Vol.3 p. 664:13-16 (Prieur).
[575] 2017 Transcript, Vol.3 p. 675:8-12 (Prieur).
[576] 2017 Transcript, Vol.3 p. 665:14-18 (Prieur).
[577] Exhibit No. SNWA_545; Exhibit No. SNWA_552.
[578] 2017 Transcript, Vol.3 p. 768:4 (Ward).
[579] 2017 Transcript, Vol.3 p. 667:14-20 (Prieur).

towards Snake Valley.[580] This water flows towards and is responsible for some of the flows at Dearden Springs, but not Big Springs.[581] The State Engineer finds that the Applicant has provided a reasonable conceptual flow model of the flow path from southern Spring Valley into Hamlin and Snake Valley.

2. Monitoring

Mr. Prieur testified that the 3M Plan includes fifteen monitoring locations in the interbasin monitoring zone.[582] Mr. Prieur explained how the Applicant received input from the State Engineer, Department of the Interior, and the USGS to identify the optimal location to place five monitoring wells in the Limestone Hills.[583] Mr. Prieur identified the locations of three current monitoring wells, and two planned monitoring wells located between a carbonate well and basin-fill well.[584] The three current monitoring wells located in the Limestone Hills are used as sentinel wells to detect and signal propagation of drawdown.[585]

Dr. Myers claimed that in order to properly identify a preferential flow path, multi-port monitoring wells should be used. Mr. Prieur disagreed with this criticism and testified a longer screen provides a higher likelihood of the well intercepting a flow path as opposed to smaller screens at different intervals.[586] Additionally, it is better to have a longer screen the further the monitoring well is from pumping.[587]

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[580] 2017 Transcript, Vol.3 pp. 667:23 – 668:5 (Prieur).
[581] 2017 Transcript, Vol.3 p. 668:15-16 (Prieur).
[582] 2017 Transcript, Vol.3 p. 671:5-8 (Prieur).
[583] 2017 Transcript, Vol.3 pp. 671:13 – 672:8 (Prieur).
[584] 2017 Transcript, Vol.3 p. 679:2-5 (Prieur).
[585] 2017 Transcript, Vol.3 p. 679:11-15 (Prieur).
[586] 2017 Transcript, Vol.3 p. 677:7-12 (Prieur).
[587] 2017 Transcript, Vol.3 p. 677:12-14 (Prieur).

Mr. Prieur discussed further monitoring associated with Granite Peak Ranch. He testified that a monitoring well upgradient of the Ranch would differentiate any influence from the Applicant's pumping operation versus drawdown created by the Ranch's irrigation operation.[588] This well, HAM1008M, will act as a mitigation trigger to either change pumping activities or take action to prevent additional drawdown from moving beyond that point.[589]

The State Engineer finds that the consensus-based sites of the monitoring wells in the interbasin monitoring zone is sound, due to the involvement of the various parties in determining the monitoring locations. The State Engineer finds that for the purpose of interbasin monitoring, monitoring primary flow paths of water is a logical way to monitor drawdown. The State Engineer further finds that the Spring Valley 3M Plan's use of a long well screen to monitor the primary flow path is a prudent choice and provides the required monitoring criteria to quantify interbasin flow.

3. Big Springs and Dearden Springs

Mr. Prieur testified about the monitoring at Big Springs and Dearden Springs. For Big Springs, he identified a joint funding agreement with the USGS which has continuously monitored the two channels for ten years,[590] and two wells which provide background information to verify flow conditions with Big Springs.[591] The Applicant further performed a synoptic discharge study at Big Springs with staff from the State Engineer's office, the National Park Service, and Utah Geological Survey.[592] The study was performed both in the irrigation and non-irrigation season to

[588] 2017 Transcript, Vol.3 p. 683:2-8 (Prieur).
[589] 2017 Transcript, Vol.3 pp. 683:20 – 684:2 (Prieur).
[590] 2017 Transcript, Vol.3 p. 669:1-5 (Prieur).
[591] 2017 Transcript, Vol.3 p. 680:16-18 (Prieur).
[592] 2017 Transcript, Vol.3 pp. 688:22 – 689:4 (Prieur).

identify specific discharge areas.[593] Mr. Prieur testified that the study will be repeated every five years after the Applicant's groundwater project begins to monitor for changes.[594] State Engineer staff questioned whether groundwater pumping in Spring Valley could impact flows at Big Springs, and Mr. Prieur stated that if there was an noticeable effect, the monitoring in place would provide early detection of the propagation of drawdown.[595]

4. Millard and Juab Counties, Snake Valley

In accordance with the Remand Order, Millard and Juab Counties were considered and included in the Spring Valley 3M Plan as water basins in Utah that may potentially be affected by GDP pumping water in Spring Valley. Mr. Prieur testified that the monitoring that's performed and the mitigation and management actions required by the Spring Valley 3M Plan prevents propagation of drawdown extending into Snake Valley.[596] Mr. Prieur identified a third party groundwater monitoring network in Snake Valley, Utah, as consisting of border monitoring performed by the Utah Geological Survey and a USGS monitoring program which monitors 73 wells in both Millard and Juab counties.[597] Mr. Prieur also testified that spring monitoring occurs in Snake Valley, Utah, where the Applicant works with the USGS and Utah Geological Survey to collect data.[598] The Spring Valley 3M Plan incorporates this USGS and UGS data to gain a better understanding of how the Applicant's network fits in with the wider regional network and hydrologic conditions.[599]

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[593] 2017 Transcript, Vol.3 p. 689:10-12 (Prieur).
[594] 2017 Transcript, Vol.3 p. 689:14-15 (Prieur).
[595] 2017 Transcript, Vol.4 p. 923:18-22 (Prieur).
[596] 2017 Transcript, Vol.3 pp. 692:24 – 693:7 (Prieur).
[597] 2017 Transcript, Vol.3 p. 754:13-19 (Prieur).
[598] 2017 Transcript, Vol.3 p. 755:11-756:22 (Prieur).
[599] 2017 Transcript, Vol.3 p. 757:15-22 (Prieur).

The Spring Valley 3M Plan identifies Dearden Spring, Clay Spring, and Pruess Lake as being located within Millard County.[600] Mr. Prieur testified that impacts at a distance in Millard County would be impossible due to the management actions in place.[601] For locations north of the analysis area in Utah, Mr. Prieur testified that effects will not be observed there from a hydrogeological standpoint.[602] Mr. Prieur identified that Juab County is north of Millard County and with all the monitoring in place over a large distance, impacts to Juab County are extremely unlikely.[603]

5. Protection of Existing Water Rights in Millard and Juab Counties, Utah

The 3M Plan addresses water rights in Millard and Juab Counties. Mr. Prieur identified the uantitative, objective investigation trigger using Figure 7-2 of the Technical Analysis Report. The hydrographs of these wells are represented in Figures 7-5 and 7-6.[604] A further investigation trigger is established at Monument Well which is shown by Figure 7-7.[605] The quantitative mitigation triggers are established from the characteristics of the water rights associated with these wells.[606] Because the mitigation trigger is based on the existing water right itself, the Spring Valley 3M Plan requires the Applicant to adhere to the legalities of Utah in implementing mitigation actions.[607] The State Engineer finds that the Spring Valley 3M Plan defines quantitative, objective investigation and mitigation triggers and thresholds. These defined thresholds and triggers will ensure that unreasonable effects are avoided to the extent possible. Further, the defined triggers

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[600] 2017 Transcript, Vol.3 p. 705:16-18 (Prieur).
[601] 2017 Transcript, Vol.3 pp. 705:23-706:1 (Prieur).
[602] 2017 Transcript, Vol.3 p. 778:13-16 (Prieur).
[603] 2017 Transcript, Vol.3 p. 705:6-11 (Prieur).
[604] 2017 Transcript, Vol.3 p. 685:16-18 (Prieur).
[605] 2017 Transcript, Vol.3 p. 686:16-19 (Prieur).
[606] 2017 Transcript, Vol.3 p. 686:13-15 (Prieur).
[607] 2017 Transcript, Vol.3 p. 772:19-24 (Prieur).

will warrant any necessary mitigation of unreasonable effects is not applied in an arbitrary or capricious way. The State Engineer further finds existing water rights in Millard and Juab Counties, Utah, are protected by the Spring Valley 3M Plan, in addition, these actions are in accordance with Utah law.[608]

Millard and Juab Counties are properly included within the Spring Valley 3M Plan, and the 3M Plan has established investigation and mitigation triggers in Utah.[609] The Spring Valley 3M Plan has established investigation and mitigation triggers, which apply to all existing water rights in Utah.[610] Mr. Prieur stated that the outside influences from irrigation pumping already present would be taken into account in any investigation.[611] He identified that southern Spring Valley has limited outside pumping whereas pumping from Granite Peak Ranch, Baker, Garrison, and Eskdale, Utah have much more effect on Utah water rights than the Applicant's POD which is about 50 miles away.[612] Mr. Prieur testified that the monitoring wells in Spring and Hamlin Valley would first see a response in drawdown before any amount of drawdown in Snake Valley would occur.[613] Mr. Prieur concluded that due to the sound plan for investigation triggers being established along the known flow path, signaling propagation of drawdown would protect all the communities in Utah.[614]

Mr. Prieur also provided his opinion that it is very unlikely that propagation of drawdown from the Applicant's pumping in Spring Valley would impact flows at Big Springs[615] and Dearden

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[608] 2017 Transcript, Vol.6 p. 1391:9-12 (Jones)
[609] 2017 Transcript, Vol.3 p. 761:16-19 (Prieur).
[610] 2017 Transcript, Vol.3 pp. 761:23-762:5 (Prieur).
[611] 2017 Transcript, Vol.3 p. 779:5-18 (Prieur).
[612] 2017 Transcript, Vol.3 p. 780:2-11 (Prieur).
[613] 2017 Transcript, Vol.3 p. 781:2-8 (Prieur).
[614] 2017 Transcript, Vol.3 p. 782:15-17 (Prieur).
[615] 2017 Transcript, Vol.3 p. 690:7-10 (Prieur).

Springs, because of the hydrologic monitoring and the 3M process.[616] Further, Mr. Prieur identified that impacts to Clay Springs in Utah are unlikely because the 3M process in place would prevent the propagation of drawdown at that location.[617]

The State Engineer agrees that notwithstanding the unlikely potential for impacts in Utah, monitoring is in place to sufficiently detect the propagation of drawdown early enough to protect existing water rights in Millard and Juab Counties. The 3M Plan requires sufficient monitoring to detect propagation of drawdown. The baseline data and investigation triggers provide early detection of drawdown in Hamlin Valley. The State Engineer finds this 3M process properly protects existing water rights in Hamlin and Snake Valley. The State Engineer further finds that Millard and Juab counties are properly included in the Spring Valley 3M Plan.

6. <u>Environmental Resources</u>

There are no native aquatic-dependent special status animal species in northern Hamlin Valley. Three native aquatic-dependent special status animal species occur in the southern Snake Valley groundwater discharge area, the bifid duct pyrg (a springsnail), the California floater (a muscle), and the longitudinal gland pyrg (a springsnail).[618] The bifid duct pyrg occurs in a spring that is sourced from local recharge and is not located along the primary groundwater flow path, where effects from GDP pumping at the site are improbable.[619] The California floater occurs in the Pruess Lake, which is a highly managed irrigation reservoir at the end of the Big Springs Creek/Lake Creek system.[620] Dearden (a.k.a. Stateline) Springs is the only spring in the

[616] 2017 Transcript, Vol.3 pp. 690:23 – 691:8 (Prieur).
[617] 2017 Transcript, Vol.3 p. 692:1-12 (Prieur).
[618] Exhibit No. SNWA_507 p. 7-25.
[619] Exhibit No. SNWA_507 p. 7-27.
[620] Exhibit No. SNWA_507 p. 7-27 – 7-28.

groundwater flow path from Spring to Snake valley which is home to the longitudinal gland pyrg.[621] The Protestants did not offer any evidence disputing this conclusion, and the State Engineer agrees with the Technical Analysis Report's assessment. The longitudinal gland pyrg also occurs at Big Springs and Clay Spring North, and may be endemic to southern Snake Valley.[622] Therefore, the 3M Plan includes triggers and actions for the longitudinal gland pyrg. The State Engineer finds this to be a logical and reasonable approach to ensure effects are avoided.

