GROUNDWATER SETTLEMENT AGREEMENT

This Groundwater Settlement Agreement is entered into between the United States of America ("United States") and the State of New Mexico ("New Mexico") (collectively, "Parties").

RECITALS

WHEREAS, the United States, through the Bureau of Reclamation ("Reclamation"), operates the Rio Grande Project ("Project") in southern New Mexico and far west Texas. The Project delivers surface water to Elephant Butte Irrigation District ("EBID") in New Mexico and El Paso County Water Improvement District No. 1 ("EPCWID") in Texas;

WHEREAS, in 1906, the United States entered into a treaty with the Republic of Mexico for the annual delivery of 60,000 acre-feet of water to Mexico in years of full supply, with reductions in times of shortage. Convention Between the United States and Mexico Providing for the Equitable Distribution of the Waters of the Rio Grande for Irrigation Purposes, May 21, 1906, U.S.-Mex., 34 Stat. 2954;

WHEREAS, the Project was decreed a right to store, release, and divert water from the Rio Grande in the ongoing New Mexico Lower Rio Grande general stream adjudication;[1]

WHEREAS, New Mexico administers water in the Lower Rio Grande under state law. Pursuant to New Mexico law, groundwater rights have been established by water users in the Rincon and Mesilla aquifers in the Lower Rio Grande below Elephant Butte Reservoir and Caballo Reservoir;

WHEREAS, the Rincon and Mesilla aquifers in the Lower Rio Grande are hydrologically connected to the Rio Grande. In general, groundwater pumping in the Rincon and Mesilla basins depletes surface flows;

WHEREAS, in the 1980s, Reclamation developed a methodology for allocating water between EBID and EPCWID that was based on the relationship between historical releases from Caballo Reservoir and diversions at Project headings during the period 1951-1978, commonly referred to as the D2 Period. This methodology uses a regression equation, known as the D2 Equation, which accounts for groundwater pumping in New Mexico below Caballo Reservoir during the D2 Period;

WHEREAS, on March 10, 2008, Reclamation, EBID, and EPCWID entered into an Operating Agreement for the Project that relies, in part, on the D2 Equation to allocate water between EBID and EPCWID;

[1] The order and decree on the Project right is the subject of an ongoing appeal to the New Mexico Court of Appeals by the State of New Mexico, the City of Las Cruces, the United States, and pre-1906 interests.

WHEREAS, since the D2 Period, groundwater pumping in the Lower Rio Grande in New Mexico has increased;

WHEREAS, in 1938, the States of Colorado, New Mexico, and Texas entered into the Rio Grande Compact, which "'effect[ed] an equitable apportionment'" of the waters of the Rio Grande above Fort Quitman, Texas among the States of Colorado, New Mexico, and Texas. *Texas v. New Mexico*, 602 U.S. 943, 950 (2024);

WHEREAS, in 2013, Texas brought suit against New Mexico, in the action styled *Texas v. New Mexico*, No. 141, Orig. ("Original Action"), alleging that groundwater pumping in New Mexico was depriving it of its equitable share of the Rio Grande. New Mexico asserted counterclaims in which it alleged that Texas was receiving more than its equitable share of the Rio Grande. The United States intervened in the Original Action, alleging that New Mexico had violated the Compact, including by interfering with the Project by allowing excessive groundwater pumping in New Mexico. New Mexico, in turn, pleaded counterclaims against the United States alleging that the 2008 Operating Agreement deprived New Mexico of water apportioned under the Rio Grande Compact;

WHEREAS, the States of Texas, New Mexico, and Colorado have proposed to resolve Texas's claims against New Mexico and New Mexico's counterclaims against Texas in the Original Action through entry of a Consent Decree, in which those parties agree to New Mexico's delivery obligations to Texas, measured at the El Paso gage near the Texas-New Mexico state line;

WHEREAS, the Parties are concurrently entering into an Operations Settlement Agreement along with EBID and EPCWID. The Operations Settlement Agreement sets forth certain agreed-upon modifications to Project Operations, as implemented though the 2008 Operating Agreement and an Operations Manual, along with certain other related agreements;

WHEREAS, the Parties share a common objective of ensuring that groundwater in the Lower Rio Grande is used efficiently and effectively and conserved to the extent possible for future use; and

WHEREAS, the Parties agree that this Groundwater Settlement Agreement, together with the Operations Settlement Agreement, is a fair and reasonable resolution of the United States' claims against New Mexico and New Mexico's counterclaims against the United States in the Original Action, and is in the public interest.

The terms of the Groundwater Settlement Agreement, including Exhibits A through E, which are incorporated herein, are set forth below.

AGREEMENT

THEREFORE, the Parties hereby agree as follows:

I. DEFINITIONS

A. **Acre-foot:** The quantity of water required to cover an acre of land to the depth of one foot, equivalent to 43,560 cubic feet or 325,851 gallons.

B. **Aquifer:** The Rincon and Mesilla aquifers in New Mexico that are hydrologically connected to the Rio Grande between the Caballo Reservoir outlet and the El Paso Gage.

C. **Aquifer Storage Loss:** A reduction in the amount of groundwater held in the shallow alluvial part of the Aquifer associated with dropping groundwater levels and the draining of the uppermost part of the Aquifer, as further explained in Appendix E.

D. **Bureau of Reclamation (Reclamation):** The United States Department of the Interior Bureau of Reclamation, the federal agency responsible for operating the Project.

E. **CAB3:** The 3-year lagged moving average of the annual releases from Caballo Reservoir as measured at the Rio Grande Below Caballo Dam stream gage (USGS 08362500) ("Caballo Gage").

F. **Combined-Right Land:** For purposes of this Groundwater Settlement Agreement, Combined-Right Land shall be acreage within the Lower Rio Grande that is irrigated with a combined surface water and groundwater right pursuant to the Final Judgment in Stream System Issue No. 101 in *State of New Mexico ex rel. Office of the State Engineer v. Elephant Butte Irrigation District, et al.*, Case No. D-307-CV-96-888 ("SSI 101").

G. **Compact:** The Rio Grande Compact, approved by Congress in the Act of May 31, 1939, ch. 155, 53 Stat. 785.

H. **Consent Decree:** The Consent Decree, also known as the "EEPI Decree," is the decree proposed by the States of Texas, New Mexico, and Colorado to resolve Texas's claims against New Mexico and New Mexico's counterclaims against Texas in the Original Action as among those parties. The Consent Decree was attached to the Compacting States' Joint Motion for Entry of Consent Decree, which was filed on August 29, 2025.

I. **Court:** The Supreme Court of the United States.

J. **D2 Period:** The period from January 1, 1951, through December 31, 1978.

K. **Decree of Dismissal:** The decree proposed by the United States and New Mexico to dismiss the claims of the United States in the Original Action with prejudice. A copy of the Decree of Dismissal is attached hereto as Appendix A.

L. **Depletion Reduction:** New Mexico's commitment to reduce Depletions from groundwater in the Lower Rio Grande as described in this Groundwater Settlement Agreement.

M. **Depletions:** Consumptive use of water in the Lower Rio Grande, excluding consumptive use from Imported Water.

N. **Domestic Wells:** Groundwater wells drilled after the orders of the State Engineer declaring the Lower Rio Grande Underground Water Basin and permitted under NMSA 1978, § 72-12-1.1.

O. **El Paso Gage:** The Rio Grande at El Paso, Texas stream gage (USGS 08364000).

P. **Groundwater-Only Land:** Agricultural land in the Lower Rio Grande that is irrigated solely by groundwater pursuant to the Final Judgment in SSI 101 and has no right to receive surface water from the Project.

Q. **Groundwater Settlement Agreement:** This agreement between New Mexico and the United States concerning the management of groundwater in New Mexico.

R. **Imported Water:** Water brought into the Rio Grande Basin from another drainage basin or groundwater within the basin that is not hydrologically connected to the Rio Grande.

S. **Inconclusive ASL:** The category of Aquifer Storage Loss when neither Potential ASL nor No ASL is determined in the Initial Evaluation in accordance with the methods set forth in Appendix E.

T. **Indicator Wells:** Wells selected by the Parties for the purposes of monitoring the groundwater levels in the Aquifer as described in Appendix E.

U. **Initial Evaluation:** A preliminary evaluation of potential Aquifer Storage Loss based on measured groundwater levels at the Indicator Wells conducted annually, as set forth in Appendix E.

V. **Judicial Review:** Any proceeding in a court of any jurisdiction to examine or consider this Groundwater Settlement Agreement or any part thereof, to interpret the provisions of the Groundwater Settlement Agreement, to declare the rights and obligations under the Groundwater Settlement Agreement, to

enforce the provisions of the Groundwater Settlement Agreement, or for any other relief related to the Groundwater Settlement Agreement.

W. **Lower Rio Grande:** The part of the Rio Grande Basin that is located between Caballo Reservoir and the New Mexico-Texas state line.

X. **Lower Rio Grande Water Management Plan (LRG Plan):** A plan to be developed and adopted by New Mexico to manage and administer water in the Lower Rio Grande.

Y. **No ASL:** The category of Aquifer Storage Loss when groundwater levels at four or more Indicator Wells in the Mesilla Valley either (1) rise by 2 feet or more or (2) rise or fall by less than 2 feet as determined in the Initial Evaluation in accordance with the methods set forth in Appendix E.

Z. **Operations Settlement Agreement:** The agreement entered into by New Mexico, the United States, EBID, and EPCWID concurrently herewith regarding modifications to Project operations and related issues.

AA. **Original Action:** The case filed in the Supreme Court of the United States styled *Texas v. New Mexico*, No. 141, Orig.

BB. **Parties:** The Parties to this Groundwater Settlement Agreement are the United States and New Mexico.

CC. **Permanently Retired Lands:** Agricultural lands associated with Permanently Retired Groundwater.

DD. **Permanently Retire Groundwater:** To Permanently Retire Groundwater means to acquire water rights and permanently forgo any use of the groundwater component of the acquired rights to achieve Depletion Reduction.

