1000 Central Avenue
Los Alamos, NM 87544

County of Los Alamos

Agenda - Final

Board of Public Utilities

Jeff Johnson, Chair; Stephen McLin, Vice-chair; Andrew Fraser,
Paul Frederickson and Kathleen Taylor, Members
Tim Glasco, Ex Officio Member
Harry Burgess, Ex Officio Member
Susan O'Leary, Council Liaison

Wednesday, March 15, 2017	5:30 PM	1000 Central Avenue Council Chambers

REGULAR SESSION

Complete Board of Public Utilities agenda packets, past agendas, videos, legislation and minutes can be found online at http://losalamos.legistar.com/Calenar.aspx. Learn more about the Board of Public Utilities at http://www.losalamosnm.us/gov/bcc/utilitiesboard.

PUBLIC COMMENTS:

Please submit written comments to the Board at bpu@lacnm.us. Oral public comment is accepted during the two periods identified on the agenda and after initial board discussion on a business item, prior to accepting a main motion on an item. Oral comments should be limited to four minutes per person. Requests to make comments exceeding four minutes should be submitted to the Board in writing prior to the meeting. Individuals representing or making a combined statement for a large group may be allowed additional time at the discretion of the Board. Those making comments are encouraged to submit them in writing either during or after the meeting to be included in the minutes as attachments. Otherwise, oral public comments will be summarized in the minutes to give a brief succinct account of the overall substance of the person’s comments.

1. CALL TO ORDER

2. PUBLIC COMMENT

This section of the agenda is reserved for comments from the public on Consent Agenda items or items that are not otherwise included in this agenda.

3. APPROVAL OF AGENDA

4. BOARD BUSINESS

4.A. Chair's Report

4.B. Board Member Reports

4.C. Utilities Manager's Report

4.D. **County Manager's Report**

4.E. **Council Liaison's Report**

4.F. **Environmental Sustainability Board Liaison's Report**

4.G. **General Board Business**

4.H. **Approval of Board Expenses**

4.I. **Preview of Upcoming Agenda Items**

4.I.1 9202-17 Tickler File for the Next 3 Months

Presenters: Board of Public Utilities

PG. 1-4

5. PUBLIC HEARING(S)

There are no public hearings scheduled for this meeting.

6. CONSENT AGENDA

The following items are presented for Board approval under a single motion unless any item is withdrawn by a member for further Board consideration in the "Business" section of the agenda.

CONSENT MOTION -

I move that the Board of Public Utilities approve the items on the Consent Agenda as presented and that the motions in the staff reports be included in the minutes for the record.
OR
I move that the Board of Public Utilities approve the items on the Consent Agenda as amended and that the motions contained in the staff reports, be included in the minutes for the record.

6.A 9192-17 Approval of Board of Public Utilities Meeting Minutes

Presenters: Department of Public Utilities

PG. 5-16

6.B 9089-17 Approval of Department of Energy (DOE) - Los Alamos County (LAC) Resource Pool Budget Revision for Fiscal Year 2017

Presenters: Bob Westervelt, Deputy Utilities Manager - Finance/Admin

PG. 17-24

6.C 9128-17 Approval of the Transfer of Profit from Electric and Gas Funds to the General Fund for Operations During Fiscal Year 2016

Presenters: Bob Westervelt, Deputy Utilities Manager - Finance/Admin

PG. 25-30

6.D 9152-17 Approval of Task Order No. 9 Under Services Agreement No. AGR15-4217 with GM Emulsion in the amount of $91,339.00, plus Applicable Gross Receipts Tax, for Site Preparation for the Los Alamos Switchgear Substation Installation

Presenters: Department of Public Utilities

PG. 31-36

7. BUSINESS

7.A 8986-17 Approval of Department of Public Utilities Budget for Fiscal Year 2018

Presenters: Bob Westervelt, Deputy Utilities Manager - Finance/Admin

PG. 37-96

7.B 9136-17 Approval of the Long-Range Water Supply Plan

Presenters: James Alarid, Deputy Utilities Manager - Engineering

PG. 97-322

7.D 9137-17 Board of Public Utilities Discussion Concerning Councilor Request for Gas Rate Sunset

Presenters: Jeff Johnson, Chair of the Board of Public Utilities

PG. 323

8. STATUS REPORTS

8.A 9193-17 Status Reports

Presenters: Board of Public Utilities

PG. 324

9. PUBLIC COMMENT

This section of the agenda is reserved for comments from the public on any items.

10. ADJOURNMENT

If you are an individual with a disability who is in need of a reader, amplifier, qualified sign language interpreter, or any other form of auxiliary aid or service to attend or participate in the hearing or meeting, please contact the County Human Resources Division at 662-8040 at least one week prior to the meeting or as soon as possible. Public documents, including the agenda and minutes can be provided in various accessible formats. Please contact the personnel in the Department of Public Utilities (505) 662-8132 if a summary or other type of accessible format is needed.

County of Los Alamos
Staff Report
March 15, 2017

Los Alamos, NM 87544
www.losalamosnm.us

Agenda No.:	4.I.1
Index (Council Goals):	BCC - N/A
Presenters:	Board of Public Utilities
Legislative File:	**9202-17**

Title
Tickler File for the Next 3 Months

Attachments
A - Tickler File for the Next 3 Months

County of Los Alamos

Tickler

Los Alamos, NM 87544
www.losalamosnm.us

Criteria: Agenda Begin Date: 3/20/2017, Agenda End Date: 6/30/2017, Matter Bodies: Board of Public Utiliti

File Number	Title

Agenda Date: 03/20/2017

8988-17 — **Briefing/Report (Dept, BCC) - No action requested** — **Closed Session**

TENTATIVE (ACTUAL DATES TBD) - MULTIPLE CLOSED SESSIONS - Board of Public Utilities Conducts FY2017 Utilities Manager's Performance Evaluation and Amends Goals and Performance Plan for FY2018 (May require several special closed sessions. HR Deadline 4/28 5:00PM)

Department Name: DPU | **Length of Presentation:** Unknown

Drop Dead Date: | **Sponsors:** Board of Public Utilities

Agenda Date: 04/19/2017

8987-17 — **Briefing/Report (Dept, BCC) - No action requested** — **04GGeneral Board Business**

Briefing from County Manager on the County Strategic Objectives

Department Name: DPU | **Length of Presentation:** Apx. 15 Min.

Drop Dead Date: | **Sponsors:** Harry Burgess, County Manager

9060-17 — **Briefing/Report (Dept,BCC) - Action Requested** — **07Business**

Approval of Western Area Power Administration (WAPA) Rocky Mountian Region (RMR) Services Agreement

Department Name: DPU | **Length of Presentation:** Apx. 20 Min.

Drop Dead Date: | **Sponsors:** Steve Cummins, Deputy Utilities Manager - Power Supply

9184-17 — **Briefing/Report (Dept, BCC) - No action requested** — **07Business**

Options for the White Rock Wastewater Treatment Plant

Department Name: DPU | **Length of Presentation:** Apx. 45 Min.

Drop Dead Date: | **Sponsors:** Tim Glasco, Utilities Manager

9197-17 — **Briefing/Report (Dept, BCC) - No action requested** — **07Business**

Preliminary Discussion on Sewer Rate Ordinance

Department Name: DPU | **Length of Presentation:** Apx. 30 Min.

Drop Dead Date: | **Sponsors:** Bob Westervelt, Deputy Utilities Manager - Finance/Admin

9198-17 — **Briefing/Report (Dept, BCC) - No action requested** — **07Business**

Preliminary Discussion on Water Rate Ordinance

Department Name: DPU **Length of Presentation:** Apx. 30 Min.

Drop Dead Date: **Sponsors:** Bob Westervelt, Deputy Utilities Manager - Finance/Admin

9094-17 **Briefing/Report (Dept, BCC) - No action requested** **07Business**

FER Implementation - Presentation and Discussion of the Draft Integrated Resource Plan

Department Name: DPU **Length of Presentation:** Apx. 30 Min.

Drop Dead Date: **Sponsors:** Steve Cummins, Deputy Utilities Manager - Power Supply

Agenda Date: 05/17/2017

CO0487-17 **Code Ordinance** **05Public Hearings**

Approval of Incorporated County of Los Alamos Code Ordinance No. ___-_____ Sewer Rates

Department Name: DPU **Length of Presentation:** Apx. 30 Min.

Drop Dead Date: **Sponsors:** Bob Westervelt, Deputy Utilities Manager - Finance/Admin

CO0488-17 **Code Ordinance** **05Public Hearings**

Approval of Incorporated County of Los Alamos Code Ordinance No. ___-_____ Water Rates

Department Name: DPU **Length of Presentation:** Apx. 30 Min.

Drop Dead Date: **Sponsors:** Bob Westervelt, Deputy Utilities Manager - Finance/Admin

9200-17 **Budget Item** **06Consent**

Approval of Year-end Budget Adjustments

Department Name: DPU **Length of Presentation:** NA

Drop Dead Date: **Sponsors:** Bob Westervelt, Deputy Utilities Manager - Finance/Admin

8703-16 **Briefing/Report (Dept,BCC) - Action Requested** **07Business**

FER Implementation (TENTATIVE) - Approval of Power Sales Agreement for the Carbon Free Power Project (CFPP) & Phase II Budget

Department Name: DPU **Length of Presentation:** Apx. 30 Min.

Drop Dead Date: **Sponsors:** Steve Cummins, Deputy Utilities Manager - Power Supply

Agenda Date: 06/21/2017

9201-17 **Briefing/Report (Dept,BCC) - Action Requested** **07Business**

FER Implementation (TENTATIVE) - Approval of the Integrated Resource Plan

Department Name: DPU **Length of Presentation:** Apx. 60 Min.

Drop Dead Date: **Sponsors:** Steve Cummins, Deputy Utilities Manager - Electric Production

8708-16 **Briefing/Report (Dept, BCC) - No action requested** **07Business**

FER Implementation (TENTATIVE) - Discussion on SJGS Indicative Pricing for Post 2022

File Number	Title	
	Fuel Supply Contract **Department Name:** DPU **Drop Dead Date:**	**Length of Presentation:** Apx. 30 Min. **Sponsors:** Steve Cummins, Deputy Utilities Manager - Power Supply
8984-17	**Briefing/Report (Dept, BCC) - No action requested** Presentation of 2017 Department of Public Utilities Customer Service Survey Results **Department Name:** DPU **Drop Dead Date:**	**07Business** **Length of Presentation:** Apx. 15 Min. **Sponsors:** Julie Williams-Hill, Public Relations Manager

County of Los Alamos
Staff Report
March 15, 2017

Los Alamos, NM 87544
www.losalamosnm.us

Agenda No.:	6.A
Index (Council Goals):	
Presenters:	Department of Public Utilities
Legislative File:	**9192-17**

Title
Approval of Board of Public Utilities Meeting Minutes

Recommended Action
I move that the Board of Public Utilities approve the meeting minutes of February 15th, 2017 as presented.

Body

REQUESTED REVISIONS TO THE DRAFT MINUTES

Draft minutes are sent to members after each meeting for their review. Members may then send changes to be incorporated prior to final approval of the minutes at the next regular meeting. There were no changes.

Attachments
A - Draft BPU Regular Session Minutes - February 15th, 2017

County of Los Alamos

1000 Central Avenue
Los Alamos, NM 87544

Minutes

Board of Public Utilities

LOS ALAMOS

Jeff Johnson, Chair; Stephen McLin, Vice-chair; Andrew Fraser, Paul Frederickson and Kathleen Taylor, Members
Tim Glasco, Ex Officio Member
Harry Burgess, Ex Officio Member
Susan O'Leary, Council Liaison

Wednesday, February 15, 2017	5:30 PM	1000 Central Avenue Council Chambers

REGULAR SESSION

1. CALL TO ORDER

The regular meeting of the Incorporated County of Los Alamos Board of Public Utilities was held on Wednesday, February 15, 2017 at 5:30 p.m. at 1000 Central Ave.,Council Chambers. Board Chair, Jeff Johnson, called the meeting to order at 5:30 p.m.

Present 7 - **Board Member Johnson, Board Member McLin, Board Member Fraser, Board Member Frederickson, Board Member Taylor, Board Member Glasco and Board Member Burgess**

Ms. Taylor joined the meeting at 5:32 p.m.

2. PUBLIC COMMENT

Mr. Johnson opened the floor for public comment on items on the Consent Agenda and for those not otherwise included on the agenda. There were no comments.

3. APPROVAL OF AGENDA

****
Mr. McLin moved that items 4.G., 4.H. and 4.I. be moved after item 8.A. and the agenda be approved as amended. The motion passed by the following vote:
****

Yes: 3 - **Board Member Johnson, Board Member McLin and Board Member Fraser**

No: 1 - **Board Member Frederickson**

Absent: 1 - **Board Member Taylor**

4. BOARD BUSINESS

4.A. Chair's Report

Mr. Johnson reported on the following items:

1) At the September 27th Council meeting, Council contemplated a gas rate. At that time, the Department proposed a continuation of the pass-through rate with no sunset clause. Due to a variety of reasons, the motion was brought to Council three days away

from when the current rate was set to expire. There was no contingency for another gas rate if Council declined to accept the proposed rate. At that meeting, the request passed unanimously by the Council. However, two members expressed regret at having the rate brought to them so late. They didn't feel that they had adequate time to debate the merits of having a pass-through rate or whether there was a need to continue to have a sunset clause. It was brought to Mr. Johnson's attention that these Councilors were still interested in having a discussion. Councilor Izraelivitz and Councilor O'Leary were two of the Councilors who mentioned that they would like to see a continuation of the sunset clause. Councilor Chrobocinski and Councilor Reiss specifically said that they did not see a need to come back with a sunset clause. Since then, there has been an election and there are two new Councilors, so Mr. Johnson does not know how this Council feels about sunset clauses on rates. Councilors Izraelivitz and O'Leary have had discussions with Mr. Johnson about the Board bringing to them the concept of a sunset on the gas pass-through rate. He told them he would discuss it at a Board meeting during the Chair's report to get a sense from Board members how they feel. Mr. Johnson invited Councilor Izraelivitz to come and speak as a member of Council, but not for Council. Councilor Izraelivitz gave a prepared statement, clarifying that he was speaking as an individual, not on behalf of or in any way representing the Council.

The following actions were identified for follow-up:

1) Because this topic was not published on the agenda as a business item, the Board agreed through general consensus to add this topic to the March regular meeting agenda for further discussion.

4.B. Board Member Reports

Board members reported on the following items:

1) Mr. McLin - Mr. McLin has lived in Los Alamos for almost thirty years. He lives in White Rock. Over that time, most of the people he has talked to who live in Los Alamos are unaware of the sandhill cranes that are moving north this time of year along the river. The official end of winter is hooted every afternoon from about 1:30 p.m. to 3:30 p.m. He encouraged those who have never heard the sandhills as they move north to go down to listen to them. They also come down from September to around Thanksgiving, which is the official beginning of winter.

2) Mr. McLin - Board members received in January a Utah Associated Municipal Power Systems (UAMPS) 2016 annual report. Looking through it with interest, he noticed that the Utilities Manager, Timothy Glasco, was listed on the UAMPS Board of Directors. He thought it would be appropriate for public airing for Mr. Glasco to explain why this is not a conflict of interest for the County. He brought up this topic in the interest of complete public disclosure. He believes the UAMPS annual report is considered a public document, so in that sense, it is public disclosure. Mr. Glasco and Assistant County Attorney, Mr. Kevin Powers, both explained why Mr. Glasco's position on the UAMPS Board of Directors is not a conflict of interest.

3) Ms. Taylor - Ms. Taylor attended the American Public Power Association (APPA) Winter Academy. She took two classes: Distributed Generation Cost of Service and Rate Design Implications and Advanced Cost of Service & Current Topics in Electric Rate Design. They were both presented by Mark Beauchamp who recently gave a presentation to the Board on the value of solar study. She thought they were good classes with a lot of in depth information. She asked Mr. Glasco if there was a 12-month rolling ratchet for people who are away for months at a time and close down their houses. He responded that there is not. A lot of the emphasis was on breaking down the rates and being very

accurate about how costs are charged to each customer category. Distributed generation isn't always solar; sometimes a company has its own generating resource, and so it has its own standby rate. There are a lot of special rates that are aimed at trying to make each category of rate payer pay accurately.

The following actions were identified for follow-up:

1) Mr. Glasco will look into getting the APPA Winter Academy course materials to send to the rest of the Board if possible.

4.C. Utilities Manager's Report

Mr. Glasco provided a written report, which is included in the minutes as an attachment.

4.D. County Manager's Report

Mr. Burgess reported on the following items:

1) Mr. Burgess attended a Council meeting the previous evening, during which Council approved a resolution for a bond election for a variety of capital improvement projects primarily focused on recreation projects. There will be a mailout election in the month of May. Ballots will be due back on May 23rd. It is important to the Board because several of the projects require coordination with the Utilities Department. Mr. Burgess commended the Department staff who have helped to obtain estimates and look at different schedules for these projects. They have been very agreeable to work with and have allowed County staff to proceed with a variety of those initiatives. There were also some preceding economic development initiatives, for which additional information was required from the Utilities Department. Mr. Burgess spoke with Councilor O'Leary, who had a conflicting meeting with a citizen advisory group that meets to discuss these efforts, which is why Ms. O'Leary could not attend the Board meeting.

Given the various different separate elections that have recently occurred between November and February, Mr. McLin asked Mr. Burgess if there is a way to combine all these different types of elections. Mr. Burgess explained the laws prohibiting the combination of certain types of elections.

4.E. Council Liaison's Report

Ms. O'Leary was absent. No report was given.

4.F. Environmental Sustainability Board Liaison's Report

Ms. Sue Barnes provided a written report, which is included in the minutes as an attachment.

5. PUBLIC HEARING(S)

There were no public hearings scheduled for this meeting.

6. CONSENT AGENDA

****

Mr. McLin moved that the Board of Public Utilities approve the items on the Consent Agenda as presented and that the motions contained in the staff reports be included in the minutes for the record. The motion passed by the following vote:

****

Yes: 5 - **Board Member Johnson, Board Member McLin, Board Member Fraser, Board Member Frederickson and Board Member Taylor**

6.A 9081-17 Approval of Board of Public Utilities Meeting Minutes

Presenters: Department of Public Utilities

I move that the Board of Public Utilities approve the meeting minutes of January 10th, 2017 and January 18th, 2017 as presented.

7. BUSINESS

7.A 8978-17 Approval and Ratification of Quote No. 40429 for $106,131.06 from Milsoft Utility Solutions for Software Licensing, GIS Database Conversion and Server Setup, and Training, Configuration; and for Ongoing Annual Software Maintenance and Support Services

Presenters: Rafael De LaTorre

Deputy Utility Manager of Electric Distribution, Mr. Rafael De La Torre, presented this item. The following is the substance of the item being considered.

During 2008, staff considered and evaluated three geographical information system (GIS) engineering modeling software systems that incorporate electrical distribution system mapping and modeling capabilities. Under the small purchase provisions of the County's procurement code, licenses for the Milsoft Windmil engineering modeling, contingency analysis, and light table were purchased. The Board of Public Utilities approved the purchase at that time through the normal Departmental budgeting process. Over the course of 4 months, an electrical model of the County's entire electrical distribution system was created for electrical engineering analysis purposes. In 2010, the Department budgeted an additional $120,000.00 to advance the software's abilities and functions. During April 2011, the Milsoft purchase order was approved for payment in the in the amount of $114,000.00 with $57,000.00 to be paid in September 2011. The Milsoft quote also contemplated that the County would then pay Milsoft another 40% for additional work to be completed over the next 4 years. In October 2016, Milsoft submitted for payment invoices totaling $33,681.06. It was then that current County and DPU accounting processes flagged the invoices because current procedures now require that all project costs such as these (possibly exceeding $50,000.00 in total) be combined as one procurement item. Thus it was recommended that the DPU seek Board ratification and approval in lieu of continuing under individual signed Quote #40429.

The Board discussed this item and requested clarification where necessary.

****
Ms. Taylor moved that the Board of Public Utilities approve and ratify the invoiced costs of Milsoft Utility Solutions, quote No. 40429, for $106,131.06 for work performed to date. She further moved that the Board of Public Utilities approve the procurement of ongoing but optional software maintenance and support services of the Milsoft software in the amount of $25,400.00. The motion passed by the following vote:
****

Yes: 5 - **Board Member Johnson, Board Member McLin, Board Member Fraser, Board Member Frederickson and Board Member Taylor**

7.B **9092-17** Approval of the Long-Range Water Supply Plan

Presenters: James Alarid

Deputy Utility Manager of Engineering, Mr. James Alarid, presented this item. The following is the substance of the item being considered.

DPU contracted with Daniel B. Stephens & Associates, Inc. (DBS&A) to revise the Long-range Water Supply Plan. Using the original format and data from the Council-adopted 2006 Long-range Water Supply Plan as a starting point, DBS&A updated the Plan to: reflect current population and water demand projections; evaluate potential climate change impacts; and assess various water supply options, including the timing for development of the County's San Juan-Chama water rights. The revised Long-range Water Supply Plan was presented to the Board of Public Utilities at a public meeting on November 15, 2016 and to the County Council on November 29, 2016. The final step, as required by the Office of the State Engineer, is to get County Council approval for adoption of the final revised Plan on February 28, 2017. Considering input from the Board, Councilors and members of the public, adjustments were made to the plan and were presented to the Board.

The Board discussed this item and requested clarification where necessary.

Mr. Johnson opened the floor for public comments. Members of the public gave the following summarized comments:

1) Mr. Craig Martin, 3100 Arizona Avenue and the Pajarito Conservation Alliance (PCA) - The PCA is concerned about the high/low scenarios involving the return flow credits related to the [Mortendad Canyon] chromium plum remediation. He also feels there were other areas of the plan that could benefit from looking more at reasonably possible scenarios rather than just at worst case scenarios.

2) Mr. Ed Jacobson, 607 Meadow Lane - Mr. Jacobson believes the County has plenty of water for hundreds of years. He does not believe the San Juan-Chama (SJC) water is needed now nor in the foreseeable future. He believes the plan should state that the County will continue to lease the water to the Bureau of Reclamation. He believes that spending more money for consultants to examine SJC water utilization options is a waste.

The following actions were identified for follow-up:

1) The Board agreed that it would be best to table approval of this plan to allow more time for citizen input and to give the consultant additional time to prepare a more complete final report.

****

Mr. Fraser moved that the Board of Public Utilities table this [approval of the Long-Range Water Supply Plan] until next month. The motion passed by the following vote:

****

Yes: 5 - **Board Member Johnson, Board Member McLin, Board Member Fraser, Board Member Frederickson and Board Member Taylor**

7.C 9091-17 Discussion of Wastewater Fund Status, Rate and Future Capital Needs

Presenters: Tim Glasco

Utilities Manager, Mr. Timothy Glasco, presented this item. The following is the substance of the item being considered.

The flow of wastewater into the County treatment plants has been steadily decreasing over at least the past ten years. As this has occurred, the old original plants the County inherited from the Atomic Energy Commission have reached, and passed, their design life. The County borrowed $12 million from the New Mexico State Revolving Loan Fund to construct the Los Alamos Wastewater Treatment Plant. Repayment of that loan began in FY09 and added almost $1 million per year debt service payments to the wastewater budget. In examining the income statement of the wastewater utility, it is apparent that revenues have not kept up with system needs, and the utility is barely financially solvent. At the present income level, the utility can function, but is not accumulating money to bring reserves up to the amount called for in the DPU financial guidelines adopted by the Board. When payments on the estimated $14 million loan that will be required to construct the White Rock Wastewater Treatment plant are included, the fund flow into the wastewater utility becomes deeply negative. The wastewater utility faces two large capital investments in the next five years: replacement of the White Rock Wastewater Treatment Plant and reconfiguring of the Los Alamos Wastewater Treatment Plant to achieve Class 1A effluent. If the design and construction of the White Rock plant is delayed until FY20 and 21 and a rate increase of 8% for FY2018, followed by lesser increases in the following six years is pursued, then the fund will be allowed to grow and be in a condition to absorb the additional debt.

The Board discussed this item and requested clarification where necessary.

The following actions were identified for follow-up:

1) When staff returns to the Board with proposed rate changes, they will include a comparison of rate variations among different rate classes.

Mr. Johnson called for a recess at 7:53 p.m. The meeting reconvened at 8:05 p.m.

Mr. Burgess left the meeting at 7:53 p.m.

7.D 9093-17 Department of Public Utilities FY2018 Budget Presentation

Presenters: Bob Westervelt

Deputy Utility Manager of Finance & Administration, Mr. Bob Westervelt, presented this item. The following is the substance of the item being considered.

Staff presented the proposed budget for FY2018. Mr. Westervelt presented a summary for general administration and each Deputy Utility Manager presented the budget for his own division. The budget as presented is a reduction of 1% from the FY2017 budget and a reduction of 5% from the preliminary FY2018 budget presented last year. This is a preliminary draft, some inputs are still being finalized and some numbers are likely to change between this presentation and the final presentation given to the Board for approval in March.

The Board discussed this item and requested clarification where necessary.

The following actions were identified for follow-up:

1) When staff returns for budget approval at the March meeting, the information presented will show how the Department's financial policies are being implemented.

8. STATUS REPORTS

8.A 9084-17 Status Reports

Presenters: Board of Public Utilities

The following informational status reports were provided to the Board in the agenda packet:

1) Electric Reliability Update
2) Accounts Receivables Report
3) Safety Report

Deputy Utility Manager for Electric Distribution, Mr. Rafael De La Torre, presented the 2016 OSHA Incident Report.

4.G. General Board Business

4.G.1 8985-17 Quarterly Conservation Program Update

Presenters: James Alarid

Items 4.G., 4.H. and 4.I. were moved after item 8.A.

Deputy Utility Manager of Engineering, Mr. James Alarid, presented this item. The following is the substance of the item being considered.

Upon approval of the Energy and Water Conservation Plan in March 2015, the Board requested that staff provide quarterly updates on the Conservation Program and on progress towards the goals and actions identified in the plan.

The Board discussed this item and requested clarification where necessary.

4.G.2 9083-17 Review of Department of Public Utilities Quarterly Report

Presenters: Tim Glasco

Items 4.G., 4.H. and 4.I. were moved after item 8.A.

Utilities Manager, Mr. Timothy Glasco, presented this item. The following is the substance of the item being considered.

The Board requested that the quarterly report be presented each quarter, with salient features explained.

The Board discussed this item and requested clarification where necessary.

4.H. Approval of Board Expenses

Items 4.G., 4.H. and 4.I. were moved after item 8.A.

There were no expenses.

4.I. Preview of Upcoming Agenda Items

4.I.1 [9082-17] Tickler File for the Next 3 Months

Presenters: Board of Public Utilities

Items 4.G., 4.H. and 4.I. were moved after item 8.A.

In addition to the items already listed in the tickler provided in the agenda packet, the following items were identified for the tickler for upcoming meetings:

1) 03/15/2017 - Approval of the Long-range Water Supply Plan (James Alarid)

2) 03/15/2017 - Sunset Clause on Gas Pass-through Rate Discussion (Jeff Johnson)

9. PUBLIC COMMENT

There were no comments.

10. ADJOURNMENT

The meeting adjourned at 10:15 p.m.

****

APPROVAL

____

Board of Public Utilities Chair Name

____

Board of Public Utilities Chair Signature

____

Date Approved by the Board

ATTACHMENT
OFFICER REPORTS
SUBMITTED AT THE MEETING

MANAGER'S REPORT

FEBRUARY 15, 2017

1. Just received a proposal from Voith for work at the El Vado Hydroelectric plant. They proposed to supply the correct seal for the generator, with an estimated 12-week delivery time. We may ask the Board for a special meeting to approve the purchase if it exceeds the Utilities Manager authorization.

2. Negotiations with the Plumbers and Pipefitters Union, Local 412 are scheduled to begin in early March. The contract expires at the end of June. This union represents the water production, wastewater treatment, and GWS field workers.

3. Pajarito Well No. 4 malfunctioned in the early fall of 2016. The pump has been removed and examined and determined to be a total loss. Quotes are being solicited for a new pump that can handle the deep setting. It is not anticipated that a replacement can be installed before late May at the earliest.

4. We received the easement from the local DOE office for the Los Alamos Substation. It still needs to be cleared by Albuquerque DOE before adoption by the County. We expect the easement back by the end of February.

Environmental Sustainability Board liason report

Susan Barns, ESB Liason   2/15/2017

At last night's meeting, the County Council enthusiastically approved our proposal for changing the Brush and Bulk Collection program. Almost two years in the making, the new program will use a third rollcart for weekly curbside collection of yard trimmings, and offer collection of bulk items for $25 per pick up. This approach should increase efficiency and reduce cost to LAC, while reducing unsightliness and improving diversion. Implementation is expected to take 18-24 months, and in the interim, we will go to a quarterly collection schedule for brush, and a paid collection for bulk items.

At our January meeting, the ESB:

- Re-elected John Bliss and Sarah Terrill as our Chair and Vice-Chair
- Drafted our FY2018 Work Plan, to include projects such as:
    - Develop and promote food waste minimization educational materials, and investigate potential for food waste collection
    - Continue to investigate waste-to-energy methods
    - Work with LA Public Schools to educate and implement waste diversion programs including reduce, reuse, recycle and composting
    - Implement a Technical Widget Award which promotes sustainability
    - Implement a Bike to Work week
    - Investigate incentives to improve recycling and diversion rates
    - Participate in county sustainability events such as Earth Day, Bear Festival, Rodeo Festival, and others
    - Host LA Clean Up day, the Recycle Fashion Show, a Recycled Art Workshop, Business Recycler of the Year awards
    - Research Pay-As-You-Throw programs

At our meeting tomorrow night, Charles Bowman will present to the ESB about the GEM*STAR Demonstration Subcritical Reactor for Los Alamos County. The GEM*STAR facility, located at LANCE, would burn waste plutonium and generate biodiesel fuel from wood refuse.

Los Alamos, NM 87544
www.losalamosnm.us

County of Los Alamos
Staff Report
March 15, 2017

Agenda No.:	6.B
Index (Council Goals):	BCC - N/A
Presenters:	Bob Westervelt, Deputy Utilities Manager - Finance/Admin
Legislative File:	**9089-17**

Title
Approval of Department of Energy (DOE) - Los Alamos County (LAC) Resource Pool Budget Revision for Fiscal Year 2017

Recommended Action
I move that the Board of Public Utilities approve the 2017 Resource Pool budget revision as presented and forward to the County Council for its approval.

Staff Recommendation
Staff recommends approval of this 2017 Resource Pool Budget revision.

Body
The Electric Coordination Agreement (ECA) between the County and the Department of Energy requires that a revision to the current year budget be prepared and approved by the contracting parties “if warranted by changes in circumstances”. In practice, this has historically been done when unbudgeted expenditures or cost increases exceeding $50,000 in a single line item or expenditure category are identified and approved by the operating committee. The following items have been identified as meeting this criterion and driving the need for a budget revision.

1. San Juan Mine Reclamation Funding- An additional $1,061,081.00 funding is required to adjust to revised funding levels required by the latest Mine Reclamation Cost Study completed and adopted by the Mine Reclamation Oversight Committee in September of last year. We are required under the San Juan agreements to fully fund by December 31, 2017, but LANL desires to fully fund in this LANL fiscal year, so we are including $707, 387.33 this LAPP fiscal year, and will include the remainder in the next regular 24-month budget.

2. El Vado- $800,000.00. This is to account for the additional costs of the El Vado rewind project. This is the additional funding beyond what has already been budgeted to complete the project. We are estimating $500k to $800k will close out the project, but are recommending budgeting at this time for the higher amount to avoid potentially having to revisit this item again later.

3. PV Site Lead Acid Battery Replacement- $60,000.00. Twelve cells in the lead acid battery failed and need replacement. We are currently using this facility for spin, which saves the Pool roughly $15k per month, so considering the quick payback on these replacement cells consider this expenditure to be in the best interest of the Pool.

4. Abiquiu Valve Installation- $537,000. This is the final estimate on the Abiquiu vent shaft repair that has been discussed and approved previously, but was unbudgeted.

5. PNM NITS Increase -$130,000. This is due to the formula rate increases for this year.

Contracts or agreements for items #2, #3, and #4 have already been approved by the Operating Committee and the Utilities Board, and by Council for the items requiring Council approval. Item #1 is resulting from a revised mine reclamation cost estimate completed and accepted by the Mine Reclamation Oversight Committee, which Los Alamos does have representation on, in September, 2016. It is a contractual obligation of San Juan participation and, as stated, must be fully funded by December 31, 2017, but is being funded as stated to better align with LANL funding availability. The rate increase associated with item #5 was anticipated, but the amount was unknown at the time the original budget was prepared, so is being included here.

This budget adjustment is a formality to adjust the power Pool budget for these expenditures, and does not represent approval of an adjustment to the Los Alamos County budget. Initial review indicates underruns in other areas leave adequate spending authority through the County Budget, but we will continue to monitor and present a County budget revision before fiscal year end if it appears necessary.

This budget revision was approved by the Operating Committee on February 8, 2017.

Alternatives

If this budget revision is not approved by the Board and Council, it could result in future complications in cost recovery through the Power Pool, due to having costs incurred outside the approved and agreed upon budget.

Fiscal and Staff Impact

None. DPU's expenditure authority for purchase power costs is incorporated into the budget approved by the Utilities Board and County Council during the normal budget cycle. Approval of this Resource Pool budget revision is a contractual requirement of the ECA. The Resource Pool budget may differ somewhat from the purchased power expenditure authority requested by DPU during the normal County budget cycle due to timing differences in the budget cycles.

Attachments

A - Revised Resource Pool 24-month Budget Summary

B - Original Approved Resource Pool 24-month Budget Summary

REVISED BUDGET 2-8-17

Department of Energy / Los Alamos County Resource Pool
Including Solar Resource
Fiscal Year 2017
Budget

Los Alamos County Resources	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Total	Total MWh	Cost per MWh
Generation															
San Juan Demand Charge	105,266	105,266	105,266	105,266	105,266	105,266	223,155	223,155	223,155	223,155	223,155	223,155	1,970,530		
San Juan Energy Charge	546,592	546,592	528,960	546,592	528,960	546,592	546,592	493,696	546,592	528,960	546,592	528,960	6,435,678	296,438	$ 28.36
El Vado Demand Charge	131,184	131,184	131,184	131,184	131,184	131,184	264,517	264,517	264,517	264,517	264,517	264,517	2,374,202		
El Vado Energy Charge	57,023	57,023	57,023	57,023	57,023	57,023	57,023	57,023	57,023	57,023	57,023	57,023	684,274	28,091	$ 108.88
Abiquiu Demand Charge	13,313	550,313	13,313	13,313	13,313	13,313	13,313	13,313	13,313	13,313	13,313	13,313	696,752		
Abiquiu Energy Charge	69,971	69,971	69,971	69,971	69,971	69,971	69,971	69,971	69,971	69,971	69,971	69,971	839,655	30,977	$ 49.60
Laramie River Station Demand	243,250	243,250	133,250	133,250	133,250	133,250	133,250	133,250	133,250	133,250	133,250	133,250	1,819,000		
Laramie River Station Energy	112,498	112,498	108,869	112,498	108,869	112,498	112,498	101,612	112,498	67,136	59,878	108,869	1,230,225	77,292	$ 39.45
Western Demand	5,331	5,331	5,331	7,922	7,922	7,922	7,922	7,922	7,922	5,331	5,331	5,331	79,518		
Western Energy	4,826	4,583	4,569	6,503	6,773	7,882	7,003	6,232	6,503	4,732	4,637	4,596	68,839	5,092	$ 29.14
CFPP Deman	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	300,000		
CFPP Energy													-		#DIV/0!
Renewable Energy Purchases	10,026	10,026	9,703	10,026	9,703	10,026	10,026	9,056	10,026	9,703	10,026	9,703	107,817	2,102	$ 51.28
Other Purchased Power	789,110	789,110	789,600	659,400	878,640	907,060	907,060	490,980	170,100	-	-	443,520	6,824,580	194,988	$ 38.77
Spinning Reserve Purchase	61,320	61,320	61,320	61,320	61,320	61,320	61,320	61,320	61,320	61,320	61,320	61,320	735,840		
Economy Sales	-	(2,625)	(7,875)	(15,750)	(5,250)	(2,625)	(5,250)	(18,375)	(10,500)	(28,875)	(141,750)	(5,250)	(244,125)	(9,300)	$ 26.25
Transmission															
Western (LRS)	27,667	27,667	27,667	27,667	27,667	27,667	27,667	27,667	27,667	27,667	27,667	27,667	332,006		
PNM Wheeling	117,702	117,702	117,702	117,702	117,702	117,702	117,702	117,702	117,702	117,702	117,702	117,702	1,412,418		
LASP allocation to batteries	6,033	6,033	6,033	6,033	6,033	6,033	6,033	6,033	66,033	6,033	6,033	6,033	132,395		
OASIS Trans./ Ancil. Services	-	-	-	-	-	-	-	-	-	-	-	-	-		
NORA	8,006	8,006	8,006	8,006	8,006	8,006	8,006	8,006	8,006	8,006	8,006	8,006	96,071		
Jemez	7,273	8,727	5,630	13,270	1,617	1,455	1,789	1,219	10,513	25,982	36,636	21,745	135,856		
Tri-State	1,254	1,505	971	2,288	279	251	309	210	1,813	4,481	6,318	3,750	23,428		
Other Costs															
Norton-STA debt service													-		
Dispatch Center	118,073	118,073	118,073	118,073	118,073	118,073	118,073	118,073	118,073	118,073	118,073	118,073	1,416,876		
Less Kirtland Credit	(50,166)	(51,453)	(47,273)	(46,789)	(44,306)	(45,246)	(41,103)	(39,105)	(41,851)	(41,636)	(43,181)	(45,162)	(537,269)		
Administrative Costs	96,358	96,358	96,358	96,358	96,358	96,358	96,358	96,358	96,358	96,358	96,358	96,358	1,156,292		
Legal Expenses	-	-	-	-	-	-	-	-	-	-	-	-	-		
Summary															
Demand Charges	772,367	772,785	663,335	675,366	664,187	663,057	785,480	786,809	854,961	810,721	821,668	802,227	9,072,962		
Energy Charges	1,734,543	2,268,675	1,705,317	1,590,759	1,799,185	1,852,923	1,982,753	1,488,024	1,240,043	986,479	884,207	1,495,222	19,028,129		
Norton-STA Demand	-	-	-	-	-	-	-	-	-	-	-	-	-		
Customer Charges															
Los Alamos Resource Total	2,506,910	3,041,460	2,368,651	2,266,125	2,463,372	2,515,980	2,768,233	2,274,833	2,095,003	1,797,199	1,705,875	2,297,449	28,101,091	625,680	$44.91

Department of Energy / Los Alamos County Resource Pool
Including Solar Resource
Fiscal Year 2017
Budget

REVISED BUDGET 2-8-17

Department of Energy Resources	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Total	Total MWh	Cost per MWh
Generation															
501 TA-3 Fuel	532	532	532	532	532	532	532	532	532	532	532	532	6,385		
503 TA-3 Steam O&M													-		
505 TA-3 Electric Expense	22,018	22,175	19,747	19,909	23,632	26,707	23,146	23,308	27,193	21,852	28,488	22,337	280,513		
513 TA-3 Maint of Elecric Plant	7,457	7,510	6,688	6,743	8,003	9,045	7,839	7,894	9,209	7,400	9,648	7,565	95,000	260	$ 1,468.84
TA-3 Fixed Charges	-	-	-	-	-	-	-	-	-	-	-	-	-		
Combustion Turbine	13,819	13,819	13,819	13,819	13,819	13,819	13,819	13,819	13,819	13,819	13,819	13,819	165,827	10,296	$ 16.11
Western Demand	90,344	90,344	90,344	96,338	96,338	96,338	96,338	96,338	96,338	90,344	90,344	90,344	1,120,092		
Western Energy	75,566	74,828	72,889	82,382	89,154	86,667	94,250	90,365	92,996	82,694	81,119	88,430	1,011,340	69,979	$ 30.46
Western Peaking Capacity/TX	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	230,400		
Transmission															
562/571 115KV O&M	80,302	80,875	72,020	72,610	86,187	97,404	84,416	85,007	99,175	79,694	103,897	81,465	1,023,051		
Fixed Charges	55,509	55,509	55,509	55,509	55,509	55,509	55,509	55,509	55,509	55,509	55,509	55,509	666,111		
SVC Transmission Credit	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	264,000		
													1,953,162		
Other Costs															
Load Dispatching	-	-	-	-	-	-	-	-	-	-	-	-	-		
Special Projects	85,803	85,803	85,803	85,803	85,803	85,803	85,803	85,803	85,803	85,803	85,803	85,803	1,029,642		
Summary															
Demand Charges	382,634	383,417	371,312	378,112	396,673	412,006	394,252	395,059	414,427	381,803	414,890	384,224	4,708,809		
Energy Charges	89,917	89,179	87,240	96,733	103,505	101,018	108,601	104,716	107,347	97,045	95,470	102,781	1,183,552		
Customer Charges															
Department of Energy Total	472,551	472,596	458,552	474,845	500,178	513,024	502,853	499,775	521,774	478,848	510,360	487,005	5,892,361	80,535	73.17

Department of Energy / Los Alamos County Resource Pool
Including Solar Resource
Fiscal Year 2017
Budget

REVISED BUDGET 2-8-17

Resource Cost	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Total	Total MWh	Cost per MWh
													Total Transmission Cost		$5.62
Demand															
Los Alamos	772,367	772,785	663,335	675,366	664,187	663,057	785,480	786,809	854,961	810,721	821,668	802,227	9,072,962		
Department of Energy	382,634	383,417	371,312	378,112	396,673	412,006	394,252	395,059	414,427	381,803	414,890	384,224	4,708,809		
Total	1,155,001	1,156,202	1,034,646	1,053,478	1,060,860	1,075,063	1,179,732	1,181,868	1,269,388	1,192,523	1,236,558	1,186,451	13,781,771		
Energy															
Los Alamos	1,734,543	2,268,675	1,705,317	1,590,759	1,799,185	1,852,923	1,982,753	1,488,024	1,240,043	986,479	884,207	1,495,222	19,028,129		
Department of Energy	89,917	89,179	87,240	96,733	103,505	101,018	108,601	104,716	107,347	97,045	95,470	102,781	1,183,552		
Total	1,824,460	2,357,854	1,792,557	1,687,493	1,902,690	1,953,941	2,091,354	1,592,740	1,347,389	1,083,524	979,677	1,598,003	20,211,681		
Norton-WTA															
Los Alamos	-	-	-	-	-	-	-	-	-	-	-	-	-		
MW Demand															
LAC Actual Demand	18	17	13	15	16	16	17	15	15	13	13	19			
DOE Actual Demand	77	80	76	76	75	74	77	61	56	57	55	76			
Total Actual Demand	95	97	90	90	91	90	94	76	70	70	69	95			
MW Billing Demand															
LAC Billing Demand	18	17	13	15	16	16	17	15	15	13	13	19			
DOE Billing Demand	77	80	76	76	75	74	77	61	56	57	55	76			
Total Billing Demand	95	97	90	90	91	90	94	76	70	70	69	95			
Norton-WTA Demand															
LAC Billing Demand	18	17	15	15	16	16	17	15	15	15	15	19			
DOE Billing Demand	77	80	76	76	75	74	77	65	65	65	65	76			
Total Billing Demand	95	97	91	91	91	90	94	80	80	80	80	95			
Total Resource Cost	2,979,460	3,514,056	2,827,203	2,740,970	2,963,550	3,029,004	3,271,086	2,774,608	2,616,777	2,276,047	2,216,235	2,784,454	33,993,452	680,334	$ 49.97
Los Alamos Demand %	18.85%	17.28%	14.72%	16.33%	17.97%	17.74%	18.08%	19.60%	21.20%	19.01%	19.38%	20.31%			
Los Alamos Energy %	16.83%	17.59%	15.47%	16.22%	17.27%	18.44%	18.26%	20.37%	21.42%	20.70%	20.46%	17.45%			
Los Alamos Norton-STA %	18.85%	17.28%	16.39%	16.57%	17.97%	17.74%	18.08%	18.75%	18.75%	18.75%	18.75%	20.31%			
Department of Energy Demand %	81.15%	82.72%	85.28%	83.67%	82.03%	82.26%	81.92%	80.40%	78.80%	80.99%	80.62%	79.69%			
Department of Energy Energy %	83.17%	82.41%	84.53%	83.78%	82.73%	81.56%	81.74%	79.63%	78.58%	79.30%	79.54%	82.55%			
DOE Norton-STA %	81.15%	82.72%	83.61%	83.43%	82.03%	82.26%	81.92%	81.25%	81.25%	81.25%	81.25%	79.69%			
Los Alamos Power Cost															
Demand	217,724	199,785	152,283	172,065	190,679	190,709	213,333	231,699	269,093	226,642	239,623	240,938			
Energy	307,137	414,796	277,248	273,782	328,538	360,356	381,864	324,414	288,667	224,274	200,419	278,774			
Norton-STA	-	-	-	-	-	-	-	-	-	-	-	-			
Customer															
Total	524,861	614,581	429,531	445,847	519,217	551,065	595,197	556,113	557,760	450,916	440,042	519,712	6,204,840	123,681	$ 50.17
Deparment of Energy Power Cost															
Demand	937,277	956,417	882,364	881,413	870,181	884,355	966,399	950,169	1,000,295	965,882	996,935	945,513			
Energy	1,517,323	1,943,058	1,515,309	1,413,711	1,574,152	1,593,585	1,709,490	1,268,326	1,058,722	859,250	779,258	1,319,229			
Norton-STA	-	-	-	-	-	-	-	-	-	-	-	-			
Customer															
Total	2,454,600	2,899,475	2,397,673	2,295,124	2,444,333	2,477,939	2,675,889	2,218,495	2,059,017	1,825,132	1,776,193	2,264,742	27,788,612	556,653	$ 49.92
Net Due to Los Alamos	1,982,049	2,426,879	1,939,121	1,820,278	1,944,155	1,964,915	2,173,036	1,718,720	1,537,243	1,346,284	1,265,833	1,777,737	21,896,251		
Distribution Expense	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(24,552)		
Debt Service Savings Split													-		
PV Site Preperation													-		
Service Charge	-	-	-	-	-	-	-	-	-	-	-	-		DOE TOTAL	$ 49.88
Net Adjusted due Los Alamos	1,980,003	2,424,833	1,937,075	1,818,232	1,942,109	1,962,869	2,170,990	1,716,674	1,535,197	1,344,238	1,263,787	1,775,691	21,871,699		

ORIGINAL APPROVED BUDGET

Department of Energy / Los Alamos County Resource Pool
Including Solar Resource
Fiscal Year 2017
Budget

Los Alamos County Resources	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Total	Total MWh	Cost per MWh
Generation															
San Juan Demand Charge	105,266	105,266	105,266	105,266	105,266	105,266	105,266	105,266	105,266	105,266	105,266	105,266	1,263,197		
San Juan Energy Charge	546,592	546,592	528,960	546,592	528,960	546,592	546,592	493,696	546,592	528,960	546,592	528,960	6,435,678	296,438	$ 25.97
El Vado Demand Charge	131,184	131,184	131,184	131,184	131,184	131,184	131,184	131,184	131,184	131,184	131,184	131,184	1,574,202		
El Vado Energy Charge	57,023	57,023	57,023	57,023	57,023	57,023	57,023	57,023	57,023	57,023	57,023	57,023	684,274	28,091	$ 80.40
Abiquiu Demand Charge	13,313	13,313	13,313	13,313	13,313	13,313	13,313	13,313	13,313	13,313	13,313	13,313	159,752		
Abiquiu Energy Charge	69,971	69,971	69,971	69,971	69,971	69,971	69,971	69,971	69,971	69,971	69,971	69,971	839,655	30,977	$ 32.26
Laramie River Station Demand	243,250	243,250	133,250	133,250	133,250	133,250	133,250	133,250	133,250	133,250	133,250	133,250	1,819,000		
Laramie River Station Energy	112,498	112,498	108,869	112,498	108,869	112,498	112,498	101,612	112,498	67,136	59,878	108,869	1,230,225	77,292	$ 39.45
Western Demand	5,331	5,331	5,331	7,922	7,922	7,922	7,922	7,922	7,922	5,331	5,331	5,331	79,518		
Western Energy	4,826	4,583	4,569	6,503	6,773	7,882	7,003	6,232	6,503	4,732	4,637	4,596	68,839	5,092	$ 29.14
CFPP Deman	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	25,000	300,000		
CFPP Energy													-		#DIV/0!
Renewable Energy Purchases	10,026	10,026	9,703	10,026	9,703	10,026	10,026	9,056	10,026	9,703	10,026	9,703	107,817	2,102	$ 51.28
Other Purchased Power	789,110	789,110	789,600	659,400	878,640	907,060	907,060	490,980	170,100	-	-	443,520	6,824,580	194,988	$ 38.77
Spinning Reserve Purchase	61,320	61,320	61,320	61,320	61,320	61,320	61,320	61,320	61,320	61,320	61,320	61,320	735,840		
Economy Sales	-	(2,625)	(7,875)	(15,750)	(5,250)	(2,625)	(5,250)	(18,375)	(10,500)	(28,875)	(141,750)	(5,250)	(244,125)	(9,300)	$ 26.25
Transmission															
Western (LRS)	27,667	27,667	27,667	27,667	27,667	27,667	27,667	27,667	27,667	27,667	27,667	27,667	332,006		
PNM Wheeling	106,868	106,868	106,868	106,868	106,868	106,868	106,868	106,868	106,868	106,868	106,868	106,868	1,282,418		
LASP allocation to batteries	6,033	6,033	6,033	6,033	6,033	6,033	6,033	6,033	6,033	6,033	6,033	6,033	72,395		
OASIS Trans./ Ancil. Services	-	-	-	-	-	-	-	-	-	-	-	-	-		
NORA	8,006	8,006	8,006	8,006	8,006	8,006	8,006	8,006	8,006	8,006	8,006	8,006	96,071		
Jemez	7,273	8,727	5,630	13,270	1,617	1,455	1,789	1,219	10,513	25,982	36,636	21,745	135,856		
Tri-State	1,254	1,505	971	2,288	279	251	309	210	1,813	4,481	6,318	3,750	23,428		
Other Costs															
Norton-STA debt service													-		
Dispatch Center	118,073	118,073	118,073	118,073	118,073	118,073	118,073	118,073	118,073	118,073	118,073	118,073	1,416,876		
Less Kirtland Credit	(50,166)	(51,453)	(47,273)	(46,789)	(44,306)	(45,246)	(41,103)	(39,105)	(41,851)	(41,636)	(43,181)	(45,162)	(537,269)		
Administrative Costs	96,358	96,358	96,358	96,358	96,358	96,358	96,358	96,358	96,358	96,358	96,358	96,358	1,156,292		
Legal Expenses	-	-	-	-	-	-	-	-	-	-	-	-	-		
Summary															
Demand Charges	761,534	761,952	652,501	664,532	653,353	652,224	656,758	658,087	666,238	681,998	692,946	673,505	8,175,628		
Energy Charges	1,734,543	1,731,675	1,705,317	1,590,759	1,799,185	1,852,923	1,849,419	1,354,691	1,106,709	853,146	750,873	1,361,889	17,691,129		
Norton-STA Demand	-	-	-	-	-	-	-	-	-	-	-	-	-		
Customer Charges															
Los Alamos Resource Total	2,496,076	2,493,626	2,357,818	2,255,292	2,452,539	2,505,147	2,506,177	2,012,777	1,772,948	1,535,144	1,443,819	2,035,394	25,866,757	625,680	$41.34

Department of Energy / Los Alamos County Resource Pool
Including Solar Resource
Fiscal Year 2017
Budget

ORIGINAL APPROVED BUDGET

Department of Energy Resources	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Total	Total MWh	Cost per MWh
Generation															
501 TA-3 Fuel	532	532	532	532	532	532	532	532	532	532	532	532	6,385		
503 TA-3 Steam O&M													-		
505 TA-3 Electric Expense	22,018	22,175	19,747	19,909	23,632	26,707	23,146	23,308	27,193	21,852	28,488	22,337	280,513		
513 TA-3 Maint of Elecric Plant	7,457	7,510	6,688	6,743	8,003	9,045	7,839	7,894	9,209	7,400	9,648	7,565	95,000	260	$ 1,468.84
TA-3 Fixed Charges	-	-	-	-	-	-	-	-	-	-	-	-	-		
Combustion Turbine	13,819	13,819	13,819	13,819	13,819	13,819	13,819	13,819	13,819	13,819	13,819	13,819	165,827	10,296	$ 16.11
Western Demand	90,344	90,344	90,344	96,338	96,338	96,338	96,338	96,338	96,338	90,344	90,344	90,344	1,120,092		
Western Energy	75,566	74,828	72,889	82,382	89,154	86,667	94,250	90,365	92,996	82,694	81,119	88,430	1,011,340	69,979	$ 30.46
Western Peaking Capacity/TX	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	19,200	230,400		
Transmission															
562/571 115KV O&M	80,302	80,875	72,020	72,610	86,187	97,404	84,416	85,007	99,175	79,694	103,897	81,465	1,023,051		
Fixed Charges	55,509	55,509	55,509	55,509	55,509	55,509	55,509	55,509	55,509	55,509	55,509	55,509	666,111		
SVC Transmission Credit	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	22,000	264,000		
													1,953,162		
Other Costs															
Load Dispatching	-	-	-	-	-	-	-	-	-	-	-	-	-		
Special Projects	85,803	85,803	85,803	85,803	85,803	85,803	85,803	85,803	85,803	85,803	85,803	85,803	1,029,642		
Summary															
Demand Charges	382,634	383,417	371,312	378,112	396,673	412,006	394,252	395,059	414,427	381,803	414,890	384,224	4,708,809		
Energy Charges	89,917	89,179	87,240	96,733	103,505	101,018	108,601	104,716	107,347	97,045	95,470	102,781	1,183,552		
Customer Charges															
Department of Energy Total	472,551	472,596	458,552	474,845	500,178	513,024	502,853	499,775	521,774	478,848	510,360	487,005	5,892,361	80,535	73.17

ORIGINAL APPROVED BUDGET

Department of Energy / Los Alamos County Resource Pool
Including Solar Resource
Fiscal Year 2017
Budget

	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Total	Total MWh	Cost per MWh
Resource Cost															
												Total Transmission Cost			$5.34
Demand															
Los Alamos	761,534	761,952	652,501	664,532	653,353	652,224	656,758	658,087	666,238	681,998	692,946	673,505	8,175,628		
Department of Energy	382,634	383,417	371,312	378,112	396,673	412,006	394,252	395,059	414,427	381,803	414,890	384,224	4,708,809		
Total	1,144,167	1,145,369	1,023,813	1,042,645	1,050,027	1,064,230	1,051,010	1,053,146	1,080,666	1,063,801	1,107,836	1,057,729	12,884,437		
Energy															
Los Alamos	1,734,543	1,731,675	1,705,317	1,590,759	1,799,185	1,852,923	1,849,419	1,354,691	1,106,709	853,146	750,873	1,361,889	17,691,129		
Department of Energy	89,917	89,179	87,240	96,733	103,505	101,018	108,601	104,716	107,347	97,045	95,470	102,781	1,183,552		
Total	1,824,460	1,820,854	1,792,557	1,687,493	1,902,690	1,953,941	1,958,021	1,459,407	1,214,056	950,190	846,344	1,464,670	18,874,681		
Norton-WTA															
Los Alamos	-	-	-	-	-	-	-	-	-	-	-	-	-		
MW Demand															
LAC Actual Demand	18	17	13	15	16	16	17	15	15	13	13	19			
DOE Actual Demand	77	80	76	76	75	74	77	61	56	57	55	76			
Total Actual Demand	95	97	90	90	91	90	94	76	70	70	69	95			
MW Billing Demand															
LAC Billing Demand	18	17	13	15	16	16	17	15	15	13	13	19			
DOE Billing Demand	77	80	76	76	75	74	77	61	56	57	55	76			
Total Billing Demand	95	97	90	90	91	90	94	76	70	70	69	95			
Norton-WTA Demand															
LAC Billing Demand	18	17	15	15	16	16	17	15	15	15	15	19			
DOE Billing Demand	77	80	76	76	75	74	77	65	65	65	65	76			
Total Billing Demand	95	97	91	91	91	90	94	80	80	80	80	95			
Total Resource Cost	2,968,627	2,966,222	2,816,370	2,730,137	2,952,716	3,018,171	3,009,030	2,512,553	2,294,722	2,013,991	1,954,180	2,522,399	31,759,118	680,334	$ 46.68
Los Alamos Demand %	18.85%	17.28%	14.72%	16.33%	17.97%	17.74%	18.08%	19.60%	21.20%	19.01%	19.38%	20.31%			
Los Alamos Energy %	16.83%	17.59%	15.47%	16.22%	17.27%	18.44%	18.26%	20.37%	21.42%	20.70%	20.46%	17.45%			
Los Alamos Norton-STA %	18.85%	17.28%	16.39%	16.57%	17.97%	17.74%	18.08%	18.75%	18.75%	18.75%	18.75%	20.31%			
Department of Energy Demand %	81.15%	82.72%	85.28%	83.67%	82.03%	82.26%	81.92%	80.40%	78.80%	80.99%	80.62%	79.69%			
Department of Energy Energy %	83.17%	82.41%	84.53%	83.78%	82.73%	81.56%	81.74%	79.63%	78.58%	79.30%	79.54%	82.55%			
DOE Norton-STA %	81.15%	82.72%	83.61%	83.43%	82.03%	82.26%	81.92%	81.25%	81.25%	81.25%	81.25%	79.69%			
Los Alamos Power Cost															
Demand	215,682	197,913	150,688	170,295	188,732	188,787	190,056	206,463	229,086	202,178	214,679	214,798			
Energy	307,137	320,326	277,248	273,782	328,538	360,356	357,518	297,257	260,102	196,676	173,142	255,514			
Norton-STA	-	-	-	-	-	-	-	-	-	-	-	-			
Customer															
Total	522,818	518,239	427,936	444,077	517,270	549,143	547,574	503,720	489,188	398,853	387,821	470,312	5,776,952	123,681	$ 46.71
Deparment of Energy Power Cost															
Demand	928,486	947,455	873,125	872,349	861,295	875,443	860,954	846,683	851,580	861,623	893,157	842,931			
Energy	1,517,323	1,500,528	1,515,309	1,413,711	1,574,152	1,593,585	1,600,502	1,162,150	953,954	753,515	673,201	1,209,156			
Norton-STA	-	-	-	-	-	-	-	-	-	-	-	-			
Customer															
Total	2,445,809	2,447,983	2,388,434	2,286,060	2,435,447	2,469,028	2,461,456	2,008,833	1,805,534	1,615,138	1,566,358	2,052,087	25,982,166	556,653	$ 46.68
Net Due to Los Alamos	1,973,258	1,975,387	1,929,882	1,811,215	1,935,269	1,956,004	1,958,603	1,509,058	1,283,760	1,136,290	1,055,998	1,565,082	20,089,805		
Distribution Expense	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(2,046)	(24,552)		
Debt Service Savings Split													-		
PV Site Preperation													-		
Service Charge	-	-	-	-	-	-	-	-	-	-	-	-		DOE TOTAL	$ 46.63
Net Adjusted due Los Alamos	1,971,212	1,973,341	1,927,836	1,809,169	1,933,223	1,953,958	1,956,557	1,507,012	1,281,714	1,134,244	1,053,952	1,563,036	20,065,253		

Avg Approved Resource Cost	$ 34.59
Avg Purchase Power Cost	$ 35.00
County Load	18.18%
Credit to County for Approved Resource Usage	$ 433,501.92

County of Los Alamos

Staff Report

March 15, 2017

Los Alamos, NM 87544
www.losalamosnm.us

Agenda No.:	6.C
Index (Council Goals):	BCC - N/A
Presenters:	Bob Westervelt, Deputy Utilities Manager - Finance/Admin
Legislative File:	**9128-17**

Title

Approval of the Transfer of Profit from Electric and Gas Funds to the General Fund for Operations During Fiscal Year 2016

Recommended Action

I move that the Board of Public Utilities approve the transfer of revenues from the electric and gas funds to the general fund for electric and gas operations during fiscal year 2016 in accordance with Incorporated County of Los Alamos Resolution 97-07 and forward to the County Council for their approval.

Staff Recommendation

The Utilities Department staff recommends approval of the fiscal year 2016 profit transfers as presented.

Body

In 1997, to establish a methodology for determining operating profits to be transferred to the County general fund, the Board of Public Utilities and the County Council agreed, through a resolution, to transfer from the electric fund and the gas fund an amount equal to 5% of retail sales to customers other than Los Alamos Public Schools and Los Alamos County. Transfer amounts are to be computed after completion of the County's annual financial audit and the transfers are to include interest from the last day of the fiscal year to the date of transfer. Accordingly the transfer for each year's activity is reflected in the following year's budget.

Profit transfers computed for fiscal year 2016 retail sales are $594,680.87 and $226,474.74 for the electric and gas utilities, respectively. A computation worksheet is attached. The budgeted amounts were $648,823 for the electric fund and $260,287 for the gas fund.

Alternatives

The transfers have been accomplished. If the Board and Council do not approve the profit transfers, the funds will revert to the Department of Public Utilities electric and gas funds.

Fiscal and Staff Impact

For FY2016 sales $594,680.87 plus interest from the electric fund to the general fund and $226,474.74 plus interest from the gas fund to the general fund.

Attachments

A - Incorporated County Of Los Alamos Resolution No. 97-07
B - Utilities Profit Transfer Schedule - Fiscal Year 2016
C - Ten Year Historical Utilities Contributions to General Fund

INCORPORATED COUNTY OF LOS ALAMOS RESOLUTION NO. 97-07

A RESOLUTION ESTABLISHING A METHODOLOGY FOR COMPUTING ELECTRIC AND GAS OPERATING PROFITS FOR TRANSFER TO THE COUNTY GENERAL FUND

WHEREAS, the Atomic Energy Commission transferred the utilities to Los Alamos County for the purpose of aiding self-sufficiency; and

WHEREAS, this resolution supersedes Resolution No. 93-05; and

WHEREAS, the Los Alamos Board of Public Utilities and the Los Alamos County Council wish to establish a methodology for determining operating profits which are transferred to the General Fund; and

NOW, THEREFORE, BE IT RESOLVED by the Incorporated County of Los Alamos to:

1. Establish goals to

   a) Achieve annual operating profits for transfer to the General Fund of 5% of total electric and gas utility retail revenues excluding commodity sales to the schools and County.

   b) Adopt a delayed appropriation approach for the General Fund transfer so that:

      Fiscal year 1 - budget and rates set and profit is earned,
      Fiscal year 2 - audit completion, profit transfer from FY1 gas and electric retail revenue excluding commodity sales to the schools and County to the General Fund (to include interest from July 1, FY2),
      Fiscal year 3 - profit available for appropriation with interest.

2. The Board of Public Utilities shall propose and the Council shall approve a budget and rates which provide for all of the following:

   First: funds required for current operations and funds for adequate working capital.

   Second: funds required to redeem and pay interest on any bond issue.

   Third: an adequate reserve to finance replacements required by normal depreciation of the utility plant or equipment as provided in the Schedule of Funds.

Fourth: amounts set forth in the budget as payments to be made to the County in lieu of franchise fees and taxes that normally would be assessed against privately owned gas and electric utilities.

Fifth: adequate provision for plant additions and improvements foreseen as necessary to meet future requirements.

Sixth: adequate provision for a separate gas and electric rate reserve.

Seventh: 5% of total electric and gas utility retail revenues excluding commodity sales to the schools and County.

3. All funds received in excess of those distributed in paragraph 2 above will be transferred to the general fund. Funds budgeted for specific utilities replacements and additions in a given fiscal year but not encumbered in that fiscal year shall be carried forward to the following fiscal year.

4. Council and Board will actively pursue modification to the existing agreement with the DOE to make the Electric Resource Power Pool arrangement equitable for the ratepayers, and produce an operating profit for the County for the risk associated with the operation of the Electric Resource Power Pool.

PASSED, ADOPTED, SIGNED AND APPROVED this 28th day of July, 1997.

COUNCIL OF THE INCORPORATED COUNTY OF LOS ALAMOS, NEW MEXICO

Denise Smith

DENISE SMITH, COUNCIL CHAIR

INCORPORATED COUNTY OF LOS ALAMOS CORPORATE SEAL

ATTEST: (SEAL)

Nita K. Taylor

NITA K. TAYLOR, COUNTY CLERK

INC COUNTY OF LOS ALAMOS
Utilities Profit Transfer Schedule
Fiscal Year 2017

Electric Distribution Fund 512

Revenue Object		FY 2016 Audited Sales	
4301	Residential metered	7,100,595.71	
4305	Private area lighting	12,998.54	
4311	Commercial metered	4,780,023.19	
4314	Industrial sales	-	
			11,893,617.44
			0.05
			594,680.87

Gas Fund 531

		FY 2016 Audited Sales	
4301	Residential metered	3,825,202.51	
4311	Commercial metered	704,292.31	
			4,529,494.82
			0.05
			226,474.74
	Total		821,155.61

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INCORPORATED COUNTY OF LOS ALAMOS
JOINT UTILITY SYSTEM PROFIT TRANSFER AND IN LIEU PAYMENTS TO THE GENERAL FUND
LAST TEN FISCAL YEARS

Table 26

	FRANCHISE FEES [a]		IN LIEU TAX [b]			PROFIT TRANSFER [c]		TOTAL
Fiscal Year	ELECTRIC DISTRIBUTION	GAS	ELECTRIC PRODUCTION	ELECTRIC DISTRIBUTION	GAS	ELECTRIC	GAS	JOINT UTILITY SYSTEM
2007	$ 192,972	$ 182,260	$ 826	$ 111,761	$ 31,668	$ 413,327	$ 407,440	$ **1,340,254**
2008	210,508	174,613	237	114,181	31,363	414,925	420,184	**1,366,011**
2009	210,931	164,301	219	141,275	31,142	442,643	402,342	**1,392,853**
2010	221,476	157,979	902	200,748	54,811	437,711	374,584	**1,448,211**
2011	225,931	123,703	747	174,095	47,631	466,858	361,617	**1,400,582**
2012	235,444	108,900	2,474	181,565	49,922	457,600	282,776	**1,318,681**
2013	233,512	109,421	4,533	175,552	61,835	486,879	250,684	**1,322,416**
2014	231,282	128,916	13,924	189,561	68,787	478,324	253,562	**1,364,356**
2015	247,143	107,219	17,208	206,136	77,004	484,485	297,390	**1,436,585**
2016	279,200	97,940	100,338 [d]	231,536	81,666	524,540	246,867	**1,562,087**

Sources: County financial records

Notes:
[a] Franchise Fees are 2% of all Electric Distribution and Gas revenue from all rate classes.
[b] In Lieu of Property Tax is the net book value of Electric and Gas fixed assets divided by three, times the Los Alamos County property tax rate.
In Lieu excludes San Juan, El Vado and Abiquiu assets located outside Los Alamos County.
[c] Profit Transfer is 5% of Electric Distribution and Gas retail revenues excluding sales to schools and the County.
[d] Began paying in lieu tax for solar assets

County of Los Alamos

Staff Report

March 15, 2017

Los Alamos, NM 87544
www.losalamosnm.us

Agenda No.:	6.D
Index (Council Goals):	BCC - N/A
Presenters:	Department of Public Utilities
Legislative File:	**9152-17**

Title

Approval of Task Order No. 9 Under Services Agreement No. AGR15-4217 with GM Emulsion in the amount of $91,339.00, plus Applicable Gross Receipts Tax, for Site Preparation for the Los Alamos Switchgear Substation Installation

Recommended Action

I move that the Board of Public Utilities approve Task Order No. 9 Under Services Agreement No. AGR15-4217 with GM Emulsion in the amount of $91,339.00 and a contingency in the amount of $28,661.00 for a total of $120,000.00, plus applicable gross receipts tax, for the purpose of Site Preparation for the Los Alamos Switchgear Substation.

Staff Recommendation

Staff recommends approval of the motion as presented.

Body

The work to be performed under this task order is the earthwork, construction of the concrete slab beneath the switchgear, site preparation and new fencing around the new substation. Upon completion of this work the site will be ready to receive the new switchgear scheduled for delivery in August of 2017. The site is located adjacent to the Eco Station, just east of the Technical Area 3 (TA-3) guard stations. GM Emulsion will perform the work under an on-call contract with the County.

The anticipated cost of improvements is $91,339, plus applicable NMGRT. In addition to the cost of improvements, we are requesting an additional $28,661 in contingency to cover the cost of any unforeseen conditions discovered during construction. DPU engineering staff will administer the project, to verify actual quantities and contractor's work compliance with department standards. The work will begin as soon as the DOE signs the easement agreement which was approved by the County Council on February 28, 2017.

In addition, these improvements will address long-standing drainage conditions, which County Public Works staff believe are contributing to methane gas formation under the closed landfill cap. For this reason, the general fund will contribute funds toward the cost of the earthwork. We are currently coordinating with the Public Works Department on their proportional share.

Alternatives

If the task order is not approved, staff will pursue other avenues to perform the site preparation work in time to receive the switchgear in August 2017.

Fiscal and Staff Impact

$2,000,000 is budgeted in fiscal year 2017 for the Los Alamos Switchgear Substation and associated ductbank.

Attachments

A - Task Order No. 9, AGR15-4217 GM Emulsion

AGR 15-4217
GM Emulsion, LLC
Vendor Number 26708
On-Call Construction Services

Date Prepared: 2/24/2017

Task Order No.: **9**

Project Title: LASS Site Improvements

Job Cost # or Work Order #: **852-56850**

Project Manager Assigned: Patricio Guerrerortiz, PE

Phone: 505 663 1907

Contract Manager: Bryan Aragon, PE

Department: Public Utilities

Vendor Contact: GM Emulsion, LLC

Location of Work: NM 501 north of LANL 271

Scope of Work including Estimated Quantities: Approximately 2700 CY of backfill processed to 95% Proctor density, using County-supplied aggregate, including transport form location on East Road (adjacent to airport runway; removal and replacement of approximately 520' of 6-foot high chain-link fence; installation of approximately 55' of new chain-link fence; structural fill and new 12' wide, 6' high chain-link gate; 22'x66'x12" reinforced concrete slab; clearing and brushing; removal of approximately 12 trees and bushes; compliance testing.

Start Work Date: 3/27/2017

Attachments: Contractor's Price Proposal

Estimated Total Cost: (not to exceed amount): $91,339.00 + NMGRT

Estimated value of all task orders to date including this task order:

Current contract value: $2,000,000

Final payment shall be based on actual field measured quantities.

AGR 15-4217
GM Emulsion, LLC
Vendor Number 26708
On-Call Construction Services

Current Contract Value	$ 2,000,000	Plus GRT
Estimated Value of all task orders to date, including this task order:	$ 676,151.25	Plus GRT
Remaining Contract Value:	$ 1,323,848.75	Plus GRT

SIGNATURE PAGE

Original Task Order

Bryan Aragon, PE **Date**
Contract Manager / Senior Engineer

Gabriel Martinez **Date**
GM Emulsion

3.3.17
Patricio Guerrerortiz **Date**
Utilities Senior Engineer/Project Manager

Timothy A. Glasco, PE **Date**
Utilities Manager

Task Order Revision (as applicable)

Timothy A. Glasco, PE **Date**
Utilities Manager

GM Emulsion LLC

5935 Agua Fria St.
Santa Fe, NM 87507
505-471-9981
office@gmemulsion.com

Estimate

Date	Estimate #
2/14/2017	1618

Los Alamos County
101 Camino Entrada , Bldg 1
Los Alamos, NM 87544

Project

Description	Qty	U/M	Rate	Total
ELECTRICAL SWITCH GEAR STATION PAD LOS ALAMOS COUNTY ON CALL 2015 project consists of 3000 cy of fill material supplied by LAC. (hauled by GME 3 miles to location and processed and compacted). 550 sy @ 12" compacted base course for pad 12" class A concrete slab 60 cy remove and replace 6' chain link fence install new 6' chain link fence install new 12' wide by 6' chain link gate no trenching, conduit, or backfill will be supplied by GME				
621000 Mobilization one way from home office per mile	45	ea	45.00	2,025.00T
201000 clearing and grubbing including tree removal 13 trees @ $650.00 each	1		9,950.00	9,950.00T
206100 select backfill material per cy minus $4.00 for material costs due LAC supplied fill	3,000		6.00	18,000.00T
207010 sub grade prep 301 to 600 sy	550		3.00	1,650.00T
304110 untreated base course 6" 2 layers of 550 sy	1,100		14.00	15,400.00T
601000 removal of structures and obstructions 518' removal and replacement of existing 6' chain link @ $18.00 = $9324.00 55' new 6' chain link @ $18.00 per ft = $990.00 1 12' x 6' gate @ $1000.00 Total $11314.00	1		11,314.00	11,314.00T
511000 structural concrete class A 12" 60 cy Price includes density testing on concrete pad, and concrete test	60		550.00	33,000.00T

Thank you for the opportunity.

Subtotal	
Sales Tax (7.3125%)	
Total	

GM Emulsion LLC
5935 Agua Fria St.
Santa Fe, NM 87507
505-471-9981
office@gmemulsion.com

Estimate

Date	Estimate #
2/14/2017	1618

Los Alamos County
101 Camino Entrada , Bldg 1
Los Alamos, NM 87544

Project

Description	Qty	U/M	Rate	Total
Does not include traffic control, swipp, permits, or trenching				

Thank you for the opportunity.

Subtotal	$91,339.00
Sales Tax (7.3125%)	$6,679.16
Total	$98,018.16

County of Los Alamos
Staff Report
March 15, 2017

Los Alamos, NM 87544
www.losalamosnm.us

Agenda No.:	7.A
Index (Council Goals):	BCC - N/A
Presenters:	Bob Westervelt, Deputy Utilities Manager - Finance/Admin
Legislative File:	**8986-17**

Title
Approval of Department of Public Utilities Budget for Fiscal Year 2018
Recommended Action
I move that the Board of Public Utilities approve the Department of Public Utilities Fiscal Year 2018 budget as presented and forward to Council for adoption.
Staff Recommendation
Staff recommends approval of Fiscal Year 2018 budget as presented.
Body
Attached is the proposed budget for fiscal year 2018. The only changes from the February presentation are as follow.

- A budget summary by expenditure category has been added.
- Analysis of cash balance projections compared with financial policy targets has been added to the ten-year forecasts.
- A residential rate history has been included, as well as a summary of total customer's utilities costs projections compared to projected median household income incorporating planned rate adjustments and projected consumption quantities.
- All Funds: Administrative Allocation has been updated.
- All Funds: Vehicle IDCs were revised for all funds.
- EP FF: DOE Revenues adjusted after finalization of Power Pool budget, reduced by $1,797,032.
- EP FF: Economy Sales Revenues adjusted after finalization of Power Pool budget, increased by $381,341.
- EP FF: El Vado Generation now includes $25,000 for a student & approx $19,300 + benefits for double-fill.
- EP FF: Adjusted Load Control to include $246,000 NERC CIP costs that were originally in FY18 but removed in previous proposed budget.
- EP FF: Added $5000 back in to PNM Transmission costs; originally in FY18 but removed in previous proposed budget.
- EP FF: Purchased Power was adjusted closer to original FY18 budget; it is still lower, but higher than what was in February's proposed budget, increased $1,394,592 to accommodate revised LANL load forecast.
- EP FF: Debt service was not entered in FY16 actuals.
- EP FF: Property/In lieu taxes were updated with correct # from Finance (lower than

February), $2,945 reduction.

- EP FF: Insurance had an error in Feb. version. At $120k, it is $40k lower than that version.
- EP FF: 2016 actual capital showed ED's capital. This has been corrected.
- EP FF: Adjusted cost of power/transfer from ED to match 24-month budget, reduced $637,385.
- EP FF: Because Cost of Power and DOE Revenues were both adjusted downward, the MWH revenue projection dropped as well.
- ED FF: Re-analyzed revenue calculation and modified sales revenue projection upward slightly.
- ED FF: Vehicle IDC corrections were received from Finance, increased $16,833.
- ED FF: In lieu taxes updated with correct # from Finance, increased $15,807.
- ED FF: Adjusted cost of power after LAPP 24 month budget update, reduced $637,385.
- GA FF: In lieu taxes updated with correct # from Finance, reduced $2,625.
- WP FF: Potable sales revenue was adjusted after further analysis, increased $264,500.
- WP FF: Interest on utility reserves was adjusted after further analysis, increased $45,483.
- WP FF: Grant proceeds previously only showed FEMA reimbursement of $562,400. WP also received four grant payments in March 2016: $61,290, $60,184, $637,008, $165,773.
- WP FF: $2M from general fund for ski hill project was received in FY17. Remaining $2M re-budgeted for FY18.
- WP FF: Sale of scrap was previously omitted from revenues.
- DW FF: Aspen School area waterline replacement project has been delayed a year, $550,000.
- WW FF: Aspen School area sewer line replacement project has been delayed a year, $150,000.

The remainder of this staff report is a re-presentation of the information distributed in February, with updates inserted as appropriate.

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Attached is the proposed budget for FY2018. The budget as presented is ~~a reduction of 1% from~~ less than one-half of one percent higher than the fiscal year 2017 budget, and a reduction of ~~5%~~ 4.1% from the preliminary FY2018 budget presented last year. The change from the preliminary budget reflects two significant planning changes. The White Rock Wastewater plant previously scheduled for construction in FY2018 has been moved out to FY2021due to funding constraints. Offsetting that reduction somewhat, the ski hill pipeline originally scheduled for FY2017 has been pushed out into FY2018, and $1.5M of the water well replacement project originally scheduled for FY17 has been pushed out to FY18.

