NEVADA TEST AND TRAINING RANGE (NTTR)
Land Withdrawal Application Packages/
Case File and Legislative EIS

WATER REQUIREMENTS STUDY OF THE NEVADA TEST AND TRAINING RANGE

FINAL
March 2017

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ACRONYMS

AEC	Atomic Energy Commission
AFB	Air Force Base
AFY	Acre-feet per Year
BLM	Bureau of Land Management
DNWR	Desert National Wildlife Range
DoD	Department of Defense
DOE	U.S. Department of Energy
DOI	Department of Interior
DRI	Desert Research Institute
EC	Electronic Combat
ECR	Electronic Combat Ranges
EC South	Electronic Combat South Range
EIS	Environmental Impact Statement
FFACO	Federal Facility Agreement and Consent Order
GBCAAS	Great Basin Carbonate and Alluvial Aquifer System
GIS	Geographic Information System
ISAFAF	Indian Springs Air Force Auxiliary Field
LEIS	Legislative Environmental Impact Statement
LVVWD	Las Vegas Valley Water District
MCL	Maximum Contaminant Level
MLWA	Military Lands Withdrawal Act
MOU	Memorandum of Understanding
NAFB	Nellis Air Force Base
NDCNR	Nevada Department of Conservation and Natural Resources
NDEP	Nevada Division of Environmental Protection
NDWIS	Nevada Drinking Water Information System
NDWR	Nevada State Division of Water Resources
NEPA	National Environmental Policy Act
NNSS	Nevada National Security Site
NTTR	Nevada Test and Training Range
O&M	Operations and Maintenance
PLSS	Public Land Survey System
SBCC	S&B Christ Consulting, LLC
SNWA	Southern Nevada Water Authority
TDS	Total Dissolved Solids
TECR	Tonopah Electronic Combat Range
TPECR	Tolicha Peak Electronic Combat Range
TRS	Township, Range and Section
TTR	Tonopah Test Range
USA	United States of America
USAF	U.S. Air Force
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

CHAPTER 1 - **EXECUTIVE SUMMARY**

The U.S. Air Force (USAF) is in the process of extending the withdrawal of land for military operations and training on the Nevada Test and Training Range (NTTR). In addition to extending the current withdrawal, the Air Force is evaluating several potential expansion alternatives. These potential expansion alternatives are pre-decisional in nature when evaluated in the context of the National Environmental Policy Act (NEPA). The current withdrawal will expire on November 6, 2021, unless Congress enacts legislation to extend it. In accordance with Section 3016 of the Military Land Withdrawal Act (MLWA), the USAF, in coordination with the Department of Defense (DOD), have notified Congress of a continuing military need for the NTTR land withdrawal. Furthermore, the Air Force plans to submit a Legislative Environmental Impact Statement (LEIS) that supports a legislative withdrawal proposal, which will be submitted through the Department of the Interior (DOI) to extend the withdrawal.

As part of the land withdrawal extension, the Air Force is preparing documentation required to support the Application Package, Case File, and legislative language to successfully accomplish the NTTR land withdrawal by November 2021. To maintain critical test and training capabilities at the NTTR, the Air Force must complete all required studies in compliance with NEPA, the Engle Act, Federal Land Policy and Management Act, the MLWA, and Land Withdrawals regulations set forth in Title 43 Code of Federal Regulations (CFR) Part 2300. The analysis and results of the Water Resources Report are needed in order to support the NEPA and Land Withdrawals regulations and support submittal of an application to the Bureau of Land Management (BLM), provision of a Case File to the DOI, and development of draft legislation for Congressional approval of the withdrawal in accordance with applicable rules and regulations.

This report compiles information to summarize historic and existing water resources filed with the State Engineer through the Nevada Division of Water Resources (NDWR). The future and cumulative impacts of these resources were also evaluated. Information was collected from a variety of sources including governmental, regulatory, public, and private organizations. The information gathered includes assessment reports, special studies, public records, status reports, management plans, policies and data relevant to water resources with the proposed NTTR withdrawal extension and expansion areas. No site investigations or visits were performed in the course of preparing this document.

Water resources are allocated and managed under the following NDWR documentation:

- Groundwater permits
- Surface water permits
- Water well logs

These resources were reviewed and further broken down into the following categories for this analysis:

- USAF owned
- Other federal agency owned
- Privately owned – includes any other individual or entity not captured under USAF or other federal agency owned

Each water source type is subject to the regulatory policies and practices of the State Engineer. Nevada water law is based on two basic principles: prior appropriation and beneficial use. Prior appropriation is based on prioritizing and protecting senior water rights, known as “first in time, first in right.” Beneficial use is based on the demonstration of water utilization for manners such as irrigation, mining, stockwatering, recreation, commercial, industrial, and municipal supply.

The transfer or purchase of land does not necessarily guarantee the ownership of the water resources attached to it. A permit application to utilize a source of water (e.g. a spring) in Nevada must be submitted to NDWR. The State Engineer will review the application and determine if a permit will be issued. The permit authorizes the use of the appropriated amount of water for beneficial use in a specified manner.

Proof of completion of water diversion works and proof of beneficial usage need to be demonstrated for a permit within a certain amount of time to be issued a certificate of appropriation. If these items are not demonstrated the permit will be cancelled.

Four alternatives have been proposed for the LEIS. The following summarizes the alternatives evaluated and the anticipated impact.

Alternative 1 continues the existing land withdrawal and management of NTTR without change to the boundary. Current activities would continue, management responsibilities would remain unchanged and industrial facilities would remain active. Existing water rights would continue to be withdrawn, except for those that are cancelled, forfeited, or abandoned into the future. Privately held water permits on the current NTTR land largely consist of those that are dated before or around establishment of the NTTR. A number of the privately held permits or well logs locatable on the NTTR through NDWR records are possibly due to administrative error. Valid certificates on the NTTR held by non-USAF individuals or entities have justification to access these resources. However, new applications for water rights submitted to NDWR may be protested by the USAF or any other concerned entity. Therefore, any potential increase of water rights appropriations into the future will likely only occur due to USAF or other federal agency specific activities that concur with land use. A portion of the privately held permits identified in this analysis appear to have been transferred from private owners to the USAF. It is recommended that the USAF continue to abrogate or acquire privately held permits on the NTTR.

This analysis identified 44 groundwater permits located on the NTTR and proposed expansion areas. This consists of 19 USAF permits, 1 other federal agency permit, and 24 privately held permits. The allocation amounts provided on these permits (when noted) totaled 11,273 acre feet per year; the USAF is allocated 1,837 AFY of this amount. One-hundred seventy-five (175) well logs were also identified; 31 USAF well logs, 42 other federal agency well logs, and 102 privately held well logs. This analysis also identified 78 surface water permits consisting of 27 USAF permits, 21 other federal agency permits, and 30 privately held permits. The allocation amounts provided on these permits (when noted) totaled 374 AFY; the USAF is allocated 188 AFY of this amount.

Alternative 2 extends the existing land withdrawal and provides ready access in the North and South Range. There would be no changes to the current NTTR boundary. Ready access may be implemented through a combination of methods including: removal of the Proposed Wilderness designation that overlaps into the South Range; reallocating primary jurisdiction from the US Fish and Wildlife Services (USFWS) to the USAF; development of a binding Memorandum of Understanding (MOU); and enactment of legislative provisions and management under the Sikes Act. It should be noted that ready access does not mean exemption from applicable laws and regulations that are not specifically addressed by legislation supporting the withdrawal.

Current activities would continue and industrial facilities would remain active. Existing water rights would remain withdrawn, except for those that are cancelled, forfeited, or abandoned. There are a number of water rights held by the USFWS for the purpose of providing water for wildlife within the Desert National Wildlife Refuge (DNWR). The removal of the proposed wilderness designation of this area would not void these water rights. The USFWS would have justification to access the water to continue wildlife watering activities.

Alternative 3 includes the currently withdrawn areas as described in Alternatives 1 and 2 above and include three (3) options for expansion areas to fulfill increased operational and safety needs. These three options include: Alternative 3A: Range 77 – EC South Withdrawal; Alternative 3B: Range 64 C/D and 65D Withdrawal and Administrative Incorporation; and Alternative 3C: Alamo Withdrawal.

Alternative 3A proposes to increase the NTTR boundary by approximately 18,000 acres of land to add a safety and security buffer to the footprint of the EC South (ECS) area and the entirety would be redesignated as “Range 77” to allow full air-to-ground operations. There would be no construction disturbance or additional water resource use in this additional area proposed for acquisition. The additional land would serve as a safety buffer for live weapons deployment on the interior of Range 77.

It is recommended that any non-USAF permits identified in these areas are abrogated or acquired by the USAF to avoid safety and security issues resulting from accessing the water sources.

Alternative 3B proposes to withdraw approximately 57,000 acres of land located along the southern border of the NTTR. This additional land would improve the NTTR operational security and safety buffers to decrease the potential for unauthorized access from the public. Water resources are not anticipated in these areas. It is recommended that any non-USAF permits identified in these areas are abrogated or acquired by the USAF to avoid safety and security issues resulting from accessing the water sources.

Alternative 3C proposes to withdraw an additional approximate 227,000 acres of the DNWR to correspond with potential weapons safety footprints associated with Range 62A. The USAF would like to develop potential insertion points that would include one runway that would be a mockup location to provide special operations personnel a location to practice tactics, while a second runway would be an active runway, providing more realistic insertion training. Each runway would be 6,000 feet long and 90 feet wide. It is anticipated that ground disturbance activities associated with construction of the runways would be less than 13 acres.

Solidified plans of installation activities are not known for specific areas within this proposed expansion area. It was assumed for the purposes of this report that additional water resources would be brought in from an existing permitted source. Alternatively, additional water may be obtained by applying for it through the NDWR. However, the Alternative 3C expansion primarily consists of water basins that are currently at or over allocation, which will likely impact the State Engineer's review in the acquisition of water resources for this area. It is anticipated that further NEPA-related environmental analysis will be necessary for future development as proposed activities and water resource needs are evaluated.

Alternative 4 includes the currently withdrawn area as described in Alternatives 1, 2, and/or 3 above, plus three options for the length of the proposed withdrawal renewal period. These three options include: Alternative 4A: 20-Year Withdrawal Period, Alternative 4B: 50-Year Withdrawal Period, and Alternative 4C: Indefinite Withdrawal Period. These are administrative options and would have to be implemented in addition to one or more of the previously identified alternatives. Adherence to water management practices is still required in the prolonged period or absence of the withdrawal process, and it would be recommended to assess water resources at periodic intervals.

The final alternative evaluated was the No Action Alternative. The No Action Alternative would allow the currently withdrawn NTTR lands to expire at the end of November 2021 and the withdrawn land would return to the Department of Interior (DOI). The DOI would be responsible for managing the land for public use and the USAF and the Department of Energy (DOE) would no longer be able to use the land for training and testing purposes. Because this alternative would end USAF mission related activities, the potential need for any additional water from the USAF would likely be eliminated. However, ceasing operations and transferring the land back to public use would not void the existing water rights. Existing water rights would remain, except for those that are cancelled, forfeited, or abandoned into the future. Wells that would no longer be used must be properly abandoned per NDWR regulations.

CHAPTER 2 - **INTRODUCTION**

2.1 NEVADA TEST AND TRAINING RANGE

The Nevada Test and Training Range (NTTR) is part of the US Air Force's (USAF) Major Range and Test Facility Base (MRTFB) enterprise. MRTFB ranges encompass the largest, most fully equipped ranges that are designed to test and evaluate capabilities to support Department of Defense (DoD) acquisition systems and combat readiness.

The NTTR is the largest contiguous air and ground space available for peacetime military operations in the free world. The range occupies 2.9 million acres of land, 5,000 square miles of airspace restricted from civilian air traffic over flight and another 7,000 square miles of military operations area that is shared with civilian aircraft. The 12,000-square nautical mile range provides a realistic arena for operational testing and training aircrews to improve combat readiness. A wide variety of live munitions can be employed on targets located on the range.

2.2 PURPOSE OF THE STUDY

This water resources report was developed for the USAF by S&B Christ Consulting (SBCC) under contract with Leidos, Inc. (contract no. W9126G-14-D-0014 subcontract PO10177023) to update the previously prepared water requirements study from 1998 in support of the Land Withdrawal Case File and Legislative Environmental Impact Statement (LEIS) addressing options for the NTTR Land Withdrawal.

Per Land Withdrawal regulations [43 Code of Federal Regulations 2310.3-2(b)(2)], if the use of water will be necessary to fulfill the purposes of the requested withdrawal, extension or modification, a report shall be prepared specifying that the applicant or using agency has acquired, or proposes to acquire, rights to use the water in conformity with applicable state laws and procedures relating to the control, appropriation, use and distribution of water, or whether the withdrawal is intended to reserve, pursuant to federal law, sufficient unappropriated water to fulfill the purposes of the withdrawal. Proof must also be provided of notification to the NDWR when a land use needed to carry out the purposes of the requested withdrawal will involve utilization of the water resources in a state. As a condition to the allowance of an order reserving water, the applicant shall certify to the Secretary of the Interior that it shall quantify the amount of water to be reserved by the order.

This report documents information available at the time this report was prepared regarding water resource issues within the NTTR in order to fulfill the documentation requirements for compliance with the Military Lands Withdrawal Act of 1999 (MLWA), Public Law 106-65. It further fulfills the documentation requirements for compliance and with regulatory acts:

- **National Environmental Policy Act of 1969 (NEPA)**, 42 United States Code [USC] Sections 4321-4370h (NEPA); requires agencies to include an environmental impact statement (EIS) with any proposal for legislation significantly affecting the quality of the human environment.
- **The Engle Act of 1958**; Requires that withdrawals, reservations, or restrictions of more than five-thousand acres of public lands of the United States for certain purposes shall not become effective until approved by an Act of Congress.
- **Federal Land Policy and Management Act (FLMPA)**; Establishes guidelines for the administration, management, protection, development, and enhancement of the public lands.

The area composing the NTTR is public land withdrawn from the Department of the Interior (DOI) Bureau of Land Management (BLM). The core set of restricted lands under NTTR management was originally withdrawn in 1940 and requires periodic renewal. The most recent renewal for NTTR land withdrawals was authorized by Public Law 106-65 (National Defense Authorization Act of FY2000) in 1999 and expires in November 2021.

Section 3019 Water Rights under PL 106-65 states that: “nothing in this subtitle shall be construed to establish a reservation to the United States with respect to any water or water right on lands covered by section 3011. No provision of this subtitle shall be construed as authorizing the appropriation of water on lands covered by section 3011 (withdrawals) by the United States after the date of the enactment of this Act, except in accordance with the law of the State in which such lands are located. This section shall not be construed to affect water rights acquired by the United States before the date of the enactment of this Act” (Congress 2000).

This report will address the land withdrawal regulations requirement by presenting an overview of surface water and groundwater rights including well logs, and the evaluation of future water requirements and allocations. This report evaluates the existing and future conditions impacts associated with groundwater and surface water rights.

Included in this report are additional areas adjacent to the current NTTR boundaries that are proposed for withdrawal to enhance and improve current USAF mission capabilities. For each option, the same information is provided and the associated impacts are evaluated.

The current withdrawn land (see **Figure 2-1**) encompasses MOUs with other agencies that share management and use of specific areas of the NTTR. The USAF is the lead agency for the LEIS, while the BLM, DOE, including the Nevada National Security Site (NNSS) and the National Nuclear Security Administration (NNSA), USFWS, and the Nevada Department of Wildlife are cooperating agencies. The USAF, in recognition of the potential impacts to other stakeholders, has had dialogue with the appropriate Nevada state agencies, local counties, and cities. The USAF also conducted government-to-government consultation with federally recognized tribes that may be impacted by the withdrawal. The LEIS is the detailed environmental statement required by law and is supported by several specific case files, including this water resources report.

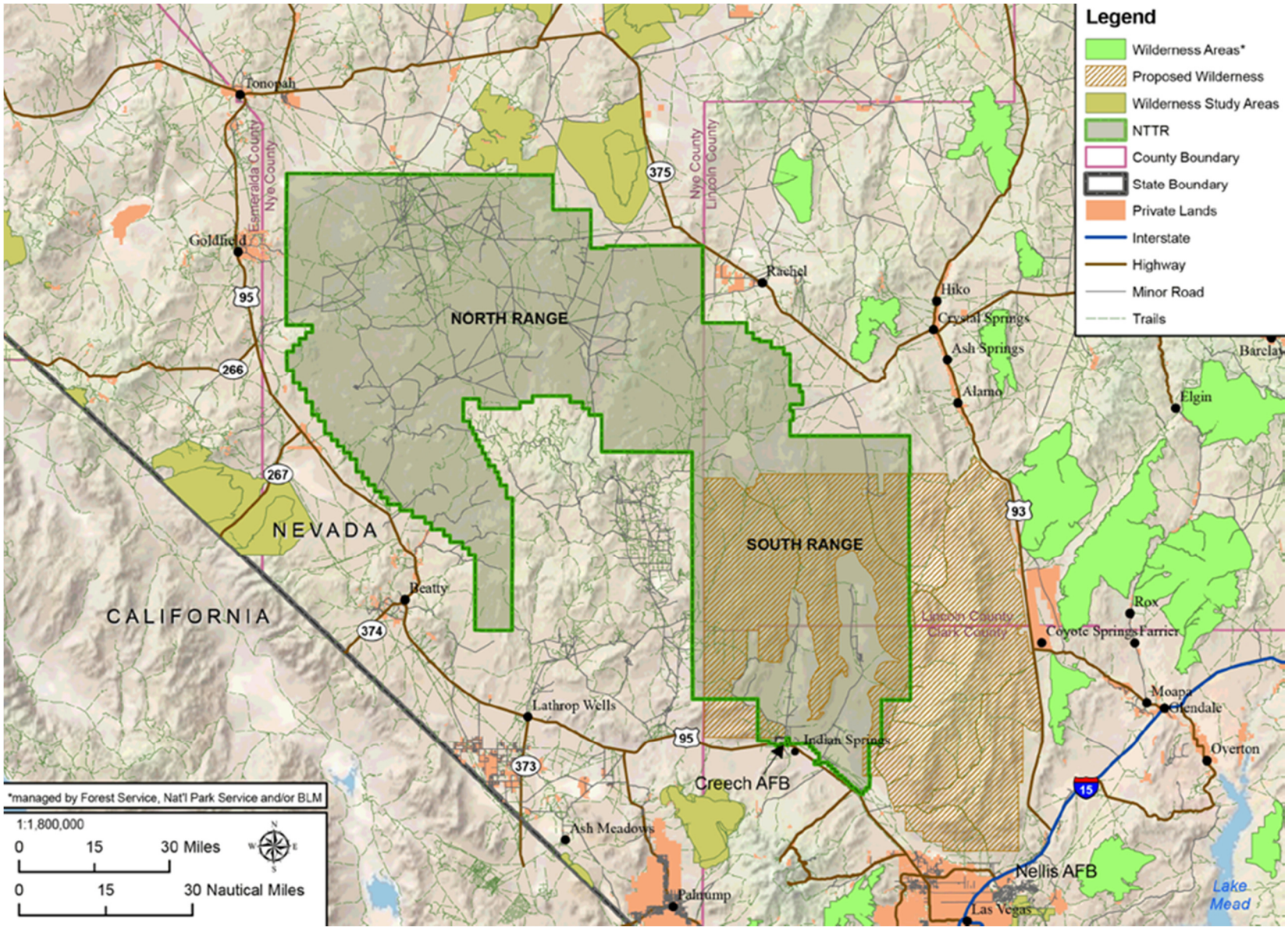


Figure 2-1 The Nevada Test and Training Range (Leidos, Inc. 2016)

CHAPTER 3 - **SITE DESCRIPTION**

The NTTR is located in southeastern Nevada and comprises about 2.9 million acres of land (approximately 4,500 square miles). The NTTR is located in the Great Basin Desert with southern portions in the Mojave Desert. The landscape consists of numerous small alluvial-filled valleys bound by north-south trending mountain ranges. The area has low precipitation and high evaporation. Groundwater beneath the NTTR varies from a few feet to over 1,000 feet below the surface with an average depth over 200 feet below the ground surface.

The NTTR is split into the North and South Ranges to facilitate overall management of USAF operations and test and training opportunities on the range. **Figure 2-1** and **Figure 3-1** illustrate the North and South Ranges with the division occurring around Range 4808A. Air Force management responsibilities include personnel safety, the ranges' electromagnetic environment, range equipment operation and maintenance and efficient airspace use through effective scheduling. The USAF has developed other infrastructure to support its use of NTTR withdrawn lands. The major industrial facilities include Creech AFB, TTR Industrial Complex, TTR Mancamp, TPECR, Cedar Pass, Operations and Maintenance (O&M) Compound, and Point Bravo. Other structures include roads, radar sites, targets, communication systems, and range electronic measuring devices.

In addition to currently withdrawn areas, the USAF proposes to expand the land boundary in the southwestern portion of the North Range (Range 77 - EC South Land Withdrawal), the eastern portion of the South Range (Alamo Withdrawal) and the southern portion of the South Range (64C/D and 65D Withdrawal and Administrative Incorporation). These areas are further discussed in Section 3.2 as alternatives.

3.1 CURRENT WITHDRAWN AREA

The North and South Ranges of the NTTR are further subdivided into smaller ranges (**Figure 3-1**). This section discusses the major range operations within the North and South Ranges. The DOE operational areas and Range 4808A is outside the scope of this project and has therefore been excluded from analysis in this report.

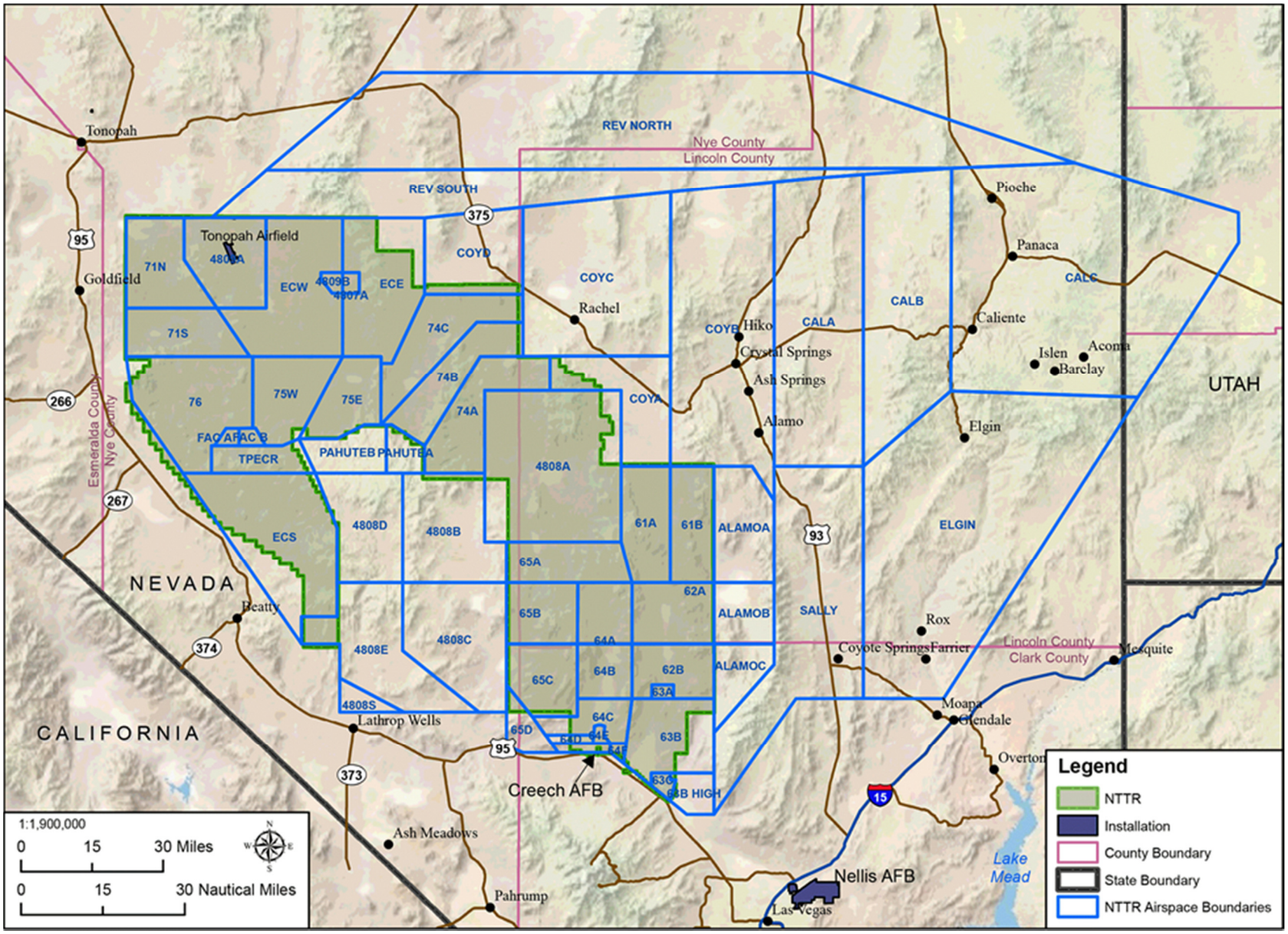


Figure 3-1 NTTR Land and Airspace Boundaries and Designations (Leidos, Inc. 2016)

3.1.1 NORTH RANGE

The North Range includes approximately 1.8 million acres of withdrawn land and contains three (3) Electronic Combat Ranges (ECRs): Tonopah ECR (TECR), Tolicha Peak ECR (TPECR), and Electronic Combat South Range (EC South). The North Range includes the Tonopah Test Range (TTR), TTR Mancamp and Cedar Pass. The following descriptions include area measurements derived from the Geographic Information Systems (GIS) shapefiles of the airspace ranges.

Tonopah Electronic Combat Range (TECR)
The TECR is comprised of two electronic combat ranges, EC East and EC West, for a total of 370,000 acres (580 square miles). These are located along the north boundary of the NTTR and this range includes the O&M compound. This includes Ranges 4809B and 4807A.

Tolicha Peak Electronic Combat Range (TPECR)
The Tolicha Peak Electronic Combat Range is a 49,000-acre (80 square miles) area located in the southwestern portion of the North Range, approximately 30 miles north of Beatty, Nevada. A permanently manned compound within the TPECR property provides support for activities in the North Range.

Electronic Combat South Range (EC South)
The Electronic Combat South Range (EC South) is a 205,000-acre (320 square miles) area located along US Highway 95 in the southern portion of the North Range.

Tonopah Test Range (TTR)
The Tonopah Test Range (TTR) consists of approximately 179,200 acres (280 square miles) of withdrawn land managed by the USAF and also includes land permitted to the DOE/NNSA. TTR contains an industrial complex operated by the USAF and a complex operated for the DOE/NNSA by Sandia Corporation, a wholly owned subsidiary of the Lockheed Martin Corporation and is part of Sandia National Laboratories (SNL). TTR is located approximately 32 miles southeast of Tonopah, NV and about 200 miles north of Las Vegas, NV within the boundaries of the NTTR. This includes Range 4809A.

TTR Mancamp
Mancamp is a lodging complex consisting of several dormitories, and recreation and fitness facilities.

3.1.2 SOUTH RANGE

The South Range is approximately 1.2 million acres of withdrawn land located in the southeastern portion of the NTTR and contains Creech AFB, and Point Bravo. The South Range overlaps a portion of the DNWR. DOE lands segregated by public land order 1662 are adjacent to the northwest corner of the South Range.

Creech Air Force Base (Creech AFB)
Creech AFB is located at the southern end of Indian Springs Valley, approximately 40 miles northwest of Nellis AFB. It was originally known as Indian Springs Airport and later the Indian Springs Air Force Auxiliary Field. Creech AFB engages in daily overseas contingency operations as the home base of remotely piloted aircraft systems. Various squadrons also provide critical support functions including base security, civil engineer capabilities, force support, logistics readiness, communications, and medical support (USAF 2014).

Point Bravo
The Point Bravo Compound is located along US Highway 95 approximately 6.5 miles southeast of Creech AFB and serves as the primary entry point for the Southern Ranges.

Range 63C
Range 63C, formerly the Silver Flag Alpha compound, is located along US Highway 95 approximately eight miles southeast of Point Bravo and had been used for small arms weapons training.

3.2 EXPANSION AREAS

The USAF is proposing multiple alternatives as outlined in the LEIS. These alternatives were used in preparing this report and are summarized from the Description of Proposed Action and Alternatives (DOPAA) document dated August 2016 (Leidos, Inc. 2016). The alternatives being considered include:

Alt 1	**Extend Existing Land Withdrawal and Management of NTTR (North and South Range) – Status Quo**
Alt 2	**Extend Existing Land Withdrawal and Provide Ready Access in the North and South Range**
Alt 3	**Expand Withdrawal of Public Lands for the NTTR** This alternative includes the currently withdrawn area as described in Alternatives 1 or 2 above, plus three options for additional land withdrawal to fulfill increased operational and safety needs. These three options include:
Alt 3A	**Range 77 – EC South Withdrawal**
Alt 3B	**64C/D and 65D Withdrawal and Administrative Incorporation**
Alt 3C	**Alamo Withdrawal**
Alt 4	**Establish the Period of Withdrawal** This alternative includes administrative action only and does not include the withdrawal of any additional land and is limited to extending the land withdrawal timeframe per one of the following three options. This option cannot be implemented alone and must be paired with one or more of the aforementioned alternatives or sub-alternatives.
Alt 4A	**20-Year Withdrawal Period**
Alt 4B	**50-Year Withdrawal Period**
Alt 4C	**Indefinite Withdrawal Period**
No-Action	**No-Action Alternative**

The following provides additional detail regarding each alternative. Any additional expansion areas incorporated into the NTTR would be subject to the same regulations, policies, and management as the current and future NTTR. Projected water usage and allocation impacts are discussed later in the report. See **Figure 3-2** for locations and details of the proposed expansion areas.

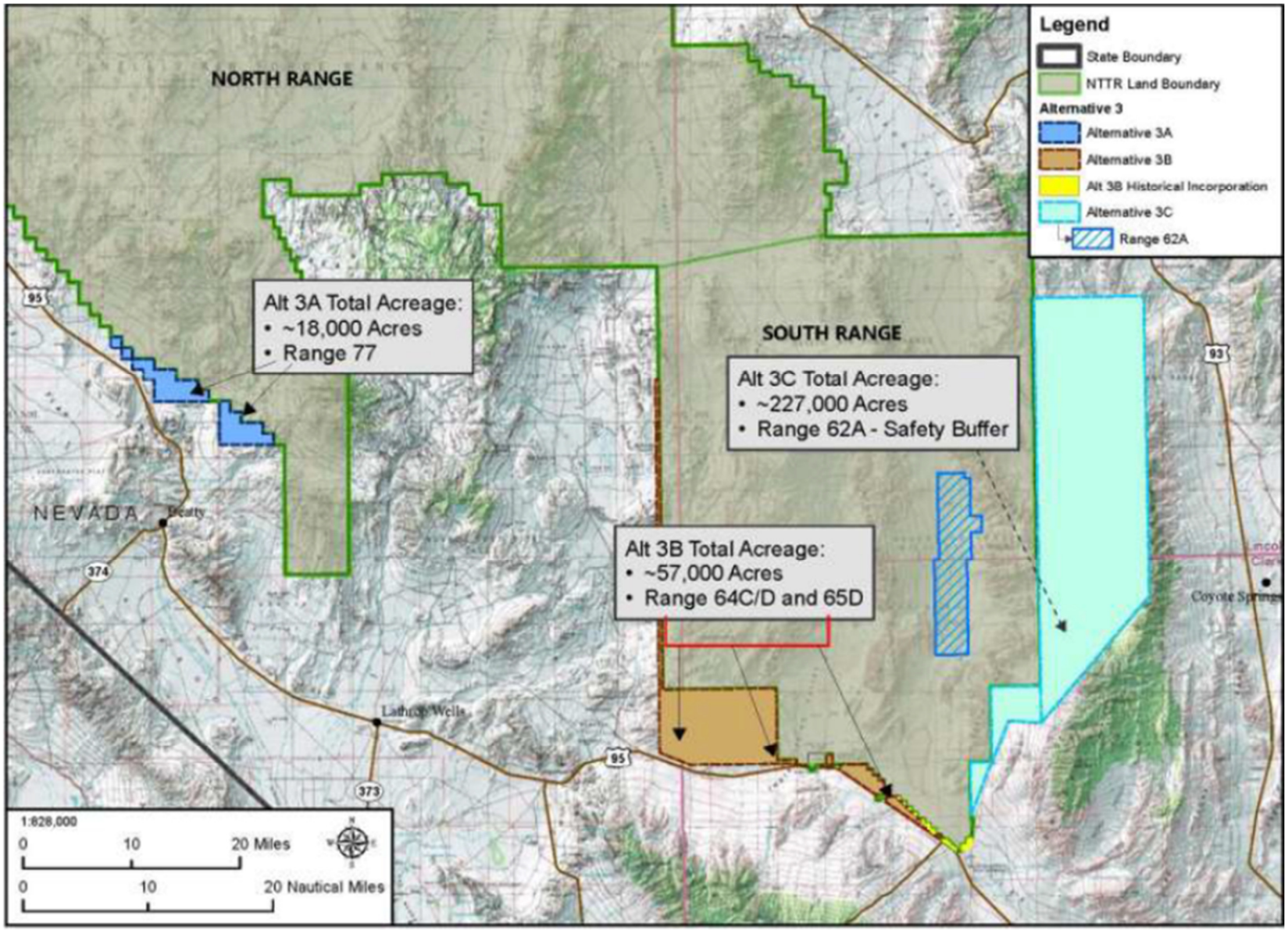


Figure 3-2 Alternatives 3A, 3B, and 3C Locations and Acreage (Leidos, Inc. 2016)

3.2.1 ALTERNATIVE 1: EXTEND EXISTING LAND WITHDRAWAL AND MANAGEMENT OF NTTR (NORTH AND SOUTH RANGE)

Under Alternative 1, there would be no changes to the current NTTR boundary or the USAF mission. Current activities would continue, management responsibilities would remain unchanged, and industrial facilities would remain active.

3.2.2 ALTERNATIVE 2: EXTEND EXISTING LAND WITHDRAWAL AND PROVIDE READY ACCESS IN THE NORTH AND SOUTH RANGE

Under Alternative 2, there would be no changes to the current NTTR boundary. However, the USAF would ensure ready access to both the North and South Ranges to improve mission capabilities. Ready access consists of the following factors (Leidos, Inc. 2016):

- Adequacy – the complete ability to fully utilize all of the withdrawn land and its many features to meet NTTR mission requirements;
- Flexibility – sufficiently permissive and cooperative management under applicable regulatory standards that allows the DoD and supported agencies to meet mission requirements;
- Timeliness – the ability to conduct mission activities in a time-sensitive manner relative to National Security timelines, including short-notice, urgent missions, following established measures for expediting any necessary coordination and;
- Variability – the ability to adjust testing and training activities over time, including realignment of sites on lands withdrawn for the NTTR and varying uses of such lands to meet DoD and supported agencies' mission requirements.

Ready access can be implemented through a combination of methods included below:

- Removing the Proposed Wilderness designation for areas within the current and future boundaries of the NTTR;
- Reallocating primary jurisdiction from the USFWS to the USAF for portions or all of the overlapping wilderness designated area;
- Development of a binding MOU granting ready access to the DoD and establishing written access procedures to ensure full compliance with other federal agency requirements and;
- Enactment of legislative provisions that ensure ready access, notwithstanding the operation of other specific statutory measures limiting such access, provided the withdrawn lands are managed under an approved Integrated Natural Resources Management Plan in accordance with the Sikes Act.

Ready access does not translate to exemption from applicable laws and regulations that are not specifically addressed by legislation supporting the withdrawal.

3.2.3 ALTERNATIVE 3A: RANGE 77 – EC SOUTH WITHDRAWAL

Alternative 3A proposes to increase the NTTR boundary by approximately 18,000 acres of land to add a safety and security buffer to the footprint of the EC South area and would be redesignated as "Range 77" to allow full air-to-ground operations. The additional land would serve as a safety buffer for live weapons deployment on the interior of Range 77. This area is shown in **Figure 3-2** and would extend the Range 77 boundary west.

3.2.4 ALTERNATIVE 3B: 64C/D AND 65D WITHDRAWAL AND ADMINISTRATIVE INCORPORATION

Alternative 3B proposes to withdraw approximately 57,000 acres of land located along the current border of the NTTR. This area is shown in **Figure 3-2**. This area is composed of approximately 54,000 acres along the southern border of NTTR (areas designated as 64C/D and 65D), approximately 6,000 acres that are parallel to the current NTTR boundary and Highway 95 Nevada Department of Transportation right-of-way, and approximately 1,000 acres as part of an administrative incorporation. Withdrawal of these areas would serve to improve the NTTR operational security and safety buffers to decrease the potential for unauthorized access from the public.

The administrative incorporation consists of land along the eastern edge of range areas 63B and 63C. This is land that was not included in the MLWA published land withdrawal boundary for the NTTR from the 1999 LEIS even though the area was analyzed in the LEIS. BLM's Public Land Survey System (PLSS) went through a significant software update during the 2001 NTTR withdrawal effort, resulting in a shift of the coordinate system, which caused a perceived boundary shift. The legal description was accurate under BLM's old PLSS data, which included this approximately 1,000 acres, but the coordinate system shift from the software update resulted in the acreage no longer being included in the legal description. Additionally, the legal description was never published by DOI in the Federal Register as directed by the MLWA. The BLM and the USAF have agreed to rectify the situation by incorporating the change at this time.

3.2.5 ALTERNATIVE 3C: ALAMO WITHDRAWAL

Alternative 3C proposes to withdraw approximately 227,000 acres of DNWR to correspond with potential weapons safety footprints associated with Range 62A in the South Range. This area is shown in **Figure 3-2**. These additional areas must be controlled for safety purposes but are not planned to be used for target impact areas. The USAF would like to develop potential insertion points that would include one runway that would be a mockup location to provide special operations personnel a location to practice tactics, while a second runway would be an active runway, providing more realistic insertion training. Each runway would be 6,000 feet long and 90 feet wide. It is anticipated that ground disturbance activities associated with construction of the runways would be less than 13 acres. Details of installation activities are not known for specific areas and it is anticipated that further NEPA related environmental analysis will be necessary for future development as proposed activities within this area are developed. The Alamo withdrawal would also serve as a safety buffer for live weapons deployment in five (5) impact areas in the South Range as shown in **Figure 3-3.**

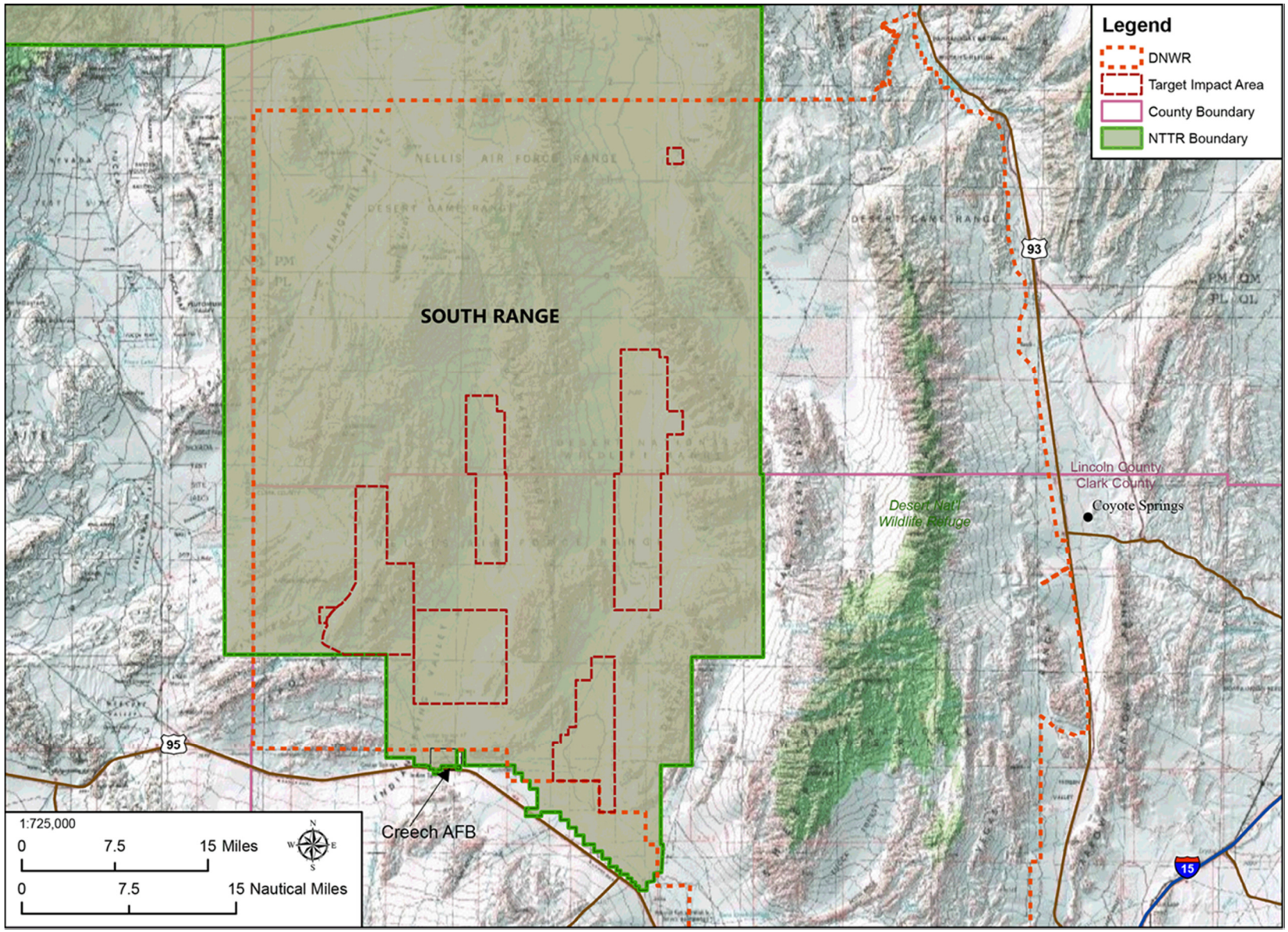


Figure 3-3 Target Impact Areas and DNWR Overlap in South Range of NTTR (Leidos, Inc. 2016)

3.2.1 ALTERNATIVE 4A: 20-YEAR WITHDRAWAL PERIOD

Alternative 4A proposes to establish the length of time in which the withdrawal would be active to be a period of 20 years. This option is only an administrative option and would have to be implemented in addition to one or more of the previously identified alternatives.

3.2.2 ALTERNATIVE 4B: 50-YEAR WITHDRAWAL PERIOD

Alternative 4B proposes to establish the length of time in which the withdrawal would be active to be a period of 50 years. This option is an administrative option and would have to be implemented in addition to one or more of the previously identified alternatives.

3.2.3 ALTERNATIVE 4C: INDEFINITE WITHDRAWAL PERIOD

Alternative 4C proposes to establish the length of time in which the withdrawal would be active to an indefinite time period. This option is an administrative option and would have to be implemented in addition to one or more of the previously identified alternatives.

3.2.4 NO ACTION ALTERNATIVE

The No Action Alternative would allow the currently withdrawn NTTR lands to expire at the end of November 2021 and the withdrawn land would return to DOI. The military and DOE would no longer be able to use the land for training or testing purposes.

CHAPTER 4 - **WATER RESOURCES OVERVIEW**

4.1 ABOUT WATER RESOURCE MANAGEMENT IN NEVADA

4.1.1 BRIEF INTRODUCTION TO NEVADA WATER LAW

Nevada water law is based on two basic principles: prior appropriation and beneficial use. Prior appropriation is based on prioritizing and protecting senior water rights, known as “first in time, first in right.” Beneficial use is based on the demonstration of water utilization for manners such as irrigation, mining, stockwatering, recreation, commercial, industrial, and municipal supply. Water may be appropriated for beneficial use as provided in Chapters 533 and 534 of the Nevada Revised Statutes. These statutes also declare that all sources of water within the boundaries of the state, above and below ground, belong to the public.

The Nevada Department of Conservation and Natural Resources (NDCNR) is responsible for management of the state’s natural resources, which includes conserving, protecting, managing, and enhancing these resources. NDCNR is organized into nine (9) divisions or programs to meet this goal, which includes the NDWR. The NDWR’s mission statement is as follows (NDWR 2013):

“The mission of the NDWR is to conserve, protect, manage and enhance the State's water resources for Nevada's citizens through the appropriation and reallocation of the public waters. In addition, the Division is responsible for quantifying existing water rights; monitoring water use; distributing water in accordance with court decrees; reviewing water availability for new subdivisions and condominiums; reviewing the construction and operation of dams; appropriating geothermal water; licensing and regulating well drillers and water rights surveyors; reviewing flood control projects; monitoring water resource data and records; and providing technical assistance to the public and governmental agencies.”

The State Engineer oversees NDWR and is responsible for administrating and enforcing Nevada water law. Nevada water law and the role of the State Engineer has changed over time and is summarized in the following table (NDCNR n.d.):

Table 4-1 Nevada Water Law History Overview

1866	Nevada’s first water law was passed, two years after statehood.
1894	The Carey Act (also known as the Desert Land Act) was enacted by Congress to allow private companies to install irrigation systems in the arid areas of the US to profit from the sales of water. The purpose of the act was to stimulate agricultural expansion through the use of vacant land.
1903	Nevada Legislature created the Office of the State Engineer to inventory existing water to aid in assessing growth.
1905	The 1903 act is amended to create the application process to allow the appropriation of water that does not already have beneficial use, subject to review of the State Engineer.
1913	Nevada General Water Law Act of 1913 is passed to grant the State Engineer jurisdiction over wells tapping into artesian aquifers or definable underground aquifers. An aquifer is a subsurface rock unit that holds and transmits water. The defining characteristic of an artesian aquifer is the high pressure that can force water through a well.
1939	The 1939 Nevada Underground Water Act is passed to grant the State Engineer jurisdiction over all groundwater in Nevada.
1960	Groundwater development has a noted increase.