The Spring Valley 3M Plan states that the unreasonable effect to avoid for longitudinal gland pyrg is extirpation of the native aquatic-dependent special status animal species from the Snake Valley groundwater discharge area.[623] The strategy for protecting the species primarily relies on avoiding unreasonable effects to existing water rights, as described above.[624] Additional hydrologic triggers and environmental mitigation actions are specified for the longitudinal gland pyrg to ensure that the unreasonable effect to the species is avoided. The investigation trigger for the species is established at Hamlin Valley monitor well 383533114102901. If the investigation trigger is activated as a result of GDP pumping, the Spring Valley 3M Plans require the Applicant to conduct an investigation and begin annual presence/absence monitoring of the longitudinal gland pyrg at Dearden Springs, Big Springs, and Clay Spring North.[625] These triggers and actions for existing water rights and longitudinal gland pyrg in northern Hamlin and southern Snake valleys also protect mesic habitat in these areas.[626]

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[621] Exhibit No. SNWA_507 p. 7-25.
[622] Exhibit No. SNWA_507 p. 7-25.
[623] Exhibit No. SNWA_592, p. 3-49.
[624] Exhibit No. SNWA_592, p. 3-51 – 3-53.
[625] Exhibit No. SNWA_592, p. 3-52.
[626] Exhibit No. SNWA_507, p. 7-28.

The mitigation trigger for the species is established at Hamlin Valley monitor well HAM1008M. If the mitigation trigger is activated, the Spring Valley 3M Plan requires that within 30 days the Applicant will implement existing water right mitigation as well as longitudinal gland pyrg mitigation as specified in the 3M Plan.[627] The mitigation trigger at HAM1008M would be activated prior to drawdown propagation reaching Snake Valley, and it is a "special mitigation trigger… to avoid unreasonable effects in Snake Valley."[628] The mitigation actions will ensure that the water is available to continue to support the longitudinal gland pyrg and mesic habitat, as well as the California floater and lake habitat, and environmental mitigation will contribute to other longitudinal gland pyrg habitat or population management efforts.[629]

The State Engineer finds that the Spring Valley 3M Plan established quantitative defined triggers and identified mitigation actions that will avoid unreasonable effects to mesic habitat, lake habitat, and the native aquatic-dependent special status animal species and mesic and lake habitats in northern Hamlin and southern Snake valleys. The State Engineer also finds that the co-location of the existing water rights, species and habitats, and the use of a special mitigation trigger at an intermediate well in Hamlin Valley, reduces the risk of approaching unreasonable effects to these resources.

The 3M Plan also addresses shrubland habitat in northern Hamlin and southern Snake valleys. The unreasonable effects which the 3M Plan avoids for shrubland habitat include excessive loss of shrub cover that results in extensive bare ground. Similar to the Spring Valley Management Block 4, the approach to avoid unreasonable effects to shrubland habitat in northern

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[627] Exhibit No. SNWA_592, p. 3-49 to 3-53.
[628] Exhibit No. SNWA_592, pp. 3-47 and 3-53.
[629] Exhibit No. SNWA_592, p. 3-55.

Hamlin and southern Snake valleys is applied if specified hydrologic investigation triggers signal propagation of drawdown due to GDP pumping. The investigation trigger for shrublands in northern Hamlin Valley is established at Hamlin Valley monitor well HAM1007M, and the investigation trigger for shrublands in northern Snake Valley is established at Hamlin Valley monitor well HAM1008M. If the HAM1007M or HAM1008M investigation trigger is activated as result of the Applicant's GDP pumping, the 3M Plan requires that the Applicant conduct an investigation and begin shrubland monitoring in the northern Hamlin Valley or southern Snake Valley groundwater discharge area, respectively.[630]

In addition, management actions may be implemented for shrubland habitat as specified in the 3M Plan.[631] If a mitigation trigger is activated, the 3M Plan requires that within 30 days the Applicant must implement shrubland habitat mitigation as specified in the 3M Plan.[632] Mitigation includes appropriate implementation of vegetation restoration techniques, assessment of mitigation efficacy, and continued implementation as necessary to achieve successful mitigation. The mitigation actions and their effectiveness are detailed in the Spring Valley 3M Plan. This mitigation plan will ensure that the shrublands located in Millard and Juab Counties are protected from unreasonable effects.

Protestant GBWN argued that the Applicant should preemptively set up the shrubland monitoring in these valleys so that a baseline can be established. Testimony was given by Mr. Marshall that the remote data used to derive the historical baseline data is readily available, and the investigation triggers that initiate monitoring will afford sufficient time to acquire, process,

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[630] Exhibit No. SNWA_592, p. 3-49 to 3-50.
[631] Exhibit No. SNWA_592, p. 3-52.
[632] Exhibit No. SNWA_592, p. 3-55.

and set up the monitoring program and collect additional baseline data if necessary.[633] The State Engineer finds that based on the distance and time available to implement baseline monitoring, extending the approach used in Spring Valley to northern Hamlin and southern Snake Valleys in the event of drawdown propagation is sound. The State Engineer also finds that the Spring Valley 3M Plan established quantitative triggers and identified mitigation actions that will avoid unreasonable effects to shrubland habitat in northern Hamlin and southern Snake Valleys. Last, State Engineer finds that the 3M Plan adequately addresses Millard and Juab counties to the extend extent that environmental resources in those counties may be affected by the GDP pumping because the monitoring network will detect propagation prior to affecting the resources in this area.

F. Dry Lake, Delamar and Cave Valleys

The Applicant has applications in Dry Lake, Delamar, and Cave valleys ("DDC"), Nevada. These basins and the neighboring basins as identified above are included in the DDC 3M Plan. Mr. Prieur and Mr. Marshall testified regarding the DDC 3M Plan in these areas and how the Plan protects existing water rights and environmental resources.

1. Cave Valley and southern White River Valley

a. Conceptual Flow Model

Mr. Prieur established that existing water rights in Cave Valley would not be impacted by the Applicant's pumping program,[634] due to the geographic location and the hydrogeologic conditions of the existing water rights.[635] Even though no impacts are anticipated for existing

[633] 2017 Transcript, Vol.3 698:18-24 (Marshall).
[634] 2017 Transcript, Vol.3 p. 709:6-8 (Prieur).
[635] 2017 Transcript, Vol.3 p. 709:11-13 (Prieur).

water rights in Cave Valley, the DDC 3M Plan describes how those rights are monitored and protected.[636]

Mr. Prieur testified to the conceptual flow model of Cave Valley and how groundwater flows to southern White River Valley through Shingle Pass.[637] In Ruling 6165, the State Engineer reserved 7,300 afa from the perennial yield of Cave Valley for the flows at Flag Springs and Butterfield Springs in southern White River Valley.[638]

b. Existing Water Rights in Cave Valley and southern White River Valley

Monitoring the flow path from Cave Valley into southern White River Valley is done through sentinel wells. Dr. Myers critiqued the DDC 3M Plan's monitoring locations, calling them "grossly insufficient" due to spacing and the lack of multiport monitoring.[639] Dr. Myers proposes that spacing should be determined with detailed local modeling, but the ultimate spacing should not be any less dense than one sentinel well per square mile.[640] As explained above, he claimed long screens are more effective than multiple short screens for monitoring distant drawdown.[641]

The DDC 3M Plan uses multiple monitoring well locations with investigation triggers established at all of them.[642] Mr. Prieur identified two intermediate monitoring wells located north of POD 53988, one located in the carbonate aquifer and the other located in basin fill alluvium.[643] Two other monitoring wells establish the investigation triggers for existing water rights in southern

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[636] 2017 Transcript, Vol.3 p. 709:15-17 (Prieur).
[637] 2017 Transcript, Vol.3 p. 710:6-8 (Prieur).
[638] 2017 Transcript, Vol.3 p. 710:9-13 (Prieur).
[639] Exhibit No. GBWN_WPC_281, p. 77; Exhibit No. GBWN_WPC_297, p. 49.
[640] Exhibit No. GBWN_WPC_297, p. 51.
[641] Exhibit No. SNWA_605, p. 18.
[642] 2017 Transcript, Vol.3 p. 714:13-14 (Prieur).
[643] 2017 Transcript, Vol.3 p. 713:8-13 (Prieur).

White River Valley.[644] Mr. Prieur testified that due to the hydrogeologic structures of the Egan Range, including the Chainman Shale, propagation of drawdown through that mountain range is unlikely.[645] However, that monitoring well will verify those flow conditions and also evaluate the relationship between runoff from the Egan Range and the Flag and Butterfield Spring discharge.[646] Mr. Prieur also identified another monitoring well which is proposed for Shingle Pass in White River Valley to help understand the hydrologic relationship between Cave Valley outflow to eastern White River Valley.[647]

The State Engineer finds that the DDC 3M Plan presents an effective network of monitoring propagation of drawdown from Cave Valley to White River Valley. The State Engineer finds that Dr. Myers' criticisms of the DDC 3M Plan's monitoring misguided and needlessly extensive. The State Engineer finds that the DDC 3M Plan requires monitoring where known flows from Cave Valley exists and requires monitoring in areas where unknown flows may exist.

c. Environmental Resources

The Applicant found that "no groundwater dependent species or ecosystems in Cave Valley… are connected to the producing aquifer," and thus the DDC 3M Plan does not address Cave Valley environmental resources.[648] Protestants did not challenge these findings. The State Engineer, based on the evidence presented and testimony given, agrees with these findings.

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[644] 2017 Transcript, Vol.3 p. 710:24 (Prieur).
[645] 2017 Transcript, Vol.3 p. 711:17-20 (Prieur).
[646] 2017 Transcript, Vol.3 p. 712:20-23 (Prieur).
[647] 2017 Transcript, Vol.3 p. 711:1-13 (Prieur).
[648] 2017 Transcript, Vol.3 p. 717:1-4 (Marshall).

Environmental resources in southern White River Valley that are addressed in the DDC 3M Plan include the federally listed endangered White River spinedace (a fish), and a suite of native aquatic-dependent special status animal species.[649] These species occurs in the Flag Spring Complex, Butterfield Spring, and Sunnyside stream.[650] Effects to these environmental resources in southern White River Valley from the GDP pumping are unlikely given the DDC 3M Plan to protect spring flows at Flag and Butterfield springs, staged groundwater development which is also required for ESA compliance.[651] Nevertheless, quantitative triggers and specific management and mitigation actions are established in the DDC 3M Plan to ensure that unreasonable effects to environmental resources in southern White River Valley are avoided.[652]

The strategy for protecting the species primarily relies on avoiding unreasonable effects to existing water rights, which includes the hydrologic monitoring, triggers, and mitigation discussed above. Mr. Marshall testified that "the protection of existing water rights at Butterfield Spring and Flag Spring also protect[s] the habitat for the native fishes, the pyrgs, and the White River spinedace."[653] In addition, hydrologic triggers and environmental mitigation actions are specified to ensure that the unreasonable effects to the species are avoided.

The unreasonable effects which the 3M Plan avoids for these environmental resources are jeopardy to the continued existence of federally listed species, and the extirpation of native aquatic-dependent special status animal species from the White River Valley groundwater discharge

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[649] 2017 Transcript, Vol.3 p. 715:8-15 (Marshall); Exhibit No. SNWA_593, p. 3-19.
[650] 2017 Transcript, Vol.3 p. 715:8-15 (Marshall); Exhibit No. SNWA_593, p. 3-18 to 3-20.
[651] 2017 Transcript, Vol.3 p. 715:8-124 (Marshall); Exhibit No. SNWA_593, p. 3-18.
[652] 2017 Transcript, Vol.3 p. 715:67-17 (Marshall); Exhibit No. SNWA_593, p. 3-18.

area.[654] Investigation triggers for the species are established at White River Valley monitor wells WRV1012M and WRV1013M. If an investigation trigger is activated as a result of GDP pumping, the DDC 3M Plan requires the Applicant to conduct an investigation, and support NDOW with native fish surveys at Flag and Butterfield springs and Sunnyside Creek.[655] The mitigation trigger for the species is established at Flag Spring No. 2, and is activated if the investigation determines that the cause of the change in flow is attributed to GDP pumping.[656] If the mitigation trigger is activated, the DDC 3M Plan requires that within 30 days, the Applicant will implement existing water right mitigation as well as species mitigation.[657] The mitigation actions will ensure that water is available to continue to support the species and their habitat and species, and will contribute to other habitat or population management efforts.

The State Engineer finds that the DDC 3M Plan establishes quantitative triggers and identified mitigation actions that will avoid unreasonable effects to federally listed endangered species and native aquatic-depended special status animal species in southern White River Valley. The State Engineer also finds that the co-location of the existing water rights and species reduces the risk of approaching unreasonable effects to the species.