Changes in each Utility sub fund are discussed below.

~~Note: this is a preliminary draft, some inputs are still being finalized and some numbers are likely to change between now and final presentation to the Board for approval in March. All changes will be noted when the Board considers the final budget for adoption in March.~~

Staffing changes

We have one additional limited term FTE on the admin roster, but that additional person is funded by the County ERP project to partially backfill staff resources that will be dedicated to the project. Included in the Electric Production budget is funding for double filling a Hydro Plant Maintenance technician for one year in anticipation of retirement of one of the existing staff in 2018. This double fill is utilizing an existing vacancy so does not result in an increased FTE count. The Plumbers and Pipefitters Union agreement is coming up for renewal, and negotiations are likely to result in some salary adjustment. There is also a reclassification of a staff position in the Admin division. $47,000 is included in the Admin budget to provide funding for these changes.

Budget Highlights

Per County Budget Office guidance, a 2% increase for salaries is assumed for this budget. The ten-year capital plan is included in the agenda packet, as well as more detailed descriptions of the projects planned for FY018.

Interdepartmental charges from the County (IDCs) increased by ~~637k, or 36%,~~ $62k, or 2%, mostly in legal, procurement, and IT support. *(Note, the significant change in this item from what was reported in the preliminary discussion in February is due to a correction in how vehicles are shown. Last month vehicles were shown in IDC's in the FY18 budget column, and in the jobs in the FY17 budget column. This month that has been corrected to show vehicle charges in the same place, IDC's, for both years in the budget summary report, which was added for this presentation. Vehicles are still shown in the jobs in the individual fund flows budgets, since that is how they were originally budgeted in FY17).* Department admin costs increased by $392k, or 9% ~~$425k, or 10%.~~ This includes a planned reconfiguration of the Customer Care center budgeted at $250k, adding one Meter Reader that was scheduled for transfer to GWS back into the Admin budget due to the postponement of the AMI project, and adding $50k for an additional "off cycle" cost of service study to consider electric rate design. ~~The allocation of these costs to the utilities is still being reworked, but preliminary allocations are included in each utility's O&M, so will not be discussed separately below.~~

Electric Production

The O&M budget for Electric Production is ~~$1.9M~~ $662k lower then presented in the projection last year, due primarily to continuing low purchased power costs. There is $450k included for LAC's share of the COLA preparation for the Carbon Free Power Project.

Electric Distribution

No rate increases are projected in FY18 for electric distribution, although a rate restructuring may be proposed in response to recommendations of the Future Energy Resources Committee. The ten year forecast includes essentially inflationary increases of 1.5% per year after FY18. The Los Alamos Sub Station (LASS) project is scheduled for FY17, but there is $500k in the capital plan for substation feeders that were not included in the original project plan. The O&M budget in electric distribution is essentially flat compared to the preliminary budget presented last year.

Gas

The new NMMEAA deal guarantees a $0.274 discount, which is included in the budget for FY2018. Natural gas market prices remain low, and gas purchases are budgeted at $3.0014/MMBTU (before the NMMEAA discount). A ten percent rate reduction was implemented in FY17 to spend down some Gas Utility cash reserves, and it was projected that another ten percent reduction in FY18 would be viable while still retaining adequate cash reserves. This budget does propose that additional 10% reduction in the fixed portion of the commodity rate charged to consumers. The O&M budget for the Gas utility remains essentially as budgeted previously except for the increased IDC and admin allocations already discussed.

Water Production and Distribution

The capital plan for Water Production, like last year, includes non-potable projects that are funded through a partial grant/loan from the Water Trust Board (WTB). These projects will only occur if the WTB funding is realized. The capital plan also includes the ski hill pipeline construction, which is funded through transfers from the general County and from the ski hill operator. $1.5M of the projected cost for the water well replacement project previously budged for FY17 has been re-budgeted for FY18 as well.

Pending further discussion and planning for the San Juan Chama utilization project, no San Juan Chama funding is included in the 10-year financial forecast or capital plan.
The O&M and capital budget for water production and distribution has been revised extensively to reflect the proposed twenty-year plan presented to the Board at the November, 2017 BPU meeting. Water sales appear to have stabilized more in line with the revised sales projections we adopted in last year's budget cycle. In accordance with the long range plan, an 8% increase in wholesale and retail potable rates is budgeted in FY18, as well as an increase for non-potable sales from $1.15 per thousand gallons to $2.50, reflecting the improved cost breakdown and accounting that now allows us to better determine the delivery cost of the non-potable commodity. As shown in the ten-year plan, additional modest rate increases are projected through 2021, then essentially inflationary increases thereafter.

Wastewater Division

The wastewater utility is facing some financial challenges and does not have the cash balance required to fund the planned White Rock treatment plant that was previously scheduled for FY18. ~~This will be discussed at length in a separate agenda item this evening.~~ A series of additional rate increases is proposed in the ten-year plan which if implemented should provide adequate resources to continue operations at the existing plant for a few more years and build sufficient cash reserves to support debt service on the design and construction of the White Rock plant in 2021. An 8% increase is budgeted for FY18. The O&M budget for the Wastewater utility is significantly reduced from the preliminary budget presented last year, due primarily to reduced debt service related to rescheduling the construction of the White Rock plant.

Alternatives

The Board could elect to adopt this budget as presented, could remand to staff with direction to re-work per specific guidance provided, or could adjust individual line items or initiatives, including those adjustments in their motion to approve. A final budget needs to be approved by the Board in time to include in the County budget package going to Council in April, so any changes not made through motion this evening would require a special meeting be held to approve the budget before the deadline. The budget as presented incorporates all initiatives and guidance that has been enunciated by the Board and represents staff's recommendation for effective and efficient operations.

Fiscal and Staff Impact

See above

Attachments

A - Fiscal Year 2018 Budget Packet

Los Alamos County Utilities Department
Fiscal Year 2018 Budget
Board Presentation 03-15-2017

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Los Alamos County Department of Public Utilities
Fiscal Year 2018
Summary of Expenditure Budget

	Actual 2016	Jul-Dec Actual 2017	Adopted Budget 2017	1st Year Budget 2018	Proposed Budget 2018	Change
Electric Production	41,089,117	16,774,857	38,384,715	40,936,357	40,699,226	-1%
Electric Distribution	14,893,792	7,469,673	16,107,497	15,069,661	14,638,692	-3%
Less Interdivision Electric Sales	(8,652,139)	(3,606,802)	(7,000,000)	(7,750,000)	(6,737,615)	-13%
Total Electric Fund	47,330,771	20,637,729	47,492,212	48,256,017	48,600,302	1%
Gas	4,797,511	2,883,498	5,564,365	5,410,631	5,462,942	1%
Water Production	4,979,019	2,700,963	11,583,707	4,786,622	11,200,314	134%
Water Distribution	5,028,035	3,537,270	4,619,978	4,643,367	5,039,246	9%
Less Interdivision Water Sales	(2,528,096)	(1,447,493)	(2,456,750)	(2,505,885)	(2,650,500)	6%
Total Water Fund	7,478,958	4,790,740	13,746,935	6,924,104	13,589,060	96%
Wastewater	5,086,077	2,728,520	5,501,226	14,993,314	4,822,576	-68%
Total Expenditure Budget	64,693,316	31,040,486	72,304,737	75,584,066	72,474,881	-4%

Los Alamos County Department of Public Utilities
Fiscal Year 2018
Summary of Expenditure Budget -- ELECTRIC PRODUCTION

	Actual 2016	Jul-Dec Actual 2017	Adopted Budget 2017	1st Year Budget 2018	Proposed Budget 2018	Change
REVENUE						
Mwh Sales - LANL	449,550	255,144	556,653	548,242	542,688	-3%
Mwh Sales - LAC Distribution	116,469	58,653	123,681	125,536	125,530	1%
Total Mwh Sales	566,018	313,797	680,334	673,778	668,218	-2%
Revenue per Mwh	$ 67.15	$ 47.69	$ 51.60	$ 55.94	$ 52.20	1%
DOE Revenues	$ 29,354,498	$ 11,357,971	$ 28,104,483	$ 29,941,469	$ 28,144,437	0%
Economy Sales	2,047,640	1,562,147	3,281,394	3,213,251	3,594,592	10%
Interest on Reserves	18,711	16,310	25,000	25,000	25,000	0%
Bond Federal Subsidy	31,664	16,992	33,984	33,984	33,984	0%
TOTAL REVENUE	$ 31,452,513	$ 12,953,420	$ 31,444,861	$ 33,213,704	$ 31,798,013	1%
OPERATING EXPENSES						
El Vado Generation	$ 492,445	$ 148,576	$ 628,454	$ 488,314	$ 620,427	-1%
Abiquiu Generation	324,465	88,683	399,655	399,088	403,881	1%
Contract Administration	20,248	3,179	19,736	20,128	20,048	2%
Load Control	2,067,004	775,343	1,696,876	1,531,455	1,822,030	7%
Transmission - PNM	1,271,864	729,813	1,380,000	1,380,000	1,405,000	2%
Transmission - Other	1,979,500	979,157	2,540,523	2,621,168	2,285,008	-10%
Purchased Power	11,684,780	6,167,656	14,147,976	14,972,854	14,614,373	3%
Photovoltaic Array	62,379	21,979	92,000	92,000	117,000	27%
Debt Service	2,498,401	1,251,951	2,529,392	2,536,071	2,635,071	4%
Property Taxes	423,907	274,706	440,212	440,212	458,055	4%
Insurance	106,189	114,844	115,000	115,000	120,000	4%
San Juan Operations	12,729,696	4,136,769	9,354,837	11,425,255	11,213,148	20%
Laramie River Operations	3,933,957	990,194	3,049,225	3,184,154	2,854,600	-6%
SMR Project	11,825	28,408	300,000	300,000	450,000	50%
Non-Pool Expenses	-	-	-	-	-	
Interdepartmental Charges	368,819	207,845	415,689	415,689	447,280	8%
Administrative Allocation	633,806	294,716	770,140	764,968	558,305	-28%
TOTAL OPERATING EXPENSES	$ 38,609,285	$ 16,213,819	$ 37,879,715	$ 40,686,357	$ 40,024,226	6%
OPERATING INCOME (LOSS)	**$ (7,156,772)**	**$ (3,260,399)**	**$ (6,434,854)**	**$ (7,472,653)**	**$ (8,226,213)**	28%
CAPITAL EXPENDITURES						
Capital Expenditures	$ 2,479,832	$ 561,039	$ 505,000	$ 250,000	$ 675,000	34%
OTHER FINANCING Forecast						
Transfer from Distribution Fund	$ 8,652,139	$ 3,606,802	$ 7,000,000	$ 7,750,000	$ 6,737,615	-4%
Bond Issue Proceeds		-				
NET INCOME (LOSS)	**$ (984,465)**	**$ (214,635)**	**$ 60,146**	**$ 27,347**	**$ (2,163,598)**	-3697%

Los Alamos County Department of Public Utilities
Fiscal Year 2018
Summary of Expenditure Budget -- ELECTRIC DISTRIBUTION

	Actual 2016	Jul-Dec Actual 2017	Adopted Budget 2017	1st Year Budget 2018	Proposed Budget 2018	Change
REVENUE						
kWh Sales	116,468,682	58,653,104	123,681,000	125,536,000	125,496,000	1%
Revenue per kWh	$ 0.1209	$ 0.1222	$ 0.1220	$ 0.1217	$ 0.1221	0%
Sales Revenue	$ 14,077,035	$ 7,165,908	$ 15,088,911	$ 15,279,913	$ 15,319,172	2%
Interest on Utility Reserves	57,023	35,980	(183,000)	(183,000)	(183,000)	0%
Bond Federal Subsidy	63,316	33,971	67,942	67,942	67,942	0%
Revenue on Recoverable Work	186,391	149,579	150,000	150,000	150,000	0%
TOTAL REVENUE	$ 14,383,765	$ 7,385,438	$ 15,123,853	$ 15,314,855	$ 15,354,114	2%
OPERATING EXPENSES						
Supervision, Misc Direct Admin	$632,824	$355,306	$685,771	$702,560	$710,342	4%
Substation Maintenance	$25,540	$19,466	$37,100	$37,815	$36,663	-1%
Switching Station Maintenance	$25,523	$10,292	$28,129	$28,632	$29,115	4%
Overhead Maintenance	$476,406	$207,430	$455,336	$462,907	$488,883	7%
Underground Maintenance	$389,360	$265,996	$370,640	$377,228	$375,882	1%
Meter Maintenance	$135,679	$96,062	$126,885	$128,416	$126,101	-1%
Interdepartmental Charges	$425,066	$214,485	$428,969	$428,969	$583,503	36%
Eng. Cust Svc. MR and Admin	$536,000	$275,211	$986,831	$980,204	$852,774	-14%
In Lieu Taxes	$510,736	$391,794	$538,602	$542,422	$558,229	4%
Debt Service	1,254,122	622,478	1,264,358	1,255,148	1,255,148	-1%
Cost of Power	8,652,139	3,606,802	7,000,000	7,750,000	6,737,615	-4%
TOTAL OPERATING EXPENSES	$ 13,063,395	$ 6,065,321	$ 11,922,621	$ 12,694,300	$ 11,754,255	-1%
OPERATING INCOME (LOSS)	**$ 1,320,370**	**$ 1,320,117**	**$ 3,201,232**	**$ 2,620,555**	**$ 3,599,859**	12%
CAPITAL EXPENDITURES						
Capital Expenditures	$ 1,305,857	$ 1,404,353	$ 3,536,053	$ 1,718,324	$ 2,233,371	-37%
OTHER FINANCING						
Bond/Grant proceeds		$ -				
Profit Transfer to General Fund	(524,540)		(648,823)	(657,036)	(651,065)	0%
BUDGETED NET INCOME (LOSS)	**$ (510,027)**	**$ (84,236)**	**$ (983,644)**	**$ 245,195**	**$ 715,423**	-173%

Los Alamos County Department of Public Utilities
Fiscal Year 2018
Summary of Expenditure Budget -- GAS DISTRIBUTION

	Actual 2016	Jul-Dec Actual 2017	Adopted Budget 2017	1st Year Budget 2018	Proposed Budget 2018	Change
REVENUE						
Therm Sales	8,416,085	2,542,267	8,463,113	8,463,113	8,455,275	0%
Revenue per Therm	$ 0.5808	$ 0.7303	$ 0.6586	$ 0.5927	$ 0.6199	-6%
Sales Revenue	$ 4,887,955	$ 1,856,572	$ 5,573,587	$ 5,016,228	$ 5,241,503	-6%
Interest on Utility Reserves	34,421	87,402	82,000	82,000	82,000	0%
Revenue on Recoverable Work	11,233	8,296	25,000	25,000	20,000	-20%
TOTAL REVENUE	$ 4,933,609	$ 1,952,270	$ 5,680,587	$ 5,123,228	$ 5,343,503	-6%
OPERATING EXPENSES						
Supervision, Misc Direct Admin	$298,000	$126,362	$297,661	$298,322	$256,975	-14%
Gas Distribution	273,909	180,307	341,235	337,217	280,994	-18%
Gas Meters	145,896	63,949	150,421	151,963	137,486	-9%
Interdepartmental Charges	259,528	142,518	285,035	285,035	366,631	29%
Eng. Cust Svc. MR and Admin	535,341	300,231	706,460	701,716	718,310	2%
In Lieu Taxes	179,606	144,703	207,857	196,710	202,705	-2%
Cost of Gas	1,845,485	982,794	2,505,410	2,505,410	2,537,766	1%
TOTAL OPERATING EXPENSES	$3,537,763	$ 1,940,864	$ 4,494,078	$ 4,476,373	$ 4,500,867	0%
OPERATING INCOME (LOSS)	**$ 1,395,846**	**$ 11,406**	**$ 1,186,509**	**$ 646,855**	**$ 842,636**	-29%
CAPITAL EXPENDITURES						
Capital Expenditures	$ 12,881	$ 942,634	$ 810,000	$ 700,000	$ 700,000	-14%
OTHER FINANCING SOURCES & USES						
Profit Transfer to General Fund	(246,867)		(260,287)	(234,258)	(262,075)	1%
Budget Adjustment for ERP	(1,000,000)					
BUDGETED NET INCOME (LOSS)	**$ 1,136,098**	**$ (931,228)**	**$ 116,222**	**$ (287,403)**	**$ (119,439)**	-203%

Los Alamos County Department of Public Utilities
Fiscal Year 2018
Summary of Expenditure Budget -- WATER PRODUCTION

	Actual 2016	Jul-Dec Actual 2017	Adopted Budget 2017	1st Year Budget 2018	Proposed Budget 2018	Change
REVENUE						
Potable 1000-gallon production	974,848	607,366	1,150,000	1,150,000	1,150,000	0%
Non-potable 1000-gallon production	45,718	16,782	66,584	66,584	86,400	30%
Potable revenue per 1000 gallons	$ 3.4121	$ 3.4737	$ 3.1680	$ 3.0545	$ 3.3949	7%
Potable Sales Revenue	$ 3,326,321	$ 2,109,794	$ 3,643,200	$ 3,716,064	$ 4,197,500	15%
Repayment of Inter-utility Loan	187,568	72,956	187,569	187,569	187,569	0%
Interest on Utility Reserves	34,871	131,848	92,000	63,750	109,233	19%
Bond Federal Subsidy	25,683	13,788	27,576	27,576	27,576	0%
Non Potable Revenue	52,575	20,171	76,572	166,460	216,000	182%
TOTAL REVENUE	$ 3,627,018	$ 2,348,557	$ 4,026,917	$ 4,161,419	$ 4,737,878	18%
OPERATING EXPENSES						
Supervision and Operations	$ 957,590	$ 442,806	$ 975,822	$ 991,861	$ 963,806	-1%
Pumping Power	523,277	271,052	800,000	800,000	800,000	0%
Wells	83,118	31,803	137,508	138,775	135,631	-1%
Booster Pump Stations	165,298	28,334	125,236	126,754	123,587	-1%
Treatment	56,055	14,767	105,199	105,595	104,271	-1%
Storage Tanks	445,205	3,179	19,600	19,798	19,385	-1%
Transmission Lines	54,999	11,749	65,509	66,248	64,705	-1%
Non Potable System	179,863	175,847	642,187	372,422	393,018	-39%
Interdepartmental Charges	227,774	131,946	263,893	263,893	341,062	29%
Eng. Cust Svc. MR and Admin	578,883	284,514	505,173	501,780	678,114	34%
State Water Tax	34,855	19,008	45,000	45,000	45,000	0%
Debt Service	220,520	116,027	254,182	279,496	235,735	-7%
TOTAL OPERATING EXPENSES	$ 3,527,436	$ 1,531,033	$ 3,939,307	$ 3,711,622	$ 3,904,314	-1%
OPERATING INCOME (LOSS)	**$ 99,582**	**$ 817,524**	**$ 87,610**	**$ 449,797**	**$ 833,564**	851%
CAPITAL EXPENDITURES						
Capital Expenditures	$ 1,451,582	$ 1,169,930	$ 7,644,400	$ 1,075,000	$ 7,296,000	-5%
OTHER FINANCING						
Grants/Loans Proceeds	$ 1,486,656	$ 72,956	$ 644,400	$ 825,000	$ 1,271,000	97%
County/External Reimbursement		2,000,000	4,000,000		2,000,000	-50%
Sale of Scrap	10,610					
BUDGETED NET INCOME (LOSS)	**$ 145,265**	**$ 1,720,550**	**$ (2,912,390)**	**$ 199,797**	**$ (3,191,436)**	10%

Los Alamos County Department of Public Utilities
Fiscal Year 2018
Summary of Expenditure Budget -- WATER DISTRIBUTION

	Actual 2016	Jul-Dec Actual 2017	Adopted Budget 2017	1st Year Budget 2018	Proposed Budget 2018	Change
REVENUE						
Sales in Thousand of Gallons	693,335	450,124	775,000	775,000	775,000	0%
Revenue per thousand gallons	$ 5.6549	$ 5.6136	$ 5.7500	$ 5.7500	$ 6.3300	10%
Sales Revenue	$ 3,920,763	$ 2,526,818	$ 4,456,250	$ 4,456,250	$ 4,905,750	10%
Interest on Utility Reserves	12,300	17,460	21,000	21,000	9,161	-56%
Revenue on Recoverable Work	59,382	18,589	30,000	30,000	30,450	1%
TOTAL REVENUE	$ 3,992,445	$ 2,562,867	$ 4,507,250	$ 4,507,250	$ 4,945,361	10%
OPERATING EXPENSES						
Supervision, Misc Direct Admin	$ 217,881	$ 98,214	$ 182,979	$ 187,327	$ 184,778	1%
Hydrants	71,088	15,279	58,860	59,924	60,645	3%
Water Distribution	387,278	161,879	403,106	368,523	372,203	-8%
Water Meters	658,592	225,931	691,840	699,124	634,691	-8%
Interdepartmental Charges	225,566	125,825	251,649	251,649	330,744	31%
Eng. Cust Svc. MR and Admin	505,593	243,845	574,794	570,935	805,686	40%
Cost of Water	2,528,096	1,447,493	2,456,750	2,505,885	2,650,500	8%
TOTAL OPERATING EXPENSES	$ 4,594,094	$ 2,318,466	$ 4,619,978	$ 4,643,367	$ 5,039,246	9%
OPERATING INCOME (LOSS)	**$ (601,650)**	**$ 244,401**	**$ (112,728)**	**$ (136,117)**	**$ (93,885)**	-17%
CAPITAL EXPENDITURES						
Capital Expenditures	$ 433,941	$ 1,218,804	$ -	$ -	$ -	
BUDGETED NET INCOME (LOSS)	**$ (1,035,591)**	**$ (974,403)**	**$ (112,728)**	**$ (136,117)**	**$ (93,885)**	-17%

Los Alamos County Department of Public Utilities
Fiscal Year 2018
Summary of Expenditure Budget -- WASTEWATER COLLECTION AND TREATMENT

	Actual 2016	Jul-Dec Actual 2017	Adopted Budget 2017	1st Year Budget 2018	Proposed Budget 2018	Change
REVENUE						
Thousands of Gallons Processed	408,234	204,369	430,000	430,000	430,000	0%
Sales Revenue	$ 4,632,768	$ 2,486,397	$ 5,174,221	$ 5,174,221	$ 5,269,745	2%
Interest on Utility Reserves	14,379	19,679	23,000	23,000	13,516	-41%
Revenue on Recoverable Work	-		1,500	1,523	-	-100%
TOTAL REVENUE	$ 4,647,147	$ 2,506,076	$ 5,198,721	$ 5,198,744	$ 5,283,261	2%
OPERATING EXPENSES						
Supervision, Misc Direct Admin	$ 159,691	$ 100,702	$ 323,618	$ 254,313	$ 230,375	-29%
Wastewater Collection	342,164	130,315	421,571	389,058	367,602	-13%
Lift Stations	336,649	105,709	245,729	248,686	275,214	12%
Wastewater Treatment	1,240,841	571,932	1,388,309	1,380,071	1,318,100	-5%
Interdepartmental Charges	372,692	205,701	411,402	411,402	590,289	43%
Eng. Cust Svc. MR and Admin	420,570	249,326	504,797	501,407	835,197	65%
Debt Service	1,151,522	575,697	1,155,799	1,808,378	1,155,799	0%
TOTAL OPERATING EXPENSES	$ 4,024,128	$ 1,939,383	$ 4,451,226	$ 4,993,314	$ 4,772,576	7%
OPERATING INCOME (LOSS)	**$ 623,019**	**$ 566,693**	**$ 747,495**	**$ 205,430**	**$ 510,684**	-32%
CAPITAL EXPENDITURES						
Capital Expenditures	$ 1,061,949	$ 789,137	$ 1,050,000	$ 10,000,000	$ 50,000	-95%
OTHER FINANCING						
Grant/Loan Proceeds				$ 10,000,000		
BUDGETED NET INCOME (LOSS)	**$ (438,930)**	**$ (222,444)**	**$ (302,505)**	**$ 205,430**	**$ 460,684**	-252%

Los Alamos County Department of Public Utilities
Fiscal Year 2018 Budget
Summary of Expenditure Budget -- ADMINISTRATION AND GENERAL

	Actual 2016	Jul-Dec Actual 2017	Adopted Budget 2017	1st Year Budget 2018	Proposed Budget 2018	Change
Meter Reading	354,410	183,437	278,892	286,245	352,536	26%
Customer Service	510,942	258,009	552,237	564,514	840,167	52%
Engineering	1,435,797	776,086	1,628,417	1,668,980	1,530,874	-6%
Administration	464,503	215,158	829,237	722,273	752,285	-9%
Finance	609,440	305,552	783,522	796,678	974,152	24%
Public Information	176,583	102,164	245,285	251,716	259,668	6%
Capital	-	298	-	-	-	
Total Administrative Division	**3,551,674**	**1,840,705**	**4,317,590**	**4,290,405**	**4,709,682**	9%

Los Alamos County Department of Public Utilities
Fiscal Year 2018
Budget Summary by Categories

	Actual FY2016	Jul-Dec Actual FY2017	Adopted Budget FY2017	1st Year Budget FY2018	Proposed Budget FY2018	Change
Expenditures by Fund:						
Electric	47,330,771	20,637,729	47,492,212	48,256,017	48,600,302	2%
Gas	4,797,511	2,883,498	5,564,365	5,410,631	5,462,942	-2%
Water	7,478,958	4,790,740	13,746,935	6,924,104	13,589,060	-1%
Wastewater	5,086,077	2,728,520	5,501,226	14,993,314	4,822,576	-12%
	64,693,316	31,040,486	72,304,737	75,584,066	72,474,881	0%
Expenditures by Type:						
Salaries	5,013,162	2,627,632	6,455,871	6,481,879	6,688,957	4%
Benefits	3,271,916	1,724,888	2,469,961	2,519,810	2,555,440	3%
Contractual Services	35,611,972	14,582,227	36,332,581	38,761,951	38,462,502	6%
Other Services	1,577,069	1,099,124	1,759,516	1,754,082	1,796,371	2%
Materials/Supplies	1,381,374	476,894	1,590,080	1,594,980	1,673,104	5%
Interfund Charges	3,997,973	2,036,925	5,274,195	5,257,010	5,684,386	8%
IDCs	3,084,250	1,587,857	2,706,690	2,706,690	2,768,398	2%
Capital Outlay	434,714	7,533	375,340	287,140	367,140	-2%
Bank Charges	2,680	2,683	-	-	-	
Misc. Other Charges	227,865	114,280	-	-	39,000	
Profit Transfer	771,407	-	909,110	891,294	913,140	0%
Debt Service	5,124,565	2,566,153	5,203,731	5,879,093	5,281,753	1%
Capital	6,746,043	6,086,195	13,545,453	13,743,324	10,954,371	-19%
Admin. & Gen. Allocation	(3,551,674)	(1,840,705)	(4,317,590)	(4,290,405)	(4,709,682)	9%
	63,693,316	31,071,684	72,304,937	75,586,848	72,474,881	0%
FTE Summary:						
Regular (full & part time)	93.00	93.00	93.00	93.00	93.00	0%
Casual, student & temp.	5.34	5.34	5.34	5.34	5.30	-1%
	98.34	98.34	98.34	98.34	98.30	0%
FTE by Division:						
Electric Production	12.00	12.00	12.00	12.00	12.00	0%
Electric Distribution	13.00	13.00	13.00	13.00	13.00	0%
Gas	24.05	29.07	29.07	29.07	29.02	0%
Water	10.25	9.25	9.25	9.25	9.75	5%
Wastewater	9.00	9.00	9.00	9.00	8.97	0%
Administrative & General	30.02	26.02	26.02	26.02	25.56	-2%
	98.32	98.34	98.34	98.34	98.30	0%

Los Alamos County Department of Public Utilities
Fiscal Year 2018
10-Year Capital Plan

FY18 (1 July 2017 - 30 June 2018)		Budget
ELECTRIC PRODUCTION		**675,000**
Abiquiu Controls Upgrade		375,000
3 Ton Jib Crane Abiquiu		140,000
Replace Control System Batteries El Vado & Abiquiu		135,000
Uinterrupted Power Supply Electric SCADA		25,000
ELECTRIC DISTRIBUTION		**2,233,371**
Los Alamos URD Replacement (cables, jboxes, pedestals)		250,000
White Rock URD Replacement (cables, jboxes, pedestals)		250,000
WR Substation Switchgear1 Refurbishment		350,000
WR Substation Transformer Oil Retention Bay		150,000
Overhead System Replacement (polex, xarms, transformers)		400,000
LASS Substation Feeders		500,000
County Labor and Benefits		333,371
GAS DISTRIBUTION		**700,000**
Quemazon Loop Alternate PRV Feed		250,000
SCADA Improvements Phase 1		250,000
PRV Site Improvements Phase 1		200,000
WATER DISTRIBUTION		**0**
WATER PRODUCTION		**7,296,000**
Ski Hill Supply Pipeline Construction **(County/Ski Hill 50/50 Funding, N/A DPU)**		4,000,000
Otowi Well No. 2 Well House & Pipeline Construction		1,500,000
PW5 MCC Replacement - Construction		275,000
RTU Replacement - 3 Each		75,000
Auto Valves 9,10,11 R&R		150,000
Uninterrupted Power Supply Water SCADA		25,000
Non Potable: Design Group 12 Tank, Bayo Booster & Overlook Booster (WTB)		495,000
Non-Potable: Bayo Booster Second Tank (WTB)		776,000
WASTEWATER TREATMENT AND SEWER COLLECTION TOTAL		**50,000**
SEWER COLLECTION	**50,000**	
Canyon Road VCP Crossings (2 Each) Rehabilitation	50,000	
WASTEWATER TREATMENT	**0**	

FY19 (1 July 2018 - 30 June 2019)		Budget
ELECTRIC PRODUCTION		**300,000**
El Vado Replace Main Transformer		300,000
ELECTRIC DISTRIBUTION		**3,000,000**
Los Alamos URD Replacement (cables, jboxes, pedestals)		300,000
White Rock URD Replacement (cables, jboxes, pedestals)		300,000
Overhead System Replacement (polex, xarms, transformers)		400,000
EA4 Feeder Replacement		2,000,000
GAS DISTRIBUTION		**450,000**
SCADA Improvements Phase 2		250,000
PRV Site Improvements Phase 2		200,000
WATER DISTRIBUTION		**550,000**
Aspen School Area Waterline Replacements Phase 1		550,000
WATER PRODUCTION		**1,979,000**
East Jemez Road PW3 to NM4 Pipeline R&R {DOT}		1,015,000
Non Potable: Construct Second Group 12 Tank (WTB)		964,000
WASTEWATER TREATMENT AND SEWER COLLECTION TOTAL		**753,000**
SEWER COLLECTION	**753,000**	
Rio Bravo Sewer Lift Station Rehabilitation	103,000	
WR WWTP Interceptor Modifications	500,000	
Aspen School Area Sewerline Replacement/Rehabilitation - Phase 1	150,000	
WASTEWATER TREATMENT	**0**	

Los Alamos County Department of Public Utilities
Fiscal Year 2018
10-Year Capital Plan

FY20 (1 July 2019 - 30 June 2020)		Budget
ELECTRIC PRODUCTION		**0**
ELECTRIC DISTRIBUTION		**1,800,000**
Los Alamos URD Replacement (cables, jboxes, pedestals)		300,000
White Rock URD Replacement (cables, jboxes, pedestals)		300,000
Overhead System Replacement (polex, xarms, transformers)		1,200,000
Townsite Circuit 15, 3 PHASE ($600K)		
White Rock Circuit 1, 3 PHASE ($600K)		
GAS DISTRIBUTION		**450,000**
SCADA Improvements Phase 3		250,000
PRV Site Improvements Phase 3		200,000
WATER DISTRIBUTION		**808,000**
Aspen School Area Waterline Replacements Phase 2		558,000
New Vactor		250,000
WATER PRODUCTION		**2,550,000**
NM SR 4 Pipeline R&R {DOT}		1,545,000
OB1 Replacement Design		155,000
Non Potable: Guaje Pines, North Mesa, Diamond Connections (WTB)		850,000
WASTEWATER TREATMENT AND SEWER COLLECTION TOTAL		**2,421,000**
SEWER COLLECTION	**1,049,000**	
SCADA Implementation	203,000	
Aspen School Area Sewerline Replacement/Rehabilitation - Phase 2	81,000	
Bayo Canyon Sewer Lift Station Elimination	515,000	
New Vactor	250,000	
WASTEWATER TREATMENT	**1,372,000**	
LA WWTP Upgrades & Rehabilitation Project - Design	361,000	
WRTP Design	1,011,000	

Los Alamos County Department of Public Utilities
Fiscal Year 2018
10-Year Capital Plan

FY21 (1 July 2020 - 30 June 2021)		Budget
ELECTRIC PRODUCTION		**0**
ELECTRIC DISTRIBUTION		**1,850,000**
Los Alamos URD Replacement (cables, jboxes, pedestals)		300,000
White Rock URD Replacement (cables, jboxes, pedestals)		300,000
White Rock GWS & ED Facility		50,000
Overhead System Replacement (polex, xarms, transformers)		1,200,000
Townsite Circuit 13, 3 PHASE ($600K)		
White Rock Circuit 2, 3 PHASE ($600K)		
GAS DISTRIBUTION		**300,000**
White Rock Steel Valve Project Phase 1		250,000
White Rock GWS & ED Facility		50,000
WATER DISTRIBUTION		**617,000**
Aspen School Area Waterline Replacements Phase 3		567,000
White Rock GWS & ED Facility		50,000
WATER PRODUCTION		**3,434,000**
OB1 Replacement Construction		3,173,000
Non Potable: Camp May Tank SCADA & Freeze Upgrades (WTB)		261,000
WASTEWATER TREATMENT AND SEWER COLLECTION TOTAL		**16,963,000**
SEWER COLLECTION	**561,000**	
Loma Vista Sewer Lift Station Rehabilitation	157,000	
Aspen School Area Sewerline Replacement/Rehabilitation - Phase 3	93,000	
North Community Backyard Sewer Mains & Services Regabilitation - Phase 1	261,000	
White Rock GWS & ED Facility	50,000	
WASTEWATER TREATMENT	**16,402,000**	
LA WWTP Upgrades & Rehabilitation Project - Construction (Filtration, High Efficiency Blowers, UV Controls, DO Meter Upgrades, Standby Power Upgrades, Compost Bin Safety)	3,137,000	
WRTP Construction	12,750,000	
WRTP Construction Administration - Engineering/Inspection	515,000	

FY22 (1 July 2021 - 30 June 2022)		Budget
ELECTRIC PRODUCTION		**0**
ELECTRIC DISTRIBUTION		**2,000,000**
Los Alamos URD Replacement (cables, jboxes, pedestals)		400,000
White Rock URD Replacement (cables, jboxes, pedestals)		400,000
Overhead System Replacement (polex, xarms, transformers)		1,200,000
Townsite Circuit 16, 3 PHASE ($600K)		
White Rock Circuit 1, 1 PHASE ($600K)		
GAS DISTRIBUTION		**250,000**
White Rock Steel Valve Project Phase 2		250,000
WATER DISTRIBUTION		**627,000**
Aspen School Area Waterline Replacements Phase 4		627,000
WATER PRODUCTION		**2,228,000**
Townsite 14" Pipeline R&R - Phase 1		1,061,000
Non Potable: White Rock Booster Replacement & Chamisa Pipeline (WTB)		1,167,000
WASTEWATER TREATMENT AND SEWER COLLECTION TOTAL		**583,000**
SEWER COLLECTION	**583,000**	
North Road Sewer Lift Station Elimination/Rehabilitation	478,000	
Aspen School Area Sewerline Replacement/Rehabilitation - Phase 4	105,000	
WASTEWATER TREATMENT	**0**	

FY23 (1 July 2022 - 30 June 2023)			Budget
ELECTRIC PRODUCTION			**0**
ELECTRIC DISTRIBUTION			**2,000,000**
Los Alamos URD Replacement (cables, jboxes, pedestals)			400,000
White Rock URD Replacement (cables, jboxes, pedestals)			400,000
Overhead System Replacement (polex, xarms, transformers)			1,200,000
Townsite Ski Hill Circuit, 3 PHASE	($600K)		
White Rock Circuit 2, 1 PHASE	($600K)		
GAS DISTRIBUTION			**250,000**
White Rock Steel Valve Project Phase 3			250,000
WATER DISTRIBUTION			**849,000**
North Mesa Distribution Upgrades			849,000
WATER PRODUCTION			**1,915,000**
Townsite 14" Pipeline R&R - Phase 2			1,077,000
Non Potable: Bayo Booster Station (WTB)			838,000
WASTEWATER TREATMENT AND SEWER COLLECTION TOTAL			**652,000**
SEWER COLLECTION		**517,000**	
Paseo Penasco Sewer Lift Station Rehabilitation		162,000	
Denver Steel Area East Portion Sewerline R&R {PW-WA 5}		86,000	
North Community Backyard Sewer Mains & Services Regabilitation - Phase 2		269,000	
WASTEWATER TREATMENT		**135,000**	
Equipment/Vehicle Replacement		135,000	

FY24 (1 July 2023 - 30 June 2024)		Budget
ELECTRIC PRODUCTION		**0**
ELECTRIC DISTRIBUTION		**2,000,000**
Los Alamos URD Replacement (cables, jboxes, pedestals)		400,000
White Rock URD Replacement (cables, jboxes, pedestals)		400,000
Overhead System Replacement (polex, xarms, transformers)		1,200,000
Townsite Circuit 15, 1 PHASE ($600K)		
White Rock Circuit 1, Wire 3 PHASE ($600K)		
GAS DISTRIBUTION		**250,000**
Pipeline Repair & Replacement / Equipment		250,000
WATER DISTRIBUTION		**970,000**
Denver Steel Area East Portion Pipeline {PW-WA 5}		970,000
WATER PRODUCTION		**1,913,000**
Townsite 14" Pipeline R&R - Phase 3		1,093,000
Non Potable: Rover & Pinon Park Pipeline Connections (WTB)		820,000
WASTEWATER TREATMENT AND SEWER COLLECTION TOTAL		**415,000**
SEWER COLLECTION	**415,000**	
El Gancho Sewer Lift Station Rehabilitation	164,000	
Arkansas Area Backyard Sewer Mains & Services Rehabilitation	164,000	
Denver Steel Area West Portion Sewerline R&R	87,000	
WASTEWATER TREATMENT	**0**	

FY25 (1 July 2024 - 30 June 2025)			**Budget**
ELECTRIC PRODUCTION			**0**
ELECTRIC DISTRIBUTION			**2,000,000**
Los Alamos URD Replacement (cables, jboxes, pedestals)			400,000
White Rock URD Replacement (cables, jboxes, pedestals)			400,000
Overhead System Replacement (polex, xarms, transformers)			1,200,000
Townsite Circuit 13, 1 PHASE	($600K)		
White Rock Circuit 2, Wire 3 PHASE	($600K)		
GAS DISTRIBUTION			**250,000**
Pipeline Repair & Replacement / Equipment			250,000
WATER DISTRIBUTION			**601,000**
Denver Steel Area West Portion Water Line Replacements			601,000
WATER PRODUCTION			**1,970,000**
Otowi Well 4 - 2nd Tank (Anniversary)			1,110,000
RTU Replacement - 5 Each			139,000
Non Potable: Barranca Mesa Pipeline Connections (WTB)			721,000
WASTEWATER TREATMENT AND SEWER COLLECTION TOTAL			**810,000**
SEWER COLLECTION		**255,000**	
Ridge Park Sewer Lift Station Rehabilitation		166,000	
Denver Steel Area Orange Street Portion Sewerline R&R {PW-WA 6}		89,000	
WASTEWATER TREATMENT		**555,000**	
LA WWTP Non-Potable Pressure Line		555,000	

FY26 (1 July 2025 - 30 June 2026)			**Budget**
ELECTRIC PRODUCTION			**0**
ELECTRIC DISTRIBUTION			**2,000,000**
Los Alamos URD Replacement (cables, jboxes, pedestals)			400,000
White Rock URD Replacement (cables, jboxes, pedestals)			400,000
Overhead System Replacement (polex, xarms, transformers)			1,200,000
Townsite Circuit 16, 1 PHASE	($600K)		
White Rock Circuit 1, Wire 1 PHASE	($600K)		
GAS DISTRIBUTION			**250,000**
Pipeline Repair & Replacement / Equipment			250,000
WATER DISTRIBUTION			**777,000**
Denver Steel Area Orange Street Portion Pipeline {PW-WA 6}			777,000
WATER PRODUCTION			**2,168,000**
West Pajarito Road Pipeline R&R - Phase 1			1,126,000
Non Potable: Bayo BS Winter Storage Facility (WTB)			1,042,000
WASTEWATER TREATMENT AND SEWER COLLECTION TOTAL			**643,000**
SEWER COLLECTION		**558,000**	
Old Pueblo Sewer Canyon Drop Replacement		355,000	
41st/45th/46th/47th Sewerline R&R {PW-WA 7}		90,000	
Ponerosa Sewer Lift Station Rehabilitation		113,000	
WASTEWATER TREATMENT		**85,000**	
LA & WR WWTP SCADA Upgrades		85,000	

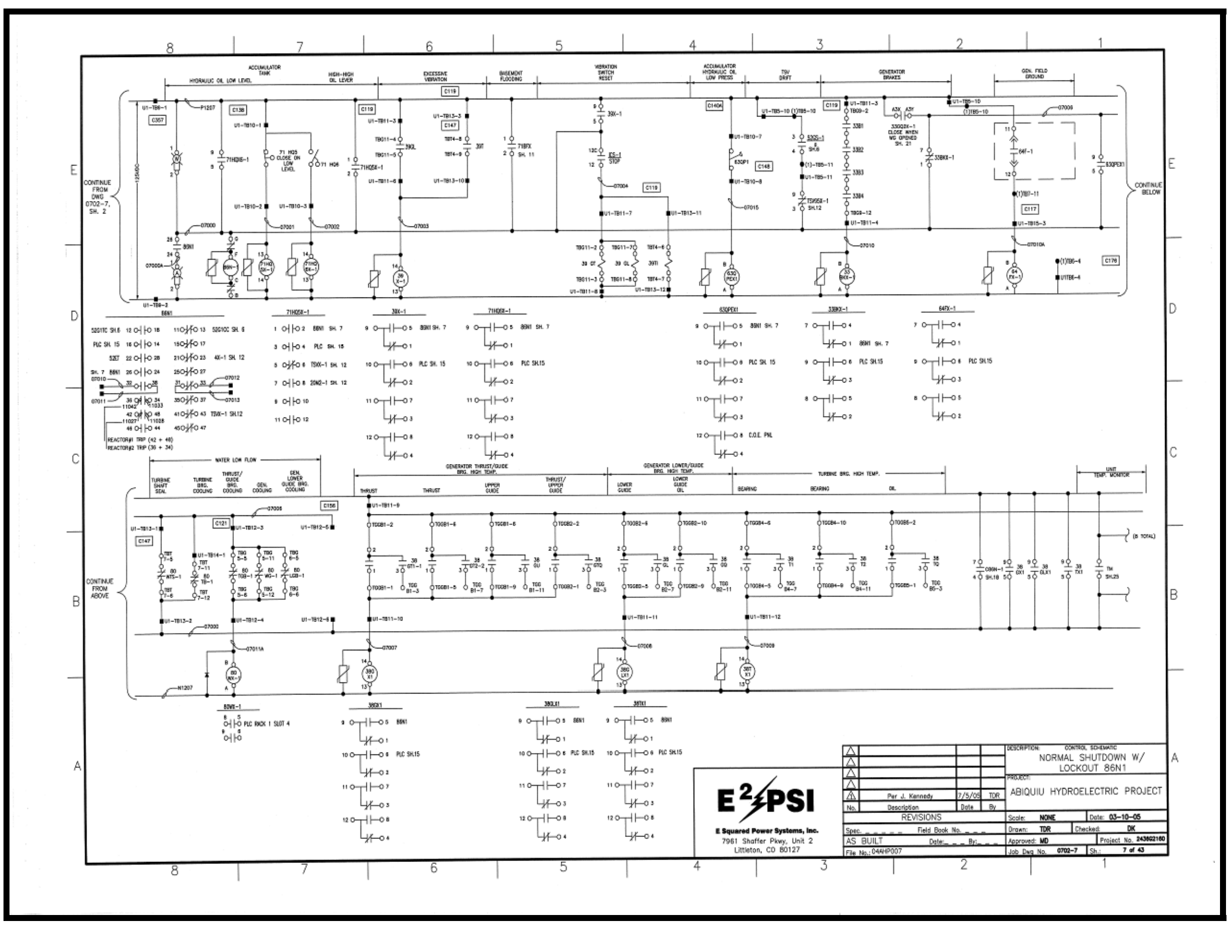
FY27 (1 July 2026 - 30 June 2027)			Budget
ELECTRIC PRODUCTION			**0**
ELECTRIC DISTRIBUTION			**2,000,000**
Los Alamos URD Replacement (cables, jboxes, pedestals)			400,000
White Rock URD Replacement (cables, jboxes, pedestals)			400,000
Overhead System Replacement (polex, xarms, transformers)			1,200,000
Townsite Circuit 16, 1 PHASE	($600K)		
White Rock Circuit 1, Wire 1 PHASE	($600K)		
GAS DISTRIBUTION			**250,000**
Pipeline Repair & Replacement / Equipment			250,000
WATER DISTRIBUTION			**676,000**
41st/45th/46th/47th Pipeline {PW-WA 7}			676,000
WATER PRODUCTION			**772,000**
Guaje Well 1 Booster Design			172,000
Non Potable: Upper Townsite Pipeline Connections (WTB)			600,000
WASTEWATER TREATMENT AND SEWER COLLECTION TOTAL			**1,029,000**
SEWER COLLECTION		**743,000**	
Airport Canyon Sewer Canyon Drop Replacement		629,000	
Eastern Area Sewerline R&R - Phase 1		114,000	
WASTEWATER TREATMENT		**286,000**	
Equipment / Vehicle		286,000	

ELECTRIC PRODUCTION
FY18: Abiquiu Controls Upgrade

Project Scope: Installation of new software and hardware to replace the existing controls system in the Abiquiu hydroelectric plant. The new upgrade will integrate the controls of the low-flow turbine and the two larger turbines into one process logic controller. The improvements are a reliability upgrade that will provide safe and efficient operation for the next 10 to 15 years.

Budget: $ 375,000

Schedule: Winter 2017/2018



ELECTRIC PRODUCTION
FY18: Abiquiu 3-Ton Jib Crane

Project Scope: A new 3-ton jib crane will be installed on the north deck of the Abiquiu hydroelectric plant to raise and lower the gates to the energy dissipating chambers. Currently, access to the gates is limited due to the location of the plant electrical gear that must be navigated through by a crane or boom truck.

Budget: $ 140,000

Schedule: Spring 2018

ELECTRIC PRODUCTION
FY18: Abiquiu and El Vado Battery Replacement

Project Scope: The batteries in both plants area approximately 11 years old. Annual testing has indicated a declining trend in their capacity in recent years. The batteries are the power supply for the plant controls system.

Budget: $ 135,000

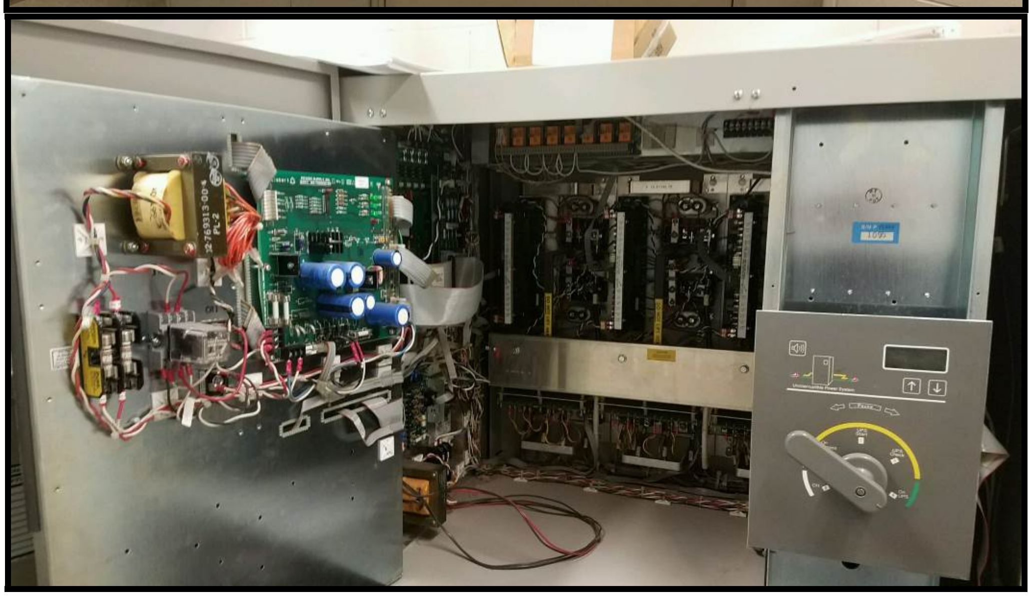
Schedule: Winter 2017/2018

ELECTRIC PRODUCTION
FY18: Electric SCADA Uninterruptible Power Source Replacement

Project Scope: An uninterruptible power supply (UPS) is a critical feature of the water and electric supervisory controls and data acquisition system (SCADA). The existing UPS at the Pajarito Cliffs serves both the water and electric SCADA systems and is over 15 years old. The UPS is beyond its service life and will be replaced.

Budget: $25,000

Schedule: Spring 2018.



ELECTRIC DISTRIBUTION
FY18: Overhead System Replacement

Project Scope: Much of the utilities' overhead infrastructure is > 50 years and operating near or past its useful plant life. The department's Asset Management Program (AMP) prioritizes O&M projects based on root cause analysis after power outages, quarterly line inspections, etc. The O&M program includes replacement of poles, cross-arms, and other pole hardware including transformers. Priority is placed on the three phase backbone and areas affecting the highest number of consumers.

1.	White Rock service area	$200,000.
2.	Los Alamos service area	$200,000.

Budget: $ 400,000
Schedule: Year round design and construction

ELECTRIC DISTRIBUTION

FY18: URD (UG residential distribution) Replacements

Project Scope: The underground system contains 1970s infrastructure which was direct-buried and in direct contact with the earth. Portions or segments of the underground system which have experienced 3 or more failures are targeted for replacement because they will fail again. Old and obsolete live-front transformers are routinely replaced due to safety and arc-flash concerns. New loop segments are designed for radial power lines which serve large amounts of customers.

1. Los Alamos town site area after three failure replacements $250,000.
2. White Rock area after three failure replacements $250,000.

Budget: $ 500,000
Schedule: Year round design and construction

ELECTRIC DISTRIBUTION
FY18: White Rock Substation Tran 1 O&M

Project Scope: The original White Rock transformer and switchgear is often utilized when LANL switches or powers OFF the NL 115KV line and refeeds White Rock from the RL 115KV line. The system often remains under this configuration from a few days up to 2 weeks. The switchgear is at least 50 years and has not been maintained nor refurbished. A failure to the switchgear would result in a very prolonged power outage. Federal rules require that substations have oil containment systems in the event of a transformer leakage or rupture.

1.	Switchgear 1 refurbishment	$350,000.
2.	Substation transformers oil retention	$150,000.

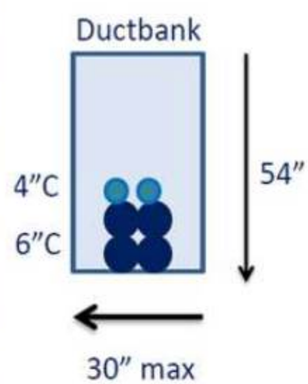
Budget: $ 500,000
Schedule: Year round design and construction

ELECTRIC DISTRIBUTION
FY18: LASS Substation Feeders (in and out)

Project Scope: Powering LASS requires the installation of two new source feeders from LANL substation called LS1 and LS2. The LASS substation would then have 8 outgoing load feeders to power 4 town site feeders and 3 other LANL feeders that power LAC loads; S6, SM6, and S18.

3. Incoming Source Feeders (2); LS1 and LS2 — $200,000.
4. Outgoing Load Feeders, (8) — $300,000.

Budget: $ 500,000
Schedule: Continuation of FY 17



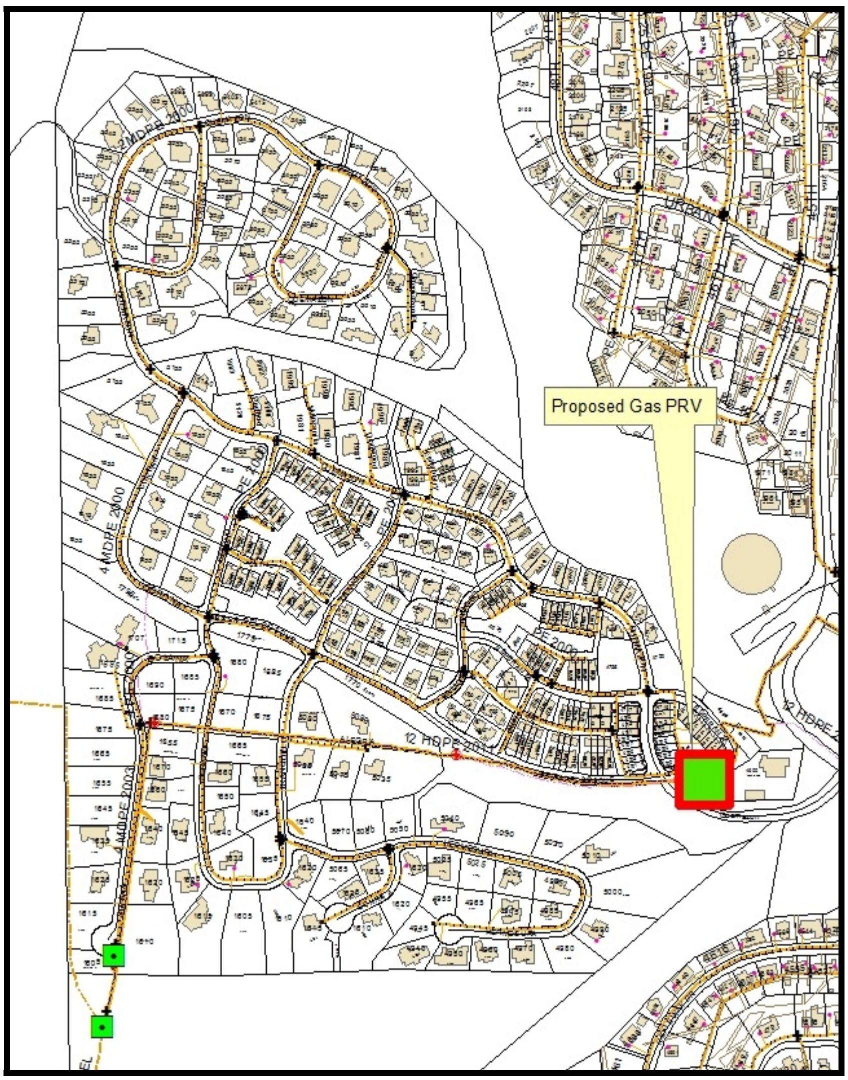
GAS DISTRIBUTION

FY18: Western Area / Quemazon Loop Alternative PRV Feed

Project Scope: Install a new gas pressure reducing valve (PRV), to allow a back feed (loop feed) into the Quemazon distribution system. The system currently has only one supply of natural gas, this project will provide a second feed providing redundancy and reliability.

Budget: $ 250.000

Schedule: Construct Fall 2017



GAS DISTRIBUTION
FY18: PRV Site Improvements Phase 1

Project Scope: New enclosures for existing gas PRV stations will be constructed. The current facilities are not adequately protected against security threats, or natural hazards such as fire. Facilities also are extremely limited in terms of the space they provide for safe O&M activities, as well as ingress and egress.

Budget: $ 200,000

Schedule: FY18

New East Park PRV enclosure (above)

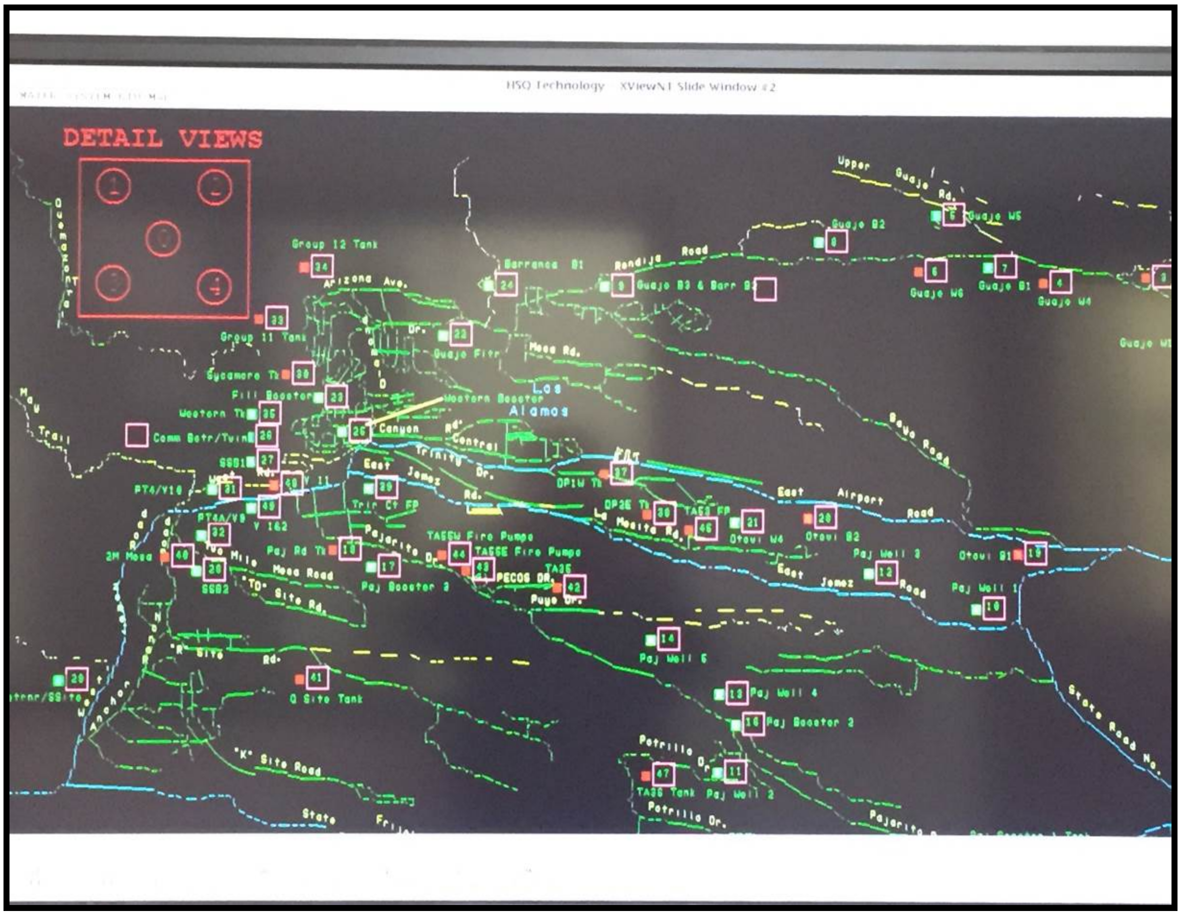
Typical enclosure (above)

GAS DISTRIBUTION
FY18: SCADA Improvements Phase 1

Project Scope: Install SCADA transmitting (RTU's) at gas PRV stations, as well as other critical locations throughout Los Alamos and White Rock gas distribution system. SCADA alarms would alert GWS and Engineering personnel when system is operating outside of established parameters. System would also be used to monitor and demonstrate that operations are in compliance with State and Federal regulations.

Budget: $250,000

Schedule: FY 18



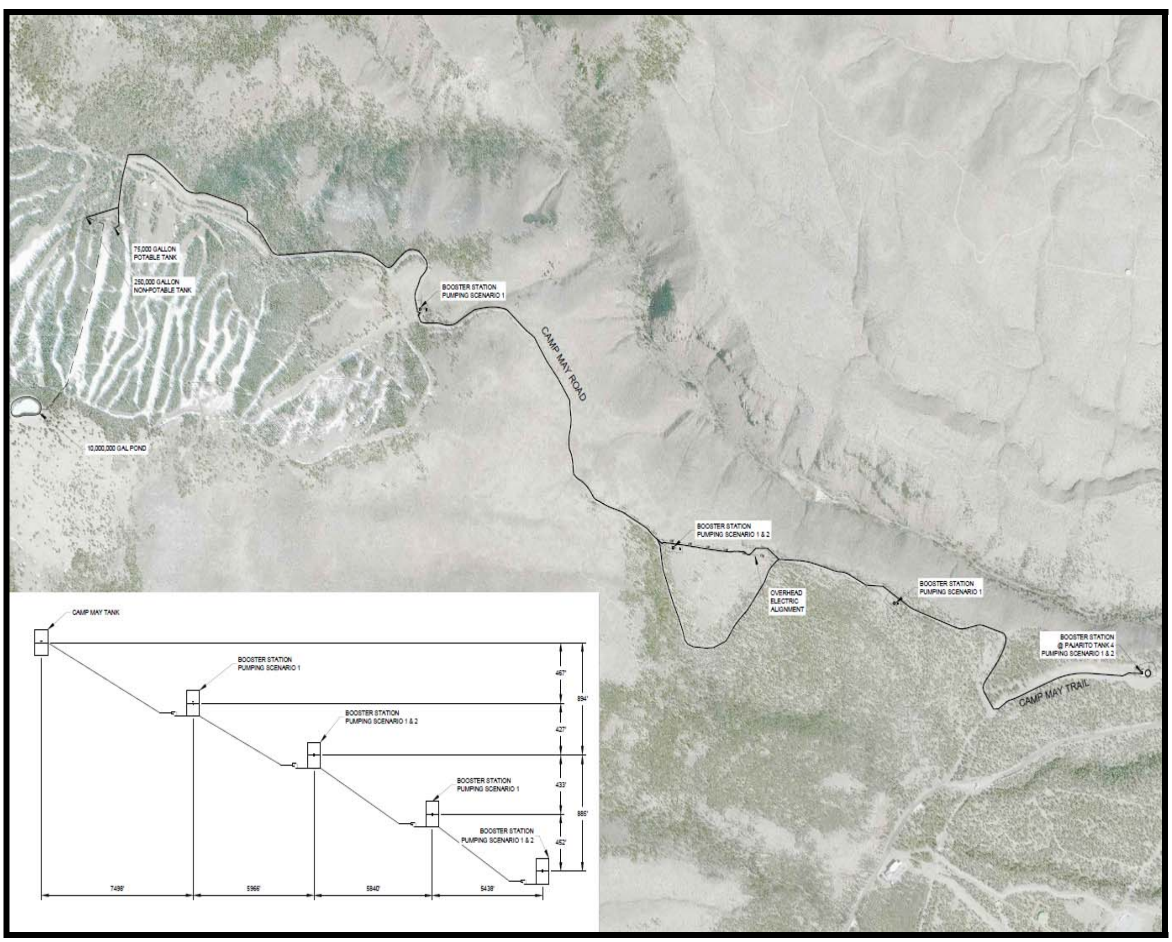
Example: Photo of Water SCADA Control Board

WATER PRODUCTION
FY18: Camp May Potable Water Supply Extension-Construction

Project Scope: This project will significantly improve fire suppression capabilities for the recreational facilities in Camp May, plus extend the potable water supply for current and future developments in the area. Cost will be shared under a private-public partnership between the County and the recreational facility operator.

Budget: $4,000.000 ($2,000,000 General Fund / remainder by third party)

Schedule: Design and environmental documents are currently in progress.



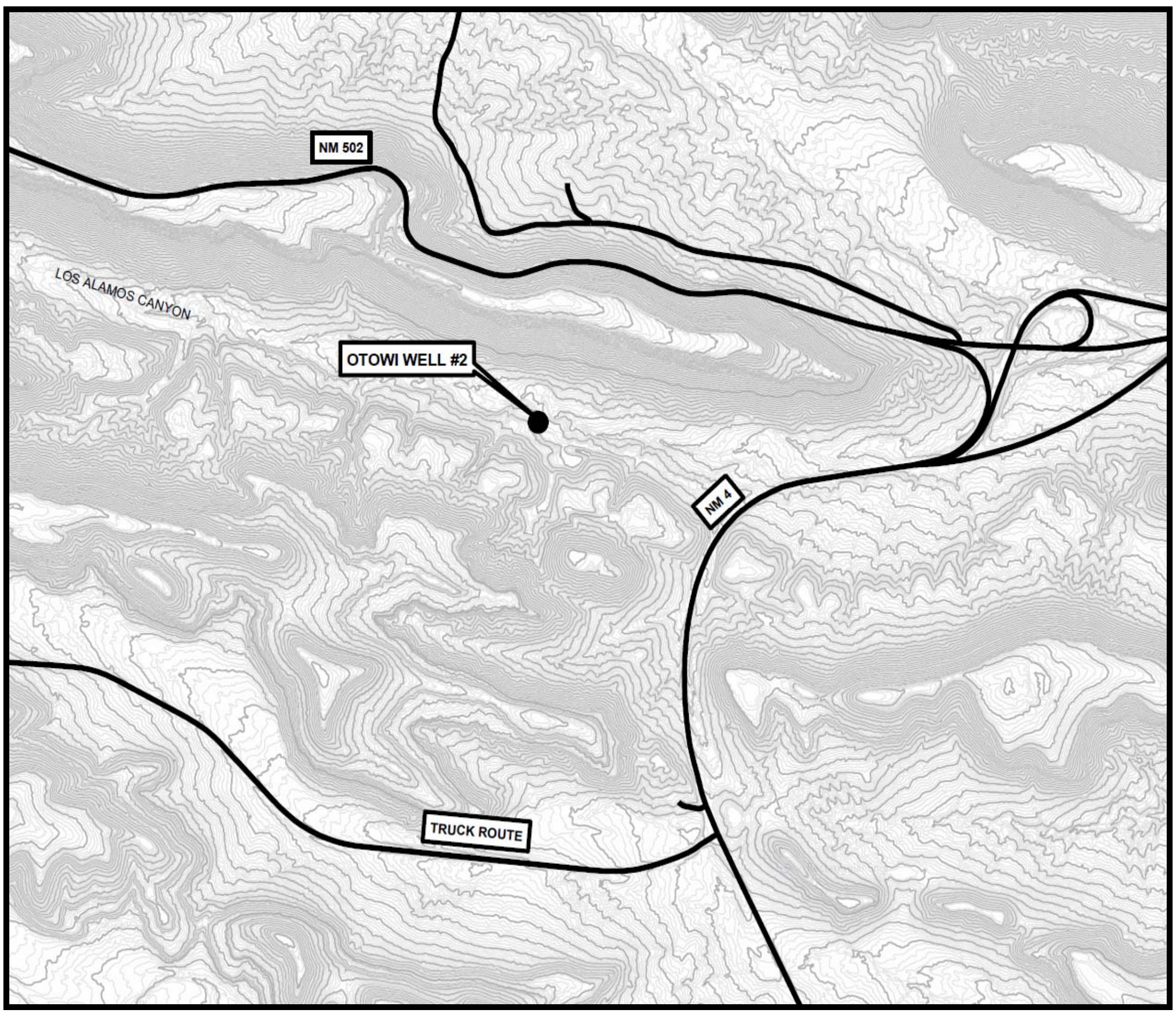
WATER PRODUCTION

FY18: Otowi Well No. 2 Pump House and Pipeline Design & Construction

Project Scope: The project will be executed in two phases. The first phase of the project will be a design-build contract for the design, drilling and development of the well scheduled for completion in the fall of 2017. The second phase of the project will be design and construction of the well house, electric gear and pipeline. The well is scheduled to be online by summer of 2018.

Budget: $1,500,000

Schedule: Well to be drilled and developed in summer 2017. The well house and pipeline will be constructed in the summer of 2018.



WATER PRODUCTION

FY18: Pajarito Well No. 5 Motor Control Center Replacement

Project Scope: The MCC equipment on the Pajarito Well No. 5 is becoming obsolete. Parts are no longer available on the open market. The DPU has maintained this equipment using parts from spare units. New equipment is required to avoid system breakdowns and to keep the system functioning properly. This project is part of a system wide effort to update all motor control centers and control equipment so they meet current codes and maintain reliable service.

Budget: $275,000

Schedule: Design and construction will occur in the spring/summer of 2018.

WATER PRODUCTION
FY18: Water SCADA Radio transmitter Unit (RTU) Replacement

Project Scope: Replace three water production Radio Transmitter Units (RTUs) associated with wells, boosters and tanks. The three most unreliable units will be replaced by in-house staff. New RTUs are being phased in each year throughout the system to maintain a reliable communications system.

Budget: $75,000

Schedule: Spring 2018.

WATER PRODUCTION

FY18: Automatic Well Replacement: Valves 9, 10 & 11.

Project Scope: These automatic valves are needed to open and close pipelines to transfer water efficiently from one section of the potable water system to other sections whenever there is a need due to a booster station or well pump failure. The mechanical and electrical portions of these valves do not function properly. Further, the equipment was manufactured overseas and it is extremely difficult to order and receive parts.

Budget: $150,000

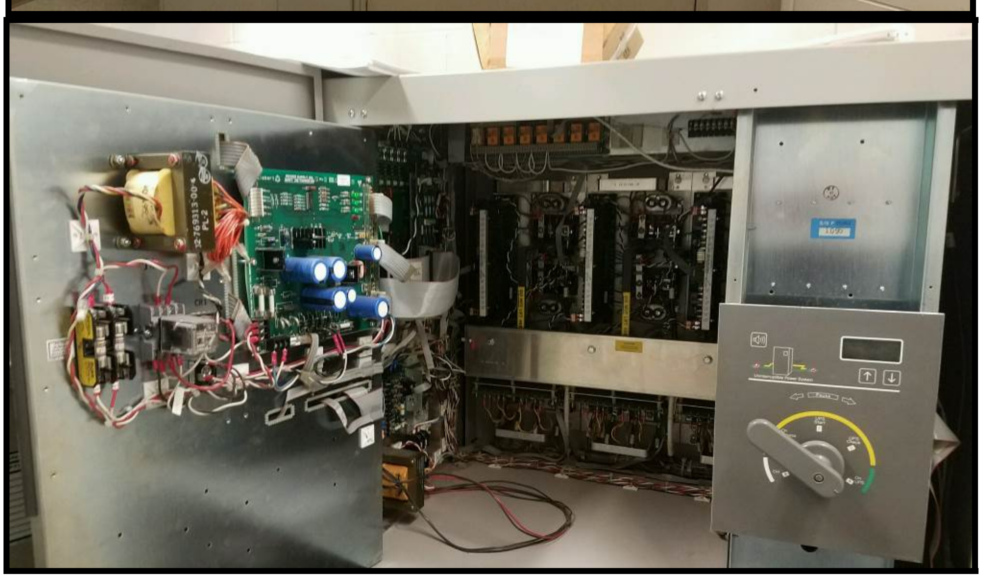
Schedule: Spring 2018.

WATER PRODUCTION
FY18: Water SCADA Uninterruptible Power Source Replacement

Project Scope: An uninterruptible power supply (UPS) is a critical feature of the water and electric supervisory controls and data acquisition system (SCADA). The existing UPS at the Pajarito Cliffs serves both the water and electric SCADA systems and is over 15 years old. The UPS is beyond its service life and will be replaced.

Budget: $25,000

Schedule: Spring 2018.



WATER PRODUCTION
FY18: Non-Potable Design of Booster Stations and Tank Construction

Project Scope: The next phase of non-potable capital improvements recommended by the Master Plan are related to increasing non–potable water storage and refurbishing aged booster stations. A project has been scoped to design multiple booster station replacements and a second water tank adjacent to the existing Group 12 tank. A second project to construct a new water tank adjacent to the Bayo Booster Station has also been scoped. This new tank will maximize the capture of water during peak periods which is now discharged to the environment.

Budget: $495,000 Design
$776,000 Tank Construction

Schedule: Spring 2018.

WASTEWATER COLLECTION
FY-18: Canyon Road Vitrified Clay Crossings Rehabilitation

Project Scope: Sewer problems have occurred in two locations where the sewer lines crosses Canyon Road. Video inspection of the lines revealed structural damage that will require sections of the pipelines be replaced.

