Rebuttal Report to Reich and Symons (2017)

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Submitted to:
Jason King, P.E., State Engineer
State of Nevada
Department of Conservation & Natural Resources
Division of Water Resources
901 S. Stewart Street, Suite 2002
Carson City, Nevada 89701

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Prepared by:
Southern Nevada Water Authority
Water Resources Division
P.O. Box 99956
Las Vegas, Nevada 89193-9956

Lisa M. Luptowitz, Environmental Resources Division Manager — Date 8/7/17

Zane L. Marshall, Director, Resources & Facilities — Date 8/9/2017

James P. Prieur, Sr. Hydrologist — Date 8/7/2017

Nancy A. Beecher, Sr. Biologist — Date 8/7/2017

1.0 INTRODUCTION

This document presents a rebuttal to the *Methodology and Process Required to Establish Quantitative Threshold Values for Mitigation to Protect Existing Water Right and Unreasonable Impacts to the Environment*, prepared by Stetson Engineers Inc. (Reich and Symons, 2017). The Reich and Symons report was prepared for the Confederated Tribes of the Goshute Reservation (CTGR) and presented as CTGR Exhibit 018.

Reich and Symons' analysis and recommendations relied upon their review of previous hydrologic monitoring and mitigation plans for Spring Valley (SNWA, 2011b) and Delamar, Dry Lake, and Cave valleys (DDC) (SNWA, 2011a), and the Spring Valley biological monitoring plan (Biological Work Group, 2009) (Reich and Symons, 2017, p. 5). The Southern Nevada Water Authority (SNWA) submitted new Monitoring, Management, and Mitigation (3M) Plans for DDC and Spring Valley (SNWA, 2017a and b, presented as SNWA Exhibits 593 and 592), which will be used for the Clark, Lincoln, and White Pine Counties Groundwater Development Project (GDP). The approach and rationale of the 3M Plans, including how specific senior water rights and environmental resources are protected, are detailed in the technical analysis report supporting the 3M Plans (Marshall et al., 2017).

Reich and Symons recommend implementation of a programmatic process for assessing impacts, including additional monitoring, modeling, consultation, and reporting. The major recommendations of Reich and Symons are summarized in Section 4.0 of their report (Reich and Symons, 2017, p. 27-30). In summary, they recommended the following topics be addressed in the 3M Plans: 1) additional monitoring, 2) cultural resources, 3) White River Flow System, 4) basin-specific groundwater models, 5) comprehensive baseline study, 6) annual reports, 7) inter-stage approval, and 8) review of studies and reports.

The SNWA 3M Plans already address additional monitoring, including for areas which may contain cultural resources identified by the CTGR, the White River flow system, baseline studies and the incorporation of adaptive management, annual reporting, and pumping stage approvals by the Nevada State Engineer (NSE). Justification is provided below regarding why preparation of basin-specific models is not appropriate or necessary at this time, along with the opportunities and processes which are available for CTGR and other stakeholder involvement.

2.0 DISCUSSION

SNWA's 3M Plans identify unreasonable effects, thresholds, quantitative triggers, monitoring, management actions, and mitigation actions (SNWA, 2017a and b). The 3M Plans meet Reich and Symons' suggestion for "an objective framework and methodology required to set triggers, thresholds, and action items required to protect the public's interest." (Reich and Symons, 2017, p. 1). As discussed below, the SNWA 3M Plans, along with other existing compliance processes, already address the concepts included in the Reich and Symons recommendations.

2.1 Additional Monitoring

Reich and Symons recommend early-time groundwater level monitor wells, and specify two monitor wells for each new production well sited at a location to record a one-foot response to pumping at year 1 and 5 after production start (Reich and Symons, 2017, p. 13). These are arbitrary recommendations without consideration for site-specific conditions and proximity of senior water rights and environmental resources. No justification or analysis was provided for these specific recommendations in the Reich and Symons report, including why recording a one-foot drawdown is necessary instead of a different drawdown value.

SNWA's approach for monitoring to detect early warning of the propagation of groundwater drawdown is detailed in the technical analysis report for the 3M Plans (Marshall et al., 2017). Rather than arbitrary numbers, SNWA uses a systematic approach to hydrologic monitoring based on actual data, including the use of intermediate and sentinel monitor wells between the GDP points of diversion (POD) and senior water rights and environmental resources. While observations of the cone of depression immediately adjacent to a production well is useful to determine aquifer properties, it is more important to ensure monitoring is associated with triggers to implement management and mitigation actions to avoid unreasonable effects to senior water rights and environmental resources.

For the 3M Plans, SNWA identified monitoring based on hydrogeologic setting, available data for the area, boundary conditions, aquifer properties including aquifer heterogeneities, expected vertical and horizontal anisotropy, expected confined or unconfined conditions, number and type of other hydrologic monitoring in the area, distance and attributes of senior water right PODs and environmental resources, and physical and regulatory access to potential monitoring sites. For the 21 permitted SNWA PODs in Spring and DDC valleys, SNWA identified over 130 current, planned, or proposed groundwater, spring, and stream monitoring locations in the 3M Plans (Marshall et al., 2017, Section 10.0; SNWA 2017a and b, Section 2.1). The 3M Plan management actions also include the evaluation of adding additional monitoring should certain investigation triggers become activated (SNWA, 2017a and b). This exceeds the arbitrary two monitor wells per production well recommendation by Reich and Symons.

