Appendix A
Supplemental Material

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Appendix A Supplemental Material

A.1 List of Preparers

Table A-1. Federal Agencies

Preparers	Agency	Participation
Melissa Dekar	Bureau of Reclamation	EA/IS development and review
Jessika Cohen	Bureau of Reclamation	EA/IS development and review
Rain Emerson	Bureau of Reclamation	EA/IS development and review
Nicole Johnson	Bureau of Reclamation	EA/IS development and review
Michael Lyttge	Bureau of Reclamation	EA/IS development and review
Andrew Overton	Bureau of Reclamation	EA/IS development and review
Natalie Taylor	Bureau of Reclamation	EA/IS development and review

Table A-2. Regional Agencies

Preparers	Agency	Participation
Lucinda Shih	Contra Costa Water District	EA/IS development and review
Hasan Abdullah	East Bay Municipal Utility District	EA/IS development and review
Max Fefer	East Bay Municipal Utility District	EA/IS development and review
Rebecca Akroyd	San Luis & Delta-Mendota Water Authority	EA/IS development and review
Pablo Arroyave	San Luis & Delta-Mendota Water Authority	EA/IS development and review
Rebecca Harms	San Luis & Delta-Mendota Water Authority	EA/IS development and review
Andrea Matarazzo	San Luis & Delta-Mendota Water Authority	EA/IS development and review
Cindy Meyer	San Luis & Delta-Mendota Water Authority	EA/IS development and review

Table A-3. Consultants

Name	Qualifications	Background/Expertise	Participation
CDM Smith			
Anusha Kashyap	M.S. Environmental Engineering 12 years experience	Environmental Engineer	Project Manager
Abbie Woodruff, AICP	M.S. Urban and Environmental Planning 8 years experience	Environmental Planner	Project Technical Lead Primary Author: Hydrology and Water Quality, Groundwater
Laura Campagna	B.S. Environmental Studies: Natural Resource Management and Conservation 8 years experience	Environmental Planner	Deliverable Support, Primary Author: Noise, Cumulative Impacts
Jenna Quan	B.S. Ecology, Evolution, and Biodiversity 2 years experience	Environmental Planner/ Biologist	Technical Review: Biological Resources
Greta Gledhill	B.S. Environmental Policy Analysis and Planning 2 years experience	Environmental Planner	Deliverable Support, Primary Author: ITAs, Indian Sacred Sites
Emma Jones	M.S. Urban & Regional Planning 4 years experience	Environmental Planner/ Biologist	Primary Author: Mineral Resources, Population & Housing, Public Services, Recreation, Transportation, Tribal Cultural Resources, Utilities and Service Systems
Jennifer Perez	B.S. Environmental Studies 1 year experience	Environmental Planner	Primary Author: Aesthetics, Agriculture & Forest Resources, Cultural Resources, Energy, Geology & Soils, Hazards & Hazardous Materials, Land Use & Planning
Gwen Pelletier	M.S. Environmental Studies B.S. Biochemistry 21 years experience	Principal Environmental Scientist	Primary Author: Air Quality and Greenhouse Gas Emissions

Name	Qualifications	Background/Expertise	Participation
Brian Heywood, PE	M.S. Environmental Engineering 25 years experience	Environmental Engineer	Technical Review: Groundwater
Jeremy Gilbride	B.S. Chemical Engineering 8 years experience	Chemical Engineer	Technical Review: Air Quality and Greenhouse Gas Emissions
MBK Engineers			
Lee Bergfeld, PE	M.S. Civil Engineering B.S. Civil Engineering 22 years experience	Principal Engineer	Project Manager
Walter Bourez, PE	M.S. Civil Engineering B.S. Civil Engineering 37 years experience	Principal Engineer	EA/IS development
Darren Cordova, PE	B.S. BioResources & Agricultural Engineering 22 years experience	Principal Engineer	EA/IS development
Anne Williams, PE	B.S. Agricultural & Biological Engineering 11 years experience	Principal Engineer	EA/IS development
Kyle Knutson, PE	B.S. Civil Engineering 14 years experience	Principal Engineer	EA/IS development
Naomi Tanaka, EIT	B.S. Civil & Environmental Engineering 3 years experience	Assistant Engineer	EA/IS development
Yuen Lenh, PE	B.S. Civil & Environmental Engineering 3 years experience	Engineer	EA/IS development
Dustin Bohn, EIT	B.S. Civil Engineering 1 year experience	Assistant Engineer	EA/IS development
Kelsey Gill, EIT	B.S. Civil Engineering 1 year experience	Assistant Engineer	EA/IS development
Swaim Biological Inc.			
Karen Swaim	M.S. Biology B.S. Biology 30 years experience	President and Principal Biologist	Primary Author: Biological Resources
Jeff Mitchell	M.B.A Management and Strategy B.T. Wildlife Management 23 years experience	Principal Biologist	Primary Author: Biological Resources

Name	Qualifications	Background/Expertise	Participation
Leslie Koenig	B.S. Biology 15 years experience	Principal Biologist	Primary Author: Biological Resources
Joie de Leon	M.S. Environmental Studies B.S. Conservation Biology 10 years experience	Staff Biologist	Deliverable Support: Biological Resources
Pacific Legacy, Inc.			
John Holson, RPA	M.A. Cultural Resource Management/ Geography B.A. Anthropology 50 years experience	Senior Principal Investigator	Primary Author: Cultural and Tribal Resources
Mizuno Consulting			
Frances Mizuno	33 years experience	Water Management	EA/IS development and review

Key: AICP = American Institute of Certified Planners; B.S. = Bachelor of Science; B.T. = Bachelor of Teaching;
EIT = Engineer in training; M.B.A. = Masters of Business Administration; M.S. = Master of Science; P.E. = Professional Engineer

A.2 Acronyms

AF	acre-feet
APCD	Air Pollution Control District
AQAP	Air Quality Attainment Plan
AQMD	Air Quality Management District
ATCM	Airborne Toxic Control Measure
BMO	basin management objective
BOs	Biological Opinons
CAAQS	California Ambient Air Quality Standard
CARB	California Air Resources Board
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQ	Council of Environmental Quality
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CVP	Central Valley Project
CVSR	Central Valley Spring Run
dB	decibel
dBA	A-weighted decibel
dbh	diameter at breast height
Delta	Sacramento-San Joaquin Delta
DWR	California Department of Water Resources
EA	Environmental Assessment
FYLF	foothill yellow-legged frog
GAMA	Groundwater Ambient Monitoring and Assessment
GDEs	groundwater-dependent ecosystems
GHG	greenhouse gas
GMP	Groundwater Management Plan
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan

GWP	global warming potential
HCP	Habitat Conservation Plan
ID	Irrigation District
IS	Initial Study
ITA	Indian Trust Asset
L_{dn}	day-night average sound level
MCL	maximum contaminant level
mg/L	milligrams per liter
MUD	Municipal Utility District
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standard
NCCP	Natural Community Conservation Plan
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NOx	nitrogen oxides
NSVPA	Northern Sacramento Valley Planning Area
O_3	ozone
PM_{10}	inhalable particulate matter
$PM_{2.5}$	fine particulate matter
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
ROD	Record of Decision
SACFEM2013	Sacramento Valley Groundwater Model
SIP	state implementation plan
SLDMWA	San Luis & Delta-Mendota Water Authority
SOx	sulfer oxides
SRA	State Responsibility Area
SRWR	Sacramento River Winter Run
SWP	State Water Project
SWRCB	State Water Resources Control Board
TCCA	Tehama-Colusa Canal Authority
TCR	The Climate Registry
TDS	total dissolved solids
tpy	tons per year
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service

VOC	volatile organic compound
WY	water year

A.3 References

Section 1 – Introduction

Bureau of Reclamation and California Department of Water Resources (Reclamation and DWR). 2019. DRAFT Technical Information for Preparing Water Transfer Proposals (Water Transfer White Paper) Information for Parties Preparing Proposals for Water Transfers Requiring Department of Water Resources or Bureau of Reclamation Approval. December 2019. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Management/Water-Transfers/Files/Draft_2019WTWhitePaper-012324.pdf. [Accessed on August 21, 2024].

California Department of Water Resources (DWR). 2024. California Hydrology Update, Conditions as of September 30, 2024. Available at: https://cww.water.ca.gov/service/document/hydroreport?_=1664980284640. [Accessed on October 29, 2024].

______. 2022. New Water Year Begins Amid Preparations for Continued Drought. Available at: https://water.ca.gov/News/News-Releases/2022/Oct-22/New-Water-Year-Begins-Amid-Preparations-for-Continued-Drought. [Accessed on December 15, 2022].

Section 2 – Alternatives

Bureau of Reclamation and California Department of Water Resources (Reclamation and DWR). 2019. DRAFT Technical Information for Preparing Water Transfer Proposals (Water Transfer White Paper) Information for Parties Preparing Proposals for Water Transfers Requiring Department of Water Resources or Bureau of Reclamation Approval. December 2019. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Management/Water-Transfers/Files/Draft_2019WTWhitePaper-012324.pdf. [Accessed on August 21, 2024].

Section 3 – Environmental Impacts

Anderson-Cottonwood Irrigation District (ACID). 2011. Anderson-Cottonwood Irrigation District Integrated Regional Water Management Program- Groundwater Production Element Project.

______. 2014. Final Water Transfer Monitoring Summary Report 2013 Water Transfer Agreement SWPAO #13-707 Anderson-Cottonwood Irrigation District.

Bureau of Reclamation (Reclamation). 2015. SACFEM2013: Sacramento Valley Finite Element Groundwater Flow Model User's Manual. Prepared by CH2M HILL and MBK Engineers, Inc. February.

———. 2024a. Central Valley Project Historical Water Allocations. Updated June 25, 2024. Available at: https://www.usbr.gov/mp/cvo/vungvari/water_allocations_historical.pdf. [Accessed on October 22, 2024].

______. 2024b. Shasta Dam. Available at: https://www.usbr.gov/projects/index.php?id=241. [Accessed on August 12, 2024].

______. 2024c. Folsom Dam. Available at: https://www.usbr.gov/projects/index.php?id=74. [Accessed on August 12, 2024].

———. 2024d. Long-Term Operations of the Central Valley Project and State Water Project Draft Environmental Impact Statement. Appendix E – Draft Alternatives. pp E-26. July. Available at: https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=54797. [Accessed on October 22, 2024].

———. 2024e. Long-Term Operations of the Central Valley Project and State Water Project Final Environmental Impact Statement. November. Available at: https://www.usbr.gov/mp/nepa/includes/documentShow.php?Doc_ID=55436. [Accessed on November 25, 2024].

Bureau of Reclamation and California Department of Water Resources (Reclamation and DWR). 2004. Environmental Water Account, Environmental Impact Statement/Environmental Impact Report. State Clearinghouse #1996032083 Available at: https://www.usbr.gov/mp/nepa/nepa_project_details.php?Project_ID=107. [Accessed on November 4, 2024].

———. 2019. DRAFT Technical Information for Preparing Water Transfer Proposals (Water Transfer White Paper) Information for Parties Preparing Proposals for Water Transfers Requiring Department of Water Resources or Bureau of Reclamation Approval. December 2019. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Management/Water-Transfers/Files/Draft_2019WTWhitePaper-012324.pdf. [Accessed on August 21, 2024].

Butte Water District GSA, City of Live Oak GSA, City of Yuba City GSA, County of Sutter GSA, Reclamation District No. 70 GSA, Reclamation District No. 1500 GSA, Reclamation District No. 1660 GSA, Sutter Extension Community Service District GSA, Sutter Extension Water District GSA. 2022. *Sutter Subbasin Groundwater Sustainability Plan*. January. Available at: https://sgma.water.ca.gov/portal/gsp/preview/112. [Accessed on November 4, 2024].

California Air Resources Board. (CARB) 2022. State Area Designations. Available at: https://ww2.arb.ca.gov/resources/documents/maps-state-and-federal-area-designations. [Accessed on August 21, 2024].

———. 2023. California Greenhouse Gas Emissions from 2000 to 2021: Trends of Emissions and Other Indicators. Available at: https://ww2.arb.ca.gov/sites/default/files/2023-12/2000_2021_ghg_inventory_trends.pdf. [Accessed on August 20, 2024].

———. 2024 Airborne Toxic Control Measures. Available at: https://ww2.arb.ca.gov/resources/documents/airborne-toxic-control-measures. [Accessed on September 27, 2024].

California Department of Conservation. 2023. 2016-2018 Farmland Conversion Report. Available at: https://www.conservation.ca.gov/dlrp/fmmp/Pages/2016-2018_Farmland_Conversion_Report.aspx. [Accessed on November 26, 2024].

California Department of Fish and Wildlife (CDFW). 2024. California Natural Diversity Database Rarefind 5. Available at: https://wildlife.ca.gov/Data/CNDDB/Maps-and-Data. [Accessed on August 20, 2024].

California Department of Water Resources (DWR). 2010. Central Valley Flood Management Planning Program. State Plan of Flood Control Descriptive Document. Available at: https://cawaterlibrary.net/wp-content/uploads/2017/05/SPFC_Descriptive_Doc_20100115.pdf. [Accessed on August 20, 2024].

______.2017. Hydroclimate Report Water Year 2017. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Flood-Management/Flood-Data/Climate-summaries/Hydroclimate_Report_2017-ADA-Final.pdf. [Accessed on August 14, 2024].

______.2018. 2017 GPS Survey of the Sacramento Valley GPS Subsidence Network. Available at: https://data.ca.gov/dataset/gps-survey-of-the-sacramento-valley-subsidence-network. [Acessed on August 21, 2024].

———. 2020. Sustainable Groundwater Management Act 2019 Basin Prioritization Dashboard. Available at: https://gis.water.ca.gov/app/bp-dashboard/final/. [Accessed on November 4, 2024].

______. 2021. California's Groundwater Update 2020 (Bulletin 118). Available at: https://data.cnra.ca.gov/dataset/calgw_update2020/resource/1187b743-44bb-44b7-aa45-2538e6a1f984. [Accessed on December 10, 2021].

______. 2023a. Oroville. Available at: https://water.ca.gov/programs/state-water-project/swp-facilities/oroville. [Accessed on August 12, 2024].

———. 2023b. SGMA Portal. Groundwater Sustainability Assessments. 5-021.52 Colusa. Available at: https://sgma.water.ca.gov/portal/gsp/assessments/92. [Accessed on November 4, 2024].

______. 2024a. Sacramento River at I Street (IST) Mean Daily Flow. Available at: https://cdec.water.ca.gov/dynamicapp/selectQuery. [Accessed on August 12, 2024].

———. 2024b. Sustainable Groundwater Management Act (SGMA). Available at: https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management#. [Accessed on October 10, 2024].

______. 2024c. SGMA Portal. Groundwater Sustainability Assessments. 5-006.03 Anderson. Available at: https://sgma.water.ca.gov/portal/gsp/assessments/83. [Accessed on November 4, 2024].

______. 2024d. SGMA Portal. Groundwater Sustainability Assessments. 5-006.04 Enterprise. Available at: https://sgma.water.ca.gov/portal/gsp/assessments/82. [Accessed on November 4, 2024].

______. 2024e. California Data Exchange Center. Water Year Hydrologic Classification Indices. Available at: http://cdec.water.ca.gov/reportapp/javareports?name=WSIHIST. [Accessed on August 12, 2024].

———. 2024f. Sustainable Groundwater Management Act Data Viewer. Groundwater Levels: Seasonal Reports- Change. Spring 2013-2023, 2018-2023, 2022-2023. Available at: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#gwlevels. [Accessed on August 14, 2024].

———. 2024g. Sustainable Groundwater Management Act Data Viewer. Current Conditions: Active Subsidence Network – InSAR Data. Total Vertical Displacement (06/2015 – 07/2024). Available at: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions. [Accessed on October 10, 2024].

______. 2024h. Zamora Extensometer 11N01E24Q008M Land Subsidence Extensometer Plot. Available at: https://wdl.water.ca.gov/WaterDataLibrary/StationDetails.aspx?dateFrom2=01%2f01%2f1900&StationTypeCode=&Station=11N01E24Q008M&IncludeVarData=False&SelectedAll=False&dateTo2=01%2f01%2f1900&source=search. [Accessed on August 12, 2024].

______. 2024i. Conaway Ranch Extensometer 09N03E08C004M Land Subsidence Extensometer Plot. Available at: https://wdl.water.ca.gov/WaterDataLibrary/StationDetails.aspx?dateFrom2=01%2f01%2f1900&StationTypeCode=&Station=09N03E08C004M&IncludeVarData=False&SelectedAll=False&dateTo2=01%2f01%2f1900&source=search. [Accessed on August 12, 2024].

______. 2024j. Arbuckle Extensometer 16N02W05B001M Land Subsidence Extensometer Plot. Available at: https://wdl.water.ca.gov/WaterDataLibrary/StationDetails.aspx?dateFrom2=01%2f01%2f1900&StationTypeCode=&Station=16N02W05B001M&IncludeVarData=False&SelectedAll=False&dateTo2=01%2f01%2f1900&source=search. [Accessed on August 12, 2024].

______. 2024k. Sutter Extensometer 11N04E04N005M Land Subsidence Extensometer Plot. Available at: https://wdl.water.ca.gov/WaterDataLibrary/StationDetails.aspx?dateFrom2=01%2f01%2f1900&StationTypeCode=&Station=11N04E04N005M&IncludeVarData=False&SelectedAll=False&dateTo2=01%2f01%2f1900&source=search. [Accessed on August 12, 2024].

———2024l. SGMA Data Viewer- Land Subsidence. GPS Stations - Station ID - P303. 37.05438314,-120.7052952. Available at: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#currentconditions [Accessed on August 12, 2024]

California State University Chico. 2002. Little Chico Creek Watershed Existing Conditions Report. Available at: https://www.csuchico.edu/bcep/_assets/documents/little-chico-creek-2002-erc.pdf [Accessed on February 13, 2025]

cbec eco engineering and H.T. Harvey & Associates. (cbec and Harvey). 2017. Coon Creek Watershed Assessment. Final Report. Prepared for County of Placer. Available at: https://www.valleyfoothill.org/mobius/wp-content/uploads/2017/03/Coon-Creek-Watershed-Assessment-Final-Report-2017_02_10-compressed.pdf. [Accessed on November 4, 2024].

City of Vacaville GSA, Reclamation District No. 3 GSA, Reclamation District No. 317 GSA, Reclamation District No. 349 GSA, Reclamation District No. 501 GSA, Reclamation District No. 554 GSA, Reclamation District No. 556 GSA, Reclamation District No. 2111 GSA, Sacramento County GSA, Solano Irrigation District GSA, Solano Subbasin GSA. 2021. *Solano Subbasin Groundwater Sustainability Plan*. November. Available at: https://sgma.water.ca.gov/portal/gsp/preview/117. [Accessed on November 4, 2024].

Cole, S., Hanak, E., and Peterson, C.. 2024. *Agrcultural land use in California*. Public Policy Institute of California. Available at: https://www.ppic.org/publication/agricultural-land-use-in-california/. [Accessed on November 4, 2024].

Colusa County. 2018. Colusa County Local Hazard Mitigation Plan Update. Available at: https://www.countyofcolusaca.gov/DocumentCenter/View/10550/Colusa-County-LHMP-Update-Annex-C-RD-108. [Accessed on March 28, 2025].

Colusa Groundwater Authority GSA, Glenn Groundwater Authority GSA. 2024. *Colusa Subbasin Groundwater Sustainability Plan*. April. Available at: https://sgma.water.ca.gov/portal/gsp/preview/92. [Accessed on November 4, 2024].

County of Placer. 2002. Auburn Ravine/Coon Creek Restoration Plan. Available at: https://www.placer.ca.gov/DocumentCenter/View/9607/Auburn-RavineCoon-Creek-Ecosystem-Restoration-Plan-PDF . [Accessed on August 13, 2024].

County of Sacramento GSA, Franklin Drainage District GSA, Omochumne-Hartnell Water District GSA, Reclamation District No. 369 GSA, Reclamation District No. 551 GSA, Reclamation District No. 744 GSA, Reclamation District No. 813 GSA, Reclamation District No. 1002 GSA, Reclamation District No. 2110 GSA, Sacramento Central Groundwater Authority GSA, Sloughhouse Resource Conservation District GSA. 2021. *South American Subbasin Groundwater Sustainability Plan*. October. Available at: https://sgma.water.ca.gov/portal/gsp/preview/111. [Accessed on November 4, 2024].

County of Sutter GSA, Reclamation District No. 1001 GSA, Sacramento Groundwater Authority GSA, South Sutter Water District GSA, West Placer GSA. 2021. *North American Subbasin Groundwater Sustainability Plan*. December. Available at: https://sgma.water.ca.gov/portal/gsp/preview/100. [Accessed on November 4, 2024].

Cramer Fish Sciences and MBK Engineers. 2024. Natomas Cross Canal Berm and Channel Enhancements Project Report. Technical Memorandum. December 2024.

Department of the Interior. 2000. Record of Decision, Trinity River mainstem fishery restoration final environmental impact statement/environmental impact report. U.S. Department of Interior, Washington D.C., Washington D.C. Available at: https://www.trrp.net/library/document?id=227. [Accessed on November 5, 2024].

Enterprise-Anderson GSA. 2022a. *Enterprise Subbasin Groundwater Sustainability Plan*. Available at: https://sgma.water.ca.gov/portal/gsp/preview/82. [Accessed November 4, 2024].

———. 2022b. *Anderson Subbasin Groundwater Sustainability Plan*. January. Available at: https://sgma.water.ca.gov/portal/gsp/preview/83. [Accessed on November 4, 2024].

Feather River Air Quality Management District (AQMD). 2010. Indirect Source Review Guidelines: A Technical Guide to Assess the Air Quality Impact of Land Use Projects Under the California Environmental Quality Act. Available at: http://www.fraqmd.org/ceqa-planning. [Accessed on August 20, 2024].

Glenn County. 1993. Glenn County General Plan. Volume III – Setting. January. Available at: https://www.countyofglenn.net/sites/default/files/images/3%20Environmental%20Setting%20Technical%20Paper%20Glenn%20County%20GP%20Vol.%20III%20Reduced%20Size.pdf. [Accessed on August 22, 2024].

———. 2020. Glenn County General Plan Update Existing Conditions Report. Available at: https://static1.squarespace.com/static/5c8a73469b7d1510bee16785/t/5e556b56c253f84cdc287783/1582656403698/GlennCounty-ECR-Final-Feb2020.pdf. [Accessed on August 22, 2024].

Hanson, R.T. 2015. Hydrologic framework of the Santa Clara Valley, California. *Geosphere,* 11 (3). Available at: https://doi.org/10.1130/GES01104.1. [Accessed on October 10, 2024].

Ireland, R .L., Poland, J. F., Riley, F. S. 1984. *Land subsidence in the San Joaquin Valley, California, as of 1980*. U.S. Geological Survey Professional Paper 437-I. United States Government Printing Office, Washington. Available at: https://pubs.usgs.gov/pp/0437i/report.pdf. [Accessed on November 26, 2024].

Lewis. D. C. and Burgy, R. H. 1964. *The relationship between oak tree roots and groundwater in fractured rock as determined by tritium tracing*. Journal of Geophysical Research, 69(12), 2581-2590. Available at: https://ucanr.edu/repository/fileaccess.cfm?article=157199&p=NIYSBU. [Accessed on November 5, 2024].

Luhdorff and Scalmanini, Consulting Engineers. 2022. Sacramento Valley Water Quality Coalition 2021 Annual Groundwater Quality Trend Monitoring Report. April 29, 2022. Available at: https://www.svwqc.org/wp-content/uploads/2023/06/2021-Groundwater-Quality-Trend-Monitoring-Update.pdf. [Accessed on August 22, 2024].

MBK Engineers. 2014. Anderson-Cottonwood Irrigation District 2013 Water Transfer – Summary. May 2014.

———. 2015. Anderson-Cottonwood Irrigation District 2014 Water Transfer – Summary. May 2015.

———. 2016. Anderson-Cottonwood Irrigation District 2015 Water Transfer – Summary. May 2016.

———. 2021. Anderson-Cottonwood Irrigation District 2020 Water Transfer – Summary. May 2021.

———. 2022. Anderson-Cottonwood Irrigation District 2021 Water Transfer – Summary. May 2014.

Merced Groundwater Sustainability Agency (GSA). 2024. *Groundwater Sustainability Plan Merced*. Available at: https://sgma.water.ca.gov/portal/gsp/preview/9. [Accessed on October 10, 2024].

Mount, J et al. 2019. *Managing California's Freshwater Ecosystems: Lessons from the 2012-2016 Drought*. Available at: https://www.ppic.org/publication/managing-californias-freshwater-ecosystems-lessons-from-the-2012-16-drought/. [Accessed on August 14, 2024].

Northern California Water Association. 2022. 2022 Groundwater Quality Assessment Report. Available at: https://www.svwqc.org/wp-content/uploads/2023/06/5-Year-Groundwater-Quality-Assessment-Report-submitted-September-2022.pdf. [Accessed on August 12, 2024].

Reclamation District 108. 2022. Reclamation District 108 History at a Glance. Available at: https://www.rd108.org/files/e9644b150/Presentation-Posters-RD108_150th-FOR-EMAIL.pdf. [Accessed on March 28, 2025].

Sacramento Metropolitan AQMD. 2020. Sacramento Metropolitan AQMD Thresholds of Significance Table. May. Available at: http://airquality.org/LandUseTransportation/Documents/CH2ThresholdsTable4-2020.pdf. [Accessed on August 20, 2024].

Sacramento River Watershed Program. 2022. Cache Creek Watershed. Available at: https://sacriver.org/explore-watersheds/westside-subregion/cache-creek-watershed/. [Accessed on August 11, 2024].

______.2024a. Lower Feather River Watershed. Available at: https://sacriver.org/explore-watersheds/feather-river-subregion/lower-feather-river-watershed/. [Accessed on August 12, 2024].

______. 2024b. Yuba River Watershed. Available at: https://sacriver.org/explore-watersheds/american-river-subregion/yuba-river-watershed/. [Accessed on August 12, 2024].

Santa Clara Valley Water District (Valley Water). 2016. *Groundwater Management Plan*. Available at: https://sj-admin.s3-us-west-2.amazonaws.com/2016_1100_SCVWD_GroundwaterManagementPlan.pdf. [Accessed on October 10, 2024].

Shasta County Air Quality Management District (AQMD). 2003. CEQA Protocol for Review - Land Use Permitting Activities. Available at: https://www.shastacounty.gov/air-quality/page/california-environmental-quality-act-ceqa. [Accessed on August 20, 2024].

State Water Resources Control Board (SWRCB). 2009. California River Indices. Available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/hearings/daviswoodland/daviswoodland_cspa_bj11.pdf. [Accessed on August 18, 2024].

———. 2022. 2020-2022 California Integrated Report. Available at: https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2020_2022_integrated_report.html. [Accessed on November 4, 2024].

———. 2023. Draft Staff Report: Sacramento/Delta Update to the Bay-Delta Plan. Chapter 2: Hydrology and Water Supply Available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/2023/staff-report/ch02-hydro.pdf. [Accessed on March 28, 2025].

———. 2024. California Regulations Related to Drinking Water. October 2024. Available at: https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/drinking-water-regulations-october-2024.pdf. [Accessed on November 5, 2024].

The Climate Registry (TCR). 2024. 2024 Climate Registry Default Emission Factors. Available at: https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf. [Accessed on August 20, 2024].

The Nature Conservancy, California. 2024. GDE Pulse v2.3. San Francisco, California. Available at: https://gde.codefornature.org/#/home. [Accessed on August 20, 2024].

U.S. Environmental Protection Agency (USEPA). 2024a. "How's My Waterway?" American River, Middle Fork (State Waterbody ID: CAR5144201020020610125450). Available at: https://mywaterway.epa.gov/community/middle%20fork%20american%20river/overview. [Accessed on November 25, 2024].

———. 2024b. California Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants. Available at: https://www3.epa.gov/airquality/greenbook/anayo_ca.html. [Accessed on August 21, 2024].

———. 2024c. eGRID with 2022 Data. Available at: https://www.epa.gov/egrid/download-data. [Accessed on August 20, 2024].

United States Geologic Survey (USGS). 2018. Aquifer Compaction due to Groundwater Pumping. Land Subsidence in California. October, Available at: https://www.usgs.gov/centers/land-subsidence-in-california/science/aquifer-compaction-due-groundwater-pumping#overview. [Accessed on April 8, 2025].

United States Geologic Survey (USGS) and SWRCB. 2019. Groundwater Quality in the Sacramento Metropolitan Shallow Aquifer, California. Available at: https://pubs.usgs.gov/of/2019/1047/ofr20191047_.pdf. [Accessed on August 20, 2024].

Westlands Water District GSA and County of Fresno GSA. 2022. *Groundwater Sustainability Plan Westside*. Available at: https://sgma.water.ca.gov/portal/gsp/preview/8. [Accessed on October 10, 2024].

Yolo-Solano AQMD. 2007. *Handbook for Assessing and Mitigating Air Quality Impacts*. July 11. Available at: https://yolosolanoair.wpenginepowered.com/wp-content/uploads/Planning/CEQAHandbook2007.pdf. [Accessed on August 20, 2024].

Yolo Subbasin GSA. January 2022. *Yolo Subbasin Groundwater Agency 2022 Groundwater Sustainability Plan.* Available at: https://sgma.water.ca.gov/portal/gsp/preview/96. [Accessed on November 4, 2024].

Section 4 – Cumulative Impacts

Bureau of Reclamation and California Department of Water Resources (Reclamation and DWR). 2019. DRAFT Technical Information for Preparing Water Transfer Proposals (Water Transfer White Paper) Information for Parties Preparing Proposals for Water Transfers Requiring Department of Water Resources or Bureau of Reclamation Approval. December 2019. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Management/Water-Transfers/Files/Draft_2019WTWhitePaper-012324.pdf. [Accessed on August 21, 2024].

Appendix B
Project Description and Background

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Appendix B Project Description and Background

This appendix includes the project background and a detailed description of the Proposed Action.

B.1 Background

B.1.1 Reclamation and the CVP

Reclamation's California Great-Basin Region is responsible for managing the CVP, which stores and delivers irrigation water to the Sacramento and San Joaquin valleys, water to cities and industries in Sacramento, the San Joaquin Valley, and the east and south Bay Areas. The CVP also delivers water to fish hatcheries and wildlife refuges throughout the Central Valley, and for protection, restoration and enhancement of fish, wildlife, and associated habitats in the Central Valley. Figure B-1 shows major CVP facilities and the CVP service area.

The CVP delivers water or makes water available for diversion to 245 agencies that hold water contracts; these contracts include Repayment Contracts, Exchange Contracts, Refuge Contracts, Settlement Contracts, and Water Service Contracts. CVP water allocations for agricultural, environmental, municipal and industrial (M&I) users vary based on factors such as hydrology, water rights, reservoir storage, environmental considerations, and operational limitations. Each year Reclamation determines the amount of water that can be delivered to or made available for diversion by each district and municipality based on conditions for that year. These allocations are expressed as a percentage of the maximum contract volumes of water according to the contracts, or historical use for M&I contractors in a water short year, held between Reclamation and the various water districts, municipalities, and other entities. Reclamation and the CVP contractors recognize that delivery of full contract quantities is not likely to occur every year (and in fact, does not/will not occur in most years). Water shortages lead to severe water constraints, especially in the southern portion of the CVP.

B.1.2 Water Agencies Requesting Transfers

Table B-1 identifies entities that may be interested in buying water made available for transfer, further referred to as Buyers. Not all of these potential Buyers may end up actually purchasing water from the Sellers. Purchase decisions depend on several factors, including, but not limited to, hydrology, water demands, availability of other supplies, and transfer costs. Reclamation may be asked to reoperate the CVP to deliver the water made available by reservoir release for transfer, and the reoperation could be limited based on specific hydrologic conditions, biological conditions, or water quality issues. Reclamation cannot guarantee that it will be able to reoperate the CVP at specific times to accommodate water transfers.

Figure B-1. Major CVP Facilities and CVP Service Areas

Table B-1. Potential Buyers

Contra Costa Water District
East Bay Municipal Utility District
San Luis & Delta-Mendota Water Authority Participating Member Agencies
Eagle Field Water District
Mercy Springs Water District
Pacheco Water District
Panoche Water District
Patterson Irrigation District
San Benito County Water District
San Luis Water District
Santa Clara Valley Water District
Westlands Water District

B.1.2.1 San Luis & Delta-Mendota Water Authority

San Luis & Delta-Mendota Water Authority (SLDMWA) was established in 1992 and consists of 27 member agencies, 25 of which contract with the United States for the delivery of CVP water (SLDMWA 2024). Figure B-2 shows the SLDMWA service area and identifies participating member agencies included in Table B-1. Not all of SLDMWA member agencies are participating. Participating members may also purchase transfers independently from SLDMWA.

Reclamation has an operation, maintenance and replacement transfer agreement with SLDMWA to operate and maintain the physical works and appurtenances associated with the San Luis and Delta-Mendota Canals, the C.W. “Bill” Jones Pumping Plant, the Delta-Mendota Canal/California Aqueduct Intertie Pumping Plant, the O’Neill Pumping/Generating Plant, the San Luis Drain, and associated works. One function SLDMWA serves is to negotiate and purchase water transfers with and on behalf of its member agencies when CVP allocations have been reduced and there is a need for supplemental water to serve existing users.

The SLDMWA service area consists primarily of agricultural lands on the west side of the San Joaquin Valley. South-of-Delta agricultural contractors, many of which are members of the SLDMWA, experience severe cutbacks in CVP allocations in most years. In 2021, deliveries were cut back to five percent of Contract Total for South-of-Delta agricultural contractors. In 2022, South-of-Delta agricultural contractors received a “0 percent” allocation. Allocations for South-of-Delta agricultural contractors occasionally improve, with a 100 percent allocation in 2023 and 50 percent allocation in 2024 (Reclamation 2024a). Note that Exchange Contractors and Settlement Contractors are not included in these allocations. SLDMWA member agencies use water transfers as a method to supplement water supplies for existing needs in years when CVP allocations are reduced.

Figure B-2. SLDWMA Service Area and Participating Member Agencies

B.1.2.2 Contra Costa Water District (WD)

The Contra Costa WD was formed in 1936 to purchase and distribute CVP water for irrigation and industrial uses. Today, the Contra Costa WD encompasses more than 214 square miles, serves a population of approximately 500,000 people in Central and East Contra Costa County, and is Reclamation's largest urban CVP contractor in terms of Contract Total (Contra Costa WD 2022). Figure B-3 shows the Contra Costa WD service area.

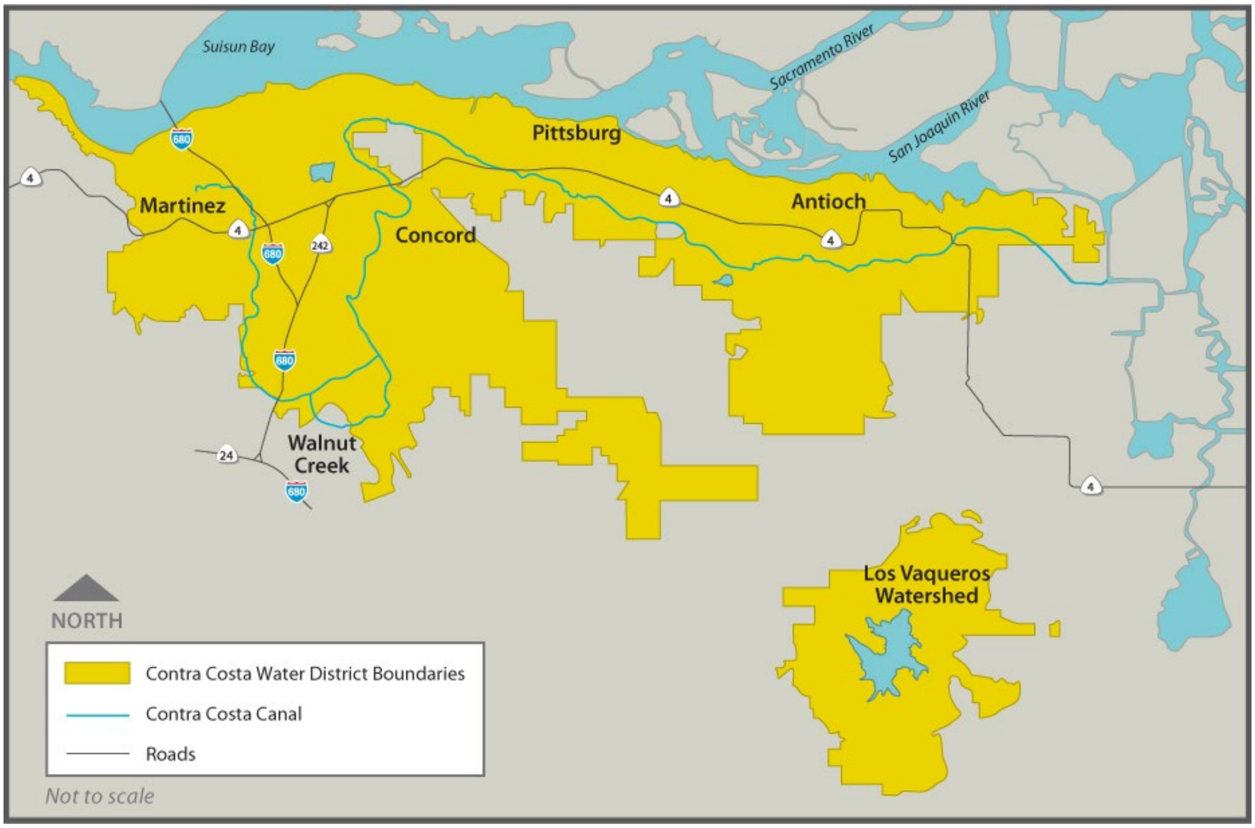

Figure B-3. Contra Costa WD Service Area

Contra Costa WD relies solely on diversions from the Delta for its water supply, with the majority diverted pursuant to its water service contract with Reclamation and smaller amounts diverted under its own water rights and a long-term water purchase agreement with East Contra Costa County Irrigation District. Contra Costa WD has a permanent CVP contract with Reclamation (l75r-3401A-LTR1-P) signed in December 2020 that provides for a Contract Total of 195,000 acre-feet (AF) per year from the CVP for M&I purposes, with a reduction during water shortages including regulatory restrictions and drought. Contra Costa WD may also divert water under State Water Resources Control Board (SWRCB) Permit No. 20749 from Old River or Victoria Canal to Los Vaqueros Reservoir from November through June during excess conditions in the Delta and under Permit No. 20750 from Kellogg Creek to Los Vaqueros Reservoir year-round, with maximum diversion amounts of 95,980 AF per year under Permit No. 20749 and 9,640 AF per year under Permit No. 20750.

Contra Costa WD diverts water from the Mallard Slough, Rock Slough, Old River, and Middle River (at Victoria Canal) Intakes in the Delta. The 48-mile Contra Costa Canal conveys water from these intakes to the service area. Contra Costa WD can also divert water from Old River and Middle River Intakes to storage in Los Vaqueros Reservoir. In 2012, Contra Costa WD expanded the total storage capacity of Los Vaqueros Reservoir from 100,000 AF to 160,000 AF (Contra Costa WD 2020).

In the June 2021 Urban Water Management Plan (UWMP), Contra Costa WD identifies constraints on water sources, including CVP supply reductions due to regulatory restrictions and drought. In 2015, Contra Costa WD received its CVP supply of 81,815 AF based on the calculation of public health and safety need, using the methodology set forth in the CVP Municipal and Industrial Shortage Policy (Contra Costa WD 2020). Water transfers would assist in meeting demands of existing customers during a drought and compensating for reductions in the availability of CVP supplies.

B.1.2.3 East Bay Municipal Utility District (MUD)

East Bay MUD was organized in 1923 to provide water service to the east San Francisco Bay Area. Today, East Bay MUD provides water to approximately 1.4 million people over a 332 square mile area in Alameda and parts of Contra Costa counties (East Bay MUD 2024). Figure B-4 shows the East Bay MUD service area.

Ninety percent of East Bay MUD’s water supply comes from the Mokelumne River watershed in the Sierra Nevada. In the long term, during drought, the Mokelumne River and local runoff cannot meet East Bay MUD’s projected customer demands, even with mandatory water use restrictions (East Bay MUD 2020).

In April 2006, East Bay MUD signed a Long Term Renewal Contract (LTRC) with United States Bureau of Reclamation (USBR) that has a term of 40 years. The LTRC provides for delivery of up to 133,000 AF in a single qualifying year, not to exceed a total of 165,000 AF in three consecutive qualifying years. Qualifying years are those in which East Bay MUD’s total stored water supply is forecast as of March 1 to be below 500,000 AF on September 30 of that year (East Bay MUD 2020). East Bay MUD will generally qualify for CVP deliveries during dry periods.

East Bay MUD exercised its LTRC and delivered CVP water for the first time during the 2014-2015 drought, with both deliveries subject to M&I water shortage allocations. In 2014, East Bay MUD received 18,641 AF of CVP supply. In 2015, East Bay MUD received 33,250 AF of CVP water. EBMUD’s water transfer program secures dry-year water supplies through water transfers. East Bay MUD’s Water Supply Management Program (WSMP) 2040 plan and 2020 UWMP both identify water transfers as a supplemental supply option to meet East Bay MUD’s future dry year need for water, with transfer water diverted in dry years at the Freeport Project intake along the Sacramento River. East Bay MUD may seek short- and long-term water transfers to address supply deficiencies during dry years (East Bay MUD 2020).

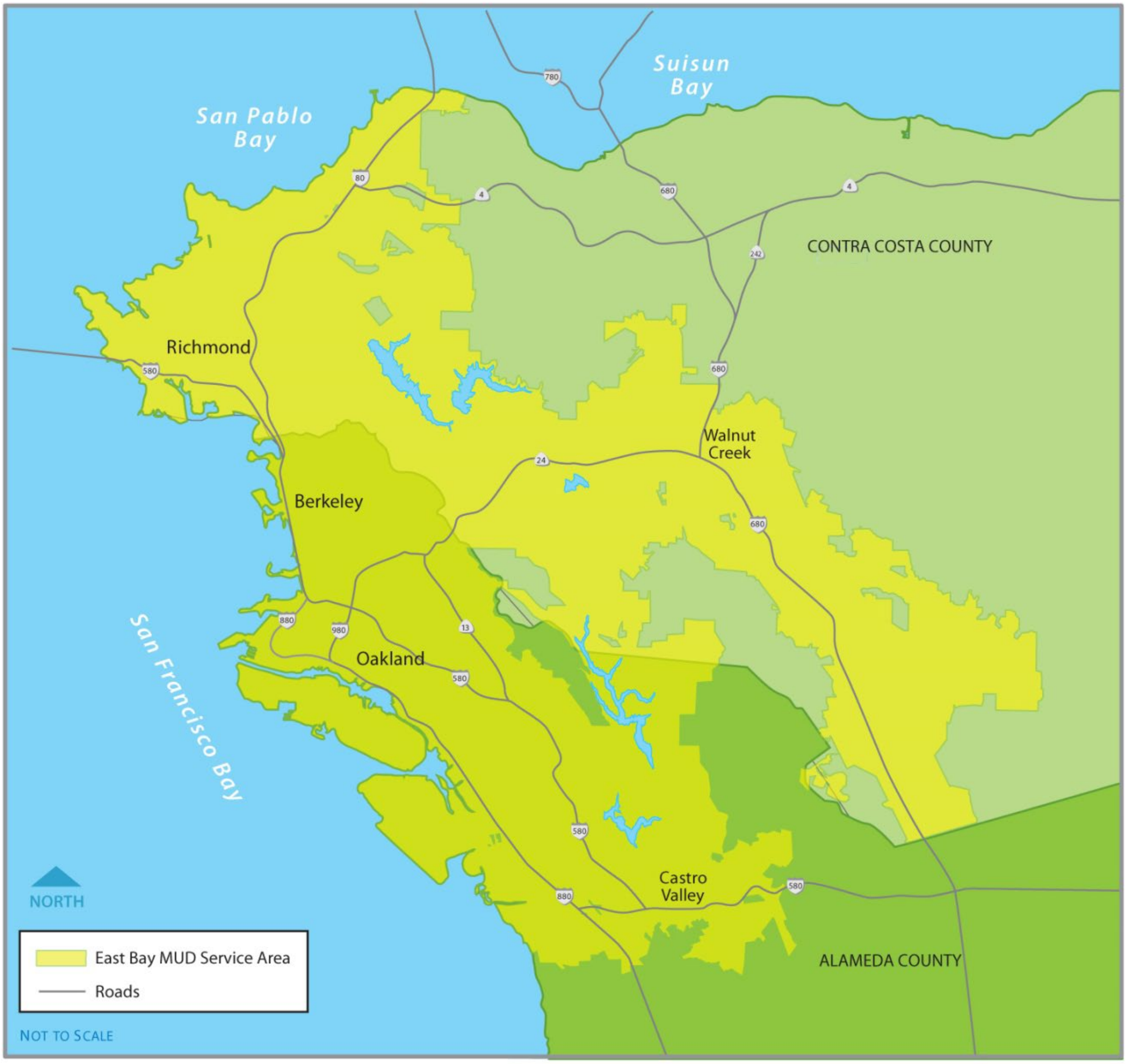

Figure B-4. East Bay MUD Service Area

B.2 Description of Alternatives

The following sections describe the alternatives under evaluation pursuant to NEPA.[1] Transfers of water would be single-year transfers only and may occur only when the Sacramento-San

[1] Pursuant to California Public Resources Code section 21166 and sections 15162-15164 of the Guidelines for Implementation of the California Environmental Quality Act (Cal. Code Regs., tit. 14) [CEQA Guidelines]), evaluation of alternatives to the Proposed Project is not required. While not required under CEQA, evaluation of alternatives to the Proposed Project is provided herein for informational purposes.

Joaquin Delta (Delta) is in balanced conditions (i.e., when Delta inflows are equal to Sacramento Valley in-basin needs, Delta outflows, and Delta exports).

B.2.1 No Action/No Project Alternative

The No Action Alternative (under NEPA) may be described as the future circumstances without the Proposed Action and can also include reasonably foreseeable future actions by persons or entities, other than the federal agency involved in a project action, acting in accordance with current management direction or level of management intensity. The No Project Alternative (under CEQA) also describes the future without the project, and may include some reasonably foreseeable changes in existing conditions and changes that would reasonably be expected to occur in the foreseeable future if the project were not approved.

For the No Action Alternative, during contract years 2026 and 2027, SLDMWA member agencies, Contra Costa WD, and East Bay MUD would not buy water from willing Sellers who require Reclamation approval in order to transfer water to the interested Buyers. Agricultural water users could experience shortages in contract years 2026 and 2027. If supplies are constrained, users may take alternative water supply actions in response to shortages, including increased groundwater pumping, cropland idling, reduction of landscape irrigation or permanent crop irrigation, or water rationing. Water users may also seek to transfer water from other Sellers not listed in this document, which may require additional NEPA or CEQA analysis. In the absence of transfers, growers may not have enough water to meet demands, and some crops including permanent crops could be lost.

Under the No Action/No Project Alternative, some agricultural and urban water users may face potential shortages in the absence of water transfers. To the extent water is not made available for transfer, there would be demand that would be unmet by surface water. Demand will likely be met by increasing groundwater pumping, idling cropland, reducing landscape irrigation, land retirement, or rationing water.

Normally, there may be subtle differences in the No Action Alternative and existing conditions, and the baseline from a NEPA and CEQA perspective would be slightly different. In those circumstances, there would be a discussion of the No Action Alternative for NEPA purposes, and the Proposed Action and Proposed Project (referred to herein as the Proposed Action) would be compared to the No Action Alternative to determine effects of the action.

B.2.2 Proposed Action

This section describes potential transfer participants, potential transfer methods and operations for the range of potential transfers identified as the Proposed Action. The Proposed Action would involve a range of potential transfers of up to 250,000 AF to SLDMWA member agencies, Contra Costa WD, and East Bay MUD. [2] For analytical purposes, the full 250,000 AF range of

[2] Historical water transfers to SLDMWA member agencies, Contra Costa WD, and East Bay MUD are typically lower than 250,000 AF. Table K-1 in Appendix K, Cumulative Projects, shows total water transfers, including all other CVP water transfers and non-CVP water transfers, from 2009 through 2024.

potential transfers is assumed to be available; however, it is not possible to determine which negotiations would be successful, what combination of Sellers would ultimately transfer water to the Buyers, or how much water would ultimately be transferred to the Buyers due to demand and export capacity at the Project pumps.

Reclamation would evaluate each proposal individually, as it is received, to determine if it meets the terms of the Settlement Contract or other water service or repayment contracts with Reclamation, the *DRAFT Technical Information for Preparing Water Transfer Proposals* (Reclamation and DWR 2019), and local, state, and federal law. Reclamation has followed this process in past years when reviewing and subsequently approving the transfer of water (such as when approving the transfer of water in 2013, 2014, 2015, 2020, and 2021). Reclamation may reoperate CVP facilities and the State may reoperate SWP facilities to change the pattern of water releases from storage to deliver water made available for transfer to potential Buyers.

B.2.2.1 Potential Transfer Participants

The sections below identify potential Sellers and Buyers for the range of potential one-year transfers that are analyzed. Figure B-5 shows the locations of Sellers.

Sellers

Figure B-5 presents the agencies that have expressed interest in making water available through groundwater substitution and reservoir release transfers in 2026 and 2027. While the entity making water available could use one or both methods for making water available or may request approval to shift the volume of water made available during a particular period to a different period for transfer, the overall amount of water transferred would not exceed the maximum volumes listed in Table B-2.

Table B-3 shows the potential upper limit of available water for transfer for each method of making water available for transfer. Surface water made available through groundwater substitution actions would be made available for transfer between July and September and subject to contract limitations. Under certain conditions and with prior approval by Reclamation, water could be “backed up” into Shasta Reservoir between April and June and delivered during the transfer window between July and November. If water is delivered in October or November, the overall amount of water made available would not change. If water is conveyed in October and November, the overall totals from April through November would still stay within the upper limits provided in Table B-2.

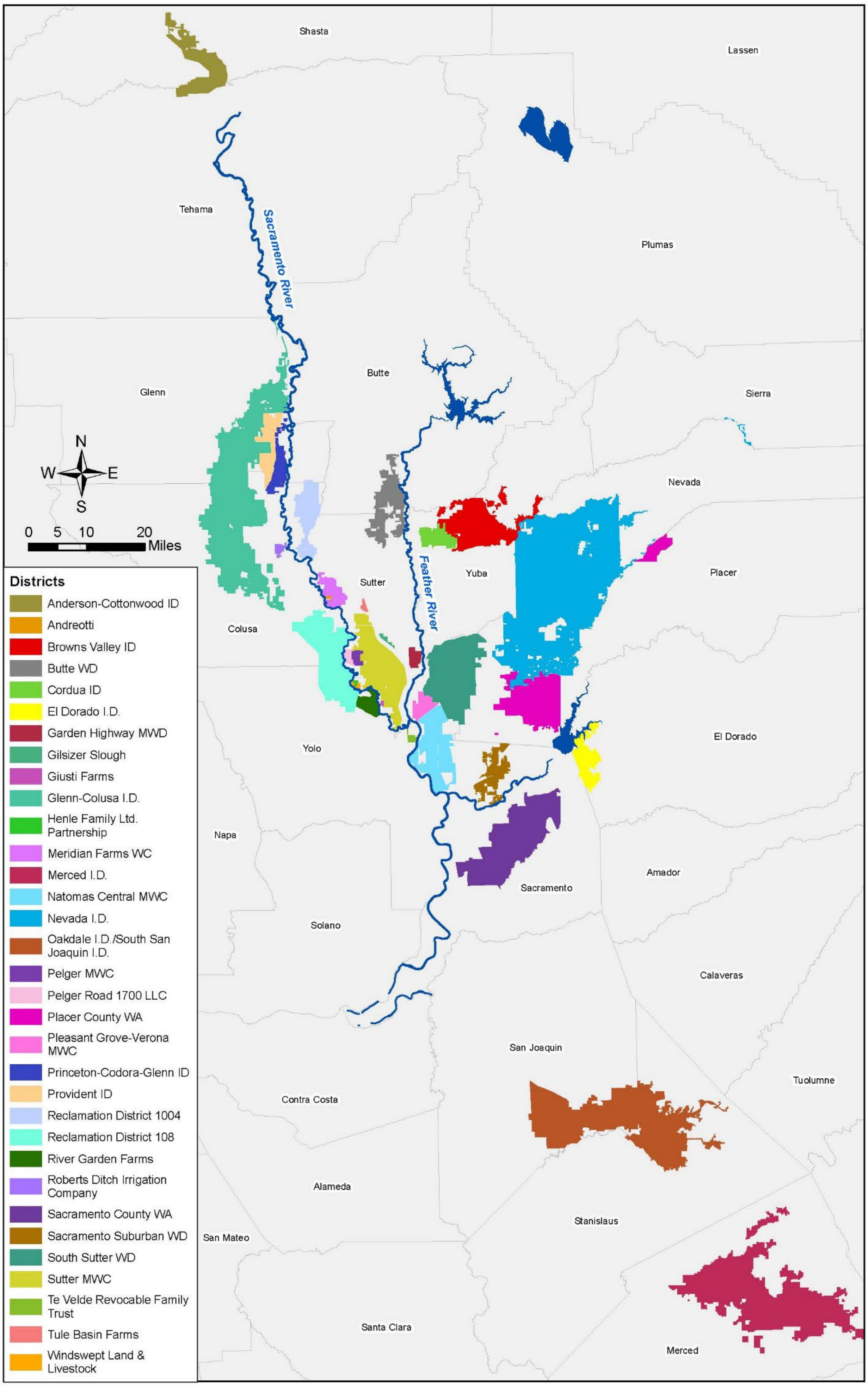

Figure B-5. Locations of Potential Sellers

Table B-2. Proposed Action Potential Sellers (Upper Limits)

Water Agency	Maximum Potential Transfer (acre-feet per year)[1]
Sacramento River Area of Analysis	
Anderson-Cottonwood Irrigation District	4,900
Andreotti	2,500
Giusti Farms	1,000
Glenn-Colusa Irrigation District[2]	23,600
Henle Family Limited Partnership	600
Meridian Farms Water Company	6,000
Natomas Central Mutual Water Company	30,000
Pelger Mutual Water Company	4,750
Pelger Road 1700 LLC	5,600
Pleasant Grove-Verona Mutual Water Company	18,000
Princeton-Codora-Glenn Irrigation District	8,000
Provident Irrigation District	11,500
Reclamation District 108	15,000
Reclamation District 1004	7,175
Roberts Ditch Irrigation Company	3,460
River Garden Farms	10,000
Sutter Mutual Water Company	50,000
Te Velde Revocable Family Trust	7,094
Windswept Land and Livestock	1,775
American River Area of Analysis	
El Dorado Irrigation District	8,000
Placer County Water Agency	47,000
Sacramento County Water Agency	15,000
Sacramento Suburban Water District	30,000
Yuba River Area of Analysis	
Browns Valley Irrigation District	5,000
Cordua Irrigation District	12,000
Feather River Area of Analysis	
Butte Water District	6,000
Garden Highway Mutual Water Company	14,000
Gilsizer Slough Ranch	3,200
Nevada Irrigation District	15,000
South Sutter Water District	15,000
Tule Basin Farms	6,000

Water Agency	Maximum Potential Transfer (acre-feet per year)[1]
Stanislaus River Area of Analysis	
Oakdale Irrigation District / South San Joaquin Irrigation District	50,000
Merced River Area of Analysis	
Merced Irrigation District	30,000
Total	***467,154***

Notes:

1 The total transfers would be limited to no more than 250,000 acre-feet in any one year, based on the Buyers' demands for transfers. The sum of transfers in Table B-2 equals more than this amount, but the Buyers (SLDMWA member agencies, Contra Costa WD, and East Bay MUD) would not purchase transfer water from all of these parties for the full amount.

2 Glenn-Colusa Irrigation District will not participate in out of basin groundwater substitution transfers.

Table B-3. Proposed Action Transfer Types (Upper Limits)

Water Agency	April-June Groundwater Substitution (acre-feet)	April-June Stored Reservoir Release (acre-feet)	July-Sep Groundwater Substitution (acre-feet)	July-Sep Stored Reservoir Release (acre-feet)	Oct-Nov Reservoir Release (acre- feet)
Sacramento River Area of Analysis					
Anderson-Cottonwood Irrigation District	2,450		2.450		
Andreotti	1,000		1.500		
Giusti Farms	500		500		
Glenn-Colusa Irrigation District[2]	11,800		11.800		
Henle Family Ltd. Partnership	325		275		
Meridian Farms Water Company	3,000		3.000		
Natomas Central Mutual Water Company	10,000		20,000		
Pelger Mutual Water Company	3,151		1,599		
Pelger Road 1700 LLC	2,600		3,000		
Pleasant Grove-Verona Mutual Water Company	8,000		10,000		
Princeton-Codora-Glenn Irrigation District	3,000		5,000		
Provident Irrigation District	4,500		7,000		
Reclamation District 108	7,500		7,500		
Reclamation District 1004	3,588		3,588		
Roberts Ditch Irrigation Company	1,700		1,760		
RRG Garden Properties LLC	4,400		5,600		
Sutter Mutual Water Company	20,000		30,000		
Te Velde Revocable Family Trust	2,700		4,394		
Windswept Land and Livestock	775		1,000		
American River Area of Analysis					
El Dorado Irrigation District				8,000	8,000
Placer County Water Agency				47,000	47,000
Sacramento County Water Agency			15,000		
Sacramento Suburban Water District	15,000		15,000		

Water Agency	April-June Groundwater Substitution (acre-feet)	April-June Stored Reservoir Release (acre-feet)	July-Sep Groundwater Substitution (acre-feet)	July-Sep Stored Reservoir Release (acre-feet)	Oct-Nov Reservoir Release (acre- feet)
Yuba River Area of Analysis					
Browns Valley Irrigation District				5,000	5,000
Cordua Irrigation District			12,000		
Feather River Area of Analysis					
Butte Water District	3,000		3,000		
Garden Highway Mutual Water Company	6,500		7,500		
Gilsizer Slough Ranch	1,600		1,600		
Nevada Irrigation District				15,000	15,000
South Sutter Water District				15,000	13,500
Tule Basin Farms	3,000		3,000		
Stanislaus River Area of Analysis					
Oakdale Irrigation District / South San Joaquin Irrigation District				50,000	
Merced River Area of Analysis					
Merced Irrigation District				30,000	30,000
Area of Analysis (all areas)					
Total[1]	**120,089**	**0**	**177,066**	**170,000**	**118,500**

Notes:

1 These totals cannot be added together. Agencies could make water available through groundwater substitution, reservoir release transfers, or a combination of the two; however, they will not make the full quantity available through both methods. Table B-2 reflects the total upper limit for each agency. The total amount of water transferred under Proposed Action would not exceed 250,000 acre-feet.

2 Glenn-Colusa Irrigation District will not participate in out of basin groundwater substitution transfers.

Buyers

Table B-4 identifies potential Buyers who may be interested in purchasing water made available for transfer. Not all of these potential Buyers may end up actually purchasing water from the Sellers. For some potential Buyers, purchase decisions would depend on the need and the ability to move the purchased water through the Delta to the Buyer Service Area.

Table B-4. Proposed Action Potential Buyers

Contra Costa Water District
East Bay Municipal Utility District
San Luis & Delta-Mendota Water Authority Participating Members
Eagle Field Water District
Mercy Springs Water District
Pacheco Water District
Panoche Water District
Patterson Irrigation District
San Benito County Water District
San Luis Water District
Santa Clara Valley Water District
Westlands Water District

B.2.2.2 Potential Water Transfer Methods

A transfer of water temporarily moves water from a willing Seller to a willing Buyer. To make water available, the Seller must take an action to reduce consumptive use or use water in storage. Water transfers must be consistent with State and Federal law. Transfers involving water diverted through the Delta are governed by existing Delta water quality standards (D-1641 requirements) and existing or future regulatory flow requirements as specified by the NMFS and USFWS Biological Opinions (BOs) for the Long-Term Operation of the CVP and SWP. Additionally, water transfers through reservoir release must comply with existing reservoir operating requirements in addition to the existing and future regulatory flow requirements as specified by the NMFS and USFWS BOs for the Long-Term Operation of the CVP and SWP.

In October 2019, USFWS and NMFS released BOs (USFWS 2019b; NMFS 2019a) on Long-term Operation of the CVP and SWP. The 2019 BOs on the Long-Term Operations of the CVP and SWP analyze transfers through the Delta that are up to 600,000 AF in critical years and dry years (following dry or critical years) with a transfer window from July 1 through November 30. For all other year types, the maximum transfer amount is up to 360,000 AF. In 2021, Reclamation and

DWR requested reinitiation of consultation on the Long-Term Operation of the CVP and SWP with the USFWS and NMFS. A Notice of Intent to prepare an Environmental Impact Statement (EIS) was published in the Federal Register on February 2, 2022. The Draft Long-Term Operation of the CVP and SWP EIS was released on July 26, 2024. The Final EIS was published on November 15, 2024, and the Record of Decision (ROD) was signed on December 19, 2024. The associated BOs were also completed in 2024 and will provide an incidental take limit and evaluate the long-term CVP and SWP operations on protected species, including impacts from potential water transfers that if exceeded would trigger additional consultation. The 2024 Draft Long-Term Operation of the CVP and SWP EIS includes the same transfer window, from July through November, and the same maximum transfer amounts of up to 600,000 AF in critical years and dry years (following dry or critical years) and 360,000 AF in all other years (Reclamation 2024b). The Proposed Action would correlate with the approach and analyses included in the 2024 Long-Term Operations of the CVP and SWP EIS and BOs.

The potential single-year transfers identified in the Proposed Action analyzed in the EA/IS would be a range up to a total of 250,000 AF per year, so they would be less than the maximum transfer amount included in the 2024 BOs and 2024 Final EIS/ROD. Through-Delta transfers would be limited to the period when USFWS and NMFS find transfers to be acceptable, typically July through November, unless a change is made in a particular water year based on concurrence from USFWS and NMFS.

Groundwater Substitution

Transfer of water made available through groundwater substitution actions occurs when Sellers choose to pump groundwater in lieu of diverting surface water supplies, thereby making the surface water available for transfer. Sellers making water available for transfer through groundwater substitution actions are agricultural and M&I users. Water could be made available for transfer by the agricultural users during the irrigation season of April through September (for release July through November). Some small amount of water could be made available for transfer in October when needed. If there are issues related to water supply availability or conveyance capacity at the Delta, Sellers could shorten the window when water is made available by switching between surface water supplies and groundwater pumping for agricultural or municipal and industrial use.

Reservoir Release

Buyers could acquire water by purchasing surface water stored in reservoirs owned by non-Project entities (not part of the CVP or SWP). To ensure that purchasing this water would not affect downstream users, Reclamation would limit transferred water to that which would not have otherwise been released downstream absent the transfer.