EE. **Project:** The Rio Grande Project, or Project, is the federal reclamation project, authorized in the Reclamation Act of June 17, 1902, 32 Stat. 390, and the Rio Grande Project Act of February 25, 1905, 33 Stat. 814, operated by the United States through the Bureau of Reclamation in coordination and cooperation with EBID and EPCWID.

FF. **Project Viability in New Mexico:** The ability to continue to operate the Rio Grande Project for Project purposes in New Mexico. Considerations for Project Viability include, but are not limited to, the Project's ability to deliver surface water to EBID; the amount of acreage in production in EBID; and the ability to use groundwater within EBID and to supplement Project deliveries in times of drought.

GG. **Potential ASL:** The category of Aquifer Storage Loss when groundwater levels at four or more Indicator Wells in the Mesilla Valley fall by 2 feet or more as determined in the Initial Evaluation in accordance with the methods set forth in Appendix E.

HH. **Third-Party Implementing Contract:** The agreement entered into between EBID and the New Mexico Interstate Stream Commission, and approved by Reclamation (Contract No. 25-WC-40-1029), under the 1920 Miscellaneous Purposes Act, 41 Stat. 451, 43 U.S.C. § 521.

II. **Upper Valley Diversion Ratio (UVDR):** The UVDR is defined and will be calculated in accordance with the method set forth in Appendix D.

JJ. **UVDR3:** The UVDR3 is the 3-year lagged moving average of the UVDR as calculated in accordance with the method set forth in Appendix D.

II. GENERAL PROVISIONS

A. The Parties agree to resolve their dispute in the Original Action by means of this Groundwater Settlement Agreement, the Operations Settlement Agreement, and the Decree of Dismissal attached hereto as Appendix A.

B. The Parties shall implement the obligations and agreements in accordance with the schedule attached hereto as Appendix B.

C. Upon the Court's entry of the Decree of Dismissal, the Parties agree that the United States' claims against New Mexico and New Mexico's counterclaims asserted against the United States in the Original Action shall be dismissed with prejudice. These dismissed claims shall include all claims for Compact violations, Project interference, damages, declaratory relief, and injunctive relief asserted or which could have been asserted in the Original Action.

III. DEPLETION REDUCTION

New Mexico shall reduce Depletions in the Lower Rio Grande by 18,200 acre-feet per year within ten (10) years of the Effective Date. New Mexico shall meet its Depletion Reduction obligation as follows:

A. Depletion Reduction Schedule. New Mexico will Permanently Retire Groundwater to reduce Depletions by 18,200 acre-feet per year according to the following schedule:

1. Within five (5) years of the Effective Date, New Mexico shall Permanently Retire Groundwater to reduce Depletions by a minimum of 9,100 acre-feet per year.

2. Within ten (10) years of the Effective Date, New Mexico shall Permanently Retire Groundwater to reduce Depletions by a total of 18,200 acre-feet per year.

3. New Mexico's Depletion Reduction obligation shall be considered fully satisfied if it reduces 18,200 acre-feet per year of Depletions of groundwater as calculated in Section III.C, provided that New Mexico shall maintain the Depletion Reduction obligation as described in this Section III.

B. Eligible Water Rights for Depletion Reduction.

1. Groundwater rights originating from the Aquifer are eligible to meet the Depletion Reduction obligation whereas groundwater rights originating from outside the Aquifer are not eligible.

2. To be eligible for satisfaction of the Depletion Reduction obligation, irrigation groundwater rights must have been used on the lands to be Permanently Retired a minimum of 5 years out of every moving 10-year period since 2010. Irrigation groundwater rights that were enrolled in the State of New Mexico's Lower Rio Grande Groundwater Conservation Program shall be deemed to have been used during the period of enrollment.

3. To be eligible for satisfaction of the Depletion Reduction obligation, non-irrigation rights must have been used a minimum of 5 years out of every moving 10-year period since 2010.

4. To be eligible for satisfaction of the Depletion Reduction obligation, the groundwater rights must be in good standing with the New Mexico Office of the State Engineer.

C. Calculating Depletion Reductions.

1. New Mexico may Permanently Retire Groundwater from Groundwater-Only Lands to satisfy its Depletion Reduction obligation.

    a. Each acre of Groundwater-Only Land that is Permanently Retired shall be deemed to reduce Depletions by 2.6 acre-feet per year.[2]

2. New Mexico may Permanently Retire Groundwater from Combined-Right Lands to satisfy its Depletion Reduction obligation.

    a. Each acre of Combined-Right Land that is Permanently Retired shall be deemed to reduce Depletions by 1.97 acre-feet per year.

[2] This Groundwater Settlement Agreement uses a consumptive irrigation requirement ("CIR") of 2.6 acre-feet per year consistent with transfers to non-irrigation purposes of use in the SSI-101 Final Judgment.

b. Appendix C shows the methodology used by the Parties to reach agreement on the amount of Depletion Reduction per acre on Combined-Right Lands. Appendix C is not enforceable as part of the Groundwater Settlement Agreement. As an example, if New Mexico were to meet its Depletion Reduction obligation solely by retiring groundwater on Combined-Right Lands, it would satisfy its obligation by Permanently Retiring Groundwater on 9,240 acres.

c. The surface water rights associated with Combined-Right Land may be used in accordance with the provisions in Section III.E of this Groundwater Settlement Agreement.

3. New Mexico may Permanently Retire Groundwater from non-irrigation groundwater rights to satisfy its Depletion Reduction obligation.

a. Depletion Reduction from non-irrigation groundwater rights shall be calculated as the reduction in consumptive use in acre-feet per year associated with the retirement of those rights.

b. New Mexico will use best available evidence to calculate the Depletions of groundwater associated with non-irrigation Permanently Retired Groundwater. Best available evidence consists of New Mexico Office of the State Engineer records or documentary evidence of beneficial use associated with the water right, including, but not limited to, historical aerial photography, records of historical diversions, or historical studies containing evidence regarding water use. Water diverted but not consumed does not qualify as Permanently Retired Groundwater for purposes of satisfying the Depletion Reduction obligation.

D. Additional Depletion Reduction.

New Mexico may Permanently Retire Groundwater in addition to the Depletion Reduction obligation under Section III.A if, in its sole discretion, it determines such retirement is needed to meet its Compact obligations, its obligations under this Groundwater Settlement Agreement, or other water management objectives.

E. Future Use of Surface Water from Permanently Retired Lands.

1. The surface water rights from Permanently Retired Lands may not be used on the lands from which they were acquired except for uses incidental to land ownership such as planting a cover crop or nuisance control.

2. New Mexico may continue to use surface water rights from Permanently Retired Lands for Project purposes such as irrigation on other lands within EBID, subject to EBID allotment, assessments, and EBID policy.

3. New Mexico may also use surface water rights from Permanently Retired Lands for miscellaneous purposes, such as aquifer recovery projects, replacement water, offsets, or allocation transfers, if such use is authorized by Reclamation and EBID, for example through a third-party implementing contract, and all terms and conditions of the third-party implementing contract are followed.

F. Future Use of Permanently Retired Lands.

1. Valid groundwater rights or combined surface and groundwater irrigation rights may be transferred onto Permanently Retired Lands, and exercised there, if the transfer results in no net increase in Depletions. Groundwater rights or combined surface and groundwater rights that are transferred must satisfy the eligibility requirements in Section III.B of this Groundwater Settlement Agreement.

2. Permanently Retired Lands may be served by a utility, mutual domestic, or other water provider for non-irrigation purposes, provided it results in no net increase in Depletions.

3. Nothing in this Groundwater Settlement Agreement prevents New Mexico from selling or otherwise disposing of Permanently Retired Lands that it may acquire, provided that if New Mexico sells or otherwise disposes of Permanently Retired Lands, New Mexico must make legally enforceable arrangements to ensure that water is not used on said lands except as provided in Sections III.E and F of this Groundwater Settlement Agreement.

G. Depletion Reduction Reporting.

Beginning after the Effective Date, New Mexico will prepare an annual report that details the previous year's Permanent Groundwater Retirement for the Depletion Reduction obligation. The annual report will document the groundwater rights that were retired during the previous year, the acreage and calculation of the Depletion Reduction based on the provisions in Section III.C of this Groundwater Settlement Agreement, the total groundwater rights retired since the Effective Date, and any use of the surface water rights associated with Permanently Retired Lands.

1. The annual report will be available as a draft for review and comment by Reclamation no later than the third Friday in February.

2. New Mexico will finalize the annual report no later than the first Friday in April.

3. After New Mexico has satisfied its Depletion Reduction obligation pursuant to Section III.A, no further annual reports will be required. However, New Mexico will include information in the Lower Rio Grande Water Master's Annual Report on the use of the surface water rights associated with Permanently Retired Lands, the continuing non-use of water on Permanently Retired Lands, maintenance of the Depletion Reduction obligation, and any proposed or approved transfers onto Permanently Retired Lands.

IV. ENFORCEABLE HYDROLOGIC CONDITIONS

A. UVDR3:

The following UVDR3 provisions shall apply following adoption of the LRG Plan:

1. New Mexico shall take all reasonable action to maintain UVDR3 above 0.79, while considering Project Viability.

2. The UVDR and UVDR3 shall be calculated annually in accordance with the method set forth in Appendix D. Reclamation shall perform the initial calculation and notify New Mexico of the calculation by no later than the third Friday in February. New Mexico shall have until the first Friday in April of each year to review and comment on the data and calculation.

3. If Reclamation and New Mexico do not agree on the UVDR and UVDR3 calculations by May 1 of each year, the UVDR3 for the period in dispute will be considered provisional, subject to the consultation process described in Section IV.A.5.

4. If UVDR3 is below 0.79, or the Parties do not agree on the UVDR or UVDR3 calculations, Reclamation may notify New Mexico that it is invoking the consultation process. Within three (3) months of the notice, the Parties shall initiate the consultation process identified below.