4.1.2 WATER RIGHTS TERMINOLOGY

The appropriation of water in Nevada requires a permit for the ownership of water rights. The following outlines the key definitions associated with water rights (NDWR 2016):

Permit Application	Application to appropriate water for beneficial use.
Permit	Issued by the NDWR, it authorizes the permitee to use the appropriated amount of water for beneficial use in a specified manner (such as stockwatering for ranching).
Beneficial Use	Examples of beneficial uses include irrigation, mining, stock watering, recreation, commercial, industrial, and municipal uses. Permitees must also exercise the beneficial use or they will lose the water right.
Certificate of Appropriation	After an application is granted, it is now a water rights permit. The permit terms establish due dates for filing proof of completion of diversion works and proof of beneficial use. Once these items are filed a certificate with the final parameters of the water rights may be issued.
Canceled, Forfeited and Abandoned Permits	If a water rights user does not provide proof of completion of work and proof of beneficial use by the deadlines outlined in the permit terms, the permit will be cancelled. Forfeiture of a groundwater right occurs if the water right is not exercised for five (5) consecutive years. Surface water rights can only be lost by abandonment. A review of whether or not a surface water right has been abandoned is based on a review of all the surrounding circumstances; however, water law provides statutory reasons that prevent a declaration of abandonment.

A water right application or permit is not required for domestic wells or through a manner of use that pre-dated water law requirements (year 1905). Approved domestic uses include culinary and household purposes in a single family dwelling, as well as watering of a family garden, lawns, and for domestic animals. The maximum amount that may be extracted under this exemption is two acre-feet per year.

Monitoring wells require coordination and approval from NDWR and the Nevada Division of Environmental Protection (NDEP), which is another branch of the NDCNR. A water right application or permit is not usually required for test or monitoring wells; however, a notice of intent along with an affidavit of intent to abandon must be filed with the NDWR. If a test well is found to be viable and the owner would like to develop the well for other purposes, then an application must be submitted.

Water rights can be bought, sold, or transferred. Water rights are an attachment to real property unless they are specifically excluded in conveyance documents. A conveyance document is any instrument that legally transfers ownership of property. As with land, water rights are considered “real property” and similar procedures are required to convey ownership. Although documents conveying title to water are required to be recorded in the County Recorder’s Office, the County Recorder does not forward copies of such documentation to the State Engineer’s Office. It is the new owner’s responsibility to file such documents with the State Engineer’s Office in a timely manner in accordance with the law (NDWR 2014).

4.1.3 GROUNDWATER MANAGEMENT

Nevada divides the state into discrete units interchangeably known as hydrographic basins, hydrographic regions, drainage basins, or watersheds. These regions are defined by a geographic area drained by a single major stream or an area consisting of a drainage system comprised of streams and natural or man-made lakes. The United States Geological Survey (USGS) and the NDWR assigned 232 hydrographic basins (256 basins and sub-basins, combined) located within 14 major hydrographic regions for water planning and management purposes in Nevada. The State Engineer may "designate" a groundwater basin under certain conditions, usually due to a volume of groundwater rights that approach or exceed the estimated average annual recharge and therefore require additional administration. This entails the declaration of preferred uses (e.g., municipal and industrial, domestic, agriculture, etc.) in the interest of public welfare for a portion or the entirety of a basin. Designated basins pertinent to the NTTR include basins 141, 146, 149, 161, 170, 209 and 210.

The applicable major hydrographic regions include the Central Region, Colorado River Basin, and Death Valley basin. The Central Region consists of 29,941,120 acres of land and includes 78 hydrographic areas, ten (10) of which are divided into two (2) sub–areas and one (1) into three (3) sub–areas. This region extends to the south and west into the State of California. The Colorado River Basin is 7,920,640 acres and is divided into 27 hydrographic areas. This region extends to the south into California, borders the Colorado River to the south and east and extends into the states of Arizona and Utah to the east. The Death Valley Basin spans eight (8) hydrographic areas, one of which has been divided into two (2) hydrographic sub-areas and also extends into the State of California to the south and west with a total area of 1,659,520 acres (NDWR 2013).

There are 27 hydrographic basins within these hydrographic regions that are applicable to the proposed NTTR withdrawal extension and expansion areas. See **Figure 4-1** for distributions of hydrographic basins within the NTTR boundary. The characteristics of these basins are discussed in the section on Hydrographic Units of the NTTR.

Ten (10) of the 27 basins are designated per the State Engineer. It should be noted that a designation status or preferred use assignment is not always applicable to the entire basin, and may only apply to a certain portion. A list of the designated basins located on the NTTR and proposed expansion areas are summarized below:

Table 4-2 Designated Basins

Basin Number and Name	NDWR Order No.	Extent of Basin Designation	Preferred Use	Extent of Preferred Use Assignments
141 – Ralston Valley	742, 752	All	Municipal	Portion
146 – Sarcobatus Flat	999	All	None listed	N/A
149 – Stone Cabin Valley	720	All	None listed	N/A
161 – Indian Spring Valley	728	Portion	None listed	N/A
170 – Penoyer (Sand Springs) Valley	712	All	None listed	N/A

Table 4-2 Designated Basins				
Basin Number and Name	**NDWR Order No.**	**Extent of Basin Designation**	**Preferred Use**	**Extent of Preferred Use Assignments**
209 – Pahranagat Valley	1199	Portion	None listed, but specifically excludes irrigation using underground water	N/A
210 – Coyote Spring Valley	905, 1169, 1169a	All	Municipal, Power, Industrial and Domestic	All
211 – Three Lake Valley (Southern Part)	745, 1036	Portion	Penal institution	Portion
212 – Las Vegas Valley	175, 182, 189, 196, 212, 249, 275, 833, 1021, 1054, 1176	All	Commercial and industrial, excludes irrigation using underground water	All
228 – Oasis Valley	741	Portion	None listed	N/A
N/A: Not applicable				

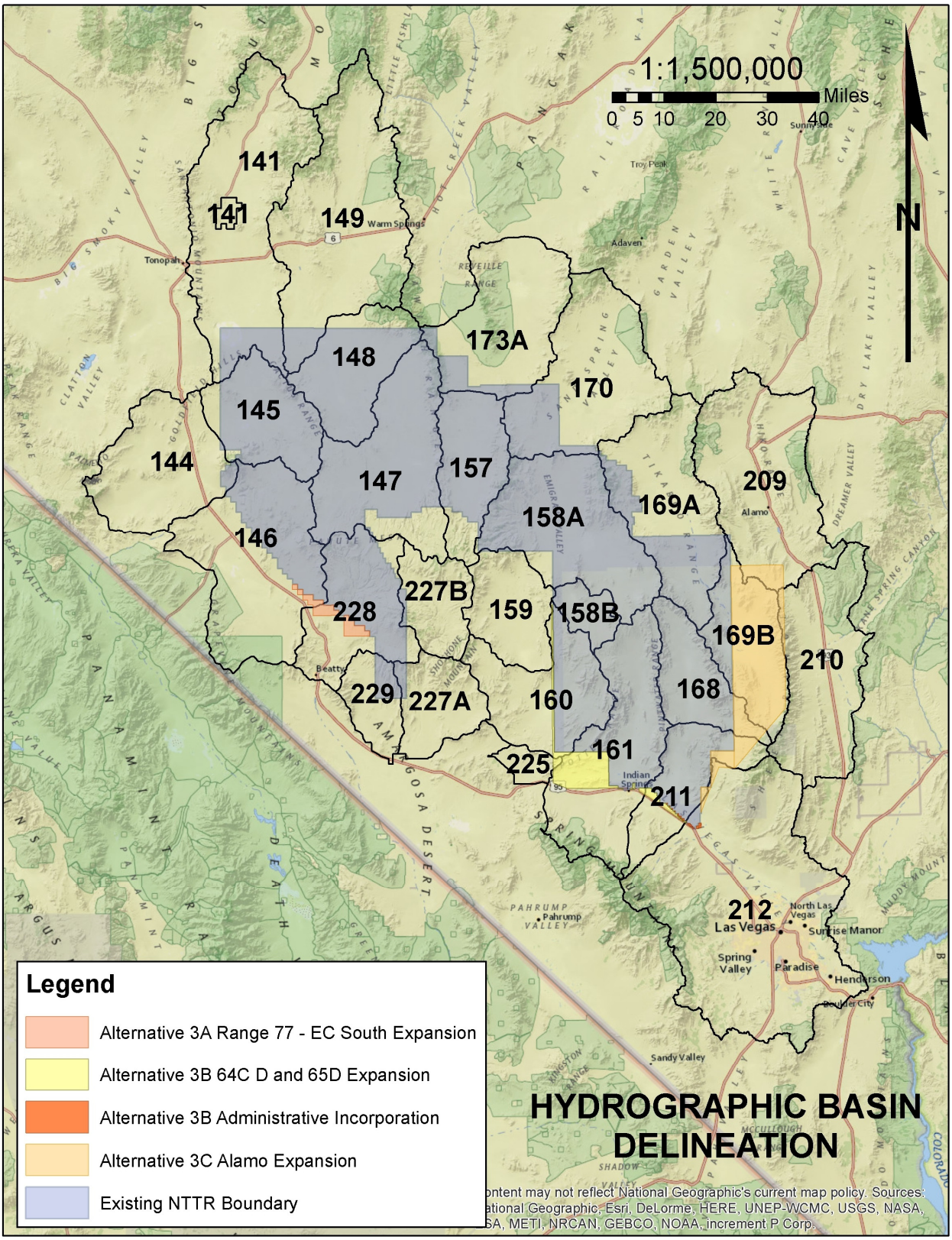


Figure 4-1 Hydrographic Basin Delineation (SBCC 2016)

The quantity of water that can be withdrawn from any given hydrographic basin is controlled by the perennial yield. The perennial yield is the estimated maximum amount of water that can be tapped into without exceeding the natural recharge rate and depleting the groundwater reservoir. This yield is usually measured in acre-feet per year (AFY), which equates to 325,851 gallons or an acre of ground covered with one foot of water.

There are basins in Nevada that are currently over-appropriated or over-allocated, meaning that there is more groundwater assigned than is estimated to be available or that is able to be replaced by natural recharge. This may be attributed to the following factors (NDCNR n.d.):

- Basins were over-allocated before the basin perennial yield was determined;
- Not all of the water rights were expected to be put to their maximum beneficial use;
- Unexpected success of the Carey Act in certain areas that increased agricultural use;
- The high presence of permit exempt domestic wells.

The State Engineer's Office is implementing procedures to cut water rights in over-allocated basins such as forfeiture of unused certificated rights, cancelling water rights for lack of due diligence, and calling for proofs of beneficial use. Therefore, it is imperative that owners maintain up-to-date records on all permits to ensure water rights are not inadvertently lost, if they are still necessary.

4.1.4 SURFACE WATER MANAGEMENT

Surface water has been used prior to state water laws. Therefore, most surface water has been or must be adjudicated through NDWR, which is a statutory process by which pre-statutory vested water right claims are quantified and finally judicially decreed. Most surface water not claimed prior to 1905 has been appropriated according to current water law (NDCNR n.d.).

The data for surface water is categorized alongside the groundwater hydrographic basin designations. However, spring and stream flow data for surface water have separate boundary designations (http://water.nv.gov/data/streamflow/). This data includes remarks and discharge rate on select surface water sources.

4.2 INFORMATION SOURCES AND PROJECT APPROACH

Information included in this technical report was gathered from numerous sources, but relies heavily on publicly available information through NDWR records. Additionally, available records from the USAF, BLM, USFWS, and DOE were reviewed to determine consistency with the state's information. The investigation included the collection and evaluation of data on groundwater rights (including well logs) and surface water rights within the proposed NTTR withdrawal extension and expansion areas.

The information collected was analyzed on a per basin basis. The NDWR evaluates and obligates water rights on a per basin basis; therefore, the research and data gathering has been conducted in this manner. Obtained records compiled for each of the identified basins were totaled and compared with the NDWR's documented basin capacity to determine whether basins are over- or under allocated.

The NDWR records review was initiated through the download of the following items:

- **Hydrographic area summary**

  A description of the basin and the allocated annual duty for underground, geothermal, and other groundwater by manner of use (http://water.nv.gov/data/underground/). This summary includes supplementally adjusted annual duty for ground water sources. A supplementally adjusted basin may have multiple water rights that draw from the same application amount. Therefore, multiple permits may indicate the total amount although they are only permitted for a proportion of it. The summary includes applicable State Engineer's Orders and Rulings numbers.

- **Hydrographic basin summary by application status**

  A brief description of the basin and summary of the allocated annual duty for underground, geothermal, and other groundwater by the status of the application. (http://water.nv.gov/data/underground/).

- **Hydrographic basin summary by manner of use**

  A description of the basin and the allocated annual duty for underground, geothermal, and other groundwater by manner of use. This summary also includes the annual duty amounts for pending applications (http://water.nv.gov/data/underground/).

- **Water Rights Records**

  Hydrographic abstracts (http://water.nv.gov/data/hydrographic/) for listings of applications within a basin. Information on relevant permits were generated from a permit query (http://water.nv.gov/data/permit/), which generates the following categories of information: general information, maps and due dates, place of use, abrogations/protests/rulings and ownership/title. The original permit and certificate are also archived.

- **Well Logs**

  Abstract reports containing general, location, well construction, and drilling contractor information downloaded by basin (http://water.nv.gov/data/welllog/). The relevant well logs were searched from the same query tool to obtain the well log details page and original well log for archival.

Only water permits with a status of application, certificate, decreed, permit, reserved, ready for action, ready for action/protested, relinquish a portion, revocable, or vested right were deemed relevant; other permit types were excluded from analysis.

The well log abstract reports were downloaded and reviewed against groundwater rights. The purpose of including well log research is to provide a means of validating applications on the proposed NTTR withdrawal extension and expansion areas where inconsistencies may imply administrative errors. Moreover, it may provide an inventory of applications that are present whether lawfully (well logs with corresponding permits) or unlawfully (non-exempt wells without water permits).

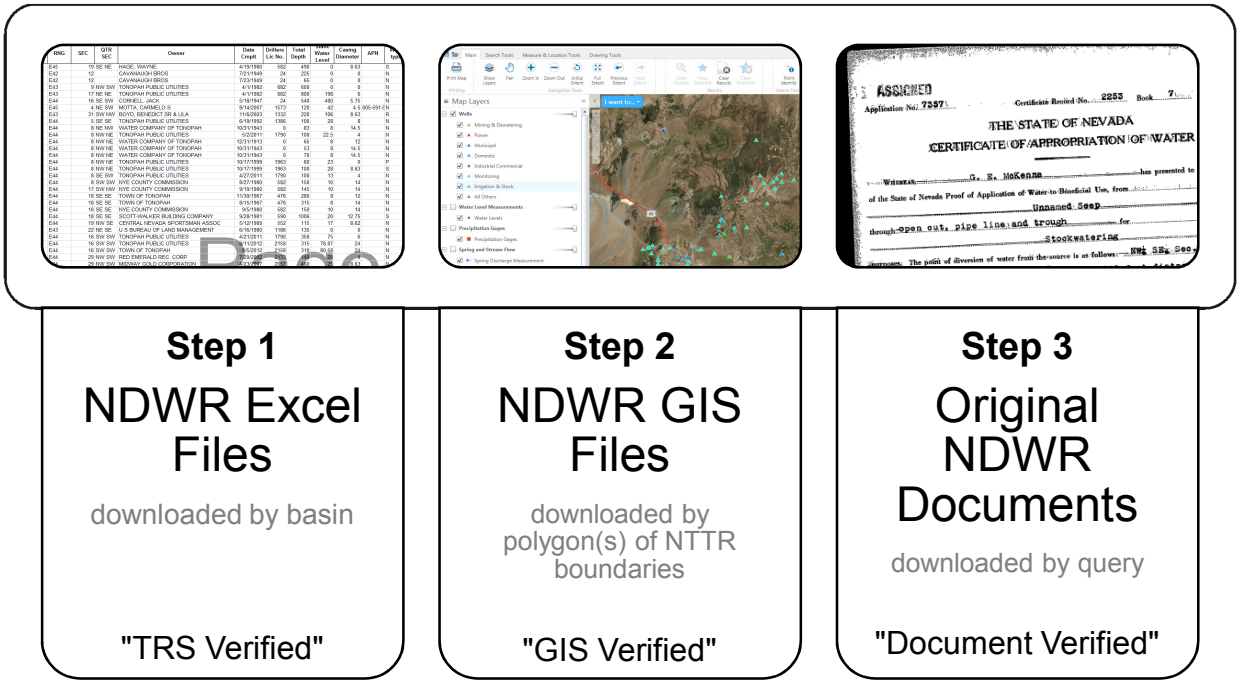
A water basin Township, Range and Section (TRS) “key” was referenced that lists the applicable TRS’ that are within each water basin inside the proposed NTTR withdrawal extension and expansion areas. This was used to compare against the water rights and well log abstract reports to eliminate offsite and out of scope records. The records were reviewed down to quarter section when it was available. Assessor Parcel Numbers (APNs) were also verified when they were available. The entries that were found to be within the applicable area were considered to be “TRS verified.” The term “verified” in this context refers to a noted location on the permit or well log that was available for review.

The next level of data refinement was the review of NDWR’s Geographic Information System (GIS) interactive map data (http://webgis.water.nv.gov/) for both water rights (under “water rights”) and well logs (under “Nevada hydrology data”). Points identified within the general location of the proposed NTTR withdrawal extension and expansion areas were reviewed on the webpage interactive map and exported to shapefiles to view in Environmental Systems Research Institute’s GIS program ArcMap. The proposed NTTR withdrawal extension and expansion areas boundary files provided by Leidos were used to further filter results. However, there are noted discrepancies of the NTTR boundaries across agencies and therefore the boundary is considered approximate.

The listings of relevant water rights and well logs extracted from the NDWR GIS data was compared against the TRS verified listings from the excel file abstract reports. Water rights or well log abstract report entries (whether or not they were TRS verified) that possessed a relevant GIS point were considered to be “GIS verified.”

The final level of data examination was the review of TRS and/or GIS verified water right permits and well logs documentation downloaded through their respective NDWR website query tools (e.g. searched by application number or well log number). The TRS location reported on the original application, change application or certificate documents (for water rights) and the TRS location reported on the original well log document (for well logs) was compared against the TRS location found through the excel abstract report and/or NDWR GIS file. Applications or well logs that agreed with either TRS location were found to be "document verified."

A summary of the work flow involved in the quality control and review of NDWR water rights and well logs is shown below:



Discrepancies in data were found through the quality control process; for example, an entry may be TRS verified (onsite) but a corresponding onsite point file was not found (not GIS verified) and the original document notes an offsite TRS. If an entry was found to be relevant through either the TRS or GIS verification, even if there is a discrepancy between the two, it is included for analysis within this report to ensure completeness of the data set. Relevant data in the upcoming sections are presented by the excel file abstract report listings even if a location discrepancy was found. Pertinent information available during the review of water permits and well logs are included. The information reviewed and compiled for this report is considered approximate. Several of the aforementioned types of geographic inconsistencies between data sets were identified. An issues log of the relevant entries discussed are provided in **Appendix B**.

4.3 HYDROGEOLOGIC SETTING OF THE NTTR

The world is divided into geologic provinces that are defined by areas or regions characterized by similar geologic features or history. There are six (6) main categories of geologic provinces under the global crustal model: shield, platform, origin, basin, large igneous province, and extended crust. The majority of Nevada is characterized by the extended crust model (R.L. Bates 1980).

Extended crust model features are the defining traits of the Basin and Range geologic province that spans most of Nevada, including the NTTR. This province is comprised of roughly north-south linear valleys and mountain ranges (USGS 2014). These features were formed through stretching and

separating of the carbonate and volcanic crust, as representative of the extended crust model. This results in large faults, which are fractures in the Earth along which one side has moved in relation to the other. Although there are various types of faults in the Basin and Range province, the extension and crustal stretching that have shaped the present landscape produced mostly normal faults. The fault plane, along which the two sides of the fault move, extends deep in the crust resulting in a relief, or difference in the highest and lowest elevation, of up to 10,000 feet. The mountains are subject to weathering and erosion from the elements (e.g. rainfall) that result in rock debris traveling downhill and filling the valleys with a thick layer of alluvium or basin fill (USGS 2014).

The climate of Nevada is characterized as semiarid to arid. The amount of annual precipitation in the area varies depending on elevation and can range from 4 inches on the valley floors to over 40 inches in localized areas on the mountain summits (USAF, Dept. of the Navy, DOI 1991). Precipitation data from the USAF Climate Center and Western Region Climate Center managed by Desert Research Institute (DRI) is summarized in the table below (DRI 2016) and (USAF, ACC 57 OSS/OSW 2016):

Table 4-3 Precipitation Data

Weather Station	Average Total Precipitation (in.)	Period of Record	Source
Creech AFB/Indian Springs	2.8	2000-2007, 2009-2015	USAF Climate Center
Desert Rock	5.6	1978/05/15 - 2015/01/20	
Tonopah	5.0	2006/01/01 - 2015/12/31	
Alamo	6.3	1921 to 1962	Western Region Climate Center
Caliente	6.9	1997 to 2002	
Desert Natural Wildlife Range	4.4	1940/04/01 to 2015/01/20	

Much of the water introduced to this area through precipitation evaporates quickly due to the arid conditions. Some of the water will percolate into the ground and will subsequently recharge the groundwater table. The remaining water may flow to channels or playas (dry lakes). Both perennial and intermittent seeps and springs are present throughout the proposed NTTR withdrawal extension area (USAF, 99 CES/CEIEA 2016). Only a small amount of water escapes this geologic province and no water reaches the ocean.

Groundwater and surface water basin delineations are typically defined by the geology and water that circulates within a mountain and valley range system. The water basins are commonly named after these geologic features. Some major terrain features in the North Range include Stonewall Mountain, Stonewall Flat, Cactus Range, Cactus Flat, Pahute Mesa, Yucca Mountain, Gold Flat, Cathedral Ridge, Kawich Valley, Belted Range, Sand Spring Valley, Groom Range, and Emigrant Valley (**Figure 4-2**).

Some major terrain features present in the South Range include the Emigrant Valley, Halfpint Range, Spotted Range, Indian Spring Valley, Pintwater Range, Three Lakes Valley, Desert Range, East Desert Range, Pahranagat Range, and Sheep Range (**Figure 4-3**).

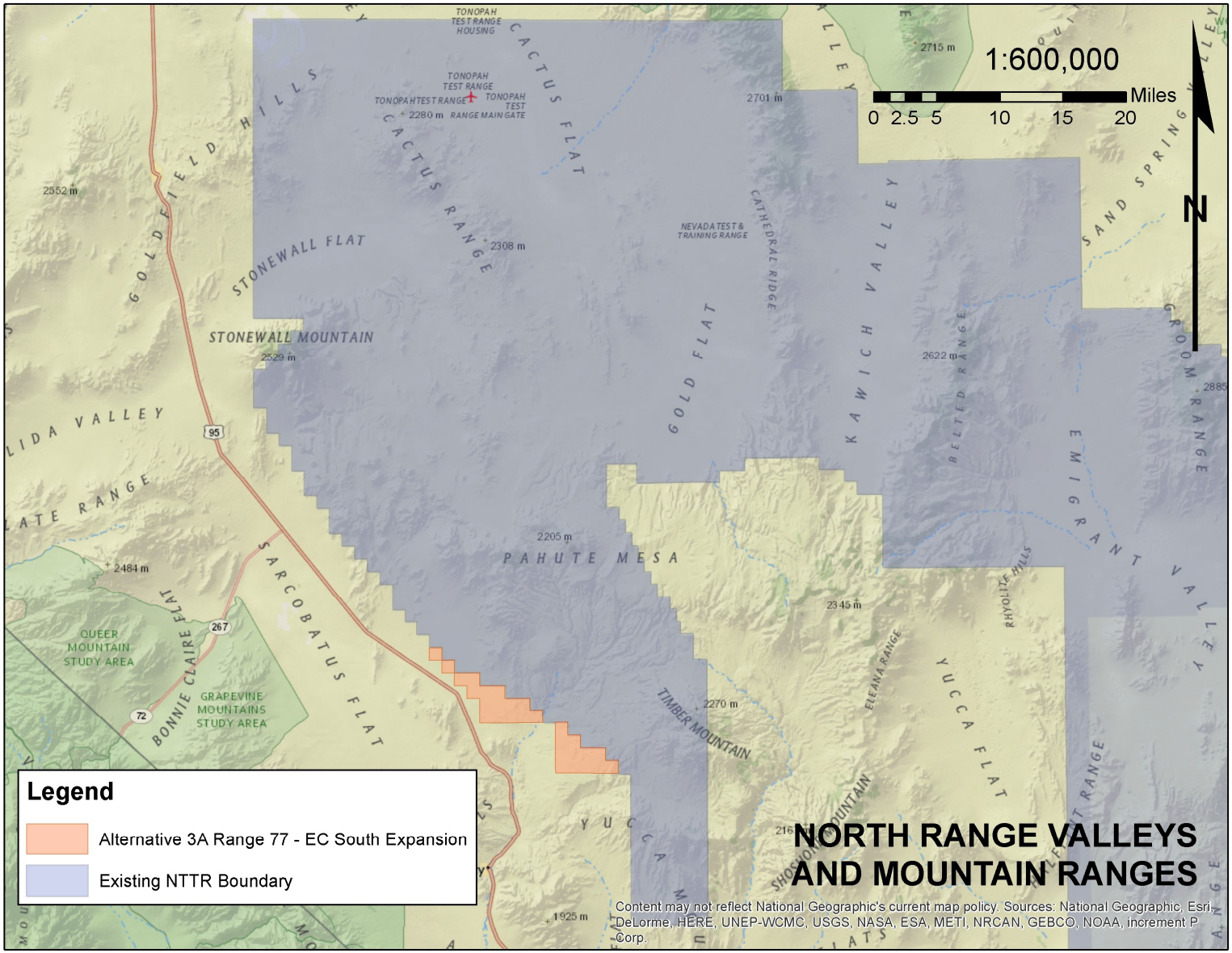


Figure 4-2 North Range Mountain Ranges and Valleys (National Geographic, SBCC 2016)

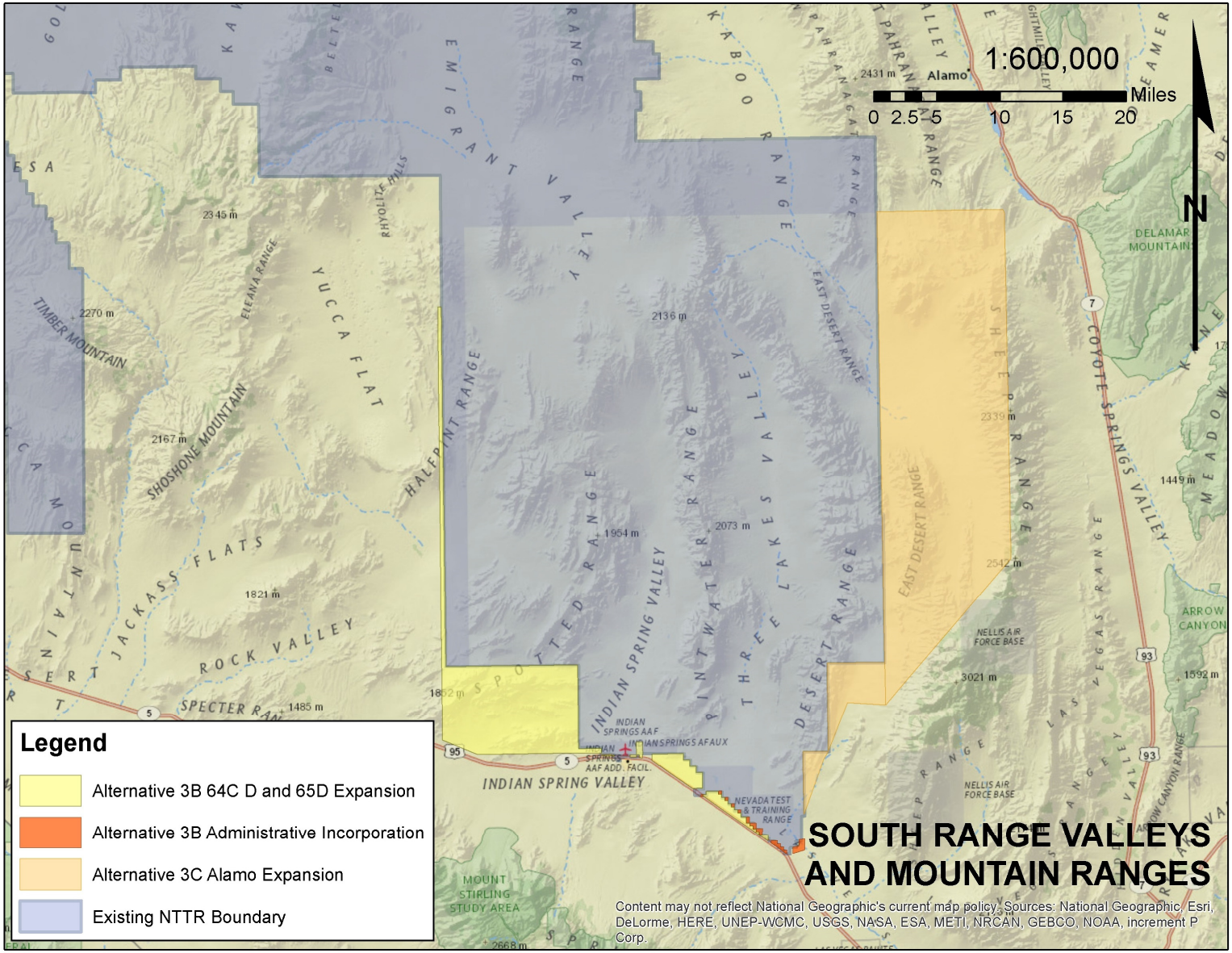


Figure 4-3 South Range Mountain Ranges and Valleys (National Geographic, SBCC 2016)

4.4 HYDROGRAPHIC UNITS OF THE NTTR

There are 27 hydrographic basins within hydrographic regions that are applicable to the proposed NTTR withdrawal extension and expansion areas (**Figure 4-3**). These basins are listed in the following table along with information regarding the area of each basin within the proposed NTTR extension and the percent of the total NTTR area that is covered by that particular basin. Areas included in the tables were taken from ArcGIS calculations of the basin polygons provided through NDWR and NTTR boundary files provided by Leidos. The total area of withdrawn land used in this calculation is 4,611 square miles. A summary of the basin areas relative to the NTTR area are located in the following table. The area calculations are provided in further detail in **Appendix C**.

Table 4-4 Areas of Hydrographic Basins within the NTTR

Hydrographic No. and Region Name	Hydrographic Basin No. and Name	Basin Area (sq. mi)	Approximate Area in NTTR (mi^2)	Percent of the NTTR
10 – Central Region	141 – Ralston Valley	980	87	1.9%
	144 – Lida Valley	532	14	0.3%
	145 – Stonewall Flat	374	338	7.3%
	146 – Sarcobatus Flat	801	294	6.4%
	147 – Gold Flat	682	579	12.6%
	148 – Cactus Flat	395	335	7.3%
	149 – Stone Cabin Valley	979	49	1.1%
	157 – Kawich Valley	350	295	6.4%
	158A – Emigrant Valley – Groom Lake Valley	656	629	13.6%
	158A Excluding Range 4808A	***242***	***216***	***4.7%***
	158B – Emigrant Valley – Papoose Lake Valley	102	102	2.2%
	158B Excluding Range 4808A	***65***	***65***	***1.4%***
	159 – Yucca Flat	304	3	0.1%
	159 Excluding Range 4808A	***303***	**2.3**	**0.05%**
	160 – Frenchman Flat	457	212	4.6%
	160 Excluding Range 4808A	***457***	***211.6***	***4.6%***
	161 – Indian Spring Valley	671	369	8.0%
	168 – Three Lake Valley (Northern Part)	289	257	5.6%
	169A – Tikapoo Valley (Northern Part)	621	241	5.2%
	169A Excluding Range 4808A	***570***	***190***	***4.1%***
	169B – Tikapoo Valley (Southern Part)	369	90	2.0%
	170 – Penoyer (Sand Springs) Valley	694	146	3.2%
	173A – Railroad Valley (Southern Part)	602	71	1.5%
13 – Colorado River Basin	209 – Pahranagat Valley	768	1	0.01%
	210 – Coyote Spring Valley	616	0	0%
	211 – Three Lake Valley (Southern Part)	320	175	3.8%
	212 – Las Vegas Valley	1,544	9	0.2%

Table 4-4 Areas of Hydrographic Basins within the NTTR				
Hydrographic No. and Region Name	Hydrographic Basin No. and Name	Basin Area (sq. mi)	Approximate Area in NTTR (mi^2)	Percent of the NTTR
14 – Death Valley Basin	225 – Mercury Valley	64	0	0%
	227A – Fortymile Canyon – Jackass Flats	267	12	0.3%
	227B – Fortymile Canyon – Buckboard Mesa	237	7	0.2%
	228 – Oasis Valley	461	264	5.7%
	229 – Crater Flat	181	33	0.7%
TOTAL		**14,316**	**4,610**	**~100%**

The basins within the expansion areas are also discussed in the following table:

Table 4-5 Areas of Hydrographic Basins within the Proposed Withdrawal Areas			
Alternative Area	Hydrographic Basin No. and Name	Approximate Area in Alternative (mi^2)	Percent of the Alternative
3A - EC South	146 – Sarcobatus Flat	7	25.4%
	228 – Oasis Valley	21	75.6%
	ALTERNATIVE 3A - EC SOUTH TOTAL	**28**	**~100%**
3B - 64 C/D & 65D Acquisition	159 – Yucca Flat	0.56	0.60%
	160 – Frenchman Flat	11	11.9%
	161 – Indian Spring Valley	71	76.0%
	211 – Three Lake Valley (Southern Part)	8	8.4%
	212 – Las Vegas Valley	0.08	0.08%
	225 – Mercury Valley	3	3.0%
	ALTERNATIVE 3B - 64 C/D & 65D ACQUISITION TOTAL	**94**	**100%**
3B - Administrative Incorporation	211 – Three Lake Valley (Southern Part)	0.74	42.3%
	212 – Las Vegas Valley	1.01	57.4%
	ALTERNATIVE 3B - ADMINISTRATIVE INCORPORATION TOTAL	**1.75**	**~100%**
3C- Alamo	168 – Three Lake Valley (Northern Part)	28	7.8%
	169B – Tikapoo Valley (Southern Part)	257	70.8%
	209 – Pahranagat Valley	29	8.1%
	210 – Coyote Spring Valley	10	2.7%
	211 – Three Lake Valley (Southern Part)	30	8.3%
	212 – Las Vegas Valley	8	2.2%
	ALTERNATIVE 3C - ALAMO TOTAL	**362**	**~100%**

The area calculations are approximate only. The totaled percentages are within ± 0.30%. Reasons for error may be due to discrepancies of the NTTR boundary between federal agencies or errors in how the areas are measured. The NDWR hydrographic basin summaries list the total area of each basin, but most of these values are not consistent with geometry calculations from NDWR's GIS basin boundary shapefiles. The calculations and associated errors found are included in **Appendix C**.

CHAPTER 5 - **GROUNDWATER RESOURCES**

5.1 HYDROGEOLOGIC SYSTEMS

Hydrogeology involves the occurrence, flow, and quality of water beneath the Earth's surface. Groundwater can be found inundated in the spaces between grains of sand and silt or lie within large fractures of impermeable rock. These underground layers of water-bearing permeable rock or pockets of water within fractures that can be extracted via water well are called aquifers. Such aquifer systems have varying degrees of connectivity.

The proposed NTTR withdrawal extension and expansion areas are within the Great Basin Carbonate and Alluvial Aquifer System (GBCAAS) located in the Basin and Range geologic province. The GBCAAS includes the Basin and Range carbonate rock aquifers, Southern Nevada volcanic rock aquifers and Basin and Range basin-fill aquifers (Victor M. Heilweil 2010).

Carbonate rock aquifers are primarily limestone and dolomite of Mesozoic and Paleozoic age. Cavernous carbonate rock has been found to be as deep as 5,000 feet and may locally extend to depths of 15,000 feet. These rocks are also highly fractured and locally brecciated, which allows for significant subsurface water movement. Carbonate rock aquifers form the majority of the south-eastern portion of the NTTR (Michael Planert 1995).

The volcanic-rock aquifer primarily consists of tuff, rhyolite, or basalt of Tertiary age. The characteristics of storage and transmission of water depend on various factors including porosity. This aquifer type has the potential to have high water transmissivity due to the fractures and porosity inherent of these types of rock masses. However, this aquifer type also commonly has zones of dense welding that inhibits flow. Volcanic-rock aquifers form a large portion of the North Range of the NTTR (Michael Planert 1995).

Basin-fill aquifers are mostly unconsolidated sand and gravel of quaternary and tertiary age. The most important hydrologic features of the basins are the alluvial fans. The basin fill material allows rapid infiltration of water as it flows from the nearly impermeable rock of the surrounding mountains out onto the surface of the fans. These basins can store large quantities of water but move slowly through the ground. Basin-fill aquifers are common throughout the entirety of the NTTR (Michael Planert 1995).

Table 5-1 General Characteristics of Aquifers Found on the NTTR

Aquifer	Permeability	Fracturing	Transmissivity
Carbonate	Low	High	High
Volcanic	Moderate	High	Moderate
Basin Fill	High	Low	Moderate

5.1.1 GROUNDWATER OCCURRENCE AND FLOW

The primary source of groundwater recharge on the NTTR is precipitation in the form of snow or rain that infiltrates the ground. However, groundwater recharge in this region is only about four percent of the total precipitation (USAF, Dept. of the Navy, DOI 1991).

Groundwater flow is governed by the geological features in the area. Movement of groundwater typically occurs from higher altitude bedrock of mountains receiving recharge toward lower altitude discharge areas.

Water is naturally discharged via evaporation from areas where ground water is near the land surface, transpiring through plants, discharging at springs, and through leaking into overlying and underlying aquifers (Donald H. Schaefer 2003).

5.1.2 GROUNDWATER QUALITY

The quality of groundwater within the Basin and Range province varies in concentration of dissolved solids across basins from fresh water (<500 milligrams per liter [mg/L]) to saline (≥10,000 mg/L). However, certain locations have concentrations of dissolved solids that exceed ocean water (35,000 mg/L). Places with geothermal activity have a tendency for large amounts of dissolved solids due to the increased solubility at higher temperatures. Geothermal waters can contain high concentrations of chemicals such as arsenic, boron, fluoride, and lithium. Arsenic concentrations in groundwater are generally high in the Western states, including Nevada (Mark Walker 2007). Basin-fill aquifers also have large amounts of soluble salts which make them naturally more brackish. However, groundwater within basin margins on the slopes of alluvial fans are generally freshwater. Anthropogenic degradation of water quality from industrial, mining, urban, and agricultural areas are also present throughout the province (Michael Planert 1995).

Groundwater underneath playas or small closed valley areas tend to be brackish. Evaporite salts and minerals including gypsum and halite are common to playas. However, deep freshwater groundwater flow systems may be present. For example, water from a well 1,200 feet deep on the northern margin of a playa in a valley near Tonopah, Nevada has a dissolved-solids concentration of less than 350 mg/L. This concentration may be indicative of deep freshwater circulation in the basin-fill aquifer. In valleys with subsurface discharge into an extensive ground-water system, the water throughout the basin-fill aquifer is generally fresh (Michael Planert 1995).

Basin-fill aquifers may contain calcium, sodium, magnesium, and bicarbonate. Sodium, chloride, and sulfate are more prevalent in water with higher concentrations of dissolved solids (>1,000 mg/L). Volcanic-rock aquifers are also dominated by calcium, sodium, and bicarbonate. Carbonate-rock aquifer chemistry includes calcium, magnesium, and bicarbonate. Sodium may be present in significant quantity if it also passes through volcanic rock (James M. Thomas 1996).

The USGS conducted a groundwater quality study of the carbonate-rock aquifer of the Great Basin in Nevada and Utah in 2003. Thirty (30) sampling locations were selected from existing wells; 20 in Nevada and 10 in Utah (Donald H. Schaefer 2003).

Table 5-2 Chemical Presence in the Carbonate-Rock Aquifer of Great Basin

Analytes	USEPA MCL	Number of Samples That Exceed MCL	Percentage of Samples that Exceeded the MCL
Dissolved Antimony	6 µg/L	1	3%
Arsenic	10 µg/L	11	37%
Thallium	2 µg/L	1	3%
Chloride	250 mg/L	5	17%
Fluoride	2 mg/L	2	7%
Iron	0.3 mg/L	4	13%
Manganese	0.05 mg/L	1	3%
Sulfate	250 mg/L	3	10%
Total Dissolved Solids (TDS)	500 mg/L	7	23%
Radon (28 samples)	300 pCi/L	21	75%
MCL: Maximum Contaminant Level			

The TDS concentrations in the samples ranged from 144 to 5,120 mg/L, the pH varied between 6.4 to 8.8 and the dissolved oxygen ranged from 0.2 to 8.0 mg/L.

The DOE (formerly the US Atomic Energy Commission) conducted nuclear testing on the NNSS and portions of the NTTR from 1951 to 1992, which has resulted in areas of radioactive contamination. The Defense Nuclear Agency (now Defense Threat Reduction Agency), the DOE and the State of Nevada signed a Federal Facility Agreement and Consent Order (FFACO) effective May 10, 1996 to address the historic contamination both onsite and offsite of the NNSS known as DOE legacy sites. The FFACO outlined a corrective action strategy to identify legacy sites with contamination, conduct investigations of these sites, and implement corrective actions under the regulatory authority and oversight of NDEP. The USAF and DOE have a MOU that stipulates the radioactive contamination is solely the responsibility of the DOE.

Many of these areas of historic nuclear testing has impacted groundwater resources. This type of contamination can persist in the environment for thousands of years. The contamination is generally moving southwest from the NNSS at a rate of up to 300 feet per year. However, the contamination has not been found in any wells beyond the NNSS or NTTR (DOE 2016).

The DOE has stated that if groundwater contaminants from NNSS activities were verified at a publicly-accessible water source and the levels exceeded Southern Drinking Water Authority standards, the Nevada Field Office would work with the State of Nevada to monitor, shut down, and/or pursue an alternate water supply, as appropriate to meet the requirements of the SDWA (DOE 2016).

The DOE awarded Nye County a $1.3 million grant for community-based tritium groundwater monitoring. The grant provides the public additional assurances and opportunities for residents to become involved in the continued monitoring to verify that the drinking water in their community is not contaminated by historic nuclear testing activities (DOE 2015).

Tritium is a radioactive form of hydrogen and is currently the only contaminant of concern both on and off the NNSS. A contaminant of concern is defined as a radionuclide that exceeds 10 percent of the associated maximum contaminant levels at sampling locations other than in or near the underground nuclear test cavity (DOE, NNSA, Nevada Field Office 2014).

DOE/NNSA's offsite groundwater sampling network includes eleven (11) NTTR wells for the purposes of early detection or characterization and modeling the flow of the contamination. Wells used for early detection are located downgradient of a contamination source/plume well *(DOE, NNSA, Nevada Field Office 2014)*. DOE wells are also mentioned in NDWR's database and the USAF GIS database. The following table details monitoring/characterization wells and discrepancies between these records *(DOE, NNSA, Nevada Field Office 2014, USAF, NTTR Range Environmental 2016, NDWR 2016)*.

Table 5-3 DOE/NNSS Monitoring Wells

Well Log No. and Name	Well Owner	Identified on the NTTR*:			Basin location
		DOE Groundwater Sampling Plan (2014)	Records Search of NDWR (2016)	USAF GIS Shapefile (2016)	
75537 ER-EC-1	DOE	X	X	X	228
79401 ER-EC-2A	DOE	X	X	X	228/227A
76025 ER-EC-4	DOE	--	X	X	228
76304 ER-EC-5	DOE	X	X	X	228
75931 ER-EC-6	DOE	X	X	X	228

Table 5-3 DOE/NNSS Monitoring Wells					
Well Log No. and Name	Well Owner	Identified on the NTTR*:			Basin location
		DOE Groundwater Sampling Plan (2014)	Records Search of NDWR (2016)	USAF GIS Shapefile (2016)	
76538 ER-EC-7	DOE	--	X	X	228
76539 ER-EC-8	DOE	X	X	X	228
109321 ER-EC-11	NNSA	X	X	X	228
111910 ER-EC-12	NNSA	X	X	X	228
113306 ER-EC-13	NNSA	X	X	X	228
115779 ER-EC-14	NNSA	X	X	--	228
113305 ER-EC-15	NNSA	X	X	X	228
Unknown Log PM-3	Unknown	X	--	--	228
79419 ER-5-3	DOE	X	X	--	160
82029 ER-5-3 #2	DOE	X	X	--	160
82840 ER-5-3 #3	DOE	--	X	--	160
115604 ER-5-5	NNSA	X	X	--	160
88009 ER-7-1	NNSA	X	X	--	160
115603 ER-11-2	NNSA	--	X	--	160
115841 ER-20-11	NNSA	X	X	--	228
102959 Unnamed well	DOE	--	X	--	227A
* Entries in **green** are located on the NTTR per the identifying document.					

A well log was not found in reference to the name “PM-3”. The well log 102959 does not have a well name listed, but references Yucca Mountain. Further discussions on the wells identified through NDWR records research is included in their respective water basin sections of this chapter. A list of the geographic issues identified with the NDWR research is also included in Appendix B.

There are fourteen (14) active wells permitted within the NTTR that are monitored for compliance with drinking water standards through the NDEP’s Nevada Drinking Water Information System (NDWIS) (https://ndwis.ndep.nv.gov/DWW/) (NDEP 2016).

Table 5-4 Drinking Water Compliance Summary		
Installation	**Water System No.**	**Well Name(s) and Status**
TTR Man Camp	NV0004068	North Cactus Flats Well (active), Well 3 Replacement EH-7 (active), EH2 Well Inactive (inactive), and Well EH7 (inactive)
TTR Area 10 Industrial Area	NV0005001	Well 3A (active), Well 3B (active), and Well EH-2 (active)
TTR Site 6	NV0003014	Well 6 (active), CC TTR Area 10 NV0005001 (inactive), Well 3B Inactive (inactive), and Well A Inactive (inactive)
Cedar Pass	NV0001095	Well (active)
TECR O&M Compound	NV0005002	O&M Well (active)
TPECR	NV0000804	Well 1 (active)
Creech AFB	NV0001081	Well 106-3 (active), Well 106-4 (active), Well 62-5 (active), Well 106-2 Inactive (inactive), and Well 62-1 Inactive & Abandoned (inactive)
Point Bravo	NV0005006	Well Point Bravo (active) and Well 2 Silver Flag (inactive)
Silver Flag Alpha (Range 63C)	NV0000378	Silver Flag Well 2372 (active)

The water system facilities overview page notes the presence of chlorinators at the listed installations, with the exception of the TECR O&M compound. The TTR Man Camp, Area 10, Sandia Well 6, and Cedar Pass water system facilities overview pages note the presence of arsenic removal filters, arsenic reduction, or an arsenic treatment plant. The need for this special treatment is consistent with the elevated arsenic levels common to Nevada and volcanic rock aquifer systems that constitute the majority of the North Range.