Budget: $ 50,000

Schedule: Bid Spring 2018 / Construct Summer 2018

Los Alamos County Utilities Department
10-Year Financial Forecast - FY2018-FY2027
Electric Production

1.50%	BUDGET 2018	FORECAST 2019	FORECAST 2020	FORECAST 2021	FORECAST 2022	FORECAST 2023	FORECAST 2024	FORECAST 2025	FORECAST 2026	FORECAST 2027
Expenditure Forecast										
El Vado Generation	620,427	600,000	609,000	618,135	627,407	636,818	646,370	656,066	665,907	675,896
Abiquiu Generation	403,881	600,000	609,000	618,135	627,407	636,818	646,370	769,861	769,861	769,861
Contract Administration	20,048	20,048	20,349	20,654	20,964	21,279	21,598	21,922	22,251	22,584
Load Control	1,822,030	1,858,471	1,895,640	1,933,553	1,972,224	2,011,668	2,051,902	2,092,940	2,134,799	2,177,495
Transmission - PNM	1,405,000	1,562,371	1,640,489	1,722,514	1,808,639	1,899,071	1,994,025	2,093,726	2,198,412	2,308,333
Transmission - Other	2,285,008	3,630,585	3,747,418	3,874,520	3,995,662	4,105,367	4,242,243	4,384,825	4,415,954	2,917,812
Purchased Power	14,614,373	15,315,863	16,051,024	16,821,473	17,628,904	18,475,092	19,361,896	20,291,267	21,265,248	22,285,980
Photovoltaic Array	117,000	118,755	120,536	122,344	124,180	126,042	127,933	129,852	131,800	133,777
Debt Service	2,635,071	2,674,597	2,714,716	2,755,437	2,796,768	2,838,720	2,881,301	2,924,520	2,968,388	3,012,914
Property Taxes	458,055	464,925	471,899	478,978	486,162	493,455	500,857	508,370	515,995	523,735
Insurance	120,000	121,800	123,627	125,481	127,364	129,274	131,213	133,181	135,179	137,207
San Juan Operations	11,213,148	10,630,015	10,969,002	13,327,274	11,850,582	11,997,282	13,685,184	12,901,824	12,901,824	12,901,824
Laramie River Operations	2,854,600	2,334,374	2,096,618	2,051,189	2,074,498	2,142,696	2,265,910	2,417,012	2,494,622	2,494,622
SMR Project	450,000	456,750	463,601	470,555	477,614	484,778	492,049	499,430	506,922	514,525
Non-Pool Expenses	-	-	-	-	-	-	-	-	-	-
Interdepartmental Charges	447,280	453,989	460,799	467,711	474,727	481,848	489,075	496,411	503,858	511,415
Administrative Allocation	558,305	662,327	672,262	682,346	692,581	702,970	713,514	724,217	735,080	746,106
Capital	675,000	300,000	-	-	-	-	-	-	-	-
Total Operation Expenses	40,024,226	41,504,869	42,665,982	46,090,300	45,785,683	47,183,176	50,251,440	51,045,425	52,366,098	52,134,086
Total Capital Expenditures	675,000	300,000	-	-	-	-	-	-	-	-
Total Cash Outflow	40,699,226	41,804,869	42,665,982	46,090,300	45,785,683	47,183,176	50,251,440	51,045,425	52,366,098	52,134,086
1.01%										
Revenue Forecast										
Mwh Sales - LANL	542,688	539,120	560,353	696,685	741,578	757,031	773,182	795,044	1,000,629	1,062,129
Mwh Sales - LAC Distribution	125,530	126,934	128,386	129,853	131,334	132,830	134,341	135,868	137,409	138,966
Total Mwh Sales	$668,218	$666,054	$688,739	$826,538	$872,912	$889,862	$907,523	$930,912	$1,138,038	$1,201,095
Revenue per Mwh	**52.20**	**50.36**	**52.34**	**54.66**	**49.07**	**51.16**	**52.59**	**52.57**	**50.46**	**48.67**
DOE Revenues	28,144,437	27,038,344	29,136,184	37,904,381	36,237,042	38,605,213	40,546,537	41,688,955	50,403,948	51,614,325
Economy Sales	3,594,592	3,648,511	3,703,239	3,758,787	3,815,169	3,872,396	3,930,482	3,989,440	4,049,281	4,110,020
Interest on Reserves	25,000	25,081	19,073	15,262	18,944	20,044	22,902	24,718	27,162	39,014
Bond Federal Subsidy	33,984	(33,984)	(33,984)	(33,984)	(33,984)	(33,984)	(30,867)	(27,669)	(24,080)	(19,561)
Bond Issue proceeds										
Transfer from Distribution Fund	6,737,615	6,505,405	6,910,136	7,277,880	6,595,061	6,917,639	7,179,711	7,249,876	7,026,526	6,845,739
Total Cash Inflow	38,535,628	37,183,356	39,734,648	48,922,326	46,632,232	49,381,308	51,648,766	52,925,320	61,482,838	62,589,539
Net Cash Flow	(2,163,598)	(4,621,513)	(2,931,334)	2,832,026	846,549	2,198,132	1,397,326	1,879,895	9,116,739	10,455,453
Cumulative Net Cash Flow	(2,163,598)	(6,785,111)	(9,716,445)	(6,884,420)	(6,037,870)	(3,839,738)	(2,442,412)	(562,517)	8,554,222	19,009,674
Cash Balance	19,292,979	14,671,466	11,740,132	14,572,158	15,418,707	17,616,839	19,014,165	20,894,060	30,010,799	40,466,252
Recommended Cash Balance	17,368,510	18,154,003	18,425,287	18,744,275	18,940,286	18,512,088	18,149,005	17,888,062	17,467,088	16,881,623
Reserves										
Retirement/Reclamation Reserve	10,079,922	10,204,395	10,293,261	10,421,375	10,426,053	9,808,674	9,239,130	8,708,141	8,130,692	8,149,336
Identified items on site	300,000	304,500	309,068	313,704	318,409	323,185	328,033	332,953	337,948	343,017
San Juan Decommissioning	4,709,820	4,898,220	5,086,620	5,275,020	5,463,420	5,651,820	5,840,220	6,028,620	6,217,020	6,405,420
Laramie River Decommissioning	721,980	760,980	799,980	838,980	877,980	916,980	955,980	994,980	1,033,980	1,072,980
San Juan Mine Reclamation	4,348,122	4,240,695	4,097,593	3,993,671	3,766,244	2,916,689	2,114,897	1,351,588	541,744	327,919

1.50%	BUDGET 2018	FORECAST 2019	FORECAST 2020	FORECAST 2021	FORECAST 2022	FORECAST 2023	FORECAST 2024	FORECAST 2025	FORECAST 2026	FORECAST 2027
Expenditure Forecast										
Supervision, Misc Direct Admin	710,342	720,997	731,812	742,789	753,931	765,240	776,718	788,369	800,195	812,198
Substation Maintenance	36,663	37,213	37,771	38,338	38,913	39,497	40,089	40,691	41,301	41,920
Switching Station Maintenance	29,115	29,552	29,995	30,445	30,902	31,365	31,836	32,313	32,798	33,290
Overhead Maintenance	488,883	496,216	503,660	511,215	518,883	526,666	534,566	542,585	550,723	558,984
Underground Maintenance	375,882	381,521	387,243	393,052	398,948	404,932	411,006	417,171	423,429	429,780
Meter Maintenance	126,101	127,992	129,912	131,861	133,839	135,846	137,884	139,952	142,051	144,182
Interdepartmental Charges	583,503	592,256	601,139	610,156	619,309	628,598	638,027	647,598	657,312	667,171
Administrative Division Allocation	852,774	560,121	568,522	577,050	585,706	594,491	603,409	612,460	621,647	630,972
In Lieu Taxes	558,229	429,543	437,453	445,563	453,877	462,399	471,137	480,093	489,275	498,688
Debt Service	1,255,148	1,271,957	1,253,438	1,253,443	1,133,909	982,377	984,776	1,015,816	1,178,311	1,178,311
Profit Transfer	651,065	676,267	693,275	710,710	728,585	746,909	765,694	784,951	804,692	824,930
Cost of Power	6,737,615	6,505,405	6,910,136	7,277,880	6,595,061	6,917,639	7,179,711	7,249,876	7,026,526	6,845,739
Total Operations Expenses	12,405,320	11,829,038	12,284,357	12,722,503	11,991,862	12,235,960	12,574,853	12,751,874	12,768,260	12,666,167
Capital	2,233,371	3,030,000	1,836,180	1,906,057	2,081,208	2,102,020	2,123,040	2,144,271	2,165,713	2,187,371
Total Cash Outflow	14,638,692	14,859,038	14,120,537	14,628,560	14,073,070	14,337,981	14,697,893	14,896,145	14,933,974	14,853,537
Revenue Forecast										
KWh Sales	125,496,000	126,934,000	128,203,340	129,485,373	130,780,227	132,088,029	133,408,910	134,742,999	136,090,429	137,451,333
Revenue per KWh	$0.1221	$0.1239	$0.1258	$0.1276	$0.1296	$0.1315	$0.1335	$0.1355	$0.1375	$0.1396
Rate Increase Percentage		**1.5%**	**1.5%**	**1.5%**	**1.5%**	**1.5%**	**1.5%**	**1.5%**	**1.5%**	**1.5%**
Total Sales Revenue	15,319,172	15,727,128	16,122,665	16,528,150	16,943,833	17,369,971	17,806,826	18,254,667	18,713,772	19,184,424
Bond/Loan proceeds										
Bond Federal Subsidy	67,942	67,942	67,942	67,942	67,942	67,942	66,045	64,099	58,759	47,731
Interest on Utility Reserves	(183,000)	(561)	26,575	82,742	137,748	218,410	305,118	395,871	495,083	607,174
Revenue on Recoverable Work	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
Total Cash Inflow	15,354,114	15,944,509	16,367,183	16,828,834	17,299,524	17,806,323	18,327,989	18,864,637	19,417,614	19,989,328
R&R and Cash Flows										
Net Cash Flow	715,423	1,085,471	2,246,646	2,200,274	3,226,454	3,468,342	3,630,096	3,968,492	4,483,640	5,135,791
Cumulative Net Cash Flow	715,423	1,800,894	4,047,539	6,247,813	9,474,267	12,942,610	16,572,705	20,541,198	25,024,838	30,160,629
Cash Balance	(22,453)	1,063,018	3,309,664	5,509,938	8,736,392	12,204,734	15,834,830	19,803,322	24,286,962	29,422,753
Recommended Cash Balance	13,141,299	12,177,298	12,610,185	11,961,579	12,349,383	12,495,248	12,603,710	12,447,880	12,466,662	12,607,024

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Los Alamos County Utilities Department
10-Year Financial Forecast - FY2018 through FY2027
Electric Fund Cash Reserve Analysis

	BUDGET 2018	FORECAST 2019	FORECAST 2020	FORECAST 2021	FORECAST 2022	FORECAST 2023	FORECAST 2024	FORECAST 2025	FORECAST 2026	FORECAST 2027
ELECTRIC DIST & PROD CASH RESERVES										
Combined Cash Balance ED & EP	19,270,527	15,734,484	15,049,796	20,082,095	24,155,099	29,821,573	34,848,994	40,697,382	54,297,761	69,889,005
Recommended Cash Balance (ED)	13,141,299	12,177,298	12,610,185	11,961,579	12,349,383	12,495,248	12,603,710	12,447,880	12,466,662	12,607,024
Recommended Cash Balance (EP)	17,368,510	18,154,003	18,425,287	18,744,275	18,940,286	18,512,088	18,149,005	17,888,062	17,467,088	16,881,623
Recommended Cash Balance	**30,509,809**	**30,331,301**	**31,035,472**	**30,705,853**	**31,289,669**	**31,007,335**	**30,752,716**	**30,335,942**	**29,933,750**	**29,488,647**
TARGET RESERVE BALANCES										
Debt Service Reserve	3,890,219	3,946,554	3,968,154	4,008,880	3,930,677	3,821,097	3,866,077	3,940,336	4,146,699	4,191,225
Retirement/Reclamation Reserve	10,079,922	10,204,395	10,293,261	10,421,375	10,426,053	9,808,674	9,239,130	8,708,141	8,130,692	8,149,336
Identified items on site	300,000	304,500	309,068	313,704	318,409	323,185	328,033	332,953	337,948	343,017
San Juan Decommissioning	4,709,820	4,898,220	5,086,620	5,275,020	5,463,420	5,651,820	5,840,220	6,028,620	6,217,020	6,405,420
Laramie River Decommissioning	721,980	760,980	799,980	838,980	877,980	916,980	955,980	994,980	1,033,980	1,072,980
San Juan Mine Reclamation	4,348,122	4,240,695	4,097,593	3,993,671	3,766,244	2,916,689	2,114,897	1,351,588	541,744	327,919
Operations Reserve	6,234,263	6,962,715	7,131,065	7,307,698	7,484,618	7,659,211	7,850,911	8,106,017	8,247,374	7,627,966
Capital Expenditures Reserve	3,300,000	1,800,000	1,850,000	1,850,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000
Contingency Reserve	500,000	507,500	515,113	522,839	530,682	538,642	546,722	554,922	563,246	571,695
Rate Stabilization Reserve	6,505,405	6,910,136	7,277,880	6,595,061	6,917,639	7,179,711	7,249,876	7,026,526	6,845,739	6,948,426
	30,509,809	30,331,301	31,035,472	30,705,853	31,289,669	31,007,335	30,752,716	30,335,942	29,933,750	29,488,647
RESERVE BALANCE FORECAST										
Debt Service Reserve	3,890,219	3,946,554	3,968,154	4,008,880	3,930,677	3,821,097	3,866,077	3,940,336	4,146,699	4,191,225
Retirement/Reclamation Reserve	10,079,922	10,204,395	10,293,261	10,421,375	10,426,053	9,808,674	9,239,130	8,708,141	8,130,692	8,149,336
Operations Reserve	5,300,386	1,583,535	788,382	5,651,841	7,484,618	7,659,211	7,850,911	8,106,017	8,247,374	7,627,966
Capital Expenditures Reserve	-	-	-	-	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000	2,000,000
Contingency Reserve	-	-	-	-	313,750	538,642	546,722	554,922	563,246	571,695
Rate Stabilization Reserve	-	-	-	-	-	5,993,948	7,249,876	7,026,526	6,845,739	6,948,426
Total Cash Remaining	-	-	-	-	-	-	**4,096,279**	**10,361,440**	**24,364,011**	**40,400,358**

Los Alamos County Utilities Department
10-Year Financial Forecast - FY2018-FY2027
Gas Distribution

1.50%	BUDGET 2018	FORECAST 2019	FORECAST 2020	FORECAST 2021	FORECAST 2022	FORECAST 2023	FORECAST 2024	FORECAST 2025	FORECAST 2026	FORECAST 2027
Supervision, Misc Direct Admin	256,975	260,829	264,742	268,713	272,743	276,835	280,987	285,202	289,480	293,822
Gas Distribution	280,994	285,209	289,487	293,829	298,237	302,710	307,251	311,860	316,538	321,286
Gas Meters	137,486	139,548	141,641	143,766	145,922	148,111	150,333	152,588	154,876	157,200
Interdepartmental Charges	366,631	372,130	377,712	383,378	389,129	394,966	400,890	406,904	413,007	419,202
Administrative Division Allocation	718,310	559,431	567,822	576,340	584,985	593,760	602,666	611,706	620,882	630,195
In Lieu Taxes	202,705	114,737	124,340	124,340	124,340	124,340	124,340	124,340	124,340	124,340
Profit Transfer	262,075	232,887	255,309	251,705	260,914	277,730	281,334	289,342	293,746	292,545
Cost of Gas	2,537,766	3,211,260	3,691,385	3,614,222	3,811,416	4,171,509	4,248,672	4,420,145	4,514,455	4,488,734
TOTAL Operations Expenses	4,762,942	5,176,031	5,712,437	5,656,292	5,887,685	6,289,960	6,396,472	6,602,085	6,727,323	6,727,323
Capital	700,000	454,500	459,045	309,090	260,151	262,753	265,380	268,034	270,714	273,421
TOTAL Cash Outflow	**5,462,942**	**5,630,531**	**6,171,482**	**5,965,382**	**6,147,836**	**6,552,713**	**6,661,852**	**6,870,119**	**6,998,037**	**7,000,744**
Revenue Forecast										
Therm Sales	8,455,275	8,455,275	8,455,275	8,455,275	8,455,275	8,455,275	8,455,275	8,455,275	8,455,275	8,455,275
Revenue per Therm	$ 0.620	$ 0.590	$ 0.647	$ 0.637	$ 0.661	$ 0.703	$ 0.712	$ 0.733	$ 0.744	$ 0.741
Rate Increase Percentage	**-10.00%**									
Total Sales Revenue	$ 5,241,503	4,986,868	5,466,992	5,389,829	5,587,023	5,947,117	6,024,279	6,195,752	6,290,063	6,264,342
Interest on Utility Reserves	82,000	83,230	84,478	85,746	87,032	88,337	89,662	91,007	92,372	93,758
Revenue on Recoverable Work	20,000	20,300	20,605	20,914	21,227	21,546	21,869	22,197	22,530	22,868
TOTAL Cash Inflow	5,343,503	5,090,398	5,572,075	5,496,489	5,695,282	6,057,000	6,135,811	6,308,957	6,404,965	6,380,967
Net Cash Flow	(119,439)	(540,134)	(599,407)	(468,894)	(452,554)	(495,713)	(526,042)	(561,162)	(593,073)	(619,777)
Cummulative net cash flow	(119,439)	(659,573)	(1,258,980)	(1,727,873)	(2,180,427)	(2,676,140)	(3,202,182)	(3,763,344)	(4,356,416)	(4,976,193)
Cash Balance	6,513,685	5,973,552	5,374,145	4,905,251	4,452,697	3,956,984	3,430,943	2,869,781	2,276,708	1,656,931
Recommended Cash Balance	1,681,550	1,569,692	1,440,428	1,406,602	1,423,019	1,439,681	1,456,594	1,473,760	1,491,184	1,508,870

Los Alamos County Utilities Department
10-Year Financial Forecast - FY2018 through FY2027
Gas Cash Reserve Analysis

	BUDGET 2018	FORECAST 2019	FORECAST 2020	FORECAST 2021	FORECAST 2022	FORECAST 2023	FORECAST 2024	FORECAST 2025	FORECAST 2026	FORECAST 2027
GAS UTILITY CASH RESERVES										
Cash Balance	6,513,685	5,973,552	5,374,145	4,905,251	4,452,697	3,956,984	3,430,943	2,869,781	2,276,708	1,656,931
Recommended Cash Balance	**1,681,550**	**1,569,692**	**1,440,428**	**1,406,602**	**1,423,019**	**1,439,681**	**1,456,594**	**1,473,760**	**1,491,184**	**1,508,870**
TARGET RESERVE BALANCES										
Operations Reserve	981,550	865,942	882,872	895,183	907,678	920,360	933,233	946,299	959,561	973,022
Capital Expenditures Reserve	450,000	450,000	300,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Contingency Reserve	250,000	253,750	257,556	261,420	265,341	269,321	273,361	277,461	281,623	285,847
Rate Stabilization Reserve*	-	-	-	-	-	-	-	-	-	-
	1,681,550	1,569,692	1,440,428	1,406,602	1,423,019	1,439,681	1,456,594	1,473,760	1,491,184	1,508,870
RESERVE BALANCE FORECAST										
Operations Reserve	981,550	865,942	882,872	895,183	907,678	920,360	933,233	946,299	959,561	973,022
Capital Expenditures Reserve	450,000	450,000	300,000	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Contingency Reserve	250,000	253,750	257,556	261,420	265,341	269,321	273,361	277,461	281,623	285,847
Rate Stabilization Reserve*	-	-	-	-	-	-	-	-	-	-
Total Cash Remaining	**4,832,135**	**4,403,860**	**3,933,716**	**3,498,649**	**3,029,678**	**2,517,303**	**1,974,348**	**1,396,020**	**785,524**	**148,062**

** Assumes pass-through cost of gas rate remains in place.*

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Los Alamos County Utilities Department
10-Year Financial Forecast - FY2018 through FY2027
Water Production

1.5%	BUDGET 2018	FORECAST 2019	FORECAST 2020	FORECAST 2021	FORECAST 2022	FORECAST 2023	FORECAST 2024	FORECAST 2025	FORECAST 2026	FORECAST 2027
Expenditure Forecast										
Supervision and Operations	963,806	978,263	992,937	1,007,831	1,022,949	1,038,293	1,053,867	1,069,675	1,085,720	1,102,006
Pumping Power	800,000	774,300	774,300	774,300	774,300	774,300	774,300	774,300	774,300	774,300
Wells	135,631	137,665	139,730	141,826	143,954	146,113	148,305	150,529	152,787	155,079
Booster Pump Stations	123,587	125,441	127,323	129,233	131,171	133,139	135,136	137,163	139,220	141,308
Treatment	104,271	105,835	107,422	109,034	110,669	112,329	114,014	115,724	117,460	119,222
Storage Tanks	19,385	19,676	19,971	20,271	20,575	20,883	21,197	21,515	21,837	22,165
Transmission Lines	64,705	65,676	66,661	67,661	68,676	69,706	70,751	71,813	72,890	73,983
Non Potable System	393,018	398,913	404,897	410,970	417,135	423,392	429,743	436,189	442,732	449,372
Interdepartmental Charges	341,062	346,178	351,371	356,641	361,991	367,421	372,932	378,526	384,204	389,967
Administrative Division Allocation	678,114	604,933	614,007	623,217	632,565	642,054	651,685	661,460	671,382	681,453
State Water Tax	45,000	45,675	46,360	47,056	47,761	48,478	49,205	49,943	50,692	51,453
Debt Service	235,735	271,610	296,354	319,015	326,175	624,275	636,639	531,435	385,374	410,451
Capital	2,025,000	1,015,000	1,700,000	3,173,000	1,061,000	1,077,000	1,093,000	1,249,000	1,126,000	172,000
Capital Paid with Debt/Grants/Reimb	3,771,000	964,000	850,000	261,000	1,167,000	838,000	820,000	721,000	1,042,000	600,000
Capital Paid with Cash	1,500,000									
Total Operations Expenses	3,904,314	3,874,165	3,941,332	4,007,054	4,057,921	4,400,382	4,457,773	4,398,272	4,298,599	4,370,759
Total Capital Expenditures	7,296,000	1,979,000	2,550,000	3,434,000	2,228,000	1,915,000	1,913,000	1,970,000	2,168,000	772,000
Total Cash Outflow	11,200,314	5,853,165	6,491,332	7,441,054	6,285,921	6,315,382	6,370,773	6,368,272	6,466,599	5,142,759
Revenue Forecast										
Non-potable										
Non-potable production in kgals	86,400	90,400	90,400	94,500	94,500	108,600	136,500	136,500	136,500	136,500
Non-potable rate per 1000 gallons	$ 2.50	$ 2.50	$ 2.50	$ 2.50	$ 2.50	$ 2.50	$ 2.50	$ 2.50	$ 2.50	$ 2.50
Rate Increase Percentage	**117%**									
Non-potable sales revenue	$ 216,000	$ 226,000	$ 226,000	$ 236,250	$ 236,250	$ 271,500	$ 341,250	$ 341,250	$ 341,250	$ 341,250

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Los Alamos County Utilities Department
10-Year Financial Forecast - FY2018 through FY2027
Water Production

1.5%	BUDGET 2018	FORECAST 2019	FORECAST 2020	FORECAST 2021	FORECAST 2022	FORECAST 2023	FORECAST 2024	FORECAST 2025	FORECAST 2026	FORECAST 2027
Potable										
Production in thousand gallons	1,150,000	1,150,000	1,150,000	1,150,000	1,150,000	1,150,000	1,150,000	1,150,000	1,150,000	1,150,000
Revenue per thousand gallons	$ 3.42	$ 3.65	$ 3.85	$ 4.02	$ 4.18	$ 4.32	$ 4.45	$ 4.56	$ 4.66	$ 4.75
Rate Increase Percentage	**8.00%**	**6.75%**	**5.50%**	**4.50%**	**4.00%**	**3.25%**	**3.00%**	**2.50%**	**2.25%**	**2.00%**
Potable sales revenue	$ 3,933,000	$ 4,197,500	$ 4,427,500	$ 4,623,000	$ 4,807,000	$ 4,968,000	$ 5,117,500	$ 5,244,000	$ 5,359,000	$ 5,462,500
Total Sales Revenue	**$ 4,149,000**	**$ 4,423,500**	**$ 4,653,500**	**$ 4,859,250**	**$ 5,043,250**	**$ 5,239,500**	**$ 5,458,750**	**$ 5,585,250**	**$ 5,700,250**	**$ 5,803,750**
Repayment & Interest on Inter-Utility Loans	187,569	187,569	187,569	187,569	187,569	187,569	187,569	93,784	-	-
Interest on Utility Reserves	109,233	113,428	111,371	101,452	71,389	74,552	75,329	78,212	80,086	85,579
Bond Federal Subsidy	27,576	27,576	27,576	27,576	27,576	27,576	21,338	14,940	10,459	8,496
Econ Dev Fund/Ski Hill Reimb	2,000,000									
Federal or State Grant/Loan	1,271,000	964,000	850,000	261,000	1,167,000	838,000	820,000	721,000	1,042,000	600,000
Total Cash Inflow	7,744,378	5,716,073	5,830,016	5,436,847	6,496,784	6,367,197	6,562,986	6,493,186	6,832,794	6,497,824
R&R and Cash Flows										
Net Cash Flow	(3,455,936)	(137,092)	(661,316)	(2,004,207)	210,863	51,815	192,213	124,914	366,195	1,355,065
Cumulative Net Cash Flow	(3,455,936)	(3,593,028)	(4,254,344)	(6,258,552)	(6,047,689)	(5,995,874)	(5,803,661)	(5,678,747)	(5,312,552)	(3,957,487)
Cash Balance	7,561,856	7,424,764	6,763,448	4,759,240	4,970,103	5,021,918	5,214,131	5,339,045	5,705,240	7,060,305
Recommended Cash Balance	3,835,025	4,534,138	6,064,512	4,008,293	4,065,071	4,413,291	4,616,288	4,423,237	3,358,856	3,748,148

Los Alamos County Utilities Department
10-Year Financial Forecast - FY2018 through FY2027
Water Distribution

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1.50%	BUDGET 2018	FORECAST 2019	FORECAST 2020	FORECAST 2021	FORECAST 2022	FORECAST 2023	FORECAST 2024	FORECAST 2025	FORECAST 2026	FORECAST 2027
Expenditure Forecast										
Supervision, Misc Direct Admin	184,778	187,550	190,363	193,218	196,117	199,058	202,044	205,075	208,151	211,273
Hydrants	60,645	61,555	62,478	63,415	64,367	65,332	66,312	67,307	68,316	69,341
Water Distribution	372,203	377,786	383,453	389,204	395,042	400,968	406,983	413,087	419,284	425,573
Water Meters	634,691	700,000	700,000	225,000	228,375	231,801	235,278	238,807	242,389	246,025
Interdepartmental Charges	330,744	335,705	340,741	345,852	351,040	356,305	361,650	367,075	372,581	378,169
Administrative Division Allocation	805,686	528,345	536,270	544,314	552,478	560,766	569,177	577,715	586,380	595,176
Cost of Water	2,650,500	2,828,750	2,983,750	3,115,500	3,239,500	3,348,000	3,448,750	3,534,000	3,611,500	3,681,250
Capital	0	550,000	808,000	617,000	627,000	849,000	970,000	601,000	777,000	676,000
Total Operation Expenses	5,039,246	5,019,690	5,197,054	4,876,504	5,026,919	5,162,230	5,290,193	5,403,065	5,508,601	5,606,807
Total Capital Expenditures	0	550,000	808,000	617,000	627,000	849,000	970,000	601,000	777,000	676,000
Total Expenditures	5,039,246	5,569,690	6,005,054	5,493,504	5,653,919	6,011,230	6,260,193	6,004,065	6,285,601	6,282,807
Revenue Forecast										
kgal Sales	775,000	775,000	775,000	775,000	775,000	775,000	775,000	775,000	775,000	775,000
Revenue per kgal	$ 6.33	$ 6.73	$ 7.06	$ 7.36	$ 7.62	$ 7.81	$ 7.97	$ 8.11	$ 8.23	$ 8.35
Rate Increase Percentage	**8.00%**	**6.25%**	**5.00%**	**4.25%**	**3.50%**	**2.50%**	**2.00%**	**1.75%**	**1.50%**	**1.50%**
Total Sales Revenue	4,905,750	5,212,359	5,472,977	5,705,579	5,905,274	6,052,906	6,173,964	6,282,008	6,376,239	6,471,882
Interest on Utility Reserves	9,161	7,870	3,092	-	-	3,541	4,712	3,988	8,724	10,729
Revenue on Recoverable Work	30,450	30,907	31,370	31,841	32,319	32,803	33,295	33,795	34,302	34,816
Total Cash Inflow from Operations	4,945,361	5,251,136	5,507,439	5,737,420	5,937,593	6,089,251	6,211,971	6,319,791	6,419,264	6,517,427
R&R and Cash Flows										
Net Cash Flow	(93,885)	(318,554)	(497,615)	243,916	283,674	78,021	(48,222)	315,726	133,663	234,620
Cumulative Net Cash Flow	(93,885)	(412,439)	(910,054)	(666,138)	(382,464)	(304,443)	(352,665)	(36,939)	96,725	331,345
Cash Balance	524,661	206,107	(291,507)	(47,591)	236,083	314,104	265,881	581,608	715,271	949,891
Recommended Cash Balance	1,744,373	1,903,470	1,723,652	1,507,502	1,742,709	1,877,115	1,521,722	1,711,533	1,624,550	1,762,779

Rates										
Commodity rate per kgal										
Residential Tier 1 - < 9,000 gals	4.98	5.29	5.55	5.79	5.99	6.14	6.26	6.37	6.47	6.57
Residential Tier 2 - 9 to 15,000 gals	5.29	5.62	5.90	6.15	6.37	6.53	6.66	6.78	6.88	6.98
Residential Tier 3 - > 15,000 gals	6.32	6.71	7.05	7.35	7.61	7.80	7.96	8.10	8.22	8.34
Multi-Family Tier 1 - < 9,000 gals	4.98	5.29	5.55	5.79	5.99	6.14	6.26	6.37	6.47	6.57
Multi-Family Tier 2 - 9 to 15,000 gals	5.23	5.55	5.83	6.08	6.29	6.45	6.58	6.70	6.80	6.90
Multi-Family Tier 3 - > 15,000 gals	5.35	5.68	5.96	6.21	6.43	6.59	6.72	6.84	6.94	7.04
Commercial All Tiers	4.98	5.29	5.55	5.79	5.99	6.14	6.26	6.37	6.47	6.57
County & Schools All Tiers	4.98	5.29	5.55	5.79	5.99	6.14	6.26	6.37	6.47	6.57
Customer Charge per Meter Size										
= or < 1.25"	9.42	10.01	10.51	10.96	11.34	11.62	11.85	12.06	12.24	12.42
1.5"	29.84	31.71	33.30	34.72	35.94	36.84	37.58	38.24	38.81	39.39
2"	44.55	47.33	49.70	51.81	53.62	54.96	56.06	57.04	57.90	58.77
2.5" to 3"	87.91	93.41	98.08	102.25	105.83	108.48	110.65	112.59	114.28	115.99
4"	149.69	159.04	166.99	174.09	180.18	184.68	188.37	191.67	194.55	197.47
6"	316.01	335.76	352.55	367.53	380.39	389.90	397.70	404.66	410.73	416.89
8"	522.13	554.76	582.50	607.26	628.51	644.22	657.10	668.60	678.63	688.81

Los Alamos County Utilities Department
10-Year Financial Forecast - FY2018 through FY2027
Water Fund Cash Reserve Analysis

	BUDGET 2018	FORECAST 2019	FORECAST 2020	FORECAST 2021	FORECAST 2022	FORECAST 2023	FORECAST 2024	FORECAST 2025	FORECAST 2026	FORECAST 2027
WATER DIST & PROD CASH RESERVES										
Combined Cash Balance DW & WP *	5,955,461	5,499,815	4,340,884	2,580,593	3,075,130	3,204,965	3,348,956	3,789,596	4,289,455	5,879,140
Recommended Cash Balance (DW)	1,744,373	1,903,470	1,723,652	1,507,502	1,742,709	1,877,115	1,521,722	1,711,533	1,624,550	1,762,779
Recommended Cash Balance (WP)	3,835,025	4,534,138	6,064,512	4,008,293	4,065,071	4,413,291	4,616,288	4,423,237	3,358,856	3,748,148
Recommended Cash Balance	**5,579,398**	**6,437,607**	**7,788,164**	**5,515,795**	**5,807,780**	**6,290,406**	**6,138,010**	**6,134,770**	**4,983,407**	**5,510,926**
TARGET RESERVE BALANCES										
Debt Service Reserve	235,735	271,610	296,354	319,015	326,175	624,275	636,639	531,435	385,374	410,451
Operations Reserve	3,028,663	2,896,747	2,929,141	2,724,521	2,759,582	2,795,168	2,831,289	2,867,951	2,905,163	2,942,933
Capital Expenditures Reserve	1,565,000	2,508,000	3,790,000	1,688,000	1,926,000	2,063,000	1,850,000	1,903,000	848,000	1,300,000
Contingency Reserve	750,000	761,250	772,669	784,259	796,023	807,963	820,082	832,384	844,869	857,542
	5,579,398	6,437,607	7,788,164	5,515,795	5,807,780	6,290,406	6,138,010	6,134,770	4,983,407	5,510,926
RESERVE BALANCE FORECAST										
Debt Service Reserve	235,735	271,610	296,354	319,015	326,175	624,275	636,639	531,435	385,374	410,451
Operations Reserve	3,028,663	2,896,747	2,929,141	2,261,578	2,748,955	2,580,690	2,712,317	2,867,951	2,905,163	2,942,933
Capital Expenditures Reserve	1,565,000	2,331,457	1,115,389	-	-	-	-	390,210	848,000	1,300,000
Contingency Reserve	750,000	-	-	-	-	-	-	-	150,918	857,542
Total Cash Remaining	**376,063**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**368,214**

** Cash balance doesn't include WTB funding or WTB-funded projects*

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Los Alamos County Utilities Department
10-Year Financial Forecast - FY2018-FY2027
Wastewater Division

1.50%	BUDGET 2018	FORECAST 2019	FORECAST 2020	FORECAST 2021	FORECAST 2022	FORECAST 2023	FORECAST 2024	FORECAST 2025	FORECAST 2026	FORECAST 2027
EXPENSE FORECAST										
WASTEWATER COLLECTION										
Supervision, Misc Direct Admin	230,375	233,831	237,338	240,898	244,512	248,179	251,902	255,681	259,516	263,409
Wastewater Collection Operations	367,602	373,116	378,713	384,394	390,160	396,012	401,952	407,981	414,101	420,313
Sewer Lift Stations	275,214	279,342	283,532	287,785	292,102	296,483	300,931	305,444	310,026	314,677
Total WWC Operations Expenses	873,191	886,289	899,583	913,077	926,773	940,675	954,785	969,107	983,643	998,398
WASTEWATER TREATMENT										
LA WWTP Operations & Maintenance	869,508	882,550	895,788	909,225	922,864	936,707	950,757	965,019	979,494	994,186
WR WWTP Operations & Maintenance	448,592	455,321	462,151	469,083	476,119	483,261	490,510	497,868	505,336	512,916
Total WWT Operations Expenses	1,318,100	1,337,871	1,357,939	1,378,308	1,398,983	1,419,968	1,441,267	1,462,886	1,484,830	1,507,102
Interdepartmental Charges	590,289	599,143	608,130	617,252	626,511	635,909	645,448	655,129	664,956	674,931
Administrative Division Allocation	835,197	439,495	446,088	452,779	459,571	466,464	473,461	480,563	487,772	495,088
Debt Service (WWT)	1,155,799	1,155,799	1,155,799	2,236,725	2,236,725	2,236,625	2,236,726	2,142,941	2,049,156	2,049,156
Capital	50,000	753,000	1,049,000	561,000	583,000	652,000	415,000	810,000	643,000	1,029,000
Capital Paid with WTB Loan				17,774,000						
Total Operations Expenses	4,772,576	4,418,597	4,467,540	5,598,142	5,648,563	5,699,640	5,751,686	5,710,626	5,670,357	5,724,674
Total Capital Expenditures	50,000	753,000	1,049,000	18,335,000	583,000	652,000	415,000	810,000	643,000	1,029,000
Total Cash Outflow	4,822,576	5,171,597	5,516,540	23,933,142	6,231,563	6,351,640	6,166,686	6,520,626	6,313,357	6,753,674
REVENUE FORECAST										
Mgal Processed	*430,000*	*430,000*	*430,000*	*430,000*	*430,000*	*430,000*	*430,000*	*430,000*	*430,000*	*430,000*
Res'l Single-Family Flat Rate Customers	6,629	6,629	6,629	6,629	6,629	6,629	6,629	6,629	6,629	6,629
Res'l Single Family Flat Rate	37.18	40.15	42.66	44.79	46.69	48.32	49.53	50.52	51.40	52.17
Res'l Single-Family Service Charge	10.27	11.09	11.78	12.37	12.90	13.35	13.68	13.95	14.19	14.40
Rate Increase Percentage	***8.00%***	***8.00%***	***6.25%***	***5.00%***	***4.25%***	***3.50%***	***2.50%***	***2.00%***	***1.75%***	***1.50%***
Total Revenue from Res'l SF Flat Rate	3,736,807	4,035,279	4,287,287	4,501,494	4,692,863	4,856,668	4,977,947	5,077,175	5,165,378	5,242,555

Los Alamos County Utilities Department
10-Year Financial Forecast - FY2018-FY2027
Wastewater Division

1.50%	BUDGET 2018	FORECAST 2019	FORECAST 2020	FORECAST 2021	FORECAST 2022	FORECAST 2023	FORECAST 2024	FORECAST 2025	FORECAST 2026	FORECAST 2027
Res'l Multi-Family Flat Rate Customers	75	75	75	75	75	75	75	75	75	75
Res'l Multi-Family Service Charge	10.27	11.09	11.78	12.37	12.90	13.35	13.68	13.95	14.19	14.40
No. of Res'l Multi-Family Dwelling Units	1,585	1,585	1,585	1,585	1,585	1,585	1,585	1,585	1,585	1,585
Res'l Multi-Family Flat Rate	30.97	33.45	35.54	37.32	38.91	40.27	41.28	42.11	42.85	43.49
Rate Increase Percentage	***8.00%***	***8.00%***	***6.25%***	***5.00%***	***4.25%***	***3.50%***	***2.50%***	***2.00%***	***1.75%***	***1.50%***
Total Revenue from Res'l MF Flat Rate	562,395	607,428	645,378	677,702	706,578	731,273	749,610	764,678	778,111	789,731
Non-Residential Customers	291	291	291	291	291	291	291	291	291	291
Non-Residential Service Charge	10.27	11.09	11.78	12.37	12.90	13.35	13.68	13.95	14.19	14.40
Non-Residential Sales in Kgal	47,522	47,427	47,332	47,237	47,143	47,049	46,955	46,861	46,767	46,673
Adjustment Factor	16.00%	8.00%	1.75%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Adjusted Non-Residential Sales in Kgal	55,126	51,221	48,160	47,237	47,143	47,049	46,955	46,861	46,767	46,673
Non-Res'l Commodity Charge per Kgal	17.50	18.90	20.08	21.08	21.98	22.75	23.32	23.79	24.21	24.57
Rate Increase Percentage	***8.00%***	***8.00%***	***6.25%***	***5.00%***	***4.25%***	***3.50%***	***2.50%***	***2.00%***	***1.75%***	***1.50%***
Total Revenue from Non-Residential	970,543	976,601	977,951	1,007,792	1,048,812	1,083,466	1,108,469	1,128,623	1,146,326	1,161,139
Total Sales Revenue	5,269,745	5,691,324	6,047,032	6,349,384	6,619,232	6,850,905	7,022,178	7,162,622	7,287,968	7,397,287
Interest on Utility Reserves	13,516	10,192	18,141	292,980	33,619	39,938	48,026	61,579	72,132	87,833
Bond Issue Proceeds			17,774,000							
Revenue on Recoverable Work	-	-	-	-	-	-	-	-	-	-
Total Cash Inflow	5,283,261	5,701,516	23,839,173	6,642,364	6,652,851	6,890,843	7,070,204	7,224,200	7,360,100	7,485,120
Net Cash Flow	460,685	529,919	18,322,633	(17,290,778)	421,288	539,203	903,518	703,574	1,046,743	731,446
Cumulative Net Cash Flow	460,685	990,604	19,313,236	2,022,458	2,443,746	2,982,948	3,886,466	4,590,040	5,636,783	6,368,229
Cash Balance	679,461	1,209,380	19,532,012	2,241,234	2,662,522	3,201,724	4,105,242	4,808,816	5,855,559	6,587,005
Recommended Cash Balance	4,067,187	4,191,448	3,733,249	4,866,421	4,966,121	4,760,182	5,186,911	4,958,229	5,283,029	5,037,102

Los Alamos County Utilities Department
10-Year Financial Forecast - FY2018 through FY2027
Wastewater Fund Cash Reserve Analysis

	BUDGET 2018	FORECAST 2019	FORECAST 2020	FORECAST 2021	FORECAST 2022	FORECAST 2023	FORECAST 2024	FORECAST 2025	FORECAST 2026	FORECAST 2027
WASTEWATER UTILITY CASH RESERVES										
Cash Balance *	679,461	1,209,380	1,758,012	2,241,234	2,662,522	3,201,724	4,105,242	4,808,816	5,855,559	6,587,005
Recommended Cash Balance	**4,067,187**	**4,191,448**	**3,733,249**	**4,866,421**	**4,966,121**	**4,760,182**	**5,186,911**	**4,958,229**	**5,283,029**	**5,037,102**
TARGET RESERVE BALANCES										
Debt Service Reserve	1,155,799	1,155,799	1,155,799	2,236,725	2,236,725	2,236,625	2,236,726	2,142,941	2,049,156	2,049,156
Operations Reserve	1,808,389	1,631,399	1,655,870	1,680,708	1,705,919	1,731,508	1,757,480	1,783,843	1,810,600	1,837,759
Capital Expenditures Reserve	753,000	1,049,000	561,000	583,000	652,000	415,000	810,000	643,000	1,029,000	750,000
Contingency Reserve	350,000	355,250	360,579	365,987	371,477	377,049	382,705	388,446	394,272	400,186
	4,067,187	4,191,448	3,733,249	4,866,421	4,966,121	4,760,182	5,186,911	4,958,229	5,283,029	5,037,102
RESERVE BALANCE FORECAST										
Debt Service Reserve	679,461	1,155,799	1,155,799	2,236,725	2,236,725	2,236,625	2,236,726	2,142,941	2,049,156	2,049,156
Operations Reserve	-	53,581	602,213	4,509	425,797	965,100	1,757,480	1,783,843	1,810,600	1,837,759
Capital Expenditures Reserve	-	-	-	-	-	-	111,036	643,000	1,029,000	750,000
Contingency Reserve	-	-	-	-	-	-	-	239,033	394,272	400,186
Total Cash Remaining	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**572,530**	**1,549,903**

** Cash balance doesn't include bond funding or bond funded projects*

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Projected Average Bill for Residential

	ELECTRIC 500 kwh	GAS 75 therms (assumes $0.30 variable)	WATER 6,000 gal	SEWER	Total (excludes refuse)	Total % annual Increase	Total cumulative % Increase
FY2017	$69.60	$49.25	$36.38	$43.94	$199.17		
FY2018	$69.60	$47.75	$39.29	$47.46	$204.10	2.47%	2.47%
FY2019	$70.64	$47.75	$41.75	$51.25	$211.39	3.57%	6.14%
FY2020	$71.70	$47.75	$43.83	$54.45	$217.74	3.00%	9.32%
FY2021	$72.78	$47.75	$45.70	$57.18	$223.40	2.60%	12.17%
FY2022	$73.87	$47.75	$47.30	$59.61	$228.52	2.29%	14.74%
FY2023	$74.98	$47.75	$48.48	$61.69	$232.90	1.92%	16.94%
FY2024	$76.10	$47.75	$49.45	$63.24	$236.54	1.56%	18.76%
FY2025	$77.25	$47.75	$50.31	$64.50	$239.81	1.38%	20.40%
FY2026	$78.40	$47.75	$51.07	$65.63	$242.85	1.27%	21.93%
FY2027	$79.58	$47.75	$51.83	$66.61	$245.78	1.21%	23.40%

Utility Expense as a Percentage of Income

	Total Bill for Average Household	Los Alamos Median Household Income	Assumed Annual Income Increase	Percentage Needed to Pay Utility Bill
FY2017	$199.17	$105,989		2.25%
FY2018	$204.10	$108,639	2.5%	2.25%
FY2019	$211.39	$111,355	2.5%	2.28%
FY2020	$217.74	$114,139	2.5%	2.29%
FY2021	$223.40	$116,992	2.5%	2.29%
FY2022	$228.52	$119,917	2.5%	2.29%
FY2023	$232.90	$122,915	2.5%	2.27%
FY2024	$236.54	$125,988	2.5%	2.25%
FY2025	$239.81	$129,137	2.5%	2.23%
FY2026	$242.85	$132,366	2.5%	2.20%
FY2027	$245.78	$135,675	2.5%	2.17%

Los Alamos County Department of Public Utilities
Fiscal Year 2018 Budget
Cash Investment Budget

	FY2016 ACTUAL	FY2017 ADOPTED BUDGET	FY2018 1ST YEAR BUDGET	FY2018 PROPOSED BUDGET
EP Cash & Investments - UNRESTRICTED	7,602,785	6,960,245	6,760,192	3,759,966
EP Cash & Investments - RESTRICTED	11,630,049	10,206,109	10,433,509	13,369,416
EP Cash & Investments - TOTAL	19,232,834	17,166,354	17,193,701	17,129,382
ED Cash & Investments - UNRESTRICTED	(7,887,776)	(5,960,945)	(5,715,751)	(2,119,944)
ED Cash & Investments - RESTRICTED	8,848,967	1,388,292	1,388,292	2,812,914
ED Cash & Investments - TOTAL	961,191	(4,572,653)	(4,327,458)	692,970
GAS Cash & Investments - UNRESTRICTED	6,397,463	6,078,231	5,790,829	6,394,246
GAS Cash & Investments - RESTRICTED	-	-	-	-
GAS Cash & Investments - TOTAL	6,397,463	6,078,231	5,790,829	6,394,246
DW Cash & Investments - UNRESTRICTED	637,389	1,417,326	1,281,209	430,776
DW Cash & Investments - RESTRICTED	-	-	-	-
DW Cash & Investments - TOTAL	637,389	1,417,326	1,281,209	430,776
WP Cash & Investments - UNRESTRICTED	10,294,284	7,277,625	7,477,423	4,177,581
WP Cash & Investments - RESTRICTED	179,962	192,838	192,838	192,838
WP Cash & Investments - TOTAL	10,474,246	7,470,464	7,670,261	4,370,420
WW Cash & Investments - UNRESTRICTED	(539,199)	154,834	360,264	(381,019)
WW Cash & Investments - RESTRICTED	1,362,985	1,362,985	1,362,985	1,362,985
WW Cash & Investments - TOTAL	823,786	1,517,818	1,723,248	981,965
DPU TOTAL Cash & Investments - UNRESTRICTED	16,504,946	15,927,316	15,954,166	12,261,606
DPU TOTAL Cash & Investments - RESTRICTED	22,021,963	13,150,225	13,377,625	17,738,153
DPU TOTAL Cash & Investments - TOTAL	$ 38,526,908	$ 29,077,541	$ 29,331,790	$ 29,999,759

Los Alamos County Department of Public Utilities

Rate History - Residential

ELECTRIC				
Date Adopted	Commodity Rate per kwh	Service Charge	Average Residential @ 500 kwh	%
2/17/15	0.1152	12.00	69.60	20.4%
12/17/13	0.1028	6.43	57.83	8.0%
2/22/11	0.0952	5.95	53.55	5.0%
9/9/08	0.0907	5.67	51.02	

GAS				
Date Adopted	Commodity Rate per Therm	Service Charge	Average Residential @ 75 therms	%
9/27/2016	.23 per therm + variable rate for gas	9.50	48.50	-21.8%
			Note: assumes .29 variable for FY17	
11/5/2013	.29 per therm + variable rate for gas	9.50	62.00	22.2%
			Note: assumes .41 variable for FY16	
1/25/11	0.5500	9.50	50.75	-18.1%
11/17/09	0.7000	9.50	62.00	-17.8%
11/24/06	0.9200	6.43	75.43	

WATER				
Date Adopted	Commodity Rate per 1,000 gal	Service Charge	Average Residential @ 6,000 gal	%
BUD	4.98	9.42	39.29	8.0%
9/27/16	4.61	8.72	36.38	10.0%
7/8/14	4.19	7.93	33.07	1.2%
7/5/11	4.19	7.55	32.69	4.8%
3/23/10	3.95	7.50	31.20	6.3%
4/20/99	3.72	7.02	29.34	

SEWER					
Date Adopted	Commodity Rate per 1,000 gal	Service Charge	Customer Charge	Average Residential	%
BUD		35.46	9.80	45.26	8.0%
7/1/16		34.43	9.51	43.94	8.0%
7/1/15		31.88	8.81	40.69	8.0%
7/1/14		29.52	8.16	37.68	8.0%
7/1/13		27.33	7.56	34.89	8.0%
2/26/13		25.31	7.00	32.31	-15.2%
		Note: Prior to flat rate, calcs based on 4,000 gallons			
8/2/11	5.89	14.52		38.08	10.1%
11/17/09	5.35	13.20		34.60	

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Agenda No.:	7.B
Index (Council Goals):	BCC - N/A
Presenters:	James Alarid, Deputy Utilities Manager - Engineering
Legislative File:	**9136-17**

Title
Approval of the Long-Range Water Supply Plan

Recommended Action
I move that the Board of Public Utilities approve the revised Long-Range Water Supply Plan and forward to the County Council for their consideration.

Staff Recommendation
Staff recommends approval of the updated Long-Range Water Supply Plan.

Body
DPU contracted with Daniel B. Stephens & Associates, Inc. (DBS&A) to revise the Long-Range Water Supply Plan. Using the original format and data from the Council-adopted 2006 Long-Range Water Supply Plan as a starting point, DBS&A updated the Plan to:

- Reflect current population and water demand projections,
- Evaluate potential climate change impacts, and
- Assess various water supply options, including the timing for development of the County's San Juan-Chama water rights.

The revised Long-Range Water Supply Plan was presented at a public meeting on November 15, 2016, which had 24 attendees, to the Board of Public Utilities on November 16, 2016 and to the County Council on November 29, 2016. On February 15, 2017, the updated plan was presented to the Utility Board. After presentation of the revised plan and discussion of the comments received from the public the Utility Board took no action and asked that the plan be presented for approval in March 2017. This would accommodate the request by the Pajarito Conservation Alliance to have more time to reveiw the revised plan. The final step, as required by the Office of the State Engineer, is to get County Council approval for adoption of the final revised Plan on March 21, 2017. DPU has received written comments from Robert Wells, the Pajarito Conservation Alliance , Ed Jacobson, and C.M. Gillespie. In addition, staff met with three County Councilors on January 17, 2017 to review the plan in detail. Staff also met with the Pajarito Conservation Alliance on March 7, 2017 to review comments provided by the group in a second letter received on February 13, 2017. Based on input from these sources the following appropriate adjustments have been incorporated: There were many comments and questions about the need for and cost of a potential San Juan-Chama project. The updated long-range water supply plan does not endorse any specific San Juan-Chama project. While the comparison of water supply and demand does not clearly demonstrate that the project water is needed in the short term, the County has more uncertainty in their demand projections than many other communities with the need to support changes in LANL water demands.

1. There were changes made to the plan recommendation related to the San Juan Chama project to "continue to examine project options". Revisions were made to better explain how bringing San Juan-Chama project online would diversify the water supply, and to discuss the potential effects of climate change on this source of supply.Based on the growth projections (LACWU and LANL combined) and the uncertainty of the U.S. DOE water rights lease, the consultants recommend that the County proceed with the project planning by conducting an environmental assessment for utilization of San Juan Chama water. The DPU will revisit whether or not to take the next steps towards project implementation at a later time when demands warrant.

2. There were comments about the importance of incorporating conservation into this revised plan. DPU has prepared the Energy and Water Conservation Plan to meet the requirements of the Office of the State (OSE). This plan was approved by the Utiltiy Board in March 2015 and submitted to the OSE as required. A separate branch of the OSE mandates an independent conservation plan be prepared and submitted for approval. As such, the Long-Range Water Supply Plan did not duplicate content and initiatives developed in the conservation plan.

Based on a question received on the earlier draft of the plan, the plan now includes information about the quantity of water that would be conserved if the per capita water use were reduced to be in line with the City of Santa Fe's 2015 value. The City of Santa Fe's per capita water demand was 90 gallons per day in 2015. Comparing this to the Los Alamos County value in the plan (135 gallons per day in 2014), the difference (45 gpd) would be equivalent to an annual conservation savings of 800-1,114 acre-feet, based on the population projections for 2060.

3. Figure 6-1 was removed from the revised plan (this figure doesn't add a lot of value and was the subject of many questions and comments). An explanation of what this was meant to illustrate is included in the text.

4. In response to the discussion about the lease of U.S. DOE water rights, any mention of the partial volume (983.39 acre-feet/year) was replaced with the total (1,662.39 acre-feet/year), since the County is pursuing a lease for the total water rights volume owned by U.S. DOE.

5. Figures 4-1, 4-2, and 4-3 were inadvertently left out of the draft plan that went out for public review, and they are added back in to the final document.

6. No changes were made to Figure 2-1 (we used the city & county boundaries for Los Alamos and White Rock that were available) or Figures 3-1 and 3-2 (that information comes from LANL publications and correctly represent the regional hydrogeology).

7. Colors of the figures were modified to aid in clarity.

Note that the revised plan is presented in its final form and in edit mode indicating revisions made since the November 2016 draft.

Responses to each of the four comment letters received have been prepared and provided as attachments.

Alternatives

If the revised plan is not approved the 2006 plan on file with the OSE will remain in effect.

Fiscal and Staff Impact

None

Attachments

A - Final Long Range Water Plan

B - Revised Long-Range Water Plan - edit mode reflecting changes from the November Final DRAFT.

C - Revised Figures - reflecting changes from the November Final DRAFT.

D - Revised Tables - reflecting changes from the November Final DRAFT.

E - Letters in Response to Comments Received

Long-Range Water Supply Plan
Los Alamos County

Prepared for **Los Alamos County**
Department of Water Utilities

February 2017

Daniel B. Stephens & Associates, Inc.

6020 Academy NE, Suite 100 • Albuquerque, New Mexico 87109

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1. Introduction

The Los Alamos County Water Utility (LACWU) supplies water for Los Alamos, White Rock, Los Alamos National Laboratory (LANL), and Bandelier National Monument. To prepare for the future water supply needs of these communities, the LACWU developed a long-range water supply plan that was published in 2006 (DBS&A, 2006). This document updates that plan to incorporate more recent data and developments relevant to water resources management. The objective of this plan is to evaluate projected demands in relation to available supply, while considering water quality and water rights risks to the supply, to ultimately ensure that both a viable physical supply and associated water rights are in place as needed to meet future demands.

In addition to providing a plan for a sustainable future water supply, a long-range water plan that covers at least 40 years addresses several regulatory requirements regarding water rights and water conservation. In particular, a water plan allows certain organizations, including Counties, to set aside water for use in the future. Section 72-1-9(B) of the New Mexico Water Code allows covered entities such as Los Alamos County to legally appropriate and preserve water that they cannot currently use but will need in the future to meet projected water requirements for the service area based on projected growth and other factors. Counties are specifically exempt from forfeiture of unused water rights if those rights have been appropriated for the implementation of a water development plan or for preservation of water supplies (NMSA 72-12-8 (F)). These provisions are the same for both surface water and groundwater (NMSA 72-5-28(C)).

The New Mexico Office of the State Engineer (OSE) requirements set out in statute NMSA 1978 Section 72-14-3.2 call for conservation planning by any public supply system with diversions of at least 500 acre-feet annually for domestic, commercial, industrial, or government customers for other than agricultural purposes. Covered entities must develop, adopt, and submit to the OSE a comprehensive water conservation plan, including a drought management plan, as a prerequisite for applying for funding from key state funding agencies. The Water Trust Board requires funding applicants to provide verification from the OSE that all of its statutory and regulatory requirements have been met, and the OSE is requiring that Water Trust Board funding applicants have a conservation plan that was prepared in accordance with New Mexico's *Water Conservation Planning Guide for Public Water Suppliers* (NMOSE, 2013). The U.S. Bureau of Reclamation (USBR) also requires a conservation plan for diversion of San Juan-Chama Project water.

The LACWU published an *Energy and Water Conservation Plan* in 2013 (LACWU, 2013a) and updated it in 2015 (LACWU, 2015), and prepares reports annually discussing the County's progress toward the goals established in that plan. This long-range water supply plan summarizes the water conservation goals established by the *Energy and Water Conservation Plan* and provides an update on its implementation and recommendations.

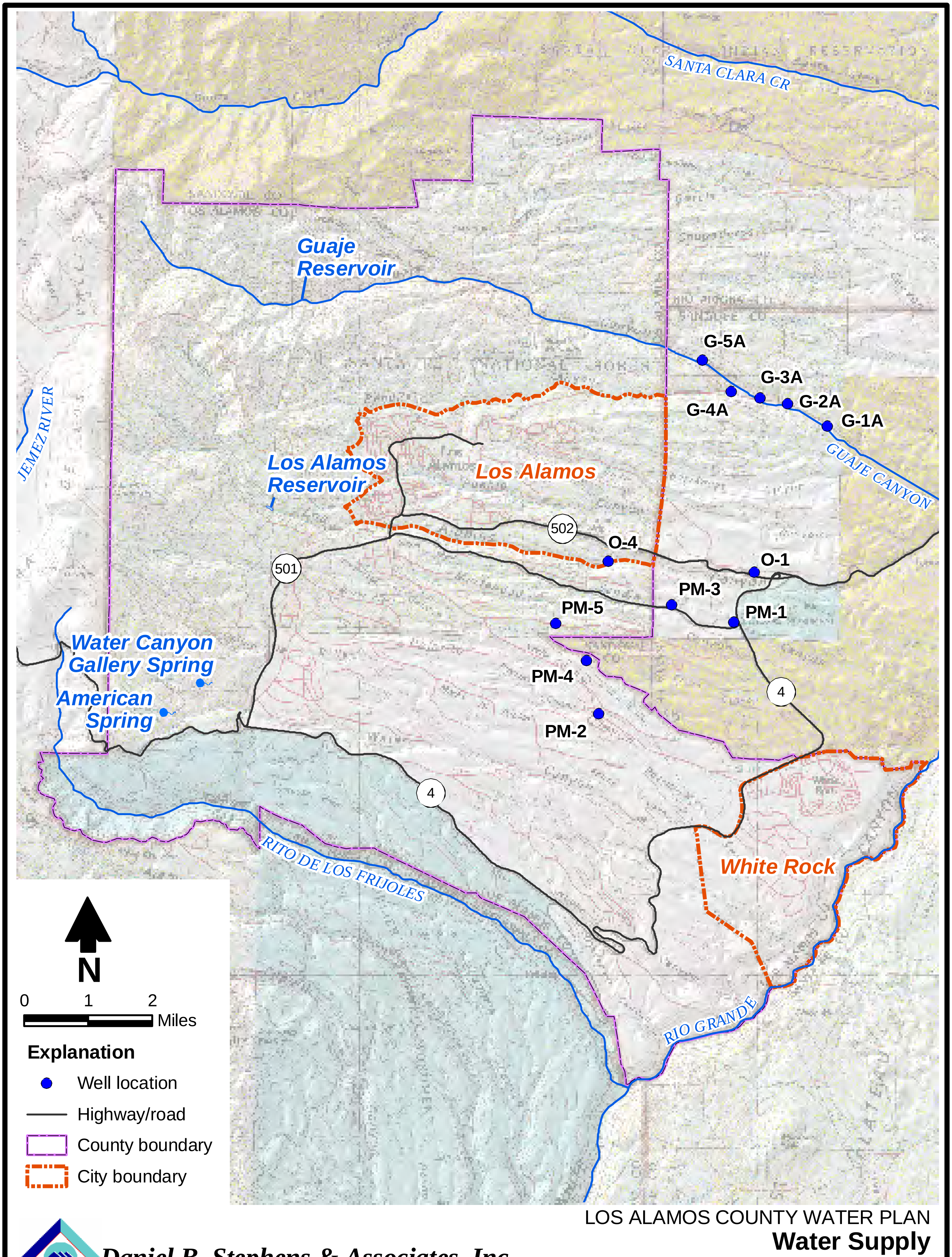
For this long-range water supply plan, the LACWU retained Daniel B. Stephens & Associates, Inc. (DBS&A) to update the 2006 plan with current data and analyses. The remainder of this water plan presents the results of the summarized and updated information including an overview of the water system (Section 2), water supply and water rights (Sections 3 and 4), current and projected demand and supply-demand gaps (Sections 5 and 6), risks due to climate change (Section 7), water conservation (Section 8), and actions the LACWU may undertake to plan for a sustainable future water supply (Section 9).

2. Overview of Los Alamos County Water System

The Los Alamos Boys Ranch, a school for teenage boys started in 1918, was the original settlement in the area that is now Los Alamos County. The sole source of water for the school was surface water from Los Alamos Reservoir in Los Alamos Canyon (Figure 2-1). The water was piped from the reservoir and stored in a redwood water tank near the school. During World War II, Los Alamos was selected as the site for the secret Project Y, because the steep canyons and mesa tops provided a secure location for the project. The Los Alamos Laboratory (as it was then called) came into existence in early 1943 for the single purpose of Project Y: to design and build an atomic bomb (LANL, 2006). Los Alamos Boys Ranch closed in early 1943 and the Laboratory became the only establishment. In 1949, Los Alamos County was created from parts of Sandoval and Santa Fe Counties.

When the Laboratory took over in 1943, they continued to use Los Alamos Reservoir, but also piped in water from a spring gallery in Guaje Canyon. In 1947, a dam was built in Guaje Canyon and water from the resulting Guaje Reservoir was used for water supply (Figure 2-1). In addition, American Spring and several springs in Water Canyon were tapped and piped into the water system. The Los Alamos well field was drilled in 1946 on San Ildefonso Pueblo property, thereby increasing the supply to meet the growing demands of the Laboratory and its residents. By 1989, groundwater from the Los Alamos, Guaje, Pajarito, and Otowi well fields supplied all of the potable demands for Los Alamos.

The Los Alamos well field was plugged and abandoned in 1992 because the wells had reached the end of their useful life. Also in the 1990s, six of the seven wells in the Guaje well field were retired, and four replacement wells were drilled and tapped into the existing piping and booster stations. Los Alamos Reservoir continued to be used to water parks, but the Cerro Grande fire in 2000, Las Conchas fire in 2011, and subsequent flooding in 2012, 2013, and 2014 damaged the reservoir and the diversion system. The LACWU has been working on a water line replacement project in order to bring the reservoir back online. The reservoir has been dredged and the LACWU will be installing a new pipeline from the reservoir into town in order to connect to the existing non-potable infrastructure (Meyers, 2016). The LACWU is also in the process of completing a few other non-potable projects, including installing booster pumps and pipelines to



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LOS ALAMOS COUNTY WATER PLAN

Water Supply

Daniel B. Stephens & Associates, Inc.

04/27/2006

JN WR05.0168

Figure 2-1

push non-potable water to the Group 12 tank, which has been renovated. This will allow gravity feed of the non-potable water to all current users, including the golf course and ball fields (Meyers, 2016).

The LACWU began operating the water system in September 1998; however, ownership of the water system and water rights was not transferred from the U.S. Department of Energy (DOE) to the LACWU until September 2001 (ownership of 70 percent of the water rights was transferred to Los Alamos County and DOE retained the other 30 percent). The LACWU provides water service to the residents of Los Alamos and White Rock, LANL, and Bandelier National Monument. The LACWU has a contract to supply DOE with the water required by LANL with no limitations. This contract will expire in 2019 (LANL demands have been projected beyond 2019 under the assumption that a new contract will be negotiated).

The LACWU has a contract with the U.S. Bureau of Reclamation for water from the San Juan-Chama Project, which brings water from the San Juan Basin to Heron Reservoir on the Rio Chama (the Rio Grande Basin). Releases from Heron Reservoir flow down the Rio Chama to the Rio Grande. In the *San Juan-Chama Water Supply Project Final Preliminary Engineering Report,* the recommended alternative for the LACWU to obtain and treat San Juan-Chama Project water for distribution was to construct up to three groundwater wells in the White Rock area and install pumps and a pipeline to connect the new wells to the Pajarito Booster Station (CDM Smith, 2012); however, the alternatives and project timeline will be revisited after the long-range water supply plan update is complete. The diversion rights of San Juan-Chama Project water could alternatively be used to offset impacts of pumping (as the City of Santa Fe has done since 1972), as further discussed in Sections 4.3.2 and 6.

With the abandonment of the Los Alamos well field and six wells in the Guaje well field, the LACWU water system is currently supplied by the 12 wells shown in Figure 2-1 and listed in Table 2-1. These wells, with depths up to 3,000 feet below ground surface (ft bgs) and water levels ranging from approximately 250 to 1,200 ft bgs, all draw on the regional aquifer beneath the Pajarito Plateau.

Table 2-1. Active Wells in the Los Alamos Water Supply System

Well Field	Well Name	Date Completed	Completion Depth (feet)	Coordinates (feet)		Initial Depth to Water
				x	Y	
Guaje	G-1A	Oct-54	1,519	1,655,241	1,784,353	250
	G-2A	Mar-98	1,980	1,651,974	1,786,166	318
	G-3A	May-98	1,980	1,649,662	1,786,585	408
	G-4A	Apr-98	1,980	1,647,318	1,787,113	452
	G-5A	Jun-98	1,980	1,644,877	1,789,636	551
Otowi	O-1 [a]	Aug-90	2,497	1,649,396	1,772,232	673
	O-4	Mar-90	2,595	1,637,337	1,772,995	780
Pajarito	PM-1	Feb-65	2,499	1,647,734	1,768,112	722
	PM-2	Jul-65	2,300	1,636,698	1,760,406	823
	PM-3	Nov-66	2,552	1,642,590	1,769,530	740
	PM-4	Aug-81	2,874	1,635,623	1,764,740	1,060
	PM-5	Sep-82	3,092	1,632,110	1,767,790	1,208

Source: Koch and Rogers, 2003

[a] Well is currently not being used to supply drinking water.

Two new applications have been filed recently:

- The LACWU filed an application for an additional point of diversion on April 28, 2016. The new well will be called Otowi Well 2 and will be drilled to supplement the system's existing production wells in anticipation of declining production rates from existing wells that are nearing the end of their service life (Alarid, 2016).

- In May 2016, an application for permit to change an existing water right was filed jointly by DOE and the LACWU in support of the chromium plume control interim measure and chromium plume center characterization project (U.S. DOE and LACWU, 2016), and emergency authorization was received on September 10, 2016 (NMOSE, 2016).

The addition of new points of diversion under these applications will not increase the appropriation of water above the existing permitted water rights.

Wastewater is treated at two facilities: the White Rock wastewater treatment plant (WWTP) and the Los Alamos WWTP. Both of these WWTPs have treated effluent reuse lines that are used for irrigation of turf. Two former WWTPs—the East Road, abandoned and demolished in the mid-1960s, and the Pueblo, abandoned in 1993—also had effluent reuse systems, both of which supplied the golf course.

The LACWU operates a non-potable water system, using treated wastewater effluent to irrigate several areas in Los Alamos and White Rock and using stormwater runoff for fire protection and snow making at the Pajarito Mountain Ski Area (Forsgren & Associates, 2013). The system has three separate components:

- *Los Alamos Townsite:* Reuse is used to irrigate four sites in Los Alamos (Los Alamos County Golf Course, Los Alamos Middle School, North Mesa Ball Fields, and North Mesa Soccer Fields) and to feed the wetlands located downgradient of the Los Alamos wastewater treatment facility. A volume of 180,000 gallons per day is needed to keep the wetlands healthy. LANL is currently receiving reuse water for the wetlands from the LACWU at no charge because surplus reuse water is available.

- *White Rock:* Reuse is used to irrigate Overlook Park.

- *Pajarito Mountain Ski Area:* Captured stormwater is used for fire protection and snow making.

A Los Alamos County non-potable water system master plan was completed in 2013, to evaluate the efficiency of the existing non-potable water system, make recommendations for how to improve the system's efficiency, determine if additional development of non-potable water use is economically feasible, and identify and evaluate sites that could potentially be served (Forsgren & Associates, 2013), most of which currently use potable water for irrigation. The plan identified a total of 25 sites (5 existing and 20 new) suitable for service by the Los Alamos Townsite non-potable water system and 6 sites (1 existing and 5 new) for the White Rock non-potable water system. Bringing the additional sites online would increase the annual average system demands from 152.8 to 206.5 million gallons per year for the Los Alamos Townsite system and from 18.9 to 41.2 million gallons per year for the White Rock system (Forsgren & Associates, 2013).

3. Hydrologic Overview and Risks to Water Supply

The LACWU public drinking water supply is supplied by groundwater, with surface water supplying a small amount of non-potable use. This section describes the hydrogeologic conditions pertinent to the Los Alamos groundwater supply (Section 3.1) and includes an assessment of potential risks to the groundwater supply due to depletion or contamination of the aquifer (Section 3.2). The LACWU water rights (groundwater and surface water) are discussed in Section 4.

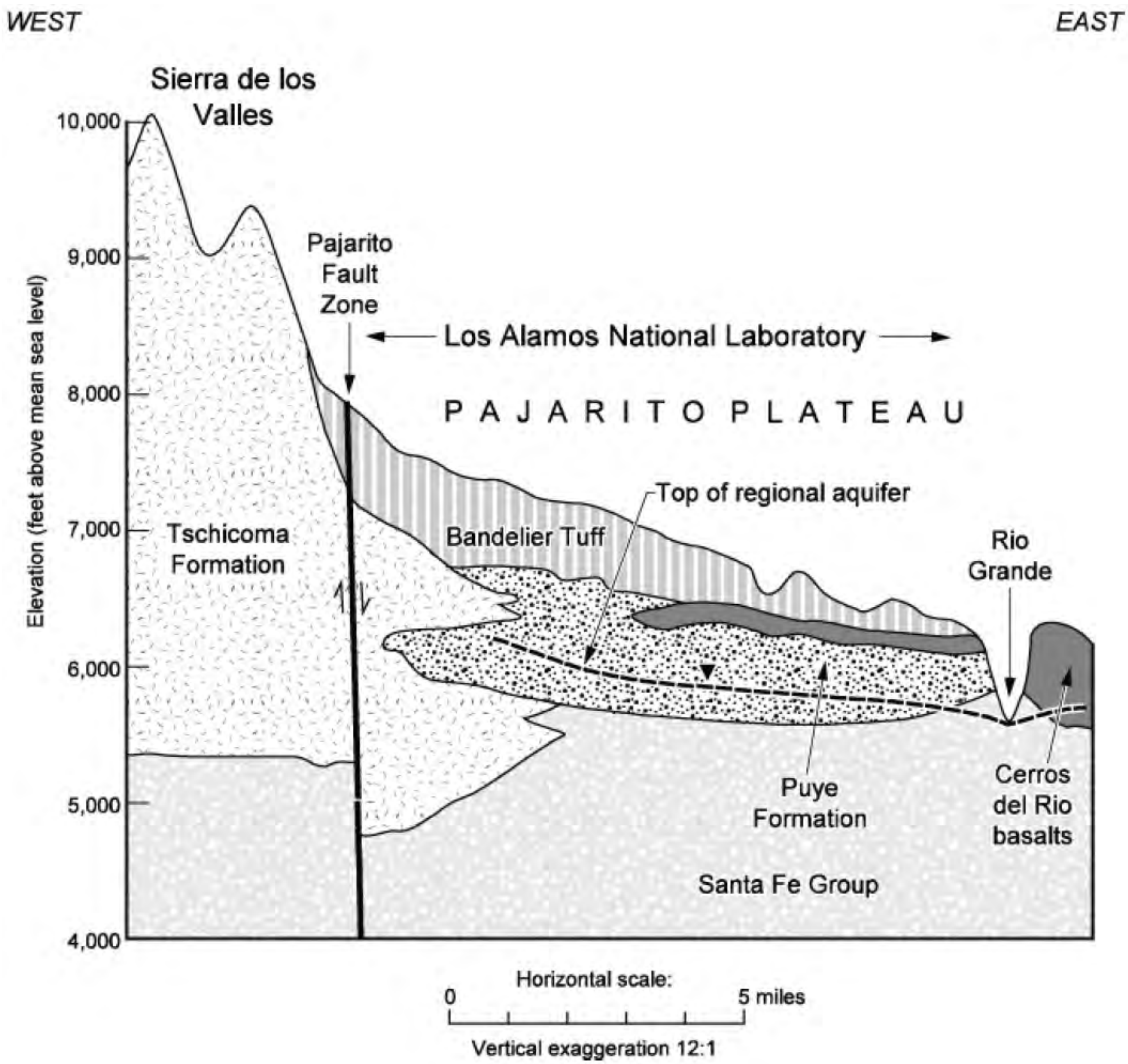
3.1 Hydrogeology

Los Alamos County is situated on the Pajarito Plateau within the western side of the Española Basin. The Pajarito Plateau extends eastward from the Sierra de los Valles, the eastern range of the Jemez Mountains. On the western part of the Pajarito Plateau, the Bandelier Tuff overlaps the Tschicoma Formation, which consists of older volcanics that form the Jemez Mountains. In the central Pajarito Plateau and near the Rio Grande, the Bandelier Tuff is underlain by the Puye Formation. The Cerros del Rio basalts interfinger with the Puye Formation conglomerate along the river and extend beneath the Bandelier Tuff to the west. These formations overlie the sediments of the Santa Fe Group, which extend across the basin between LANL and the Sangre de Cristo Mountains and are more than 3,300 ft thick (LANL, 2014a). A cross section of the area is shown on Figure 3-1.

The hydrogeologic framework within Los Alamos County consists of three distinct aquifer systems (LANL, 2014a):

- Shallow perched groundwater in alluvial deposits along canyon bottoms
- Intermediate-depth perched groundwater
- Deeper regional aquifer, which extends through the neighboring Española Basin

A block diagram depicting a conceptual model of the hydrogeology of the Los Alamos area that illustrates the general configuration of these aquifer systems is shown in Figure 3-2.



Source: LANL, 2014b

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LOS ALAMOS COUNTY WATER PLAN
Cross Section

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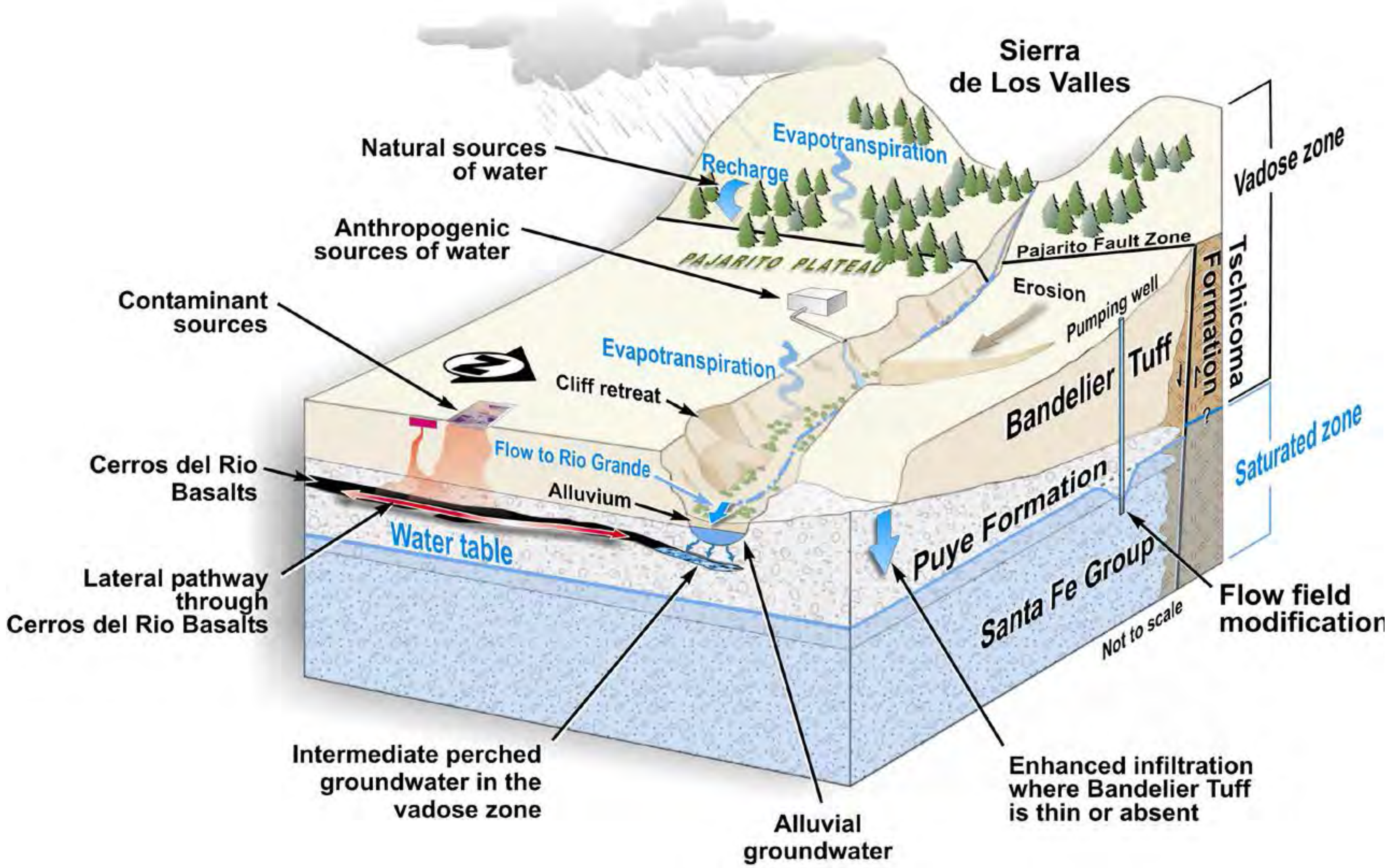
5/14/2015
JN WR14.0178

Figure 3-1



Source: LANL, 2005

LOS ALAMOS COUNTY WATER PLAN

Conceptual Hydrogeologic Model of the Los Alamos County Area

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11/3/16

Figure 3-2

Alluvial aquifers occur within axial fluvial deposits located along canyon bottoms and have a limited saturated thickness and variable lateral extent, depending on the presence of intermittent surface flow or anthropogenic discharges from wastewater treatment outfalls. Hydrologic investigations of alluvial aquifers have been conducted in Los Alamos Canyon, Pueblo Canyon, Mortandad Canyon, Pajarito Canyon, Sandia Canyon, Cañon de Valle, and Water Canyon. Though their limited extent precludes any utility for beneficial use, these aquifers provide an important pathway for contaminant migration.

Intermediate-depth perched aquifers are widely distributed across the northern, western, and central parts of the Pajarito Plateau beneath Los Alamos Canyon, Pueblo Canyon, Sandia Canyon, Mortandad Canyon, and Cañon de Valle. These perched zones usually occur in the Puye Formation fanglomerates, the Cerros del Rio Basalt, and units of the Bandelier Tuff, and are typically associated with low-permeability layers such as unfractured basalt flows and fine-grained zones. Saturated thicknesses range from about 3 to 420 feet, but lateral extents are sometimes poorly defined (LANL, 2005). Depths to the intermediate perched groundwater vary. For example, the depth to intermediate-perched groundwater is approximately 120 feet in Pueblo Canyon, 450 feet in Sandia Canyon, and 500 to 750 feet in Mortandad Canyon (LANL, 2014a). Though the exact extent of these aquifers is not well defined, it is clear that they are generally small enough that their potential for beneficial use is limited. However, they provide an important pathway for contaminant migration through the vadose zone.

The regional aquifer occurs primarily within the poorly to semi-consolidated basin-fill sediments of the Santa Fe Group. The total thickness of the Santa Fe Group beneath the Pajarito Plateau is poorly defined. The deepest well on the plateau (PM-5), with a depth of 3,110 feet, does not fully penetrate the base of the basin-fill sediments. Estimates of the total thickness of these sediments range from 6,650 feet in the central basin to as much as 9,000 to 10,000 feet in the central and western parts of the basin (Broxton and Vaniman, 2005).

The regional aquifer extends into the overlying Puye Formation fanglomerate beneath parts of the Pajarito Plateau. Other geologic units encompassed by the regional aquifer beneath parts of the county include fractured volcanic rocks of the Tschicoma Formation (western part) and the Cerros del Rio Basalt (eastern part), as well as localized occurrences of older basalts.