When the willing Seller releases stored reservoir water for transfer, these reservoirs are drawn down to levels lower than they would have been without the water transfer. To refill the reservoir, a Seller must capture some flow that would have otherwise gone downstream. Sellers must refill the vacated storage at a time when downstream users would not have otherwise captured the water, either in downstream reservoirs or at the CVP and SWP (collectively "the

Projects") or non-Project pumps in the Delta. Typically, refill can only occur during excess conditions in the Delta, defined by the Coordinated Operations Agreement (COA) as "periods when it is agreed that releases from upstream reservoirs plus unregulated flow exceed Sacramento Valley in basin uses, plus exports," or when any downstream reservoirs are in flood control operations. Additionally, refill cannot occur at times when the water would have been used to meet downstream flow or water quality standards. Refill of the storage vacated for a transfer may take more than one season if the above conditions are not met in the wet season following the transfer. Each reservoir release transfer would include a refill agreement between the Seller and Reclamation, (developed in coordination with the California Department of Water Resources [DWR]) to prevent impacts to downstream users following a transfer.

Some entities that could transfer water through reservoir release are upstream of CVP reservoirs and could request to store water temporarily in the CVP reservoirs. These entities may have restrictions on the pattern that they could release water from their reservoirs, and the pattern may not match the availability of export capacity in the Delta. The Seller could request that Reclamation store the non-CVP water in the CVP reservoir until Delta capacity is available, which would require an excess capacity contract with Reclamation. Reservoir levels would temporarily increase while water was stored. Reclamation would only release non-CVP water for transfer from CVP reservoirs when the non-CVP water is actually being made available for transfer consistent with their release pattern.

B.2.2.3 Water Transfer Operations

Water transfer operations are discussed by geographic region. Transfer operations could affect river flows and timing of flows upstream or downstream from the point of diversion. The following sections describe how potential transfers would operate on rivers.

Seller Service Area

Water made available for transfer that must be conveyed through the Delta are limited to periods when capacity at C.W. "Bill" Jones Pumping Plant (Jones Pumping Plant) or Harvey O. Banks Pumping Plant (Banks Pumping Plant) is available, typically from July through November, and only after Project needs are met. Reclamation and DWR must also determine that the Delta is in balanced conditions[3] under the terms of the COA (USFWS 2019). Transfer of CVP water that would be pumped and conveyed at Banks Pumping Plant could occur under a Wheeling Agreement with DWR for use of Banks Pumping Plant. The Delta pumping restrictions do not apply to East Bay MUD diversions at Freeport. In addition, the July through November window would also not apply to East Bay MUD and instead balanced conditions would apply.

Carriage water (a portion of the transfer that is not diverted in the Delta and becomes Delta outflow) is a required component of water transfers that is used to maintain water quality in the

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[3] The Delta is determined to be "Balanced" by Reclamation and DWR when it is agreed that releases from upstream reservoirs plus unregulated flow exceed Sacramento Valley in basin uses, plus exports (Reclamation and DWR 1986).

Delta. Carriage water is calculated to reflect conveyance losses as the water moves from the point at which it is made available for transfer, to the Delta export pumps, and is conveyed from the Delta to Buyers. Carriage water is represented as a percent of the transfer that does not reach the Buyer, and this percent is calculated during the transfer based on real-time monitoring information in the Delta. Typical carriage water amounts range from 20 to 30 percent for water made available transfer from the Sacramento Valley, and about ten percent for water made available for transfer from the San Joaquin Valley.

The timing of water made available for transfer by potential agricultural Sellers upstream from the Delta through groundwater substitution would be dictated by the irrigation season. At the start of the irrigation season, usually April, the Delta pumps cannot pump water made available for transfer because the current BOs on CVP and SWP operations typically only allow for conveyance of water made available for transfer from July through November. Water made available for transfer prior to July would either bypass the pumps or may be stored in upstream reservoirs for later release in the July through November period, if CVP operations can account for the storage. However, as described in subsequent sections, Shasta Reservoir is operated to meet mandated temperature and flow requirements in the Sacramento River, which could limit its ability to store water to support transfers.

Sacramento River

Potential Sellers on the Sacramento River could make water available for transfer through groundwater substitution. Potential Sellers receive CVP Project water that is stored upstream from their service areas in Shasta Reservoir, a CVP facility. Releases from Shasta Reservoir may be routed through or around the Shasta Power Plant to the Sacramento River, where flows are re-regulated by Keswick Dam.

Conveyance capacity in the Delta would be available when conditions for sensitive species are acceptable to NMFS and USFWS, typically from July through November, but water made available through groundwater substitution would be available from April through September. Storing water in Shasta Reservoir from April through June would help facilitate these types of transfers; however, Shasta Reservoir has a very limited opportunity to store water made available for transfer during the April through June period because of downstream temperature requirements. Reclamation is required by SWRCB Water Rights Orders 90-05/91-01 to meet average daily temperature objectives as far downstream as practical when temperatures could affect fish. To meet these objectives, Reclamation must carefully manage the cold-water pool in Shasta Reservoir. Backing up water in Shasta Reservoir allows for additional storage, which can help Reclamation maintain the cold-water pool. Reclamation would only consider storing water made available for transfer if it would not affect releases for temperature, or if it could be "backed up" into another reservoir (by reducing releases from that reservoir). Backing up water may be possible if the Delta is in balanced conditions (see footnote 3 above) and instream standards are being met. The decision to back up water made available for transfer would be made on a case-by-case basis, but storage is analyzed so that the analysis is complete in the event Reclamation determines that storage is possible in a specific year.

Proposed Sellers divert water from various locations along the Sacramento River or the Sutter Bypass. If a Seller shifts from using surface water to groundwater to make water available for transfer, river flows would not decrease from Shasta Reservoir to the Seller's point of diversion; however, river flow would increase from the Seller's point of diversion downstream to the Buyer's point of diversion because water is not diverted for use until it reaches the Delta.

American River

Multiple potential Sellers on the American River system could make water available for transfer through groundwater substitution actions. Placer County Water Agency could make additional water available for transfer through the release of stored water from Hell Hole and French Meadows Reservoirs, which are upstream from Folsom Reservoir on the Rubicon River and Middle Fork American River. El Dorado Irrigation District (ID) could make additional water available for transfer through the release of stored water from Weber Reservoir, Caples Lake, and Silver Lake, which are upstream from Folsom Reservoir on North Fork Weber Creek and Silver Fork American River. Folsom Reservoir is the primary storage and flood control reservoir on the American River. Releases from Folsom Reservoir are re-regulated at Nimbus Dam, which is about seven miles downstream from Folsom Dam. Reclamation generally cannot guarantee use of excess storage in Folsom Reservoir prior to the transfer season because operational complexities may require water releases.

The Sellers on the American River divert water from the lower American River or Folsom Reservoir. When transferring water made available through groundwater substitution actions, the Sellers would take less surface water, leaving the water in storage in Folsom Reservoir. This water may be able to be stored in Folsom Reservoir before being conveyed south-of-Delta, depending on year-to-year operational restrictions on the export pumps. Storing water in Folsom Reservoir would likely be possible because this water would not otherwise have been released to the river absent the transfer.

Placer County Water Agency could transfer a maximum of 47,000 AF per year through reservoir release of stored surface water from Hell Hole and French Meadows Reservoirs, as shown in Figure B-6. It would time release of water to coincide with the availability of Delta export capacity, generally starting in July. Placer County Water Agency’s release schedule would be influenced by power generation, so it may wish to release water before July to generate power and reregulate that water in Folsom Reservoir until the water can be conveyed through the Delta export pumps. Non-Project water in Folsom Reservoir for greater than 30 days requires a Warren Act Contract for storage. Placer County Water Agency would release water that would otherwise have remained in storage; therefore, this water would increase flows downstream along the Middle Fork of the American River to Folsom Reservoir, and downstream of Folsom Reservoir from July through November. The water releases would leave additional storage capacity in the reservoirs that would be refilled during the following wet seasons (at times that it would not affect downstream users). Refilling the empty storage would decrease flows downstream of the reservoirs; therefore, a refill agreement would be required as part of any transfer. The water made available for transfer by Placer County Water Agency could be conveyed to the Buyer Service Area from any of the following ways:

- Water from French Meadows Reservoir could flow down the Middle Fork American River to the North Fork American River to Folsom Lake to the American River to the Sacramento River to the Delta where water can be diverted through the Jones or Banks Pumping Plants.
- Water from Hell Hole Reservoir could flow down the Rubicon River to Oxbow Reservoir to the Middle Fork American River to the North Fork American River to Folsom Lake to the American River to the Sacramento River to the Delta where water can be diverted through the Jones or Banks Pumping Plants.

El Dorado ID could transfer a maximum of 8,000 AF per year through reservoir release from Weber Reservoir, Caples Lake, and Silver Lake, as shown in Figure B-7. The water made available for transfer by El Dorado ID could be conveyed to the Buyer Service Area from any of the following ways:

- Water from Weber Reservoir could flow down the North Fork Weber Creek to the Weber Creek to the South Fork American River to Folsom Lake to the American River to the Sacramento River to the Delta where water can be diverted through the Jones or Banks Pumping Plants.
- Water from Silver Lake could flow down the Silver Fork American River to the South Fork American River to Folsom Lake to the American River to the Sacramento River to the Delta where water can be diverted through the Jones or Banks Pumping Plants.
- Water from Caples Lake could flow down Caples Creek to Silver Fork American River to the South Fork American River to Folsom Lake to the American River to the Sacramento River to the Delta where water can be diverted through the Jones or Banks Pumping Plants.

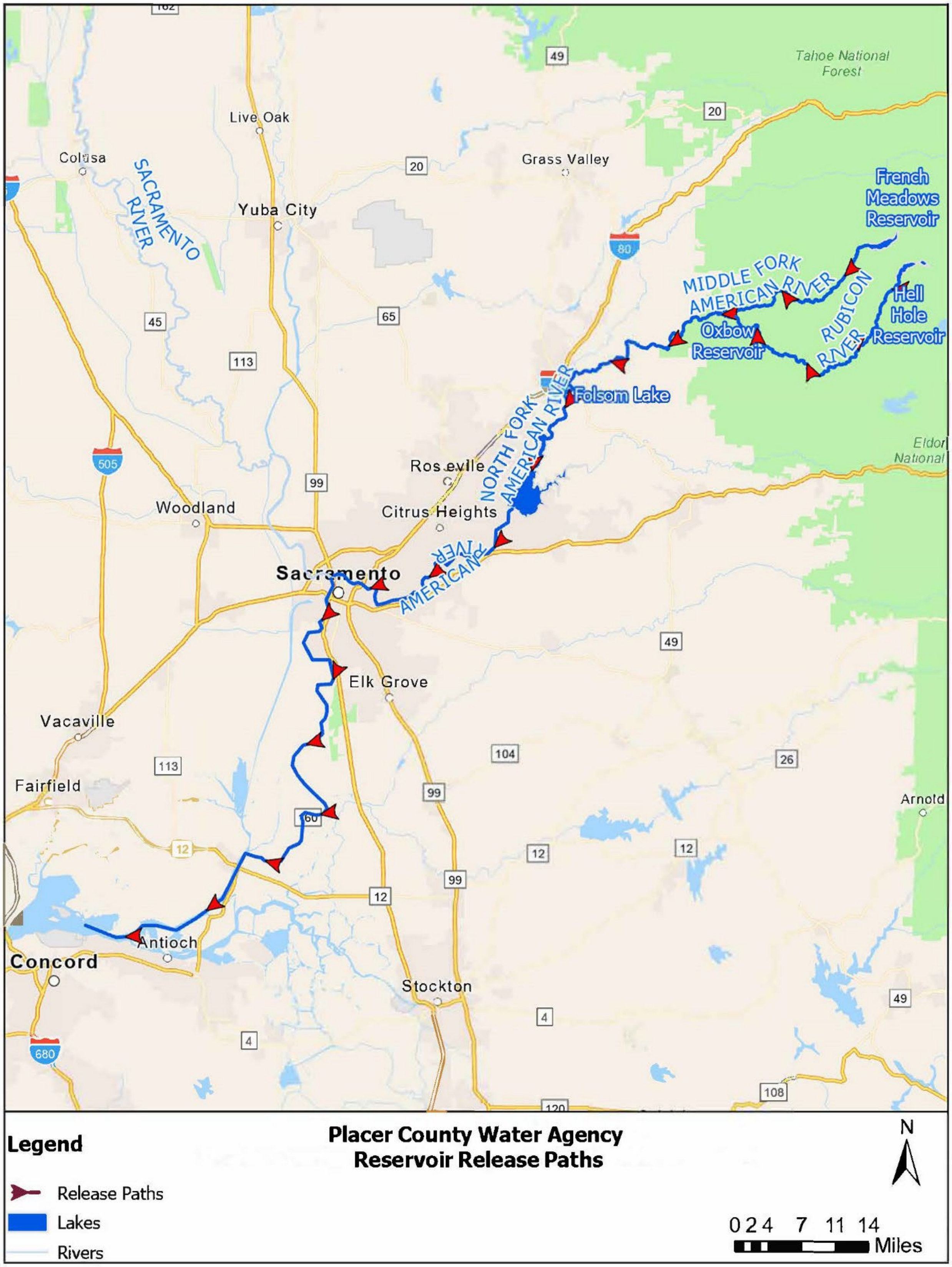

Figure B-6. Placer County Water Agency Reservoir Release Path

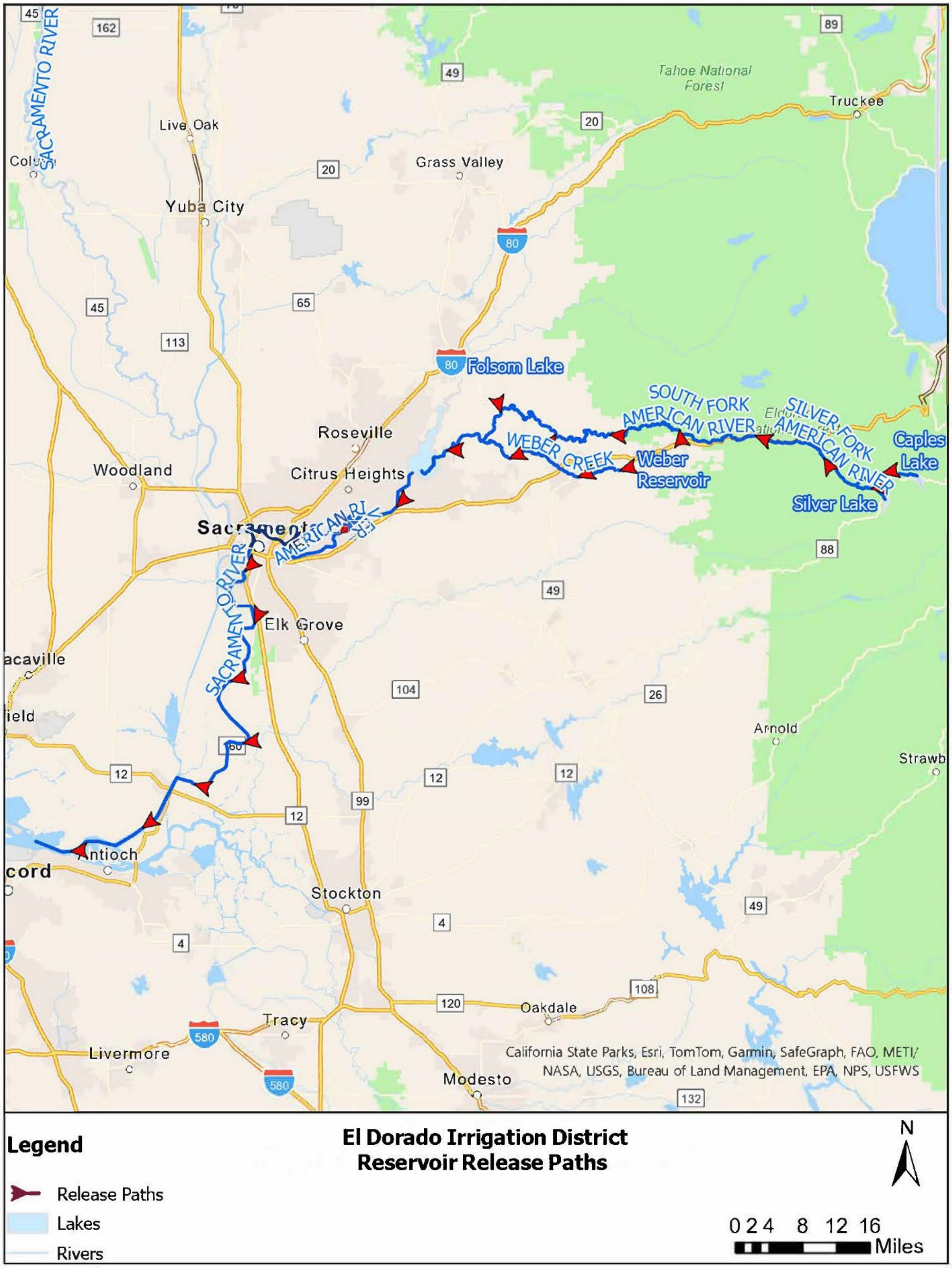

Figure B-7. El Dorado ID Reservoir Release Path

Yuba River

Browns Valley ID and Cordua ID are the potential Sellers on the Yuba River. Browns Valley ID would generate water for transfer through stored reservoir release. Browns Valley ID could transfer a maximum of 5,000 AF per year through reservoir release by releasing water from Merle Collins Reservoir that otherwise would have remained in storage (see Figure B-8). The water made available for transfer by Browns Valley ID could be conveyed to the Buyer Service Area from Merle Collins Reservoir to Dry Creek to the Yuba River to the Feather River to the Sacramento River to the Delta where water can be diverted through the Jones or Banks Pumping Plants. Release of this water would increase flows downstream in Dry Creek and in the Yuba River downstream of the confluence with Dry Creek. Similar to stored reservoir release transfers from Placer County Water Agency, refilling the reservoir would decrease flows downstream of the reservoir; therefore, a refill agreement would be required for the transfer.

Cordua ID would transfer water made available through groundwater substitution actions. This transfer would increase flows on the Yuba River downstream of Cordua ID's point of diversion in comparison to No Action/No Project Alternative from July through September.

Feather River

Potential Sellers on the Feather River could make water available for transfer through groundwater substitution or stored reservoir release actions.

Butte WD is a member agency of the Joint Water Districts Board (Joint Board). The Joint Board has a settlement agreement with DWR and the water supply under that agreement is distributed among the four member agencies of the Joint Board. DWR approval would be required for a transfer from Butte WD. DWR makes releases from Lake Oroville to Thermalito Afterbay for diversion by Butte WD. Changes in diversion from Thermalito Afterbay would result in changes in DWR's releases to the Afterbay but would not change Feather River flows. An increase in flows in the Feather River would result when the water made available for transfer is released by DWR to the Feather River. The timing of releases could change from the timing of diversions by Butte WD from Thermalito Afterbay, absent the transfer action.

Garden Highway Mutual Water Company (MWC) has a settlement agreement with DWR to divert water from the Feather River for irrigation use. A transfer from Garden Highway MWC must be approved by DWR. A reduction in diversions from Garden Highway MWC would result in higher flows in the Feather River downstream of the existing point of diversion.

Gilsizer Slough Ranch diverts water from the East Canal of the Sutter Bypass, Gilsizer Slough, and a drainage canal. Tule Basin Farms diverts water from the West Canal of the Sutter Bypass. Transfers from these entities would increase flows downstream of their points of diversion absent the transfer, which would increase flows in the Sutter Bypass canals and downstream in the Sacramento River.

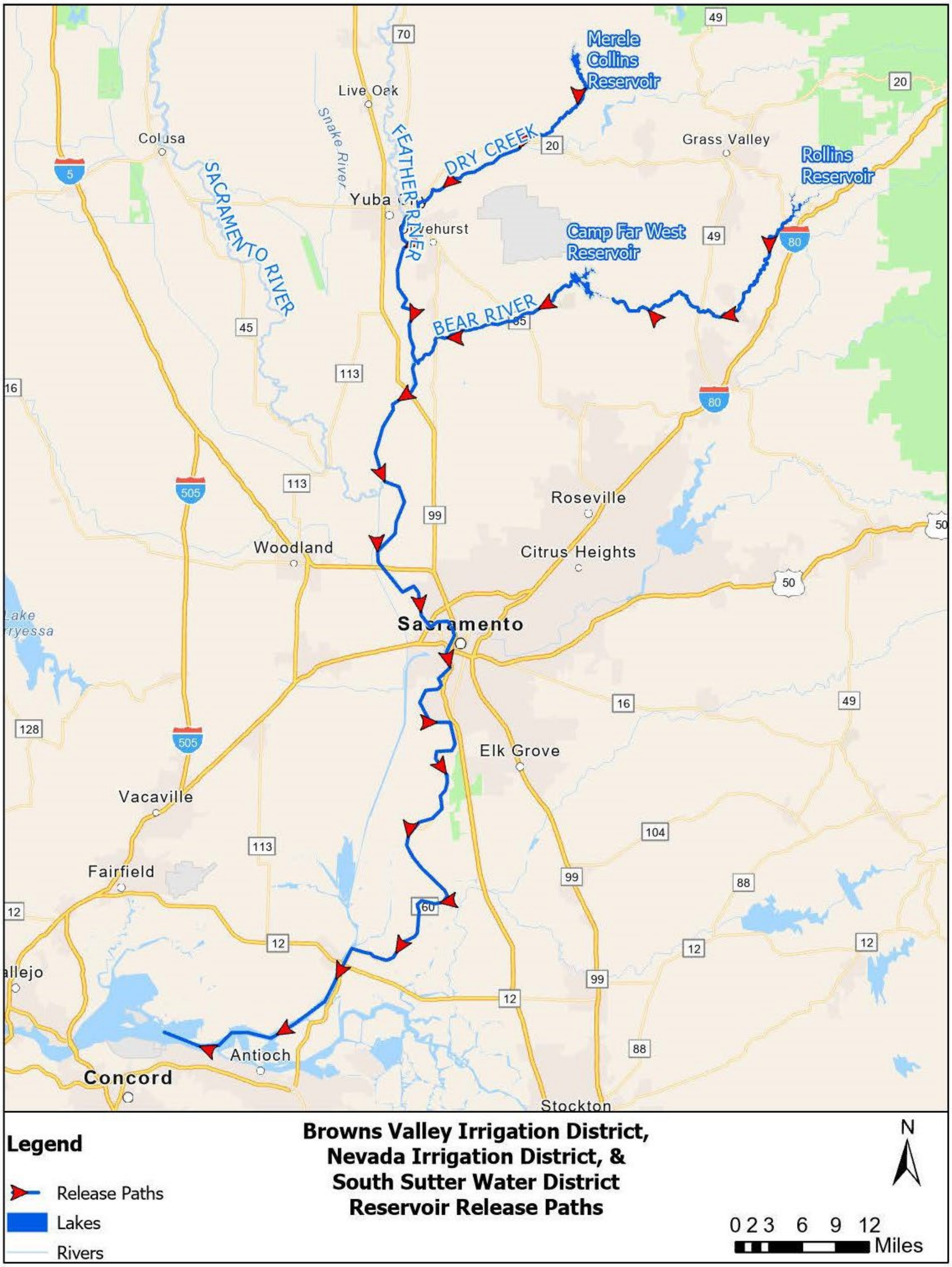

Figure B-8. Nevada ID, South Sutter WD, and Browns Valley ID Reservoir Release Paths

DWR operates Lake Oroville on the Feather River, which is upstream from the diversion locations for these entities. At times, DWR has the ability to retain water in Lake Oroville that would have been released for diversion by Butte WD and Garden Highway MWC during April through June until the Delta export pumps have capacity to convey the water. Any transfer agreement with DWR for Butte WD or Garden Highway MWC would need to include approval to store water in Lake Oroville before DWR could provide storage for the transfer. DWR cannot approve storage in Lake Oroville if it would affect SWP operations. The transfer water would be the first water spilled if Lake Oroville reaches flood capacity. River flows would increase downstream of the Sellers' points of diversion (compared to the No Action/No Project Alternative) when the stored transfer water is released.

Nevada ID could transfer a maximum of 15,000 AF per year through stored reservoir release from Rollins Reservoir. The water made available for transfer by Nevada ID could be conveyed to the Buyer Service Area from Rollins Reservoir down the Bear River to Camp Far West Reservoir to the Feather River to the Sacramento River to the Delta where water can be diverted through the Jones or Banks Pumping Plants (see Figure B-8). South Sutter WD could also transfer a maximum of 15,000 AF per year through stored reservoir release from Camp Far West Reservoir. The water made available for transfer by South Sutter WD could be conveyed to the Buyer Service Area from Camp Far West Reservoir to the Bear River to the Feather River to the Sacramento River to the Delta where water can be diverted through the Jones or Banks Pumping Plants (see Figure B-8). During the transfer period, Camp Far West Reservoir and Rollins Reservoir would be slightly lower than conditions without the transfer until the reservoir is refilled. River flows downstream of the reservoirs on the Bear River, Feather River, and Sacramento River would increase during the release period. The reservoirs would refill as water was available in the Bear River and when the Delta is in excess conditions, which would decrease flows downstream from the reservoir relative to non-transfer conditions. A refill agreement would be required for this transfer to avoid affects to downstream water users.

Stanislaus River

Oakdale ID and South San Joaquin ID could provide water through stored reservoir release from New Melones Reservoir with Reclamation approval (see Figure B-9). During the transfer period, water elevations in New Melones Reservoir would be slightly lower than conditions without the transfer until the reservoir is refilled. New Melones Reservoir would refill as water was available in the Stanislaus River and when the Delta is in excess conditions, which would decrease flows downstream from the reservoir relative to non-transfer conditions. The water made available for transfer by Oakdale ID and South San Joaquin ID could be conveyed to the Buyer Service Area from New Melones Reservoir to the Stanislaus River to the San Joaquin River to the Delta where water can be diverted through the Jones or Banks Pumping Plants.

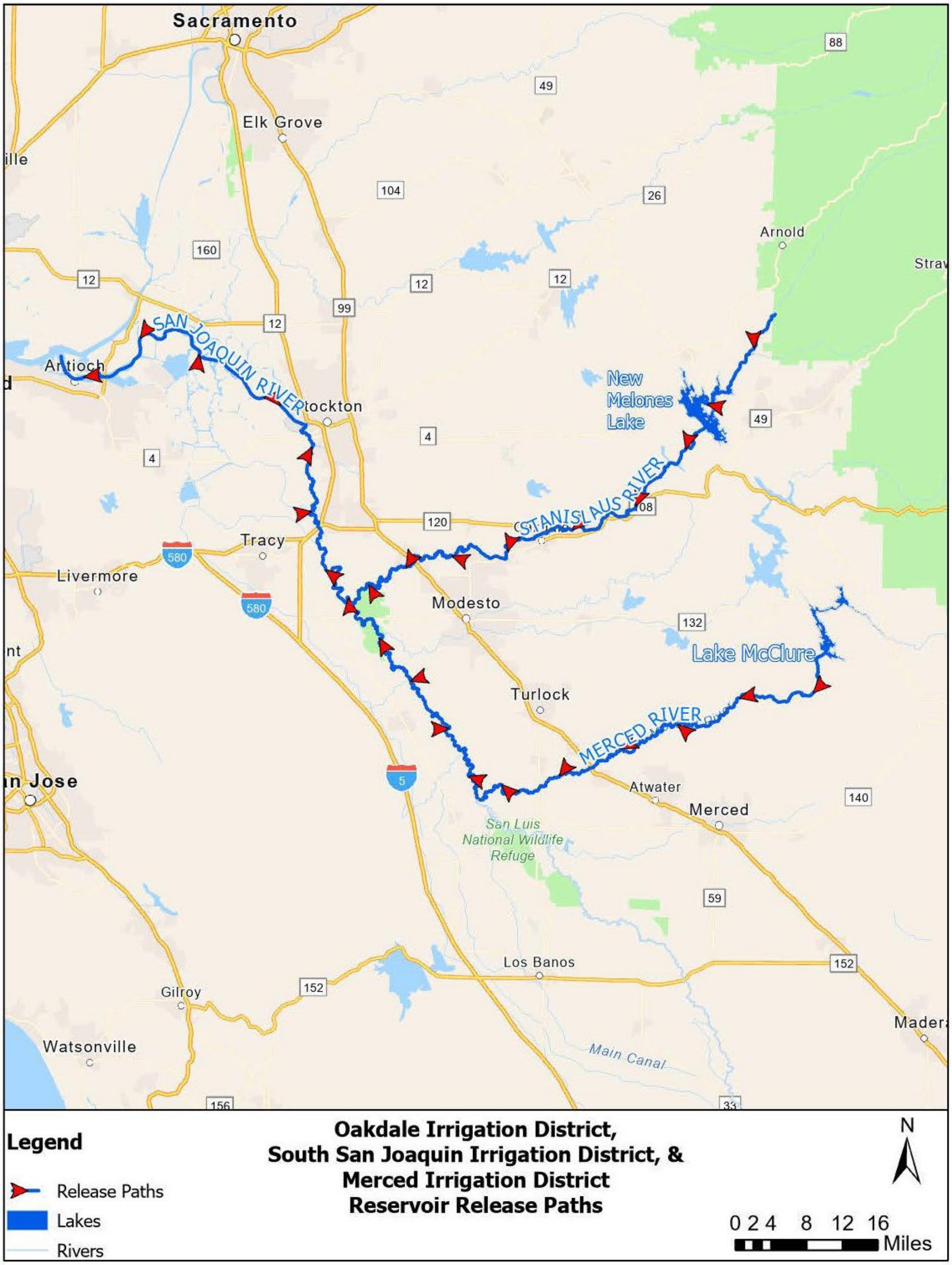

Figure B-9. Oakdale ID, South San Joaquin ID, and Merced ID Reservoir Release Paths

Merced River

Merced ID could provide water through stored reservoir release from Lake McClure (see Figure B-9). During the transfer period, water elevations in Lake McClure would be slightly lower than conditions without the transfer until the reservoir is refilled. Lake McClure would refill as water was available in the Merced River and when the Delta is in excess conditions, which would decrease flows downstream from the reservoir relative to non-transfer conditions. The timing of these transfers would depend on the limitations at the diversion point. Transfers through Jones and Banks Pumping Plants would be during periods in compliance with existing and future regulatory requirements as specified by the NMFS and USFWS BOs for the Long-Term Operation of the CVP and SWP. A stored reservoir release transfer from Merced ID would require a refill agreement to clarify how the reservoir would be refilled after the transfer. Additionally, Buyers would require a Warren Act Contract with Reclamation to provide for conveyance of non-CVP water through CVP facilities.

The water made available for transfer by Merced ID’s could be conveyed to the Buyer Service Area in several ways:

- Water could flow down the Merced River, through the San Joaquin River, and be diverted through the Jones or Banks Pumping Plants in the Delta.
- Water could flow down the Merced River into the San Joaquin River and be diverted through existing facilities within Banta Carbona ID, West Stanislaus ID, or Patterson ID (see Figure B-10). These agencies would either convey the water through their districts to the Delta-Mendota Canal, or they would use the water diverted from the San Joaquin River in exchange for their CVP water from the Delta-Mendota Canal.
- Water from Lake McClure could flow down the Merced River and be diverted into the Eastside Canal before reaching the San Joaquin River confluence. Water could be delivered for exchange to San Luis Canal Company, which would reduce its use of water from the Delta-Mendota Canal.
- Water would be diverted from Lake McClure for delivery through Merced ID's internal conveyance facilities to one of the refuges in the San Luis unit for exchange. The refuge would reduce its use of water from the Delta-Mendota Canal. This delivery mechanism would not change flows in any surface water body and could therefore be used year-round.

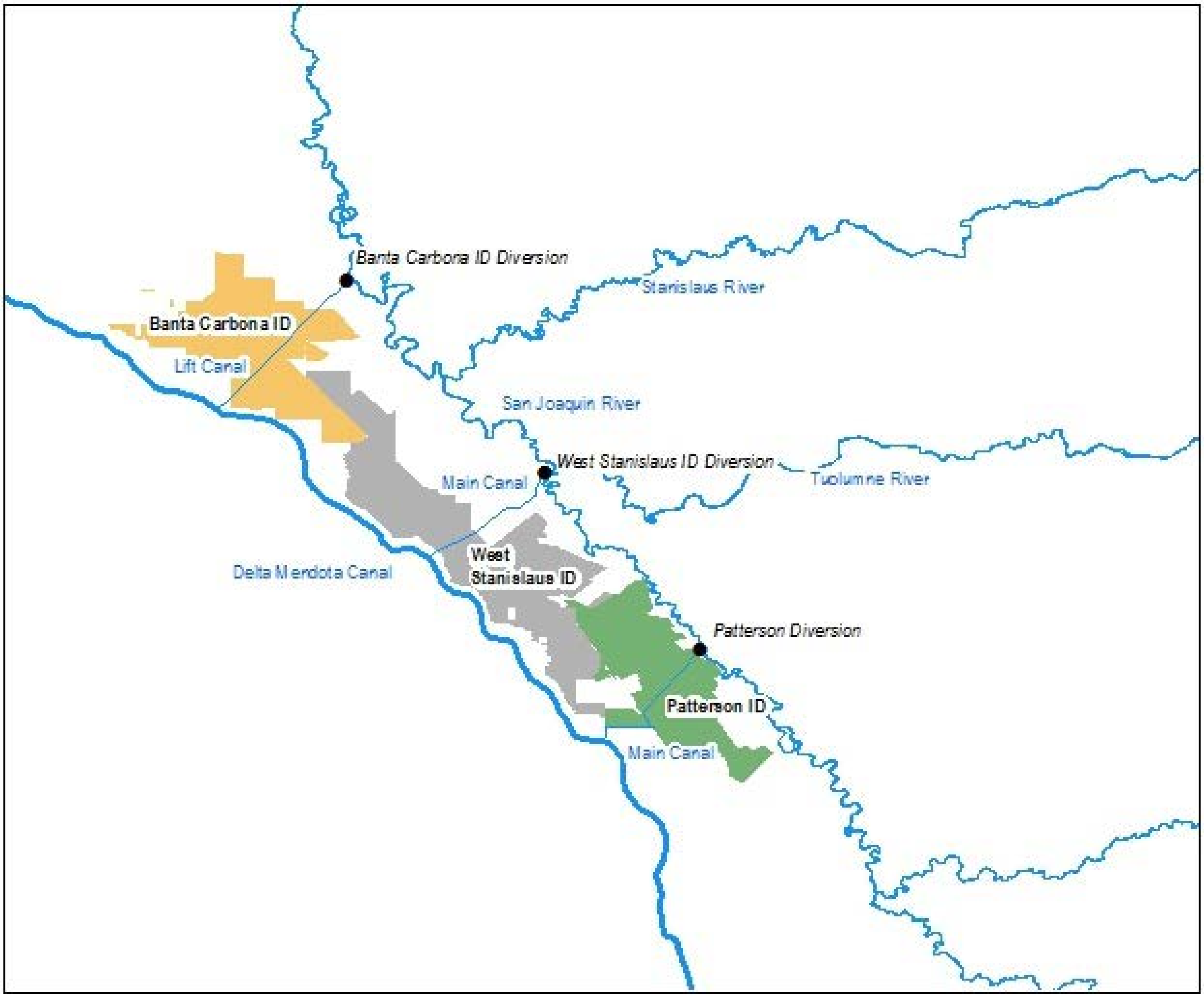

Figure B-10. Diversion Facilities for Banta Carbona ID, West Stanislaus ID, and Patterson ID

Delta Region

The Sacramento and San Joaquin rivers join at the Sacramento-San Joaquin Delta. Potential Sellers could transfer water made available through groundwater substitution. Transfers from potential Sellers in the Delta have several challenges, including water made available outside the transfer window cannot be exported or stored in Delta and the status of many underlying water rights can be difficult to verify.

Contra Costa WD could transfer a maximum of 30,000 AF per year through reservoir release from Los Vaqueros Reservoir. Contra Costa WD would make water available via an in-lieu exchange. Contra Costa WD would use previously stored water in Los Vaqueros Reservoir to meet Contra Costa WD customer demands in lieu of diverting the same amount of water from the Delta under Contra Costa WD's CVP contract allocation. The foregone Contra Costa WD CVP water would be left in the Delta to be diverted at Banks or Jones Pumping Plants for delivery to the Buyer.

Buyer Service Area

This EA/IS addresses a range of potential single-year transfers of water to the SLDMWA and its members, Contra Costa WD, and East Bay MUD. These entities divert water from the Delta or its tributaries. The points of diversion for SLDMWA, Contra Costa WD and East Bay MUD are discussed below:

- Water made available for transfer to Buyers within the SLDMWA service area would be pumped through the Jones or Banks pumping plants (see Figure B-11), or would be delivered and /or stored in San Luis Reservoir. This water would then be conveyed through SWP or CVP facilities and local irrigation canals to the purchasing agencies.
- Contra Costa WD is an in-Delta water user and diverts both CVP water pursuant to its water service contract with Reclamation and water under its own water rights from Delta drinking water intakes located at Rock Slough, Old River near Highway 4, Victoria Canal, and Mallard Slough (see Figure B-11).
- Water transfers to the East Bay MUD would be diverted at the Freeport Regional Water Authority's intake on the Sacramento River near Freeport, at the northern end of the Delta (see Figure B-11). The water made available for transfer would not pass through the Delta and therefore would not be subject to constraints on through Delta pumping. Once diverted from the Sacramento River, water made available for transfer to East Bay MUD would travel eastward through 16 miles of underground pipeline to the Folsom South Canal. After flowing 14 miles to the southern end of the canal, the water would be pumped via 18 miles of pipeline to East Bay MUD's Mokelumne Aqueducts, which cross the Delta and deliver the water to East Bay MUD's service area in the East Bay.

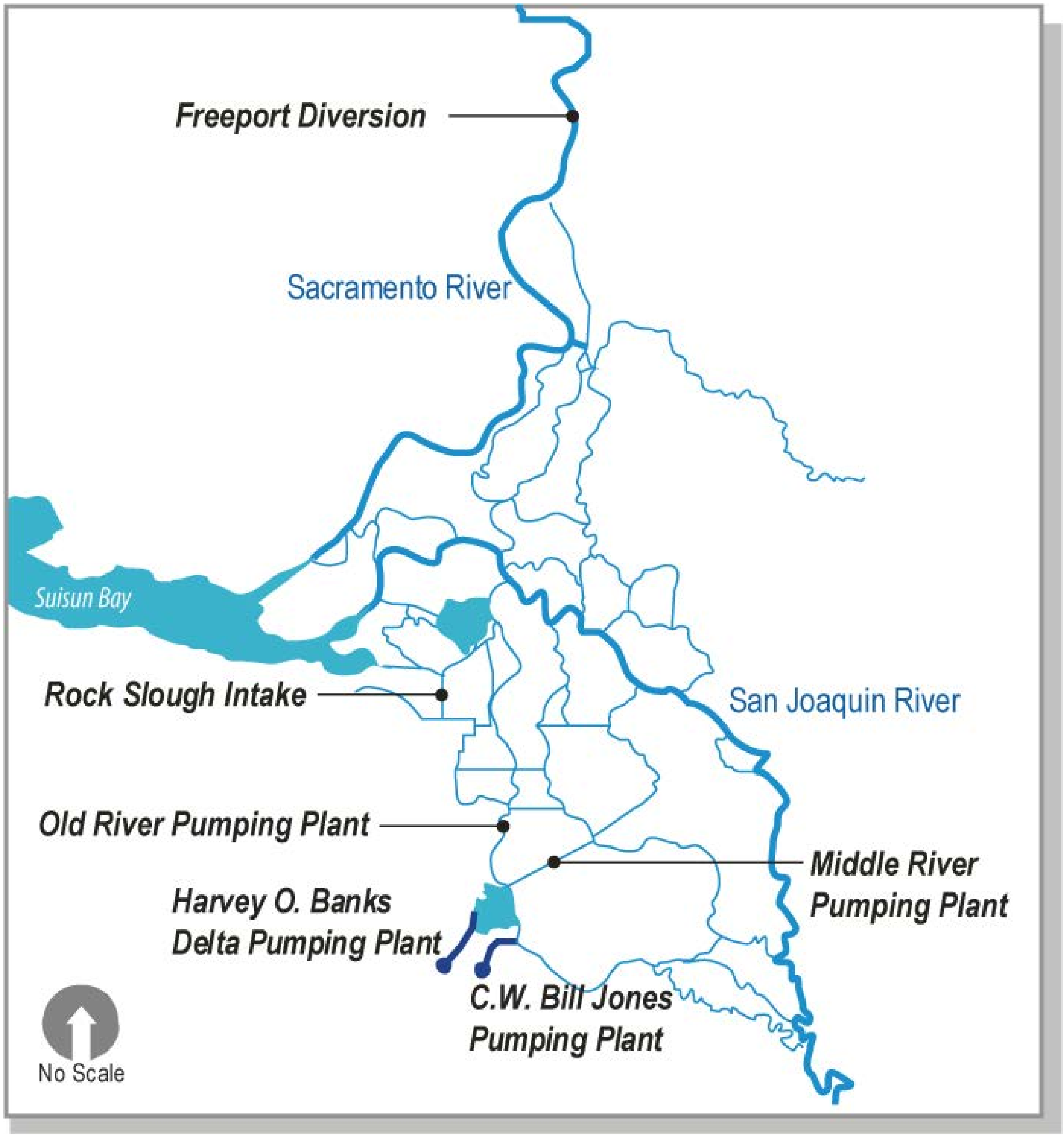

Figure B-11. Delta Transfer Diversion Locations

B.3 References

Bureau of Reclamation (Reclamation). 2024. Summary of Water Supply Allocations. Available at: https://www.usbr.gov/mp/cvo/vungvari/water_allocations_historical.pdf. [Accessed on August 20, 2024].

______. 2024b. Long-Term Operations of the Central Valley Project and State Water Project Draft Environmental Impact Statement. July. Available at: https://cawaterlibrary.net/document/long-term-operations-of-the-central-valley-project-and-state-water-project-draft-environmental-impact-statement/. [Accessed on October 22, 2024].

Bureau of Reclamation (Reclamation) and California Department of Water Resources (DWR). 1986. Agreement Between the United States of America and the State of California for Coordinated Operation of the Central Valley Project and the State Water Project. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Files/Coordinated-Agreement-between-Reclamation-and-DWR_a_y20.pdf. [Accessed on August 20, 2024].

Contra Costa Water District (WD). 2020. 2020 Urban Water Management Plan. Available at: https://www.ccwater.com/DocumentCenter/View/9851/2020-Urban-Water-Management-Plan-PDF. [Accessed on August 20, 2024].

______. 2022. 2022 Annual Report. Available at: https://www.ccwater.com/ArchiveCenter/ViewFile/Item/370. [Accessed on August 20, 2024].

East Bay Municipal Water District (MUD). 2024. Who We Are. Available at: https://www.ebmud.com/about-us/who-we-are. [Accessed on August 20, 2024].

National Oceanic and Atmospheric Association Fisheries Service (NMFS). 2019. Biological Opinion for the Reinitiation of Consultation on the Long-Term Operation of the Central Valley Project and State Water Project. October 22, 2019.

San Luis & Delta-Mendota Water Authority. 2024. Learn More: About Us. Available at: https://sldmwa.org/learn-more/about-us/. [Accessed on August 20, 2024].

U.S. Fish and Wildlife Service (USFWS). 2019. Biological Opinion for the Reinitiation of Consultation on the Long-Term Operation of the Central Valley Project and State Water Project. 21 October 2019.

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Appendix C
California Environmental Quality Act Checklist

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Appendix C California Environmental Quality Act Checklist

This appendix provides an environmental impact analysis using the checklist from Appendix G of the California Environmental Quality Act (CEQA) Guidelines (Association of Environmental Professionals 2024) as a template for SLDMWA to assess potential environmental effects. The discussion for each resource focuses on potential impacts. A full analysis for less than significant impacts and potentially significant impacts is contained within Section 3 of the Environmental Assessment/Initial Study (EA/IS).

C.1 Aesthetics

Except as provided in Public Resources Code Section 21099, would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

a, b, d) No Impact. The Proposed Action would not affect any scenic vista, damage scenic resources, or create a new light source. The Proposed Action would not affect scenic vistas relative to rivers or reservoirs because there would be no changes beyond historical or seasonal fluctuations in flows or water levels. The Proposed Action does not include any construction or new structures that could damage scenic resources (e.g., trees, rock outcroppings, historic buildings) or produce notable sources of light or glare.

c) Less than Significant. A full analysis related to the visual quality and public view of non-urban areas is in Section 3.10 of the EA/IS.

C.2 Agriculture and Forestry Resources

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forestry resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

a, b) No Impact. Water made available via groundwater substitution and stored reservoir release actions would have no impact on agricultural land use. Consequently, the Proposed Action would not affect Williamson Act contracts or the long-term designations of Prime Farmland or other Farmland Mapping and Monitoring Program classifications.

c, d) No Impact. The Proposed Action would have no impact to existing forest lands or timber, as the proposed methods for making water available for transfer do not pertain to such lands or resources.

e) No Impact. The Proposed Action would not affect existing agricultural land use or forest lands and would therefore not convert any agricultural land to non-agricultural use or convert any forest lands to non-forest use.

C.3 Air Quality

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations.

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☒	☐	☐
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	☐	☐	☒	☐
c) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

a) Less than Significant with Mitigation Incorporation. A full analysis related to applicable air quality plans is presented in Section 3.5 of the EA/IS.

b) Less than Significant. A full analysis related to cumulatively considerable emissions is in Section 3.5 of the EA/IS.

c) Less than Significant. A full analysis related to sensitive receptors is in Section 3.5 of the EA/IS.

d) Less than Significant. A full analysis related to other emissions, such as odors, is presented in Section 3.5 of the EA/IS.

C.4 Biological Resources

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☐	☒	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☒	☐
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☒	☐

a) Less than Significant Impact. Section 3.7 in the EA/IS presents a full analysis of potential effects on species.

b, c) Less than Significant Impact with Mitigation Incorporation. A full analysis of potential impacts on riparian habitat and wetlands is presented in Section 3.7 of the EA/IS.

e, f) Less Than Significant Impact. A full analysis related to local policies, ordinances, and adopted plans is presented in Section 3.7 of the EA/IS.

C.5 Cultural Resources

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☐	☐	☒
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☐	☒

a-c) No Impact. Under the Proposed Action, elevations at participating reservoirs would not fluctuate beyond historical or seasonal level and would not drop below the conservation pool at any of the facilities and expose cultural resources existing below the conservation pool. Changes in water levels are expected to be in line with normal operations.

These water transfers would occur within existing facilities and would not require construction of new facilities/or water conveyance structures. Therefore, there would be no ground-disturbing activities, changes in land use, or construction proposed that could disturb historic properties associated with the Proposed Action. This is the type of undertaking that does not have the potential to cause effects to historic properties, should such properties be present, pursuant to the Title 54 U.S.C. § 306108, commonly known as Section 106 of the National Historic Preservation Act regulations codified at 36 CFR § 800.3(a)(1). Reclamation has no further obligations under Section 106, pursuant to 36 CFR § 800.3(a)(1). Historical resources per CEQA are defined as “a resource listed or eligible for listing on the California Register of Historical Resources” (Public Resources Code, Section 5024.1; 14 CCR 15064.5). As previously discussed, this type of undertaking does not have the potential to cause effects to historic properties, should such properties be present, pursuant to Section 15064.5.

C.6 Energy

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

a) Less than Significant Impact. A full analysis related to consumption of energy resources is in Section 3.12 of the EA/IS.

b) No Impact. California has a "Renewable Energy Program" focused on development of new utility-level renewable energy sources and rebates for consumers installing facilities. California also has an "Energy Efficiency Strategic Plan" that includes goals to improve agricultural energy efficiency and improve use of renewable energy (California Public Utilities Commission 2023). The Proposed Action would not result in the construction of new facilities, so it would not conflict with these statewide plans or local general plans.

C.7 Geology And Soils

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☒	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	☐	☐	☐	☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	☐	☐	☐	☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒

a) No Impact. Strong seismic shaking is not common in the Central Valley, and liquefaction and other seismic-related ground failures are not major hazards in the region. Landslides and other hazards associated with unstable soil are uncommon owing to the flat terrain. In addition, there are no new facilities or construction proposed, and no existing facilities fall within an Alquist-Priolo Earthquake Fault Zone, as shown in the California Department of Conservation, Earthquake Zones of Required Investigation Mapper (California Department of Conservation 2024). Therefore, the Proposed Action would not expose people or structures to impacts related to fault rupture, ground shaking, ground failure, liquefaction, or landslides.

b) No Impact. No new construction or ground-disturbing actions are proposed, and thus there is no new risk of causing substantial soil erosion or the loss of topsoil. In addition, the Proposed Action would not substantially increase the erosion of sediments. While there may be flow increases during the period when water transfers are conveyed from the Sellers to the Buyers, these increases would occur during the dry season of dry and critical years when flows are below normal. The increased flows would not elevate streamflow to a level that would cause soil erosion impacts to stream and riverbanks. Therefore, there would be no impact resulting from the implementation of the Proposed Action.

c) Less than Significant with Mitigation Incorporation. A full analysis related to unstable soils and subsidence is in Section 3.4 of the EA/IS. Groundwater-pumping-related land subsidence is analyzed in more detail in Section 3.3 of the EA/IS.

d, e, f) No Impact. The project area largely consists of soils with low to moderate shrink-swell potential and some areas with high to very high shrink-swell potential (U.S. Department of Agriculture, Natural Resources Conservation Service 2024). There would be no impact to expansive soils from groundwater substitution and reservoir release transfers. There are no septic tanks or alternative wastewater disposal systems proposed or required. The Proposed Action does not include new construction, and thus no new wastewater generation or risk of affecting paleontological resources is expected. Therefore, there would be no impact on soil resulting from the implementation of the Proposed Action.

C.8 Greenhouse Gas Emissions

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

a, b) Less than Significant. A full analysis related to greenhouse gas emissions and applicable plans, policies, or regulations related to reducing greenhouse gas emissions is in Section 3.6 of the EA/IS.

C.9 Hazards and Hazardous Materials

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☒
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☐	☒
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☐	☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?	☐	☐	☐	☒

a-g) No Impact. The Proposed Action would not involve the transport or use of hazardous materials, nor change in any way, public exposure to hazards or hazardous materials. The Proposed Action would not occur on a hazardous materials site and therefore would not create a risk to the public or environment. The Proposed Action would not affect a public airport or private air strip. The Proposed Action would not interfere with an adopted emergency response plan or emergency evacuation plan. There are no new structures or buildings included in the Proposed Action; therefore, no people or structures would be exposed to a significant risk of loss, injury, or death, such as wildland fires, as a result of implementation.

C.10 Hydrology and Water Quality

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?	☐	☐	☒	☐
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☒	☐	☐
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surface, in a manner which would:				
i) Result in substantial erosion or siltation on- or off-site?	☐	☐	☐	☒
ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	☐	☐	☐	☒
iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒
iv) Impede or redirect flood flows?	☐	☐	☐	☒
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☒	☐

a) Less than Significant. A full analysis related to surface water and groundwater quality is in Section 3.2 and Section 3.3 of the EA/IS, respectively.

b) Less than Significant with Mitigation Incorporation. A full analysis related to groundwater supplies is in Section 3.3 of the EA/IS.

c (i) No Impact. As discussed under Section C.7, Geology and Soils, no new construction or ground-disturbing actions are proposed, and thus there is no new risk of causing substantial erosion or siltation. In addition, the groundwater substitution and stored reservoir release transfers would not substantially increase erosion or siltation. While there may be flow increases during the period when water transfers are conveyed from the Sellers to the Buyers, these increases would occur during the dry season of dry and critical years when flows are below normal. The increased flows would not elevate streamflow to a level that would cause soil erosion impacts to stream and riverbanks. Therefore, there would be no impact resulting from the implementation of the Proposed Action.

c(ii), c(iii), c(iv), d) No Impact. The Proposed Action would not involve any actions that would result in flooding or create runoff water that would exceed the capacity of existing drainage systems, impede or redirect flood flows or provide a substantial source of polluted runoff.

e) Less Than Significant. A full analysis related to groundwater quality and sustainable groundwater management plans is in Section 3.3 of the EA/IS.

C.11 Land Use and Planning

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Physically divide an established community?				X
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?				X

a, b) No Impact. The Proposed Action would not involve any construction or new structures that could divide a community or conflict with land use plans, policies, or zoning.

C.12 Mineral Resources

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				X
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?				X

a, b) No Impact. The Proposed Action does not require construction or other activities that would result in the loss of availability of known mineral resources or mineral resource recovery sites.

C.13 Noise

Would the project result in:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b) Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

a) Less Than Significant. A full analysis related to potential increases in ambient noise levels is in Section 3.8 of the EA/IS.

b, c) No Impact. The Proposed Action would not result in groundborne vibration or noise and would not result in noise near a public or private airport. The Proposed Action would only rely on existing facilities and equipment. No new construction activities would be associated with the Proposed Action and no ground-disturbing actions with the potential to generate groundborne vibrations would occur. Certain wells may be located within an airport land use plan, but there would be no new permanent residents or workers near the wells that could be affected by any plane noise. For private airstrips, the Proposed Action would not expose people in the vicinity to excessive noise levels.

C.14 Population and Housing

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

a) No Impact. The Proposed Action would not induce population growth. Water transfers would help reduce water shortages and would not increase the maximum acreage under production or require more farm workers to meet labor demands. No housing would be constructed, demolished, or replaced as a result of water transfers.

b) No Impact. The Proposed Action would not include construction, demolition, or other activities that could displace existing housing or people and necessitate the construction of replacement housing.

C.15 Public Services

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Fire protection?	☐	☐	☐	☒
b) Police protection?	☐	☐	☐	☒
c) Schools?	☐	☐	☐	☒
d) Parks?	☐	☐	☐	☒
e) Other public facilities?	☐	☐	☐	☒

a-e) No Impact. The Proposed Action would not create new demand for public services or require any existing public facilities to be altered. Water made available for transfer would be transported using existing conveyance facilities and pumping stations, and would not require the use of area roads, so there would be no impact to roads or other government facilities. Transferred water would not affect the supplies available to municipalities or other jurisdictions for fire protection, parks, or school use. Therefore, there would be no impact to public services or public facilities as a result of this project.

C.16 Recreation

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐
b) Include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒

a) Less Than Significant Impact. A full analysis of potential impacts on recreational facilities is in Section 3.11 of the EA/IS.

b) No Impact. The Proposed Action would not affect recreation facilities to such an extent that construction or expansion of recreation facilities would be required.

C.17 Transportation

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☐	☒
b) Conflict or be inconsistent with CEQA Guidelines §15064.3, subdivision (b)?	☐	☐	☐	☒
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
d) Result in inadequate emergency access?	☐	☐	☐	☒

a-d) No Impact. The Proposed Action would not create new demand on transportation services. The Proposed Action has no construction activities that would increase the traffic on roads in the project area. The amount of water transferred would be less than what is supplied during normal WYs, and so would not create an increase in farm activity in the Buyer Service Area that could increase traffic. There would neither be an impact to the level of service or air traffic patterns in the project area, nor would there be an increase in hazards owing to design features, inadequate emergency access or parking capacity, or conflict with adopted policies supporting alternative

C.18 Tribal Cultural Resources

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code § 21074 as either a site, feather, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or	☐	☐	☐	☒
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code § 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code § 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☐	☒

a) No Impact. The Proposed Action would not include ground-disturbing activities, land alteration, or construction proposed that could disturb tribal cultural resources.

C.19 Utilities and Service Systems

Would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electrical power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☐	☒
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☐	☒

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
c) Result in a determination by the wastewater treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
d) Generate solid waste in excess of state or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☐	☒
e) Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☐	☒

a-e) No Impact. The Proposed Action would not create new demand on utilities or service systems. There would be no impact to utility or service systems resulting from implementing the Proposed Action. Transfers of water would not require the construction of new water or wastewater treatment facilities as all transferred water would use existing facilities. There would be no increase in demand for wastewater treatment facilities that could exceed existing capacities; and no new stormwater drainage facilities would be required under the Proposed Action.

Water made available for transfer would be within the existing contractual entitlements and resources; and no new water supplies for the Sellers would be required. Buyers would also not require new water supplies as the transferred water would provide agricultural water in lieu of the limited surface water supplies.

There would be no solid waste generated as a result of the Proposed Action; therefore, no landfill would be required. Thus, there would be no impact to utilities or other service systems as a result of the Proposed Action.

C.20 Wildfire

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?				X
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?				X
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?				X
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?				X

a-c) No Impact. The project area is near State Responsibility Areas (SRAs) classified as moderate, high and very high fire hazard severity zones (California Department of Forestry and Fire Protection [CAL FIRE] 2024a; CAL FIRE 2024b). However, the Proposed Action would not impair an emergency response plan or evacuation plan, nor would the Proposed Action exacerbate wildfire risks and expose people to pollutant concentrations. The Proposed Action would not require installation or maintenance of infrastructure. Therefore, there would be no impact.

d) No Impact. Under the Proposed Action there would be no construction of any structures that would be at risk from post-fire slope instability. In addition, as discussed under Section C.10, the Proposed Action would not involve any actions that would result in flooding or create runoff water that would exceed the capacity of existing drainage systems. Therefore, there would be no impact.

C.21 Mandatory Findings of Significance

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☒	☐	☐
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒

a) Less than Significant with Mitigation Incorporation. As discussed in Section 3.7 of the EA/IS, the Proposed Action would not have substantial incremental effects to habitat or species relative to the conditions that would occur in response to the dry hydrologic conditions. Mitigation Measure GW-1 would reduce potential impacts to existing natural communities and groundwater dependent ecosystems to less than significant. As discussed in Section C.5, the Proposed Action would not degrade the quality of the environment or eliminate examples of California history or prehistory.

b) Less than Significant with Mitigation Incorporation. The cumulative impacts analysis in Section 4 of the EA/IS identifies past, present, and reasonably foreseeable future projects with the potential to contribute to cumulative effects, when combined with the Proposed Action. The Proposed Action has the potential to make a cumulatively considerable contribution to impacts to related to surface water supply, surface water quality, groundwater resources, air quality, and biological resources. The cumulative analysis, included in Section 4, concludes that the Proposed Action would not have cumulatively considerable impacts to other resources evaluated in this EA/IS.

c) No Impact. The Proposed Action would not result in environmental effects that cause substantial adverse impacts to human beings. Effects in the Sellers' area would be temporary, occurring only in 2026-2027, and do not present a substantial risk to human beings. The Proposed Action would provide additional water to the Buyer Service Area, which would benefit agricultural production and the regional economies in the Buyer Service Area. There would be no long-term effects of the Proposed Action. The Proposed Action would be used to meet anticipated water supply shortages within the service area of the San Luis & Delta-Mendota Water Authority, Contra Costa Water District, and East Bay Municipal Utility District. In addition, each transfer proposal would be evaluated individually to determine if it meets the terms of the Settlement Contract or other water service contracts with Reclamation, if applicable, the *Water Transfer White Paper* (Bureau of Reclamation and California Department of Water Resources 2019), and state and federal law. Therefore, there would be no contribution to growth-inducing impacts.

C.22 References

Association of Environmental Professionals. 2024. 2024 California Environmental Quality Act (CEQA)Statute and Guidelines. Appendix G: Environmental Checklist Form. Available at: https://www.califaep.org/docs/2024_CEQA_Statute_and_Guidelines_Handbook.pdf/ [Accessed on November 4, 2024].

Bureau of Reclamation and California Department of Water Resources. 2019. DRAFT Technical Information for Preparing Water Transfer Proposals (Water Transfer White Paper) Information for Parties Preparing Proposals for Water Transfers Requiring Department of Water Resources or Bureau of Reclamation Approval. December 2019. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Management/Water-Transfers/Files/Draft_2019WTWhitePaper-012324. [Accessed on August 21, 2024].

California Department of Conservation. 1997. Land Evaluation and Site Assessment Model. Available at: https://www.conservation.ca.gov/dlrp/Pages/qh_lesa.aspx. [Accessed on August 20, 2024].

———. 2024. Earthquake Zones of Required Investigation Mappers. Available at: https://maps.conservation.ca.gov/cgs/EQZApp/. [Accessed on August 21, 2024].

California Department of Forestry and Fire Protection (CAL FIRE). 2024a. State Responsibility Area (SRA) Viewer. Available at: https://calfire-forestry.maps.arcgis.com/apps/webappviewer/index.html?id=468717e399fa4238ad86861638765ce1. [Accessed on November 4, 2024].

———. 2024b. State Responsibility Area Fire Hazard Severity Zones Map of California. September 29, 2023. Available at: https://34c031f8-c9fd-4018-8c5a-4159cdff6b0d-cdn-endpoint.azureedge.net/-/media/osfm-website/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones/fire-hazard-severity-zones-map-2022/fire-hazard-severity-zones-maps-2022-files/fhsz_statewide_sra_11x17_2022_3.pdf?rev=78556847dfe24aab8ab7684ef85d73a9&hash=BA554CAAA7D1809B3558DBE500487223. [Accessed on November 5, 2024].

California Public Utilities Commission. 2023. 2023 Energy Efficiency Potential and Goals Study. Available at: https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M517/K604/517604907.PDF. [Accessed on August 22, 2024].

U.S. Department of Agriculture, Natural Resources Conservation Service. 2024. Web Soil Survey – Soil Properties and Qualities. Available at: https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. [Accessed on August 20, 2024].

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Appendix D
Groundwater Existing Conditions

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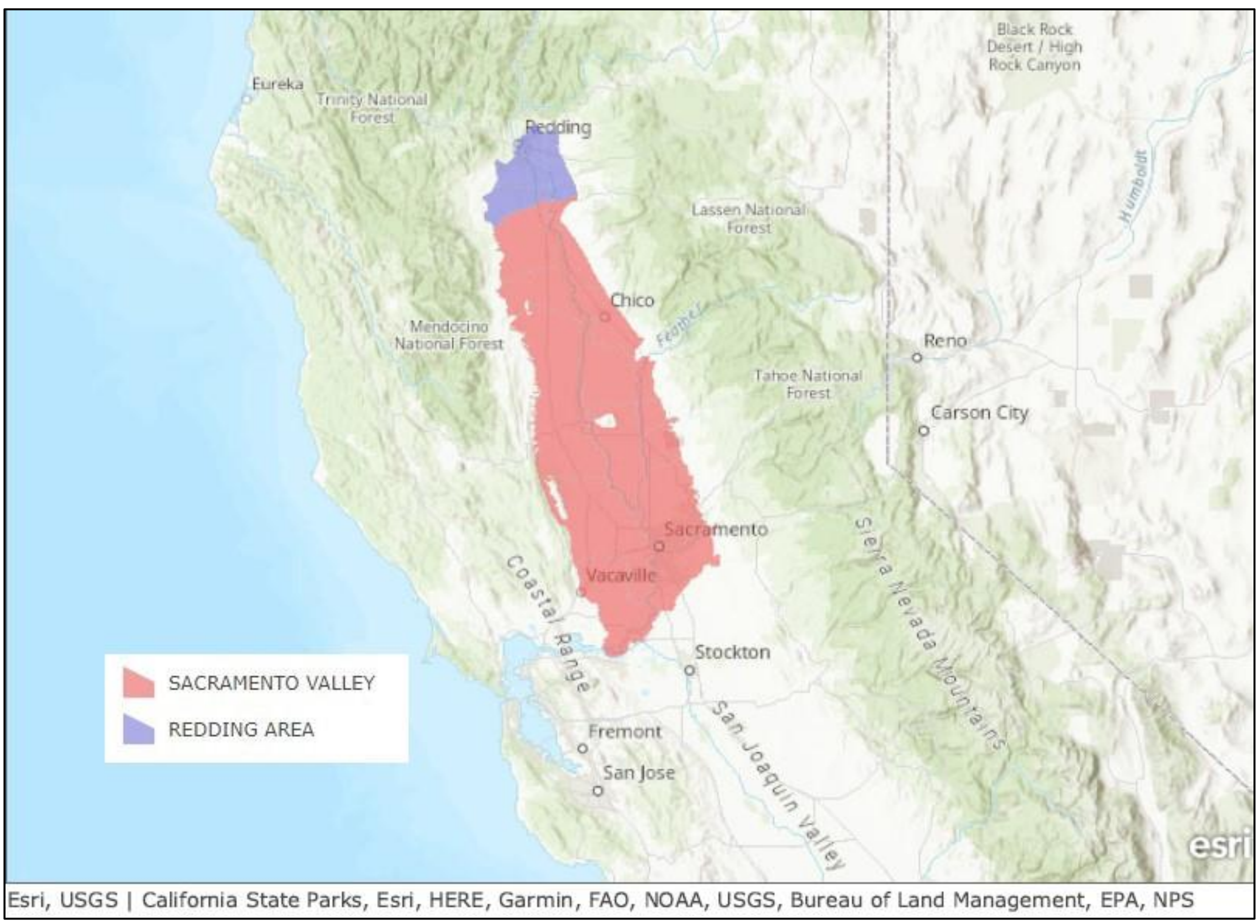
Appendix D Groundwater Existing Conditions

This appendix provides an overview of groundwater existing conditions in the Seller Service Area of those making water available through groundwater substitution, which is limited to the Redding Area and Sacramento Valley groundwater basins in the Sacramento Valley.