The previous water requirements report from 1998 noted eleven (11) wells monitored for compliance with drinking water standards and two (2) additional wells monitored by Sandia/DOE, Sandia Well 6 and Sandia Area 9 (USAF NAFB 1998). The 2015 annual site environmental report for Sandia National Laboratories (SNL), TTR, identifies production Well 6 which supplies potable water for the SNL/TTR Area 3 drinking water and fire water protection distribution systems under water system number NV0003014 (Sandia National Laboratories 2016). This water system number is for the TTR Site 6 on the NDEP NDWIS and includes Well 6.

5.2 GROUNDWATER QUANTITY, RIGHTS, AND USE ON THE NTTR

This section discusses the results of the NDWR research for groundwater. Pertinent information available during the review of water permits and well logs are included. It should be noted that there are discrepancies in the data compiled from the NDWR (Appendix B). The information reviewed and compiled is considered approximate.

Only application (APP), certificate (CER), decreed (DEC), permit (PER), reserved (RES), ready for action (RFA), ready for action/protested (RFP), relinquish a portion (RLP), revocable permit (RVP) and vested right (VST) water permits were deemed relevant; other permit types are excluded from discussion in this report. Relevant information provided from the water permit and well logs are discussed when it was provided.

The information collected has been analyzed on a per basin basis since the NDWR evaluates and distributes water rights on a per basin basis. Therefore, the research and data gathering was conducted

in this manner. The reported annual duty for active applications and projected annual duty for pending applications are noted for each basin. These were compared against the assigned basin perennial yield to determine whether basins are over- or under allocated. The NDWR hydrographic area summary reports include supplementally adjusted annual duty for ground water sources. A supplementally adjusted basin may have multiple water rights that draw from the same application amount. Therefore, multiple permits may indicate the total amount although they are only permitted for a proportion of it.

NDWR records indicate that groundwater is appropriated from 176 wells for use within the boundaries of proposed NTTR withdrawal extension and expansion areas. Nineteen (19) groundwater rights are specifically appropriated by name to either the USAF or NAFB. The remaining water rights are held by other federal agencies or are privately held (any person or entity other than a federal agency). Groundwater use records from active NDEP registered water system facilities are presented in the following table (NDEP 2016):

Table 5-5 Drinking Water Systems Summary

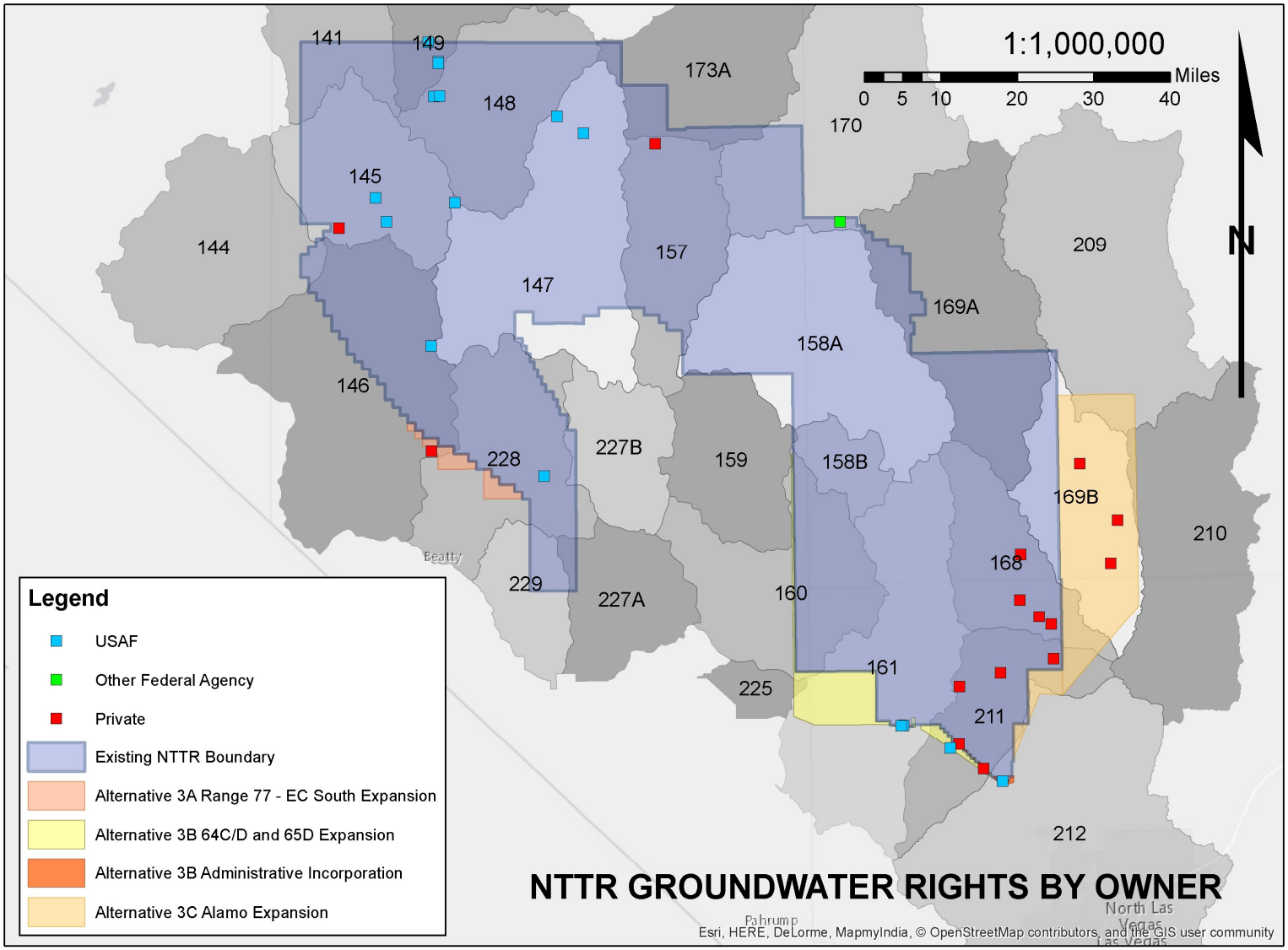
Installation	Water System Number	Active Well Name(s)	Population Served
TTR Man Camp	NV0004068	North Cactus Flats Well, Well 3 Replacement EH-7	30
TTR Area 10 Industrial Area	NV0005001	3A, 3B, EH-2	130
TTR Site 6	NV0003014	Well 6	150
Cedar Pass	NV0001095	Well	250
TECR O&M Compound	NV0005002	O&M Well	127
TPECR	NV0000804	Well 1	80
Creech AFB	NV0001081	106-3, 106-4, 62-5	300
Point Bravo	NV0005006	Well Point Bravo	50
Silver Flag Alpha (Range 63C)	NV0000378	Well 2372	35

The Las Vegas Valley Water District (LVVWD) and Southern Nevada Water Authority (SNWA) have been attempting to obtain water rights throughout central Nevada to keep up with the associated demands of population growth in the Las Vegas Valley. Applications were filed in 1989 to withdraw 864,000 acre-feet of ground water from 26 basins in Lincoln, Nye, and White Pine Counties and 70,000 acre-feet of surface water from the Virgin River in Clark County. LVVWD plans proposed pumping about 181,000 acre-feet per year from 21 basins as of 1992. However, rural counties and federal agencies (U.S. Bureau of Indian Affairs, BLM, National Park Service, and USFWS) opposed these applications as of 1992 (USGS 1997).

The LVVWD and SNWA have formally requested access onto the NTTR on multiple occasions since 1991 for groundwater exploration. LVVWD has requested to conduct groundwater exploration near Alamo Road, Slate Wash, the Desert Mountain Range, Tikaboo Valley, Jumbled Hills, Pintwater Range, White Sage Gap, and Three Lakes Valley. The majority of the requested areas were determined to conflict with the USAF mission and were subsequently denied.

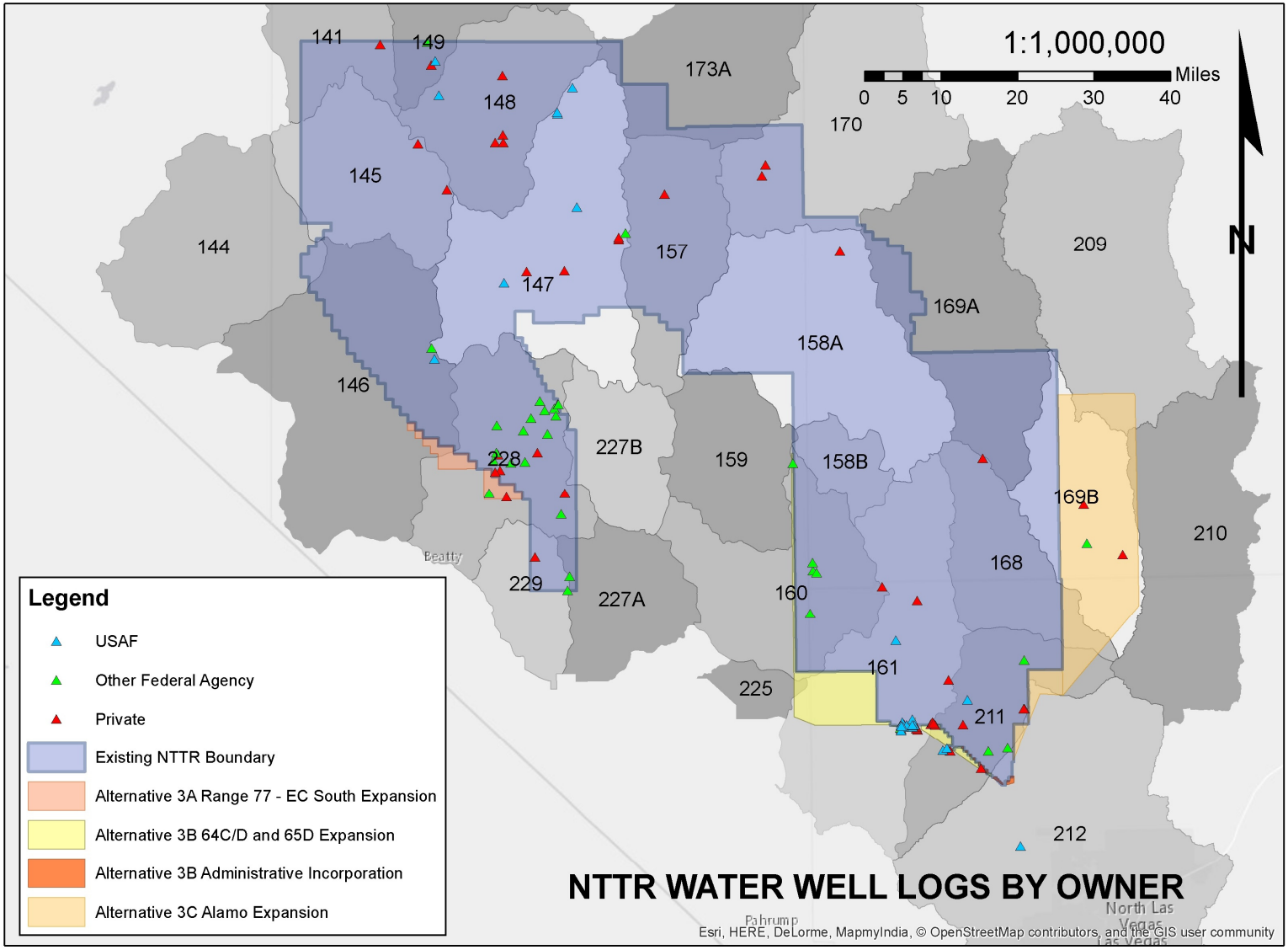
SNWA requested groundwater exploration through one (1) monitoring well in Three Lakes Valley North (168-OB1) and two (2) monitoring wells in Tikaboo Valley South (169-OB1 and 169-OB2) via correspondence dated April 28, 2003. These wells are mentioned in the section for Basin 169B.

See **Figure 5-1** and **Figure 5-2** for locations of identified groundwater rights and water well logs within the NTTR extension and expansion areas.



Note: Unmapped sites were outside of the scope of this report or lacked discoverable coordinates.

Figure 5-1 NTTR Groundwater Rights by Owner (SBCC 2017)



Note: Unmapped sites were outside of the scope of this report or lacked discoverable coordinates.

Figure 5-2 NTTR Water Well Logs by Owner (SBCC 2017)

5.2.1 BASIN 141 – RALSTON VALLEY

Ralston Valley, hydrographic basin number 141, is located in the northwestern portion of the proposed NTTR extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR extension boundary: 1S 44E; 1S 45E; 1S 46E; 2S 44E; 2S 45E; and 2S 46E. The basin area within the proposed NTTR extension area comprises 8.9% of the total water basin area of 980 square miles and 1.9% of the total proposed NTTR extension boundary. The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 6,000 AFY with no remarks on system yield. The yield quantity was obtained from the USGS Open File Report 78-768. The total assigned allocation for underground water is 4,307.33 AFY, which is 72% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-6 Basin 141 Manner of Use

Manner of Use*	Groundwater, Geothermal and Other Groundwater	
	Active Annual Duty	Pending Annual Duty
Industrial	7.86	0.00
Irrigation	7.16	18.00
Municipal	4,121.93	0.00
Quasi-Municipal	36.19	1,500.00
Stockwater	134.19	0.00
Total	**4,307.33**	**1,518.00**
Percentage of Total Perennial Yield (6,000 AFY)	**72%**	**25%**

* Manner of use categories that did not have any active or pending annual duty assigned to them (“zero” entries) were excluded from the table.

If all pending annual duty applications are approved the new total annual yield will be 5,825.33 AFY and would constitute 97% of the basin yield.

The basin abstracts of water rights and well logs were reviewed for entries with a location within the proposed NTTR withdrawal extension area. Relevant groundwater permit entries were not identified. However, one (1) relevant well log entry was identified as described in the table below:

Table 5-7 Basin 141 Well Logs

Well Log No. and Name	Owner	Completion Date	Work Type	Proposed Use	Permit/ Waiver No.*	Onsite/ Offsite**
Private						
7684	Frank Arcularius	12/29/1963	N	S	30196	Offsite

* The permit number for the water rights permit associated with the well log.
** If the associated water rights permit is within the proposed NTTR withdrawal extension area it is identified as “onsite”, otherwise it is “offsite".

Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.2 BASIN 144 – LIDA VALLEY

Lida Valley, hydrographic basin number 144, is located in the northwestern portion of the proposed NTTR extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR extension boundary: 4S 44E; 5S 44E; and 6S 44E. The basin area within the proposed NTTR extension area comprises 2.6% of the total water basin area of 532 square miles and 0.3% of the total proposed NTTR extension boundary. The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 350 AFY with no remarks on system yield. The yield quantity was obtained from the USGS Recon 45. The total assigned allocation for underground water is 258.91 AFY, which is 74% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-8 Basin 144 Manner of Use

Manner of Use*	Groundwater, Geothermal and Other Groundwater	
	Active Annual Duty	Pending Annual Duty
Commercial	167.96	0.00
Domestic	3.62	0.00
Mining and Milling	29.96	0.00
Quasi-Municipal	29.70	0.00
Stockwater	27.68	0.00
Total	**258.91**	**0.00**
Percentage of Total Perennial Yield (350 AFY)	**74%**	**0%**

* Manner of use categories that did not have any active or pending annual duty assigned to them ("zero" entries) were excluded from the table.

The basin abstracts of water rights and well logs were reviewed for entries with a location within the proposed NTTR extension area. Relevant groundwater permit entries were not identified. However, one (1) relevant well log entry was identified as described in the table below:

Table 5-9 Basin 144 Well Logs

Well Log No. and Name	Owner	Completion Date	Work Type	Proposed Use	Permit/ Waiver No.*	Onsite/ Offsite**
Private						
8027 Salisbury Park Wash Well	State of Nevada Highway Department	10/02/1963	N	P	21657	Offsite

* The permit number for the water rights permit associated with the well log.
** If the associated water rights permit is within the proposed NTTR withdrawal extension area it is identified as "onsite", otherwise it is "offsite".

Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.3 BASIN 145 – STONEWALL FLAT

Stonewall Flat, hydrographic basin number 145, is located in the northwestern portion of the proposed NTTR extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR extension boundary: 1S 44E; 1S 45E; 2S 44E; 2S 45E; 2S 46E; 3S 44E; 3S 45E; 3S 46E; 3S 47E; 4S 44E; 4S 45E; 4S 45E; 4S 46E; 4S 47E; 5S 44E; 5S 45E; 5S 46E; 5S 47E; and 6S 56E. The basin area within the proposed NTTR extension area comprises 90% of the total water basin area of 374 square miles and 7.3% of the total proposed NTTR extension boundary. The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 100 AFY with no remarks on system yield. The yield quantity was obtained from the USGS Recon 45. The total assigned allocation for underground water is 11.78 AFY, which is 12% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-10 Basin 145 Manner of Use

Manner of Use*	Groundwater, Geothermal and Other Groundwater	
	Active Annual Duty	Pending Annual Duty
Stockwater	11.78	0.00
Total	**11.78**	**0.00**
Percentage of Total Perennial Yield (100 AFY)	**12%**	**0%**

* Manner of use categories that did not have any active or pending annual duty assigned to them (“zero” entries) were excluded from the table.

The basin abstracts of water rights and well logs were reviewed for entries with a location within the proposed NTTR extension area. Three (3) relevant groundwater permit entries were identified; the findings are included in the table below:

Table 5-11 Basin 145 Groundwater Rights Permits

Application No.	Owner	Application File Date	Status	Source	Type of Use	Annual Duty (AFA)
USAF						
13284	USAF	03/06/1950	CER 4169	UG Desert Well	STK	6.94
13289	USAF	03/06/1950	CER 4171	UG Gold Crater Well	STK	4.85
Private						
12707	Colvin Cattle Co.	11/03/1948	CER 7726	OGW Yellow Tiger Tunnel	STK	0.00
Total						**11.79**

One (1) relevant well log entry was identified as described in the table below:

Table 5-12 Basin 145 Well Logs

Well Log No. and Name	Owner	Completion Date	Work Type	Proposed Use	Permit/ Waiver No.*	Onsite/ Offsite**
Private						
33183	Stone Cabin Partnership	02/10/1990	N	I	50738	Offsite

* The permit number for the water rights permit associated with the well log.
** If the associated water rights permit is within the proposed NTTR withdrawal extension area it is identified as “onsite”, otherwise it is “offsite".

Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.4 BASIN 146 – SARCOBATUS FLAT

Sarcobatus Flat, hydrographic basin number 146, is located in the northwestern portion of the proposed NTTR extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension and expansion area: 5S 44E; 5S 45E; 5S 46E; 6S 44E; 6S 45E; 6S 46E; 6S 47E; 7S 44E; 7S 45E; 7S 46E; 7S 47E; 8S 45E; 8S 46E; 8S 47E; 9S 46E; 9S 47E; 10S 47E; and 10S 48E. The basin area within the proposed NTTR extension area comprises 36.7% of the total water basin area of 801 square miles and 6.4% of the total proposed NTTR extension boundary. Basin 146 also includes 25.4% of the Alternative 3A expansion area.

The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 3,000 AFY with no remarks on system yield. The yield quantity was obtained from the USGS Open File Report 78-768. The total assigned allocation for underground water is 3,395.42 AFY, which is 113% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-13 Basin 146 Manner of Use

Manner of Use*	Groundwater, Geothermal and Other Groundwater	
	Active Annual Duty	Pending Annual Duty
Irrigation	2,631.80	0.00
Mining and Milling	162.34	210.00
Municipal	500.00	0.00
Quasi-Municipal	25.26	0.00
Stockwater	76.02	0.00
Total	**3,395.42**	**210.00**
Percentage of Total Perennial Yield (3,000 AFY)	**113%**	**7%**

* Manner of use categories that did not have any active or pending annual duty assigned to them (“zero” entries) were excluded from the table.

Basin 146 is over allocated by 395.42 AFY; if all pending annual duty applications are approved the new total will be 3,605.42 AFY and would equate to 120% of the basin yield.

The basin abstracts of water rights and well logs were reviewed for entries with a location within the proposed NTTR withdrawal extension and expansion area. Two (2) relevant groundwater permit entries were identified; the findings are included in the following table:

Table 5-14 Basin 146 Groundwater Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
USAF						
48429	USAF*	09/21/1984	CER 13619	UG Existing Well	QM	13.93
Private						
11081	V.E. Greenwald	03/09/1944	CER 3357	UG Well No. 1	STK	11.57
Total						**25.50**
* Original applicant						

The applicant for water permit 48429 is under the name USAF, Nellis AFB, Tolicha Peak. The specifications note a deep well with submersible pump and water storage in underground storage tanks. The water supply is intended to provide a broad range of uses including potable supply, dust control, and vehicle maintenance (washing). The permit references well log 64754 and is included in the next table.

Two (2) relevant well log entries were identified as described in the table below:

Table 5-15 Basin 146 Well Logs						
Well Log No. and Name	**Owner**	**Completion Date**	**Work Type**	**Proposed Use**	**Permit/ Waiver No.***	**Onsite/ Offsite****
USAF						
18899	Nellis AFB	08/30/1978	N	X	--	--
Other Federal Agency						
64754	Desert Research Institute	06/05/1984	N	P	48429	Onsite
* The permit number for the water rights permit associated with the well log. ** If the associated water rights permit is within the proposed NTTR withdrawal extension and expansion areas it is identified as “onsite”, otherwise it is “offsite".						

Well log 64754 owned by US Government c/o Desert Research was identified as being located within Tolicha Peak in connection to permit 48429. Well log 18899 owned by Nellis AFB also states the location as Tolicha Peak. Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.5 BASIN 147 – GOLD FLAT

Gold Flat, hydrographic basin number 147, is located in the northwestern portion of the proposed NTTR extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR extension boundary: 1S 49E; 1S 50E; 2S 49E-51E; 3S 48E-51E; 4S 47E-51E; 5S 46E-51E; 6S 46E-51E; 7S 46E-51E; 8S 47E; 8S 50E; and 8S 51E. The basin area within the proposed NTTR extension area comprises 84.9% of the total water basin area of 682 square miles and 12.6% of the total proposed NTTR extension boundary. The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 1,900 AFY with no remarks on system yield. The yield quantity was obtained from the USGS Open File Report 78-768. The total assigned allocation for underground water is 391.32

AFY, which is 21% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-16 Basin 147 Manner of Use		
Manner of Use*	**Groundwater, Geothermal and Other Groundwater**	
	Active Annual Duty	**Pending Annual Duty**
Quasi-Municipal	380.06	0.00
Stockwater	11.26	0.00
Total	**391.32**	**0.00**
Percentage of Total Perennial Yield (1,900 AFY)	**21%**	**0%**
* Manner of use categories that did not have any active or pending annual duty assigned to them ("zero" entries) were excluded from the table.		

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension area. Three (3) relevant groundwater permit entries were identified; the findings are included in the table below:

Table 5-17 Basin 147 Groundwater Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
USAF						
13365	Nellis AFB	05/03/1950	CER 4172	UG Sulphide Well	STK	11.26
54178	USAF	11/16/1989	CER 15421	UG	QM	18.08
62503	USAF*	10/07/1996	PER	UG Existing Well	QM	361.98
Total						**391.32**
* Original applicant						

Permit 62503 states that the well is used in support of an O&M complex, offices, vehicle maintenance, "fuel service various maintenance shops" and fire protection. Well logs 113419 and 113420 are connected to permit 62503 and are included in the next table.

The previous owner for permit 54178 is the Energy Department-US Nevada Operations. The certificate associated with the permit held by the USAF notes water is developed by means of a drilled well and pumped to storage tanks through a distribution system to a military facility located within multiple sections. It was unclear if the well was existing at the time of application and if so, what the well designation was.

Twelve (12) relevant well log entries were identified as described in the table below:

Table 5-18 Basin 147 Well Logs

Well Log No. and Name	Owner	Completion Date	Work Type	Proposed Use	Permit/ Waiver No.*	Onsite/ Offsite**
USAF						
36310	US Government	07/02/1990	D	X	--	--
73188	Nellis AFB	10/05/1998	N	P	64237	Onsite, Cancelled
81586	USAF	10/10/2000	P	U	--	--
104626 Well 53	USAF	12/14/2007	N	X	--	--
113419	USAF	01/05/2011	S	P	62503	Onsite
113420	USAF	01/05/2011	P	P	62503	Onsite
Private						
250 Gold Flat Well #2	Hip O Ranch	06/06/1947	N	S	--	--
1117 Gold Flat Well #1	John Leasey	11/07/1949	N	S	--	--
1280	Jim Daniels	04/30/1950	N	S	--	--
2994	Wilson Stewart	06/01/1955	N	S	--	--
50651 Well #2	Joe Fallini	05/14/1995	N	I	59707	Offsite
50652 Well #1	Joe Fallini	05/05/1995	N	I	59706	Offsite

* The permit number for the water rights permit associated with the well log.
** If the associated water rights permit is within the proposed NTTR withdrawal extension area it is identified as “onsite”, otherwise it is “offsite".

Well logs 113419 and 113420 appear to be associated with O&M operations in connection to permit 62503; these logs clarify the location as TTR. Well logs 36310 and 104626 also specify the well address as TTR. Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.6 BASIN 148 – CACTUS FLAT

Cactus Flat, hydrographic basin number 148, is located in the northern portion of the proposed NTTR extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR extension boundary: 1S 46E-50E; 2S 46E-49E; 3S 46E-49E; and 4S 47-49E. The basin area within the proposed NTTR extension comprises 84.8% of the total water basin area of 395 square miles and 7.3% of the total proposed NTTR extension boundary. The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 300 AFY with no remarks on system yield. The yield quantity was obtained from the USGS Open File Report 78-768. The total assigned allocation for underground water is 248.18 AFY, which is 83% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-19 Basin 148 Manner of Use		
Manner of Use*	**Groundwater, Geothermal and Other Groundwater**	
	Active Annual Duty	**Pending Annual Duty**
Quasi-Municipal	243.12	0.00
Stockwater	5.06	0.00
Total	**248.18**	**0.00**
Percentage of Total Perennial Yield (300 AFY)	**83%**	**0%**
* Manner of use categories that did not have any active or pending annual duty assigned to them ("zero" entries) were excluded from the table.		

The basin abstracts of water rights and well logs were reviewed for entries within the proposed NTTR extension area. Two (2) relevant groundwater permit entries were identified; the findings are included in the table below:

Table 5-20 Basin 148 Groundwater Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
USAF						
50169	USAF	09/19/1986	CER 14160	UG EH-2	QM	64.35
76668	USAF*	01/25/2008	PER	UG Existing Well	QM	178.77
Total						**243.12**
* Original applicant						

The original owner of Permit 50169 was the Energy Department-US. The certificate associated with the permit held by the USAF notes the well water is pumped to a storage tank through a distribution system to the TTR for quasi-municipal purposes. The underground source is specified as EH-2. This source is listed in the NDEP NDWIS under TTR Man Camp as an inactive well.

Permit 76668 states it is for well water to be pumped to a storage pond and pumped to facilities to support the TTR. The permit notes well log 25266 and is included in the next table.

Three (3) well log entries were found within the proposed NTTR withdrawal extension area as described in the following table:

Table 5-21 Basin 148 Well Logs						
Well Log No. and Name	**Owner**	**Completion Date**	**Work Type**	**Proposed Use**	**Permit/ Waiver No.***	**Onsite/ Offsite****
USAF						
18974	USAF	07/13/1978	N	P	--	--
25266	USAF	03/05/1984	N	X	--	--
Private						
1912 Casey Well	John J. Casey	04/17/1952	N	S	--	--

* The permit number for the water rights permit associated with the well log.
** If the associated water rights permit is within the proposed NTTR withdrawal extension area it is identified as “onsite”, otherwise it is “offsite".

Well log 25266 does not mention an associated water rights permit to confirm its connection to Permit 76668. Notable issues found during the water rights and well logs research for this basin are included in **Appendix B.**

5.2.7 BASIN 149 – STONE CABIN VALLEY

Stone Cabin Valley, hydrographic basin number 149, is located in the northwestern portion of the proposed NTTR extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR extension boundary: 1S 45E; 1S 46E; 1S 47E; and 2S 46E. The basin area within the proposed NTTR extension area comprises 5.0% of the total water basin area of 979 square miles and 1.1% of the total proposed NTTR extension boundary. The NDWR hydrographic basin summary notes a perennial yield of 2,000 AFY with no remarks on system yield. The yield quantity was obtained from the USGS Recon 12. The total assigned allocation for underground water is 10,426.77 AFY, which is 521% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-22 Basin 149 Manner of Use		
Manner of Use*	**Groundwater, Geothermal and Other Groundwater**	
	Active Annual Duty	**Pending Annual Duty**
Domestic	2.42	0.00
Irrigation	9,516.87	0.00
Quasi-Municipal	630.19	0.00
Stockwater	277.30	0.00
Total	**10,426.77**	**0.00**
Percentage of Total Perennial Yield (2,000 AFY)	**521%**	**0%**

* Manner of use categories that did not have any active or pending annual duty assigned to them (“zero” entries) were excluded from the table

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR extension area. Three (3) relevant groundwater permit entries were identified; the findings are included in the following table:

Table 5-23 Basin 149 Groundwater Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
USAF						
58149	USAF	09/29/1992	CER 14285	UG Well 3B	QM	320.55
58150	USAF	09/29/1992	CER 14286	UG Well 3A	QM	460.34
53885	USAF	09/25/1989	CER 14093	UG	QM	146.91
Total						**927.80**

The previous owner for permits 53885, 58149, and 58150 was the Energy Department-US Nevada Operations. The certificate associated with permit 53885 held by the USAF states water is developed by means of a drilled well, pumped to a distribution system to a government facility at the TTR for quasi-municipal purposes. This permit is connected to well logs 32284, 126391, and 126392 and are included in the next table.

Permit 58149 is a permit to change the manner of use under permit 50167, which is an abrogated application by the Energy Department-US for construction water from an onsite underground source. The current USAF owned certificate-status permit manner of use was changed to quasi-municipal for TTR's shops, office buildings, barracks, and hangers. The underground source is specified as Well 3B.

Permit 58150 is a permit to change the manner of use, under permit 50170, which is an abrogated application by the Energy Department-US for construction water from an onsite underground source. The current USAF owned certificate-status permit manner of use was changed to quasi-municipal for TTR's shops, office buildings, barracks, and hangers. The underground source is specified as Well 3A.

Eight (8) relevant well log entries were identified as described in the table below:

Table 5-24 Basin 149 Well Logs						
Well Log No. and Name	**Owner**	**Completion Date**	**Work Type**	**Proposed Use**	**Permit/ Waiver No.***	**Onsite/ Offsite****
USAF						
32808 TTR-03B	USAF	01/11/1985	N	X	--	--
Other Federal Agency						
32284	US Department of Energy	09/01/1989	N	P	53885	Onsite
126391 TTR EH-07	US Department of Energy	02/23/16	N	P	53885	Onsite
126392	US Department of Energy	02/23/16	P	P	53885	Onsite
Private						
46118	Greenridge Water Co.	07/05/1994	N	H	MO-2054	Offsite
65353 Well #1	Lavon Rasmussen	03/09/1966	N	I	22622	Offsite

Table 5-24 Basin 149 Well Logs						
Well Log No. and Name	**Owner**	**Completion Date**	**Work Type**	**Proposed Use**	**Permit/ Waiver No.***	**Onsite/ Offsite****
Private (Continued)						
65354 Well #2	Carroll Rasmussen	03/13/1966	N	I	22621	Offsite
65355	John Stikelman	03/20/1966	N	I	22620	Offsite
* The permit number for the water rights permit associated with the well log. ** If the associated water rights permit is within the proposed NTTR withdrawal extension area it is identified as “onsite”, otherwise it is “offsite".						

Well log 32284 states the well location as TTR for a potable water system. Well log 126392 is for the abandonment of the well associated with log 32284 and the new replacement well log number is provided as 126391. Well log 126391 remains located at the TTR for quasi-municipal/industrial uses.

Well log 32808 owned by USAF c/o Desert Research Institute, University of Nevada Reno states the well location as TTR. Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.8 BASIN 157 – KAWICH VALLEY

Kawich Valley, hydrographic basin number 157, is located in the northern portion of the proposed NTTR withdrawal extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension boundary: 3S 50E; 3S 51E; 3S 51.5E; 3S 52E; 4S 50E; 4S 51E; 4S 51.5E; 4S 52E; 5S 50E-53E; 6S 51E-53E; 7S 51E; 7S 52E; 8S 51E; and 8S 52E. The basin area within the proposed NTTR withdrawal extension area comprises 84.3% of the total water basin area of 350 square miles and 6.4% of the total proposed NTTR withdrawal extension boundary. The NDWR hydrographic basin summary notes a perennial yield of 2,200 AFY with no remarks on system yield. The yield quantity is from the USGS Open File Report 78-768. The total assigned allocation for underground water is 22.74 AFY, which is 1% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-25 Basin 157 Manner of Use		
Manner of Use *	**Groundwater, Geothermal and Other Groundwater**	
	Active Annual Duty	**Pending Annual Duty**
Stockwater	22.74	0.00
Total	**22.74**	**0.00**
Percentage of Total Perennial Yield (2,200 AFY)	**1%**	**0%**
* Manner of use categories that did not have any active or pending annual duty assigned to them (“zero” entries) were excluded from the table.		

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension area. One (1) groundwater permit entry was identified; the finding is included in the table below:

Table 5-26 Basin 157 Groundwater Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
Private						
12143	Helen Fallini Living Trust & Fallini 1983 Trust	12/27/1947	CER 3253	UG Camp's Well	STK	22.74
Total						**22.74**

The current certificate status permit 12143 is for permission to change the point of diversion and place of use to an onsite location within basin 157.

Two (2) relevant well log entries were identified as described in the table below:

Table 5-27 Basin 157 Well Logs						
Well Log No. and Name	**Owner**	**Completion Date**	**Work Type**	**Proposed Use**	**Permit/ Waiver No.***	**Onsite/ Offsite****
Other Federal Agency						
61855	Holmes	05/04/1969	N	N	--	--
Private						
17674	Joe Fallini	02/02/1978	N	I	--	--
* The permit number for the water rights permit associated with the well log. ** If the associated water rights permit is within the proposed NTTR withdrawal extension area it is identified as "onsite", otherwise it is "offsite".						

Well log 61855 is owned by Holmes & Narver with the location specified as the main gate at the central NNSS for the purposes of industrial water for a camp. Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.9 BASIN 158A – EMIGRANT VALLEY-GROOM LAKE VALLEY

Emigrant Valley-Groom Lake Valley, hydrographic basin number 158A, is located in the central portion of the proposed NTTR withdrawal extension area. The majority of the relevant basin area is within range 4808A, therefore the majority of this basin is out of scope and excluded from analysis. This report may or may not account for everything within this basin. The revised relevant basin area covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension boundary: 5S 53E-55.5E; 6S 52E-54E; 7S 52E; 7S 53E; 8S 52E; 8S 53E; 8S 57E; 9S 57E; and 10S 57E.

The basin area within the proposed NTTR withdrawal extension area comprises 96.0% of the total water basin area of 656 square miles and 13.6% of the total proposed NTTR withdrawal extension boundary. However, the revised relevant basin area of 216 square miles within the proposed NTTR withdrawal extension comprises 32.9% of the total water basin area and 4.7% of the total proposed NTTR withdrawal extension area.

The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 2,800 AFY with no remarks on system yield. The yield quantity was obtained from the USGS Open File Report 78-768. The total assigned allocation for underground water is 12.32 AFY, which is 0.4% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-28 Basin 158A Manner of Use		
Manner of Use*	**Groundwater, Geothermal and Other Groundwater**	
	Active Annual Duty	**Pending Annual Duty**
Stockwater	12.32	0.00
Total	**12.32**	**0.00**
Percentage of Total Perennial Yield (2,800 AFY)	**0.4%**	**0%**
* Manner of use categories that did not have any active or pending annual duty assigned to them ("zero" entries) were excluded from the table.		

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension area. Relevant groundwater permit entries were not identified. However, one (1) relevant well log entry was identified as described in the table below:

Table 5-29 Basin 158A Well Logs						
Well Log No. and Name	**Owner**	**Completion Date**	**Work Type**	**Proposed Use**	**Permit/ Waiver No.***	**Onsite/ Offsite****
Private						
9492	Gulf Oil Corp	04/28/1967	N	U	--	--
* The permit number for the water rights permit associated with the well log. ** If the associated water rights permit is within the proposed NTTR withdrawal extension and expansion areas it is identified as "onsite", otherwise it is "offsite".						

Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.10 BASIN 158B – EMIGRANT VALLEY-PAPOOSE LAKE VALLEY

Emigrant Valley-Papoose Lake Valley, hydrographic basin number 158B, is located in the southwestern portion of the proposed NTTR withdrawal extension area. A portion of the relevant basin area is within Range 4808A, therefore a portion of this basin is out of scope and excluded from analysis. This report may or may not account for everything within this basin. The revised relevant basin area covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension boundary: 10S 54E; 10S 55E; 10S 55.5E; 10S 56E; 11S 55E; 11S 55.5E; and 11S 56E.

The basin area within the proposed NTTR withdrawal extension area comprises 99.9% of the total water basin area of 102 square miles and 2.2% of the total proposed NTTR withdrawal extension boundary. However, the revised relevant basin area of 65 square miles within the proposed NTTR withdrawal extension comprises 63.4% of the total water basin area and 1.4% of the total proposed NTTR withdrawal extension area.

The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 10 AFY with no remarks on system yield. The yield quantity was obtained from the USGS Recon 54. The total assigned allocation for underground water is 0.00.

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension area. Relevant groundwater permit or well log entries were not identified. Notable issues found during the water rights and well log research for this basin are included in **Appendix B**.

5.2.11 BASIN 159 – YUCCA FLAT

Yucca Flat, hydrographic basin number 159, is located in the central portion of the proposed NTTR withdrawal extension area. This basin is primarily covered by the NNSS and also includes a portion located within Range 4808A. The revised relevant basin area covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension and expansion area boundary: 8S 52E; 8S 53E; 10S 54E; 11S 54E; and 12S 54E.

The basin area within the proposed NTTR withdrawal extension area comprises 1.0% of the total water basin area of 304 square miles and 0.1% of the total proposed NTTR withdrawal extension boundary. However, the revised relevant basin area of 2.3 square miles within the proposed NTTR withdrawal extension comprises 0.7% of the total water basin area and 0.05% of the total proposed NTTR withdrawal extension area. Basin 159 includes 0.60% of the Alternative 3B expansion area.

The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 350 AFY with no remarks on system yield. The yield quantity was obtained from the USGS Open File Report 78-768. The total assigned allocation for underground water is 0.00.

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension and expansion area. Relevant groundwater rights entries or well logs were not identified. Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.12 BASIN 160 – FRENCHMAN FLAT

Frenchman Flat, hydrographic basin number 160, is located in the southwestern portion of the proposed NTTR withdrawal extension area. A portion of the relevant basin area is within Range 4808A, therefore the portion of this basin is out of scope and excluded from analysis. This report may or may not account for everything within this basin. The revised relevant basin area covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension and expansion area boundary: 9S 54E; 10S 54E; 10S 55E; 11S 54E; 11S 55E; 11S 55.5E; 12S 54E; 12S 55E; 12S 55.5E.

The basin area within the proposed NTTR withdrawal extension area comprises 46% of the total water basin area of 457 square miles and 4.6% of the total proposed NTTR withdrawal extension boundary. The revised relevant basin area of 211.6 within the proposed NTTR withdrawal extension still comprises 46.3% of the revised total water basin area square miles and 4.6% of the total proposed NTTR withdrawal extension area. Basin 160 also includes 11.9% of the Alternative 3B proposed expansion area.

The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 100 AFY with no remarks on system yield. The yield quantity was obtained from the Water for Nevada Report No. 3. The total assigned allocation for underground water is 0.00.

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension and expansion area. Relevant groundwater rights entries were not identified. However, seven (7) relevant well log entries were identified as described in the following table:

Table 5-30 Basin 160 Well Logs						
Well Log No. and Name	**Owner**	**Completion Date**	**Work Type**	**Proposed Use**	**Permit/ Waiver No.***	**Onsite/ Offsite****
Other Federal Agency						
76780 WW-01	US Army	12/17/1950	N	U	--	--
79419 ER-5-3	US Department of Energy	03/16/2000	N	G	R-1024S	Unknown
82029 ER-5-3 #2	US Department of Energy	05/19/2000	N	G	R-1024B	Unknown
82840 ER-5-3 #3	US Department of Energy	02/05/2001	N	G	--	--
88009 ER-7-1	National Nuclear Security Admin	02/10/2003	N	G	R-1024C	Unknown
115603 ER-11-2	National Nuclear Security Admin	08/23/2012	N	G	--	--
115604 ER-5-5	National Nuclear Security Admin	08/12/2012	N	G	--	--
* The permit number for the water rights permit associated with the well log. ** If the associated water rights permit is within the proposed NTTR withdrawal extension and expansion areas it is identified as “onsite”, otherwise it is “offsite".						

The DOE/NNSA operates monitoring wells on the proposed NTTR withdrawal extension area for characterization, modeling, and early detection of the radiological contamination from historic nuclear testing (DOE, NNSA, Nevada Field Office 2014). DOE/NNSA records, USAF GIS data, and NDWR records were compared. Refer to **Table 5-3** for details.

Well log 76780 is owned by the US Army; the well log document is an US Army Corps of Engineers drawing labelled as “Mercury, Near Indian Springs, Nevada, Log of Well No. 1.” Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.13 BASIN 161 – INDIAN SPRINGS VALLEY

Indian Springs Valley, hydrographic basin number 161, is located in the central-southwestern portion of the proposed NTTR withdrawal extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension and expansion areas boundary: 10S 56E; 10S 57E; 11S 55.5E; 11S 56E; 11S 57E; 12S 55.5E; 12S 56E; 12S 57E; 13S 55E; 13S 55.5E; 13S 56E; 13S 57E; 14S 54E; 14S 55E; 14S 55.5E; 14S 56E; 14S 57E; 15S 54E; 15S 55E; 15S 55.5E; 15S 56E; 15S 57E; 16S 54E; 16S 55E; 16S 55.5E; and 16S 56E. The basin area within the proposed NTTR withdrawal extension area comprises 55.0% of the total water basin area of 671 square miles and 8.0% of the total proposed NTTR withdrawal extension boundary. Basin 161 also includes 76.0% of the Alternative 3B proposed expansion area.

The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 500 AFY with no remarks on system yield. The yield quantity was obtained from the State Engineer Ruling 3986. The total assigned allocation for underground water is 1,389.98 AFY, which is 278% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-31 Basin 161 Manner of Use		
Manner of Use*	**Groundwater, Geothermal and Other Groundwater**	
	Active Annual Duty	**Pending Annual Duty**
Commercial	7.64	0.00
Domestic	1.38	0.00
Irrigation	108.65	0.00
Municipal	798.00	32,000.00
Quasi-Municipal	474.30	0.00
Total	**1,389.98**	**32,000.00**
Percentage of Total Perennial Yield (500 AFY)	**278%**	**6400%**
* Manner of use categories that did not have any active or pending annual duty assigned to them ("zero" entries) were excluded from the table.		

If all pending annual duty applications are approved the new total will be 33,389.98 AFY and would equate to 6678% of the basin yield. The large pending annual duty is due to SNWA applications to acquire additional water rights to supply water for growth in the Las Vegas Valley.

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension and expansion area. Five (5) relevant groundwater rights entries were identified; the findings are included in the table below:

Table 5-32 Basin 161 Groundwater Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
USAF						
51572	USAF*	11/19/1987	CER 13636	UG Well 106-2	QM	35.48
51573	USAF*	11/19/1987	CER 13637	UG Well 62-1	QM	67.91
66651	USAF*	08/08/2000	PER	UG	IND	50.67
66652	USAF*	11/19/1987	CER 13637	UG	QM	67.91
84836	USAF	02/12/2015	PER	UG Existing Well	QM	14.48
Total						**236.45**
* Original applicant						

Permit 51572 states the water is to be diverted from its source in building no. T-106 for quasi-municipal purposes. The underground source is specified as well 106-2. The permit is also connected to well logs 52398 and 102134. Permit 66651 uses building no. T-106 as the diversion source and water is to be used for dust control and construction for the Indian Springs Air Force Auxiliary Field (ISAFAF) (Creech AFB) under application 51572 and 51573.

Permit 51573 states the water is to be diverted from its source in building no. T-62 for quasi-municipal purposes. The underground source is specified as well 62-1. The permit is also connected to well logs

26775 and 111318. Permit 66652 uses building no. T-62 as the diversion source and is to be used for dust control and construction for the ISAFAF (Creech AFB) under application 51572 and 51573. The sources 106-2 and 62-1 are listed in the NDEP NDWIS under Creech AFB as inactive wells.

Permits 66651 and 66652 remark that water under applications 51572 and 51573 are intended to be comingled with water under other applications to serve the ISAFAF (Creech AFB). The total combined duty of water under permits 51572 certificate 13636, 51573 certificate 13637, permit 66651, and permit 66652 shall not exceed 56.09 million gallons annually (dated May 2001).

Permit 64603 owned by USA but originally held by Sheila Becker was abrogated and referenced application 84836. Permit 84836 is to change the point of diversion and manner of use granted under 64603. The water is intended for quasi-municipal purposes for Creech AFB. The total combined duty of water under permits 51572 certificate 13636, 51573 certificate 13637, permit 66651, permit 66652 and permit 84836 shall not exceed 156.615 acre-feet annually (dated September 2015).