In addition to monitoring by SNWA, other entities also collect hydrologic monitoring data in the GDP area. These include the U.S. Geological Survey, NSE, Utah Geological Survey, and other federal, state, and private entities. This additional monitoring data supplements and verifies SNWA data.

The use of a monitor well near a production well to determine aquifer properties, along with a more distant well to detect the propagation of a cone of depression, is consistent with industry practice (Sterret, 2007, p. 190). However, rather than using a predetermined projected drawdown value to determine the distance a monitor well should be located, as suggested by Reich and Symons (2017, p. 13), monitor wells can be located at any distance that detects measurable drawdown. Aquifer properties can be calculated using both time-drawdown and distance-drawdown analysis methods. Therefore, monitor wells do not need to be located at a specific distance from a production well to be effective at determining aquifer properties or to be used in calibrating a numerical groundwater flow model.

In concert with the monitoring network identified in the 3M Plans, SNWA anticipates additional monitor wells will also be installed associated with the GDP production wells for sites with limited aquifer response data. An example of the approach SNWA will use for developing production well sites is the process SNWA used for installation of test wells in Spring and Cave valleys. After completion of surface geophysical surveys, geologic mapping, and collection of other local hydrogeologic data, an exploratory borehole was drilled, and lithologic logging and downhole geophysics performed. The exploratory borehole was then completed as a monitor well, and a decision was made for installation of an adjacent high capacity test well based on observed subsurface conditions. After completion and development of the test well, hydraulic testing was performed including a step-drawdown test followed by a multiple-day constant rate test. The original exploratory borehole/monitor well was used for drawdown observation during this testing. SNWA anticipates a similar process for new GDP production well drilling and testing. For areas where there is limited hydrogeologic information, SNWA anticipates production wells will typically have an adjacent monitor well.

Data collected from drilling and testing of monitor and production wells, along with monitoring data collected during groundwater production, will be used in numerical groundwater flow model updates which will be submitted to the NSE as committed under the 3M Plans (SNWA, 2017a and b, Section 4.0). Groundwater modeling is further discussed in Section 2.4 below.

Thus, the monitoring identified in SNWA's 3M Plans meets Reich and Symons' recommendation of monitoring that provides an "early warning system for predicting long-term impacts to existing water rights and environmental resources" and "provide[s] for improved model calibration" (Reich and Symons, 2017, p. 28). The monitoring proposed in the SNWA 3M Plans identifies the number, location, design, and configuration of monitor wells based on hydrogeologic setting and available data, instead of using an arbitrary number of wells sited based on predetermined presumed aquifer response values.

2.2 Cultural Resources

Reich and Symons recommend monitoring of cultural resource sites, and consultation with Native American Tribes (Tribes) (Reich and Symons, 2017, p. 14-15). The monitoring identified in SNWA's 2017 3M Plans and other compliance processes address these recommendations. A Programmatic Agreement (PA) regarding National Historic Preservation Act Section 106 compliance for the GDP was completed among the Department of the Interior, Bureau of Land Management (BLM), Nevada State Historic Preservation Officer, the Advisory Council on Historic Preservation, and SNWA (U.S. Department of Interior et al., 2012, presented as Exhibit D of SNWA Exhibit 481). The PA incorporates commitments and processes for identification, evaluation, and mitigation of potential impacts to cultural resource sites, including properties for which Tribes attach religious and cultural significance. In accordance with federal regulations, executive orders, and agency guidance, and as committed under the PA, the BLM is the lead federal agency responsible for consultation with Tribes on the GDP, and has committed to ongoing and future consultation on the GDP. The PA provides an established process for ongoing consultation with Tribes during implementation of the GDP (U.S. Department of Interior et al., 2012). In accordance with the PA, SNWA may, with prior BLM authorization, contact the Tribes to collect information for purposes such as identification of historic properties, but SNWA may not negotiate or give the appearance of exercising BLM's tribal

consultation authority, without BLM having obtained express written consent from the relevant tribal government (U.S. Department of Interior et al., 2012, p. 10).

The technical analysis report for the 3M Plans explains why resources must be in hydraulic connection with the producing aquifer to be affected by SNWA GDP pumping (Marshall et al., 2017, Section 4.2.1). There is no evidence that environmental resources outside of the groundwater discharge area, such as springs, streams, or vegetation in the mountain block, are hydraulically connected to the producing aquifer in which SNWA GDP production wells will be installed. As shown on Figure 1 of the Reich and Symons report, and confirmed using the UTM coordinates listed in Attachment B of the Reich and Symons report, two of the identified CTGR cultural sites are located within the groundwater discharge area of Spring Valley (Figure 1). These two sites are Village 11 Biabauwundu, and Village 12 Basonip. Village 11 Biabauwundu is located on Cleveland Ranch, private land owned by the Corporation of the Presiding Bishop for the Church of Jesus Christ of Latter-day Saints (CPB), and Village 12 Basonip is located on land owned by SNWA (Figure 2).