D.1 Seller Service Area Groundwater Basins

As described in Section 3.3.1, Groundwater Resources Affected Environment/Environmental Setting, the Sellers making water available through groundwater substitution is within the Sacramento Valley are within the Redding Area and Sacramento Valley groundwater basins, as shown in Figure D-1.



Source: ArcGIS 2024

Figure D-1. Sacramento Valley and Redding Area Groundwater Basins

D.2 Sustainable Groundwater Management Act

The California Sustainable Groundwater Management Act (SGMA), passed in 2014, establishes a statewide framework to help protect groundwater resources. SGMA was enacted to stop overdraft and bring basins into balanced levels of pumping and recharge. SGMA requires local agencies to form groundwater sustainability agencies (GSAs) for the high and medium priority basins and implement groundwater sustainability plans (GSPs). Under SGMA, basins must reach sustainability within 20 years of implementing their plans. To accomplish this goal, the GSPs include minimum thresholds and measurable objectives to avoid undesirable results, including chronic lowering of groundwater levels and groundwater storage reduction.

Table D-1 provides the name of the GSA, the SGMA basin prioritization, and the GSP status for each subbasin within the groundwater substitution Seller Service Area. GSPs for five of the six subbasins with the potential to provide surface water made available through groundwater substitution pumping in the Sacramento Valley Groundwater Basin have been submitted and approved by California Department of Water Resources (DWR). The GSP for the Colusa subbasin was submitted and reviewed by DWR but remains incomplete.

Table D-1. Sustainable Groundwater Management Act Basin Prioritization and Status in the Groundwater Substitution Seller Service Area

Basin / Subbasin	Groundwater Sustainability Agency/Agencies (GSA)	Priority	Adopted	Groundwater Sustainability Plans (GSP) Status
Redding Area / Anderson	Enterprise-Anderson GSA	Medium	January 19, 2022	Approved - January 18, 2024
Redding Area / Enterprise	Enterprise-Anderson GSA	Medium	January 19, 2022	Approved - January 18, 2024
Sacramento Valley / Colusa	Colusa Groundwater Authority GSA - Colusa Glenn Groundwater Authority GSA	High	December 14, 2021	Incomplete
Sacramento Valley / Sutter	Sutter Community Service District GSA Butte Water District GSA - Sutter Sutter Extension Water District GSA City of Live Oak GSA County of Sutter GSA - Sutter Reclamation District No. 1500 GSA City of Yuba City GSA Reclamation District No. 70 GSA Reclamation District No. 1660 GSA	Medium	January 25, 2022	Approved - October 26, 2023
Sacramento Valley / Yolo	Yolo Subbasin GSA	High	January 24, 2022	Approved - October 26, 2023
Sacramento Valley / North American	Sacramento Groundwater Authority GSA West Placer GSA South Sutter Water District GSA Reclamation District No. 1001 GSA County of Sutter GSA - North American	High	January 11, 2022	Approved - July 27, 2023

Basin / Subbasin	Groundwater Sustainability Agency/Agencies (GSA)	Priority	Adopted	Groundwater Sustainability Plans (GSP) Status
Sacramento Valley / South American	Reclamation District No. 1002 GSA - Northern Delta GSA Franklin Drainage District GSA - Northern Delta GSA Reclamation District No. 744 GSA - Northern Delta GSA Reclamation District No. 813 GSA - Northern Delta GSA Reclamation District No. 369 GSA - Northern Delta GSA Reclamation District No. 2110 GSA - Northern Delta GSA Reclamation District No. 551 GSA County of Sacramento GSA - South American Sacramento Central Groundwater Authority GSA - 1 Sloughhouse Resource Conservation District GSA - South American 1 Omochumne-Hartnell Water District GSA - South American	High	December 8, 2021	Approved - July 27, 2023
Sacramento Valley / Solano	Sacramento County GSA - Solano – Solano Reclamation District No. 3 GSA Reclamation District No. 554 GSA Reclamation District No. 2111 GSA Reclamation District No. 317 GSA Reclamation District No. 556 GSA Reclamation District No. 501 GSA - Northern Delta GSA Reclamation District No. 349 GSA Solano Subbasin GSA City of Vacaville GSA Solano Irrigation District GSA	Medium	December 2, 2021	Approved - January 18, 2024

Source: DWR 2024a, DWR 2024b, DWR 2024c

D.3 Change In Groundwater Elevation

Existing groundwater level measurements were reviewed to establish existing conditions in the project area and determine general groundwater elevation trends in the greater Sacramento Valley. The SGMA Data Viewer (DWR 2024d) was used to research water level data for three periods:

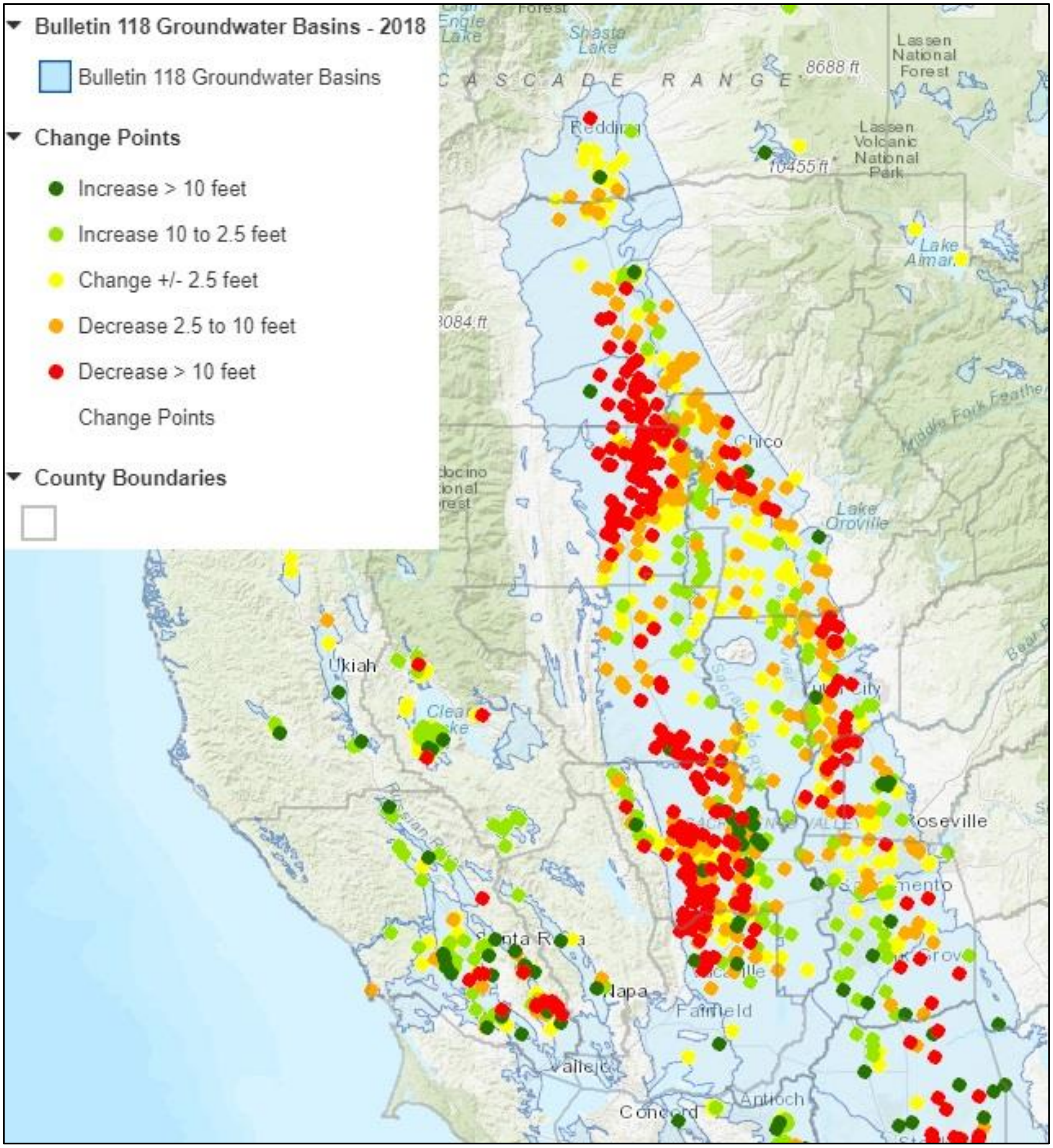
- Spring 2013 to Spring 2023 (i.e., the past 10 years),
- Spring 2018 to Spring 2023 (i.e., the past 5 years), and
- Spring 2022 to Spring 2023 (i.e., the past year), and

The SGMA Data Viewer provides data showing the difference between measured groundwater levels at two different periods. The SGMA Data Viewer shows data only if a measurement exists in both time periods (DWR 2024e). The spring measurements include dates that range from January to May.

To determine the general groundwater elevation trends in the groundwater substitution Seller Service Area, groundwater level data was downloaded from the SGMA Data Viewer for the Redding Area and Sacramento Valley groundwater basins (DWR 2024d). The data was downloaded into Excel from the “Seasonal Reports” of the “Groundwater Levels” tab in the SGMA Data Viewer. The change in groundwater surface elevation data was then matched by well site code to well depth data from DWR’s Groundwater Level Data library (DWR 2024f). The combined data was then sorted by well depth: shallow (well depths less than 200 feet deep below ground surface [bgs]), intermediate (well depths greater than 200 feet and less than 600 feet deep bgs), and deep (well depths greater than 600 feet bgs). Wells without known depths were not included.

D.3.1 Spring 2013 to Spring 2023

Figure D-2 shows the change in groundwater elevation from Spring 2013 to Spring 2023 in the Sacramento Valley as queried from the SGMA Data Viewer. Table D-2 and Table D-3 provide a summary of the change in groundwater elevation from Spring 2013 to Spring 2023 in the groundwater substitution Seller Service Area of the Redding Area and Sacramento Valley groundwater basins, respectively. Groundwater levels in the Sacramento Valley Groundwater Basin have declined over the last 10 years (Spring 2013 to Spring 2023) coinciding with the persistent dry weather conditions described in Section 3.3.1, Groundwater Resources Affected Environment/Environmental Setting.



Source: DWR 2024d

Figure D-2. Spring 2013 to Spring 2023 Change in Groundwater Elevation, Sacramento Valley

Table D-2. Groundwater Substitution Seller Service Area Change in Groundwater Elevation, Redding Area Groundwater Basin, Spring 2013 to Spring 2023

Well Depth	Maximum Increase (feet)	Maximum Decrease (feet)	Average Change (feet)	Number of Measurements
Shallow	2.9	-8.3	-0.8	19
Intermediate	31.5	-17.5	-0.2	21
Deep	1.0	-5.8	-2.2	6
All	31.5	-17.5	-0.7	46

Source: DWR 2024d

Note: Wells without known depths were not included.

Key: Shallow = well depths less than 200 feet below ground surface (bgs). Intermediate = well depths greater than 200 feet and less than 600 feet deep bgs. Deep = well depths greater than 600 feet bgs.

Table D-3. Groundwater Substitution Seller Service Area Change in Groundwater Elevation, Sacramento Valley Groundwater Basin, Spring 2013 to Spring 2023

Well Depth	Maximum Increase (feet)	Maximum Decrease (feet)	Average Change (feet)	Number of Measurements
Shallow	23.5	-68.3	-4.7	326
Intermediate	27.6	-78.2	-6.0	415
Deep	144.5	-75.1	-10.4	140
All	144.5	-78.2	-6.2	881

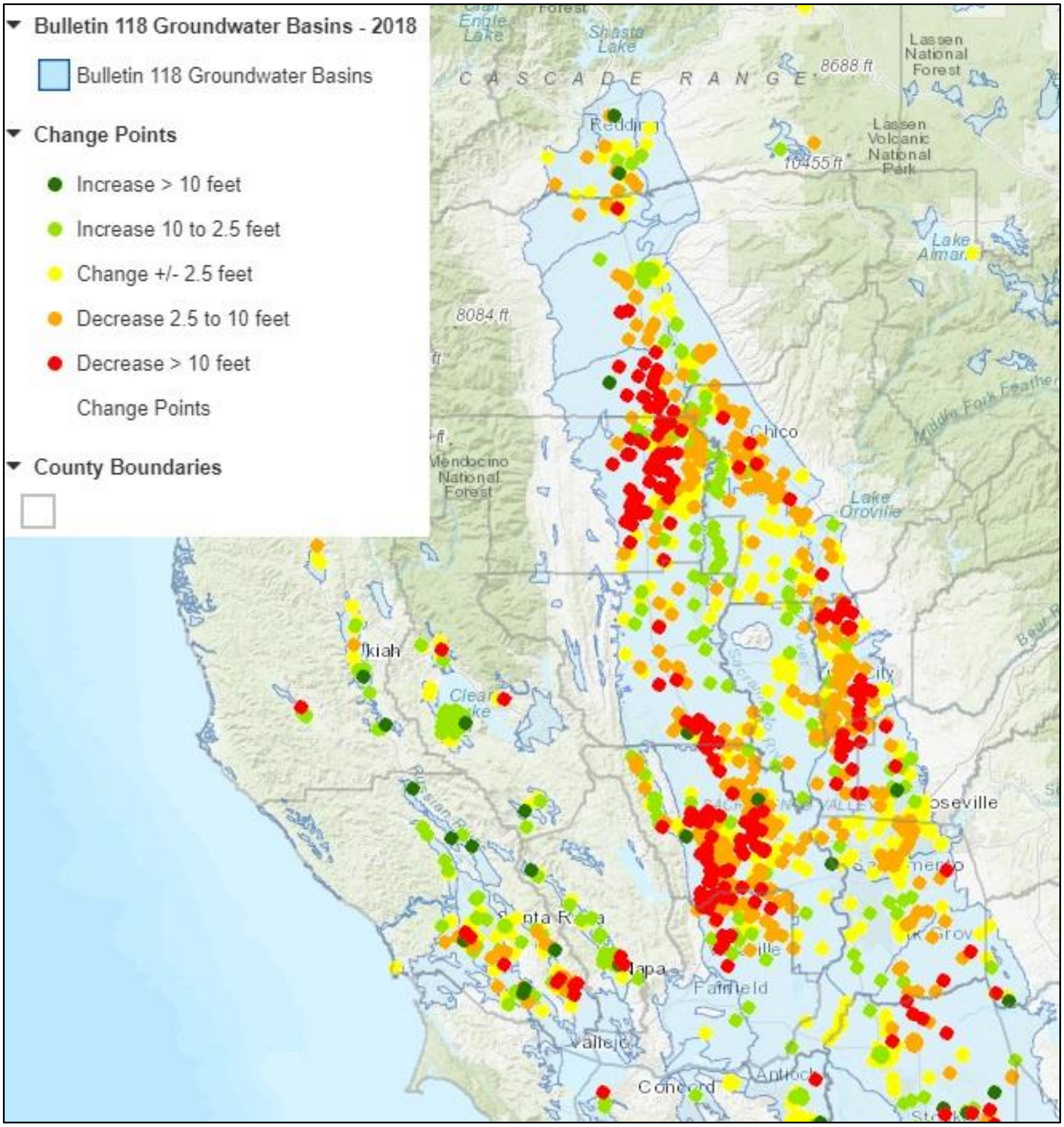
Source: DWR 2024d

Note: Wells without known depths were not included.

Key: Shallow = well depths less than 200 feet bgs. Intermediate = well depths greater than 200 feet and less than 600 feet deep bgs. Deep = well depths greater than 600 feet bgs.

D.3.2 Spring 2018 to Spring 2023

Figure D-3 shows the change in groundwater elevation from Spring 2018 to Spring 2023 in the Sacramento Valley as queried from the SGMA Data Viewer. Table D-4 and Table D-5 provide a summary of the change in groundwater elevation from Spring 2018 to Spring 2023 in the groundwater substitution Seller Service Area of the Redding Area and Sacramento Valley groundwater basins, respectively. In general, Spring 2023 groundwater levels in the Sacramento Valley Groundwater Basin are lower in comparison to Spring 2018 levels.



Source: DWR 2024d

Figure D-3. Spring 2018 to Spring 2023 Change in Groundwater Elevation, Sacramento Valley

Table D-4. Groundwater Substitution Seller Service Area Change in Groundwater Elevation, Redding Area Groundwater Basin, Spring 2018 to Spring 2023

Well Depth	Maximum Increase (feet)	Maximum Decrease (feet)	Average Change (feet)	Number of Measurements
Shallow	3.5	-9.1	-0.8	23
Intermediate	39.0	-11.9	0.3	24
Deep	0.0	-4.4	-2.4	7
All Wells	39.0	-11.9	-0.5	54

Source: DWR 2024d

Note: Wells without known depths were not included.

Key: Shallow = well depths less than 200 feet bgs. Intermediate = well depths greater than 200 feet and less than 600 feet deep bgs. Deep = well depths greater than 600 feet bgs.

Table D-5. Groundwater Substitution Seller Service Area Change in Groundwater Elevation, Sacramento Valley Groundwater Basin, Spring 2018 to Spring 2023

Well Depth	Maximum Increase (feet)	Maximum Decrease (feet)	Average Change (feet)	Number of Measurements
Shallow	15.5	-44.6	-2.9	310
Intermediate	51.8	-55.0	-4.5	530
Deep	171.2	-41.9	-6.5	122
All Wells	171.2	-55.0	-4.2	962

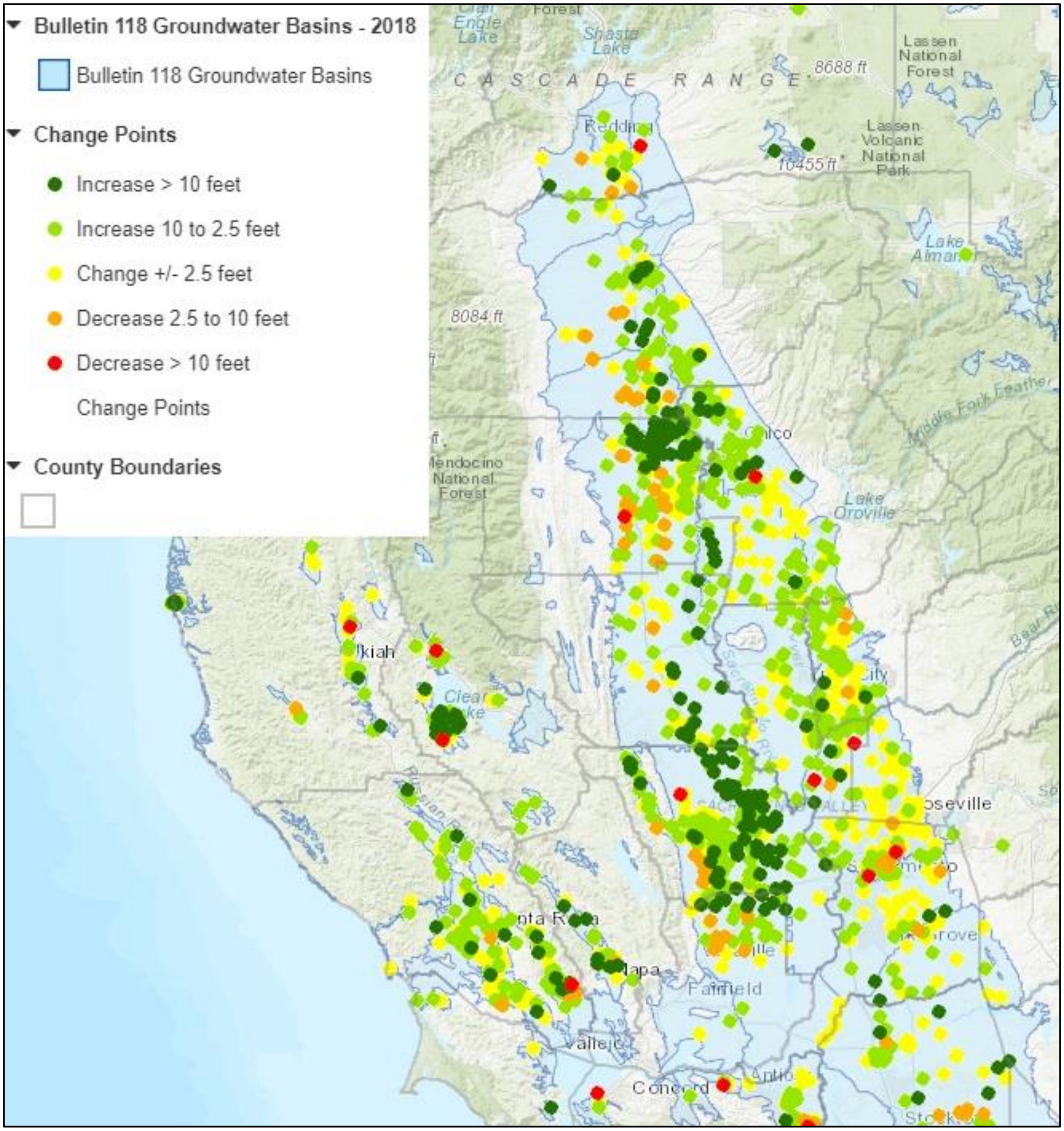
Source: DWR 2024d

Note: Wells without known depths were not included.

Key: Shallow = well depths less than 200 feet bgs. Intermediate = well depths greater than 200 feet and less than 600 feet deep bgs. Deep = well depths greater than 600 feet bgs.

D.3.3 Spring 2022 to Spring 2023

Figure D-4 shows the change in groundwater elevation for Spring 2023 to Spring 2022 in the Sacramento Valley as queried from the SGMA Data Viewer. Table D-6 and Table D-7 provide a summary of the change in groundwater elevation from Spring 2022 to Spring 2023 in the groundwater substitution Seller Service Area of the Redding Area and Sacramento Valley groundwater basins, respectively. Water Year 2022 was a dry year and, on average, Spring 2023 groundwater levels across the Sacramento Valley showed increases in comparison to Spring 2022 groundwater levels.



Source: DWR 2024d

Figure D-4. Spring 2022 to Spring 2023 Change in Groundwater Elevation, Sacramento Valley

Table D-6. Groundwater Substitution Seller Service Area Change in Groundwater Elevation, Redding Area Groundwater Basin, Spring 2022 to Spring 2023

Well Depth	Maximum Increase (feet)	Maximum Decrease (feet)	Average Change (feet)	Number of Measurements
Shallow	29.0	-8.5	2.1	22
Intermediate	29.5	-60.7	-0.2	19
Deep	3.4	-0.3	0.9	7
All Wells	29.5	-60.7	1.0	48

Source: DWR 2024d

Note: Wells without known depths were not included.

Key: Shallow = well depths less than 200 feet bgs. Intermediate = well depths greater than 200 feet and less than 600 feet deep bgs. Deep = well depths greater than 600 feet bgs.

Table D-7. Groundwater Substitution Seller Service Area Change in Groundwater Elevation, Sacramento Valley Groundwater Basin, Spring 2022 to Spring 2023

Well Depth	Maximum Increase (feet)	Maximum Decrease (feet)	Average Change (feet)	Number of Measurements
Shallow	40.0	-7.5	4.9	322
Intermediate	76.8	-42.7	5.2	592
Deep	57.7	-5.6	4.6	131
All Wells	76.8	42.7	5.1	1,045

Source: DWR 2024d

Note: Wells without known depths were not included.

Key: Shallow = well depths less than 200 feet bgs. Intermediate = well depths greater than 200 feet and less than 600 feet deep bgs. Deep = well depths greater than 600 feet bgs.

D.4 Groundwater Monitoring Data

This section includes measured groundwater level data to further characterize groundwater conditions in the Redding Area and Sacramento Valley groundwater basins near the potential groundwater substitution selling entities. The figures in this section show the groundwater levels recorded over time (i.e., hydrograph) at a specific well near the potential groundwater substitution Sellers. The hydrographs typically show a drop in water levels in the summer (irrigation) season and an increase in the winter (wet) season. The amount of water level decline and recovery typically depends on irrigation activities and hydrology. Seasonal groundwater level changes involve a wide variety of factors including rainfall, wetting of streams, and irrigation pumping.

Though the Redding Area and Sacramento Valley groundwater basins and other parts of California are currently experiencing declining groundwater level trends, past groundwater trends are indicative of groundwater levels declining moderately during extended droughts and recovering to pre-drought levels after subsequent wet periods.

DWR's California Statewide Groundwater Elevation Monitoring (CASGEM) website (DWR 2024g) was used to obtain the monitoring data. The red symbols on the hydrographs are data noted "questionable" in CASGEM, identifying potentially poorer quality data.

D.4.1 Redding Groundwater Basin Groundwater Monitoring Data

Figure D-5 shows the location of groundwater monitoring wells near potential Sellers in the Redding Area Groundwater Basin. Figure D-6 through Figure D-13 show measured groundwater level data to further characterize groundwater conditions in the Redding Area Groundwater Basin near the potential groundwater substitution selling entities.

D.4.2 Sacramento Valley Groundwater Basin Groundwater Monitoring Data

Figure D-14 shows the location of selected groundwater monitoring wells near potential Sellers in the Sacramento Valley Groundwater Basin. Figure D-15 through Figure D-47 show measured groundwater level data to further characterize groundwater conditions in the Sacramento Valley Groundwater Basin near the potential groundwater substitution selling entities.

D.5 Land Subsidence

Figure D-48 through Figure D-51 shows a spatial view of subsidence as reported in the TRE Altamira InSAR dataset (DWR 2024h) depicting the change in ground surface elevation for Water Years 2020, 2021, 2022, and 2023. As shown, subsidence has been measured in areas of the Sacramento Valley Groundwater Basin, particularly on the west side.

DWR maintains data at three extensometers in the Sacramento Valley to monitor potential subsidence (i.e., a lowering of the ground surface elevation). Figure D-52 shows the change in ground surface elevation at the Zamora extensometer in Yolo County, Figure D-53 shows the change in ground surface elevation at the Conaway Ranch extensometer in Yolo County, Figure D-54 shows the change in ground surface elevation at the Arbuckle extensometer in Colusa County, and Figure D-55 shows the change in ground surface elevation at the Sutter extensometer in Sutter County.

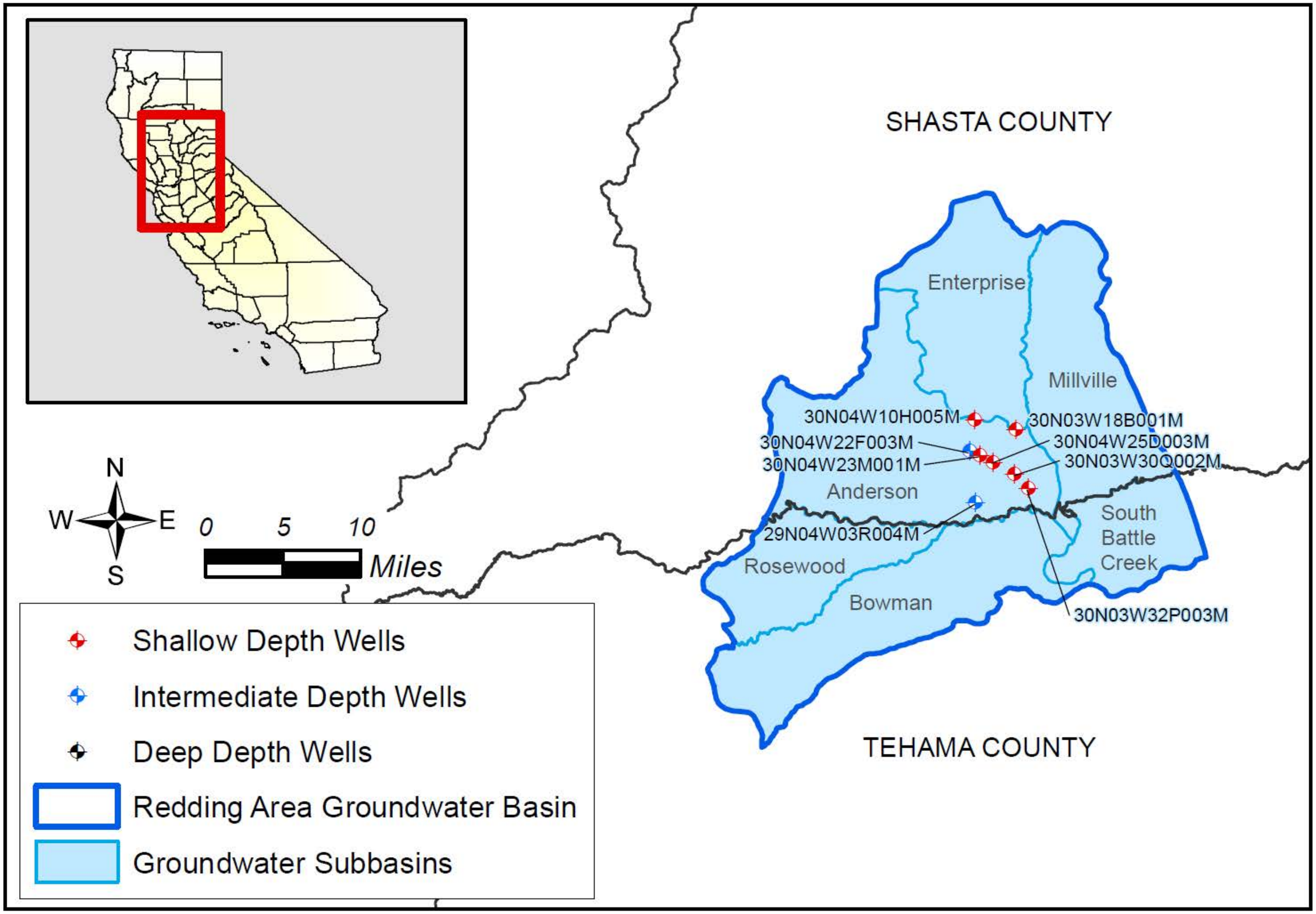
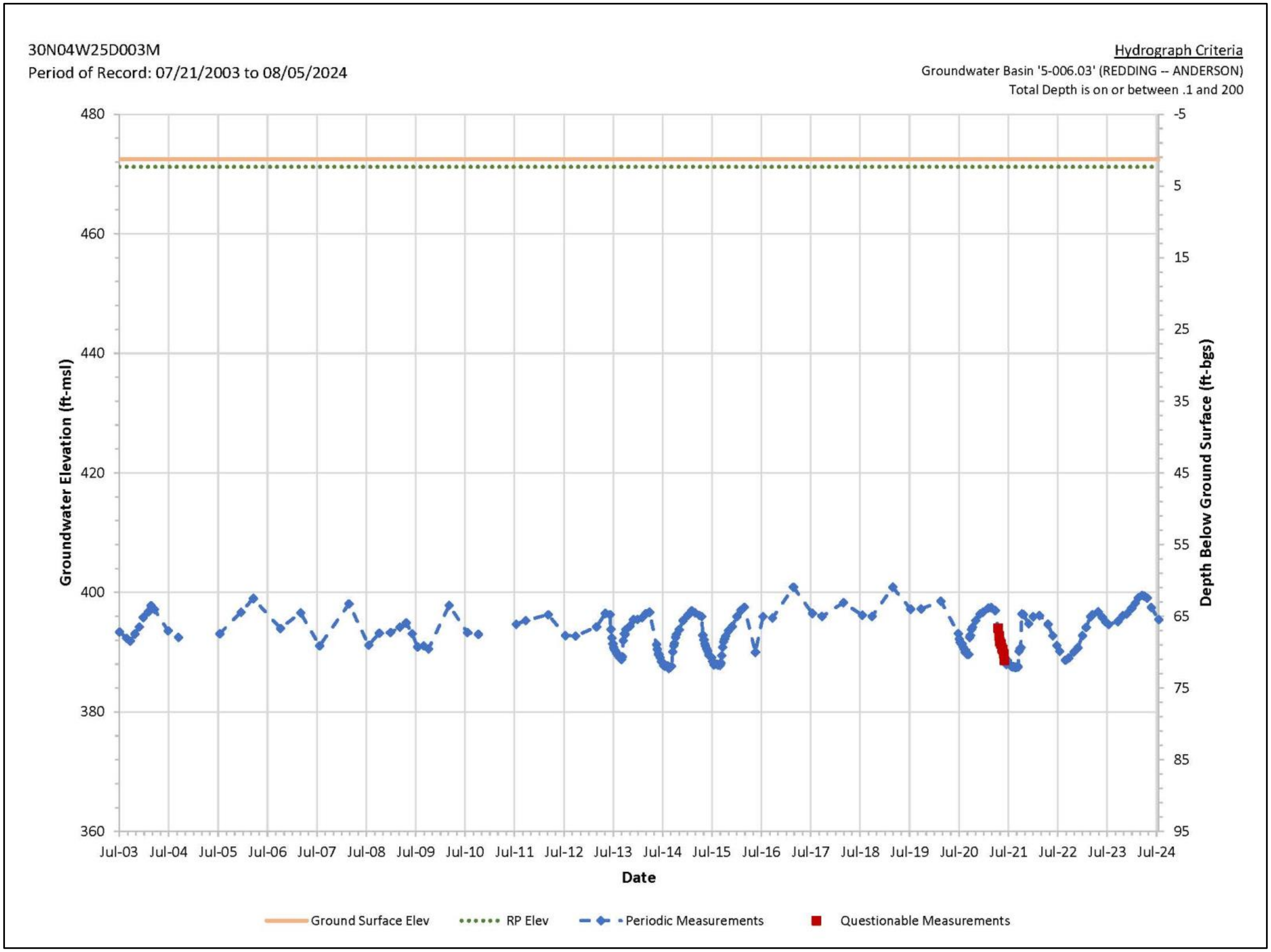
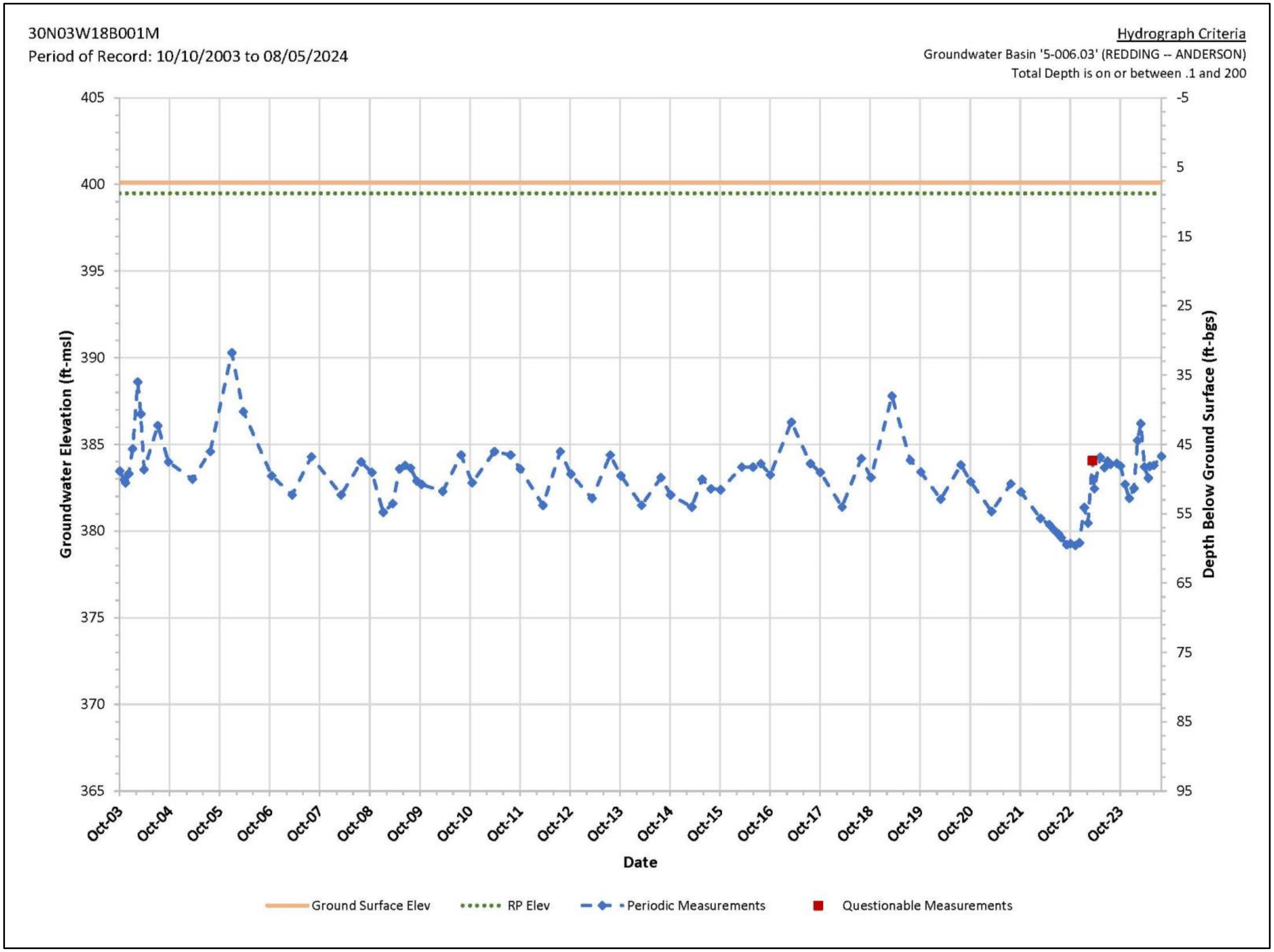


Figure D-5. Location of Selected Groundwater Wells Near Potential Sellers in Redding Area Groundwater Basin