2. Dry Lake and Delamar Valley

Mr. Prieur testified that the existing water rights in Delamar Valley are classified in management category E, meaning that there is no hydraulic connection between the existing water rights and the aquifer from which the Applicant will be pumping.[658] He further testified that some

[654] Exhibit No. SNWA_593, p. 3-18.
[655] Exhibit No. SNWA_593, p. 3-21.
[656] Exhibit No. SNWA_539, p. 3-22.
[657] Exhibit No. SNWA_593, pp. 3-22 – 3-24.
[658] 2017 Transcript, Vol.3 p. 723:3-5 (Prieur).

existing water rights in Dry Lake Valley are classified in management category C because they are greater than ten miles from the Applicant's wells.[659] Even with no hydraulic connection and the large distance from a well, the DDC 3M Plan protects to the existing water rights in Dry Lake and Delamar valleys.[660]

Based on the evidence presented, there are no groundwater-dependent environmental resources in the groundwater discharge area in Dry Lake or Delamar Valleys.[661] The Protestants did not present any evidence to counter this fact.

3. Pahranagat Valley

Mr. Prieur testified regarding the Applicant's the conceptual flow model for Pahranagat Valley. The primary flow is from north to south along the range fronts.[662] He noted that, at most, a minor flow path could be present in the Timpahute transverse zone and a detailed monitoring network was in place to detect propagation of drawdown through that zone.[663] The DDC 3M Plan includes southern Pahranagat Valley through a series of monitoring wells.

a. Existing Water Rights

Mr. Prieur testified that impacts in Pahranagat Valley from groundwater pumping in Dry Lake and Delamar valleys is nonexistent or very, very unlikely.[664] Nonetheless, because Pahranagat Valley contains Hiko, Crystal, and Ash springs, the DDC 3M Plan ensures these resources are protected. Mr. Prieur described the monitoring program the DDC 3M Plan uses to detect propagation of drawdown through the Timpahute transverse zone using Figure 9-4 in the

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[659] 2017 Transcript, Vol.3 p. 723:6-8 (Prieur).
[660] 2017 Transcript, Vol.3 p. 723:9-10 (Prieur).
[661] Exhibit No. SNWA_593, p.3-30.
[662] 2017 Transcript, Vol.3 p. 726:1-3 (Prieur).
[663] 2017 Transcript, Vol.3 p. 726:4-15 (Prieur).
[664] 2017 Transcript, Vol.3 pp. 728:22 – 729:2 (Prieur).

Technical Analysis Report.[665] Mr. Prieur testified that the 3M Plan uses well 209M-1 as a sentinel well and there are two other basin fill wells located closer to Hiko Spring, and a planned carbonate monitoring well (PAH1010M), which is already sited.[666] Although propagation of drawdown is unlikely at the sentinel well, if drawdown is observed, the DDC 3M Plan could institute management actions in order to avoid activating a mitigation trigger at the planned well location.[667] Furthermore, three monitoring wells are in place to detect propagation of drawdown towards southern Pahranagat Valley.

b. Environmental Resources in Pahranagat Valley

Review of the testimony and evidence presented shows that effects to environmental resources in Pahranagat Valley from the Applicant's GDP pumping are extremely unlikely. Nevertheless, the DDC 3M Plan establishes environmental triggers and management and mitigation actions to ensure that unreasonable effects to environmental resources in Pahranagat Valley are avoided. Environmental resources in Pahranagat Valley that are addressed in the DDC 3M Plan include the federally listed endangered White River springfish and Hiko White River springfish, and a suite of native aquatic-dependent special status animal species.[668] These species occur in, Hiko, Crystal, and Ash springs, which are highly modified by man.[669] The strategy for protecting the species primarily relies on avoiding unreasonable effects to existing water rights, and includes hydrologic monitoring, investigation triggers at intermediate wells, preemptive management actions, mitigation triggers, and mitigation actions. In addition, hydrologic triggers

[665] Exhibit No. SNWA_507, p. 9-17.
[666] 2017 Transcript, Vol.3 p. 727:15-21 (Prieur).
[667] 2017 Transcript, Vol.3 p. 728:3-6 (Prieur).
[668] Exhibit No. SNWA_593, pp. 3-30 – 3-31.
[669] Exhibit No. SNWA_593, p. 9-5.

and environmental mitigation actions are specified to ensure that the unreasonable effects to the species are avoided.

The unreasonable effects which the 3M Plan avoids for these environmental resources are jeopardy to the continued existence of federally listed species, and the extirpation of native aquatic-dependent special status animal species from the Pahranagat Valley groundwater discharge area.[670] The investigation trigger for the species is established at Pahranagat Valley monitor well 373803115050501. If the investigation trigger is activated as a result of GDP pumping, the DDC 3M Plan requires that the Applicant conduct an investigation, support NDOW with native fish surveys at Hiko, Crystal, and Ash springs, incorporate presence/absence surveys of the other native aquatic-dependent special status animal species at the sites, and continue to participate on the Pahranagat Valley Native Fishes Recovery Implementation Team.[671] The mitigation trigger is established at Pahranagat Valley monitor well PAH1010M. If the mitigation trigger is activated, the DDC 3M Plan requires that within 30 days the Applicant will implement existing water right mitigation as well as species mitigation as specified in the DDC 3M Plan.[672] The mitigation actions will ensure that the water is available to continue to support the species and their habitat, and will contribute to other habitat or population management efforts. This approach also protects other wildlife which occur in downstream habitat supported by the regional spring discharge, including the federally listed Pahranagat roundtail chub, southwestern willow flycatcher, and western yellow-billed cuckoo.[673]

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[670] Exhibit No. SNWA_593, p.3-30.
[671] Exhibit No. SNWA_593, p. 3-32.
[672] Exhibit No. SNWA_593, p. 3-33 – 3-35.
[673] Exhibit No. SNWA_593, p. 3-31.

The State Engineer finds that that the DDC 3M Plan established quantitative triggers and specified effective mitigation actions that will avoid unreasonable effects to federally listed endangered species and native aquatic-depended special status animal species in Pahranagat Valley. These triggers and mitigation actions are established in such a way that any necessary mitigation will not be applied arbitrarily or capriciously because the triggers are defined, based in science, and substantial credible evidence was presented as to the setting of the triggers. The State Engineer also finds that the co-location of the existing water rights and species reduces the risk of approaching unreasonable effects to the species.

IV. RECALCULATION OF APPRORPATIONS FROM CAVE VALLEY, DRY LAKE VALLEY AND DELAMAR VALLEY

The fourth issue to be addressed pursuant to the District Court's Remand Order is the instruction requiring the State Engineer to "[r]ecalculate the appropriations from Cave Valley, Dry Lake and Delamar Valley to avoid over appropriations or conflicts with down-gradient, existing water rights."[674] The District Court ordered this recalculation to address the contention that, after accounting for the water awarded to the Applicant in Rulings 6165, 6166, and 6167, insufficient water may remain in the down-gradient basins to fulfill existing water rights.[675]

The State Engineer's prior rulings on the applications for groundwater appropriations in Delamar, Dry Lake, and Cave valleys ("DDC") included an accounting analysis of the water available for appropriation in those basins.[676] The analysis, as incorporated into the rulings,

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[674] Exhibit No. SE_118, p. 23.
[675] Exhibit No. SE_118, p. 19.
[676] State Engineer Ruling 6165, p. 81, dated Mar. 22, 2012, official records in the Office of the State Engineer Ruling ("Ruling 6165"); State Engineer Ruling 6166, p. 79, dated Mar. 22, 2012, official records in the Office of the State Engineer Ruling ("Ruling 6166"); State Engineer Ruling 6167, p. 79, dated Mar. 22, 2012, official records in the Office of the State Engineer Ruling ("Ruling 6167").

showed there was sufficient water available in each of those basins to supply the permitted volumes. Protestants, however, claimed that the water awarded had in fact been previously appropriated in down-gradient basins, but provided little to no analysis or evidence to support the claim. The District Court was nevertheless concerned that "the same water has been awarded twice, once in the upper basins, and again in the lower basins."[677] To address this concern, the District Court did not reverse the appropriation, but rather ordered a recalculation of unappropriated water.[678]

The State Engineer's 2011 DDC Rulings contained extensive analysis regarding conflicts with existing rights.[679] The conflicts analyses in the 2011 administrative record evaluated whether pumping of the proposed applications would impact the water level at the location of existing rights. When the District Court referred to conflicts, the District Court stated that it was looking for something different, a calculation that was not contained in the 2011 administrative record.[680] The 2011 administrative record did not contain an express analysis of whether, in granting the Applicant's applications, the same water would be awarded twice, thereby resulting in an over-appropriation of the flow system. When the District Court referred to conflicts, it was not referencing the conflicts analysis with existing rights required by NRS 533.370 because in the 2011 DDC Rulings the State Engineer found there were no conflicts with existing rights.[681] The District Court did not disturb those findings.[682] Given this context, the State Engineer finds the District Court's remand instruction requires a recalculation - an accounting - of the amount of

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[677] Exhibit No. SE_118, p. 19:19-23.
[678] Exhibit No. SE_118, p. 20:14-19.
[679] Ruling 6167, pp. 79-107. Ruling 6166, pp. 79-108. Ruling 6165, pp. 81-113.
[680] Exhibit No. SE_118, p.20:14-19. ("There may be water from the CDD basins which could properly be appropriated without conflicting with down-gradient rights. The current orders do not contain such a calculation.").
[681] Ruling 6167, pp. 79-107. Ruling 6166, pp. 79-108. Ruling 6165, pp. 81-113.
[682] Exhibit No. SE_118, pp. 18-20.

water available for appropriation in the White River Flow System ("WRFS"), not a traditional "conflicts analysis."

Delamar, Dry Lake, and Cave valleys are basins in the WRFS.[683] The District Court determined that in basins like DDC, where some amount of groundwater is discharged into a down-gradient basin, there is a risk that appropriating water up-gradient may cause the water to be taken and used before it flows into down-gradient basins, possibly depriving down-gradient water rights holders of water they need.[684] Generally, however, the water resources of individual basins are accounted for separately from other basins. The State Engineer's traditional practice, which is the practice in Nevada, is to calculate the groundwater resources available in an individual hydrographic basin and make appropriations based upon that analysis.[685] The State Engineer finds that an analysis in addition to the traditional basin-by-basin approach is needed to comply with the District Court's remand instruction.

To comply with the District Court's Remand Order, however, the State Engineer considered evidence submitted by the Applicant and Protestants related to the amount of water available within the WRFS to supply all appropriations. This decision is based upon that evidence. The State Engineer further relied on all factual findings and legal conclusions in Rulings 6165, 6166, and 6167 left undisturbed by the District Court. Those findings and conclusions, which were not expressly disturbed by the District Court's Remand Order, are incorporated by reference and re-adopted in this ruling.

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[683] Ruling 6165, p. 47. Exhibit No. SNWA_483, pp. 1-1 to 1-2 (citing Eakin Report 1966).
[684] Exhibit No. SNWA_483, p. 1-1.
[685] Ruling 6165, p. 48.

A. Evidence Regarding Existing Groundwater Appropriations in WRFS

The Applicant addressed this remand issue through the report, exhibits, and testimony of Michael Stanka, a Nevada Registered Professional Engineer and an expert in water rights research, quantification, vested rights, chain of title, and surveying, as well as the testimony of James Watrus, an expert hydrologist.[686] During the remand hearing, the Applicant submitted evidence accounting for the amount of committed groundwater in all of the basins within the WRFS, including the amounts awarded to Applicant in the prior rulings and water reserved by the State Engineer for future growth. The Applicant added all committed groundwater rights for each WRFS basin and compared the sum with the amount of water available for appropriation in the entire flow system, an amount previously adopted by the State Engineer. This water-budget approach was used to determine if sufficient water was available in the WRFS to fulfill all groundwater commitments, including those previously granted to the Applicant, thereby avoiding double appropriations.

Protestants did not provide a competing water rights accounting or elicit testimony from a water rights expert. Protestants responded through the reports and testimony of Dr. Tom Myers. While Dr. Myers was recognized as an expert in hydrogeology and groundwater modeling, he stated that he was not offering any opinion on the categorization or legal status of water rights.[687] He did not conduct a water rights assessment.[688] Dr. Meyer conceded that he was not a water rights surveyor and therefore he was not qualified to offer opinions on the quantification of water rights.