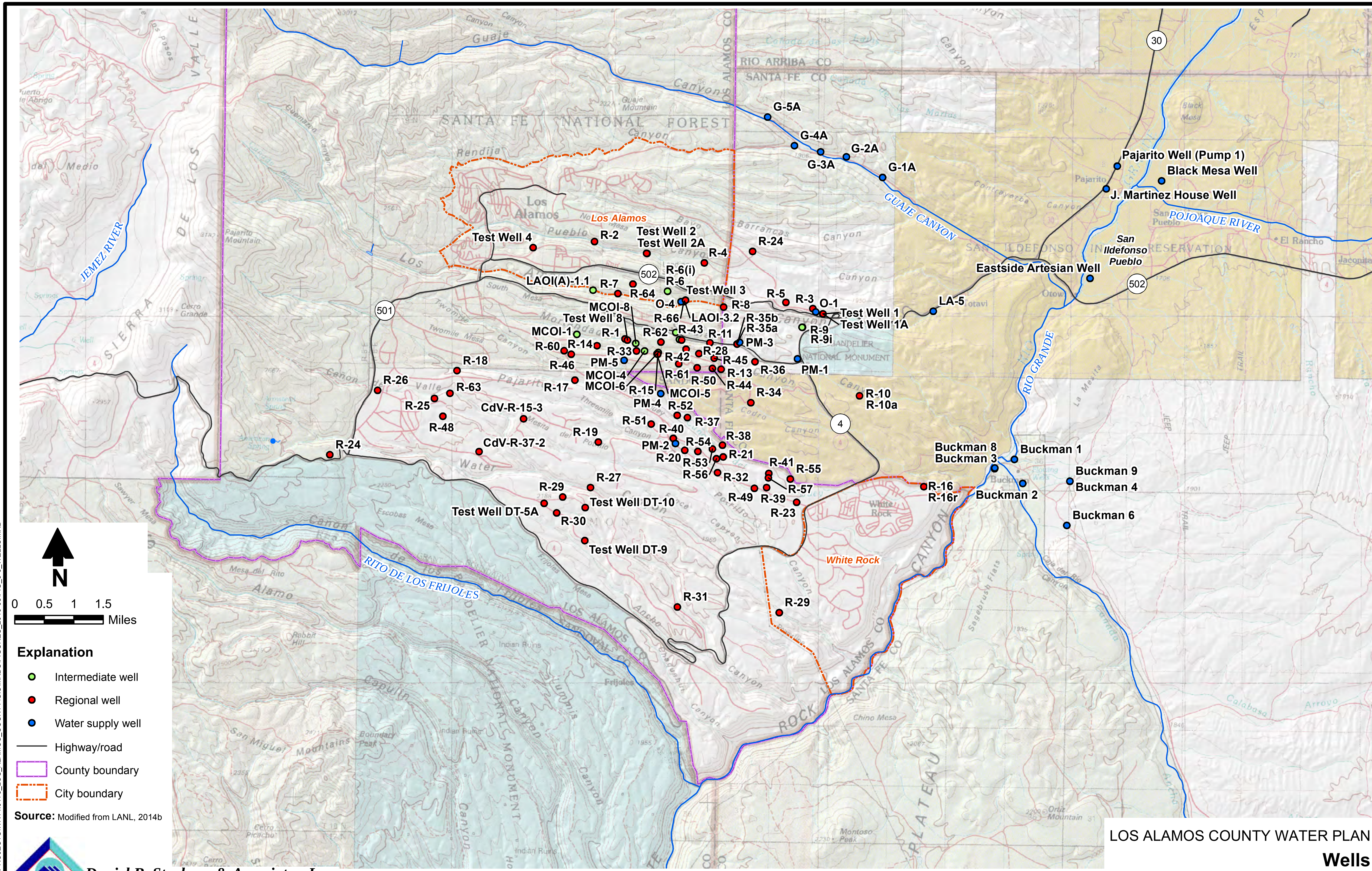
The regional aquifer water table occurs at a depth of 1,200 feet along the western edge of the plateau and 600 feet along the eastern edge. In the central part of the plateau, the regional aquifer lies about 1,000 feet beneath the mesa tops. The regional aquifer is the only aquifer in the area capable of serving as a municipal water supply (LANL, 2014a).

Well locations and types are shown in Figure 3-3, and the potentiometric surface contours and extrapolated flow directions in the regional aquifer are shown in Figure 3-4. Water in the regional aquifer generally flows east or southeast (LANL, 2015c). As discussed in Section 2, the LACWU's production wells have water levels that range between approximately 250 and 1,200 feet below ground surface (ft bgs). Water in the regional aquifer is under artesian conditions beneath the eastern part of the Pajarito Plateau near the Rio Grande and under phreatic conditions beneath most of the Pajarito Plateau (Purtymun and Johansen, 1974). The upper portion of the regional aquifer beneath the Laboratory discharges into the Rio Grande through springs in White Rock Canyon (LANL, 2014a).

Groundwater modeling studies indicate that underflow of groundwater from the Sierra de los Valles west of Los Alamos is the main source of regional aquifer recharge (LANL, 2014a). Alluvial groundwater is also a source of recharge to the regional aquifer, as well as to the intermediate perched saturated zones (thereby providing potential downward pathways for contaminants released at the surface to eventually reach the regional aquifer).

A number of studies have estimated recharge to the regional aquifer for the Española Basin and for the Pajarito Plateau (Table 3-1). Recharge varies in relation to precipitation, which in Los Alamos County is elevation-dependent and ranges between about 13 and 20 inches annually (Newman and Robinson, 2005). Keating et al. (2005) determined that significant recharge occurs primarily above the 2,195-meter (7,200-foot) elevation. At lower elevations, recharge occurs primarily in canyons and arroyos; recharge on mesas is minimal to non-existent (Anderholm, 1994; Birdsell et al., 2005). Kwicklis et al. (2005) estimated that 23 percent of total recharge to the regional aquifer beneath the plateau is from streamflow loss.

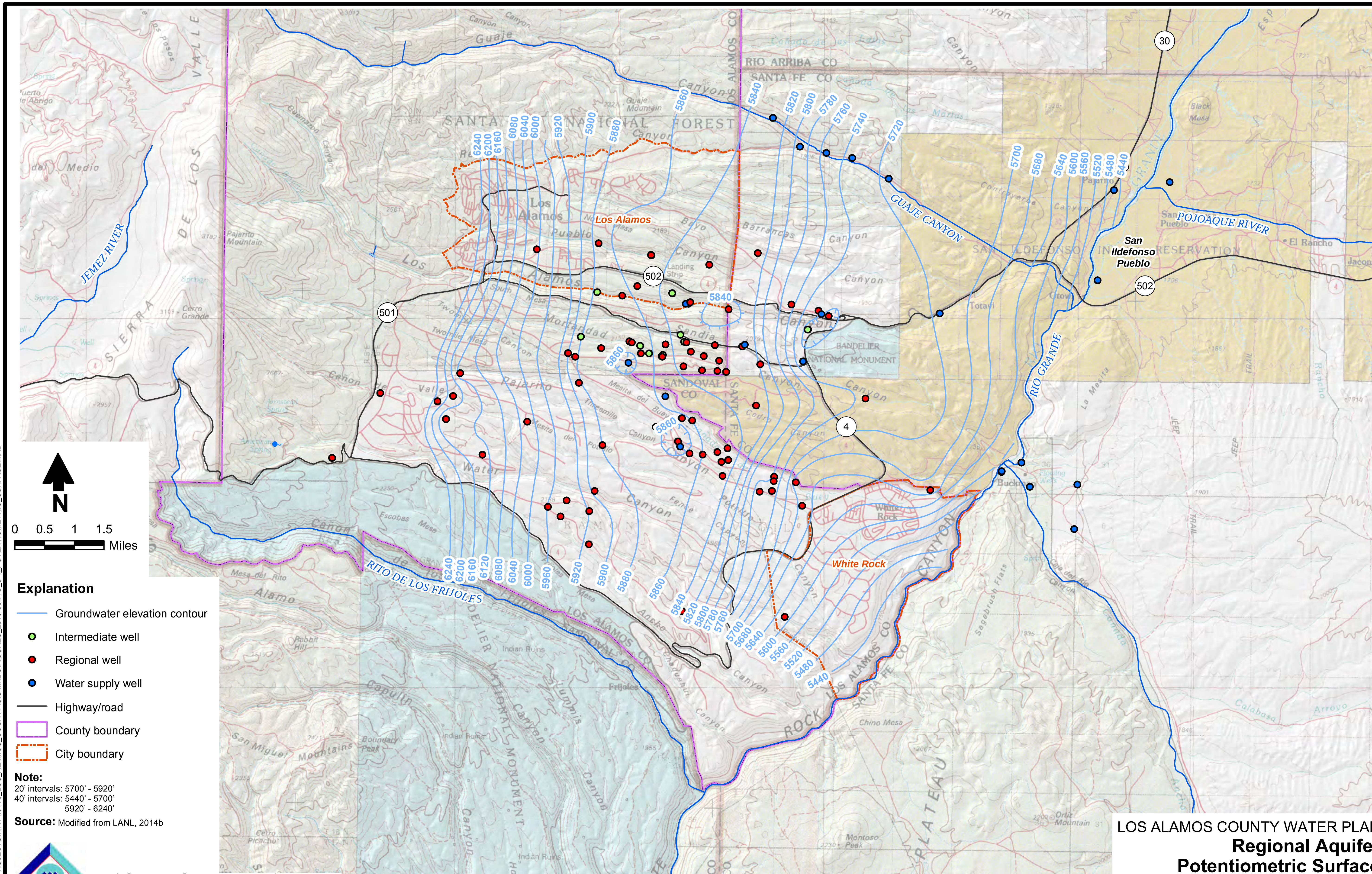
In addition to the recharge estimates, Table 3-1 includes an estimate of discharge to the Rio Grande (determined from inverse modeling using streamflow data and transient head data), which approximates aquifer recharge before significant pumping began.



LOS ALAMOS COUNTY WATER PLAN

Wells

Figure 3-3



LOS ALAMOS COUNTY WATER PLAN
Regional Aquifer Potentiometric Surface

Figure 3-4

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Table 3-1. Regional Aquifer Recharge Estimates

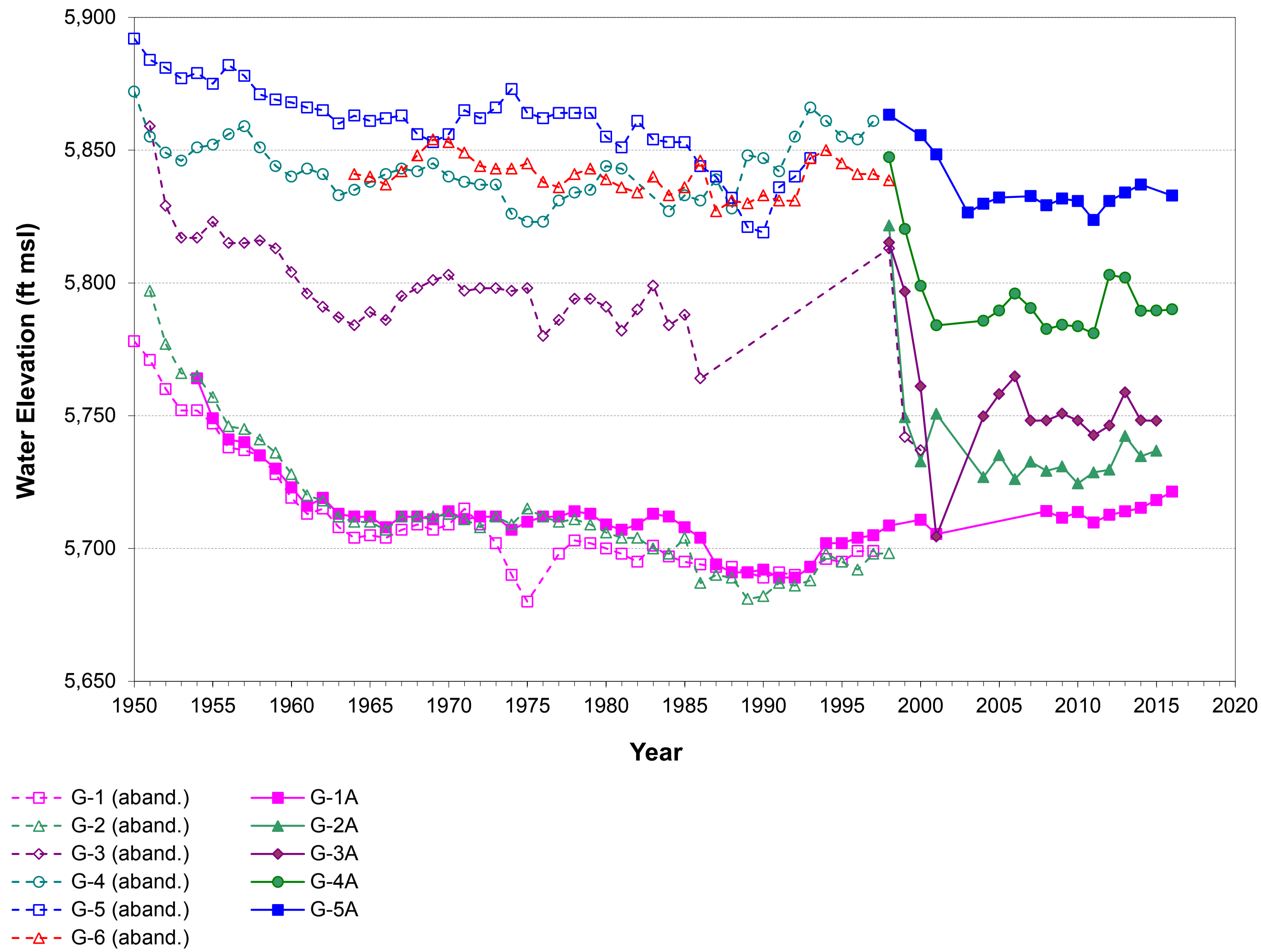
Category	Rate (ac-ft/yr)	Source
Pajarito Plateau recharge	8,596	Kwicklis et al., 2005
	4,912	McLin et al., 1996
	4,298 to 5,526	Griggs and Hem, 1964
	8,084	Hearne, 1985
Lateral inflow from Jemez Mountains	7,445	McAda and Wasiolek, 1988
Discharge to Rio Grande from Pajarito Plateau and Sierra de los Valles	6,473	Keating et al., 2003

3.2 Aquifer Depletion Risk

To evaluate risks of water supply depletion, available water level data from numerous wells screened in the regional aquifer were used to plot hydrographs illustrating historical water level behavior in the regional aquifer. Locations of these wells are shown in Figure 3-3. Long-term supply well data, consisting of annual average non-pumping water levels for the Guaje well field (since 1950) and the Pajarito well field (since 1965), are shown in Figures 3-5 and 3-6 respectively. More recent (since 1990) but sporadic data are available for the Otowi well field (Figure 3-7).

Table 3-2 summarizes the net changes and average water level declines indicated by these data. Long-term data from the Pajarito and Guaje well fields indicate an average water level decline of about 1.1 and 3.5 feet per year (ft/yr), respectively; the average decline in the Otowi well field is about 0.8 ft/yr. Substantial declines have occurred in the abandoned Guaje wells, ranging from about 0.2 to 2.5 feet, and averaging about 1.3 ft/yr.

LANL also monitors water levels in regional wells. Previous analysis of those data indicated that responses were mixed but that water levels in most regional wells were also steadily declining (DBS&A, 2006). Though the average rate of decline appears modest on an annual basis, one supply well has experienced a total water level decline of approximately 85 feet since 1998, and water levels in four of the active production wells have declined by more than 50 feet (Table 3-2).



LOS ALAMOS COUNTY WATER PLAN
Average Annual Non-Pumping Water Levels
Guaje Well Field

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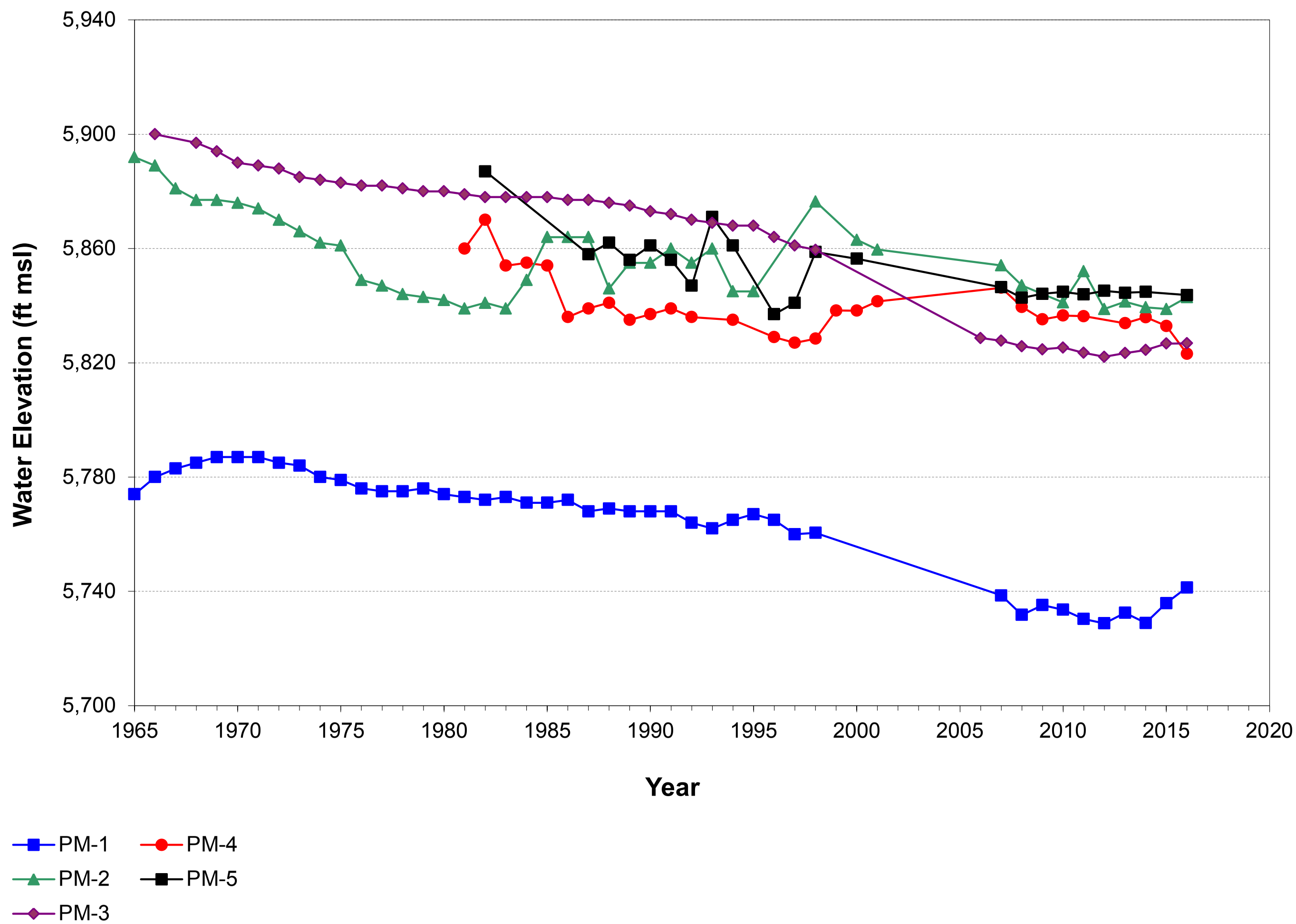
Figure 3-5



LOS ALAMOS COUNTY WATER PLAN

Average Annual Non-Pumping Water Levels
Pajarito Well Field

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Figure 3-6

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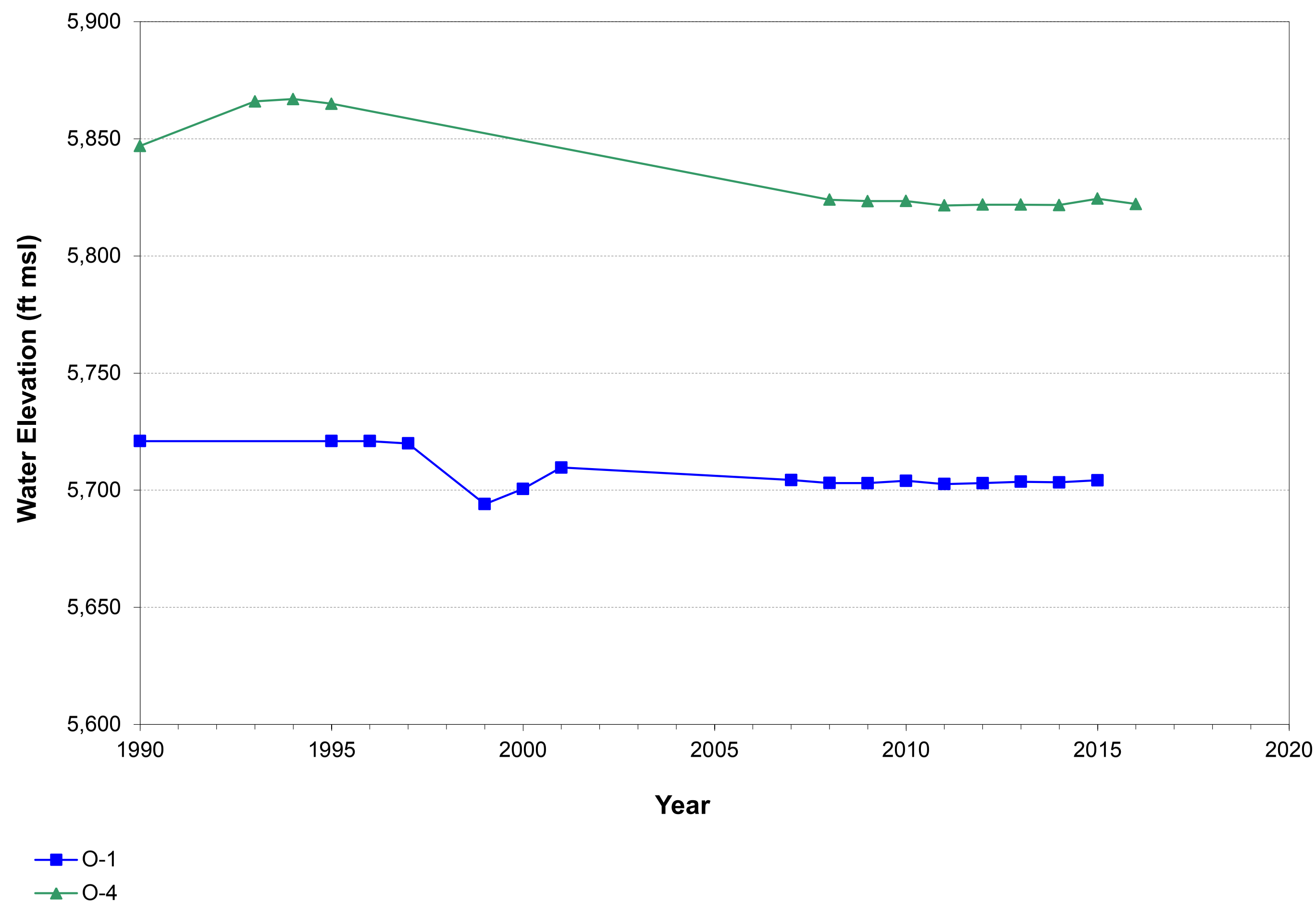

LOS ALAMOS COUNTY WATER PLAN

Average Annual Non-Pumping Water Levels
Otowi Well Field

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9/8/16

Figure 3-7

Table 3-2. Average Supply Well Water Level Declines

Well	Well Depth (ft)	Year	Average Water Level (ft msl)	Water Level Change (ft)	Years of Record	Average Decline (ft/yr)
PM-1	2,499	1965	5,774.0	–32.6	51	–0.64
		2016	5,741.4			
PM-2	2,300	1965	5,892.0	–49.1	51	–0.96
		2016	5,842.9			
PM-3	2,552	1966	5,900.0	–73.2	50	–1.46
		2016	5,826.8			
PM-4	2,874	1981	5,860.0	–36.8	35	–1.05
		2016	5,823.2			
PM-5	3,092	1982	5,887.0	–43.3	34	–1.27
		2016	5,843.7			
Pajarito Well Field Average (1965-2016)						**–1.08**
O-1	2,497	1990	5,721.0	–16.7	25	–0.67
		2015	5,704.3			
O-4	2,595	1990	5,847.0	–24.8	26	–0.95
		2016	5,822.2			
Otowi Well Field Average (1990-2016)						**–0.81**
G-1A	1,519	1954	5,764.0	–42.6	62	–0.69
		2016	5,721.4			
G-2A	1,980	1998	5,821.6	–84.8	17	–4.99
		2015	5,736.8			
G-3A	1,980	1998	5,815.2	–67.1	17	–3.95
		2015	5,748.1			
G-4A	1,980	1998	5,847.3	–57.3	18	–3.18
		2016	5,790.0			
G-5A	1,980	1998	5,863.3	–30.4	18	–1.69
		2016	5,832.8			
Guaje Well Field Average (1954-2016)						**–3.45**
G-1 (aband.)	2,000	1950	5,778.0	–79.0	47	–1.68
		1997	5,699.0			
G-2 (aband.)	1,980	1951	5,797.0	–98.8	47	–2.10
		1998	5,698.2			
G-3 (aband.)	1,800	1951	5,859.0	–122.0	49	–2.49
		2000	5,737.0			
G-4 (aband.)	1,940	1951	5,872.0	–11.0	47	–0.23
		1998	5,861.0			
G-5 (aband.)	1,850	1951	5,892.0	–45.0	43	–1.05
		1994	5,847.0			
G-6 (aband.)	1,530	1964	5,850.0	–11.4	34	–0.34
		1998	5,838.6			
Guaje Well Field Abandoned Wells Average (1950-1998)						**–1.32**

ft = feet ft msl = feet above mean sea level ft/yr = feet per year aband. = abandoned

Using water level data, Rogers et al. (1996) estimated the volume of groundwater depletion from supply well production between 1949 and 1993 to be between 4.0×10^{10} and 6.0×10^{10} gallons (123,000 and 184,000 acre-feet), compared to total pumping withdrawals of 5.7×10^{10} gallons (175,000 acre-feet) during the same period. This analysis implies that recharge to the regional aquifer during this period was negligible and that production well pumping was essentially mining the aquifer. However, the recovery of water levels in wells that were not pumped for extended periods was cited by McLin et al. (1996) as evidence that recharge has occurred. Water levels can recover without recharge as the cone of depression that develops during pumping re-equilibrates, however, and it should be noted that the recharge estimates presented in Table 3-1 are on the same order as pumping withdrawals.

Even if net recharge is negligible, considering a demonstrated saturated thickness of at least 1,900 feet penetrated in supply well PM-5 and potentially as much as 10,000 feet of Santa Fe Group sediments underlying the plateau (Section 3.1), a continuation of the observed rates of decline does not represent a substantial imminent or foreseeable risk to the water supply. Barring potential water quality issues, continued pumping of the regional aquifer at current rates is likely to be sustainable for hundreds of years. LANL's Española Basin and Pajarito Plateau Regional Flow Model predicts that water levels will continue to decline at the same rate (with the same production rates) and that this rate can be sustained for hundreds of years (Keating, 2006). However, the water is expected to be of poorer quality as wells begin to draw from greater depths, and pumping costs will increase.

3.3 Contamination Risk

To evaluate the potential for the LACWU water system to produce water quality that meets all drinking water standards, this section (1) identifies sources of contaminants in the Los Alamos area, (2) summarizes existing knowledge of contaminant transport pathways and velocities, and (3) summarizes the concentrations and extent of chromium, perchlorate, and other contaminants in groundwater.

3.3.1 Sources of Contamination

Since the early 1940s, a wide array of chemicals have been released into the canyons of the Pajarito Plateau from various LANL operations. These releases have occurred through effluent discharges from wastewater treatment facilities and other miscellaneous sources, such as sanitary septic systems, cooling towers, and runoff from firing sites and other LANL facilities. Figure 3-8 shows the locations of industrial outfall sites at LANL.

The presence of contaminants in groundwater in Los Alamos County is primarily associated with areas where effluent discharges have led to enhanced infiltration. Since the 1940s, liquid effluent discharge by LANL has affected the shallow perched alluvial groundwater that lies beneath the floor of a few canyons, and has also affected intermediate-perched zones and the regional aquifer (LANL, 2014a). The major effluent discharges include:

- Mortandad Canyon, Pueblo Canyon from its tributary Acid Canyon, and Los Alamos Canyon from its tributary DP Canyon received liquid radioactive effluents during past decades (LANL, 2015c).

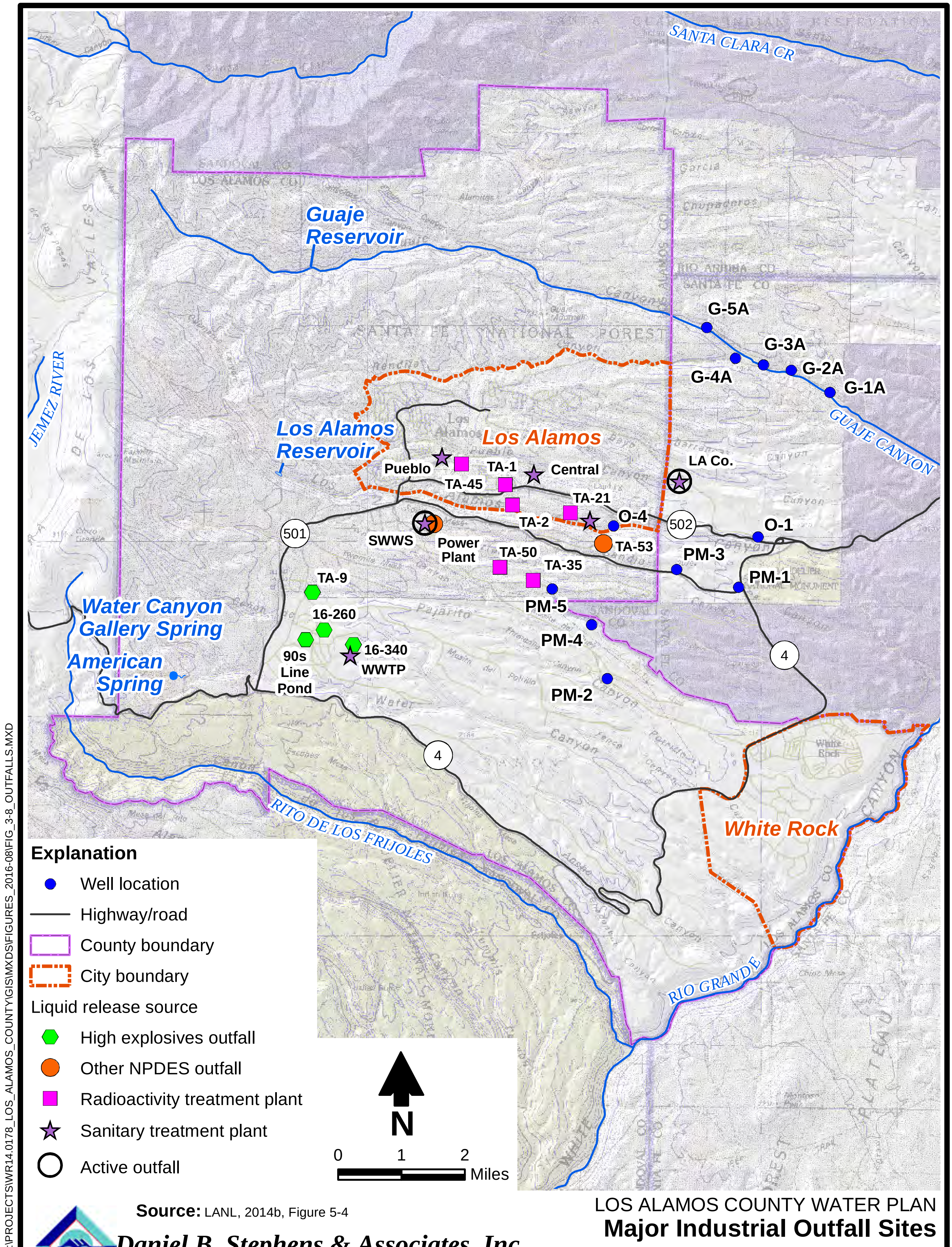
- Sandia Canyon has received discharges of power plant cooling water and water from LANL's Sanitary Wastewater Systems Consolidation (SWSC) Plant.

- Water Canyon and its tributary Cañon de Valle have received effluents produced by high explosives processing and experimentation (LANL, 1993a, 1993b).

- Over the years, Los Alamos County has operated several sanitary wastewater treatment plants (WWTPs) in Pueblo Canyon (LANL, 1981). The Los Alamos and White Rock WWTPs are currently operating. LANL has also operated numerous sanitary treatment plants.

- From 1956 through 1976, up to 160,000 pounds of hexavalent chromium were released from cooling towers at a LANL power plant. The chromium was commonly used in industry at the time as a corrosion inhibitor (LANL, 2014b).

Since the early 1990s, LANL has significantly reduced both the number of industrial outfalls and the volume of water discharged. The quality of the remaining discharges has been improved through treatment process improvements so that they meet applicable standards (LANL, 2014a).



Source: LANL, 2014b, Figure 5-4

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LOS ALAMOS COUNTY WATER PLAN
Major Industrial Outfall Sites

Figure 3-8

Los Alamos groundwater monitoring has defined two areas of notable contamination: RDX contamination beneath Technical Area 16 and chromium contamination beneath Sandia and Mortandad Canyons (LANL, 2015c).

3.3.2 Contaminant Transport Pathways and Velocities

Numerous pathways for potential contaminant transport are present throughout the Pajarito Plateau. Transport modes for contaminants from the surface to the regional aquifer vary according to the hydrogeologic setting and include:

- Matrix flow through nonwelded and poorly welded tuffs (mesa tops and dry canyons)
- Fracture flow through welded tuffs (mountain front and Pajarito Fault zone)
- Fracture and matrix flow through dense and brecciated basalts (Cerros del Rio basalt outcrop at low-head weir and perched intermediate aquifers)
- Infiltration from wet canyons (portions of Los Alamos Canyon, Pueblo Canyon, Mortandad Canyon, Sandia Canyon, and Cañon de Valle)

Transport velocities are highly variable throughout the plateau. Infiltration beneath dry canyons and mesa tops is estimated to be very low, resulting in travel times to the regional aquifer of several hundred to thousands of years (Birdsell et al., 2005). On the other hand, fracture flow through fractured tuffs or basalts is likely to be comparatively rapid in many locations. Although they vary spatially, groundwater velocities are typically on the order of 30 feet per year (LANL, 2016).

Another possible contaminant transport pathway is potential cross contamination between perched aquifers and the regional aquifer during well drilling, primarily when open borehole conditions are maintained over an extended period of time. Well drilling by LANL has incorporated procedures to minimize this risk, such as sealing off zones of saturation above the regional aquifer prior to advancing the borehole to the regional aquifer. Data do not indicate any cases of cross contamination in the monitoring network; however, future drilling should include the procedures that are in place to minimize the risk of cross contamination.

The chemical properties of each contaminant control the degree to which they move into the subsurface. Reactive chemicals have a tendency for adsorption (adhesion of dissolved molecules to the surfaces of solids), limiting their movement in groundwater, while conservative or non-reactive chemicals tend to move readily in groundwater. Examples of these two types of contaminants that have been released from LANL facilities are:

- Non-reactive contaminants include chromium, tritium, nitrate, perchlorate, and RDX (a component of explosives, also known as cyclotrimethylenetrinitramine, cyclonite, hexogen, and T4). These chemicals are highly mobile and are observed in groundwater within perched intermediate zones and the regional aquifer beneath several canyons, including Cañon de Valle, Los Alamos Canyon, Mortandad Canyon, Pueblo Canyon, and Sandia Canyon (LANL, 2005).

- Reactive contaminants include strontium-90, americium-241, cesium-137, plutonium-238, -239, and -240 (LANL, 2005). These contaminants have been detected in the alluvial system but are not observed in the intermediate and regional aquifers.

3.4 Extent of Contamination and Risk to Water Supply

To evaluate the risk of contamination to the LACWU water supply, this section summarizes existing contaminant levels in the regional aquifer (Section 3.4.1) and provides additional detail on percholorate, hexavalent chromium, and other contaminants (Sections 3.4.2 through 3.4.4).

3.4.1 Summary of Contamination in Groundwater

Monitoring of production wells is conducted by the LACWU as part of routine monitoring and compliance with the U.S. Safe Drinking Water Act, and monitoring is also conducted by LANL. Recent monitoring and reporting indicates that all drinking water produced by the LACWU water system meets federal and state drinking water standards. Drinking water wells in the Los Alamos area have not been impacted by LANL discharges with one exception: well Otowi-1 (O-1) in Pueblo Canyon, where perchlorate has been detected below the 2012 LANL Compliance Order on Consent screening level of 4-micrograms per liter (µg/L) (the 2016 LANL Compliance Order on Consent does not include a screening level for perchlorate and the perchlorate standard that will apply going forward is a New Mexico Environment Department (NMED) tap water screening level of 13.8 µg/L). Concentrations of perchlorate in this well are continuing to decline (LANL, 2016). Tritium has also been detected at low levels in well O-1. This well is not being used to supply drinking water due to water leaks in the transmission line, but the LACWU plans to put it back online in the future after this pipeline has been replaced.

Table 3-3 summarizes groundwater contaminants that were detected in the regional aquifer in 2015. These data were downloaded from the LANL and NMED Intellus New Mexico web site (LANL and NMED, 2016). Data for well O-1 has been included on Table 3-3, although there were no standard exceedances for samples collected from this well.

Table 3-3. Groundwater Contaminants in the Regional Aquifer in 2015

Chemical	Location	Concentration [a] (µg/L [b]) Result	Screening Level	Trends
Regional Aquifer (LANL and NMED, 2016)				
Perchlorate	Mortandad Canyon	**≤ 99.4**	4 [c] 13.8 [d]	
Hexavalent chromium	Sandia Canyon	**≤ 386** (2014)	50 [e]	Flat trend in the center of the plume (monitoring wells R-42 and R-28) and gradually increasing trend along the edge of the plume (monitoring wells R-45 screen 1, R-43 screen 1, and R-50 screen 1).
	Mortandad Canyon	**≤ 915**	50 [e]	
Los Alamos County Water Supply Wells (LANL and NMED, 2016)				
Tritium	Well O-1	2.373 pCi/L	20,000 pCi/L [f]	Results have declined since 2004, when there was a detection of 58 pCi/L.
Perchlorate	Well O-1	0.515	4 [c] 13.8 [d]	Results variable, but declining since 2008; concentrations ≤ 3 µg/L since 2001.

[a] **Bold** text indicates standard exceedances.
[b] Unless otherwise noted
[c] 2012 LANL Compliance Order on Consent screening level (NMED, 2012)
[d] NMED tap water screening level (NMED, 2014)
[e] NMWQCC Groundwater Standards for Human Health (20.6.2.3103)
[f] The EPA has established an MCL of 4 millirem per year for beta particle and photon radioactivity from man-made radionuclides in drinking water. The average concentration of tritium that is assumed to yield 4 millirem per year is 20,000 pCi/L. If other radionuclides that emit beta particles and photon radioactivity are present in addition to tritium, the sum of the annual dose from all the radionuclides shall not exceed 4 millirem per year (U.S. EPA, 2002).

µg/L = Micrograms per liter
≤ = Less than or equal to
pCi/L = PicoCuries per liter

The alluvial and intermediate-perched groundwater bodies are separated from the regional aquifer by hundreds of feet of unsaturated rock and sediments, so recharge from the shallow groundwater occurs slowly. As a result, less contamination reaches the regional aquifer than is found in the shallow perched groundwater (LANL, 2014a). Where contaminants are found at depth, the setting is either a canyon where alluvial groundwater is usually present or a location beneath canyons where large amounts of liquid effluent have been discharged. This section focuses mainly on contamination that has been detected in the regional aquifer, since it is the source of the LACWU water supply.

Discussion of the extent and concentrations of specific contaminants follows.

3.4.2 Perchlorate Contamination

Perchlorate is used as an energetics booster or oxidant in solid propellant for rockets and missiles. An official standard for this chemical has not been established. A screening level for perchlorate of 4 µg/L was set in the LANL Compliance Order on Consent issued by NMED on March 1, 2005 and revised on April 20, 2012 (NMED, 2012); however, a new LANL Compliance Order on Consent was issued in 2016 and it does not include a screening level for perchlorate (NMED, 2016). The perchlorate standard that will apply going forward is an NMED tap water screening level of 13.8 µg/L (NMED, 2014).

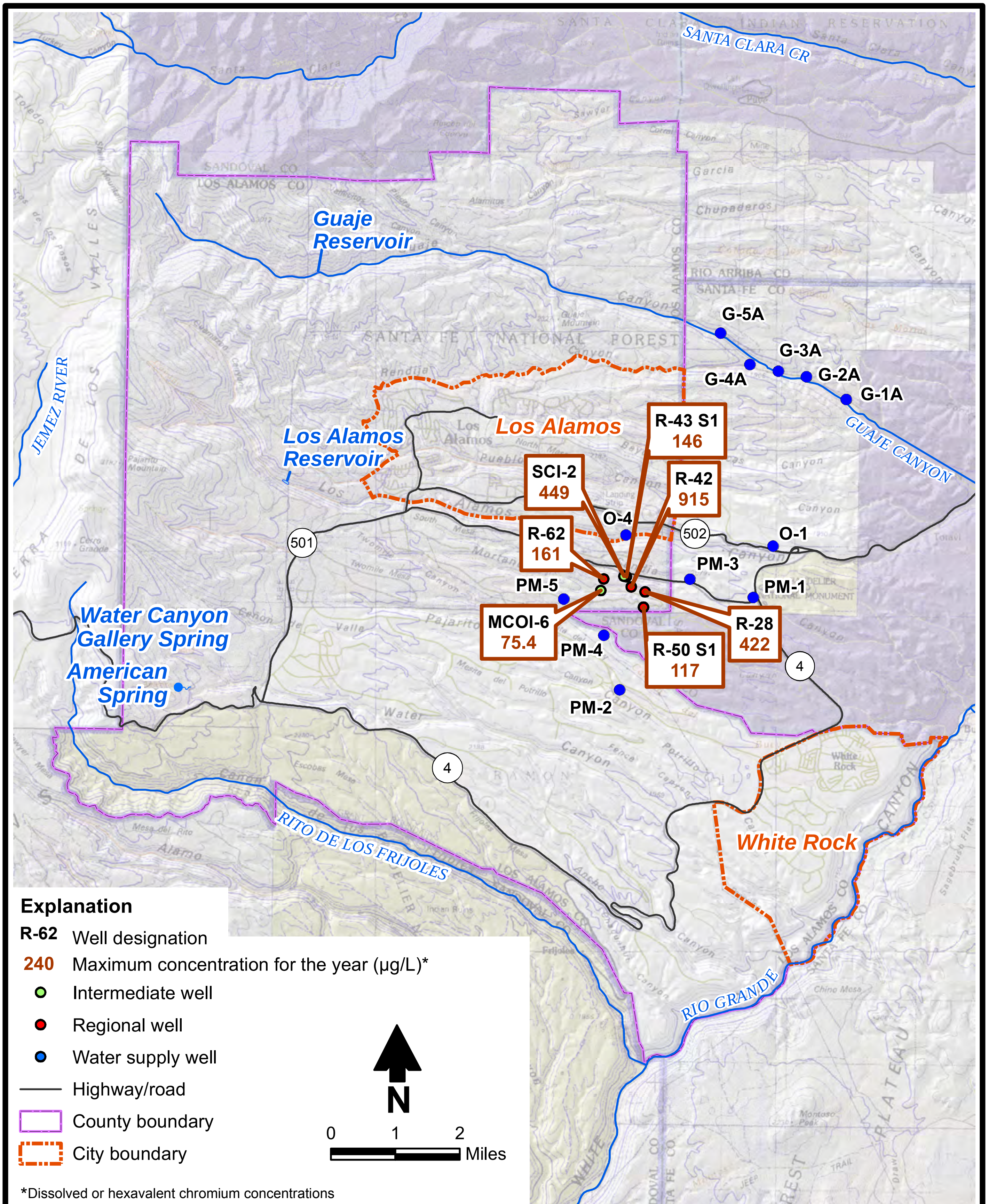
Perchlorate contamination is present in groundwater beneath Mortandad Canyon (LANL, 2016). In 2015, perchlorate concentrations exceeded 4 µg/L in samples collected from 8 monitoring wells, one of which (R-15) is completed in the regional aquifer (LANL, 2016). As discussed above, the 2016 LANL Compliance Order on Consent does not include a screening level for perchlorate (NMED, 2016), and the perchlorate standard that will apply going forward is an NMED tap water screening level of 13.8 µg/L (NMED, 2014). The concentrations detected in 2015 in the regional aquifer well R-15 ranged between 7.22 and 9.05 µg/L (LANL and NMED, 2016). The 4-µg/L screening level was the standard in effect in 2015, but with the higher standard being applied in the future, the number of standard exceedances is expected to decrease (any similar concentrations detected in the future will not exceed the 13.8-µg/L screening level). The two monitoring wells with the highest detected concentrations of perchlorate in 2015 were MCOI-5 and MCOI-6 (LANL and NMED, 2016), and these wells are completed in the perched-intermediate aquifer (LANL, 2016). The concentrations detected in these wells in 2015 ranged between 61.1 and 99.4 µg/L (LANL and NMED, 2016).

3.4.3 Hexavalent Chromium

Most contaminants that have been detected in groundwater beneath LANL have concentrations that are largely below regulatory standards; however, a hexavalent chromium plume is present in the regional aquifer. Chromium can be present in either the Cr^{+3} (trivalent chromium) or Cr^{+6} (hexavalent chromium) species. Cr^{+3} is an essential nutrient for humans and occurs naturally in many foods; Cr^{+6} causes various health effects. The U.S. Environmental Protection Agency (U.S. EPA) is currently reviewing data from a 2008 long-term animal study by the Department of Health and Human Service's National Toxicology Program, which concluded that hexavalent chromium may be a human carcinogen if ingested (U.S. EPA, 2015a).

The primary source of chromium is blowdown of potassium dichromate from the TA-03 power plant cooling tower that occurred from 1956 to 1972. LANL's conceptual model hypothesizes that chromium originated from releases into Sandia Canyon and may have migrated along lateral pathways to locations beneath Mortandad Canyon. For this reason, perched-intermediate and regional wells beneath Mortandad Canyon are monitored. Other contamination beneath Sandia and Mortandad Canyons may be associated with Mortandad Canyon sources. These sources and the migration pathways are described in the *Investigation Report for Sandia Canyon* (LANL, 2009) and *Phase II Investigation Report for Sandia Canyon* (LANL, 2012).

As discussed in the original long-range water supply plan (DBS&A, 2006), several exceedances of the New Mexico Water Quality Control Commission (NMWQCC) groundwater standard for human health of 50 µg/L for chromium were observed in samples collected in 2005 from monitoring well R-28. Since the 2006 water plan was completed, the areal extent and concentrations within the plume have been better defined. The chromium plume is located in an area of approximately 1 mile by 0.5 mile and within the top 50 feet of the regional aquifer (LANL, 2016). Data for monitoring wells where there were chromium concentration exceedances of the NMWQCC groundwater quality standard for human health in 2015 are shown on Figure 3-9.



Explanation

R-62 Well designation

240 Maximum concentration for the year (µg/L)*

Intermediate well

Regional well

Water supply well

Highway/road

County boundary

City boundary

N

0 1 2 Miles

*Dissolved or hexavalent chromium concentrations that exceed the NM WQCC groundwater standard of 50 µg/L for human health.

Source: LANL, 2016

S:\PROJECTS\WR14.0178_LOS_ALAMOS_COUNTY\GIS\MXDS\FIGURES_2016-08\FIG_3-09_CHROMIUM.MXD

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LOS ALAMOS COUNTY WATER PLAN

Monitoring Wells with 2015 Chromium Concentration Exceedances

Figure 3-9

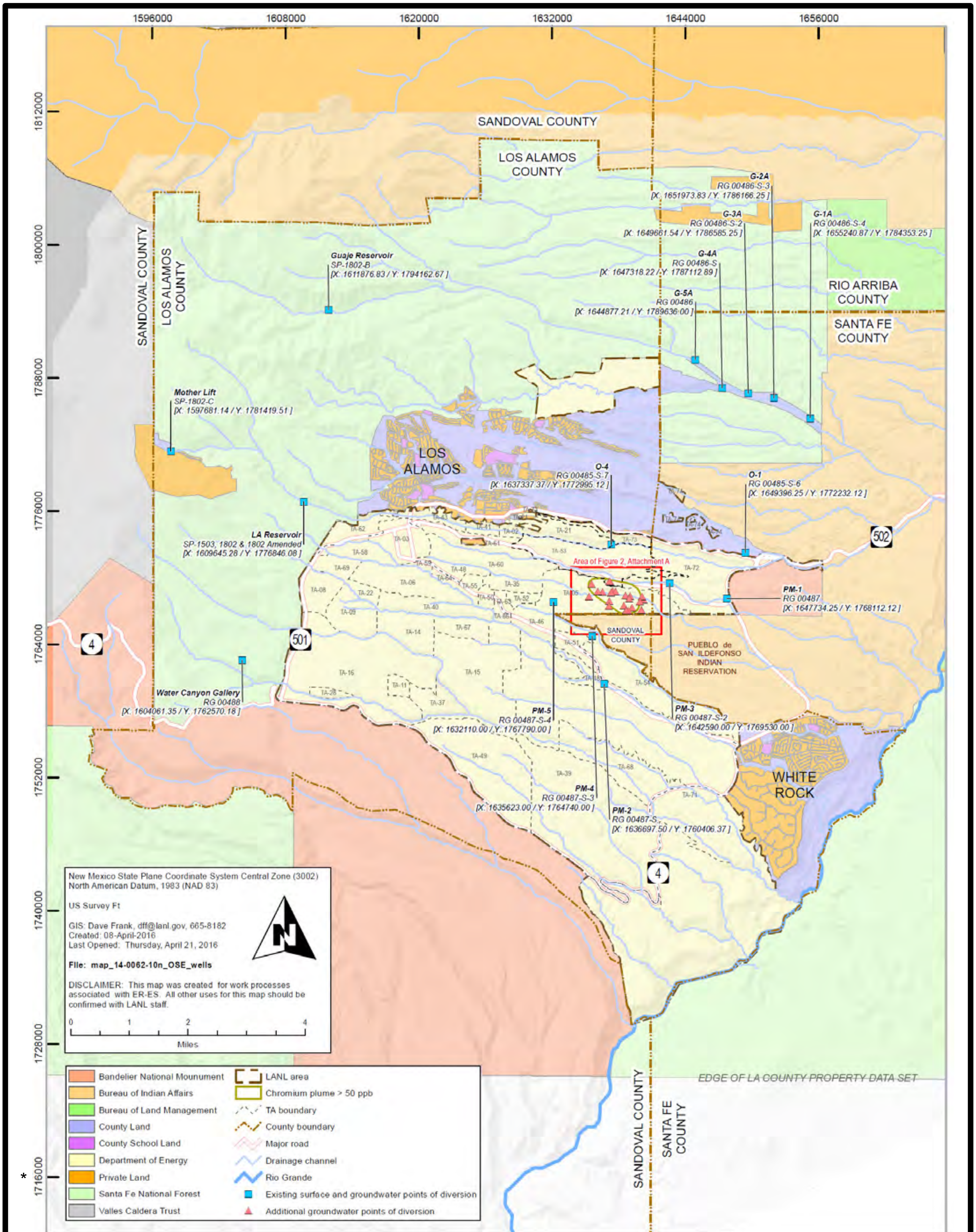
In 2015, hexavalent chromium concentrations exceeded the NMWQCC groundwater quality standard in five regional aquifer monitoring wells—R-28, R-42, R-62, R-50 Screen 1, and R-43 Screen 1 (Figure 3-9)—and the highest concentrations of hexavalent chromium detected in the plume are near monitoring wells R-42 and R-28. Two intermediate wells (SCI-2 and MCOI-6) also had hexavalent chromium concentrations above the standard (LANL, 2016). The monitoring wells located in the center of the plume (R-42 and R-28) show a relatively flat trend in the hexavalent chromium concentrations, while monitoring wells along the edge of the plume (R-45 screen 1, R-43 Screen 1, and R-50 Screen 1) show gradually increasing hexavalent chromium concentrations (LANL, 2016). The LACWU production well that is located closest to the hexavalent chromium plume is PM-3, which is located about ½ mile from R-28 (Figure 3-9). Hexavalent chromium detections in monitoring wells R-35a and R-35b (located adjacent to PM-3 and screened deep in the upper louvered section of PM-3 and at the water table, respectively) are at background levels (Katzman, 2016). Well PM-3 could become contaminated in the future, depending on the direction of groundwater flow and on the interim measures being implemented by LANL (discussed below) to control plume migration (LANL, 2015b).

The screened interval in monitoring well R-28 is from 934 to 958 feet deep, extending only 69 feet into the top of the regional aquifer, while PM-3 is screened at much greater depths (from 956 to 2,532 feet), therefore producing water from a much larger section of the aquifer. If the chromium plume were to reach PM-3 yet be confined to a shallow segment near the top of the aquifer, the concentration is likely to be highly diluted as a result of pumping from an interval of more than 1,500 feet. Nevertheless, the presence of hexavalent chromium near the well represents a risk that should be carefully monitored. During 2015, the NMED DOE Oversight Bureau coordinated with the NMED Drinking Water Bureau on a scope of work for a potential project to assess the vulnerability of the LACWU water supply wells to contamination; however, due to grant timing and State contracting limitations, the project has been put on hold (Yanicak, 2016). In the event that any of the production wells are impacted by hexavalent chromium, the LACWU maintains an insurance policy to fund and implement corrective actions, as needed.

The May 2015 Interim Measures Work Plan (LANL, 2015a) presents LANL's approach for controlling movement of chromium-contaminated groundwater along the downgradient portions of the plume. LANL plans to extract contaminated groundwater, treat it at the surface using ion exchange, and reinject it into the aquifer, with project implementation beginning in 2016 (LANL, 2016). In an October 2015 letter, NMED approved the LANL work plan and set due dates for the interim measure task work plans (NMED, 2015b). Figure 3-10a shows the chromium interim measure project area in relation to the rest of the County, and Figure 3-10b shows the existing and planned extraction, injection, and monitoring wells, and provides an approximate areal extent of the hexavalent chromium-contaminated groundwater that exceeds the 50-µg/L NMWQCC groundwater standard for human health (DOE and LACWU, 2016). The work plan also provides a general description of the planned treatment system, including two ion exchange vessels for treatment and redundancy (LANL, 2015b).

In addition, LANL is conducting work under the July 2015 *Work Plan for Chromium Plume Center Characterization* to further investigate the aquifer in the center of the chromium plume and to further characterize the nature and extent of the contamination in order to identify remedial alternatives for the chromium plume (LANL, 2015b). Objectives include investigating the feasibility of chromium source removal, further characterizing the aquifer—including heterogeneity and dual porosity—in order to evaluate the potential for in situ remedial strategies, studying the hydrologic and geochemical conditions that occur near the proposed injection wells, and characterizing the infiltration beneath the shallow alluvial groundwater in Sandia Canyon (LANL, 2015b). The LANL chromium plume center characterization work plan details planned LANL activities, including extraction well installation, pumping, and sampling, aquifer tracer tests and a field cross-hole trace study, an injection well study, and characterization of infiltration in Sandia Canyon (LANL, 2015b).

LANL plans to work with the LACWU to ensure that the interim measure pumping does not interfere with the water supply pumping and to continue to monitor water quality in the monitoring and water supply wells (LANL, 2014c). In addition, LANL will prepare a corrective measures evaluation report that proposes the final remedy for the chromium plume (LANL, 2015b).



Source: U.S. DOE and LACWU, 2016

LOS ALAMOS COUNTY WATER PLAN

Points of Diversion

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Figure 3-10a

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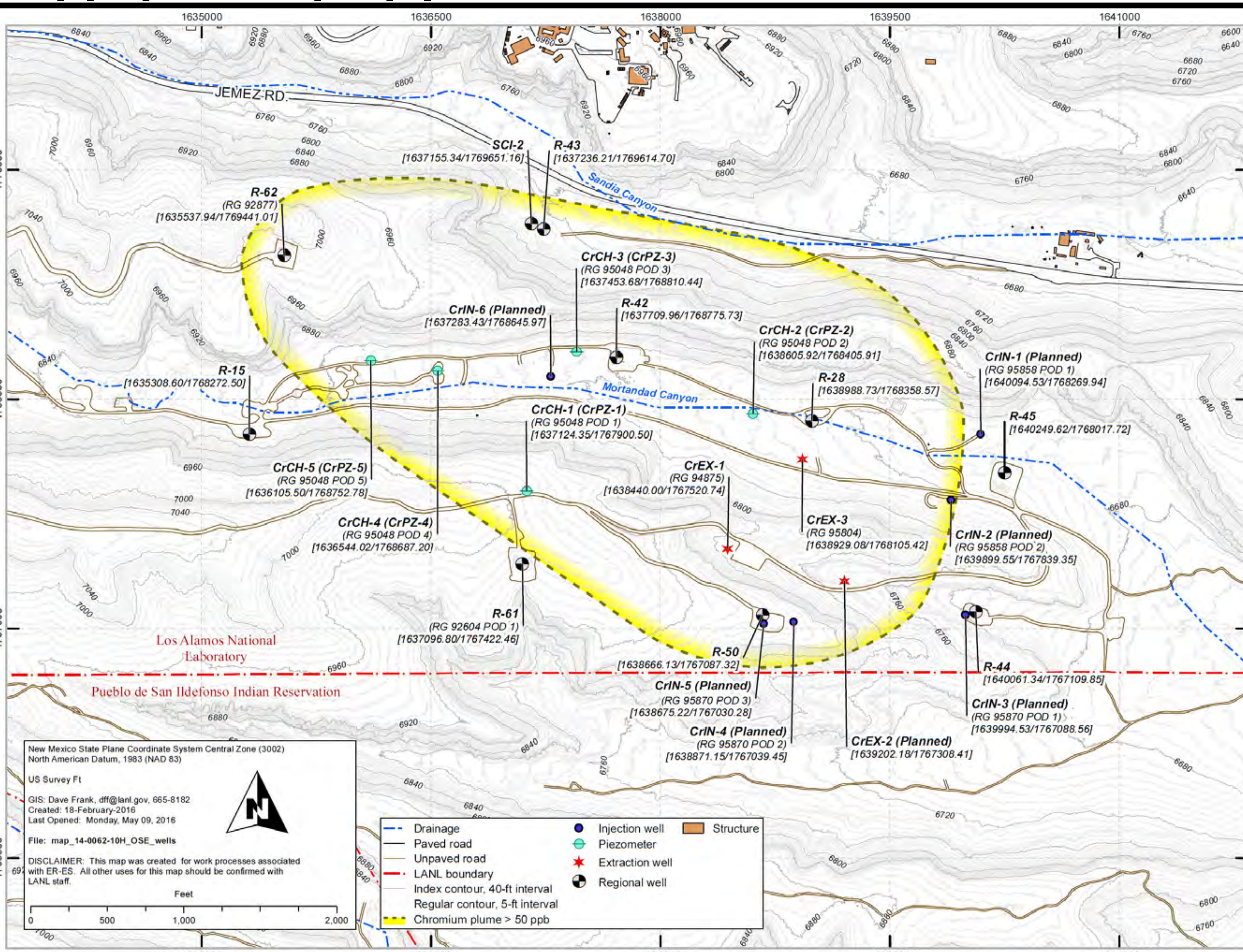
S:\PROJECTS\WR14.0178_LOS_ALAMOS_COUNTY\GIS\MXDS\FIGURES_2016-08\FIG_3-10B_PODS.MXD



Source: U.S. DOE and LACWU, 2016

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LOS ALAMOS COUNTY WATER PLAN
Points of Diversion

Figure 3-10b

3.4.4 Other Contaminants in Groundwater

A number of additional contaminants have been detected in groundwater, including nitrate, RDX, tritium, trichloroethene, and radioactive contaminants. These contaminants are discussed briefly in the sections that follow.

3.4.4.1 Nitrate

Nitrate (NO_3 as nitrogen) has been detected in the regional aquifer at concentrations of up to 6.1 mg/L in monitoring wells R-43 S1 and R-11 in Sandia Canyon and R-42 in Mortandad Canyon (the U.S. EPA national primary drinking water standard and NMWQCC groundwater standard for human health are both 10 mg/L). Nitrate (as N) concentrations are also elevated (> 2 mg/L) in samples from regional aquifer monitoring wells R-36 in Sandia Canyon and R-15, R-28, and R-45 in Mortandad Canyon (LANL, 2014a).

3.4.4.2 RDX

RDX, a component of explosives, has been detected in groundwater. An official standard for this chemical has not been established; however, the EPA's tap water screening level for RDX is 0.70 µg/L (U.S. EPA, 2016). LANL indicated that EPA is using a target risk of E–6 for RDX (0.70×10^{-6} µg/L), and that NMED requires LANL to use a target risk of E–5 (Katzman, 2015). The RDX standard used by LANL is 7.0 µg/L (NMED, 2015a).

RDX is monitored by LANL, and RDX concentrations exceed LANL's 7.0-µg/L standard at two springs (Burning Ground Spring and Martin Spring), one alluvial well (CdV-16-02659), and three intermediate-perched zone wells (CdV-16-4ip S1, CdV-16-2(i)r, and CdV-16-1(i)) near TA-16 in the Water Canyon watershed (LANL, 2015c). RDX is also persistently detected in regional aquifer monitoring wells R-18 and R-63 at concentrations that are below the standard. In 2015, the maximum concentrations detected were 1.66 µg/L in R-63 and 2.86 µg/L in R-18. The concentrations in R-63 have been relatively steady since this well was installed in 2011, with the exception of the first few samples following well construction. Detected concentrations in R-18 show an increasing trend since the well was completed in 2006 (LANL, 2016).

3.4.4.3 Trichloroethene and Tetracloroethene

Chlorinated solvents are present in the groundwater near TA-16 (LANL, 2015c). Trichloroethene (TCE) was detected in Pajarito Canyon regional aquifer monitoring well R-20 S2 beginning in late 2008 and continued to be detected in every sampling event through 2011. In 2015, TCE was not detected in R-20 S2 (LANL and NMED, 2016). In 2014, tetrachloroethene (PCE) and TCE were detected in alluvial well FLC-16-25280 at concentrations above the U.S. EPA national primary drinking water standards of 5 µg/L (LANL and NMED, 2016).

3.4.4.4 Radioactive Contaminants

Radioactive effluent was discharged into Los Alamos Canyon during the earliest Manhattan Project operations at TA-01 (1942 through 1945) and from nuclear reactors at TA-02 (until 1993). Liquid and solid radioactive wastes were also discharged in Los Alamos Canyon from TA-21, and radionuclides and metals were discharged from the sanitary sewage lagoons and cooling towers at the Los Alamos Neutron Science Center at TA-53. Compared with past decades, little radioactivity is now found in groundwater samples. In 2013, strontium-90 was detected in shallow alluvial wells in DP and Los Alamos Canyons, at concentrations of up to 17 picoCuries per liter (pCi/L) (LANL, 2014a). The U.S. EPA has established a national primary drinking water standard of 4 millirem per year (mrem/yr) for beta particle and photon radioactivity from man-made radionuclides in drinking water (including strontium-90, which emits beta particles during radioactive decay). Based on conversions provided by the U.S. Department of Commerce Bureau of Standards, the derived concentration of 8 pCi/L is equivalent to a dose of 4 mrem/yr for strontium-90 (U.S. Department of Commerce, 1959; U.S. EPA, 2015b). Samples collected from alluvial well LAO-3a continue to exceed the standard. In 2015, the strontium-90 concentration in this well was 12.4 pCi/L (LANL and NMED, 2016).

Tritium activities in groundwater peaked in the early 1980s and have since declined. Tritium was detected in water supply well O-1 at an activity of 2.373 pCi/L in 2015 (LANL and NMED, 2016). In the intermediate zone monitor wells MCOI-5 and MCOI-6, tritium was detected in 2015 at activities of 3,140 and 2,940 pCi/L, respectively. The U.S. EPA's dose-based drinking water standard for tritium is 4 mrem/yr, based on a maximum contaminant level of 20,000 pCi/L (U.S. EPA, 2002).

3.5 Surface Water Supply

Though most of the LACWU water supply is from groundwater, there are two sources of surface water supply:

- The Los Alamos Canyon reservoir has provided non-potable water supplies to schools, parks, and a golf course. The reservoir filled with debris following the 2000 Cerro Grande Fire, and the area was further impacted by the 2011 Los Conchas fire and subsequent flooding. The debris was cleared and reservoir repair and reconstruction was completed in the spring of 2013, but a flood in September 2013 filled the reservoir with silt again. The reservoir has been dredged and the LACWU plans to install a new pipeline from the reservoir into town in order to connect to the existing non-potable infrastructure (Meyers, 2016).

- LACWU has the potential to use Rio Grande surface water from the San Juan-Chama Project in the future, though a diversion structure has not yet been constructed. Bringing the San Juan-Chama Project water online would diversify the water supply geographically and also in terms of water rights, helping the LACWU to mitigate any future effects due to contamination of existing wells and/or climate change. Details of the proposed San Juan-Chama Project and LACWU water rights are discussed in Section 4.

Since surface water supplies only non-potable supplies to LACWU, surface water contamination is not a primary issue for drinking water quality. However, careful management of stormwater runoff, particularly in areas impacted by fire, is an important water resource management issue for Los Alamos County, as discussed in Section 7. Surface water quality will become more of an issue if and when a project to use San Juan-Chama Project water comes online.

4. Water Rights

In addition to having sufficient physical supply, the LACWU needs to have the legal rights to use the water. New Mexico water law is founded on the principle that all water in New Mexico belongs to the State of New Mexico, which thus has the sole authority to grant or recognize rights to use that water. Two further tenets, both based on New Mexico Constitution Article XVI, Section 2, are that (1) water rights “are subject to appropriation for beneficial use, in accordance with the laws of the state” and (2) ”priority of appropriation shall give the better right.”

- The concept underlying the principle of prior appropriation is that the first person to use water for a beneficial purpose has a prior right to use that water against subsequent appropriators. Water rights acquired through this system of prior appropriation are a type of property right and may be sold or leased.

- The essential basis of water right ownership is beneficial use. The principle of beneficial use is that a water right arises out of a use that is productive or beneficial, such as agricultural, municipal, industrial, and domestic uses, among others.

The State Engineer, through the OSE, administers water rights for the State of New Mexico:

- To actively manage groundwater resources in New Mexico, the State Engineer has the authority, as set forth in the Water Code, to delineate groundwater basins that require a permit for groundwater withdrawals. Such a permit specifies (1) how much water a user can withdraw in any given year, (2) the location and type of well that will be used to withdraw the water, and (3) the use to which the water will be put. Many water right permits have special conditions that further define the use and quantity of water allowed under the permit.

- Like groundwater, the diversion of water from New Mexico’s surface waters requires either a declaration, permit, license, or court decree to divert the water. Surface water appropriations follow the same standards as groundwater rights in that a transfer or lease cannot impair existing water rights and must not be contrary to public welfare or conservation (NMSA 72-5-23, 72-12-3(D)).

Many of New Mexico's surface waters are governed by interstate compacts that require set amounts of water to be delivered to specified delivery points. The Interstate Stream Commission (ISC), an adjunct commission to the OSE, has responsibility for ensuring that specific rivers in New Mexico meet their obligations under their respective interstate compacts.

4.1 Water Rights

The LACWU has existing water rights from a variety of sources, including water rights from the Rio Grande surface water and underground water basins and rights to use 1,200 acre-feet of water from the San Juan-Chama Project. The U.S. DOE also owns Rio Grande underground water basin rights. These rights are discussed in Sections 4.1.1 and 4.1.2, respectively.

4.1.1 Rio Grande Surface Water and Groundwater Rights

As discussed in Section 2, the LACWU's Rio Grande water rights were originally owned by the U.S. DOE. In 2001, 70 percent ownership was transferred to the LACWU, and DOE retained 30 percent ownership. Table 4-1 summarizes these permitted, licensed, and declared water rights.

Table 4-1. Summary of Water Rights

Permit Number	Water Source	Priority Date	Quantity of Water Originally Appropriated (ac-ft/yr)
RG-485 through RG-496-Comb-S-4 [a]	Groundwater	1948-1951	5,329
RG-485 through RG-496-Comb-S-5 [b]	Groundwater	1948-1951	50
1503,1802, and 1802-amended [c]	Surface water	March 14, 1922	168.1
Evaporation loss	Surface water	NA	(5.8)
		Total water rights	5,541.3 [d]

Source: Southwest Water Consultants, Inc., 1999

[a] Permitted August 31, 1965 from numerous underground water right declarations filed on March 5, 1957 and amended in 1965. These declarations identified actual use of 3,966 acre-feet in 1964, a capacity of 6,579 ac-ft/yr, and an OSE feasible diversion of 5,329 ac-ft/yr. Dates that water was put to beneficial use vary.

[b] Subsequent declarations added an additional 50 acre-feet and new points of diversion.

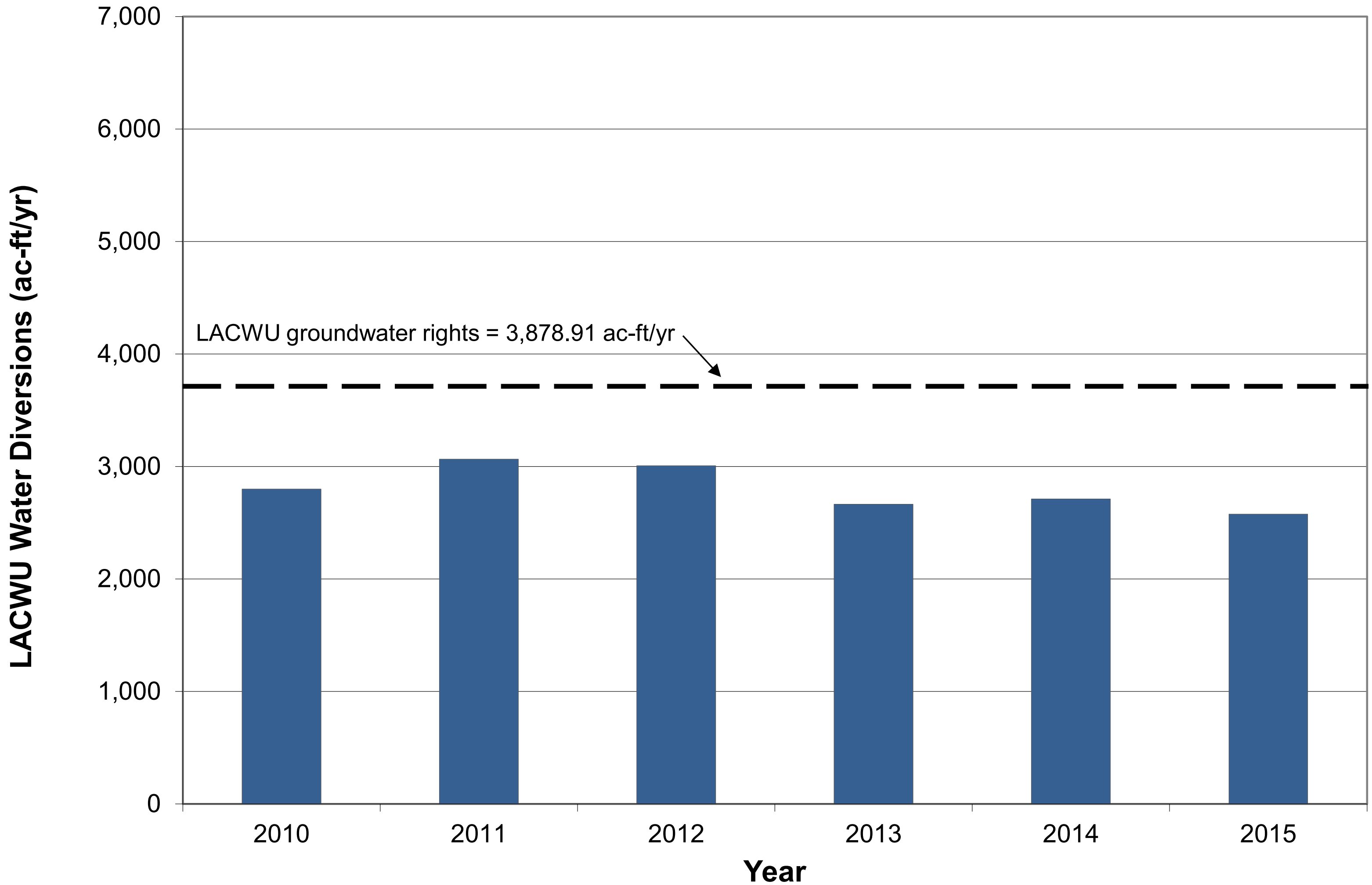
[c] The amendment to Permit 1802 raised the storage capacity from 6.66 acre-feet to 28.33 acre-feet.

[d] Of the total 5,541.3 ac-ft/yr under the 1975 combined permit, the LACWU owns 70 percent (3,878.91 ac-ft/yr) and DOE owns 30 percent (1,662.39 ac-ft/yr).

The rights outlined in Table 4-1 are based on a permit application filed by U.S. Energy Research on May 29, 1975 to combine a series of previously licensed and declared water rights. That application requested a total right of 5,547.1 ac-ft/yr for municipal, industrial, and related purposes that could be diverted from any combination of permitted points of diversion. The OSE approved the application on October 30, 1975 with the exception of subtracting 5.8 ac-ft/yr for evaporation losses at Los Alamos Reservoir. Figure 4-1 shows the LACWU water diversions for 2010 to 2015 (these volumes were calculated by subtracting LANL demands from total diversions), and Figure 4-2 shows the LANL water use volumes for the same period, in comparison to their respective groundwater rights. Figure 4-3 shows the LACWU water diversions and LANL water use volume, along with the water rights for both entities. The LACWU has an extension of time for putting their rights to beneficial use that will expire on September 30, 2017.

The LACWU (which is the sole water provider for LANL) leased the DOE-owned water rights from 2001 to 2011, when the lease expired. In May 2016, an application for permit to change an existing water right was filed jointly by DOE and the LACWU in support of the chromium plume control interim measure and chromium plume center characterization project (U.S. DOE and LACWU, 2016). In addition, a Request for Emergency Authorization associated with the joint application was submitted, and emergency authorization was received on September 10, 2016 (NMOSE, 2016). The application and emergency authorization request were filed jointly because of the nature of the existing permitted rights between the DOE and the LACWU (U.S. DOE and LACWU, 2016).

The application requests a change in purpose of use for groundwater to add groundwater remediation and additional groundwater points of diversion (PODs) to be used for control and future characterization of hexavalent chromium-contaminated groundwater at LANL (U.S. DOE and LACWU, 2016). The application calls for 24 additional PODs (3 extraction wells, 6 injection wells, and 15 monitoring wells). The volume of water for this application is 679 ac-ft/yr (U.S. DOE and LACWU, 2016), and LANL also plans to file for return credits from the OSE. Operation of the additional PODs will not impair or increase the appropriation of water above the existing permitted water rights between DOE and the LACWU (5,541.3 ac-ft/yr total) (U.S. DOE and LACWU, 2016). On September 10, 2016, the OSE approved the request for Emergency Authorization and issued Emergency Authorization, RG-00485 et al. (NMOSE, 2016). The LACWU continues to negotiate a new lease with DOE for the full 1,662.39 ac-ft/yr, for use by all customers, including LANL and the chromium interim measure (Meyers, 2016).



Note: These values were obtained by subtracting the LANL water demands from the total diversions.

LOS ALAMOS COUNTY WATER PLAN

Annual Water Use by Los Alamos County 2010 Through 2015

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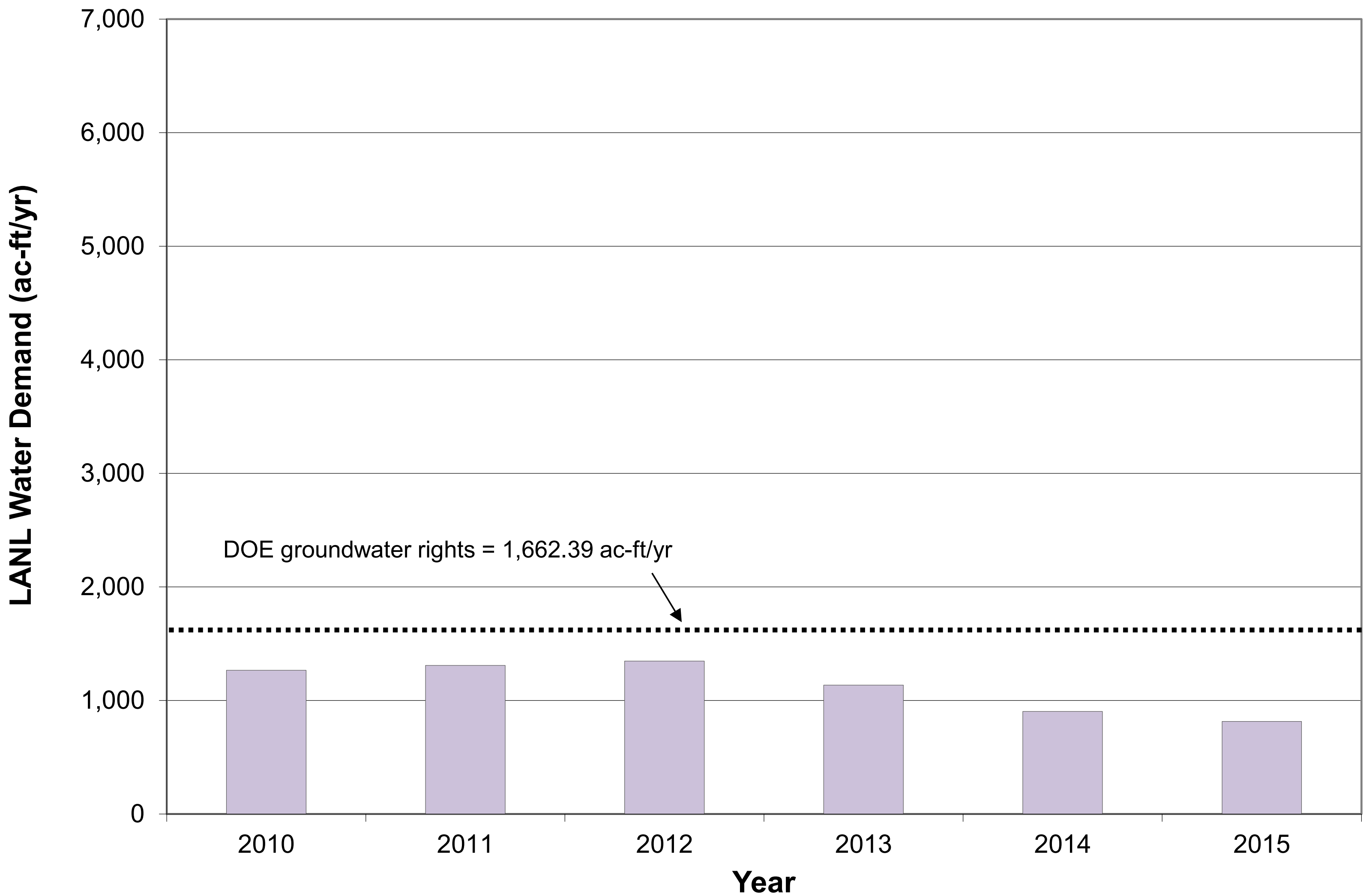
1/31/17

Figure 4-1



Notes: 1. The groundwater supply being used for the LANL chromium interim measure project has not been subtracted from DOE's total water rights.
2. See Section 4.1.1 for a discussion of water rights ownership and leasing.