Sixty-eight (68) relevant well log entries were identified as described in the table below:

Table 5-33 Basin 161 Well Logs

Well Log No. and Name	Owner	Completion Date	Work Type	Proposed Use	Permit/ Waiver No.*	Onsite/ Offsite**
USAF						
26775	***US Air Force***	***01/11/1985***	***N***	***P***	***51573***	***Onsite***
41220 MW-098	Nellis AFB	03/03/1993	N	G	MO-2231	Unknown
41221 MW-099	Nellis AFB	03/01/1993	N	G	MO-2231	Unknown
41222 MW-100	Nellis AFB	03/03/1993	N	G	MO-2231	Unknown
41223 MW-097	Nellis AFB	02/22/1993	N	G	MO-2231	--
64248	***US Air Force***	***01/16/1997***	***N***	***G***	***MO-2769***	***Unknown***
65269	***US Air Force***	***01/16/1997***	***N***	***G***	***MO-2769***	***Unknown***
66353	***US Air Force***	***02/17/1993***	***P***	***G***	***MO-2239***	***Unknown***
70441	***Nellis AFB***	***01/08/1998***	***P***	***G***	***--***	***--***
84684	***Nellis AFB***	***06/27/2001***	***N***	***Z***	***--***	***--***
102134	***USAF***	***10/06/2006***	***S***	***P***	***51572/ R-1330***	***Onsite/ Unknown***
103371 Well 1R	***US Air Force***	***06/15/2007***	***S***	***P***	***51573***	***Onsite***
103372 Well 1	***US Air Force***	***06/16/2007***	***P***	***P***	***51573***	***Onsite***
108220	***US Government***	***07/02/2007***	***N***	***G***	***R-1365***	***Unknown***
111318	US Air Force	04/21/2010	R	P	51573	Onsite
117196 MW-100	***USA***	***03/27/2013***	***P***	***G***	***--***	***--***
117197 MW-099	***USA***	***03/27/2013***	***P***	***G***	***--***	***--***

Table 5-33 Basin 161 Well Logs						
Well Log No. and Name	**Owner**	**Completion Date**	**Work Type**	**Proposed Use**	**Permit/ Waiver No.***	**Onsite/ Offsite****
117198 MW-098	***USA***	***03/27/2013***	***P***	***G***	***--***	***--***
Other Federal Agency						
52398 Well 02	***US Army***	***09/15/1942***	***N***	***P***	***51572***	***Onsite***
Private						
6652	Clark County School District	05/30/1962	N	P	29616	Abrogated
8254	State of Nevada Highway Dept.	03/20/1963	N	U	21287	Withdrawn
8582	Sproul	06/18/1965	N	C	21089	Cancelled
11127	State of Nevada Highway Dept.	07/22/1970	N	H	--	--
15347	Susie Smith	07/14/1975	N	P	29578	Abrogated
17420	Richard Presley	05/04/1977	N	I	31126	Forfeited
22174	Elmer & Betty Glover	03/29/1979	N	C	38283	Unknown
24116	Indian Springs Sewage Co.	06/17/1982	N	P	38859	Offsite
24379	Indian Springs Sewage Co.	11/07/1982	R	P	38859	Offsite
26773	Cliff Houpt	03/08/1985	N	H	--	--
26774	James Fisher Jr.	02/13/1985	N	H	--	--
31041	Tommy Young	10/11/1988	N	H	--	--
41157	Richard & Kim Dunn	03/19/1993	N	H	--	--
50746	Broadbent & Associates	10/04/1995	N	G	MO-2629	Unknown
52362	Gaylen Albright	04/07/1978	N	H	--	--
52363	Phil Andreggs	09/05/1969	N	H	--	--
52364	Baker	05/21/1956	N	H	--	--
52365	Clyde Vanbebber	06/08/1981	N	H	--	--
52367	William J Brady	11/18/1958	N	H	--	--
52368	Scott Camberm	09/05/1969	N	H	--	--
52369	Cassity	02/22/1960	N	H	--	--
52370	Robert Cassity	11/22/1961	N	H	--	--
52371	Dwain Dotson	05/03/1977	N	H	--	--
52372	O E Davis	06/10/1967	N	H	--	--
52373	William Fairchild	05/16/1956	N	H	--	--
52374	Ned Ferraro	11/25/1958	N	H	--	--
52375	Tim Harnedy	10/23/1946	N	I	67458	Unknown
52376	Jay Hayes	02/29/1960	N	H	--	--

Table 5-33 Basin 161 Well Logs

Well Log No. and Name	Owner	Completion Date	Work Type	Proposed Use	Permit/ Waiver No.*	Onsite/ Offsite**
52377	Howell & Pool	03/07/1960	N	H	--	--
52378	Frank Hunter	05/07/1956	N	H	--	--
52379	Leroy Johnson	03/11/1960	N	H	--	--
52380	Johnnie Lewis	12/02/1981	N	H	--	--
52381	Johnnie Lewis	11/25/1981	N	H	--	--
52382	Johnnie Lewis	01/30/1982	N	H	--	--
52383	Johnnie Lewis	08/16/1963	N	H	--	--
52384	Johnnie Lewis	08/30/1963	N	C	21666	Cancelled
52385	Jack Moe	06/18/1962	N	H	--	--
52386	Joe Robinson	06/09/1962	N	H	--	--
52387	Jerry Rushing	06/13/1966	N	H	--	--
52388	Vesta Schenk	06/26/1961	N	H	--	--
52389	Charles Smith	02/25/1960	N	C	21666	Cancelled
52390	H L Smith	11/12/1958	N	H	--	--
52391	A C Spears	05/11/1956	N	H	--	--
52392	Brad Thomas	04/09/1978	N	H	--	--
52393	Mike Williams	06/30/1981	N	H	--	--
52399	R G Kyker	09/26/1962	N	H	--	Abrogated
72163	Broadbent & Associates	06/16/1998	P	G	MO-2629	Unknown
83204	Clark County School District	06/12/2001	P	R	29616 /R-1057	Abrogated/ Unknown
118830	Glendale Gas Management LLC	09/17/13	N	G	--	--

* The permit number for the water rights permit associated with the well log.
** If the associated water rights permit is within the proposed NTTR withdrawal extension and expansion areas it is identified as “onsite”, otherwise it is “offsite".
Bolded and italicized entries had specific references for the location as ISAFAF, Creech AFB, Nellis AFB Range Complex or NTTR on the original well log.

Well log 111318 states the purpose is for the reconditioning of an USAF municipal/industrial well under log 26775 completed in 2010. Well log 103372 states it is for the plugging for the same well completed in 2007. Well logs 117196, 117197 and 117198 owned by USA are for the plugging of NAFB owned monitoring wells under logs 41222, 41221 and 41220, respectively.

Well logs 52398 and 102134 are under the aforementioned water permit 51572. Well log 52398 is owned by the US Army; the well log document is an US Army Corps of Engineers drawing labelled as “Indian Springs Aux. Land Field, Indian Springs, Nevada, Water Supply, Log of Well No. 2”. Well log 102134 states the well location address as building 106-2A, which is similar to the listed source (well 106-2) on the corresponding water permit.

The well logs identified within this basin are primarily privately owned wells. Privately owned wells are defined within this analysis as any owner other than a federal entity. This basin includes Creech AFB

located within the town of Indian Springs, NV. Creech AFB is subsequently near or even adjoins private residences and publicly owned property. Therefore, a number of these privately held well logs were shown onsite due to possible administrative errors across the different verification processes discussed in the Information Sources and Project Approach section. Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.14 BASIN 168 – THREE LAKES VALLEY (NORTHERN PART)

Three Lakes Valley (Northern Part), hydrographic basin number 168, is located in the southeastern portion of the proposed NTTR withdrawal extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension and expansion area boundary: 9S 57E; 10S 57E; 10S 58E; 11S 57E-59E; 12S 57E-59E; 13S 57E-59E; 12.5S 60E; 13S 60E; and 14S 57E-61E. The basin area within the proposed NTTR withdrawal extension area comprises 88.9% of the total water basin area of 289 square miles and 5.6% of the total proposed NTTR withdrawal extension boundary. Basin 168 also includes 7.8% of the Alamo expansion area.

The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 3,700 AFY with no remarks on system yield. The yield quantity is obtained from the State Engineer Ruling 5465. The total assigned allocation for underground water is 3,700.00 AFY, which is 100% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-34 Basin 168 Manner of Use

Manner of Use*	Groundwater, Geothermal and Other Groundwater	
	Active Annual Duty	Pending Annual Duty
Municipal	3,700.00	0.00
Total	**3,700.00**	**0.00**
Percentage of Total Perennial Yield (3,700 AFY)	**100%**	**0%**

* Manner of use categories that did not have any active or pending annual duty assigned to them (“zero” entries) were excluded from the table.

The basin abstracts of water rights and well logs were reviewed for entries within the proposed NTTR withdrawal extension and expansion area. Eight (8) relevant groundwater permit entries were identified; the findings are included in the table below:

Table 5-35 Basin 168 Groundwater Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
Private						
54060	SNWA	10/17/1989	PER	UG Well 168-1A	MUN	1,700.00
54061	SNWA	10/17/1989	RFP	UG Well 168-2R	MUN	0.00
54068	SNWA	10/17/1989	PER	UG Well 168-2A	MUN	2,000.00
54069	SNWA	10/17/1989	PER	UG Well 168-1R	MUN	2,000.00
79316	SNWA*	01/28/2010	RFP	UG Well 168-1A	MUN	0.00
79317	SNWA*	01/28/2010	RFP	UG Well 168-2R	MUN	0.00
79318	SNWA*	01/28/2010	RFP	UG Well 168-2A	MUN	0.00
79319	SNWA*	01/28/2010	RFP	UG Well 168-1R	MUN	0.00
Total						**5,700.00**
* Original applicant						

Relevant well log entries were not identified. Notable issues found during the water rights and well log research for this basin are included in **Appendix B**.

5.2.15 BASIN 169A – TIKAPOO VALLEY (NORTHERN PART)

Tikapoo Valley (Northern Part), hydrographic basin number 169A, is located in the northwestern portion of the proposed NTTR withdrawal extension area. A portion of the relevant basin area is within Range 4808A, therefore a portion of this basin is out of scope and excluded from analysis. This report may or may not account for everything within this basin. The revised relevant basin area covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension boundary: 5S 55.5E; 5S 56E; 6S 55E-57E; 7S 56E; 7S 57E; 8S 56E-59E; 9S 57E-59E; 10S 57E-59E; 11S 58E; and 11S 59E.

The basin area within the proposed NTTR withdrawal extension area comprises 38.8% of the total water basin area of 621 square miles and 5.2% of the total proposed NTTR withdrawal extension boundary. However, the revised relevant basin area of 190 square miles within the proposed NTTR withdrawal extension comprises 30.6% of the total water basin area and 4.1% of the total proposed NTTR withdrawal extension area.

The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 2,600 AFY with no remarks on system yield. The yield quantity was obtained from State Engineer Ruling 5465. The total assigned allocation for underground water is 2,594.20 AFY, which is 99.8% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-36 Basin 169A Manner of Use		
Manner of Use*	**Groundwater, Geothermal and Other Groundwater**	
	Active Annual Duty	**Pending Annual Duty**
Municipal	2,587.00	0.00
Stockwater	7.20	0.00
Total	**2,594.20**	**0.00**
Percentage of Total Perennial Yield (2,600 AFY)	**99.8%**	**0%**
* Manner of use categories that did not have any active or pending annual duty assigned to them ("zero" entries) were excluded from the table.		

The basin abstracts of water rights and well logs were reviewed for entries within the proposed NTTR withdrawal extension area. Relevant groundwater permit entries were not identified. However, one (1) relevant well log entry was identified as described in the table below:

Table 5-37 Basin 169A Well Logs						
Well Log No. and Name	**Owner**	**Completion Date**	**Work Type**	**Proposed Use**	**Permit/ Waiver No.***	**Onsite/ Offsite****
Private						
5935	Whitney Enterprises	06/18/1961	N	I	--	--
* The permit number for the water rights permit associated with the well log. ** If the associated water rights permit is within the proposed NTTR withdrawal extension area it is identified as "onsite", otherwise it is "offsite".						

Notable issues found during the water rights and well log research for this basin are included in **Appendix B.**

5.2.16 BASIN 169B – TIKAPOO VALLEY (SOUTHERN PART)

Tikapoo Valley (Southern Part), hydrographic basin number 169B, is located in the northwestern portion of the proposed NTTR withdrawal extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension and expansion area: 8S 59E; 8S 60E; 9S 59E-61E; 10S 59E-61E; 11S 58E-61E; 12S 59E-61E; 12.5S 60E; 12.5S 61E; 13S 59E-61E; 14S 60E; and 14S 61E. The basin area within the proposed NTTR withdrawal extension area comprises 24.4% of the total water basin area of 369 square miles and 2.0% of the total proposed NTTR withdrawal extension boundary. Basin 169B also includes 70.8% of the Alamo expansion area.

The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 1,700 AFY with no remarks on system yield. The yield quantity was obtained from State Engineer Ruling 5465. The total assigned allocation for underground water is 1,700 AFY, which is 100% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-38 Basin 169B Manner of Use		
Manner of Use*	**Groundwater, Geothermal and Other Groundwater**	
	Active Annual Duty	**Pending Annual Duty**
Municipal	1,700.00	0.00
Total	**1,700.00**	**0.00**
Percentage of Total Perennial Yield (1700 AFY)	**100%**	**0%**
* Manner of use categories that did not have any active or pending annual duty assigned to them ("zero" entries) were excluded from the table.		

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension and expansion area. Five (5) relevant groundwater permit entries were identified; the findings are included in the table below:

Table 5-39 Basin 169B Groundwater Rights Permits						
Application No. and Source	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
Private						
53950	SNWA	10/17/1989	PER	UG Well 169B-1A	MUN	1,700.00
53951	SNWA	10/17/1989	PER	UG Well 169B-1R	MUN	1,700.00
53952	SNWA	10/17/1989	RFP	UG Well 169B-2R	MUN	0.00
79323	SNWA*	01/28/2010	RFP	UG Well 169B-1A	MUN	0.00
79324	SNWA*	01/28/2010	RFP	UG Well 169B-2R	MUN	0.00
Total						**3,400.00**
* Original applicant						

SNWA requested groundwater exploration through a monitoring well in Three Lakes Valley North (168-OB1) and two monitoring wells in Tikaboo Valley South (169-OB1 and 169-OB2) via correspondence to the Air Force dated April 28, 2003. It is possible the permits 53952, 53951, and 53950 are the applications for the wells referenced in the correspondence; however, the well designations are not an exact match.

Three (3) relevant well log entries were identified as described in the table below:

Table 5-40 Basin 169B Well Logs

Well Log No. and Name	Owner	Completion Date	Work Type	Proposed Use	Permit/ Waiver No.*	Onsite/ Offsite**
Other Federal Agency						
31194	USGS	01/21/1989	N	X	--	--
Private						
44256	Luanne Baker	03/14/1994	N	H	--	--
117027	K B Homes	06/20/2013	P	H	--	--

* The permit number for the water rights permit associated with the well log.
** If the associated water rights permit is within the proposed NTTR withdrawal extension and expansion areas it is identified as “onsite”, otherwise it is “offsite".

Notable issues found during the water rights and well logs research for this basin are included in **Appendix B.**

5.2.17 BASIN 170 – PENOYER VALLEY (SAND SPRING VALLEY)

Penoyer Valley (Sand Spring Valley), hydrographic basin number 170, is located within the central portion of the proposed NTTR withdrawal extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension boundary: 3S 52E-54E; 4S 52E-54E; 5S 53E-55E; and 5S 55.5E. The basin area within the proposed NTTR withdrawal extension area comprises 21.0% of the total water basin area of 694 square miles and 3.2% of the total proposed NTTR withdrawal extension boundary. The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 4,000 AFY with no remarks on system yield. The yield quantity is obtained from the USGS Recon 60. The total assigned allocation for underground water is 15,082.65 AFY, which is 377% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-41 Basin 170 Manner of Use

Manner of Use*	Groundwater, Geothermal and Other Groundwater	
	Active Annual Duty	Pending Annual Duty
Commercial	64.20	0.00
Irrigation	12,390.73	0.00
Municipal	0.00	8,687.64
Quasi-Municipal	2,540.01	0.00
Stockwater	87.71	0.00
Total	**15,082.65**	**8,687.64**
Percentage of Total Perennial Yield (4,000 AFY)	**377%**	**217%**

* Manner of use categories that did not have any active or pending annual duty assigned to them (“zero” entries) were excluded from the table.

If all pending annual duty applications are approved the new total will be 23,770.29 AFY and would equate to 594% of the basin yield.

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension area. One (1) relevant groundwater permit entry was identified; the finding is included in the table below:

Table 5-42 Basin 170 Groundwater Rights Permits

Application No.	Owner	Application File Date	Status	Source	Type of Use	Annual Duty (AFA)
Other Federal Agency						
3364	USA	04/24/1915	CER	UG The Wells	STK	1.66
Total						**1.66**
* Original applicant						

Three (3) relevant well log entries were identified as described in the table below:

Table 5-43 Basin 170 Well Logs

Well Log No. and Name	Owner	Completion Date	Work Type	Proposed Use	Permit/ Waiver No.*	Onsite/ Offsite**
Private						
25369	Joe Fallini	04/26/1984	S	S	11049	Offsite
88272	Twin Springs Ranch	10/23/2002	S	S	13498	Offsite
88276	Twin Springs Ranch	11/04/2002	P	S	13498/R-420	Offsite

* The permit number for the water rights permit associated with the well log.
** If the associated water rights permit is within the proposed NTTR withdrawal extension area it is identified as “onsite”, otherwise it is “offsite".

Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.18 BASIN 173A – RAILROAD VALLEY (SOUTHERN)

Railroad Valley (Southern Part), hydrographic basin number 173A, is located in the northern portion of the proposed NTTR withdrawal extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension boundary: 1S 50E; 2S 50E; 2S 51E; 3S 51E; 3S 51.5E; 3S 52E; and 3S 53E. The basin area within the proposed NTTR withdrawal extension area comprises 11.7% of the total water basin area of 602 square miles and 1.5% of the total proposed NTTR withdrawal extension boundary. The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 2,800 AFY with no remarks on system yield. The yield quantity was obtained from the USGS Recon 60. The total assigned allocations for underground water is 3,931.02 AFY, which is 140% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-44 Basin 173A Manner of Use		
Manner of Use*	**Groundwater, Geothermal and Other Groundwater**	
	Active Annual Duty	**Pending Annual Duty**
Irrigation	3,676.51	0.00
Stockwater	245.54	0.00
Other	8.96	0.00
Total	**3,931.02**	**0.00**
Percentage of Total Perennial Yield (2,800 AFY)	**140%**	**0%**
* Manner of use categories that did not have any active or pending annual duty assigned to them ("zero" entries) were excluded from the table.		

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension area. Groundwater permit or well log entries were not identified. Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.19 BASIN 209 – PAHRANAGAT VALLEY

Pahranagat Valley, hydrographic basin number 209, is located southeast of the proposed NTTR withdrawal extension area. The basin approximately covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension and expansion area boundary: 8S 59E; 8S 60E; 8S 61E; 9S 60E; and 9S 61E. The basin area within the proposed NTTR withdrawal extension area comprises 0.1% of the total water basin area of 768 square miles and 0.01% of the total proposed NTTR withdrawal extension boundary. Basin 209 also includes 8.1% of the Alamo expansion area.

The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 25,000 AFY with remarks on system yield stating that the yield is equal to the system yield. The yield quantity was obtained from the USGS Water Resources Bulletin No. 33. The total assigned allocation for underground water is 10,743.76 AFY, which is 43% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-45 Basin 209 Manner of Use		
Manner of Use*	**Groundwater, Geothermal and Other Groundwater**	
	Active Annual Duty	**Pending Annual Duty**
Commercial	39.19	0.00
Irrigation	7,460.87	18.00
Municipal	1,089.10	0.00
Quasi-Municipal	2.04	17.00
Stockwater	60.52	0.00
Storage	0.00	0.00
Wildlife	2,092.05	0.00
Total	**10,743.76**	**35.00**
Percentage of Total Perennial Yield (25,000 AFY)	**43%**	**0.14%**
* Manner of use categories that did not have any active or pending annual duty assigned to them ("zero" entries) were excluded from the table.		

If all pending annual duty applications are approved the new total will be 10,778.76 AFY and would still equate to about 43% of the basin yield.

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension and expansion area. Relevant groundwater permit or well log entries were not identified. Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.20 BASIN 210 – COYOTE SPRING VALLEY

Coyote Spring Valley, hydrographic basin number 210, is located exclusively in the eastern portion of the Alamo proposed expansion area. The basin covers the following townships and ranges of the PLSS within the proposed expansion area boundary: 9S 61E; 10S 61E; and 11S 61E. None of the 616 square miles of this basin includes the proposed NTTR withdrawal extension area. Basin 210 includes 2.7% of the Alternative 3C expansion area.

The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 1,900-18,000 AFY and no remarks on system yield. Yield remarks state to "see state engineer ruling 6254 and 6255." The yield quantities were obtained from State Engineer Ruling 4542. A search for state ruling 6254 revealed 19 records for municipal and quasi-municipal applications from 2014 that were denied because there was no unappropriated water. A search for state ruling 6255 revealed 22 records for municipal, quasi-municipal and mining and milling applications from 2014 that were also denied because there was no unappropriated water.

The state ruling 4542 explains the State Engineer's finding that the groundwater recharge (perennial yield) as a direct result of precipitation above the 6,500 foot elevation in the watershed is estimated at 1,900 AFA. In a deeper analysis of the basin's aquifer system, it was determined the perennial yield of the basin is 18,000 AFA. The total assigned allocations for underground water are 16,693.00 AFY, which is 879% of the 1,900 AFY basin yield and 93% of the 18,000 AFY basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-46 Basin 210 Manner of Use

Manner of Use*	Groundwater, Geothermal and Other Groundwater	
	Active Annual Duty	Pending Annual Duty
Commercial	0.00	543.00
Industrial	2,500.00	0.00
Irrigation	343.00	0.00
Municipal	13,850.00	2,000.00
Wildlife	0.00	460.00
Total	**16,693.00**	**3,003.00**
Percentage of Total Perennial Yield (1,900 AFY)	**879%**	**158%**
Percentage of Total Perennial Yield (18,000 AFY)	**93%**	**17%**

* Manner of use categories that did not have any active or pending annual duty assigned to them ("zero" entries) were excluded from the table.

If all pending annual duty applications are approved the new total will be 19,696.00 AFY and would equate to about 1037% of the basin yield for the 1,900 AFY max and 109% of the basin yield for the 18,000 AFY max.

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed expansion area. Groundwater rights entries or well logs were not identified. Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.21 BASIN 211 – THREE LAKES VALLEY (SOUTHERN PART)

Three Lakes Valley (Southern Part), hydrographic basin number 211, is located in the southern portion of the proposed NTTR withdrawal extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension and expansion areas boundary: 14S 57E-60E; 15S 56-60E; 16S 56E; 16S 57E; 16S 58E; and 17S 58E. The basin area within the proposed NTTR withdrawal extension area comprises 54.7% of the total water basin area of 320 square miles and 3.8% of the total proposed NTTR withdrawal extension boundary. Basin 211 also includes 42.3% of the Alternative 3B (Administrative Incorporation) Land, 8.4% of the Alternative 3B (Range 64C/D and 65 D) expansion area and 8.3% of Alternative 3C.

The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 4,500 AFY with no remarks on system yield. The yield quantity was obtained from State Engineer Ruling 5465. The total assigned allocation for underground water is 4,500.27 AFY, which is 100.01% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-47 Basin 211 Manner of Use

Manner of Use*	Groundwater, Geothermal and Other Groundwater	
	Active Annual Duty	Pending Annual Duty
Commercial	300.00	0.00
Municipal	2,618.00	0.00
Quasi-Municipal	1,582.27	0.00
Total	**4,500.27**	**0.00**
Percentage of Total Perennial Yield (4,500 AFY)	**100.01%**	**0%**

* Manner of use categories that did not have any active or pending annual duty assigned to them (“zero” entries) were excluded from the table.

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension and expansion areas. Nine (9) relevant groundwater permit entries were identified; the findings are included in the table below:

Table 5-48 Basin 211 Groundwater Rights Permits

Application No.	Owner	Application File Date	Status	Source	Type of Use	Annual Duty (AFA)
USAF						
62502	USAF*	10/07/1996	CER 16149	UG Existing Well	QM	7.35
Private						
54063	SNWA	10/17/1989	RFP	UG Well 211-2A	MUN	0.00
54065	SNWA	10/17/1989	RFP	UG Well 211-2R	MUN	0.00
54106	SNWA	10/23/1989	RFP	UG Well 211-4R	MUN	0.00
67646	Ready Mix, Inc.	06/07/2001	PER	UG Lee Canyon	COM	300.00

Table 5-48 Basin 211 Groundwater Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
79348	SNWA*	01/28/2010	RFP	UG Well 211-2A	MUN	0.00
79350	SNWA*	01/28/2010	RFP	UG Well 211-2R	MUN	0.00
79351	SNWA*	01/28/2010	RFP	UG Well 211-3R	MUN	0.00
79353	SNWA*	01/28/2010	RFP	UG Well 211-4R	MUN	0.00
Total						**307.35**
* Original applicant						

The certificate under permit 62502 is for a well to provide water to a 50,000 gallon storage tank and to a distribution system to nine (9) office and maintenance shops and for fire suppression, presumably for the Point Bravo installation from the TRS location. This also has the expired permit 64137T for construction water listed under the abrogation information. Well log 71163 is associated with this permit and is included in the next table.

Thirty-three (33) relevant well log entries were identified as described in the following table:

Table 5-49 Basin 211 Well Logs						
Well Log No. and Name	**Owner**	**Completion Date**	**Work Type**	**Proposed Use**	**Permit/ Waiver No.***	**Onsite/ Offsite****
USAF						
52416 Point B Well	NAFB	06/30/1973	N	P	--	--
71163 Point B Well	Nellis AFB	03/25/1998	S	P	62502	Onsite
78658	Nellis AFB	04/06/1999	N	G	--	--
Other Federal Agency						
3320 Well 01	US Engineer Office	12/17/1950	N	Z	--	--
3321 Well 03	US Engineer Office	02/10/1951	N	Z	--	--
3322 Well 04	US Engineer Office	11/08/1950	N	Z	--	--
3323 Well 05	US Engineer Office	11/12/1950	N	Z	--	--
3324 Well 5A	US Engineer Office	03/23/1951	N	Z	--	--
28422	USGS	02/24/1987	N	X	--	--
28819	Desert Research Institute	07/26/1987	N	X	--	--
Private						
7475	Stewart Construction	04/20/1963	N	Z	--	--
72357 Monitor Well #2	Indian Springs Sewage Co.	08/14/1998	N	G	--	--
72358 Monitor Well #1	Indian Springs Sewage Co.	08/14/1998	N	G	--	--
91151	Steve Turner	11/14/2003	N	P	67646	Onsite
112298	Clark County	09/10/2010	N	D	DW-1299	Unknown
112299	Clark County	09/10/2010	N	D	DW-1299	Unknown
112300	Clark County	09/10/2010	N	D	DW-1299	Unknown
112301	Clark County	09/10/2010	N	D	DW-1299	Unknown
112302	Clark County	09/09/2010	N	D	DW-1299	Unknown
112303	Clark County	09/09/2010	N	D	DW-1299	Unknown
112304	Clark County	09/09/2010	N	D	DW-1299	Unknown
112305	Clark County	09/09/2010	N	D	DW-1299	Unknown
112306	Clark County	08/26/2010	N	D	DW-1299	Unknown
112307	Clark County	08/26/2010	N	D	DW-1299	Unknown
112308	Clark County	08/26/2010	N	D	DW-1299	Unknown
112309	Clark County	08/26/2010	N	D	DW-1299	Unknown

Table 5-49 Basin 211 Well Logs						
Well Log No. and Name	**Owner**	**Completion Date**	**Work Type**	**Proposed Use**	**Permit/ Waiver No.***	**Onsite/ Offsite****
112310	Clark County	08/25/2010	N	D	DW-1299	Unknown
113391	Clark County	10/04/2010	N	G	MO-2861	Unknown
113392	Clark County	09/14/2010	N	G	MO-2861	Unknown
113393	Clark County	09/14/2010	N	G	MO-2861	Unknown
113394	Clark County	09/14/2010	N	G	MO-2861	Unknown
121972 MW-08	Primm South Real Estate Co.	01/29/2015	N	G	MO-3013	Unknown
121973 MW-07	Primm South Real Estate Co.	01/27/2015	N	G	MO-3013	Unknown
* The permit number for the water rights permit associated with the well log. ** If the associated water rights permit is within the proposed NTTR withdrawal extension and expansion area it is identified as “onsite”, otherwise it is “offsite".						

Well logs 3320, 3321, 3322, 3323 and 3324 owned by the US Engineer Office include an US Army Corps of Engineer drawing as the well log. The drawing for well log 3220 is labelled as “Mercury, Near Indian Springs, Nevada, Log of Well No. 1.” This is the same drawing that was included for well log 76780 discussed in the groundwater section for Basin 160. The remaining well log drawings were also labelled as “Mercury, Near Indian Springs, Nevada” along with their respective well names.

Well logs 52416 and 71163 for municipal/industrial purposes utilize “Point B Well” as the well name. The name likely refers to the Point Bravo installation. Well log 71163 is connected to the aforementioned water permit 62502.

A similar well log is also discussed in the groundwater section for Basin 161 under well log 52398 “Well 02.” Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.22 BASIN 212 – LAS VEGAS VALLEY

Las Vegas Valley, hydrographic basin number 212, is located in the southern-most portion of the proposed NTTR withdrawal extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension and expansion areas boundary: 15S 58E; 15S 59E; 16S 58E; 17S 58E; and 17S 59E. The basin area within the proposed NTTR withdrawal extension area comprises 0.6% of the total water basin area of 1,544 square miles and 0.2% of the total proposed NTTR withdrawal extension boundary. Basin 212 also includes 57.4% of the Alternative 3B (Administrative Incorporation) Land, 0.08% of the Alternative 3B (Range 64C/D and 65 D) expansion area and 2.2% of Alternative 3C.

The NDWR hydrographic basin summary notes a perennial yield of 25,000 AFY with no remarks on system yield. The yield quantity was obtained from the USGS Bulletin 29. The total assigned allocation for underground water is 90,439.41 AFY, which is 362% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-50 Basin 212 Manner of Use		
Manner of Use*	**Groundwater, Geothermal and Other Groundwater**	
	Active Annual Duty	**Pending Annual Duty**
Commercial	1,663.61	57.20
Construction	0.00	11.83
Domestic	412.31	0.00
Environmental	11,120.10	0.00
Industrial	706.95	0.00
Irrigation	3,845.41	860.00
Mining and Milling	4,058.43	0.00
Municipal	43,337.79	179.75
Quasi-Municipal	18,925.23	544.01
Recreation	5,901.62	464.62
Wildlife	123.05	0.00
Other	344.91	0.00
Total	**90,439.41**	**2,117.40**
Percentage of Total Perennial Yield (25,000 AFY)	**362%**	**8%**
* Manner of use categories that did not have any active or pending annual duty assigned to them ("zero" entries) were excluded from the table.		

If all pending annual duty applications are approved the new total will be 92,556.81 AFY and would equate to 370% of the basin yield. Ground water use in the Las Vegas Valley has exceeded the perennial yield since the early 1950's (Special Nevada Report, 1991). The Las Vegas Valley was purposefully allowed to overdraft water resources with the goal that infrastructure would eventually be in place to deliver Colorado River water and thereby replace the groundwater pumping (NDCNR 2016).

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension and expansion areas. One (1) relevant groundwater permit entry was identified; the finding is in the table below:

Table 5-51 Basin 212 Groundwater Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
USAF						
63001	USAF*	04/04/1997	RVP	UG	QM	4.48
Total						**4.48**
* Original applicant						

Permit 63001 is for the water supply through a drilled well with pump and motor to service 25 military barracks year-round that each hold 15 people.

Relevant well log entries were not identified. Notable issues found during the water rights and well log research for this basin are included in **Appendix B**.

5.2.23 BASIN 225 – MERCURY VALLEY

Death Valley Basin, hydrographic basin number 225, is located exclusively in the western portion of the Alternative 3B proposed expansion area. The basin covers the following townships and ranges of the PLSS within the expansion area boundary: 15S 54E. None of the 64 square miles of this basin covers the proposed NTTR withdrawal extension area. Basin 225 includes 3.0% of the Alternative 3B expansion area.

The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 110 Acre AFY with no remarks on system yield. Yield remarks state that "24,000 combined for basins 225 thru 230." The yield quantity was obtained from the USGS Recon 54. The total assigned allocation for underground water is 0.00 AFY, which is 0% of the basin yield.

The basin abstracts of water rights and well logs were reviewed for entries with locations within the expansion area. Relevant groundwater permit entries or well logs were not identified. Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.24 BASIN 227A – FORTYMILE CANYON – JACKASS FLATS

Fortymile Canyon – Jackass Flats, hydrographic basin number 227A, is located in the southern portion of the proposed NTTR withdrawal extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension boundary: 11S 49E; and 12S 49E. The basin area within the proposed NTTR withdrawal extension area comprises 4.6% of the total water basin area of 267 square miles and 0.3% of the total proposed NTTR withdrawal extension boundary. The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 24,000 AFY with no remarks on system yield. Yield remarks state that "24,000 combined for basins 225 thru 230." The yield quantity was obtained from the USGS Recon 54. The total assigned allocation for underground water is 17.22 AFY, which is 0.07% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-52 Basin 227A Manner of Use

Manner of Use*	Groundwater, Geothermal and Other Groundwater	
	Active Annual Duty	Pending Annual Duty
Industrial	0.00	4.60
Stockwater	17.22	0.00
Total	**17.22**	**4.60**
Percentage of Total Perennial Yield (24,000 AFY)	**0.07%**	**0.02%**

* Manner of use categories that did not have any active or pending annual duty assigned to them ("zero" entries) were excluded from the table.

If all pending annual duty applications are approved the new total will be 21.82 AFY and would equate to 0.09% of the basin yield.

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension area. Relevant groundwater rights entries were not identified. However, three (3) relevant well log entries were identified as described in the table below:

Table 5-53 Basin 227A Well Logs						
Well Log No. and Name	**Owner**	**Completion Date**	**Work Type**	**Proposed Use**	**Permit/ Waiver No.***	**Onsite/ Offsite****
Other Federal Agency						
79401 ER-EC-2A	US DOE	02/14/2000	N	G	R-1024	Unknown
102959	US DOE	05/13/1994	N	G	MO-2263	Unknown
Private						
27273	Eugene C. Johnston	06/01/1984	N	H	--	--
* The permit number for the water rights permit associated with the well log. ** If the associated water rights permit is within the proposed NTTR withdrawal extension and expansion areas it is identified as “onsite”, otherwise it is “offsite".						

Well log 79401 is a DOE/NNSA monitoring well for characterization and modeling of the radiological contamination from historic nuclear testing. The remaining wells under this program on the proposed NTTR withdrawal extension area are mentioned in the section for Basin 229. Refer to **Table 5-3** for additional research on the DOE/NNSA monitoring wells.

Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.25 BASIN 227B – FORTYMILE CANYON – BUCKBOARD MESA

Fortymile Canyon – Buckboard Mesa, hydrographic basin number 227B, is located in the northwestern portion of the proposed NTTR withdrawal extension area. The basin covers the following townships and ranges of the PLSS within the NTTR boundary: 9S 49E; and 10S 49E. The basin area within the proposed NTTR withdrawal extension area comprises 3.0% of the total water basin area of 237 square miles and 0.2% of the total proposed NTTR withdrawal extension boundary. The NDWR hydrographic basin summary notes a supplemental adjusted perennial yield of 24,000 AFY with no remarks on system yield. Yield remarks state that “24,000 combined for basins 225 thru 230.” The yield quantity was obtained from the USGS Recon 54. The total assigned allocations for underground water is 0.00 AFY.

The basin abstracts of water rights and well logs were reviewed for entries within the proposed NTTR withdrawal extension area. Groundwater permit entries were not identified. Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.26 BASIN 228 – OASIS VALLEY

Oasis Valley, hydrographic basin number 228, is located in the southern portion of the proposed NTTR withdrawal extension area. The basin covers the following townships and ranges of the PLSS within the proposed NTTR withdrawal extension and expansion area boundary: 7S 47E; 7S 48E; 8S 47E-49E; 9S 47E-49E; 10S 47E-49E; and 11S 49E. The basin area within the proposed NTTR withdrawal extension boundary comprises 57.4% of the total water basin area of 461 square miles and 5.7% of the total proposed NTTR withdrawal extension boundary. Basin 228 also includes 74.6% of the Alternative 3A expansion area.

The NDWR hydrographic basin summary notes a supplemental adjusted perennial yield of 24,000 AFY with no remarks on system yield. Yield remarks state that “24,000 combined for basins 225 thru 230.” The yield quantity was obtained from the USGS Recon 54. The total assigned allocation for underground water is 1,295.98 AFY, which is 5% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-54 Basin 228 Manner of Use		
Manner of Use*	**Groundwater, Geothermal and Other Groundwater**	
	Active Annual Duty	**Pending Annual Duty**
Commercial	5.52	0.00
Irrigation	74.60	0.00
Mining and Milling	0.87	0.00
Municipal	1,162.78	0.00
Recreation	50.00	0.00
Stockwater	2.21	0.00
Total	**1,295.98**	**0.00**
Percentage of Total Perennial Yield (24,000 AFY)	**5%**	**0%**
* Manner of use categories that did not have any active or pending annual duty assigned to them ("zero" entries) were excluded from the table.		

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension and expansion area. One (1) relevant groundwater permit entry was identified; the finding is included in the table below:

Table 5-55 Basin 228 Groundwater Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
USAF						
9606	Nellis AFB	07/04/1932	CER 2295	UG	STK	1.10
Total						**1.10**
* Original applicant						

Twenty-five (25) relevant well log entries were identified as described in the table below:

Table 5-56 Basin 228 Well Logs						
Well Log No. and Name	**Owner**	**Completion Date**	**Work Type**	**Proposed Use**	**Permit/ Waiver No.***	**Onsite/ Offsite****
Other Federal Agency						
69874 ER-OV-06A	US Geological Survey	08/09/1997	N	G	--	--
69875 ER-OV-06A2	US Geological Survey	08/11/1997	N	G	--	--
70114 ER-OV-01	US Geological Survey	08/04/1997	N	G	--	--
70116 ER-OV-03	US Geological Survey	08/22/1997	N	G	--	--

Table 5-56 Basin 228 Well Logs

Well Log No. and Name	Owner	Completion Date	Work Type	Proposed Use	Permit/ Waiver No.*	Onsite/ Offsite**
70117 ER-OV-03A3	US Geological Survey	09/13/1997	N	G	--	--
70118 ER-OV-03	US Geological Survey	08/27/1997	N	G	--	--
75537 ER-EC-01	US Department of Energy	05/01/1999	N	G	R-1024	Unknown
75931 ER-EC-06	US Department of Energy	03/28/1999	N	G	R-1024	Unknown
76025 ER-EC-04	US Department of Energy	06/20/1999	N	G	R-1024	Unknown
76304 ER-EC-05	US Department of Energy	07/11/1999	N	G	R-1024	Unknown
76538 ER-EC-07	US Department of Energy	08/10/1999	N	G	R-1024	Unknown
76539 ER-EC-08	US Department of Energy	07/28/1999	N	G	R-1024	Unknown
109321 ER-EC-11	National Nuclear Security Admin	10/21/2009	N	G	R-1024E	Unknown
111910 ER-EC-12	National Nuclear Security Admin	07/26/2010	N	G	R-1024F	Unknown
113305 ER-EC-15	National Nuclear Security Admin	12/01/2010	N	G	R-1024G	Unknown
113306 ER-EC-13	National Nuclear Security Admin	10/26/2010	N	G	R-1024G	Unknown
115779 ER-EC-14	National Nuclear Security Admin	10/17/2012	N	G	R-1024E	Unknown
115841 ER-20-11	National Nuclear Security Admin	09/14/2012	N	G	R-1024H	Unknown
Private						
227	Bob Gibson	04/01/1941	N	Z	--	--
29408	G L Coffer	02/04/1985	N	S	--	--
31027	G L Coffer	12/08/1988	N	I	42473	Offsite
34497	G L Coffer	05/24/1990	N	I	42473	Offsite
34644	G L Coffer	09/30/1990	N	H	--	--
65557	Bud Hawkins	01/25/1977	N	H	--	--
65561	Amargosa Mission Church	02/27/1982	N	H	--	--

* The permit number for the water rights permit associated with the well log.

** If the associated water rights permit is within the proposed NTTR withdrawal extension and expansion areas it is identified as “onsite”, otherwise it is “offsite".

The DOE/NNSA operates monitoring wells on the proposed NTTR withdrawal extension area for characterization, modeling, and early detection of the radiological contamination from historic nuclear

testing (DOE, NNSA, Nevada Field Office 2014). DOE/NNSA records, USAF GIS data, and NDWR records were compared. Refer to **Table 5-3** for details.

The ER-OV wells were part of a USDOE-ERP long term groundwater monitoring network installed by the USGS during August through October 1997. Most of these wells were used to measure water levels in the deeper zones (more than 100 feet below land surface) of the ground-water flow system (USGS 2002).

Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.2.27 BASIN 229 – CRATER FLAT

Crater Flat, hydrographic basin number 229, is located in the northwestern portion of the proposed NTTR withdrawal extension area. The basin covers the following townships and ranges of the PLSS within the NTTR boundary: 11S 49E; and 12S 49E. The basin area within the proposed NTTR withdrawal extension area comprises 18.1% of the total water basin area of 181 square miles and 0.7% of the total proposed NTTR withdrawal extension boundary. The NDWR hydrographic basin summary notes a supplementally adjusted perennial yield of 24,000 AFY with no remarks on system yield. Yield remarks state that "24,000 combined for basins 225 thru 230." The yield quantity was obtained from the USGS Recon 54. The total assigned allocation for underground water is 681.36 AFY, which is 3% of the basin yield. The manner of use for allocated groundwater is provided in the following table, along with the pending or proposed additions:

Table 5-57 Basin 229 Manner of Use

Manner of Use*	Groundwater, Geothermal and Other Groundwater	
	Active Annual Duty	Pending Annual Duty
Industrial	61.38	0.00
Mining and Milling	619.98	0.00
Total	**681.36**	**0.00**
Percentage of Total Perennial Yield (24,000 AFY)	**3%**	**0%**

* Manner of use categories that did not have any active or pending annual duty assigned to them ("zero" entries) were excluded from the table.

The basin abstracts of water rights and well logs were reviewed for entries with locations within the proposed NTTR withdrawal extension area. Relevant groundwater permit entries were not identified. However, one (1) relevant well log entry was identified as described in the table below:

Table 5-58 Basin 229 Well Logs

Well Log No. and Name	Owner	Completion Date	Work Type	Proposed Use	Permit/ Waiver No.*	Onsite/ Offsite**
Other Federal Agency						
78608	US DOE	05/03/1999	D	P	64451T	Onsite, Expired

* The permit number for the water rights permit associated with the well log.
** If the associated water rights permit is within the proposed NTTR withdrawal extension area it is identified as "onsite", otherwise it is "offsite".

Notable issues found during the water rights and well logs research for this basin are included in **Appendix B**.

5.3 SUMMARY

There are a total of 44 groundwater rights permits equating to 11,273.34 AFA found on the proposed NTTR withdrawal extension and expansion areas. The USAF currently holds 19 of these permits with 1,837.37 AFA authorized for use. A summary of the groundwater rights are included in the following table:

Table 5-59 Ground Water Rights Allocation Quantities Summary

Number of Water Right Permits	Total Allocation (AFA)	Number of USAF Water Right Permits[1]	Total USAF Allocation (AFA)*	Number of Other Federal Agency Water Right Permits**	Number of Privately Held Water Right Permits***
44	11,273.34	19	1,837.37	1	24

* Also includes permit owners under Nellis AFB.

** Includes USA, US Government, US Army, BLM, USGS, USFWS and DOE.

*** Private owner is considered any person or entity other than a federal agency.

Basins 225 through 230 have a combined perennial yield of 24,000 AFY. Basin 226 and 230 are within these listings but were not included as they are offsite. Rock Valley, hydrographic basin number 226, does not have any active or pending allocations. Amargosa Desert, hydrographic basin number 230, has an active allocation of 29,296.76 AFY and 3,210.80 in pending allocations.

Table 5-60 Basin 225 to 230 Allocation Summary

Basin	Active Annual Duty	Pending Annual Duty
225	0	0
226	0	0
227A	17.22	4.60
227B	0	0
228	1295.98	0
229	681.36	0
230	26,296.76	3,210.80
Total	28,291.32	3,215.40
Percentage of Total Perennial Yield (24,000 AFY)	118%	13%

If all pending annual duty applications are approved the new total will be 31,506.72 AFY and would equate to 131% of the basin yield.

A summary of the water wells present within the proposed NTTR withdrawal extension and expansion areas is also provided in the following table:

Table 5-61 Water Wells Quantities Summary			
Number of Well Logs	Number of USAF Well Logs*	Number of Other Federal Agency Well Logs**	Number of Privately Held Well Logs***
175	31	42	102

* Also includes permit owners under Nellis AFB.

** Includes USA, US Government, US Army, BLM, USGS, USFWS and DOE. The DRI is also included since they specifically reference federal work.

*** Private owner is considered any person or entity other than a federal agency.

The majority of groundwater rights owned by federal agencies on the NTTR appear to have been transferred from the original owners whose principle uses of water resources were likely for ranching. Such groundwater appropriations on the range are presumably not being used for direct mission-support by the USAF based off the types of uses for the permits (e.g. irrigation). This may mean the allocated groundwater may go unused unless it is determined at a later date to be utilized. In that case, an application must be submitted to change the manner of use if the original application “type of use” is not congruent with the actual intended use.

Additionally, six (6) basins within the proposed NTTR withdrawal extension and expansion areas currently still have privately held permits and 15 basins still have privately held wells. It is recommended that the remaining privately held permits and well logs located on the NTTR be transferred to the USA with the reporting agency secondary (i.e.: USA/USAF, USA/BLM).

CHAPTER 6 - **SURFACE WATER RESOURCES**

6.1 HYDROLOGIC SETTING

The semi-arid climate in the NTTR within the GBCAAS limits the presence of surface water. The only major river that is within the NTTR is the Amargosa River. The river is an approximately 200-mile regional drainage channel connecting the northern highlands of the NNSA to the floor of Death Valley in Inyo County, California. This river is perennial but flows largely underground and is often dry on the surface except following a storm event (Lingenfelter 1986).