Village 11 Biabauwundu is located approximately 6.5 miles northwest of the closest GDP POD. There are five sentinel wells (SPR7044M (planned), SPR7030M and SPR7030M2, and SPR7029M and SPR7029M2), another monitor well (SPR7031Z), and two spring discharge measurement locations (1848401 and 1848501) between the Village 11 site and the closest GDP PODs (Figure 2). The use of sentinel and monitor wells is described in the technical analysis report for the 3M Plans (Marshall et al., 2017, Sections 3.2 and 6.2). Current baseline hydrographs and investigation triggers for these sentinel and monitor wells are presented on Figures C-1 through C-4 and C-34 in the Spring Valley 3M Plan (SNWA, 2017b, Appendix C). These monitoring sites will detect and measure any groundwater drawdown that may propagate toward the Village 11 site area. More detailed maps, descriptions of the GDP POD locations, and additional monitoring in the vicinity are presented in Sections 6.2.2 and 6.2.3 of the technical analysis report for the 3M Plans (Marshall et al., 2017). The commitment to monitoring, along with triggers, management and mitigation actions tied to monitor wells under the Spring Valley 3M Plan (SNWA, 2017b) protects the Village 11 cultural resource site area. The Village 11 Biabauwundu site will also be identified, evaluated, assessed, and mitigated if necessary in accordance with the commitments in the PA.

Village 12 Basonip is located approximately two miles northeast from the closest GDP POD. According to CTGR, as stated in Reich and Symons, “The Basonip Village is also associated with Bastian Springs and Layton Spring, which together with Bastian Creek, ‘played a key role in the human occupation and use of Spring Valley and the Swamp Cedar Natural Area’” (Reich and Symons, 2017, p. 14-15). Based on the site description for Bastian Springs (Lahren, 2010, p. 9), it appears that this is meant to reference South Bastian Spring. Layton and South Bastian springs have been documented to be dry over extended periods of time (Marshall et al., 2017, p. 6-19 and Appendix F p. F-2 to 5). Bastian Creek does not have a saturated continuum between the streambed and the GDP producing aquifer (i.e., it does not have a hydraulic connection to the aquifer in which GDP production wells will be installed), and therefore would not be affected by SNWA GDP pumping (Marshall et al., 2017, p. 4-6).

Two intermediate monitor wells (Bastian South and SPR7012Z) are located between the closest GDP POD and the Village 12 site (Figure 2). Current baseline hydrographs and investigation triggers for these monitor wells are presented on Figures C-25 and C-29 in the Spring Valley 3M Plan (SNWA,

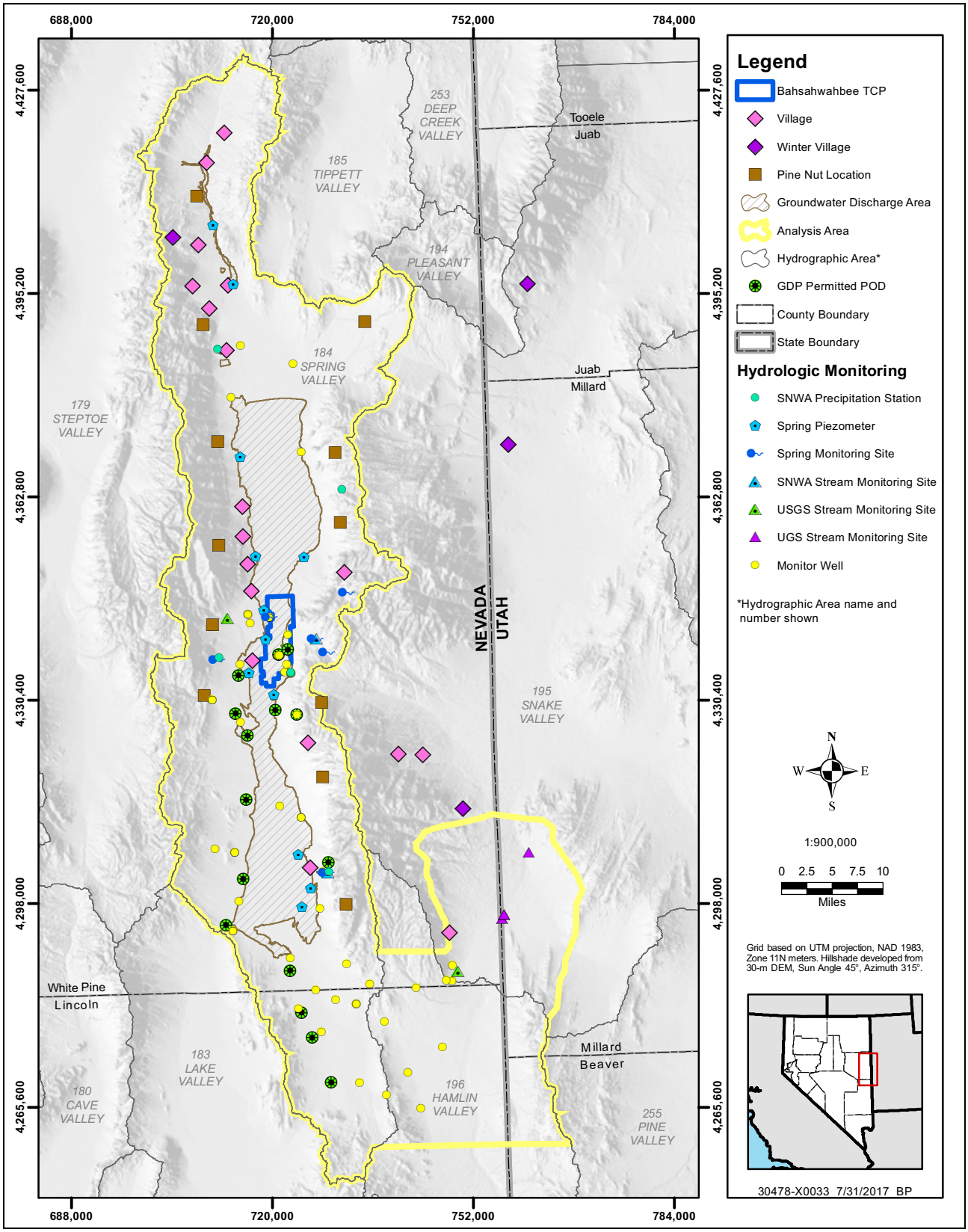

Figure 1
CTGR Sites, Groundwater Discharge Area, and Hydrologic Monitoring Network