LOS ALAMOS COUNTY WATER PLAN

Annual Water Use by Los Alamos National Laboratory 2010 Through 2015

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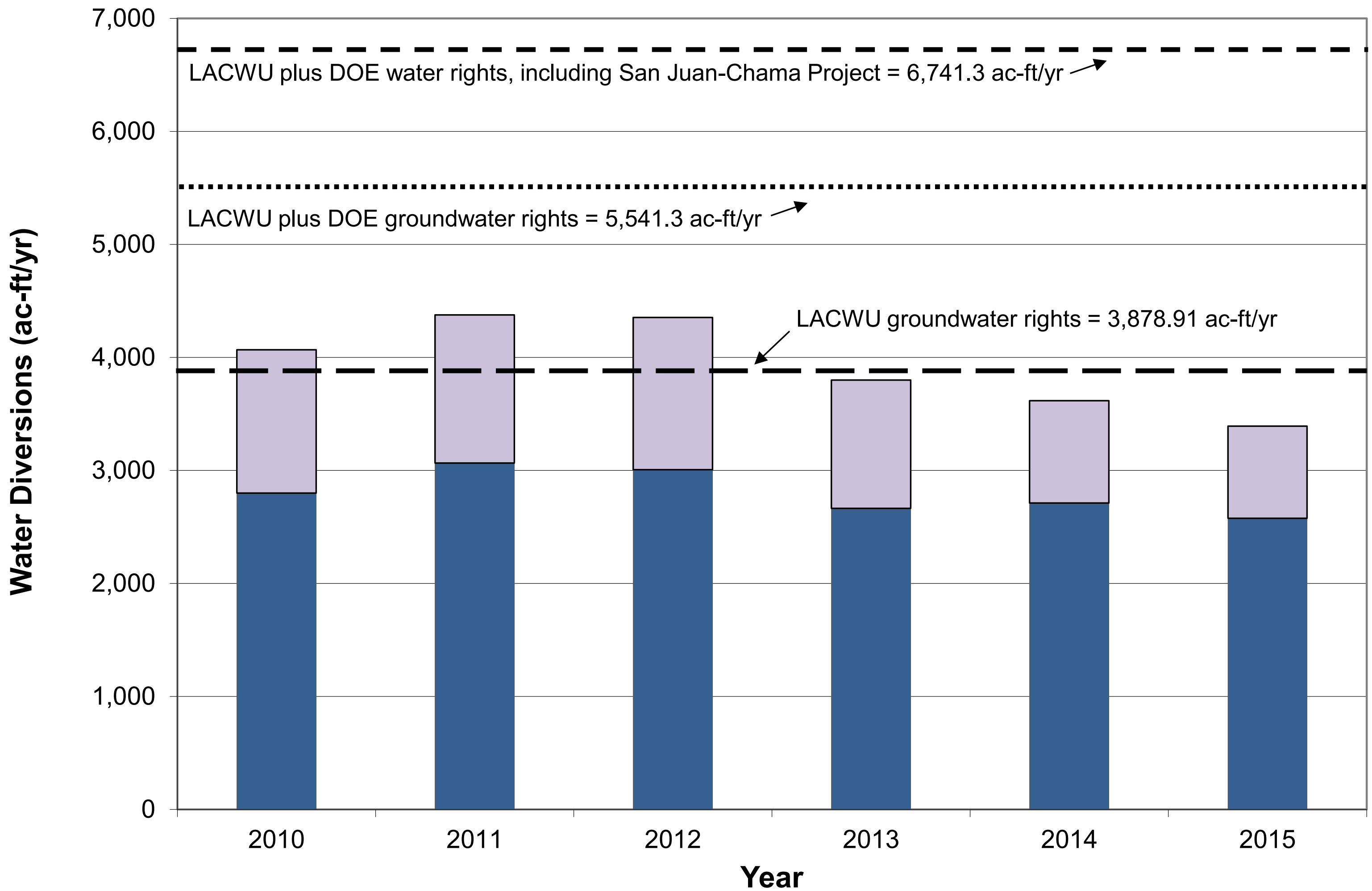
2/22/17



Notes: 1. The groundwater supply being used for the LANL chromium interim measure project has not been subtracted from DOE's total water rights.
2. See Section 4.1.1 for a discussion of water rights ownership and leasing.

LOS ALAMOS COUNTY WATER PLAN

Annual Water Use by Los Alamos County and Los Alamos National Laboratory, 2010 Through 2015

Daniel B. Stephens & Associates, Inc.

2/22/17

Figure 4-3

In 2006, the OSE approved a 30-ac-ft/yr surface water diversion from Los Alamos Canyon for snowmaking, which is included in the existing total water rights volume of 5,541.3 ac-ft/yr. The purpose of use was changed from municipal and industrial to municipal, industrial, recreational, and snowmaking.

4.1.2 San Juan-Chama Surface Water Rights

Implementation of a project to use San Juan-Chama Project water will help to diversify the Los Alamos County water supply, both geographically and from a water rights perspective. The San Juan-Chama Project surface water originates in the Colorado River Basin and provides a source of supply that is geographically separate from the regional aquifer near Los Alamos. This geographic separation will be a benefit should there be expanded water quality contamination issues in the local groundwater in the future. Additionally, as a federal project, San Juan-Chama Project water contracts are not subject to OSE priority issues, although they may be subject to water rights administration (discussed in Section 4.3.1 and 4.3.2). The San Juan-Chama Project water rights may also be subject to shortage sharing on a pro rata basis among all contractors in drought years, as discussed in Section 4.3.3. Even with some drought vulnerability, having a separate source of supply could help to provide back-up supply if contamination or water rights issues affect the use of the regional aquifer.

Los Alamos County has contracted water rights with the U.S. Department of the Interior Bureau of Reclamation for 1,200 acre-feet of San Juan-Chama Project surface water, which flows into the Rio Grande through a series of tunnels, conveyance channels, and reservoirs. Los Alamos County's San Juan-Chama contract was converted from a service contract to a repayment contract in October 2006, and the LACWU completed repayment of the contract (Los Alamos County's share of the San Juan-Chama Water Project construction costs) in December 2015. Under the current contract, remaining payments are for operation, maintenance, and replacement costs only (SJ-C Project Contract No. 05-WC-40-560).

A final preliminary engineering report (PER) was completed for the LACWU San Juan-Chama Project water supply project in September 2012. The PER evaluated five alternatives for diverting, treating, and conveying the San Juan-Chama Project water and recommended the alternative that called for the installation of three wells in White Rock (CDM Smith, 2012).

Under this alternative, groundwater that would have naturally discharged to the river would be pumped, and the San Juan-Chama Project water would replace the pumped groundwater in the river (CDM Smith, 2012). This alternative would not require treatment above disinfection, and the proposed well locations would allow for connection to the water system at an existing booster station (CDM Smith, 2012). The Los Alamos County Council advised that further study of alternatives and an environmental assessment be completed before the project moves forward (LACWU, 2014).

The environmental assessment will provide an opportunity to re-evaluate specifics of the project design in light of environmental and public concerns. In July 2014, the Utilities Manager recommended delaying further action on the San Juan-Chama Project diversions until the 40-year water plan update has been completed (LACWU, 2014). Through the environmental assessment and further planning processes, LACWU will need to consider the benefits of the separate San Juan-Chama Project water supply in relation to costs and other concerns, and to determine when and if to construct a project that would bring this water online.

4.2 Water Rights Administration

As part of the planning process, it is important to view the LACWU's water rights in the larger context of the administrative and other legal considerations that could affect the LACWU's ability to use and divert its water rights in any given year. This section discusses the administrative policies currently or potentially affecting the LACWU's water rights; Section 4.3 assesses the potential risks to those water rights.

4.2.1 Rio Grande Compact

Water in the Rio Grande is governed by the Rio Grande Compact, an agreement entered into by New Mexico, Texas, and Colorado in 1939 and approved by the United States Congress and the State of New Mexico (NMSA 72-15-23). The Compact applies to the use of surface water of the Rio Grande, from its headwaters in Colorado to Fort Quitman, Texas, by each of the three states. Each upstream state is required to make a surface water delivery to its downstream neighbor. The volumes of water required to be delivered to New Mexico and Texas are calculated based on upstream flows, and an annual accounting is conducted to determine each state's actual deliveries in relation to that delivery obligation and the resulting credits or debits (over- or under-deliveries), which are carried over from year to year.

New Mexico's Compact delivery requirements are based on an inflow-outflow schedule where inflow is measured at the Rio Grande at Otowi Bridge near San Ildefonso, NM gage (Otowi gage) east of Los Alamos. Because of the Otowi gage's role in determining delivery amounts, the State Engineer has a long-standing administrative practice of not permitting a change in point of diversion from one side of the gage to the other, whether by sale or by lease (Cartron et al., 2002). This requirement places a significant restriction on the water rights market, and coupled with the fact that few pre-1907 water rights are available for purchase, means that purchasing water rights, whether for municipal use or offsets (Section 4.2.4), will be a significant challenge. Additionally, even if a willing seller can be identified, water rights transfers on the Rio Grande are routinely protested and can require expenditure of significant technical and legal fees.

4.2.2 Protection of Senior Water Rights

As discussed above, the State of New Mexico adheres to the prior appropriation system for water rights administration. This approach is based on a "first in time, first in right" concept, whereby the water right holder with a priority date senior to other rights can exercise that right to the detriment of a right with a junior priority date. When senior water right holders are unable to fully exercise their right due to diversions by junior water right holders, they can make a priority call on a river (including stream-connected groundwater rights). This call, which would be administered by the OSE, would require junior users to cease pumping or diverting so that the senior rights could be fulfilled.

To date, priority call-based administration has rarely happened; however, most rivers and connected groundwater basins are over-appropriated. Even though the Rio Grande Basin has not been adjudicated (a legal process that establishes the amounts and priority dates of all surface water and groundwater rights in a stream system), LACWU water rights are junior to a significant number of downstream senior water rights, such as the Middle Rio Grande Conservancy District, that could be impacted by additional depletions upstream. With additional growth and other pressures, such as endangered species requirements, active administrative protection of senior water rights in groundwater basins and rivers is likely to become more frequent over the 40-year planning horizon.

4.2.3 Active Water Resource Management

In an effort to develop more flexible tools for administering water rights in New Mexico, the OSE adopted Active Water Resource Management (AWRM) regulations (NMAC 19.25.13.1 to 13.49) in December 2004. The AWRM legislation creates an administrative framework within which the OSE will establish water master districts, appoint water masters for those districts, and develop district-specific water rights administration regulations.

The OSE has established seven priority basins for AWRM (NMOSE, 2004a), including the Lower Rio Grande. Over time, the OSE may extend the AWRM program to the Upper Rio Grande and develop regulations that will address administration of water rights, although the regulations will not become final until the Rio Grande Basin has been adjudicated (NMOSE, 2004b). In the Pecos River and connected groundwater basins, the OSE has developed AWRM regulations that clearly lay out several approaches to priority administration, all of which allow for curtailment of junior water rights to protect senior water rights.

4.2.4 Rio Grande Offset Requirements

In accordance with statutory authority and case law, the OSE manages the Rio Grande surface water and groundwater basins conjunctively and considers Rio Grande surface water to have been fully appropriated as of the year 1939 (the year the Rio Grande Compact was signed) (NMOSE, 2000). This means that the OSE recognizes the groundwater-surface water connection and conditions permits so that new groundwater appropriations will not increase surface water depletions and thereby affect senior water right holders. Specifically, the OSE requires applicants for groundwater rights to purchase and retire valid water rights in an amount equivalent to the effect the groundwater withdrawals will have on the river.

Previously, the OSE didn’t require applicants to immediately begin purchasing and retiring water rights. However, current policy, which was upheld in a case involving the City of Rio Rancho, specifies that offsets must be in place to counteract the effect of pumping on the river. A phased acquisition of the offsets is possible, especially if the applicant is not planning to immediately pump up to the full permitted amount; however, offsets for impacts must be in place by the time those impacts affect the river (i.e., increase depletion).

The OSE has further clarified this policy, stating that offset rights may be valid only for pre-1907 rights, a pre-1907 surface water right previously transferred into a well, or an existing groundwater right with a priority date older than May 31, 1939, the date of the Rio Grande Compact (NMOSE, 2006). This policy limits the number of water rights that could be considered for offset requirements.

4.2.5 Rio Grande Declared Underground Water Basin

The Rio Grande Underground Water Basin covers 26,209 square miles along the Rio Grande in the center of the state. Although specific administrative criteria exist for the area near the river in the Middle Rio Grande (the reach from Cochiti to Socorro) (NMOSE, 2000), the OSE has no unique administrative criteria for the portion of the Rio Grande Basin near Los Alamos County. The OSE evaluates applications for water rights in this reach, including a change in point of diversion or place and purpose of use of water rights, to determine whether the granting of the application will impair existing water rights or be detrimental to the public welfare or contrary to the conservation of water.

4.3 Risks to Los Alamos County Water Rights

Although the LACWU owns a specific volume of water rights, the legal right to divert and use those rights in any given year can be affected by the rights of other water rights holders and even as a result of interstate compacts or other agreements governing interstate waters. These risks are discussed in the following subsections.

4.3.1 Protection of Senior Water Rights

As discussed in Section 4.2.2, the LACWU could potentially be subject to limitation of its water rights in order to protect senior water rights. A significant yet unquantified number of the water rights on the Rio Grande are senior to those of the LACWU. In the event that the OSE begins administering priorities based on a call or based on AWRM regulations, the LACWU could be required to limit its use or to use some of its San Juan-Chama Project water to mitigate the effects of its diversions on senior water right holders. Until the OSE conducts a hydrographic survey and adjudicates the Rio Grande Basin, however, it is impossible to quantitatively evaluate the LACWU's susceptibility to curtailment of its water rights under priority administration.

4.3.2 Rio Grande Offset Requirements

Even without a priority call, the OSE could potentially require the LACWU to offset its current pumping to avoid impairment of pre-1939 senior water rights holders. For example, should the LACWU submit an application to change the POD or purpose and place of use of a water right, the OSE would evaluate that application with respect to impairment, public welfare, and conservation. Because the LACWU's use of its water rights increases depletions on the Rio Grande, thereby impacting senior water rights holders, the OSE could require offsets due to impairment even though the existing permits have no offset requirement. As discussed in Sections 4.2.4 and 6, the LACWU could satisfy those offset requirements by using San Juan-Chama Project water as offset rights or by purchasing water rights. However, willing sellers of pre-1907 water rights are difficult to find, and many municipalities have encountered difficulties in identifying water rights to purchase.

The LACWU might also be able to reduce the number of offset water rights the OSE would require by applying to the OSE for return flow credit for the treated wastewater effluent it returns to the Rio Grande. Credit for return flow to the aquifer is also possible. Both types must be demonstrated in a return flow plan subject to OSE approval (NMOSE, 2000, Section 3).

4.3.3 Navajo Water Rights Settlement Provisions

The original legislation authorizing the San Juan-Chama Project includes provisions for sharing shortages among beneficiaries of the project (76 Stat. 96, PL 87-483). The Northwestern New Mexico Rural Water Projects Act (123 Stat. 1372, PL 111-11) was enacted on March 30, 2009, and Section 10402 amends Public Law 87-483, providing additional detail about shortage sharing. The Navajo Water Rights Settlement, which was approved in August 2013, defines flows and other requirements in a manner that could result in shortages to the San Juan-Chama Project. These shortages would likely be shared on a pro rata basis among all contractors. Although conditions giving rise to shortage sharing may be rare, implementation of the act could nonetheless reduce the quantity of San Juan-Chama Project water available to contractors in some years. Predicted changes in San Juan-Chama Project water allocations resulting from climate change are discussed in Section 7.

4.4 Acquisition of New Water Rights to Meet Future Demand

As discussed in Section 6, the LACWU could be required to obtain additional water rights to meet future water demand, or to move points of diversion for existing rights if contamination affects supply wells (Section 3). As the Rio Grande basin is considered to be fully appropriated, the LACWU would have to purchase water rights to meet future needs, which may not be feasible given water market limitations. The LACWU should consider maximizing use of its existing water rights through conservation or reuse and through maximizing return flow credits.

4.5 Los Alamos National Laboratory

In September 2009, LACWU signed an agreement with DOE to provide water service to LANL for the period October 1, 2009 through September 30, 2019, and the County will be the sole water provider for LANL at least through the term of this agreement. The contract indicates that DOE will provide support to LACWU for implementing use of San Juan-Chama Project water. The contract also identifies other terms of service such as meter testing, access to wells for hydrologic monitoring, water storage for firefighting, and water rates. Estimated quantities of water to be provided to LANL range from 412,000,000 gallons (1,264 acre-feet) in 2010 to 572,000,000 gallons (1,743 acre-feet) in 2019. The contract recognized that predicting future water needs for LANL is difficult and included provisions for notification if the future water needs were expected to increase by more than 50,000,000 gallons (153 acre-feet) per year. The agreement also includes a curtailment plan with provisions to reduce water use during times of shortage. LANL provided a 10-year water demand forecast (fiscal year 2017 through fiscal year 2027) in support of this plan update, with values ranging between 254,610,000 gallons (781 acre-feet) and 490,510,000 gallons (1,505 acre-feet) (Ballesteros Rodriguez, 2016) (Section 5).

5. Water Demand

In order to assess the LACWU's projected future demand for water, this section discusses current and historical water uses (Sections 5.1 and 5.2) and demographic and economic trends (Section 5.3). Based on this information, projected future water demands for the region are presented in Section 5.4.

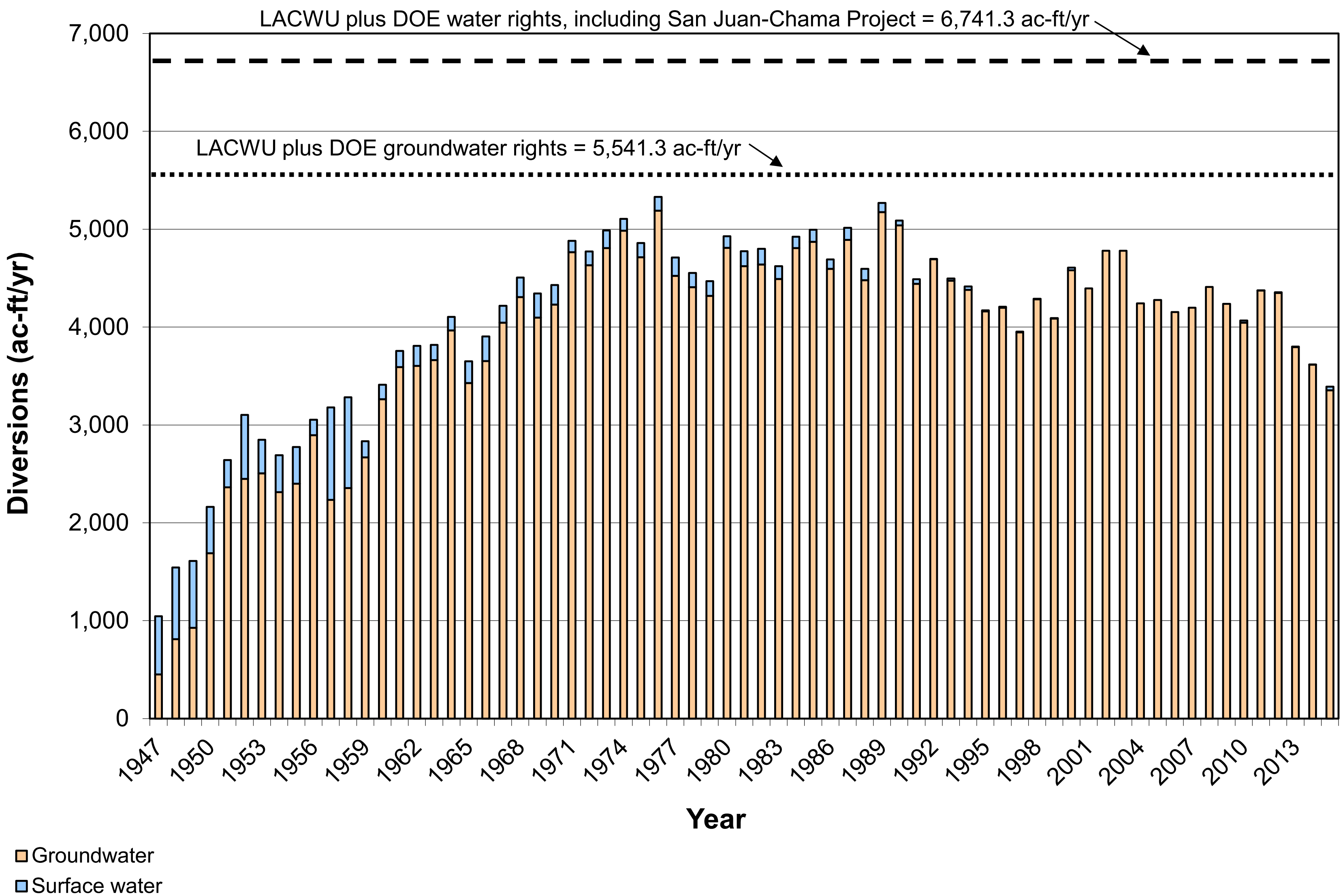
5.1 Historical Use

Groundwater and surface water have supplied the community of Los Alamos for 60 years. Figure 5-1 and Table 5-1 show the metered diversion amounts from wells and surface water from 1947 through 2015. Table 5-2 shows water diversions and population by decade from 1950 through 2010.

Between 1950 and 2000, population increased in Los Alamos County, and since 2000, the population has decreased by approximately 2 percent (Table 5-2). Diversions also increased between 1950 and 1990, due to increased population, and decreased between 1990 and 2010, partially due to water conservation efforts.

Diversions fluctuate significantly from year to year due in part to fluctuating levels of precipitation (Figure 5-2). For instance, in 2012 precipitation was 8.76 inches, and total system demand was 156 gallons per capita per day (gpcd). In 2014, precipitation was 16.82 inches, and total system demand was 135 gpcd.

Demand from the LANL's operations also impacts the magnitude of diversions. Figure 5-3 shows the monthly variation in water use in 2014, with an annual diversion for LANL of 29 percent and 71 percent for the LACWU. While demand in summer months triples for the LACWU due to outdoor watering, the monthly range in water use by LANL varies less. In 2014, LANL used the greatest volume of water in November.



LOS ALAMOS COUNTY WATER PLAN

Historical Los Alamos County Water Diversions

Daniel B. Stephens & Associates, Inc.

2/23/17

Figure 5-1

Table 5-1. Annual Diversions from Groundwater and Surface Water Los Alamos County, 1947-2015 Page 1 of 4

	Annual Diversions (million gallons per year[a])										
	Groundwater					Surface Water					
Year	Los Alamos Well Field	Guaje Well Field	Pajarito Well Field	Otowi Well Field	Total	Water Canyon Gallery Spring	Los Alamos Reservoir	Guaje Reservoir	Camp May	Total	Total
1947	147	—	—	—	147	84	21.7	87.8	—	193.5	341
1948	264	—	—	—	264	97	21.9	119.8	—	238.7	503
1949	302	—	—	—	302	92	14.7	116.1	—	222.8	525
1950	547	3	—	—	550	54	20.6	79.9	—	154.5	705
1951	702	68	—	—	770	39	10.5	41	—	90.5	861
1952	448	350	—	—	798	48	33.6	131	—	212.6	1,011
1953	444	372	—	—	816	39	14.8	58	—	111.8	928
1954	380	374	—	—	754	40	16.9	66	—	122.9	877
1955	407	375	—	—	782	33	18.1	71	—	122.1	904
1956	437	506	—	—	943	23	4.8	24	—	51.8	995
1957	350	378	—	—	728	40	54.8	213	—	307.8	1,036
1958	372	395	—	—	767	60	49.4	193	—	302.4	1,069
1959	391	478	—	—	869	54	—	0	—	54	923
1960	530	533	—	—	1,063	48	—	—	—	48	1,111
1961	546	624	—	—	1,170	54	—	—	—	54	1,224
1962	577	597	—	—	1,174	67	—	—	—	67	1,241
1963	539	654	—	—	1,193	51	—	—	—	51	1,244
1964	627	665	—	—	1,292	45	—	—	—	45	1,337
1965	447	571	99	—	1,117	72	—	—	—	72	1,189
1966	450	613	127	—	1,190	82	—	—	—	82	1,272
1967	373	464	481	—	1,318	56	—	—	—	56	1,374
1968	345	474	584	—	1,403	65	—	—	—	65	1,468

Sources: Koch & Rogers, 2003 (1947-1998)
Los Alamos County Water Utility (1999-2015)

[a] 1 million gallons = 3.07 acre-feet

— = Not applicable (not yet installed or no longer used)

Table 5-1. Annual Diversions from Groundwater and Surface Water
Los Alamos County, 1947-2015
Page 2 of 4

Year	Annual Diversions (million gallons per year[a])										
	Groundwater					Surface Water					Total
	Los Alamos Well Field	Guaje Well Field	Pajarito Well Field	Otowi Well Field	Total	Water Canyon Gallery Spring	Los Alamos Reservoir	Guaje Reservoir	Camp May	Total	
1969	331	435	569	—	1,335	80	—	—	—	80	1,415
1970	360	423	595	—	1,378	65	—	—	—	65	1,443
1971	412	484	657	—	1,553	37	—	—	—	37	1,590
1972	380	467	662	—	1,509	40	—	5.8	—	45.8	1,555
1973	406	475	685	—	1,566	49	—	9.7	—	58.7	1,625
1974	369	453	802	—	1,624	35	—	4.9	—	39.9	1,664
1975	356	431	749	—	1,536	42	—	5.3	—	47.3	1,583
1976	343	531	817	—	1,691	41	—	4.4	—	45.4	1,736
1977	345	515	614	—	1,474	57	—	4.1	—	61.1	1,535
1978	302	444	690	—	1,436	45	—	2.8	—	47.8	1,484
1979	289	456	662	—	1,407	44	1.3	3.7	—	49	1,456
1980	339	485	743	—	1,567	32	2.3	4.7	—	39	1,606
1981	336	469	701	—	1,506	45	2.1	2.7	—	49.8	1,556
1982	317	422	773	—	1,512	46	2.8	3.4	—	52.2	1,564
1983	221	338	904	—	1,463	38	1.4	3.4	—	42.8	1,506
1984	326	460	780	—	1,566	34	1.3	3	—	38.3	1,604
1985	290	456	841	—	1,587	37	0.9	2.8	—	40.7	1,628
1986	179	460	858	—	1,497	28	1.5	2.4	—	31.9	1,529
1987	217	485	892	—	1,594	34	3.2	2.8	—	40	1,634
1988	158	477	824	—	1,459	34.5	1.4	2.4	—	38.3	1,497
1989	219	506	961	—	1,686	23	3.3	4.6	—	30.9	1,717
1990	187	532	923	—	1,642	9.3	4.6	2.2	—	16.1	1,658

Sources: Koch & Rogers, 2003 (1947-1998)
Los Alamos County Water Utility (1999-2015)

[a] 1 million gallons = 3.07 acre-feet

— = Not applicable (not yet installed or no longer used)

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Table 5-1. Annual Diversions from Groundwater and Surface Water
Los Alamos County, 1947-2015
Page 3 of 4

Year	Annual Diversions (million gallons per year[a])										
	Groundwater					Surface Water					Total
	Los Alamos Well Field	Guaje Well Field	Pajarito Well Field	Otowi Well Field	Total	Water Canyon Gallery Spring	Los Alamos Reservoir	Guaje Reservoir	Camp May	Total	
1991	125	502	820	—	1,447	12	2.4	1.5	—	15.9	1,463
1992	13	472	1,044	—	1,529	0.1	0	0	—	0.1	1,529
1993	—	298	876	284	1,458	6.4	0.5	0	—	6.9	1,465
1994	—	179	1,042	206	1,427	11.6	0	0	—	11.6	1,439
1995	—	230	1,126	0	1,356	1.6	1.6	0	—	3.2	1,359
1996	—	269	889	210	1,368	0	2.6	0	—	2.6	1,371
1997	—	272	798	216	1,286	0	2.4	0	—	2.4	1,288
1998	—	148	941	307	1,396	0	1.6	0	—	1.6	1,398
1999	—	323	800	209	1,331	0	2	0	—	2	1,333
2000	—	417	902	174	1,492	0	9.3	0	—	9.3	1,501
2001	—	269	785	389	1,443	0	0	0	—	0	1,443
2002	—	405	855	297	1,557	0	0	0	—	0	1,557
2003	—	430	855	273	1,558	0	0	0	—	0	1,558
2004	—	370	800	212	1,382	0	0	0	—	0	1,382
2005	—	303	814	276	1,393	0	0	0	—	0	1,393
2006	—	358	690	305	1,353	0	0	0	—	0	1,353
2007	—	373	750	245	1,368	0	0	0	—	0	1,368
2008	—	382	806	249	1,437	0	0	0	—	0	1,437
2009	—	389	680	312	1,381	0	0	0	—	0	1,381
2010	—	399	695	224	1,318	0	0	0	7.2	7.2	1,325
2011	—	364	767	294	1,425	0	0	0	0.6	0.6	1,426
2012	—	380	741	296	1,417	0	0	0	1.9	1.9	1,419

Sources: Koch & Rogers, 2003 (1947-1998)
Los Alamos County Water Utility (1999-2015)

[a] 1 million gallons = 3.07 acre-feet

— = Not applicable (not yet installed or no longer used)

Table 5-1. Annual Diversions from Groundwater and Surface Water
Los Alamos County, 1947-2015
Page 4 of 4

	Annual Diversions (million gallons per year[a])										
	Groundwater					Surface Water					
Year	Los Alamos Well Field	Guaje Well Field	Pajarito Well Field	Otowi Well Field	Total	Water Canyon Gallery Spring	Los Alamos Reservoir	Guaje Reservoir	Camp May	Total	Total
2013	—	290	689	258	1,237	0	0	0	1.3	1.3	1,238
2014	—	351	650	177	1,178	0	0	0	0.4	0.4	1,178
2015	—	298	647	148	1,093	0	0	0	12.3	12.3	1,105

Sources: Koch & Rogers, 2003 (1947-1998)
Los Alamos County Water Utility (1999-2015)

[a] 1 million gallons = 3.07 acre-feet

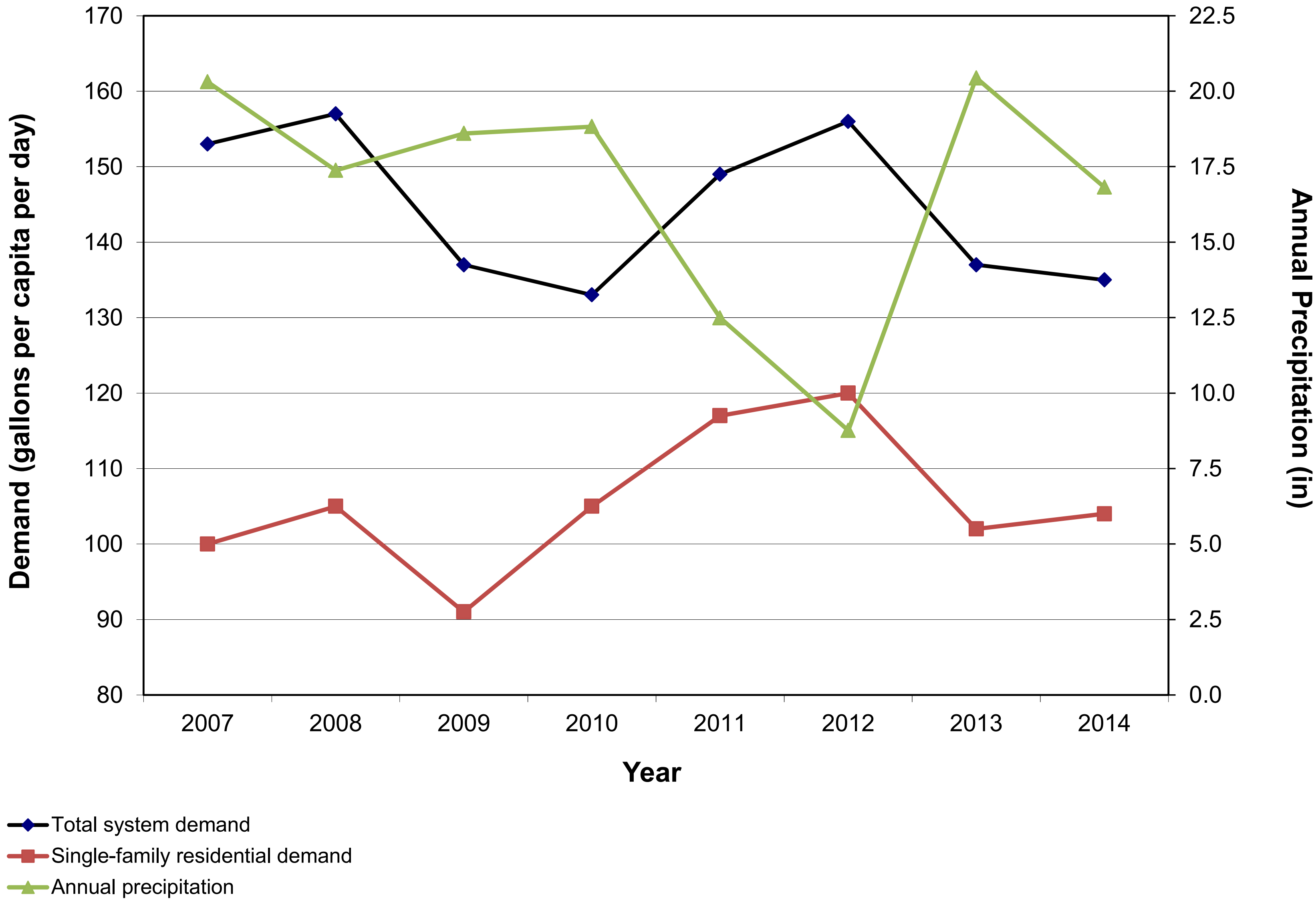
— = Not applicable (not yet installed or no longer used)

Table 5-2. Historical Diversions and Population for Los Alamos County 1950-2010

Year	Diversions (ac-ft/yr)			Population [a]	10-Year Growth Rate [b]
	Groundwater	Surface Water	Total		
1950	1,688	474	2,162	10,476	—
1960	3,262	147	3,410	13,037	24.4
1970	4,229	199	4,429	15,198	16.6
1980	4,809	120	4,929	17,599	15.8
1990	5,039	49	5,089	18,115	3.2
2000	4,580	29	4,608	18,343	1.0
2010	4,045	22	4,067	17,950	–2.1

[a] Source: U.S. Census Bureau, 1995, 2006, 2010
[b] Population growth over preceding decade

ac-ft/yr = Acre-feet per year
— = Not applicable



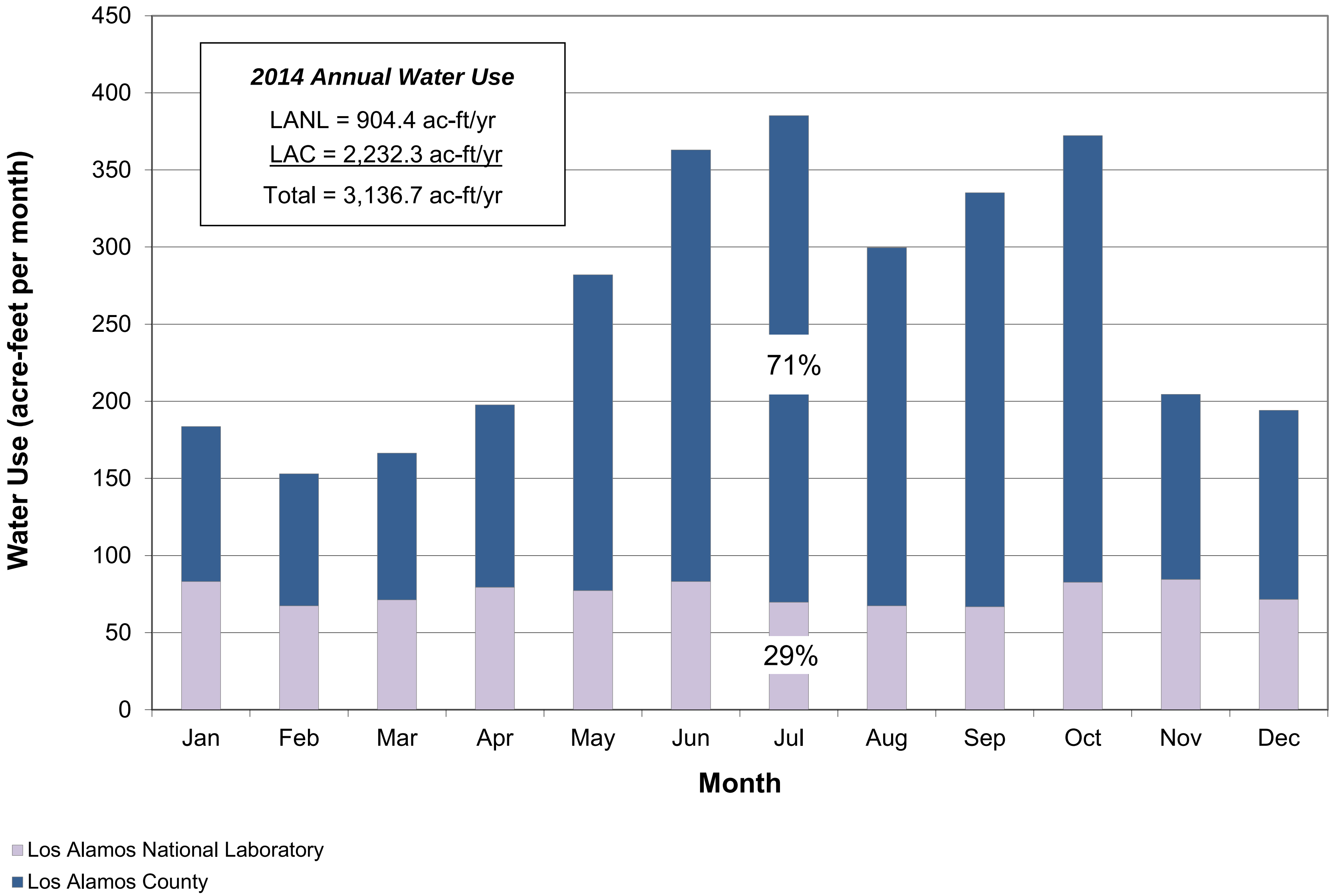
LOS ALAMOS COUNTY WATER PLAN

Per Capita Demand and Precipitation in Los Alamos County, 2007-2014

Daniel B. Stephens & Associates, Inc.

5/21/15

Figure 5-2



LOS ALAMOS COUNTY WATER PLAN

Monthly Water Use by Los Alamos County and Los Alamos National Laboratory in 2014

Daniel B. Stephens & Associates, Inc.

1/31/17

Figure 5-3

The LACWU has been using the GPCD (gallons per capita per day) calculator developed by the OSE to calculate per capita use since 2007. This allows the County to evaluate water use apart from the bulk water sales to LANL. The per capita values calculated for the total water system demand and by sector for 2007 through 2014 are presented on Table 5-3. Since 2007, total system water demand has ranged between 133 and 157 gallons per day. For the single-family residential sector, per capita demand has ranged between 91 and 120 gallons per day.

Table 5-3. Los Alamos County Daily Per Capita Demand

Year	Per Capita Demand (gpcd)			
	Sector			Annual System Total
	Single-Family Residential	Multi-Family Residential	Industrial, Commercial, and Institutional	
2007	100	55	32	153
2008	105	55	29	157
2009	91	51	26	137
2010	105	53	29	133
2011	117	59	31	149
2012	120	60	31	156
2013	102	56	22	137
2014	104	54	23	135

Sources: Los Alamos County (2007-2013 data)
LACWU, 2015 (2014 data)

gpcd = Gallons per capita per day

5.2 Current Water Use

The total population served by the LACWU includes the 17,950 residents estimated to live within Los Alamos County in 2010, primarily in the communities of White Rock and Los Alamos.

Table 5-4 shows the monthly and annual billing data by sector for 2010 through 2015. The total system water demand by LACWU (excluding LANL sales) was 135 gallons per day in 2014. In 2014, the per capita demand for the single-family residential sector was 104 gallons per day (Table 5-3). As shown in Figure 5-3, water use increases in the summer months for landscape watering.

Table 5-4. Billing Records by Sector, 2010-2015
Page 1 of 3

Month	Billing Data (gallons)				
	Single-Family Residential	Multi-Family Residential	Industrial, Commercial, and Institutional	Los Alamos National Laboratory	Total
2010					
January	18,752,000	8,024,000	9,104,000	27,669,780	63,549,780
February	15,770,000	7,433,000	7,799,000	31,723,200	62,725,200
March	21,188,000	8,360,000	10,450,000	47,397,810	87,395,810
April	13,929,000	9,019,000	6,432,000	19,740,800	49,120,800
May	42,197,000	9,868,000	18,551,000	50,069,470	120,685,470
June	77,716,000	15,101,000	27,480,000	27,979,260	148,276,260
July	69,237,000	15,132,000	25,641,000	41,127,820	151,137,820
August	55,788,000	11,015,000	25,345,000	39,362,040	131,510,040
September	47,968,000	13,423,000	21,939,000	32,726,930	116,056,930
October	51,155,000	10,220,000	22,262,000	30,883,230	114,520,230
November	26,682,000	7,499,000	9,698,000	30,988,209	74,867,209
December	24,830,000	8,641,000	9,943,000	33,087,840	76,501,840
Total	465,212,000	123,735,000	194,644,000	412,756,389	1,196,347,389
2011					
January	19,011,000	8,290,000	7,881,000	30,941,680	66,123,680
February	16,908,000	7,558,000	7,201,000	32,069,010	63,736,010
March	23,571,000	9,499,000	6,768,000	31,559,390	71,397,390
April	27,385,000	9,634,000	7,613,000	32,417,950	77,049,950
May	50,605,000	12,940,000	18,041,000	41,797,130	123,383,130
June	64,440,000	16,456,000	30,624,000	47,764,100	159,284,100
July	101,524,000	19,854,000	29,846,000	41,386,960	192,610,960
August	77,689,000	14,812,000	40,891,000	39,369,280	172,761,280
September	48,319,000	11,611,000	23,745,000	34,507,460	118,182,460
October	37,970,000	10,142,000	18,087,000	31,195,970	97,394,970
November	25,065,000	8,216,000	9,923,000	32,784,870	75,988,870
December	19,800,000	8,600,000	9,024,000	30,914,740	68,338,740
Total	512,287,000	137,612,000	209,644,000	426,708,540	1,286,251,540
2012					
January	18,147,000	8,299,000	10,593,833	33,976,790	71,016,623
February	14,030,000	8,073,000	7,076,400	31,111,040	60,290,440
March	23,042,000	8,067,000	9,187,400	30,945,380	71,241,780
April	22,091,000	8,719,000	8,954,700	30,361,480	70,126,180
May	57,004,000	12,862,000	18,249,900	35,650,090	123,765,990
June	78,009,000	18,041,000	30,796,500	39,560,560	166,407,060
July	82,714,000	16,927,000	29,577,700	41,969,120	171,187,820

Table 5-4. Billing Records by Sector, 2010-2015
Page 2 of 3

Month	Billing Data (gallons)				
	Single-Family Residential	Multi-Family Residential	Industrial, Commercial, and Institutional	Los Alamos National Laboratory	Total
2012 (cont.)					
August	68,750,000	15,062,000	27,941,000	44,359,720	156,112,720
September	55,520,000	12,787,000	22,721,700	41,365,310	132,394,010
October	53,003,000	10,517,000	19,666,183	43,986,330	127,172,513
November	29,417,800	9,102,000	11,291,717	31,005,310	80,816,827
December	22,877,590	8,181,000	8,067,200	34,763,240	73,889,030
Total	524,605,390	136,637,000	204,124,233	439,054,370	1,304,420,993
2013					
January	20,496,000	7,974,000	11,195,000	34,157,620	73,822,620
February	16,225,000	7,681,000	6,861,000	29,673,620	60,440,620
March	16,579,000	8,887,000	5,947,000	30,484,280	61,897,280
April	28,921,000	8,942,000	6,842,000	25,629,270	70,334,270
May	51,390,000	13,204,000	13,745,000	26,420,100	104,759,100
June	76,121,000	16,515,000	20,696,000	28,455,360	141,787,360
July	71,977,000	13,641,000	22,750,000	36,036,030	144,404,030
August	52,219,000	12,688,000	17,920,000	35,773,540	118,600,540
September	48,435,000	12,201,000	19,144,000	31,803,760	111,583,760
October	35,013,000	8,710,000	12,683,000	30,889,410	87,295,410
November	20,597,000	7,141,000	7,706,000	30,907,190	66,351,190
December	15,939,000	8,099,000	5,703,000	29,549,140	59,290,140
Total	453,912,000	125,683,000	151,192,000	369,779,320	1,100,566,320
2014					
January	18,284,000	7,392,000	7,070,000	27,111,050	59,857,050
February	15,516,000	7,159,000	5,201,000	21,960,230	49,836,230
March	18,537,000	7,145,000	5,323,000	23,225,500	54,230,500
April	21,927,000	9,044,000	7,550,000	25,888,920	64,409,920
May	40,100,000	11,090,000	15,510,000	25,202,260	91,902,260
June	58,293,000	13,459,000	19,464,000	27,072,730	118,288,730
July	64,336,000	14,653,000	23,832,000	22,706,380	125,527,380
August	50,511,000	9,968,000	15,201,000	21,943,590	97,623,590
September	55,548,000	12,674,000	19,231,000	21,759,250	109,212,250
October	67,465,000	10,317,000	16,561,000	26,957,850	121,300,850
November	22,535,000	7,762,000	8,767,000	27,556,690	66,620,690
December	24,325,000	7,653,000	7,978,000	23,331,140	63,287,140
Total	457,377,000	118,316,000	151,688,000	294,715,590	1,022,096,590

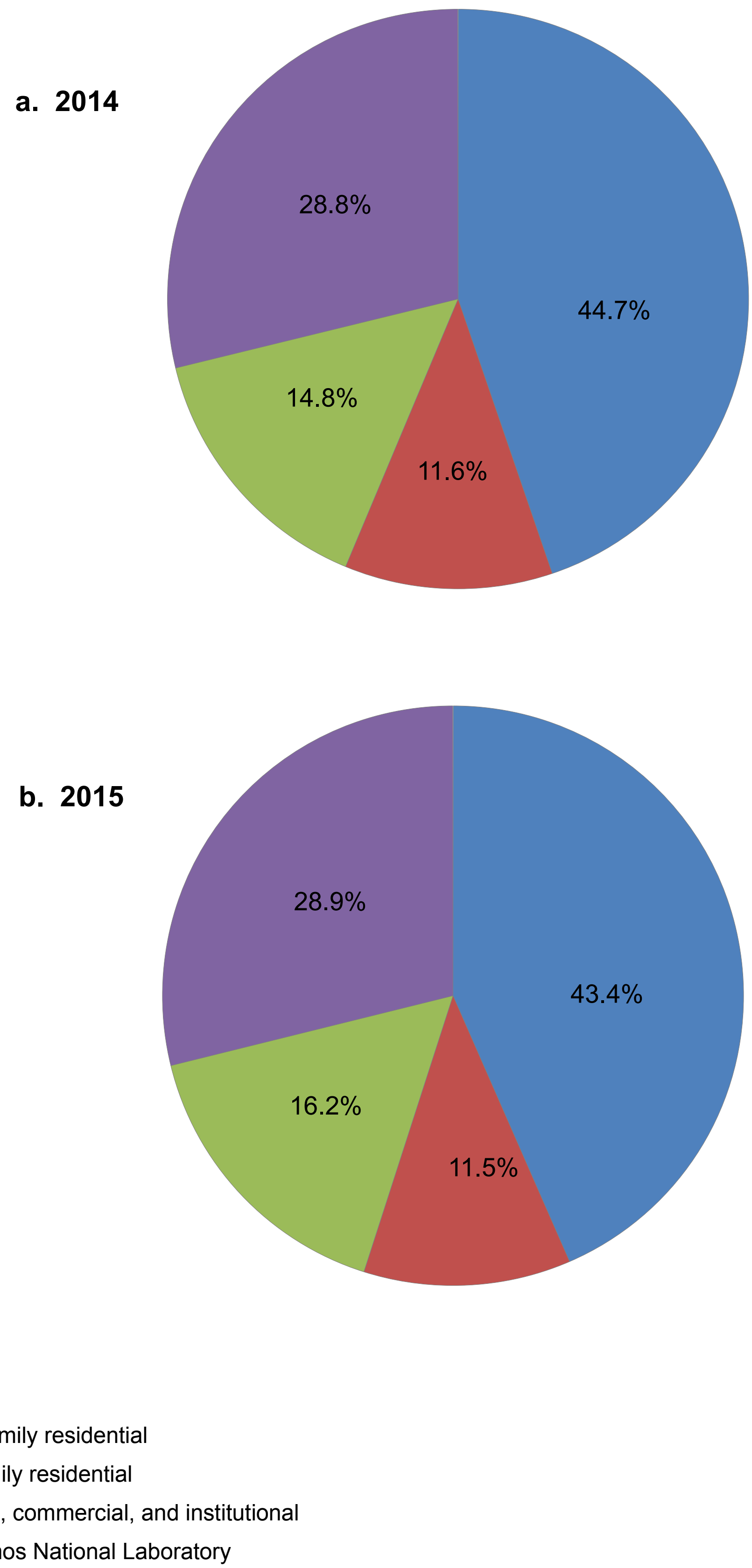
Table 5-4. Billing Records by Sector, 2010-2015
Page 3 of 3

Month	Billing Data (gallons)				
	Single-Family Residential	Multi-Family Residential	Industrial, Commercial, and Institutional	Los Alamos National Laboratory	Total
2015					
January	18,403,570	8,220,800	6,757,990	26,171,490	59,553,850
February	14,877,600	6,179,000	5,407,479	17,246,620	43,710,699
March	16,133,700	7,133,300	6,401,700	18,442,090	48,110,790
April	22,074,600	7,786,100	9,556,600	17,205,510	56,622,810
May	30,609,300	8,806,100	14,576,391	17,378,210	71,370,001
June	55,658,420	10,263,300	18,194,264	17,004,930	101,120,914
July	51,318,980	11,423,700	19,425,160	31,891,120	114,058,960
August	40,413,330	9,562,400	13,966,707	14,443,150	78,385,587
September	48,407,030	11,413,369	20,191,581	26,247,120	106,259,100
October	50,709,951	10,188,972	18,210,788	28,905,780	108,015,491
November	23,676,649	6,913,362	9,130,233	25,658,300	65,378,544
December	27,276,540	8,039,800	6,992,101	24,953,020	67,261,461
Total	399,559,670	105,930,203	148,810,994	265,547,340	919,848,207

In 2014, single-family residential water use accounted for 44.7 percent of LACWU water use (excluding LANL), and multi-family residential water use accounted for 11.6 percent of LACWU water use. Industrial, commercial, and institutional water use accounted for 14.8 percent of the LACWU's water use, with LANL sales accounting for 28.8 percent of the billed totals (Figure 5-4a). In 2015, single-family residential water use accounted for 43.4 percent of LACWU water use (excluding LANL), and multi-family residential water use accounted for 11.5 percent of LACWU water use. Industrial, commercial, and institutional water use accounted for 16.2 percent of the LACWU's water use, with LANL sales accounting for 28.9 percent of the billed totals (Figure 5-4b).

Comparing the billed totals (Table 5-4) to total diversions (Table 5-1), there was a total of 156 million gallons of non-revenue water in 2014 and 185 million gallons of non-revenue water in 2015. Non-revenue water can include unmetered deliveries, leaking pipes in the delivery system, and periodic flushing of the system. The LACWU has performed a water audit following the International Water Association/American Water Works Association (IWA/AWWA) water audit methodology using data for fiscal year 2014 (Table 5-5). This analysis found a total of 86.4 million gallons in non-revenue water (LACWU, 2015). (The large discrepancy between the two results may be due to the different time periods, that is, calendar versus fiscal years).

Indoor watering is estimated as the average water demand for December, January, and February. Comparing the average summer (June, July, and August) and winter demands for the single-family residential sector in 2014, approximately 66 percent of the average summer demand was used outdoors, with the remaining 34 percent used indoors. Comparing the average summer and winter demands for the multi-family residential sector in 2014, approximately 42 percent of the average summer demand was used outdoors and 58 percent was used indoors. Comparing the average summer and winter demands for the single-family residential sector in 2015, approximately 59 percent of the average summer demand was used outdoors, with the remaining 41 percent used indoors. For the multi-family residential sector in 2015, approximately 28 percent of the average summer demand was used outdoors and 72 percent was used indoors.



LOS ALAMOS COUNTY WATER PLAN

Water Demand by Customer Class in 2014 and 2015

Figure 5-4

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**Table 5-5. Comprehensive Water Audit Balance for Los Alamos County
July 1, 2013 through June 30, 2014**

Item	Amount	
	Gallons	% of Total
Water Production		
1a. Metered production	1,138,000,000	
1b. Production meter error [a]	0	
1c. Exported water (LANL)	368,000,000	
1d. Adjusted production	***770,000,000***	***100***
Authorized Consumption		
2. Billed metered	683,636,000	88.78
3. Billed unmetered	0	0.00
4. Unbilled metered	0	0.00
5. Unbilled unmetered	9,625,000	1.25
6. Total authorized consumption	***693,261,000***	***90.03***
Water Losses		
7. Water supplied - authorized consumption	***76,739,000***	***9.97***
Apparent Losses		
8. Unauthorized consumption [b]	1,925,000	0.25
9. Customer metering inaccuracies [c]	42,092,000	5.47
10. Systematic data handling errors [d]	1,709,000	0.22
11. Total apparent losses	***45,726,000***	***5.94***
Real Losses		
12. Water losses - apparent losses	***31,013,000***	***4.03***
Non-Revenue Water		
4. Unbilled metered	*0*	*0.00*
5. Unbilled unmetered	9,625,000	1.25
7. Water losses	76,739,000	9.97
13. Total non-revenue water	***86,364,000***	***11.20***

Source: LACWU, 2015
[a] The production total has not been adjusted to account for production meter error.
[b] Unauthorized consumption was calculated by the AWWA software, using the default percentage option (0.25% of the adjusted production).
[c] The AWWA software requires a value be entered that is <10% for customer metering inaccuracies. The value entered was selected by LAC.
[d] Systematic data handling errors were calculated by the AWWA software, using the default percentage option (0.25% of the billed metered volume).

For more than 70 years, Los Alamos County has used treated wastewater to irrigate turf for a golf course and parks during summer months. The golf course built in Los Alamos in the 1940s has never been irrigated with anything but effluent. As discussed in Section 2, the LACWU has a non-potable water system that uses treated wastewater effluent for irrigation of several areas in Los Alamos and White Rock, for fire protection, and for snow making at the Pajarito Mountain Ski Area. Table 5-6 shows the monthly volume of treated effluent that was reused in 2010 through 2015; almost 72 million gallons was reused in 2015.

Table 5-6. Water Reuse, 2010-2015

Month	Reuse (gallons)					
	2010	2011	2012	2013	2014	2015
January	81,600	104,800	0	0	0	0
February	107,100	96,900	0	0	1,012,477	0
March	145,200	7,369,900	5,638,165	3,867,063	4,544,270	2,311,815
April	11,178,612	14,612,700	9,032,844	11,552,192	7,256,932	10,895,334
May	11,427,200	19,023,600	17,904,886	20,165,106	14,125,782	5,531,325
June	23,262,400	22,388,800	24,743,657	21,739,135	18,148,354	14,975,357
July	12,140,000	21,091,000	16,050,773	9,850,279	8,197,735	2,916,420
August	5,531,600	7,950,983	18,097,000	10,504,260	12,815,537	12,186,453
September	18,847,100	4,660,344	13,174,880	7,470,298	16,036,338	16,723,354
October	8,367,300	6,392,581	11,028,777	6,106,035	7,517,914	6,133,506
November	249,300	1,293,627	4,256,322	876,738	1,651,125	321,250
December	126,800	0	0	0	0	77
Total	91,464,212	104,985,235	119,927,304	92,131,106	91,306,464	71,994,891
Total (acre-feet)	281	322	368	283	280	221

5.3 Population Projections

The Bureau of Business and Economic Research (BBER) at the University of New Mexico has prepared multiple population projections for Los Alamos County, by examining the growth rate in the previous decades, the age of the population, current rates of in-migration, and death and birth rates (BBER, 1996, 2000). Because Los Alamos County's growth rate slowed significantly in the 1980s and 1990s, the 1996 and 2000 projections for growth were very small, showing an increase of only about 3,000 people (Table 5-7). The previous long-range water supply plan

(DBS&A, 2006) presented the BBER projections, but did not use them to project demand, because they did not take recent land transfers and plans for growth into account. Instead, the 2006 projections were based on the growth scenario identified in the August 2004 New Mexico First Town Hall (Fruth, 2004), which showed that a full build-out could occur rapidly, increasing the population to 25,000 people in 2020 (Table 5-7). Contrary to these projections, the population in Los Alamos County actually declined between 2000 and 2010 (Table 5-2), largely due to a reduction in the work force at LANL.

Table 5-7. Population Projections for Los Alamos County 2000 through 2060

Year	Population Census	BBER (1996)	BBER (2000) [a]	Fruth (2004)	BBER (2012)	2014 Population Projections [b]	
						Low	High
2000	18,343	19,317	19,234	18,359	—	—	—
2004	18,796	19,647	19,505	18,796	—	—	—
2005	18,407	19,729	19,573	19,189	—	—	—
2010	17,950	20,123	19,913	21,155	—	—	—
2015	NA	20,601	20,318	23,120	—	—	—
2020	NA	21,079	20,722	25,086	18,063	17,988	20,000
2030	NA	21,758	21,289	—	17,880	17,789	20,812
2040	NA	22,141	21,627	—	17,210	17,123	21,447
2050	NA	22,291	21,761	—	—	16,480	21,874
2060	NA	22,404	21,854	—	—	15,863	22,092

[a] Based on BBER's (2000) "most likely" scenario
[b] Poster Enterprises, 2014

— = Population not estimated for this decade
NA = Not yet available

The State of New Mexico prepared updates of the 16 regional water plans that were published in 2016, and population projections were prepared by a market research consultant as a part of this effort (Poster Enterprises, 2014). BBER released new population projections in November 2012 that project population by decade through 2040, and these projections were extended by the ISC market research consultant in 10-year increments through 2060 using the BBER growth rate trends as a basis for the extensions. Interviews were conducted to obtain input on growth trends and potential water conservation measures, with the feedback being used to refine the projections. Two population projections were developed for Los Alamos County, with the high forecast assuming that the County's goal of a population of 20,000 is achieved in 2020, with a very low rate of growth thereafter, and the low forecast closely tracking the BBER projections (Table 5-7).

The high and low population projections that have been developed for Los Alamos County as part of the regional water planning effort have been used as the basis for projecting demand as part of the updated long-range water supply plan. In addition, a separate water demand forecast was obtained from LANL (Table 5-8). There is considerable uncertainty in developing forecasts for LANL over a 40-year horizon, because its mission and size is dependent on political and national security decisions that could result in a wide range of possible activity.

Table 5-8. Los Alamos National Laboratory 10-Year Water Forecast

Fiscal Year	Estimated Annual Consumption (gallons)	Water Demand [a] (acre-feet)
2017	254,610,000	781
2018	262,160,000	805
2019	268,950,000	825
2020	299,110,000	918
2021	363,180,000	1,115
2022	380,760,000	1,169
2023	387,690,000	1,190
2024	389,650,000	1,196
2025	411,700,000	1,263
2026	482,980,000	1,482
2027	490,510,000	1,505

Source: Ballesteros Rodriguez, 2016
[a] The LACWU provides the LANL water supply, so these demands have been included on Table 5-9.

A conceptual master plan has been developed for a new development that is planned in White Rock (Baer, 2016). The A-19 tract development will have a maximum residential density of 8.7 dwelling units per acre, and a total of 160 dwelling units are proposed (Baer, 2016). This will be a private development, although the potential buyer is still in due diligence and the property still belongs to the County (Baer, 2016). The proposed A-19 tract development was not called out specifically in the ISC population projections; however, the high population projection will account for this growth. The 2010 Census reported a County population of 17,950 people and an average household size of 2.33 people (U.S. Census Bureau, 2010). Adding 160 dwelling units would add approximately 370 people, which is within the 20,000-person high projection for 2020.

5.4 Future Water Demand

DBS&A developed two projections of future water demand for the LACWU for 2020 through 2060. The projections are based on (1) the population projections developed as a part of the State of New Mexico's regional water plan update project (Poster Enterprises, 2014), (2) the total water system per capita demand for 2014 (LACWU, 2015), and (3) a separate water demand forecast that was provided by LANL (Ballesteros Rodriguez, 2016). The demand projections are shown on Table 5-9 and Figures 5-5 and 5-6. Total projected demand ranges between 3,634 and 4,841 ac-ft/yr, with the low projection showing an increase in demand between 2020 and 2030 and decreasing demand between 2030 and 2060, and the high projection showing increasing demands throughout the 40-year time frame.

The previous long-range water supply plan recommended an initial minimum goal of a 12 percent reduction in water demand (DBS&A, 2006). This was one of the long-term goals developed for the LACWU's fiscal year 2013 planning, and it was approved by the Utility Board on September 18, 2013 (Alarid, 2015). Comparing the 2006 water diversions to the more current data, this goal was met by 2014 (Table 5-1), when total diversions were 13 percent less than in 2006. Los Alamos County has a robust water conservation program (Section 8) and recently published an update to the *Energy and Water Conservation Plan* (LACWU, 2015). Further reductions in per capita demand are expected; however, to help compensate for the uncertainty of the LANL projections and ensure that the County plans for adequate future supply, further reductions in demand that may result from conservation have not been incorporated into the water demand projections that are shown on Table 5-9 and Figures 5-5 and 5-6.

LANL provided a 10-year water demand forecast, spanning the period of fiscal year 2017 to 2027 (Table 5-8). For the projections beyond 2027, to 2060, LANL demand was assumed to remain at the fiscal year 2027 volume.

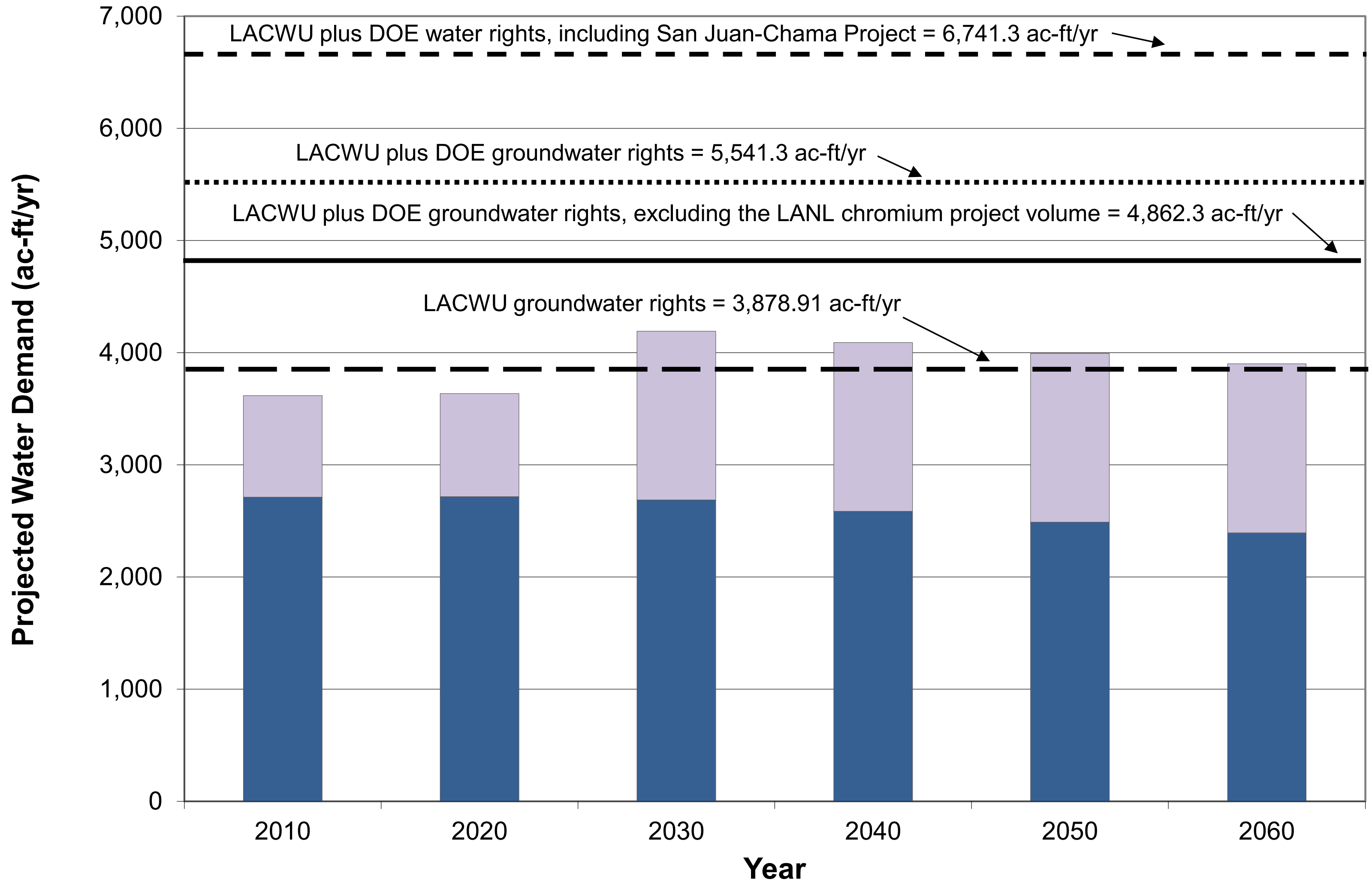
Table 5-9. Projected LACWU-Supplied Water Demand, 2020-2060

Year	Population Projection [a]		Projected Per Capita Demand [b] (ac-ft/yr)	2014 Total Diversions (ac-ft/yr)	2014 Water Sales (ac-ft/yr)		Projected demand [c] (ac-ft/yr)		LANL Water demand forecast [d] (ac-ft/yr)	Total projected demand [e] (ac-ft/yr)	
	Low	High			LACWU [c]	LANL	Low Projection	High Projection		Low Projection	High Projection
2010	17,950 [f]		0.151	3,616	2,232	904	—	—	—	—	—
2020	17,988	20,000	0.151	—	—	—	2,716	3,020	918	3,634	3,938
2030	17,789	20,812	0.151	—	—	—	2,686	3,143	1,505	4,191	4,648
2040	17,123	21,447	0.151	—	—	—	2,586	3,239	1,505	4,091	4,744
2050	16,480	21,874	0.151	—	—	—	2,488	3,303	1,505	3,993	4,808
2060	15,863	22,092	0.151	—	—	—	2,395	3,336	1,505	3,900	4,841

[a] Poster Enterprises, 2014
[b] Equivalent to 135 gpcd (the 2014 total water system per capita demand)
[c] Excluding LANL demands
[d] Ballesteros Rodriguez, 2016 (through fiscal year 2027; projections held constant beyond 2030)
[e] Including LANL demands, but not including the demand for the LANL chromium plume control and characterization project (679 ac-ft/yr; U.S. DOE and LACWU, 2016)
[f] Actual U.S. Census population

ac-ft/yr = Acre-feet per year
LACWU = Los Alamos County Water Utility
LANL = Los Alamos National Laboratory

— = Not applicable



Note: See Section 4.1.1 for a discussion of water rights ownership and leasing.

LOS ALAMOS COUNTY WATER PLAN

Projected Water Demand Under the Low Water Use Projection

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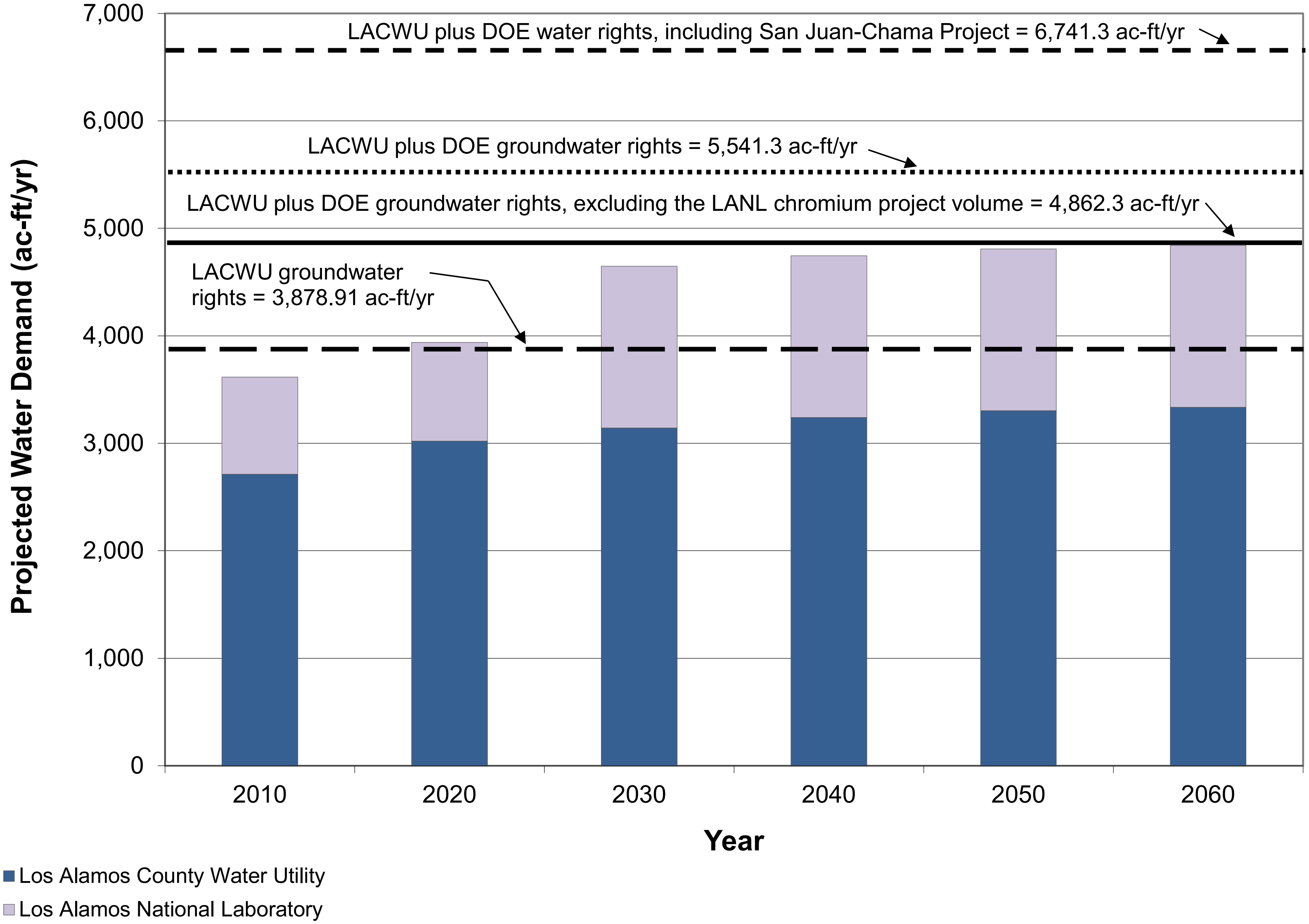
Figure 5-5



Note: See Section 4.1.1 for a discussion of water rights ownership and leasing.

LOS ALAMOS COUNTY WATER PLAN

Projected Water Demand Under the High Water Use Projection

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Figure 5-6

LANL also provided projections for the volume of water to be pumped as part of the chromium interim measure project. As discussed in Section 4.1.1, an application for permit to change an existing water right was filed jointly by DOE and the LACWU in May 2016, in support of the chromium interim measure project that will run through December 2023 (Rodriguez, 2016), and emergency authorization was received on September 10, 2016 (NMOSE, 2016). The volume of water for this application is 679 ac-ft/yr (U.S. DOE and LACWU, 2016). In the absence of any estimates for the volume of water that will be needed to support the future chromium remediation project, the chromium interim measure volume is assumed to be needed through 2060. This volume has not been included in the water demand projections (Table 5-9), as the water will be pumped separately and will not be supplied by the LACWU. Figures 5-5 and 5-6 present the low and high water demand projections and illustrate the LACWU and DOE water rights volumes including and excluding the volume needed for the chromium interim measure project. The projections assume that the water supply remains available in terms of water rights and contamination, and do not take into account the possibility of treating and using contaminated groundwater, which would be possible (with public support).

Table 5-10 presents a range in conservation savings that could be achieved with further reductions in the LACWU's 2014 per capita demand of 135 gpcd, ranging from a 5-gpcd savings to a 45-gpcd savings (the reduction necessary to match the City of Santa Fe's 2015 per capita value of 90 gpcd). Achieving the City of Santa Fe's 2015 per capita value would be equivalent to a water conservation savings of between 800 and 1,114 acre-feet per year, based on the population projections for 2060.

Table 5-10. Potential Water Conservation Savings

Per Capita Water Use (gpcd)	Reduction from 2014 Per Capita Use (%)	Annual Conservation Savings	
		Low Population Projection (acre-feet) a	High Population Projection (acre-feet) a
130	4	89	124
120	11	267	371
110	19	444	619
100	26	622	866
90 [b]	33	800	1,114

[a] Annual water conservation savings that would be achieved based on reductions from the 2014 per capita value of 135 gallons per day in 2060.
[b] This value is equivalent to the City of Santa Fe's per capita demand in 2015.

Figures 5-7 and 5-8 show low and high water demand projections, assuming that the LACWU water demands are reduced in the future due to conservation (the LANL water demands remain unchanged). Table 5-11 shows the data that are plotted on Figures 5-7 and 5-8. The same low and high population projections that are used for Figures 5-5 and 5-6 have been used for both scenarios, but the per capita demand is assumed to be reduced from 135 gpcd (the 2014 value) to 130 gpcd by 2030, 120 gpcd by 2040, 110 gpcd by 2050, and 100 gpcd by 2060.

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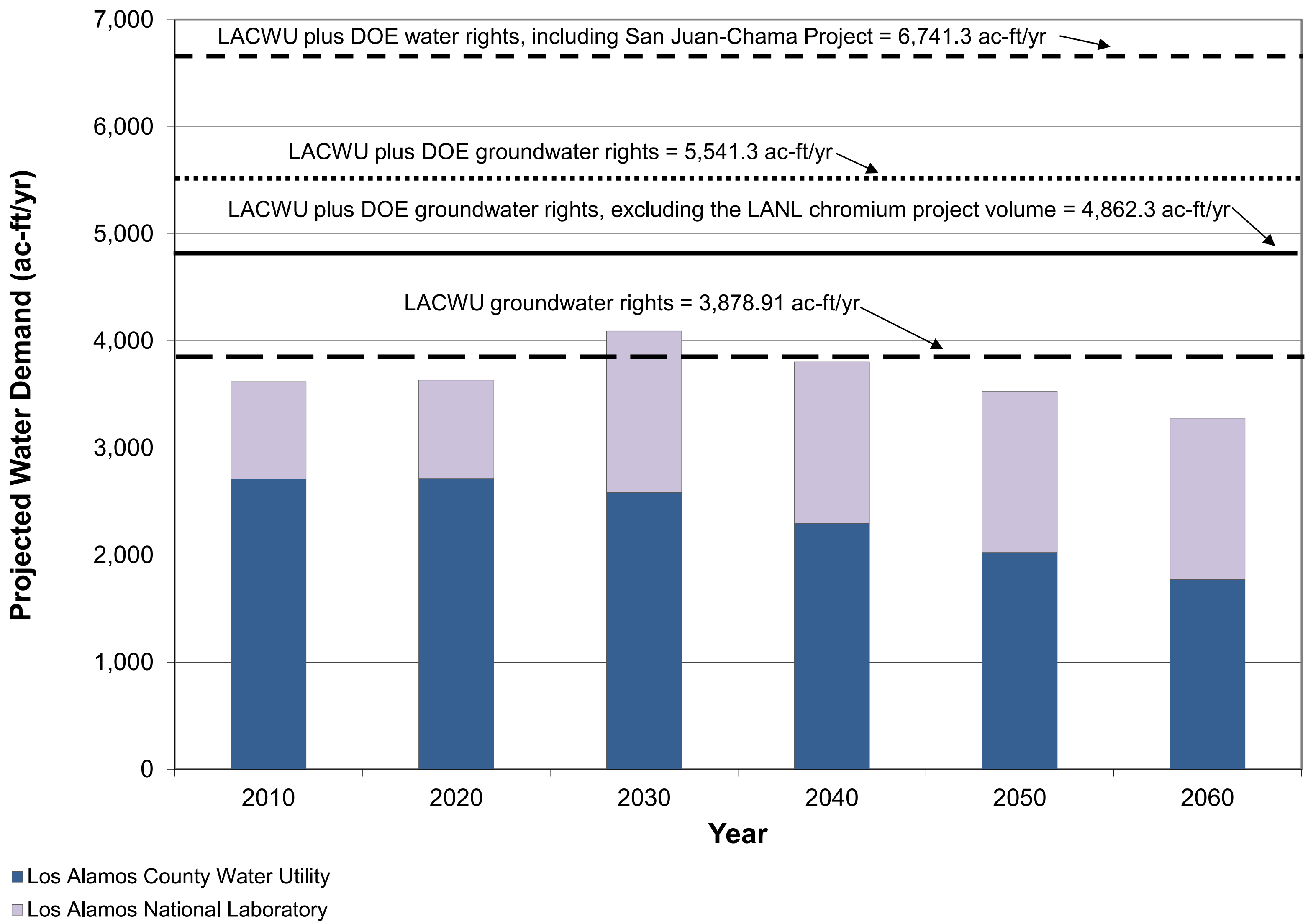

Notes: 1. Per capita demand assumed to be reduced over time due to water conservation.
2. See Section 4.1.1 for a discussion of water rights ownership and leasing.