5. Consultation Process for UVDR3: If Reclamation notifies New Mexico that it is invoking the consultation process, the Parties shall consult as follows:

    a. At a minimum, the consultation process shall include:

        i. A review of the data and analysis to determine whether UVDR3 is below 0.79. If the Parties determine that UVDR3 is not below 0.79, or the Parties do not agree on whether UVDR3 is below 0.79, the consultation is concluded.

        ii. If the Parties determine that UVDR3 is below 0.79, a review of groundwater levels and other information to assess the cause(s)

for UVDR3 falling below 0.79 and to discuss the actions New Mexico may take to bring the UVDR3 above 0.79, while also considering Project Viability in New Mexico.

b. Subject to the Judicial Review provisions of Section VI, New Mexico shall have discretion to determine what water management actions are necessary and appropriate to bring UVDR3 above 0.79. If Reclamation does not agree with New Mexico on how to bring the UVDR3 above 0.79, the United States' sole remedy is to seek Judicial Review as contemplated in Section VI.A.2.

c. Subject to the Judicial Review provisions of Section VI, nothing in this Groundwater Settlement Agreement shall be construed to limit the authority, discretion, or ability of New Mexico to administer water or Depletions. Even as the UVDR3 consultation is ongoing, New Mexico may administer water or Depletions as it deems appropriate or advisable to bring UVDR3 above 0.79.

d. The consultation process shall be completed within six (6) months of receipt of the notice identified in Section IV.A.4.

B. Aquifer Storage Loss:

The following provisions on Aquifer Storage Loss shall apply three (3) years after the adoption of the LRG Plan:

1. New Mexico shall take all reasonable action to achieve stable or gaining Aquifer levels when CAB3 is greater than 400,000 acre-feet, while considering Project Viability.

2. Groundwater Monitoring at Indicator Wells. The Parties shall monitor annual changes in groundwater levels in the New Mexico portion of the Aquifer consistent with the methods and procedures identified in Appendix E.

a. The Parties will operate and maintain Indicator Wells to monitor and evaluate groundwater levels in the Aquifer.

b. The Parties will jointly fund the monitoring activities for the Indicator Wells as follows[3]:

i. The Parties will jointly fund annual measurements and regular operation and maintenance of the Indicator Wells and any

[3] This Groundwater Settlement Agreement does not require Reclamation to obligate or transfer funds. The funding in Section IV.B.2.b will be available only after all applicable legal requirements are met, including but not limited to, the negotiation and execution of any necessary agreements, the appropriation of needed funding, and the completion of environmental compliance.

associated instrumentation following the methods identified in Appendix E.

ii. If the Parties determine that a well needs to be improved or replaced for use as an Indicator Well, New Mexico will coordinate and fund these activities with up to fifty percent (50%) cost match from Reclamation.

c. Within six (6) months of the Effective Date, the Parties will consult and select the Indicator Wells using the methods identified in Appendix E.

d. The Indicator Wells must be equipped and operating with the required instrumentation identified in Appendix E within two (2) years of the Effective Date.

3. Initial Evaluation of Aquifer Storage Loss. The Parties will conduct an Initial Evaluation each year based on change in measured water levels at the Indicator Wells, following the method in Appendix E, to determine which category of Aquifer Storage Loss (ASL) applies for that year: (1) Potential ASL, (2) Inconclusive ASL, or (3) No ASL. The Parties will jointly prepare and finalize a summary memorandum of the Initial Evaluation by the first Friday in April.

4. Initiation of the Aquifer Storage Loss Consultation.

a. If the Initial Evaluation concludes that there is Potential ASL and CAB3 is greater than 400,000 acre-feet, the Parties will begin the consultation process for Aquifer Storage Loss as described in Section IV.B.5 and Appendix E.

b. If the Initial Evaluation concludes that there is No ASL, there shall be no consultation process.

c. Reclamation may provide notice that it is initiating the consultation process for Aquifer Storage Loss as described in Section IV.B.5 if:

i. The Initial Evaluation is Inconclusive ASL and CAB3 is greater than 400,000 acre-feet; or

ii. If there is any dispute related to the Initial Evaluation and CAB3 is greater than 400,000 acre-feet.

iii. Notice under this Section IV.B.4.c shall be timely if received within three (3) months of the summary memorandum identified in Section IV.B.3.

5. Aquifer Storage Loss Consultation. If the consultation process is initiated pursuant to Section IV.B.4, the Parties shall consult as follows and as further described in Appendix E:

    a. The Parties will conduct further analysis, as necessary, to determine whether Aquifer Storage Loss has occurred. If the Parties determine that Aquifer Storage Loss has occurred, the consultation shall proceed. If the Parties determine Aquifer Storage Loss has not occurred, or if the Parties do not agree that Aquifer Storage Loss has occurred, the consultation is concluded.

    b. If the Parties determine Aquifer Storage Loss has occurred, New Mexico will consult with the United States to assess cause(s) of Aquifer Storage Loss and discuss actions that New Mexico may take to achieve stable or gaining Aquifer levels when CAB3 is greater than 400,000 acre-feet, while considering Project Viability in New Mexico.

    c. The consultation process may include review of the following data sources:

        i. Measured groundwater levels from Indicator Wells;

        ii. Available measured groundwater levels from other wells;

        iii. Metered flow data on Project releases, diversions, and drainage return flows;

        iv. Streamflow in the Rio Grande (including the Caballo Gage, El Paso Gage, and gages in between); and

        v. Metered and estimated groundwater pumping.

    d. Subject to the Judicial Review provisions of Section VI, New Mexico shall have discretion to determine what actions are necessary and appropriate to achieve stable or gaining Aquifer levels when CAB3 is greater than 400,000 acre-feet. If the United States does not agree with New Mexico on how to achieve stable or gaining Aquifer levels when CAB3 is greater than 400,000 acre-feet, its sole remedy is to seek Judicial Review as contemplated in Section VI.A.3.

    e. Subject to the Judicial Review provisions of Section VI, nothing in this Groundwater Settlement Agreement shall be construed to limit the authority, discretion, or ability of New Mexico to administer water or Depletions. Even as the Aquifer Storage Loss consultation is ongoing,

New Mexico may administer Depletions as it deems appropriate or advisable to achieve stable or gaining Aquifer levels.

f. The Aquifer Storage Loss consultation shall be completed within six (6) months of initiation. Upon conclusion of the consultation, the Parties will jointly document the consultation and, if applicable, actions to be taken by New Mexico to achieve stable or gaining Aquifer levels.

V. LOWER RIO GRANDE WATER MANAGEMENT PLAN

A. New Mexico shall adopt an LRG Plan setting forth its plan to manage and administer water in the Lower Rio Grande within two (2) years of the Effective Date.

B. New Mexico shall review the LRG Plan every five (5) years after adoption. As part of its review, New Mexico shall consult with the Rio Grande Compact Commission and Reclamation and shall submit a written report to the Rio Grande Compact Commission and Reclamation every five (5) years after the adoption of the LRG Plan.

C. At a minimum, the LRG Plan shall include the following elements, but shall otherwise be within the sole discretion of New Mexico:

1. Actions to satisfy and maintain the Depletion Reduction obligation in Section III.

2. Actions from the New Mexico State Engineer closing the Lower Rio Grande Basin.

3. Actions to keep UVDR3 above 0.79.

4. Actions to achieve stable or gaining Aquifer levels when CAB3 is greater than 400,000 acre-feet.

5. Actions to limit Depletions from Domestic Wells in the Lower Rio Grande, including actions to prevent or offset Depletions from future Domestic Wells.

6. A description of district specific rules, State Engineer orders, or alternative administration plans approved by the State Engineer for the Lower Rio Grande.

D. New Mexico shall not adopt or approve district specific rules, State Engineer orders, alternative administration plans, or other measures in the Lower Rio Grande that change the manner in which EBID members' surface, supplemental

groundwater rights, or the Project right held by the United States is administered in priority without the consent of the United States and EBID.

VI. JUDICIAL REVIEW OF THE GROUNDWATER SETTLEMENT AGREEMENT

A. Judicial Review of the Provisions in Section IV.

1. Judicial Review of the provisions contained in Section IV shall not be available until eight (8) years after the Effective Date.

2. The Parties must complete the mandatory consultation provisions in Section IV.A.5 before a lawsuit related to UVDR3 may be filed. A suit related to UVDR3 shall be limited to (1) a dispute over whether UVDR3 is below 0.79; or (2) challenges to the sufficiency of the actions New Mexico adopts to bring the UVDR3 above 0.79 within a reasonable amount of time.

3. The Parties must complete the mandatory consultation provisions in Section IV.B.5 before a lawsuit related to Aquifer Storage Loss may be filed. Any such lawsuit shall be limited to (1) a dispute over whether Aquifer Storage Loss has occurred when CAB3 is greater than 400,000 acre-feet; or (2) challenges to the sufficiency of the actions New Mexico adopts to achieve stable or gaining Aquifer levels within a reasonable amount of time when CAB3 is greater than 400,000 acre-feet.

B. Judicial Review of the Provisions in Section V. The obligation to adopt an LRG Plan in Section V of this Groundwater Settlement Agreement, with the minimum components described above, is subject to Judicial Review, but the specific provisions of the LRG Plan are left to the discretion of New Mexico and are not enforceable.

C. Venue for an action to enforce the terms of this Groundwater Settlement Agreement is proper if filed in the U.S. District Court for the District of New Mexico or the United States Court of Federal Claims, as applicable, except as set forth in Section IX.H, below.

D. This Section VI identifies all possible challenges to, or Judicial Review of, New Mexico actions contemplated or recognized by this Groundwater Settlement Agreement. Any other challenge to water management actions in New Mexico, other than the specific challenges set forth above in this Section VI, shall be subject to applicable state laws and regulations, including applicable laws and regulations regarding the exhaustion of administrative remedies.