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[686] 2017 Transcript, Vol.1 p. 41:14-25 (Stanka). 2017 Transcript, Vol.1 p.144:13-20 (Watrus).
[687] 2017 Transcript, Vol.8 p. 1660:12-17 (Myers). 2017 Transcript, Vol.8 p. 1783:6-11 (Myers).
[688] 2017 Transcript, Vol.8 p. 1783:14-18 (Myers).

1. Water Budget Approach to Accounting Groundwater Commitments

To determine whether sufficient groundwater exists in the WRFS to supply all committed groundwater rights, including those awarded to the Applicant in 2011, Mr. Stanka utilized a water-budget approach.[689] The approach uses a water budget to define the amount of groundwater available for appropriation within the 11 up-gradient basins in the WRFS.[690] From that amount, Mr. Stanka subtracted the total groundwater already appropriated in the 11 basins to calculate whether sufficient resources exist to supply every committed water right, thereby confirming that the water in DDC basins was not previously appropriated in down-gradient basins.[691]

Mr. Stanka relied on evidence and methods previously adopted by the State Engineer, and prior rulings, to determine the quantity of water available for appropriation.[692] The water budget for the WRFS was based upon prior State Engineer findings that were undisturbed by the District Court.[693] These findings were made in Rulings 6165, 6166 and 6167 after the 2011 hearing. The State Engineer finds that Mr. Stanka properly used a water budget approach to address this remand instruction, and properly relied on the water budget that was developed by the State Engineer after the 2011 hearing.[694]

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[689] Exhibit No. SNWA_483, p. 1-10.
[690] Exhibit No. SNWA_483, p. 1-10.
[691] Exhibit No. SNWA_483, p. 1-10.
[692] Exhibit No. SNWA_483, pp. 1-3 to 1-10. Exhibit No. SNWA_590, p. 1. 2017 Transcript, Vol.1 p. 48:14-24 (Stanka).
[693] Exhibit No SE_135.
[694] In 2011, Applicant utilized an Excel Solver ("Solver"). The Solver is a tool created by the Applicant that was modified by the State Engineer after the 2011 proceeding. The Solver was used to develop a water budget for the WRFS that yielded a value for the quantity of groundwater available for appropriation in the WRFS.

2. Accounting for Groundwater Commitments in Coyote Spring Valley and Muddy River Springs Area

The Applicant provided an accounting analysis of the entire WRFS to determine whether water appropriated to the Applicant from DDC had been previously awarded in down-gradient basins.[695] The WRFS consists of 13 hydrographic basins.[696] The Applicant's analysis relied on previous State Engineer rulings that already determined how much groundwater flows to the two most down-gradient basins in the WRFS.[697]

In Rulings 6255 through 6259, entered January 29, 2014, the State Engineer determined that due to a unique and close hydrological connection, five basins (Coyote Spring Valley, Muddy River Springs Area, Hidden Valley, Garnet Valley, California Wash) should be jointly managed.[698] There have been no additional appropriations since that time. Two of the five basins—Coyote Spring Valley and Muddy River Springs Area—are part of the traditional 13-basin WRFS.[699] In Ruling 6255, the State Engineer further determined that 39,000 afa is the supply of water from the 11 up-gradient WRFS basins to the five-basin management area.[700]

Based on these Rulings, the Applicant did not perform a new accounting analysis for Coyote Spring Valley and Muddy River Springs Area. Instead, the Applicant relied on the State Engineer's previous rulings to conclude that 39,000 afa must be accounted from the 11 WRFS basins that are up-gradient from the five-basin management area.[701] GBWN's expert, Dr. Myers, stated that 39,000 afa of subsurface groundwater inflow to Coyote Spring Valley identified in

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[695] Exhibit No. SNWA_483, p. 1-1.
[696] Exhibit No. SNWA_483, p. 1-1 (citing Eakin Report 1966).
[697] Exhibit No. SNWA_483, p. 1-6.
[698] Ruling 6255, p. 25. Exhibit No. SNWA_483, p. 1-4.
[699] Exhibit No. SNWA_483, 1-2.
[700] Exhibit No. SNWA_483, p. 1-6. Ruling 6255, p. 25.
[701] Exhibit No. SNWA_483, p. 1-6.

Ruling 6255 accounted for all the supply from interbasin flow to the five jointly-managed basins.[702]

However, even if 39,000 afa is not enough to meet committed rights in the Coyote Spring Valley, appropriations up-gradient in DDC valleys would not impact those rights because any change in head at the Pahranagat Shear Zone will not materially affect outflow. The hydraulic potential between Pahranagat Valley and Coyote Spring Valley is approximately 1,400 feet.[703] Dr. Myers testified that the hydraulic potential between Pahranagat Valley and Delamar Valley is "quite a lot."[704] The CCRP Model indicated that the drawdown in head at the Pahranagat Shear Zone from pumping in the DDC Valleys was less than 10 feet.[705] Thus, the potential impact to down-gradient basins would be less than one percent of the 39,000 afa of outflow to the lower basins, or a reduction of interbasin flow of up to 390 afa after 200 years.[706] Although the efficacy of a hypothesis extending out thousands of years is questionable, Dr. Myers also testified that after 4,000 years of pumping, the modeled impact to the Muddy River Springs was less than 0.5 cfs, which is less than 362 afa.[707] Dr. Myers stated that the point of his testimony was that Muddy River Springs should be included in a monitoring plan and not that there will be an impact to existing rights on the Muddy River.[708]

The State Engineer therefore finds that the Applicant's approach in reserving 39,000 afa groundwater from the up-gradient 11 WRFS basins for the groundwater commitments in the five-

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[702] 2017 Transcript, Vol.9 pp. 1966:7-1967:9 (Myers).
[703] Exhibit No. SNWA_258, p. 7-21.
[704] 2017 Transcript, Vol 9 p. 1977:2 (Myers).
[705] Exhibit No. GWBN_281, p. 42.
[706] 2017 Transcript, Vol 9 pp. 1979:7-1980:4 (Myers).
[707] 2017 Transcript, Vol.9 p. 1972:12-20 (Myers). Exhibit No. GBWN_004, p. 55.
[708] 2017 Transcript, Vol.9 pp. 1974:24-1975:10 (Myers).

basin management area is appropriate to assure groundwater in the WRFS is not over-appropriated by awarding the same water twice.[709]

B. Calculation of Quantity of Groundwater Available for Appropriation

1. Groundwater Sources for 11 Up-Gradient WRFS basins

Mr. Stanka started the recalculation of groundwater available for appropriation by identifying the groundwater sources for the 11 up-gradient basins in the WRFS. Those sources are interbasin inflow and precipitation recharge.[710]

Subsurface interbasin flow into the 11-basin WRFS occurs at Jakes Valley.[711] In Ruling 6165, the State Engineer found an estimated 6,700 afa of interbasin flow from southern Butte Valley to the WRFS.[712] This amount of interbasin flow was determined using a Darcy analysis supplied by the Applicant in 2011 and was corroborated by the U.S. Geological Survey's Great Basin Carbonate and Alluvial Aquifer System study, which estimated 9,000 afa of interbasin flow.[713] The District Court did not disturb this finding in the Remand Order.[714] The NDWR Hydrographic Area Summary for southern Butte Valley indicates a perennial yield of 14,000 afa and lists only 364.46 afa of committed groundwater rights. The State Engineer finds that there is at least 6,700 afa of unappropriated groundwater in southern Butte Valley available to flow into Jakes Valley.

Precipitation recharge was determined by adopting the State Engineer's findings from 2011, findings that were not disturbed by the District Court in the Remand Order.[715] Those

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[709] Exhibit No. SNWA_483, p. 1-6.
[710] Exhibit No. SNWA_483, p. 1-10.
[711] Exhibit No. GBWN_297, p. 14.
[712] Ruling 6165, p. 64.
[713] Ruling 6165, pp. 62-64.
[714] Exhibit No. SE_118, pp. 18-20.
[715] Exhibit No. SNWA_483, p. 1-10.

findings estimated the precipitation recharge (i.e. the amount of precipitation that becomes groundwater via recharge) for the WRFS.[716] In Rulings 6165, 6166 and 6167, the State Engineer found that the estimates were fundamentally sound.[717] The State Engineer has subsequently relied on the same recharge estimates in other rulings.[718] The State Engineer's prior finding was that total precipitation in the 13 WRFS basins is 4,639,011 afa, and the total recharge into groundwater from that precipitation is 138,800 afa.[719] The Applicant utilized this precipitation recharge estimate to conclude that 136,702 afa of total precipitation recharge is available for appropriation in the 11 up-gradient WRFS basins by subtracting the amounts of precipitation recharge allocated to Coyote Spring Valley and Muddy River Springs Area from the total recharge for the whole WRFS.[720] Protestants presented no objection to the accuracy of the precipitation recharge estimates.

As 136,702 afa recharges the 11 up-gradient basins in the WRFS, and 6,700 afa of subsurface inflow enters that part of the WRFS at Jakes Valley, Mr. Stanka concluded 143,402 afa of groundwater is available on an average annual basis in the 11 up-gradient basins in the WRFS.[721] Considering all of the evidence, the State Engineer finds that the precipitation recharge and interbasin flow estimates that were relied upon by Mr. Stanka were appropriate for the recalculation of groundwater resources available for appropriation in the WRFS.

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[716] Exhibit No. SNWA_483, p. 1-10. See also Ruling 6166, pp. 72-73.
[717] Ruling 6166, pp. 72-73.
[718] Ruling 6255, p. 25.
[719] Exhibit No. SE_135, worksheet 3.
[720] Exhibit No. SNWA_483, p.1-10.
[721] Exhibit No. SNWA_483, p 1-10.

2. Outflow from the 11-basin WRFS

In Rulings 6165, 6166 and 6167, the State Engineer made findings regarding groundwater availability in the WRFS. Those findings included a determination that 4,100 afa from the WRFS may flow into Tikapoo Valley South. Mr. Stanka did not reserve groundwater from the upper 11 basins to account for groundwater rights in Tikapoo Valley South. Mr. Stanka relied on Ruling 5465 to make this determination.[722] In that ruling the State Engineer found, consistent with past practice, that the State Engineer is not required to reserve outflow from an up-gradient basin for use in a down-gradient basin if the outflow is not already part of the down-gradient basin's perennial yield budget.[723] Specifically, Ruling 5465 determined that all the groundwater sources in Tikapoo Valley South were fully appropriated. In making that determination, the State Engineer did not consider any groundwater inflow from the WRFS to be part of the groundwater sources for water rights in Tikapoo Valley South.[724] Accordingly, in Ruling 5465, the State Engineer determined that no additional groundwater is available for appropriation in Tikapoo Valley South, and that the quantity of rights in Tikapoo Valley South does not exceed the groundwater available in the basin, without any groundwater contribution from the WRFS. Therefore, Mr. Stanka concluded that 4,100 afa was available to meet groundwater rights in the 11 up-gradient WRFS basins.

GBWN's expert Dr. Myers claimed that although this 4,100 afa is not appropriated in Tikapoo Valley South, it may be used further down-gradient in fully-appropriated basins in the

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[722] Exhibit No. SNWA_483, p. 1-3.
[723] State Engineer Ruling 5465, p. 45, dated Jan. 4, 2005, official records in the Office of the State Engineer Ruling ("Ruling 5465").
[724] Exhibit No. SNWA_483, p. 1-3. Ruling 5465, pp. 43-46.

Death Valley Flow System ("DVFS").[725] While Dr. Myers suggested it was inappropriate to assume the 4,100 afa was available in the WRFS, he did not provide any analysis, assessment, or quantification of the down-gradient water rights within DVFS to support his speculation regarding its use.[726] The State Engineer will not base a decision on such speculation. Nor will the State Engineer require an assessment of every down-gradient basin to determine if some up-gradient water may be needed elsewhere, as this hypothetical accounting would end up including large portions of the Great Basin, an area crossing through six states.

In addition to being speculation, Dr. Myers' testimony on this point conflicts with his own prior sworn testimony and would carry little weight even if it did not. In prior hearings, Dr. Myers claimed that 6,500 afa of groundwater from the DVFS contributed to the water available in the WRFS, not the DVFS.[727] If this were true, even more water would be available in the WRFS for appropriation than Mr. Stanka concluded.[728] In addition, Dr. Myers conceded during the hearing on remand that considering the time, distance, and geologic region, only the DVFS' first four basins (Tikapoo Valley North, Tikapoo Valley South, Three Lakes North, and Three Lake South) could, if at all, be effected.[729] But the Applicant already owns the majority of the water rights in those four basins and thus, only the Applicant could be negatively affected if Dr. Myers is correct.[730]

The State Engineer finds that Tikapoo Valley South is fully appropriated, the commitments in that basin can be met without any groundwater from the WRFS, and therefore, the State

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[725] Exhibit No. GBWN_297, p. 14.
[726] Exhibit No. GBWN_297, p. 14.
[727] 2011 Transcript, Vol.17 p. 3809:4-18 (Myers).
[728] Exhibit No. GBWN_297, p. 14. 2017 Transcripts, Vol.9 p. 1965:5-10 (Myers).
[729] 2017 Transcript, Vol.9 pp. 1965:18-1966:3 (Myers).
[730] 2017 Transcript, Vol.9 p. 1962:15-23 (Myers).