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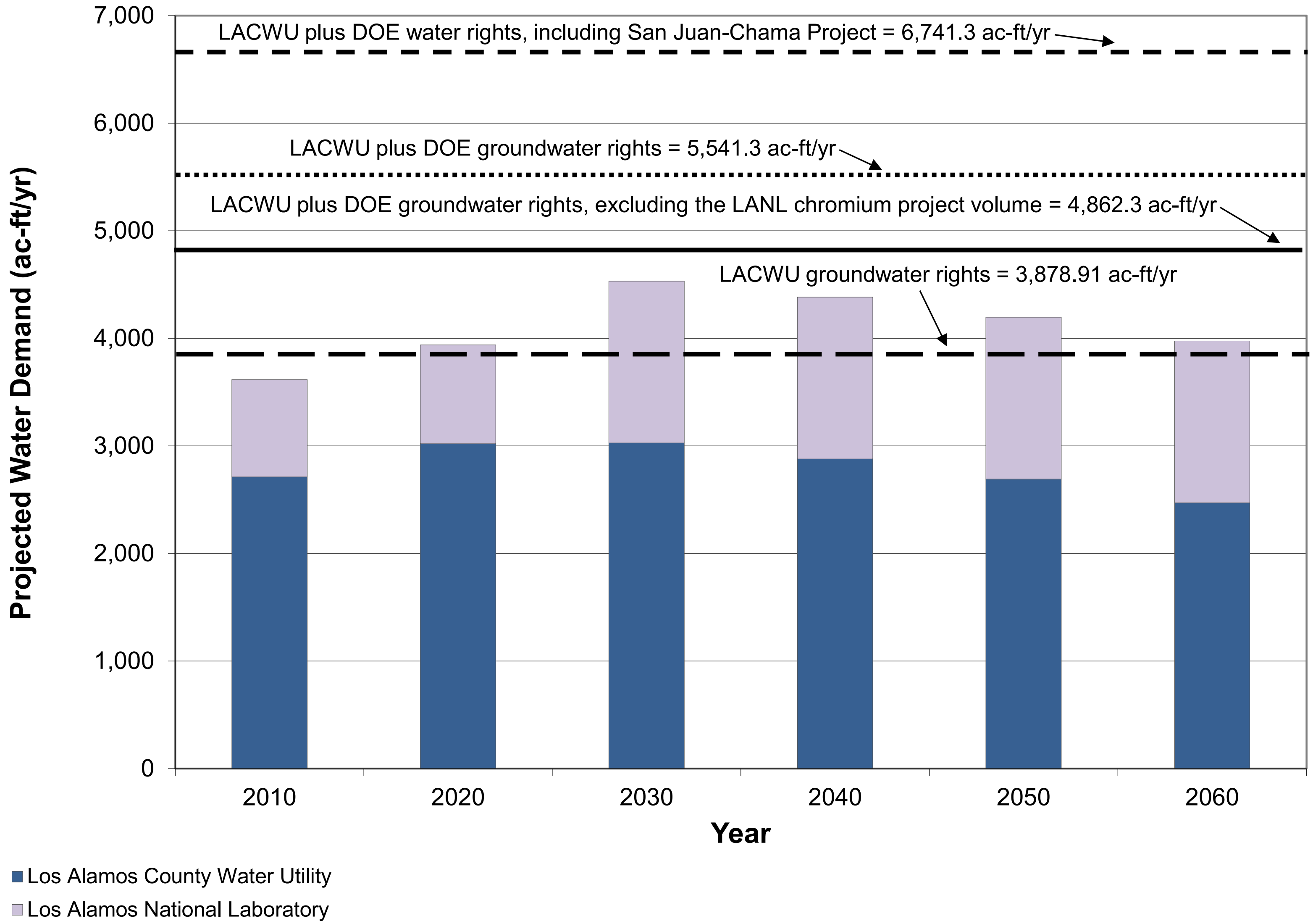
LOS ALAMOS COUNTY WATER PLAN
Projected Water Demand Under the Low Water Use Projection with Reduced Per Capita Demand

Figure 5-7



Notes:
1. Per capita demand assumed to be reduced over time due to water conservation.
2. See Section 4.1.1 for a discussion of water rights ownership and leasing.

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LOS ALAMOS COUNTY WATER PLAN

Projected Water Demand Under the High Water Use Projection with Reduced Per Capita Demand

Figure 5-8

Table 5-11. Projected LACWU Supplied Water Demand Assuming Decreased Demand Due to Water Conservation, 2020-2060

Year	Per Capita Water Demand Used to Calculate LACWU Demand (gpcd)	Low Demand Scenario (ac-ft/yr)			High Demand Scenario (ac-ft/yr)			LANL Projected Demand (ac-ft/yr)
		LACWU Projected Demand	Potential Conservation Savings	LACWU Projected Demand with Conservation	LACWU Projected Demand	Potential Conservation Savings	LACWU Projected Demand with Conservation	
2010 [a]	135	2,712	—	2,712	2,712	—	2,712	904
2020	135	2,716	0	2,716	3,020	0	3,020	918
2030	130	2,686	100	2,586	3,143	117	3,026	1,505
2040	120	2,586	288	2,298	3,239	360	2,879	1,505
2050	110	2,488	461	2,027	3,303	613	2,690	1,505
2060	100	2,395	622	1,773	3,336	866	2,470	1,505

[a] Actual values

gpcd = Gallons per capita per day
ac-ft/yr = Acre-feet per year
LACWU = Los Alamos County Water Utility
LANL = Los Alamos National Laboratory
— = Not applicable

6. Reconciliation of Supply with Demand

To ensure that adequate water resources are available to meet future demands, the LACWU must take into consideration the quantity of supply available, limitations to the supply due to water quality concerns, and the legal ability to use the available supply (water rights).

The physical water supply is discussed in detail in Section 3. Given the amount of water in storage and the large saturated thickness in relation to observed rates of water level decline, and assuming that the LACWU remains the primary diverter in the area, the LACWU is expected to have an adequate quantity of supply to meet the projected demands over a 40-year time frame. Wells may need to be replaced or moved to new locations, but it is expected that the available supply somewhere in the vicinity of Los Alamos will be adequate to fulfill the LACWU's existing water rights. Ongoing monitoring of water levels and aquifer testing is recommended to confirm that threats to water supply do not develop.

As discussed in Section 3.2.2, there is some risk to the supply due to contamination, and if the LACWU's supply wells were to be impacted, they could become unusable over the 40-year plan horizon (without treatment). The hexavalent chromium plume near several supply wells will continue to be monitored as the interim measure is implemented, and the presence of this contamination highlights why contingency planning for potential impacts to water supply wells is important.

If contaminant levels exceed applicable standards in any supply well, the LACWU could potentially redrill the well in an alternate location and continue to pump the same volume, provided that the transfer of the diversion point is approved by the OSE. Potential locations for replacement wells have not been identified, but the best locations would be upgradient from contaminant sources, accessible to existing water supply infrastructure, in productive zones, and separate from the influence of other pumping wells. The LACWU filed an application for an additional point of diversion (Otowi Well No. 2) on April 28, 2016. This well will be drilled to supplement the system's existing production wells in anticipation of declining production rates from existing wells that are nearing the end of their service life (Alarid, 2016), rather than as a replacement well for any future contamination of well(s) that could occur.

As discussed in Section 4.1.1, DOE owns 30 percent (1,662.39 ac-ft/yr) of the total groundwater rights (5,541.3 ac-ft/yr), and the long-term lease that was in place for LACWU to use these water rights expired in 2011. A portion of the volume of the DOE-owned water rights (679 ac-ft/yr) will be used for the chromium interim measure project; however, the LACWU is pursuing a lease for the full DOE-owned water rights volume (1,662.39 ac-ft/yr). The lease is not yet in place. If DOE declines to lease their water rights to the LACWU, the groundwater rights volume that the LACWU has access to will be reduced to 3,878.91 ac-ft/yr.

The LACWU-owned groundwater rights volume (3,878.91 ac-ft/yr) is not adequate to meet the LACWU plus LANL low-water-use projections for 2030, 2040, 2050, or 2060, but the 2020 low-water-use projections can be met with this volume (Figure 5-5). The LACWU-owned groundwater rights volume is not adequate to meet any of the LACWU plus LANL high-water-use projections (Figure 5-6). With increased conservation in the amounts shown on Table 5-11, the LACWU-owned groundwater rights volume is not adequate to meet the LACWU plus LANL low-water-use projections for 2030, but the 2020, 2040, 2050, and 2060 low-water-use projections can be met with this volume (Figure 5-7). With increased conservation, the LACWU-owned groundwater rights volume is not adequate to meet any of the LACWU plus LANL high-water-use projections (Figure 5-8). In the event that the remaining DOE water rights are not leased to the LACWU, the LACWU continues to be the sole water provider for LANL, and the high population projections are realized, even with significant additional conservation the LACWU will need to implement a project to bring their San Juan-Chama Project water online. Additional discussion of contaminant and water rights risks is presented in Sections 3.2.3 and 4.3, and recommendations for responding to these risks are discussed in Section 9.

As discussed in Section 5.4, both low- and high-water-use projections were developed based on LACWU and LANL growth projections made for the current regional water plan updates. To evaluate the gap between the projected demands and the available supply, two scenarios were considered, as discussed in Sections 6.1 and 6.2.

6.1 Scenario 1: Low-Water-Use Projection and Supply Available to Fulfill Water Rights

The total (LACWU plus LANL) projected water use under the low-water-use scenario is estimated to increase from the actual 2010 water demand of 3,616 ac-ft/yr to 3,634 ac-ft/yr in 2020 and 4,191 ac-ft/yr in 2030 and then decrease to 3,900 ac-ft/yr by 2060 (Table 5-9, Figure 5-5). In this scenario, total projected demand can be met by the existing groundwater rights, assuming that the LACWU will lease the DOE groundwater rights. The total low-water-use projections are less than the volume of LACWU- and DOE-owned groundwater rights remaining after subtracting the volume that will be used for the chromium interim measure project (4,862.3 ac-ft/yr). It is also assumed that the LACWU can continue to produce water under these water rights, recognizing that either treatment or moving of wells to alternate uncontaminated locations may be required to fulfill those water rights.

6.2 Scenario 2: High-Water-Use Projection and Loss of Water Rights

The total (LACWU plus LANL) projected water use under the high-water-use scenario is estimated to increase to 3,938 ac-ft/yr by the year 2020 (Table 5-9, Figure 5-6) and to further increase to 4,841 ac-ft/yr by 2060. In this scenario, total projected demand can be met by the existing groundwater rights, assuming that the LACWU will lease the DOE groundwater rights. The total high-water-use projections are less than the volume of LACWU- and DOE-owned groundwater rights remaining after subtracting the volume that will be used for the chromium interim measure project (4,862.3 ac-ft/yr); however, the projected water demand in 2060 is within 21.3 ac-ft/yr of this water rights volume.

As discussed in Section 4.3.2, there is some risk that if wells need to be moved or other changes are needed that require OSE approval, additional water rights may be required to offset pumping impacts on the Rio Grande. If additional water rights could not be purchased and transferred to the Los Alamos area, a potential scenario given extended drought conditions and other growth pressures on the Rio Grande, the San Juan-Chama Project water rights might need to be used to offset pumping effects, in which case physical diversion of the San Juan-Chama Project water would not be possible.

In the event that a portion of the groundwater supply is contaminated, 1,200 acre-feet of groundwater diversions will need to be relocated and the OSE will require the impacts to the Rio Grande to be offset in an amount equal to the production of the new wells. To meet this requirement, San Juan-Chama Project water would be needed to offset the pumping.

The high water demand projection with a loss of water rights scenario assumes that the LACWU will lease the full volume of DOE groundwater rights, and that the volume not being used for the chromium interim measure project will be available for use. Under this scenario, there is a gap between the diminished groundwater supply and projected demand starting in 2030 that would need to be addressed, either by bringing the San Juan-Chama Project water online or through reductions in demand (water conservation). Taking into account the volume of DOE groundwater rights that will be used to support the LANL chromium interim measure project, this gap reaches 1,146 ac-ft/yr by 2060.

7. Climate Change

One of the goals of the LACWU water resource planning effort is anticipating and preparing for potential climate change impacts. For water resources planning, it is important to understand both natural variations in climate and variations that may result from anthropogenic climate change. This section includes information on natural climate variability (Section 7.1), anticipated changes in temperature and precipitation due to climate change (Section 7.2), potential impacts of climate change in the Los Alamos area (Section 7.3), and recommendations for mitigating climate change impacts (Section 7.4).

7.1 Natural Climate Variability

The climate of Los Alamos County naturally exhibits variability in precipitation and temperature, including both seasonal and annual variations. Weather patterns in the southwestern United States, including the Los Alamos area, are affected by several natural cycles:

- *El Niño/La Niña:* El Niño and La Niña are characterized by unusually warm and unusually cool temperatures, respectively, in the equatorial Pacific. Years in which El Niño is present are more likely to be wetter than average in New Mexico, and years with La Niña conditions are more likely to be drier than average.

- *The Pacific Decadal Oscillation (PDO):* The PDO is a long-lived pattern of climate variability caused by shifting sea surface temperatures between the eastern and western Pacific Ocean that cycle approximately every 20 to 30 years. Warm phases of the PDO (shown as positive numbers on the PDO index) correspond to El Niño-like temperature and precipitation anomalies (i.e., wetter than average), while cool phases of the PDO (shown as negative numbers on the PDO index) correspond to La Niña-like climate patterns (drier than average). It is believed that since 1999, Los Alamos County has been in the cool phase of the PDO.

- *The Atlantic Multidecadal Oscillation (AMO):* The AMO refers to variations in surface temperatures of the Atlantic Ocean which, similarly to the PDO, cycle on a multi-decade frequency. The pairing of a cool phase of the PDO with the warm phase of the AMO is typical of drought in the southwestern United States (McCabe et al., 2004; Stewart, 2009). The AMO has been in a warm phase since 1995 and it is possible that the AMO may be shifting to a cool phase, but the data are not yet conclusive. LANL has been doing statistical analyses to evaluate the correlation between the AMO and warming temperatures and has concluded that anthropogenic effects account for two-thirds of the post-1975 global warming, while the AMO accounts for one-third of the effect (Chylek et al., 2014).

These natural cycles and other short-term meteorological conditions lead to considerable annual and monthly variability in temperature and precipitation.

7.2 Changes in Temperature and Precipitation

In addition to the natural variability in temperature and precipitation, there is significant research indicating that long-term trends, particularly in temperature, are changing. The Intergovernmental Panel on Climate Change (IPCC) is an international body that was created to assess the science related to climate change world-wide. The IPCC's most recent research efforts are summarized in the Fifth Assessment Report, which was released in September 2013.

IPCC assessments are prepared and reviewed by hundreds of scientists and provide a scientific basis for governments at all levels to develop policies related to climate change. The Fifth Assessment report indicates that globally the atmosphere and oceans have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased (IPCC, 2013). Atmospheric concentrations of greenhouse gases are rising so quickly that all current climate models project significant warming trends over continental areas in the 21st century. The IPCC report also suggests that it is extremely likely that more than half of the increase in annual surface temperature from 1951 to 2010 is explained by anthropogenic increases in greenhouse gases and other anthropogenic forcings (IPCC, 2014). Likely impacts of climate change include increased numbers of dry days and extreme events (IPCC, 2012).

In the United States, regional assessments conducted by the U.S. Global Change Research Program (USGCRP, 2015) have found that temperatures in the southwestern United States have increased and are predicted to continue to increase. Reduced snowpack and streamflow and increased drought and wildfires are anticipated impacts of climate change in the southwest (USGCRP, 2015). Recent flows in the Upper Colorado and Rio Grande were 3 to 5 percent lower during 2001 through 2010 than 20th Century average flows, and snowmelt occurred earlier (Overpeck et al., 2013).

To assess climate trends in New Mexico, the NMOSE and NMISC (2006) conducted a study of observed climate conditions over the century and found that observed wintertime average temperatures had increased statewide by about 1.5 degrees Fahrenheit (°F) since the 1950s.

More recently, the U.S. Bureau of Reclamation, with technical assistance from Sandia National Laboratories and the U.S. Army Corps of Engineers, conducted a study of the Upper Rio Grande that evaluated climate impacts in northern New Mexico (USBR, 2013). The study, entitled the Upper Rio Grande Impact Assessment (URGIA) found that average temperatures from 1971 through 2011 rose at a rate of approximately 0.7°F per decade, approximately twice the global average, for a total warming of approximately 2.5°F since 1971. Temperatures are predicted to rise an additional 4° to 6°F by the end of the century. The study additionally projected a decrease in native Rio Grande water by about a third and a decrease in tributary flow by about a quarter, increasing frequency, intensity, and duration of droughts and floods, earlier snowmelt runoff, and increased variability in the magnitude, timing, and spatial distribution of streamflow and other hydrologic variables.

A number of other studies predict temperature increases in New Mexico from 5° to 10°F by the end of the century (Forest Guild, 2008; Hurd and Coonrod, 2008; USBR, 2011).

Although there is consensus among climate scientists that global temperatures are warming, there is considerable uncertainty regarding the specific local and temporal impacts that can be expected. Predictions of annual precipitation are also subject to uncertainty, particularly regarding precipitation during the summer monsoon season in the southwestern U.S.

While attribution of individual events remains a challenge, droughts and heavy short-term precipitation in the Southwest are predicted to be more severe as human-induced climate change progresses (USGCRP, 2014). An example of extreme precipitation events occurred in

September 2013 in Boulder, Colorado, where a 3-day rainfall exceeded the monthly total for any month on record and was classified as a 1,000-year event (chance of 1 in 1,000 of occurring) (NOAA Climate.gov, 2013). During the same September 2013 time period, the Los Alamos area also experienced extreme precipitation. Initial research indicates that the extreme events that occurred in Colorado in 2013 were not due to anthropogenic climate change (NOAA Climate.gov, 2014). Since extreme events occur infrequently, however, it is difficult to observe trends and conclusively attribute causes.

7.3 Impacts of Climate Change on Los Alamos County

Climate change impacts that are likely to occur in Los Alamos County based on studies of the Southwest and New Mexico in particular (Christensen et al., 2004; Hurd and Coonrod, 2008; NMOSE/NMISC, 2006; Overpeck et al., 2013; USBR, 2011, 2013; USGCRP, 2015; Williams et al., 2010) include:

- Though model predictions vary, increasing temperatures are expected to occur. Warming will continue with longer and hotter heat waves during summer months.

- Higher temperatures will result in a longer and warmer growing season, resulting in increased water demand for outdoor watering during the spring and summer months and potentially lower rates of recharge.

- Reservoir and other open water evaporation is expected to increase. This could affect the non-potable water in storage in Los Alamos Reservoir and could potentially lead to shortages of San Juan-Chama Project water.

- Although predictions of annual precipitation are subject to greater uncertainty “given poor representation of the North American monsoon processes in most climate models” (NMOSE/NMISC, 2006), precipitation is expected to be more concentrated and intense, so increases in the frequency and severity of flooding are projected. Due to the presence of various contaminated areas around Los Alamos due to historical LANL operations, stormwater management is a key issue for the LACWU and LANL.

- Streamflow in major rivers across the Southwest is projected to decrease during this century, due to a combination of diminished cold season snowpack in the headwaters regions and higher evapotranspiration during the warm season. The U.S. Bureau of Reclamation developed projections of the hydrologic impacts of modeled climate changes for the Upper Rio Grande Basin over the rest of this century and published their results in the Upper Rio Grande Impact Assessment (USBR, 2013). Their analysis included the reliability of the San Juan-Chama Project water under potential climate change scenarios. The projections suggest an increase in the month-to-month and inter-annual variability, and a somewhat more reliable supply from the San Juan-Chama Project than for the native Rio Grande supply (USBR, 2013). The results for the average total San Juan-Chama allocations were 94 percent of contracted water rights in the 2020s, 88 percent in the 2050s, and 81 percent in the 2090s (USBR, 2013), indicating that the average total San Juan-Chama Project allocation would be reduced by about 20 percent by the 2090s (USBR, 2013). To account for the potential for reduced streamflow to result in shortages of San Juan-Chama Project water in some years, San Juan-Chama Project water should be conjunctively managed with more reliable groundwater resources.

- The seasonal distribution of streamflow is projected to change as well: flows could be somewhat higher than at present in late winter as warmer conditions lead to more winter precipitation falling as rain and less as snow, but peak runoff will be weaker due to reduced snowpack. Late spring/early summer flows are projected to be much lower than at present, given the combined effects of less snow, earlier melting, and higher evaporation rates after snowmelt. Since the LACWU relies primarily on groundwater, this is not anticipated to present a major concern for LACWU water resources, but these pressures may lead to overall added stress on the Rio Grande systems, which may increase vulnerability to administrative changes in junior water rights management, as discussed in Section 4 and by Kenney et al. (2008).

During the period of observed record, the Southwest has experienced two significant dry periods, the 1950s and the early 2000s, with the second drought period being warmer and producing greater water loss. The 1980s and 1990s were wetter and promoted a lot of vegetation growth, creating conditions of higher vulnerability to forest fire (NOAA, 2013). The extreme drought conditions prevalent throughout New Mexico and Los Alamos in the past 10 years have resulted in the mortality of many trees. Between 2002 and 2005, more than 90 percent of the mature piñon trees in the Los Alamos area died from a combination of drought stress and bark beetle infestation (Breshears et al., 2005, as cited in LANL, 2014a). Lower-elevation ponderosa pine and mixed conifer stands were also affected. More recently, large numbers of mature ponderosa pine are dying, apparently due to prolonged drought stress. These conditions lead to vulnerability to wildfire and post-fire flooding.

Los Alamos County has already experienced extreme wildfires and post-fire flooding since 2000:

- The Cerro Grande fire burned 47,000 acres in May 2000. The fire started as a result of controlled burning in Bandelier National Monument and directly impacted structures and vegetation in the Los Alamos area.

- The Las Conchas wildfire started on June 26, 2011 in the Jemez Mountains, approximately 10 miles west of Los Alamos, and ultimately burned approximately 156,600 acres, making it the largest wildfire in New Mexico history at the time. Fire damage in the upper portions of watersheds above Los Alamos greatly increased the risk of flash floods and flood damage in the downstream canyons (LANL, 2014a).

- On September 13, 2013, anywhere from 2.49 to 3.52 inches of rain fell at different locations around Los Alamos within a 24-hour period. All of the local canyons flooded, and some experienced substantial channel and bank erosion and widespread sediment deposition. Infrastructure, including roads, gaging stations, and other sampling equipment, was also significantly damaged (LANL, 2014a). With saturated antecedent soil conditions caused by a previous storm on September 10, the flooding that occurred during the September 12 to 13 storm damaged LANL's environmental monitoring and control infrastructure, including access roads, groundwater monitoring wells, gaging stations, and watershed controls. The damage to or impairment of flood- and sediment-control structures included a large amount of erosion in the Pueblo Canyon Wetlands, and overflow from sediment traps and retention basins in other canyons. LANL has since installed various sediment-control structures to minimize the erosive nature of stormwater runoff and to enhance deposition of sediment.

As discussed previously, while it may be difficult to determine if a specific event is caused by climate change, these are the types of impacts that the LACWU needs to continue to plan for.

7.4 Recommendations for Mitigating Impacts of Climate Change

Though it is difficult to determine whether individual events are a result of natural climate variability or climate change, it is important for the LACWU to be prepared to address variability, including drought and extreme precipitation events, and to be aware that these conditions may be both more frequent and more severe as a result of climate change. Higher temperatures and drought may contribute to increased demands for water, diminished supplies, impacts to vegetation, and wildfire risk. Extreme precipitation may damage infrastructure due to stormwater runoff and flooding, mobilize surface or shallow contaminants due to erosion, and create extreme sedimentation that can affect reservoir storage, as has occurred at Los Alamos Reservoir following the Cerro Grande and Las Conchas fires.

The following are recommendations that the LACWU could implement to prepare for long-term and severe drought, as well as for extreme precipitation events:

- Implement adaptive management as a part of the long-range water supply plan, where decisions are made sequentially over time, allowing adjustments to be made as more information is known. This approach may be useful in dealing with the additional uncertainty introduced by potential climate change.

- Use research and monitoring to fill knowledge gaps and enhance planning capabilities. Although neither will eliminate all uncertainty, they will provide significant improvements in understanding the effects of climate change on water resources and in evaluating associated uncertainties and risks required for more informed decision making (Brekke et al., 2009).

- Continue to implement and update the Los Alamos Energy and Water Conservation Plan to help reduce outdoor demands during periods of drought and to use water resources efficiently during all times.

- Conjunctively manage surface and groundwater resources. It will be important to bring surface water from Los Alamos Reservoir (and potentially San Juan-Chama Project water) online, allowing for conservation of groundwater resources during times when surface water is available, while having provisions for meeting demand with groundwater during extreme drought periods when surface water is not available.

- Prepare for the increasing risk of large and severe wildfires. The LACWU should work with U.S. Forest Service and New Mexico State Forestry Division personnel to identify particular fire risks and vulnerabilities. Ponderosa pine and Douglas fir are particularly susceptible to drought and rising temperatures (Williams et al., 2010). An important component of wildfire planning is to work with emergency personnel on a plan to protect critical drinking water infrastructure during potential fires. The LACWU should also coordinate with LANL on its efforts to mitigate the effects of potential wildfires:

  – LANL operates a program to reduce wildfire fuels and manage forest health throughout forested areas on Laboratory and DOE property. Defensible space is created and maintained around facilities and other high-priority areas, and areas not designated as defensible space are managed for a combination of wildfire fuel reduction and forest health. The major roads within the facility continue to be thinned along the road easements to the fencelines, to provide firebreaks and improve vehicle visibility to wildlife crossing the roads (LANL, 2014a).

  – Following the Los Conchas fire in 2011, high-priority areas in the canyons were armored to protect against potential flood damage (LANL, 2014a).

The U.S. EPA published the 2013 Draft National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Industrial Activities, also referred to as the Multi-Sector General Permit (MSGP), by Federal Register (FR) notice on September 27, 2013 (78 FR 59672). The MSGP requires the implementation of control measures, development of stormwater pollution prevention plans (SWPPPs), and monitoring of stormwater discharges from permitted sites. LANL conducts stormwater sampling and has implemented some flood mitigation measures. LACWU should continue to work with LANL to mitigate the risk of extreme precipitation events and flooding mobilizing contamination, which could affect the drinking water system.

Climate change modeling for the Southwest is based on varying carbon emissions scenarios, with higher rates of warming predicted with higher emissions. While Los Alamos County alone cannot significantly change regional emissions, the LACWU can contribute to reduced emissions through its energy policies, as discussed in the *Energy and Water Conservation Plan* (LACWU, 2015).

8. Water Conservation

The existing long-range water supply plan (DBS&A, 2006) included a water conservation plan, and additional documents that address water conservation have been published since that time. The LACWU published an *Energy and Water Conservation Plan* in 2013 (LACWU, 2013a), and this document was revised and reissued in 2015. The updated *Energy and Water Conservation Plan* focuses on conservation goals for the planning period of 2015 through 2019 (LACWU, 2015), and it meets the requirements of the New Mexico *Water Conservation Planning Guide for Public Water Suppliers* (NMOSE, 2013). The plan includes a water audit covering fiscal year 2014 (July 1, 2013 through June 30, 2014) (Section 5, Table 5-6), as well as the completed GPCD calculator worksheets covering 2007 through 2014 (LACWU, 2015).

The conservation program is implemented by customers primarily on a voluntary basis and the goals are not directed toward LANL, which falls outside of the County's jurisdiction (LACWU, 2015). Existing water conservation program activities that are discussed in detail in the 2015-2019 Energy and Water Conservation Plan (LACWU, 2015) include:

- *Customer meter testing and replacement.* The LACWU routinely tests customer meters and replaces those that are not working properly; in FY 2015, the program goal called for replacing 350 residential water meters.

- *Large water customer usage and account review.* The LACWU completed a large water meter review project in 2011 that addressed discrepancies in the billing or metering of large customers.

- *System leak detection surveys.* The LACWU surveys 20 percent of the water system annually in an effort to identify and fix water leaks.

- *Regulatory measures.* The Los Alamos Board of Public Utilities adopted Water Rule W-8 in 2005 to prohibit water waste and implement the even/odd address watering schedule, daytime watering restrictions, and leak repair requirements.

- *Water rates.* The Los Alamos County Council approved a tiered water rate structure in July 2014 for the LACWU's single-family and multi-family residential customers.

- *County park irrigation water audits.* The LACWU has worked with the County parks to conduct irrigation audits, recommend irrigation scheduling and maintenance, and identify any leaks or problems. The Los Alamos County Sustainability Plan includes a goal of reducing water demand for County parks by 25 percent of 2012 demand by 2020 (LACWU, 2013b).

- *Residential water leak training and audits*. The LACWU participates in the nationally advertised "Fix a Leak" week, offering fix a leak demonstrations and providing water audits for high water using customers.

- *Commercial water audits.* The LACWU conservation coordinator implemented a commercial water audit program in 2012, initially conducting seven audits on facilities including a hotel, grocery store, and school campus. The program is ongoing, and each participating facility is provided with a detailed report of the audit findings and recommendations.

- *Residential water conservation outreach.* Educational materials are distributed to LACWU customers through bill inserts, feature articles, workshops, and booklets on subjects including graywater use, rainwater harvesting, xeriscape and permaculture, and energy efficiency.

- *Public school outreach.* Since 2008, the LACWU has had a contract with the Pajarito Environmental and Education Center (PEEC) to perform energy and water conservation outreach in the public schools.

- *Conservation partnerships.* The LACWU participates in numerous regional and national conservation partnerships in order to share ideas, resources, and lessons learned. Existing partnerships include EPA WaterSense (promotional partner), Alliance for Water Efficiency (charter member), New Mexico Water Conservation Alliance (member), U.S. EPA Energy Star (promotional partner), Alliance to Save Energy (member), and Los Alamos Sustainability Program (participant).

- *Residential bill revisions.* The LACWU implemented changes to the residential customer bills in 2012, and customer bills now show usage for the past 13 months, allowing for comparison of usage between the current month and the previous year. Additional revisions are being planned.

A Conservation Advisory Group was formed in 2011 and has eight members, representing the Los Alamos Public Schools, County Parks Division, County Environmental Services Division, small commercial customers, and residential customers (LACWU, 2015). The long-term goal of the water conservation program is to achieve a 12 percent reduction in per capita water demand by 2050, as approved by the Utility Board on September 18, 2013 (Alarid, 2015). Specific actions that have been identified to assist in meeting this goal include:

- Increase water conservation education in the public schools.
- Increase adult education efforts, including outreach lectures and demonstration workshops.
- Implement residential irrigation water audits, focusing on customers with high summer water use.
- Improve Water Rule W-8 by researching its effectiveness, revising as necessary, and potentially adding enforcement capabilities.
- Implement incentives for replacement of lawns, including rebates for plant purchases and technical assistance.
- Implement the county's non-potable water master plan (Forsgren & Associates, 2013), which presents water use criteria for evaluating the efficiency of the existing non-potable water systems and for additional sites that could be potentially served by one of the non-potable water systems in the future.

The LACWU monitors the success and implementation of the Energy and Water Conservation Program annually, using activities such as evaluating data from the Cayenta billing system, completing the OSE GPCD calculator, and using the Alliance for Water Efficiency tracking tool (LACWU, 2015).

9. Recommendations

The LACWU is planning for potential future growth and increased water demands. While the groundwater supply will likely continue to produce at current rates for well beyond the 40-year planning period, issues regarding water rights and potential water quality concerns indicate that the LACWU needs to proactively plan for the future. A summary of recommendations for addressing the future water supply needs of the LACWU follows.

Water Supply (Quantity)

- Monitor water levels in the vicinity of the water supply wells and evaluate declines on a regular basis, with particular emphasis on monitoring the Guaje well field. Static water levels should also be measured in each of the active production wells on at least an annual basis.

- Continue to examine project options and initiate an environmental assessment for San Juan-Chama Project water utilization, and evaluate whether to initiate steps toward implementation, based on the water demand projections and supply-demand gap estimates presented in this plan. Bringing the San Juan-Chama Project water online would help the LACWU address the potential for contamination of the existing wells by diversifying the water supply both geographically and in terms of water rights.

Water Quality/Contaminant Risk Recommendations

- Work closely with LANL and NMED regarding the ongoing monitoring of contaminants and assessment of anticipated transport velocities and flow paths, especially relating to the chromium interim measure and future remediation projects.

- Evaluate contaminant data on a quarterly basis to identify any trends or changes.

- Begin contingency planning for alternate well locations. In a worst case scenario, many wells could be affected by contaminants over the planning period. To prepare for this contingency, identify possible locations for new wells that are upgradient from or off-gradient of key source areas, and begin to resolve infrastructure, land access, and water rights transfer issues so that alternative wells could be developed in a timely manner.

- To mitigate potential climate change impacts, work with emergency personnel to develop a plan to protect drinking water infrastructure in the event of a wildfire, and work with LANL to prepare for extreme precipitation events, to ensure that stormwater runoff does not mobilize contaminants to the detriment of the drinking water system.

Water Rights

- Pursue a new lease with DOE for their water rights (1,662.39 ac-ft/yr).

- Renegotiate the contract that LACWU has with DOE for supplying water to LANL before it expires in 2019.

- Secure services of a water rights attorney to advise and plan for water rights acquisition (availability of pre-1907 water rights, return flow credits, costs, time to secure, potential litigation).

- Pursue return flow credits as identified in the 1999 return flow study (SWC, 1999).

- Evaluate and quantify pumping effects on the Rio Grande from the current water production regime and explore potential changes in pumping amounts and locations in order to be prepared to address OSE concerns during a potential water rights transfer application process.

- Meet with the OSE to discuss priority administration and the number and amount of water rights that are senior to the LACWU's water rights.

Water Conservation

- Continue and expand the existing water conservation program, as discussed in Section 8, monitoring the effectiveness of the existing and new conservation measures and refining the conservation program as needed.

- Monitor the effectiveness of voluntary compliance with Rule W-8 in reducing water waste, and if necessary, pass an enforceable ordinance so that penalties can be assessed.

- Update the subdivision regulations to include requirements for graywater reuse, water harvesting, xeriscaping, and low-water-use indoor plumbing for all new commercial and residential development.

- Establish rebate programs for xeriscaping and appliance replacement.

- Distribute indoor plumbing leak detection and retrofit kits.

Implementation of these recommendations will help the LACWU be prepared to meet its future water supply needs.

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Table of Contents

1. Introduction

The Los Alamos County Water Utility (LACWU) supplies water for Los Alamos, White Rock, Los Alamos National Laboratory (LANL), and Bandelier National Monument. To prepare for the future water supply needs of these communities, the LACWU developed a long-range water supply plan that was published in 2006 (DBS&A, 2006). This document updates that plan to incorporate more recent data and developments relevant to water resources management. The objective of this plan is to evaluate projected demands in relation to available supply, while considering water quality and water rights risks to the supply, to ultimately ensure that both a viable physical supply and associated water rights are in place as needed to meet future demands.

In addition to providing a plan for a sustainable future water supply, a long-range water plan that covers at least 40 years addresses several regulatory requirements regarding water rights and water conservation. In particular, a water plan allows certain organizations, including Counties, to set aside water for use in the future. Section 72-1-9(B) of the New Mexico Water Code allows covered entities such as Los Alamos County to legally appropriate and preserve water that they cannot currently use but will need in the future to meet projected water requirements for the service area based on projected growth and other factors. Counties are specifically exempt from forfeiture of unused water rights if those rights have been appropriated for the implementation of a water development plan or for preservation of water supplies (NMSA 72-12-8 (F)). These provisions are the same for both surface water and groundwater (NMSA 72-5-28(C)).

The New Mexico Office of the State Engineer (OSE) requirements set out in statute NMSA 1978 Section 72-14-3.2 call for conservation planning by any public supply system with diversions of at least 500 acre-feet annually for domestic, commercial, industrial, or government customers for other than agricultural purposes. Covered entities must develop, adopt, and submit to the OSE a comprehensive water conservation plan, including a drought management plan, as a prerequisite for applying for funding from key state funding agencies. The Water Trust Board requires funding applicants to provide verification from the OSE that all of its statutory and regulatory requirements have been met, and the OSE is requiring that Water Trust Board funding applicants have a conservation plan that was prepared in accordance with New Mexico's *Water Conservation Planning Guide for Public Water Suppliers* (NMOSE, 2013). The U.S. Bureau of Reclamation (USBR) also requires a conservation plan for diversion of San Juan-Chama Project water.

The LACWU published an *Energy and Water Conservation Plan* in 2013 (LACWU, 2013a) and updated it in 2015 (LACWU, 2015), and prepares reports annually discussing the County's progress toward the goals established in that plan. This long-range water supply plan summarizes the water conservation goals established by the *Energy and Water Conservation Plan* and provides an update on its implementation and recommendations.

For this long-range water supply plan, the LACWU retained Daniel B. Stephens & Associates, Inc. (DBS&A) to update the 2006 plan with current data and analyses. The remainder of this water plan presents the results of the summarized and updated information including an overview of the water system (Section 2), water supply and water rights (Sections 3 and 4), current and projected demand and supply-demand gaps (Sections 5 and 6), risks due to climate change (Section 7), water conservation (Section 8), and actions the LACWU may undertake to plan for a sustainable future water supply (Section 9).

2. Overview of Los Alamos County Water System

The Los Alamos Boys Ranch, a school for teenage boys started in 1918, was the original settlement in the area that is now Los Alamos County. The sole source of water for the school was surface water from Los Alamos Reservoir in Los Alamos Canyon (Figure 2-1). The water was piped from the reservoir and stored in a redwood water tank near the school. During World War II, Los Alamos was selected as the site for the secret Project Y, because the steep canyons and mesa tops provided a secure location for the project. The Los Alamos Laboratory (as it was then called) came into existence in early 1943 for the single purpose of Project Y: to design and build an atomic bomb (LANL, 2006). Los Alamos Boys Ranch closed in early 1943 and the Laboratory became the only establishment. In 1949, Los Alamos County was created from parts of Sandoval and Santa Fe Counties.

When the Laboratory took over in 1943, they continued to use Los Alamos Reservoir, but also piped in water from a spring gallery in Guaje Canyon. In 1947, a dam was built in Guaje Canyon and water from the resulting Guaje Reservoir was used for water supply (Figure 2-1). In addition, American Spring and several springs in Water Canyon were tapped and piped into the water system. The Los Alamos well field was drilled in 1946 on San Ildefonso Pueblo property, thereby increasing the supply to meet the growing demands of the Laboratory and its residents. By 1989, groundwater from the Los Alamos, Guaje, Pajarito, and Otowi well fields supplied all of the potable demands for Los Alamos.

The Los Alamos well field was plugged and abandoned in 1992 because the wells had reached the end of their useful life. Also in the 1990s, six of the seven wells in the Guaje well field were retired, and four replacement wells were drilled and tapped into the existing piping and booster stations. Los Alamos Reservoir continued to be used to water parks, but the Cerro Grande fire in 2000, Las Conchas fire in 2011, and subsequent flooding in 2012, 2013, and 2014 damaged the reservoir and the diversion system. The LACWU has been working on a water line replacement project in order to bring the reservoir back online. The reservoir has been dredged and the LACWU will be installing a new pipeline from the reservoir into town in order to connect to the existing non-potable infrastructure (Meyers, 2016). The LACWU is also in the process of completing a few other non-potable projects, including installing booster pumps and pipelines to push non-potable water to the Group 12 tank, which has been renovated. This will allow gravity feed of the non-potable water to all current users, including the golf course and ball fields (Meyers, 2016).

The LACWU began operating the water system in September 1998; however, ownership of the water system and water rights was not transferred from the U.S. Department of Energy (DOE) to the LACWU until September 2001 (ownership of 70 percent of the water rights was transferred to Los Alamos County and DOE retained the other 30 percent). The LACWU ~~currently~~ provides water service to the residents of Los Alamos and White Rock, LANL, and Bandelier National Monument. The LACWU has a contract to supply DOE with the water required by LANL with no limitations. This contract will expire in 2019 (LANL demands have been projected beyond 2019 under the assumption that a new contract will be negotiated).

The LACWU has a contract with the U.S. Bureau of Reclamation for water from the San Juan-Chama Project, which brings water from the San Juan Basin to Heron Reservoir on the Rio Chama (the Rio Grande Basin). Releases from Heron Reservoir flow down the Rio Chama to the Rio Grande. In the *San Juan-Chama Water Supply Project Final Preliminary Engineering Report,* the recommended alternative for the LACWU to obtain and treat San Juan-Chama Project water for distribution was to construct up to three groundwater wells in the White Rock area and install pumps and a pipeline to connect the new wells to the Pajarito Booster Station (CDM Smith, 2012); however, the alternatives and project timeline will be revisited after the long-range water supply plan update is complete. The diversion rights of San Juan-Chama **Project** water could alternatively be used to offset impacts of pumping (as the City of Santa Fe has done since 1972), as further discussed in Sections 4.3.2 and 6.

With the abandonment of the Los Alamos well field and six wells in the Guaje well field, the LACWU water system is currently supplied by the 12 wells shown in Figure 2-1 and listed in Table 2-1. These wells, with depths up to 3,000 feet below ground surface (ft bgs) and water levels ranging from approximately 250 to 1,200 ft bgs, all draw on the regional aquifer beneath the Pajarito Plateau.

Table 2-1. Active Wells in the Los Alamos Water Supply System.

Well Field	Well Name	Date Completed	Completion Depth (feet)	Coordinates (feet) x	Coordinates (feet) Y	Initial Depth to Water
Guaje	G-1A	Oct-54	1,519	1,655,241	1,784,353	250
	G-2A	Mar-98	1,980	1,651,974	1,786,166	318
	G-3A	May-98	1,980	1,649,662	1,786,585	408
	G-4A	Apr-98	1,980	1,647,318	1,787,113	452
	G-5A	Jun-98	1,980	1,644,877	1,789,636	551
Otowi	O-1 [a]	Aug-90	2,497	1,649,396	1,772,232	673
	O-4	Mar-90	2,595	1,637,337	1,772,995	780
Pajarito	PM-1	Feb-65	2,499	1,647,734	1,768,112	722
	PM-2	Jul-65	2,300	1,636,698	1,760,406	823
	PM-3	Nov-66	2,552	1,642,590	1,769,530	740
	PM-4	Aug-81	2,874	1,635,623	1,764,740	1,060
	PM-5	Sep-82	3,092	1,632,110	1,767,790	1,208

Source: Koch and Rogers, 2003

[a] Well is currently not being used to supply drinking water.

Two new applications have been filed recently:

- The LACWU filed an application for an additional point of diversion on April 28, 2016. The new well will be called Otowi Well 2 and will be drilled to supplement the system's existing production wells in anticipation of declining production rates from existing wells that are nearing the end of their service life (Alarid, 2016).

- In May 2016, an application for permit to change an existing water right was filed jointly by DOE and the LACWU in support of the chromium plume control interim measure and chromium plume center characterization project (U.S. DOE and LACWU, 2016), and emergency authorization was received on September 10, 2016 (NMOSE, 2016).

The addition of new points of diversion under these applications will not increase the appropriation of water above the existing permitted water rights.

Wastewater is treated at two facilities: the White Rock wastewater treatment plant (WWTP) and the Los Alamos WWTP. Both of these WWTPs have treated effluent reuse lines that are used for irrigation of turf. Two former WWTPs—the East Road, abandoned and demolished in the mid-1960s, and the Pueblo, abandoned in 1993—also had effluent reuse systems, both of which supplied the golf course.

The LACWU operates a non-potable water system, using treated wastewater effluent to irrigate several areas in Los Alamos and White Rock and using stormwater runoff for fire protection and snow making at the Pajarito Mountain Ski Area (Forsgren & Associates, 2013). The system has three separate components:

- *Los Alamos Townsite:* Reuse is used to irrigate four sites in Los Alamos (Los Alamos County Golf Course, Los Alamos Middle School, North Mesa Ball Fields, and North Mesa Soccer Fields) and to feed the wetlands located downgradient of the Los Alamos wastewater treatment facility. A volume of 180,000 gallons per day is needed to keep the wetlands healthy. LANL is currently receiving reuse water for the wetlands from the LACWU at no charge because surplus reuse water is available.

- *White Rock:* Reuse is used to irrigate Overlook Park.

- *Pajarito Mountain Ski Area:* Captured stormwater is used for fire protection and snow making.

A Los Alamos County non-potable water system master plan was completed in 2013, to evaluate the efficiency of the existing non-potable water system, make recommendations for how to improve the system's efficiency, determine if additional development of non-potable water use is economically feasible, and identify and evaluate sites that could potentially be served (Forsgren & Associates, 2013), most of which currently use potable water for irrigation. The plan identified a total of 25 sites (5 existing and 20 new) suitable for service by the Los Alamos Townsite non-potable water system and 6 sites (1 existing and 5 new) for the White Rock non-potable water system. Bringing the additional sites online would increase the annual average system demands from 152.8 to 206.5 million gallons per year for the Los Alamos

Townsite system and from 18.9 to 41.2 million gallons per year for the White Rock system (Forsgren & Associates, 2013).

3. Hydrologic Overview and Risks to Water Supply

The LACWU public drinking water supply is supplied by groundwater, with surface water supplying a small amount of non-potable use. This section describes the hydrogeologic conditions pertinent to the Los Alamos groundwater supply (Section 3.1) and includes an assessment of potential risks to the groundwater supply due to depletion or contamination of the aquifer (Section 3.2). The LACWU water rights (groundwater and surface water) are discussed in Section 4.

3.1 Hydrogeology

Los Alamos County is situated on the Pajarito Plateau within the western side of the Española Basin. The Pajarito Plateau extends eastward from the Sierra de los Valles, the eastern range of the Jemez Mountains. On the western part of the Pajarito Plateau, the Bandelier Tuff overlaps the Tschicoma Formation, which consists of older volcanics that form the Jemez Mountains. In the central Pajarito Plateau and near the Rio Grande, the Bandelier Tuff is underlain by the Puye Formation. The Cerros del Rio basalts interfinger with the Puye Formation conglomerate along the river and extend beneath the Bandelier Tuff to the west. These formations overlie the sediments of the Santa Fe Group, which extend across the basin between LANL and the Sangre de Cristo Mountains and are more than 3,300 ft thick (LANL, 2014a). A cross section of the area is shown on Figure 3-1.

The hydrogeologic framework within Los Alamos County consists of three distinct aquifer systems **(LANL, 2014a)**:

- Shallow perched groundwater in alluvial deposits along canyon bottoms
- Intermediate-depth perched groundwater
- Deeper regional aquifer, which extends through the neighboring Española Basin ~~(LANL, 2014a)~~

A block diagram depicting a conceptual model of the hydrogeology of the Los Alamos area that illustrates the general configuration of these aquifer systems is shown in Figure 3-2.

Alluvial aquifers occur within axial fluvial deposits located along canyon bottoms and have a limited saturated thickness and variable lateral extent, depending on the presence of intermittent surface flow or anthropogenic discharges from wastewater treatment outfalls. Hydrologic investigations of alluvial aquifers have been conducted in Los Alamos Canyon, Pueblo Canyon, Mortandad Canyon, Pajarito Canyon, Sandia Canyon, Cañon de Valle, and Water Canyon. Though their limited extent precludes any utility for beneficial use, these aquifers provide an important pathway for contaminant migration.

Intermediate-depth perched aquifers are widely distributed across the northern, western, and central parts of the Pajarito Plateau beneath Los Alamos Canyon, Pueblo Canyon, Sandia Canyon, Mortandad Canyon, and Cañon de Valle. These perched zones usually occur in the Puye Formation fanglomerates, the Cerros del Rio Basalt, and units of the Bandelier Tuff, and are typically associated with low-permeability layers such as unfractured basalt flows and fine-grained zones. Saturated thicknesses range from about 3 to 420 feet, but lateral extents are sometimes poorly defined (LANL, 2005). Depths to the intermediate perched groundwater vary. For example, the depth to intermediate-perched groundwater is approximately 120 feet in Pueblo Canyon, 450 feet in Sandia Canyon, and 500 to 750 feet in Mortandad Canyon (LANL, 2014a). Though the exact extent of these aquifers is not well defined, it is clear that they are generally small enough that their potential for beneficial use is limited. However, they provide an important pathway for contaminant migration through the vadose zone.

The regional aquifer occurs primarily within the poorly to semi-consolidated basin-fill sediments of the Santa Fe Group. The total thickness of the Santa Fe Group beneath the Pajarito Plateau is poorly defined. The deepest well on the plateau (PM-5), with a depth of 3,110 feet, does not fully penetrate the base of the basin-fill sediments. Estimates of the total thickness of these sediments range from 6,650 feet in the central basin to as much as 9,000 to 10,000 feet in the central and western parts of the basin (Broxton and Vaniman, 2005).

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The regional aquifer extends into the overlying Puye Formation fanglomerate beneath parts of the Pajarito Plateau. Other geologic units encompassed by the regional aquifer beneath parts of the county include fractured volcanic rocks of the Tschicoma Formation (western part) and the Cerros del Rio Basalt (eastern part), as well as localized occurrences of older basalts.

The regional aquifer water table occurs at a depth of 1,200 feet along the western edge of the plateau and 600 feet along the eastern edge. In the central part of the plateau, the regional aquifer lies about 1,000 feet beneath the mesa tops. The regional aquifer is the only aquifer in the area capable of serving as a municipal water supply (LANL, 2014a).

Well locations and types are shown in Figure 3-3, and the potentiometric surface contours and extrapolated flow directions in the regional aquifer are shown in Figure 3-4. Water in the regional aquifer generally flows east or southeast (LANL, 2015c). As discussed in Section 2, the LACWU's production wells have water levels that range between approximately 250 and 1,200 feet below ground surface (ft bgs). Water in the regional aquifer is under artesian conditions beneath the eastern part of the Pajarito Plateau near the Rio Grande and under phreatic conditions beneath most of the Pajarito Plateau (Purtymun and Johansen, 1974). The upper portion of the regional aquifer beneath the Laboratory discharges into the Rio Grande through springs in White Rock Canyon (LANL, 2014a).

Groundwater modeling studies indicate that underflow of groundwater from the Sierra de los Valles west of Los Alamos is the main source of regional aquifer recharge (LANL, 2014a). Alluvial groundwater is also a source of recharge to the regional aquifer, as well as to the intermediate perched saturated zones (thereby providing potential downward pathways for contaminants released at the surface to eventually reach the regional aquifer).

A number of studies have estimated recharge to the regional aquifer for the Española Basin and for the Pajarito Plateau (Table 3-1). Recharge varies in relation to precipitation, which in Los Alamos County is elevation-dependent and ranges between about 13 and 20 inches annually (Newman and Robinson, 2005). Keating et al. (2005) determined that significant recharge occurs primarily above the 2,195-meter (7,200-foot) elevation. At lower elevations, recharge occurs primarily in canyons and arroyos; recharge on mesas is minimal to non-existent

(Anderholm, 1994; Birdsell et al., 2005). Kwicklis et al. (2005) estimated that 23 percent of total recharge to the regional aquifer beneath the plateau is from streamflow loss.

In addition to the recharge estimates, Table 3-1 includes an estimate of discharge to the Rio Grande (determined from inverse modeling using streamflow data and transient head data), which approximates aquifer recharge before significant pumping began.

Table 3-1. Regional Aquifer Recharge Estimates

Category	Rate (ac-ft/yr)	Source
Pajarito Plateau recharge	8,596	Kwicklis et al., 2005
	4,912	McLin et al., 1996
	4,298 to 5,526	Griggs and Hem, 1964
	8,084	Hearne, 1985
Lateral inflow from Jemez Mountains	7,445	McAda and Wasiolek, 1988
Discharge to Rio Grande from Pajarito Plateau and Sierra de los Valles	6,473	Keating et al., 2003

~~A number of investigations have been conducted to help understand regional aquifer properties as they relate to the potential for contaminant transport:~~

- ~~The results of pump tests performed in several regional aquifer monitor wells (often referred to as *R-* wells) installed as part of LANL's *Hydrogeologic Work Plan* (1998) implementation showed hydraulic conductivities ranging from 0.04-4.9 feet per day (ft/d) in all wells except R-13, which had a much higher conductivity (DBS&A, 2006).~~

- ~~A multiple well pump test conducted by LANL on supply well PM-2 during February 2003, using supply wells PM-4 and PM-5 (which were not pumped during the 25-day test) and monitor wells R-15, R-20, R-21, R-22, and R-32 as observation wells (McLin, 2005), estimated hydraulic conductivities ranging from 5 to 15 ft/d (DBS&A, 2006).~~

- ~~Anisotropy, the ratio of vertical to horizontal hydraulic conductivity, is important for predicting contaminant movement in the vadose and saturated zones. Pumping test~~

~~analyses have indicated that a strong degree of anisotropy is present in the regional aquifer beneath the Pajarito Plateau. Hydrologic modeling suggests that vertical permeability is 100 to 1,000 times lower than horizontal permeability in the Santa Fe Group silts and sands (Hearne, 1985; McAda and Wasiolek, 1988; Keating et al., 2003, as cited by LANL, 2005), indicating that contamination is much more likely to move horizontally than vertically.~~

- ~~A 2008 aquifer test evaluated responses in monitor wells R-11, R-15, and R-28 due to long-term water supply pumping at the Pajarito (PM-1 through PM-5) and Otowi (O-1 and O-4) well fields, and concluded that there is considerable heterogeneity in aquifer properties. The heterogeneity can lead to preferential flow paths (Vesselinov et al., 2008).~~

- ~~The deep section of the regional aquifer pumped by Santa Fe's Buckman well field is in relatively poor hydraulic connection with the Rio Grande and the aquifer below LANL. This can be explained by the pronounced westward-dipping stratification of the Santa Fe group sediments near the Buckman well field, which cause the aquifer to be anisotropic and under confined conditions (Vesselinov et al., 2011).~~

3.2 Aquifer Depletion Risk

To evaluate risks of water supply depletion, available water level data from numerous wells screened in the regional aquifer were used to plot hydrographs illustrating historical water level behavior in the regional aquifer. Locations of these wells are shown in Figure 3-3. Long-term supply well data, consisting of annual average non-pumping water levels for the Guaje well field (since 1950) and the Pajarito well field (since 1965), are shown in Figures 3-5 and 3-6 respectively. More recent (since 1990) but sporadic data are available for the Otowi well field (Figure 3-7).

Table 3-2 summarizes the net changes and average water level declines indicated by these data. Long-term data from the Pajarito and Guaje well fields indicate an average water level decline of about 1.1 and 3.5 feet per year (ft/yr), respectively; the average decline in the Otowi well field is about 0.8 ft/yr. Substantial declines have occurred in the abandoned Guaje wells, ranging from about 0.2 to 2.5 feet, and averaging about 1.3 ft/yr.

LANL also monitors water levels in regional wells. Previous analysis of those data indicated that responses were mixed but that water levels in most regional wells were also steadily declining (DBS&A, 2006). Though the average rate of decline appears modest on an annual basis, one supply well has experienced a total water level decline of approximately 85 feet since 1998, and water levels in four of the active production wells have declined by more than 50 feet (Table 3-2).

Using water level data, Rogers et al. (1996) estimated the volume of groundwater depletion from supply well production between 1949 and 1993 to be between 4.0×10^{10} and 6.0×10^{10} gallons (123,000 and 184,000 acre-feet), compared to total pumping withdrawals of 5.7×10^{10} gallons (175,000 acre-feet) during the same period. This analysis implies that recharge to the regional aquifer during this period was negligible and that production well pumping was essentially mining the aquifer. However, the recovery of water levels in wells that were not pumped for extended periods was cited by McLin et al. (1996) as evidence that recharge has occurred. Water levels can recover without recharge as the cone of depression that develops during pumping re-equilibrates, however, and it should be noted that the recharge estimates presented in Table 3-1 are on the same order as pumping withdrawals.

Even if net recharge is negligible, considering a demonstrated saturated thickness of at least 1,900 feet penetrated in supply well PM-5 and potentially as much as 10,000 feet of Santa Fe Group sediments underlying the plateau (Section 3.1), a continuation of the observed rates of decline does not represent a substantial imminent or foreseeable risk to the water supply. Barring potential water quality issues, continued pumping of the regional aquifer at current rates is likely to be sustainable for hundreds of years. LANL's Española Basin and Pajarito Plateau Regional Flow Model predicts that water levels will continue to decline at the same rate (with the same production rates) and that this rate can be sustained for hundreds of years (Keating, 2006). However, the water is expected to be of poorer quality as wells begin to draw from greater depths, and pumping costs will increase.

3.3 Contamination Risk

To evaluate the potential for the LACWU water system to produce water quality that meets all drinking water standards, this section (1) identifies sources of contaminants in the Los Alamos area, (2) summarizes existing knowledge of contaminant transport pathways and velocities, **and** (3) summarizes the concentrations and extent of chromium, perchlorate, and other contaminants in groundwater~~, and (4) discusses potential treatment options~~.

3.3.1 Sources of Contamination

Since the early 1940s, a wide array of chemicals have been released into the canyons of the Pajarito Plateau from various LANL operations. These releases have occurred through effluent discharges from wastewater treatment facilities and other miscellaneous sources, such as sanitary septic systems, cooling towers, and runoff from firing sites and other LANL facilities. Figure 3-8 shows the locations of industrial outfall sites at LANL.

The presence of contaminants in groundwater in Los Alamos County is primarily associated with areas where effluent discharges have led to enhanced infiltration. Since the 1940s, liquid effluent discharge by LANL has affected the shallow perched alluvial groundwater that lies beneath the floor of a few canyons, and has also affected intermediate-perched zones and the regional aquifer (LANL, 2014a). The major effluent discharges include:

- Mortandad Canyon, Pueblo Canyon from its tributary Acid Canyon, and Los Alamos Canyon from its tributary DP Canyon received liquid radioactive effluents during past decades (LANL, 2015c).

- Sandia Canyon has received discharges of power plant cooling water and water from LANL's Sanitary Wastewater Systems Consolidation (SWSC) Plant.

- Water Canyon and its tributary Cañon de Valle have received effluents produced by high explosives processing and experimentation (LANL, 1993a, 1993b).

- Over the years, Los Alamos County has operated several sanitary wastewater treatment plants (WWTPs) in Pueblo Canyon (LANL, 1981). The Los Alamos and White Rock WWTPs are currently operating. LANL has also operated numerous sanitary treatment plants.

- From 1956 through 1976, up to 160,000 pounds of hexavalent chromium were released from cooling towers at a LANL power plant. The chromium was commonly used in industry at the time as a corrosion inhibitor (LANL, 2014b).

Since the early 1990s, LANL has significantly reduced both the number of industrial outfalls and the volume of water discharged. The quality of the remaining discharges has been improved through treatment process improvements so that they meet applicable standards (LANL, 2014a).

Los Alamos groundwater monitoring has defined two areas of notable contamination: RDX contamination beneath Technical Area 16 and chromium contamination beneath Sandia and Mortandad Canyons (LANL, 2015c).

3.3.2 Contaminant Transport Pathways and Velocities

Numerous pathways for potential contaminant transport are present throughout the Pajarito Plateau. Transport modes for contaminants from the surface to the regional aquifer vary according to the hydrogeologic setting and include:

- Matrix flow through nonwelded and poorly welded tuffs (mesa tops and dry canyons)
- Fracture flow through welded tuffs (mountain front and Pajarito Fault zone)
- Fracture and matrix flow through dense and brecciated basalts (Cerros del Rio basalt outcrop at low-head weir and perched intermediate aquifers)
- Infiltration from wet canyons (portions of Los Alamos Canyon, Pueblo Canyon, Mortandad Canyon, Sandia Canyon, and Cañon de Valle)

Transport velocities are highly variable throughout the plateau. Infiltration beneath dry canyons and mesa tops is estimated to be very low, resulting in travel times to the regional aquifer of several hundred to thousands of years (Birdsell et al., 2005). On the other hand, fracture flow through fractured tuffs or basalts is likely to be comparatively rapid in many locations. Although they vary spatially, groundwater velocities are typically on the order of 30 feet per year (LANL, 2016).

Another possible contaminant transport pathway is potential cross contamination between perched aquifers and the regional aquifer during well drilling, primarily when open borehole conditions are maintained over an extended period of time. Well drilling by LANL has incorporated procedures to minimize this risk, such as sealing off zones of saturation above the regional aquifer prior to advancing the borehole to the regional aquifer. Data do not indicate any cases of cross contamination in the monitoring network; however, future drilling should include the procedures that are in place to minimize the risk of cross contamination.

The chemical properties of each contaminant control the degree to which they move into the subsurface. Reactive chemicals have a tendency for adsorption (adhesion of dissolved molecules to the surfaces of solids), limiting their movement in groundwater, while conservative or non-reactive chemicals tend to move readily in groundwater. Examples of these two types of contaminants that have been released from LANL facilities are:

- Non-reactive contaminants include chromium, tritium, nitrate, perchlorate, and RDX (a component of explosives, also known as cyclotrimethylenetrinitramine, cyclonite, hexogen, and T4). These chemicals are highly mobile and are observed in groundwater within perched intermediate zones and the regional aquifer beneath several canyons, including Cañon de Valle, Los Alamos Canyon, Mortandad Canyon, Pueblo Canyon, and Sandia Canyon (LANL, 2005).

- Reactive contaminants include strontium-90, americium-241, cesium-137, plutonium-238, -239, and -240 (LANL, 2005). These contaminants have been detected in the alluvial system but are not observed in the intermediate and regional aquifers.

3.4 Extent of Contamination and Risk to Water Supply

To evaluate the risk of contamination to the LACWU water supply, this section summarizes existing contaminant levels in the regional aquifer (Section 3.4.1) and provides additional detail on percholorate, hexavalent chromium, and other contaminants (Sections 3.4.2 through 3.4.4).

3.4.1 Summary of Contamination in Groundwater

Monitoring of production wells is conducted by the LACWU as part of routine monitoring and compliance with the U.S. Safe Drinking Water Act, and monitoring is also conducted by LANL. Recent monitoring and reporting indicates~~d~~ that all drinking water produced by the LACWU water system meets federal and state drinking water standards. Drinking water wells in the Los Alamos area have not been impacted by LANL discharges with one exception: well Otowi-1 (O-1) in Pueblo Canyon, where perchlorate has been detected below the 2012 LANL Compliance Order on Consent screening level of 4-micrograms per liter (µg/L) (the 2016 LANL Compliance Order on Consent does not include a screening level for perchlorate and the perchlorate standard that will apply going forward is an NMED tap water screening level of 13.8 µg/L). Concentrations of perchlorate in this well are continuing to decline (LANL, 2016). Tritium has also been detected at low levels in well O-1. This well is not being used to supply drinking water due to water leaks in the transmission line, but the LACWU plans to put it back online in the future after this pipeline has been replaced.

Table 3-3 summarizes groundwater contaminants that were detected in the regional aquifer in 2015. These data were downloaded from the LANL and NMED Intellus New Mexico web site (LANL and NMED, 2016). Data for well O-1 has been included on Table 3-3, although there were no standard exceedances for samples collected from this well.

The alluvial and intermediate-perched groundwater bodies are separated from the regional aquifer by hundreds of feet of unsaturated rock and sediments, so recharge from the shallow groundwater occurs slowly. As a result, less contamination reaches the regional aquifer than is found in the shallow perched groundwater (LANL, 2014a). Where contaminants are found at depth, the setting is either a canyon where alluvial groundwater is usually present or a location beneath canyons where large amounts of liquid effluent have been discharged. This section focuses mainly on contamination that has been detected in the regional aquifer, since it is the source of the LACWU water supply.

Discussion of the extent and concentrations of specific contaminants follows.

3.4.2 Perchlorate Contamination

Perchlorate is used as an energetics booster or oxidant in solid propellant for rockets and missiles. An official standard for this chemical has not been established. A screening level for perchlorate of 4 µg/L was set in the LANL Compliance Order on Consent issued by NMED on March 1, 2005 and revised on April 20, 2012 (NMED, 2012); however, a new LANL Compliance Order on Consent was issued in 2016 and it does not include a screening level for perchlorate (NMED, 2016). The perchlorate standard that will apply going forward is an NMED tap water screening level of 13.8 µg/L (NMED, 2014).

Perchlorate contamination is present in groundwater beneath Mortandad Canyon (LANL, 2016). In 2015, perchlorate concentrations exceeded 4 µg/L in samples collected from 8 monitoring wells, one of which (R-15) is completed in the regional aquifer (LANL, 2016). As discussed above, the 2016 LANL Compliance Order on Consent does not include a screening level for perchlorate (NMED, 2016), and the perchlorate standard that will apply going forward is an NMED tap water screening level of 13.8 µg/L (NMED, 2014). The concentrations detected in 2015 in the regional aquifer well R-15 ranged between 7.22 and 9.05 µg/L (LANL and NMED, 2016). The 4-µg/L screening level was the standard in effect in 2015, but with the higher standard being applied in the future, the number of standard exceedances is expected to decrease (any similar concentrations detected in the future will not exceed the 13.8-µg/L screening level). The two monitoring wells with the highest detected concentrations of perchlorate in 2015 were MCOI-5 and MCOI-6 (LANL and NMED, 2016), and these wells are completed in the perched-intermediate aquifer (LANL, 2016). The concentrations detected in these wells in 2015 ranged between 61.1 and 99.4 µg/L (LANL and NMED, 2016).

3.4.3 Hexavalent Chromium

Most contaminants that have been detected in groundwater beneath LANL have concentrations that are largely below regulatory standards; however, a hexavalent chromium plume is present in the regional aquifer. Chromium can be present in either the Cr^{+3} (trivalent chromium) or Cr^{+6} (hexavalent chromium) species. Cr^{+3} is an essential nutrient for humans and occurs naturally in many foods; Cr^{+6} causes various health effects. The U.S. Environmental Protection Agency (U.S. EPA) is currently reviewing data from a 2008 long-term animal study by the Department of Health and Human Service's National Toxicology Program, which concluded that hexavalent chromium may be a human carcinogen if ingested (U.S. EPA, 2015a).

The primary source of chromium is blowdown of potassium dichromate from the TA-03 power plant cooling tower that occurred from 1956 to 1972. LANL's conceptual model hypothesizes that chromium originated from releases into Sandia Canyon and may have migrated along lateral pathways to locations beneath Mortandad Canyon. For this reason, perched-intermediate and regional wells beneath Mortandad Canyon are monitored. Other contamination beneath Sandia and Mortandad Canyons may be associated with Mortandad Canyon sources. These sources and the migration pathways are described in the *Investigation Report for Sandia Canyon* (LANL, 2009) and *Phase II Investigation Report for Sandia Canyon* (LANL, 2012).

As discussed in the original long-range water supply plan (DBS&A, 2006), several exceedances of the New Mexico Water Quality Control Commission (NMWQCC) groundwater standard for human health of 50 µg/L for chromium were observed in samples collected in 2005 from monitoring well R-28. Since the 2006 water plan was completed, the areal extent and concentrations within the plume have been better defined. The chromium plume is located in an area of approximately 1 mile by 0.5 mile and within the top 50 feet of the regional aquifer (LANL, 2016). Data for monitoring wells where there were chromium concentration exceedances of the NMWQCC groundwater quality standard for human health in 2015 are shown on Figure 3-9.

In 2015, **hexavalent** chromium concentrations exceeded the NMWQCC groundwater quality standard in five regional aquifer monitoring wells—R-28, R-42, R-62, R-50 Screen 1, and R-43

Screen 1 (Figure 3-9)—and the highest concentrations of **hexavalent** chromium detected in the plume are near monitoring wells R-42 and R-28. Two intermediate wells (SCI-2 and MCOI-6) also had **hexavalent** chromium concentrations above the standard (LANL, 2016). The monitoring wells located in the center of the plume (R-42 and R-28) show a relatively flat trend in the **hexavalent** chromium concentrations, while monitoring wells along the edge of the plume (R-45 screen 1, R-43 Screen 1, and R-50 Screen 1) show gradually increasing **hexavalent** chromium concentrations (LANL, 2016). The LACWU production well that is located closest to the **hexavalent** chromium plume is PM-3, which is located about ½ mile from R-28 (Figure 3-9). **Hexavalent c**~~C~~hromium detections in monitoring wells R-35a and R-35b (located adjacent to PM-3 and screened deep in the upper louvered section of PM-3 and at the water table, respectively) are at background levels (Katzman, 2016). Well PM-3 could become contaminated in the future, depending on the direction of groundwater flow and on the interim measures being implemented by LANL (discussed below) to control plume migration (LANL, 2015b).

The screened interval in monitoring well R-28 is from 934 to 958 feet deep, extending only 69 feet into the top of the regional aquifer, while PM-3 is screened at much greater depths (from 956 to 2,532 feet), therefore producing water from a much larger section of the aquifer. If the chromium plume were to reach PM-3 yet be confined to a shallow segment near the top of the aquifer, the concentration is likely to be highly diluted as a result of pumping from an interval of more than 1,500 feet. Nevertheless, the presence of **hexavalent** chromium near the well represents a risk that should be carefully monitored. During 2015, the NMED DOE Oversight Bureau coordinated with the NMED Drinking Water Bureau on a scope of work for a potential project to assess the vulnerability of the LACWU water supply wells to contamination; however, due to grant timing and State contracting limitations, the project has been put on hold (Yanicak, 2016). **In the event that any of the production wells are impacted by hexavalent chromium, the LACWU maintains an insurance policy to fund and implement corrective actions, as needed.**

The May 2015 Interim Measures Work Plan (LANL, 2015a) presents LANL's approach for controlling movement of chromium-contaminated groundwater along the downgradient portions of the plume. LANL plans to extract contaminated groundwater, treat it at the surface using ion

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exchange, and reinject it into the aquifer, with project implementation beginning in 2016 (LANL, 2016). In an October 2015 letter, NMED approved the LANL work plan and set due dates for the interim measure task work plans (NMED, 2015b). Figure 3-10a shows the chromium interim measure project area in relation to the rest of the County, and Figure 3-10b shows the existing and planned extraction, injection, and monitoring wells, and provides an approximate areal extent of the hexavalent chromium-contaminated groundwater that exceeds the 50-µg/L NMWQCC groundwater standard for human health (DOE and LACWU, 2016). The work plan also provides a general description of the planned treatment system, including two ion exchange vessels for treatment and redundancy (LANL, 2015b).

In addition, LANL is conducting work under the July 2015 *Work Plan for Chromium Plume Center Characterization* to further investigate the aquifer in the center of the chromium plume and to further characterize the nature and extent of the contamination in order to identify remedial alternatives for the chromium plume (LANL, 2015b). Objectives include investigating the feasibility of chromium source removal, further characterizing the aquifer—including heterogeneity and dual porosity—in order to evaluate the potential for in situ remedial strategies, studying the hydrologic and geochemical conditions that occur near the proposed injection wells, and characterizing the infiltration beneath the shallow alluvial groundwater in Sandia Canyon (LANL, 2015b). The LANL chromium plume center characterization work plan details planned LANL activities, including extraction well installation, pumping, and sampling, aquifer tracer tests and a field cross-hole trace study, an injection well study, and characterization of infiltration in Sandia Canyon (LANL, 2015b).

LANL plans to work with the LACWU to ensure that the interim measure pumping does not interfere with the water supply pumping and to continue to monitor water quality in the monitoring and water supply wells (LANL, 2014c). In addition, LANL will prepare a corrective measures evaluation report that proposes the final remedy for the chromium plume (LANL, 2015b).

3.4.4 Other Contaminants in Groundwater

A number of additional contaminants have been detected in groundwater, including nitrate, RDX, tritium, trichloroethene, and radioactive contaminants. These contaminants are discussed briefly in the sections that follow.

3.4.4.1 Nitrate

Nitrate (NO_3 as nitrogen) has been detected in the regional aquifer at concentrations of up to 6.1 mg/L in monitoring wells R-43 S1 and R-11 in Sandia Canyon and R-42 in Mortandad Canyon (the U.S. EPA national primary drinking water standard and NMWQCC groundwater standard for human health are both 10 mg/L). Nitrate (as N) concentrations are also elevated (> 2 mg/L) in samples from regional aquifer monitoring wells R-36 in Sandia Canyon and R-15, R-28, and R-45 in Mortandad Canyon (LANL, 2014a).

3.4.4.2 RDX

RDX, a component of explosives, has been detected in groundwater. An official standard for this chemical has not been established; however, the EPA's tap water screening level for RDX is 0.70 µg/L (U.S. EPA, 2016). LANL indicated that EPA is using a target risk of E–6 for RDX (0.70 x 10^{-6} µg/L), and that NMED requires LANL to use a target risk of E–5 (Katzman, 2015). The RDX standard used by LANL is 7.0 µg/L (NMED, 2015a).

RDX is monitored by LANL, and RDX concentrations exceed LANL's 7.0-µg/L standard at two springs (Burning Ground Spring and Martin Spring), one alluvial well (CdV-16-02659), and three intermediate-perched zone wells (CdV-16-4ip S1, CdV-16-2(i)r, and CdV-16-1(i)) near TA-16 in the Water Canyon watershed (LANL, 2015c). RDX is also persistently detected in regional aquifer monitoring wells R-18 and R-63 at concentrations that are below the standard. In 2015, the maximum concentrations detected were 1.66 µg/L in R-63 and 2.86 µg/L in R-18. The concentrations in R-63 have been relatively steady since this well was installed in 2011, with the exception of the first few samples following well construction. Detected concentrations in R-18 show an increasing trend since the well was completed in 2006 (LANL, 2016).

3.4.4.3 Trichloroethene and Tetracloroethene

Chlorinated solvents are present in the groundwater near TA-16 (LANL, 2015c). Trichloroethene (TCE) was detected in Pajarito Canyon regional aquifer monitoring well R-20 S2 beginning in late 2008 and continued to be detected in every sampling event through 2011. In 2015, TCE was not detected in R-20 S2 (LANL and NMED, 2016). In 2014, tetrachloroethene (PCE) and TCE were detected in alluvial well FLC-16-25280 at concentrations above the U.S. EPA national primary drinking water standards of 5 µg/L (LANL and NMED, 2016).

3.4.4.4 Radioactive Contaminants

Radioactive effluent was discharged into Los Alamos Canyon during the earliest Manhattan Project operations at TA-01 (1942 through 1945) and from nuclear reactors at TA-02 (until 1993). Liquid and solid radioactive wastes were also discharged in Los Alamos Canyon from TA-21, and radionuclides and metals were discharged from the sanitary sewage lagoons and cooling towers at the Los Alamos Neutron Science Center at TA-53. Compared with past decades, little radioactivity is now found in groundwater samples. In 2013, strontium-90 was detected in shallow alluvial wells in DP and Los Alamos Canyons, at concentrations of up to 17 picocuries per liter (pCi/L) (LANL, 2014a). The U.S. EPA has established a national primary drinking water standard of 4 millirem per year (mrem/yr) for beta particle and photon radioactivity from man-made radionuclides in drinking water (including strontium-90, which emits beta particles during radioactive decay). Based on conversions provided by the U.S. Department of Commerce Bureau of Standards, the derived concentration of 8 pCi/L is equivalent to a dose of 4 mrem/yr for strontium-90 (U.S. Department of Commerce, 1959; U.S. EPA, 2015b). Samples collected from alluvial well LAO-3a continue to exceed the standard. In 2015, the strontium-90 concentration in this well was 12.4 pCi/L (LANL and NMED, 2016).

Tritium activities in groundwater peaked in the early 1980s and have since declined. Tritium was detected in water supply well O-1 at an activity of 2.373 pCi/L in 2015 (LANL and NMED, 2016). In the intermediate zone monitor wells MCOI-5 and MCOI-6, tritium was detected in 2015 at activities of 3,140 and 2,940 pCi/L, respectively. The U.S. EPA's dose-based drinking water standard for tritium is 4 mrem/yr, based on a maximum contaminant level of 20,000 pCi/L (U.S. EPA, 2002).

3.5 Surface Water Supply

Though most of the LACWU water supply is from groundwater, there are two sources of surface water supply:

- The Los Alamos Canyon reservoir has provided non-potable water supplies to schools, parks, and a golf course. The reservoir filled with debris following the 2000 Cerro Grande Fire, and the area was further impacted by the 2011 Los Conchas fire and subsequent flooding. The debris was cleared and reservoir repair and reconstruction was completed in the spring of 2013, but a flood in September 2013 filled the reservoir with silt again. The reservoir has been dredged and the LACWU plans to install a new pipeline from the reservoir into town in order to connect to the existing non-potable infrastructure (Meyers, 2016).