VII. NOTICES

All notices and other communications required or permitted to be given hereunder shall be in writing and shall be deemed to have been duly given and delivered, if mailed certified postage prepaid or emailed:

If to New Mexico:

The Rio Grande Compact Commissioner
for New Mexico:

Elizabeth Anderson, P.E., State Engineer
New Mexico Office of the State Engineer
5550 San Antonio Dr. NE
Albuquerque, NM 87109-4127
elizabeth.anderson@ose.nm.gov

With a copy to:

The Rio Grande Compact Commission Legal
Advisor for New Mexico:

Chris Shaw, Deputy General Counsel
New Mexico Interstate Stream Commission
5550 San Antonio Dr. NE
Albuquerque, NM 87109-4127
chris.shaw@ose.nm.gov

If to the United States:

Regional Director
Upper Colorado Region
Attn: UC-4455
125 South State Street
Room 6107
Salt Lake City, Utah 84138-1102
jhearty@usbr.gov

With a copy to:

Area Manager
Albuquerque Area Office
Attn: ALB-107
555 Broadway NE, Suite 100
Albuquerque, NM 87102
mestradalopez@usbr.gov

And to any other address or addresses as may be hereafter specified by notice given to the other Party by anyone desiring a change of address. In providing notice under

this Groundwater Settlement Agreement, days shall be calculated consistent with Rule 6(a) of the Federal Rules of Civil Procedure. Notice shall be deemed effective upon receipt.

VIII. EFFECTIVE DATE

This Groundwater Settlement Agreement will become effective upon entry of both the Decree of Dismissal and the Consent Decree in the Original Action. If, for any reason, the Court should decline to enter the Decree of Dismissal or decline to approve the Consent Decree in the form presented, the entire Groundwater Settlement Agreement shall be null and void and the terms of this Groundwater Settlement Agreement may not be used as evidence in any litigation between the Parties.

IX. MISCELLANEOUS PROVISIONS

A. Construction of the Groundwater Settlement Agreement and Appendices. To the extent a conflict exists between the language of this Groundwater Settlement Agreement and the Appendices or any ambiguity is created by the language of the Appendices, the language of the Groundwater Settlement Agreement controls.

B. No Admission of Liability. This Groundwater Settlement Agreement is a compromise to avoid further litigation only. This Groundwater Settlement Agreement does not represent an admission by any Party to any fact, claim, or defense relating to any issue in this or any future litigation. This Groundwater Settlement Agreement has no precedential value and shall not be used as evidence of any precedent in any litigation.

C. Integration. This Groundwater Settlement Agreement is a fully integrated agreement which sets forth the entire agreement and understanding of the Parties concerning the subject matter of this Groundwater Settlement Agreement. Accordingly, this Groundwater Settlement Agreement supersedes and controls over all prior written and oral communications between the Parties concerning the subject matter of this Groundwater Settlement Agreement.

D. Modification of the Groundwater Settlement Agreement. The Groundwater Settlement Agreement and any of its Appendices may not be waived, rescinded, canceled, terminated, supplemented, amended, or modified in any manner without the prior written consent of both Parties.

E. Binding Effect. This Groundwater Settlement Agreement shall apply to and be binding on the Parties and their present, past and future members, officers, agents, representatives, employees, insurers, heirs, successors, and assigns.

F. Authority to Sign. The undersigned representatives of the Parties certify that they are fully authorized by their respective Party to execute this Groundwater

Settlement Agreement on behalf of the Party and related entities for which they sign, and that they are authorized to bind such Parties to the terms stated herein.

G. Anti-Deficiency Act. No provision in this Groundwater Settlement Agreement shall be interpreted as or constitute a commitment or requirement that the United States Department of the Interior, Reclamation, or their offices or officials obligate or pay funds in violation of the Anti-Deficiency Act, 31 U.S.C. § 1341, or any other law or regulation.

H. No Third-Party Rights. Nothing in this Groundwater Settlement Agreement is intended or shall be construed to create rights in, or authorize any cause of action by, anyone not a Party to this Groundwater Settlement Agreement, except EBID has the right to file suit regarding New Mexico's Depletion Reduction obligation established in Section III, above, as set forth in the Operations Settlement Agreement.

I. Jointly Drafted Agreement. This Groundwater Settlement Agreement shall be considered a jointly drafted contract and shall not be construed against any Party as the drafter.

J. Attorney's Fees and Costs. The Parties agree to separately bear their own costs and attorney's fees arising from these proceedings and the negotiation and execution of this Groundwater Settlement Agreement.

K. Counterparts. This Groundwater Settlement Agreement may be executed in one or more counterparts, each of which shall be deemed an original, and all of which together constitute one and the same instrument, and photographic copies of such signed counterparts may be used in lieu of the original.

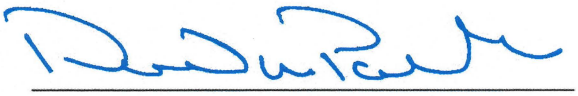
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FOR THE UNITED STATES OF AMERICA:



D. John Sauer
Solicitor General
Counsel of Record
Curtis E. Gannon
Deputy Solicitor General
Frederick Liu
Assistant to the Solicitor General
U.S. Department of Justice
Washington, D.C. 20530-0001
SupremeCtBriefs@usdoj.gov
(202) 514-2217

Dated: 8/28/25



David M. Palumbo
Acting Commissioner
Bureau of Reclamation
U.S. Department of the Interior

Dated: 8-27-2025

FOR THE STATE OF NEW ~~MEXICO~~:

RAÚL TORREZ
New Mexico Attorney General
JAMES GRAYSON
Chief Deputy Attorney General
New Mexico Department of Justice
408 Galisteo St.
Villagra Building
Santa Fe, NM 87501
jgrayson@nmdoj.gov
(505) 490-4060

JEFFREY J. WECHSLER
SHELLY DALRYMPLE
KALEB W. BROOKS
Special Assistant Attorneys General
Spencer Fane LLP

BENNETT W. RALEY
LISA M. THOMPSON
MICHAEL A. KOPP
Special Assistant Attorneys General
Trout Raley

JOHN B. DRAPER
CORINNE E. ATTON
Special Assistant Attorneys General
Draper & Draper LLC

Dated: 8/26/25

In the Supreme Court of the United States

No. 141, Original

STATE OF TEXAS, PLAINTIFF

v.

STATE OF NEW MEXICO AND
STATE OF COLORADO, DEFENDANTS

UNITED STATES OF AMERICA, INTERVENOR

DECREE OF DISMISSAL

This cause, having come to be heard on the Report of the Special Master appointed by this Court on the United States' and New Mexico's joint motion to dismiss the United States' claims, IT IS HEREBY ORDERED THAT:

The United States' claims in this case are hereby dismissed with prejudice.

GROUNDWATER SETTLEMENT AGREEMENT - APPENDIX A

Appendix B

Deadlines for Groundwater Settlement Agreement

This Appendix summarizes the deadlines set forth in the Groundwater Settlement Agreement (GSA). To the extent that any deadline or date in this Appendix B is inconsistent with the Groundwater Settlement Agreement, the terms of the Groundwater Settlement Agreement shall control.

Reference in the GSA	Deadline	Description
Depletion Reduction		
III.A.1	Within 5 years of the Effective Date	New Mexico shall Permanently Retire Groundwater to reduce Depletions by a minimum of 9,100 acre-feet per year
III.A.2	Within 10 years of the Effective Date	New Mexico shall Permanently Retire Groundwater to reduce Depletions by a total of 18,200 acre-feet per year
UVDR3		
IV.A	Following adoption of the LRG Plan	UVDR3 provisions contained in Section IV.A shall apply
IV.A.2	3rd Friday in February each year	Reclamation shall perform the initial calculation of UVDR and UVDR3 and notify New Mexico of the calculation
IV.A.2	1st Friday in April each year	Deadline for New Mexico to review and comment on the data and calculation of the UVDR and UVDR3
IV.A.3	May 1st of each year	Deadline for the United States and New Mexico to agree on the annual UVDR and UVDR3 calculations. If the Parties do not agree, the UVDR3 for the period in dispute will be considered provisional, subject to the consultation process described in Section IV.A.5
IV.A.4	Within 3 months of the United States giving notice that it is initiating the UVDR3 consultation process	Parties to initiate the UVDR3 consultation process
IV.A.5.d	Within 6 months of receipt of notice identified in Section IV.A.4	UVDR3 consultation process shall be completed

Reference in the GSA	Deadline	Description
Aquifer Storage Loss		
IV.B	3 years after adoption of the LRG Plan	The Aquifer Storage Loss provisions contained in Section IV.B shall apply
IV.B.2.c	Within 6 months of the Effective Date	Parties must consult and select Indicator Wells
IV.B.2.d	Within 2 years of the Effective Date	Indicator Wells must be equipped and operating with the required instrumentation
IV.B.3	1st Friday in April each year	Parties to jointly prepare and finalize a summary memorandum of the Initial Evaluation of Aquifer Storage Loss
IV.B.5.f	Within 6 months of initiation	Aquifer Storage Loss consultation shall be completed
LRG Plan		
V.A	Within 2 years of the Effective Date	New Mexico shall adopt an LRG Plan setting forth its plan to manage and administer water in the Lower Rio Grande
V.B	Every 5 years after adoption of the LRG Plan	New Mexico shall review the LRG Plan and submit a written report on the LRG Plan to the Rio Grande Compact Commission and Reclamation
Judicial Review		
VI.A.1	8 years after the Effective Date	Judicial Review available for the provisions contained in Section IV

Technical Memorandum: Method for Determining Consumptive Use on Irrigated Acreage in the Lower Rio Grande, New Mexico

To: New Mexico, Interstate Stream Commission
Date: August 13, 2025
From: Dave M. Romero and Steven E. Silver, Balleau Groundwater, Inc.

Introduction

This Technical Memorandum proposes a method to quantify water consumed by irrigation on farm tracts in the Lower Rio Grande (LRG) Basin in New Mexico. The approach is based on a method of partitioning the components of consumptive use (CU) from eeMETRIC OpenET data (OpenET, 2025). More specifically, this memo: (1) describes the technical methodology used to partition the components of CU, (2) verifies this technical methodology by comparing results to a canal and farm budget methodology, and (3) applies the methodology on a subset of lands within the LRG to quantify an average per acre consumptive use of groundwater.

Description of Technical Methodology

OpenET provides satellite-based estimates of the amount of water that transfers from the land surface to the atmosphere through the process of evapotranspiration (ET). The method[1] is ideal because it provides readily available monthly estimates of ET dating back to the year 2000. Herein we describe a methodology using OpenET to quantify consumptive use on lands in the LRG Basin in New Mexico. The approach is described in a series of steps that can be reproduced with basic GIS software such as ArcGIS.