Engineer agrees with the Applicant on this point and finds that the 4,100 afa can be reserved for appropriations in the WRFS without conflicting with existing rights in the DVFS.

As described above, Mr. Stanka reserved 39,000 afa from the upper 11 basins to account for flow from those basins to the five-basin management unit. Mr. Stanka determined that of the 143,402 afa of groundwater that is available on an average annual basis in the 11 up-gradient basins, 39,000 afa must be maintained as outflow to the five jointly-administered basins. Thus, he then concluded that 104,402 afa is available for groundwater commitments in the 11 up-gradient WRFS basins.[731] Protestants did not contest the accuracy of this final estimate. Based on these considerations and the State Engineer's expertise, the State Engineer finds the Applicant's estimate to be accurate and further finds that 104,402 afa of groundwater is available for appropriation within the 11 up-gradient WRFS basins.

C. Method for Calculating Committed Groundwater Resources

The Applicant completed and submitted as evidence an extensive and comprehensive analysis quantifying the amount of committed groundwater rights in each hydrographic basin within the 11 up-gradient WRFS basins.[732] The Applicant generally applied an eight-step analysis for each basin, although every step was not required in every basin.[733] This process required analysis of nearly 1,000 water rights and the creation of over 300 maps showing places of use.[734] The result was a determination of the quantity of groundwater previously committed for water

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[731] Exhibit No. SNWA_483, p. 1-10.
[732] Exhibit No. SNWA_483, p. 2-1.
[733] Exhibit No. SNWA_483, p. 2-1. The eight steps are (1) quantify and classify active water rights, (2) quantify sole source versus supplemental groundwater irrigation rights, (3) evaluate State Engineer's hydrographic basin abstract, (4) identify spring rights within groundwater discharge areas, (5) quantify springs rights within the groundwater discharge area (6) quantify and adjust for groundwater supplemental to surface water, (7) estimate crop consumptive use, (8) estimate domestic use.
[734] 2017 Transcript, Vol.1 pp. 70:8-10, 72:1-9 (Stanka).

rights in each of the 11 basins. The eight-step process employed by Applicant is summarized as follows:

1. Quantity and classify active water rights

The Applicant developed a list of all active water rights within the basin.[735] "Active water rights" for purposes of the analysis are those rights listed as Certificated, Decreed, Permitted, Reserved Rights, or Vested Claims.[736] Water rights with a status of Ready for Action (RFA), Ready for Action – Protested (RFP), and Applications (APP) were not considered active water rights because they may not become active water rights and are subject to State Engineer approval.[737] After generating the list of active water rights, the Applicant identified all groundwater rights and reviewed them to determine the total quantity of rights that were attributed to each manner of use.[738] Mr. Stanka analyzed the permit and certificate conditions of groundwater rights with a manner of use other than irrigation (which were analyzed separately) to determine if multiple rights were subject to a combined total duty limit.[739] For these rights, Mr. Stanka used the maximum combined duty limitation for quantification rather than adding the total duty for each right.[740] The State Engineer finds that the Applicant properly selected all active water rights, and that water rights with a status of RFA, RFP and APP were properly excluded because they are not yet active water rights and may never become active rights. The State Engineer further finds that it was appropriate to use the maximum combined duty limitations rather than adding the total duty for each right.

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[735] 2017 Transcript, Vol.1 pp. 68:19-69:7 (Stanka). Exhibit No. SNWA_483, p. 2-2.
[736] 2017 Transcript, Vol.1 p. 70:14-20 (Stanka). Exhibit No. SNWA_483, p. 2-2.
[737] Exhibit No. SNWA_483, p. 2-2. 2017 Transcript, Vol.1 pp. 68:19-69:7 (Stanka).
[738] Exhibit No. SNWA_483, p. 2-2. 2017 Transcript, Vol.1 p. 70:14-20 (Stanka).
[739] Exhibit No. SNWA_483, p. 2-2.
[740] Exhibit No. SNWA_483, p. 2-2.

2. Quantify sole source versus supplemental groundwater irrigation rights

Mr. Stanka reviewed all groundwater irrigation rights within the basin to determine the quantity, if any, of water rights that could be considered supplemental to other groundwater rights.[741] The place of use ("POU") for each irrigation right was identified and compared using maps and spreadsheets to determine if a POU was served by multiple points of diversion ("PODs").[742] In those instances, a senior right (sole source or non-supplemental) is supplemented by a junior right to meet the maximum permitted duty (af/acre) at the POU.[743] Accordingly, where multiple irrigation rights served a POU, the total volume of those rights was limited to that POU's maximum permitted duty.[744] Mr. Stanka also reviewed each permit, certificate, and application for supplemental duty terms.[745] The Protestants did not contest this approach. The State Engineer finds that the Applicant correctly analyzed and adjusted supplemental groundwater rights.

3. Evaluate State Engineer's Hydrographic Area Summary

Mr. Stanka then totaled the groundwater rights for the basin as adjusted by the supplemental rights analysis.[746] The Nevada Division of Water Resources has compiled information on groundwater appropriations in each basin within Nevada. This information is available in the State Engineer's Hydrographic Area Summary for each basin.[747] The Applicant also compared its estimates with those listed in the Hydrographic Area Summary as an interim check.[748] In some instances there were minor discrepancies between the Applicant's estimate and

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[741] Exhibit No. SNWA_483, p. 2-3.
[742] Exhibit No. SNWA_483, p. 2-3. 2017 Transcript, Vol.1 p. 71:7-18 (Stanka).
[743] Exhibit No. SNWA_483, p. 2-3.
[744] Exhibit No. SNWA_483, p. 2-3.
[745] 2017 Transcript, Vol.1 p. 71:7-18 (Stanka).
[746] 2017 Transcript, Vol.1 p. 72:19-22 (Stanka).
[747] Exhibit No. SNWA_483, p. 2-4. 2017 Transcript, Vol.1 pp. 72:23-73:1 (Stanka).
[748] 2017 Transcript, Vol.1 p. 73:4-8 (Stanka).

the State Engineer's.[749] In these instances, Mr. Stanka's report tabulated the variation and stated the rationale supporting the Applicant's conclusion.[750] The State Engineer finds that the Applicant's supplementally-adjusted groundwater totals are accurate and supported by substantial evidence.

4. Spring rights within groundwater discharge areas

Mr. Stanka reviewed water rights from spring sources. An analysis of committed groundwater resources would not normally include water rights from spring sources.[751] In Ruling 6165, however, the State Engineer included water rights sourced from springs located in groundwater discharge areas in the analysis of existing rights to avoid double counting of the groundwater resource.[752] In his analysis, Mr. Stanka also accounted for water rights that have spring sources and are located in "groundwater discharge areas." Groundwater discharge areas are delineated areas in each WRFS basin where plants utilize groundwater, in addition to surface water run-off and precipitation. Mr. Stanka included these spring water rights in his accounting to be consistent with the method used, and approved of in Rulings 6165, 6166 and 6167, to determine the water budget for the WRFS.[753]

James Watrus, another expert for the Applicant, explained the rationale for including certain springs as committed groundwater rights, and the rationale for excluding others.[754] He explained that the precipitation-recharge estimates for the WRFS basins were used as components

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[749] 2017 Transcript, Vol.1 p. 73:12-18 (Stanka).
[750] 2017 Transcript, Vol.1 p. 73:12-25 (Stanka).
[751] 2017 Transcript, Vol.1 p. 74:14-16 (Stanka). Exhibit No. SNWA_483, p. 2-4.
[752] Ruling 6165, p. 81.
[753] Exhibit No. SNWA_483, p. 2-4. Exhibit No. SNWA_590, p. 1.
[754] 2017 Transcript, Vol.1 p. 146:7-9 (Watrus). Mr. Watrus was qualified as an expert hydrologist and an expert in groundwater hydrology. 2017 Transcript, Vol.1 p. 144:13-19 (Watrus).

of the groundwater budget for the WRFS.[755] The precipitation-recharge estimates relied on estimates of groundwater discharge from the main groundwater discharge areas delineated for each of the WRFS basins.[756] Mr. Watrus concluded only springs within these groundwater discharge areas have the potential to contribute to the measure of groundwater discharge in the water budget analysis.[757] Therefore, only water rights sourced from these springs were included in the accounting, and water rights associated with spring sources outside the groundwater discharge areas, such as in the mountain blocks, were excluded from the accounting.[758]

Mr. Stanka identified only those water rights sourced from springs within the groundwater discharge areas and included them as groundwater resources for accounting purposes.[759] Mr. Stanka also concluded that the State Engineer previously used the same accounting process in the 2011 DDC Rulings.[760] The State Engineer finds that the Applicant accurately identified water rights sourced from springs within groundwater discharges areas, and further finds that it was appropriate to include those rights in the accounting analysis because it avoids double counting of the groundwater resource.

5. <u>Quantification of spring rights within groundwater discharge area</u>

Mr. Stanka determined if any of the spring rights in the groundwater discharge area were supplemental to other rights and adjusted the quantity of those rights accordingly.[761] For irrigation spring rights, this included extensive use of spreadsheets and the creation of numerous maps to

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[755] 2017 Transcript, Vol.1 pp. 150:18-151:6 (Watrus).
[756] Exhibit No. SNWA_483, p. 2-4.
[757] Exhibit No. SNWA_590, p.1.
[758] 2017 Transcript, Vol.1 p. 7:7-18 (Watrus).
[759] 2017 Transcript, Vol.1 p. 74:3-13 (Stanka).
[760] 2017 Transcript, Vol.1 p. 47:15-17 (Stanka); *see also* Ruling 6165, p. 81 (discussing DDC accounting).
[761] Exhibit No. SNWA_483, p. 2-5. 2017 Transcript, Vol.1 p. 76:11-22 (Stanka).

determine if rights had the same place of use as other water rights, and were therefore supplemental.[762]

6. Quantification and adjustment for groundwater supplemental to surface water irrigation rights

The next step consisted of comparing irrigation groundwater rights to surface water irrigation rights to determine if any were supplemental to the surface water rights.[763] Groundwater irrigation rights are considered supplemental if they are appurtenant to the same place of use as the surface water irrigation right.[764] Mr. Stanka compared the places of use. Any rights located within the same 40-acre subdivision were evaluated further by reviewing permits, certificates, vested claims, decrees, associated maps, and maps created by Mr. Stanka showing the location of the rights.[765]

The supplemental rights identified by this process were then adjusted based on expected annual use.[766] Mr. Stanka determined expected annual use by reviewing the location and duty of existing surface water rights, existing groundwater rights, and hydrographs of stream flow patterns.[767] Only Cave Valley, Garden Valley, and White River Valley had groundwater rights supplemental to surface water irrigation rights.[768]

For groundwater rights supplemental to surface water, Mr. Stanka assumed that surface water would be used preferentially when available and that supplemental groundwater would be used only when insufficient surface water was available to satisfy the entire permitted amount.[769]

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[762] 2017 Transcript, Vol.1 p. 76:23-77:8 (Stanka).
[763] 2017 Transcript, Vol.1 pp. 79:25-80:5 (Stanka).
[764] Exhibit No. SNWA_483, p. 2-5.
[765] Exhibit No. SNWA_483, p. 2-5.
[766] Exhibit No. SNWA_483, p. 2-6.
[767] Exhibit No. SNWA_483, p. 2-6.
[768] 2017 Transcript, Vol.1 pp. 80:14-81:1 (Stanka).
[769] Exhibit No. SNWA_483, p. 2-5. Exhibit No. GBWN_297, p. 20.

There were no hydrographs or stream flow data available for surface water sources in Cave or Garden Valleys, so Mr. Stanka concluded 50 percent as the average amount of supplemental groundwater rights expected to be used annually, which is the same estimated average annual amount used by the State Engineer in Ruling 6164 for Spring Valley.[770] The State Engineer finds that 50 percent is the proper usage rate for groundwater rights that are supplemental to surface rights in Cave and Garden Valleys.