Surface water does not usually flow between basins due to the climate and topography of the area. Playas can be found in some internally drained basins. Playas are dry or ephemeral lakebeds that form in semi-arid to arid regions in closed evaporative basins that receive surface-water flow. Otherwise, no natural lakes or other open bodies of water occur within the NTTR.

6.1.1 SURFACE WATER OCCURRENCE AND FLOW

Sources of surface water on the NTTR include perennial and ephemeral seeps, springs, and streams (USAF, 99 CES/CEIEA 2016). One intermittent stream, Breen Creek, is present within Cactus Flats on the NTTR near Silverbow Corral. The only major river that is present is the Amargosa River that is perennial but often dry on the surface except following a storm event.

Infrequent severe thunderstorms and rain events can produce large quantities of precipitation that will saturate the soils faster than it can be absorbed with the excess precipitation flowing downhill as runoff. Large volumes of runoff lead to streamflow, flash flooding, and ponding in valleys and other low-lying regions such as the playas. A portion of water that is absorbed into the ground may recharge the aquifer system(s). However, precipitation events are not a significant source of surface water due to the high loss from evapotranspiration and infrequency of storm events.

The sparse sources of perennial surface water have come from springs that have formed where ground water intersects the surface. The springs flow for only short distances on the ground surface. Man-made reservoirs and impoundments are also present on the NTTR as sources of surface water.

6.1.2 SURFACE WATER QUALITY

Surface water quality varies within Nevada. Concentrations of dissolved solids fluctuate based on water discharge. High concentrations of dissolved solids are present during low streamflow and lowest during high streamflow as a result of dilution by precipitation. Water quality declines near the termination of streams due to the concentrating effects of evaporation.

The USGS National Water Information System Mapper was reviewed and no active sites for springs or surface-water data were available on the Proposed NTTR withdrawal extension and expansion areas (USGS 2016).

6.2 SURFACE WATER QUANTITY, RIGHTS, AND USE ON THE NTTR

This section discusses the results of the NDWR research for surface water. Pertinent information available during the review of surface water permits are included. It should be noted that there are discrepancies in the data compiled from the NDWR (Appendix B). The information reviewed and compiled is considered approximate.

Only application (APP), certificate (CER), decreed (DEC), permit (PER), reserved (RES), ready for action (RFA), ready for action/protested (RFP), relinquish a portion (RLP), revocable permit (RVP) and vested right (VST) water permits were deemed relevant; other permit types are excluded from discussion in this

report. Relevant information provided from the water permit and well logs are discussed when it was provided.

NDWR records indicate that surface water is appropriated from 83 springs and other sources of surface water for use within the proposed NTTR withdrawal extension and expansion areas. Twenty-eight (28) surface water rights are specifically appropriated by name to either the Nellis AFB, US Defense Department, or USAF. The BLM has five (5) permits and the USFWS has six (6) permits for surface water rights. The remaining water rights are owned by other federal agencies or are privately owned (a person or entity other than a federal agency).

The Nevada Wild Horse Range was established in 1962 and is the first wild horse range established in the United States (BLM 2016). The BLM's wild horse management unit is located in the northern portion of the NTTR. The impacts that wild horses have on surface water are partly addressed by BLM's unit (BLM 2016). BLM prepared a Herd Management Area Plan which established objectives and actions to prevent degradation to water and forage resources. Included were the re-development of water systems to better distribute the wild horses along with setting an appropriate management level so the population was in balance with water and forage capabilities. The Final Environmental Assessment for the Nevada Wild Horse Range Herd Management Area Plan from 2008 notes six (6) water trough locations: Cactus Springs, Silver Bow, Rose, Tunnel, Corral, and Cedar Well (BLM 2008).

The sampling of main surface water sources for wildlife could be made a management practice as part of overall resource management on the NTTR and proposed expansion areas. See **Figure 6-1**.

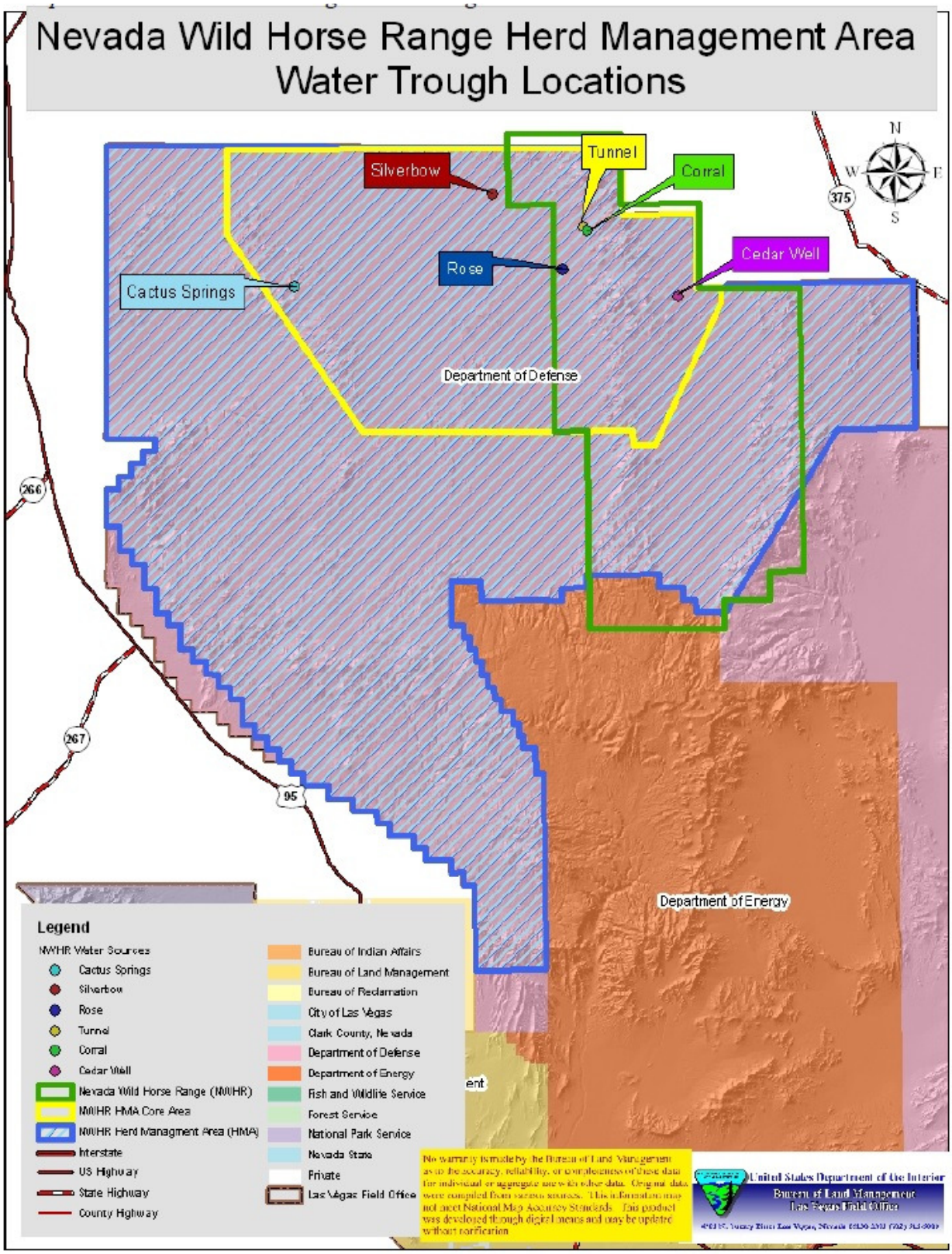


Figure 6-1 Nevada Wild Horse Range Herd Management Area Water Trough Locations (BLM 2008)

The USFWS holds water rights for stockwatering/wildlife purposes within the proposed NTTR withdrawal extension and expansion areas as summarized below (Mayer 2016):

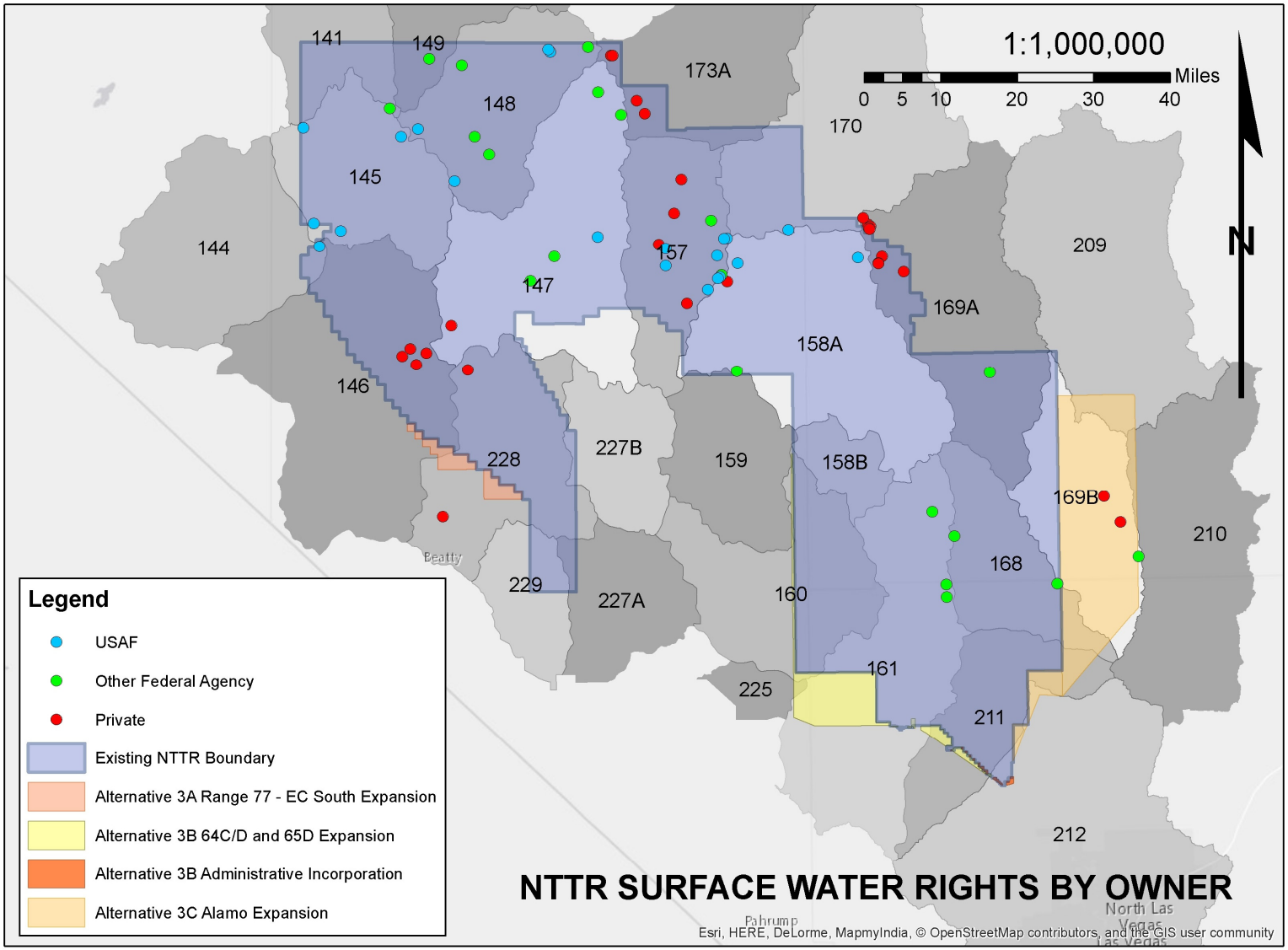
Table 6-1 USFWS Water Rights Permits

Total Permits*	Permits in Basin 212	Remaining Permits Throughout Other Water Basins	Permits Identified within Proposed NTTR Withdrawal Extension and Expansion Areas from NDWR Research
28	12	16	6

*Located on the Desert National Wildlife Refuge outside of the Corn Creek station.

The USAF also holds permits that are not directly beneficial for operations but rather are intended for such wildlife support, as exemplified in Basin 157.

See **Figure 6-2** for locations of identified surface water rights within the NTTR extension and expansion areas.



Note: Unmapped sites were outside of the scope of this report or lacked discoverable coordinates.

Figure 6-2 NTTR Surface Water Rights by Owner (SBCC 2017)

6.2.1 BASIN 141 – RALSTON VALLEY

Ralston Valley, hydrographic basin number 141, was reviewed for relevant surface water rights through the NDWR database. One (1) surface water right was identified within the proposed NTTR withdrawal extension as described in the table below:

Table 6-2 Basin 141 Surface Water Rights Permits

Application No.	Owner	Application File Date	Status	Source Details	Type of Use	Annual Duty (AFA)
Other Federal Agency						
7357	USA	05/06/1925	CER 2253	SPR Unnamed Seep	STK	0.90
Total						**0.90**

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.2 BASIN 144 – LIDA VALLEY

Lida Valley, hydrographic basin number 144, was reviewed for relevant surface water rights through the NDWR database. One (1) surface water right was identified within the proposed NTTR withdrawal extension as described in the table below:

Table 6-3 Basin 144 Surface Water Rights Permits

Application No.	Owner	Application File Date	Status	Source Details	Type of Use	Annual Duty (AFA)
USAF						
5931	NAFB	01/02/1920	CER 850	SPR Jerome Spring	STK	2.18
Total						**2.18**

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.3 BASIN 145 – STONEWALL FLAT

Stonewall Flat, hydrographic basin number 145, was reviewed for relevant surface water rights through the NDWR database. Five (5) surface water rights were identified within the proposed NTTR withdrawal extension as described in the table below:

Table 6-4 Basin 145 Surface Water Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source Details**	**Type of Use**	**Annual Duty (AFA)**
USAF						
3908	USAF	04/15/1916	CER 1581	SPR Wild Horse Spring	STK	2.46
5929	USAF	01/02/1920	CER 848	SPR Alkali Springs	STK	18.11
8977	USAF	06/30/1929	CER 2201	OSW Yellow Tiger Tunnel	STK	2.24
12362	USAF	03/25/1948	CER 3773	SPR Stonewall Spring	STK	7.06
12784	USAF	12/31/1948	CER 4167	SPR Alkali Springs	STK	6.94
Total						**36.81**

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.4 BASIN 146 – SARCOBATUS FLAT

Sacrobatus Flat, hydrographic basin number 146, was reviewed for relevant surface water rights through the NDWR database. Four (4) surface water rights were identified within the proposed NTTR withdrawal extension and expansion areas as described in the table below:

Table 6-5 Basin 146 Surface Water Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
Private						
3942	Colvin Cattle Co.	04/27/1916	CER 2378	SPR Monte Cristo Spring	STK	2.18
5173	Neal Cook	07/26/1918	CER 856	SPR Trappman Spring	STK	10.86
5540	Neal Cook	06/14/1919	CER 853	SPR Tula George Spring	STK	1.44
6022	Neal Cook	03/20/1920	CER 851	SPR Rock Springs	STK	4.36
Total						**18.84**

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.5 BASIN 147 – GOLD FLAT

Gold Flat, hydrographic basin number 147, was reviewed for relevant surface water rights through the NDWR database. Seven (7) surface water rights were identified within the proposed NTTR withdrawal extension as described in the table below:

Table 6-6 Basin 147 Surface Water Rights Permits

Application No.	Owner	Application File Date	Status	Source	Type of Use	Annual Duty (AFA)
USAF						
11609	Nellis AFB	06/12/1946	CER 4243	OSW**	STK	7.00
13625	Nellis AFB	01/29/1951	CER 3956	SPR Silver Bow Spring	STK	21.73
Other Federal Agency						
V02371	USA	08/25/1950	VST	SPR Nixon Water Hole No. 1	STK	0.00
V02372	USA	08/25/1950	VST	SPR Nixon Water Hole No. 2	STK	0.00
V02373	BLM	08/25/1950	VST	SPR Tunnel Spring	STK	0.00
V02374	BLM	08/25/1950	VST	SPR Rose or Wild Horse	STK	0.00
Private						
10863	Brian Greenspun Property Trust*	09/14/1942	CER 3141	SPR Larry's Seep	STK	3.62
Total						**32.35**

* Original applicant
** Dry Lake Drainage through Jackpot Reservoir

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.6 BASIN 148 – CACTUS FLAT

Ralston Valley, hydrographic basin number 141, was reviewed for relevant surface water rights through the NDWR database. Nine (9) surface water rights were identified within the proposed NTTR withdrawal extension as described in the table below:

Table 6-7 Basin 148 Surface Water Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
USAF						
1580	Nellis AFB	01/20/1910	CER 377	SPR Cactus Spring	IRR	7.24
4943	USAF	03/01/1918	CER 1111	STR Silver Bow Canyon	IRR	44.88
12785	USAF	12/31/1948	CER 4168	SPR Cactus Spring	STK	7.06
13288	USAF	03/06/1950	CER 4170	SPR Antelope Spring	STK	4.85
Other Federal Agency						
V02368	USA	08/25/1950	VST	RES Fork Reservoir	STK	0.00
V02369	USA	08/25/1950	VST	RES North Antelope Reservoir	STK	0.00
V02370	USA	08/25/1950	VST	RES Antelope Reservoir	STK	0.00
V02375	BLM	01/29/1951	VST	SPR Corral Spring	STK	0.00
V02376	USA	01/29/1951	VST	SPR Silver Bow Spring	STK	0.00
Total						**64.03**

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.7 BASIN 149 – STONE CABIN VALLEY

Stone Cabin Valley, hydrographic basin number 149, was reviewed for relevant surface water rights through the NDWR database. One (1) surface water right was identified within the proposed NTTR withdrawal extension as described in the table below:

Table 6-8 Basin 149 Surface Water Rights Permits

Application No.	Owner	Application File Date	Status	Source	Type of Use	Annual Duty (AFA)
Other Federal Agency						
V02385	BLM	04/12/1951	VST	RES Reservoir #2	STK	0.00
Total						**0.00**

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.8 BASIN 157 – KAWICH VALLEY

Kawich Valley, hydrographic basin number 157, was reviewed for relevant surface water rights through the NDWR database. Fourteen (14) surface water rights were identified within the proposed NTTR withdrawal extension as described in the table below:

Table 6-9 Basin 157 Surface Water Rights Permits

Application No.	Owner	Application File Date	Status	Source	Type of Use	Annual Duty (AFA)
USAF						
2357	USAF	02/28/1912	CER 350	SPR Cliff Springs	STK	7.24
2359	USAF	02/28/1912	CER 208	SPR Indian Springs	STK	2.82
11605	US Defense Department	06/12/1946	CER 3258	SPR Cliff Springs	STK	4.48
11606	Nellis AFB	06/12/1946	CER 3259	RES Sundown Reservoir	STK	4.54
11607	Nellis AFB	06/12/1946	CER 3260	SPR Shirley Spring	STK	4.54
11608	Nellis AFB	06/12/1946	CER 3261	SPR Indian Spring	STK	4.54
11668	USAF	08/19/1946	CER 3265	SPR Pony Spring	STK	4.48

Table 6-9 Basin 157 Surface Water Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
11669	USAF	08/19/1946	CER 3266	LAK Lambs Pond	STK	4.48
55321*	USAF*	09/25/1990	CER 14605	SPR Unnamed Spring	WLD	8.96
55322*	USAF	09/25/1990	CER 14606	SPR Unnamed Spring	WLD	4.48
Other Federal Agency						
12043	USA	10/14/1947	CER 3453	SPR Gold Spring	STK	4.70
Private						
7448*	J.E. Clark*	07/22/1925	PER	SPR Sundown Spring	STK	0.00
11626	Helen Fallini	07/01/1946	CER 3536	STR Unnamed Drainage Basin	STK	4.48
11865	Helen Fallini Trust & Fallini 1983 Trust	05/29/1947	CER 3297	OSW Kawich Valley Wash	STK	21.73
12692	Helen Fallini Trust & Fallini 1983 Trust	10/14/1948	CER 3521	OSW Coyote Pond	STK	0.00
Total						**81.47**
* Original applicant						

The USAF owns wildlife permits 55321 and 55322, which have a combined duty of water not to exceed the watering for 500 head of wild horses, burros and other wildlife. Permit 55321 is for the use by 400 head of wild horses, burros and wildlife. This is conducted through a spring box and pipe to a stock tank from the unnamed seep. This permit application is for permission to change the point of diversion and place of and manner of use from permit 11605.

Permit 55322 is for the use by 200 head of wild horses, burros, and wildlife. This is completed through a tunnel and pipe to a stock tank. This permit application is for permission to change the point of diversion and place of and manner of use from permit 11605.

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.9 BASIN 158A – EMIGRANT VALLEY – GROOM LAKE VALLEY

Emigrant Valley – Groom Lake Valley, hydrographic basin number 158A, was reviewed for relevant surface water rights through the NDWR database. The majority of the relevant basin area is within range 4808A, therefore the majority of this basin is out of scope and excluded from analysis. This report may or may not account for everything within this basin. Four (4) surface water rights were found within the revised proposed NTTR withdrawal extension as described in the table below:

Table 6-10 Basin 158A Surface Water Rights Permits

Application No.	Owner	Application File Date	Status	Source	Type of Use	Annual Duty (AFA)
USAF						
3887	Nellis AFB	04/12/1916	CER 690	SPR Wildcat Spring	STK	0.31
V01378	USAF	04/27/1915	VST	SPR Naquinta Spring	STK	0.00
Other Federal Agency						
3743	USA	12/20/1915	CER 376	SPR Wiregrass Spring	STK	18.01
Private						
3746	Sam Watkins	12/20/1915	CER 334	SPR Johnie's Water	STK	0.00
Total						**18.32**

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.10 BASIN 158B – EMIGRANT VALLEY – PAPOOSE LAKE VALLEY

Emigrant Valley – Papoose Lake Valley, hydrographic basin number 158B, was reviewed for applicable surface water rights through the NDWR database. A portion of the relevant basin area is within Range 4808A, therefore a portion of this basin is out of scope and excluded from analysis. This report may or may not account for everything within this basin. Surface water rights were not identified within the proposed NTTR withdrawal extension.

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.11 BASIN 159 – YUCCA FLAT

Yucca Flat, hydrographic basin number 159, was reviewed for relevant surface water rights through the NDWR database. This basin is primarily covered by the NNSS and also includes a portion located within Range 4808A that is excluded from analysis. This report may or may not account for everything within this basin. Surface water rights were not identified within the proposed NTTR withdrawal extension and expansion area.

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.12 BASIN 160 – FRENCHMAN FLAT

Frenchman Flat, hydrographic basin number 160, was reviewed for relevant surface water rights through the NDWR database. A portion of the relevant basin area is within Range 4808A, therefore a portion of this basin is out of scope and excluded from analysis. This report may or may not account for everything within this basin. Surface water rights were not identified within the proposed NTTR withdrawal extension and expansion areas.

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.13 BASIN 161 – INDIAN SPRINGS VALLEY

Indian Springs Valley, hydrographic basin number 161, was reviewed for relevant surface water rights through the NDWR database. Two (2) surface water rights were identified within the proposed NTTR withdrawal extension and expansion areas as described in the table below:

Table 6-11 Basin 161 Surface Water Rights Permits

Application No.	Owner	Application File Date	Status	Source	Type of Use	Annual Duty (AFA)
USAF						
11642	USFWS*	07/26/1946	CER 3371	SPR Quartz Spring	WLD	0.43
13521	USFWS*	10/16/1950	CER 3787	SPR Tim Spring	STK	0.40
Total						**0.83**
* Original applicant						

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.14 BASIN 168 – THREE LAKES VALLEY (NORTHERN PART)

Three Lakes Valley (Northern Part), hydrographic basin number 168, was reviewed for relevant surface water rights through the NDWR database. Four (4) surface water rights were identified within the proposed NTTR withdrawal extension and expansion areas as described in the table below:

Table 6-12 Basin 168 Surface Water Rights Permits

Application No.	Owner	Application File Date	Status	Source	Type of Use	Annual Duty (AFA)
USAF						
3254	Nellis AFB	01/26/1915	CER 2621	SPR White Rock Spring	STK	2.24
Other Federal Agency						
3253	USFWS	01/26/1915	CER 2620	SPR Shale Cut Spring	STK	2.24
12631	USFWS*	09/13/1948	CER 3535	SPR Indian Canyon	WLD	7.24
13520	USFWS*	10/16/1950	CER 3786	SPR Sand Spring	STK	0.03
Total						**11.75**
* Original applicant						

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.15 BASIN 169A – TIKAPOO VALLEY (NORTHERN PART)

Tikapoo Valley, hydrographic basin number 169A, was reviewed for relevant surface water rights through the NDWR database. A portion of the relevant basin area is within Range 4808A, therefore a portion of this basin is out of scope and excluded from analysis. This report may or may not account for everything within this basin. Fourteen (14) surface water rights were identified within the proposed NTTR withdrawal extension and expansion areas as described in the table below:

Table 6-13 Basin 169A Surface Water Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
Other Federal						
4730	USA	11/21/1917	CER 897	RES Crescent Valley Reservoir #2	STK	5.00
Private						
V01371	D/4 Enterprises	04/27/1915	VST	SPR Savio Spring	STK	2.26
V01374	D/4 Enterprises	04/24/1915	VST	SPR Old Tikapoo Spring	STK	2.26
V01377	D/4 Enterprises, Inc.	04/24/1915	VST	SPR Rosebud Spring	STK	1.32
V01380	D/4 Enterprises, Inc.	04/27/1915	VST	SPR April Fool Spring	STK	0.34
V01381	D/4 Enterprises, Inc.	04/24/1915	VST	SPR Sharp Spring	STK	0.45
V01382	D/4 Enterprises, Inc.	04/24/1915	VST	SPR New Tickapoo Spring	STK	0.45
V01533	D/4 Enterprises, Inc.	01/03/1918	VST	SPR Alum Spring	STK	0.51
V01534	D/4 Enterprises, Inc.	01/03/1918	VST	SPR Lick Spring	STK	0.51
V01536	D/4 Enterprises, Inc.	11/22/1917	VST	SPR Rabbit Spring	STK	0.47
Total						**13.57**

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.16 BASIN 169B – TIKAPOO VALLEY (SOUTHERN PART)

Tikapoo Valley (Southern Part), hydrographic basin number 169B, was reviewed for relevant surface water rights through the NDWR database. Three (3) surface water rights were identified within the proposed NTTR withdrawal extension and expansion areas as described in the table below:

Table 6-14 Basin 169B Surface Water Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
Other Federal Agency						
11643*	USFWS*	07/26/1946	CER 3372	SPR Sheep Spring	WLD	0.74
Private						
10463	Floyd R. Lamb	01/04/1940	CER 2778	LAK Sheep Mtn. Dry Lake	STK	2.21
10814	Floyd R. Lamb	04/20/1942	CER 2839	OSW Sheep Mtn. Dry Channels	STK	6.72
Total						**9.67**
* Original applicant						

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.17 BASIN 170 – PENOYER VALLEY (SAND SPRING VALLEY)

Penoyer Valley, hydrographic basin number 170, was reviewed for relevant surface water rights through the NDWR database. Three (3) surface water rights were identified within the proposed NTTR withdrawal extension as described in the table below:

Table 6-15 Basin 170 Surface Water Rights Permits						
Application No.	**Owner**	**Application File Date**	**Status**	**Source**	**Type of Use**	**Annual Duty (AFA)**
USAF						
3888	Nellis AFB	04/12/1916	CER 689	SPR Beck Spring	STK	1.10
3889	Nellis AFB	04/12/1916	CER 688	SPR Chalk Spring	STK	2.26
Other Federal Agency						
12044	USA	10/14/1947	CER 3454	SPR Horse Spring	STK	5.25
Total						**8.61**

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.18 BASIN 173A – RAILROAD VALLEY (SOUTHERN PART)

Railroad Valley (Southern Part), hydrographic basin number 173A, was reviewed for relevant surface water rights through the NDWR database. Seven (7) surface water rights were identified within the proposed NTTR withdrawal extension as described in the table below:

Table 6-16 Basin 173A Surface Water Rights Permits

Application No.	Owner	Application File Date	Status	Source	Type of Use	Annual Duty (AFA)
Private						
13541	Helen Fallini Trust & Fallini 1983 Trust	11/16/1950	CER 3659	SPR Summer Spring	STK	14.49
13542	Helen Fallini Trust & Fallini 1983 Trust	11/16/1950	CER 3660	SPR Cedar Spring	STK	18.08
26501	Helen Fallini Trust & Fallini 1983 Trust	01/24/1972	CER 8133	SPR Cedar Spring	STK	9.67
57383	Fallini 1983 Trust	04/02/1992	CER 18099	SPR George's Water (Tunnel)	STK	22.40
V09633*	Fallini 1983 Trust*	01/30/2007	VST	SPR George's Water Spring	STK	0.00
V09634*	Fallini 1983 Trust*	01/30/2007	VST	SPR Sumner Spring	STK	0.00
V09635	Fallini 1983 Trust*	01/30/2007	VST	SPR Cedar Spring	STK	0.00
Total						**64.64**
* Original applicant						

Fallini is a private permit owner that was given access to the NTTR to utilize his water rights under permit 13542 for Cedar Springs and permit 13541 for Summer Springs as of the date of the previous special study water resources report (USAF NAFB 1998).

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.19 BASIN 209 – PAHRANAGAT VALLEY

Pahranagat Valley, hydrographic basin number 209, was reviewed for relevant surface water rights through the NDWR database. Surface water rights were not identified within the proposed NTTR withdrawal extension and expansion areas.

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.20 BASIN 210 – COYOTE SPRING VALLEY

Coyote Spring Valley, hydrographic basin number 210, was reviewed for relevant surface water rights through the NDWR database. Surface water rights were not identified within the proposed expansion areas.

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.21 BASIN 211 – THREE LAKES VALLEY (SOUTHERN PART)

Coyote Spring Valley, hydrographic basin number 210, was reviewed for relevant surface water rights through the NDWR database. Surface water rights were not identified within the proposed NTTR withdrawal extension and expansion areas.

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.22 BASIN 212 – LAS VEGAS VALLEY

Las Vegas Valley, hydrographic basin number 212, was reviewed for relevant surface water rights through the NDWR database. Surface water rights were not found identified the proposed NTTR withdrawal extension and expansion areas.

The only major surface water available in the Las Vegas Valley is Lake Mead water imported from the Colorado River. The Arizona vs. California decision of the US Supreme Court established an annual consumptive use allocation for Nevada from the Colorado River of 300,000 acre-feet (USAF, Dept. of the Navy, DOI 1991).

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.23 BASIN 225 – MERCURY VALLEY

Mercury Valley, hydrographic basin number 225, was reviewed for relevant surface water rights through the NDWR database. Surface water rights were not found identified within the proposed expansion areas.

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.24 BASIN 227A – FORTYMILE CANYON-JACKASS FLATS

Fortymile Canyon – Jackass Flats, hydrographic basin number 227A, was reviewed for relevant surface water rights through the NDWR database. Surface water rights were not identified within the proposed NTTR withdrawal extension.

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.25 BASIN 227B – FORTYMILE CANYON – BUCKBOARD MESA

Fortymile Canyon – Buckboard Mesa, hydrographic basin number 227B, was reviewed for relevant surface water rights through the NDWR database. Surface water rights were not identified within the proposed NTTR withdrawal extension and expansion areas.

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.26 BASIN 228 – OASIS VALLEY

Oasis Valley, hydrographic basin number 228, was reviewed for relevant surface water rights through the NDWR database. Four (4) surface water rights were identified within the proposed NTTR withdrawal extension and expansion areas as described in the table below:

Table 6-17 Basin 228 Surface Water Rights Permits

Application No.	Owner	Application File Date	Status	Source	Type of Use	Annual Duty (AFA)
Private						
10664	Brian L. Greenspun Separate Property Trust	05/19/1941	CER 2947	SPR Bryan Spring	STK	2.18
13283	Colvin Cattle Co.	03/06/1950	CER 4664	SPR Pillar Spring	STK	7.86
Total						**10.04**

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.2.27 BASIN 229 – CRATER FLAT

Crater Flat, hydrographic basin number 229, was reviewed for relevant surface water rights through the NDWR database. Surface water rights were not identified within the proposed NTTR withdrawal extension.

Additional information can be found in this basin's section under the Groundwater Resources chapter. Notable issues found during the water rights research for this basin are included in **Appendix B**.

6.3 SUMMARY

There are a total of 78 surface water right permits equating to 374.07 AFA found on the proposed NTTR withdrawal extension and expansion areas; the USAF currently holds 27 of these permits for 188.22 AFA. A summary of the surface water rights is included in the following table:

Table 6-18 Surface Water Rights Allocation Quantities Summary

Number of Water Right Permits	Total Allocation (AFA)	Number of USAF Water Right Permits*	Total USAF Allocation (AFA)*	Number of Other Federal Agency Water Right Permits**	Number of Privately Held Water Right Permits***
78	374.07	27	188.22	21	30

* Also includes permit owners under Nellis AFB and US Defense Department.

** Includes the USA, US Government, US Army, BLM, USGS, USFWS and DOE.

*** Private owner is considered any person or entity other than a federal agency.

A majority of the surface water rights owned by agencies of the USA appear to have been transferred to the USA from the original owners whose principle use of the water was likely for ranching. Such surface water appropriations on the range are presumably not being used for direct mission-support by the USAF based on such manner of uses. This may mean the allocated surface water goes unused by humans, but is used by wildlife.

Eight (8) basins within the proposed NTTR withdrawal extension and expansion areas currently have privately held permits. It is recommended that the remaining privately held permits located on the NTTR be abrogated or acquired by the appropriate federal agency (i.e. USA/USAF, USA/BLM).

CHAPTER 7 - **PROJECTED WATER USE**

There are ten (10) basins that are currently at or over allocated. The summary of allocated groundwater for the basins within the proposed NTTR withdrawal extension and expansion areas is provided in the following table:

Table 7-1 Basin Allocation Summary

Basin	Active Allocation	Pending Allocation	Combined
141	72%	25%	97%
144	74%	0%	N/A
145	12%	0%	N/A
146*	113%	7%	120%
147	21%	0%	N/A
148	83%	0%	N/A
149	521%	0%	N/A
157	1%	0%	N/A
158A	0.4%	0%	N/A
158B	0%	0%	N/A
159*	0%	0%	N/A
160*	0%	0%	N/A
161*	278%	6400%	6678%
168*	**100%**	**0%**	**N/A**
169A	99.8%	0%	N/A
169B*	**100%**	**0%**	**N/A**
170	377%	217%	594%
173A	140%	0%	N/A
209*	43%	0.14%	43%
210*	879%	158%	1037%
	93%	17%	109%
211*	100.01%	0%	N/A
212*	362%	8%	370%
225*	0%	0%	N/A
227A	0.07%	0.02%	0.09%
227B	0%	0%	N/A
228*	5%	0%	N/A
229	3%	0%	N/A

* Entries that are at least partially located within the proposed expansion areas.
N/A: Not Applicable

Of note, but not clear within the above table, Basins 225 through 230 have a combined perennial yield of 24,000 AFY. The combined yield for basins 225 through 230 (including the offsite basins 226 and 230) are at a current active annual duty of 118% and will reach 131% if the pending allocations are approved.

The proposed land expansion areas include Alternatives 3A, 3B, and 3C. Most of the land being proposed for expansion is to serve as additional safety and security buffer zones. However, minimal disturbance activities are anticipated for Alternative 3C. The Alternative 3C expansion includes portions of basins 168, 169B, 209, 210, 211, and 212. These basins are currently at or over their allocation, except 209 (43%) and arguably 210 (879% and 93%). Basin 210 has two perennial yields assigned to it per state ruling 4542. The basin 210 summary report also references state rulings 6255 and 6256, which are denied applications from 2014 due to the fact that there was "no unappropriated water."

Another consideration is the designation of certain water basins. The State Engineer may "designate" a groundwater basin under certain conditions, usually due to a volume of groundwater rights that approach or exceed the estimated average annual recharge and therefore require additional administration. Basins 141, 146, 149, 161, 170, 209 and 210 are designated (see **Table 4-2**).

7.1 GROUNDWATER

Active water system facilities are within nine (9) locations: TTR Man Camp, TTR Industrial Area 10, TTR Site 6, Cedar Pass, TECR O&M Compound, TPECR, Creech AFB, Point Bravo, and Range 63C. Multiple wells may be present for an installation. A summary of the current and projected groundwater usage from 2014 is provided in the following table through NDWR records and USAF correspondence and records (USAF ACC 99 CES/CEIEA 2015):

Table 7-2 Projected Groundwater Use

Location	Well Name	Allocation (AFY)	2014 Actual Water Use (AFY)	Percentage of Allocation	Projected Increase (AFY)	Percentage of Allocation
TTR Man Camp	North Cactus Flats Well	22.93	18.36	80%	UNK	UNK
	EH-7*	149.91	4.47	3%		
TTR Area 10 Industrial Area	3A	460.34	0	0%	UNK	UNK
	3B	320.55	7.2	2%		
	EH-2	64.35	26.72	42%		
TTR Site 6	Well 6	UNK	UNK	UNK	UNK	UNK
Cedar Pass	Well	UNK	47.4	UNK	UNK	UNK
TECR O&M Compound	O&M Well	361.98	41.60	11%	UNK	UNK
TPECR	Well 1	13.93	15.18	109%	UNK	UNK
CAFB	106-3, 106-4, 62-5	186.62	89.82	48%	158.09	85%
Point Bravo	Well Point Bravo	7.35	2.26	31%	UNK	UNK

Table 7-2 Projected Groundwater Use						
Location	**Well Name**	**Allocation (AFY)**	**2014 Actual Water Use (AFY)**	**Percentage of Allocation**	**Projected Increase (AFY)**	**Percentage of Allocation**
Range 63C	Silver Flag Well 2372	4.50	1.51	34%	UNK	UNK
* EH-7 has been replaced by Well 3 Replacement EH-7 (NDEP 2016) UNK: Unknown						

The NDWR issues pumpage inventories for select water basins (http://water.nv.gov/data/pumpage/). The remainder of the facilities were searched for current usage through the NDWR pumpage inventories; however, data for the entries marked as “unknown” were unavailable.

Potential future operations on the NTTR may necessitate additional water appropriations. This includes a possible need for industrial water for construction and maintenance of new structures for the Alternative 3C expansion area to expand mission capabilities. The increased water requirement may be fulfilled through current and future transferred rights to the USAF with a change application to the State Engineer for change of point of diversion or manner of use. However, it is anticipated that further NEPA-related environmental analysis will be necessary as proposed activities within this area are solidified.

7.2 SURFACE WATER

Since there are no records of historical use of surface water within the NTTR, and the USAF does not utilize these water sources for direct mission support, it can be assumed that current USAF surface water usage is at or below the permitted quantities.

CHAPTER 8 - **CONCLUSIONS**

8.1 CURRENT WITHDRAWN AREA

The current tracking and projection of future water use is imperative to maintain the operations of the NTTR. The relevant research conducted through NDWR records has been included and analyzed within this document to support the sustainability of the mission. It should be noted that there are discrepancies in the data compiled from the NDWR (**Appendix B**). The information reviewed and compiled is considered approximate.

A comprehensive summary of the groundwater rights appropriations is below. It provides the number of groundwater permits between the different owner categories (USAF, other federal agency, and private). Allocations that were listed for these permits were totaled for each basin and the USAF amount of this total is provided. The percentage of USAF owned allocations per basin is included.

Table 8-1 Comprehensive Summary of Groundwater Right Allocations

Basin	Number of USAF Permits	Number of Other Federal Permits	Number of Private Permits	Total Number of Water Rights	Total Allocation (AFA)	USAF Allocation (AFA)	% of USAF Allocations in Basin (AFA)
141	0	0	0	0	0	0	0
144	0	0	0	0	0	0	0
145	2	0	1	3	11.79	11.79	100%
146	1	0	1	2	25.50	13.93	55%
147	3	0	0	3	391.32	391.32	100%
148	2	0	0	2	243.12	243.12	100%
149	3	0	0	3	927.8	927.8	100%
157	0	0	1	1	22.74	0	0%
158A	0	0	0	0	0	0	0%
158B	0	0	0	0	0	0	0%
159	0	0	0	0	0	0	0%
160	0	0	0	0	0	0	0%
161	5	0	0	5	236.45	236.45	100%
168	0	0	8	8	5,700.00	0	0%
169A	0	0	0	0	0	0	0%
169B	0	0	5	5	3,400.00	0	0%
170	0	1	0	1	1.66	0	0%
173A	0	0	0	0	0	0	0%
209	0	0	0	0	0	0	0%
210	0	0	0	0	0	0	0%
211	1	0	8	9	307.35	7.35	2%
212	1	0	0	1	4.48	4.48	100%
225	0	0	0	0	0	0	0%
227A	0	0	0	0	0	0	0%

Table 8-1 Comprehensive Summary of Groundwater Right Allocations							
Basin	**Number of USAF Permits**	**Number of Other Federal Permits**	**Number of Private Permits**	**Total Number of Water Rights**	**Total Allocation (AFA)**	**USAF Allocation (AFA)**	**% of USAF Allocations in Basin (AFA)**
227B	0	0	0	0	0	0	0%
228	1	0	0	1	1.1	1.1	100%
229	0	0	0	0	0	0	0%
Total	**19**	**1**	**24**	**44**	**11,273.31**	**1,837.34**	--

A comprehensive summary of the water wells is below. It provides the number of well logs between the different owner categories (USAF, other federal agency, and private). The percentage of USAF well logs per basin is included.

Table 8-2 Comprehensive Summary of Water Wells					
Basin	**Number of USAF Wells**	**Number of Other Federal Agency Wells**	**Number of Private Wells**	**Total Number of Wells**	**% of USAF Wells**
141	0	0	1	1	0%
144	0	0	1	1	0%
145	0	0	1	1	0%
146	1	1	0	2	50%
147	6	0	6	12	50%
148	2	0	1	3	67%
149	1	3	4	8	13%
157	0	1	1	2	0%
158A	0	0	1	1	0%
158B	0	0	0	0	0%
159	0	0	0	0	0%
160	0	7	0	7	0%
161	18	1	49	68	26%
168	0	0	0	0	0%
169A	0	0	1	1	0%
169B	0	1	2	3	0%
170	0	0	3	3	0%
173A	0	0	0	0	0%
209	0	0	0	0	0%
210	0	0	0	0	0%
211	3	7	23	33	9%
212	0	0	0	0	0%
225	0	0	0	0	0%
227A	0	2	1	3	0%

Table 8-2 Comprehensive Summary of Water Wells					
Basin	**Number of USAF Wells**	**Number of Other Federal Agency Wells**	**Number of Private Wells**	**Total Number of Wells**	**% of USAF Wells**
227B	0	0	0	0	0%
228	0	18	7	25	0%
229	0	1	0	1	0%
Total	**31**	**42**	**102**	**175**	**--**

A comprehensive summary of the surface water rights appropriations is included in the following table. It provides the number of groundwater permits between the different owner categories (USAF, other federal agency, and private). Allocations that were listed for these permits were totaled for each basin and the USAF amount of this total is provided. The percentage of USAF owned allocations per basin is included.