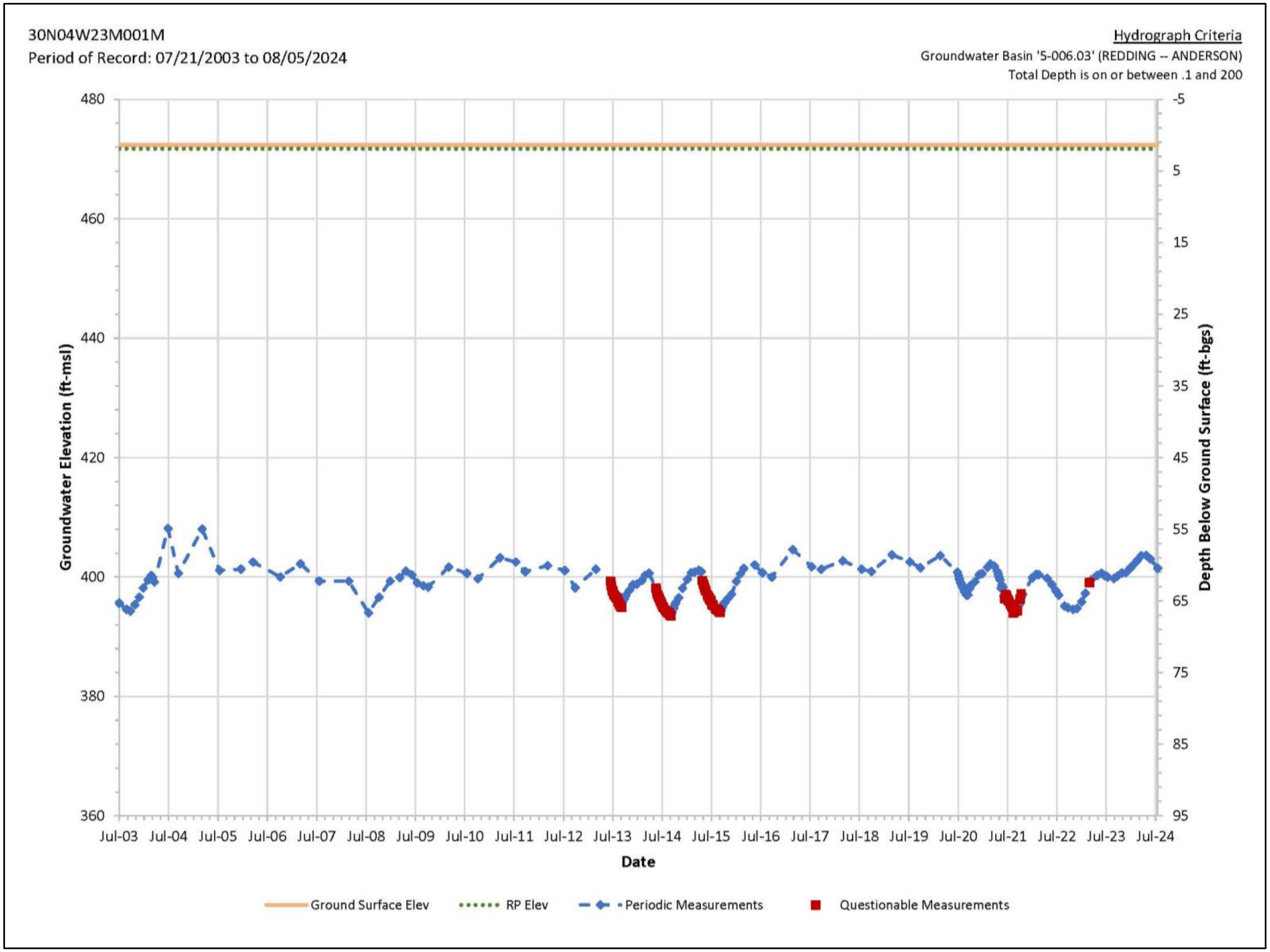
Source: DWR 2024g

Figure D-6. Hydrograph for Well 30N04W25D003M



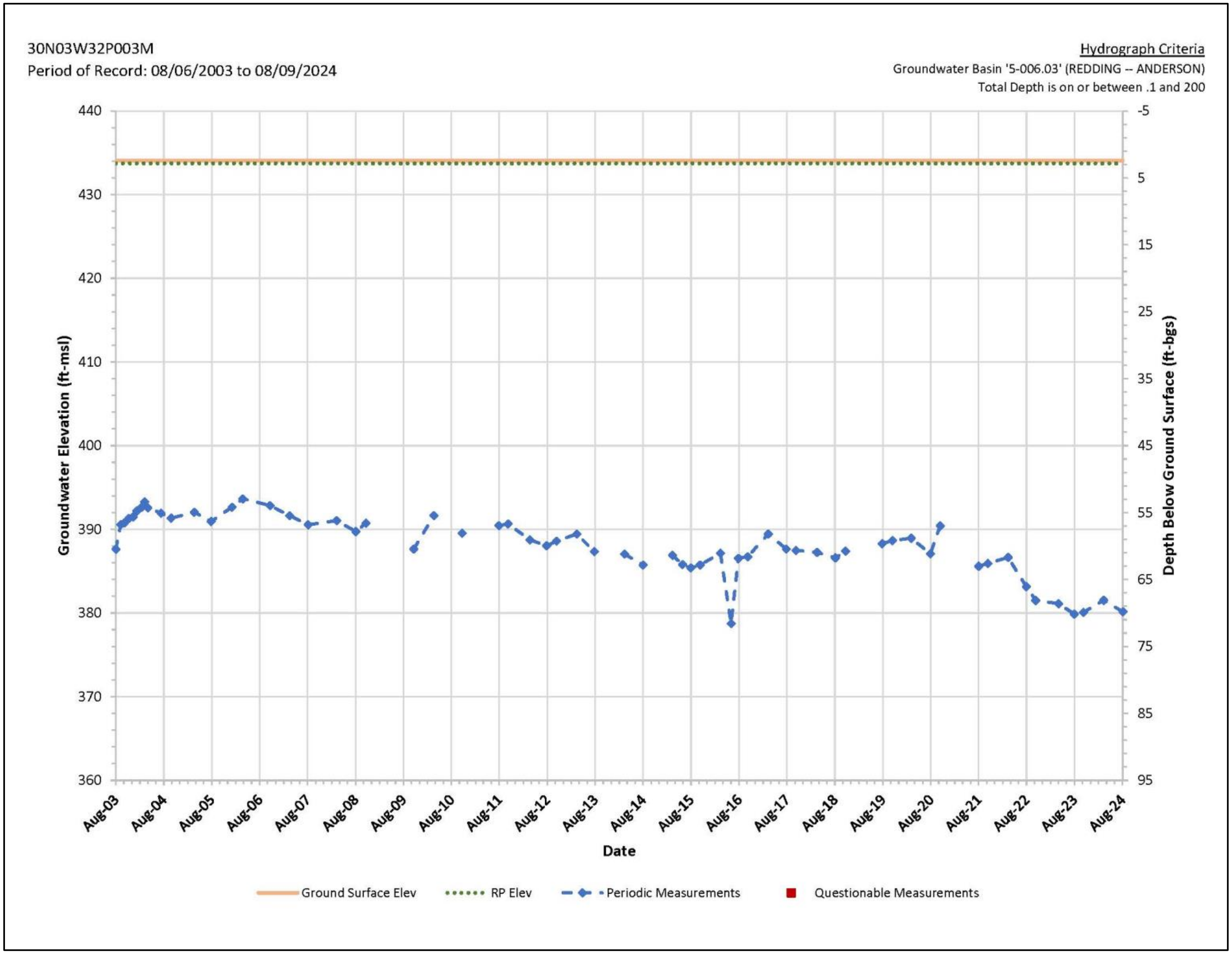
Source: DWR 2024g

Figure D-7. Hydrograph for Well 30N03W18B001M



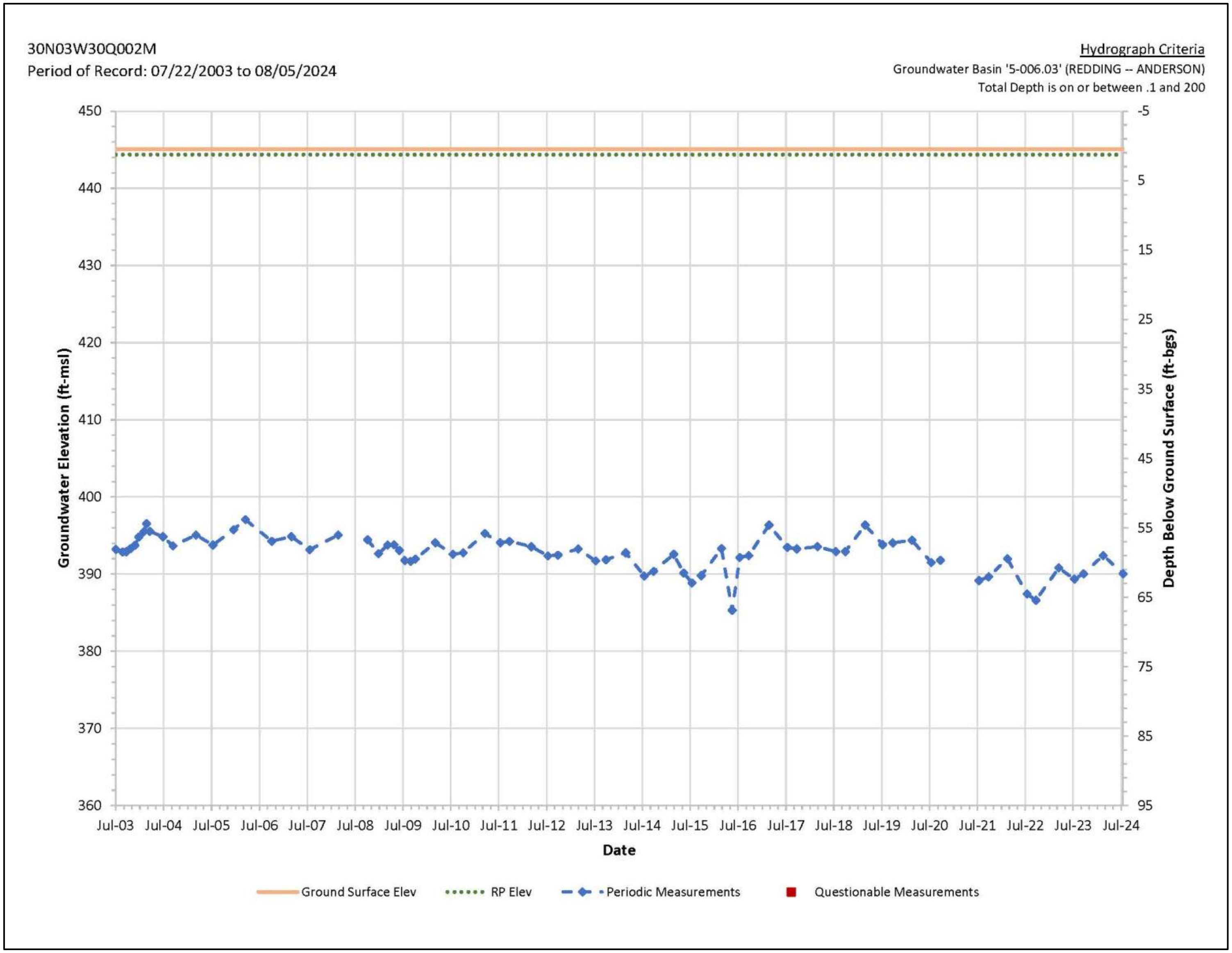
Source: DWR 2024g

Figure D-8. Hydrograph for Well 30N04W23M001M



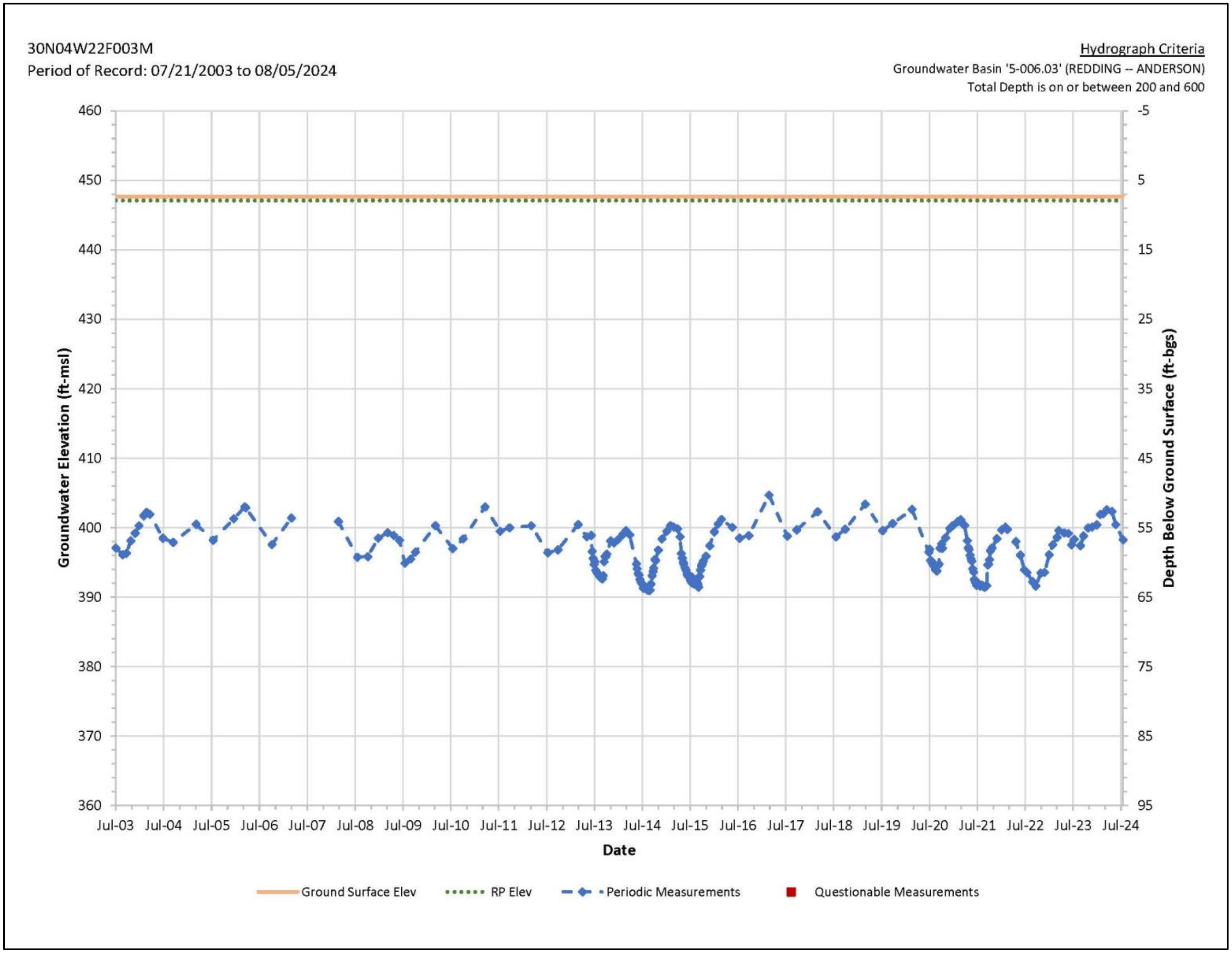
Source: DWR 2024g

Figure D-9. Hydrograph for Well 30N03W32P003M



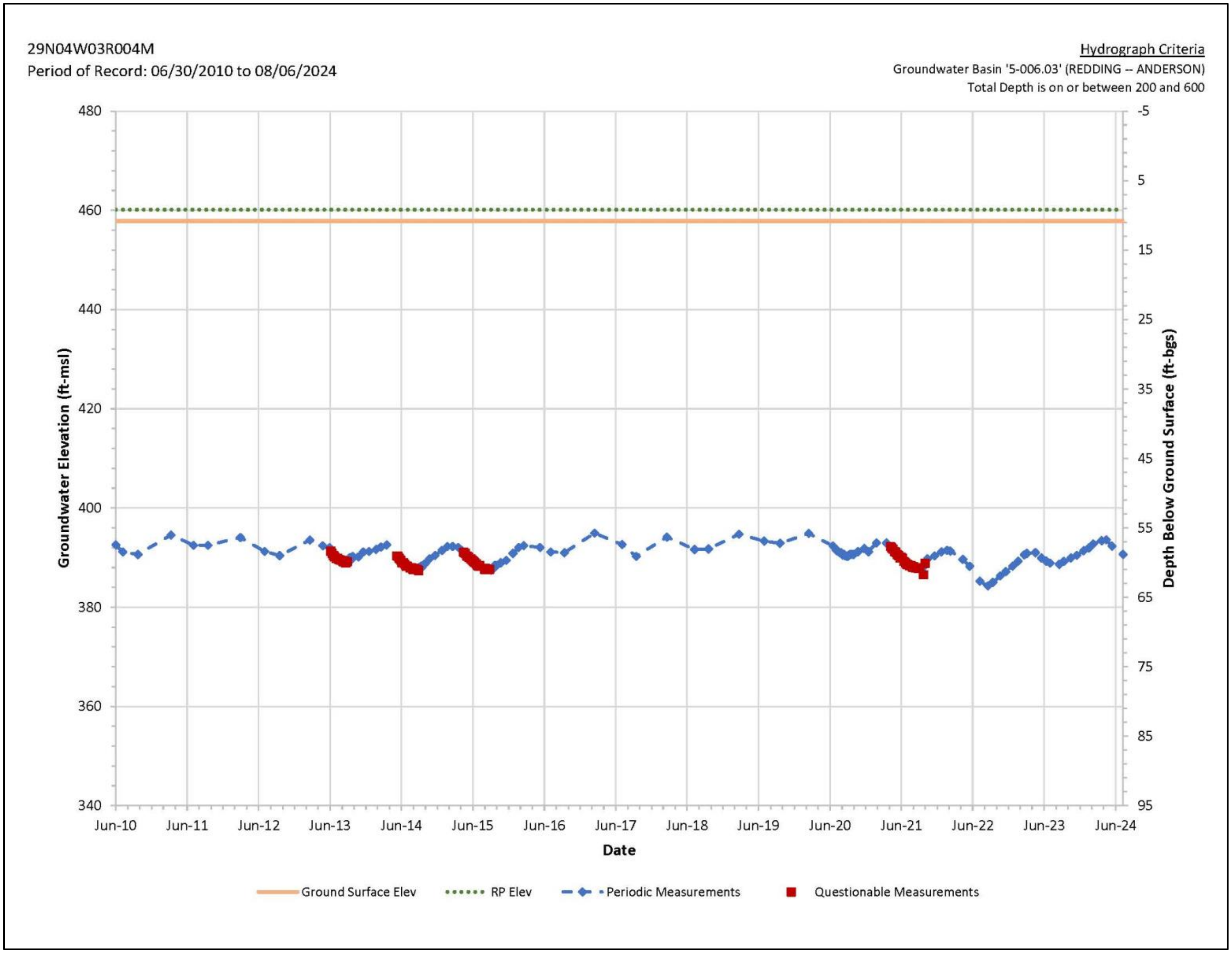
Source: DWR 2024g

Figure D-10. Hydrograph for Well 30N03W30Q002M



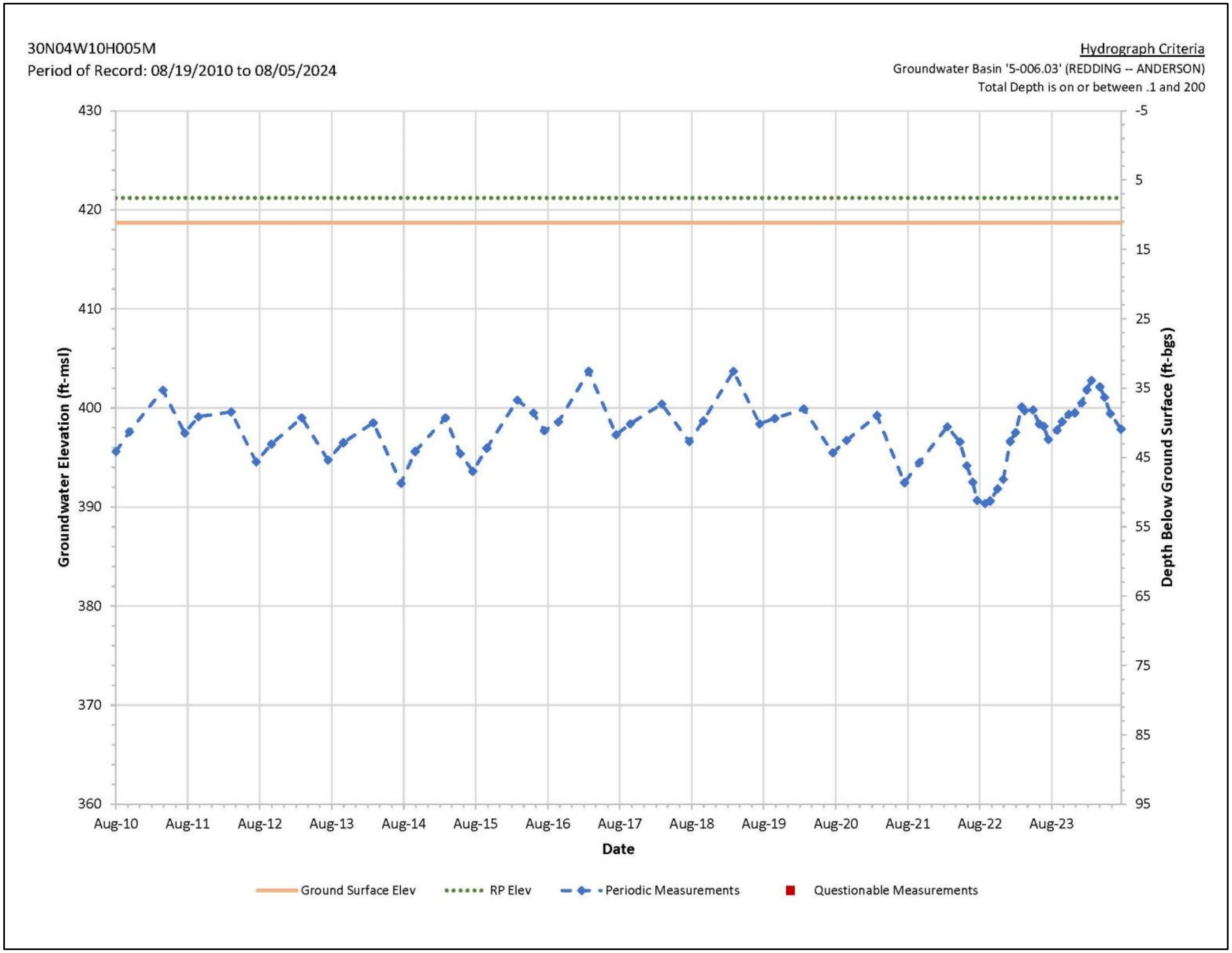
Source: DWR 2024g

Figure D-11. Hydrograph for Well 30N04W22F003M



Source: DWR 2024g

Figure D-12. Hydrograph for Well 29N04W03R004M



Source: DWR 2024g

Figure D-13. Hydrograph for Well 30N04W10H005M

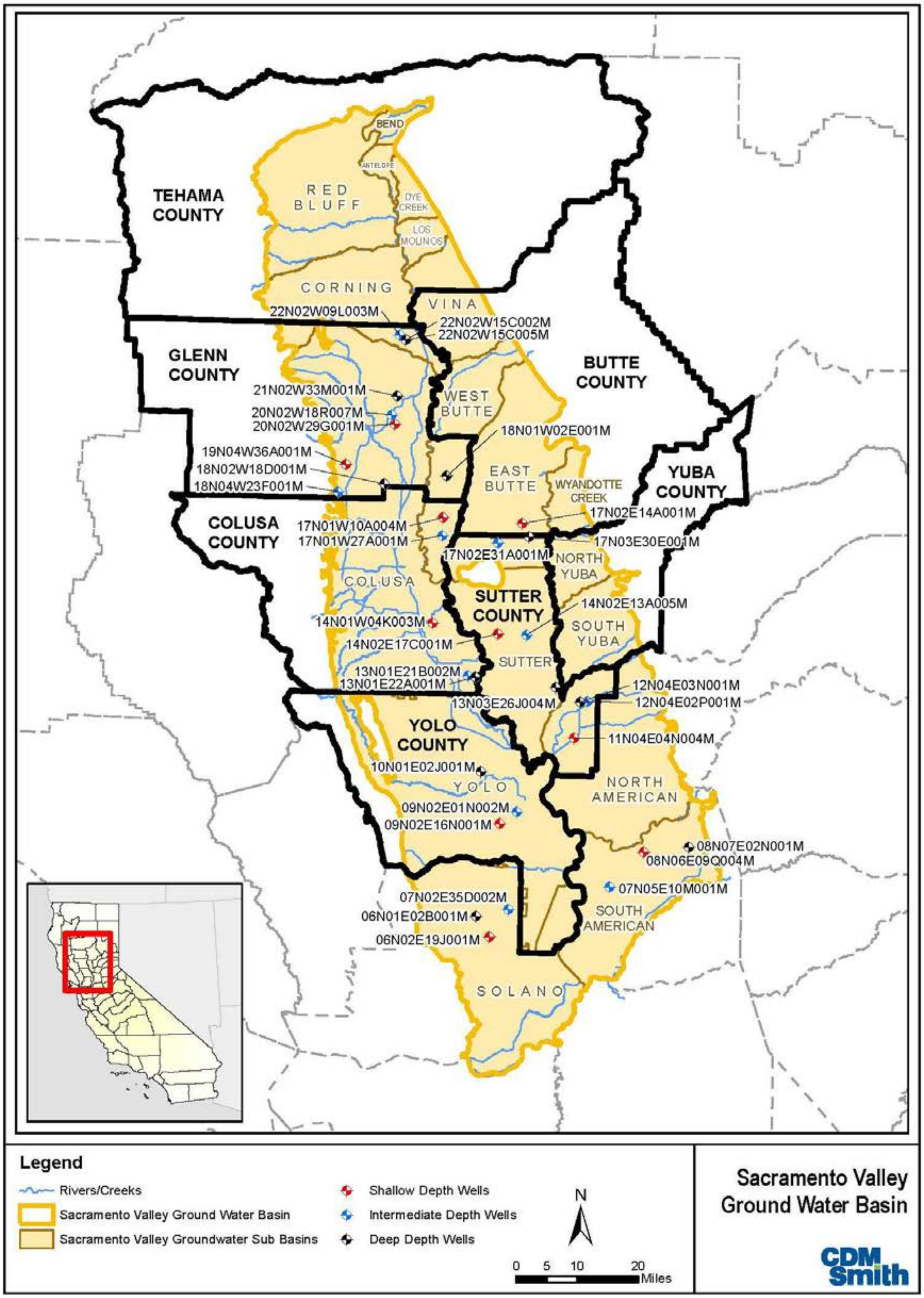
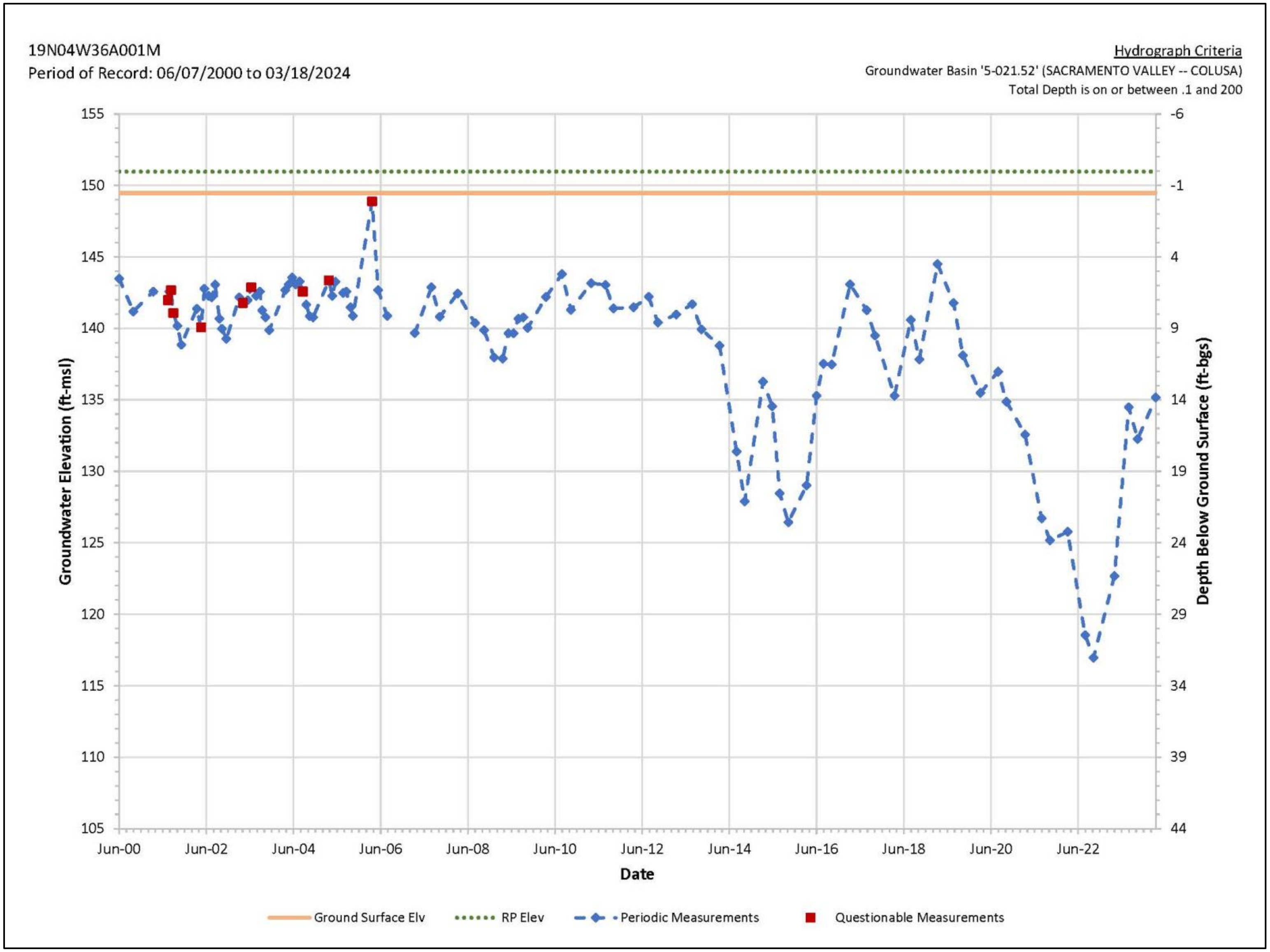
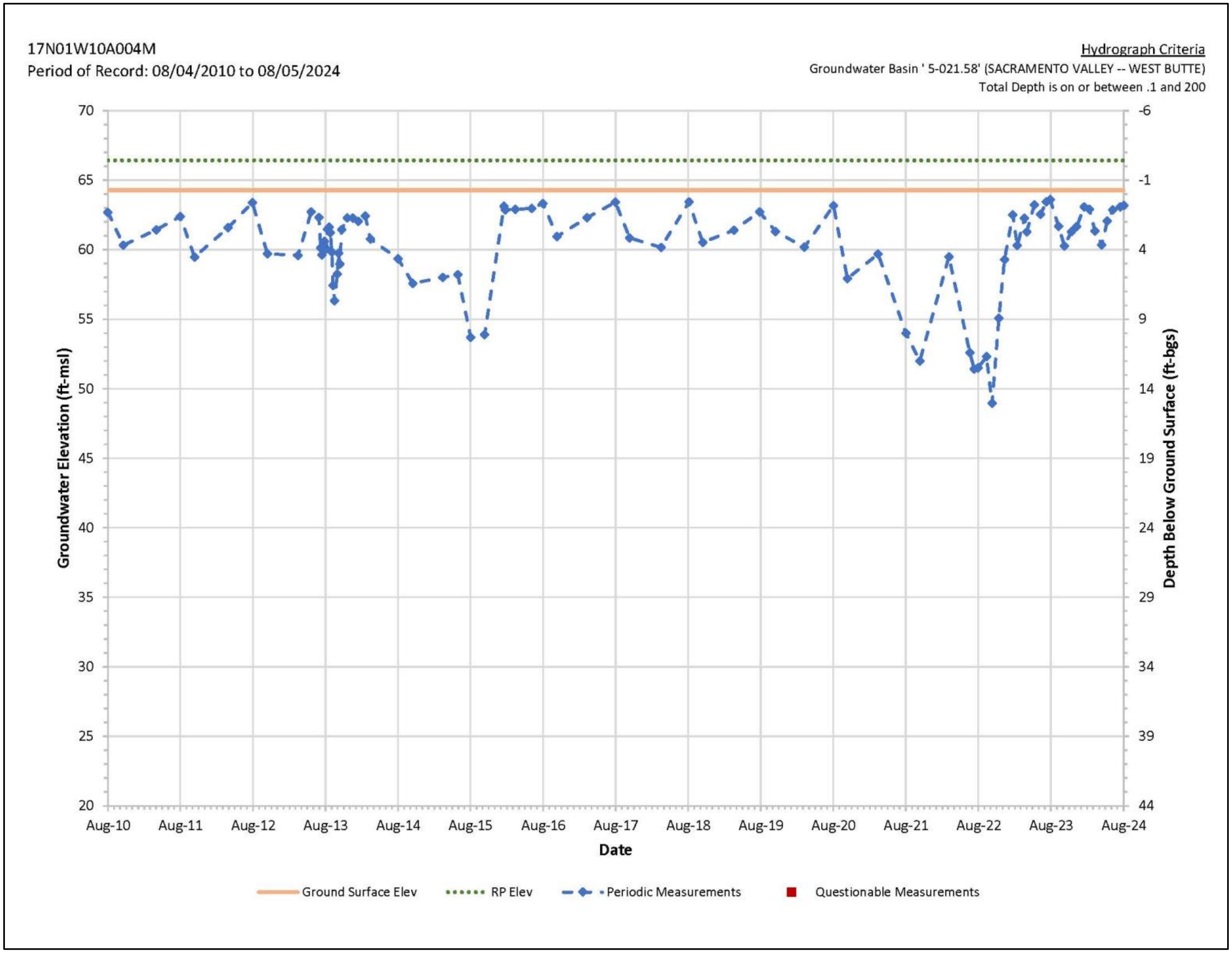


Figure D-14. Location of Selected Groundwater Wells Near Potential Sellers in Sacramento Valley Groundwater Basin