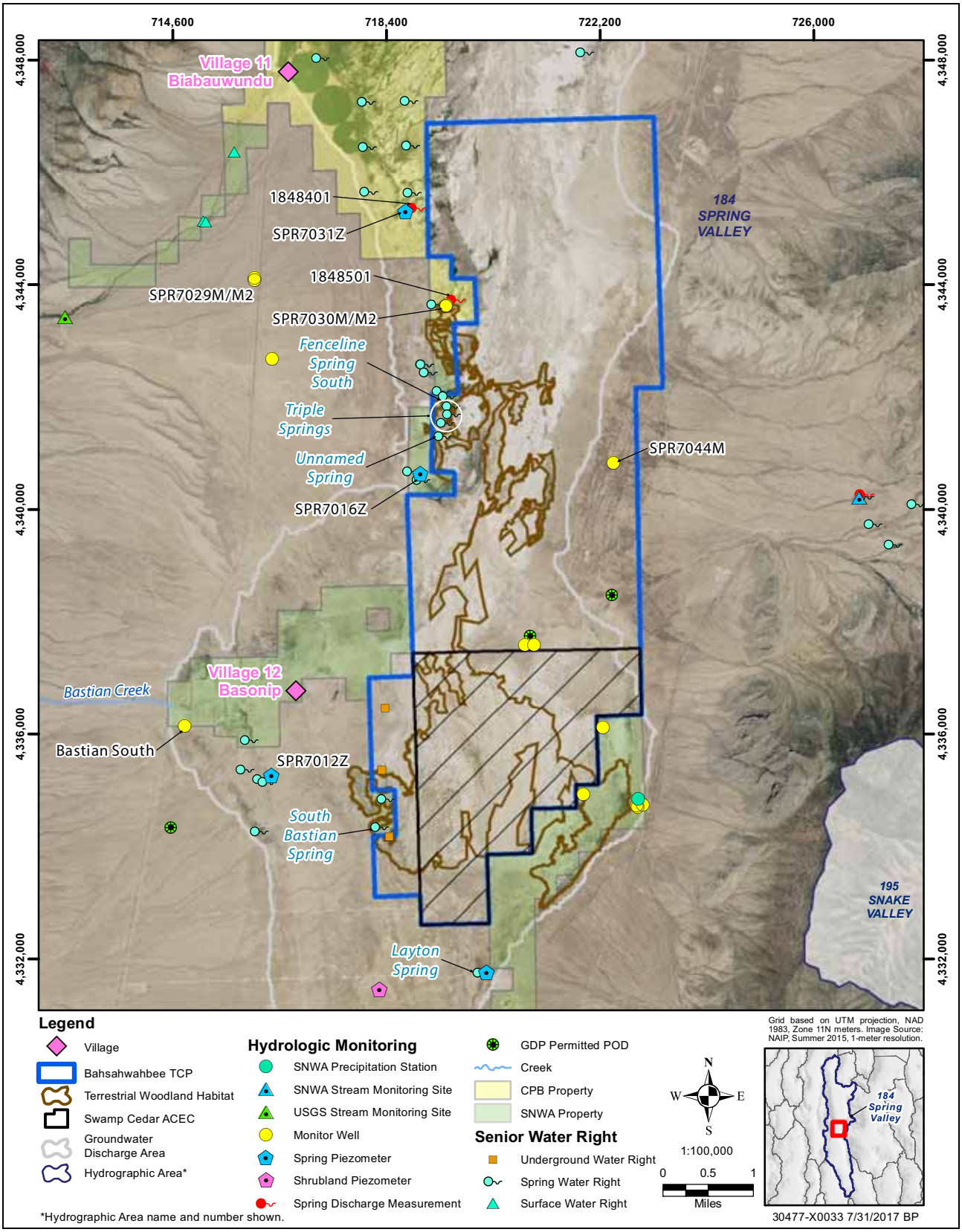

Figure 2
Bahsahwahbee TCP, Swamp Cedar ACEC, and Hydrologic Monitoring Network

2017b, Appendix C). These shallow and deep aquifer monitoring sites will detect and measure any drawdown which may propagate towards the Village 12 site area. More detailed maps, descriptions of the GDP POD locations, and additional monitoring in the vicinity are presented in Section 6.2.2 of the technical analysis report for the 3M Plans (Marshall et al., 2017). The commitment to monitoring, along with triggers, management and mitigation actions tied to the intermediate monitor wells under the Spring Valley 3M Plan (SNWA, 2017b) protects the Village 12 cultural resource site area. The Village 12 Basonip site will also be identified, evaluated, assessed, and mitigated if necessary in accordance with the commitments in the PA.