For White River Valley, Mr. Stanka analyzed USGS hydrographs from surface water sources in his supplemental use analysis for that basin.[771] Three hydrographs are available in White River Valley, and Mr. Stanka used two of those hydrographs in his analysis.[772] He selected those two hydrographs because they measure the two sources of stream water in White River Valley with supplemental groundwater rights.[773] Mr. Stanka assumed that, during peak stream flows, only surface water would be used, and that if there was a decrease in surface water flow, groundwater would be used to make up the reduced flow.[774]

After evaluating the hydrographs, Mr. Stanka determined that supplemental groundwater rights would be pumped on average 36.8 percent of the time, which is the combined average annual usage based on the two hydrographs.[775]

Dr. Myers agreed that when supplemental groundwater rights exist, surface water rights are used first if they are available.[776] However, Dr. Myers suggested that the stream gauges' hydrographs used by Mr. Stanka were not representative of surface water flows on the valley

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[770] 2017 Transcript, Vol.1 pp. 81:19-82:2 (Stanka). 2017 Transcript, Vol.1 p. 82:3-17 (Stanka).
[771] Exhibit No. SNWA_483, pp. 5-33 to 5-38.
[772] 2017 Transcript, Vol.1 p. 83:15-18 (Stanka).
[773] Exhibit No. SNWA_484, pp. 5-67, 5-70, 5-73. 2017 Transcript, Vol.1 p. 120:3-6 (Stanka).
[774] 2017 Transcript, Vol.1 p. 83:1-10 (Stanka).
[775] Exhibit No. SNWA_483, p. 5-38.
[776] Exhibit No. GBWN_297, p. 20. 2017 Transcript, Vol.8 p. 1807:2-8 (Myers).

floor.[777] Dr. Myers did not perform an independent supplemental use analysis, and could not offer an opinion on whether the value for the percent usage of supplemental groundwater would go up or down based on stream gauges on the valley floor.[778]

The State Engineer finds that Mr. Stanka used the best available methods and science to calculate the value for the percent usage of supplemental groundwater in his supplemental rights analysis. The two USGS stream gauges used by Mr. Stanka provided a reliable estimate of surface water availability based on historical hydrographic flow data. Dr. Myers did not provide an independent supplemental analysis or identify alternate stream gauges to use. Also, Dr. Myers did not offer an opinion about whether more or less supplemental water would be used if a different gauge had been utilized. Therefore, the State Engineer finds that in the White River Valley, groundwater irrigation rights that are supplemental to surface irrigation rights are utilized, on an average basis, 36.8 percent of the time.

Dr. Myers also claimed that there was no basis for assuming that the stream rights on Water Canyon Creek, Proof V01519, would have supplemental rights.[779] The State Engineer finds, however, that his records show that groundwater Permit 22301 is supplemental to surface water irrigation right V01519 from Water Canyon Creek.[780] Also, surface water irrigation rights V01166 and V01167, which were sourced from White River and located a few miles downstream of the White River gauge near Red Mountain, also contained supplemental groundwater rights.[781]

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[777] 2017 Transcript, Vol.8 pp. 1795:17-23, 1808:21-22 (Myers).
[778] 2017 Transcript, Vol.8 pp. 1811:18-21, 1822:20-24 (Myers).
[779] Exhibit No. GBWN_297, p. 25.
[780] Exhibit No. SNWA_484, p. 5-75.
[781] Exhibit No. SNWA_484, p. 5-75.

7. Estimated crop consumptive use

Mr. Stanka identified all the irrigation rights and compared the duty of those rights with the amount of water actually consumed by growing the crop, an amount referred to as the Net Irrigation Water Requirement (NIWR).[782] The State Engineer has previously established the individual NIWR for different crops for each basin within Nevada.[783] The amount of water exceeding the NIWR up to the maximum duty of an irrigation right is the non-consumptive portion of the water right that returns to the groundwater system.[784] Mr. Stanka determined which non-supplemental irrigation rights had maximum duties exceeding the consumptive use and adjusted the quantities of those rights to match consumptive use.[785] The State Engineer finds that the Applicant correctly adjusted irrigation rights based upon the NIWR.

8. Estimated domestic water use

The final step in the Applicant's accounting was to adjust the amount of committed groundwater rights per basin for estimated domestic water use.[786] Water for domestic use is limited to two afa per household, does not require a permit, and is therefore not listed in the NDWR Hydrographic Summaries. Mr. Stanka used the NDWR well-driller's log database to search for wells with a proposed use of "domestic."[787] For accounting purposes, Mr. Stanka assumed that each identified domestic well used its maximum allocation of two afa, even though this assumption likely overestimates use.[788] The State Engineer finds that two afa per well is an appropriate and conservative estimated amount to use in accounting for domestic water use. The State Engineer

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[782] Exhibit No. SNWA_483, p. 2-6.
[783] Exhibit No. SNWA_483, p. 2-6.
[784] Exhibit No. SNWA_483, p. 2-6. 2017 Transcript, Vol.1 p. 84:4-11 (Stanka).
[785] Exhibit No. SNWA_483, p. 2-6.
[786] Exhibit No. SNWA_483, p. 2-6.
[787] Exhibit No. SNWA_483, p. 2-7.
[788] Exhibit No. SNWA_483, p. 2-7. 2017 Transcript, Vol.1 p. 86:1-22 (Stanka).

further finds that the Applicant's eight-step method accurately quantifies committed groundwater rights.

D. Protestant Claims Regarding Committed Groundwater Resources

1. Protestant claims regarding springs outside discharge area

Dr. Myers testified that some springs located outside of the groundwater discharge areas should have been considered committed groundwater.[789] Dr. Myers suggested that only counting spring rights within the groundwater discharge area can underestimate the amount of committed spring water rights that depend on groundwater sources because some regional springs are located outside of the mapped groundwater discharge areas.[790] Dr. Myers also suggested that springs outside the groundwater discharge area could flow into channels that ultimately become discharge in the wetlands.[791]

Dr. Myers was qualified in the field of hydrogeology and groundwater modeling, but did not provide any hydrologic analysis to prove any such springs exist, or that spring flow originating outside of the groundwater discharge areas actually flows into the groundwater discharge areas. Dr. Myers based these opinions on only geologic maps and geologic characteristics, and then prepared a list of spring water rights that he concluded should be groundwater commitments.[792] However, he testified that he was not offering any opinion on the categorization or legal status of water rights and that he was not conducting a water rights assessment.[793] He did not possess any expertise in water rights research, quantification, vested rights, chain of title, or surveying. Despite

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[789] 2017 Transcript, Vol.8 pp.1795:17-1796:10 (Myers).
[790] Exhibit No. GBWN_297, p. 19.
[791] Exhibit No. GBWN_297, p. 19.
[792] 2017 Transcript, Vol.9 pp. 1990:6-1991:22 (Myers). Exhibit No. GBWN_ 297, p. 26.
[793] 2017 Transcript, Vol.8 p. 1783:6-18 (Myers).

these limitations, he offered opinions on whether certain water rights should have been included in the accounting analysis. Given his lack of experience or analysis, the State Engineer finds Dr. Myers' opinions regarding the classification of water rights for accounting purposes has very little merit, and will not be considered.

Mr. Stanka analyzed Dr. Myers' list of spring rights. Mr. Stanka testified that the water rights identified by application numbers 699, 2420, 4163, 5336, 5337, and 69363 were properly excluded from the groundwater commitment calculation because those rights come from springs that are not within the groundwater discharge area.[794] The rights identified as V001166, V01170, V01167, V01171, and V01169 are decreed rights within the White River Decree.[795] Mr. Stanka testified that he reviewed the White River Decree and concluded those decreed rights are surface rights with the White River as their source.[796]

The State Engineer finds that Mr. Stanka properly excluded the springs listed by Dr. Myers from the calculation of groundwater commitments. First, some of those rights are from springs located outside the groundwater discharge area. Dr. Myers used geologic maps to identify springs he believed should be included in the accounting.[797] The water budget for the WRFS is based, in part, on the location of the groundwater discharge areas and not geologic maps. Even if there are hypothetical flows from springs located outside the groundwater discharge area, there would be no impact on the ultimate conclusion because such flows would necessarily be the non-consumptive portion of the spring right that would not be subtracted from available groundwater. The State Engineer finds that water rights sourced from springs located outside of the groundwater

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[794] 2017 Transcript, Vol.1 pp. 113:2-114:19 (Stanka).
[795] 2017 Transcript, Vol.1 pp. 114:20-115:17 (Stanka).
[796] 2017 Transcript, Vol.1 p. 115:1-17 (Stanka).
[797] 2017 Transcript, Vol.1 pp. 1990:21-1991:22 (Myers).

discharge areas are properly excluded from this accounting analysis because it is consistent with the method used to determine the WRFS water budget and consistent with the 2011 DDC Rulings.

Second, the remaining water rights on Dr. Myers' list are actually surface water rights, not spring rights. A proper analysis of existing groundwater commitments requires each water right to be analyzed individually, and should include a review of the application, permit terms, certificate terms, maps, and for decreed rights, the actual decree.[798] Dr. Myers admitted he did not analyze or review any of this information, and only looked at the cover of the White River Decree.[799] Further, the State Engineer finds that since the remaining water rights on Dr. Myers' list have a surface water source, they should not be considering committed groundwater for accounting purposes.

2. Protestant claims regarding streams outside discharge area

Dr. Myers also suggested that certain stream water rights, with application numbers V01519, 2334, 2384, 2896, 3232, 10118, 10174, 11076, 78946, 11078, 20466, 20819, 22354, 23624, 38205, V10515, V04605, V01351, and V00801 should have been consider groundwater rights in the groundwater accounting.[800] Dr. Myers added these water rights based solely on his review of a State Engineer hydrographic abstract for White River Valley, not an analysis of the water rights themselves or the hydrology related to those water rights.[801] As previously stated, Mr. Stanka is an expert in the research and quantification of water rights. Dr. Myers does not have that expertise.

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[798] 2017 Transcript, Vol.1 p. 116:10-20 (Stanka).
[799] 2017 Transcript, Vol.9 pp. 1995:24-1996:2 (Myers).
[800] Exhibit No. GBWN_297, pp. 28, 29, 57, and 58.
[801] Exhibit No. SNWA_600, p. 2.

Mr. Stanka reviewed the stream water rights identified by Dr. Myers and testified regarding whether they should be considered groundwater in the accounting analysis.[802] He concluded stream Permit No. 38205 should not because it was sourced from floodwaters from excess precipitation.[803] He concluded stream Proof No. V04605 was already included as groundwater in his accounting.[804] Dr. Myers' list included Proof Nos. V10515 and V00801, which have a duty of zero.[805] Dr. Myers did not indicate how or why inclusion of those rights would alter the accounting.

Mr. Stanka did concede that Permit No. 3235 and Proof No. V01351 should have been included as committed groundwater rights, because both stream rights are sourced from Hot Creek, which in turn has its source within the groundwater discharge area.[806] Mr. Stanka then performed a consumptive use analysis to conclude that the two Hot Creek rights total 2,480.25 afa in additional groundwater commitments.[807] Mr. Stanka visited the place of use for the water rights, and based on that field visit, he concluded the water rights were not being used for irrigation, and appeared to not have been so used for some time because the area has been converted to a wildlife refuge, although the water rights have not been modified to reflect this use.[808] Those rights are currently owned by the Nevada Division of Wildlife.[809] The State Engineer finds Mr. Stanka properly concluded Permit No. 3235 and Proof No. V01351 should be included as groundwater commitments because the water source is actually located within the groundwater discharge area,

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[802] 2017 Transcript, Vol.1 pp. 120:7-127:18 (Stanka). Exhibit No. SNWA_613, pp. 17-18.
[803] 2017 Transcript, Vol.1 p. 124:1-13 (Stanka). Exhibit No. SNWA_613, pp. 17-18.
[804] 2017 Transcript, Vol.1 p. 124:1-13 (Stanka). Exhibit No. SNWA_613, pp. 17-18.
[805] Exhibit No. GBWN_297, p. 62.
[806] 2017 Transcript, Vol.1 p. 125:6-22 (Stanka). Exhibit No. SNWA_613, pp. 17-18.
[807] Exhibit No. SNWA_613, pp. 17-18.
[808] 2017 Transcript, Vol.1 pp. 127:23-128:18 (Stanka).
[809] 2017 Transcript, Vol.1 p. 128:7-18 (Stanka).

and that Mr. Stanka accurately, and conservatively, calculated 2,480.25 afa as the additional committed groundwater resource in White River Valley, as the current use may be less than the permitted duty.