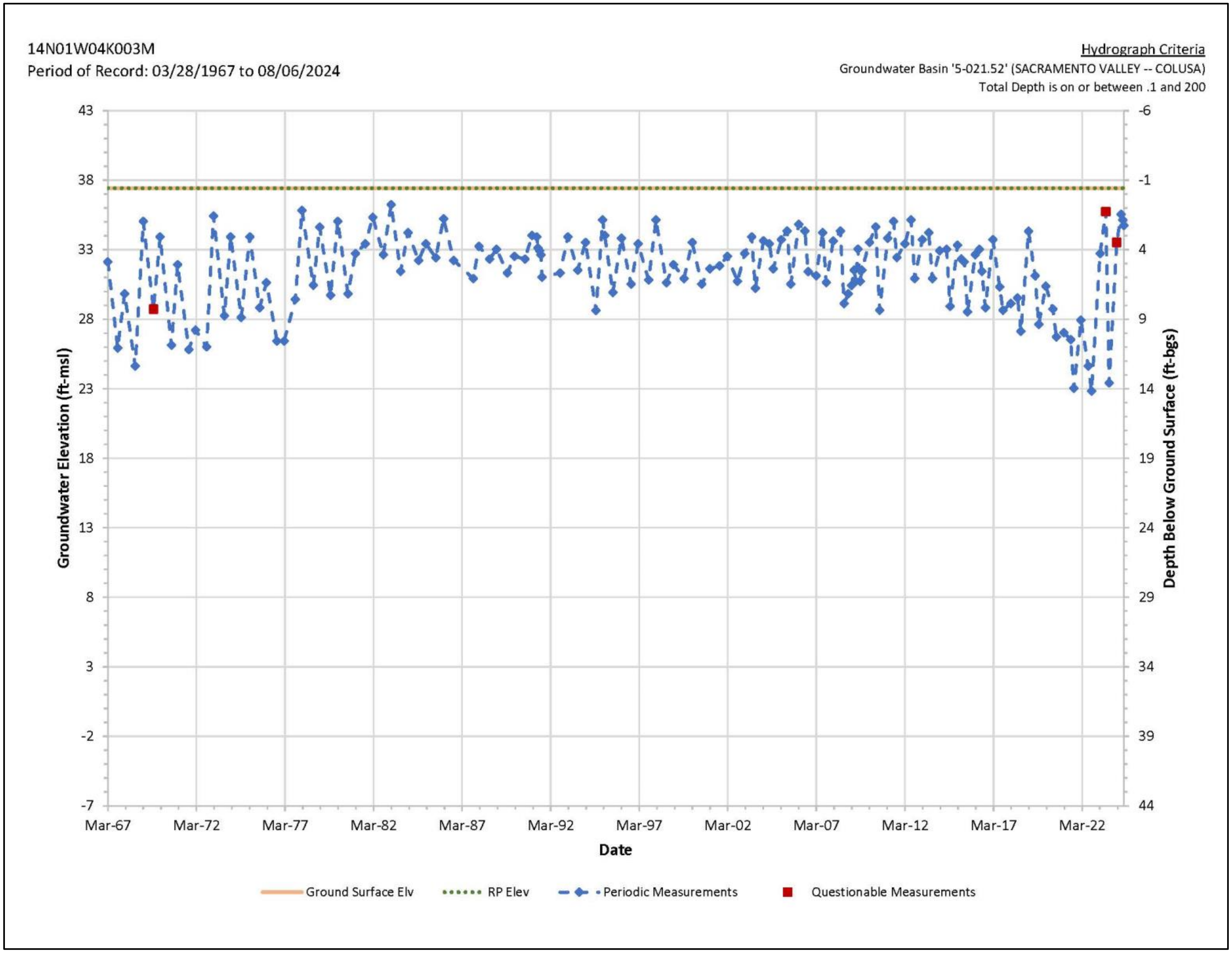
Source: DWR 2024g

Figure D-15. Hydrograph for Well 19N04W36A001M



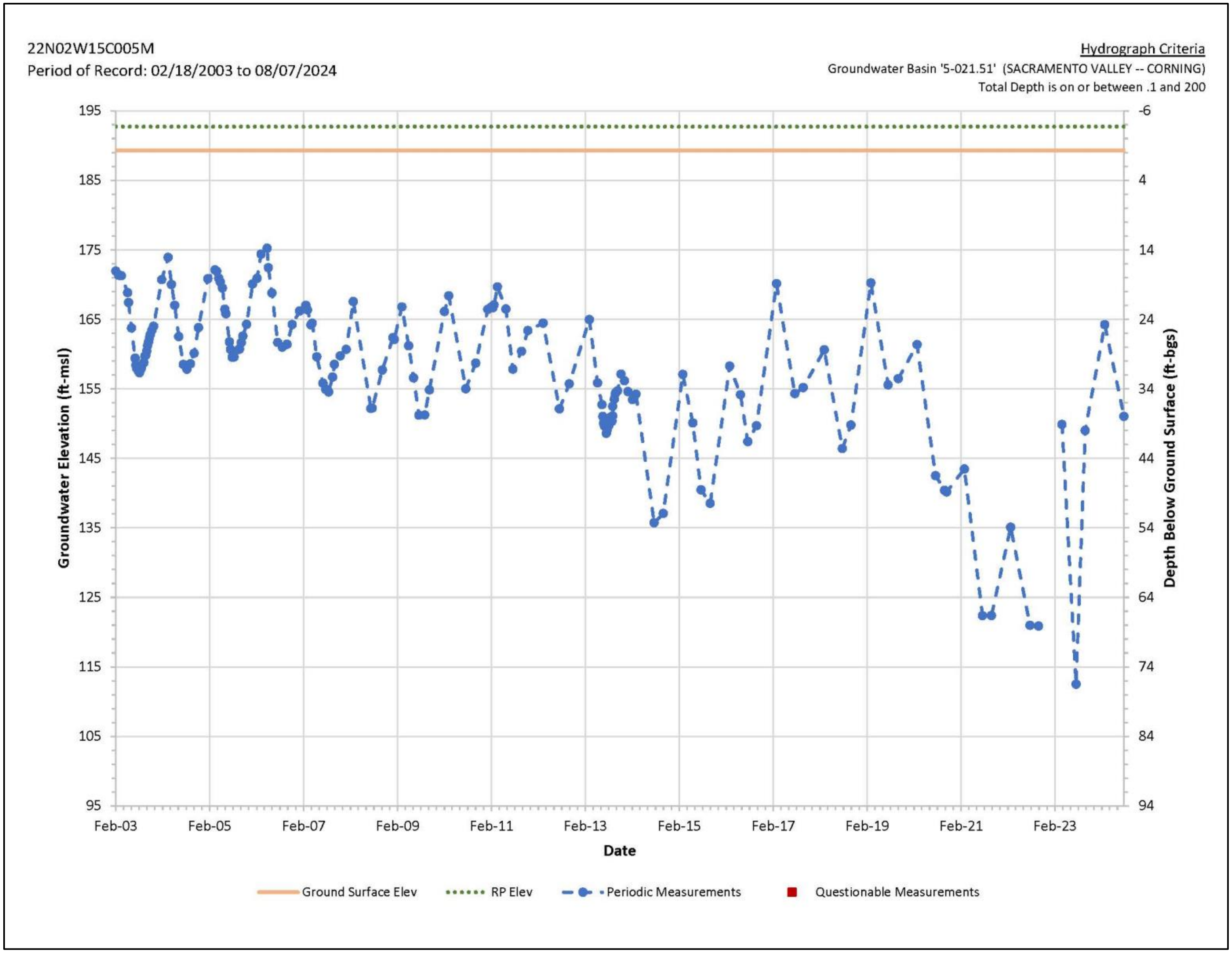
Source: DWR 2024g

Figure D-16. Hydrograph for Well 17N01W10A004M



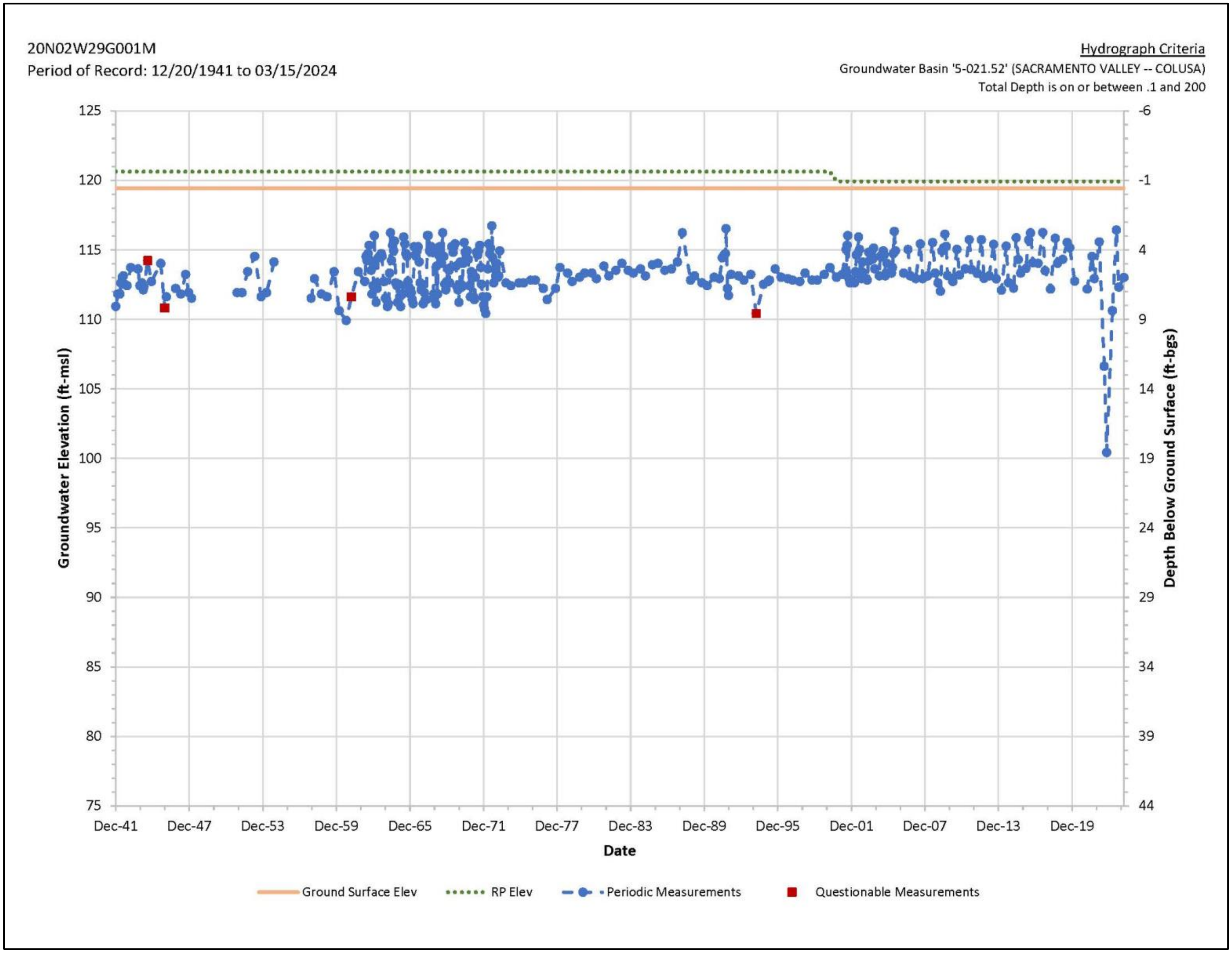
Source: DWR 2024g

Figure D-17. Hydrograph for Well 14N01W04K003M



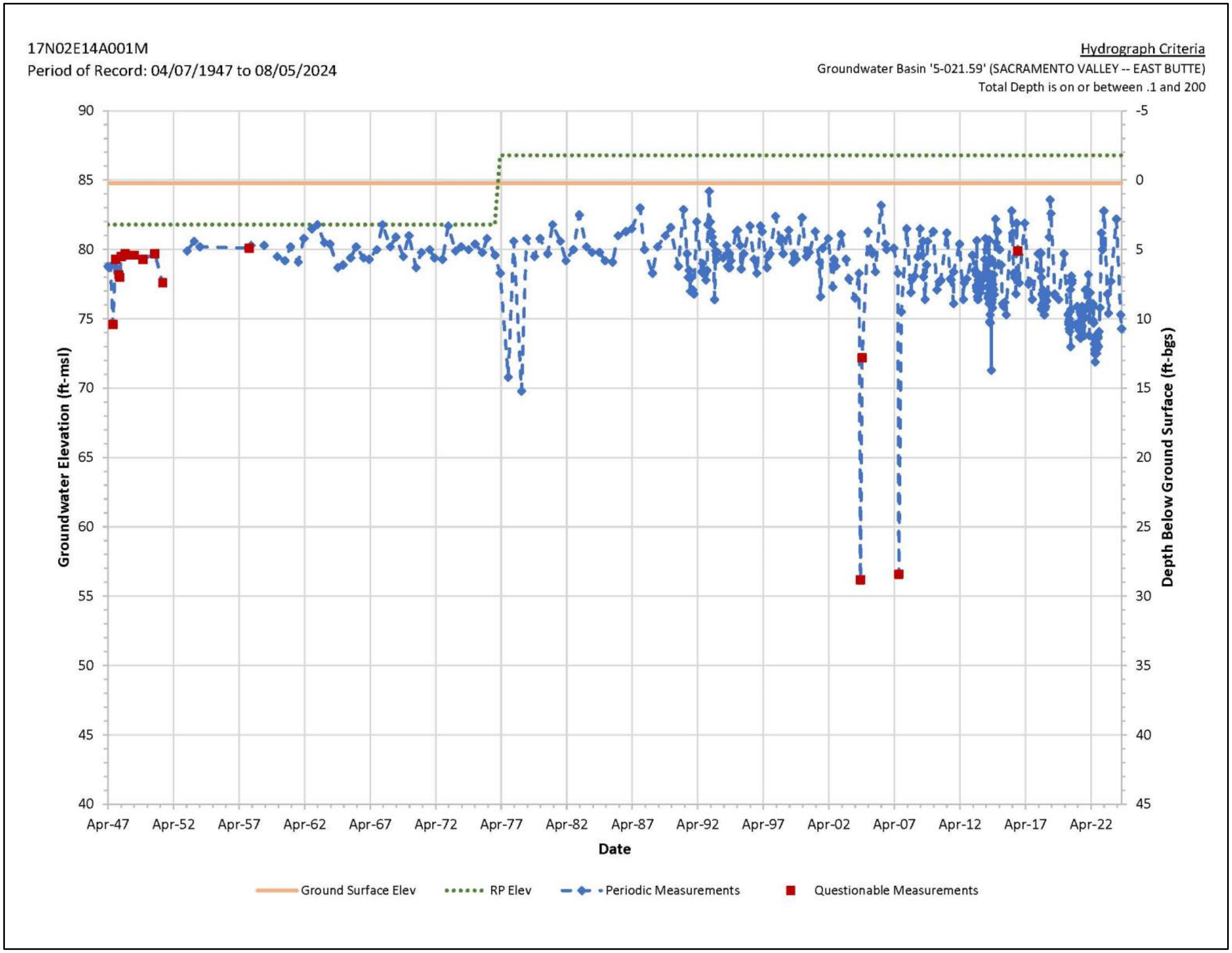
Source: DWR 2024g

Figure D-18. Hydrograph for Well 22N02W15C005M



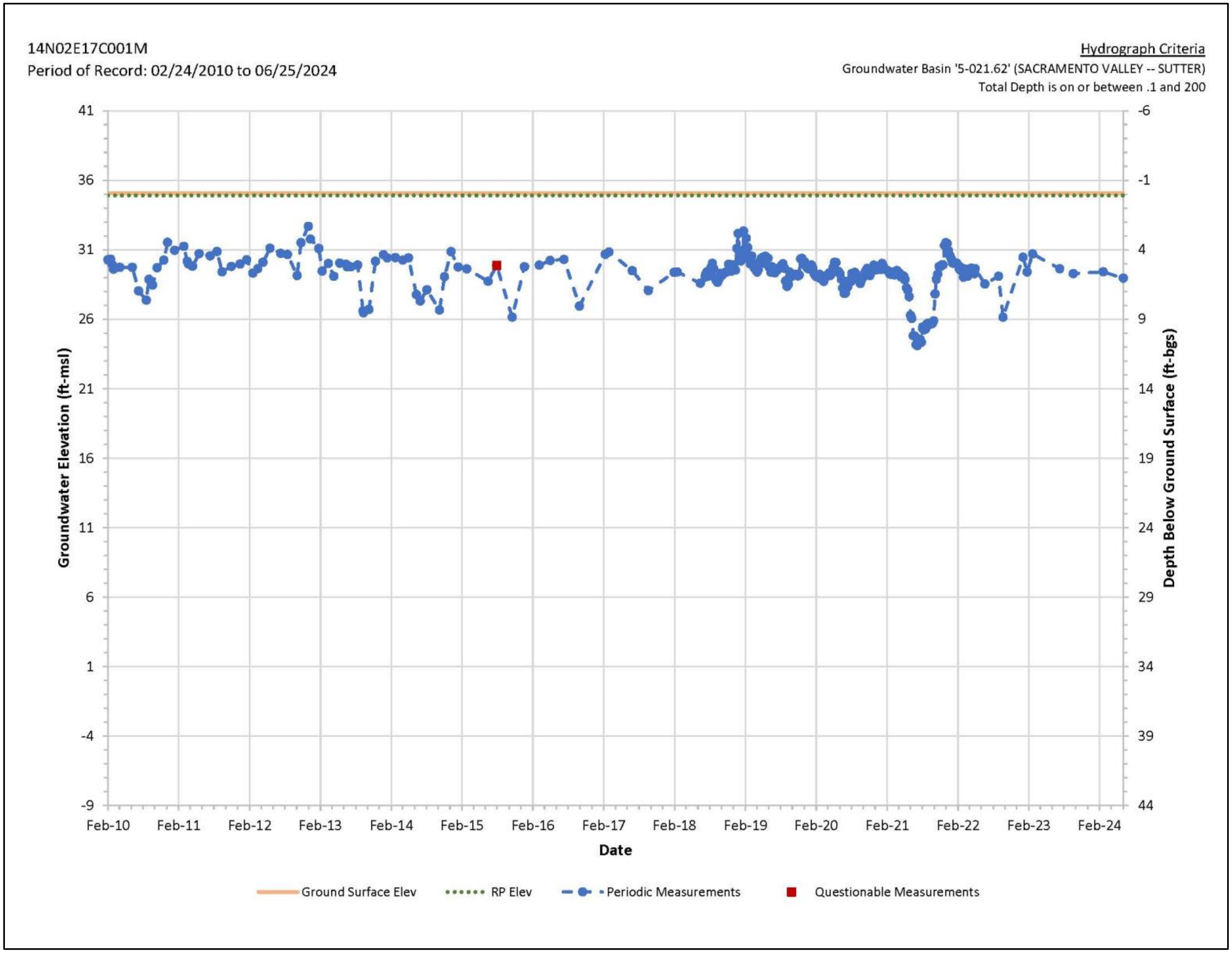
Source: DWR 2024g

Figure D-19. Hydrograph for Well 20N02W29G001M



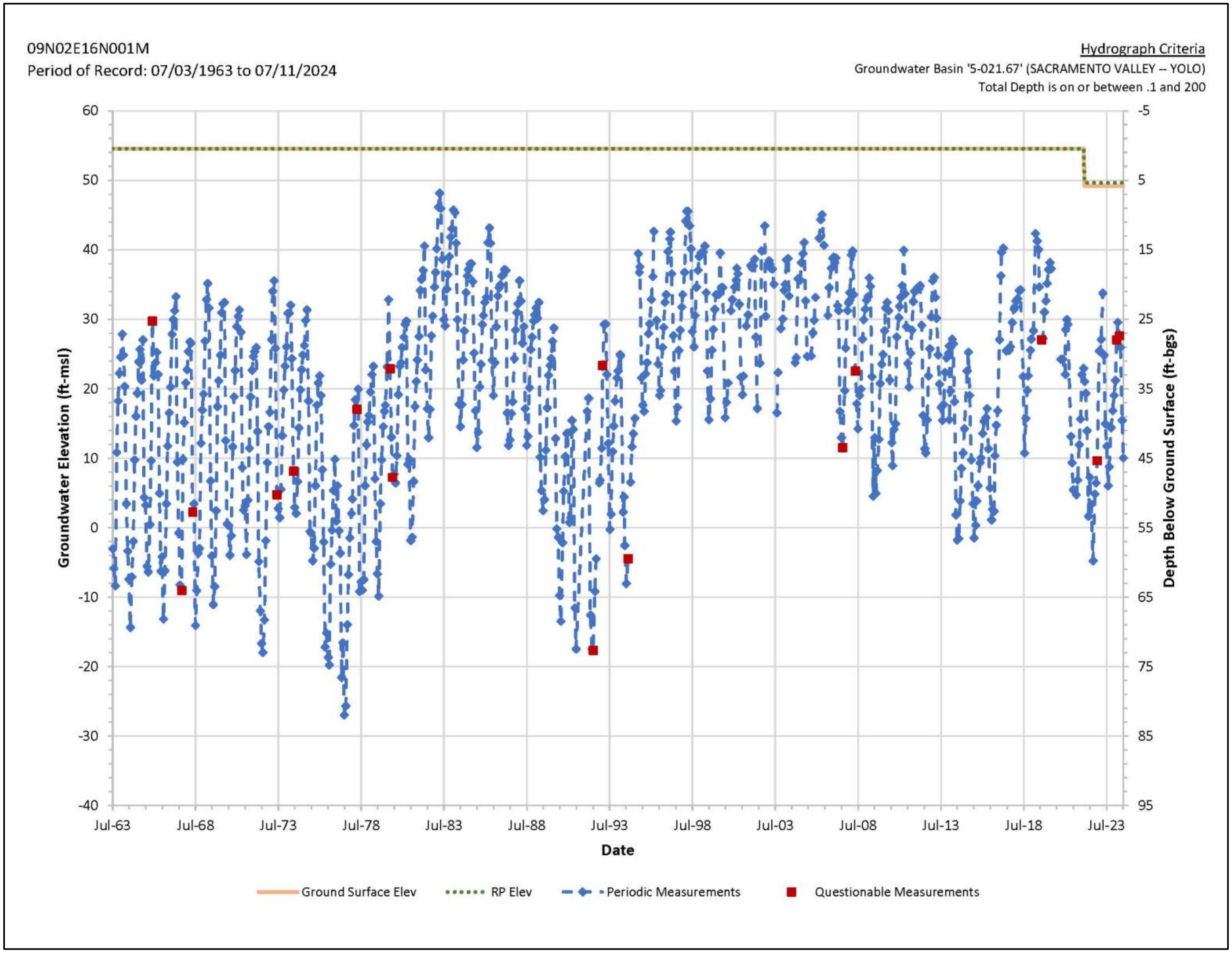
Source: DWR 2024g

Figure D-20. Hydrograph for Well 17N02E14A001M



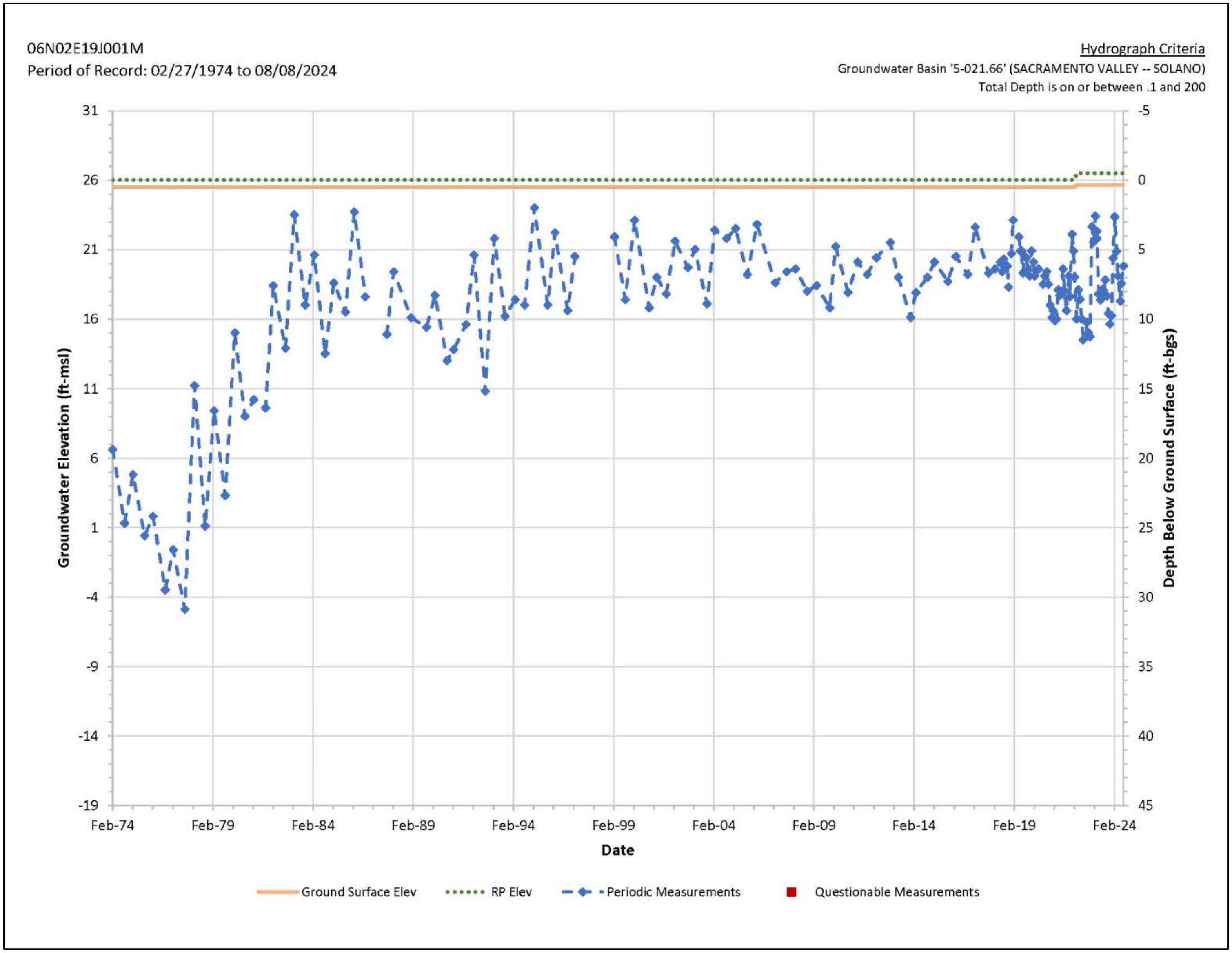
Source: DWR 2024g

Figure D-21. Hydrograph for Well 14N02E17C001M



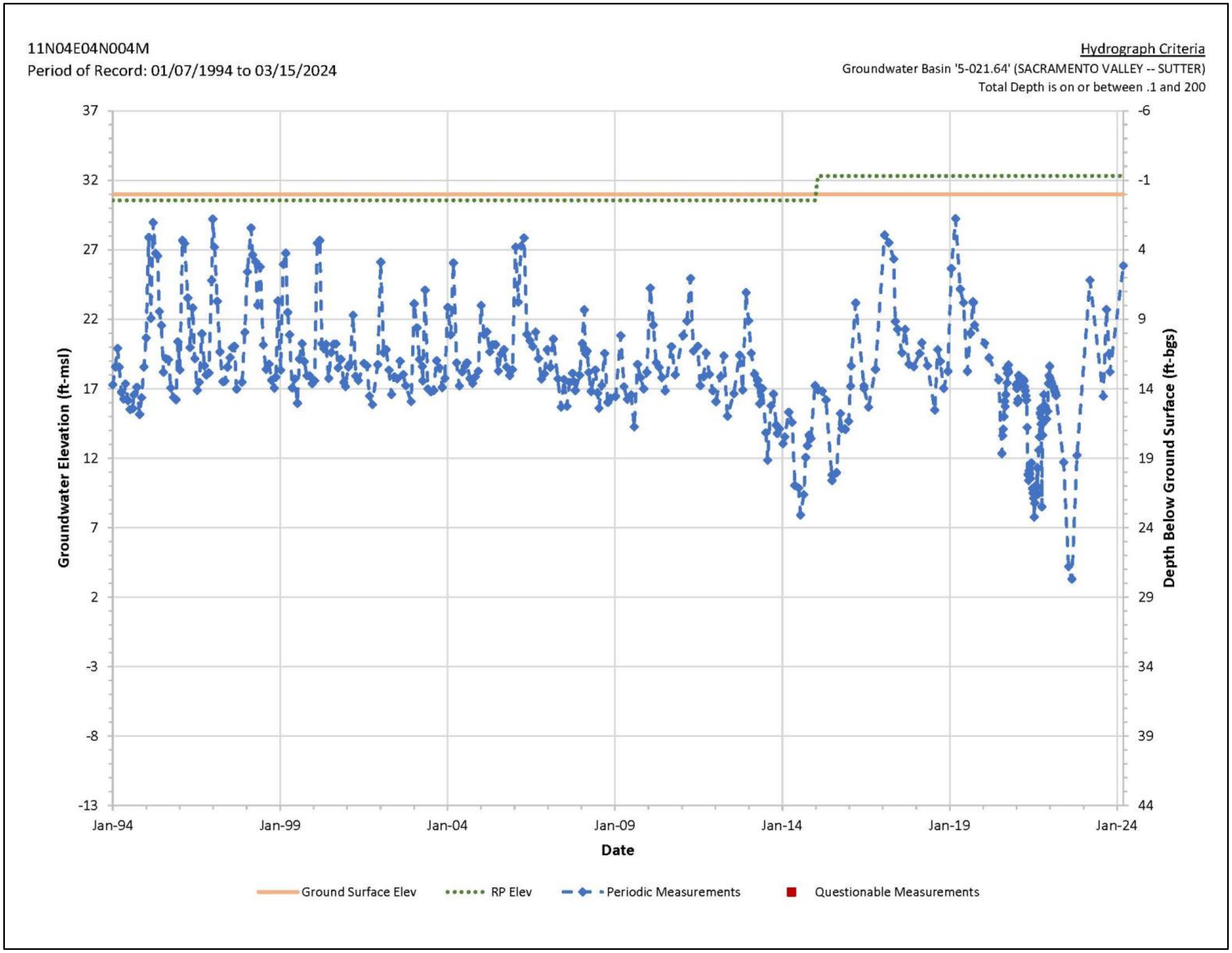
Source: DWR 2024g

Figure D-22. Hydrograph for Well 09N02E16N001M



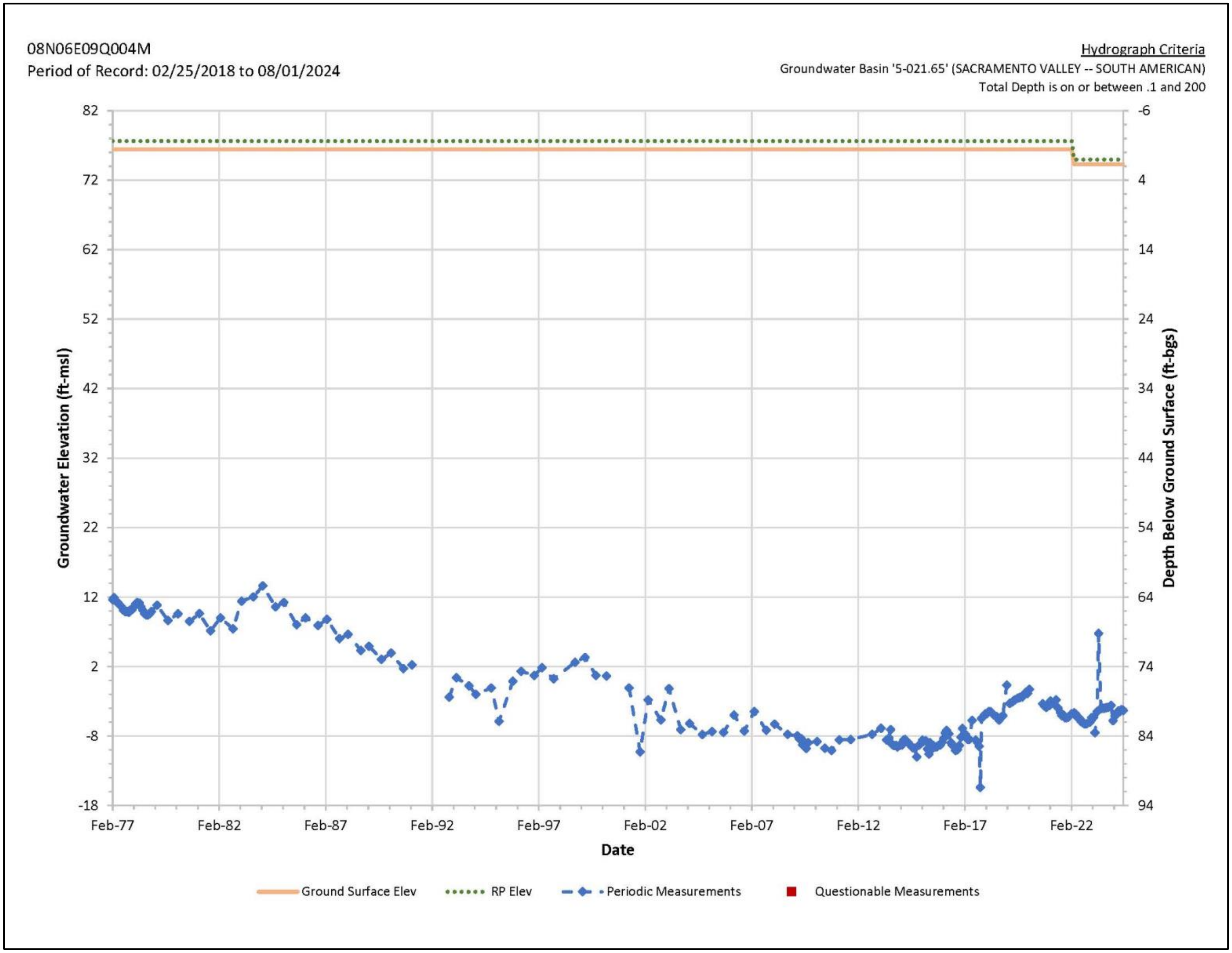
Source: DWR 2024g

Figure D-23. Hydrograph for Well 06N02E19J001M



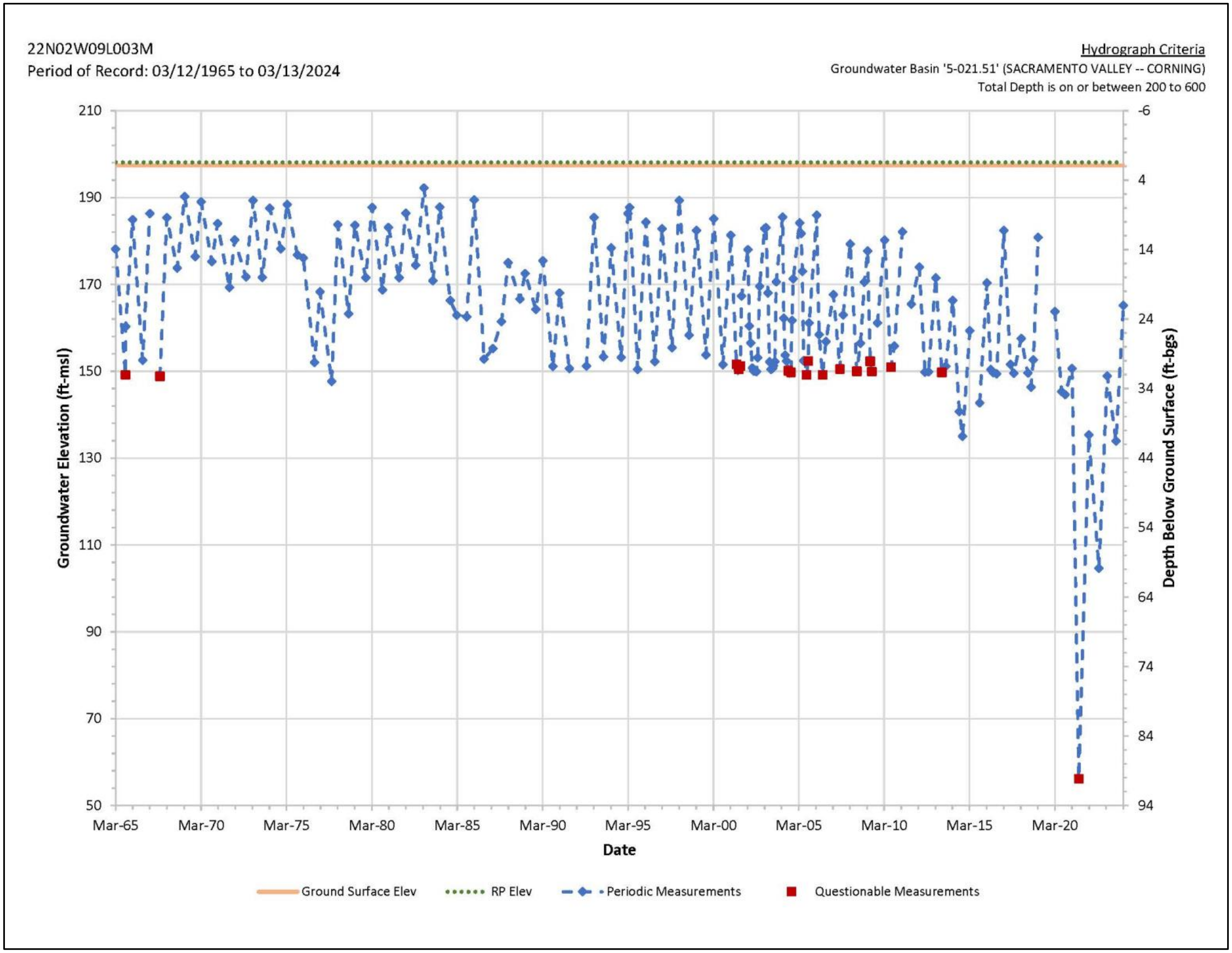
Source: DWR 2024g

Figure D-24. Hydrograph for Well 11N04E04N004M



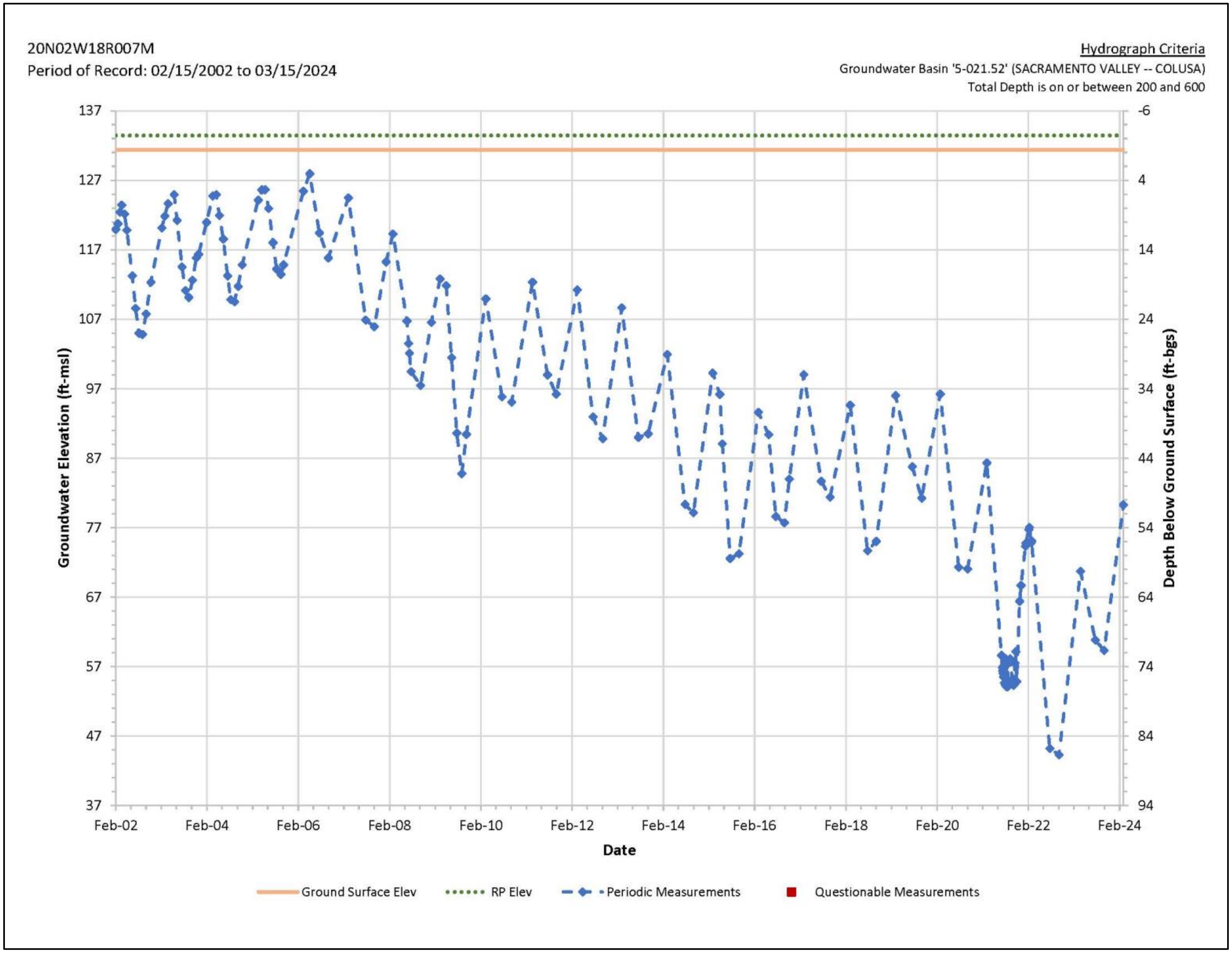
Source: DWR 2024g

Figure D-25. Hydrograph for Well 08N06E09Q004M



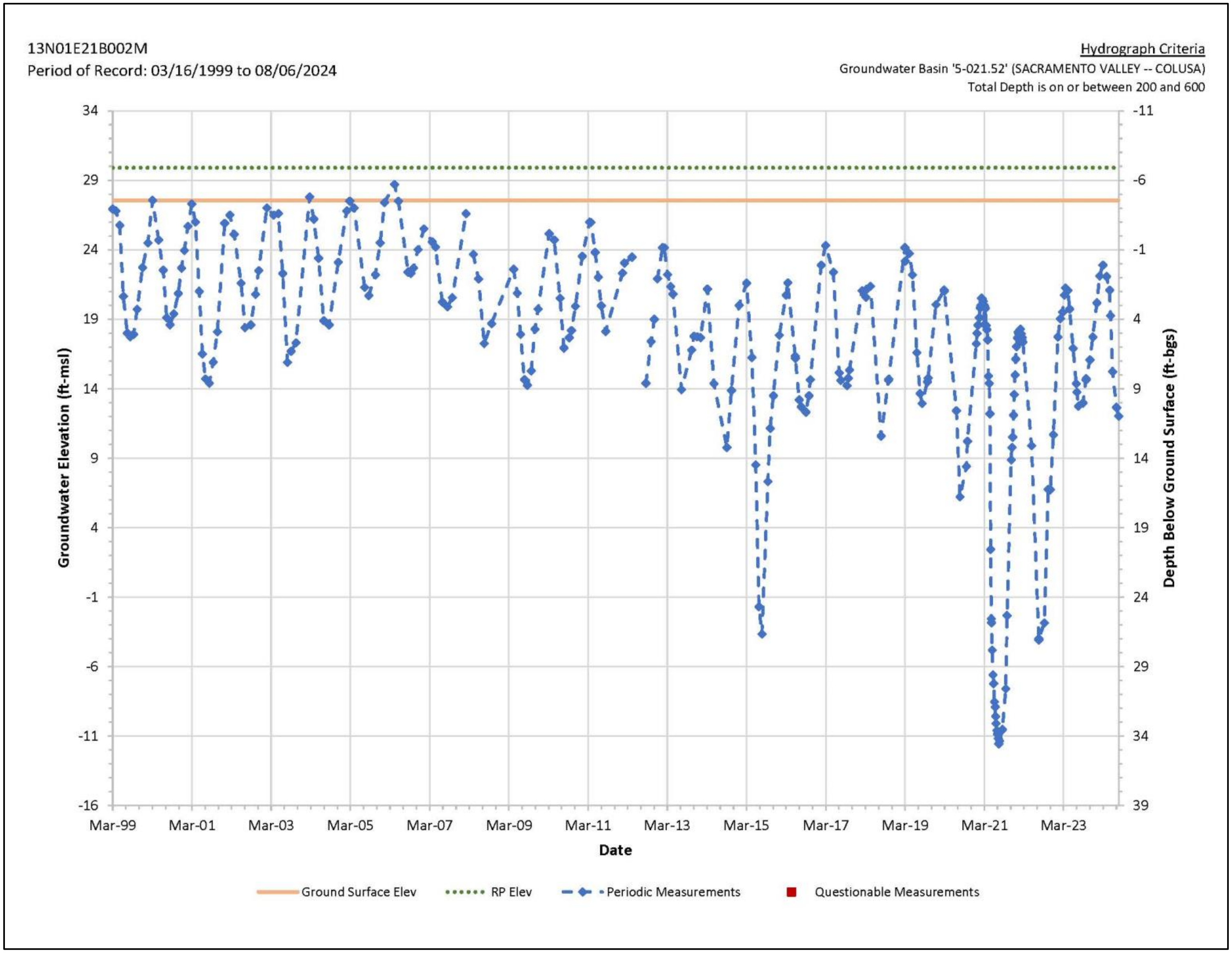
Source: DWR 2024g

Figure D-26. Hydrograph for Well 22N02W09L003M



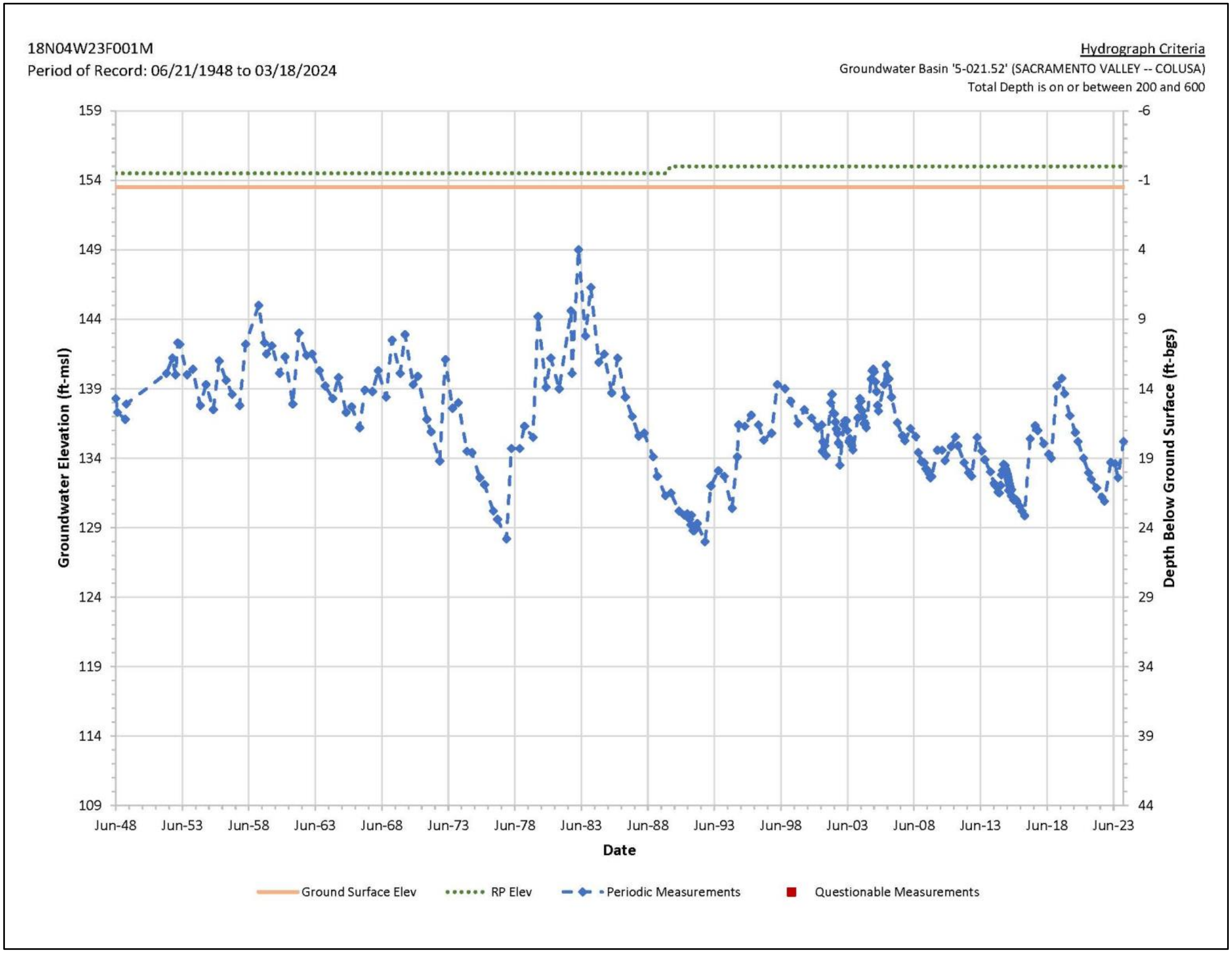
Source: DWR 2024g

Figure D-27. Hydrograph for Well 20N02W18R007M



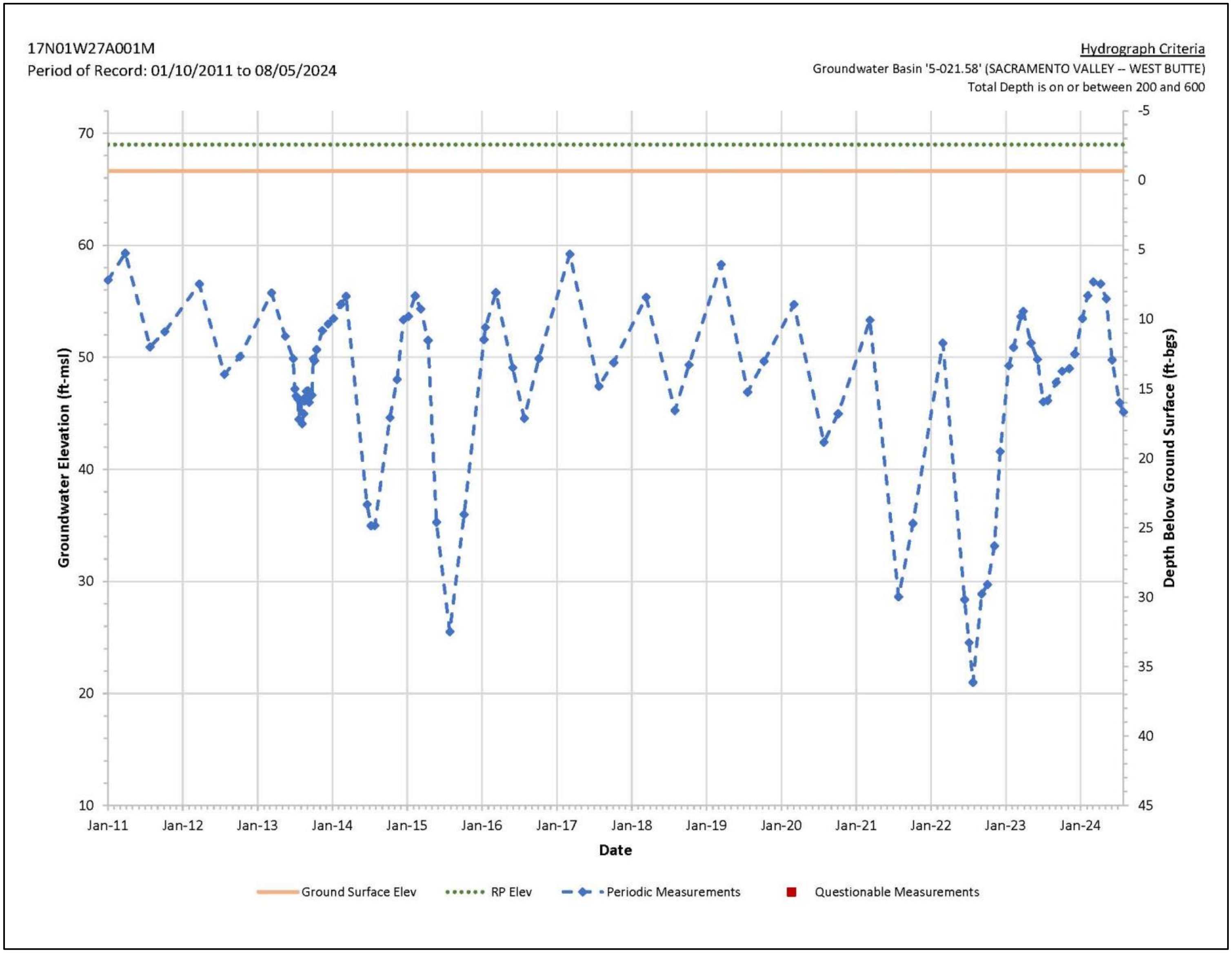
Source: DWR 2024g

Figure D-28. Hydrograph for Well 13N01E21B002M



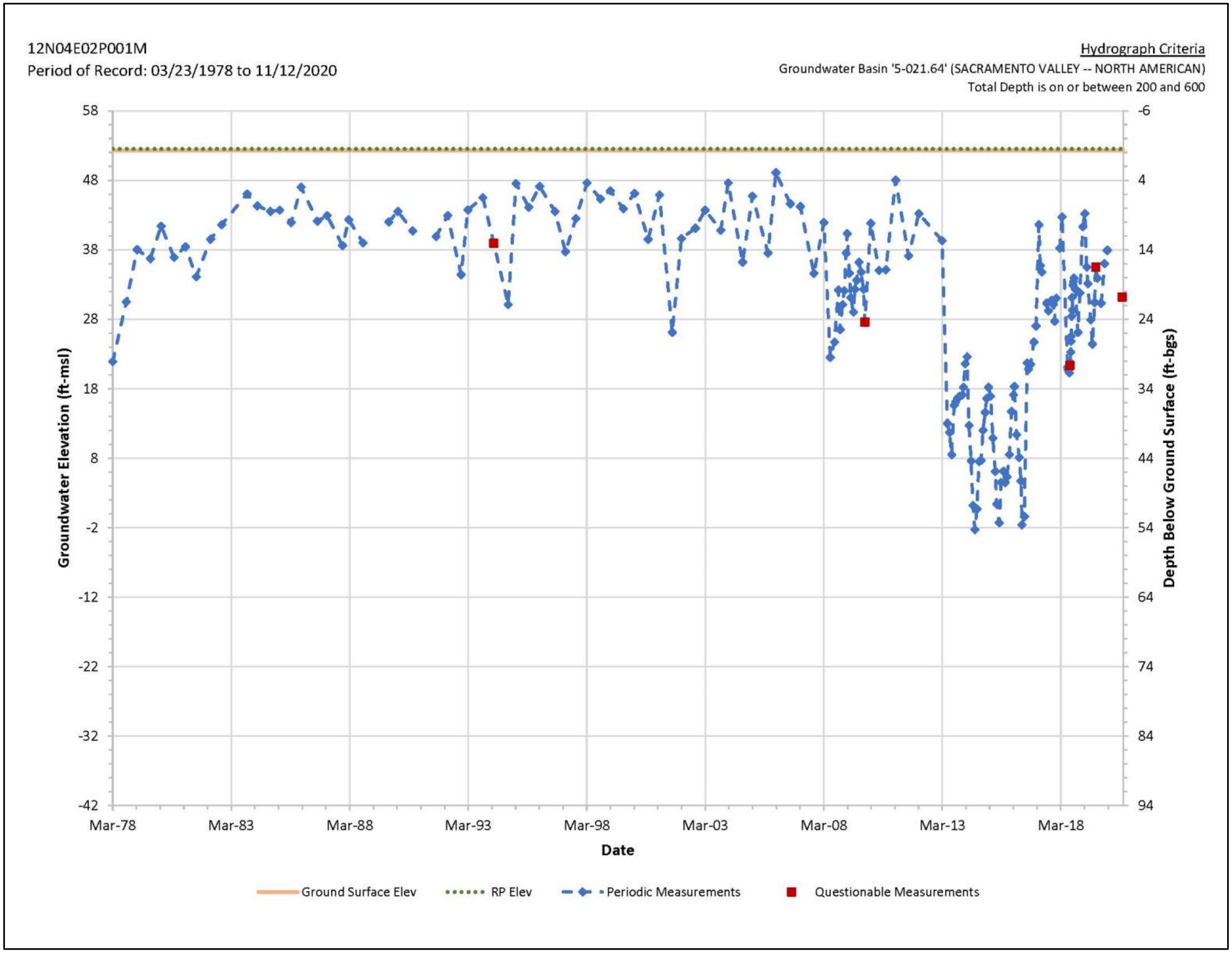
Source: DWR 2024g

Figure D-29. Hydrograph for Well 18N04W23F001M



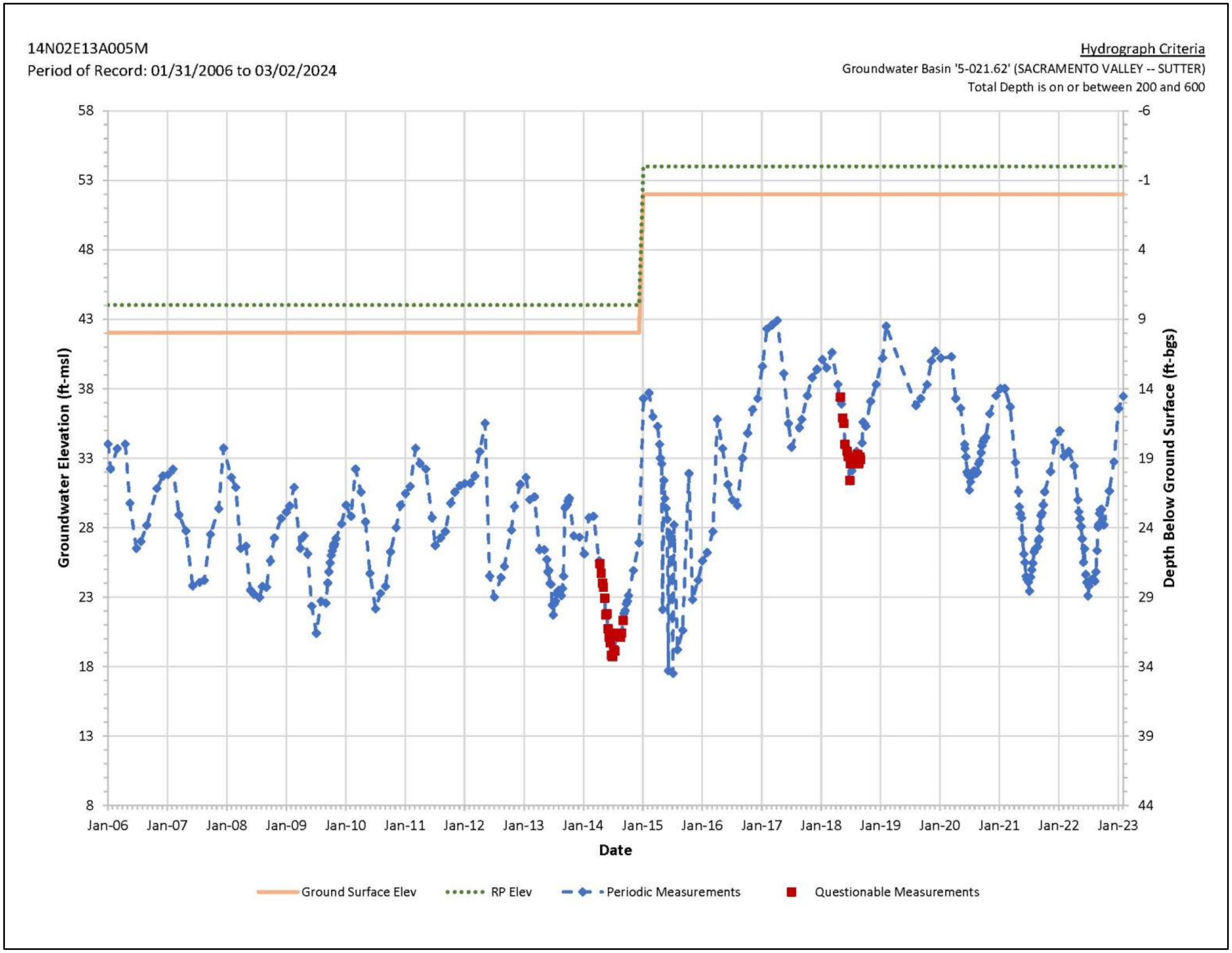
Source: DWR 2024g

Figure D-30. Hydrograph for Well 17N01W27A001M



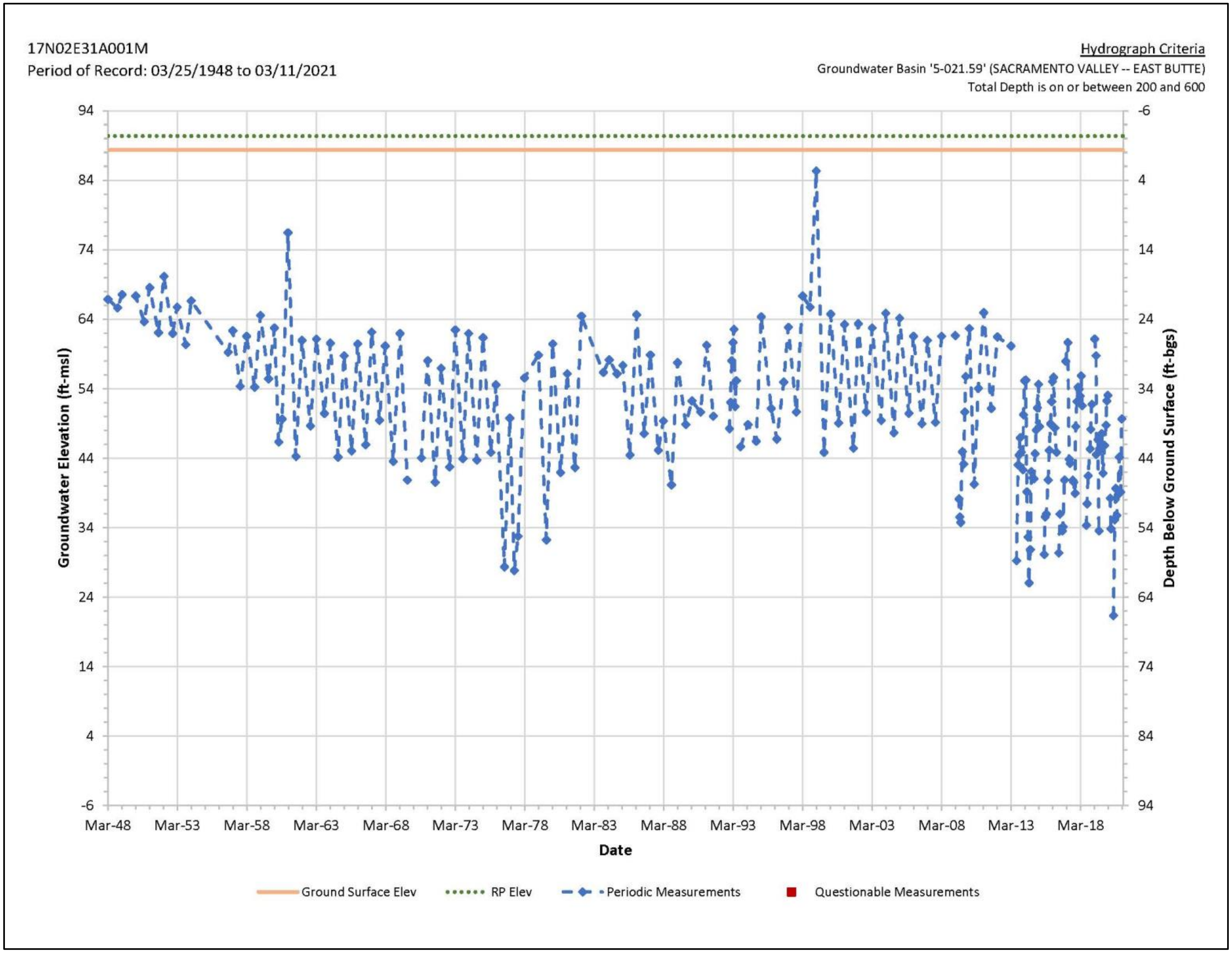
Source: DWR 2024g

Figure D-31. Hydrograph for Well 12N04E02P001M



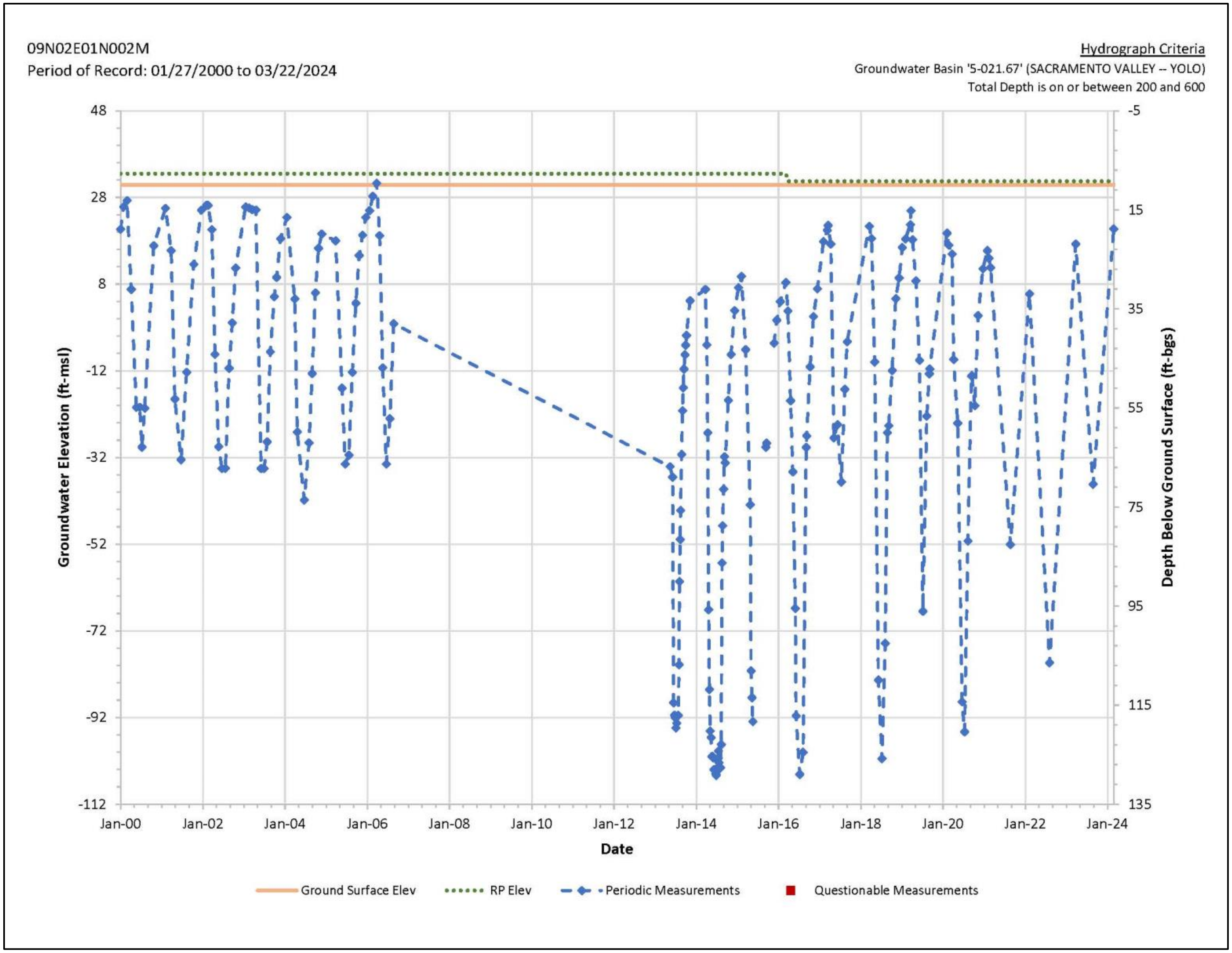
Source: DWR 2024g

Figure D-32. Hydrograph for Well 14N02E13A005M



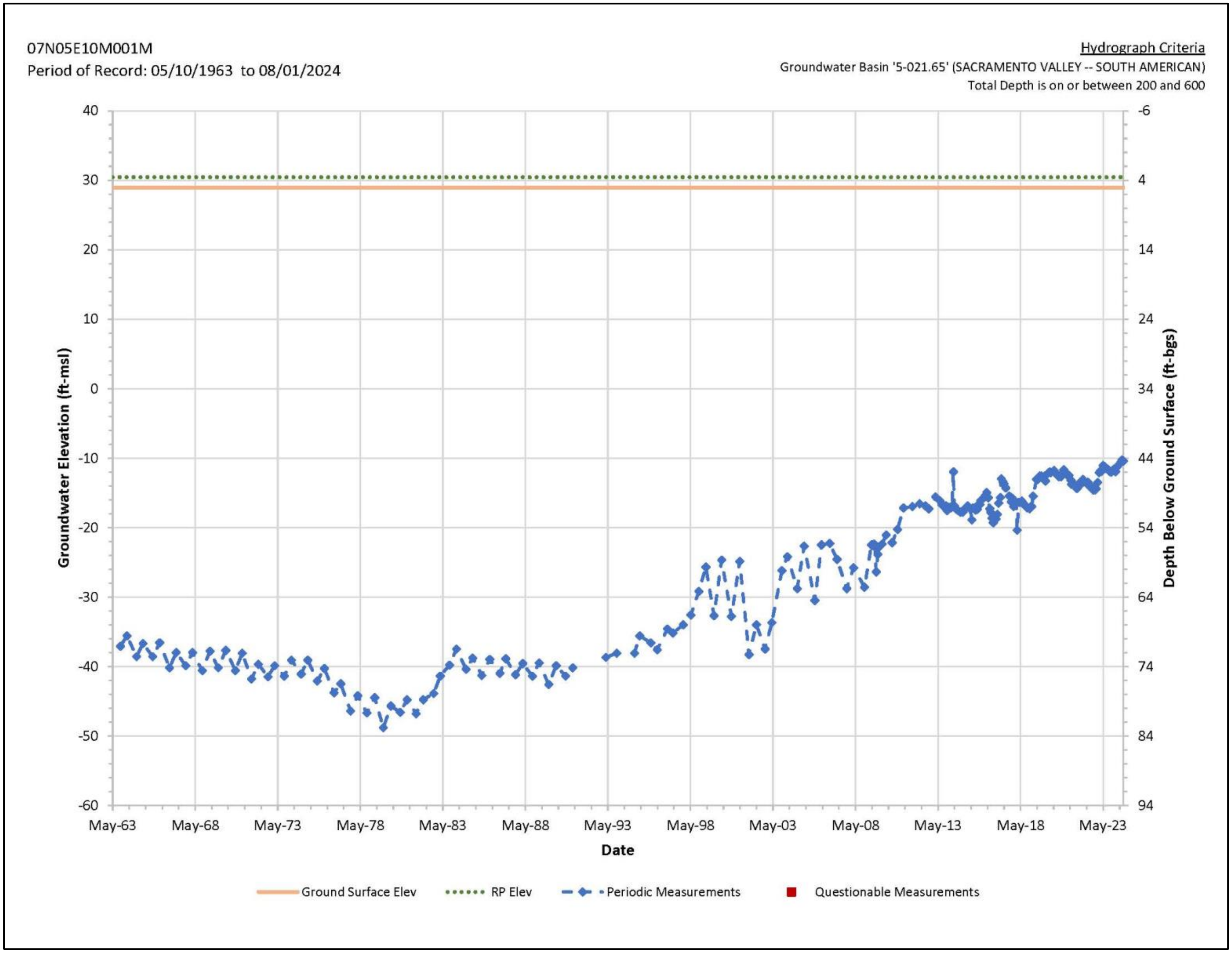
Source: DWR 2024g

Figure D-33. Hydrograph for Well 17N02E31A001M



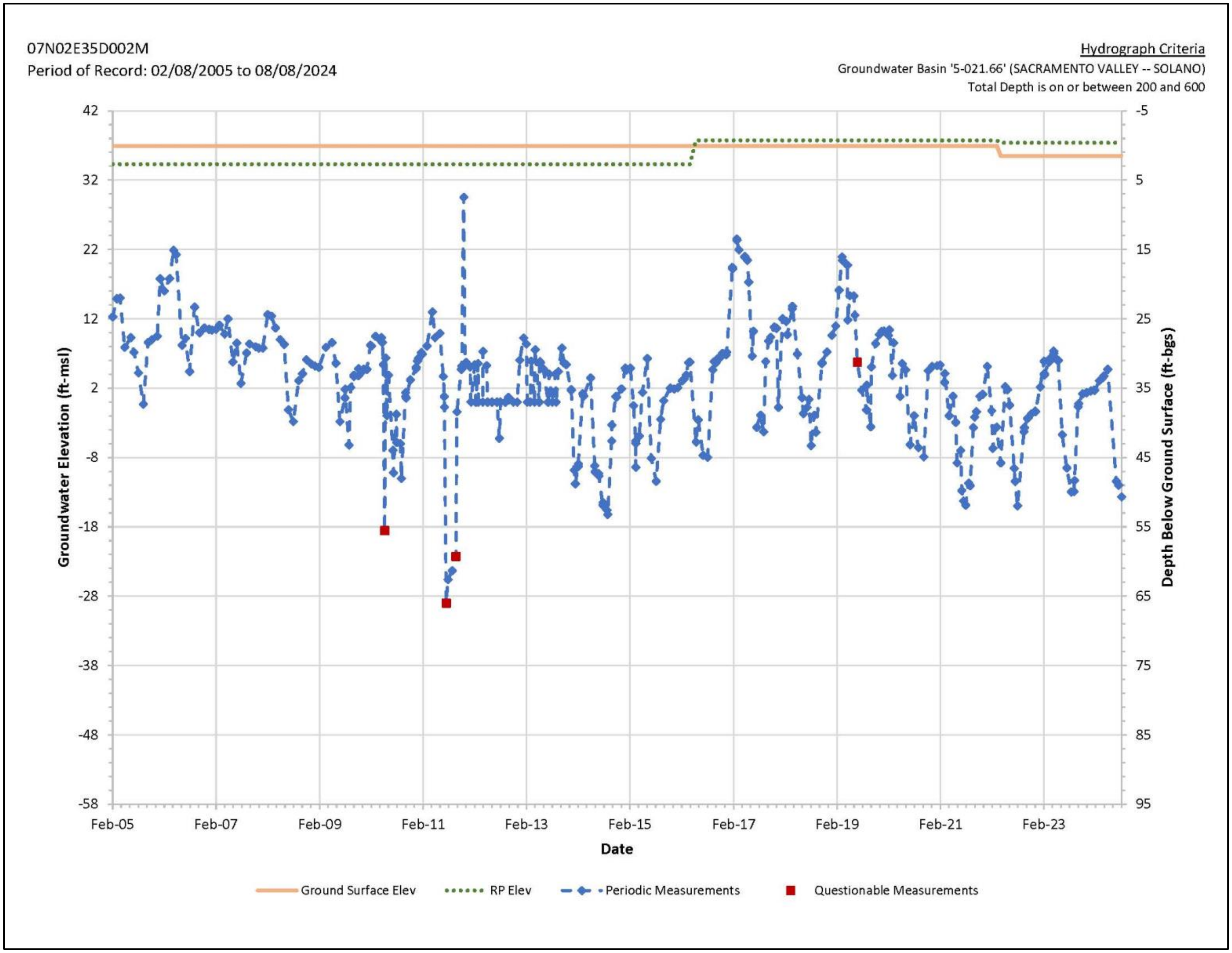
Source: DWR 2024g

Figure D-34. Hydrograph for Well 09N02E01N002M



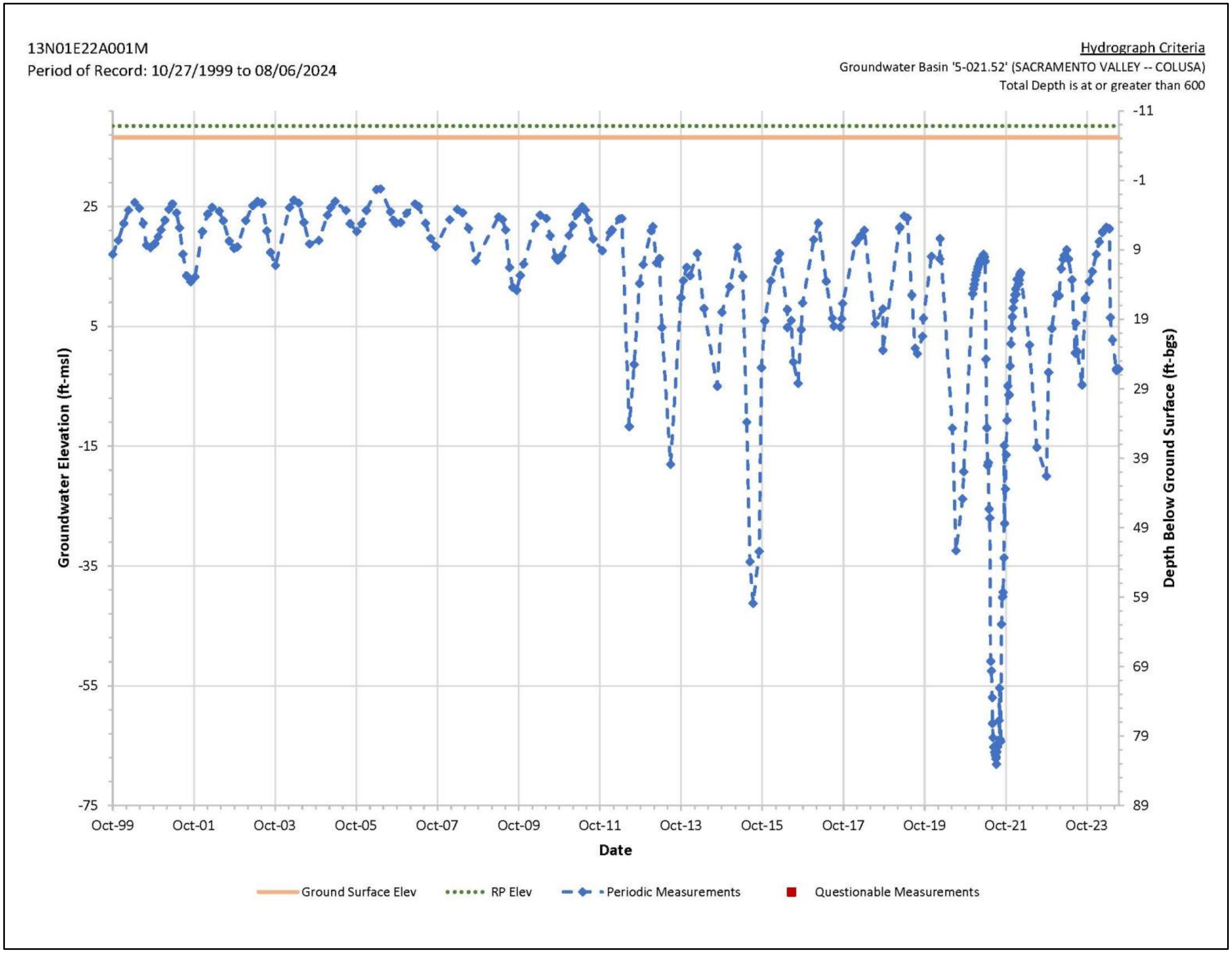
Source: DWR 2024g

Figure D-35. Hydrograph for Well 07N05E10M001M



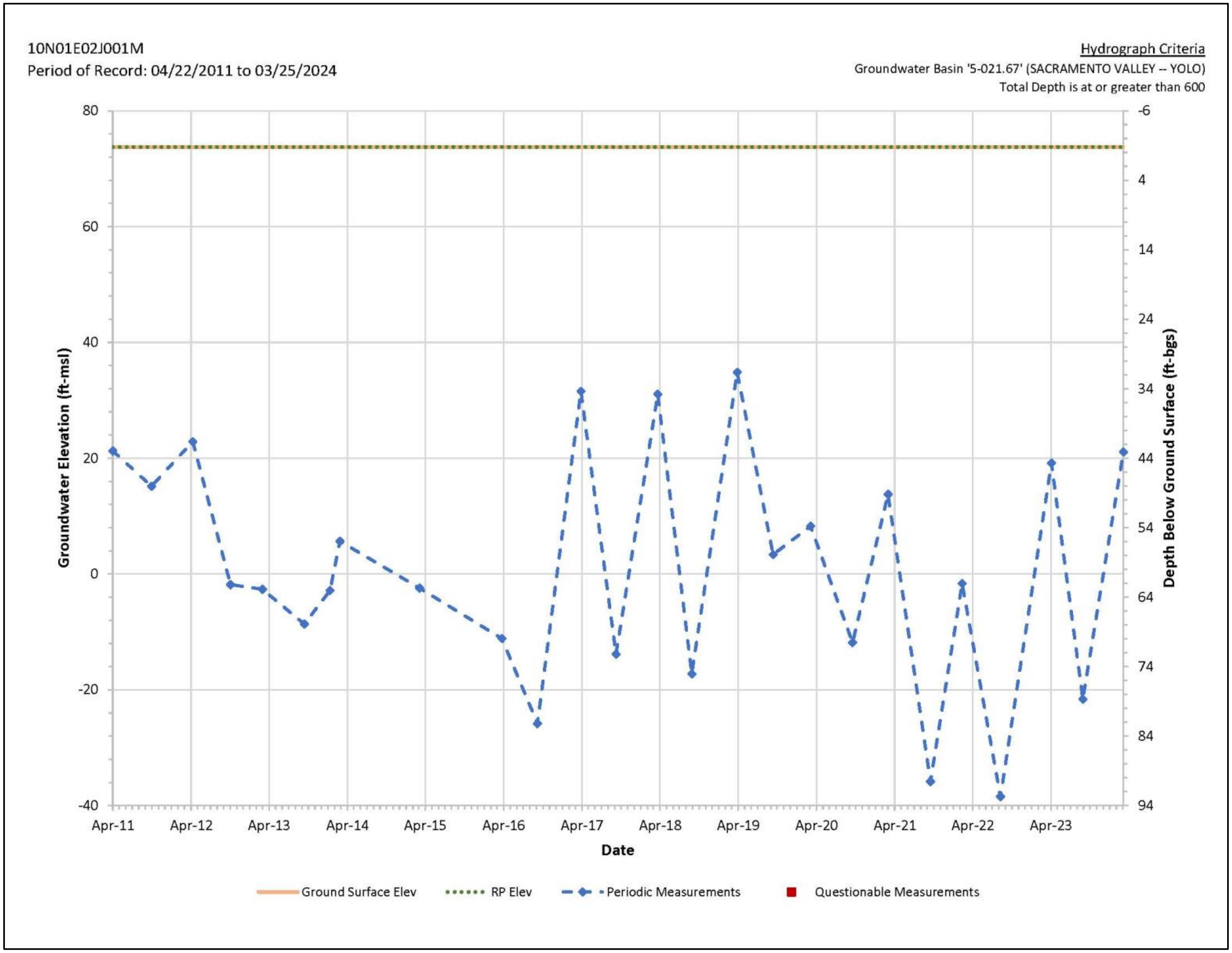
Source: DWR 2024g

Figure D-36. Hydrograph for Well 07N02E35D002M



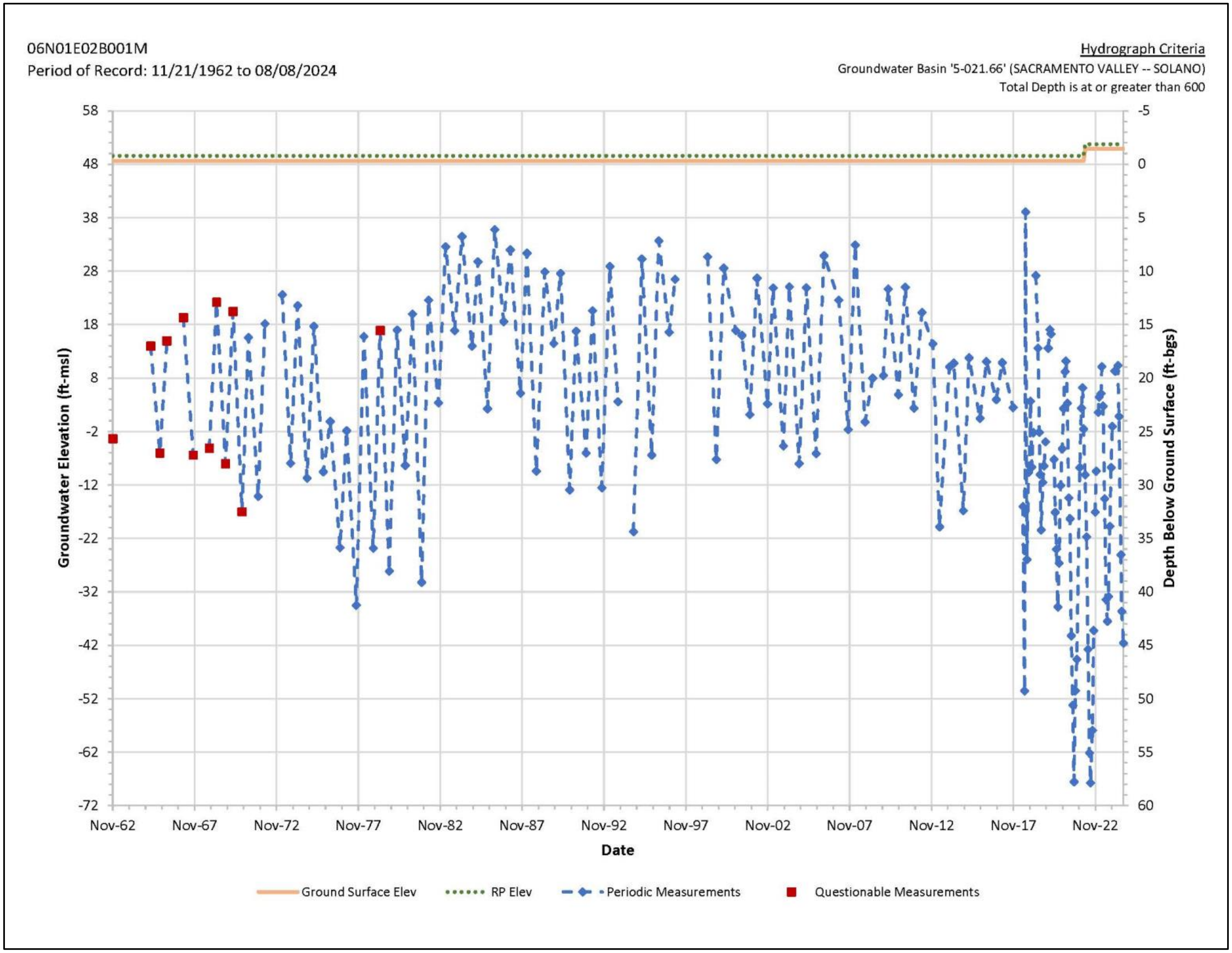
Source: DWR 2024g

Figure D-37. Hydrograph for Well 13N01E22A001M



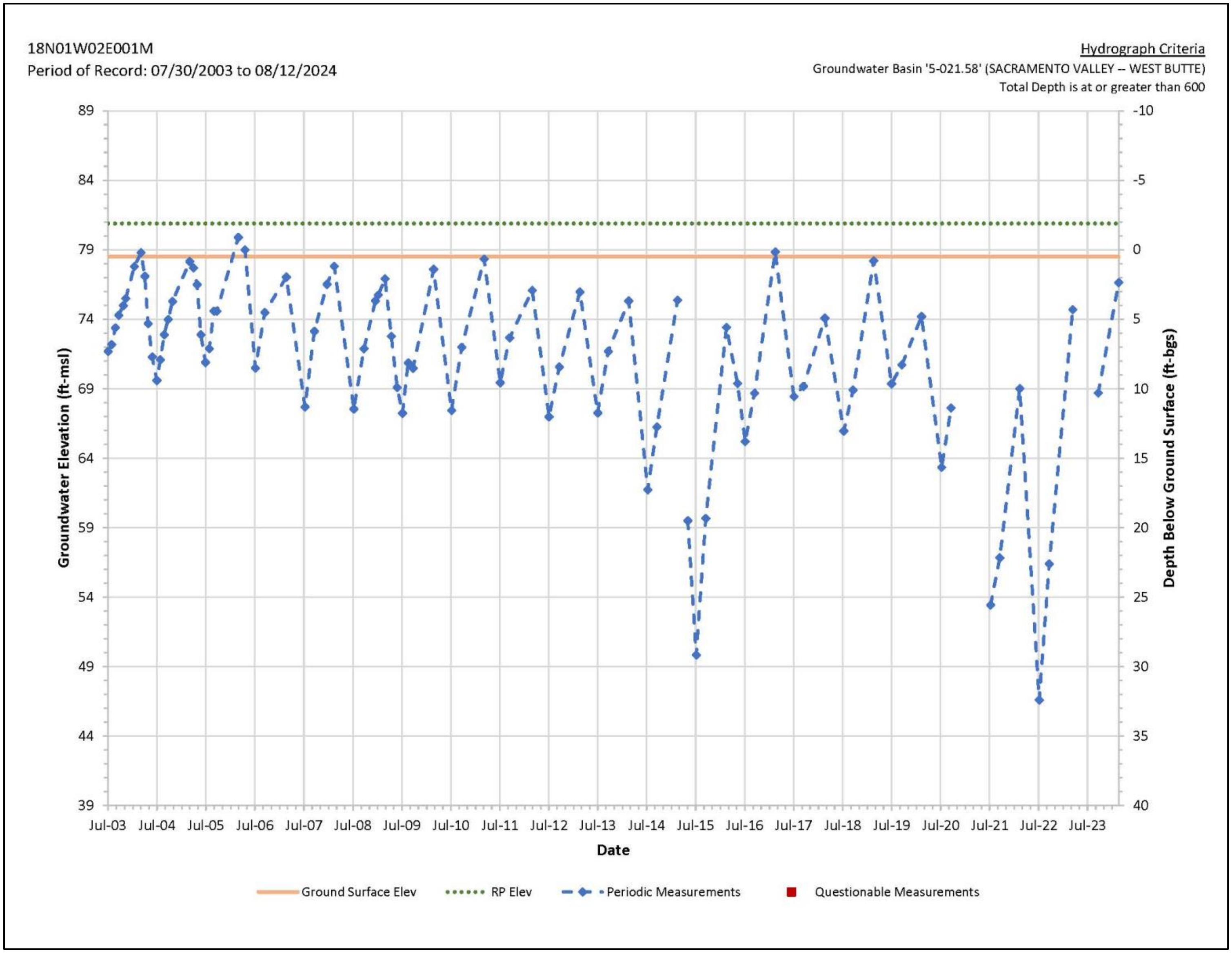
Source: DWR 2024g

Figure D-38. Hydrograph for Well 10N01E02J001M



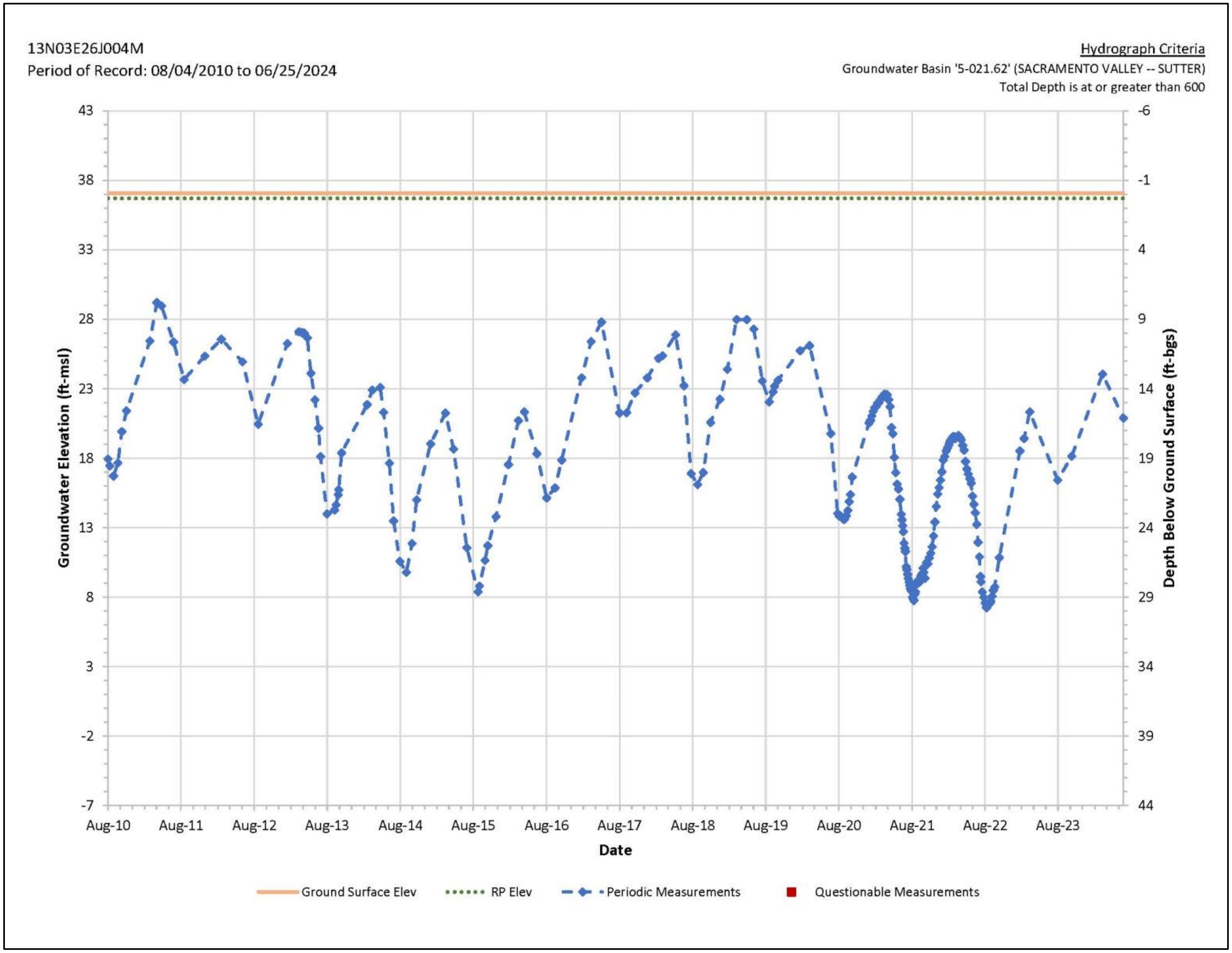
Source: DWR 2024g

Figure D-39. Hydrograph for Well 06N01E02B001M



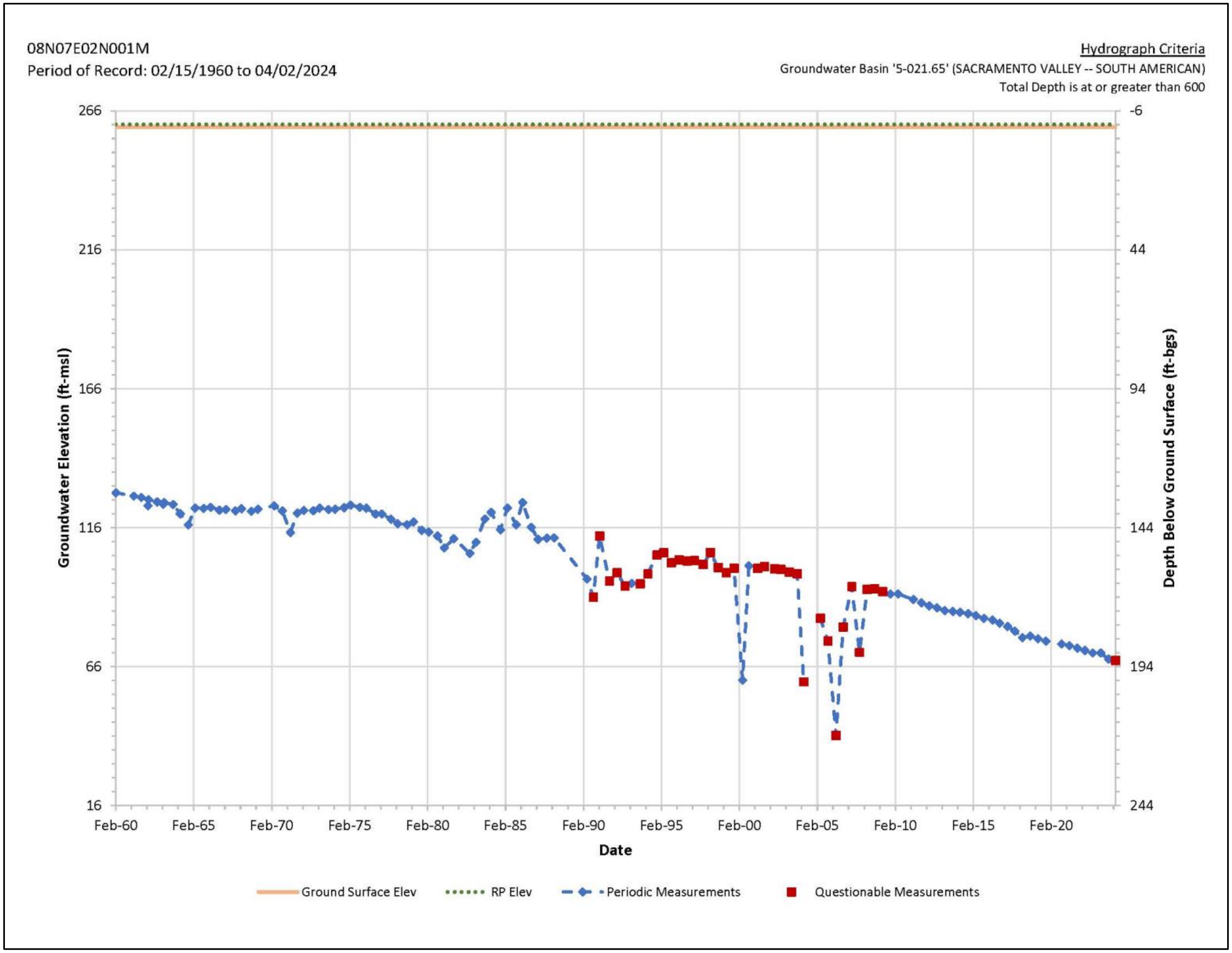
Source: DWR 2024g

Figure D-40. Hydrograph for Well 18N01W02E001M



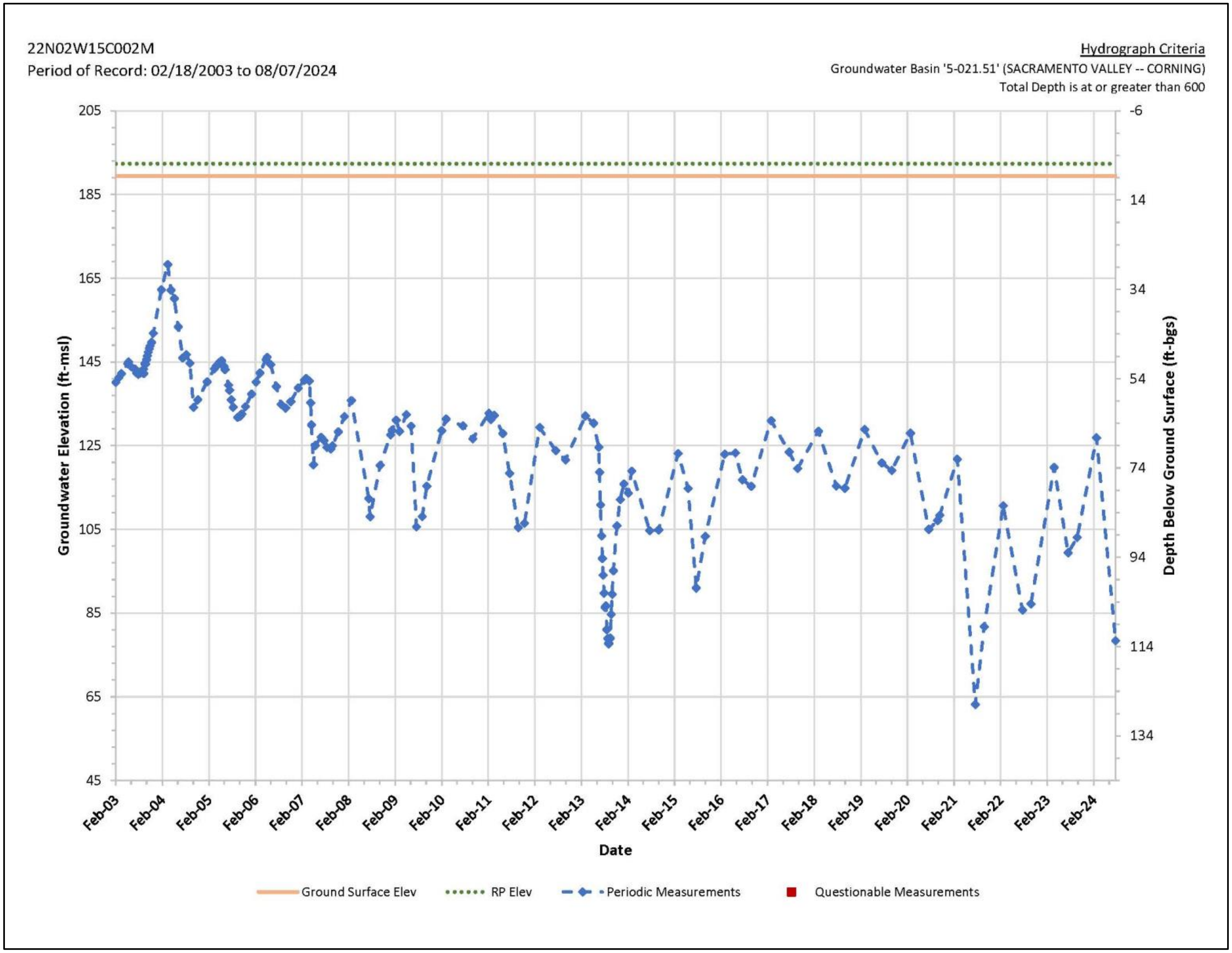
Source: DWR 2024g

Figure D-41. Hydrograph for Well 13N03E26J004M



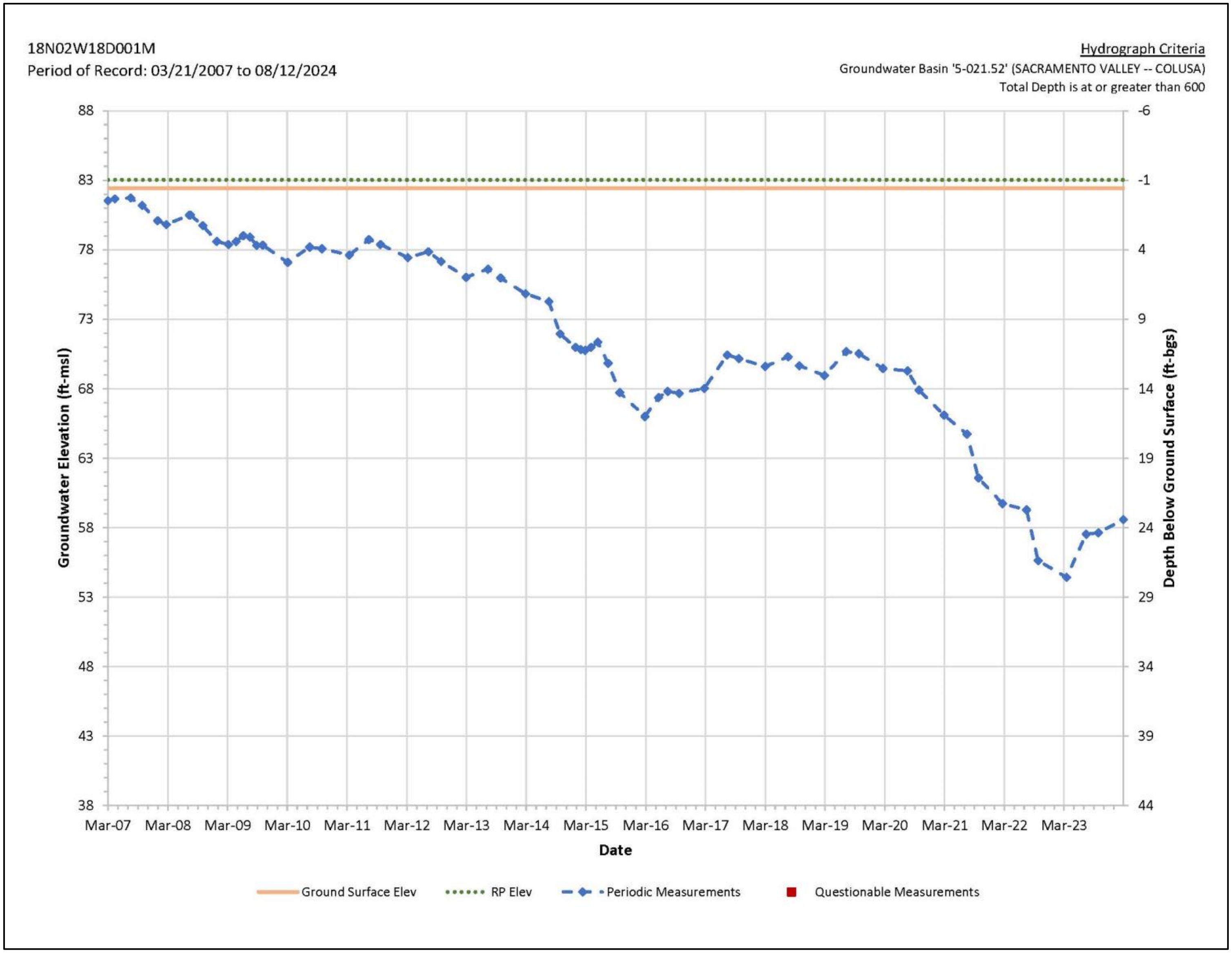
Source: DWR 2024g

Figure D-42. Hydrograph for Well 08N07E02N001M



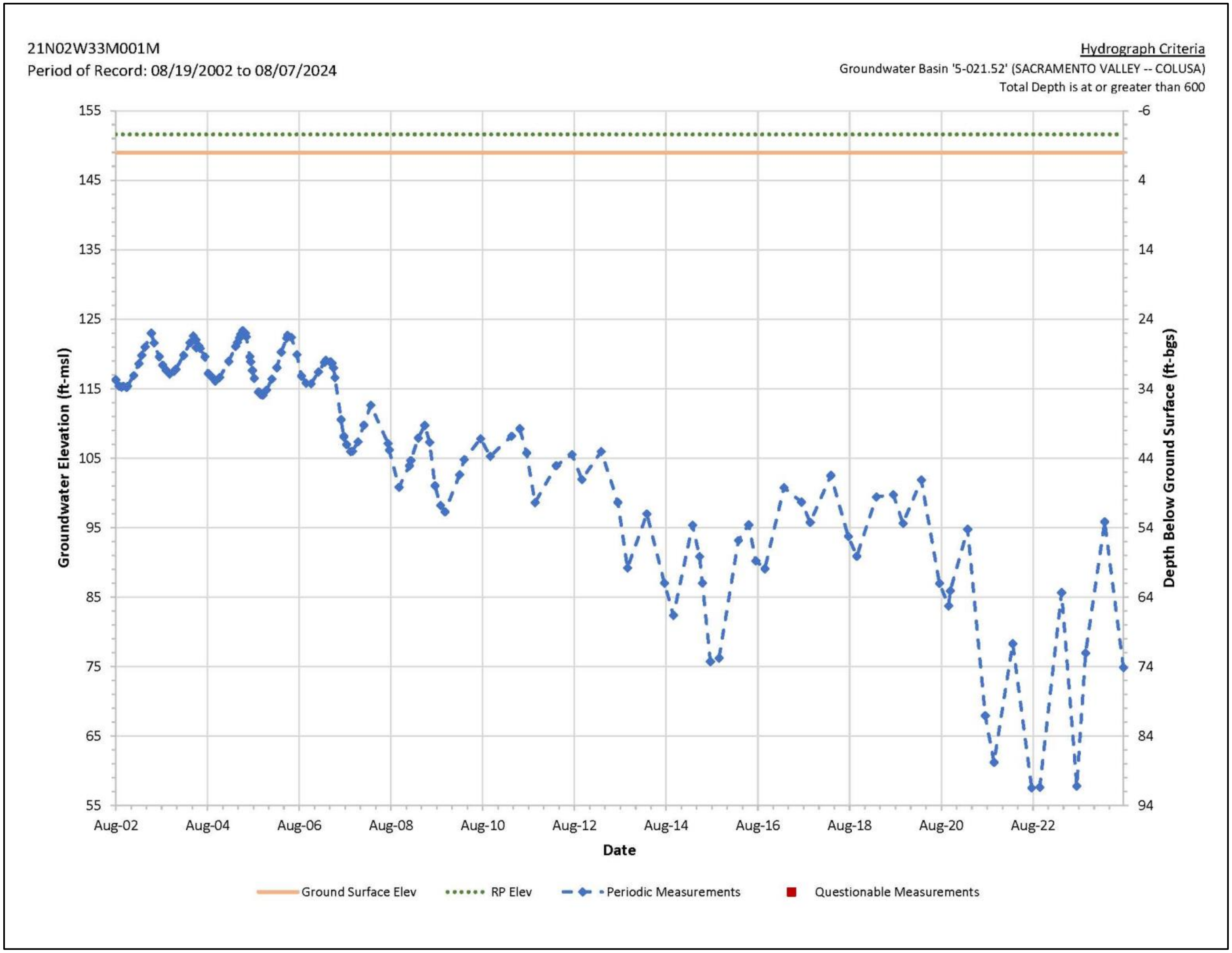
Source: DWR 2024g

Figure D-43. Hydrograph for Well 22N02W15C002M



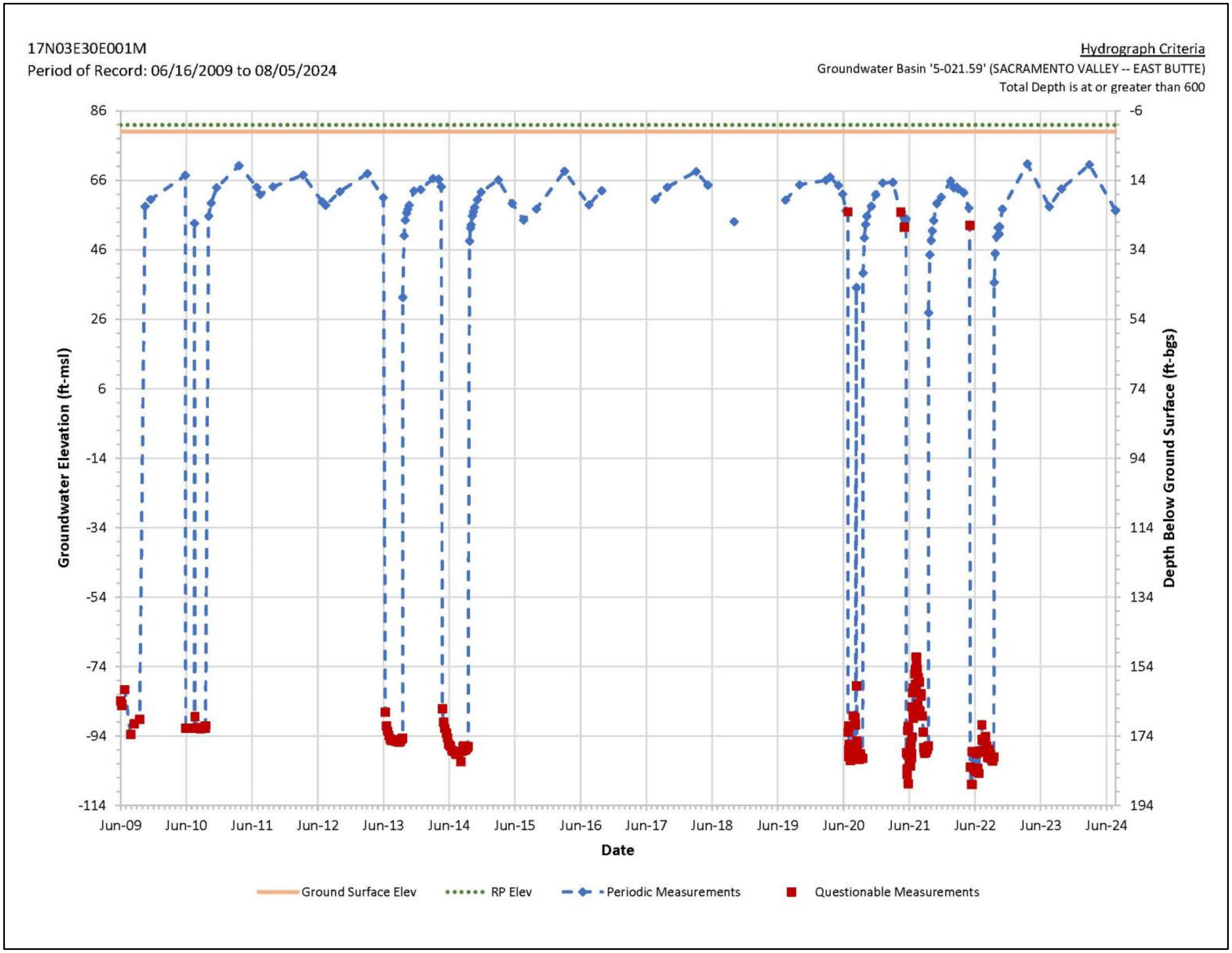
Source: DWR 2024g

Figure D-44. Hydrograph for Well 18N02W18D001M



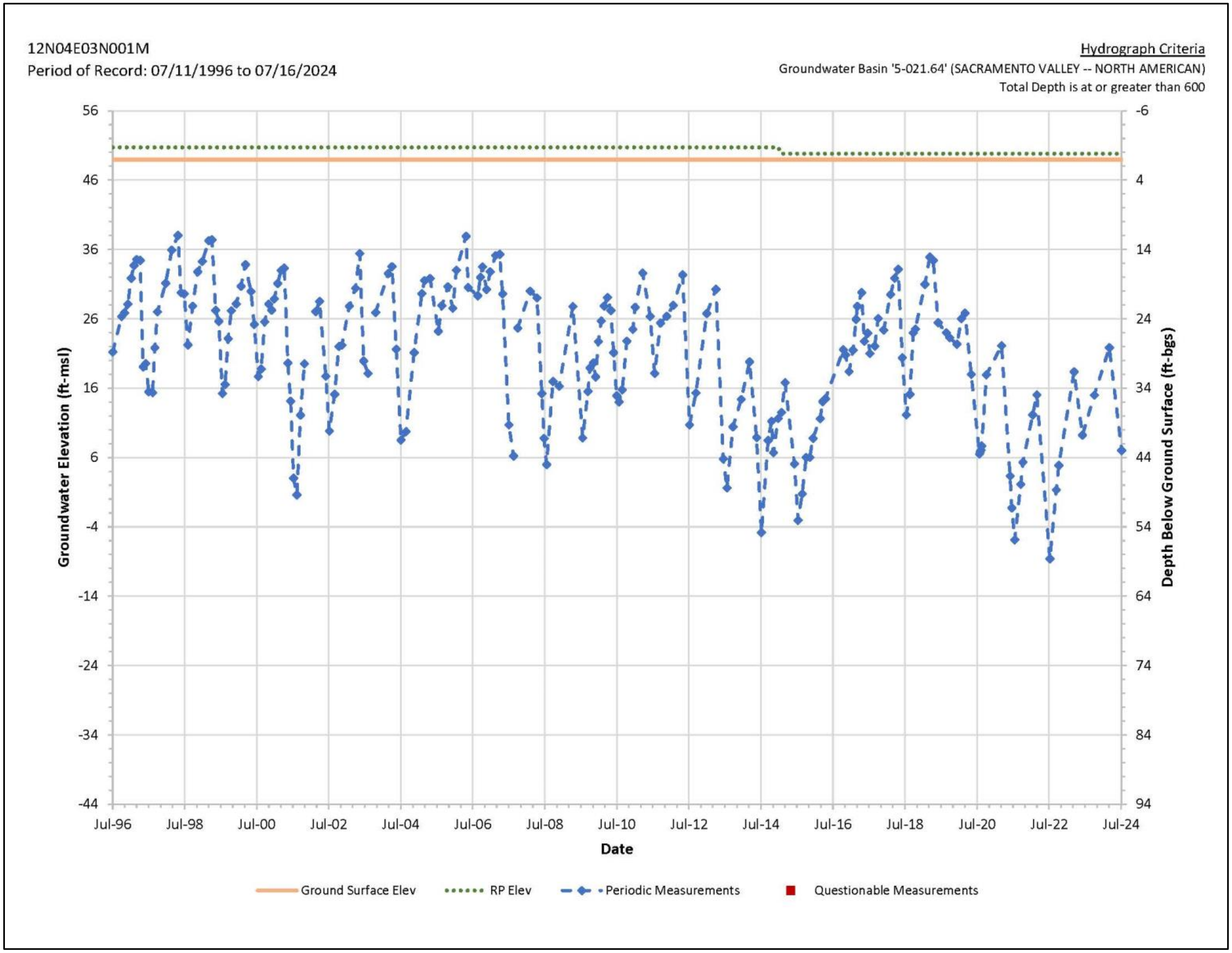
Source: DWR 2024g

Figure D-45. Hydrograph for Well 21N02W33M001M



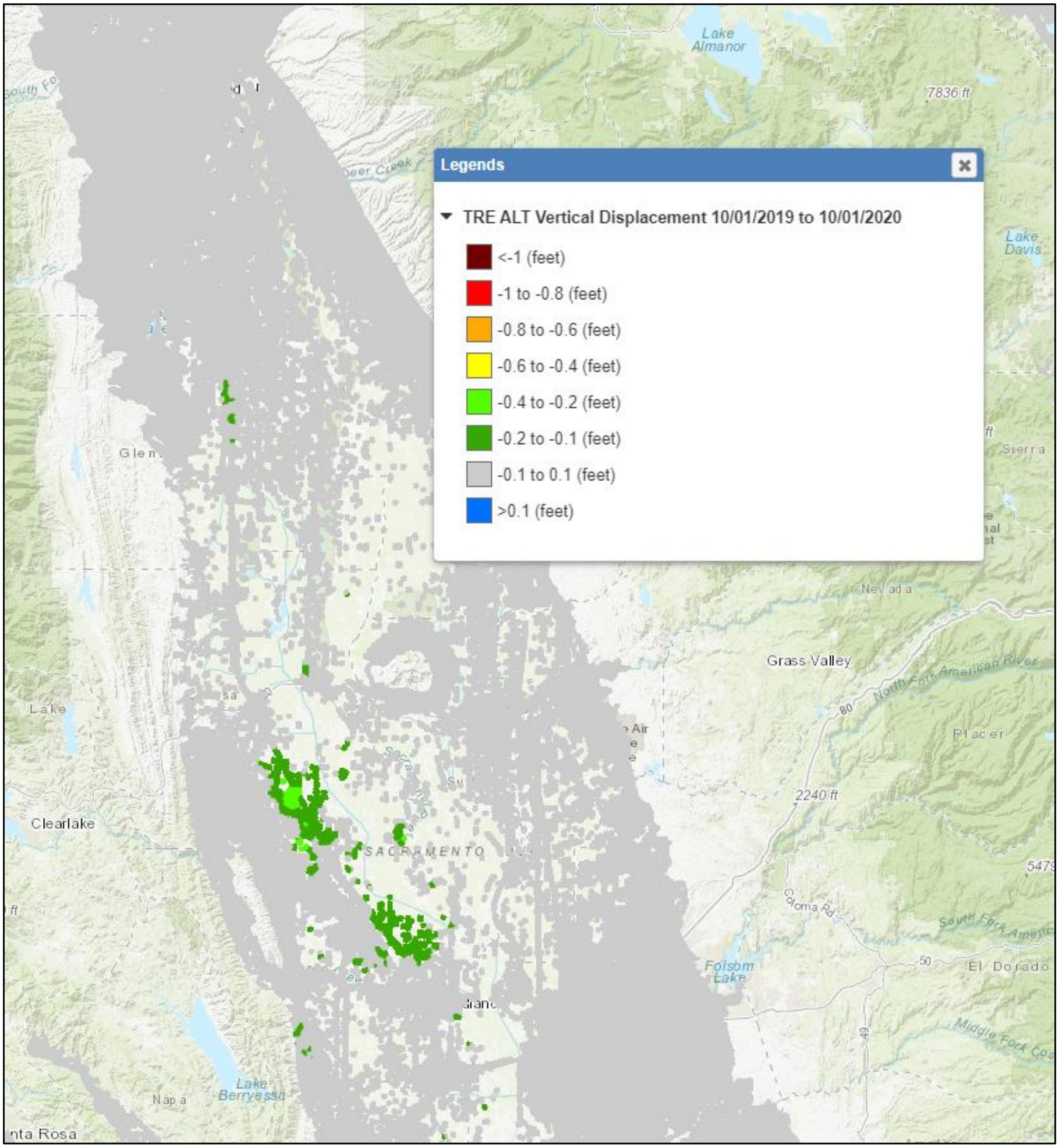
Source: DWR 2024g

Figure D-46. Hydrograph for Well 17N03E30E001M



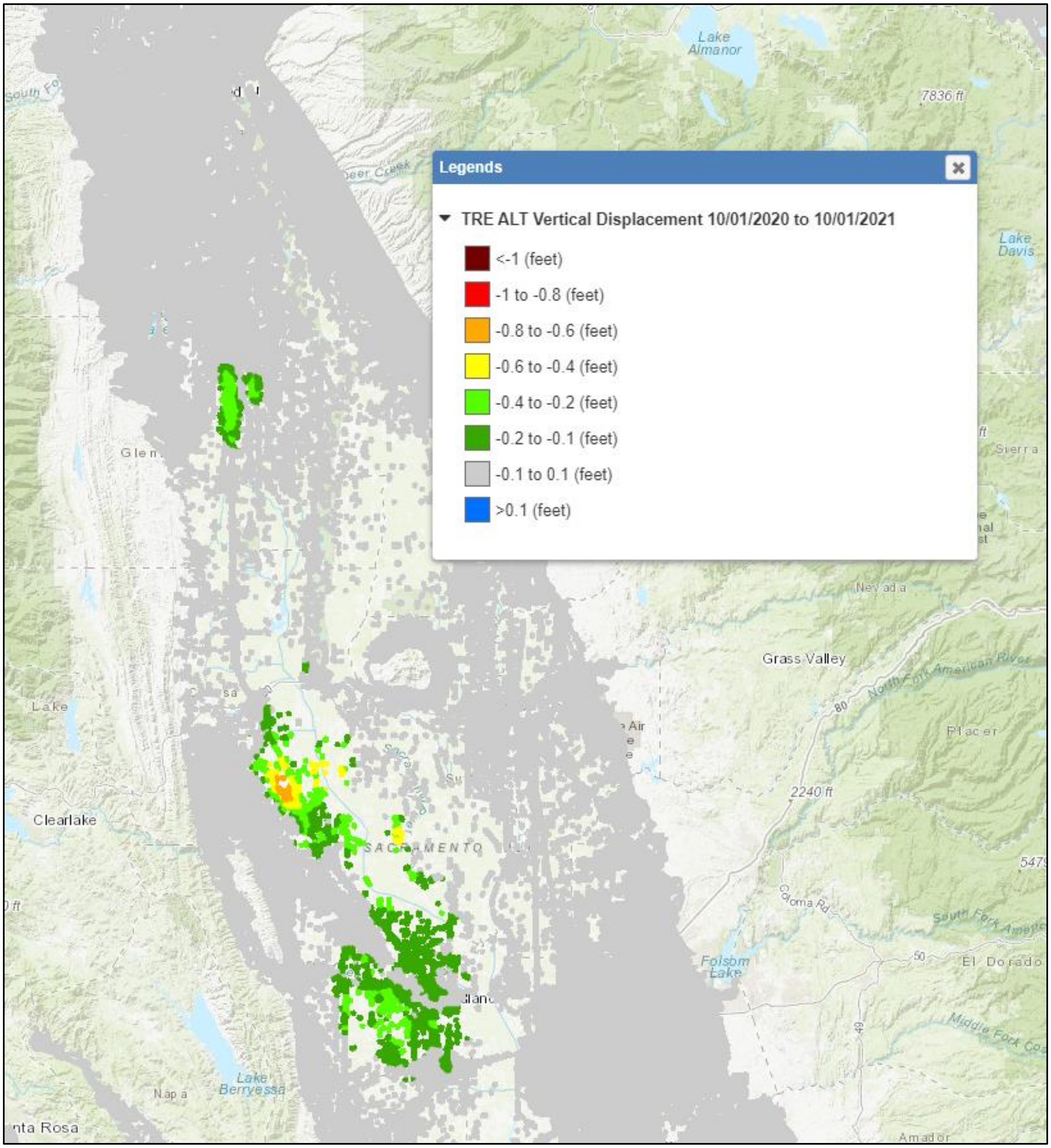
Source: DWR 2024g

Figure D-47. Hydrograph for Well 12N04E03N001M



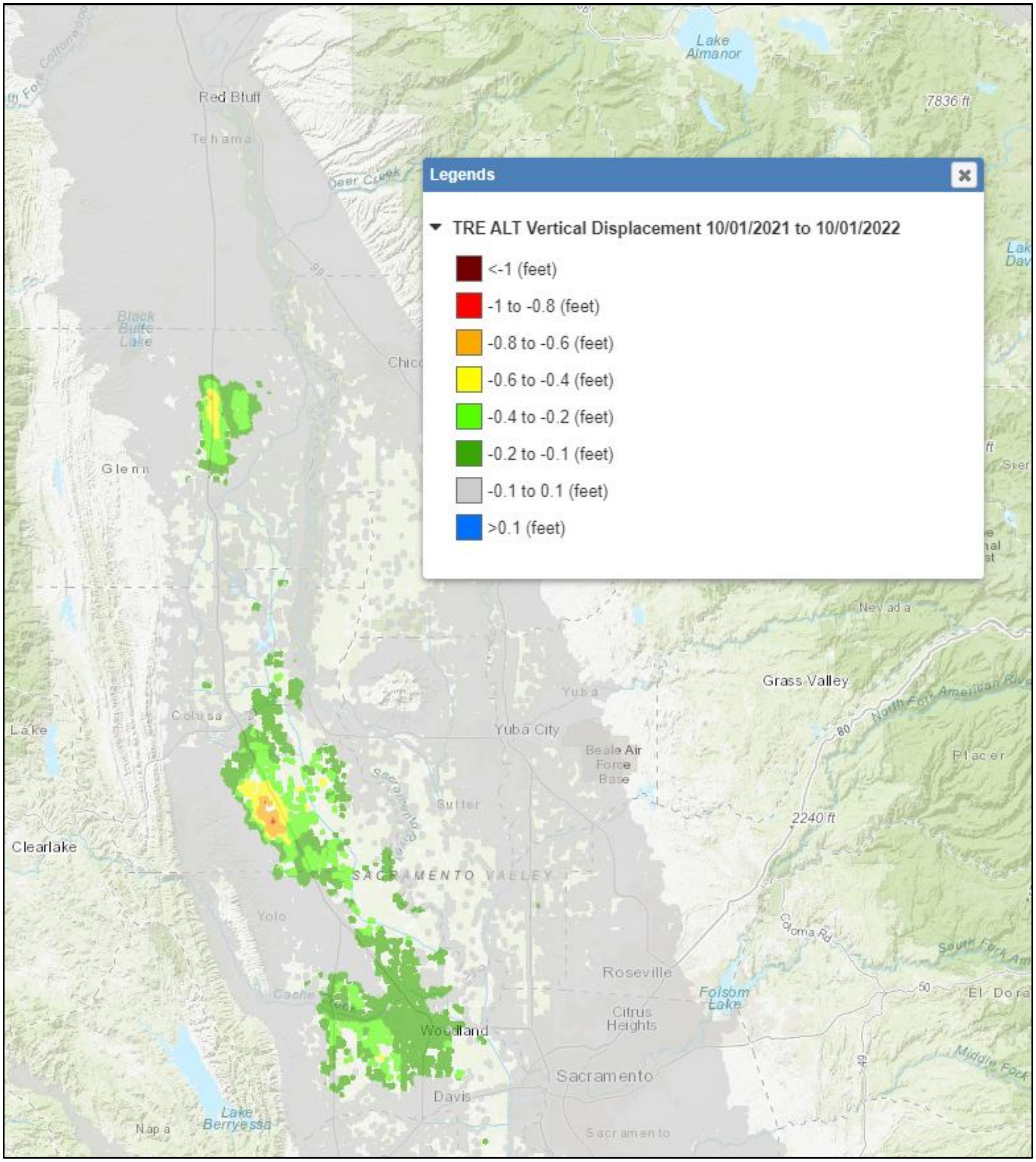
Source: DWR 2024h

Figure D-48. Annual Subsidence for WY 2020 from the TRE Altamira InSAR Dataset



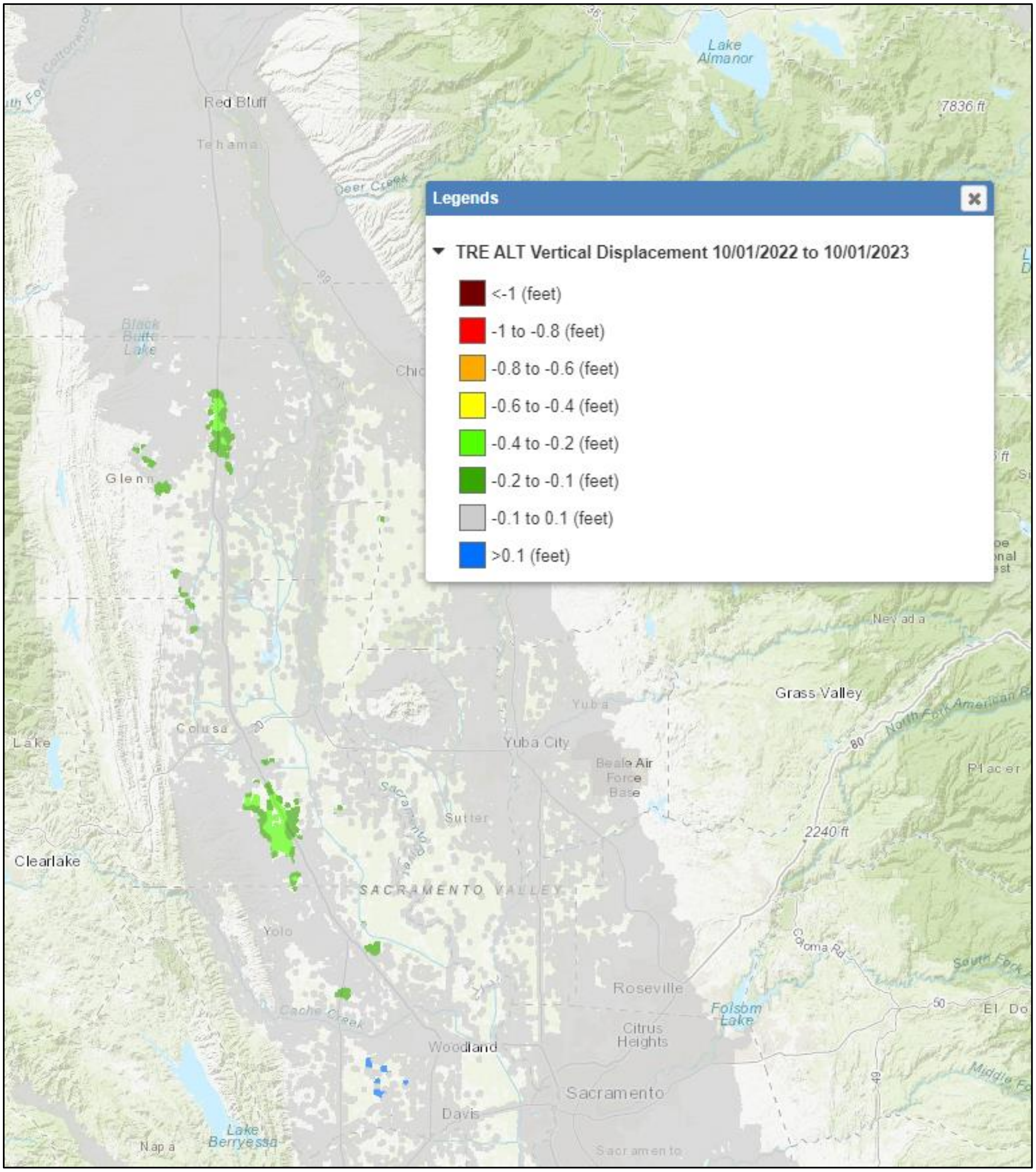
Source: DWR 2024h

Figure D-49. Annual Subsidence for WY 2021 from the TRE Altamira InSAR Dataset



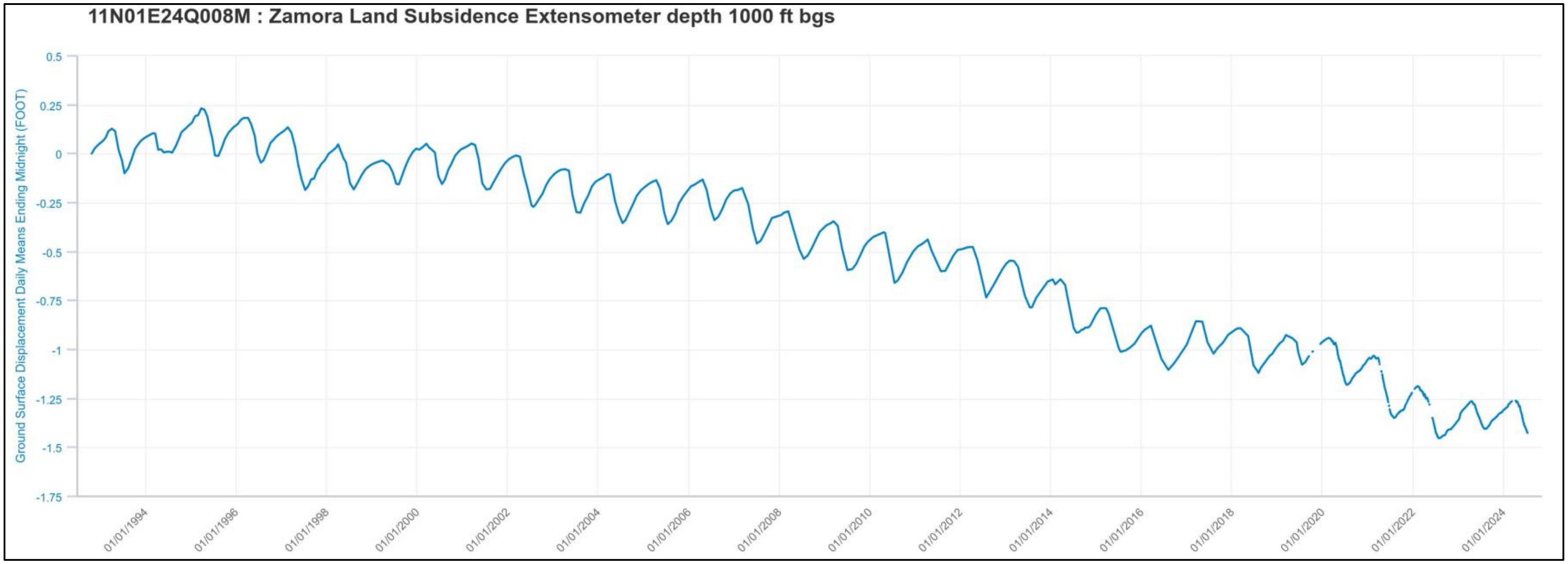
Source: DWR 2024h

Figure D-50. Annual Subsidence for WY 2022 from the TRE Altamira InSAR Dataset



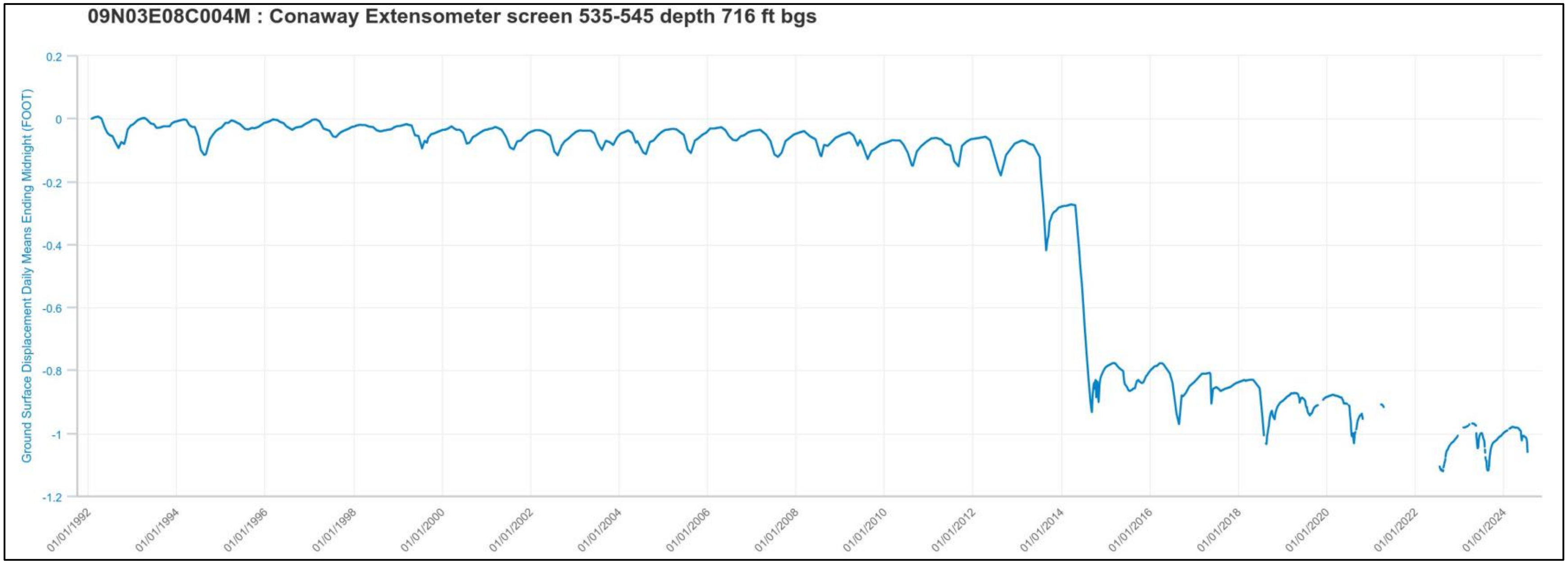
Source: DWR 2024h

Figure D-51. Annual Subsidence for WY 2023 from the TRE Altamira InSAR Dataset



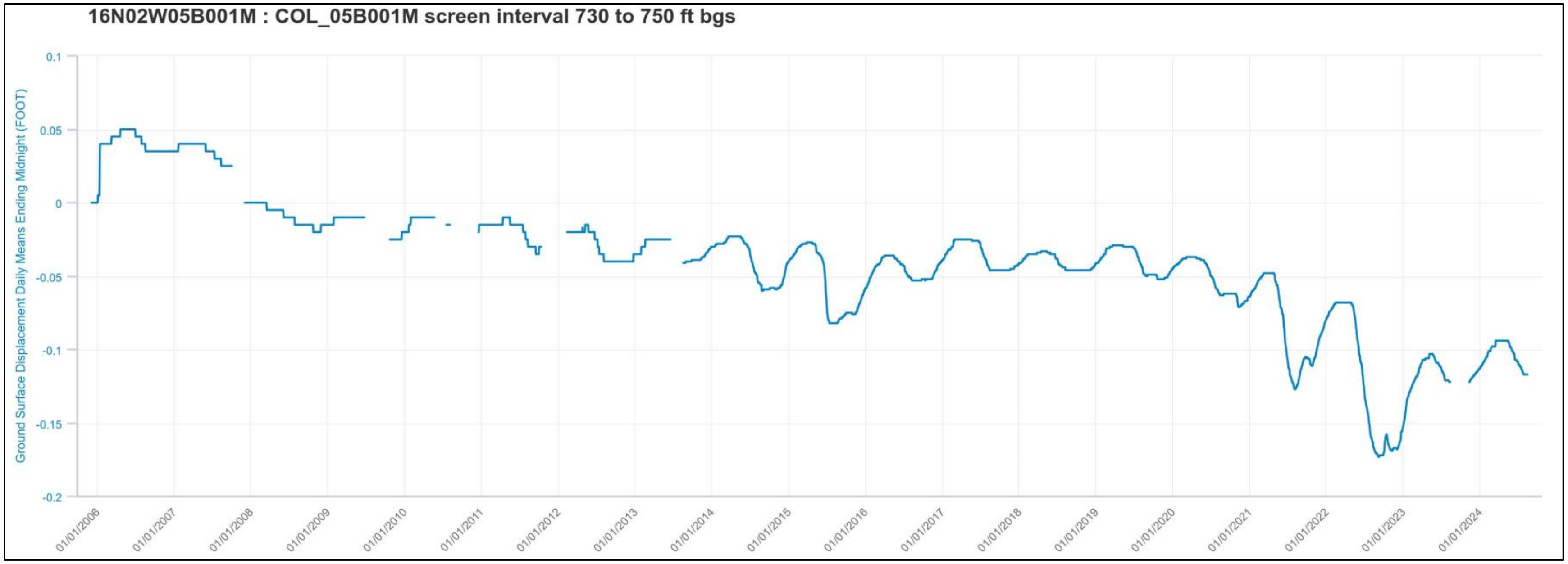
Source: DWR 2024i

Figure D-52. Ground Surface Displacement at the Zamora Extensometer (11N01E24Q008M)



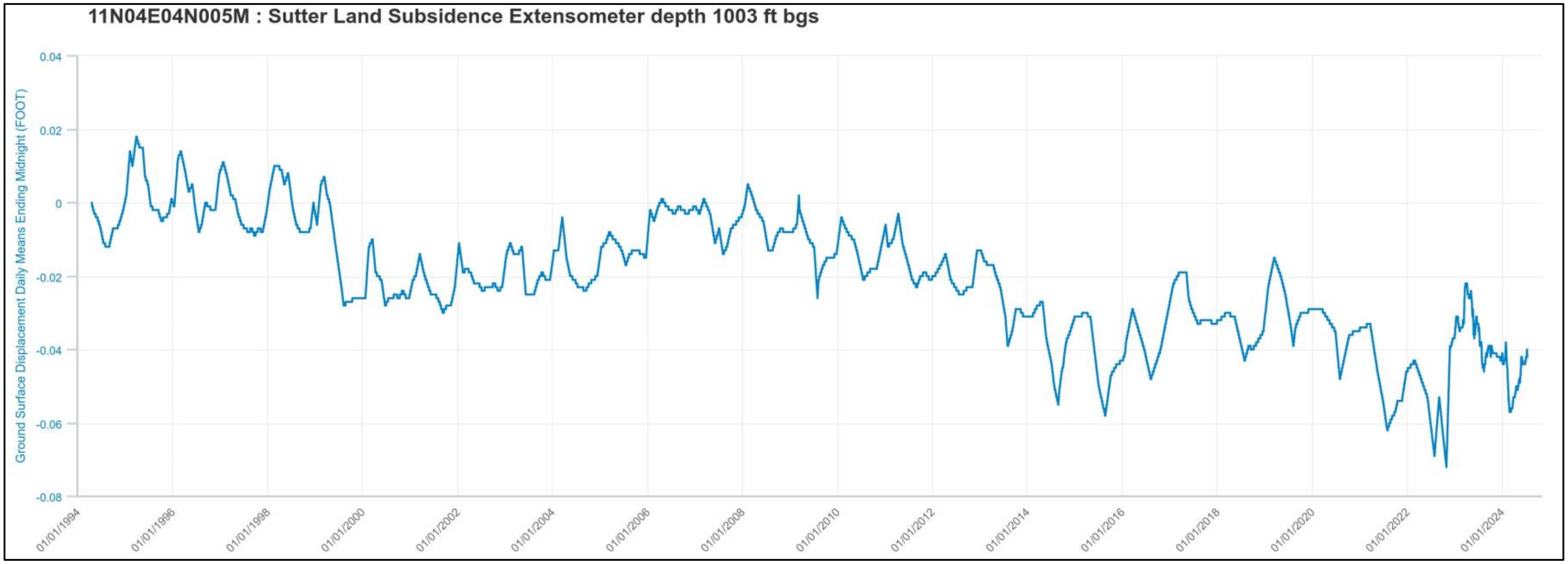
Source: DWR 2024j

Figure D-53. Ground Surface Displacement at the Conaway Ranch Extensometer (09N03E08C004M)



Source: DWR 2024k

Figure D-54. Ground Surface Displacement at the Arbuckle Extensometer (16N02W05B001M)



Source: DWR 2024l

Figure D-55. Ground Surface Displacement at the Sutter Extensometer (11N04E04N005M)

D.6 References

ArcGIS. 2024. Bulletin 118 Basin Boundaries Data Viewer. Layer: i08_B118_CA_GroundwaterBasins. Available at: https://www.arcgis.com/home/webmap/viewer.html?url=https://gis.water.ca.gov/arcgis/rest/services/Geoscientific/i08_B118_CA_GroundwaterBasins/FeatureServer. [Accessed on August 5, 2024].

California Department of Water Resources (DWR). 2024a. All Posted GSA Notices. Available at: https://sgma.water.ca.gov/portal/gsa/all. [Accessed on August 5, 2024].

———.2024b. Basin Prioritization. Available at: https://water.ca.gov/Programs/Groundwater-Management/Basin-Prioritization. [Accessed on August 5, 2024].

______. 2024c. GSP Status Summary. Available at: https://sgma.water.ca.gov/portal/gsp/status. [Accessed on August 5, 2024].

———. 2024d. Sustainable Groundwater Management Act Data Viewer. Available at: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#gwlevels. [Accessed on August 5, 2024].

———. 2024e. Seasonal Groundwater Level Reports- Change. Available at: https://sgma.water.ca.gov/webgis/config/custom/html/SGMADataViewer/doc/#seasonal-groundwater-level-reports. [Accessed on August 5, 2024].

———. 2024f. Water Data Library – Groundwater Level Data. Available at: https://wdl.water.ca.gov/waterdatalibrary/GroundWaterLevel.aspx. [Accessed on August 5, 2024].

______. 2024g. Groundwater Monitoring (CASGEM). Available at: https://water.ca.gov/programs/groundwater-management/groundwater-elevation-monitoring--casgem. [Accessed on August 7, 2024].

———. 2024h. Sustainable Groundwater Management Act Data Viewer. TRE Altamira InSAR Dataset. Available at: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#landsub. [Accessed on August 8, 2024].

______. 2024i. Zamora Extensometer 11N01E24Q008M Land Subsidence Extensometer Plot. Available at: https://wdl.water.ca.gov/StationDetails.aspx?Station=11N01E24Q008M. [Accessed on August 8, 2024].

______. 2024j. Conaway Ranch Extensometer 09N03E08C004M Land Subsidence Extensometer Plot. Available at: https://wdl.water.ca.gov/StationDetails.aspx?Station=09N03E08C004M. [Accessed on August 8, 2024].

______. 2024k. Arbuckle Extensometer 16N02W05B001M Land Subsidence Extensometer Plot. Available at: https://wdl.water.ca.gov/StationDetails.aspx?Station=16N02W05B001M. [Accessed on August 12, 2024].

______. 2024l. Sutter Extensometer 11N04E04N005M Land Subsidence Extensometer Plot. Available at: https://wdl.water.ca.gov/StationDetails.aspx?Station=11N04E04N005M. [Accessed on August 8, 2024].

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Appendix E1
Groundwater Modeling Results

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Appendix E1 Groundwater Modeling Results

E1.1 Numerical Groundwater Modeling Analysis