1. **Step 1** – Determine the area for which ET information is sought. Access the publicly available OpenET data servers to download the results of the ET analysis for that area. The ET information retrieved will be total CU of water, which includes two components: CU derived from precipitation and CU derived from applied water (irrigation).

2. **Step 2** – Adjust the OpenET data for local-scale factors. OpenET uses weather station measurements and other data across the U.S. that are processed into regional-scale gridded datasets that that generally range in dimension from 1 x 1 km^2 to 4 x 4 km^2. Whenever possible, it is a prudent approach to enhance the OpenET analysis when local-scale ET information is available.[2] Allen (2019) produced a METRIC[3] ET analysis in the LRG with an enhanced algorithm that refines canopy/shading effects specific to the LRG.

[1] see https://etdata.org/methodologies/
[2] The developers of OpenET "*…encourage users to rely upon their knowledge of local conditions in applying the ensemble ET value, or selecting a single model or subset of models for use in their application.*" (https://etdata.org/known-issues/, Item 8).
[3] **M**apping **E**vapo**t**ranspiration at high **R**esolution with **I**nternalized **C**alibration model (METRIC).

Accordingly, we scaled the OpenET METRIC analysis to fit an analysis completed by Allen (2019) for year 2013. The overall result was an increase to the OpenET analysis of about 10 percent.

3. **Step 3** – Of interest is water consumed by irrigation, so it is necessary to isolate the CU associated with irrigation by subtracting the effective precipitation from CU to derive CU of applied water (CUaw). In the example herein, we estimated effective precipitation based on (USDA and others, 1962). We note that OpenET is in the process of developing estimates of effective precipitation so the information for this step will soon be available from the OpenET servers for review.

4. **Step 4** – Separate the CU from the irrigation water into two components: consumptive use of applied surface water (CUasw) and consumptive use of applied groundwater (CUagw). A straightforward approach to quantifying CUasw is to partition New Mexico's surface-water into the portion of the Elephant Butte Irrigation District (EBID) allotment that is consumed.[4] Then, any remaining CU (quantified in Step 3) is attributed to CUagw and soil moisture.

We note that in steps 3 and 4 above, we designate the terminology CU of applied water (irrigation) is equal to the sum of CU of applied surface water and CU of applied groundwater, or

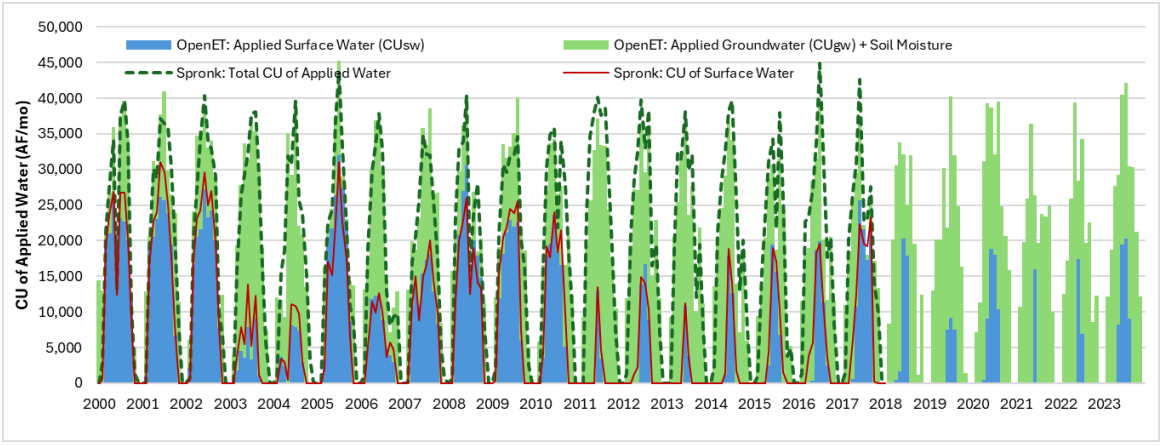
$$CUaw = CUasw + CUagw. \quad (1)$$

Verification of Technical Methodology

To verify the methodology described above, we applied Steps 1 through 4 to the irrigated areas of the New Mexico portion of the LRG, or within EBID, and compared the results to the canal and farm budget developed by Spronk (2020). **Figure 1** shows the comparison from 2000 through 2017.

The stacked areas in **Figure 1** represent the monthly surface water (blue) and groundwater + soil moisture (green) portions of the CU from years 2000 through 2023 as derived from the OpenET methodology. The top of the stack (blue + green) is the total CU of applied water (irrigation). For qualitative comparison, **Figure 1** also shows lines representing the LRG Canal and Farm Budget (CFB) developed by (Spronk, 2020) from the years 2000 to 2017. The red line is CU of applied surface water, and the dashed green line is total CU of total applied water so that subtracting the red line from the dashed green line would isolate the CU of groundwater.

[4] We note that if all the EBID allotment is equal to the delivered water to individual farms, then this consumed portion would be equal to the allotment times the estimated on-farm irrigation efficiency. In the next section of this document, we clarify that we use a factor of 0.70.



CFB = Canal and Farm Budget (Spronk, 2020)

Figure 1. Open ET and CFB irrigation components compared.

CUasw is CU of applied surface water
CUagw is CU of applied groundwater

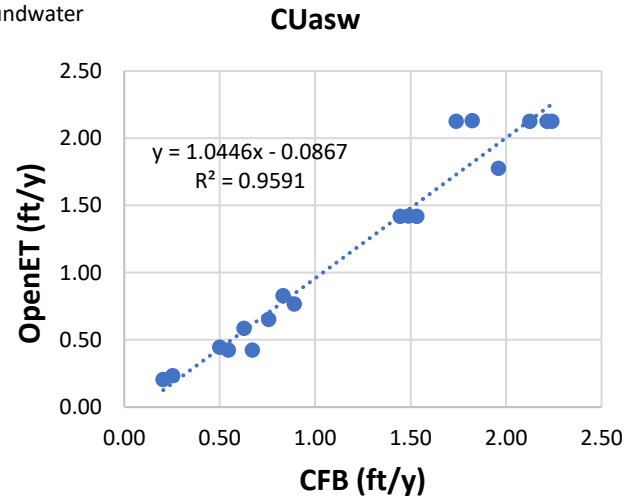


Figure 2. Year-by-year comparison of OpenET and CFB in years 2000 through 2017 (CUasw).

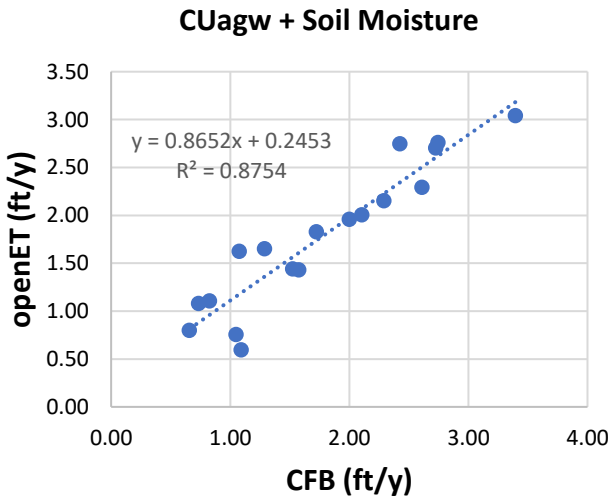


Figure 3. Year-by-year comparison of OpenET and CFB in years 2000 through 2017 (CUagw + soil moisture).

More quantitative comparisons of year-by-year (2000 through 2017) consumptive use of applied water between the CFB and OpenET methodologies are shown in **Figure 2** for CUasw and **Figure 3** for CUagw with soil moisture. For surface water, the 18-year correlation of year-to-year values has R^2= 0.96 compared to R^2= 0.88 for groundwater with soil moisture.

In addition to the year-by-year comparison above, a comparison of the average consumptive use of applied water from 2000 through 2017 is of interest (Table 1). The total CUaw (CUasw and CUagw with soil moisture) is 2.98 ft/yr calculated with the CFB and 2.96 ft/yr calculated with OpenET.

Table 1. 18-year average CU of applied water (all lands in EBID).

Method	Average CU of Applied Water (2000 - 2017)		Total (ft/yr)
	Surface Water (ft/yr)	Groundwater + Soil Moisture (ft/yr)	
CFB	1.21	1.77	2.98
OpenET	1.18	1.78	2.96

The OpenET approach implemented herein and the CFB (Spronk, 2020) are similar, even though there is a general difference between the two approaches. Namely, Spronk (2020) developed a comprehensive farm water budget that considers water releases, conveyance efficiency, on-farm efficiency and irrigation water partitioning with root zone soil moisture and water demands that build from a daily water accounting methodology (Davids Engineering, 2019). The OpenET approach generalizes the farm water budget by partitioning the consumptive use on LRG farms into two parts (CUasw and CUagw with soil moisture). We note that Spronk uses an on-farm efficiency of 0.75. For the OpenET methodology, we use a factor of 0.70, which, as described in Footnote 4, is on-farm efficiency assuming all the EBID allotment gets delivered to individual farm tracts. However, the general alignment between the OpenET methodology and the more comprehensive canal and farm budget methodology verifies that the OpenET method is reasonable for purposes of determining the consumptive use of groundwater in the LRG.

Application of Technical Methodology

We applied the OpenET methodology to two regions of land in EBID. The first is 6,191 acres of land entered into the Groundwater Conservation Program (GCP) implemented by the New Mexico Interstate Stream Commission (ISC). The second region is all irrigated lands in EBID.

For the 6,191 acres of land currently active in the GCP, we applied the OpenET methodology for the purpose of estimating an average annual consumptive use of applied groundwater for use by New Mexico. The result, 1.97 ac-ft/acre/year, is shown in **Figure 4**. A small portion of these lands are irrigated by groundwater only.