Table 8-3 Comprehensive Summary of Surface Water Right Allocations							
Basin	**Number of USAF Permits**	**Number of Other Federal Permits**	**Number of Private Permits**	**Total Number of Water Permits**	**Total Allocation (AFA)**	**USAF Allocation (AFA)**	**% of USAF Allocations in Basin (AFA)**
141	0	1	0	1	0.90	0	0%
144	1	0	0	1	2.18	2.18	100%
145	5	0	0	5	36.81	36.81	100%
146	0	0	4	4	18.84	0	0%
147	2	4	1	7	32.35	28.73	89%
148	4	5	0	9	64.03	64.03	100%
149	0	1	0	1	0	0	0%
157	10	1	4	15	81.47	50.56	62%
158A	2	1	1	4	18.38	0.31	2%
158B	0	0	0	0	0	0	0%
159	0	0	0	0	0	0	0%
160	0	0	0	0	0	0	0%
161	0	2	0	2	0.83	0	0%
168	1	3	0	4	11.75	2.24	19%
169A	0	1	9	10	13.57	0	0%
169B	0	1	2	3	9.67	0	0%
170	2	1	0	3	8.61	3.36	39%
173A	0	0	7	7	64.64	0	0%
209	0	0	0	0	0	0	0%
210	0	0	0	0	0	0	0%
211	0	0	0	0	0	0	0%
212	0	0	0	0	0	0	0%
225	0	0	0	0	0	0	0%
227A	0	0	0	0	0	0	0%

Table 8-3 Comprehensive Summary of Surface Water Right Allocations							
Basin	**Number of USAF Permits**	**Number of Other Federal Permits**	**Number of Private Permits**	**Total Number of Water Permits**	**Total Allocation (AFA)**	**USAF Allocation (AFA)**	**% of USAF Allocations in Basin (AFA)**
227B	0	0	0	0	0	0	0%
228	0	0	2	2	10.04	0	0%
229	0	0	0	0	0	0	0%
Total	**27**	**21**	**30**	**78**	**374.07**	**188.22**	--

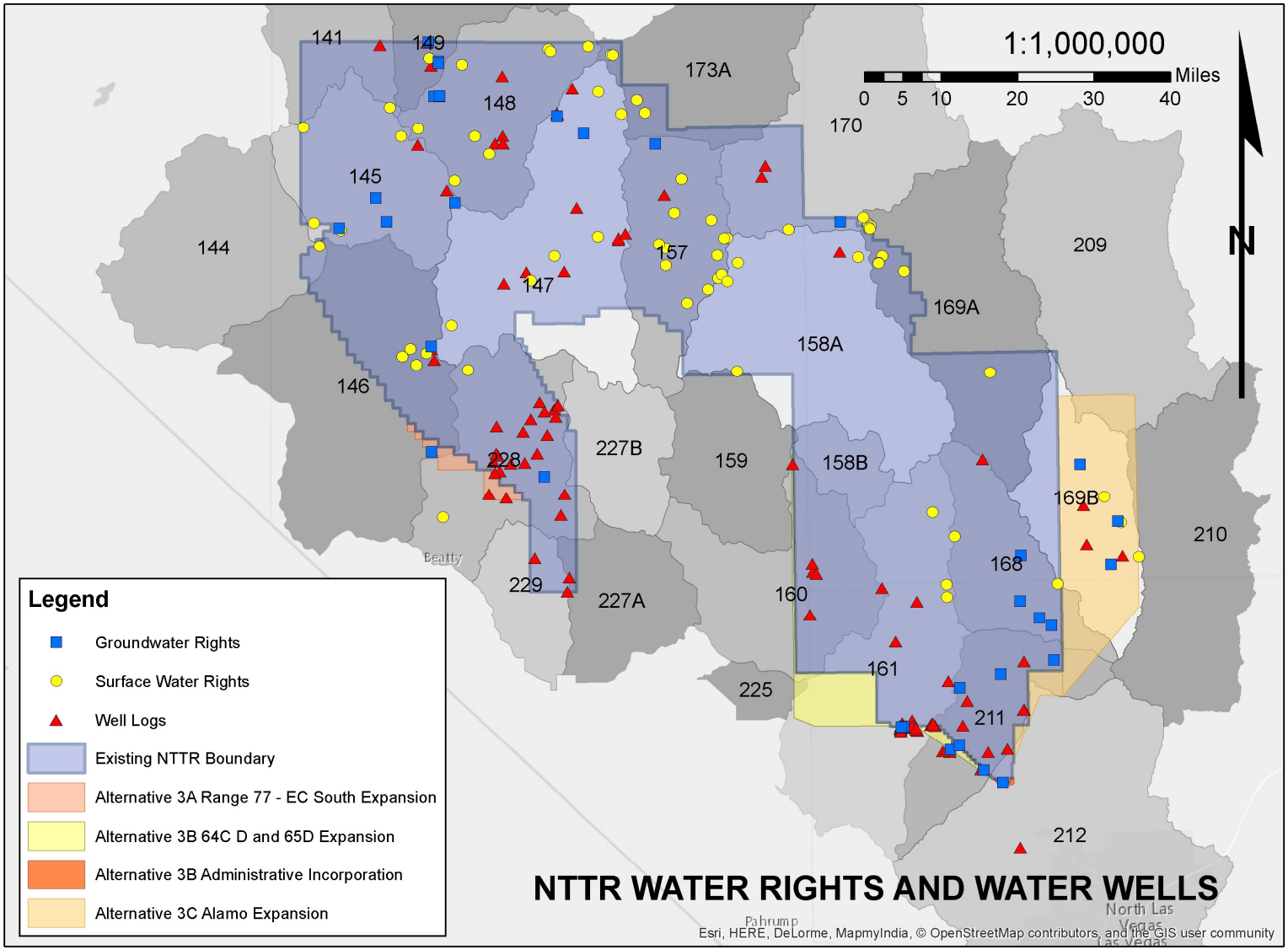
Multiple permits on the proposed NTTR withdrawal extension and expansion areas are privately held as evident from the summary tables within this section. Privately held water permits on the current NTTR land largely consist of those that are dated before or around establishment of the NTTR. A number of the privately held permits or well logs locatable on the NTTR through NDWR records are possibly due to administrative error. Valid certificates held by non-USAF individuals or entities have justification to access these resources. However, new applications for water rights submitted to NDWR may be protested by the USAF or any other concerned entity. Therefore, any potential increase of water rights appropriations will likely only occur due to USAF or other federal agency specific activities that concur with current land use. A portion of the privately held permits identified in this analysis appear to have been transferred from private owners to the USAF.

It is recommended that the remaining privately held permits be abrogated or acquired by the USAF. Permits that have already been transferred to the USAF could conceivably be utilized, especially for basins that are at or over allocation, with approval of the State Engineer through an application for changing the manner of use or point of diversion.

The State Engineer's Office is implementing procedures to cut water rights in over-allocated basins such as forfeiting unused certificated rights, cancelling water rights for lack of due diligence, and calling for proofs of beneficial use. Therefore, it is imperative that the permit owners maintain up-to-date records on all existing permits to ensure water rights are not inadvertently lost.

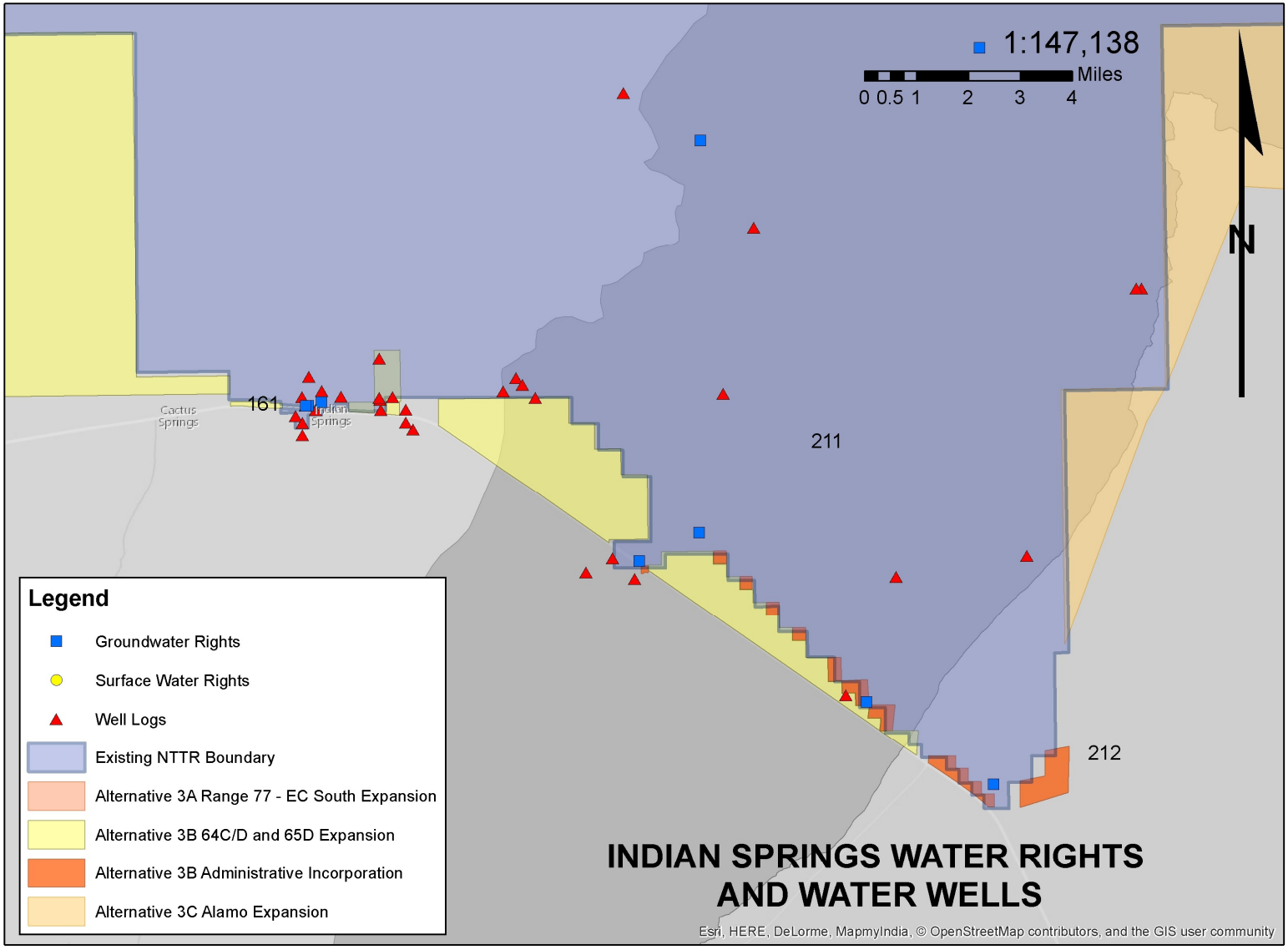
The projected water usage of existing facilities with available data are not anticipated to exceed the current appropriations.

See **Figure 8-1** and **Figure 8-2** for locations of all groundwater, surface water, and water wells on the NTTR extension and expansion areas.



Note: Unmapped sites were outside of the scope of this report or lacked discoverable coordinates.

Figure 8-1 NTTR Water Rights and Water Wells (SBCC 2017)



Note: Unmapped sites were outside of the scope of this report or lacked discoverable coordinates.

Figure 8-2 Indian Springs Water Rights and Water Wells (SBCC 2017)

8.2 EXPANSION AREAS

The alternatives presented for analysis provide a mixture of administrative and land expansion options. Alternative 1 (extend existing land withdrawal and management of NTTR) would maintain the current NTTR boundary. Current activities would continue, management responsibilities would remain unchanged and industrial facilities would remain active. Existing water rights would continue to be withdrawn, except for those that are cancelled, forfeited, or abandoned.

Alternative 2 (extend existing land withdrawal and provide ready access to the North and South Range) would also maintain the existing NTTR boundary but provides an additional administrative aspect by providing ready access for training activities. Current activities would continue and industrial facilities would remain active. Existing water rights would continue to be withdrawn, except for those that are cancelled, forfeited, or abandoned. There are a number of water rights held by the USFWS for the purpose of providing water for wildlife within the Desert National Wildlife Refuge (DNWR). The removal of the proposed wilderness designation of this area would not void these water rights. The USFWS would have justification to access the water to continue wildlife watering activities.

Alternative 3A proposes to increase the NTTR boundary by approximately 18,000 acres of land to add a safety and security buffer to the footprint of the EC South (ECS) area and the entirety would be redesignated as “Range 77” to allow full air-to-ground operations. There would be no construction disturbance or additional water resources use in this additional area proposed for acquisition. The additional land would serve as a safety buffer for live weapons deployment on the interior of Range 77. It is recommended that any non-USAF permits identified in these areas are abrogated or acquired by the USAF to avoid safety and security issues resulting from accessing the water sources.

Table 8-4 Alternative 3A – EC South Water Permits and Well Logs

Type	Basin	Log or Permit Number	Owner	Category
Groundwater Permit	146	11081	V.E. Greenwald	Private
Well Log	228	29408	GL Coffer	Private
Well Log	228	65557	Bud Hawkins	Private
Well Log	228	69874	USGS	Other Federal Agency
Well Log	228	69875	USGS	Other Federal Agency
Well Log	228	70114	USGS	Other Federal Agency
Well Log	228	70116	USGS	Other Federal Agency
Well Log	228	70117	USGS	Other Federal Agency
Well Log	228	70118	USGS	Other Federal Agency

Details on these entries and the geographic location inconsistences are covered in **Appendix B** for the Issues Log.

Alternative 3B proposes to withdraw approximately 57,000 acres of land located along the southern border of the NTTR. This additional land would improve the NTTR operational security and safety buffers to decrease the potential for unauthorized access from the public. Water resource needs are not anticipated in these areas. It is recommended that any non-USAF permits identified in these areas are abrogated or acquired by the USAF to avoid safety and security issues resulting from accessing the water sources.

Table 8-5 Alternative 3B – 6465 Acquisition and Administrative Incorporation Water Permits and Well Logs				
Type	**Basin**	**Log or Permit Number**	**Owner**	**Category**
Groundwater Permit	211	67646	Ready Mix, Inc.	Private
Well Log	160	88009	NNSA	Other Federal Agency
Well Log	160	115604	NNSA	Other Federal Agency
Well Log	161	70441	Nellis AFB	USAF
Well Log	161	108220	US Government	USAF
Well Log	161	117196	USA	USAF
Well Log	161	117197	USA	USAF
Well Log	161	117198	USA	USAF
Well Log	161	52393	Mike Williams	Private
Well Log	211	72357	Indian Springs Sewage Co	Private
Well Log	211	72358	Indian Springs Sewage Co	Private
Well Log	211	91151	Steve Turner	Private
Well Log	211	113391	Clark County	Private
Well Log	211	113392	Clark County	Private
Well Log	211	113393	Clark County	Private
Well Log	211	113394	Clark County	Private

Details on these entries and the geographic location inconsistences are covered in **Appendix B** for the Issues Log.

Alternative 3C (Alamo) would function as additional safety and security buffer for potential weapons safety footprints associated with Ranges 62A. The additional safety and security buffer for potential weapons safety footprints are associated with target impact areas in the South Range.

Solidified plans of installation activities are not known for specific areas with this proposed expansion area. It was assumed for the purposes of this report that additional water resources would be brought in from an existing permitted source. Alternatively, additional water may be obtained by applying for it through the NDWR. However, the Alternative 3C expansion primarily consists of water basins that are currently at or over allocation, which will likely impact the State Engineer's review in the acquisition of water resources for this area. It is anticipated that further NEPA-related environmental analysis will be necessary for future development as proposed activities and water resource needs within this area are evaluated.

Table 8-6 Alternative 3C – Alamo Water Permits and Well Logs				
Type	**Basin**	**Log or Permit Number**	**Owner**	**Category**
Groundwater Permit	169B	53952	SNWA	Private
Groundwater Permit	169B	79324	SNWA	Private
Groundwater Permit	169B	59350	SNWA	Private
Groundwater Permit	169B	79323	SNWA	Private

Table 8-6 Alternative 3C – Alamo Water Permits and Well Logs				
Type	**Basin**	**Log or Permit Number**	**Owner**	**Category**
Groundwater Permit	169B	53951	SNWA	Private
Surface water Permit	169B	11643	USFWS	Other Federal Agency
Surface water Permit	169B	10463	Floyd R. Lamb	Private
Surface water Permit	169B	10814	Floyd R. Lamb	Private
Well Log	169B	31194	USGS	Other Federal Agency
Well Log	169B	44256	Luanne Baker	Private
Well Log	169B	117027	KB Homes	Private

Details on these entries and the geographic location inconsistences are covered in **Appendix B** for the Issues Log.

Alternative 4 includes the currently withdrawn area as described in Alternatives 1, 2, and/or 3 above, plus three options for the length of the proposed withdrawal renewal period. These three options include: Alternative 4A: 20-Year Withdrawal Period, Alternative 4B: 50-Year Withdrawal Period, and Alternative 4C: Indefinite Withdrawal Period. These are administrative options and would have to be implemented in addition to one or more of the previously identified alternatives. Adherence to water management practices is still required in the prolonged period or absence of the withdrawal process, and it would be recommended to assess water resources at periodic intervals.

The final alternative evaluated was the No Action Alternative. The No Action Alternative would allow the currently withdrawn NTTR lands to expire at the end of November 2021 and the withdrawn land would return to the Department of Interior (DOI). The DOI would be responsible for managing the land for public use and the USAF and the Department of Energy (DOE) would no longer be able to use the land for training and testing purposes. Because this alternative would end USAF mission related activities, the potential need for any additional water from the USAF would likely be eliminated. However, ceasing operations and transferring the land back to public use would not void the existing water rights. Existing water rights would remain, except for those that are cancelled, forfeited, or abandoned. The BLM may request that the water rights be vacated or transferred to the BLM. The federal agencies would follow the NDWR process for transferring or vacating water rights in this case. Wells that would no longer be used must be properly abandoned per NDWR regulations.

REFERENCES

BIBLIOGRAPHY

BLM . 2016. *BLM Programs: Wild Horses and Burros.* October 18. https://www.blm.gov/nv/st/en/prog/wh_b.html.

BLM. 2008. "Final Environmental Assessment for the Nevada Wild Horse Range Herd Management Area Plan."

—. 2016. "Nevada Wild Horse Range: Clark, Lincoln, and Nye Counties, Nevada." *Bureau of Land Management.* Accessed January 10, 2017. http://www.blm.gov/style/medialib/blm/nv/field_offices/las_vegas_field_office/wild_horse___burro/las_vegas_herd_management.Par.9168.File.dat/NWHR2.pdf.

Congress, 106th. 2000. "National Defense Authorization Act for Fiscal Year 2000." *Public Law 106-65 .* U.S. Government Printing Office.

DOE. 2015. "DOE Awards Nye County Grant for Community-Based Groundwater Monitoring." Energy.gov, December 29.

—. 2016. "Nevada National Security Site Nevada Field Office, Groundwater Questions and Answers, Revision 6." July.

DOE, NNSA, Nevada Field Office. 2014. "Nevada National Security Site Integrated Groundwater Sampling Plan ." October.

Donald H. Schaefer, Susan A. Thiros, and Michael R. Rosen. 2003. "Ground-Water Quality in the Carbonate-Rock Aquifer of the Great Basin, Nevada and Utah, USGS."

DRI. 2016. *Desert Research Institute Weather Data.* http://www.wrcc.dri.edu/summary/Climsmnv.html.

Heath, Ralph C. 1983. "USGS Water Supply Paper 2220 Basic Ground-Water Hydrology." USGS, Information Services.

James M. Thomas, Alan H. Welch, Michael D. Dettinger. 1996. "Geochemistry and Isotope Hydrology of Representative Aquifers in the Great Basin Region of Nevada, Utah and Adjacent States – Regional Aquifer System Analysis, USGS Professional Paper 1409-C."

Leidos, Inc. 2016. "Working Draft: Nevada Test and Training Range Land Withdrawl, Description of Proposed Action and Alternatives." August.

Lingenfelter, Richard E. 1986. *Death Valley and the Amargosa: A Land of Illusion.* Berkely, Los Angeles, London: University of California Press.

Mark Walker, Crystel Montecinos. 2007. "Arsenic in Drinking Water: Issues Associated with Revising the Standard." University of Nevada, February 22.

Mayer, Tim. 2016. "Desert NWR Water Rights Summary." Portland, July 25.

Michael Planert, John S. Williams. 1995. "Groundwater Atlas of the United States, California and Nevada, HA 730-B." *U.S. Geological Survey.* http://pubs.usgs.gov/ha/ha730/ch_b/index.html.

NDCNR. n.d. "Nevada Water Law 101." *Nevada Department of Conservation and Natural Resources.* Accessed July 26, 2016. http://dcnr.nv.gov/documents/nevada-water-law-101/.

NDEP. 2016. *Nevada Drinking Water Information System (NDWIS).* Accessed January 18, 2017. https://ndwis.ndep.nv.gov/DWW/.

NDWR. 2014. *Guidelines for Transferring Ownership of Water Rights.* NDWR.

—. 2013. *Hydrographic Regions and Basins: Nevada's Hydrographic Regions, Basins and Sub-Basins.* March 21. http://water.nv.gov/programs/planning/counties/.

—. 2013. *State of Nevada Division of Water Resources: Home Page.* December 23. Accessed January 11, 2017. http://water.nv.gov/index.cfm.

—. 2016. *State of Nevada Division of Water Resources: Mapping and Data.* November 11. Accessed January 18, 2017. http://water.nv.gov/mapping/.

R.L. Bates, J.A. Jackson. 1980. *Glossary of Geology 2nd Edition.* Falls Church: American Geological Institute.

Sandia National Laboratories. 2016. "2015 Annual Site Environmental Report for Sandia National Laboratories: Tonopah Test Range, Nevada and Kaua'i Test Facility, Hawai'i." September.

USAF. 2014. "About Us: Creech Air Force Base Fact Sheet." *Creech Air Force Base.* November 6. http://www.creech.af.mil/AboutUs/FactSheets/Display/tabid/7069/Article/669891/creech-air-force-base.aspx.

USAF ACC 99 CES/CEIEA. 2015. "OSD Policy Memo - Water Rights and Water Resources Management on Defense Installations and Ranges in the United States and Territories, May 2014." October 14.
USAF NAFB. 1998. "Final Water Requirements Study of the Nellis Air Force Range." September.
USAF. 1999. "Renewal of the Nellis Air Force Range Land Withdrawal, Legislative Environmental Impact Statement, Volume 1." March.
USAF, 99 CES/CEIEA. 2016. "Draft Project Report Seeps, Springs, and Wildlife Water Developments of the NTTR." March/April.
USAF, ACC 57 OSS/OSW. 2016. "Weather Data: NTTR Average Annual Precipitation."
USAF, Dept. of the Navy, DOI. 1991. "Special Nevada Report (in accordance with public law 99-606." September 23.
USAF, NTTR Range Environmental. 2016. "DOE Monitoring Wells ECS." June 16.
USGS. 2014. *Geologic Province and Thermo-Tectonic Age Maps.* June 25. Accessed February 8, 2017. http://earthquake.usgs.gov/data/crust/maps.php.
—. 2014. "Geology in the Parks, Fault, Normal Faults, Reverse Faults, Strike-slip Faults and Fault Scarp." October 3.
—. 2002. "Ground-Water Discharge Determined from Measurements of Evaportranspiration, Other Available Hydrologic Components, and Shallow Water-Level Changes, Oasis Valley, Nye County, Nevada." *Water Resources Investigations Report 01-4239.* Carson City: US Geological Survey.
—. 1997. "Major Water Issues in Nevada."
—. 2016. *National Water Information System: Mapper.* http://maps.waterdata.usgs.gov/mapper/index.html.
USNRC. 2015. "Tritium, Radiation Protection Limits, and Drinking Water Standards." Backgrounder: Office of Public Affairs, February.
Victor M. Heilweil, Lynette E. Brooks. 2010. "USGS, Conceptual Model of the Great Basin Carbonate and Alluvial Aquifer System, Scientific Investigations Report 2010-5193, USGS."

FURTHER READING

Nevada Revised Statutes, Chapter 533 – Adjudication of Vested Water Rights; Appropriation of Public Waters http://www.leg.state.nv.us/NRS/NRS-533.html, Chapter 534 - Underground Water And Wells http://www.leg.state.nv.us/NRS/NRS-534.html

NDCNR, NDWR Evolution of Nevada's Water Laws, As Related to the Development and Evaluation of the State's Water Resources from about 1866 to about 1960, Water Resources Bullet 46, High A. Shamberger, dated 1991, http://images.water.nv.gov/images/publications/water%20resources%20bulletins/Bulletin46.pdf

APPENDICES

APPENDIX A – NDWR ACRONYMS

Nevada Division of Water Resources (NDWR) Acronyms

Sources	
Water Permits	http://water.nv.gov/data/hydrographic/
Well Logs	http://water.nv.gov/data/welllog/

Township, Range, Section, Quarter, Quarter-Quarter

Lands west of Ohio are divided into 36 square mile units called townships. Each township has a township and range designation to define its 36 square mile area. Townships are numbered north or south from a selected parallel of latitude called a base line and range, is numbered west or east of a selected meridian of longitude called a principle meridian. The primary base line and meridian for Nevada is Mount Diablo near Danville California and is designated the Mount Diablo Base and Meridian or MDB&M for short.

Examples

Townships - 20N
Half Townships - S13H
Range - E24
Half Range - E34H

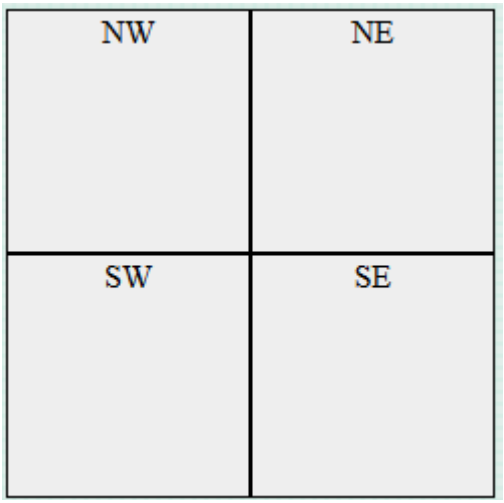
The directional prefix may also be appended to the township or range number. For example: N20 may also be input as 20N, in the case of half townships and ranges, the directional affix comes before the half 'H' designator. For example: E23H may also be input as 23EH.

Section numbers must have two digits. Valid numbers are 01-36.

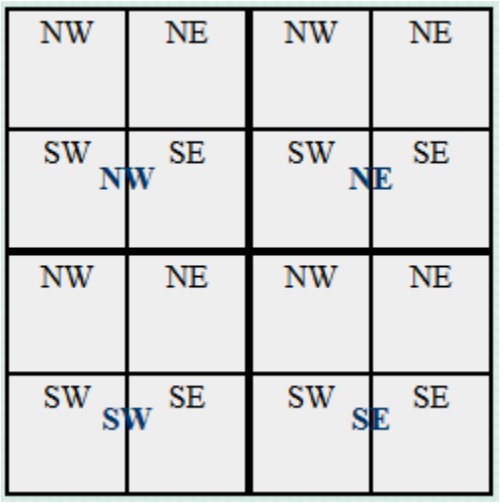
06	05	04	03	02	01
07	08	09	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Township, Range, Section, Quarter, Quarter-Quarter

Quarter Sections:



Quarter-Quarter sections:



Well Log County Codes	
Acronym	**Stands For**
32510	Carson City
32001	Churchill
32003	Clark
32005	Douglas
32007	Elko
32009	Esmeralda
32011	Eureka
32013	Humboldt
32015	Lander
32017	Lincoln
32019	Lyon
32021	Mineral
32023	Nye
32027	Pershing
32029	Storey
32031	Washoe
32033	White Pine

Well Log Proposed Use Codes	
Acronym	**Stands For**
A	Air Conditioning
B	Bottling
C	Commercial
D	Dewater
E	Power
F	Fire
G	Monitoring Well
H	Domestic
I	Irrigation
J	Industrial – Cooling
K	Mining
M	Medicinal
N	Industrial
P	Public Supply (Municipal)
Q	Aquaculture
R	Recreation
S	Stock
T	Institution
U	Unused
X	Test Well
Y	Desalination
Z	Other (Explained in Remarks)

Well Log Work Type Codes	
Acronym	**Stands For**
D	Deepen
G	Geothermal
N	New
O	Other (Explained in Remarks)
P	Plug or Abandonment
R	Recondition
S	Replacement Well
T	Test

Water Rights Permits Application Status Codes	
Acronym	**Stands For**
ABN	Abandoned
ABR	Abrogated
APP	Application
CAN	Cancelled
CER	Certificate
CUR	Curtailed
DEC	Decreed
DEN	Denied
EXP	Expired
FOR	Forfeited
PER	Permit
REJ	Rejected
REL	Relinquish
RES	Reserved
RFA	Ready for Action
RFP	Ready for Action (Protested)
RLP	Relinquished a Portion
RVK	Revoked
RVP	Revoked Permit
SUP	Superceded
SUS	Suspended
VST	Vested Right
WDR	Withdrawn

Water Rights Permits Source Codes	
Acronym	**Stands For**
EFF	Effluent
GEO	Geothermal
LAK	Lake
OGW	Other Ground Water
OSW	Other Surface Water
RES	Reservoir
SPR	Spring
STO	Storage
STR	Stream
UG	Underground
UKN	Unknown

Water Rights Permits Manner of Use Codes	
Acronym	**Stands For**
COM	Commercial
CON	Construction
DEC	As Decreed
DOM	Domestic
DWR	Dewater
ENV	Environmental
IND	Industrial
IRC	Irrigation-Carey Act
IRD	Irrigation-DLE
IRR	Irrigation
MM	Mining and Milling
MMD	Mining, Milling, and Dewatering
MUN	Municipal
OTH	Other
PWR	Power
QM	Quasi-Municipal
REC	Recreational
STK	Stockwatering
STO	Storage
UKN	Unknown
WLD	Wildlife

Water Rights County Codes	
Acronym	**Stands For**
AL	Alpine
CC	Carson City
CH	Churchill
CL	Clark
DO	Douglas
EL	Elko
ES	Esmeralda
EU	Eureka
HU	Humboldt
LA	Lander
LI	Lincoln
LY	Lyon
MI	Mineral
NY	Nye
PE	Pershing
ST	Storey
UK	Unknown
WA	Washoe
WP	White Pine

APPENDIX B – NDWR RESEARCH ISSUES LOG

Basin	Source Description	Application	Change Application	Cert	Status	Source	POD Township	POD Range	POD Section	POD Quarter	POD Quarter Quarter	Diversion Rate (CFS)	Type of Use	Sup	File Date	Priority Date	Date of PBU	Date of POC	Appx Date of Download	Annual Duty (AFA)	County	Owner Code	Owner of Record	Previous Permit Number	Previous Permit Owner	Well Log	Notes
GROUND WATER PERMITS																											
145	Yellow Tiger Tunnel	12707		7726	Certificate	Other Ground Water	05S	44E	1	SW	NW	0.003	Stockwatering		11/3/1948	11/3/1948	7/27/1971	7/27/1971	4/5/2016	0	Nye	PRIV	COLVIN CATTLE CO.	--	James M. Daniels	--	
145	Desert Well	13284		4169	Certificate	Underground	04S	45E	15	SE	NE	0.01	Stockwatering		3/6/1950	3/6/1950	7/21/1954	7/21/1954	4/5/2016	6.935714	Nye	USAF	U.S.-AIR FORCE	--	James M. Daniels	--	
145	Gold Crater Well	13289		4171	Certificate	Underground	04S	45E	36	SW	SE	0.007	Stockwatering		3/6/1950	3/6/1950	7/21/1954	7/21/1954	4/5/2016	4.848862	Nye	USAF	U.S.-AIR FORCE	--	James M. Daniels	--	
146	Well No. 1	11081		3357	Certificate	Underground	09S	46E	36	SW	NW	0.016	Stockwatering		3/9/1944	3/9/1944	10/4/1949	10/4/1948	4/7/2016	11.569753	Nye	PRIV	GREENWALD, V.E.	--	V.E. Greenwald and R.J. Kell	--	The excel TRS and GIS point are located in the EC South expansion area.
146	Existing Well	48429		13619	Certificate	Underground	07S	46E	25	NW	NW	0.22	Quasi-Municipal		9/21/1984	8/31/1990	10/9/1991	9/2/1986	4/7/2016	13.932806	Nye	USAF	U.S.-AIR FORCE	--	--	64754	In basin 147 and sec 24 SW qtr from NDWR GIS data (onsite).
147	Sulphide Well	13365		4172	Certificate	Underground	04S	47E	21	NW	SW	0.016	Stockwatering		5/3/1950	5/3/1950	7/21/1954	7/21/1954	4/5/2016	11.262863	Nye	USAF	NELLIS AIR FORCE BASE	--	James M. Daniels	--	
147	978.94	62503			Permit	Underground	02S	49E	22	SE	NW	0.5	Quasi-Municipal		10/7/1996	10/7/1996	--	8/2/1999	4/5/2016	361.98	Nye	USAF	U.S.-AIR FORCE	--	--	113419, 113420	
147	--	54178		15421	Certificate	Underground	03S	50E	5	NW	SW	0.085	Quasi-Municipal		11/16/1989	11/16/1989	9/12/1996	3/6/1992	4/5/2016	18.075821	Nye	USAF	U.S.-AIR FORCE	--	Energy Department-US	--	
148	EH-2	50169		14160	Certificate	Underground	02S	46E	12	NW	NE	0.09	Quasi-Municipal		9/19/1986	9/19/1986	9/29/1992	11/21/1989	4/7/2016	64.34825373	Nye	USAF	U.S.-AIR FORCE	--	Energy Department-US	--	
148	Existing Well	76668	50169		Permit	Underground	02S	47E	7	NW	NW	0.25	Quasi-Municipal		1/25/2008	10/6/2015	12/24/1986	12/24/1986	4/7/2016	178.77	Nye	USAF	U.S.-AIR FORCE	--	--	25266	The map labeled for 50169 is for 02S 46E NW qtr (onsite), another map is included for 50166 (a cancelled application) that includes the excel TRS.
149	--	53885		14093	Certificate	Underground	01S	46E	2	NE	NW	0.89	Quasi-Municipal	Y	9/25/1989	9/25/1989	10/19/1993	9/25/1990	7/19/2016	146.908243	Nye	USAF	U.S.-AIR FORCE	--	Energy Department-US	32284	
149	Well 3B	58149	50167	14285	Certificate	Underground	01S	46E	13	SE	NE	1	Quasi-Municipal	Y	9/29/1992	9/19/1986	11/1/1994	10/19/1993	4/7/2016	320.546605	Nye	USAF	U.S.-AIR FORCE	50167	Energy Department-US	--	
149	Well 3A	58150	50170	14286	Certificate	Underground	01S	46E	13	SE	SE	1	Quasi-Municipal	Y	9/29/1992	9/19/1986	11/1/1994	10/19/1993	4/7/2016	460.335	Nye	USAF	U.S.-AIR FORCE	50170	Energy Department-US	--	
157	Camp's Well	12143	11864	3253	Certificate	Underground	03S	51E	11	SW	SE	0.032	Stockwatering		12/27/1947	5/29/1947	4/5/1949	4/5/1949	4/5/2016	22.740549	Nye	PRIV	HELEN FALLINI LIVING TRUST & FALLINI 1983 TRUST	--	E.W., Joe B. and R.A. Fallini; Constant Vener	--	
161	Existing Well	84836	64603		Permit	Underground	16S	56E	8	TR42		0.02	Quasi-Municipal	Y	2/12/2015	12/2/1946	9/1/2017 Due	1/26/2016	7/19/2016	14.48	Clark	USAF	U.S.-AIR FORCE	64603	United States of America/United States Air Force	--	Showing in NW qtr, tract T42B and on border line from NDWR GIS data. Application confirms within tract no. T-42B. Tract 42B is partially onsite.
161	Well 106-2	51572		13636	Certificate	Underground	16S	56E	8	TR42		0.56	Quasi-Municipal	Y	11/19/1987	11/19/1987	12/16/1992	12/27/1990	4/7/2016	35.476484	Clark	USAF	U.S.-AIR FORCE	--	--	52398, 102134	Showing in NE qtr, tract T42B and on border line from NDWR GIS data. Connected to 84836, 51572, 51573, 66651, and 66652. Certificate specifies building T-106.
161	--	66651			Permit	Underground	16S	56E	8			0.07	Industrial	Y	8/8/2000	8/8/2000	5/26/2016 Due	5/29/2001	4/7/2016	50.667539	Clark	USAF	U.S.-AIR FORCE	--	--	--	Showing in NE qtr and on border line from NDWR GIS data. Connected to 84836, 51572, 51573, 66651, and 66652. Application states within tract no. T42B and building T106. Tract 42B is partially onsite.
161	Well 62-1	51573		13637	Certificate	Underground	16S	56E	5	SE	SE	0.68999999	Quasi-Municipal	Y	11/19/1987	11/19/1987	12/16/1992	12/27/1990	4/7/2016	67.914757	Clark	USAF	U.S.-AIR FORCE	--	--	26775, 111318	Connected to 84836, 51572, 51573, 66651, and 66652. Application and certificate state within tract no. 40. Showing in tract T40D from NDWR GIS data (onsite). Certificate specifies building T-62.
161	--	66652		13637	Certificate	Underground	16S	56E	5	SE	SE	0.68999999	Quasi-Municipal	Y	11/19/1987	11/19/1987	5/26/2016 Due	5/29/2001	4/7/2016	67.914757	Clark	USAF	U.S.-AIR FORCE	--	--	--	Connected to 84836, 51572, 51573, 66651, and 66652. Application states within tract no. 40 and building no. T62. Tracts 40A through 40D are located onsite.
168	Well 168-1A	54060	72791		Permit	Underground	13S	58E	13	SW	SW	6	Municipal		10/17/1989	10/17/1989	4/14/2020 Due	4/14/2020 Due	4/6/2016	1700	Clark	PRIV	SOUTHERN NEVADA WATER AUTHORITY	72791	Las Vegas Valley Water District	--	
168	Well 168-1A	79316			Ready for Action (Protested)	Underground	13S	58E	13	SW	SW	6	Municipal		1/28/2010	1/28/2010	--	--	4/6/2016	0	Clark	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	--	--	
168	Well 168-2R	54061			Ready for Action (Protested)	Underground	12S	59E	17	SW	NW	10	Municipal		10/17/1989	10/17/1989	--	--	4/6/2016	0	Lincoln	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	Las Vegas Valley Water District	--	
168	Well 168-2R	79317			Ready for Action (Protested)	Underground	12S	59E	17	SW	NW	10	Municipal		1/28/2010	1/28/2010	--	--	4/6/2016	0	Lincoln	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	--	--	
168	Well 168-2A	54068			Permit	Underground	13S	59E	32	NE	NW	6	Municipal	Y	10/17/1989	10/17/1989	4/14/2020 Due	4/14/2020 Due	4/6/2016	2000	Clark	PRIV	SOUTHERN NEVADA WATER AUTHORITY	72789	Las Vegas Valley Water District	--	
168	Well 168-2A	79318			Ready for Action (Protested)	Underground	13S	59E	32	NE	NW	6	Municipal		1/28/2010	1/28/2010	--	--	4/6/2016	0	Clark	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	--	--	
168	Well 168-1R	54069			Permit	Underground	14S	59E	3	NW	NE	10	Municipal	Y	10/17/1989	10/17/1989	4/14/2020 Due	4/14/2020 Due	4/6/2016	2000	Clark	PRIV	SOUTHERN NEVADA WATER AUTHORITY	72790	Las Vegas Valley Water District	--	
168	Well 168-1R	79319			Ready for Action (Protested)	Underground	14S	59E	3	NW	NE	10	Municipal		1/28/2010	1/28/2010	--	--	4/6/2016	0	Clark	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	--	--	
170	The Wells	3364		1984	Certificate	Underground	05S	55E	5	SE	NW	0.002	Stockwatering		4/24/1915	4/24/1915	12/4/1918	5/7/1917	4/7/2016	1.657206	Lincoln	OFED	UNITED STATES OF AMERICA	--	W.T. Stewart Sr. and Jr.	--	Showing in sec 02 NE qtr from NDWR GIS data (onsite).
211	Well 211-2A	54063			Ready for Action (Protested)	Underground	16S	57E	21	SE	NE	6	Municipal		10/17/1989	10/17/1989	--	--	4/7/2016	0	Clark	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	Las Vegas Valley Water District	--	
211	Well 211-2A	79348			Ready for Action (Protested)	Underground	16S	57E	21	SE	NE	6	Municipal		1/28/2010	1/28/2010	--	--	4/7/2016	0	Clark	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	--	--	
211	Well 211-4R	54106			Ready for Action (Protested)	Underground	15S	57E	15	NW	NW	10	Municipal		10/23/1989	10/23/1989	--	--	4/7/2016	0	Clark	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	Las Vegas Valley Water District	--	
211	Well 211-4R	79353			Ready for Action (Protested)	Underground	15S	57E	15	NW	NW	10	Municipal		1/28/2010	1/28/2010	--	--	4/7/2016	0	Clark	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	--	--	
211	Lee Canyon	67646	63345		Permit	Underground	17S	58E	5	SE	SE	2	Commercial		6/7/2001	8/18/1997	5/9/2016 Due	3/9/2006	7/18/2016	300	Clark	PRIV	READY MIX, INC.	--	Stephen F. Turner	91151	The PLSS GIS data for this area is incomplete. TRS is projected to be located partially onsite. Showing in admin incorporation from NDWR GIS data.
211	Well 211-2R	54065			Ready for Action (Protested)	Underground	15S	58E	4	NE	SW	10	Municipal		10/17/1989	10/17/1989	--	--	4/7/2016	0	Clark	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	Las Vegas Valley Water District	--	
211	Well 211-2R	79350			Ready for Action (Protested)	Underground	15S	58E	4	NE	SW	10	Municipal		1/28/2010	1/28/2010	--	--	4/7/2016	0	Clark	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	--	--	
211	Well 211-3R	79351			Ready for Action (Protested)	Underground	14S	59E	27	SE	NW	10	Municipal		1/28/2010	1/28/2010	--	--	4/7/2016	0	Clark	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	--	--	
211	Existing Well	62502		16149	Certificate	Underground	16S	57E	29	NE	NE	0.2	Quasi-Municipal		10/7/1996	10/7/1996	6/7/2000	8/19/1999	4/7/2016	7.35	Clark	USAF	U.S.-AIR FORCE	--	--	71163	
212	--	63001			Revocable Permit	Underground	17S	58E	14	SW	NE	0.01	Quasi-Municipal		4/4/1997	4/4/1997	--	--	7/18/2016	4.480594	Clark	USAF	U.S.-AIR FORCE	--	--	--	
228	--	9606		2295	Certificate	Underground	10S	49E	17	SE	SE	0.002	Stockwatering		7/4/1932	7/4/1932	10/21/1936	10/21/1936	4/7/2016	1.104804	Nye	USAF	NELLIS AIR FORCE BASE	--	V.E. Greenwald	--	
169B	Well 169B-2R	53952			Ready for Action (Protested)	Underground	10S	60E	15	SW	SW	10	Municipal		10/17/1989	10/17/1989	--	--	4/7/2016	0	Lincoln	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	Las Vegas Valley Water District	--	The excel TRS and GIS point is located in the Alamo expansion area. Showing in sec 16 SE qtr from NDWR GIS data (onsite Alamo expansion area).
169B	Well 169B-2R	79324			Ready for Action (Protested)	Underground	10S	60E	15	SW	SW	10	Municipal		1/28/2010	1/28/2010	--	--	4/7/2016	0	Lincoln	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	--	--	The excel TRS and GIS point is located in the Alamo expansion area. Showing in sec 16 SE qtr from NDWR GIS data (onsite Alamo expansion area).
169B	Well 169B-1A	53950			Permit	Underground	12S	61E	30	NE	NE	6	Municipal	Y	10/17/1989	10/17/1989	4/14/2020 Due	4/14/2020 Due	4/7/2016	1700	Lincoln	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	Las Vegas Valley Water District	--	The excel TRS and GIS point located in the Alamo expansion area.
169B	Well 169B-1A	79323			Ready for Action (Protested)	Underground	12S	61E	30	NE	NE	16	Municipal		1/28/2010	1/28/2010	--	--	4/7/2016	0	Lincoln	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	--	--	The excel TRS and GIS point located in the Alamo expansion area.
169B	Well 169B-1R	53951			Permit	Underground	11S	61E	29	NE	SE	10	Municipal	Y	10/17/1989	10/17/1989	4/14/2020 Due	4/14/2020 Due	4/7/2016	1700	Lincoln	PRIV	SOUTHERN NEVADA WATER AUTHORITY	--	Las Vegas Valley Water District	--	The excel TRS and GIS point located in the Alamo expansion area.