Numerical groundwater modeling analysis was performed using the Sacramento Valley Finite Element Groundwater Model (SACFEM2013) developed to simulate groundwater conditions in the Sacramento Valley Groundwater Basin (Reclamation 2015). SACFEM2013 was selected as the numerical modeling tool for this analysis based on the state of the model and its capabilities to simulate groundwater conditions at a greater level of detail than other potential modeling tools within the Seller Service Area. Reclamation commissioned a peer review of the SACFEM2013 model in 2010 (WRIME 2011). Revisions were made to the model and the revised model was used for the impacts analysis described here.

SACFEM2013 uses the MicroFEM finite-element numerical modeling code. MicroFEM is capable of simulating multiple aquifer systems in both steady state and transient conditions. The model is capable of simulating groundwater conditions and groundwater/surface water interactions in the valley. SACFEM2013 was also used to estimate how groundwater pumping and recharge affects surface water (Reclamation 2015).

SACFEM2013 covers the entire Sacramento Valley Groundwater Basin from just north of Red Bluff to the Cosumnes River in the south (see Figure E-1). The model was calibrated to historic conditions from Water Year (WY) 1970 through WY 2009. This SACFEM2013 model simulation, which includes highly variable historical hydrology (from very wet periods to very dry periods), was used as a basis for simulating groundwater substitution pumping. Potential water transfers for 2026 and 2027 were simulated in SACFEM2013 under September 1977 hydrologic conditions (after the simulated groundwater substitution transfer) because this year represents the driest condition available during the SACFEM2013 simulation period (WY 1970 to WY 2003).

Groundwater drawdown impacts associated with the groundwater substitution pumping from 426 wells that are part of the Proposed Action have been modeled to estimate effects to groundwater resources. The groundwater substitution pumping was modeled to occur from May through September, but groundwater substitution pumping could also occur in October. If groundwater pumping continued into October, groundwater drawdown impacts may also extend into October. However, even if groundwater pumping was extended into October, the total amount of water transferred would be the same quantity that was modeled. Because the same volume of groundwater substitution pumping may occur over a longer period of time, when compared to the shorter groundwater modeling period, impacts to groundwater levels, interaction with surface water, and land subsidence would be less than those modeled. Overall, a longer duration in pumping for the same quantity that was modeled would decrease the depth of the drawdown impacts.

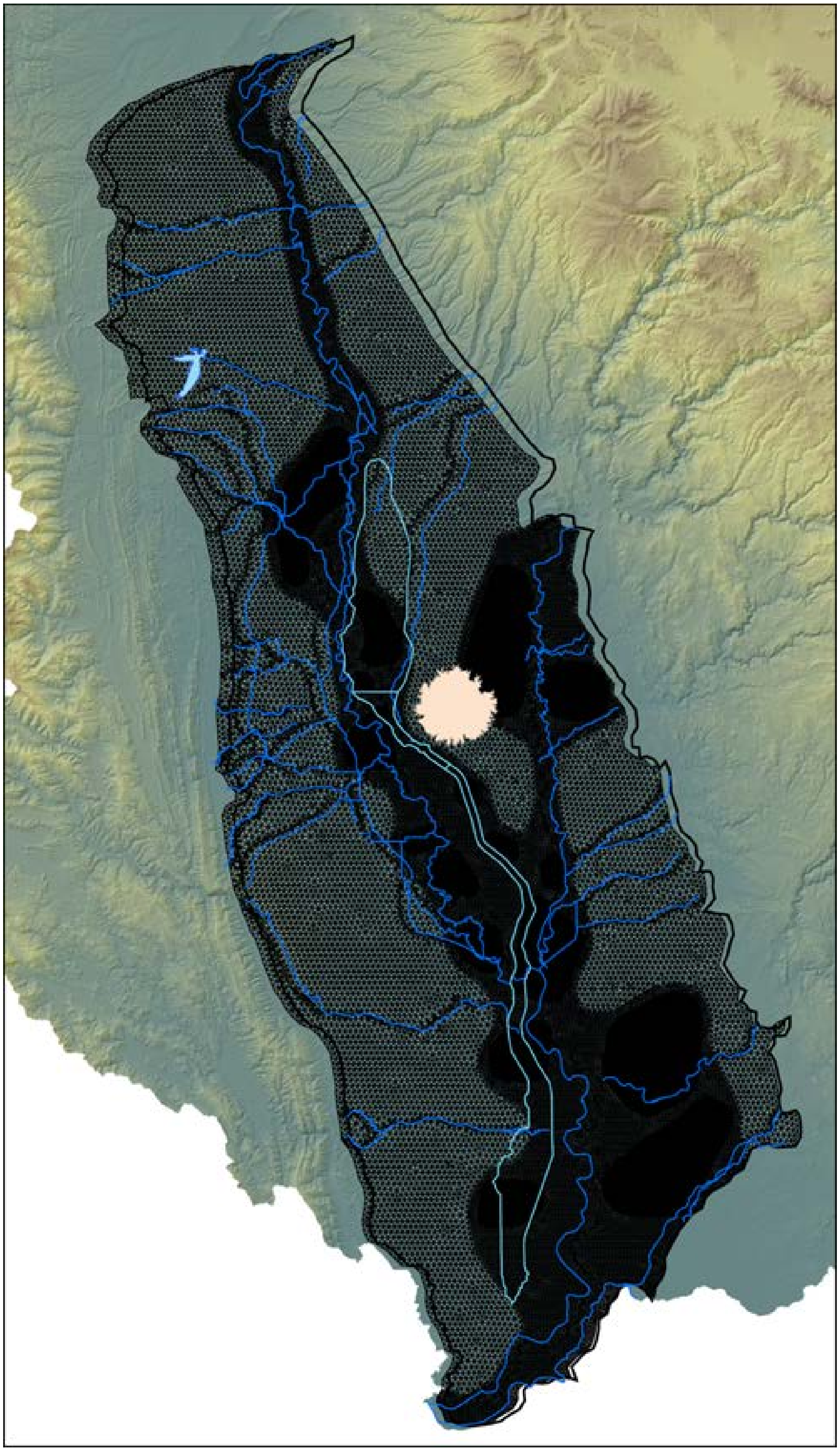

Figure E-1. SACFEM Model Domain

Table E-1 summarizes the pumping details including pumping capacity and the range of screened intervals of the modeled groundwater substitution pumping wells. The locations and depths of these wells are specified in the model based on data collected from the potential groundwater substitution Sellers.

Table E-1. Water Transfers through Groundwater Substitution under the Proposed Action (Potential 2026/2027 Wells)

Potential Seller	Number of Wells	Pumping Rate or Range of Rates (gpm)	Range of Screened Interval(s) (feet bgs)
Redding Area Groundwater Basin[1]			
Anderson-Cottonwood Irrigation District	2	1,200-5,500	150-455
Sacramento Valley Groundwater Basin			
Andreotti	1	6,000	200-400
Butte Water District	3	3,600-4,150	463-906
Cordua Irrigation District	37	800-3,100	60-430
Garden Highway Mutual Water Company	9	1,500-4,000	80-200
Gilsizer Slough Ranch	1	4,000	220-640
Giusti Farms	2	1,500-3,500	160-410
Glenn-Colusa Irrigation District	18	400-3,500	20-760
Henle Family Farms	2	2,600-3,600	155-480
Meridian Farms Water Company	13	1,200-3,000	115-310
Natomas Central Mutual Water Company	51	1,000-3,200	80-921
Pelger Mutual Water Company	5	2,500-4,400	101-485
Pelger Road 1700 LLC	4	3,500-5,000	200-720
Pleasant Grove-Verona Mutual Water Company	41	800-3,600	90-520
Princeton-Codora-Glenn Irrigation District	17	2,000-4,000	100-570
Provident Irrigation District	26	2,000-6,000	73-580
Reclamation District 108	26	1,250-4,950	100-1,020
Reclamation District 1004	3	4,500	380-730
RRG Garden Properties LLC	10	1,500-3,400	170-686
Roberts Ditch Irrigation Company	10	500-5,500	79-790
Sacramento County Water Agency	34	600-1,915	150-1,456
Sacramento Suburban Water District	64	400-3,500	145-810
Sutter Mutual Water Company	31	1,300-5,500	40-668
Te Velde Revocable Family Trust	10	2,500-4,500	56-415
Tule Basin Farms	4	2,500-3,600	100-480
Windswept Land & Livestock	4	2,500-3,500	120-580

Note:
1 Anderson-Cottonwood ID's proposed transfer was not simulated in the Sacramento Valley Finite Element Groundwater Model (SACFEM2013) because the model area does not include the Redding Area Groundwater Basin.
Key: gpm = gallons per minute; bgs = below ground surface

Figure E-2 through Figure E-8 show the simulated drawdown due to the Proposed Action under September 1977 hydrologic conditions. During dry years, surface water resources are limited and users have historically increased groundwater pumping to address shortages. Simulating transfers during this period illustrates the potential to compound impacts from dry-year pumping as compared to the No Action Alternative.

- Figure E-2a through Figure E-2c show the simulated drawdown at the water table based on results from the top layer of the SACFEM2013 model. This layer has a depth of up to 35 feet below ground surface (bgs).
- Figure E-3a through Figure E-3c show simulated drawdown at approximately 35 to 200 feet bgs.
- Figure E-4a through Figure E-4c show simulated drawdown at approximately 200 to 300 feet bgs.
- Figure E-5a through Figure E-5c present the simulated drawdown at approximately 300 to 400 feet bgs.
- Figure E-6a through Figure E-6c present the simulated drawdown at approximately 500 to 700 feet bgs.
- Figure E-7a through Figure E-7c present the simulated drawdown at approximately 700 to 900 feet bgs.
- Figure E-8a through Figure E-8c show simulated drawdown at approximately 900 to 1,300 feet bgs.
- Figure E-9 overlays the Indian Trust Assets (ITAs) within the Sacramento Valley Groundwater Basin over the simulated drawdown at the water table.

Drawdown at the water table (Figure E-2a through Figure E-2-c, and Figure E-29) represents the estimated decline in the groundwater surface within the shallow, unconfined portion of the aquifer (i.e., the height of water within a shallow groundwater well). Figure E-3a through Figure E-3c also show drawdown in the shallower portion of the aquifer system. The drawdown in the deeper portions of the aquifer (Figure E-4a through Figure E-8c) represents a change in hydraulic head (i.e., water pressure) in a well that is screened in this deeper portion of the aquifer.

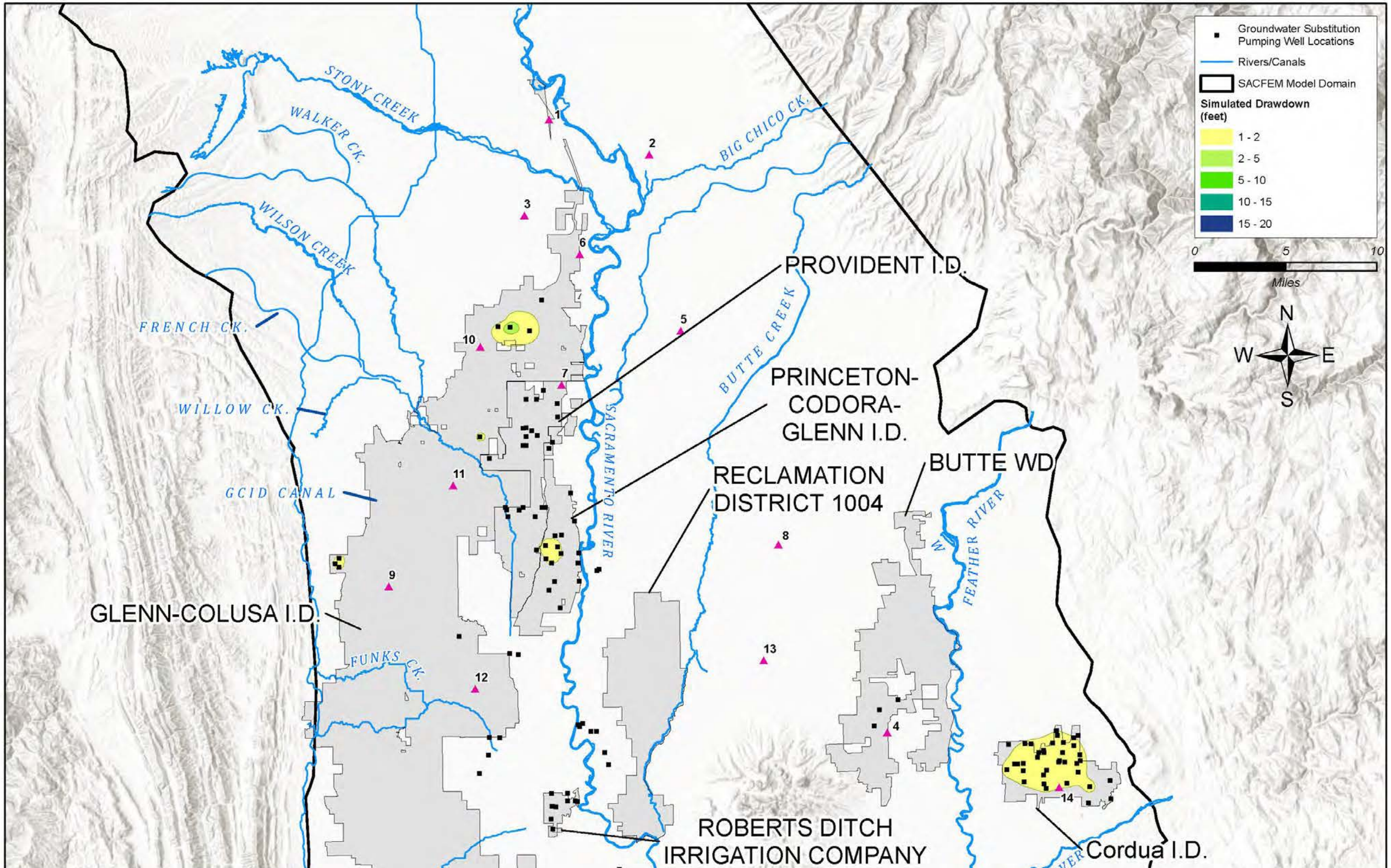

Figure E-2a. Simulated Drawdown in Water Table Elevation (0 to approximately 35 feet bgs), Based on September 1977 Hydrologic Conditions

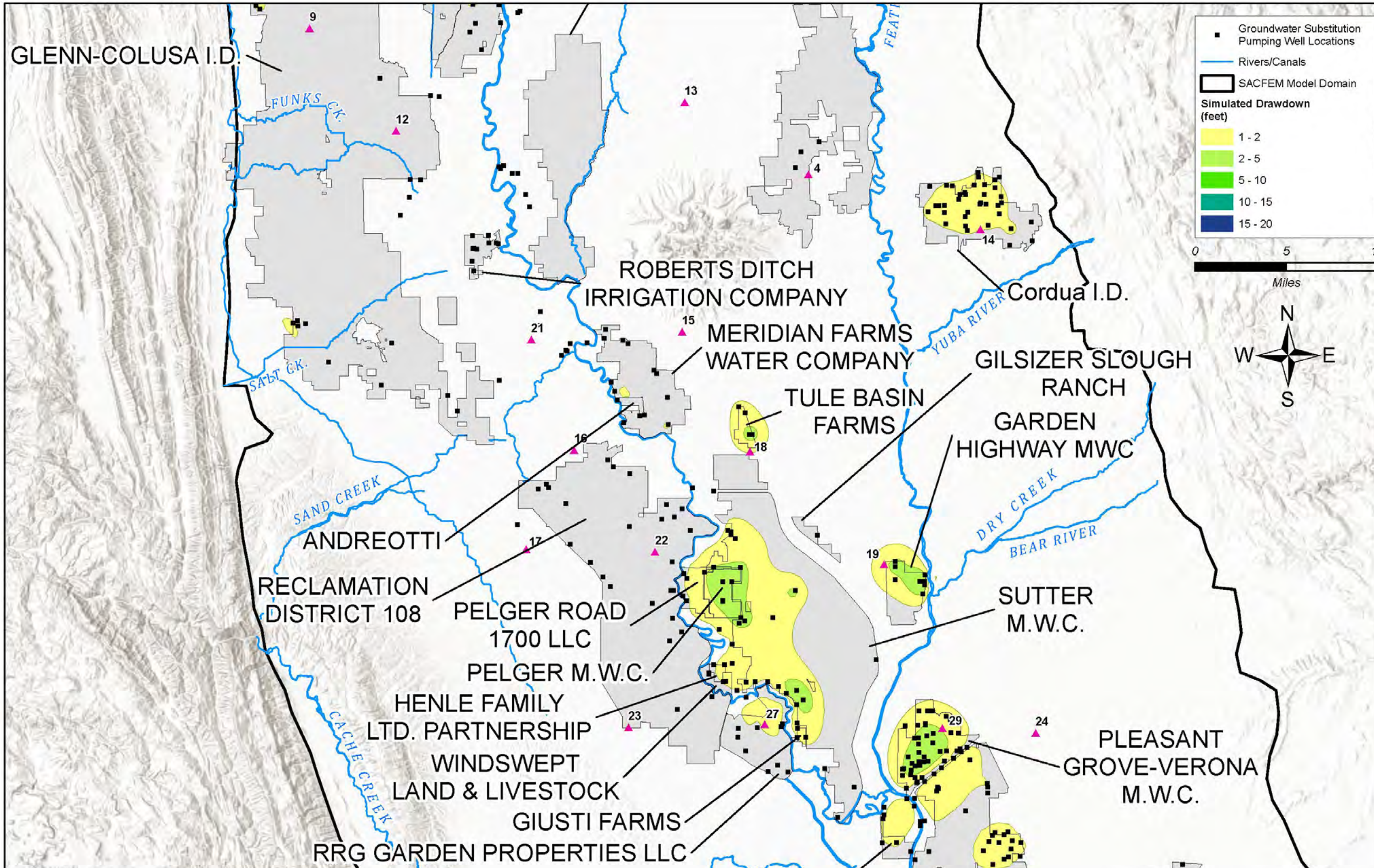

Figure E-2b. Simulated Drawdown in Water Table Elevation (0 to approximately 35 feet bgs), Based on September 1977 Hydrologic Conditions

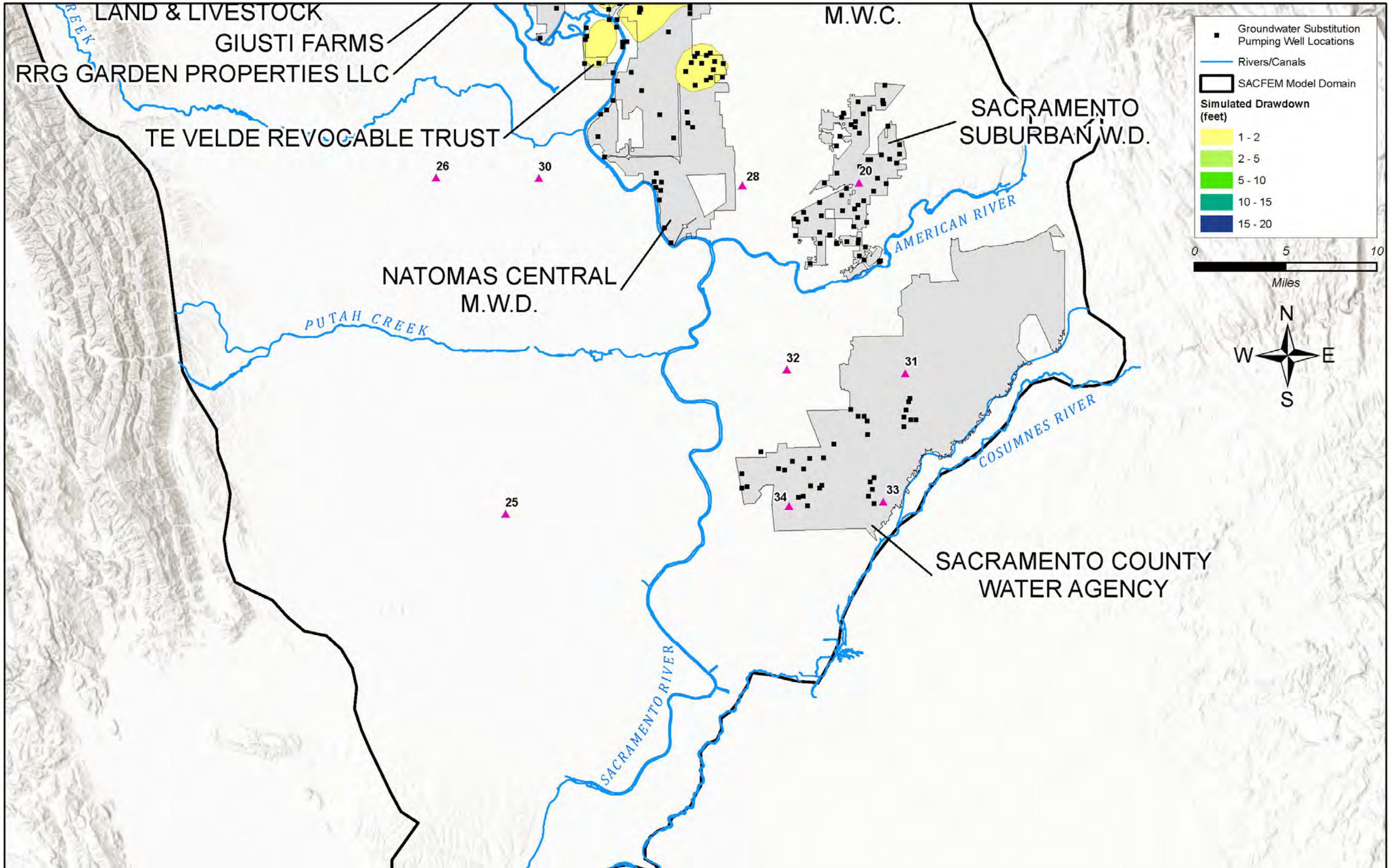

Figure E-2c. Simulated Drawdown in Water Table Elevation (0 to approximately 35 feet bgs), Based on September 1977 Hydrologic Conditions

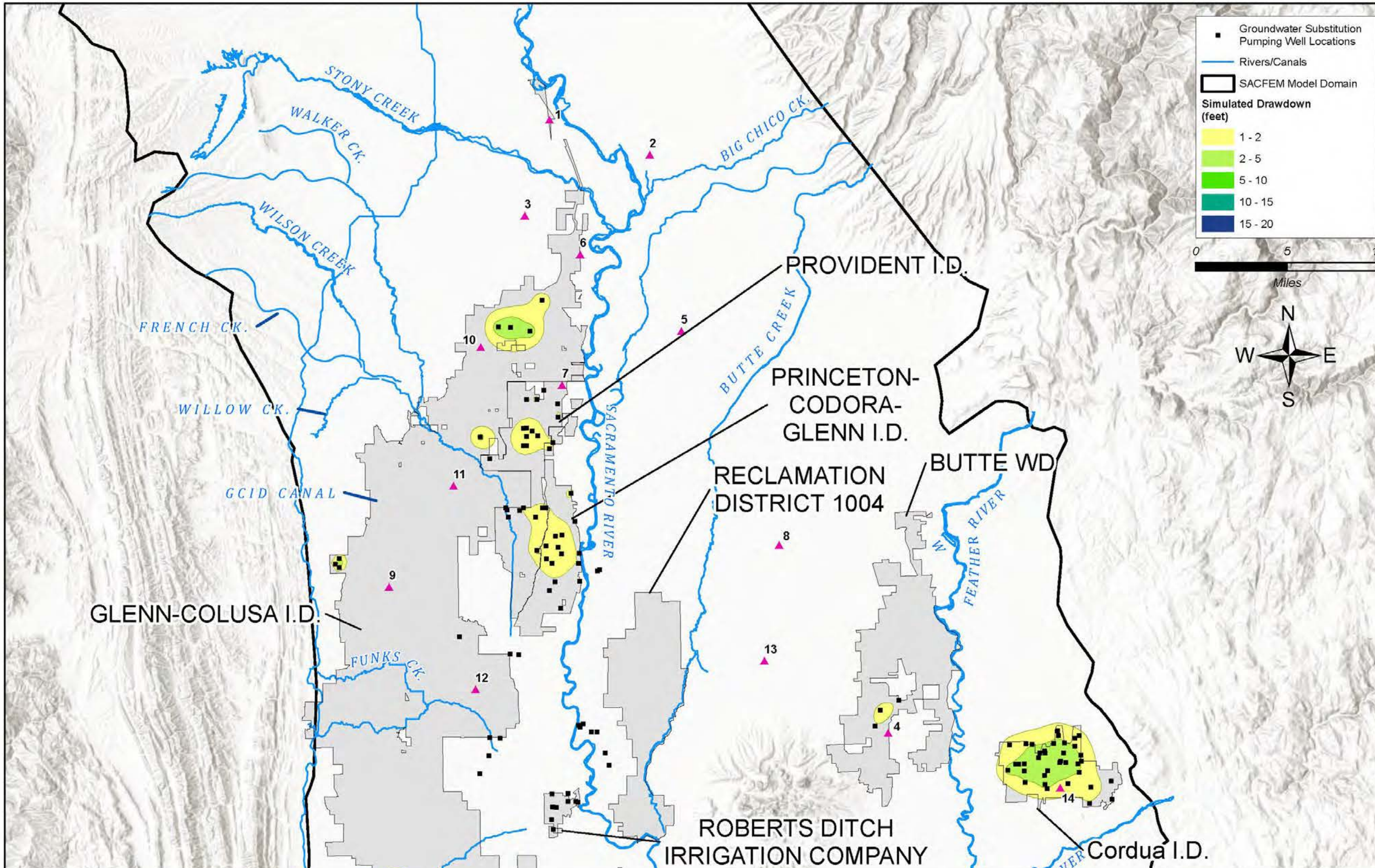

Figure E-3a. Simulated Drawdown in Water Table Elevation (approximately 35 to 200 feet bgs), Based on September 1977 Hydrologic Conditions

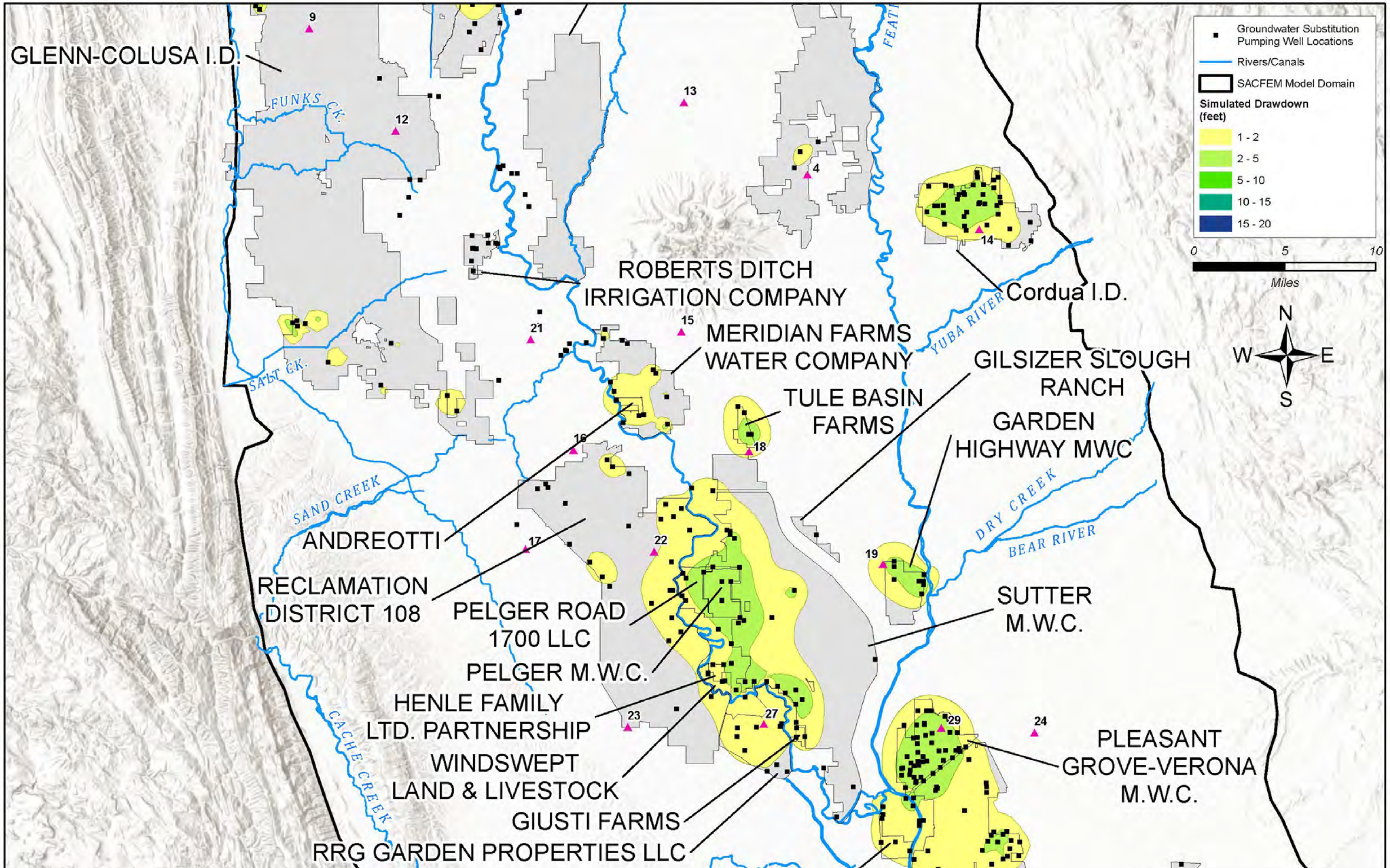

Figure E-3b. Simulated Drawdown in Water Table Elevation (approximately 35 to 200 feet bgs), Based on September 1977 Hydrologic Conditions