With respect to the remaining stream rights on Dr. Myers' list, the Applicant's expert Mr. Watrus reviewed those stream water rights and concluded they should not be considered committed groundwater rights.[810] He stated that the rights were appropriately excluded because they were located outside of the groundwater discharge area.[811] Mr. Watrus further testified that Dr. Myers' use of a geologic map to determine hydrologic sources was inappropriate, and that a map containing the groundwater discharge area would be more appropriate.[812]

The State Engineer finds the Applicant's approach to classifying streams is supported by substantial evidence and appropriate for this accounting exercise. The State Engineer finds that the Applicant used the groundwater discharge areas as previously approved by the State Engineer and undisturbed by the District Court. The Applicant properly used those groundwater discharges areas to determine which stream rights should be considered committed groundwater rights because the water budget for the WRFS was determined using the same groundwater discharge areas.[813] Counting stream rights outside the groundwater discharge area would be inconsistent with prior Rulings and the findings therein that concluded only rights within groundwater discharge areas should be considered groundwater rights.[814] Further, including streams outside the groundwater discharge areas would require a recalculation of the water budgets to maintain the

[810] 2017 Transcript, Vol.1 p. 153:16-19 (Watrus).
[811] 2017 Transcript, Vol.1 p. 154:3-8 (Watrus).
[812] 2017 Transcript, Vol.1 pp. 154:15-155:3 (Watrus).
[813] Exhibit No. SNWA_590, p. 1.
[814] Ruling 6165, p. 81.

water balance. The State Engineer finds Dr. Myers' report and testimony on this point has little weight. Using Dr. Myers' approach, the groundwater commitments would increase, the precipitation recharge would increase, and the difference between the two would remain identical—the conclusion does not change. Again, Dr. Myers is not a water rights surveyor or a water rights specialist, and did nothing more that print a list of water rights off the State Engineer's database. Adopting his overly simplistic and incomplete approach would overestimate the true groundwater commitment in White River Valley.[815]

3. Protestant Claim of Impacts to Down-Gradient Springs

Dr. Myers stated that the purpose of discussing the Central Carbonate Rock Province (CCRP) numerical model at the 2017 hearing was to show that certain areas should be included in the monitoring portion of the 3M plan, but the State Engineer finds that Dr. Myers intended to reopen the conflicts analysis completed in 2011.[816] The State Engineer will not consider Dr. Myers' reports and testimony related to simulated decreases in spring discharge in White River Valley, Pahranagat Valley, and Muddy River Springs because the numerical model and conflicts analysis were fully vetted and determined in the 2011 hearing and those findings were not disturbed by the District Court's Remand Order. Further, even if the conflicts analysis were reopened for consideration, Dr. Myers' evidence is not credible.

In the 2008 hearing on the DDC basins, Dr. Myers stated that water rights in White River Valley, Pahranagat Valley, Coyote Spring Valley, and the Muddy River Springs Area would be impacted if the DDC applications were granted.[817] Dr. Myers testified that the RASA model he

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[815] 2017 Transcript, Vol.1 pp. 105-107 (Stanka).
[816] 2017 Transcript, Vol.9 pp. 1973:8-1975:3 (Myers).
[817] State Engineer Ruling 5875, p. 22, dated July 9, 2008, vacated Oct. 19, 2009, official records in the Office of the State Engineer Ruling ("Ruling 5875").

used showed that spring discharge would be reduced in White River and Pahranagat valleys.[818] In now vacated Ruling 5875, the State Engineer found that spring discharge in Pahranagat Valley remains stable for 200 to 500 years.[819] The State Engineer then found there were no conflicts with existing rights in Pahranagat Valley, recognizing that he could not responsibly rely on projections of impacts that might occur several hundred years in the future because they are too uncertain.[820]

In 2011, Dr. Myers again used the RASA model to project the effects of pumping in DDC over thousands of years.[821] His projections showed that after 2,000 years of simulated non-stop pumping in the amount of the perennial yield there were only minor decreases in flow at down-gradient springs.[822] While Dr. Myers also provided projections showing greater impacts to down-gradient springs after 2,000 years, those projections were based on pumping in amounts greater than perennial yield—more than the Applicant was approved for.[823] Furthermore, he admitted that the geochemical data for the regional springs in White River Valley showed that they were likely sourced from northern basins and not Cave Valley and would therefore not be affected.[824] He also admitted that the RASA model he used is not as accurate as the Applicant's model.[825]

The State Engineer considered the 2011 projections, but concluded he could not credibly use the model to predict drawdown at specific water rights locations because the model did not represent local-scale geologic or hydrogeologic features that control whether or not a drawdown will actually occur.[826] The State Engineer found that projections generated by the model become

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[818] 2008 Transcript, Vol 6 pp. 1244:1-1245:3 (Myers).
[819] Ruling No. 5875, p. 22. (vacated).
[820] Ruling No. 5875, p. 22. (vacated).
[821] Ruling 6165, p. 107.
[822] Exhibit No. GBWN_011, p. 56.
[823] Exhibit No. GBWN_011, p. 56.
[824] Ruling No. 6165, pp. 112-113.
[825] Ruling No. 6165, p. 111.
[826] Ruling No. 6167, p. 102. Ruling No. 6166, p. 103. Ruling No. 6165, pp. 106-107.

increasingly uncertain the further in the future they predict.[827] All model and qualitive analyses showed there would be no impacts to springs in White River Valley, Pahranagat Valley, and the Muddy River Springs Area.[828] Accordingly, the State Engineer found that pumping in the amounts granted to the Applicant would not conflict with existing rights.[829]

In this hearing, Dr. Myers used a version of the CCRP numerical groundwater flow model to claim that pumping in DDC basins would impact down-gradient water rights.[830] He described the simulated effects of pumping in DDC basins on springs in neighboring valleys in terms of specific reduction in spring discharges, such as a 70 afa decrease at Butterfield Springs in White River Valley after 200 years, or a 150 afa decrease at Ash spring in Pahranagat Valley after 200 years.[831] Not only is it inappropriate to use a regional model to simulate local effects, but these are not accurate projections.[832] Dr. Myers used outdated data to generate these projections.[833] The Applicant updated the CCRP model to reflect the findings of the State Engineer in the 2011 DDC Rulings, but Dr. Myers used the data and reports from an older version.[834] The Applicant was never approved to pump at those rates. Furthermore, the numbers provided by Dr. Myers are misleading because he does not explain which part of the simulated decrease in flow is due to pumping from existing rights, and not from the Applicant.[835]

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[827] Ruling No. 6165, p. 106.
[828] Ruling No. 6165, p. 48.
[829] Ruling No. 6165, p. 113.
[830] Exhibit No. GBWN_281, p. 99.
[831] Exhibit No. GWBN_281, pp. 53.
[832] Exhibit No. SNWA_596, p. 6.
[833] Exhibit No. SNWA_596, pp. 5-6.
[834] Exhibit No. SNWA_596, pp. 5-6.
[835] Exhibit No. GBWN_281, pp. 53-54.

The error is even more apparent in his discussion of Muddy River Springs.[836] Dr. Myers claims that discharge at Muddy River Springs will decrease by approximately 2,000 afa after 250 years of pumping and he appears to attribute that decrease to activity in Delamar Valley.[837] By viewing the hydrograph he provides, it is apparent that all of the projected decrease in flow in Muddy River Springs is due to the simulated pumping of existing rights (the "No Action" line), and not the Applicant.[838]

Dr. Myers stated that the simulations he presented underestimate impacts due to flaws in the model.[839] He testified, however, that his own model provided for the 2011 hearing showed only a .5 cfs (361 afa) change in flow at Muddy River Springs after 4,000 years.[840] He testified that his report was not requesting denial of the applications, but was about monitoring because he believed there was a potential that in the long run there could be an effect.[841] Dr. Myers also testified that the point of his presentation was to show there needed to be monitoring included south of Muddy River Springs.[842] He then agreed that the monitoring network that already exists in Coyote Spring Valley was enough to detect any difference between the model he criticized and the actual hydrologic conditions.[843]

The State Engineer finds, for the third time, that there is no evidence that the DDC applications will impact flows at regional springs in White River Valley, or any springs in Pahranagat Valley or the Muddy River. Dr. Myers used an outdated version of the model and used

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[836] Exhibit No. GBWN_281, pp. 57-58.
[837] Exhibit No. GBWN_281, p. 57.
[838] Exhibit No. GBWN_281, p. 58. Exhibit No. SNWA_596, pp. 9-10.
[839] Exhibit No. GBWN_281, p. 58.
[840] 2017 Transcript, Vol.9 p. 1972:15-20 (Myers).
[841] 2017 Transcript, Vol.9 pp. 1973:8-1974:17 (Myers).
[842] 2017 Transcript, Vol.9 pp. 1974:18-1975:8 (Myers).
[843] 2017 Transcript, Vol.9 p. 1980:5-22 (Myers).

that model inappropriately to try to project local effects. He tried to attribute reductions in spring discharge to the Applicant, but those projected reductions were actually due to the pumping of existing rights. Dr. Myers presented no evidence of impacts to specific existing rights and his misleading reliance on regional models is not credible. Therefore, the State Engineer reaffirms the prior findings that there is no substantial evidence that the Applicant's proposed use of groundwater in the DDC basins will conflict with existing rights.[844]

E. Applicant's Calculation of Committed Groundwater Resources

Mr. Stanka completed the above-described process for each of the 11 up-gradient WRFS basins. Based on that analysis, Mr. Stanka arrived at an estimated quantity of committed groundwater for each basin, and for the 11 basins combined.[845] Dr. Myers challenged the final calculations that were made by Mr. Stanka and identified water rights he believed should have been included in the accounting.

In testimony, Mr. Stanka presented a summary of the results of his analysis. He also presented evidence that the quantification in his expert report should be increased by 2,480.25 afa based on the inclusion of two Hot Creek rights.[846] As modified, Mr. Stanka concluded the committed groundwater in the 11 up-gradient WRFS basins is 80,234.19 afa.[847] According to the Mr. Stanka, this amount includes the permitted water rights granted to the Applicant in Rulings 6165, 6166, and 6167 in Cave Valley, Dry Lake Valley, and Delamar Valley, as well as water reserved for future growth within the DDC Basins in those Rulings.[848] The State Engineer finds

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[844] Ruling No. 6167, p. 160. Ruling No. 6166, p. 162. Ruling No. 6165, pp. 168-169.
[845] Exhibit No. SNWA_483, p. 14-1.
[846] Exhibit No. SNWA_613, p. 19.
[847] Exhibit No. SNWA_613, p. 19. Including rights with priority dates both before and after October 17, 1989, gives a total of 95,628.85 afa of committed groundwater and spring water rights.
[848] 2017 Transcript, Vol.1 p. 92:3-9 (Stanka).

this calculation to be accurate and therefore finds that the committed groundwater in the 11 up-gradient WRFS basins to be 80,234.19 afa. The State Engineer further finds that the estimate is supported by substantial evidence.

F. Recalculation of Appropriations in the DDC Valleys

The District Court ordered a recalculation of the appropriations from the DDC valleys to determine if water was available in those basins that was not already appropriated in down-gradient basins.[849] The Applicant provided a recalculation.[850] That recalculation, made with and without water rights with priority dates later in time than Applicant's priority date, included spring rights not typically counted as groundwater rights and amounts reserved by the State Engineer for future growth in the DDC Basins.[851]

The State Engineer finds the Applicant's method is comprehensive and conservative. The recalculation was completed by a professional water rights surveyor who conducted the analysis with extensive and reliable documentation. Therefore, the State Engineer finds 80,234.19 afa as the amount of committed groundwater rights with a priority date on or before October 17, 1989 in the 11 up-gradient WRFS basins.[852] The State Engineer further finds 95,628.85 afa is the amount of committed groundwater rights with priority dates before, on, and after October 17, 1989 in the 11 up-gradient WRFS basins.[853] The State Engineer previously found that 104,402 afa is the amount of groundwater available for appropriation in the 11 up-gradient WRFS basins.[854] As the amount of groundwater available for appropriation exceeds the groundwater that is currently

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[849] Exhibit No. SE_118, pp. 19-20.
[850] Exhibit No. SNWA_483, p. 14-1.
[851] 2017 Transcript, Vol.1 p. 94:7-24 (Stanka).
[852] Exhibit No. SNWA_613, p. 19.
[853] Exhibit No. SNWA_613, p.19. 2017 Transcript, Vol.1 p. 129:3-7 (Stanka).
[854] Exhibit No. SNWA_483, p. 1-10.

committed, the State Engineer finds that there is sufficient water available to supply the Applicant's permits in Cave, Dry Lake, and Delamar valleys without awarding the same water twice and, in fact, additional water is available for appropriation.