Basin	Source Description	Application	Change Application	Cert	Status	Source	POD Township	POD Range	POD Section	POD Quarter	POD Quarter Quarter	Diversion Rate (CFS)	Type of Use	Sup	File Date	Priority Date	Date of PBU	Date of POC	Appx Date of Download	Annual Duty (AFA)	County	Owner Code	Owner of Record	Previous Permit Number	Previous Permit Owner	Well Log	Notes
SURFACE WATER PERMITS																											
141	Unnamed Seep	7357		2253	Certificate	Spring	02S	45E	13	SE	NW	0.0013	Stockwatering		5/6/1925	5/6/1925	4/6/1934	4/6/1934	4/7/2016	0.9	Nye	OFED	UNITED STATES OF AMERICA	--	G.E. McKenna	--	The TRS includes portions of basin 145 and 149. In basin 145 through NDWR GIS data. Application states SW qtr (onsite); certificate states SE qtr.
144	Jerome Spring	5931		850	Certificate	Spring	05S	44E	16	SE	SW	0.025	Stockwatering		1/2/1920	1/2/1920	9/5/1923	9/5/1922	4/7/2016	2.178919	Nye	USAF	NELLIS AIR FORCE BASE	--	Kawich Cattle Company	--	Appears to be in SW qtr from NDWR GIS data (onsite).
145	Wild Horse Spring	3908		1581	Certificate	Spring	02S	44E	31	NW	SE	0.004	Stockwatering		4/15/1916	4/15/1916	12/23/1918	8/18/1917	4/5/2016	2.45512	Nye	USAF	U.S.-AIR FORCE	--	George E. McKenna	--	
145	Stonewall Spring	12362		3773	Certificate	Spring	04S	44E	32	SE	SE	0.01	Stockwatering		3/25/1948	3/25/1948	11/13/1951	12/24/1951	4/5/2016	7.05847	Nye	USAF	U.S.-AIR FORCE	--	James M. Daniels	--	
145	Yellow Tiger Tunnel	8977		2201	Certificate	r Surface Water	05S	44E	1	SW	SW	0.003	Stockwatering		6/30/1929	6/30/1929	1/10/1936	6/7/1934	4/5/2016	2.240297	Nye	USAF	U.S.-AIR FORCE	--	Kawich Cattle Company	--	
145	Alkali Springs	5929		848	Certificate	Spring	03S	46E	5	NW	SW	0.025	Stockwatering		1/2/1920	1/2/1920	8/7/1920	8/7/1920	4/5/2016	18.10651	Nye	USAF	U.S.-AIR FORCE	--	Kawich Cattle Company	--	Appears to be in SW qtr from NDWR GIS data (onsite).
145	Alkali Springs	12784		4167	Certificate	Spring	03S	46E	5	NW	SW	0.01	Stockwatering		12/31/1948	12/31/1948	7/21/1954	7/21/1954	4/5/2016	6.935714	Nye	USAF	U.S.-AIR FORCE	--	James M. Daniels	--	Appears to be in SW qtr from NDWR GIS data (onsite).
146	Trappman Spring	5173		856	Certificate	Spring	07S	46E	32	SE	NW	0.015	Stockwatering		7/26/1918	7/26/1918	8/24/1919	6/23/1919	4/7/2016	10.863906	Nye	PRIV	COOK, NEAL	--	T.H. Chatum, J.J. Vignolo	--	
146	Monte Cristo Spring	3942		2378	Certificate	Spring	07S	46E	28	SW	SW	0.003	Stockwatering		4/27/1916	4/27/1916	4/21/1937	7/27/1918	4/7/2016	2.178919	Nye	PRIV	COLVIN CATTLE CO.	--	Kawich Cattle Assn.	--	Appears to be in NW qtr from NDWR GIS data (onsite).
146	Tula George Spring	5540		853	Certificate	Spring	08S	46E	3	SE	NW	0.002	Stockwatering		6/14/1919	6/14/1919	2/23/1922	2/23/1922	4/7/2016	1.442383	Nye	PRIV	COOK, NEAL	--	T.H. Chatom	--	Appears to be in NW qtr from NDWR GIS data (onsite).
146	Rock Springs	6022		851	Certificate	Spring	07S	46E	26	SW	SE	0.006	Stockwatering		3/20/1920	3/20/1920	2/23/1922	2/23/1922	4/7/2016	4.357838	Nye	PRIV	COOK, NEAL	--	T.H. Chatom	--	
147	Nixon Water Hole No. 1	V02371			Vested	Spring	06S	49E	7	NW	SW	0.025	Stockwatering		8/25/1950	01/01/1880	--	--	4/5/2016	0	Nye	OFED	UNITED STATES OF AMERICA	--	John J. Casey	--	
147	Nixon Water Hole No. 2	V02372			Vested	Spring	05S	49E	27	NW	NE	0.025	Stockwatering		8/25/1950	01/01/1880	--	--	4/5/2016	0	Nye	OFED	UNITED STATES OF AMERICA	--	John J. Casey	--	
147	Tunnel Spring	V02373			Vested	Spring	02S	50E	4	SE	SE	0.01	Stockwatering		8/25/1950	01/01/1880	--	--	4/5/2016	0	Nye	OFED	BLM	--	John J. Casey	--	
147	Rose or Wild Horse	V02374			Vested	Spring	02S	50E	24	SE	SE	0.03	Stockwatering		8/25/1950	01/01/1879	--	--	4/5/2016	0	Nye	OFED	BLM	--	John J. Casey	--	
147	Larry's Seep	10863		3141	Certificate	Spring	07S	47E	8	NE	NW	0.005	Stockwatering		9/14/1942	9/14/1942	6/18/1948	8/29/1945	4/5/2016	3.621302	Nye	PRIV	BRIAN L. GREENSPUN SEPARATE PROPERTY TRUST (25% UDI)	--	V.E. Greenwald	--	
147	Silver Bow Spring	13625		3956	Certificate	Spring	01S	49E	9	NE	NW	0.03	Stockwatering		1/29/1951	1/29/1951	3/25/1953	3/25/1953	4/5/2016	21.727812	Nye	USAF	NELLIS AIR FORCE BASE	--	John J. Casey	--	The excel TRS and GIS point are located in Basin 148.
147	Dry Lake Drainage through Jackpot Reservoir	11609		4243	Certificate	r Surface Water	05S	50E	9	SE	SE	0.018	Stockwatering		6/12/1946	6/12/1946	4/11/1955	4/12/1954	4/5/2016	6.997092	Nye	USAF	NELLIS AIR FORCE BASE	--	Carlton P. and Floyd R. Lamb	--	
148	Fork Reservoir	V02368			Vested	Reservoir	01S	47E	22	NW	NW	0.02	Stockwatering		8/25/1950	01/01/1880	--	--	4/7/2016	0	Nye	OFED	UNITED STATES OF AMERICA	--	John J. Casey	--	
148	North Antelope Reservoir	V02369			Vested	Reservoir	03S	47E	2	NE	SE	0.02	Stockwatering		8/25/1950	01/01/1880	--	--	4/7/2016	0	Nye	OFED	UNITED STATES OF AMERICA	--	John J. Casey	--	Appears to be in SW qtr from NDWR GIS data (onsite).
148	Antelope Reservoir	V02370			Vested	Reservoir	03S	48E	19	NE	NW	0.025	Stockwatering		8/25/1950	01/01/1880	--	--	4/7/2016	0	Nye	OFED	UNITED STATES OF AMERICA	--	John J. Casey	--	
148	Silver Bow Spring	V02376			Vested	Spring	01S	49E	9	NE	NW	0.025	Stockwatering		1/29/1951	01/01/1880	--	--	4/7/2016	0	Nye	OFED	UNITED STATES OF AMERICA	--	John J. Casey	--	
148	Corral Spring	V02375			Vested	Spring	01S	50E	8	NE	NW	0.02	Stockwatering		1/29/1951	01/01/1880	--	--	4/7/2016	0	Nye	OFED	BLM	--	John J. Casey	--	
148	Cactus Spring	12785		4168	Certificate	Spring	02S	46E	34	NW	SE	0.01	Stockwatering		12/31/1948	12/31/1948	7/21/1954	7/21/1954	4/7/2016	7.05847	Nye	USAF	U.S.-AIR FORCE	--	James M. Daniels	--	
148	Cactus Spring	1580		377	Certificate	Spring	02S	46E	34	NW	SE	0.01	Irrigation		1/20/1910	1/20/1910	2/8/1911	2/8/1911	7/19/2016	7.24	Nye	USAF	NELLIS AIR FORCE BASE	--	George Wallace Dean	--	
148	Antelope Spring	13288		4170	Certificate	Spring	04S	47E	4	NW	SW	0.007	Stockwatering		3/6/1950	3/6/1950	7/21/1954	7/21/1954	4/7/2016	4.848862	Nye	USAF	U.S.-AIR FORCE	--	James M. Daniels	--	
148	Silver Bow Canyon	4943		1111	Certificate	Stream	01S	49E	4	SW	SE	0.15	Irrigation		3/1/1918	3/1/1918	6/22/1924	9/23/1919	4/7/2016	44.88	Nye	USAF	U.S.-AIR FORCE	--	Dionigo Rodoni	--	Application states SE qtr (onsite); certificate and map reference SW qtr.
149	Reservoir #2	V02385			Vested	Reservoir	01S	46E	14	NE	NE	0.018	Stockwatering		4/12/1951	01/01/1880	--	--	4/7/2016	0	Nye	OFED	BLM	--	John J. Casey	--	
157	Gold Spring	12043		3453	Certificate	Spring	06S	52E	1	SW	SW	0.007	Stockwatering		10/14/1947	10/14/1947	1/30/1950	1/30/1950	4/5/2016	4.695417	Nye	OFED	UNITED STATES OF AMERICA	--	Carlton P. and Floyd R. Lamb	--	Showing in 6S 53E sec 05 SW qtr from NDWR GIS data (onsite).
157	Kawich Valley Wash	11865		3297	Certificate	r Surface Water	05S	51E	13	SW	NW	0.03	Stockwatering		5/29/1947	5/29/1947	7/25/1949	7/25/1949	4/5/2016	21.727812	Nye	PRIV	HELEN FALLINI LIVING TRUST & FALLINI 1983 TRUST	--	E.W., Joe B. and R.A. Fallini; Constant Verner	--	
157	Unnamed Drainage Basin	11626		3536	Certificate	Stream	04S	51EH	29	SW	SW	0.006	Stockwatering		7/1/1946	7/1/1946	10/4/1950	10/4/1950	4/5/2016	4.480594	Nye	PRIV	FALLINI, HELEN	--	Carlton P. and Floyd R. Lamb	--	Showing in sec 30 SW qtr through NDWR GIS data (onsite). Certificate specifies as "unnamed drainage basin through antelope reservoir".
157	Coyote Pond	12692		3521	Certificate	r Surface Water	04S	51EH	5	NE	SE	0.031	Stockwatering		10/14/1948	10/14/1948	8/30/1950	8/30/1950	7/19/2016	0	Nye	PRIV	HELEN FALLINI LIVING TRUST & FALLINI 1983 TRUST	--	Fallini Brothers	--	Entry discovered onsite through GIS data. Permit info states location is in basin 156. Showing in basin 157 in 4S 51.5E sec 5 NE qtr from NDWR GIS data (onsite).
157	Sundown Spring	7448			Permit	Spring	06S	52E	28	NE	SW	0.1	Stockwatering		7/22/1925	7/22/1925	10/10/1928	10/10/1927	4/5/2016	0	Nye	PRIV	CLARK, J.E.	--	--	--	
157	Sundown Reservoir	11606		3259	Certificate	Reservoir	05S	51E	36	SE	NE	0.006	Stockwatering		6/12/1946	6/12/1946	3/9/1949	3/9/1949	4/5/2016	4.541972	Nye	USAF	NELLIS AIR FORCE BASE	--	Carlton P. and Floyd R. Lamb	--	
157	Lambs Pond	11669		3266	Certificate	Lake	05S	51E	24	NE	NE	0.006	Stockwatering		8/19/1946	8/19/1946	3/9/1949	3/9/1949	4/5/2016	4.480594	Nye	USAF	U.S.-AIR FORCE	--	Carlton P. and Floyd R. Lamb	--	
157	Shirley Spring	11607		3260	Certificate	Spring	06S	52E	16	SE	NE	0.006	Stockwatering		6/12/1946	6/12/1946	3/9/1949	3/9/1949	4/5/2016	4.541972	Nye	USAF	NELLIS AIR FORCE BASE	--	Carlton P. and Floyd R. Lamb	--	Showing in sec 13 SW qtr from NDWR GIS data (onsite).
157	Pony Spring	11668		3265	Certificate	Spring	05S	52E	26	NW	SW	0.006	Stockwatering		8/19/1946	8/19/1946	3/9/1949	3/9/1949	4/5/2016	4.480594	Nye	USAF	U.S.-AIR FORCE	--	Carlton P. and Floyd R. Lamb	--	Showing in 5S 53E sec 30 NE qtr from NDWR GIS data (onsite).
157	Indian Spring	11608		3261	Certificate	Spring	06S	52E	11	NW	SW	0.006	Stockwatering		6/12/1946	6/12/1946	3/9/1949	3/9/1949	4/5/2016	4.541972	Nye	USAF	NELLIS AIR FORCE BASE	--	Carlton P. and Floyd R. Lamb	--	Showing in 6S 53E sec 07 NE qtr from NDWR GIS data (onsite).
157	Indian Springs	2359		208	Certificate	Spring	06S	52E	11	NW	NW	0.003	Stockwatering		2/28/1912	2/28/1912	6/1/1914	8/2/1912	4/5/2016	2.823388	Nye	USAF	U.S.-AIR FORCE	--	Kawich Cattle Association	--	Showing in 6S 53E sec 08 NW qtr from NDWR GIS data (onsite).
157	Cliff Springs	2357		350	Certificate	Spring	05S	52E	14			0.01	Stockwatering		2/28/1912	2/28/1912	10/26/1916	8/2/1912	4/5/2016	7.242604	Nye	USAF	U.S.-AIR FORCE	--	Kawich Cattle Association	--	Showing in 5S 53E sec 17 NE qtr from NDWR GIS data (onsite).
157	Cliff Springs	11605		3258	Certificate	Spring	05S	52E	14	NE	NW	0.006	Stockwatering		6/12/1946	6/12/1946	3/9/1949	3/9/1949	4/5/2016	4.480594	Nye	USAF	U.S.-DEFENSE DEPARTMENT	--	Carlton P. and Floyd R. Lamb	--	Showing in 5S 53E sec 17 NE qtr from NDWR GIS data (onsite).
157	Unnamed Spring	55322	11605	14606	Certificate	Spring	05S	53E	17	NE	NW	0.006	Wildlife		9/25/1990	6/12/1946	8/3/1995	6/21/1993	4/5/2016	4.480594	Nye	USAF	U.S.-AIR FORCE	--	--	--	Map notes source as "Cliff Spring 1".
157	Unnamed Spring	55321		14605	Certificate	Spring	05S	53E	8	SW	SW	0.012	Wildlife		9/25/1990	9/25/1990	8/3/1995	6/3/1993	4/5/2016	8.961188	Nye	USAF	U.S.-AIR FORCE	--	--	--	Appears to be in SE qtr from NDWR GIS data. Application, certificate and map states SE corner (onsite). Map notes source as "Cliff Spring 2".
161	Quartz Spring	11642		3371	Certificate	Spring	11S	57E	20	NW	SE	0.001	Wildlife		7/26/1946	7/26/1946	8/10/1949	8/31/1948	4/7/2016	0.429646	Lincoln	OFED	USFWS	--	--	--	Showing in sec 17 SE qtr from NDWR GIS data (onsite).
161	Tim Spring	13521		3787	Certificate	Spring	13S	57E	4	SW	NE	0.001	Stockwatering		10/16/1950	10/16/1950	1/28/1952	1/15/1952	4/7/2016	0.398957	Clark	OFED	USFWS	--	--	--	Showing in sec 05 NE qtr from NDWR GIS data (onsite).
168	Sand Spring	13520		3786	Certificate	Spring	13S	57E	15	NW	NE	0.001	Stockwatering		10/16/1950	10/16/1950	1/28/1952	1/15/1952	4/6/2016	0.030689	Clark	OFED	USFWS	--	--	--	Showing in basin 161 and sec 17 NE qtr from NDWR GIS data (onsite).
168	Indian Canyon	12631		3535	Certificate	Spring	12S	57E	2	NW	NE	0.01	Wildlife		9/13/1948	9/13/1948	6/16/1950	6/16/1950	4/6/2016	7.242604	Lincoln	OFED	USFWS	--	--	--	
168	Shale Cut Spring	3253		2620	Certificate	Spring	13S	59E	2	SW	NE	0.003	Stockwatering		1/26/1915	1/26/1915	10/14/1918	5/4/1916	7/18/2016	2.240297	Clark	OFED	USFWS	--	J.L. Sharp	--	Certificate and map states section 01; however, section 1 does not exist within this township and range.
168	White Rock Spring	3254		2621	Certificate	Spring	13S	59E	13	SE	NW	0.003	Stockwatering		1/26/1915	1/26/1915	10/14/1918	5/14/1916	4/6/2016	2.240297	Clark	USAF	NELLIS AIR FORCE BASE	--	J.L. Sharp	--	Section 13 in this township and range doesn't exist. GIS shapefile not found; No results found on NDWR GIS Map 01/19/17. Certificate and map states section 12, which also does not exist within this township and range.
170	Horse Spring	12044		3454	Certificate	Spring	05S	52E	1	NE	NE	0.007	Stockwatering		10/14/1947	10/14/1947	1/30/1950	1/30/1950	7/18/2016	5.247819	Nye	OFED	UNITED STATES OF AMERICA	--	Carlton P. and Floyd R. Lamb	--	The excel TRS and GIS point are located in basin 157. NDWR permit summary page also states that the POD is in basin 157.
170	Chalk Spring	3889		688	Certificate	Spring	05S	54E	5	SE	SW	0.003	Stockwatering		4/12/1916	4/12/1916	4/29/1919	5/24/1918	4/7/2016	2.26	Nye	USAF	NELLIS AIR FORCE BASE	--	Clay Spring Cattle Company	--	Showing in sec 02 SW qtr from NDWR GIS data (onsite). Application states sec 09 SW qtr (onsite); but certificate states sec 05 SE qtr (onsite).
170	Beck Spring	3888		689	Certificate	Spring	05S	54E	2	NE	NE	0.001	Stockwatering		4/12/1916	4/12/1916	4/29/1919	5/24/1918	7/18/2016	1.104804	Nye	USAF	NELLIS AIR FORCE BASE	--	Clay Spring Cattle Company	--	GIS shapefile not found; No results found on NDWR GIS Map 01/19/17. Application states SW qtr (onsite); but certificate has NE qtr.
228	Bryan Spring	10664		2947	Certificate	Spring	11S	49E	18	NE	NW	0.003	Stockwatering		5/19/1941	5/19/1941	5/18/1946	3/9/1945	7/16/2016	2.178919	Nye	PRIV	BRIAN L. GREENSPUN SEPARATE PROPERTY TRUST (25% UDI)	--	V.E. Greenwald	--	The excel TRS is located onsite. Showing at 11S 47E sec 18 NE qtr (offsite) through NDWR GIS data. Application, certificate and map state 11S 47E sec 18 NE qtr (offsite).
228	Pillar Spring	13283		4664	Certificate	Spring	08S	47E	10	NE	NE	0.011	Stockwatering		3/6/1950	3/6/1950	8/23/1957	8/23/1957	4/7/2016	7.856384	Nye	PRIV	COLVIN CATTLE CO.	--	James M. Daniels	--	
158A	Wiregrass Spring	3743		376	Certificate	Spring	08S	53E	7	NW	SE	0.025	Stockwatering		12/20/1915	12/20/1915	12/28/1917	3/3/1917	4/6/2016	18.075821	Nye	OFED	UNITED STATES OF AMERICA	--	R.E. Bower	--	Showing in sec 10 NW qtr from NDWR GIS data (onsite). The map shows the spring in sec 18 of 08S 53E (offsite). Ownership remarks state that the POD is in the NE NE 18-08S-53E - section 18 is offsite.
158A	Johnie's Water	3746		334	Certificate	Spring	06S	52E	12	SE	SE	0.025	Stockwatering		12/20/1915	12/20/1915	2/26/1917	7/22/1916	4/6/2016	0	Nye	PRIV	WATKINS, SAM	--	R.E. Bower	--	The excel TRS is located in basin 157 (onsite). Showing in basin 158A and 06S 53E sec 08 SE qtr from NDWR GIS data (onsite).
158A	Wildcat Spring	3887		690	Certificate	Spring	05S	53E	31	SW	SE	0.003	Stockwatering		4/12/1916	4/12/1916	4/29/1919	5/24/1918	4/6/2016	0.30689	Lincoln	USAF	NELLIS AIR FORCE BASE	--	Clay Springs Cattle Company	--	The excel TRS is located in basin 157 (onsite). Showing in basin 158A and sec 34 NW qtr from NDWR GIS data (onsite). Application states 8S 53E sec 17 NW qtr (offsite); certificate matches the excel TRS.
158A	Naquinta Spring	V01378			Vested	Spring	05S	55EH	29	SW	NE	0.2	Stockwatering		4/27/1915	01/01/1899	--	--	4/6/2016	0	Lincoln	USAF	U.S.-AIR FORCE	--	W.T. Jr. and Sr. Stewart	--	Application map states 05S 55E section 26 NW qtr (onsite). Map notes 5S 55E (entirety of this township and range are onsite).
169A	Crescent Valley Reservoir #2	4730		897	Certificate	Reservoir	08S	58E	15	SW	NE	0.007	Stockwatering		11/21/1917	11/21/1917	9/28/1921	10/17/1919	4/7/2016	5.002307	Lincoln	OFED	UNITED STATES OF AMERICA	--	J.L. and L.H. Sharp, W.F. Thorne	--	Ownership and Title permit remarks state that the source is crescent valley reservoir no. 2 and summit spring drainage.
169A	Rosebud Spring	V01377			Vested	Spring	05S	55E	2	NE	NE	0.1	Stockwatering		4/24/1915	1/1/1900	--	--	7/18/2016	1.319627	Lincoln	PRIV	D/4 ENTERPRISES INC.	--	W.T. Stewart Jr. and Sr.	--	The excel TRS is located onsite in basin 170. Showing in basin 169A in 5S 55.5E sec 05 NE qtr (offsite) from NDWR GIS data. NDWR permit summary page states POD is located within basin 170.
169A	Old Tikapoo Spring	V01374			Vested	Spring	05S	55E	1	SW	SE	0.05	Stockwatering		4/24/1915	01/01/1897	--	--	7/18/2016	2.26	Lincoln	PRIV	D/4 ENTERPRISES	--	W.T. Stewart Jr. and Sr.	--	The excel TRS is located onsite in basin 170. Showing in basin 169A in 5S 55.5E sec 04 SW qtr (offsite) from NDWR GIS data. NDWR permit summary page states the POD is located within basin 170.
169A	Sharp Spring	V01381			Vested	Spring	05S	55E	12	NW	SE	0.05	Stockwatering		4/24/1915	01/01/1898	--	--	7/18/2016	0.45	Lincoln	PRIV	D/4 ENTERPRISES, INC.	--	W.T. Stewart Jr. and Sr.	--	The excel TRS is located in basin 158A or 170. Showing in basin 169A and 5S 55.5E sec 04 SE qtr (offsite) from NDWR GIS data. The NDWR permit summary page states the POD is located within basin 158A.

Basin	Source Description	Application	Change Application	Cert	Status	Source	POD Township	POD Range	POD Section	POD Quarter	POD Quarter Quarter	Diversion Rate (CFS)	Type of Use	Sup	File Date	Priority Date	Date of PBU	Date of POC	Appx Date of Download	Annual Duty (AFA)	County	Owner Code	Owner of Record	Previous Permit Number	Previous Permit Owner	Well Log	Notes
169A	New Tickapoo Spring	V01382			Vested	Spring	05S	55E	12	SE	NW	0.05	Stockwatering		4/24/1915	12/31/1998	--	--	7/18/2016	0.45	Lincoln	PRIV	D/4 ENTERPRISES, INC.	--	W.T. Stewart Jr. and Sr.	--	The excel TRS is located onsite in basin 158A. Showing in 5S 55.5E sec 04 SE qtr (offsite) from NDWR GIS data. NDWR permit summary page states the POD is located within basin 158A.
169A	April Fool Spring	V01380			Vested	Spring	05S	55E	12	NE	NW	0.05	Stockwatering		4/27/1915	12/31/1898	--	--	7/18/2016	0.34	Lincoln	PRIV	D/4 ENTERPRISES, INC.	--	W.T. Stewart Jr. and Sr.	--	The excel TRS is located onsite in basin 158A or 170. Showing in basin 169A in 5S 55.5E sec 04 SE qtr (offsite) from NDWR GIS data. The NDWR permit summary page states the POD is located within basin 158A.
169A	Lick Spring	V01534			Vested	Spring	05S	56E	30	NE	NW	0.05	Stockwatering		1/3/1918	12/31/1897	--	--	4/7/2016	0.51	Lincoln	PRIV	D/4 ENTERPRICES INC.	--	W.T. Stewart Jr.	--	Showing in 6S 56E sec 06 NE qtr from NDWR GIS data (out of scope). Application states SW corner (onsite).
169A	Rabbit Spring	V01536			Vested	Spring	05S	56E	30	NE	SW	0.05	Stockwatering		11/22/1917	03/01/1897	--	--	4/7/2016	0.47	Lincoln	PRIV	D/4 ENTERPRISES, INC.	--	W.T. Stewart	--	Showing in 6S 56E sec 06 NE qtr from NDWR GIS data (out of scope). Application states location as 05S 56E sec 30 SW corner (onsite).
169A	Savio Spring	V01371			Vested	Spring	05S	56E	32	NW		0.1	Stockwatering		4/27/1915	01/01/1897	--	--	4/7/2016	2.26	Lincoln	PRIV	D/4 ENTERPRISES	--	W.T. Stewart Jr. and Sr.	--	Entry discovered onsite through GIS data. Original excel file states in 05S 56E sec 05 SW qtr (offsite).
169A	Alum Spring	V01533			Vested	Spring	05S	56E	34	NE	SE	0.05	Stockwatering		1/3/1918	12/31/1897	--	--	4/7/2016	0.51	Lincoln	PRIV	D/4 ENTERPRISES, INC.	--	W.T. Stewart Jr.	--	Showing in 6S 56E sec 11 NW qtr from NDWR GIS data (out of scope). Application states NW corner of sec 31 of 05S 56E (onsite).
169B	Sheep Spring	11643		3372	Certificate	Spring	12S	61E	22	NE	SW	0.001	Wildlife		7/26/1946	7/26/1946	8/10/1949	8/31/1948	4/7/2016	0.736536	Lincoln	OFED	USFWS	--	--	--	The excel TRS and GIS point are located in the Alamo expansion area. Showing in sec 23 NW qtr and offsite through NDWR GIS data. Application states NE corner sec 22 of 12S 61E (onsite).
169B	Sheep Mtn Dry Lake	10463		2778	Certificate	Lake	11S	61E	7	NW	NW	0.006	Stockwatering		1/4/1940	1/4/1940	2/11/1944	3/15/1943	4/7/2016	2.21	Lincoln	PRIV	LAMB, FLOYD R	--	Higbee, Sharp, Stewart	--	The excel TRS and GIS point are located within the Alamo expansion area.
169B	Sheep Mtn Dry Channels	10814		2839	Certificate	Surface Water	11S	61E	28	SW	NW	0.00899999	Stockwatering		4/20/1942	4/20/1942	12/6/1944	12/6/1944	4/7/2016	6.720891	Lincoln	PRIV	LAMB, FLOYD R.	--	Ernie Higbee, Lawrence Sharp, Paul Stewart	--	The excel TRS and GIS point are located within the Alamo expansion area.
173A	Georges Water (Tunnel)	57383	46196	18099	Certificate	Spring	01S	50E	14	NE	NW	0.031	Stockwatering		4/2/1992	5/29/1947	2/14/2011	2/27/2008	7/18/2016	22.4	Nye	PRIV	FALLINI 1983 TRUST	--	Joe B., Helen L., Susan L. Fallini	--	
173A	Georges Water Spring	V09633			Vested	Spring	01S	50E	14	NE	NE	0	Stockwatering		1/30/2007	01/01/1870	--	--	4/7/2016	0	Nye	PRIV	FALLINI 1983 TRUST	--	--	--	Application also states sec 05 (onsite).
173A	Summer Spring	13541	5662	3659	Certificate	Spring	02S	51E	16	NW	NW	0.02	Stockwatering		11/16/1950	8/9/1919	5/4/1951	5/4/1951	4/7/2016	14.485208	Nye	PRIV	HELEN FALLINI LIVING TRUST & FALLINI 1983 TRUST	5662	E.W., Joe B., R.A. Fallini	--	Showing in sec 17 NE qtr from NDWR GIS data (onsite).
173A	Sumner Spring	V09634			Vested	Spring	02S	51E	16	NW	NW	0	Stockwatering		1/30/2007	01/01/1870	--	--	4/7/2016	0	Nye	PRIV	FALLINI 1983 TRUST	--	--	--	Showing in sec 17 NE qtr from NDWR GIS data (onsite).
173A	Cedar Spring	13542	4639	3660	Certificate	Spring	02S	51E	22	SW	NW	0.025	Stockwatering		11/16/1950	10/15/1917	5/4/1954	5/4/1951	4/7/2016	18.075821	Nye	PRIV	HELEN FALLINI LIVING TRUST & FALLINI 1983 TRUST	4639	Fallini Brothers	--	
173A	Cedar Spring	26501		8133	Certificate	Spring	02S	51E	22	SW	NW	0.013	Stockwatering		1/24/1972	1/24/1972	6/5/1973	6/5/1973	4/7/2016	9.667035	Nye	PRIV	HELEN FALLINI LIVING TRUST & FALLINI 1983 TRUST	--	Helen, Joe B., Joe B. Jr. Fallini	--	
173A	Cedar Spring	V09635			Vested	Spring	02S	51E	22	SW	NW	0	Stockwatering		1/30/2007	01/01/1870	--	--	4/7/2016	0	Nye	PRIV	FALLINI 1983 TRUST	--	--	--	

Key:

Gray Highlighting	Entries that do not have a corresponding GIS data point
Yellow Highlighting	New entries that were not found from TRS verification of the NDWR Excel Files by basin.

Notes:
Some applications have incomplete information. Information compiled into this table is derived from publicly available information through the Nevada Division of Water Resources (NDWR). Only TRS information from the point of diversion was verified from applications and certificates. Distance and bearing, geographic coordinates or other listed location measurements were not verified.

NDWR Research
Issues Log
Well Logs

Basin	Basin Name	Log No.	Co	Well Name	TWN	RNG	SEC	QTR SEC	Owner Code	Owner	Date Cmplt	Appx Date of Download	Drillers Lic No.	Total Depth	Static Water Level	Casing Diameter	APN	Work type	Proposed Use	Permit/ Waiver	Issues
141	Ralston Valley	7684	ES		S01	E45	2		PRIV	ARCULARIUS, FRANK	12/29/1963	5/5/2016	382	247	0	6		N	S	30196	Appears to be NW qtr through NDWR GIS data (onsite).
144	Lida Valley	8027	ES	Salisbury Park Wash Well	S03	E46	10	NE SW	PRIV	STATE OF NEVADA HIGHWAY DEPARTMENT	10/2/1963	7/13/2016		99	40	0		N	P	21657	The excel TRS and GIS point are located in basin 145 (onsite).
145	Stonewall Flat	33183	NY		S04	E47	8	NW SW	PRIV	STONE CABIN PARTNERSHIP	2/10/1990	4/8/2016	1375	224	2	16		N	I	50738	
146	Sarcobatus Flat	18899	NY		S07	E46	36		USAF	NELLIS AFB	8/30/1978	5/24/2016	1048	2005	0	9		N	X		
146	Sarcobatus Flat	64754	NY		S07	E46	25	NW NW	OFED	DESERT RESEARCH INSTITUTE	6/5/1984	5/24/2016	856	1023	677	14		N	P	48429	
147	Gold Flat	250	NY	Gold Flat Well #2	S06	E48	9	SW SE	PRIV	HIP O RANCH	6/6/1947	4/8/2016	24	290	230	5.75		N	S		
147	Gold Flat	1117	NY	Gold Flat Well #1	S06	E49	2		PRIV	LEASEY, JOHN	11/7/1949	4/8/2016	24	400	250	6		N	S		Appears to be in NE qtr from NDWR GIS info (onsite).
147	Gold Flat	1280	NY		S06	E49	2		PRIV	DANIELS, JIM	4/30/1950	4/8/2016		530	415	8		N	S		Appears to be in NE qtr from NDWR GIS info (onsite).
147	Gold Flat	2994	NY		S06	E48			PRIV	STEWART, WILSON	6/1/1955	4/8/2016		225	0	0		N	S		Showing in section 01 NE qtr from NDWR GIS info (onsite).
147	Gold Flat	36310	NY		S02	E49	1	NW NE	USAF	U S GOVERNMENT	7/2/1990	4/8/2016	856	1222	818	10		D	X		Showing in 1S 49E sec 36 SE Qtr from NDWR GIS info (onsite).
147	Gold Flat	50651	NY	Well #2	S05	E50	13	NE	PRIV	FALLINI, JOE	5/14/1995	4/8/2016	1734	410	76	30	09-071-02	N	I	59707	Entry discovered onsite through GIS data. Excel file states N05 E50 Sec 13 SW NE qtr (offsite). The Nye county assessors website states the excel sheet provided APN is located at N05 E50 Sec 12, 13&24 (offsite).
147	Gold Flat	50652	NY	Well #1	S05	E50	12	SW	PRIV	FALLINI, JOE	5/5/1995	4/8/2016	1734	410	76	20	09-071-02	N	I	59706	Entry discovered onsite through GIS data. Excel file states N05 E50 Sec 13 NW NE qtr (offsite). The Nye county assessors website states the excel sheet provided APN is located at N05 E50 Sec 12, 13&24 (offsite).
147	Gold Flat	73188	NY		S06	E48	9	SW SE	USAF	NELLIS AFB	10/5/1998	9/9/2016	1923	410	242	6		N	P	64237	Well log states basin 143 (offsite).
147	Gold Flat	81586	NY		S06	E48	9	SW SE	USAF	U S AIR FORCE	10/10/2000	4/8/2016	2163	410	0	6		P	U		
147	Gold Flat	104626	NY	Well 53	S04	E50	30	NW NW	USAF	U S AIR FORCE	12/14/2007	4/8/2016	2039	800	464	10.75		N	X		
147	Gold Flat	113419	NY		S02	E49	22	NW SE	USAF	U S AIR FORCE	1/5/2011	4/8/2016	1426	900	586	8.62		S	P	62503	Appears to be in NE qtr from NDWR GIS info (onsite).
147	Gold Flat	113420	NY		S02	E49	22	NW SE	USAF	U S AIR FORCE	1/5/2011	4/8/2016	1426	850	586	8.62		P	P	62503	Appears to be in NE qtr from NDWR GIS info (onsite).
148	Cactus Flat	1912	NY	Casey Well	S01	E48	28		PRIV	CASEY, JOHN J	4/17/1952	4/8/2016	24	418	365	6		N	S		Appears to be in NW qtr from NDWR GIS info (onsite).
148	Cactus Flat	18974	NY		S02	E49	22	SW NE	USAF	U S AIR FORCE	7/13/1978	4/8/2016		854	584	8		N	P		The excel TRS and GIS point are located in basin 147 (onsite).
148	Cactus Flat	25266	NY		S02	E47	7	NW NW	USAF	U S AIR FORCE	3/5/1984	4/8/2016	675	800	584	12		N	X		
149	Stone Cabin Valley	32284	NY		S01	E46	2	NW NE	OFED	U S DEPARTMENT OF ENERGY	9/1/1989	7/13/2016	1469	650	300	13.38		N	P	53885	Appears to be in NW qtr from NDWR GIS info (onsite).
149	Stone Cabin Valley	32808	NY	TTR-03B	S01	E46	13	NW SE	USAF	U S AIR FORCE	1/11/1985	7/13/2016	856	300	111	20		N	X		
149	Stone Cabin Valley	46118	NY		S01	E46	24	NW NW	PRIV	GREENRIDGE WATER CO	7/5/1994	5/5/2016	1108	200	102	6		N	H	MO-2054	The original well log was not available for review through NDWR.
149	Stone Cabin Valley	65353	NY	Well #1	S03	E48	4		PRIV	RASMUSSEN, LAVON	3/9/1966	7/13/2016	464	421	0	16		N	I	22622	The excel TRS and GIS point are located in basin 148 (onsite). Appears to be in NW qtr from NDWR GIS data (onsite). Typing on original well log is smeared and difficult to read.
149	Stone Cabin Valley	65354	NY	Well #2	S03	E48	8		PRIV	RASMUSSEN, CARROLL	3/13/1966	7/13/2016	490	422	0	14		N	I	22621	The excel TRS and GIS point are located in basin 148 (onsite). Appears to be in SW qtr from NDWR GIS data (onsite). Typing on original well log is smeared and difficult to read.
149	Stone Cabin Valley	65355	NY		S03	E48	9		PRIV	STIKELMAN, JOHN	3/20/1966	7/13/2016	464	359	0	16		N	I	22620	The excel TRS and GIS point are located in basin 148 (onsite). Appears to be in SW qtr from NDWR GIS data (onsite). Typing on original well log is smeared and difficult to read.
149	Stone Cabin Valley	126391	NY	TTR EH-07	S01	E46	2	NW NE	OFED	U S DEPARTMENT OF ENERGY	2/23/2016	1/17/2017	2485	600	105	10.75		N	P	53885	Not found on NDWR mapping tool. Coordinates were taken from previous, associated well log 32284. Township, section, and range were the same across original logs and details page on NDWR website.
149	Stone Cabin Valley	126392	NY		S01	E46	2	NW NE	OFED	U S DEPARTMENT OF ENERGY	2/23/2016	1/17/2017	2485	660	125	13.38		P	P	53885	Not found on NDWR mapping tool. Coordinates were taken from previous, associated well log 32284. Township, section, and range were the same across original logs and details page on NDWR website.
157	Kawich Valley	17674	NY		S04	E51	13	SW NE	PRIV	FALLINI, JOE	2/2/1978	4/8/2016	904	403	0	6		N	I		
157	Kawich Valley	61855	NY		S05	E51	7		OFED	HOLMES	5/4/1969	4/8/2016	476	502	70	7		N	N		The excel TRS and GIS point are located in basin 147 (onsite). Appears to be in NE qtr from NDWR GIS info. Original well log states owner as "Holmes & Narver" with the location as the central Nevada Test Site (offsite) at the main gate for "water for camp".
160	Frenchman Flat	76780	NY	WW-01	S13	E54	22		OFED	U S ARMY	12/17/1950	9/12/2016	45	870	714	8		N	U		Showing in sec 26 NW qtr through NDWR GIS data (onsite). Well construction exhibit "Mercury, near Indian Springs, Nevada, Log of Well No. 1" submitted as the well log.
160	Frenchman Flat	79419	NY	ER-5-3	S12	E55	19	SE	OFED	U S DEPARTMENT OF ENERGY	3/16/2000	7/13/2016	2125	2606	927	13.38		N	G	R-1024S	Entry discovered onsite through GIS data. NDWR excel file states S12 E54 Sec 22 SE SE qtr (offsite). Well location stated as Area 5 Nevada Test Site (offsite). A Bechtel Nevada memo is included and references contract no. DE-AC08-96NV11718.
160	Frenchman Flat	82029	NY	ER-5-3 #2	S12	E55	19	SE	OFED	U S DEPARTMENT OF ENERGY	5/19/2000	7/13/2016	2127	5683	927	30		N	G	R-1024B	Entry discovered onsite through GIS data. NDWR excel file states S12 E54 Sec 22 SE SE qtr (offsite). Well location stated as Area 5 Nevada Test Site (offsite).
160	Frenchman Flat	82840	NY	ER-5-3 #3	S12	E55	19	SE	OFED	U S DEPARTMENT OF ENERGY	2/5/2001	7/13/2016	2127	1800	927	2.88		N	G		Entry discovered onsite through GIS data. NDWR excel file states S12 E54 Sec 22 SE SE qtr (offsite). Well location stated as Area 5 Nevada Test Site (offsite). A Bechtel Nevada memo is included and references contract no. DE-AC08-96NV11718.
160	Frenchman Flat	88009	NY	ER-7-1	S10	E54	11	SW	OFED	NATIONAL NUCLEAR SECURITY ADMINISTRATION	2/10/2003	4/8/2016	2127	2500	1854	7.62		N	G	R-1024C	Entry discovered onsite within the 6465 Acquisition area through GIS data. NDWR excel file states within basin 158B and in S10 E54 sec 17 NE NW qtr (offsite). Original well log states well location is at Nevada Test Site (offsite).
160	Frenchman Flat	115603	NY	ER-11-2	S12	E55	18	SE	OFED	NATIONAL NUCLEAR SECURITY ADMINISTRATION	8/23/2012	7/13/2016	2125	1311	0	2.88		N	G		Entry discovered onsite through GIS data. NDWR excel file states S12 E54 Sec 15 SE SE qtr (offsite). Well location stated as Nevada National Security Site, Area 11 (offsite). A National Security Technologies memo is included with reference number H300-KO-12-0007.
160	Frenchman Flat	115604	NY	ER-5-5	S12	E54	26	NE NW	OFED	NATIONAL NUCLEAR SECURITY ADMINISTRATION	8/12/2012	7/13/2016	2125	1088	930	6.63		N	G		The excel TRS is located within the 6465 Acquisition area. Showing in 12S 55E sec 29 SW qtr through NDWR GIS data (which is onsite but not on the expansion area). Original well log states location as Nevada National Security Site, Area 5 (offsite).
161	Indian Springs Valley	6652	CL		S16	E56	5		PRIV	CLARK COUNTY SCHOOL DISTRICT	5/30/1962	4/8/2016	45	225	55	18		N	P	29616	Appears to be in SW qtr through NDWR GIS data (onsite). Original well log states NE NE corner (onsite).
161	Indian Springs Valley	8254	CL		S16	E56	8		PRIV	STATE OF NEVADA HIGHWAY DEPARTMENT	3/20/1963	4/8/2016	117	200	23	8.62		N	U	21287	Showing in sec 01 SW qtr and basin 211 though NDWR GIS data (onsite). The original well log specifies "south 600 feet east of 350 feet of tract 47A T16S R56E", which is offsite.
161	Indian Springs Valley	8582	CL		S16	E56	9	NE NE	PRIV	SPROUL	6/18/1965	4/11/2016	279	370	38	16.25		N	C	21089	Original well log specifies tract 46 (offsite), which is not within the NE quarter (that is partially onsite).
161	Indian Springs Valley	11127	CL		S13	E56	6	SE NE	PRIV	STATE OF NEVADA HIGHWAY DEPARTMENT	7/22/1970	4/8/2016	554	370	130	8		N	H		Showing in basin 160 and 13S 55.5E sec 01 SW qtr through NDWR GIS data (onsite).
161	Indian Springs Valley	15347	CL		S16	E56	1		PRIV	SMITH, SUSIE	7/14/1975	4/8/2016	45	150	46	12		N	P	29578	The excel TRS and GIS point are located in basin 211 (onsite). Original well log also includes Oasis Trailer Park as owner. Parcel number listed as 059-08-610-123 on log; however, this APN could not be located.
161	Indian Springs Valley	17420	CL		S16	E56	1		PRIV	PRESLEY, RICHARD	5/4/1977	4/8/2016	552	145	67	8.62		N	I	31126	Showing in basin 211 and SE qtr through NDWR GIS data (onsite). Location specified as tract 47B on the original well log, which is located offsite in section 08.
161	Indian Springs Valley	22174	CL		S16	E56	9		PRIV	GLOVER, ELMER & BETTY	3/29/1979	4/8/2016	45	150	33	12		N	C	38283	Showing onsite in basin 211 and sec 01 through NDWR GIS data. Original well log states tract 45 (offsite), lot 83 of Indian Springs Pecan Grove subdivision.
161	Indian Springs Valley	24116	CL		S16	E56	8	SE SE	PRIV	INDIAN SPRINGS SEWAGE CO	6/17/1982	4/8/2016	623	400	39	10.5		N	P	38859	Excel TRS is offsite. However, GIS point is showing in section 01 and basin 211 (onsite). Original well log states tract 47B located in SE qtr of sec 8 (offsite).
161	Indian Springs Valley	24379	CL		S16	E56	8	SE SE	PRIV	INDIAN SPRINGS SEWAGE CO	11/7/1982	4/8/2016	623		0	0		R	P	38859	Excel TRS is offsite. However, GIS point is showing in section 01 and basin 211 (onsite).
161	Indian Springs Valley	26773	CL		S16	E56	0		PRIV	HOUPT, CLIFF	3/8/1985	4/8/2016	1426	190	44	8		N	H		The excel township and range is only partially onsite. GIS point is showing onsite in basin 211 and sec 01. Original well log states tract 48A; East 2/7 of West 7/8 of South 1/2 of North 2/5 of tract. Tract 48A is offsite.
161	Indian Springs Valley	26774	CL		S16	E56	0		PRIV	FISHER JR, JAMES	2/13/1985	4/8/2016	1426	162	11	8		N	H		Excel township and range only partially onsite. GIS point is showing onsite in basin 211 and sec 01. Original well log specifies tract 48C (offsite) and parcel 1196780 #2 (could not locate this parcel number).
161	Indian Springs Valley	26775	CL		S16	E56	5	SW	USAF	U S AIR FORCE	1/11/1985	4/8/2016	675	600	71	10		N	P	51573	Appears to be in SE qtr through NDWR GIS data (onsite). Original well log states tract 40. Tracts 40A through 40D are onsite.
161	Indian Springs Valley	31041	CL		S16	E56	0		PRIV	YOUNG, TOMMY	10/11/1988	4/8/2016	1559	240	20	8.62		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log states tract 48B and "plot #2" as the parcel number. Tract 48B is offsite.
161	Indian Springs Valley	41157	CL		S13	E56	15		PRIV	DUNN, RICHARD & KIM	3/19/1993	9/12/2016	1573	130	50	8.62	580-280-079	N	H		Entry discovered onsite through GIS data. NDWR website search states it is within basin 163 and in S24 E56 sec 36 SE NE qtr (offsite). Original well log notes well is located at Kolo Street in Sandy Valley, NV (offsite). Parcel number on the well log is listed as 580-280-079-93, but could not locate this APN or the excel sheet provided APN.
161	Indian Springs Valley	41220	CL	MW-098	S16	E56	4	SW SW	USAF	NELLIS AFB	3/3/1993	4/8/2016	1747	61	39	2.5		N	G	MO-2231	
161	Indian Springs Valley	41221	CL	MW-099	S16	E56	4	SW SW	USAF	NELLIS AFB	3/1/1993	4/8/2016	1747	61	39	2.5		N	G	MO-2231	
161	Indian Springs Valley	41222	CL	MW-100	S16	E56	4	SW SW	USAF	NELLIS AFB	3/3/1993	4/8/2016	1747	63	41	2.5		N	G	MO-2231	
161	Indian Springs Valley	41223	CL	MW-097	S16	E56	9	NE NE	USAF	NELLIS AFB	2/22/1993	4/11/2016	1747	51	39	2.5		N	G	MO-2231	
161	Indian Springs Valley	50746	CL		S16	E56	0	SE	PRIV	BROADBENT & ASSOCIATES	10/4/1995	4/8/2016	1869	50	0	2.38		N	G	MO-2629	Located on sec 5 according to NDWR GIS data (onsite). Original well log states owner as "Broadbent & Assoc./NDOT Indian Springs". The address of the well location is 154 Greta Lane, Indian Springs, NV. The address was likely mispelled from "Gretta Lane", which is located offsite.