The Bahsahwahbee Traditional Cultural Property (TCP) is identified in CTGR Exhibit 021 (CTGR, 2017). None of the CTGR cultural sites identified in the Reich and Symons report are located within the boundaries of the Bahsahwahbee TCP. The CTGR identifies that the Bahsahwahbee TCP boundary encompasses the area where massacres occurred, areas where Newe attempted to escape during massacres, plant communities used for ceremonial purposes, historic plant gathering areas, and springs used historically and presently for ceremonies (CTGR, 2017, p. 35). The Bahsahwahbee TCP is located entirely on federal land managed by the BLM (CTGR, 2017, p. 34). Figure 2 displays the Bahsahwahbee TCP, using the UTM coordinates provided in CTGR Exhibit 021, in relation to terrestrial woodland habitat and springs. The terrestrial woodland habitat is a low elevation woodland, comprised of Rocky Mountain juniper with intermixed Utah juniper, which in this area is also referred to as “swamp cedars”. Further discussion of the terrestrial woodland habitat (swamp cedars) is provided in the technical analysis report for the 3M Plans (Marshall et al., 2017, Section 6.3.4). As noted in CTGR Exhibit 021, the trees are of spiritual and cultural significance to the Western Shoshone and Goshute and the area is associated with historical massacres (CTGR, 2017, p.4).

Terrestrial woodland habitat monitoring, triggers, management actions, and mitigation actions have been identified for the Swamp Cedar Area of Critical Environmental Concern (ACEC) (SNWA, 2017b, Sections 2.2.1.4 and 3.3.2.4). Of the 2,450 acres of terrestrial woodland habitat within the Bahsahwahbee TCP, approximately 65 percent is located within the Swamp Cedar ACEC, which has been designated by the BLM for its cultural resources and unique plant community (Rocky Mountain juniper in alkali valley soils) (BLM, 2007, p. 2.4-106; BLM, 2012, p. 3.14-19). An additional 500 acres of terrestrial woodlands are located on adjacent SNWA property, which are a natural continuation of the trees in the ACEC. SNWA has committed to maintaining and enhancing the trees on its property as part of mitigation actions associated with the GDP (SNWA, 2017b, p. 3-46), and would not object to requests from Tribal members to access these areas on its property as they do the federal lands of the Bahsahwahbee TCP for traditional cultural and ceremonial practices.

Springs located within or immediately adjacent to the Bahsahwahbee TCP are Fenceline Spring South, Triple Springs (North, Middle, and South), and an unnamed spring (Figure 2). Fenceline Spring South and Triple Springs have senior vested water right claims (Application Nos. V10085, V10078, V10079, and V10080) for stockwater, and the unnamed spring has a senior reserved spring water right (Permit No. R05279) (Marshall et al., 2017, p. 6-17 Table 6-6). These springs are located approximately 2.5 miles from the closest GDP POD. An additional 13 senior spring water rights are located within 150-1,800 feet of the TCP boundary (Figure 2). Two monitor wells (SPR7044M (planned) and SPR7016Z) are located between the nearest GDP PODs and these springs. The current baseline hydrograph and investigation trigger for the existing well is presented on Figure C-30 in the

Spring Valley 3M Plan (SNWA, 2017b, Appendix C). The monitoring sites will detect and measure any groundwater drawdown that may propagate toward the springs. Additional monitoring and GDP POD locations in the vicinity of the springs are presented in Section 6.2.2 of the technical analysis report for the 3M Plans (Marshall et al., 2017). A description of the SNWA 3M Plans' approach and process, and how triggers, management actions, and mitigation actions will ensure protection of these senior water rights, are described in the technical analysis report for the 3M Plans (Marshall et al., 2017, Section 3.0) and the Spring Valley 3M Plan (SNWA, 2017b, Section 3.0).

All cultural resource sites with the potential to be adversely affected by the GDP, including the sites identified by the CTGR, the Bahsahwahbee TCP, other pre-historic and historic properties, and other properties of traditional religious and cultural importance to Tribes, will be identified, evaluated, assessed, and mitigated in accordance with federal regulations and the processes established in the PA. The commitments under the PA apply on federal, state, and private lands, and include assessment of direct effects from facility construction, visual effects, indirect effects from groundwater pumping, and cumulative effects. In accordance with federal regulations and as committed under the PA, the BLM is responsible for ongoing and future government-to-government consultation with Tribes, regardless of whether the Tribes signed the PA (BLM, 2012, p. 3.17-4; U.S. Department of Interior et al., 2012, p. 2 and 4).

Pursuant to state law, the Tribes have the opportunity to provide input into the NSE's decision on establishment of monitoring, triggers, and management and mitigation actions for the GDP as part of the current hearings, in future NSE hearings on changes to the GDP water rights, and in future public reviews of reports and studies submitted to the NSE. As noted by Reich and Symons, the BLM is using a tiered approach for National Environmental Policy Act (NEPA) compliance for the GDP, and "future NEPA analysis...will provide opportunities for additional, more-specific analysis of groundwater withdrawal options." (Reich and Symons, 2017, p. 10). The Tribes and the public will have additional opportunities to provide comment and input on GDP development as part of the NEPA process, and federal government-to-government consultation with the Tribes will continue to occur as committed under the PA.

Thus, SNWA's 3M Plans, along with the federal PA and NEPA processes, address Reich and Symons' recommendations for Tribal consultation, monitoring of cultural resource sites, establishment of quantitative triggers, mitigation, and public involvement.

2.3 White River Flow System and Utah Counties

Reich and Symons recommend the 3M Plans address the White River Flow System (WRFS) and Millard and Juab Counties, Utah. Water rights and environmental resources in the WRFS are described in Sections 8.0 and 9.0 of the technical analysis report for the 3M Plans (Marshall et al., 2017) and monitoring, triggers, and management and mitigation actions relating to the WRFS are identified in the 3M Plan for DDC (SNWA, 2017a).