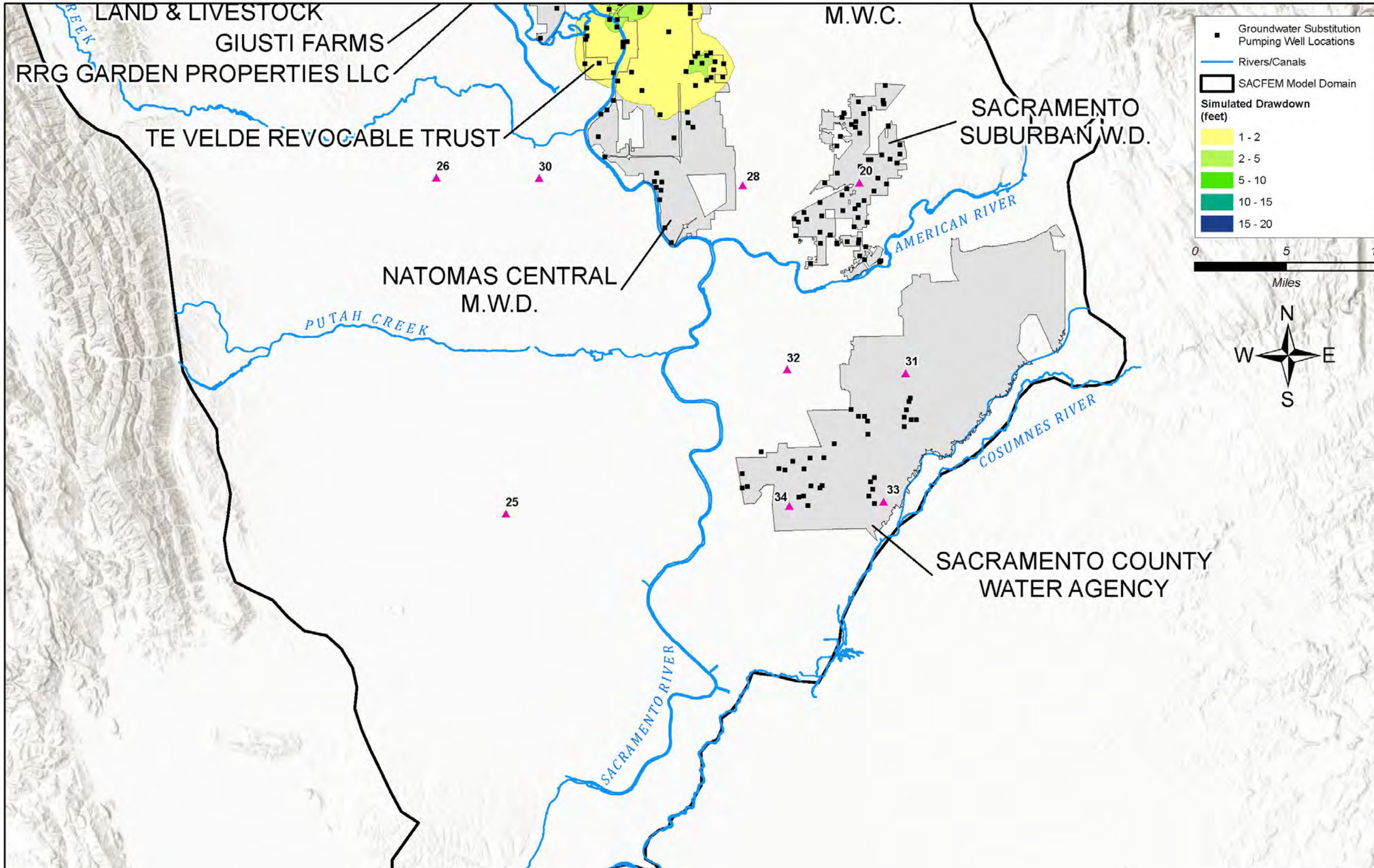

Figure E-3c. Simulated Drawdown in Water Table Elevation (approximately 35 to 200 feet bgs), Based on September 1977 Hydrologic Conditions

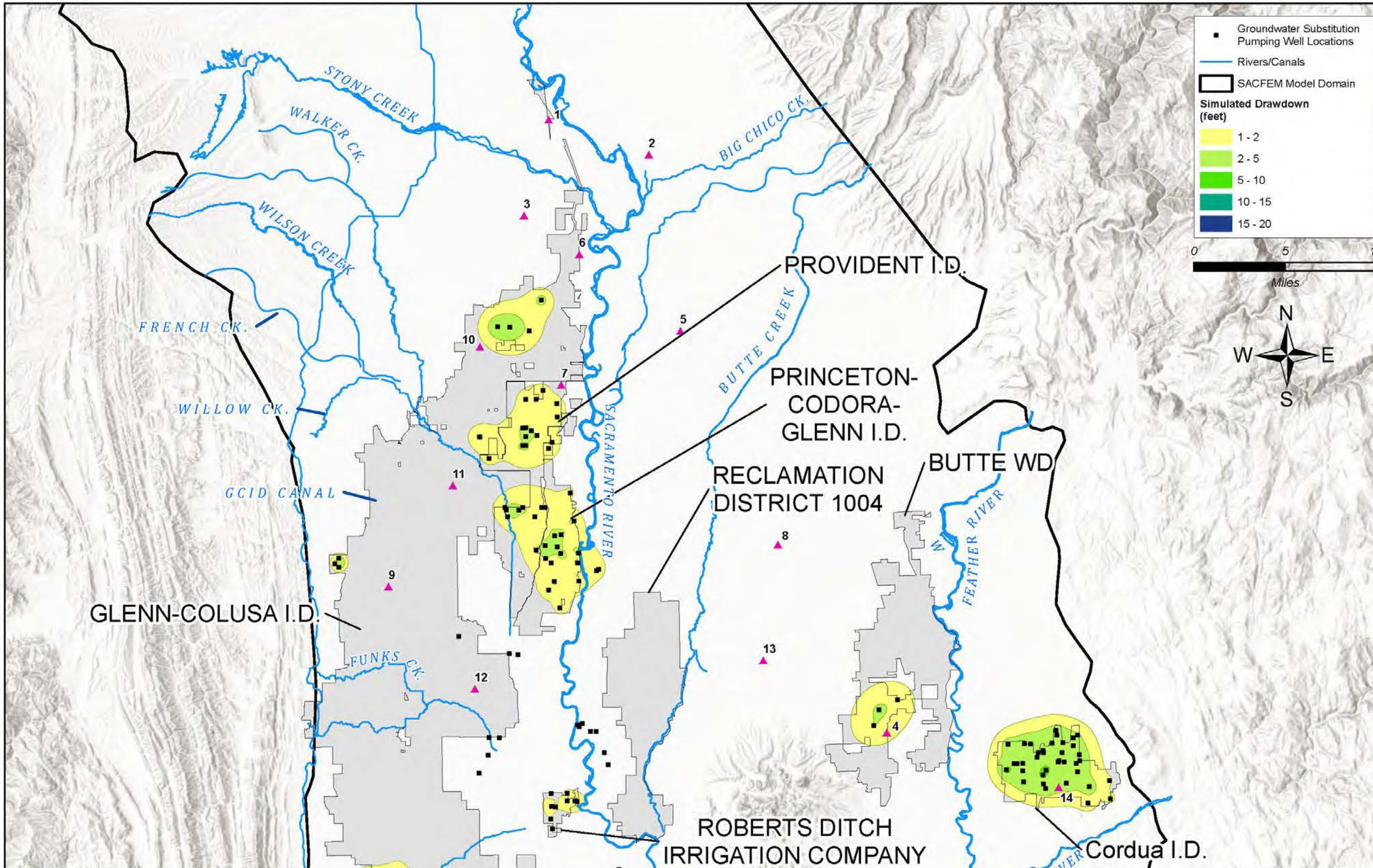

Figure E-4a. Simulated Drawdown in Groundwater Head (approximately 200 to 300 feet bgs), Based on September 1977 Hydrologic Conditions

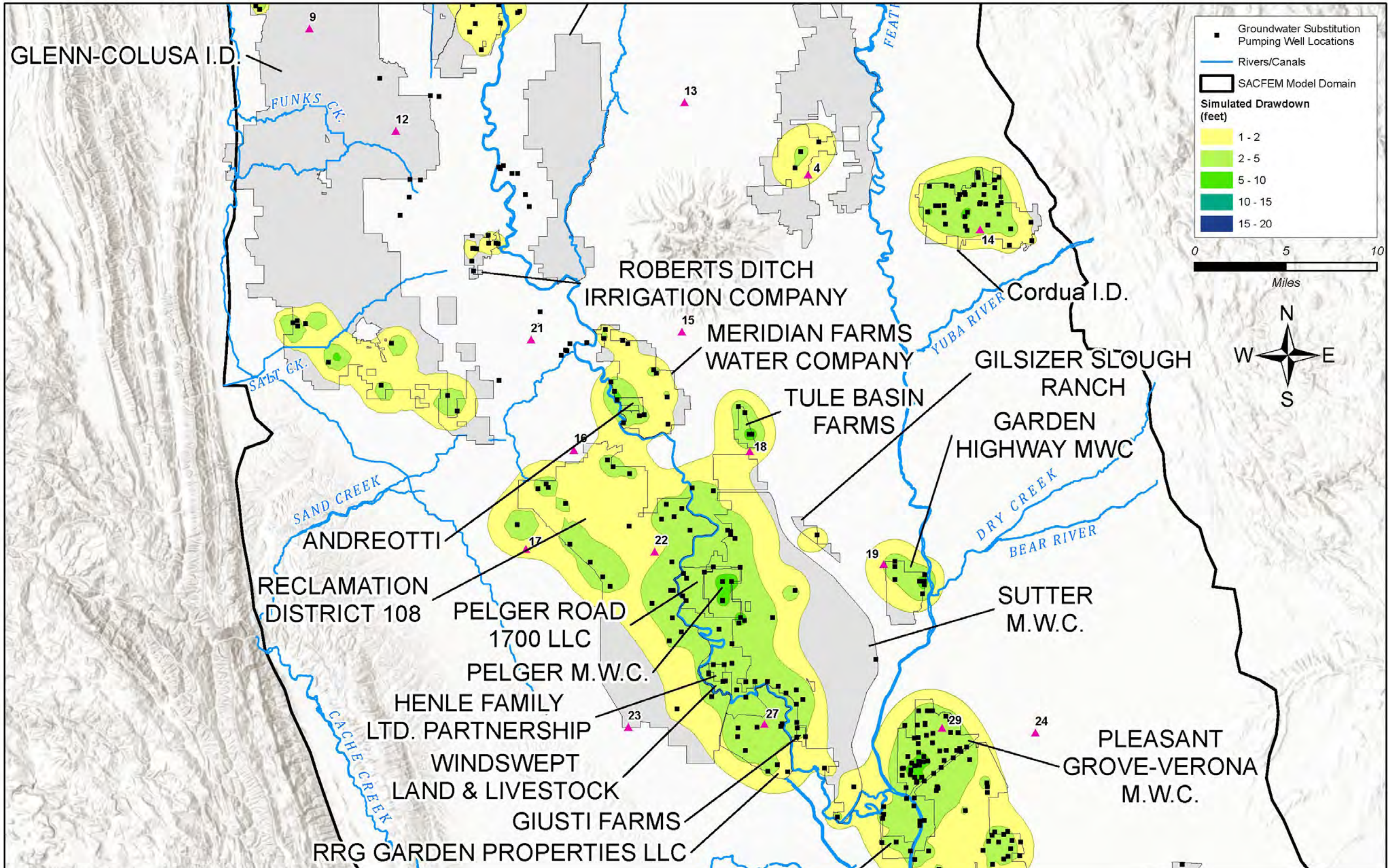

Figure E-4b. Simulated Drawdown in Groundwater Head (approximately 200 to 300 feet bgs), Based on September 1977 Hydrologic Conditions

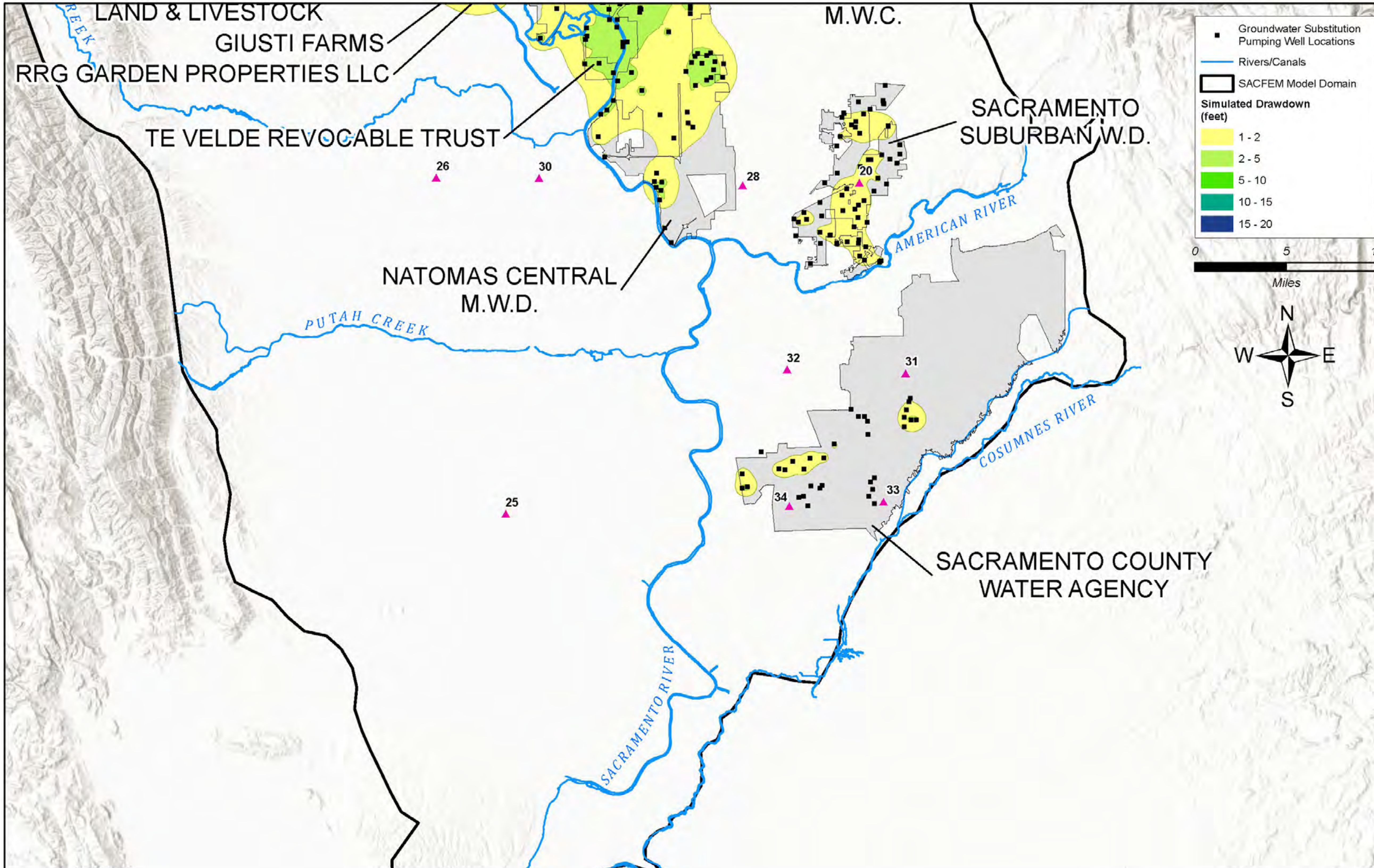

Figure E-4c. Simulated Drawdown in Groundwater Head (approximately 200 to 300 feet bgs), Based on September 1977 Hydrologic Conditions

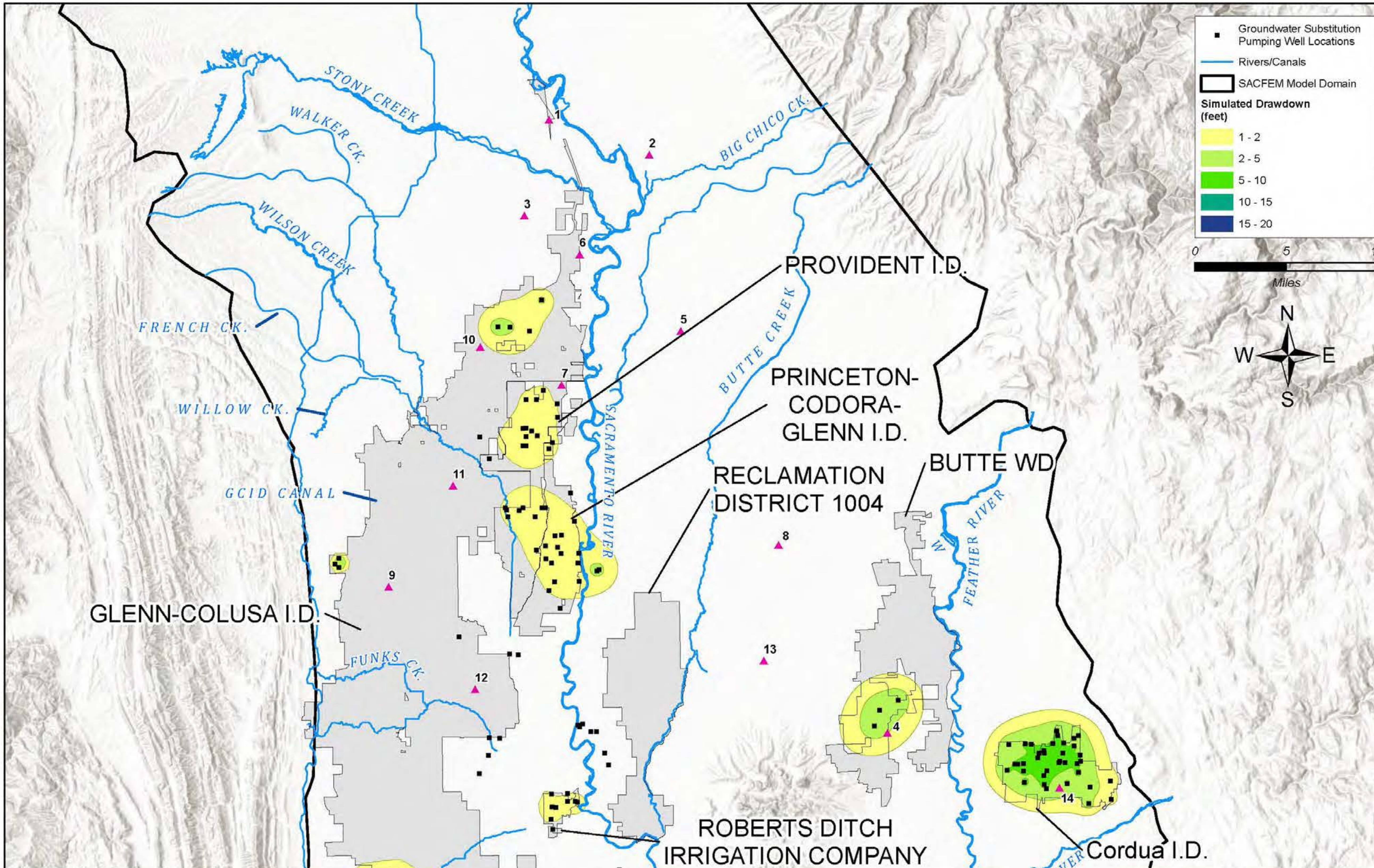

Figure E-5a. Simulated Drawdown in Groundwater Head (approximately 300 to 400 feet bgs), Based on September 1977 Hydrologic Conditions

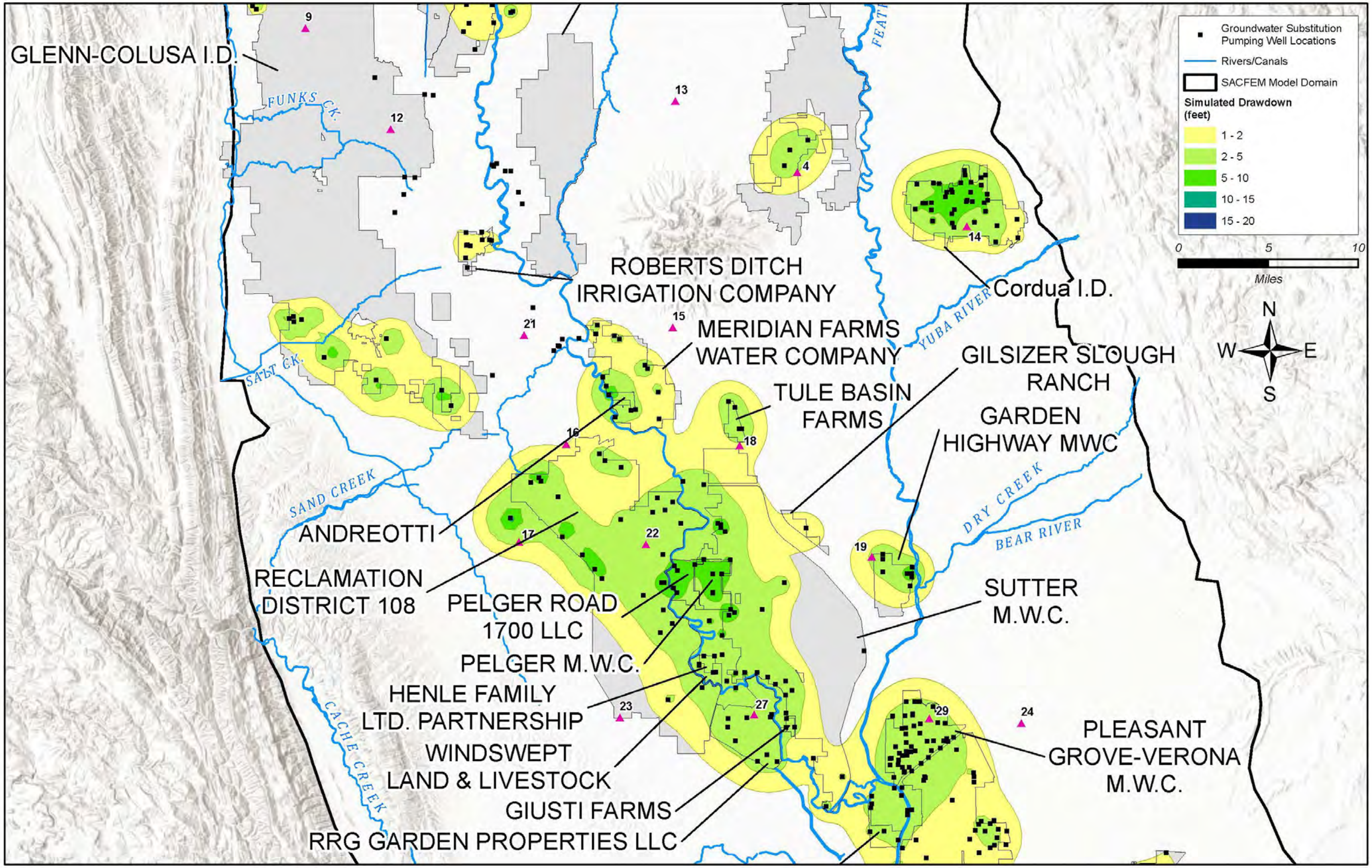

Figure E-5b. Simulated Drawdown in Groundwater Head (approximately 300 to 400 feet bgs), Based on September 1977 Hydrologic Conditions

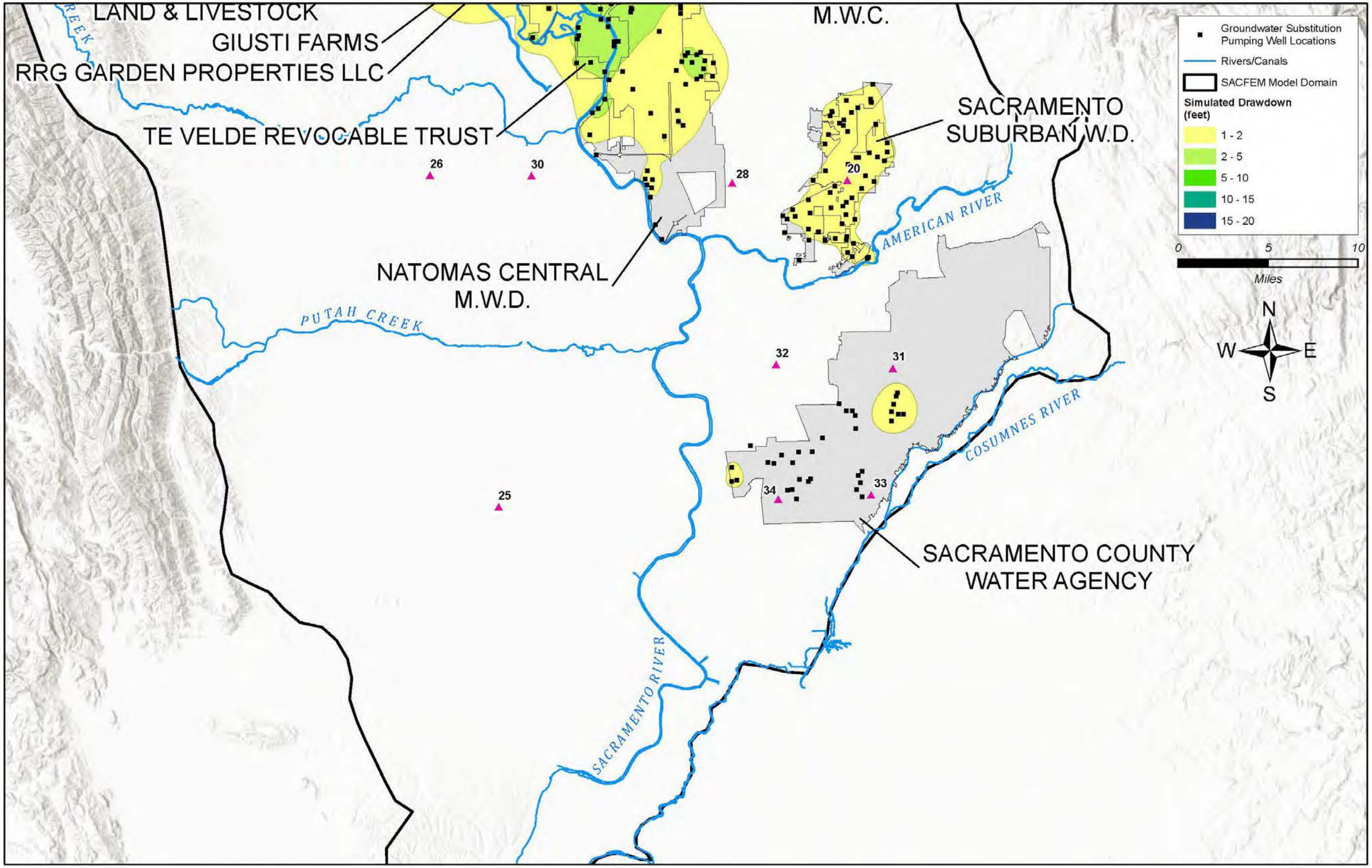

Figure E-5c. Simulated Drawdown in Groundwater Head (approximately 300 to 400 feet bgs), Based on September 1977 Hydrologic Conditions

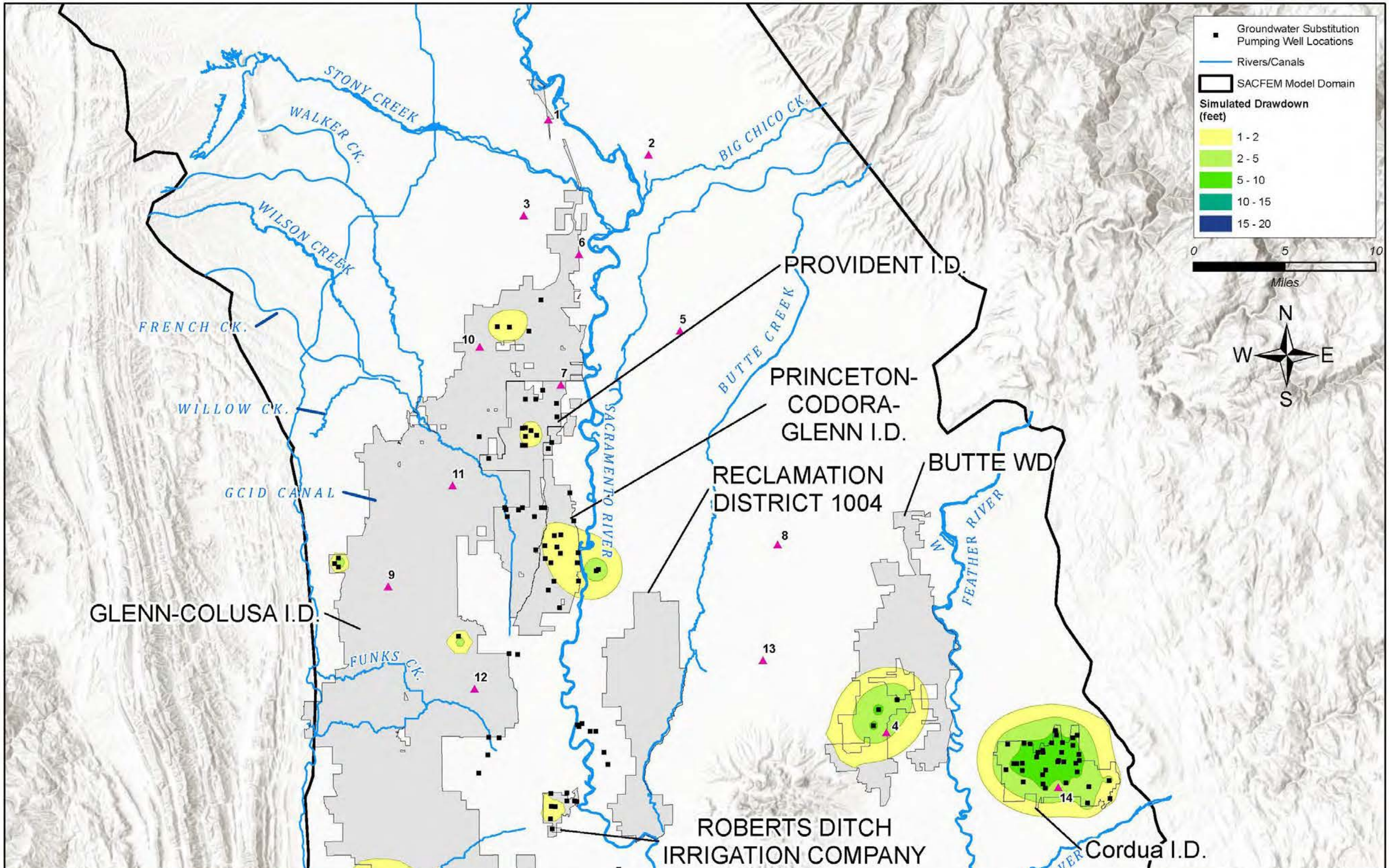

Figure E-6a. Simulated Drawdown in Groundwater Head (approximately 500 to 700 feet bgs), Based on September 1977 Hydrologic Conditions

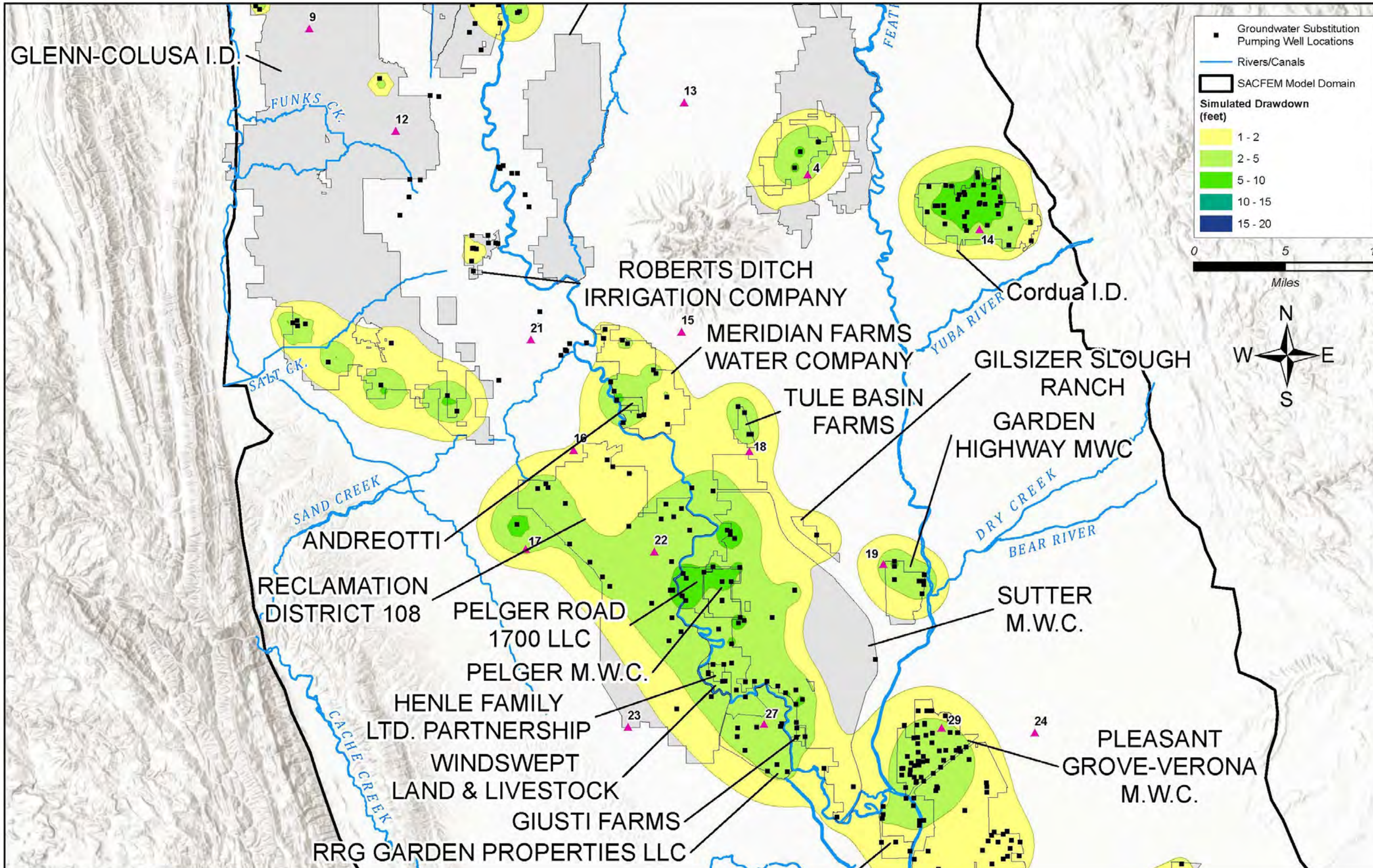

Figure E-6b. Simulated Drawdown in Groundwater Head (approximately 500 to 700 feet bgs), Based on September 1977 Hydrologic Conditions

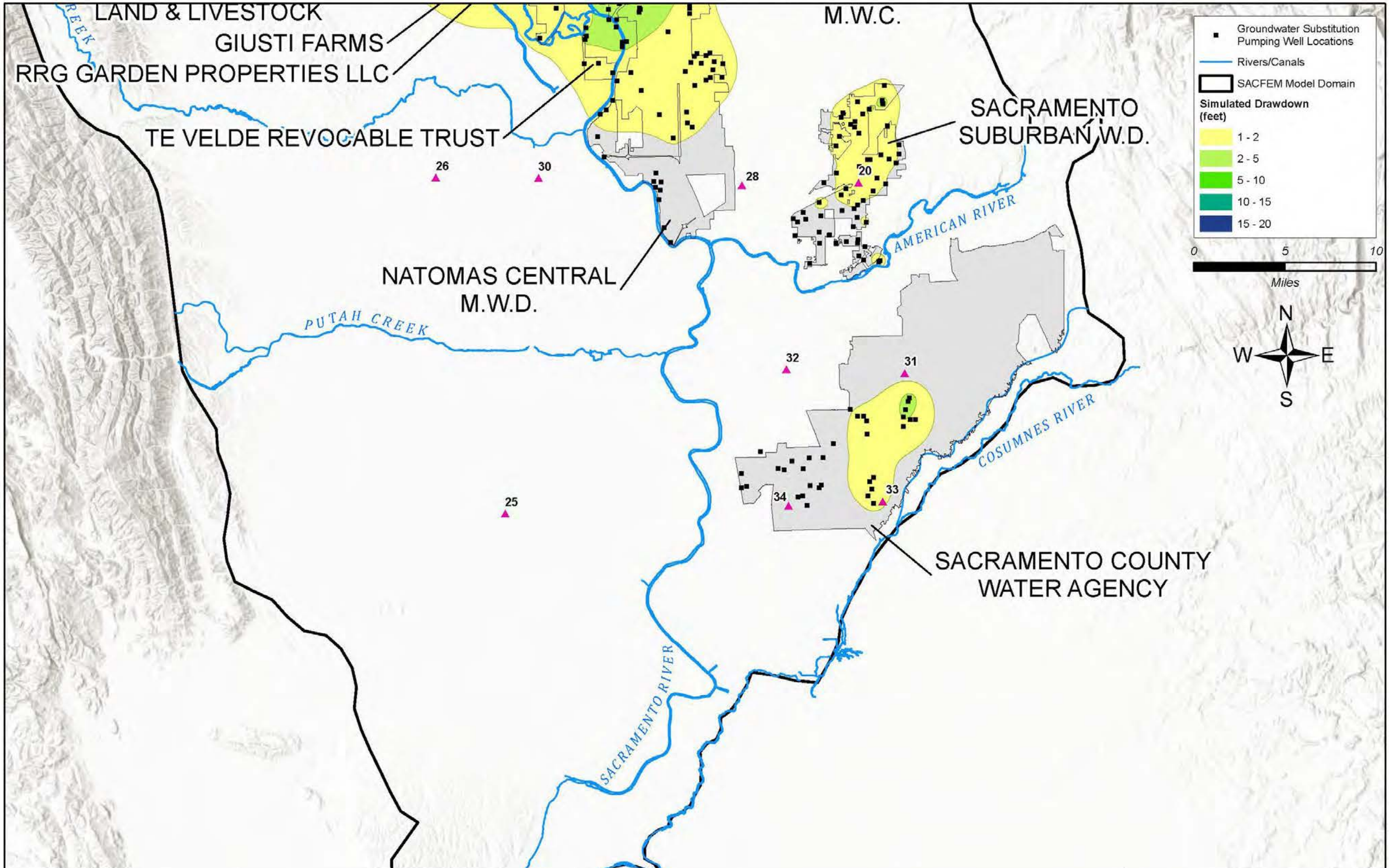

Figure E-6c. Simulated Drawdown in Groundwater Head (approximately 500 to 700 feet bgs), Based on September 1977 Hydrologic Conditions

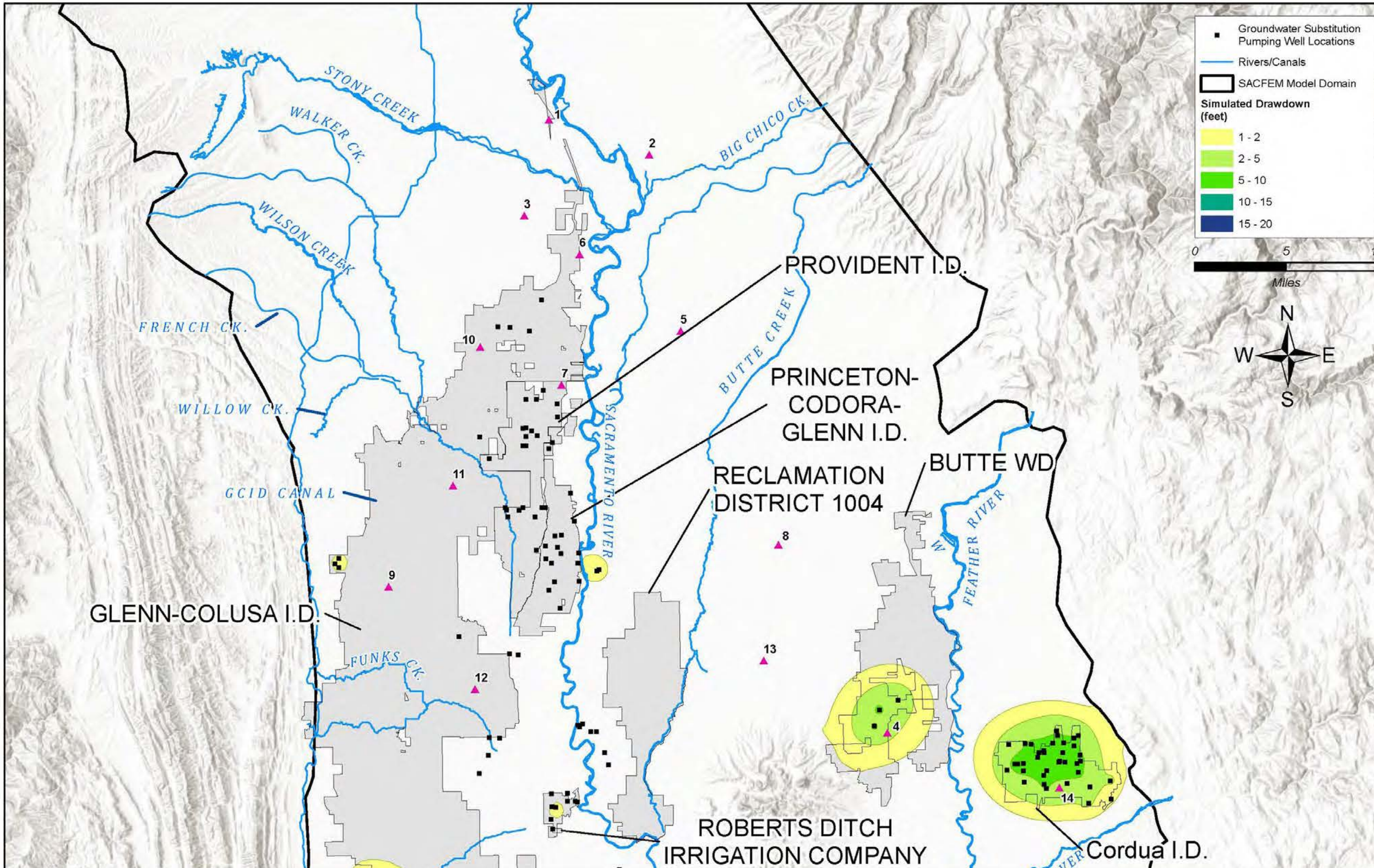

Figure E-7a. Simulated Drawdown in Groundwater Head (approximately 700 to 900 feet bgs), Based on September 1977 Hydrologic Conditions

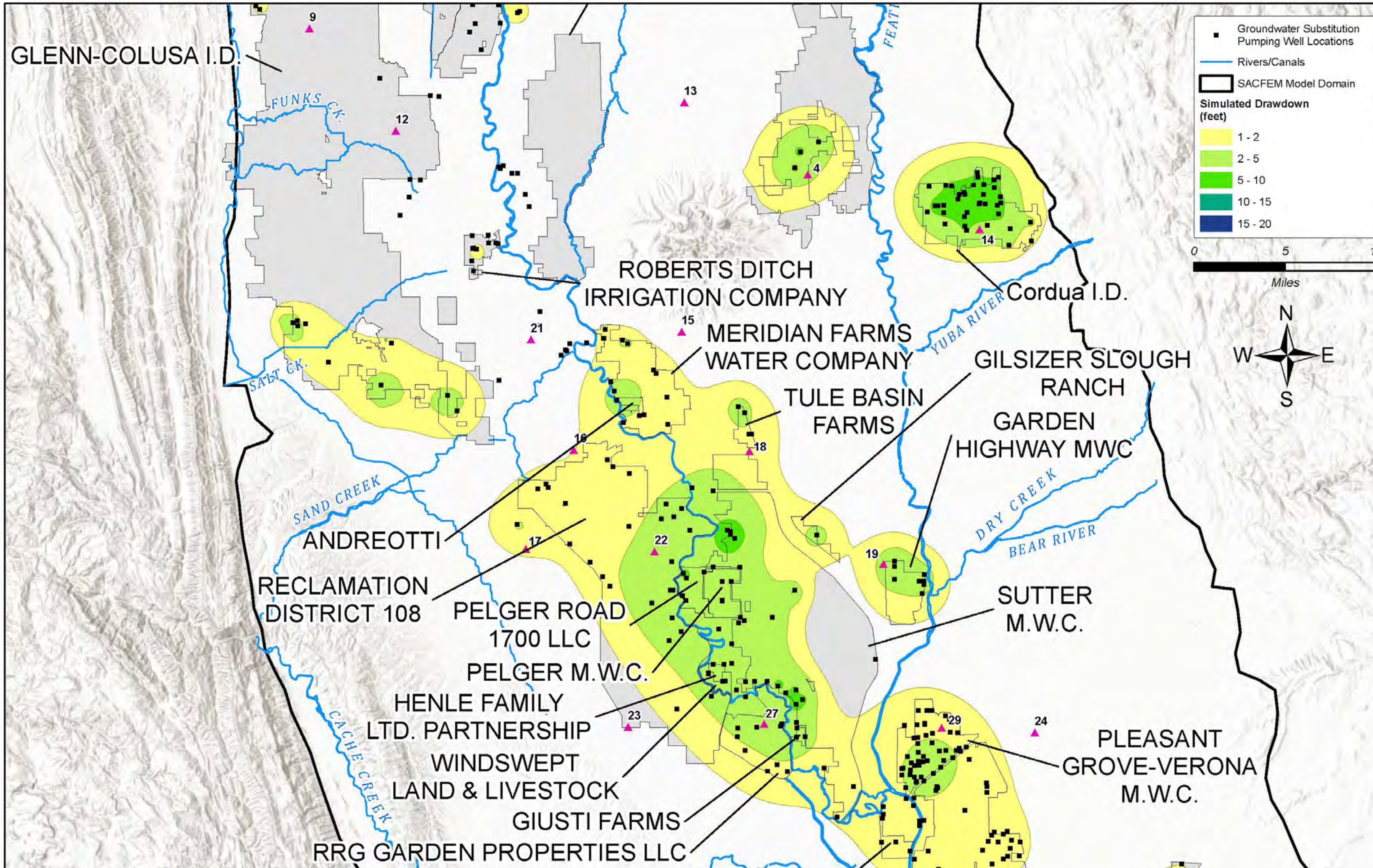

Figure E-7b. Simulated Drawdown in Groundwater Head (approximately 700 to 900 feet bgs), Based on September 1977 Hydrologic Conditions

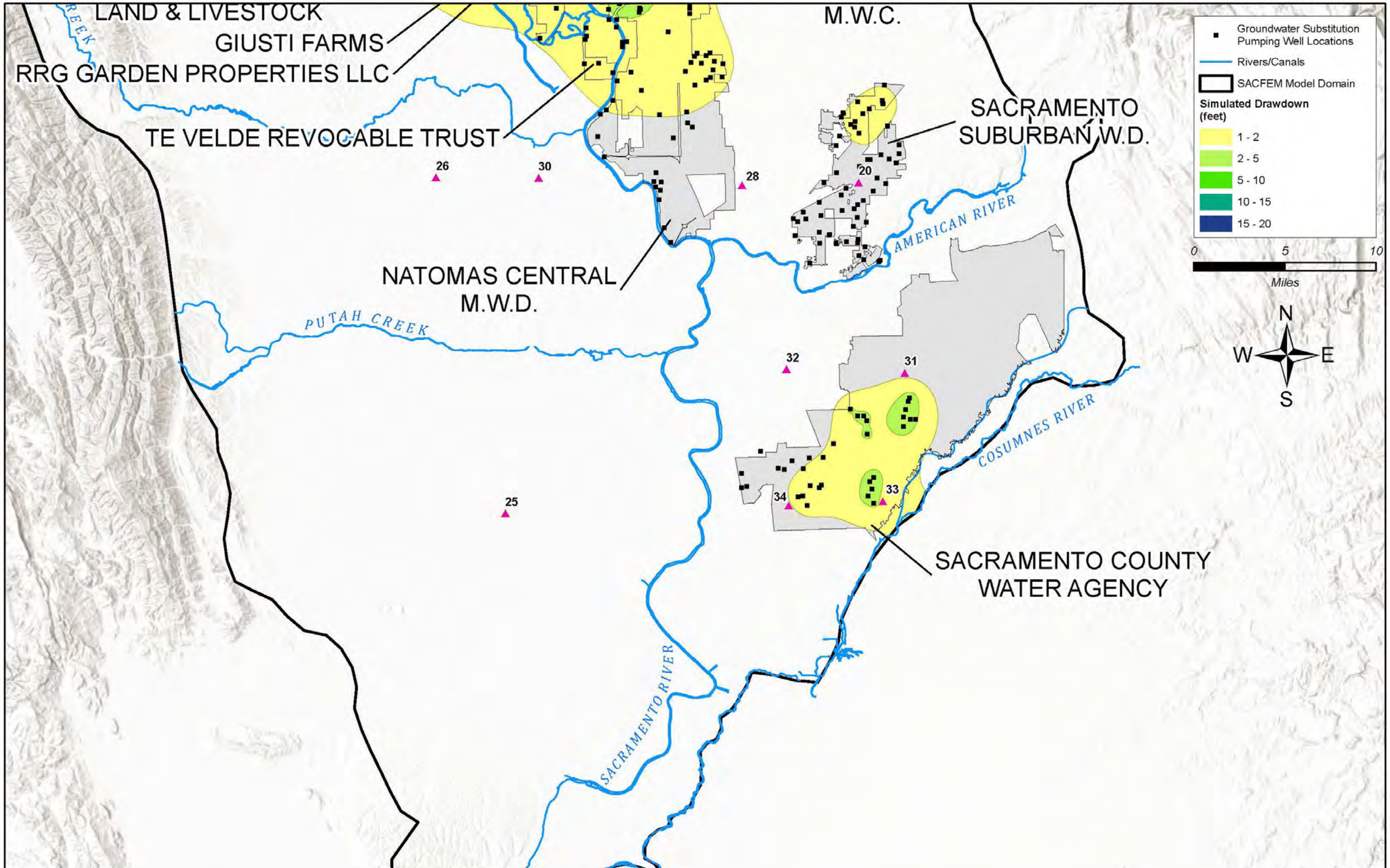

Figure E-7c. Simulated Drawdown in Groundwater Head (approximately 700 to 900 feet bgs), Based on September 1977 Hydrologic Conditions

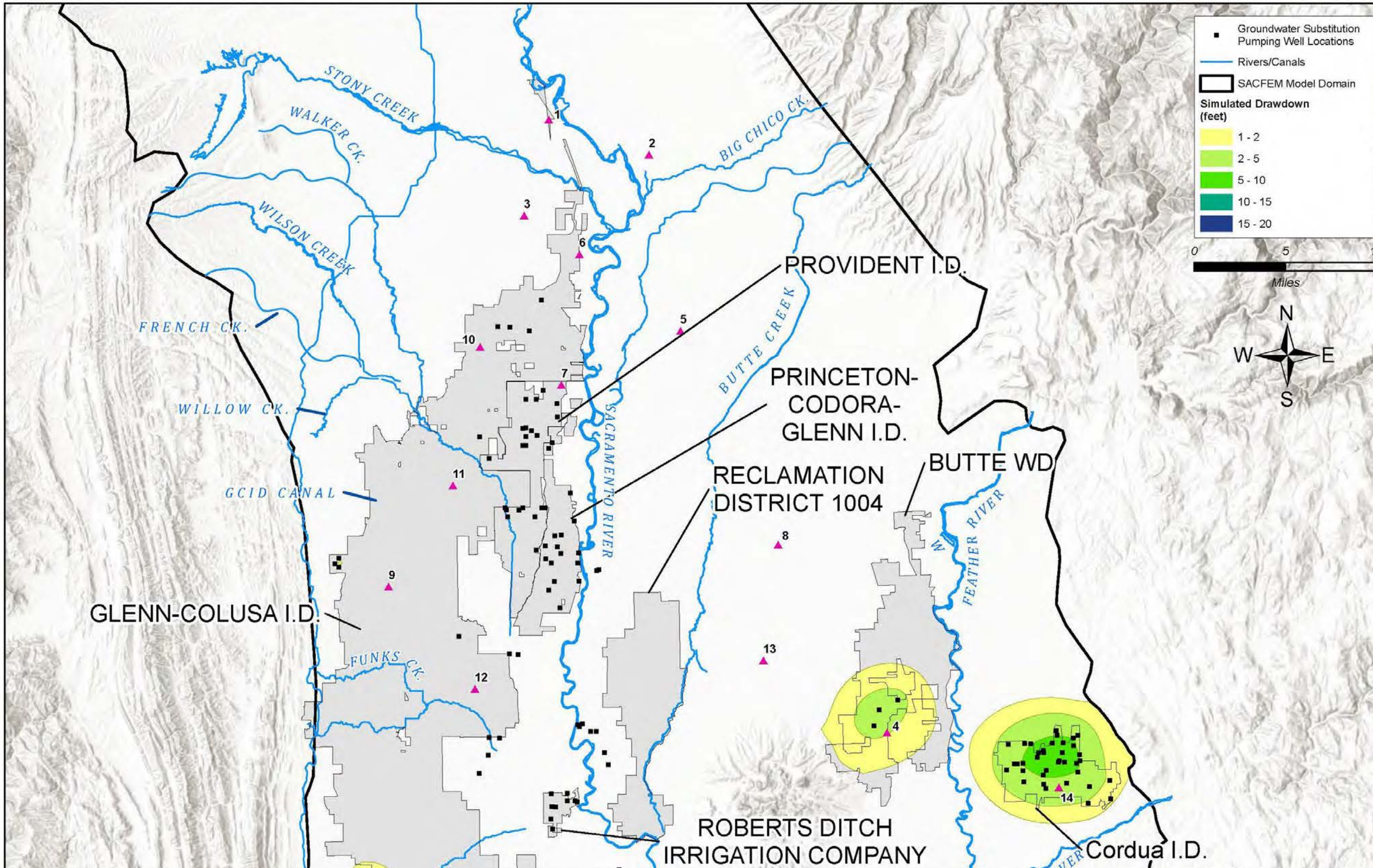

Figure E-8a. Simulated Drawdown in Groundwater Head (approximately 900 to 1,300 feet bgs), Based on September 1977 Hydrologic Conditions

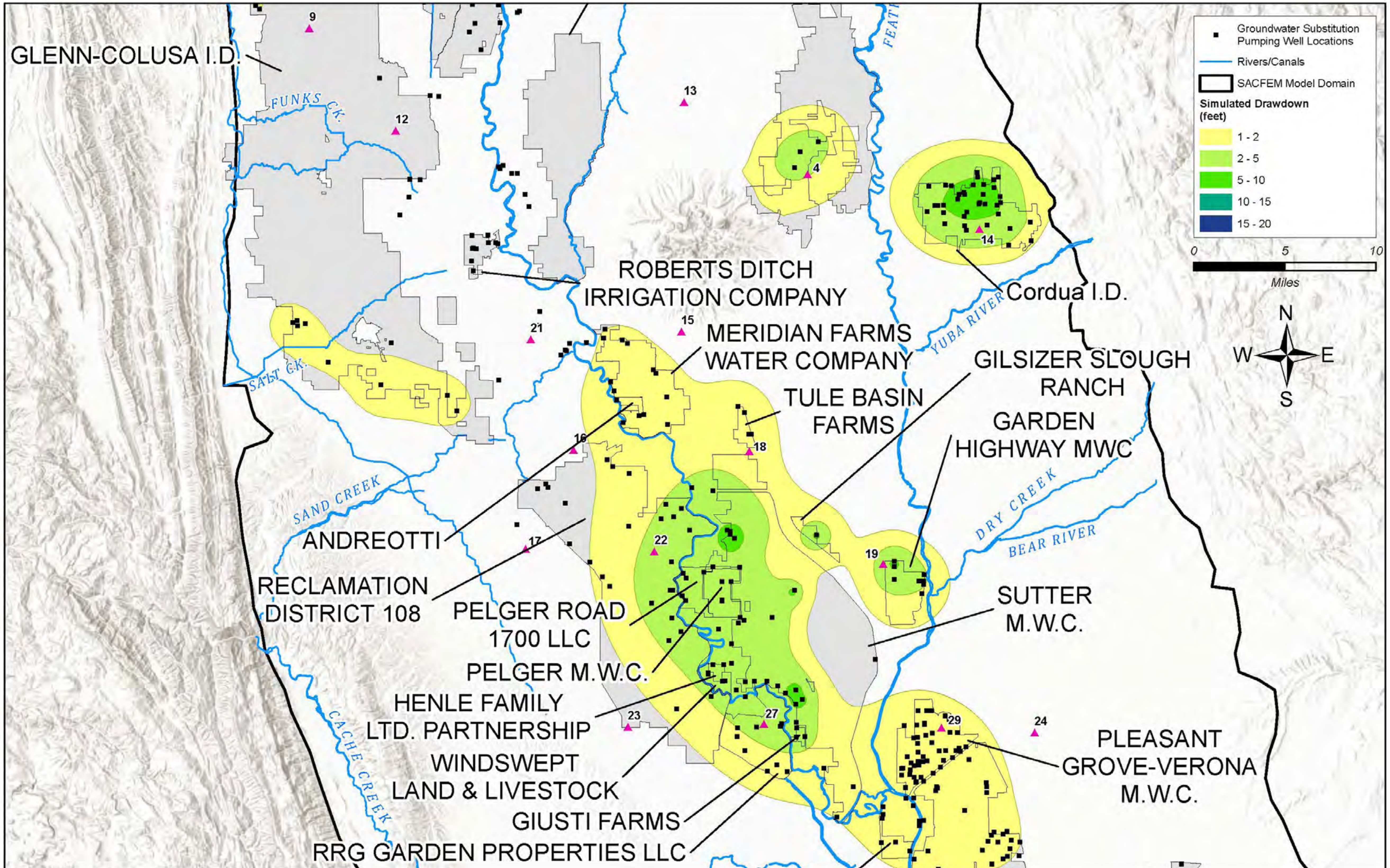

Figure E-8b. Simulated Drawdown in Groundwater Head (approximately 900 to 1,300 feet bgs), Based on September 1977 Hydrologic Conditions

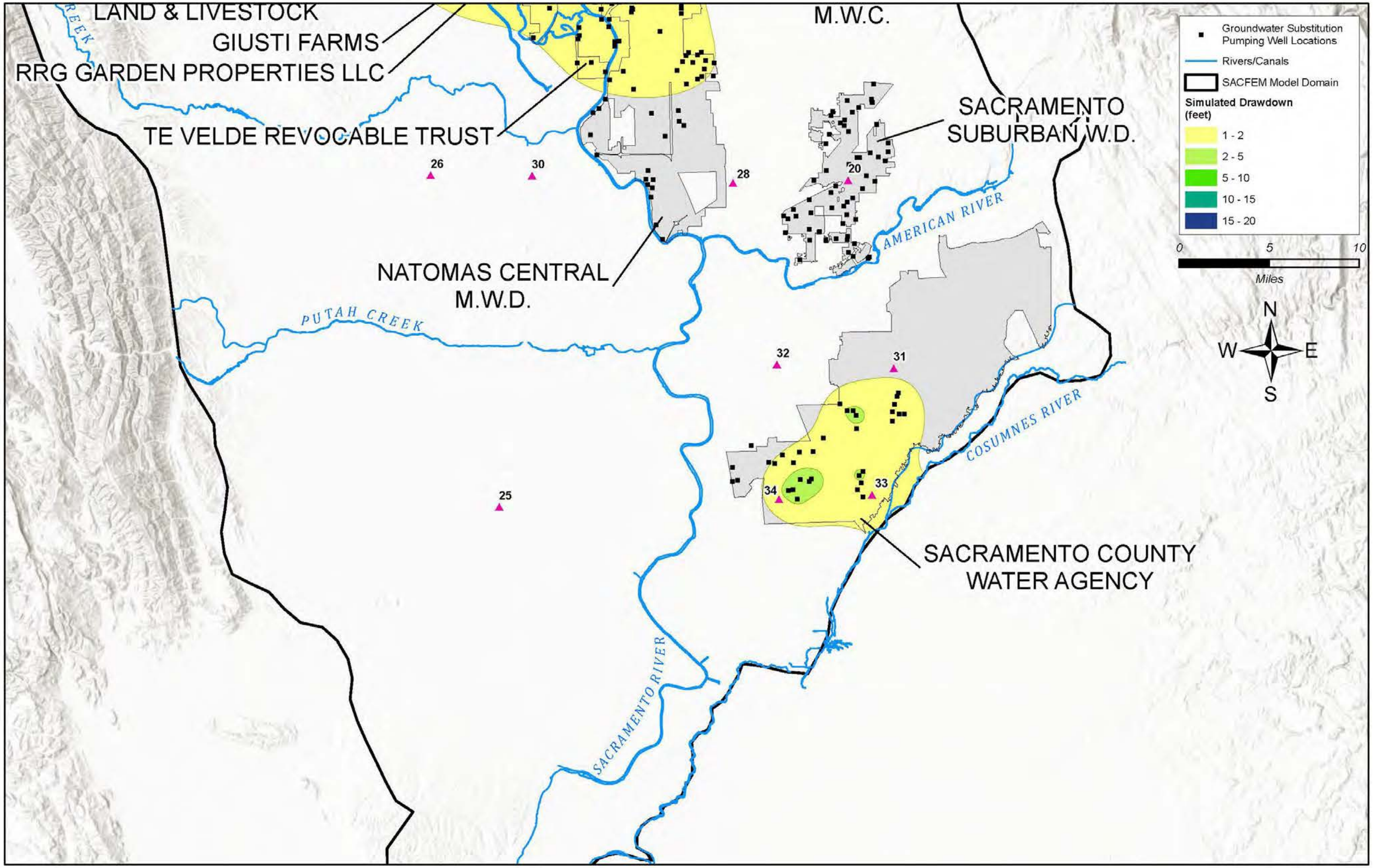

Figure E-8c. Simulated Drawdown in Groundwater Head (approximately 900 to 1,300 feet bgs), Based on September 1977 Hydrologic Conditions

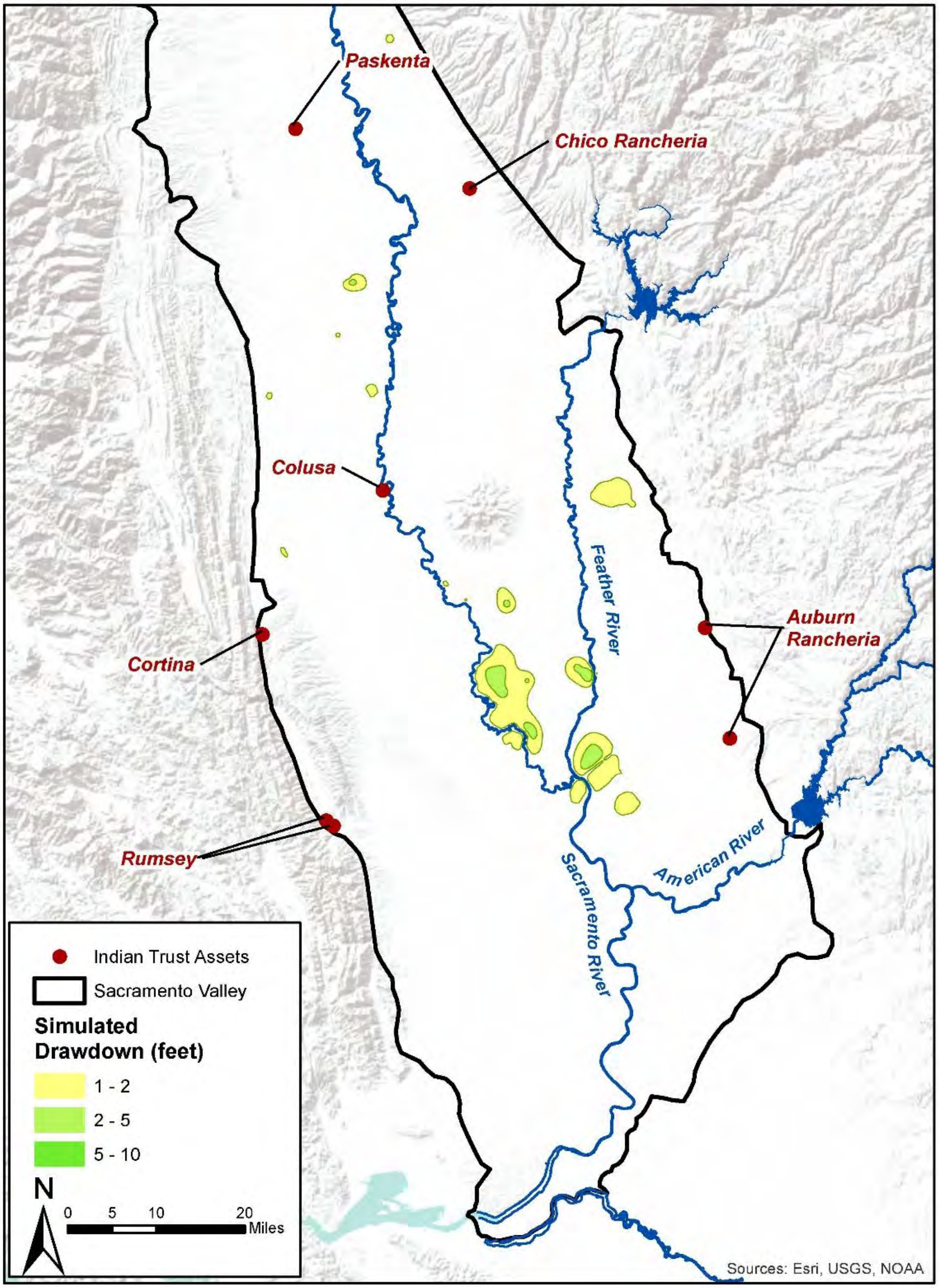

Figure E-9. Groundwater Effects to ITAs in the Sacramento Valley Groundwater Basin (simulated drawdown at the water table)

E1.2 References

Bureau of Reclamation. (Reclamation). 2015. SACFEM2013: Sacramento Valley Finite Element Groundwater Flow Model User's Manual. Prepared by CH2M HILL and MBK Engineers, Inc. February.