- LACWU has the potential to use Rio Grande surface water from the San Juan-Chama Project in the future, though a diversion structure has not yet been constructed. Bringing the San Juan-Chama Project water online would diversify the water supply **geographically and also in terms of water rights**, helping the LACWU to mitigate any future effects due to contamination of existing wells and/or climate change. Details of the proposed San Juan-Chama Project and LACWU water rights are discussed in Section 4.

Since surface water supplies only non-potable supplies to LACWU, surface water contamination is not a primary issue for drinking water quality. However, careful management of stormwater runoff, particularly in areas impacted by fire, is an important water resource management issue for Los Alamos County, as discussed in Section 7. Surface water quality will become more of an issue **if and when a project to use** ~~once the~~ San Juan-Chama Project **water** comes online.

4. Water Rights

In addition to having sufficient physical supply, the LACWU needs to have the legal rights to use the water. New Mexico water law is founded on the principle that all water in New Mexico belongs to the State of New Mexico, which thus has the sole authority to grant or recognize rights to use that water. Two further tenets, both based on New Mexico Constitution Article XVI, Section 2, are that (1) water rights "are subject to appropriation for beneficial use, in accordance with the laws of the state" and (2) "priority of appropriation shall give the better right."

- The concept underlying the principle of prior appropriation is that the first person to use water for a beneficial purpose has a prior right to use that water against subsequent appropriators. Water rights acquired through this system of prior appropriation are a type of property right and may be sold or leased.

- The essential basis of water right ownership is beneficial use. The principle of beneficial use is that a water right arises out of a use that is productive or beneficial, such as agricultural, municipal, industrial, and domestic uses, among others.

The State Engineer, through the OSE, administers water rights for the State of New Mexico:

- To actively manage groundwater resources in New Mexico, the State Engineer has the authority, as set forth in the Water Code, to delineate groundwater basins that require a permit for groundwater withdrawals. Such a permit specifies (1) how much water a user can withdraw in any given year, (2) the location and type of well that will be used to withdraw the water, and (3) the use to which the water will be put. Many water right permits have special conditions that further define the use and quantity of water allowed under the permit.

- Like groundwater, the diversion of water from New Mexico's surface waters requires either a declaration, permit, license, or court decree to divert the water. Surface water appropriations follow the same standards as groundwater rights in that a transfer or lease cannot impair existing water rights and must not be contrary to public welfare or conservation (NMSA 72-5-23, 72-12-3(D)).

Many of New Mexico's surface waters are governed by interstate compacts that require set amounts of water to be delivered to specified delivery points. The Interstate Stream Commission, an adjunct commission to the OSE, has responsibility for ensuring that specific rivers in New Mexico meet their obligations under their respective interstate compacts.

4.1 Water Rights

The LACWU has existing water rights from a variety of sources, including water rights from the Rio Grande surface water and underground water basins and rights to use 1,200 acre-feet of water from the San Juan-Chama Project. The U.S. DOE also owns Rio Grande underground water basin rights. These rights are discussed in Sections 4.1.1 and 4.1.2, respectively.

4.1.1 Rio Grande Surface Water and Groundwater Rights

As discussed in Section 2, the LACWU's Rio Grande water rights were originally owned by the U.S. DOE. In 2001, 70 percent ownership was transferred to the LACWU, and DOE retained 30 percent ownership. Table 4-1 summarizes these permitted, licensed, and declared water rights.

The rights outlined in Table 4-1 are based on a permit application filed by U.S. Energy Research on May 29, 1975 to combine a series of previously licensed and declared water rights. That application requested a total right of 5,547.1 ac-ft/yr for municipal, industrial, and related purposes that could be diverted from any combination of permitted points of diversion. The OSE approved the application on October 30, 1975 with the exception of subtracting 5.8 ac-ft/yr for evaporation losses at Los Alamos Reservoir. Figure 4-1 shows the LACWU water diversions for 2010 to 2015 (these volumes were calculated by subtracting LANL demands from total diversions), and Figure 4-2 shows the LANL water use volumes for the same period, in comparison to their respective groundwater rights. Figure 4-3 shows the LACWU water diversions and LANL water use volume, along with the water rights for both entities. The

LACWU has an extension of time for putting their rights to beneficial use that will expire on September 30, 2017.

Table 4-1. Summary of Water Rights

Permit Number	Water Source	Priority Date	Quantity of Water Originally Appropriated (ac-ft/yr)
RG-485 through RG-496-Comb-S-4 [a]	Groundwater	1948-1951	5,329
RG-485 through RG-496-Comb-S-5 [b]	Groundwater	1948-1951	50
1503,1802, and 1802-amended [c]	Surface water	March 14, 1922	168.1
Evaporation loss	Surface water	NA	(5.8)
		Total water rights	5,541.3 [d]

Source: Southwest Water Consultants, Inc., 1999

[a] Permitted August 31, 1965 from numerous underground water right declarations filed on March 5, 1957 and amended in 1965. These declarations identified actual use of 3,966 acre-feet in 1964, a capacity of 6,579 ac-ft/yr, and an OSE feasible diversion of 5,329 ac-ft/yr. Dates that water was put to beneficial use vary.

[b] Subsequent declarations added an additional 50 acre-feet and new points of diversion.

[c] The amendment to Permit 1802 raised the storage capacity from 6.66 acre-feet to 28.33 acre-feet.

[d] Of the total 5,541.3 ac-ft/yr under the 1975 combined permit, the LACWU owns 70 percent (3,878.91 ac-ft/yr) and DOE owns 30 percent (1,662.39 ac-ft/yr).

The LACWU (which is the sole water provider for LANL) leased the DOE-owned water rights from 2001 to 2011, when the lease expired. In May 2016, an application for permit to change an existing water right was filed jointly by DOE and the LACWU in support of the chromium plume control interim measure and chromium plume center characterization project (U.S. DOE and LACWU, 2016). In addition, a Request for Emergency Authorization associated with the joint application was submitted, and emergency authorization was received on September 10, 2016 (NMOSE, 2016). The application and emergency authorization request were filed jointly because of the nature of the existing permitted rights between the DOE and the LACWU (U.S. DOE and LACWU, 2016).

The application requests a change in purpose of use for groundwater to add groundwater remediation and additional groundwater points of diversion (PODs) to be used for control and future characterization of hexavalent chromium-contaminated groundwater at LANL (U.S. DOE and LACWU, 2016). The application calls for 24 additional PODs (3 extraction wells, 6 injection wells, and 15 monitoring wells). The volume of water for this application is 679 ac-ft/yr (U.S. DOE and LACWU, 2016), and LANL also plans to file for return credits from the OSE.

Operation of the additional PODs will not impair or increase the appropriation of water above the existing permitted water rights between DOE and the LACWU (5,541.3 ac-ft/yr total) (U.S. DOE and LACWU, 2016). On September 10, 2016, the OSE approved the request for Emergency Authorization and issued Emergency Authorization, RG-00485 et al. (NMOSE, 2016).

~~Using 679 ac-ft/yr of the DOE-owned water rights for the LANL chromium project leaves 983.39 ac-ft/yr of DOE-owned water rights.~~ The LACWU **continues to negotiate** ~~plans to enter into~~ a new lease with DOE for the ~~remaining 983.39~~ **full 1,662.39** ac-ft/yr, for use by all customers, including LANL **and the chromium interim measure** (Meyers, 2016).

In 2006, the OSE approved a 30-ac-ft/yr surface water diversion from Los Alamos Canyon for snowmaking**, which is included in the existing total water rights volume of 5,541.3 ac-ft/yr**. The purpose of use was changed from municipal and industrial to municipal, industrial, recreational, and snowmaking. ~~The proof of completion of works was accepted by the OSE in August 2010. The diversion could be increased up to 120 ac-ft/yr with the filing of a return flow plan, provided that the consumptive use did not exceed 30 ac-ft/yr. These water rights are referred to as the Camp May water rights (SP-1802-C). In 2009, the OSE approved an additional POD to fill a storage tank or reservoir for snowmaking at the Pajarito Ski Area. The coordinates for the new POD will be x = 1,646,410.77 and y = 1,771,027.64 (New Mexico State Plane NAD83 coordinates), within Township 19 North, Range 5 East, Section 10. In November 2014, the OSE approved an extension of time for submitting proof of completion of works, and proof of application of water to beneficial use is due to the OSE by September 30, 2017.~~

4.1.2 San Juan-Chama Surface Water Rights

Implementation of a project to use San Juan-Chama Project water will help to diversify the Los Alamos County water supply, both geographically and from a water rights perspective. The San Juan-Chama Project surface water originates in the Colorado River Basin and provides a source of supply that is geographically separate from the regional aquifer near Los Alamos. This geographic separation will be a benefit~~,~~ should there be expanded water quality contamination issues in the local groundwater in the future. Additionally, as a federal project, San Juan-Chama Project water contracts are not subject to OSE priority issues, although they may be subject to water rights

administration (discussed in Section 4.3.1 and 4.3.2). The San Juan-Chama Project water rights may also be subject to shortage sharing on a pro rata basis among all contractors in drought years, as discussed in Section 4.3.3. Even with some drought vulnerability, having a separate source of supply could help to provide back-up supply~~,~~ if contamination or water rights issues affect the use of the regional aquifer.

Los Alamos County has contracted water rights with the U.S. Department of the Interior Bureau of Reclamation for 1,200 acre-feet of San Juan-Chama Project surface water, which flows into the Rio Grande through a series of tunnels, conveyance channels, and reservoirs. ~~Los Alamos County has a service contract for 1,200 acre-feet of San Juan-Chama Project surface water, which flows into the Rio Grande through a series of tunnels, conveyance channels, and reservoirs. The current contract has an expiration date of 2017. Los Alamos County's San Juan-Chama service contract was converted to a repayment contract, which eliminates expiration dates and the need to renegotiate and renew the contract. Under the amended repayment form of contract, the annual payments are viewed as repayment of Los Alamos's allocated construction cost obligation instead of annual water service charges, as was the case under the former water service form of contract (USBR, 2007).~~**Los Alamos County's San Juan-Chama contract was converted from a service contract to a repayment contract in October 2006, and the LACWU completed repayment of the contract (Los Alamos County's share of the San Juan-Chama Water Project construction costs) in December 2015. Under the current contract, remaining payments are for operation, maintenance, and replacement costs only (SJ-C Project Contract No. 05-WC-40-560).**

A final preliminary engineering report (PER) was completed for the LACWU San Juan-Chama **Project** water supply project in September 2012. The PER evaluated five alternatives for diverting, treating, and conveying the San Juan-Chama Project water and **recommended**~~selected~~ the alternative that called for the installation of three wells in White Rock (CDM Smith, 2012). Under this alternative, groundwater that would have naturally discharged to the river would be pumped, and the San Juan-Chama **Project** water would replace the pumped groundwater in the river (CDM Smith, 2012). This alternative would not require treatment above disinfection, and the proposed well locations would allow for connection to the water system at an existing booster station (CDM Smith, 2012). ~~Public concerns have~~

~~been raised over the proposed well locations, and t~~**T**he Los Alamos County Council advised that **further study of alternatives and** an environmental assessment be completed before the project moves forward (LACWU, 2014).

The environmental assessment will provide an opportunity to re-evaluate specifics of the project design in light of environmental and public concerns. In July 2014, the Utilities Manager recommended delaying further action on the San Juan-Chama Project diversions until the 40-year water plan update has been completed (LACWU, 2014). **Through the environmental assessment and further planning processes, LACWU will need to consider the benefits of the separate San Juan-Chama Project water supply in relation to costs and other concerns, and to determine when and if to construct a project that would bring this water online.** ~~Bringing the San Juan-Chama Project water online would diversify the water supply, helping the LACWU to mitigate any future effects due to contamination of existing wells and/or climate change.~~

4.2 Water Rights Administration

As part of the planning process, it is important to view the LACWU's water rights in the larger context of the administrative and other legal considerations that could affect the LACWU's ability to use and divert its water rights in any given year. This section discusses the administrative policies currently or potentially affecting the LACWU's water rights; Section 4.3 assesses the potential risks to those water rights.

4.2.1 Rio Grande Compact

Water in the Rio Grande is governed by the Rio Grande Compact, an agreement entered into by New Mexico, Texas, and Colorado in 1939 and approved by the United States Congress and the State of New Mexico (NMSA 72-15-23). The Compact applies to the use of surface water of the Rio Grande, from its headwaters in Colorado to Fort Quitman, Texas, by each of the three states. Each upstream state is required to make a surface water delivery to its downstream neighbor. The volumes of water required to be delivered to New Mexico and Texas are calculated based on upstream flows, and an annual accounting is conducted to determine each state's actual deliveries in relation to that delivery obligation and the resulting credits or debits (over- or under-deliveries), which are carried over from year to year.

New Mexico's Compact delivery requirements are based on an inflow-outflow schedule where inflow is measured at the Rio Grande at Otowi Bridge near San Ildefonso, NM gage (Otowi gage) east of Los Alamos. Because of the Otowi gage's role in determining delivery amounts, the State Engineer has a long-standing administrative practice of not permitting a change in point of diversion from one side of the gage to the other, whether by sale or by lease (Cartron et al., 2002). This requirement places a significant restriction on the water rights market, and coupled with the fact that few pre-1907 water rights are available for purchase, means that purchasing water rights, whether for municipal use or offsets (Section 4.2.4), will be a significant challenge. Additionally, even if a willing seller can be identified, water rights transfers on the Rio Grande are routinely protested and can require expenditure of significant technical and legal fees.

4.2.2 Protection of Senior Water Rights

As discussed above, the State of New Mexico adheres to the prior appropriation system for water rights administration. This approach is based on a "first in time, first in right" concept, whereby the water right holder with a priority date senior to other rights can exercise that right to the detriment of a right with a junior priority date. When senior water right holders are unable to fully exercise their right due to diversions by junior water right holders, they can make a priority call on a river (including stream-connected groundwater rights). This call, which would be administered by the OSE, would require junior users to cease pumping or diverting so that the senior rights could be fulfilled.

To date, priority call-based administration has rarely happened; however, most rivers and connected groundwater basins are over-appropriated. Even though the Rio Grande Basin has not been adjudicated (a legal process that establishes the amounts and priority dates of all surface water and groundwater rights in a stream system), LACWU water rights are junior to a significant number of downstream senior water rights, such as the Middle Rio Grande Conservancy District, that could be impacted by additional depletions upstream. With additional growth and other pressures, such as endangered species requirements, active administrative protection of senior water rights in groundwater basins and rivers is likely to become more frequent over the 40-year planning horizon.

4.2.3 Active Water Resource Management

In an effort to develop more flexible tools for administering water rights in New Mexico, the OSE adopted Active Water Resource Management (AWRM) regulations (NMAC 19.25.13.1 to 13.49) in December 2004. The AWRM legislation creates an administrative framework within which the OSE will establish water master districts, appoint water masters for those districts, and develop district-specific water rights administration regulations.

The OSE has established seven priority basins for AWRM (NMOSE, 2004a), including the Lower Rio Grande. Over time, the OSE may extend the AWRM program to the Upper Rio Grande and develop regulations that will address administration of water rights, although the regulations will not become final until the Rio Grande Basin has been adjudicated (NMOSE, 2004b). In the Pecos River and connected groundwater basins, the OSE has developed AWRM regulations that clearly lay out several approaches to priority administration, all of which allow for curtailment of junior water rights to protect senior water rights.

4.2.4 Rio Grande Offset Requirements

In accordance with statutory authority and case law, the OSE manages the Rio Grande surface water and groundwater basins conjunctively and considers Rio Grande surface water to have been fully appropriated as of the year 1939 (the year the Rio Grande Compact was signed) (NMOSE, 2000). This means that the OSE recognizes the groundwater-surface water connection and conditions permits so that new groundwater appropriations will not increase surface water depletions and thereby affect senior water right holders. Specifically, the OSE requires applicants for groundwater rights to purchase and retire valid water rights in an amount equivalent to the effect the groundwater withdrawals will have on the river.

Previously, the OSE didn't require applicants to immediately begin purchasing and retiring water rights. However, current policy, which was upheld in a case involving the City of Rio Rancho, specifies that offsets must be in place to counteract the effect of pumping on the river. A phased acquisition of the offsets is possible, especially if the applicant is not planning to immediately pump up to the full permitted amount; however, offsets for impacts must be in place by the time those impacts affect the river (i.e., increase depletion).

The OSE has further clarified this policy, stating that offset rights may be valid only for pre-1907 rights, a pre-1907 surface water right previously transferred into a well, or an existing groundwater right with a priority date older than May 31, 1939, the date of the Rio Grande Compact (NMOSE, 2006). This policy limits the number of water rights that could be considered for offset requirements.

4.2.5 Rio Grande Declared Underground Water Basin

The Rio Grande Underground Water Basin covers 26,209 square miles along the Rio Grande in the center of the state. Although specific administrative criteria exist for the area near the river in the Middle Rio Grande (the reach from Cochiti to Socorro) (NMOSE, 2000), the OSE has no unique administrative criteria for the portion of the Rio Grande Basin near Los Alamos County. The OSE evaluates applications for water rights in this reach, including a change in point of diversion or place and purpose of use of water rights, to determine whether the granting of the application will impair existing water rights or be detrimental to the public welfare or contrary to the conservation of water.

4.3 Risks to Los Alamos County Water Rights

Although the LACWU owns a specific volume of water rights, the legal right to divert and use those rights in any given year can be affected by the rights of other water rights holders and even as a result of interstate compacts or other agreements governing interstate waters. These risks are discussed in the following subsections.

4.3.1 Protection of Senior Water Rights

As discussed in Section 4.2.2, the LACWU could potentially be subject to limitation of its water rights in order to protect senior water rights. A significant yet unquantified number of the water rights on the Rio Grande are senior to those of the LACWU. In the event that the OSE begins administering priorities based on a call or based on AWRM regulations, the LACWU could be required to limit its use or to use some of its San Juan-Chama Project water to mitigate the effects of its diversions on senior water right holders. Until the OSE conducts a hydrographic survey and adjudicates the Rio Grande Basin, however, it is impossible to quantitatively evaluate the LACWU's susceptibility to curtailment of its water rights under priority administration.

4.3.2 Rio Grande Offset Requirements

Even without a priority call, the OSE could potentially require the LACWU to offset its current pumping to avoid impairment of pre-1939 senior water rights holders. For example, should the LACWU submit an application to change the POD or purpose and place of use of a water right, the OSE would evaluate that application with respect to impairment, public welfare, and conservation. Because the LACWU's use of its water rights increases depletions on the Rio Grande, thereby impacting senior water rights holders, the OSE could require offsets due to impairment even though the existing permits have no offset requirement. As discussed in Sections 4.2.4 and 6, the LACWU could satisfy those offset requirements by using San Juan-Chama Project water as offset rights or by purchasing water rights. However, willing sellers of pre-1907 water rights are difficult to find, and many municipalities have encountered difficulties in identifying water rights to purchase.

The LACWU might also be able to reduce the number of offset water rights the OSE would require by applying to the OSE for return flow credit for the treated wastewater effluent it returns to the Rio Grande. Credit for return flow to the aquifer is also possible. Both types must be demonstrated in a return flow plan subject to OSE approval (NMOSE, 2000, Section 3).

4.3.3 Navajo Water Rights Settlement Provisions

The original legislation authorizing the San Juan-Chama Project includes provisions for sharing shortages among beneficiaries of the project (76 Stat. 96, PL 87-483). The Northwestern New Mexico Rural Water Projects Act (123 Stat. 1372, PL 111-11) was enacted on March 30, 2009, and Section 10402 amends Public Law 87-483, providing additional detail about shortage sharing. The Navajo Water Rights Settlement, which was approved in August 2013, defines flows and other requirements in a manner that could result in shortages to the San Juan-Chama Project. These shortages would likely be shared on a pro rata basis among all contractors. Although conditions giving rise to shortage sharing may be rare, implementation of the act could nonetheless reduce the quantity of San Juan-Chama **Project** water available to contractors in some years. **Predicted changes in San Juan-Chama Project water allocations resulting from climate change are discussed in Section 7.**

4.4 Acquisition of New Water Rights to Meet Future Demand

As discussed in Section 6, the LACWU could be required to obtain additional water rights to meet future water demand, or to move points of diversion for existing rights if contamination affects supply wells (Section 3). As the Rio Grande basin is considered to be fully appropriated, the LACWU would have to purchase water rights to meet future needs, which may not be feasible given water market limitations. The LACWU should consider maximizing use of its existing water rights through conservation or reuse and through maximizing return flow credits.

4.5 Los Alamos National Laboratory

In September 2009, LACWU signed an agreement with DOE to provide water service to LANL for the period October 1, 2009 through September 30, 2019, and the County will be the sole water provider for LANL at least through the term of this agreement. The contract indicates that DOE will provide support to LACWU for implementing use of San Juan-Chama Project water. The contract also identifies other terms of service such as meter testing, access to wells for hydrologic monitoring, water storage for firefighting, and water rates. Estimated quantities of water to be provided to LANL range from 412,000,000 gallons (1,264 acre-feet) in 2010 to

572,000,000 gallons (1,743 acre-feet) in 2019. The contract recognized that predicting future water needs for LANL is difficult and included provisions for notification if the future water needs were expected to increase by more than 50,000,000 gallons (153 acre-feet) per year. The agreement also includes a curtailment plan with provisions to reduce water use during times of shortage. LANL provided a 10-year water demand forecast (fiscal year 2017 through fiscal year 2027) in support of this plan update, with values ranging between 254,610,000 gallons (781 acre-feet) and 490,510,000 gallons (1,505 acre-feet) (Ballesteros Rodriguez, 2016) (Section 5).

5. Water Demand

In order to assess the LACWU's projected future demand for water, this section discusses current and historical water uses (Sections 5.1 and 5.2) and demographic and economic trends (Section 5.3). Based on this information, projected future water demands for the region are presented in Section 5.4.

5.1 Historical Use

Groundwater and surface water have supplied the community of Los Alamos for 60 years. Figure 5-1 and Table 5-1 show the metered diversion amounts from wells and surface water from 1947 through 2015. Table 5-2 shows water diversions and population by decade from 1950 through 2010.

Between 1950 and 2000, population increased in Los Alamos County, and since 2000, the population has decreased by approximately 2 percent (Table 5-2). Diversions also increased between 1950 and 1990, due to increased population, and decreased between 1990 and 2010, partially due to water conservation efforts.

Diversions fluctuate significantly from year to year due in part to fluctuating levels of precipitation (Figure 5-2). For instance, in 2012 precipitation was 8.76 inches, and total system demand was 156 gallons per capita per day (gpcd). In 2014, precipitation was 16.82 inches, and total system demand was 135 gpcd.

Demand from the LANL's operations also impacts the magnitude of diversions. Figure 5-3 shows the monthly variation in water use in 2014, with an annual diversion for LANL of 29 percent and 71 percent for the LACWU. While demand in summer months triples for the LACWU due to outdoor watering, the monthly range in water use by LANL varies less. In 2014, LANL used the greatest volume of water in November.

The LACWU has been using the GPCD (gallons per capita per day) calculator developed by the OSE to calculate per capita use since 2007. This allows the County to evaluate water use apart from the bulk water sales to LANL. The per capita values calculated for the total water system demand and by sector for 2007 through 2014 are presented on Table 5-3. Since 2007, total system water demand has ranged between 133 and 157 gallons per day. For the single-family residential sector, per capita demand has ranged between 91 and 120 gallons per day.

Table 5-3. Los Alamos County Per Capita Demand

Year	Sector			Annual System Total
	Single-Family Residential	Multi-Family Residential	Industrial, Commercial, and Institutional	
2007	100	55	32	153
2008	105	55	29	157
2009	91	51	26	137
2010	105	53	29	133
2011	117	59	31	149
2012	120	60	31	156
2013	102	56	22	137
2014	104	54	23	135

Sources: Los Alamos County (2007-2013 data)
LACWU, 2015 (2014 data)

5.2 Current Water Use

The total population served by the LACWU includes the 17,950 residents estimated to live within Los Alamos County in 2010, primarily in the communities of White Rock and Los Alamos.

Table 5-4 shows the monthly and annual billing data by sector for 2010 through 2015. The total system water demand by LACWU (excluding LANL sales) was 135 gallons per day in 2014. In 2014, the per capita demand for the single-family residential sector was 104 gallons per day (Table 5-3). As shown in Figure 5-3, water use increases in the summer months for landscape watering.

In 2014, single-family residential water use accounted for 44.7 percent of LACWU water use (excluding LANL), and multi-family residential water use accounted for 11.6 percent of LACWU water use. Industrial, commercial, and institutional water use accounted for 14.8 percent of the LACWU's water use, with LANL sales accounting for 28.8 percent of the billed totals (Figure 5-4a). In 2015, single-family residential water use accounted for 43.4 percent of LACWU water use (excluding LANL), and multi-family residential water use accounted for 11.5 percent of LACWU water use. Industrial, commercial, and institutional water use accounted for 16.2 percent of the LACWU's water use, with LANL sales accounting for 28.9 percent of the billed totals (Figure 5-4b).

Comparing the billed totals (Table 5-4) to total diversions (Table 5-1), there was a total of 156 million gallons of non-revenue water in 2014 and 185 million gallons of non-revenue water in 2015. Non-revenue water can include unmetered deliveries~~ (when a meter is broken)~~, leaking pipes in the delivery system, and periodic flushing of the system. The LACWU has performed a water audit following the International Water Association/American Water Works Association (IWA/AWWA) water audit methodology using data for fiscal year 2014 (Table 5-5). This analysis found a total of 86.4 million gallons in non-revenue water (LACWU, 2015). (The large discrepancy between the two results may be due to the different time periods, that is, calendar versus fiscal years).

Indoor watering is estimated as the average water demand for December, January, and February. Comparing the average summer (June, July, and August) and winter demands for the single-family residential sector in 2014, approximately 66 percent of the average summer demand was used outdoors, with the remaining 34 percent used indoors. Comparing the average summer and winter demands for the multi-family residential sector in 2014, approximately 42 percent of the average summer demand was used outdoors and 58 percent was used indoors. Comparing the average summer and winter demands for the single-family residential sector in 2015, approximately 59 percent of the average summer demand was used outdoors, with the remaining 41 percent used indoors. For the multi-family residential sector in 2015, approximately 28 percent of the average summer demand was used outdoors and 72 percent was used indoors.

For more than 70 years, Los Alamos County has used treated wastewater to irrigate turf for a golf course and parks during summer months. The golf course built in Los Alamos in the 1940s has never been irrigated with anything but effluent. As discussed in Section 2, the LACWU has a non-potable water system that uses treated wastewater effluent for irrigation of several areas in Los Alamos and White Rock, for fire protection, and for snow making at the Pajarito Mountain Ski Area. Table 5-6 shows the monthly volume of treated effluent that was reused in 2010 through 2015; almost 72 million gallons was reused in 2015.

Table 5-6. Water Reuse, 2010-2015

Month	Reuse (gallons)					
	2010	2011	2012	2013	2014	2015
January	81,600	104,800	0	0	0	0
February	107,100	96,900	0	0	1,012,477	0
March	145,200	7,369,900	5,638,165	3,867,063	4,544,270	2,311,815
April	11,178,612	14,612,700	9,032,844	11,552,192	7,256,932	10,895,334
May	11,427,200	19,023,600	17,904,886	20,165,106	14,125,782	5,531,325
June	23,262,400	22,388,800	24,743,657	21,739,135	18,148,354	14,975,357
July	12,140,000	21,091,000	16,050,773	9,850,279	8,197,735	2,916,420
August	5,531,600	7,950,983	18,097,000	10,504,260	12,815,537	12,186,453
September	18,847,100	4,660,344	13,174,880	7,470,298	16,036,338	16,723,354
October	8,367,300	6,392,581	11,028,777	6,106,035	7,517,914	6,133,506
November	249,300	1,293,627	4,256,322	876,738	1,651,125	321,250
December	126,800	0	0	0	0	77
Total	91,464,212	104,985,235	119,927,304	92,131,106	91,306,464	71,994,891
Total (acre-feet)	281	322	368	283	280	221

5.3 Population Projections

The Bureau of Business and Economic Research (BBER) at the University of New Mexico has prepared multiple population projections for Los Alamos County, by examining the growth rate in the previous decades, the age of the population, current rates of in-migration, and death and birth rates (BBER, 1996, 2000). Because Los Alamos County's growth rate slowed significantly in the 1980s and 1990s, the 1996 and 2000 projections for growth were very small, showing an increase of only about 3,000 people (Table 5-7). The previous long-range water supply plan (DBS&A, 2006) presented the BBER projections, but did not use them to project demand, because they did not take recent land transfers and plans for growth into account. Instead, the 2006 projections were based on the growth scenario identified in the August 2004 New Mexico First Town Hall (Fruth, 2004), which showed that a full build-out could occur rapidly, increasing the population to 25,000 people in 2020 (Table 5-7). Contrary to these projections, the population in Los Alamos County actually declined between 2000 and 2010 (Table 5-2), largely due to a reduction in the work force at LANL.

Table 5-7. Population Projections for Los Alamos County 2000 through 2060

Year	Population Census	BBER (1996)	BBER (2000) [a]	Fruth (2004)	BBER (2012)	2014 Population Projections [b]	
						Low	High
2000	18,343	19,317	19,234	18,359	—	—	—
2004	18,796	19,647	19,505	18,796	—	—	—
2005	18,407	19,729	19,573	19,189	—	—	—
2010	17,950	20,123	19,913	21,155	—	—	—
2015	NA	20,601	20,318	23,120	—	—	—
2020	NA	21,079	20,722	25,086	18,063	17,988	20,000
2030	NA	21,758	21,289	—	17,880	17,789	20,812
2040	NA	22,141	21,627	—	17,210	17,123	21,447
2050	NA	22,291	21,761	—	—	16,480	21,874
2060	NA	22,404	21,854	—	—	15,863	22,092

[a] Based on BBER's (2000) "most likely" scenario
[b] Poster Enterprises, 2014

— = Population not estimated for this decade
NA = Not yet available

The State of New Mexico prepared updates of the 16 regional water plans that were published in 2016, and population projections were prepared by a market research consultant as a part of this effort (Poster Enterprises, 2014). BBER released new population projections in November 2012 that project population by decade through 2040, and these projections were extended by the ISC market research consultant in 10-year increments through 2060 using the BBER growth rate trends as a basis for the extensions. Interviews were conducted to obtain input on growth trends and potential water conservation measures, with the feedback being used to refine the projections. Two population projections were developed for Los Alamos County, with the high forecast assuming that the County's goal of a population of 20,000 is achieved in 2020, with a very low rate of growth thereafter, and the low forecast closely tracking the BBER projections (Table 5-7).

The high and low population projections that have been developed for Los Alamos County as part of the regional water planning effort have been used as the basis for projecting demand as part of the updated long-range water supply plan. In addition, a separate water demand forecast was obtained from LANL (Table 5-8). There is considerable uncertainty in developing forecasts for LANL over a 40-year horizon, because its mission and size is dependent on political and national security decisions that could result in a wide range of possible activity.

Table 5-8. Los Alamos National Laboratory 10-Year Water Forecast

Fiscal Year	Estimated Annual Consumption (gallons)	Water Demand [a] (acre-feet)
2017	254,610,000	781
2018	262,160,000	805
2019	268,950,000	825
2020	299,110,000	918
2021	363,180,000	1,115
2022	380,760,000	1,169
2023	387,690,000	1,190
2024	389,650,000	1,196
2025	411,700,000	1,263
2026	482,980,000	1,482
2027	490,510,000	1,505

Source: Ballesteros Rodriguez, 2016

[a] The LACWU provides the LANL water supply, so these demands have been included on Table 5-9.

A conceptual master plan has been developed for a new development that is planned in White Rock (Baer, 2016). The A-19 tract development will have a maximum residential density of 8.7 dwelling units per acre, and a total of 160 dwelling units are proposed (Baer, 2016). This will be a private development, although the potential buyer is still in due diligence and the property still belongs to the County (Baer, 2016). The proposed A-19 tract development was not called out specifically in the ISC population projections; however, the high population projection will account for this growth. The 2010 Census reported a County population of 17,950 people and an average household size of 2.33 people (U.S. Census Bureau, 2010). Adding 160 dwelling units would add approximately 370 people, which is within the 20,000-person high projection for 2020.

5.4 Future Water Demand

DBS&A developed two projections of future water demand for the LACWU for 2020 through 2060. The projections are based on (1) the population projections developed as a part of the State of New Mexico's regional water plan update project (Poster Enterprises, 2014), (2) the total water system per capita demand for 2014 (LACWU, 2015), and (3) a separate water demand forecast that was provided by LANL (Ballesteros Rodriguez, 2016). The demand projections are shown on Table 5-9 and Figures 5-5 and 5-6. Total projected demand ranges between 3,634 and 4,841 ac-ft/yr, with the low projection showing an increase in demand between 2020 and 2030 and decreasing demand between 2030 and 2060, and the high projection showing increasing demands throughout the 40-year time frame.

The previous long-range water supply plan recommended an initial minimum goal of a 12 percent reduction in water demand (DBS&A, 2006). This was one of the long-term goals developed for the LACWU's fiscal year 2013 planning, and it was approved by the Utility Board on September 18, 2013 (Alarid, 2015). Comparing the 2006 water diversions to the more current data, this goal was met by 2014 (Table 5-1), when total diversions were 13 percent less than in 2006. Los Alamos County has a robust water conservation program (Section 8) and recently published an update to the *Energy and Water Conservation Plan* (LACWU, 2015). Further reductions in per capita demand are expected; however, to help compensate for the uncertainty of the LANL projections and ensure that the County plans for adequate future supply, further reductions in demand that may result from conservation have not been incorporated into the water demand projections **that are shown on Table 5-9 and Figures 5-5 and 5-6**.

LANL provided a 10-year water demand forecast, spanning the period of fiscal year 2017 to 2027 (Table 5-8). For the projections beyond 2027, to 2060, LANL demand was assumed to remain at the fiscal year 2027 volume. LANL also provided projections for the volume of water to be pumped as part of the chromium interim measure project. As discussed in Section 4.1.1, an application for permit to change an existing water right was filed jointly by DOE and the LACWU in May 2016, in support of the chromium interim measure project that will run through December 2023 (Rodriguez, 2016), and emergency authorization was received on September 10, 2016 (NMOSE, 2016). The volume of water for this application is 679 ac-ft/yr (U.S. DOE and LACWU, 2016). In the absence of any estimates for the volume of water that will be needed to support the future chromium remediation project, the chromium interim measure volume is assumed to be needed through 2060. This volume has not been included in the water demand projections (Table 5-9), as the water will be pumped separately and will not be supplied by the LACWU. Figures 5-5 and 5-6 present the low and high water demand projections and illustrate the LACWU and DOE water rights volumes including and excluding the volume needed for the chromium interim measure project. The projections assume that the water supply remains available in terms of water rights and contamination**, and do not take into account the possibility of treating and using contaminated groundwater, which would be possible (with public support)**.

Table 5-10 presents a range in conservation savings that could be achieved with further reductions in the LACWU's 2014 per capita demand of 135 gpcd, ranging from a 5-gpcd savings to a 45-gpcd savings (the reduction necessary to match the City of Santa Fe's 2015 per capita value of 90 gpcd). Achieving the City of Santa Fe's 2015 per capita value would be equivalent to a water conservation savings of between 800 and 1,114 acre-feet per year, based on the population projections for 2060.

Table 5-10. Potential Water Conservation Savings

Per Capita Water Use (gpcd)	Reduction from 2014 Per Capita Use (%)	Annual Conservation Savings: Low Population Projection (acre-feet) [a]	Annual Conservation Savings: High Population Projection (acre-feet) [a]
130	4	89	124
120	11	267	371
110	19	444	619

Per Capita Water Use (gpcd)	Reduction from 2014 Per Capita Use (%)	Annual Conservation Savings: Low Population Projection (acre-feet) [a]	Annual Conservation Savings: High Population Projection (acre-feet) [a]
100	26	622	866
90 [b]	33	800	1,114

[a] Annual water conservation savings that would be achieved based on reductions from the 2014 per capita value of 135 gallons per day in 2060.
[b] This value is equivalent to the City of Santa Fe's per capita demand in 2015.

Figures 5-7 and 5-8 show low and high water demand projections, assuming that the LACWU water demands are reduced in the future due to conservation (the LANL water demands remain unchanged). Table 5-11 shows the data that are plotted on Figures 5-7 and 5-8. The same low and high population projections that are used for Figures 5-5 and 5-6 have been used for both scenarios, but the per capita demand is assumed to be reduced from 135 gpcd (the 2014 value) to 130 gpcd by 2030, 120 gpcd by 2040, 110 gpcd by 2050, and 100 gpcd by 2060.

6. Reconciliation of Supply with Demand

To ensure that adequate water resources are available to meet future demands, the LACWU must take into consideration the quantity of supply available, limitations to the supply due to water quality concerns, and the legal ability to use the available supply (water rights).

The physical water supply is discussed in detail in Section 3. Given the amount of water in storage and the large saturated thickness in relation to observed rates of water level decline, and assuming that the LACWU remains the primary diverter in the area, the LACWU is expected to have an adequate quantity of supply to meet the projected demands over a 40-year time frame. Wells may need to be replaced or moved to new locations, but it is expected that the available supply somewhere in the vicinity of Los Alamos will be adequate to fulfill the LACWU's existing water rights. Ongoing monitoring of water levels and aquifer testing is recommended to confirm that threats to water supply do not develop.

As discussed in Section 3.2.2, there is some risk to the supply due to contamination, and if the LACWU's supply wells were to be impacted, they could become unusable over the 40-year plan horizon **(without treatment)**. The hexavalent chromium plume near several supply wells will continue to be monitored as the interim measure is implemented, and the presence of this contamination highlights why contingency planning for potential impacts to water supply wells is important.

If contaminant levels exceed applicable standards in any supply well, the LACWU could potentially redrill the well in an alternate location and continue to pump the same volume, provided that the transfer of the diversion point is approved by the OSE. Potential locations for replacement wells have not been identified, but the best locations would be upgradient from contaminant sources, accessible to existing water supply infrastructure, in productive zones, and separate from the influence of other pumping wells. The LACWU filed an application for an additional point of diversion (O**towi Well No. -**2) on April 28, 2016. This well will be drilled to supplement the system's existing production wells in anticipation of declining production rates from existing wells that are nearing the end of their service life (Alarid, 2016), rather than as a replacement well for any future contamination of well(s) that could occur.

As discussed in Section 4.1.1, DOE owns 30 percent (1,662.39 ac-ft/yr) of the total groundwater rights (5,541.3 ac-ft/yr), and the long-term lease that was in place for LACWU to use these water rights expired in 2011. A portion of the volume of the DOE-owned water rights (679 ac-ft/yr) will be used for the chromium interim measure project**; however,** ~~, and~~**the** LACWU **is pursuing**~~plans to~~ **a** lease **for** the ~~remaining~~ **full** DOE**-owned water rights volume**~~ water rights~~ (**1,662.39**~~983.39~~ ac-ft/yr)**.**~~;~~ ~~however, t~~**T**he lease is not yet in place. If DOE declines to lease their water rights to the LACWU, the groundwater rights volume that the LACWU has access to will be reduced to 3,878.91 ac-ft/yr.

The LACWU-owned groundwater rights volume **(3,878.91 ac-ft/yr)** is not adequate to meet the LACWU plus LANL low-water-use projections for 2030, 2040, 2050, or 2060, but the 2020 low-water-use projections can be met with this volume (Figure 5-5). The LACWU-owned groundwater rights volume is not adequate to meet any of the LACWU plus LANL high-water-use projections (Figure 5-6). **With increased conservation in the amounts shown on Table 5-11, the LACWU-owned groundwater rights volume is not adequate to meet the LACWU plus LANL low-water-use projections for 2030, but the 2020, 2040, 2050, and 2060 low-water-use projections can be met with this volume (Figure 5-7). With increased conservation, the LACWU-owned groundwater rights volume is not adequate to meet any of the LACWU plus LANL high-water-use projections (Figure 5-8).** In the event that the remaining DOE water rights are not leased to the LACWU**,**~~ and~~ the LACWU continues to be the sole water provider for LANL, **and the high population projections are realized, even with significant additional conservation** the LACWU will need to implement a project to bring their San Juan-Chama **Project** water online. Additional discussion of contaminant and water rights risks is presented in Sections 3.2.3 and 4.3, and recommendations for responding to these risks are discussed in Section 9.

As discussed in Section 5.4, both low- and high-water-use projections were developed based on LACWU and LANL growth projections made for the current regional water plan updates. To evaluate the gap between the projected demands and the available supply, two scenarios were considered, as discussed in Sections 6.1 and 6.2.

6.1 Scenario 1: Low-Water-Use Projection and Supply Available to Fulfill Water Rights

The total (LACWU plus LANL) projected water use under the low-water-use scenario is estimated to increase from the actual 2010 water demand of 3,616 ac-ft/yr to 3,634 ac-ft/yr in 2020 and 4,191 ac-ft/yr in 2030 and then decrease to 3,900 ac-ft/yr by 2060 (Table 5-9, Figure 5-5). In this scenario, total projected demand can be met by the existing groundwater rights, assuming that the LACWU will lease the DOE groundwater rights ~~that will not be used for the chromium interim measure project~~. The total low-water-use projections are less than the volume of LACWU- and DOE-owned groundwater rights remaining after subtracting the volume that will be used for the chromium **interim measure** project (4,862.3 ac-ft/yr). It is also assumed that the LACWU can continue to produce water under these water rights, recognizing that either treatment or moving of wells to alternate uncontaminated locations may be required to fulfill those water rights.

6.2 Scenario 2: High-Water-Use Projection and Loss of Water Rights

The total (LACWU plus LANL) projected water use under the high-water-use scenario is estimated to increase to 3,938 ac-ft/yr by the year 2020 (Table 5-9, Figure 5-6) and to further increase to 4,841 ac-ft/yr by 2060. In this scenario, total projected demand can be met by the existing groundwater rights, assuming that the LACWU will lease the DOE groundwater rights ~~that will not be used for the chromium interim measure project~~. The total high-water-use projections are less than the volume of LACWU- and DOE-owned groundwater rights remaining after subtracting the volume that will be used for the chromium **interim measure** project (4,862.3 ac-ft/yr); however, the projected water demand in 2060 is within 21.3 ac-ft/yr of this water rights volume.

As discussed in Section 4.3.2, there is some risk that if wells need to be moved or other changes are needed that require OSE approval, additional water rights may be required to offset pumping impacts on the Rio Grande. If additional water rights could not be purchased and transferred to the Los Alamos area, a potential scenario given extended drought conditions and other growth pressures on the Rio Grande, the San Juan-Chama **Project** water rights might need to be used to offset pumping effects, in which case physical diversion of the San Juan-Chama **Project** water would not be possible.

In the event that ~~This scenario envisions a situation where~~ a portion of the groundwater supply is contaminated, ~~necessitating the relocation of~~ 1,200 acre-feet of groundwater diversions **will need to be relocated and** ~~. The scenario further assumes that~~ the OSE **will** require the impacts to the Rio Grande to be offset in an amount equal to the production of the new wells**.** **To meet this requirement,** ~~necessitating the use of~~ San Juan-Chama **Project** water **would be needed** ~~in an equal amount~~ to offset the pumping. ~~In effect, the groundwater rights would be diminished.~~

The high water demand projection with a loss of water rights scenario assumes that the LACWU will lease the **full volume of** DOE groundwater rights**, and that the volume** ~~that will~~ not be**ing** used for the chromium interim measure project **will be available for use**. Under this scenario, there is a gap between the diminished groundwater supply and projected demand starting in 2030 that would need to be addressed, either by bringing the San Juan-Chama Project water online or through reductions in demand (water conservation). Taking into account the volume of DOE groundwater rights that will be used to support the LANL chromium interim measure project, this gap reaches **1,146**~~500~~ ac-ft/yr by 2060 ~~(Figure 6-1)~~.

7. Climate Change

One of the goals of the LACWU water resource planning effort is anticipating and preparing for potential climate change impacts. For water resources planning, it is important to understand both natural variations in climate and variations that may result from anthropogenic climate change. This section includes information on natural climate variability (Section 74.1), anticipated changes in temperature and precipitation due to climate change (Section 74.2), potential impacts of climate change in the Los Alamos area (Section 74.3), and recommendations for mitigating climate change impacts (Section 74.4).

7.1 Natural Climate Variability

The climate of Los Alamos County naturally exhibits variability in precipitation and temperature, including both seasonal and annual variations. Weather patterns in the southwestern United States, including the Los Alamos area, are affected by several natural cycles:

- *El Niño/La Niña:* El Niño and La Niña are characterized by unusually warm and unusually cool temperatures, respectively, in the equatorial Pacific. Years in which El Niño is present are more likely to be wetter than average in New Mexico, and years with La Niña conditions are more likely to be drier than average.

- *The Pacific Decadal Oscillation (PDO):* The PDO is a long-lived pattern of climate variability caused by shifting sea surface temperatures between the eastern and western Pacific Ocean that cycle approximately every 20 to 30 years. Warm phases of the PDO (shown as positive numbers on the PDO index) correspond to El Niño-like temperature and precipitation anomalies (i.e., wetter than average), while cool phases of the PDO (shown as negative numbers on the PDO index) correspond to La Niña-like climate patterns (drier than average). It is believed that since 1999, Los Alamos County has been in the cool phase of the PDO.

- *The Atlantic Multidecadal Oscillation (AMO):* The AMO refers to variations in surface temperatures of the Atlantic Ocean which, similarly to the PDO, cycle on a multi-decade frequency. The pairing of a cool phase of the PDO with the warm phase of the AMO is typical of drought in the southwestern United States (McCabe et al., 2004; Stewart, 2009). The AMO has been in a warm phase since 1995 and it is possible that the AMO may be shifting to a cool phase, but the data are not yet conclusive. LANL has been doing statistical analyses to evaluate the correlation between the AMO and warming temperatures and has concluded that anthropogenic effects account for two-thirds of the post-1975 global warming, while the AMO accounts for one-third of the effect (Chylek et al., 2014).

These natural cycles and other short-term meteorological conditions lead to considerable annual and monthly variability in temperature and precipitation.

7.2 Changes in Temperature and Precipitation

In addition to the natural variability in temperature and precipitation, there is significant research indicating that long-term trends, particularly in temperature, are changing. The Intergovernmental Panel on Climate Change (IPCC) is an international body that was created to assess the science related to climate change world-wide. The IPCC's most recent research efforts are summarized in the Fifth Assessment Report, which was released in September 2013.

IPCC assessments are prepared and reviewed by hundreds of scientists and provide a scientific basis for governments at all levels to develop policies related to climate change. The Fifth Assessment report indicates that globally the atmosphere and oceans have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased (IPCC, 2013). Atmospheric concentrations of greenhouse gases are rising so quickly that all current climate models project significant warming trends over continental areas in the 21st century. The IPCC report also suggests that it is extremely likely that more than half of the increase in annual surface temperature from 1951 to 2010 is explained by anthropogenic increases in greenhouse gases and other anthropogenic forcings (IPCC, 2014). Likely impacts of climate change include increased numbers of dry days and extreme events (IPCC, 2012).

In the United States, regional assessments conducted by the U.S. Global Change Research Program (USGCRP, 2015) have found that temperatures in the southwestern United States have increased and are predicted to continue to increase. Reduced snowpack and streamflow and increased drought and wildfires are anticipated impacts of climate change in the southwest (USGCRP, 2015). Recent flows in the Upper Colorado and Rio Grande were 3 to 5 percent lower during 2001 through 2010 than 20th Century average flows, and snowmelt occurred earlier (Overpeck et al., 2013).

To assess climate trends in New Mexico, the NMOSE and NMISC (2006) conducted a study of observed climate conditions over the century and found that observed wintertime average temperatures had increased statewide by about 1.5 degrees Fahrenheit (°F) since the 1950s.

More recently, the U.S. Bureau of Reclamation, with technical assistance from Sandia National Laboratories and the U.S. Army Corps of Engineers, conducted a study of the Upper Rio Grande that evaluated climate impacts in northern New Mexico (USBR, 2013). The study, entitled the Upper Rio Grande Impact Assessment (URGIA) found that average temperatures from 1971 through 2011 rose at a rate of approximately 0.7°F per decade, approximately twice the global average, for a total warming of approximately 2.5°F since 1971. Temperatures are predicted to rise an additional 4° to 6°F by the end of the century. The study additionally projected a decrease in native Rio Grande water by about a third and a decrease in tributary flow by about a quarter, increasing frequency, intensity, and duration of droughts and floods, earlier snowmelt runoff, and increased variability in the magnitude, timing, and spatial distribution of streamflow and other hydrologic variables.

A number of other studies predict temperature increases in New Mexico from 5° to 10°F by the end of the century (Forest Guild, 2008; Hurd and Coonrod, 2008; USBR, 2011).

Although there is consensus among climate scientists that global temperatures are warming, there is considerable uncertainty regarding the specific local and temporal impacts that can be expected. Predictions of annual precipitation are also subject to uncertainty, particularly regarding precipitation during the summer monsoon season in the southwestern U.S.

While attribution of individual events remains a challenge, droughts and heavy short-term precipitation in the Southwest are predicted to be more severe as human-induced climate change progresses (USGCRP, 2014). An example of extreme precipitation events occurred in September 2013 in Boulder, Colorado, where a 3-day rainfall exceeded the monthly total for any month on record and was classified as a 1,000-year event (chance of 1 in 1,000 of occurring) (NOAA Climate.gov, 2013). During the same September 2013 time period, the Los Alamos area also experienced extreme precipitation. Initial research indicates that the extreme events that occurred in Colorado in 2013 were not due to anthropogenic climate change (NOAA Climate.gov, 2014). Since extreme events occur infrequently, however, it is difficult to observe trends and conclusively attribute causes.

7.3 Impacts of Climate Change on Los Alamos County

Climate change impacts that are likely to occur in Los Alamos County based on studies of the Southwest and New Mexico in particular (Christensen et al., 2004; Hurd and Coonrod, 2008; NMOSE/NMISC, 2006; Overpeck et al., 2013; USBR, 2011, 2013; USGCRP, 2015; Williams et al., 2010) include:

- Though model predictions vary, increasing temperatures are expected to occur. Warming will continue with longer and hotter heat waves during summer months.

- Higher temperatures will result in a longer and warmer growing season, resulting in increased water demand for outdoor watering during the spring and summer months and potentially lower rates of recharge.

- Reservoir and other open water evaporation is expected to increase. This could affect the non-potable water in storage in Los Alamos Reservoir and could potentially lead to shortages of San Juan-Chama **Project** water.

- Although predictions of annual precipitation are subject to greater uncertainty “given poor representation of the North American monsoon processes in most climate models” (NMOSE/NMISC, 2006), precipitation is expected to be more concentrated and intense, so increases in the frequency and severity of flooding are projected. Due to the presence of various contaminated areas around Los Alamos due to historical LANL operations, stormwater management is a key issue for the LACWU and LANL.

- Streamflow in major rivers across the Southwest is projected to decrease ~~substantially~~ during this century, due to a combination of diminished cold season snowpack in the headwaters regions and higher evapotranspiration during the warm season. **The U.S. Bureau of Reclamation developed projections of the hydrologic impacts of modeled climate changes for the Upper Rio Grande Basin over the rest of this century and published their results in the Upper Rio Grande Impact Assessment (USBR, 2013). Their analysis included the reliability of the San Juan-Chama Project water under potential climate change scenarios. The projections suggest an increase in the month-to-month and inter-annual variability, and a somewhat more reliable supply from the San Juan-Chama Project than for the native Rio Grande supply (USBR, 2013). The results for the average total San Juan-Chama allocations were 94 percent of contracted water rights in the 2020s, 88 percent in the 2050s, and 81 percent in the 2090s (USBR, 2013), indicating that the average total San Juan-Chama Project allocation would be reduced by about 20 percent by the 2090s (USBR, 2013). To account for the**~~There is a~~ potential for reduced streamflow to result in shortages of San Juan-Chama **Project** water in some years, ~~indicating~~ **San Juan-Chama Project water**~~that it~~ should be conjunctively managed with more reliable groundwater resources.

- The seasonal distribution of streamflow is projected to change as well: flows could be somewhat higher than at present in late winter as warmer conditions lead to more winter precipitation falling as rain and less as snow, but peak runoff will be weaker due to reduced snowpack. Late spring/early summer flows are projected to be much lower than at present, given the combined effects of less snow, earlier melting, and higher evaporation rates after snowmelt. Since the LACWU relies primarily on groundwater, this is not anticipated to present a major concern for LACWU water resources, but these pressures may lead to overall added stress on the Rio Grande systems, which may

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increase vulnerability to administrative changes in junior water rights management, as discussed in Section 4 and by Kenney et al. (2008).

During the period of observed record, the Southwest has experienced two significant dry periods, the 1950s and the early 2000s, with the second drought period being warmer and producing greater water loss. The 1980s and 1990s were wetter and promoted a lot of vegetation growth, creating conditions of higher vulnerability to forest fire (NOAA, 2013). The extreme drought conditions prevalent throughout New Mexico and Los Alamos in the past 10 years have resulted in the mortality of many trees. Between 2002 and 2005, more than 90 percent of the mature piñon trees in the Los Alamos area died from a combination of drought stress and bark beetle infestation (Breshears et al., 2005, as cited in LANL, 2014a). Lower-elevation ponderosa pine and mixed conifer stands were also affected. More recently, large numbers of mature ponderosa pine are dying, apparently due to prolonged drought stress. These conditions lead to vulnerability to wildfire and post-fire flooding.

Los Alamos County has already experienced extreme wildfires and post-fire flooding since 2000:

- The Cerro Grande fire burned 47,000 acres in May 2000. The fire started as a result of controlled burning in Bandelier National Monument and directly impacted structures and vegetation in the Los Alamos area.

- The Las Conchas wildfire started on June 26, 2011 in the Jemez Mountains, approximately 10 miles west of Los Alamos, and ultimately burned approximately 156,600 acres, making it the largest wildfire in New Mexico history at the time. Fire damage in the upper portions of watersheds above Los Alamos greatly increased the risk of flash floods and flood damage in the downstream canyons (LANL, 2014a).

- On September 13, 2013, anywhere from 2.49 to 3.52 inches of rain fell at different locations around Los Alamos within a 24-hour period. All of the local canyons flooded, and some experienced substantial channel and bank erosion and widespread sediment deposition. Infrastructure, including roads, gaging stations, and other sampling equipment, was also significantly damaged (LANL, 2014a). With saturated antecedent soil conditions caused by a previous storm on September 10, the flooding that occurred during the September 12 to 13 storm damaged LANL's environmental monitoring and control infrastructure, including access roads, groundwater monitoring wells, gaging stations, and watershed controls. The damage to or impairment of flood- and sediment-control structures included a large amount of erosion in the Pueblo Canyon Wetlands, and overflow from sediment traps and retention basins in other canyons. LANL has since installed various sediment-control structures to minimize the erosive nature of stormwater runoff and to enhance deposition of sediment.

As discussed previously, while it may be difficult to determine if a specific event is caused by climate change, these are the types of impacts that the LACWU needs to continue to plan for.

7.4 Recommendations for Mitigating Impacts of Climate Change

Though it is difficult to determine whether individual events are a result of natural climate variability or climate change, it is important for the LACWU to be prepared to address variability, including drought and extreme precipitation events, and to be aware that these conditions may be both more frequent and more severe as a result of climate change. Higher temperatures and drought may contribute to increased demands for water, diminished supplies, impacts to vegetation, and wildfire risk. Extreme precipitation may damage infrastructure due to stormwater runoff and flooding, mobilize surface or shallow contaminants due to erosion, and create extreme sedimentation that can affect reservoir storage, as has occurred at Los Alamos Reservoir following the Cerro Grande and Las Conchas fires.

The following are recommendations that the LACWU could implement to prepare for long-term and severe drought, as well as for extreme precipitation events:

- Implement adaptive management as a part of the long-range water supply plan, where decisions are made sequentially over time, allowing adjustments to be made as more information is known. This approach may be useful in dealing with the additional uncertainty introduced by potential climate change.

- Use research and monitoring to fill knowledge gaps and enhance planning capabilities. Although neither will eliminate all uncertainty, they will provide significant improvements in understanding the effects of climate change on water resources and in evaluating associated uncertainties and risks required for more informed decision making (Brekke et al., 2009).

- Continue to implement and update the Los Alamos Energy and Water Conservation Plan to help reduce outdoor demands during periods of drought and to use water resources efficiently during all times.

- Conjunctively manage surface and groundwater resources. It will be important to bring surface water from Los Alamos Reservoir (and potentially ~~the~~ San Juan-Chama **P**~~p~~roject **water**) online, allowing for conservation of groundwater resources during times when surface water is available, while having provisions for meeting demand with groundwater during extreme drought periods when surface water is not available.

- Prepare for the increasing risk of large and severe wildfires. The LACWU should work with U.S. Forest Service and New Mexico State Forestry Division personnel to identify particular fire risks and vulnerabilities. Ponderosa pine and Douglas fir are particularly susceptible to drought and rising temperatures (Williams et al., 2010). An important component of wildfire planning is to work with emergency personnel on a plan to protect critical drinking water infrastructure during potential fires. The LACWU should also coordinate with LANL on its efforts to mitigate the effects of potential wildfires:

  – LANL operates a program to reduce wildfire fuels and manage forest health throughout forested areas on Laboratory and DOE property. Defensible space is created and maintained around facilities and other high-priority areas, and areas not designated as defensible space are managed for a combination of wildfire fuel reduction and forest health. The major roads within the facility continue to be thinned along the road easements to the fencelines, to provide firebreaks and improve vehicle visibility to wildlife crossing the roads (LANL, 2014a).

- Following the Los Conchas fire in 2011, high-priority areas in the canyons were armored to protect against potential flood damage (LANL, 2014a).

The U.S. EPA published the 2013 Draft National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Industrial Activities, also referred to as the Multi-Sector General Permit (MSGP), by Federal Register (FR) notice on September 27, 2013 (78 FR 59672). The MSGP requires the implementation of control measures, development of stormwater pollution prevention plans (SWPPPs), and monitoring of stormwater discharges from permitted sites. LANL conducts stormwater sampling and has implemented some flood mitigation measures. LACWU should continue to work with LANL to mitigate the risk of extreme precipitation events and flooding mobilizing contamination, which could affect the drinking water system.

Climate change modeling for the Southwest is based on varying carbon emissions scenarios, with higher rates of warming predicted with higher emissions. While Los Alamos County alone cannot significantly change regional emissions, the LACWU can contribute to reduced emissions through its energy policies, as discussed in the *Energy and Water Conservation Plan* (LACWU, 2015).

8. Water Conservation

The existing long-range water supply plan (DBS&A, 2006) included a water conservation plan, and additional documents that address water conservation have been published since that time. The LACWU published an *Energy and Water Conservation Plan* in 2013 (LACWU, 2013a), and this document was revised and reissued in 2015. The updated *Energy and Water Conservation Plan* focuses on conservation goals for the planning period of 2015 through 2019 (LACWU, 2015), and it meets the requirements of the New Mexico *Water Conservation Planning Guide for Public Water Suppliers* (NMOSE, 2013). The plan includes a water audit covering fiscal year 2014 (July 1, 2013 through June 30, 2014) (Section 5, Table 5-6), as well as the completed GPCD calculator worksheets covering 2007 through 2014 (LACWU, 2015).

~~The LACWU has a full-time conservation coordinator position, responsible for public outreach, program implementation and monitoring, and future document revisions.~~ The conservation program is implemented by customers primarily on a voluntary basis and the goals are not directed toward LANL, which falls outside of the County's jurisdiction (LACWU, 2015).

Existing water conservation program activities that are discussed in detail in the 2015-2019 Energy and Water Conservation Plan (LACWU, 2015) include:

- *Customer meter testing and replacement.* The LACWU routinely tests customer meters and replaces those that are not working properly; in FY 2015, the program goal called for replacing 350 residential water meters.

- *Large water customer usage and account review.* The LACWU completed a large water meter review project in 2011 that addressed discrepancies in the billing or metering of large customers.

- *System leak detection surveys.* The LACWU surveys 20 percent of the water system annually in an effort to identify and fix water leaks.

- *Regulatory measures.* The Los Alamos Board of Public Utilities adopted Water Rule W-8 in 2005 to prohibit water waste and implement the even/odd address watering schedule, daytime watering restrictions, and leak repair requirements.

- *Water rates.* The Los Alamos County Council approved a tiered water rate structure in July 2014 for the LACWU's single-family and multi-family residential customers.

- *County park irrigation water audits.* The LACWU **has** work**ed**~~s~~ with the County parks to conduct irrigation audits, ~~to~~ recommend irrigation scheduling and maintenance, and ~~to~~ identify any leaks or problems. ~~Baseline water use is being determined for each park, so that park managers are able to analyze trends in water use after the audit has been completed.~~ The Los Alamos County Sustainability Plan includes a goal of reducing water demand for County parks by 25 percent ~~compared to~~**of** 2012 demand by 2020 (LACWU, 2013b).

- *Residential water leak training and audits*. The LACWU participates in the nationally advertised "Fix a Leak" week, offering fix a leak demonstrations and providing water audits for high water using customers.

- *Commercial water audits.* The LACWU conservation coordinator implemented a commercial water audit program in 2012, initially conducting seven audits on facilities including a hotel, grocery store, and school campus. The program is ongoing, and each participating facility is provided with a detailed report of the audit findings and recommendations.

- *Residential water conservation outreach.* Educational materials are distributed to LACWU customers through bill inserts, feature articles, workshops, and booklets on subjects including graywater use, rainwater harvesting, xeriscape and permaculture, and energy efficiency.

- *Public school outreach.* Since 2008, the LACWU has had a contract with the Pajarito Environmental and Education Center (PEEC) to perform energy and water conservation outreach in the public schools.

- *Conservation partnerships.* The LACWU participates in numerous regional and national conservation partnerships in order to share ideas, resources, and lessons learned. Existing partnerships include EPA WaterSense (promotional partner), Alliance for Water Efficiency (charter member), New Mexico Water Conservation Alliance (member), U.S. EPA Energy Star (promotional partner), Alliance to Save Energy (member), and Los Alamos Sustainability Program (participant).

- *Residential bill revisions.* The LACWU implemented changes to the residential customer bills in 2012, and customer bills now show usage for the past 13 months, allowing for comparison of usage between the current month and the previous year. Additional revisions are being planned.

A Conservation Advisory Group was formed in 2011 ~~to assist the LACWU conservation coordinator with the development of conservation goals.~~ **and** ~~The group~~ has eight members, representing the Los Alamos Public Schools, County Parks Division, County Environmental Services Division, small commercial customers, and residential customers (LACWU, 2015). The long-term goal of the water conservation program is to achieve a 12 percent reduction in per capita water demand by 2050, as approved by the Utility Board on September 18, 2013 (Alarid, 2015). Specific actions that have been identified to assist in meeting this goal include:

- Increase water conservation education in the public schools.
- Increase adult education efforts, including outreach lectures and demonstration workshops.
- Implement residential irrigation water audits, focusing on customers with high summer water use.
- Improve Water Rule W-8 by researching its effectiveness, revising as necessary, and potentially adding enforcement capabilities.

- Implement incentives for replacement of lawns, including rebates for plant purchases and technical assistance.
- Implement the county's non-potable water master plan (Forsgren & Associates, 2013), which presents water use criteria for evaluating the efficiency of the existing non-potable water systems and for additional sites that could be potentially served by one of the non-potable water systems in the future.

The LACWU monitors the success and implementation of the Energy and Water Conservation Program annually, using activities such as evaluating data from the Cayenta billing system, completing the OSE GPCD calculator, and using the Alliance for Water Efficiency tracking tool~~. The LACWU conservation coordinator updates the Board of Public Utilities on the program's activities on a quarterly basis~~ (LACWU, 2015).

9. Recommendations

The LACWU is planning for potential future growth and increased water demands. While the groundwater supply will likely continue to produce at current rates for well beyond the 40-year planning period, issues regarding water rights and potential water quality concerns indicate that the LACWU needs to proactively plan for the future. A summary of recommendations for addressing the future water supply needs of the LACWU follows.

Water Supply (Quantity)

- Monitor water levels in the vicinity of the water supply wells and evaluate declines on a regular basis, with particular emphasis on monitoring the Guaje well field. Static water levels should also be measured in each of the active production wells on at least an annual basis.

- **Continue to examine project options and initiate an environmental assessment for San Juan-Chama Project water utilization**~~Initiate an environmental assessment for the San Juan-Chama Project~~, and evaluate whether to initiate steps toward implementation, based on the water demand projections and supply-demand gap estimates presented in this ~~report~~**plan**. Bringing the San Juan-Chama Project water online would help the LACWU address the potential for contamination of the existing wells by diversifying the water supply **both geographically and in terms of water rights**.

Water Quality/Contaminant Risk Recommendations

- Work closely with LANL and NMED regarding the ongoing monitoring of contaminants and assessment of anticipated transport velocities and flow paths, especially relating to the chromium interim measure and future remediation projects.

- Evaluate contaminant data on a quarterly basis to identify any trends or changes.

- Begin contingency planning for alternate well locations. In a worst case scenario, many wells could be affected by contaminants over the planning period. To prepare for this contingency, identify possible locations for new wells that are upgradient from or off-gradient of key source areas, and begin to resolve infrastructure, land access, and water rights transfer issues so that alternative wells could be developed in a timely manner.

- To mitigate potential climate change impacts, work with emergency personnel to develop a plan to protect drinking water infrastructure in the event of a wildfire, and work with LANL to prepare for extreme precipitation events, to ensure that stormwater runoff does not mobilize contaminants to the detriment of the drinking water system.

Water Rights

- Pursue a new lease with DOE for ~~the portion of~~ their water rights ~~that will not be used by the chromium interim measure project~~ (~~983.39~~**1,662.39** ac-ft/yr).

- Renegotiate the contract that LACWU has with DOE for supplying water to LANL before it expires in 2019.

- Secure services of a water rights attorney to advise and plan for water rights acquisition (availability of pre-1907 water rights, return flow credits, costs, time to secure, potential litigation).

- Pursue return flow credits as identified in the 1999 return flow study (SWC, 1999).

- Evaluate and quantify pumping effects on the Rio Grande from the current water production regime and explore potential changes in pumping amounts and locations in order to be prepared to address OSE concerns during a potential water rights transfer application process.

- Meet with the OSE to discuss priority administration and the number and amount of water rights that are senior to the LACWU's water rights.

Water Conservation

- Continue and expand the existing water conservation program, as discussed in Section 8, monitoring the effectiveness of the existing and new conservation measures and refining the conservation program as needed.

- Monitor the effectiveness of voluntary compliance with Rule W-8 in reducing water waste, and if necessary, pass an enforceable ordinance so that penalties can be assessed.

- Update the subdivision regulations to include requirements for graywater reuse, water harvesting, xeriscaping, and low-water-use indoor plumbing for all new commercial and residential development.

- Establish rebate programs for xeriscaping and appliance replacement.

- Distribute indoor plumbing leak detection and retrofit kits.

Implementation of these recommendations will help the LACWU be prepared to meet its future water supply needs.

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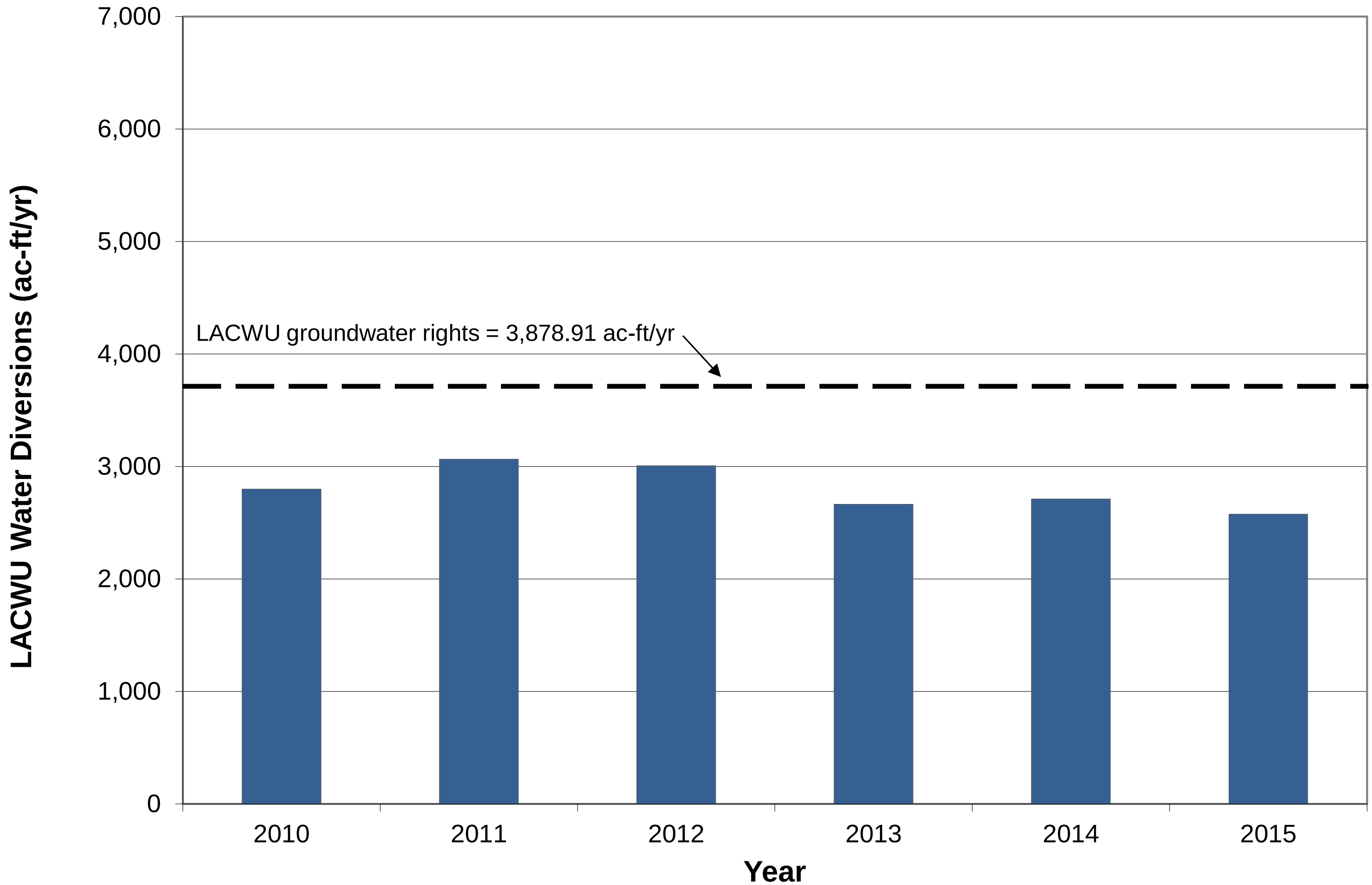


Note: These values were obtained by subtracting the LANL water demands from the total diversions.

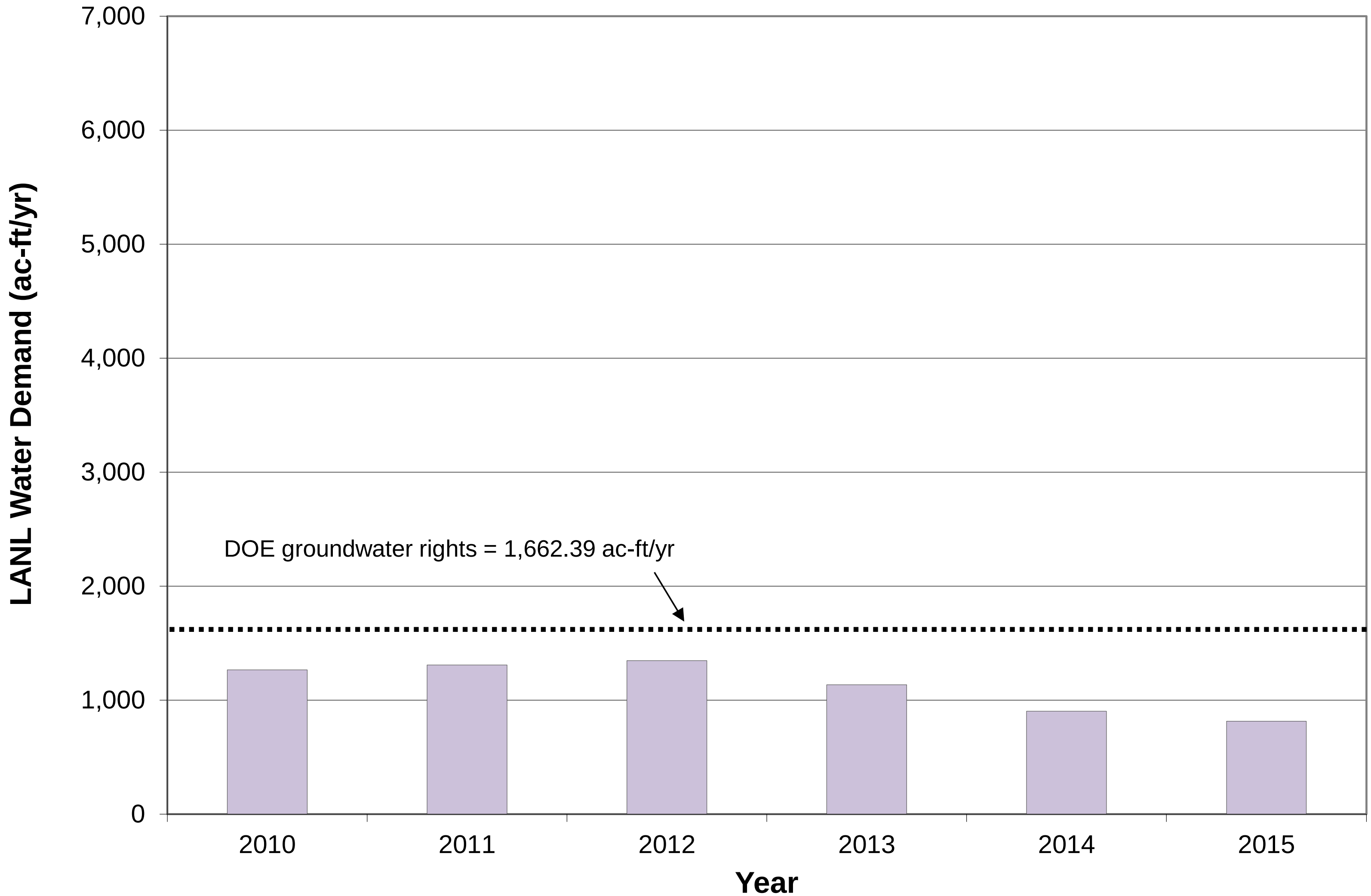
LOS ALAMOS COUNTY WATER PLAN

Annual Water Use by Los Alamos County
2010 Through 2015

Daniel B. Stephens & Associates, Inc.

1/31/17

Figure 4-1



Note: The groundwater supply being used for the LANL chromium interim measure project has not been subtracted from LANL's total water rights.

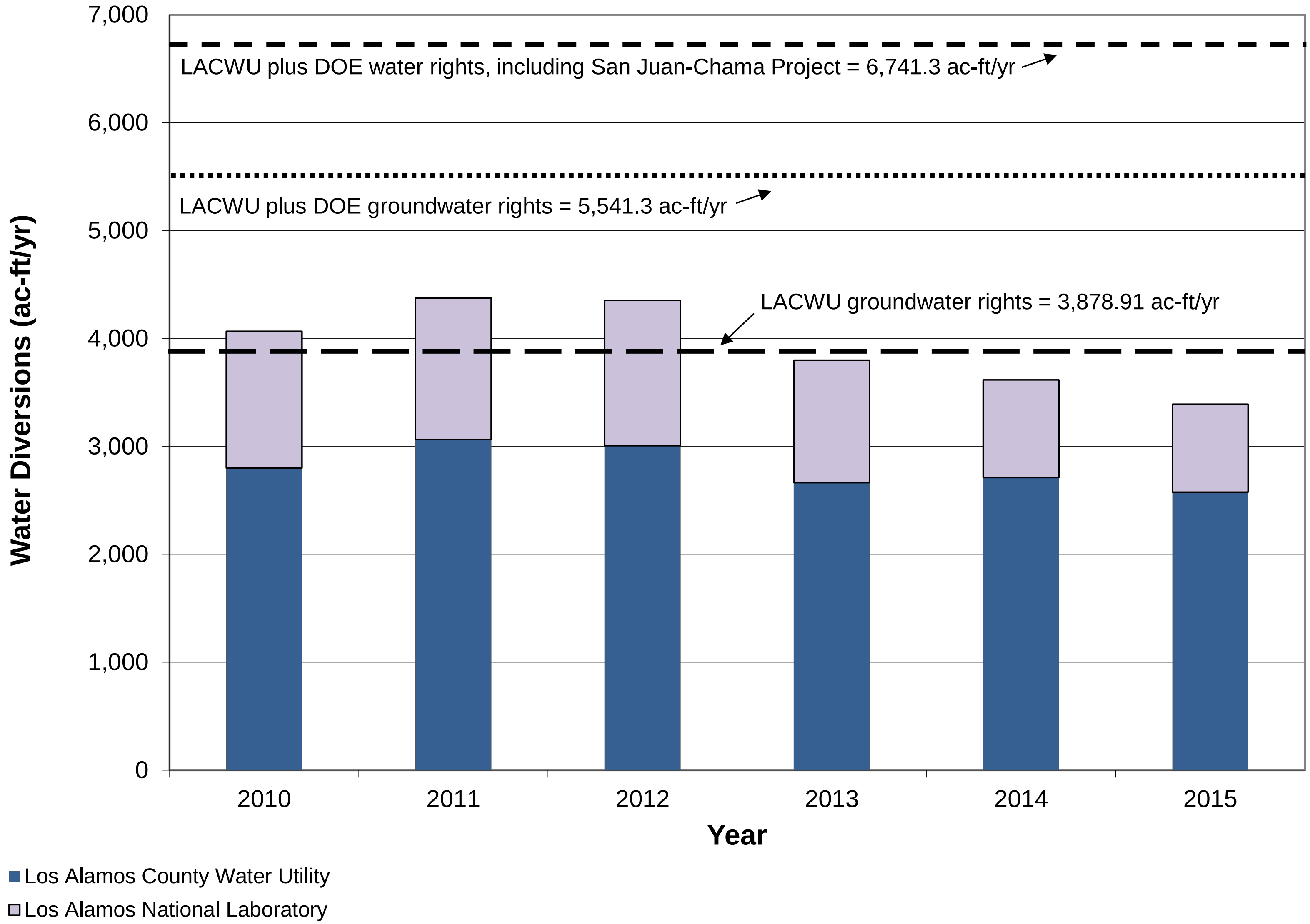
LOS ALAMOS COUNTY WATER PLAN

Annual Water Use by Los Alamos National Laboratory 2010 Through 2015

Daniel B. Stephens & Associates, Inc.