Senior water rights and environmental resources within the analysis area in Utah, which encompasses portions of Millard and Beaver Counties, are described in Section 7.0 of the technical analysis report for the 3M Plans (Marshall et al., 2017). Juab County is located approximately 40 miles north of the analysis area's northern boundary in Snake Valley, and potential effects from the GDP in Juab

County were not identified in either SNWA's regional groundwater flow model or the BLM's Final Environmental Impact Statement (BLM, 2012). Under the Sping Valley 3M Plan, hydrologic monitoring associated with resources in Hamlin and Snake Valleys provide the ability to effectively detect and measure any propagation of drawdown and implement appropriate management and mitigation actions to avoid unreasonable effects in both Nevada and Utah (Marshall et al., 2017, p. 7-4). The SNWA monitoring network provides over 15 miles of buffer between sentinel monitor wells and other senior water rights in Snake Valley in Nevada and Utah. The triggers and management and mitigation actions associated with the sentinel monitor wells ensure potential unreasonable effects at more distant senior water rights and environmental resource sites in Utah are avoided (Marshall et al., 2017, p. 7-19 to 7-28).

Thus, SNWA's 3M Plans meet Reich and Symons' recommendation of addressing the WRFS and Utah Counties.

2.4 Basin-Specific Groundwater Flow Models

Reich and Symons recommend development of basin-specific groundwater models prior to pumping, to establish standards when mitigation would occur. As noted in their report, the preparation of basin-specific numerical groundwater flow models is a requirement of the NEPA process (mitigation measure GW-WR-3b) and a commitment of SNWA's right-of-way grant (BLM, 2013, Exhibit C p. 8). This commitment requires preparation of these basin-specific models prior to tiered NEPA analysis, so the BLM can use the models to evaluate potential project-related impacts under federal law.

Both the NSE and the BLM have determined that the current regional groundwater flow model is sufficient for granting approval of the GDP, and the NSE's findings on this were not overturned by the Court (Seventh Judicial District Court of the State of Nevada, 2013). It is important to recognize that basin-scale models will initially be no better at predicting project-related impacts than the regional scale model, as they would be based on the same currently available hydrologic and geologic information. The most important type of information necessary to improve the predictive capability of a model is aquifer-response data. The basins that are the subject of this hearing currently have very few production and associated monitor wells within them, which means there is very little aquifer-response data available. Aquifer-response data will be collected with the onset of groundwater production and the predictive capabilities of the regional groundwater model and any basin-specific models will dramatically improve shortly after production begins. The groundwater flow models will be updated or revised and recalibrated at least every 5-8 years, or sooner as required by the NSE (SNWA, 2017a and b, p. 4-1) or the BLM (BLM, 2013, Exhibit C p. 8). Reich and Symons fail to describe how, in the absence of aquifer-response data, basin-scale groundwater flow models will provide a "higher degree of certainty" and are necessary "in order to refine environmental indicator threshold levels" (Reich and Symons, 2017, p. 5 and 11).

Reich and Symons recommend a minimum of 10 years of hydrologic data to calibrate the basin-specific models. A hydrologic monitoring network was established and systematic baseline data collection for the GDP began in 2006; annual data reports of this hydrologic data have been provided to the NSE since 2008. The current regional groundwater flow model incorporated all available hydrologic data in the region to date, along with 30 years of precipitation data and other

climate data ranging back to 1895 (SNWA, 2009). Any additional baseline data which is available will be incorporated in an update to the regional groundwater flow model as required by the NSE before groundwater development begins (NDWR, 2012a, p. 217; NDWR, 2012b, p. 170; NDWR, 2012c, p. 163; and NDWR, 2012d, p. 162). Pursuant to the requirements under NSE Ruling Nos. 6164-6167, biological and hydrologic baseline studies will be completed and approved by the NSE prior to export of groundwater from Spring Valley and DDC (NDWR, 2012a, p. 217; NDWR, 2012b, p. 170; NDWR, 2012c, p. 163; and NDWR, 2012d, p. 161). The NSE required a minimum of two years of biological and hydrologic baseline data, however SNWA has committed to additional five years of baseline data under the 3M Plans (SNWA, 2017a and b). The NSE decisions regarding baseline data collection were not overturned by the Court (Seventh Judicial District Court of the State of Nevada, 2013).

The establishment of thresholds, triggers, and monitoring, management and mitigation actions is required at this stage in accordance with the Court's Remand Order (Seventh Judicial District Court of the State of Nevada, 2013, p.23). Therefore, SNWA is unable to follow Reich and Symons' recommendation to wait to establish these items until after basin-specific models are developed. SNWA developed thresholds, triggers, and management and mitigation actions based on observed data, and did not rely on uncertain modeling results. Detailed pumping schedules and additional hydrologic data are not yet available, and thus development of basin-specific groundwater flow models would have nothing to contribute to the establishment of thresholds, triggers, monitoring, management, and mitigation actions. SNWA recognizes that basin-specific groundwater flow models will have a role as part of the GDP, and has identified preparation of higher resolution local flow models as a management action (SNWA, 2017a, p. 3-9; SNWA, 2017b, p. 3-8). However, these higher resolution models are relevant only if sufficient data exists to make them a useful tool for analysis within the specific area of interest.

Thus, Reich and Symons' recommendation for preparation of basin-specific groundwater flow models will be completed as part of future NEPA analysis and as management actions associated with the 3M Plans. However, they are not necessary at this time for establishment of monitoring, triggers, and management and mitigation actions.