Basin	Basin Name	Log No.	Co	Well Name	TWN	RNG	SEC	QTR SEC	Owner Code	Owner	Date Cmplt	Appx Date of Download	Drillers Lic No.	Total Depth	Static Water Level	Casing Diameter	APN	Work type	Proposed Use	Permit/ Waiver	Issues
161	Indian Springs Valley	52362	CL		S16	E56	0		PRIV	ALBRIGHT, GAYLEN	4/7/1978	4/8/2016	552	165	18	8.62		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log specifies tract 48B lot 1. Tract 48B is offsite.
161	Indian Springs Valley	52363	CL		S16	E56	0		PRIV	ANDREGGS, PHIL	9/5/1969	4/8/2016		158	93	8		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log specifies 48A lot 29. Tract 48A is offsite.
161	Indian Springs Valley	52364	CL		S16	E56	0		PRIV	BAKER	5/21/1956	4/8/2016	40	100	50	8		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite).
161	Indian Springs Valley	52365	CL		S16	E56	0		PRIV	VANBEBBER, CLYDE	6/8/1981	4/8/2016	721	150	25	12.25		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite).
161	Indian Springs Valley	52367	CL		S16	E56	0		PRIV	BRADY, WILLIAM J	11/18/1958	4/8/2016	45	100	61	8		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite).
161	Indian Springs Valley	52368	CL		S16	E56	9		PRIV	CAMBERM, SCOTT	9/5/1969	4/11/2016	552	160	25	8		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log specifies track 48A plot 2, which is located offsite in section 9.
161	Indian Springs Valley	52369	CL		S16	E56	0		PRIV	CASSITY	2/22/1960	4/8/2016	45	100	16	8		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log specifies the well is located approximately 1/4 mile south of Indian Springs Store on parcel number 059-08-701. APN was unable to be located. The Indian Springs General Store is located offsite.
161	Indian Springs Valley	52370	CL		S16	E56	0		PRIV	CASSITY, ROBERT	11/22/1961	4/8/2016	192	110	57	8.62		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite).
161	Indian Springs Valley	52371	CL		S16	E56	0		PRIV	DOTSON, DWAIN	5/3/1977	4/8/2016	552	120	28	8.62		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log specifies tract 48B (offsite).
161	Indian Springs Valley	52372	CL		S16	E56	0		PRIV	DAVIS, O E	6/10/1967	4/8/2016	70	100	34	0		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log specifies tract 48A (offsite).
161	Indian Springs Valley	52373	CL		S16	E56	0		PRIV	FAIRCHILD, WILLIAM	5/16/1956	4/8/2016	40	102	49	8.62		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log location of well specifies "Indian Springs Ranch (sub-division)", which is offsite.
161	Indian Springs Valley	52374	CL		S16	E56	0		PRIV	FERRARO, NED	11/25/1958	4/8/2016	45	100	47	8		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite).
161	Indian Springs Valley	52375	CL		S16	E56	9	SW	PRIV	HARNEDY, TIM	10/23/1946	4/11/2016	31	200	19	8		N	I	67458	Showing in section 01 from NDWR GIS info (onsite). Original well log states SW corner of tract 45, which is located offsite within section 09.
161	Indian Springs Valley	52376	CL		S16	E56	0		PRIV	HAYES, JAY	2/29/1960	4/8/2016	45	130	53	8		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log states the well is about 1/2 mile south of Indian Springs Store (offsite).
161	Indian Springs Valley	52377	CL		S16	E56	0		PRIV	HOWELL & POOL	3/7/1960	4/8/2016	45	100	35	8		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log states about 1/4 mile south of Indian Springs (offsite).
161	Indian Springs Valley	52378	CL		S16	E56	0		PRIV	HUNTER, FRANK	5/7/1956	4/8/2016	40	112	53	7.62		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log specifies well being located at Indian Springs Ranch (offsite).
161	Indian Springs Valley	52379	CL		S16	E56	0		PRIV	JOHNSON, LEROY	3/11/1960	4/8/2016	45	100	18	8		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log states about 1/4 mile south of Indian Springs (offsite).
161	Indian Springs Valley	52380	CL		S16	E56	0		PRIV	LEWIS, JOHNNIE	12/2/1981	4/8/2016	721	150	20	8.62		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log specifies location as "east 1/7, west 7/8".
161	Indian Springs Valley	52381	CL		S16	E56	0		PRIV	LEWIS, JOHNNIE	11/25/1981	4/8/2016	721	150	50	8.62		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log specifies location as east 1/6, west 6/8.
161	Indian Springs Valley	52382	CL		S16	E56	0		PRIV	LEWIS, JOHNNIE	1/30/1982	4/8/2016	721	150	40	8		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log specifies location as south 1/2, north 3/5 of tract 48A. Tract 48A is offsite within section 09.
161	Indian Springs Valley	52383	CL		S16	E56	0		PRIV	LEWIS, JOHNNIE	8/16/1963	4/8/2016	156	150	45	8.62		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log specifies tract 48 (offsite).
161	Indian Springs Valley	52384	CL		S16	E56	8		PRIV	LEWIS, JOHNNIE	8/30/1963	9/12/2016	70	150	45	8.62		N	C	21666	Showing in basin 211 and sec 01 through NDWR GIS data (offsite). Original well log states well is within government lot 56 and tract 48. Tract 48 is offsite.
161	Indian Springs Valley	52385	CL		S16	E56	0		PRIV	MOE, JACK	6/18/1962	4/8/2016	45	100	35	8		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite).
161	Indian Springs Valley	52386	CL		S16	E56	0		PRIV	ROBINSON, JOE	6/9/1962	4/8/2016	45	100	21	8		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite).
161	Indian Springs Valley	52387	CL		S16	E56	0		PRIV	RUSHING, JERRY	6/13/1966	4/8/2016	70	100	12	8.62		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log specifies lot 48B of tract #2 of Indian Springs Ranch. Lot 48B is offsite.
161	Indian Springs Valley	52388	CL		S16	E56	0		PRIV	SCHENK, VESTA	6/26/1961	4/8/2016	192	100	22	8.62		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite).
161	Indian Springs Valley	52389	CL		S16	E56	8		PRIV	SMITH, CHARLES	2/25/1960	4/8/2016	45	100	20	8		N	C	21666	Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log states the well is about 1/4 mile south of Indian Springs Store (offsite).
161	Indian Springs Valley	52390	CL		S16	E56	0		PRIV	SMITH, H L	11/12/1958	4/8/2016	45	100	28	8		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite).
161	Indian Springs Valley	52391	CL		S16	E56	0		PRIV	SPEARS, A C	5/11/1956	4/8/2016	40	115	48	8		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log location of well specifies "Indian Springs Ranch (sub-division)" (offsite).
161	Indian Springs Valley	52392	CL		S16	E56	0		PRIV	THOMAS, BRAD	4/9/1978	4/8/2016	552	125	11	8.62		N	H		Showing in basin 211 and sec 01 through NDWR GIS data (onsite). Original well log specifies tract 47C (offsite).
161	Indian Springs Valley	52393	CL		S16	E56	0	SE SE	PRIV	WILLIAMS, MIKE	6/30/1981	4/8/2016	721	150	25	12.25		N	H		Showing in basin 211 on the 6465 acquisition and section 12 SE qtr from NDWR GIS data (onsite). Original well log specifies tract 48A (offsite).
161	Indian Springs Valley	52398	CL	Well 02	S16	E56	8	NW	OFED	U S ARMY	9/15/1942	9/12/2016		575	54	0		N	P	51572	Well construction exhibit titled "Indian Springs Auxiliary Land Field, Indian Springs, Nevada Water Supply, Log of Well No. 2" submitted as the well log.
161	Indian Springs Valley	52399	CL		S16	E56	8	SE NW	PRIV	KYKER, R G	9/26/1962	4/11/2016	70	115	45	8.62		N	H		Original well log specifies lot A, tract 47, Indian Springs Ranch Trailer Park. Tract 47 is offsite.
161	Indian Springs Valley	64248	CL		S16	E56	5	SE SW	USAF	U S AIR FORCE	1/16/1997	4/8/2016	2057	75	63	4.25	550-390-001	N	G	MO-2769	Original well log states well location address as Indian Springs Air Force Base off I-95. Unable to locate the excel sheet provided APN.
161	Indian Springs Valley	65269	CL		S16	E56	5	SE SW	USAF	U S AIR FORCE	1/16/1997	4/8/2016	1847	75	62	4.25		N	G	MO-2769	Original well log states well location address as Indian Springs Air Force Base off I-95.
161	Indian Springs Valley	66353	CL		S16	E56	8	NW NE	USAF	U S AIR FORCE	2/17/1993	4/8/2016	1526	76	55.4	4.5		P	G	MO-2239	May be onsite or offsite through NDWR GIS data (GIS point on creech boundary). Original well log states well location address as Indian Springs AFAF Indian Springs, Nevada.
161	Indian Springs Valley	70441	CL		S16	E56	4	NE NE	USAF	NELLIS AFB	1/8/1998	4/8/2016	2057	60	47	4	550-270-002	P	G		Located in the 6465 acquisition expansion area. Unable to locate the excel sheet provided APN. Original well log states well location address as Indian Springs AF Auxiliary Field.
161	Indian Springs Valley	72163	CL		S16	E56		SE	PRIV	BROADBENT & ASSOCIATES	6/16/1998	4/8/2016	1869	50	0	0	560-090-001	P	G	MO-2629	Showing in basin 211 and section 01 and SE qtr from NDWR GIS data (onsite). Unable to locate the excel sheet provided APN. Original well log states well location address as NDOT Indian Springs Maintenance Station at 154 Greta Lane, Indian Springs, NV. The address was likely mispelled from "Gretta Lane", which is offsite. The log further specifies SE 1/4 N1/2 tract 47. Tract 47 is offsite.
161	Indian Springs Valley	83204	CL		S16	E56	5	SE	PRIV	CLARK COUNTY SCHOOL DISTRICT	6/12/2001	4/8/2016	2120	223	57	10.75		P	R	29616/R-1057	Shares onsite GIS point with well log 50746, but attribute/info not present through NDWR GIS data. Original well log notes parcel number 059-08-801-001 with written comment "wrong parcel?". This parcel number is located offsite.
161	Indian Springs Valley	84684	CL		S14	E56	9	SW NE	USAF	NELLIS AFB	6/27/2001	4/8/2016	2162	1530	0	0		N	Z		Showing in sec 7 through NDWR GIS data (onsite). Original well log states address at well location as Nellis AFB Range Complex.
161	Indian Springs Valley	102134	CL		S16	E56	8	NE SW	USAF	U S AIR FORCE	10/6/2006	9/12/2016	2191	800	63	12.75	590-82-201-002	S	P	51572/R-1330	Included through water permit 51572. Sec 8 is partially onsite. Unable to locate the excel spreadsheet APN. NDWR GIS data shows point offsite. Original well log states the well location address as building 106-2a Tract 42B, Creech Air Force Base, Indian Springs NV 89018.
161	Indian Springs Valley	103371	CL	Well 1R	S16	E56	5	SE SE	USAF	U S AIR FORCE	6/15/2007	4/8/2016	2338	1666	40	14.63	059-05-000-006	S	P	51573	GIS point showing in 18S 59E sec 31 NE qtr (offsite). Excel sheet provided APN is onsite. Original well log states well is located on Creech AFB.
161	Indian Springs Valley	103372	CL	Well 1	S16	E56	5	SE SE	USAF	U S AIR FORCE	6/16/2007	4/8/2016	2338	563	41	8	059-05-000-006	P	P	51573	GIS point showing in 18S 59E sec 32 NW qtr (offsite) through NDWR GIS data. Excel sheet provided APN is onsite. Original well log states well is located on Creech AFB. The well logs details page remarks "plugging of log 26775".
161	Indian Springs Valley	108220	CL		S16	E56	3	SW SW	USAF	U S GOVERNMENT	7/2/2007	4/8/2016	2342	482	314	6.62	059-03-000-004	N	G	R-1365	Located in the 6465 acquisition expansion area. Excel sheet provided APN is onsite. Original well log states well is located on Creech AFB.
161	Indian Springs Valley	111318	CL		S16	E56	5	SE SE	USAF	U S AIR FORCE	4/21/2010	4/8/2016	1642	530	71	10		R	P	51573	Showing in sec 8 NW qtr through NDWR GIS data (onsite). The well logs details page remarks "recondition of well drilled under well log 26775".
161	Indian Springs Valley	117196	CL	MW-100	S16	E56	4	SE SE	USAF	U S A	3/27/2013	4/8/2016	2097	62	40	2.5	059-03-000-005	P	G		Located in the 6465 acquisition expansion area. Excel sheet provided APN is onsite. Original well log states well is located within unincorp. County (Creech AFB). Connected to well log 41222.
161	Indian Springs Valley	117197	CL	MW-099	S16	E56	4	SE SE	USAF	U S A	3/27/2013	4/8/2016	2097	60	39	2.5	059-03-000-005	P	G		Located in the 6465 acquisition expansion area. Excel sheet provided APN is onsite. Original well log states well is located within unincorp. County (Creech AFB). Connected to well log 412221.
161	Indian Springs Valley	117198	CL	MW-098	S16	E56	4	SE SE	USAF	U S A	3/27/2013	4/8/2016	2097	60	38	2.5	059-03-000-005	P	G		Located in the 6465 acquisition expansion area. Excel sheet provided APN is onsite. Original well log states well is located within unincorp. County (Creech AFB). Connected to well log 41220.
161	Indian Springs Valley	118830	CL		15S	57E	8		PRIV	GLENDALE GAS MANAGEMENT LLC	9/17/2013	9/12/2016	2477	20	9	4	042-02-501-013	N	G		Entry discovered onsite through GIS data. NDWR website search states it is in within basin 205 and in 15S 66E sec 02 NE NE qtr (offsite). Excel sheet provided APN is offsite.
170	Penoyer Valley (Sandy Spring Valley)	25369	NY		S03	E53	35	NW NW	PRIV	FALLINI, JOE	4/26/1984	7/13/2016	1333	300	180	8		S	S	11049	Original well log states well is within basin 173A.
170	Penoyer Valley (Sandy Spring Valley)	88272	NY		S04	E53	3	SE	PRIV	TWIN SPRINGS RANCH	10/23/2002	9/12/2016	1191	144	69	6.5	156-35	S	S	13498	Entry discovered onsite through GIS data. NDWR website search states it is in basin 173A and N01 E53 sec 03 SW SE qtr (offsite). Original well log states well is located 5 miles east of mile marker #15 SR 375 Railroad Valley (offsite). The Nye county assessors website does not provide a location or maps for the excel sheet provided APN 000-156-35.

Basin	Basin Name	Log No.	Co	Well Name	TWN	RNG	SEC	QTR SEC	Owner Code	Owner	Date Cmplt	Appx Date of Download	Drillers Lic No.	Total Depth	Static Water Level	Casing Diameter	APN	Work type	Proposed Use	Permit/ Waiver	Issues
170	Penoyer Valley (Sandy Spring Valley)	88276	NY		S04	E53	3	SE	PRIV	TWIN SPRINGS RANCH	11/4/2002	9/12/2016	1191		0	6	156-35	P	S	13498/R-420	Entry discovered onsite through GIS data. NDWR website search states it is in basin 173A and N01 E53 sec 03 SW SE qtr (offsite). Original well log states well is located 5 miles east of mile marker #15 SR 375 Railroad Valley (offsite). The Nye county assessors website does not provide a location or maps for the excel sheet provided APN 000-156-35.
211	Three Lakes Valley-Southern Part	3320	NY	Well 01	S14	E58	25	SE	OFED	U S ENGINEER OFFICE	12/17/1950	9/12/2016	0	870	714	12		N	Z		Entry discovered through GIS data. NDWR website search states it is in basin 161 and 14S 53E (offsite). US Army Corps of Engineers well construction exhibit titled "Mercury, near Indian Springs, Nevada, Log of Well No. 1" submitted as the well log.
211	Three Lakes Valley-Southern Part	3321	CL	Well 03	S14	E58	25	SE	OFED	U S ENGINEER OFFICE	2/10/1951	9/12/2016	0	1575	0	12		N	Z		Entry discovered through GIS data. NDWR website search states it is in basin 161 and S14 E53 sec 00 (offsite). US Army Corps of Engineers well construction exhibit titled "Mercury, near Indian Springs, Nevada, Log of Well No. 3" submitted as the well log.
211	Three Lakes Valley-Southern Part	3322	CL	Well 04	S14	E58	25	SE	OFED	U S ENGINEER OFFICE	11/8/1950	9/12/2016	0	172	0	12		N	Z		Entry discovered through GIS data. NDWR website search states it is in basin 161 and S14 E53 sec 00 (offsite). US Army Corps of Engineers well construction exhibit titled "Mercury, near Indian Springs, Nevada, Log of Well No. 4" submitted as the well log.
211	Three Lakes Valley-Southern Part	3323	CL	Well 05	S14	E58	25	SE	OFED	U S ENGINEER OFFICE	11/12/1950	9/12/2016	0	461	0	12		N	Z		Entry discovered through GIS data. NDWR website search states it is in basin 161 and S14 E53 sec 00 (offsite). US Army Corps of Engineers well construction exhibit titled "Mercury, near Indian Springs, Nevada, Log of Well No. 5" submitted as the well log.
211	Three Lakes Valley-Southern Part	3324	CL	Well 5A	S14	E58	25	SE	OFED	U S ENGINEER OFFICE	3/23/1951	9/12/2016	0	910	700	12		N	Z		Entry discovered through GIS data. NDWR website search states it is in basin 161 and S14 E53 sec 00 (offsite). US Army Corps of Engineers well construction exhibit titled "Mercury, near Indian Springs, Nevada, Log of Well No. 5A" submitted as the well log.
211	Three Lakes Valley-Southern Part	7475	CL		S16	E57	28		PRIV	STEWART CONSTRUCTION	4/20/1963	4/11/2016	581	550	95	10.75		N	Z		The excel TRS is located only partially onsite. Showing offsite in sec 29 NE qtr through NDWR GIS data. Section information is crossed out on original well log.
211	Three Lakes Valley-Southern Part	28422	CL		S16	E58	27	NW	OFED	U S GEOLOGICAL SURVEY	2/24/1987	4/11/2016		720	582	6		N	X		Entry discovered onsite through GIS data. NDWR website search states it is in S16 E58 sec 26 SE NE qtr (offsite).
211	Three Lakes Valley-Southern Part	28819	CL		S16	E58	29	NW SW	OFED	DESERT RESEARCH INSTITUTE	7/26/1987	4/11/2016	1470	210	126	4		N	X		Showing in sec 30 SE qtr through NDWR GIS data (onsite). Original well log states well location as Nevada Test Site, Bombing Range (old drywell).
211	Three Lakes Valley-Southern Part	52416	CL	Point B Well	S16	E57	29	SW NW	USAF	NAFB	6/30/1973	4/11/2016	40	400	207	10.75		N	P		Sec 29 is only partially onsite. The GIS point is showing offsite in sec 30 NE qtr. Original well log states well is within basin 161. Log notes designation as "Point B Well".
211	Three Lakes Valley-Southern Part	71163	CL	Point B Well	S16	E57	29	NE NE	USAF	NELLIS AFB	3/25/1998	4/11/2016	1623	485	214	8		S	P	62502	Only a portion of sec 29 is onsite. The GIS point is showing offsite in the NW qtr. Original well log states well is within basin 212.
211	Three Lakes Valley-Southern Part	72357	CL	Monitor Well #2	S16	E56	10		PRIV	INDIAN SPRINGS SEWAGE CO	8/14/1998	4/11/2016	1594	80	55	2	059-10-101-002	N	G		Section 10 is only partially in the 6465 acquisition expansion area. Showing in basin 161 and offsite through NDWR GIS data. Excel sheet provided APN is offsite.
211	Three Lakes Valley-Southern Part	72358	CL	Monitor Well #1	S16	E56	10		PRIV	INDIAN SPRINGS SEWAGE CO	8/14/1998	4/11/2016	1594	73	55	2	059-10-101-002	N	G		Section 10 is partially in 6465 acquisition area. Excel sheet provided APN is offsite. The excel TRS and GIS point are located in basin 161. Showing offsite through NDWR GIS data. Original well log specifies lot 1.
211	Three Lakes Valley-Southern Part	78658	CL		S15	E57	23	SW SW	USAF	NELLIS AFB	4/6/1999	4/11/2016	2128	930	345	0	021-00-001-001	N	G		Original well log notes well is located in "Nellis AFB NV Range 63". Unable to locate the excel sheet provided APN.
211	Three Lakes Valley-Southern Part	91151	CL		S17	E58	5	SE SE	PRIV	TURNER, STEVE	11/14/2003	4/11/2016	1617	450	224	8	089-00-001-004	N	P	67646	The PLSS GIS data for this area is incomplete. TRS is projected to be located partially onsite. GIS point is located in 64C/D and 65D acquisition. Original well log states well is located 1 1/2 miles past Lee Canyon (offsite). Excel sheet provided APN is offsite.
211	Three Lakes Valley-Southern Part	112298	CL		S16	E57	3	SW	PRIV	CLARK COUNTY	9/10/2010	9/13/2016	2361	40	11	8		N	D	DW-1299	Entry discovered onsite through GIS data. NDWR website search states it is in basin 220 and S16 E67 sec 12 NW NW qtr (offsite). Original well log states well is located on public ROW on Moapa Valley Blvd, which is located in Overton, NV (offsite).
211	Three Lakes Valley-Southern Part	112299	CL		S16	E57	3	SW	PRIV	CLARK COUNTY	9/10/2010	9/13/2016	2361	40	11	8		N	D	DW-1299	Entry discovered onsite through GIS data. NDWR website search states it is in basin 220 and S16 E67 sec 12 NW NW qtr (offsite). Original well log states well is located on public ROW on Moapa Valley Blvd, which is located in Overton, NV (offsite).
211	Three Lakes Valley-Southern Part	112300	CL		S16	E57	3	SW	PRIV	CLARK COUNTY	9/10/2010	9/13/2016	2361	40	11	8		N	D	DW-1299	Entry discovered onsite through GIS data. NDWR website search states it is in basin 220 and S16 E67 sec 12 NW NW qtr (offsite). Original well log states well is located on public ROW on Moapa Valley Blvd, which is located in Overton, NV (offsite).
211	Three Lakes Valley-Southern Part	112301	CL		S16	E57	3	SW	PRIV	CLARK COUNTY	9/10/2010	9/13/2016	2361	40	11	8		N	D	DW-1299	Entry discovered onsite through GIS data. NDWR website search states it is in basin 220 and S16 E67 sec 12 NW NW qtr (offsite). Original well log states well is located on public ROW on Moapa
211	Three Lakes Valley-Southern Part	112302	CL		S16	E57	3	SW	PRIV	CLARK COUNTY	9/9/2010	9/13/2016	2361	40	11	8		N	D	DW-1299	Entry discovered onsite through GIS data. NDWR website search states it is in basin 220 and S16 E67 sec 12 NW NW qtr (offsite). Original well log states well is located on public ROW on Moapa Valley Blvd, which is located in Overton, NV (offsite).
211	Three Lakes Valley-Southern Part	112303	CL		S16	E57	3	SW	PRIV	CLARK COUNTY	9/9/2010	9/13/2016	2361	40	11	8		N	D	DW-1299	Entry discovered onsite through GIS data. NDWR website search states it is in basin 220 and S16 E67 sec 12 NW NW qtr (offsite). Original well log states well is located on public ROW on Moapa Valley Blvd, which is located in Overton, NV (offsite).
211	Three Lakes Valley-Southern Part	112304	CL		S16	E57	3	SW	PRIV	CLARK COUNTY	9/9/2010	9/13/2016	2361	40	11	8		N	D	DW-1299	Entry discovered onsite through GIS data. NDWR website search states it is in basin 220 and S16 E67 sec 12 NW NW qtr (offsite). Original well log states well is located on public ROW on Moapa Valley Blvd, which is located in Overton, NV (offsite).
211	Three Lakes Valley-Southern Part	112305	CL		S16	E57	3	SW	PRIV	CLARK COUNTY	9/9/2010	9/13/2016	2361	40	11	8		N	D	DW-1299	Entry discovered onsite through GIS data. NDWR website search states it is in basin 220 and S16 E67 sec 12 NW NW qtr (offsite). Original well log states well is located on public ROW on Moapa Valley Blvd, which is located in Overton, NV (offsite).
211	Three Lakes Valley-Southern Part	112306	CL		S16	E57	3	SW	PRIV	CLARK COUNTY	8/26/2010	9/13/2016	2361	40	10	8		N	D	DW-1299	Entry discovered onsite through GIS data. NDWR website search states it is in basin 220 and S16 E67 sec 12 NW NW qtr (offsite). Original well log states well is located on public ROW on Moapa Valley Blvd, which is located in Overton, NV (offsite).
211	Three Lakes Valley-Southern Part	112307	CL		S16	E57	3	SW	PRIV	CLARK COUNTY	8/26/2010	9/13/2016	2361	40	10	8		N	D	DW-1299	Entry discovered onsite through GIS data. NDWR website search states it is in basin 220 and S16 E67 sec 12 NW NW qtr (offsite). Original well log states well is located on public ROW on Moapa Valley Blvd, which is located in Overton, NV (offsite).
211	Three Lakes Valley-Southern Part	112308	CL		S16	E57	3	SW	PRIV	CLARK COUNTY	8/26/2010	9/13/2016	2361	40	10	8		N	D	DW-1299	Entry discovered onsite through GIS data. NDWR website search states it is in basin 220 and S16 E67 sec 12 NW NW qtr (offsite). Original well log states well is located on public ROW on Moapa Valley Blvd, which is located in Overton, NV (offsite).
211	Three Lakes Valley-Southern Part	112309	CL		S16	E57	3	SW	PRIV	CLARK COUNTY	8/26/2010	9/13/2016	2361	40	10	8		N	D	DW-1299	Entry discovered onsite through GIS data. NDWR website search states it is in basin 220 and S16 E67 sec 12 NW NW qtr (offsite). Original well log states well is located on public ROW on Moapa Valley Blvd, which is located in Overton, NV (offsite).
211	Three Lakes Valley-Southern Part	112310	CL		S16	E57	3	SW	PRIV	CLARK COUNTY	8/25/2010	9/13/2016	2361	40	10	8		N	D	DW-1299	Entry discovered onsite through GIS data. NDWR website search states it is in basin 220 and S16 E67 sec 12 NW NW qtr (offsite). Original well log states well is located on public ROW on Moapa Valley Blvd, which is located in Overton, NV (offsite).
211	Three Lakes Valley-Southern Part	113391	CL		S16	E56	10	SE NW	PRIV	CLARK COUNTY	10/4/2010	4/11/2016	2231	80	47	4	059-10-299-001	N	G	MO-2861	Section partially in 6465 acquisition area. Showing in basin 161 and offsite through NDWR GIS data. Original well log states well is located at 2630 East US Hwy 95 North Indian Springs, NV, which is the address for the Indian Springs Wastewater Treatment Plant. Owner is specified as Clark County Water Reclamation District. The excel sheet provided APN is for a portion of US Hwy 95 east of Indian Springs, NV - unable to view aerial imagery in this area from the Clark County assessors GISMO tool.
211	Three Lakes Valley-Southern Part	113392	CL		S16	E56	10	NE NW	PRIV	CLARK COUNTY	9/14/2010	4/11/2016	2231	80	0	4	059-10-101-002	N	G	MO-2861	Section partially in 6465 acquisition area. Showing in basin 161 and offsite through NDWR GIS data. Excel sheet provided APN is offsite. Original well log states well is located at 2630 East US Hwy 95 North Indian Springs, NV, which is the address for the Indian Springs Wastewater Treatment Plant. Owner is specified as Clark County Water Reclamation District. Excel sheet provided APN appears to be offsite - but unable to view aerial imagery in this area.
211	Three Lakes Valley-Southern Part	113393	CL		S16	E56	10	NE NW	PRIV	CLARK COUNTY	9/14/2010	4/11/2016	2231	80	0	4	059-10-101-002	N	G	MO-2861	Section partially in 6465 acquisition area. Showing in basin 161 and offsite through NDWR GIS data. Excel sheet provided APN is offsite. Original well log states well is located at 2630 East US Hwy 95 North Indian Springs, NV, which is the address for the Indian Springs Wastewater Treatment Plant. Owner is specified as Clark County Water Reclamation District. Excel sheet provided APN appears to be offsite - but unable to view aerial imagery in this area.
211	Three Lakes Valley-Southern Part	113394	CL		S16	E56	10	NE NW	PRIV	CLARK COUNTY	9/14/2010	4/11/2016	2231	80	60	4	059-10-101-002	N	G	MO-2861	Section partially in 6465 acquisition area. Showing in basin 161 and offsite through NDWR GIS data. Excel sheet provided APN is offsite. Original well log states well is located at 2630 East US Hwy 95 North Indian Springs, NV, which is the address for the Indian Springs Wastewater Treatment Plant. Owner is specified as Clark County Water Reclamation District. Excel sheet provided APN appears to be offsite - but unable to view aerial imagery in this area.

Basin	Basin Name	Log No.	Co	Well Name	TWN	RNG	SEC	QTR SEC	Owner Code	Owner	Date Cmplt	Appx Date of Download	Drillers Lic No.	Total Depth	Static Water Level	Casing Diameter	APN	Work type	Proposed Use	Permit/ Waiver	Issues
211	Three Lakes Valley-Southern Part	121972	CL	MW-08	S15	E58	36	NE	PRIV	PRIMM SOUTH REAL ESTATE CO	1/29/2015	9/13/2016	2381	96	84	2.38	237-08-301-002	N	G	MO-3013	Entry discovered onsite through GIS data. NDWR website search states it is in basin 164A and S27 E59 sec 08 NE SW qtr (offsite). Original well log states well is located at 100 W. Primm Blvd-Clark County (offsite). Excel provided APN is offsite.
211	Three Lakes Valley-Southern Part	121973	CL	MW-07	S15	E58	36	NW	PRIV	PRIMM SOUTH REAL ESTATE CO	1/27/2015	9/13/2016	2381	97	87	2.38	237-08-301-002	N	G	MO-3013	Entry discovered onsite through GIS data. NDWR website search states it is in basin 164A and S27 E59 sec 08 NE SW qtr (offsite). Original well log states well is located at 100 W. Primm Blvd-Clark County (offsite). Excel provided APN is offsite.
228	Oasis Valley	227	NY		S10	E47	0		PRIV	GIBSON, BOB	4/1/1941	7/14/2016		120	17	8.62		N	Z		Excel township and range is only partially onsite. GIS point showing in 9S 49E sec 32 SW qtr (onsite). Well log document states well is located 1/4 mile west of Springdale (offsite).
228	Oasis Valley	29408	NY		S10	E48	33	SE SE	PRIV	COFFER, G L	2/4/1985	7/14/2016	1312	300	0	0		N	S		The excel TRS and GIS point are located in the EC South expansion area. Original well log states that well is not completed. BLM land permit number N6-4-4796 is provided.
228	Oasis Valley	31027	NY		S10	E48	16	NW	PRIV	COFFER, G L	12/8/1988	7/14/2016	1312	30	10	13.38		N	I	42473	Entry discovered through GIS data. Original well log states within S10 E47 sec 14 SW NE qtr (offsite). Well location is listed as Fleur de Lis Ranch. Well log details page notes "well not completed - see log 34497 for completed drilling".
228	Oasis Valley	34497	NY		S10	E48	16	NW	PRIV	COFFER, G L	5/24/1990	7/14/2016	1312	120	12	12		N	I	42473	Entry discovered onsite through GIS data. Original well log states within S10 E47 sec 14 SW NE qtr (offsite).
228	Oasis Valley	34644	NY		S10	E48	17	NW	PRIV	COFFER, G L	9/30/1990	7/14/2016	1312	120	21	6		N	H		Entry discovered through GIS data. Original well log states within S10 E47 sec 14 NE SW qtr (offsite).
228	Oasis Valley	65557	NY		S10	E47	3	SW NE	PRIV	HAWKINS, BUD	1/25/1977	7/13/2016	656	65	0	8		N	H		In EC South expansion area from TRS. Showing in 10S 48E sec 05 NE qtr from NDWR GIS data (which is onsite but not in the expansion area).
228	Oasis Valley	65561	NY		S10	E49	35		PRIV	AMARGOSA MISSION CHURCH	2/27/1982	7/13/2016	1256	200	102	8		N	H		Appears to be in NE qtr through NDWR GIS data (onsite). Original well log specifies N 1/2, E1/2 and parcel no. 2.
228	Oasis Valley	69874	NY	ER-OV-06A	S10	E47	11	SE NE	OFED	U S GEOLOGICAL SURVEY	8/9/1997	7/13/2016	1859	536	18.2	2.5		N	G		In EC South withdrawal area from TRS. Showing in 10S 48E sec 10 NE qtr from NDWR GIS data, which is onsite but not in the expansion area. Original well log states well is located in Oasis Valley near Springdale.
228	Oasis Valley	69875	NY	ER-OV-06A2	S10	E47	11	SE NE	OFED	U S GEOLOGICAL SURVEY	8/11/1997	7/13/2016	1859	66	22.81	2.5		N	G		In EC South withdrawal area from TRS. Showing in 10S 48E sec 10 NE qtr from NDWR GIS data, which is onsite but not in the expansion area. Original well log states well is located in Oasis Valley near Springdale.
228	Oasis Valley	70114	NY	ER-OV-01	S10	E47	11	SE NE	OFED	U S GEOLOGICAL SURVEY	8/4/1997	7/13/2016	1859	180	22.71	2.5		N	G		In EC South withdrawal area from TRS. Showing in 10S 48E sec 10 NE qtr from NDWR GIS data, which is onsite but not in the expansion area. Original well log states well is located in Oasis Valley near Springdale.
228	Oasis Valley	70116	NY	ER-OV-03	S10	E47	10	NW NE	OFED	U S GEOLOGICAL SURVEY	8/22/1997	7/13/2016	1859	250	61.4	2.5		N	G		In EC South withdrawal area from TRS. Showing in 10S 48E sec 05 SW qtr from NDWR GIS data, which is onsite but not in the expansion area. Original well log states well is located in Oasis Valley near Springdale.
228	Oasis Valley	70117	NY	ER-OV-03A3	S10	E47	10	NW NE	OFED	U S GEOLOGICAL SURVEY	9/13/1997	7/13/2016	1859	820	164	2.5		N	G		In EC South withdrawal area from TRS. Showing in 10S 48E sec 05 SW qtr from NDWR GIS data, which is onsite but not in the expansion area. Original well log states well is located in Oasis Valley near Springdale.
228	Oasis Valley	70118	NY	ER-OV-03	S10	E48	31	SW NE	OFED	U S GEOLOGICAL SURVEY	8/27/1997	7/13/2016	1859	400	350.3	4.5		N	G		The excel TRS and GIS point are located in the EC South expansion area. Original well log states well is located in Oasis Valley near Springdale.
228	Oasis Valley	75537	NY	ER-EC-01	S08	E49	32	NW NW	OFED	U S DEPARTMENT OF ENERGY	5/1/1999	7/13/2016	2126	5000	1858	13		N	G	R-1024	Original well log states well is located in Nellis Air Force Range, EC-South. A Bechtel Nevada memo is included and references contract no. DE-AC08-96NV11718.
228	Oasis Valley	75931	NY	ER-EC-06	S09	E49	3	NW NW	OFED	U S DEPARTMENT OF ENERGY	3/28/1999	7/13/2016	1946	5000	1428	30		N	G	R-1024	Original well log states well is located in Nellis Air Force Range, EC-South. A Bechtel Nevada memo is included and references contract no. DE-AC08-96NV11718.
228	Oasis Valley	76025	NY	ER-EC-04	S09	E48	17	SW NE	OFED	U S DEPARTMENT OF ENERGY	6/20/1999	7/13/2016	2125	3487	749	36		N	G	R-1024	Original well log states well is located in Nellis Air Force Range, EC-South.
228	Oasis Valley	76304	NY	ER-EC-05	S10	E48	12	SE NW	OFED	U S DEPARTMENT OF ENERGY	7/11/1999	7/14/2016	2125	2500	1019	20		N	G	R-1024	Original well log states well is located in Nellis Air Force Range, EC-South.
228	Oasis Valley	76538	NY	ER-EC-07	S11	E49	11	SW	OFED	U S DEPARTMENT OF ENERGY	8/10/1999	7/14/2016	2125	1386	748	13.38		N	G	R-1024	Entry discovered onsite through GIS data. Original well log states within sec 14 NW NW qtr (onsite); with the well being located in Nellis Air Force Range, EC-South. A Bechtel Nevada memo is included and references contract no. DE-AC08-96NV11718.
228	Oasis Valley	76539	NY	ER-EC-08	S10	E48	5	NW NE	OFED	U S DEPARTMENT OF ENERGY	7/28/1999	7/13/2016	2125	2000	324	13.38		N	G	R-1024	Showing in 9S 48E sec 32 SE qtr from NDWR GIS data (onsite). Original well log states well is located in Nellis Air Force Range, EC-South.
228	Oasis Valley	109321	NY	ER-EC-11	S08	E49	34	NW SW	OFED	NATIONAL NUCLEAR SECURITY ADMINISTRATION	10/21/2009	7/13/2016	2125	4148	1477	13.38		N	G	R-1024E	Showing in SE qtr from NDWR GIS data (offsite). Original well log states well is located in Nev. Test & Training Range, EC South.
228	Oasis Valley	111910	NY	ER-EC-12	S09	E49	10	NE NW	OFED	NATIONAL NUCLEAR SECURITY ADMINISTRATION	7/26/2010	7/13/2016	2219	4069	1363	7.62		N	G	R-1024F	Appears to be in NE qtr from NDWR GIS info (onsite). Original well log states well is located in Nev. Test & Training Range, EC South.
228	Oasis Valley	113305	NY	ER-EC-15	S09	E49	5	SE NE	OFED	NATIONAL NUCLEAR SECURITY ADMINISTRATION	12/1/2010	7/13/2016	2219	3000	1192	7.63		N	G	R-1024G	Showing in sec 04 NW qtr from NDWR GIS data (onsite). Original well log states well is located in Nev. Test & Training Range, EC South.
228	Oasis Valley	113306	NY	ER-EC-13	S09	E49	7	SW NW	OFED	NATIONAL NUCLEAR SECURITY ADMINISTRATION	10/26/2010	7/13/2016	2219	3000	1012	7.63		N	G	R-1024G	Original well log states well is located in Nevada Test and Training Range.
228	Oasis Valley	115779	NY	ER-EC-14	S09	E49	21	SE NW	OFED	NATIONAL NUCLEAR SECURITY ADMINISTRATION	10/17/2012	7/13/2016	2219	2378	1021	16		N	G	R-1024E	Original well log states well is located in Nevada Test & Training Range, EC South.
228	Oasis Valley	115841	NY	ER-20-11	S08	E49	34	NW SE	OFED	NATIONAL NUCLEAR SECURITY ADMINISTRATION	9/14/2012	7/13/2016	2219	3004	1645	7.62		N	G	R-1024H	Showing offsite from NDWR GIS data. Original well log states well is located within Nevada National Security Site Area 20 (offsite).
229	Crater Flat	78608	NY		S12	E49	35	SE SE	OFED	U S DEPARTMENT OF ENERGY	5/3/1999	7/13/2016	1839	2807	2507	9.62		D	P	64451T	Original well log states the subdivision name as Nevada Test Site, Area 25 (offsite).
158A	Emigrant Valley-Groom Lake Valley	9492	NY		S05	E55	29	NW SE	PRIV	GULF OIL CORP	4/28/1967	4/8/2016	30	100	40	6		N	U		Showing in section 26 NE qtr through NDWR GIS data (onsite).
169A	Tikapoo Valley-Northern Part	5935	NY		S10	E58	9	SW SW	PRIV	WHITNEY ENTERPRISES	6/18/1961	7/13/2016	56	104	14	14		N	I		The excel TRS includes area from basin 168 and 169A. Located in basin 168 through GIS data.
169B	Tikapoo Valley-Southern Part	31194	LI		S12	E60	10	SE NE	OFED	U S GEOLOGICAL SURVEY	1/21/1989	4/8/2016	1515	460	216	10		N	X		Excel TRS and GIS point located in the Alamo expansion area. Original well log notes that well is located 2 miles south of Desert Dry Lake.
169B	Tikapoo Valley-Southern Part	44256	CL		S12	E61	16	SW	PRIV	BAKER, LUANNE	3/14/1994	7/14/2016	1792	450	237	6.62	191-04-701-004	N	H		Entry discovered onsite through GIS data. NDWR GIS point is located in the Alamo expansion area. NDWR website search states it is in basin 212 and S23 E61 sec 04 SW SW qtr (offsite). Original well log states well is located at Barbara and Placid, 295 Barbara Lane, which is located offsite in Las Vegas, NV. Unable to locate the excel sheet provided APN.
169B	Tikapoo Valley-Southern Part	117027	CL		S11	E60	15	NW	PRIV	K B HOMES	6/20/2013	7/14/2016	2097	500	294	8	176-34-501-031	P	H		Entry discovered onsite through GIS data. NDWR GIS point is located in the Alamo expansion area. NDWR website search states it is in basin 212 and S22 E60 sec 34 NE NE qtr (offsite). Original well log states well location as "Enter Prise". Parcel number could not be located.
227A	Fortymile Canyon-Jackass Flats	27273	NY		S12	E49	7		PRIV	JOHNSTON, EUGENE C	6/1/1984	7/13/2016	1312	120	60	7.5	12-196-34	N	H		Located in Basin 229 and SE qtr from NDWR GIS data (onsite). Original well log not available for review through NDWR. Could not locate the excel sheet provided APN.
227A	Fortymile Canyon-Jackass Flats	79401	NY	ER-EC-2A	S09	E48	24	NW NW	OFED	U S DEPARTMENT OF ENERGY	2/14/2000	7/14/2016	2125	4974	755	13.38		N	G	R-1024	TRS and GIS point in Basin 228. Original well log states within basin 227A and well location as Nellis Air Force Range, EC South. A Bechtel Nevada memo is included and references contract no. DE-AC08-96NV11718.
227A	Fortymile Canyon-Jackass Flats	102959	NY		S12	E49	25	NW NW	OFED	U S DEPARTMENT OF ENERGY	5/13/1994	7/13/2016	1885	2223	1901.29	7.63		N	G	MO-2263	

Key:

Yellow Highlighting	New entries that were not found from TRS verification of the NDWR Excel Files by basin.

Notes:
Some well logs have incomplete information. Information compiled into this table is derived from publicly available information through the Nevada Division of Water Resources (NDWR).

APPENDIX C – HYDROGRAPHIC BASIN AREA CALCULATIONS WORKSHEET

Hydrographic Basin No. and Name	Basin Area (sq. mi) from NDWR	Basin Area (acres) from NDWR	Basin Area (sq. mi) from GIS	Basin Area (acres) from GIS	Area inside NTTR (sq. mi) GIS	Area inside NTTR (acres) GIS	Percentage of Total Basin Area (sq. mi)	Percentage of Total Basin Area (acres)	Difference Between NDWR and GIS Data (acres)	% Error	Percentage of NTTR from GIS	Area inside Proposed Alternative Area (sq. mi) GIS	Area inside Proposed Alternative Area (acres) GIS	Percentage of Proposed Alternative Area	Alternative	NTTR and Proposed Expansion Area Boundaries	
141 – Ralston Valley	971	621,440	980	626,944	87	55,494	8.9%	8.9%	5,504	0.9%	1.9%					**Current Withdrawn Area (acres)**	2,951,049
144 – Lida Valley	535	342,400	532	340,557	14	8,781	2.6%	2.6%	1,843	0.5%	0.3%					**Alternative 3A Area - EC South (acres)**	17,906
145 – Stonewall Flat	381	243,840	374	239,328	338	216,173	90.3%	90.3%	4,512	1.9%	7.3%					**Alternative 3B Area - 6465 Acquisition Land (acres)**	59,872
146 – Sarcobatus Flat	812	519,680	801	512,941	294	188,141	36.7%	36.7%	6,739	1.3%	6.4%	7	4,544	25.4%	EC South	**Alternative 3B Area - Administrative Incorp (acres)**	1,125
147 – Gold Flat	684	437,760	682	436,429	579	370,675	84.9%	84.9%	1,331	0.3%	12.6%					**Alternative 3C Area - Alamo (acres)**	231,944
148 – Cactus Flat	403	257,920	395	252,838	335	214,426	84.8%	84.8%	5,082	2.0%	7.3%					**Total Proposed Expansion Areas (area in acres)**	310,847
149 – Stone Cabin Valley	985	630,400	979	626,522	49	31,168	5.0%	5.0%	3,878	0.6%	1.1%						
157 – Kawich Valley	350	224,000	350	224,109	295	188,896	84.3%	84.3%	109	0.05%	6.4%						
158A – Emigrant Valley – Groom Lake Valley	663	424,320	656	419,712	629	402,726	96.0%	96.0%	4,608	1.1%	13.6%					**Current Withdrawn Area (sq mi)**	4611
158A without Range 4808A	--	--	242	155,072	216	138,086	32.9%	32.9%	--	--	4.7%					**Alternative 3A Area - EC South (sq mi)**	28
158B – Emigrant Valley – Papoose Lake Valley	104	66,560	102	65,344	102	65,261	99.9%	99.9%	1,216	1.8%	2.2%					**Alternative 3B Area - 6465 Acquisition Land (sq mi)**	94
158B without Range 4808A	--	--	65	41,536	65	41,459	63.4%	63.4%	--	--	1.4%					**Alternative 3B Area - Administrative Incorp (sq mi)**	1.75
159 – Yucca Flat	305	195,200	304	194,317	3	1,926	1.0%	1.0%	883	0.45%	0.1%	0.56	358	0.6%	6465 Acquisition	**Alternative 3C Area - Alamo (sq mi)**	362
159 without Range 4808A	--	--	303	193,869	2.3	1,446	0.7%	0.7%	--	--	0.05%					**Total Proposed Expansion Areas (area in sq mi)**	486
160 – Frenchman Flat	463	296,320	457	292,538	212	135,494	46.3%	46.3%	3,782	1.3%	4.6%	11	7,149	11.9%	6465 Acquisition		
160 without Range 4808A	--	--	457	109,678	211.6	135,430	46.3%	46.3%	--	--	4.6%						
161 – Indian Spring Valley	655	419,200	671	429,536	369	236,224	55.0%	55.0%	10,336	2.5%	8.0%	71	45,517	76.0%	6465 Acquisition		
168 – Three Lake Valley (Northern Part)	298	190,720	289	184,819	257	164,294	88.9%	88.9%	5,901	3.1%	5.6%	28	18,144	7.8%	Alamo		
169A – Tikapoo Valley (Northern Part)	607	388,480	621	397,562	241	154,150	38.8%	38.8%	9,082	2.3%	5.2%					**Total Percentages for EC South**	**100.02%**
169A without Range 4808A	--	--	570	364,922	190	121,504	30.6%	30.6%	--	--	4.1%						
169B – Tikapoo Valley (Southern Part)	391	250,240	369	236,442	90	57,658	24.4%	24.4%	13,798	5.5%	2.0%	257	164,179	70.8%	Alamo	**Total Percentages for Alamo**	**99.99%**
170 – Penoyer (Sand Springs) Valley	700	448,000	694	444,384	146	93,338	21.0%	21.0%	3,616	0.8%	3.2%						
173A – Railroad Valley (Southern Part)	603	385,920	602	385,440	71	45,242	11.7%	11.7%	480	0.1%	1.5%					**Total Percentages for 6465 Acquisition**	**100.00%**
209 – Pahranagat Valley	768	491,520	768	491,469	1	358	0.1%	0.1%	51	0.0%	0.01%	29	18,848	8.1%	Alamo		
210 – Coyote Spring Valley	657	420,480	616	394,054	0	-	0.0%	0.0%	26,426	6.3%	0%	10	6,285	2.7%	Alamo	**Total Percentages for Historical Incorporation**	**99.70%**
211 – Three Lake Valley (Southern Part)	311	199,040	320	204,768	175	111,962	54.7%	54.7%	5,728	2.9%	3.8%	30	19,341	8.3%	Alamo		
												0.74	476	42.3%	Admin Incorporation		
												8	5,018	8.4%	6465 Acquisition		
212 – Las Vegas Valley	1,564	1,000,960	1544	988,032	9	5,530	0.6%	0.6%	12,928	1.3%	0.2%	8	5,114	2.2%	Alamo		
												1.01	646	57.4%	Admin Incorporation		
												0.08	48	0.1%	6465 Acquisition		
225 – Mercury Valley	110	70,400	64	40,659	0	-	0.0%	0.0%	29,741	42.2%	0%	3	1,779	3.0%	6465 Acquisition		
227A – Fortymile Canyon – Jackass Flats	279	178,560	267	170,829	12	7,834	4.6%	4.6%	7,731	4.3%	0.3%						
227B – Fortymile Canyon – Buckboard Mesa	240	153,600	237	151,539	7	4,614	3.0%	3.0%	2,061	1.3%	0.2%						
228 – Oasis Valley	460	294,400	461	294,771	264	169,274	57.4%	57.4%	371	0.1%	5.7%	21	13,365	74.6%	EC South		
229 – Crater Flat	182	116,480	181	116,141	33	20,986	18.1%	18.1%	339	0.3%	0.7%						
TOTALS	**14,481**	**9,267,840**	**14,316**	**9,162,022**	**4,610**	**2,950,624**	**--**	**--**	**--**	**--**	**99.99%**						