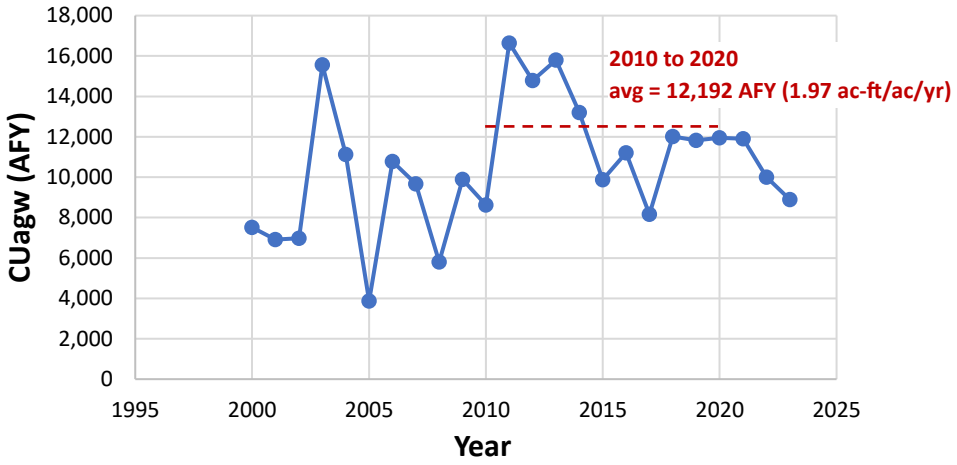


Figure 4. OpenET groundwater irrigation CU estimate on 6,191 acres in the GCP (including soil moisture). The average CUagw in the 11 years from 2010 through 2020 is 12,192 AFY, which translates to an average of 1.97 ft/yr. (Although not shown on Figure 4, the total average CUaw over the same 11-year period is 2.73 ft/yr implying CUasw is 0.76 ft/yr.)

To estimate the average annual consumptive use of applied groundwater for all lands in EBID, we applied the OpenET methodology and then describe a comparison with the 6,191 acres of land in the GWP. The resulting OpenET calculation for all EBID lands is shown in Figure 5.

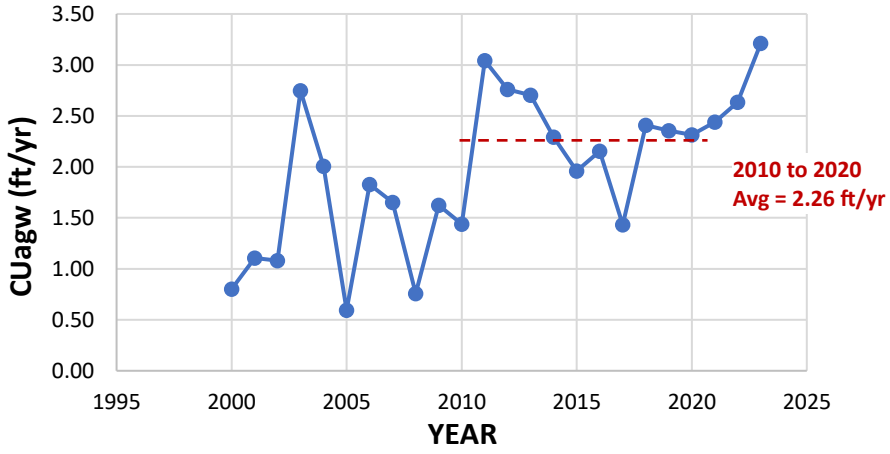


Figure 5. OpenET groundwater irrigation CU estimate on all lands in the NM portion of the LRG (including soil moisture).

The calculation of CUagw in **Figure 5** is based on dividing the total CUagw by the annual observed irrigated acreage estimated by Intera (2019) from years 2000 to 2018 and from the OpenET data for years post 2018. For the post 2018 lands, we added tracts deemed historically irrigable by Intera that had at least 12 inches of applied water in a single year.

The average CUagw on **Figure 5** from 2010 to 2020 is 2.26 ft/yr. On irrigated lands that entered the GWP (**Figure 4**), we calculated 1.97 ft/yr over the same time period. Accordingly, the average CUagw on land tracts that entered the GWP consume 87.2% (1.97/2.26) of the average of water consumed by all irrigation lands during the 11-year period from 2010 through 2020. Assuming some of the higher water consumption crops in the LRG did not enter the GWP, then less water consumption by the lands that did enter is expected, and compatible with the finding herein.

For interest, we also compared the average consumptive use of applied water between OpenET and the CFB for the period from 2010 through 2020 for all lands in EBID. The result is shown in Table 2.

Table 2. 11-year average CU of applied water (all lands in EBID).

Method	Average CU of Applied Water (2010 - 2020)		Total (ft/yr)
	Surface Water (ft/yr)	Groundwater + Soil Moisture (ft/yr)	
CFB	0.81	2.33	3.14
OpenET	0.67	2.26	2.93

Note on Soil moisture: The analysis herein estimates consumptive use of applied groundwater (irrigation) with inclusion of soil moisture. Groundwater is pumped and applied to the land when surface water, effective precipitation and residual soil moisture do not produce enough supply for the crop. Under a general concept that groundwater was applied to the irrigated land because soil moisture from other sources was predominantly consumed by the crop, then the residual soil moisture will tend to be associated with applied groundwater that is consumed, particularly during dry periods with less precipitation and less surface-water supply.

Observation

OpenET, in conjunction with a localized scaling factor developed by New Mexico (Allen, 2019), results in an estimate of irrigation water consumptive use in the LRG in NM that reasonably aligns with a comprehensive Spronk (2020) canal and farm budget (CFB) analysis. This indicates that OpenET is reasonable for estimating consumption of irrigation water use in the LRG to assess reductions in consumptive use associated with groundwater conservation. This Technical Memorandum documents the methodology used by New Mexico to quantify groundwater consumed by irrigated farm tracts in the Lower Rio Grande, New Mexico.

References

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[Intera] Jordan, D, 2019, Analysis of Irrigated Lands in the Rio Grande Valley from Caballo Reservoir in New Mexico to Fort Quitman, Texas: Texas v. New Mexico and Colorado, No. 141, Orig., U.S. Supreme Court.

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[Spronk] Expert Report of Gregory K. Sullivan, P.E. and Heidi M. Welsh: prepared for State of New Mexico, report dated (Revised July 15, 2020).

United States Department of Agriculture (USDA) and the Agricultural Research Service, 1962, Determining Consumptive Use and Irrigation Water Requirements. Technical Bulletin No. 1275.

Groundwater Settlement Agreement – Appendix D

Definition and Calculation of UVDR

The Upper Valley Diversion Ratio (UVDR) is a measure of Rio Grande Project (Project) delivery performance. UVDR is calculated using Equation 1:

$$UVDR = \frac{\begin{pmatrix} Total\ Project\ Diversions\ above\ El\ Paso\ Gage \\ +\ Total\ Flow\ at\ the\ El\ Paso\ Gage \\ +\ Texas\ Mesilla\ DCMI\ Pumping\ in\ Excess\ of\ D2 \end{pmatrix} - (El\ Paso\ Carriage)}{Project\ Release} \quad (1)$$

Total Project Diversions above the El Paso Gage is the sum of measured diversions at all Project diversion points above the Rio Grande at El Paso stream gage (El Paso Gage) during a given calendar year in units of acre-feet. Total Project Diversions above the El Paso Gage includes all measured Project diversions above the El Paso Gage regardless of how those diversions are accounted for in Project accounting. Current Project diversion points above the El Paso Gage include:

- Arrey Canal
- Percha Lateral
- Leasburg Canal
- Clark and California Wasteways
- Del Rio Lateral
- Eastside Canal
- Westside Canal
- EBID River Pumps

Project diversions to canals and laterals are measured at metering stations located near the headings of each canal.[1] Metering stations are operated and maintained by EBID and EPCWID and reported to Reclamation. Project diversions by EBID river pumps are measured by flow meters operated and maintained by EBID and reported to Reclamation. Total Project Diversions above the El Paso Gage will be calculated based on the record of measured diversions jointly maintained by Reclamation, EBID, and EPCWID. If additional Project Diversion sites are established upstream of the El Paso Gage, diversions from those sites will be included in the UVDR calculation.

Total Flow at the El Paso Gage is the total measured streamflow at the El Paso Gage during a given calendar year in units of acre-feet. The El Paso Gage is operated and maintained by the U.S. Section of the International Boundary and Water Commission (US-IBWC). Total Flow at the El Paso Gage will be based on the streamflow record jointly developed with the US-IBWC using streamflow measurements made by Reclamation, EBID, EPCWID, and US-IBWC.

[1] Measured Project diversions exclude excess water diverted at canal headings and returned to the river above canal metering stations for sluicing or other purposes as part of normal operations.

Texas Mesilla DCMI Pumping in Excess of D2 is the total volume of groundwater pumping for domestic, commercial, municipal, and industrial (DCMI[2]) uses in the Texas Mesilla[3] during a given calendar year in units of acre-feet minus the average annual DCMI groundwater pumping in the Texas Mesilla during the period 1951-1978 (D2 Period). The total volume of water of DCMI groundwater pumping includes pumping from municipal or utility wells, including the Canutillo Well Field, and from individual domestic wells, mutual domestic wells, and private commercial and industrial wells. DCMI groundwater pumping is either metered by individual well owners and reported to Texas, or estimated by Texas. New Mexico will obtain DCMI groundwater pumping from Texas for each year and provided it to Reclamation for use in calculating the UVDR. The average annual groundwater pumping during the D2 Period is 17,721 acre-feet.

El Paso Carriage is the volume of water intentionally diverted at Project diversion points in excess of normal operations during a given calendar year that is returned to the Rio Grande for subsequent diversion at downstream diversion points, in units of acre-feet. During the D2 Period, Reclamation determined that in dry years Project canals in the Rincon and Mesilla Valleys were more efficient than the river channel. During these periods, a portion of the water released from Caballo Dam for delivery to EPCWID and Mexico was diverted at Percha, Leasburg, and Mesilla Dams, conveyed through Project canals, and returned to the Rio Grande. This practice of diverting water in excess of normal operational diversions is referred to as El Paso Carriage. El Paso Carriage does not include sluicing at canal headings or operational spills (also referred to as operational waste) from Project canals under normal operations.