1/31/17

Figure 4-2



Note: The groundwater supply being used for the LANL chromium interim measure project has not been subtracted from DOE's total water rights.

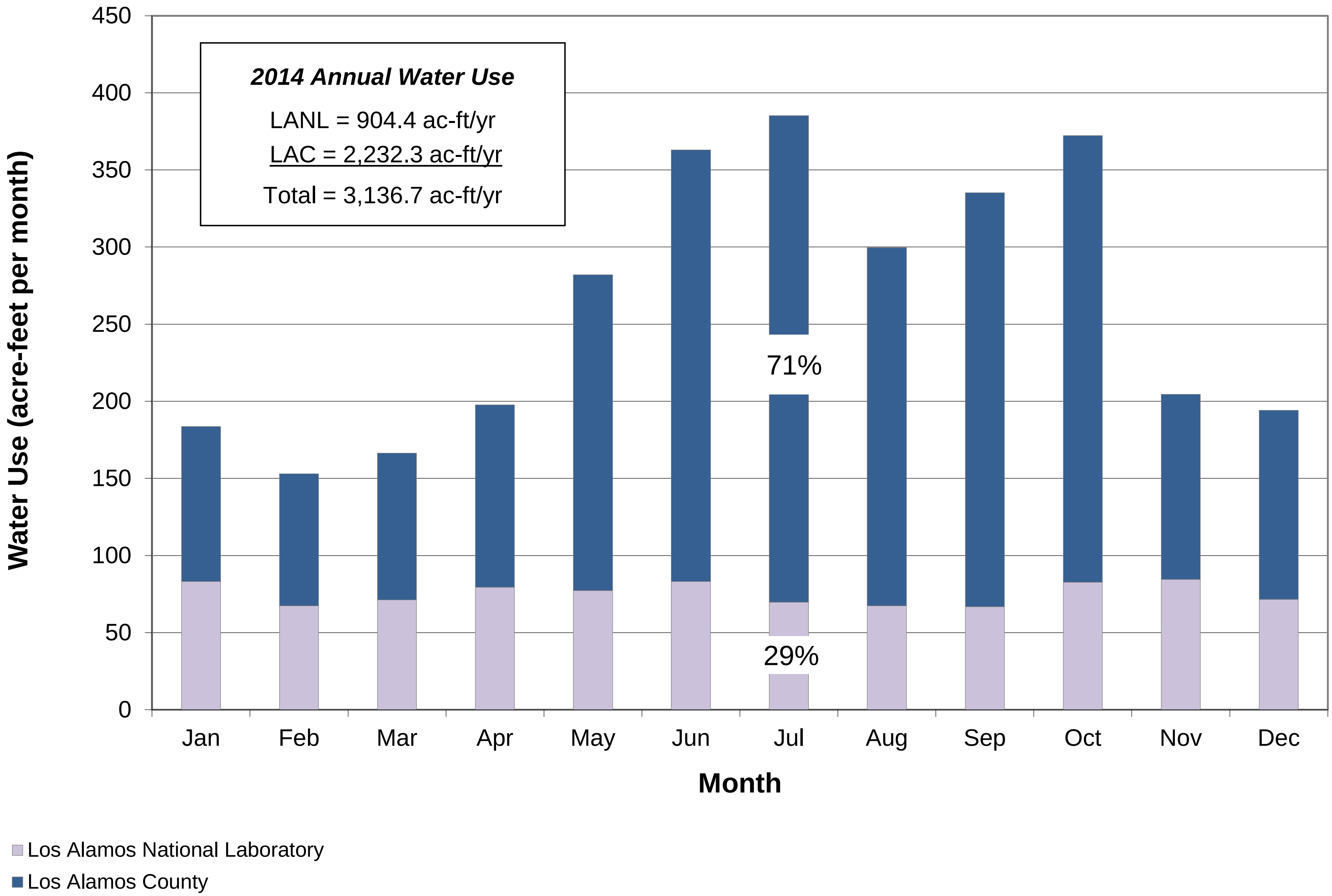
LOS ALAMOS COUNTY WATER PLAN

Annual Water Use by Los Alamos County and Los Alamos National Laboratory, 2010 Through 2015

Daniel B. Stephens & Associates, Inc.

1/31/17

Figure 4-3



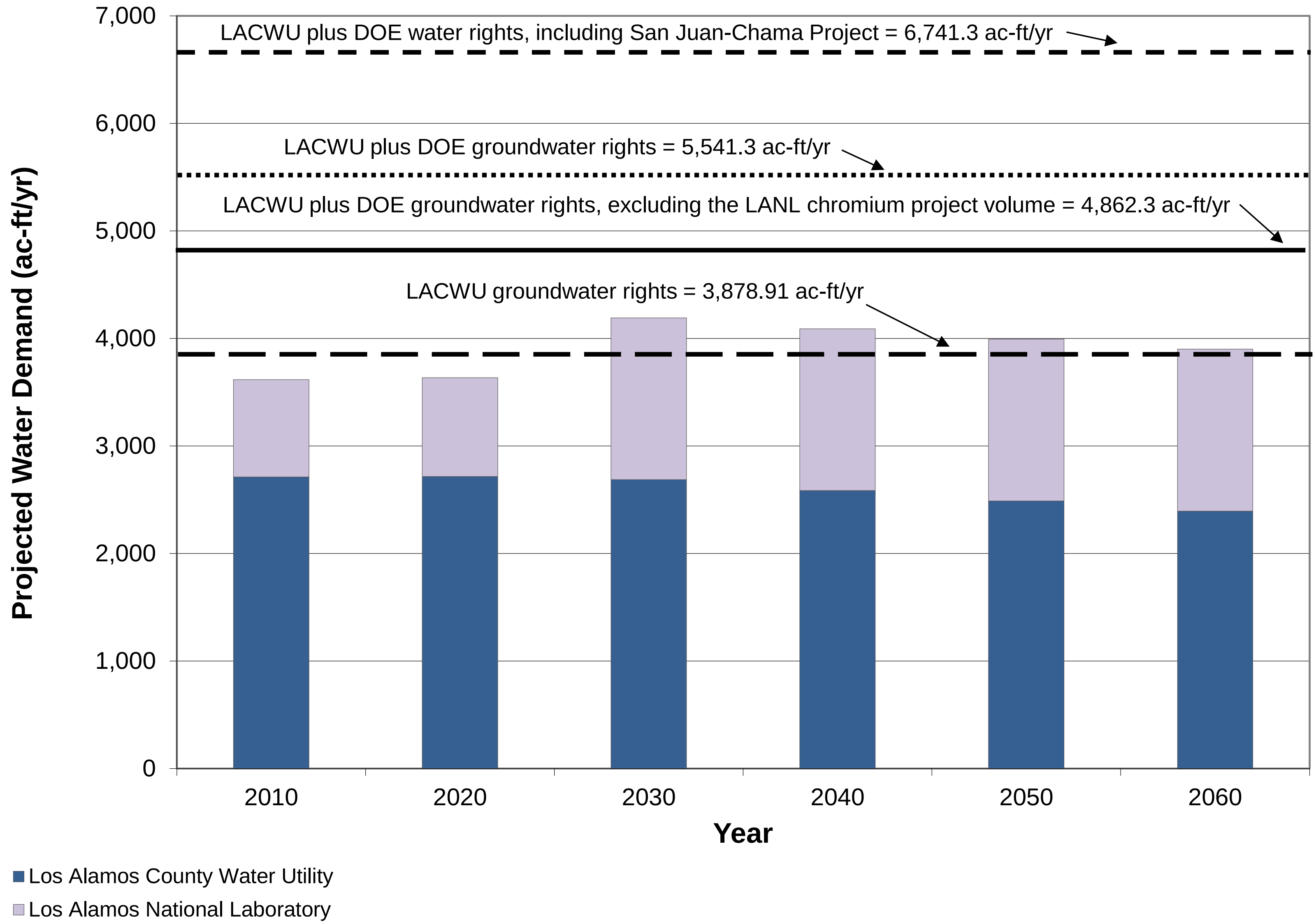
LOS ALAMOS COUNTY WATER PLAN

Monthly Water Use by Los Alamos County and Los Alamos National Laboratory in 2014

Daniel B. Stephens & Associates, Inc.

1/31/17

Figure 5-3



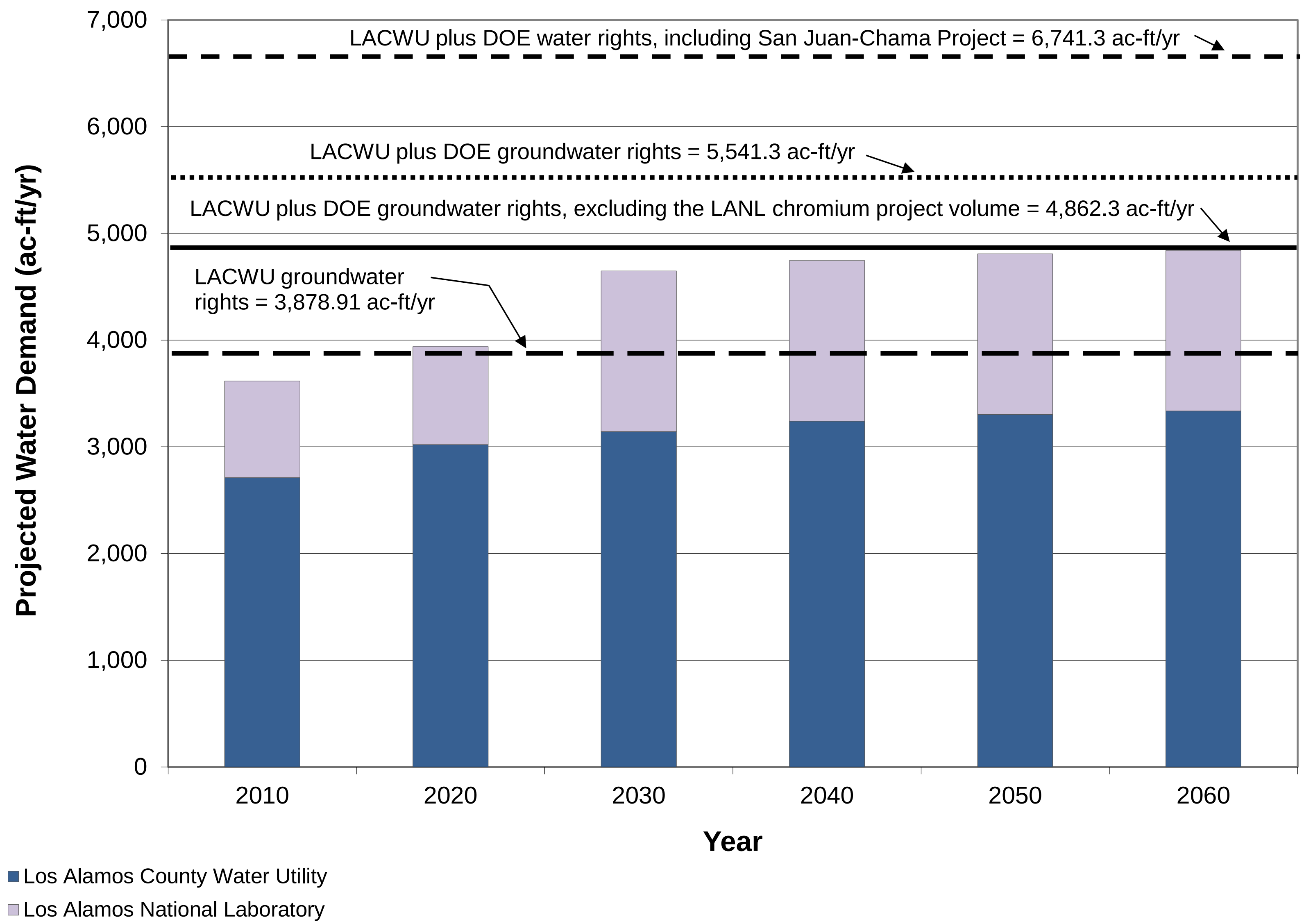
LOS ALAMOS COUNTY WATER PLAN

Projected Water Demand Under the Low Water Use Projection

Daniel B. Stephens & Associates, Inc.

1/31/17

Figure 5-5



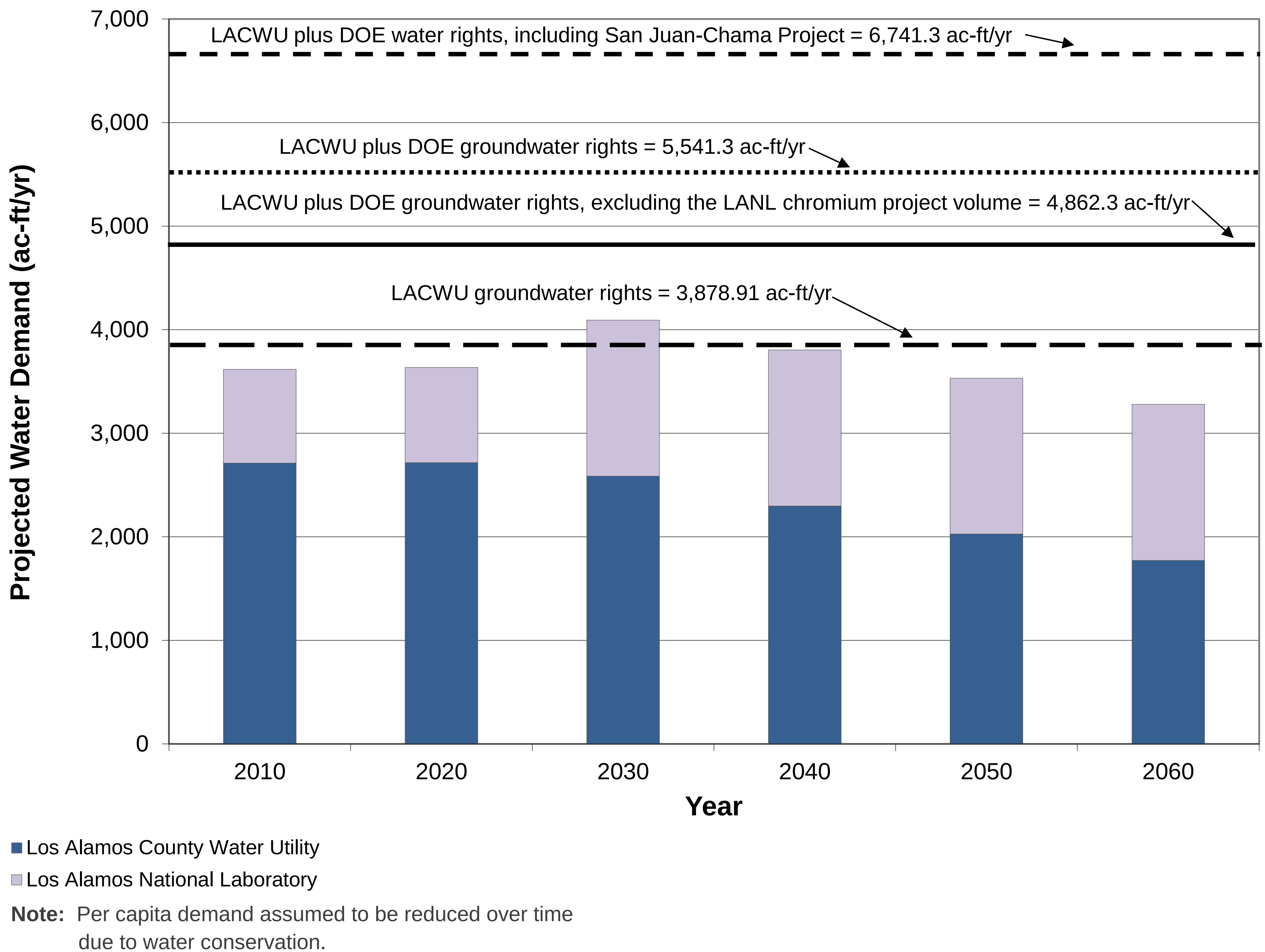
LOS ALAMOS COUNTY WATER PLAN

Projected Water Demand Under the High Water Use Projection

Daniel B. Stephens & Associates, Inc.

1/31/17

Figure 5-6



Note: Per capita demand assumed to be reduced over time due to water conservation.

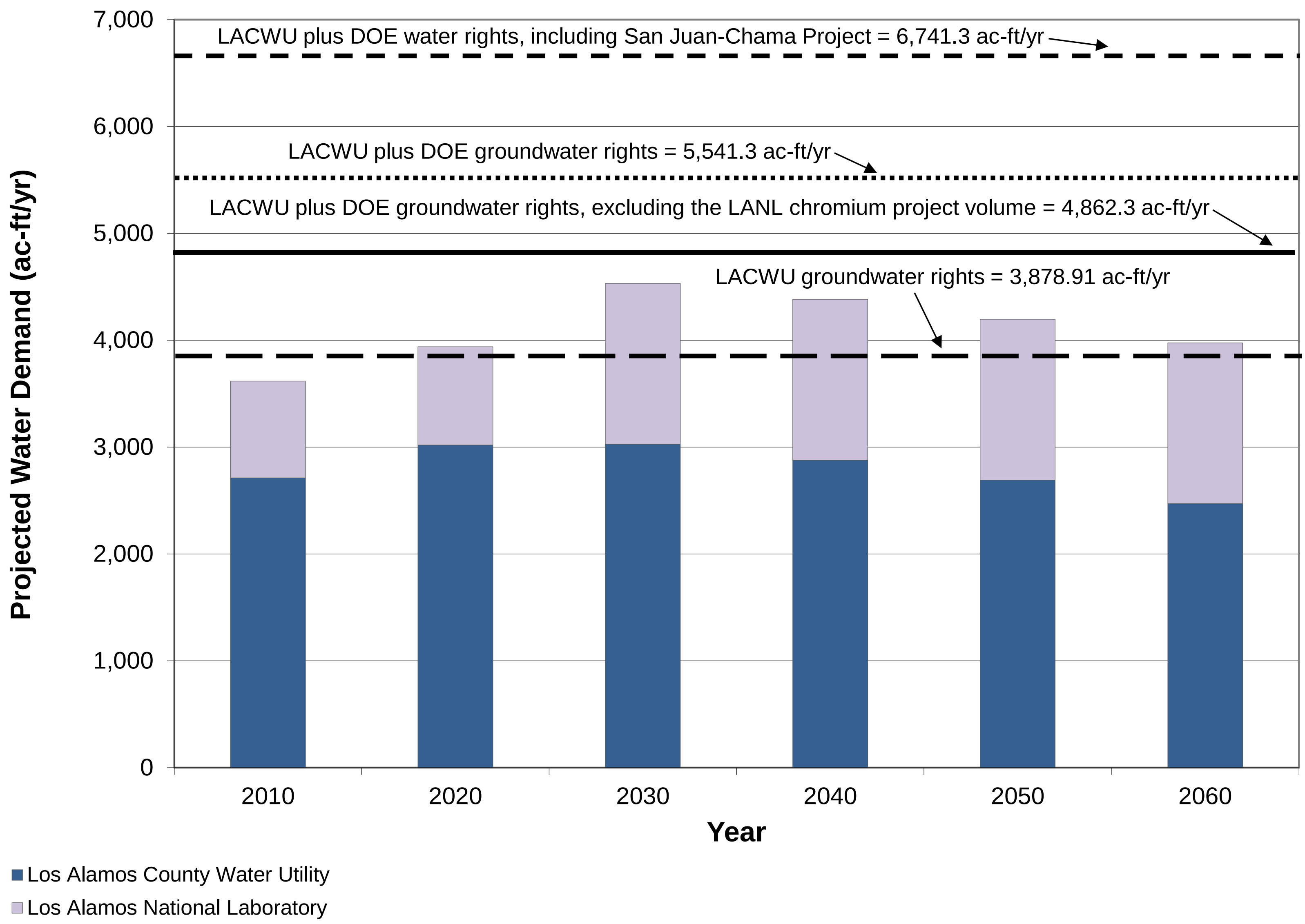
LOS ALAMOS COUNTY WATER PLAN

Projected Water Demand Under the Low Water Use Projection with Reduced Per Capita Demand

Daniel B. Stephens & Associates, Inc.

1/31/17

Figure 5-7



Note: Per capita demand assumed to be reduced over time due to water conservation.

LOS ALAMOS COUNTY WATER PLAN

Projected Water Demand Under the High Water Use Projection with Reduced Per Capita Demand

Daniel B. Stephens & Associates, Inc.

1/31/17

Figure 5-8

Table 3-3. Groundwater Contaminants in the Regional Aquifer in 2015

Chemical	Location	Concentration [a] (µg/L [b]) Result	Screening Level	Trends
Regional Aquifer (LANL and NMED, 2016)				
Perchlorate	Mortandad Canyon	**≤ 99.4**	4 [c] 13.8 [d]	
Hexavalent ~~c~~Chromium	Sandia Canyon	**≤ 386** (2014)	50 [e]	Flat trend in the center of the plume (monitoring wells R-42 and R-28) and gradually increasing trend along the edge of the plume (monitoring wells R-45 screen 1, R-43 screen 1, and R-50 screen 1).
	Mortandad Canyon	**≤ 915**	50 [e]	
Los Alamos County Water Supply Wells (LANL and NMED, 2016)				
Tritium	Well O-1	2.373 pCi/L	20,000 pCi/L [f]	Results have declined since 2004, when there was a detection of 58 pCi/L.
Perchlorate	Well O-1	0.515	4 [c] 13.8 [d]	Results variable, but declining since 2008; concentrations ≤ 3 µg/L since 2001.

[a] **Bold** text indicates standard exceedances.
[b] Unless otherwise noted
[c] 2012 LANL Compliance Order on Consent screening level (NMED, 2012)
[d] NMED tap water screening level (NMED, 2014)
[e] NMWQCC Groundwater Standards for Human Health (20.6.2.3103)
[f] The EPA has established an MCL of 4 millirem per year for beta particle and photon radioactivity from man-made radionuclides in drinking water. The average concentration of tritium that is assumed to yield 4 millirem per year is 20,000 pCi/L. If other radionuclides that emit beta particles and photon radioactivity are present in addition to tritium, the sum of the annual dose from all the radionuclides shall not exceed 4 millirem per year (U.S. EPA, 2002).

µg/L = Micrograms per liter
≤ = Less than or equal to
pCi/L = PicoCuries per liter

Table 5-11. Projected LACWU Supplied Water Demand Assuming Decreased Demand Due to Water Conservation, 2020-2060

Year	Per Capita Water Demand Used to Calculate LACWU Demand (gpcd)	Low Demand Scenario (ac-ft/yr)			High Demand Scenario (ac-ft/yr)			LANL Projected Demand (ac-ft/yr)
		LACWU Projected Demand	Potential Conservation Savings	LACWU Projected Demand with Conservation	LACWU Projected Demand	Potential Conservation Savings	LACWU Projected Demand with Conservation	
2010 [a]	135	2,712	—	2,712	2,712	—	2,712	904
2020	135	2,716	0	2,716	3,020	0	3,020	918
2030	130	2,686	100	2,586	3,143	117	3,026	1,505
2040	120	2,586	288	2,298	3,239	360	2,879	1,505
2050	110	2,488	461	2,027	3,303	613	2,690	1,505
2060	100	2,395	622	1,773	3,336	866	2,470	1,505

[a] Actual values

gpcd = Gallons per capita per day
ac-ft/yr = Acre-feet per year
LACWU = Los Alamos County Water Utility
LANL = Los Alamos National Laboratory
— = Not applicable

DRAFT

LOS ALAMOS
Department of Public Utilities
Electric, Gas, Water, and Wastewater Services

February 6, 2017

Robert Wells
1001 Oppenheimer Drive, Unit #301
Los Alamos, NM 87544

Dear Mr. Wells,

This letter is in response to your email dated November 21, 2016 in regards to the Long-Range Water Supply Plan, November 2016 draft.

Your comments, observations, and long-term perspectives are in some cases reflections of the internal discussions that took place as we prepared the plan. In particular, the uncertainty of projecting LANL demands. We relied on LANL to provide projections of their future water demand, which is limited to a 10-year horizon due to their uncertainty.

We agree with your comment that "while a 2060 planning horizon is understandable, it must be kept in mind that, hopefully, the Los Alamos community will exist much longer, possibly hundreds of years. The reality of Southwest water resources management is that increasing dependence is being placed on groundwater "mining" and that even aggressive restoration methods might take hundreds of years, even if good snow packs continue to feed ground water reserves." The State uses a 40-year water planning horizon, with communities continually updating their plans to continue planning into the future. Our consultants recommend that the LACWU continue to plan for development of a San Juan-Chama project, given the uncertainty of water demand and the U.S. Department of Energy (DOE) water rights lease, and the availability of the water; however, it will be up to the County and the public to select whether or not to construct a project, and to define its scope. Additional language has been added to the final plan to better explain how bringing San Juan-Chama project water online would diversify the water supply.

You suggest that the County pursue the exchange of the San Juan-Chama contract water for groundwater water rights that could be pumped in our existing and future water wells. There is a fundamental difference in the SJC contract water being a surface water right and the groundwater rights owned by the county and DOE. Consistently and historically, the OSE does not view favorably the intermingling of water rights from different supply

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sources (in our case SJC water being a surface diversion associated with an interstate water transfer and the groundwater rights whose origin is the aquifer below the Pajarito Plateau). Performing such an exchange is much more complicated than a "political problem" to be overcome. For this reason, a transfer of SJC water to existing water wells is not a proposed option in the plan.

Other comment responses:

- On Figure 2-1, community and county boundaries for Los Alamos and White Rock that were available were used.
- Figures 3-1 and 3-2 come from LANL publications and correctly represent the regional hydrogeology.
- Regarding the County's San Juan-Chama water supply, it will be up to the County and its residents to decide whether to pursue a project.
- In the event of a SJC water shortage, Los Alamos will have the same priority as other SJC contractors. We do not support the concept that SJC water can be traded for additional groundwater rights.
- The County population projections were put together by a demographer for the State, and LANL/DOE provided the LANL projections. We agree that it is especially difficult to project what will happen at LANL. Los Alamos certainly has many attractive attributes that could lead to increases in population.
- The long-range water supply plan update reports on the LACWU's existing conservation program, but is not a water conservation plan itself. We have added information to the final plan about the quantity of water that would be conserved if the per capita water use were reduced in the future.

We thank you for taking the time to review the plan and provide valuable input. If you have any questions or would like to discuss further please contact me at 663-3420 or by email at james.alarid@lacnm.us.

Sincerely,

James Alarid
Deputy Utility Manager Engineering

Cc: Gaylyn Meyers, LAC
Amy Ewing, DBS&A
Tim Glasco, LAC

From: Robert Wells, 1001 Oppenheimer Dr., Unit #301, Los Alamos, NM 87544

To: James Alarid, DPU/BPU, Los Alamos County

Subject: Comments on County Water Plan (draft)

November 21, 2016

As a **general comment**, I found the draft plan to be professionally credible. The consultants demonstrated a good understanding of the issues and complexities of making an essentially forty year projection under conditions of considerable uncertainty regarding County needs and weather changes impacting water. While a 2060 planning horizon is understandable, it must be kept in mind that, hopefully, the Los Alamos community will exist much longer, possibly hundreds of years. The reality of Southwest water resources management is that increasing dependence is being placed on ground water "mining" and that even aggressive restoration methods might take hundreds of years, even if good snow packs continue to feed ground water reserves.

Page 3 and associated Figure 2-1.

Los Alamos County does not contain "cities/towns" – it is simply and solely a "county" with three postal codes (87544/Los Alamos townsite or "hill", 87545/LANL, and 87547/White Rock). Thus, "city" boundaries shown in Figure 2-1 should be discussed with appropriate County authorities.

Figures 3-1 and 3-2, which show conceptual hydrological models for Los Alamos County, appear to misrepresent the reality that Los Alamos County is founded on the apron of a massive and complex volcanic system that formed the Jemez Mountains region. The idea that there is an essentially uniform saturated zone under the County (i.e., the Santa Fe Group shown in Figure 3-2) should be reconsidered as being a system of largely disconnected perched aquifers within the shoulders of the volcanic system formation. (This more realistic characterization is noted on page 11; i.e., "Intermediate-depth perched aquifers are widely distributed across the northern, western and central parts of the Pajarito Plateau ...")

Section 4. -- Water Rights, pages 38-48

One of the major issues raised at the public meeting on November 16th, involved how best to use the San Juan-Chama 1200 acre-feet annual allocation for Los Alamos County. I first raised the question whether the County's long –term water needs might best be realized by considering trading the 1200 acre-feet of San Juan-Chama surface water rights for an equivalent amount of additional ground water right within the County. The consultants were dismissive of this because of bureaucratic difficulties (e..g., BLM versus State Engineer responsibilities and authorities). This response was vehemently countered by a White Rock attendee. It is recommended that the following factors be considered by County authorities:

a. The San Juan-Chama diversion was planned in the 1950s, when factors such as water availability and downstream demands were much different than now – let alone for the long-term future.

b. Los Alamos has not needed the San Juan-Chama water allocation to date – and may not need it under more optimistic 2060 projections of this plan. The County's San Juan allocation has been beneficially used thus far for other State/Rio Grande needs -- without endangering the County's original allocation.

c. However, there are less optimistic 2060 projections that would need the 1200 acre-feet allocation.

d. The overall annual San Juan-Chama diversion to New Mexico is about 100,000 acre-feet; but this year that amount of water could not be delivered. Should such shortfalls become the norm – and given the projected needs of other beneficiaries (especially Santa Fe, Albuquerque and further down Rio Grande users) – Los Alamos might find its allocation a low priority vis-a-vis such other users.

e. Assuming that only Los Alamos County (including LANL) will have direct access to ground water within Los Alamos County, there should be considerable ground water in addition to the present County and LANL/DOE ground water right authorizations (using either 5,379 acre-feet per Figure 4-1 or 5,541 acre-feet per Figure 5-1, neither figure including the 1200 acre-feet of San Juan-Chama surface water rights).

f. The State Engineer would likely welcome the additional 1200 acre-feet of San Juan-Chama surface water rights to help adjudicate water long-standing and worsening water rght disputes along the Rio Grande.

g. While the Bureau of Land Management would have to concur in the suggested transfer, there is no obvious reason why they should object – other than bureaucratic inertia. As emphasized during the November 16th public meeting, this appears to be a political problem, not a technical problem or a judicial problem involving potential harm to other parties involved in the San Juan-Chama scheme.

h. Ultimately, the acquisition of an additional 1200 acre-feet of ground water rights would assure Los Alamos County of water it can reasonably count on having available – as opposed to San Juan-Chama surface water that already could be in jeopardy. Further, Los Alamos County access to an additional 1200 acre-feet of ground water from Pajarito Plateau would be relatively inexpensive, as compared to the cost of using water pumped one way or another from the Rio Grande.

Section 5 -- Future Water Demand, pps 49-72

Table 5-2, page 55, shows that Los Alamos County resident population has been very stable for at least the past thirty years; i.e., 17,599 in 1980 and 17,950 in 2010, with a peak of 18,343 in 2000. This plan uses a reasonable range of projections through 2060 (i.e., a 2060 low of 15,863 versus a 2060 high of 22,092). A major uncertainty will be the needs of LANL during this planning period. During the period 1987-1994, I served as LANL's Program Director for Construction Development. Periodically, DOE would survey their sites for potential major new developments. Their queries would typically include (a) buildable land, (b) water, and (c) power. Consequently, it should be easily recognizable that water availability – in terms of water rights and actual water that could be inexpensively acquired -- would likely be the most crucial decision factor. Another factor that should be included is whether Los Alamos Count might attract significant population growth from high end residents now in Santa Fe and the northern Rio Grande Valley generally – who are attracted by (c) excellent schools and community facilities and (d) availability of very good and relatively inexpensive community water. This last point should be considered in light of excessive water shortfall projections, such as -35% deficiency in Santa Fe County by 2030. It is particularly important to note (e) of the eight north central New Mexico water sheds, only Los Alamos is free of major shortfalls for 2030. Further, most if not all of these "valley" communities are depending heavily on San Juan-Chama surface water diversions that (f) might not be as available as expected and (f) very expensive diversion schemes, such as those constructed for Santa Fe and Albuquerque are supposed to be returning diversion water to local aquifers and/or the Rio Grande – a very questionable presumption. Thus, Los Alamos may draw significant new population that has nothing to do with LANL mission growth – but which could be a critical factor for long term community welfare should the LANL mission be seriously curtailed.

Section 8 – Recommendations: Water Consevation, page 87

Both Los Alamos County and LANL appear to have started to take water conservation seriously. Where not too long ago at least one member of the Board of Public Utilities expressed support for ensuring that traditional "green lawns" should be mandated, this plan appears to start thinking seriously about water conservation. However, the recommendations listed in pages 87-90 essentially address fairly easy-to-accomplish administrative and educational measures. For example, a Conservation Advisory Group was formed in 2011 to assist the LACWU conservation coordinator with development of conservation goals, such as "implement incentives for replacement of lawns, including rebates for plant purchases and technical assistance." It should be noted in the mid-1970s, Albuquerque threatened to fine home owners who wanted to practice xeroscaping rather than have traditional green lawns. When Albuquerque subsequently faced water crunches, a program of financial compensation for removing green lawns in favor of xeroscaping was implemented, which in large part helped Albuquerque roughly halve its water consumption. Thus, it would seem that Los Alamos County needs to put some "teeth" into its conservation program.

While, on one hand, Los Alamos County has what appears to be a uniquely favorable water future – at least for the next few decades, but on the other hand, if future weather does not provide historical snow packs – which are essential for ground water recharge – future water consumption will necessarily be "mining" explicitly limited ground water reserves. Again, 2060 is merely a practical planning horizon; the community's fundamental responsibility is to pursue a concerted effort ensuring very long-term water availability – potentially hundreds of years -- which can best be achieved by reasonably optimum conservation; i.e., never use more water than what seems to be reasonable when keeping long term water availability in mind.

One thing that might be helpful would be for this plan to include specific examples of various types of water conservation techniques and community programs that have shown significant progress. At present, the plan merely alludes to such possibilities – which does not promise much reader comprehension regarding what things he/she could/should be doing.

LOS ALAMOS
Department of Public Utilities
Electric, Gas, Water, and Wastewater Services

February 3, 2017

Reid Priedhorsky, Secretary
Pajarito Conservation Alliance

Sent Via Email

Dear Mr. Priedhorsky,

This letter is in response to your letter to Jeff Johnson, Chair of Board of Public Utilities dated December 21, 2016 in regards to the Long-Range Water Supply Plan, November 2016 draft.

We have reviewed your comments and prepared the following responses:

1. The purpose of this long-range (40-year) water plan is to provide the New Mexico Office of the State Engineer (OSE) with updated demand projections and a comparison of projected water demand to the water rights portfolio. Water conservation is important, and the Los Alamos County Water Utility has a stand-alone water conservation plan. Conservation will be a part of the solution when the time comes to make large investments in water supply and balance future demands. This will be a future decision for our community to make.

   The New Mexico Water Code allows covered entities to set aside water for use in the future (i.e., hold more water rights than they can currently use but will need in the future to meet projected water requirements). This 40-year plan is an instrument that allows Los Alamos County to protect unused water rights. The scope of this project does not include going into detail about the water conservation program, since the County has an existing water conservation program and a compliant plan is on file with the OSE. Information has been added to the final 40-year water plan update to quantify the volumes of water that would be conserved if the per capita water use were reduced by various amounts, to as low as the City of Santa Fe's 2015 value of 90 gallons per capita per day.

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2. Conservation planning is required by statute for any public water supply system with diversions of at least 500 acre-feet annually. The OSE developed a guidance document for water conservation plans that was published in 2013 (this document is available at http://www.ose.state.nm.us/WUC/PDF/Planning%20Guide_Final_.pdf), although there is no current requirement for water conservation plans to meet this guidance. Our consultants expect that this will be required in the future and recommend that the guidance document be followed when preparing a conservation plan (the LACWU water conservation plan follows the guidance). The 40-year water plan is a different type of plan, and the conservation plan guidelines do not apply to these plans. Section 72-1-9 of the New Mexico Water Code allows for 40-year water planning, but it does not specifically outline what should go into 40-year water plans. There have been a few efforts to adopt specific guidelines for 40-year water plans, but none of them has been passed by the legislature. Discussions of water quality are not usually included in 40-year water plans, but is beneficial for Los Alamos. The rest of the outline of the draft plan (water rights, water supply, projected demand, and the comparison of supply and demand) reflects the content of all 40-year water plans.

3. The County's consultants recommend that the LACWU continue to plan for development of a San Juan-Chama project, given the uncertainty of water demand and the U.S. Department of Energy (DOE) water rights lease, and the availability of the water. It will be up to the County and the public to select whether or not to construct a project, and to define its scope. Additional language has been added to the final plan to better explain how bringing San Juan-Chama project water online would diversify the water supply, and to discuss the potential effects of climate change on this source of supply.

4. Development of a cost-benefit analysis for drilling replacement wells is outside of the scope of this project and plan.

5. The scenario where the LACWU is unable to lease the DOE water rights but is required to supply LANL with their water supply is unlikely; however, it provides a worst case scenario for projecting demand. The current LACWU-DOE contract will expire in 2019. LANL does not have its own wells, and so we assume that the LACWU will continue to provide LANL with water supply in the future under a new agreement. LANL water projections have uncertainty. We would like to note that Los Alamos County does not have authority to impose conservation measures on LANL.

6. It is possible that the LACWU and DOE will receive return flow credits for treated water that gets reinjected as a part of the chromium interim measure and/or the eventual remediation project; however, for planning purposes, the consultants feel that it would be premature to assume that any return flow credits will be obtained. This will be something to re-evaluate during the next update of the plan.

7. The San Juan-Chama project planning is entirely separate from this effort, and the scope of the 40-year water plan update does not call for evaluation of the potential impacts to White Rock Canyon from a potential project.

We thank you for taking the time to review the plan and provide valuable input. We would like to invite you and other members of the Alliance to discuss our conservation plan. Conservation is a common goal of our two organizations, and we see an opportunity to work together on future conservation efforts. I can be reached at 663-3420 or by email at james.alarid@lacnm.us.

Sincerely,

James Alarid
Deputy Utility Manager Engineering

Cc: Gaylyn Meyers, LAC
Amy Ewing, DBS&A
Tim Glasco, LAC

Jeff Johnson
Chair, Board of Public Utilities
Los Alamos, NM

pajarito conservation alliance

http://pajarito.org
info@pajarito.org

Board:
Craig Martin, president
Carlos Chiquete, treasurer
Reid Priedhorsky, secretary

December 21, 2016
RE: *Long Range Water Supply Plan*, Nov. 2016 draft

Dear Mr. Johnson and BPU members:

I write on behalf of the Pajarito Conservation Alliance, a non-profit community organization that supports the ecosystems and outdoor experience of the Pajarito Plateau.

We have reviewed the *Long Range Water Supply Plan* draft dated November 2016 and have several concerns, which are summarized in this letter under three themes.

First, the draft does not sufficiently consider water conservation. That is, the draft *says* that conservation is good but does not incorporate it into any of the scenarios. We believe this is insufficient for the following reasons:

1. The impact of conservation on demand is not quantified. As the draft states, "further reductions in per capita demand are expected" (p. 68), but rather than attempting to quantify these reductions, the draft instead assumes that conservation demand reductions equal the high-side error in LANL estimates. These two things are not the same, and it is inappropriate to misuse conservation to offset deficiencies in LANL-provided documents. Reasonable estimates of high and low conservation effects are available and should be used.
2. The draft understates conservation opportunities. Specifically, the goal of 12% per capita reduction in demand by 2050 (p. 89) is unrealistically low. For example, Las Vegas, Nevada reduced its per-capita demand by 40% in 25 years [1], and the Los Angeles Metro's water use was the same in 2014 as 1970 [2], despite growing from 10 to 18 million people.
3. The draft references legally required conservation planning on pp. 1–2 but does not address whether water supply plans must actually plan for conservation and what the relevant criteria are. These criteria along with a justification of how they are met should be included.

Second, we find the claim that San Juan-Chama water is a good hedge against supply/demand imbalance unconvincing:

1. Surface water such as SJC will be significantly less reliable than groundwater in a drier climate (p. 82). That is, the draft states that diversification of water sources is important (p. 42) but does not quantify the value of SJC water for this purpose. Quantifying the expected value of specific diversification scenarios will avoid false confidence. That is, simply having diverse water sources it not enough; the plan must convincingly justify each source in the proposed mix.
2. The alternative of drilling new groundwater wells upstream of potential contamination is not sufficiently analyzed. No financial analysis versus White Rock Canyon wells is presented. Several risks of new wells — that drilling permits might be unobtainable (p. 47), that "technical and legal fees" might be prohibitive (p. 43), that other municipalities "encountered difficulties" in trading or purchasing water rights (p. 46) — are advertised but not quantified. This produces an invalid cost/benefit analysis.
3. A scenario where LANL does not lease its water rights to the county but nevertheless forces the county to supply it with water (p. 74) seems far-fetched and should be either convincingly justified or removed.
4. The draft does not quantify the possible effects of return flow credits (p. 47, etc.), which again distorts the cost/benefit analysis.

Third, the draft does not consider the impacts of San Juan-Chama water development on White Rock Canyon:

1. The canyon contains numerous springs. "[G]roundwater that would have naturally discharged to the river" does so via springs. This is the very definition of a spring: a place where groundwater emerges to the surface. Thus, an approach that develops SJC water via wells in or near White Rock necessarily impacts springs; the only question is which ones and by how much.
2. These springs support state-listed sensitive species that would also be impacted.
3. Regardless of whether the approach involves groundwater interception, development of SJC surface water anywhere in White Rock Canyon is likely to impact the White Rock Canyon Archaeological District.
4. We realize that the draft is not an environmental or cultural assessment. However, such assessments are expensive, and Los Alamos rate-payers should not be expected to shoulder those costs without a reasonable likelihood of success. This includes both an acceptable outcome of the assessments and a proper cost/benefit analysis supporting the alternative that requires the assessments.

In short, while the draft spends a lot of words on conservation, its proposed actions largely ignore conservation opportunities, and its cost/benefit analyses are distorted in favor of expensive, environmentally damaging policies. This way of thinking will harm the future of our community.

We urge you to revise this plan as described above, in order to incorporate the quantitative, evidence-based reasoning and conservation values prized by the citizens of Los Alamos. We look forward to remaining engaged with this water planning process.

Sincerely,

Reid Priedhorsky

Reid Priedhorsky
Secretary, Pajarito Conservation Alliance

Citations:

[1] Jonathan Thompson, *High Country News*, Jan. 23, 2014. The Vegas Paradox.

[2] Jon Christensen, High Country News, Jan. 23, 2014. Brave New L.A.

LOS ALAMOS

Department of Public Utilities
Electric, Gas, Water, and Wastewater Services

February 6, 2017

Ed Jacobson
White Rock, NM 87544
Sent via email

Dear Mr. Jacobson,

This letter is in response to your emails dated November 21 and December 6, 2016, and January 17, 2017 in regards to the Long-Range Water Supply Plan, November 2016 draft. In addition, we would like to express our appreciation to you for taking the time to meet in person on January 17, 2017.

Your earlier emails presented various objections to the County proceeding with development of the San Juan-Chama (SJC) water, and questioned why the Long-Range Water Supply plan included the SJC water in the planning effort. After meeting on January 17, 2017, you indicated (via email) that after the discussions that took place in our meeting, you recognize why the SJC water is a part of the County's water resource planning.

We want to ensure that you have received an adequate response from the DPU. If our assessment of your comments stated above are not correct, please let me know. The content of the final plan that will be presented for approval remains the same with respect to the SJC water, with exception of some clarifying statements to address comments from others.

If you have any questions or would like to discuss further please contact me at 663-3420 or by email at james.alarid@lacnm.us.

Sincerely,

James Alarid
Deputy Utility Manager Engineering

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Cc: Gaylyn Meyers, LAC
Amy Ewing, DBS&A
Tim Glasco, LAC

Alarid, James

From: A,E,A Jacobson <beepbeep@cybermesa.com>
Sent: Tuesday, January 17, 2017 10:45 PM
To: O'Leary, Susan
Cc: Chandler, Christine; Maggiore, Antonio; Glasco, Timothy; Alarid, James
Subject: A couple of comments re this morning's water plan mtg

Councilor O'Leary,

You, Councilor Chandler, and Councilor Maggiore asked good questions and Utilities Manager Glasco and Deputy Manager Alarid had good answers.
Such an exchange in which there are also answers to questions that didn't get asked means they were good questions, in my opinion.

New information that I hadn't thought about is the fact that Bureau of Reclamation interpretations of rules have varied depending on which BuRec lawyer was in charge at a given time. That doesn't surprise me, but I hadn't thought about county officials having to contend with that sort of variable in their planning. Not that it matters for this long range water plan, but State Engineers seem to have come and gone fairly frequently recently, too. I've been unable to find a list of those who served following Steve Reynolds, who had the job for 35 years until his death in 1990, but I'm pretty sure there have been two in the past three years.

It doesn't seem it would be necessary to put Section 9, Recommendations, in the document submitted to the OSE.

I recognize that San Juan-Chama water needs to be mentioned. Perhaps it would be sufficient to say that the County intends to continue to sell/lease/whatever the term is, its allocation to the Bureau of Reclamation, or to any other San Juan-Chama Project contractor if the Bureau no longer wants it. If the County at some time in the future needs the water, and any is still coming through the tunnels, it could then do the NEPA work necessary and drill the well(s) needed to produce it. (That source might be short-lived, as the eventual need for treatment for sediment removal could make it too costly to use.)

It was noted in brief discussion after the close of the meeting that the dollar amounts of San Juan-Chama maintenance costs and BuRec reimbursement are no longer balanced at $60K per year. Those amounts are now more like $30K per year.

Thanks again for the invitation to attend the meeting, Ed Jacobson

Alarid, James

From:	A,E,A Jacobson <beepbeep@cybermesa.com>
Sent:	Monday, December 05, 2016 7:26 AM
To:	Reiss, Rick; O'Leary, Susan; Chrobocinski, James; Girrens, Steven; Henderson, Kristin; Izraelevitz, David; Sheehey, Pete
Cc:	Alarid, James; McLin, Stephen
Subject:	Long-Range Water Plan

12/5/16

Councilors,

Councilor O'Leary is to be commended for wanting to spend the time needed to get more familiar with the required periodic water plan for the Office of the State Engineer.

This e-mail will be an attempt to argue that any county funds spent to actually pump water from wells drilled in proximity to surface flow of the Rio Grande to draw from groundwater is an improper use of funds. (I should note that what little I know of the San Juan-Chama issue has been learned since I became interested as a result of comments made at a public meeting at which the Comprehensive Plan was being discussed. Any errors are due to ignorance, not an intentional attempt to mislead.)

1. The water is not needed. Even without recharge, at present rate of pumping, the water available is sufficient for hundreds of years.

2. Although perhaps it would not initially need to be treated, eventually, within 25 years is a number recalled being heard, there would be enough sediment that an expensive water treatment plant would be required and need a location. The reason is that wells said to be using San Juan-Chama water have to be close enough to the Rio Grande to actually be drawing from water that is being replaced by flow in the Rio Grande.

3. There is good reason to think that in the perhaps not too distant future there will not be any water flowing from the Colorado River Basin to the Rio Grande basin.

Support of 1. is provided in the DBSA Long-Range Water Supply Plan. Even if it is thought that it would be good for the county's population to increase, despite the fact that it is trending downward, water conservation measures are available. If there is money available to drill wells, they should be located with the intent to learn more about how recharge occurs. Just because the aquifer is good for hundreds of years is no reason not to try to learn if there is a way to replenish it or if it may already be getting recharged.

It's my impression that underground movement of water is a very complicated subject, and that there are real requirements/calculations for wells drilled near rivers. There are both legal and physical aspects for 2.

There can be talk about storage in the lakes on the Chama upstream from Los Alamos in which water from wet years can be kept for dry years, but it seems to be unreasonable to think that could keep 1200 acre-feet available for Los Alamos. It has already been the case that it has not been available.

Support for 3., in addition to other sources, can be found here:
https://www.abqjournal.com/518371/san-juan-water-dries-up-for-first-time-in-40-years.html

I don't think there are any villains. James Alarid and others at the county are on top of this and would be irresponsible not to be looking at San Juan-Chama water as a possible source for the county. The Daniel B. Stephens hydrologists have provided a tremendous amount of information, probably more than needed, but I don't have a problem with that -- it's good for the historical record. However, their conclusions and recommendations from their findings don't have to be the conclusions of the county in the plan submitted to the Office of the State Engineer. The conclusion with regard to San Juan-Chama water can be simply to continue selling to the Bureau of Reclamation for S60K per year, about the share of the county's cost of maintaining the San Juan-Chama infrastructure. It's being put to beneficial use at the present, when there is flow. In the unlikely event the county somehow needed the water in the future, and the more likely case that it would not be available then, an impact statement could be funded, but not before.

One item I just noted this morning, which might be of interest:
http://www.ose.state.nm.us/Basins/Colorado/isc_CO_pilot_program.php

Thanks for you consideration,
Ed Jacobson
607 Meadow Lane

Alarid, James

From: A,E,A Jacobson <beepbeep@cybermesa.com>
Sent: Monday, November 21, 2016 11:09 PM
To: Alarid, James
Cc: ~County Council

Subject: Draft Long-Range Water Supply Plan

Mr. Alarid,

The November 20, 2016, Los Alamos Monitor states that comments on the draft Long-Range Water Supply Plan should be sent to you by November 22. It is noted that that's not a very long time to review a 111-page document.

My comments are summarized by this statement. San Juan-Chama water should not be considered as a source of water for Los Alamos County, and no money and staff time should be expended in pursuing it.

There is no need for it now, and should a need for additional water arise, San Juan-Chama water would likely not be available. Excerpts from five sections of the draft Plan are copied below with my comments in parentheses.

Section 3.2
Barring potential water quality issues, continued pumping of the regional aquifer at current rates is likely to be sustainable for hundreds of years. (This is even if there is no recharge, and it's not clear to me that recharge of this aquifer is understood. If water quality in the present wells becomes a problem, it will probably be even more of a problem for wells drilled close the Rio Grande.)

Section 4.1.2
Bringing the San Juan-Chama Project water online would diversify the water supply, helping the LACWU to mitigate any future effects due to contamination of existing wells and/or climate change. (If contamination becomes an issue in existing wells if may be even more of an issue in wells that are receiving some water from the Rio Grande.)

Section 4.3.3
The Navajo Water Rights Settlement, which was approved in August 2013, defines flows and other requirements in a manner that could result in shortages to the San Juan-Chama Project. These shortages would likely be shared on a pro rata basis among all contractors.
Although conditions giving rise to shortage sharing may be rare, implementation of the act could nonetheless reduce the quantity of San Juan-Chama water available to contractors in some years. (In a very dry year, there might be no diversion of Colorado River basin water.)

Section 7.2
The study additionally projected a decrease in native Rio Grande water by about a third and a decrease in tributary flow by about a quarter, increasing frequency, intensity, and duration of droughts and floods, earlier snowmelt runoff, and increased variability in the magnitude, timing, and spatial distribution of streamflow and other hydrologic variables. (It just makes sense not to rely on flow associated with the Rio Grande.)

Section 7.3
Higher temperatures will result in a longer and warmer growing season, resulting in increased water demand for outdoor watering during the spring and summer months and

potentially lower rates of recharge. (If Los Alamos County was a major producer of alfalfa or chile, this might be a consideration, but the County is not. Even if the population of the county increased, which does not seem likely, outdoor watering could simply be reduced or eliminated.)

To repeat Section 3.2, "Barring potential water quality issues, continued pumping of the regional aquifer at current rates is likely to be sustainable for hundreds of years."

Thanks for your consideration,
Ed Jacobson
White Rock

LOS ALAMOS

Department of Public Utilities

Electric, Gas, Water, and Wastewater Services

February 3, 2017

C.M. Gillespie
427 Estante Way
Los Alamos, NM 87544

Dear Mr. Gillespie,

This letter is in response to your email dated November 22, 2016 in regards to the Long-Range Water Supply Plan, November 2016 draft. The purpose of this long-range (40-year) water plan is to provide the New Mexico Office of the State Engineer (OSE) with updated demand projections and a comparison of projected water demand to the water rights portfolio. Your comments have been reviewed and incorporated into the plan as described below.

A number of your comments were related to the County's San Juan-Chama (SJC) water rights and the potential future development of this water. This revised Long-Range Water Supply Plan does not endorse a specific SJC project. Our consultants recommend that the LACWU continue to plan for development of a San Juan-Chama project, given the uncertainty of water demand and the U.S. Department of Energy water rights lease, and the availability of the water. It will be up to the County and the public to select whether or not to construct a project, and to define its scope. Additional language has been added to the final plan to better explain how bringing San Juan-Chama project water online would diversify the water supply, and to discuss the potential effects of climate change on this source of supply.

We have removed Figure 6-1 from the plan. The figure was meant to show that at least under the high growth scenario, there is no room for losing any production due to contamination. We have covered that in the text.

The long-range water supply plan update reports on the LACWU's existing conservation program, but it is not intended to be a water conservation plan itself. While there has been opposition to water conservation in Los Alamos in the past, we agree that

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conservation could reduce demands in the future. We have added information about the volume of water that would be potentially conserved, and have discussed the possibility of per capita water use to be reduced to as low as the City of Santa Fe's 2015 value of 90 gallons per day.

In your comments, you question the consistency of various sections of the plan. The plan has been organized and content selected to be consistent with the requirements of the Office of the State Engineer. Although there are not published criteria, DBS&A has been contracted, due to their experience and knowledge of the OSE requirements, for the purpose of preparing a plan that meets the requirements of the OSE and best protects the County's unused water rights.

Your input has been valuable, and incorporating some of your suggestions has added to the quality of the plan. If you have any questions or would like to discuss further please contact me at 663-3420 or by email at james.alarid@lacnm.us.

Sincerely,

James Alarid
Deputy Utility Manager Engineering

Cc: Gaylyn Meyers, LAC
Amy Ewing, DBS&A
Tim Glasco, LAC

Comments on the Long-Range Water supply Plan Draft
Nov 2016

The last line in the top paragraph on page 42 of the report states "Bringing the SJC water online would diversify the water supply". This is not correct since the new wells proposed are just more wells in the regional aquifer and would be subject to the same threats as the other wells. Also, how does SJC water mitigate the effect of climate change, especially when the climate change envisioned could result in a reduction in our SJC allocation?

Section 5.4 (p68) states that water conservation beyond what has already been accomplished in the county has not been incorporated in the water demand projections. This means that the demand projections in Table 5-9 (p69) and Figures 5-5 and 5-6 (p70 &71) do not acknowledge plausible lower demand numbers at all. This is very unlike the high demand Scenario 2 (p75) and Figure 6-1 (p77) which depict plausible reductions in supply against the high demand projections.

The City of Santa Fe has accomplished water conservation that lowers their per capital water demand below that which has been accomplished in Los Alamos. This report should acknowledge this and show what the Los Alamos water demand would be if Los Alamos were to achieve the same conservation that has been done in Santa Fe. This could be done on the existing Figures 5-5 and 5-6 by crosshatching, for example.

Figure 6-1 (p 77) of the draft report is misleading. A well that was shut down due to some problem would not be a 40 year problem. It would be fixed in a few years by a repair, addition of a well-head purification technology, or by drilling a new well. This would return the orange bar to the level shown for 2010. If the OSE required a full offset for the repaired well as postulated in Section 6.2 (p75), the San Juan Chama water rights would be used for this offset and not be physically available for Los Alamos.

There is a major inconsistency in the report between the recommendations in Section 9 and the earlier discussion in Sections 4,5 and6.

The second bullet under "Water Supply (Quantity)" (p91) recommends an environmental assessment of the SJC project "---and evaluate whether to initiate steps toward implementation---. Bringing the San Juan Project water online would help the LACWU address the potential for contamination of the existing wells---". Note that as discussed elsewhere in the document, Section 4.1.2 (p41), and clarified in the discussion at the 11/16/16 meeting by the DPU, this is referring to the plan for three wells on the WR canyon rim as proposed in the CDM Smith study.

Various threats to existing LAC ground and SJC surface water rights in Sections 4.2.2; 4.2.3;4.2.4 (p43-45). Section 4.3 (p45) continues this discussion and makes the point that with respect to Senior Water Rights and Rio Grande Offset Requirements the OSE could required the LACWU to use SJC rights to meet these demands (p47). Section 4.3.3 further notes that the county SJC allocation could be reduced if there is not enough water available to meet existing allocations.

In Section 6.2 Scenario 2: High Water Use and Loss of Water Rights (p75) the third paragraph gives the assumptions used to derive Figure 6-1 (p77). Just why 1200 ac-ft/yr would disappear in the three years from now to 2020 is not stated and seems unlikely, but it implies the need for very prompt action to avert a very serious problem.

Here is the problem. The first complete sentence on page 76 states "Under this scenario there is a gap between the diminished groundwater supply and projected demand starting in 2030 that would need to be addressed, either by bringing the San Juan-Project water supply online or through reduction in demand (water conservation)". We can only 'spend' the SJC rights once. If we choose to develop the SJC water, which seems to be the preferred course, we no longer have those rights to 'defend' our existing groundwater rights, for example, to enable new wells to be developed to replace contaminated wells or in the event OSE invokes demands on our water rights for Senior Users or Rio Grande Offset.

Los Alamos, NM 87544
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County of Los Alamos

Staff Report

March 15, 2017

Agenda No.:	7.D
Index (Council Goals):	BCC - N/A
Presenters:	Jeff Johnson, Chair of the Board of Public Utilities
Legislative File:	**9137-17**

Title

Board of Public Utilities Discussion Concerning Councilor Request for Gas Rate Sunset

Recommended Action

None

Staff Recommendation

N/A

Body

At the September 27th, 2016 Council meeting a pass-through gas rate was adopted by unanimous vote. The rate superseded a previous pass-through rate with a sunset clause. The new rate did not have a sunset provision. The new rate was under the sunset deadline (due to expire on 10/1/16), and several councilors felt the deadline of the ordinance request did not leave Council adequate time to discuss the merits of the pass-through rate. These councilors have requested the BPU submit a sunset associated with the pass-through so that Council has an additional opportunity to discuss the pass-through rate.

Alternatives

N/A

Fiscal and Staff Impact

None

Attachments

None

County of Los Alamos
Staff Report
March 15, 2017

Los Alamos, NM 87544
www.losalamosnm.us

Agenda No.:	8.A
Index (Council Goals):	BCC - N/A
Presenters:	Board of Public Utilities
Legislative File:	**9193-17**

Title
Status Reports

Body
Each month the Board receives in the agenda packet informational reports on various items. No presentation is given, but the Board may discuss any of the reports provided.

Attachments
A - Electric Reliability Report
B - Accounts Recievables Report
C - Safety Report

STATUS REPORTS

ELECTRIC RELIABILITY

Los Alamos County Utilities

Electric Distribution Reliability

March 15, 2017

Stephen Marez
Senior Engineer

Electric Distribution Reliability Study
Twelve Month Outage History

Prepared by Stephen Marez
Senior Engineer L.A.C.U.

Date	Call Rcd.	Circuit	Cause	Start Time	End Time	Duration	Customers Affected (Meters)	Combined Customer Outage Durations	Total Outage H:M:S	Running SAIDI
3/2/2016	Utilities	EA4	OH Failure	14:40	15:09	0:29	18	8:42:00	8:42:00	0:00:03
3/2/2016	Utilities	WR2	Planned	9:00	10:40	1:40	10	16:40:00	25:22:00	0:00:10
3/10/2016	Utilities	WR2	Planned	9:30	10:30	1:00	7	7:00:00	32:22:00	0:00:13
3/28/2016	Utilities	16	URD Failure	19:36	22:30	2:54	30	87:00:00	119:22:00	0:00:48
4/3/2016	Utilities	WR2	URD Failure	11:18	13:00	1:42	12	20:24:00	139:46:00	0:00:56
4/3/2016	Utilities	16	URD Failure	21:15	22:20	1:05	50	54:10:00	193:56:00	0:01:17
4/13/2016	Utilities	13	Unknown	10:00	10:20	0:20	24	8:00:00	201:56:00	0:01:21
4/28/2016	Dispatch	WR1	OH Failure	22:15	23:30	1:15	30	37:30:00	239:26:00	0:01:36
5/10/2016	Utilities	16	Planned	9:00	9:10	0:10	18	3:00:00	242:26:00	0:01:37
5/17/2016	Utilities	15	Planned	9:00	10:00	1:00	7	7:00:00	249:26:00	0:01:40
5/21/2016	Utilities	WR2	Planned	10:00	10:15	0:15	7	1:45:00	251:11:00	0:01:40
6/9/2016	Utilities	13	Planned	9:00	10:00	1:00	27	27:00:00	278:11:00	0:01:51
6/9/2015	Utilities	14	URD Failure	1:45	4:00	2:15	24	54:00:00	332:11:00	0:02:13
6/10/2016	Utilities	WR2	Planned	9:00	11:00	2:00	17	34:00:00	366:11:00	0:02:26
6/23/2016	Utilities	WR2	Weather	19:00	0:00	5:00	4	20:00:00	386:11:00	0:02:34
7/12/2016	Utilities	16	URD Failure	1:44	3:00	1:16	306	387:36:00	773:47:00	0:05:09
7/15/2016	Utilities	13	URD Failure	10:30	13:30	3:00	88	264:00:00	1037:47:00	0:06:55
7/15/2016	Dispatch	WR1	URD Failure	21:40	0:00	2:20	21	49:00:00	1086:47:00	0:07:14
7/16/2016	Utilities	14	Animal	12:00	13:22	1:22	537	733:54:00	1820:41:00	0:12:07
7/19/2016	Utilities	18	Planned	0:00	5:00	5:00	4	20:00:00	1840:41:00	0:12:15
7/19/2016	Utilities	EA4	HUMAN	16:30	22:30	6:00	3	18:00:00	1858:41:00	0:12:23
7/20/2016	Utilities	13	Unknown	20:00	20:45	0:45	20	15:00:00	1873:41:00	0:12:29
7/27/2016	Utilities	14	URD Failure	8:17	9:30	1:13	120	146:00:00	2019:41:00	0:13:27
7/28/2016	Dispatch	WR1	URD Failure	2:30	5:30	3:00	12	36:00:00	2055:41:00	0:13:41
8/3/2016	Utilities	13	Planned	9:00	10:15	1:15	13	16:15:00	2071:56:00	0:13:45
8/10/2016	Utilities	17	URD Failure	3:10	3:30	0:20	209	69:40:00	2141:36:00	0:14:12
8/10/2016	Utilities	WR1	Planned	9:00	10:20	1:20	8	10:40:00	2152:16:00	0:14:17
8/11/2016	Utilities	WR1	Planned	9:00	11:00	2:00	6	12:00:00	2164:16:00	0:14:21
8/16/2016	Utilities	WR1	URD Failure	12:30	13:00	0:30	80	40:00:00	2204:16:00	0:14:37
9/23/2016	Utilities	18	Planned	9:00	10:25	1:25	3	4:15:00	2208:31:00	0:14:39
10/3/2016	Utilities	WR2	HUMAN	11:00	12:05	1:05	16	17:20:00	2225:51:00	0:14:46
10/22/2016	Utilities	14	HUMAN	10:53	11:52	0:59	539	530:01:00	2755:52:00	0:18:17
10/28/2016	Utilities	WR1	URD Failure	21:20	22:30	1:10	15	17:30:00	2773:22:00	0:18:24
11/2/2016	Utilities	14	URD Failure	17:47	18:40	0:53	129	113:57:00	2887:19:00	0:19:09
11/10/2016	Utilities	17	URD Failure	8:15	12:30	4:15	6	25:30:00	2912:49:00	0:19:19
11/15/2016	Utilities	14	Planned	8:30	9:30	1:00	54	54:00:00	2966:49:00	0:19:41
11/28/2016	Utilities	15	Unknown	6:00	6:45	0:45	25	18:45:00	2985:34:00	0:19:53
11/28/2016	Utilities	15	Unknown	6:00	8:05	2:05	25	52:05:00	3037:39:00	0:20:14
11/28/2016	Utilities	14	URD Failure	10:15	14:15	4:00	6	24:00:00	3061:39:00	0:20:19
12/16/2016	Utilities	13	Tree	9:17	13:00	3:43	13	48:19:00	3109:58:00	0:20:38
12/17/2016	Utilities	13	OH Failure	9:17	10:30	17:00	10	170:00:00	3279:58:00	0:21:45
1/1/2017	Utilities	15	Animal	13:00	13:45	0:45	25	18:45:00	3298:43:00	0:21:53
1/16/2016	Utilities	13	Weather	20:15	23:59	3:44	5	18:40:00	3317:23:00	0:22:00
1/29/2017	Utilities	15	Animal	2:20	3:00	0:40	1145	763:20:00	4080:43:00	0:27:04
1/29/2017	Utilities	15	Animal	2:20	3:15	0:55	131	120:05:00	4200:48:00	0:27:52
1/29/2017	Utilities	15	Animal	2:20	3:40	1:20	72	96:00:00	4296:48:00	0:28:30
1/29/2017	Utilities	15	Animal	2:20	4:30	2:10	527	1141:50:00	5438:38:00	0:36:05

CIRCUIT SAIDI IS CALCULATED ACCORDING TO THE NUMBER OF CUSTOMERS IN EACH CIRCUIT RESPECTIVELY

Running SAIDI Circuit 13	**Running SAIDI Circuit 14**	**Running SAIDI Circuit 15**	**Running SAIDI Circuit 16**	**Running SAIDI Circuit 17**	**Running SAIDI Circuit 18**	**SAIDI Circuit EA4 & Royal Crest**	**Running SAIDI Circuit WR1**	**Running SAIDI Circuit WR2**	**Monthly SAIDI**		**Monthly Customer Minutes out of service**	**WEATHER SAIDI**
						0:04:01						
								0:01:35				
								0:03:36				
			0:02:50						MARCH	0:00:48	119:22:00	
								0:12:18				
			0:04:36									
0:00:17												
							0:01:25		APRIL	0:00:48	230:44:00	
			0:04:42									
		0:00:13										
								0:27:57	JUNE	0:00:05	11:45:00	
0:01:15												
	0:06:01											
								0:50:46				
								0:24:04	JULY	0:00:54	135:00:00	0:00:08
			0:17:21									
0:10:43												
							0:03:16					
	1:27:42											
					0:05:38							
						0:12:19						
0:11:15												
	1:43:58											
							0:04:37		AUGUST	0:11:04	1017:54:00	
0:11:50												
				0:20:00								
							0:05:02					
							0:05:29					
							0:07:00		SEPTEMBER	0:00:59	148:35:00	
					0:06:50				OCTOBER	0:00:02	4:15:00	
								2:18:41				
	2:42:58											
							0:00:40		NOVEMBER	0:03:45	564:51:00	
	2:55:39											
				0:27:19								
	3:01:39											
		0:00:50										
		0:02:30										
	3:04:20								DECEMBER	0:01:55	288:17:00	
0:13:35												
0:19:45									JANUARY	0:01:27	218:19:00	
		0:00:36										
0:00:41												0:00:07
		0:24:29										
		0:28:20										
		0:31:25										
		1:08:02							FEBRUARY	0:14:19	2158:40:00	
										SAIDI TOTAL		**WEATHER**
Circ 13	**Circ 14**	**Circ 15**	**Circ 16**	**Circ 17**	**Circ 18**	**Circ EA4**	**Circ WR1**	**Circ WR2**	**Total**	**0:36:05**		**0:00:15**
1655	**539**	**1875**	**1842**	**209**	**213**	**165**	**1586**	**961**	**9045**			

Twelve Month History	FEBRUARY 2017	-
Total # Accounts	9045	-
Total # Interruptions	47	-
Sum Customer Interruption Durations	5438:38:00	hours:min:sec
# Customers Interrupted	4458	
SAIFI(APPA AVG. = 1.0)	.49	int./cust.
SAIDI (APPA AVG. = 1:00)	:36	hours:min
CAIDI	1:13	hours:min/INT
ASAI	99.9997%	% available

- **SAIFI - System Average Interruption Frequency Index**
  A measure of interruptions per customer (Per Year)

  SAIFI= (Total number of customer interruptions)
  (Total number of customers served)

- **SAIDI – System Average Interruption Duration Index**
  A measure of outage time per customer if all customers were out at the same time (hours per year)

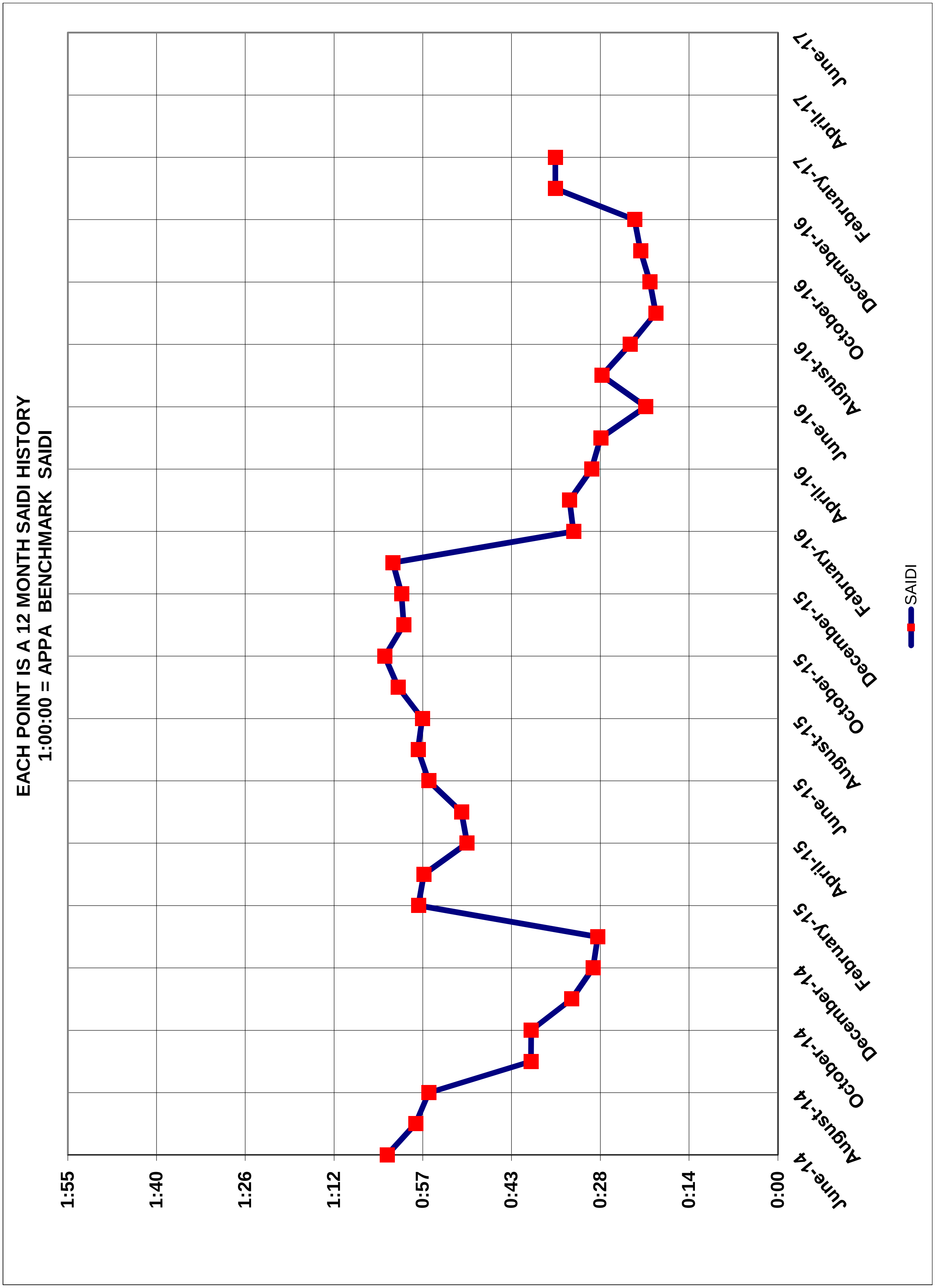
  SAIDI=(Sum of all customer outage durations)
  (Total number of customers served)

- **CAIDI – Customer Average Interruption Duration Index**
  A measure of the average outage duration per customer (hours per interruption)

  CAIDI=(Sum of all customer outage durations) = SAIDI
  (Total number of customers interruptions) SAIFI

- **ASAI – Average System Availability Index**
  A measure of the average service availability (Per unit)

  ASAI= (Service hours available) = 8760-SAIDI
  (Customer demand hours) 8760


EACH POINT IS A 12 MONTH SAIDI HISTORY
1:00:00 = APPA BENCHMARK SAIDI
1:55
1:40
1:26
1:12
0:57
0:43
0:28
0:14
0:00
June-14
August-14
October-14
December-14
February-15
April-15
June-15
August-15
October-15
December-15
February-16
April-16
June-16
August-16
October-16
December-16
February-17
April-17
June-17
SAIDI

STATUS REPORTS

ACCOUNTS RECEIVABLES

Los Alamos County Utilities Department
Active Receivables Over 90 Days Past Due
March 1, 2017

Account	*Acct Type*	*Comments*	*90 - 119*	*120 +*
2008575	RES	Scheduling turn off, contacting 3/6/17	101.22	-
2118518	COMM	Door Tag to be delivered 3/6/17	105.04	-
2021703	COMM	Door Tag to be delivered 3/6/17	122.71	-
2082208	RES	Paid $177 on 3/2/17	127.99	-
2013117	RES	Scheduling turn off, contacting 3/6/17	128.25	-
2090328	RES	Paid $200 on 3/1/17	146.33	-
2009914	RES	Payment arrangement on file	204.19	-
2062968	RES	Scheduling turn off, contacting 3/6/17	244.10	6.39
2009863	RES	Door Tag due 3/6/17	115.39	18.14
2083378	RES	Door Tag due 3/6/17	70.80	68.00
2073778	RES	Paid $442 on 3/2/17	10.00	527.85
			1,376.02	620.38
			TOTAL	**$ 1,996.40**

Los Alamos County Utilities Department
Receivables More than 60 Days Inactive
March 1, 2017

YEAR	OUTSTANDING 3/1	# OF ACCOUNTS	OUTSTANDING 2/1	# OF ACCOUNTS
FY13	16,846.55	74	16,726.55	73
FY14	30,005.15	97	30,414.07	98
FY15	28,454.69	103	28,454.69	103
FY16	22,699.80	146	22,765.53	148
FY17	28,746.34	110	29,575.52	105
TOTAL	**$ 126,752.53**	**530**	**$ 127,936.36**	**527**

STATUS REPORTS

SAFETY

	ADMIN	EL DIST	EL PROD	GWS	WA PROD	WWTP
MONTH						
Jan - 2017	2612.0	1286.0	1602.0	2857.0	1066.0	987.0
Feb - 2017	3592.0	1462.0	3135.0	3912.0	1301.0	1055.0
Mar - 2016	5275.0	2172.8	2606.0	5330.0	1995.5	2029.0
Apr - 2016	3553.8	1490.0	1772.0	3615.0	1359.0	1322.0
May - 2016	3656.5	1410.5	1675.0	3759.6	1395.5	1338.5
June - 2016	4122.0	1462.3	1606.1	3773.0	1422.5	1376.3
July - 2016	4122.0	1462.3	1606.1	3773.0	1422.5	1376.3
Aug - 2016	3599.0	1567.0	718.0	3730.0	987.0	1210.0
Sept - 2016	5389.0	2064.0	2472.0	5772.0	1722.0	1775.0
Oct - 2016	3724.0	1298.0	1604.0	3749.0	956.0	1348.0
Nov - 2016	3753.0	1329.0	1443.0	3574.0	1165.0	1248.0
Dec - 2016	3022.0	1435.0	1502.0	3390.0	1203.0	1081.0
	46420.3	18438.9	21741.2	47234.6	15995.0	16146.1
INJURIES	0	0	0	0	0	0
INC RATE	0	0	0	0	0	0
LOST/RSTR CASES	0	0	0	0	0	0
LOST/RSTR RATE	0	0	0	0	0	0