2.5 Comprehensive Baseline Study

Reich and Symons recommend preparation of a comprehensive baseline study prior to groundwater withdrawals, incorporating an adaptive management plan. However, Reich and Symons do not acknowledge that parallel processes are necessary under Nevada water law and federal environmental and land regulations. It is not necessary, nor appropriate, for the NSE to wait until BLM approves specific production well sites to make a decision regarding the award of water rights.

All of the components of Reich and Symons' recommended comprehensive baseline study are already addressed under the SNWA 3M Plans or by the NSE water rights process. Reich and Symons' recommendations relating to the comprehensive baseline study are discussed by topic below.

Adaptive Management

SNWA concurs that adaptive management is an important component for managing development of the GDP, and the NSE also determined that adaptive management is appropriate and advisable for managing a long-term project such as the GDP (NDWR, 2012a, p. 182). Adaptive management is defined as "a system of management practices based on clearly identified outcomes and monitoring to determine whether management actions are meeting desired outcomes; and, if not, facilitating management changes that will best ensure that outcomes are met or re-evaluated" (43 C.F.R. § 46.30).

Adaptive management is incorporated into the monitoring, triggers, and management and mitigation actions in SNWA's 3M Plans (SNWA, 2017a and b). The 3M Plans have clearly defined outcomes to avoid unreasonable effects, including the establishment of quantitative investigation and mitigation triggers, monitoring to detect if triggers are activated and if actions are meeting desired outcomes, and management and mitigation actions that can be implemented to ensure unreasonable effects are avoided. Examples of adaptive management in the 3M Plans include:

- Quantitative trigger values that are linked to the baseline data record will be re-calculated using new data acquired through the entire baseline period (Marshall et al., 2017, p. 3-6).

- Aquifer response data will be used to update the groundwater model and other predictive tools, which will lead to enhanced understanding and management of groundwater drawdown (SNWA, 2017a and b, Section 4.0).

- Monitoring data will be used to assess management and mitigation efficacy, which may lead to modifications in management and mitigation actions to avoid unreasonable effects (Marshall et al., 2017, Section 3.1.4; SNWA, 2017a and b, p. 2-1).

- Preemptive, discretionary management actions, which are employed as best management practices for the GDP to avoid or minimize the risk of activating a mitigation trigger, will be implemented depending upon the resource and situation (Marshall et al., 2017, p.3-5; SNWA, 2017a, p. 3-4; SNWA, 2017b, p. 3-3).

- GDP pumping operations will be managed and adjusted as necessary to manage drawdown based on aquifer response and groundwater flow model projections (SNWA, 2017a, p. 3-10; SNWA, 2017b, p. 3-9).

Reich and Symons recommended adaptive management components be addressed in a comprehensive baseline study. These components, along with how they are addressed in the current 3M Plans, are listed below.

1. Adaptive management approach, describing concepts such as reliability, resiliency and sustainability along with stakeholder involvement. The adaptive management approach for the 3M Plans is described in Section 3.1.4 of the technical analysis report for the 3M Plans (Marshall et al., 2017). As discussed further below and in Section 2.2, stakeholders and the Tribes have opportunities for involvement through the current NSE hearing process, future

NSE hearing processes, future NEPA and other federal processes, and as part of public review of materials submitted to the NSE.

2. Adaptive management cycle, with a set-up phase and an iterative phase, and modification of triggers, thresholds, and action items after knowledge of the system response during the baseline period. The 3M Plans identify how specific monitoring, predictive tools, and GDP operations are integrated to minimize potential effects and the potential for modification of actions (SNWA, 2017a and b, Sections 2.0 through 4.0). As noted in Section 2.4, establishment of thresholds and triggers is required at this stage by the Remand Order.

3. List of management constraints, including physical, environmental, and legal. The physical constraints, including surface water, groundwater, and aquifer conditions, were considered by the NSE in Rulings 6164-6167. Environmental constraints, including their definition under unreasonable effects, are addressed in Section 1.2 of the 3M Plans (SNWA, 2017a and b) and Section 2.2 of the associated technical analysis report (Marshall et al., 2017). Adherence to NSE rulings, court orders, and other legal considerations are also described in the technical analysis report for the 3M Plans (Marshall et al., 2017).

4. Identify triggers and thresholds. Thresholds and triggers have been identified in the 3M Plans, including specific, quantitative triggers and comprehensive lists of action items that will be implemented for each of the triggers for each senior water right or environmental resource (SNWA, 2017a and b, Section 3.0). It should be noted that there is no standard definition for the terms thresholds and triggers, and the definitions used in the SNWA 3M Plans (Marshall et al., 2017, p. 3-2 to 3-4) differ slightly than those used by Reich and Symons (Reich and Symons, 2017, p. 20-21).

5. List of action items. Action items, including both management and mitigation actions, are identified in the 3M Plans (SNWA, 2017a and b, Section 3.0) and described in the technical analysis report (Marshal et al., 2017, Sections 3.2 and 6.0-9.0). These replace the list of action items in the Reich and Symons report, which were from previous 3M plans (Reich and Symons, 2017, p. 21).

Updated Hydrologic and Biological Monitoring Plans

As previously described, the SNWA 2017 3M Plans replace the previous hydrologic and biological monitoring plans (SNWA, 2017a and b, p. 1-2). The 3M Plans may be updated or amended in accordance with any future rulings, orders, or other direction from the NSE.