El Paso Carriage occurred in 17 out of 28 years during the D2 Period. El Paso Carriage has not occurred since the D2 Period. If El Paso Carriage occurs in the future, the volume of El Paso Carriage will be subtracted in calculating the UVDR as shown in Equation 1. Operational spills that occur under normal operations will not be considered in calculation of the UVDR.

Project Release is the total volume of water released from Caballo Dam in a given calendar year as measured at the Rio Grande below Caballo Dam stream gage (Caballo Gage) in units of acre-feet, excluding water spilled from Caballo Dam or released for flood control purposes. The Caballo Gage is operated and maintained by Reclamation. Project Release will be based on the daily flow record maintained by Reclamation.

Calculation of UVDR and UVDR3

The UVDR for each year will be calculated using Equation (1) and the datasets described above for that calendar year.

The UVDR3 will be calculated for each year using Equation (1) using the three-year total of each of the datasets described above in the numerator and in the denominator. The UVDR3 for year Y will be calculated based on the three-year sums over years Y, Y-1, and Y-2.

[2] DCMI groundwater pumping means pumping for domestic, commercial, municipal, and industrial uses and generally refers to all pumping that is not for irrigation use.
[3] Texas Mesilla is the portion of the Mesilla Valley in Texas.

Consultation Process

If UVDR3 is below 0.79, or the Parties do not agree on the UVDR or UVDR3 calculations, then Reclamation may invoke the consultation process.

If the Parties do not agree on the UVDR or UVDR3 calculation, consultation will include review and evaluation of the data and calculations.

If UVDR3 is below 0.79, consultation will include review and analysis of relevant data and information to assess the cause(s) of UVDR3 falling below 0.79 and discussion of potential actions that New Mexico may take to bring the UVDR3 above 0.79. Relevant data and information include, but are not limited to:

- Surface water supply and distribution data, including metered Project flow data;
- Measured groundwater levels;
- Metered and estimated groundwater pumping;
- Projections of surface water supply;
- Measured climate data, including precipitation and temperature;
- Measured or estimated evapotranspiration; and
- Data and information pertaining to implementation of New Mexico's LRG Plan.

If UVDR falls below 0.79 in a year in which the Caballo Release was less than 200,000 AF, the Parties will consider whether the calculated UVDR reflects aquifer conditions or whether it reflects other factors, such as high evaporative loss or the timing and duration of Project releases. In considering potential actions that New Mexico may take to bring the UVDR3 above 0.79, the Parties will consider recent conditions as well as longer term trends and will consider Project Viability in New Mexico.

Upon conclusion of consultation, the Parties will prepare and finalize a joint memorandum summarizing the consultation. The memorandum will summarize the data, methods, and analyses used in the consultation; the Parties' final determination or disagreement regarding the calculations of UVDR and UVDR3; and the Parties' assessment of the cause(s) UVDR3 falling below 0.79 and any actions identified to bring UVDR3 above 0.79, if applicable.

Modification and Amendment

The Parties may modify or amend the data, methods, and procedures described in this appendix upon written consent of Reclamation and the New Mexico State Engineer, provided that any modification or amendment is consistent with the Groundwater Settlement Agreement.

Groundwater Settlement Agreement – Appendix E
Aquifer Storage Appendix

This appendix describes the data, methods, and procedures by which the United States, through the Bureau of Reclamation (Reclamation), and the State of New Mexico (collectively, Parties) will monitor annual changes in groundwater levels in the Aquifer and assess Aquifer Storage Loss for the purposes of the Groundwater Settlement Agreement.

1. Monitoring of Groundwater Levels

1.1 Selection of Indicator Wells

The parties will select Indicator Wells based on well location and screened interval. Indicator Wells must be distributed throughout the Aquifer, with one Indicator Well located in each of six subareas (Figure 1): Rincon Valley, Mesilla Valley - North of Las Cruces, Mesilla Valley - Las Cruces Area, Mesilla Valley - Mesquite Area, Mesilla Valley - South of Mesquite and West of the Rio Grande, and Mesilla Valley - South of Mesquite and East of the Rio Grande. Indicator Wells must be located within the boundary of the Elephant Butte Irrigation District (EBID), and with no known hydrologic flow barrier between the Indicator Well and the Rio Grande or nearby Rio Grande Project (Project) drains. Indicator Wells must be screened in the shallow portion of the Aquifer, with the screened interval below the current groundwater level and bottom of the screened interval no deeper than 125 feet below the land surface.

Candidate wells are listed in Table 1 and shown in Figure 1. The Parties may select Indicator Wells from the list of candidate wells in Table 1, may select other existing monitoring wells, may establish new monitoring wells, or a combination thereof.

Table 1: Candidate Wells

Subarea	**Candidate Wells**
Rincon Valley	NMISC RIN-02R NMISC RIN-03R
Mesilla Valley – North of Las Cruces	NMISC MES-17R NMISC MES-19R NMISC MES-20R NMISC MES-26R
Mesilla Valley – Las Cruces Area	USGS LC-3B / LC-3C NMISC MES-44R NMISC MES-45R NMISC MES-47R
Mesilla Valley – Mesquite Area	USGS M-4B / M-4C NMISC MES-13R NMISC MES-14R

	NMISC MES-46R
Mesilla Valley – South of Mesquite, West of Rio Grande	NMISC MES-09R NMISC MES-10R NMISC MES-25R
Mesilla Valley – South of Mesquite, East of Rio Grande	NMISC MES-03R NMISC MES-05R NMISC MES-06R

Upon selection of Indicator Wells, the Parties will jointly document well construction information and existing measured groundwater levels for each Indicator well, including but not limited to:

- Well location, including narrative description and geographic coordinates
- Elevation of ground surface at well head
- Elevation at top of well casing (measuring point)
- Drill date
- Well depth
- Well screen interval
- Drill log and well development data, if available
- Original depth to water, if available
- Measured groundwater levels (full available period of record)

1.2 Operation and Maintenance of Indicator Wells

The Parties will operate and maintain Indicator Wells to monitor groundwater levels in the Aquifer. Indicator Wells and associated instrumentation will be operated and maintained consistent with standard practices as described in the Groundwater Technical Procedures of the U.S. Geological Survey (USGS Techniques and Methods 1-A1, Cunningham and Schalk 2011).

The Parties will conduct at least one manual groundwater level measurement at each Indicator Well between January 1 and January 31 of each year. In addition, the Parties will equip each Indicator Well with an automated water level logger or comparable device to measure and record groundwater levels daily or more frequently. All groundwater level measurements, whether manual or automated, will be carried out consistent with the Groundwater Technical Procedures of the USGS.

The Parties will equip each Indicator Well with a telemetry system. Each telemetry system will transmit automated water level measurements to a central database in near real-time. The Parties will provide access to the central database through the internet.

1.3 Consultation Regarding Groundwater Monitoring

In the event that either Party identifies a potential issue with an Indicator Well or with a manual groundwater level measurement from an Indicator Well, the Parties will consult to assess the

issue and determine appropriate actions to resolve the issue. Consultation may include review of measured groundwater levels, field logs, and records of any repair, rehabilitation, modification, or other activity at the subject Indicator Well; comparison of measured groundwater levels at the subject Indicator Well with available measured groundwater levels at other monitoring wells in the vicinity; or additional analysis as needed to determine whether an issue has occurred and to identify appropriate action(s) to resolve the issue.

Potential issues with an Indicator Well include clogging by debris, corrosion, fouling, or sediment; groundwater levels falling below the bottom of the well screen such that the groundwater level cannot be accurately measured; or other conditions that impact the Indicator Well's ability to accurately monitor groundwater levels. Actions to resolve such issues may include repairing, rehabilitating, or replacing the affected Indicator Well. If the Parties determine that an Indicator Well must be replaced, replacement may be achieved by selecting an existing monitoring well or by establishing a new monitoring well. A replacement Indicator Well must be in the same subarea as the Indicator Well being replaced (see Figure 1) and must meet the location and depth requirements described in Section 1.1, above.

Potential issues with a groundwater level measurement include erroneous or improper measurement, measurement with an uncalibrated instrument, transcription error, or other errors that result in an inaccurate measurement. Actions to resolve such issues may include correcting the erroneous measurement based on other available data, using an alternative measurement from the affected Indicator Well, or using an alternative measurement from another suitable well in the vicinity of the affected Indicator Well.

Upon resolving an issue with an Indicator Well or groundwater level measurement, the Parties will jointly prepare a summary memorandum documenting the issue and how the issue was resolved.

2. Initial Evaluation of Aquifer Storage Loss

The Parties will conduct an Initial Evaluation of Aquifer Storage Loss (Initial Evaluation) each year based on change in measured groundwater levels at the five Indicator Wells in the Mesilla Valley. The Initial Evaluation will determine which of the following categories of Aquifer Storage Loss (ASL) applies for that year: (1) Potential ASL, (2) Inconclusive ASL, or (3) No ASL.

The Initial Evaluation will include four steps as described below in Sections 2.1-2.4.

2.1 Review of Measured Groundwater Levels

The Parties will review measured groundwater levels for each Indicator Well for the current year and three prior years, including manual and automated measurements and associated field logs, to assess potential inconsistencies, errors, or other issues with measured groundwater levels. Review will include an assessment of whether the groundwater level at any Indicator Well has

fallen below the bottom of the well screen. Review may include comparison of measured groundwater levels at Indicator Wells to available measured groundwater levels from other monitoring wells in the vicinity.

If either Party identifies a potential inconsistency, error, or other issue with an Indicator Well or measured groundwater level, the Parties will consult as described in Section 1.3, above.

2.2 Calculate Change in Groundwater Levels

The Parties will calculate the change in measured groundwater level at each Indicator Well in the Mesilla Valley over the three most recent calendar years. The three-year change in groundwater level will be calculated from the manual groundwater level measurements conducted per Section 1.2, above, including any correction to the manual groundwater level measurement applied per Section 1.3, above. The groundwater level measurement for each year will be the measurement taken in January of the following year. For example, the calculated three-year change in groundwater level for 2025 is the difference between the manual groundwater level measurements from January 2026 and January 2023.