The State Engineer finds, based upon the evidence submitted and a review of its own records, that adequate water resources exist in the WRFS to support the appropriations made to the Applicant in 2011 and all prior appropriations. The evidence and analysis presented further establishes that additional water can be appropriated to the Applicant pursuant to its applications in those basins without causing any over-appropriation in the WRFS.

In evidence and testimony, the Applicant requested an adjusted appropriation of 3,500 additional afa from Cave Valley as part of the staged development previously approved in that basin. Although the evidence submitted at the 2017 hearing clearly demonstrates that additional water is, indeed, available for appropriation, the Applicant withdrew the request because it determined that the request would be more appropriate at a later date rather than as part of this remand proceeding.

CONCLUSIONS OF LAW

I. JURISDICTION

The State Engineer has jurisdictions over the parties and the subject matter of this action and determination.[855]

II. STATUTORY STANDARD TO DENY

The State Engineer is prohibited by law from granting an application to appropriate the public waters where:[856]

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[855] NRS Chapters 533 and 534.
[856] NRS 533.370(2)

1. there is no unappropriated water at the proposed source; [and]
2. the proposed use or change conflicts with existing rights.

The State Engineer is directed to make new findings for:

1. The addition of Millard and Juab counties, Utah in the mitigation plan so far as water basins in Utah are affected by pumping of water from Spring Valley Basin, Nevada;
2. A recalculation of water available for appropriation from Spring Valley assuring that the basin will reach equilibrium between discharge and recharge in a reasonable time;
3. Define standards, thresholds or triggers so that mitigation of unreasonable effects from pumping of water and neither arbitrary nor capricious in Spring Valley, Cave Valley, Dry Lake Valley and Delamar Valley, and;
4. Recalculate the appropriations from Cave Valley, Dry Lake and Delamar Valley to avoid over appropriations or conflicts with down-gradient, existing water rights.

III. INCLUSION OF MILLARD AND JUAB COUNTIES, UTAH

The State Engineer concludes the Applicant adhered to the Court's Order by providing for the inclusion of Millard and Juab counties, Utah in the Spring Valley 3M Plan so far as water basins in Utah are affected by pumping groundwater from Spring Valley, Nevada. The State Engineer concludes that the Spring Valley 3M Plan establishes effective monitoring of flow paths which will detect propagation of drawdown prior to the propagation reaching Millard and Juab Counties, Utah. The 3M Plan also establishes new defined triggers specific to Millard and Juab Counties' resources that will ensure that mitigation of unreasonable effects are neither arbitrary or capricious. The State Engineer concludes the Spring Valley 3M Plan methodology will protect, and if necessary, provide appropriate mitigation for, existing water rights and environmental resources in Millard and Juab counties, Utah.

IV. ASSURANCE THAT EQUILIBRIUM WILL BE REACHED

The State Engineer concludes the Applicant provided satisfactory proof that after a recalculation of water available for appropriation from Spring Valley, the basin will reach

equilibrium between discharge and recharge in a reasonable time. Equilibrium can be determined based upon change in water levels in the basin. The State Engineer reaffirms its finding noted by the District Court that "[d]rawdown of less than 50 feet over a seventy-five year is generally a reasonable lowering of the static water table." The State Engineer concludes the projected capture of transitional storage between 9 and 17 percent after 200 years of pumping coincides with principles of groundwater development and is reasonable. The State Engineer concludes the numerical model and scenarios used are scientifically sound and represent the best available science. The State Engineer concludes that coupled with a sound 3M plan, staged development, and continuing empirical data acquisition, the State Engineer will ensure groundwater levels are managed to establish a new equilibrium state. The State Engineer concludes the Applicant provided substantial evidence that the pumping scenarios assure some prospect that equilibrium will be reached in a reasonable time and therefore no reduction in the reward of 61,127 afa is required.

V. MONITORING, MANAGEMENT, & MITIGATION

The State Engineer concludes the Applicant provided substantial evidence that the 3M Plans are in accordance with Nevada water law and the Remand Order. The 3M Plans adhered to the Remand Order by defining objective standards, thresholds and triggers so that mitigation of unreasonable effects from pumping of water are neither arbitrary nor capricious in the project basins and adjacent basins which may be affected by project pumping. The 3M Plans adhere to statutory requirements to protect existing water rights, the protectable interest in existing domestic wells, the public interest, and environmental soundness under Nevada water law. The State Engineer makes these conclusions on presently-known, substantial evidence in the record.

A. Baseline

The State Engineer concludes the Applicant currently has sufficient baseline data to appropriately establish defined quantitative triggers and that between now and when pumping begins, additional data will make the baseline more robust. The State Engineer concludes the 3M Plans' methodology is reasonable and acceptable for establishing triggers from the baseline.

B. Staged Development

The Applicant's GDP pumping in Spring Valley is authorized in three stages under Ruling 6164. The 3M Plans require the groundwater flow models to be updated at least every five years after the beginning of the Applicant's GDP pumping. The requirement of staged development under the 3M Plans allows for a specific amount of pumping to observe and evaluate the aquifer response at various monitoring points under different pumping rates, durations, and distributions between production wells.

The same approach has been requested in Cave Valley. Cave Valley groundwater development is to take place in three stages. In stage one, a total volume of 2,600 afa will be permitted. Stage two will increase the total volume to 3,900 afa. The final stage will increase the total volume to 5,235 afa. To advance to the next stage, the Applicant will be required to pump at least 85 percent, but not more than 100 percent, of the total afa for a minimum of five years. The staged development will provide additional information on aquifer properties, as well as help refine other predictive analytical tools used in the 3M Plans. The State Engineer accepts the Applicant's request for staged development in Cave Valley, and finds that the 3M Plans' strategy to employ staged development is a pragmatic and practical approach to developing a large amount of groundwater in a safe and sustainable manner.

C. Defined Triggers and Thresholds

The State Engineer concludes the 3M Plans will ensure that existing water rights will not be conflicted with, as holders of existing water rights will have the appropriate amount of water at their point of diversion, in sufficient quality, to continue their permitted beneficial use. Substantial evidence supports the finding that the proper water rights were considered and included in the plan. The Office of the State Engineer further concludes that so long as an existing water right holder has access to their allocated amount of water via the same or substantially the same delivery method, there is no conflict under Nevada water law.

The 3M Plan also ensures environmental resources are protected during the Applicant's GDP pumping. The State Engineer concludes the 3M Plans meet the requirements of environmental soundness under the Nevada law. Additionally, the State Engineer concludes that all relevant environmental resources have been adequately delineated into the plan. A review of the 3M Plans show that the mitigation options are not merely a list, but specific actions which will be required by the State Engineer depending on the particular circumstances, which is effective to mitigate any impacts, including unforeseen impacts, if necessary and appropriate. The 3M Plans' holistic approach to avoiding all defined hydrologic and environmental unreasonable effects outlined therein will effectively avoid unreasonable effects to senior water rights and the public interest.

In summary, the State Engineer finds that the 3M Plan meets all requirements outlined in the Remand Order, and in *Eureka County v. State Engineer*. As required by the Remand Order, the 3M Plan defines standards, thresholds, and triggers so that mitigation of unreasonable effects from the Applicant's GDP pumping is not arbitrary or capricious. The triggers established 3M Plan for both existing water rights and environmental resources are defined, quantitative and

objective triggers that are currently established, and based upon substantial evidence and sound science. The 3M Plan and evidence presented further specifies specific mitigation actions for the various resources, including why the mitigation actions will be effective to avoid, or if necessary, mitigate, the defined unreasonable effects.

D. Public Input

The State Engineer concludes ongoing public input is paramount for GDP success. The State Engineer determines that hydrologic monitoring data (i.e. quarterly reports), environmental monitoring data, and water chemistry data will be made publicly available, such as through a website.

In addition, public comment shall be accepted for the following reports:

1. The following year's operation plan will be available for 30 days for public comment before finalization; and
2. Annual monitoring data reports and groundwater flow model output reports will be available 90 days of public comment before finalization.

The State Engineer concludes that in addition to these reporting requirements, the Applicant shall notify an existing water right holder if a mitigation trigger is activated for their water right and provide the existing water right holder with the mitigation trigger memorandum within the time specified in the 3M Plans. The State Engineer also concludes the Applicant shall invite the Tribes to provide input and participate in mitigating the Swamp Cedar ACEC as required under the Spring Valley 3M Plan.

E. State Engineer Control

The State Engineer finds it necessary to continue gathering data both before pumping operations begin and during the groundwater development program. The State Engineer finds that because of the large area and the nature of the GDP, the Applicant must supply the resources to

provide oversight and implementation of the 3M Plans. The State Engineer hereby adopts and will ensure implementation of the 3M Plans. The State Engineer reserves the right to make adjustments as deemed necessary and will notify the Applicant and Protestants if any such revisions should arise.

F. Permit Terms

The State Engineer hereby accepts the 3M Plans as permit terms and requires that the Applicant adhere to the provisions set forth in the 3M Plans for the duration of the GDP.

VI. RECALCULATIONS OF APPROPRIATIONS IN DDC BASINS

The State Engineer concludes based upon substantial evidence of a calculation of the existing water rights, including the appropriations from Cave Valley, Dry Lake Valley and Delamar Valley, water is available for appropriation and the Applicant's pumping will not conflict with down-gradient, senior or existing water rights. The State Engineer concludes the Applicant's methodology provides satisfactory proof that groundwater appropriated to the Applicant in the DDC basins was not previously appropriated for use by senior or existing water rights in down-gradient basins, but is in fact available for the Applicant's appropriation and use. The State Engineer concludes that after accounting for all committed groundwater rights in the WRFS, including the full appropriations granted to the Applicant in 2011, sufficient water remains available to satisfy, and avoid any conflicts with, down-gradient rights. Further, the State Engineer finds that additional water is available for appropriation within the DDC basins, in particular Cave Valley.

RULING ON REMAND

The Remand Order by the Seventh Judicial District Court has been addressed and satisfied by presently-known, substantial evidence in the record. Applications 53987 to 53922, 54003 to 54015, 54019 and 54020 are hereby granted subject to the following conditions:

1. The State Engineer has reviewed and approves of the Spring Valley and DDC 3M Plans that were prepared by the Applicant. The Applications are granted conditioned upon the Applicant's compliance with those 3M Plans, and any amendments to those 3M Plans that the State Engineer requires at a later date pursuant to his authority under Nevada water law;

2. The Applicant shall file an annual report with the State Engineer by March 31st of each year detailing the findings of the approved 3M Plans. Public comment will be received until June 30;

3. The Applicant shall file environmental monitoring data with the State Engineer by December 31 of each year;

4. The Applicant shall submit reports to the State Engineer setting forth the hydrologic datasets and notifications of investigation trigger activation. These data reports must be submitted within 15 days after the end of the calendar quarter for which they are submitted. The investigation trigger activation reports will be available for public review and comments shall be due 45 days after the end of the calendar quarter for which they are submitted;

5. The Applicant shall submit groundwater flow model output with the State Engineer as required in the 3M Plans. Public review and comments will be accepted by the State Engineer no later than 90 days after submittal of the reports;

6. The Applicant shall submit to the State Engineer the operation plan for the following calendar year, detailing the planned pumping distribution as well as management and mitigation

actions by November 15. Public review and comments will be accepted up to and including February 13;

7. The Applicant shall submit a memorandum to the State Engineer detailing if a mitigation trigger is activated. The memorandum shall be submitted within 30 days of activating a mitigation trigger detailing the description of the activated mitigation trigger and the implementation of mitigation actions.

8. The amount of groundwater available for appropriation under Applications 54003 to 54015, 54019 and 54020 is 61,127 afa, in staged development.

9. The amount of groundwater available for appropriation under Applications 53987 to 53922 is 22,861 afa.

Respectfully submitted this ____ day of January, 2018.

By:_____

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CERTIFICATE OF SERVICE

Pursuant to NRCP 5(b) and NRS 533.450, I hereby certify that I am an employee of TAGGART & TAGGART, LTD., and that on this date I served, or caused to be served, a true and correct copy of the foregoing, as follows:
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DATED this ____ day of January, 2018.

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Employee of TAGGART & TAGGART, LTD.