Additional monitoring or other requirements which may be developed under NEPA or other federal or state regulatory processes will supplement, but are separate from, the monitoring required by the NSE in accordance with Nevada state water law. These other compliance processes are not part of Nevada water law or under the jurisdiction of the NSE, but represent the extensive requirements with which the SNWA GDP must comply in addition to the requirements under Nevada water law.

Baseline Data and Analysis

Reich and Symons recommend all baseline monitoring and analysis should be publicly available. All information SNWA submits to the NSE is public information and available for public review. SNWA anticipates this information will be available on a publicly accessible website.

Basin-Specific Groundwater Models and Model Analysis

Reich and Symons' recommendation regarding basin-specific groundwater flow modeling is discussed in Section 2.4. The use and updating of the groundwater flow model is described in Section 4.0 of the 3M Plans (SNWA, 2017a and b) and Section 3.2 of the associated technical analysis report (Marshall et al., 2017).

Stakeholder Involvement and Public Review

Reich and Symons recommended a process of stakeholder involvement, with identification of stakeholder goals and objectives. Stakeholder goals and objectives were described by Reich and Symons as "typically... expressed by triggers, thresholds, and action items" (Reich and Symons, 2017, p. 6). The current NSE hearing process provides an opportunity for stakeholder involvement and identification of stakeholder goals and objectives through submittal of expert reports, hearing testimony, and public comment.

SNWA does not object to the Reich and Symons' recommendation of a 90-day public review period for baseline and other data and reports submitted to the NSE. However, the NSE retains the authority and responsibility, as designated under Nevada law, to make decisions regarding permitting of water rights, to approve plans, and to give authorization to advance to the next stage of phased groundwater development.

In summary, the SNWA 3M Plans address all of Reich and Symons' recommendations on monitoring, triggers, and action items. The 3M Plans detail how monitoring provides an early-warning system and is used to make management decisions. Specific, quantitative triggers are established, along with a comprehensive list of action items that will be implemented for each of the triggers for each senior water right or environmental resource. Stakeholder involvement is provided through the NSE process. Thus, preparation of a separate comprehensive baseline study is not necessary.

2.6 Reporting and Approval Processes

Reich and Symons recommend information be provided to the NSE in an Annual Report, documenting monitoring activities, any changes and updates to the model, comparison of observed to predicted effects, management actions, thresholds, triggers and mitigation actions. These concepts are incorporated in SNWA's reporting described in the 3M Plans (SNWA, 2017a and b, Sections 4.0 and 5.0). SNWA proposed the following reporting schedule:

- Quarterly hydrologic monitoring data submittal, including notification of any hydrologic investigation trigger activation.

- Annual environmental monitoring data submittal, including notification of any environmental investigation trigger activation.

- Annual monitoring data report, describing data and activities performed over the past year. This includes pumping data, hydrologic and environmental data results, any investigation findings, any implemented management and mitigation actions, assessments of mitigation efficacy, and groundwater flow model output when the model is updated (every 5-8 years or as requested by the NSE).

- Annual operation plan, describing activities planned for the next year. This includes anticipated pumping distribution and any planned management and mitigation actions.

- Memorandum submitted within 30-days of any mitigation trigger activation. This includes description of the trigger and identification of the corresponding mitigation action(s) that will be implemented within 30 days of activation of the trigger.

- Other information upon request by the NSE.

Reich and Symons also recommend preparation of a "Consolidated Stage Performance Report." The information recommended for this report, including planned versus actual pumping, effectiveness of the model predictions, observed conditions as compared to baseline, and vegetation analysis are all components of either the annual monitoring data report or the annual operation plan described above. Thus, preparation of an additional separate report is duplicative and not necessary.

SNWA does not object to Reich and Symons' recommended 90-day public review period for reports submitted by SNWA or other entities. As noted in Section 2.5, all information submitted to the NSE is public information and available for public review.

As noted in Ruling No. 6164, the NSE will make a determination as to whether SNWA can proceed to the next stage of groundwater development, after review of the annual monitoring report including updated groundwater flow modeling results (NDWR, 2012a, p. 216-217).

3.0 CONCLUSION

Reich and Symons reviewed previous iterations of SNWA monitoring plans, and provided a series of recommendations for additional monitoring, modeling, and processes to establish standards for a comprehensive 3M Plan. SNWA's 2017 3M Plans have already identified additional monitoring, including for areas which may contain cultural resources, baseline studies, adaptive management, and reporting processes which address the concepts included in the Reich and Symons' recommendations.

SNWA defined unreasonable adverse effects, and established quantitative thresholds, triggers, and management and mitigation actions in the 3M Plans (SNWA, 2017a and b) and associated technical analysis report (Marshall et al., 2017). The triggers are established based on actual observed hydrologic and environmental data, rather than theoretical modeling. Preparation of basin-specific groundwater models is not necessary for the identification of thresholds or establishment of

thresholds, triggers, and management and mitigation actions, and in the absence of additional hydrologic data would have nothing to contribute to a better understanding of the area.

The NSE has recognized that the federal NEPA process and the state water rights hearings are separate but parallel processes, and that the NSE does not need to wait for completion of federal right-of-way processes to make decisions regarding water right applications. The current hearing process and any future change application process, provide opportunities for the Tribes, public and other stakeholders to provide comments and input prior to NSE decisions, and separate stakeholder processes are not necessary to comply with Nevada water law.

The monitoring, triggers, and management and mitigation actions identified in the SNWA 3M Plans address the mutual goal of the State of Nevada, SNWA, and stakeholders to allow water resource development without unreasonable effects on senior water rights, environmental resources, or the public interest.

4.0 REFERENCES

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