The calculated three-year change in groundwater level at each Indicator Well will be interpreted as follows:

- If the measured groundwater level at a given Indicator Well falls by 2 feet or more over the three-year period, this will be interpreted as a decrease in Aquifer storage in the vicinity of that well.
- If the measured groundwater level at a given Indicator Well rises by 2 feet or more over the three-year period, this will be interpreted as a gain in Aquifer storage the vicinity of that well.
- If the measured groundwater level at a given Indicator Well changes by less than 2 feet over the three-year period, this will be interpreted as Aquifer stability (no change in Aquifer storage) in the vicinity of that well.

2.3 Assess Potential Aquifer Storage Loss and CAB3

The Parties will evaluate the change in measured groundwater levels at the Indicator Wells in the Mesilla Valley to determine which of three categories of Aquifer Storage Loss (ASL) applies for the current year:

- Potential ASL: If groundwater levels at four or more Mesilla Valley Indicator Wells exhibit a decrease in Aquifer storage, then the Initial Evaluation will conclude that Aquifer Storage Loss has potentially occurred.
- No ASL: If groundwater levels at four or more Mesilla Valley Indicator Wells exhibit Aquifer stability or a gain in Aquifer storage, then the Initial Evaluation will conclude that Aquifer Storage Loss has not occurred.
- Inconclusive ASL: Otherwise, the Initial Evaluation will be deemed inconclusive.

The Parties will calculate the three-year average of the annual release from Caballo Reservoir (CAB3) for three most recent calendar years based on the daily flow record for the Rio Grande Below Caballo Dam stream gage (Caballo Gage; USGS 08362500). For example, CAB3 for 2025 is the average of the annual releases from Caballo Reservoir in acre-feet, as measured at the Caballo Gage, for calendar years 2023, 2024, and 2025.

2.4 Document the Initial Evaluation and Conclusion

The Parties will prepare and finalize a joint summary memorandum of the Initial Evaluation. The summary memorandum will briefly summarize the review of measured groundwater levels, including any potential issues identified during the review (Section 2.1); the calculated three-year change in groundwater level at each Indicator Well, including the measured groundwater levels at the start and end of the three-year period and the interpretation of each calculated change (Section 2.2); and the assessment of Aquifer Storage Loss and calculated CAB3 (Section 2.3).

3.0 Consultation

If the Initial Evaluation concludes that there is Potential ASL and CAB3 is greater than 400,000 acre-feet, the Parties will begin the consultation process for Aquifer Storage Loss. Reclamation may also initiate the consultation process if the Initial Evaluation results in Inconclusive ASL and CAB3 is greater than 400,000 acre-feet, or if there is any dispute related to the Initial Evaluation and CAB3 is greater than 400,000 acre-feet. If the Initial Evaluation concludes that there is No ASL, there will be no consultation process.

The consultation process consists of two stages. The objective of the first stage is to determine whether Aquifer Storage Loss has occurred when CAB3 is greater than 400,000 acre-feet. The objectives of the second stage are to assess the cause(s) of current Aquifer Storage Loss and to discuss actions that New Mexico may take to achieve stable or gaining Aquifer levels when CAB3 is greater than 400,000 acre-feet, while considering Project Viability in New Mexico.

3.1 Stage 1: Determine Aquifer Storage Loss

Consultation to determine Aquifer Storage Loss (Stage 1) will consist of further analysis, as needed, to determine whether Aquifer Storage Loss has occurred. Stage 1 may involve review and analysis of measured groundwater levels at Indicator Wells, including manual and automated measurements; available measured groundwater levels at other monitoring wells in the Aquifer; and any additional available information related to groundwater levels or Aquifer storage over the period of interest. If the Parties agree based on the Initial Evaluation that Aquifer Storage Loss has occurred when CAB3 is greater than 400,000 acre-feet, the Parties will conclude Stage 1 and proceed to Stage 2 (Section 3.2). If following further analysis the Parties do not agree that Aquifer Storage Loss has occurred, the consultation is concluded.

3.2 Stage 2: Assess Causes and Discuss Actions

If Stage 1 determines that Aquifer Storage Loss has occurred when CAB3 is greater than 400,000 acre-feet, the Parties will proceed with consultation to assess the cause(s) of Aquifer Storage Loss and discuss actions that New Mexico may take to achieve stable or gaining Aquifer levels when CAB3 is greater than 400,000 acre-feet (Stage 2). Stage 2 may involve review and evaluation of the following data sources:

- Measured groundwater levels from Indicator Wells;
- Available measured groundwater levels from other wells;
- Metered flow data on Project releases, diversions, and drainage return flows;
- Metered streamflow in the Rio Grande, including metered flows at the Caballo Gage, El Paso Gage, and gages in between;
- Metered and estimated groundwater pumping, including pumping for irrigation and for domestic, commercial, municipal, and industrial (DCMI) uses; and
- Other data, information, or analyses related to groundwater levels and storage in the Aquifer.

In discussing actions, the Parties will consider recent conditions as well as longer term trends and will consider Project Viability in New Mexico.

3.3 Document the Consultation

Upon conclusion of consultation, the Parties will prepare and finalize a joint memorandum summarizing the consultation. The memorandum will summarize the data, methods, and analyses used in the consultation; the Parties' final determination or disagreement regarding whether Aquifer Storage Loss occurred when CAB3 was greater than 400,000 acre-feet; and the Parties' assessment of the cause(s) of Aquifer Storage Loss and any actions that New Mexico may take to achieve stable or gaining Aquifer conditions when CAB3 is greater than 400,000 acre-feet, if applicable.

Modification and Amendment

The Parties may modify or amend the data, methods, and procedures described in this appendix upon written consent of Reclamation and the New Mexico State Engineer, provided that any modification or amendment is consistent with the Groundwater Settlement Agreement.

References

Cunningham, W.L., and Schalk, C.W., comps., 2011, Groundwater technical procedures of the U.S. Geological Survey: U.S. Geological Survey Techniques and Methods 1–A1, 151 p.

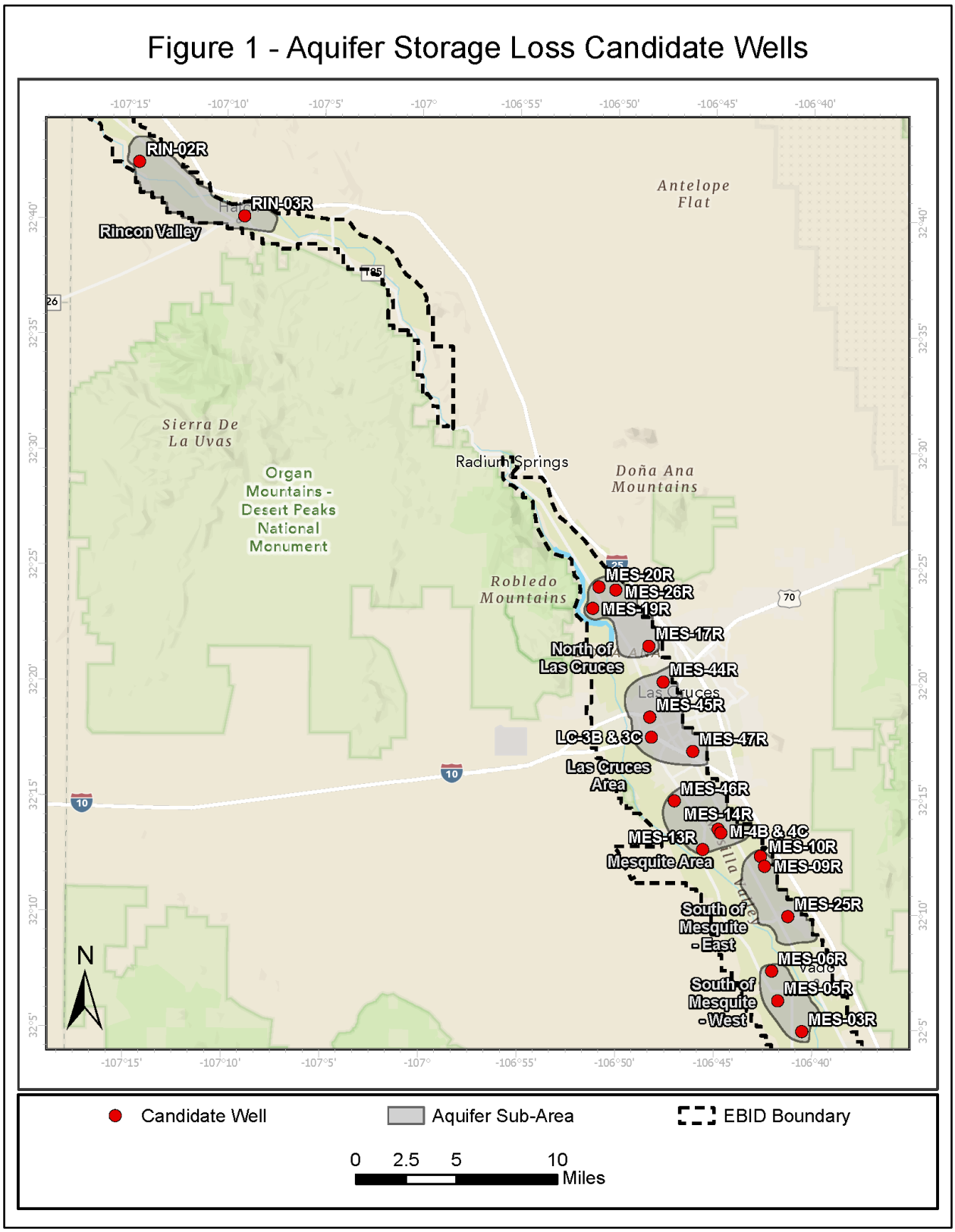


Figure 1: Map of Aquifer Subareas and Candidate Wells.