WRIME. 2011. AQUA Exhibit 65: Technical Memorandum. Peer Review of Sacramento Valley Finite Element Groundwater Model (SACFEM). Available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/california_waterfix/exhibits/docs/CSPA%20et%20al/aqua_65.pdf. [Accessed on August 12, 2024].

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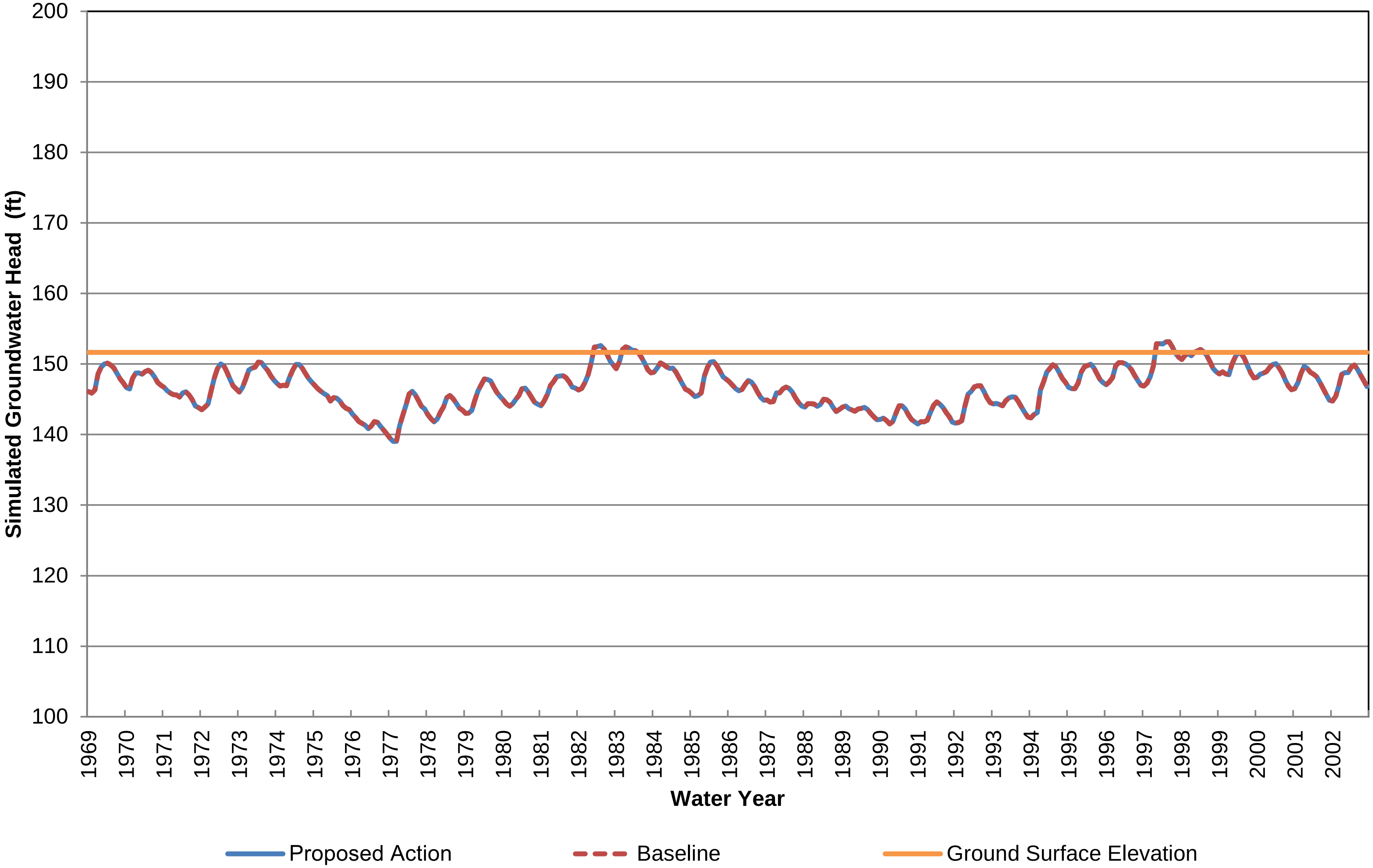
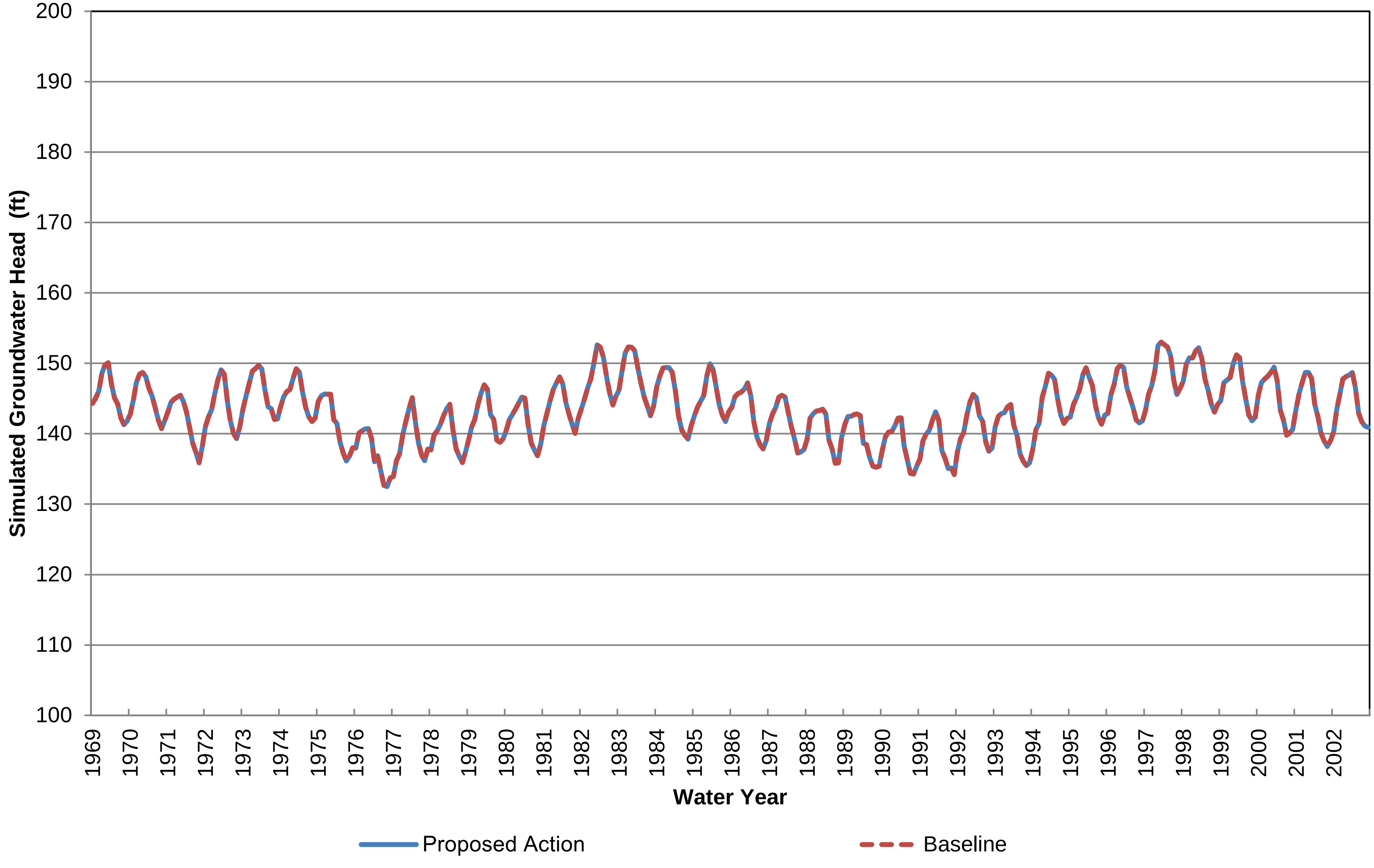
Appendix E2
Groundwater Head Hydrographs

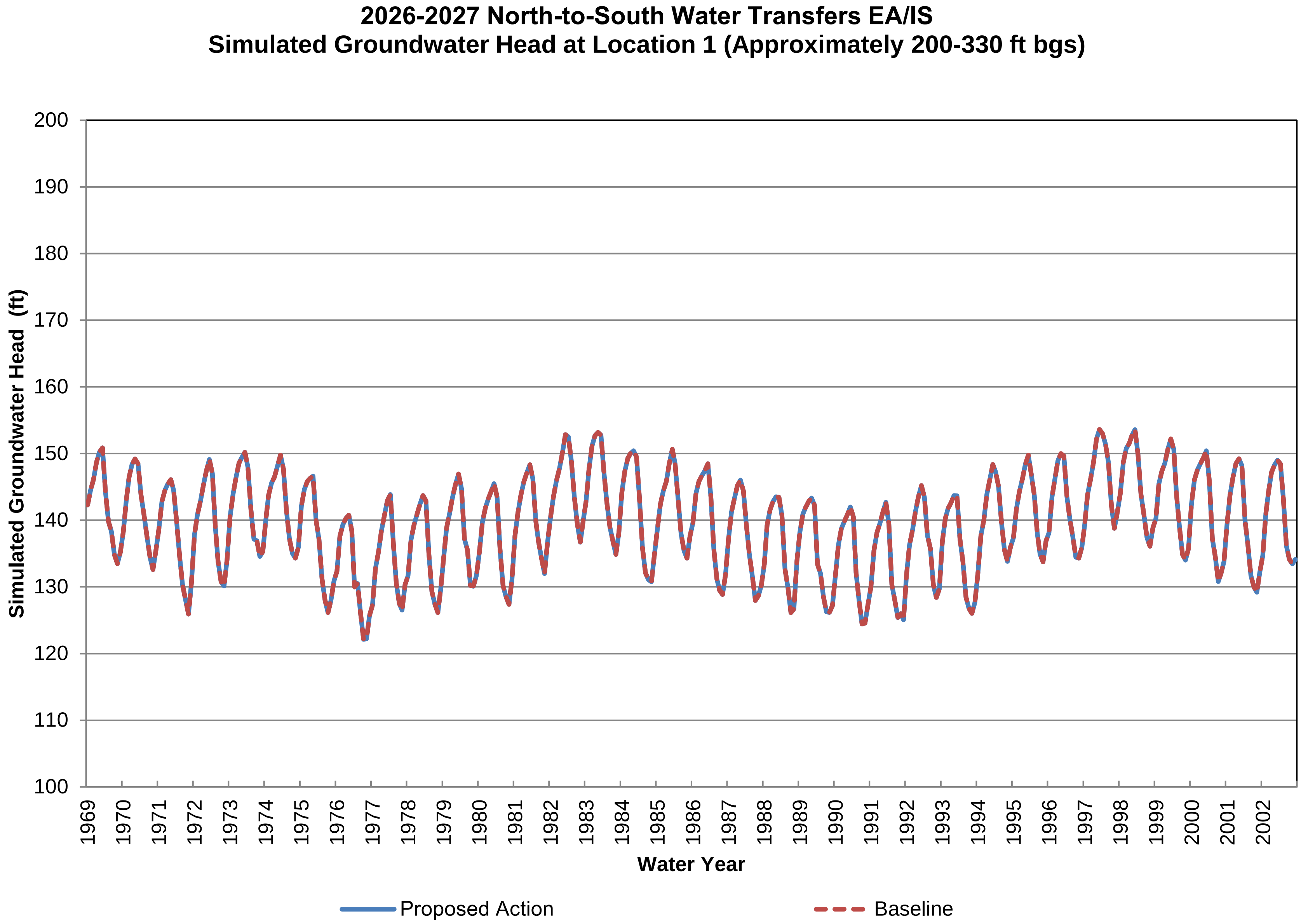
Groundwater head hydrographs for Locations 1 to 34

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 1 (Approximately 0-70 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 1 (Approximately 70-200 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 1 (Approximately 200-330 ft bgs)
Simulated Groundwater Head (ft)
200
190
180
170
160
150
140
130
120
110
100
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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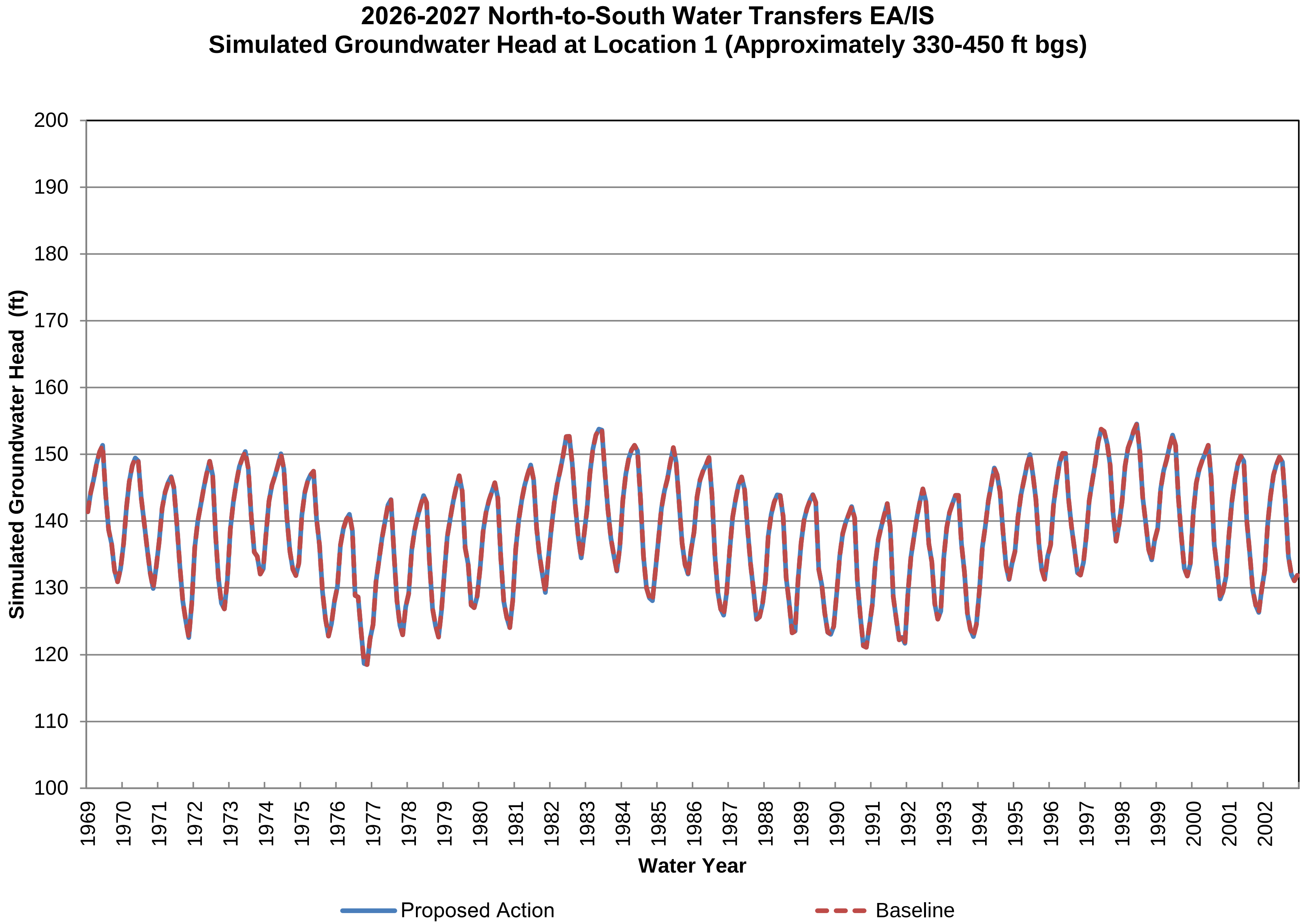
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 1 (Approximately 330-450 ft bgs)
Simulated Groundwater Head (ft)
200
190
180
170
160
150
140
130
120
110
100
1969
1970
1971
1972
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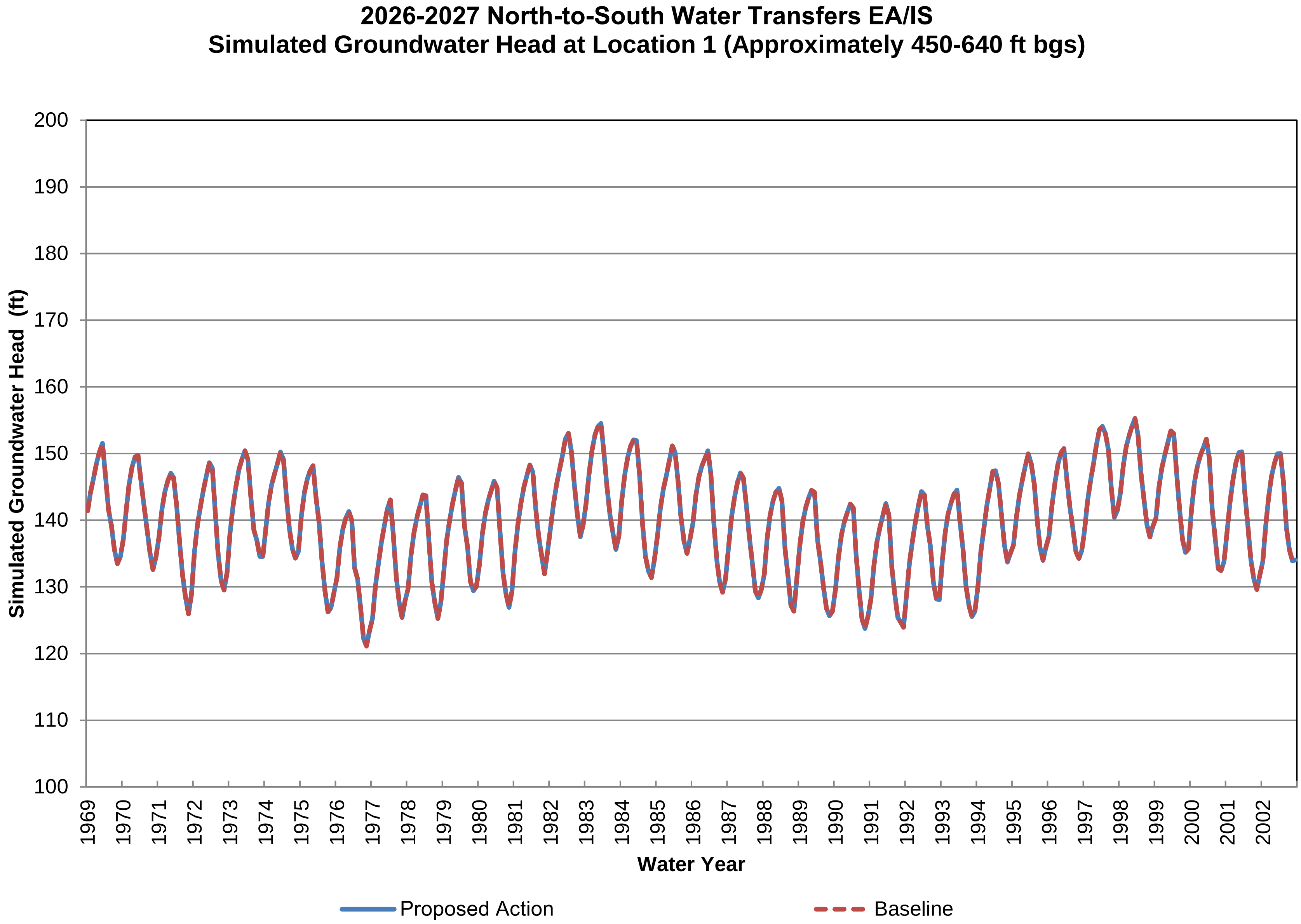
2001
2002
Water Year
Proposed Action
Baseline


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 1 (Approximately 450-640 ft bgs)
Simulated Groundwater Head (ft)
200
190
180
170
160
150
140
130
120
110
100
1969
1970
1971
1972
1973
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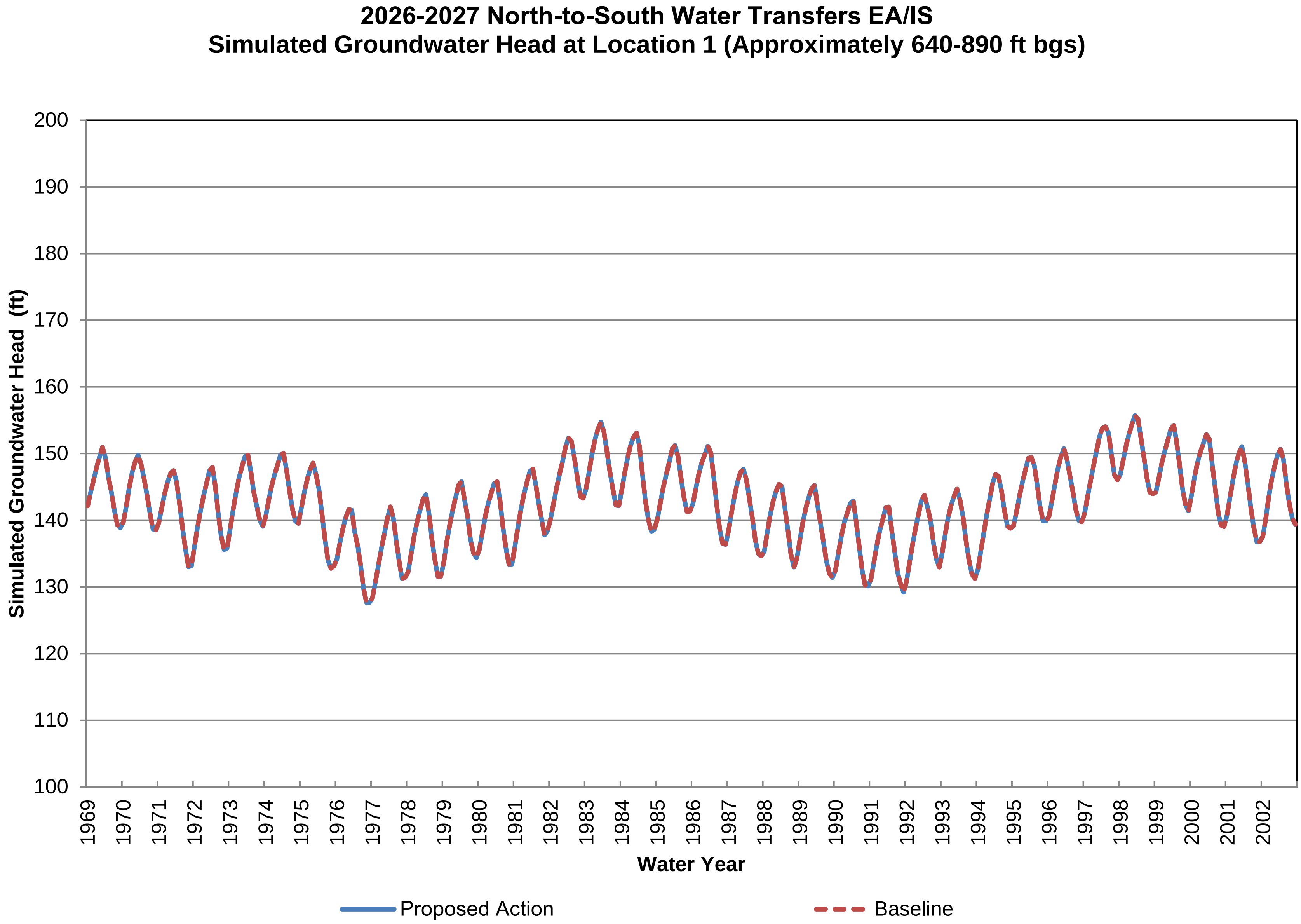
2002
Water Year
Proposed Action
Baseline


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 1 (Approximately 640-890 ft bgs)
Simulated Groundwater Head (ft)
200
190
180
170
160
150
140
130
120
110
100
1969
1970
1971
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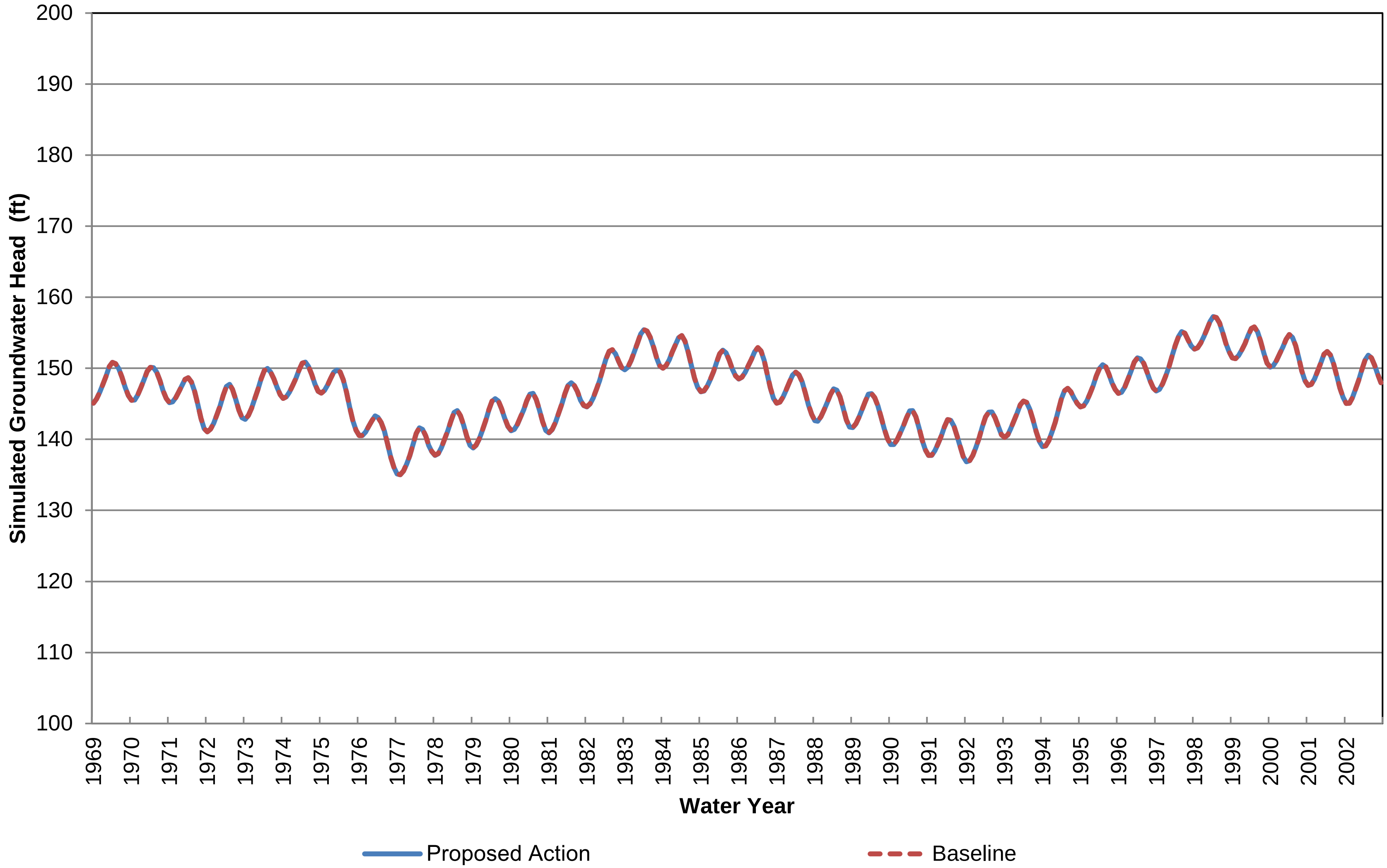
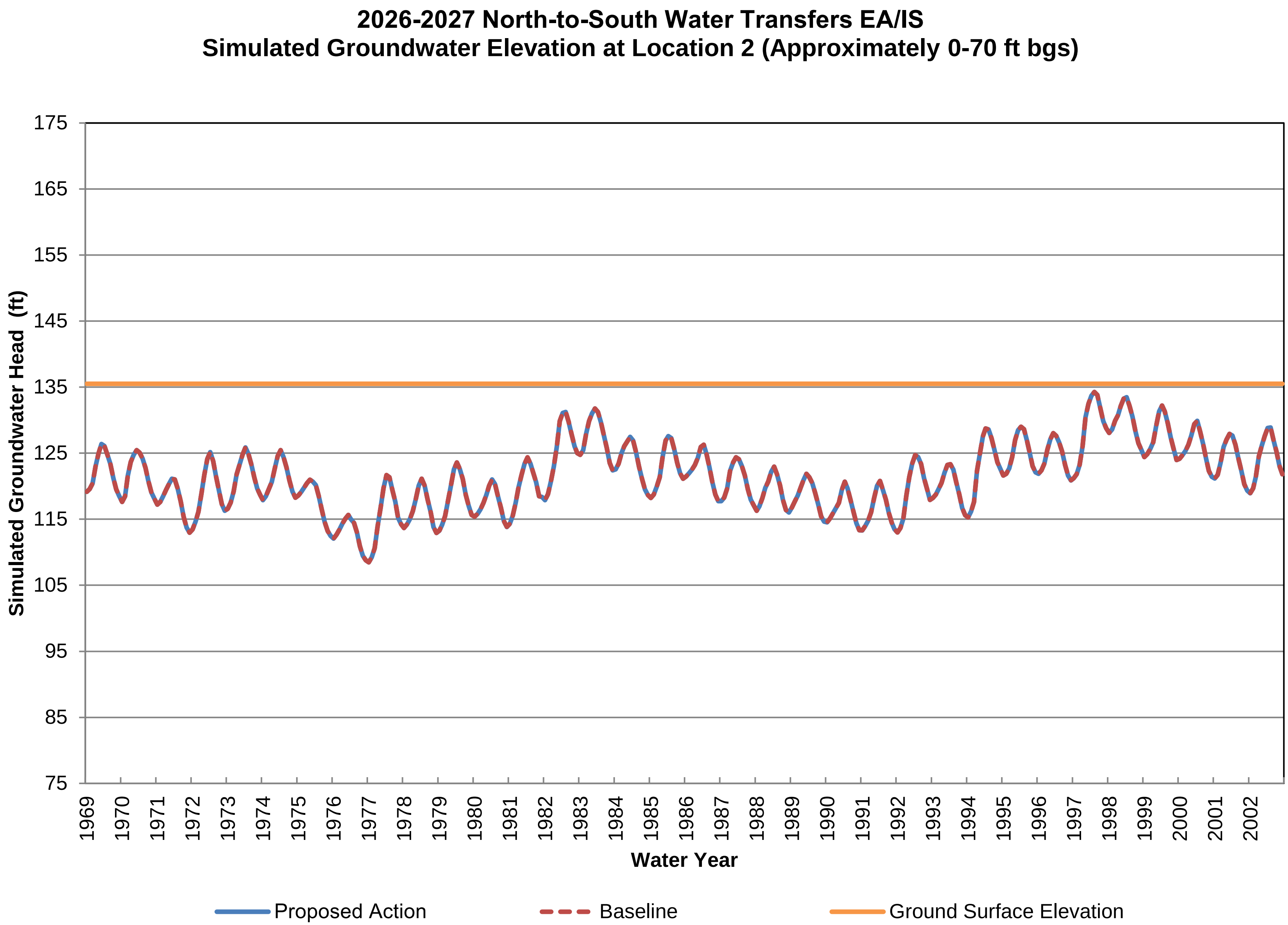
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 1 (Approximately 890-1360 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 2 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
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1999
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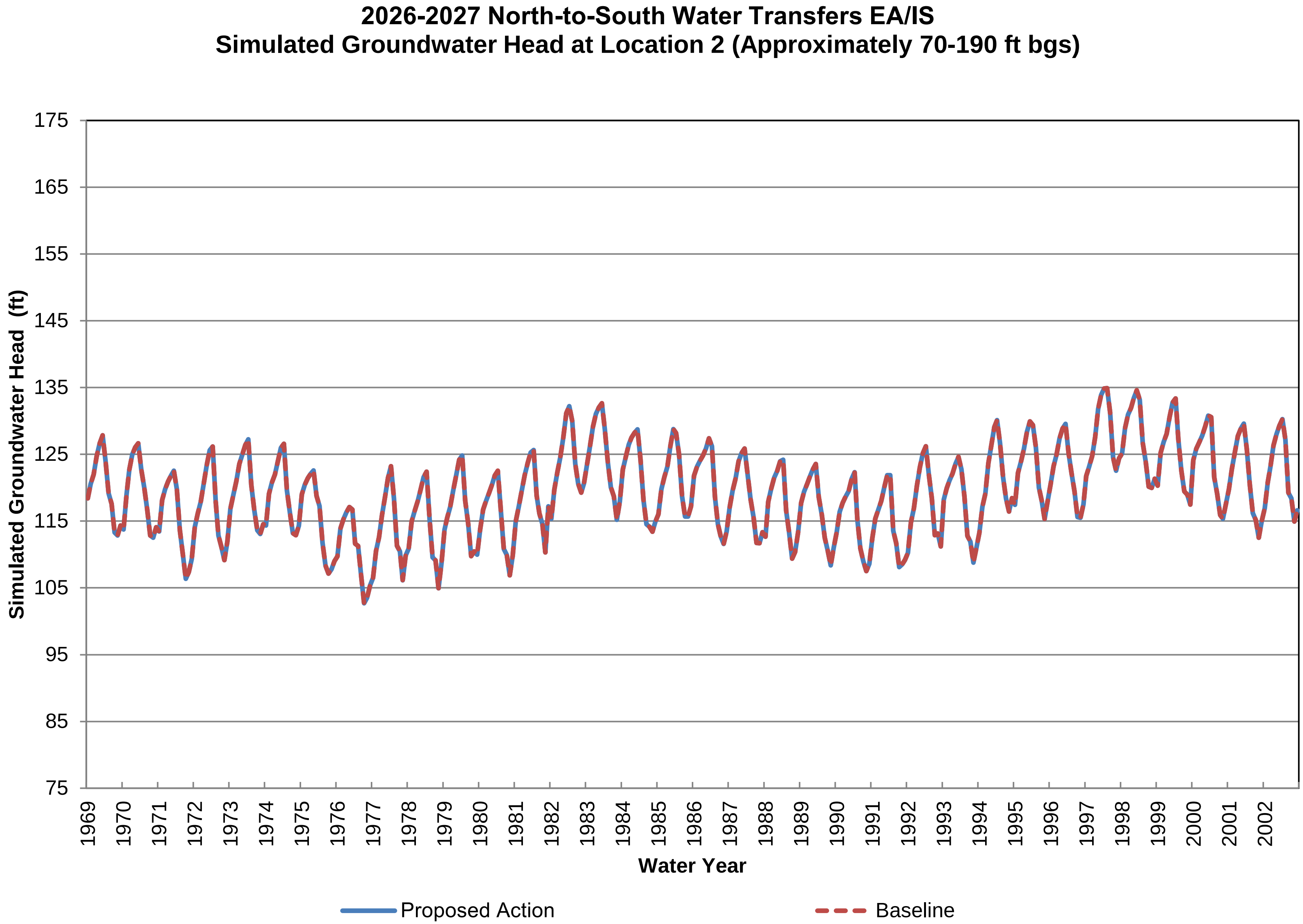
2001
2002
Water Year
Proposed Action
Baseline
Ground Surface Elevation


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 2 (Approximately 70-190 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
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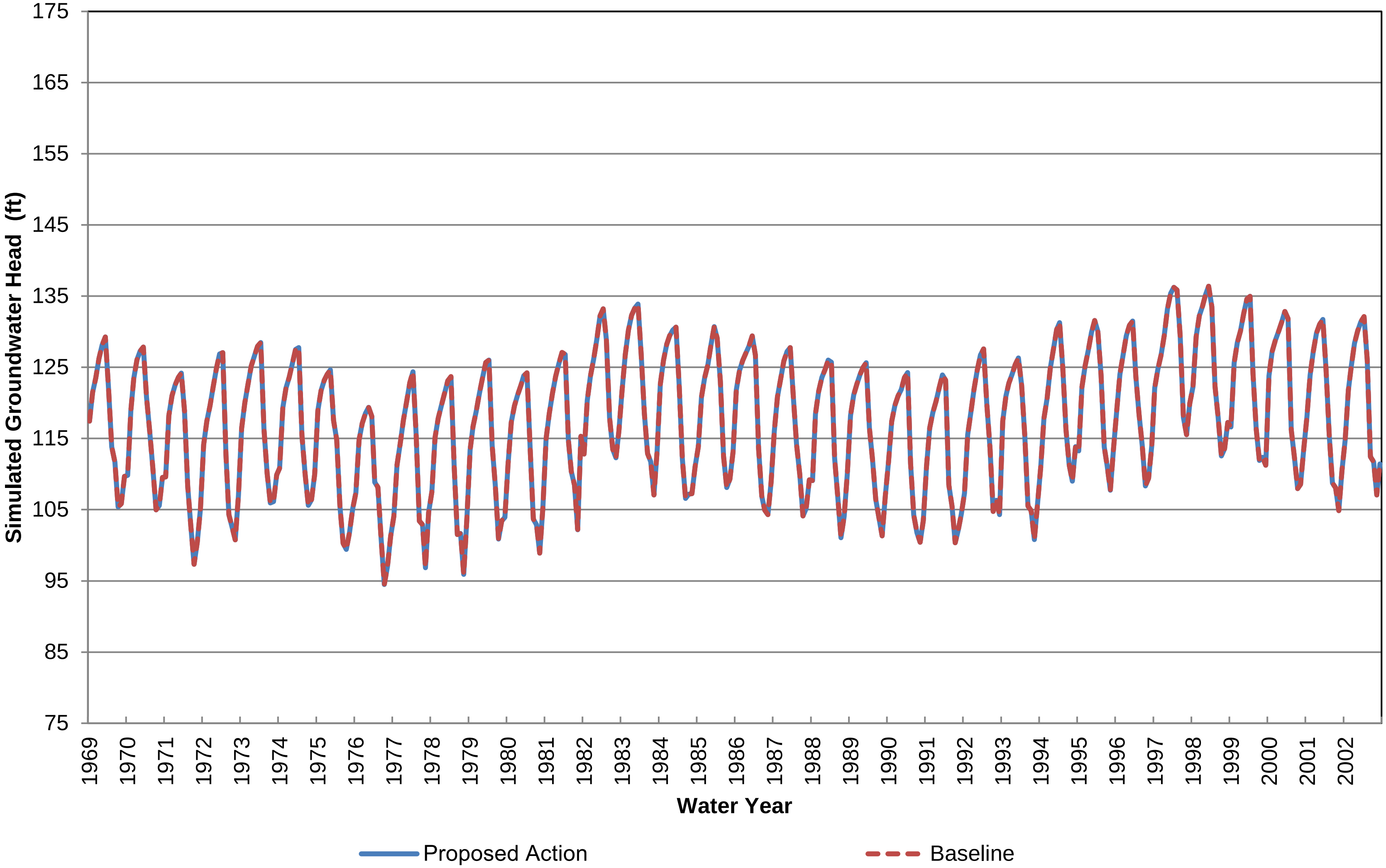
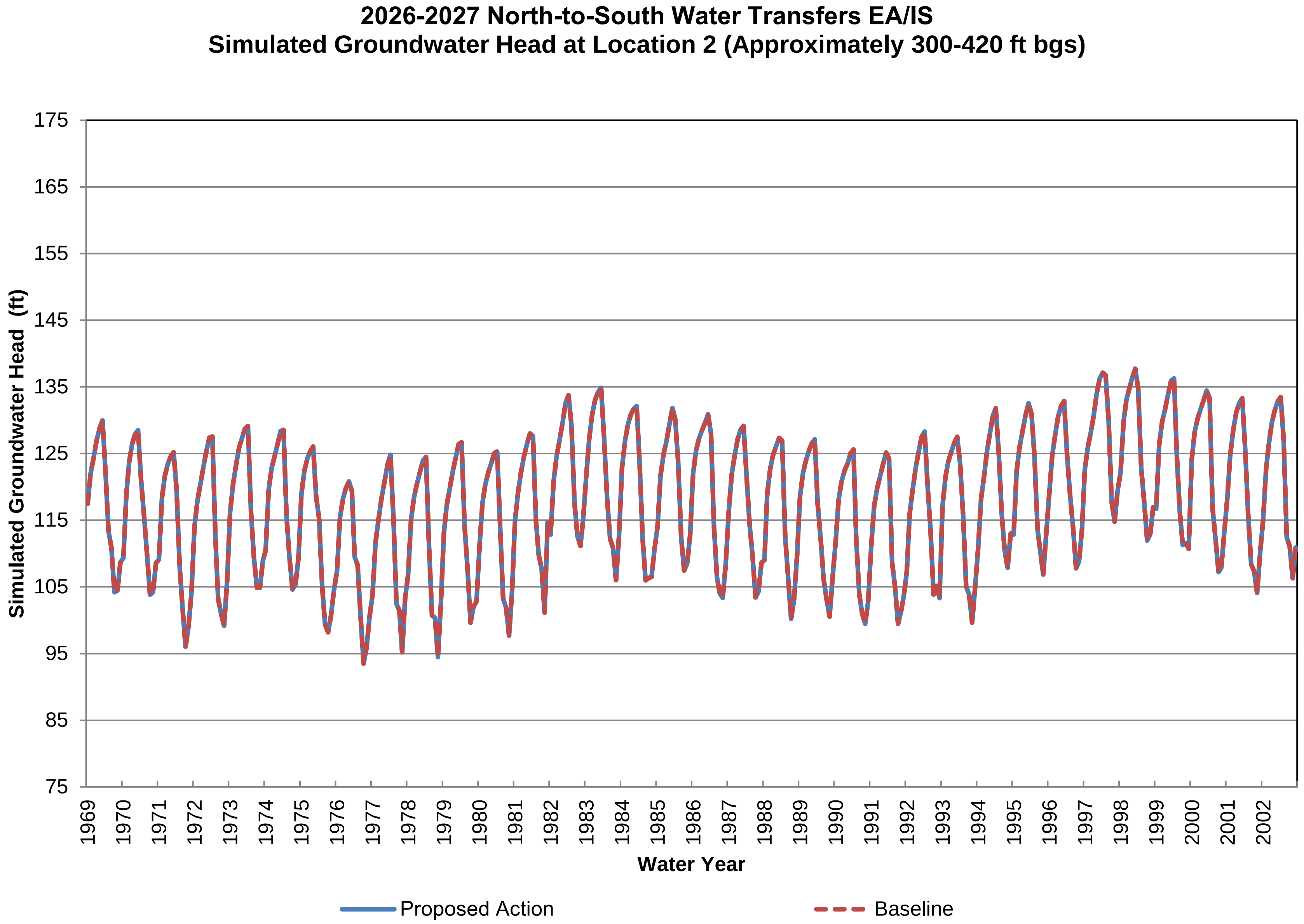
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 2 (Approximately 190-300 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 2 (Approximately 300-420 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
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1984
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1993
1994
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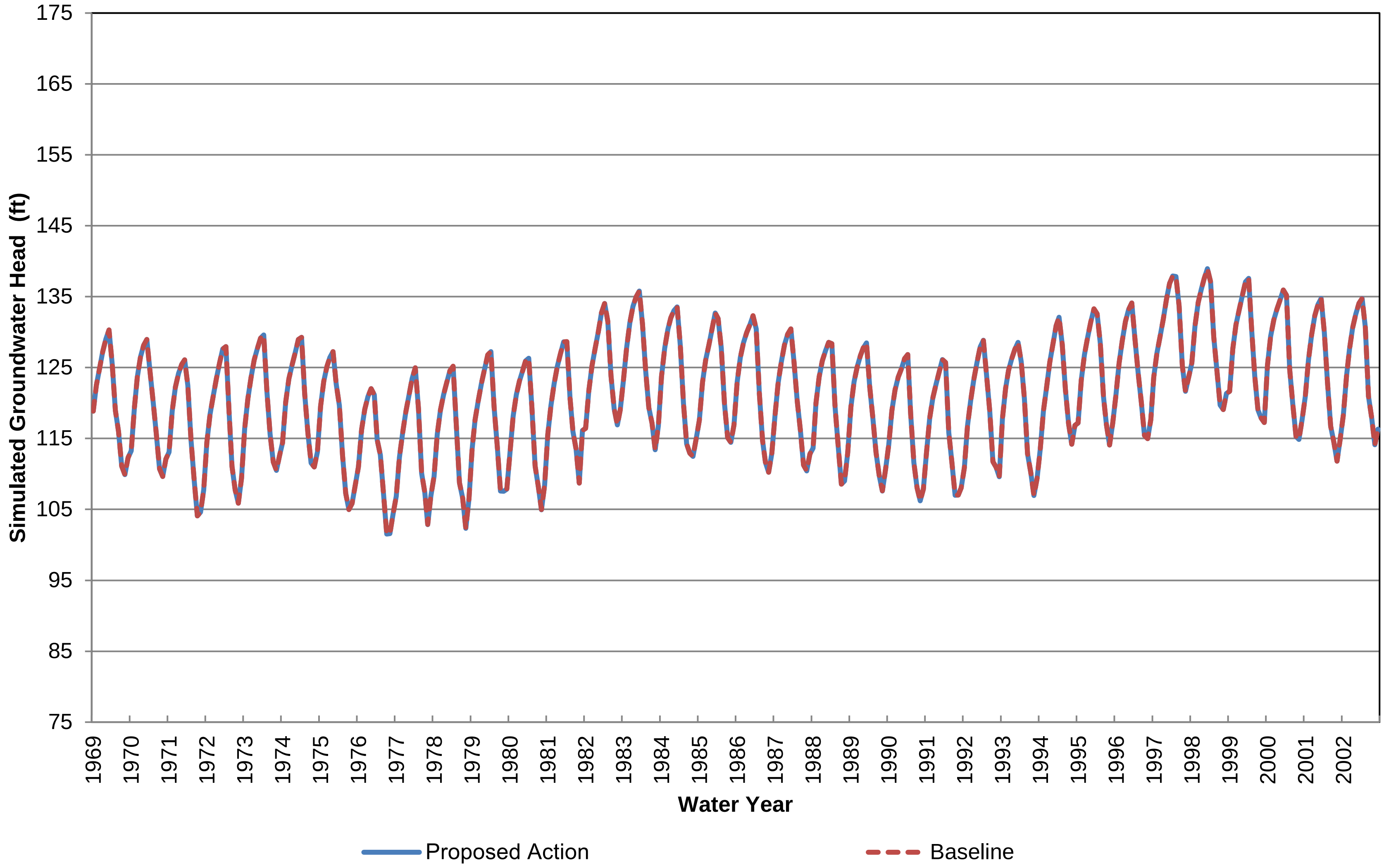
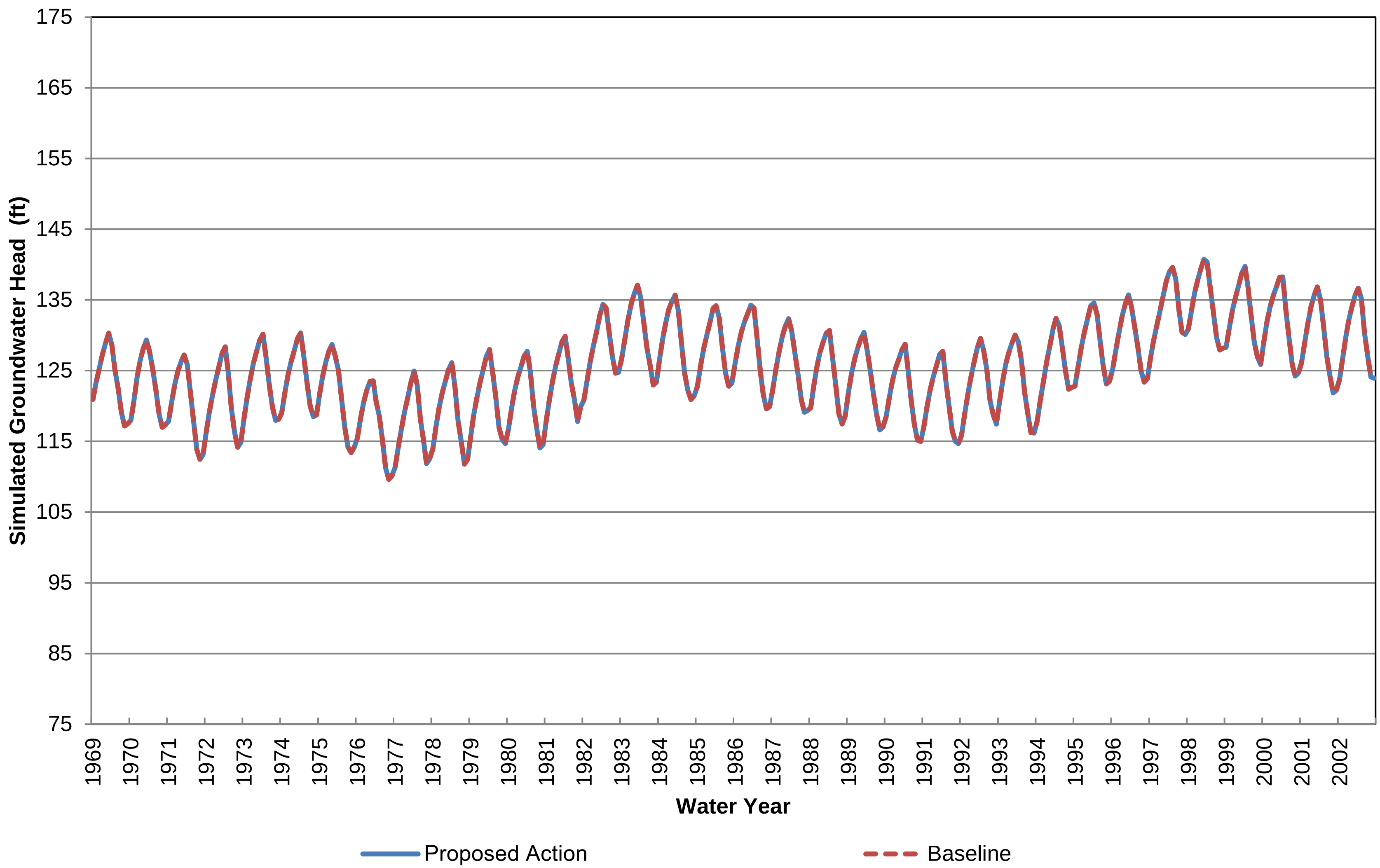
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

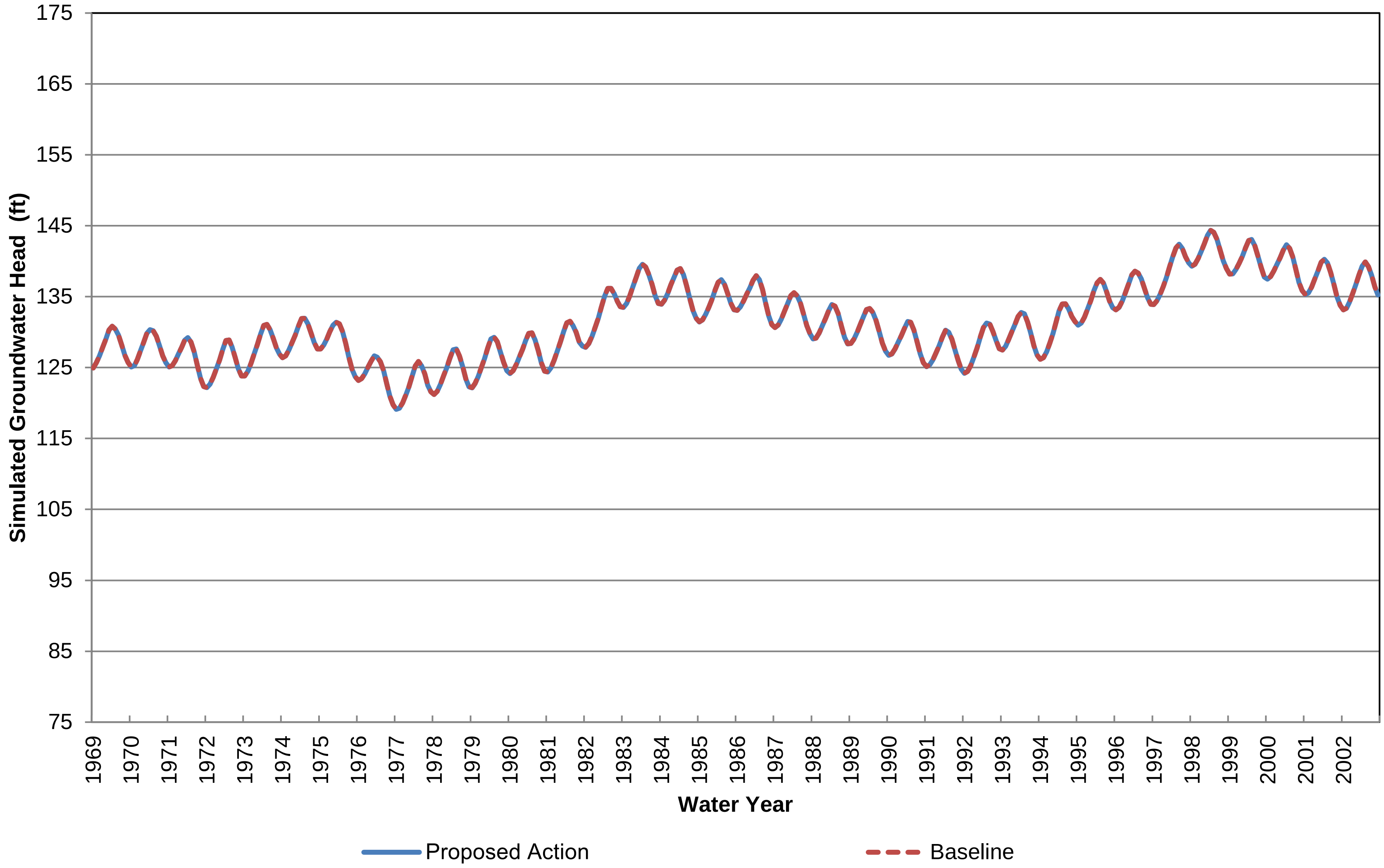
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 2 (Approximately 420-580 ft bgs)

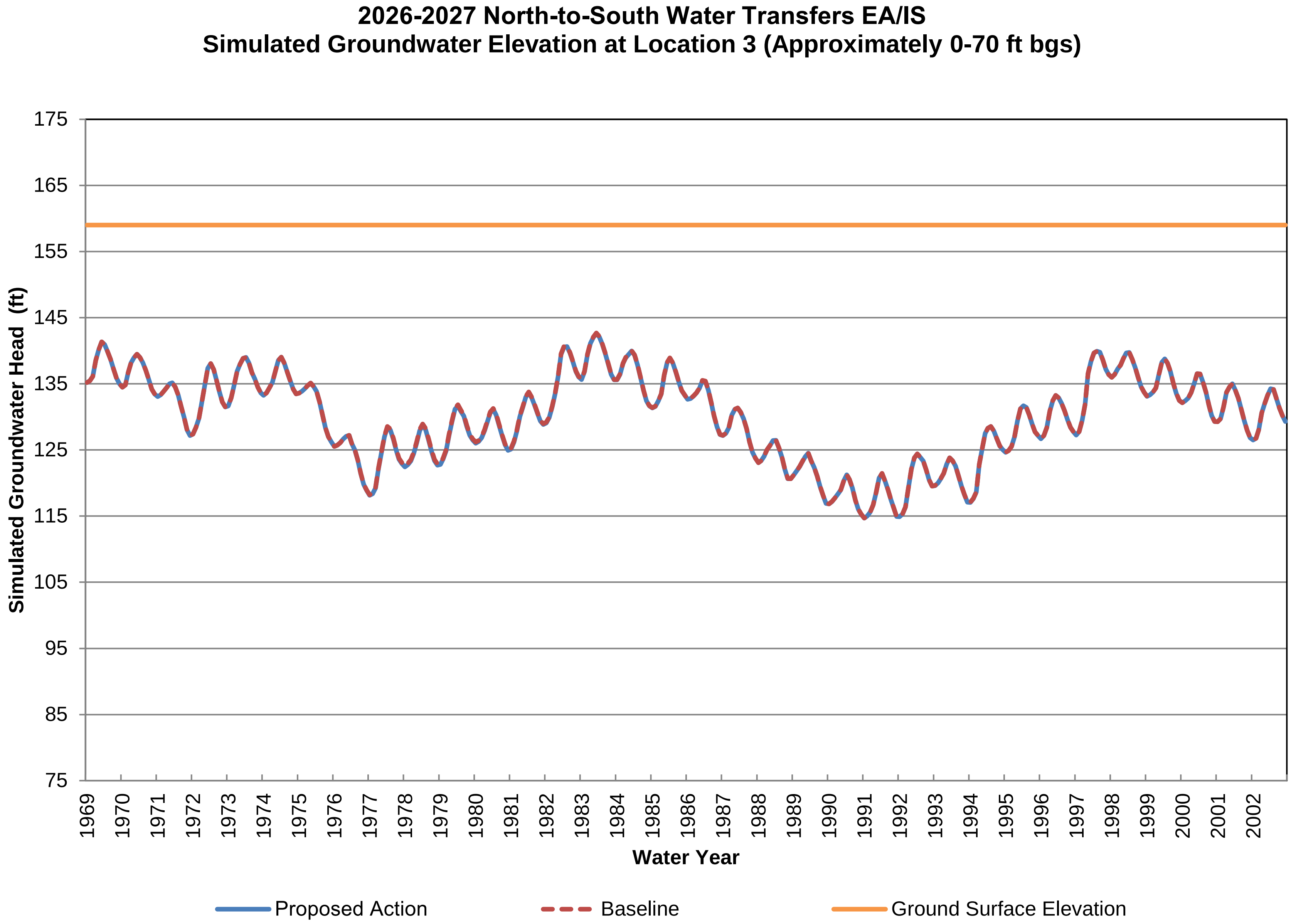


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 2 (Approximately 580-830 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 2 (Approximately 830-1330 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 3 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1969
1970
1971
1972
1973
1974
1975
1976
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1978
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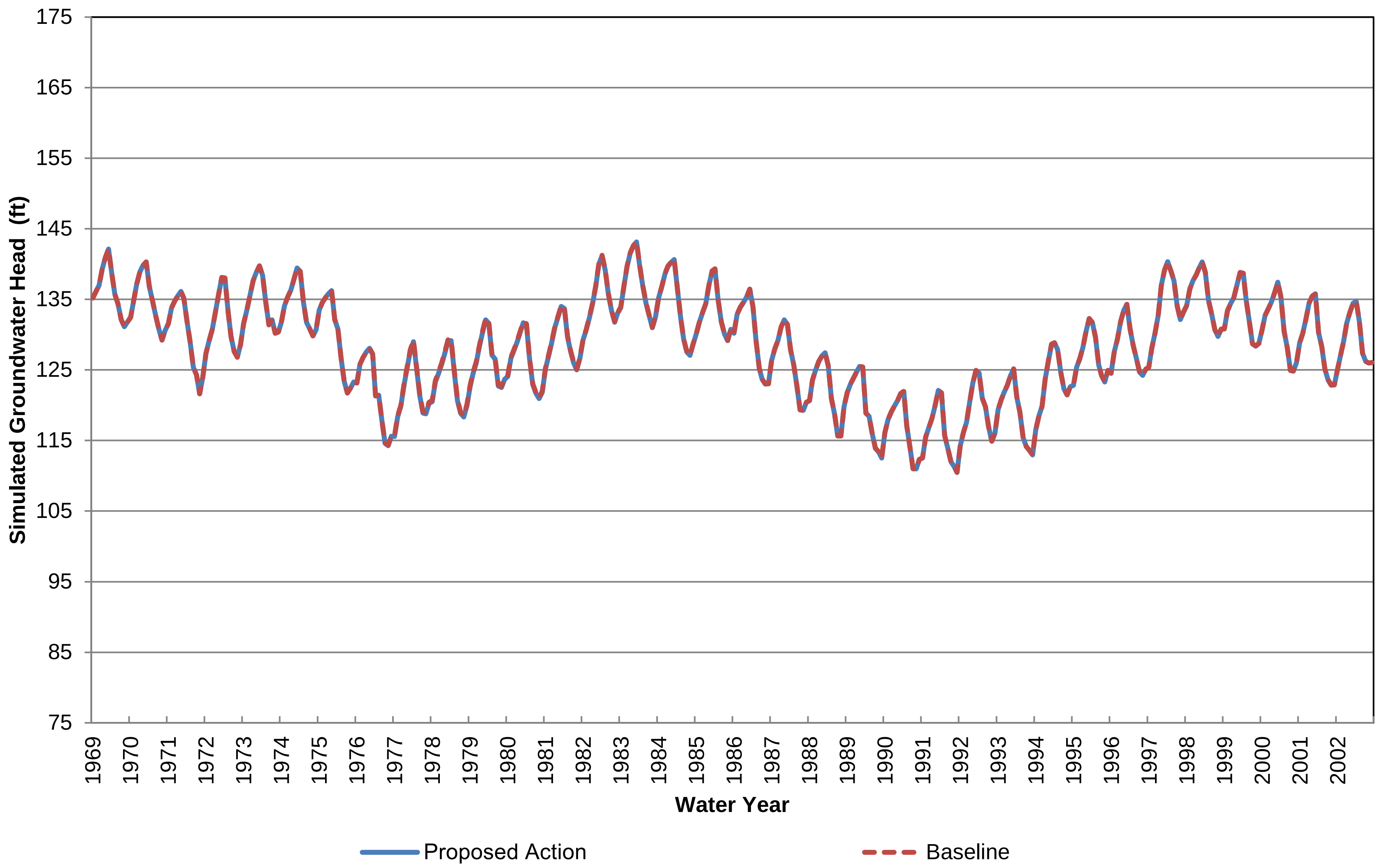
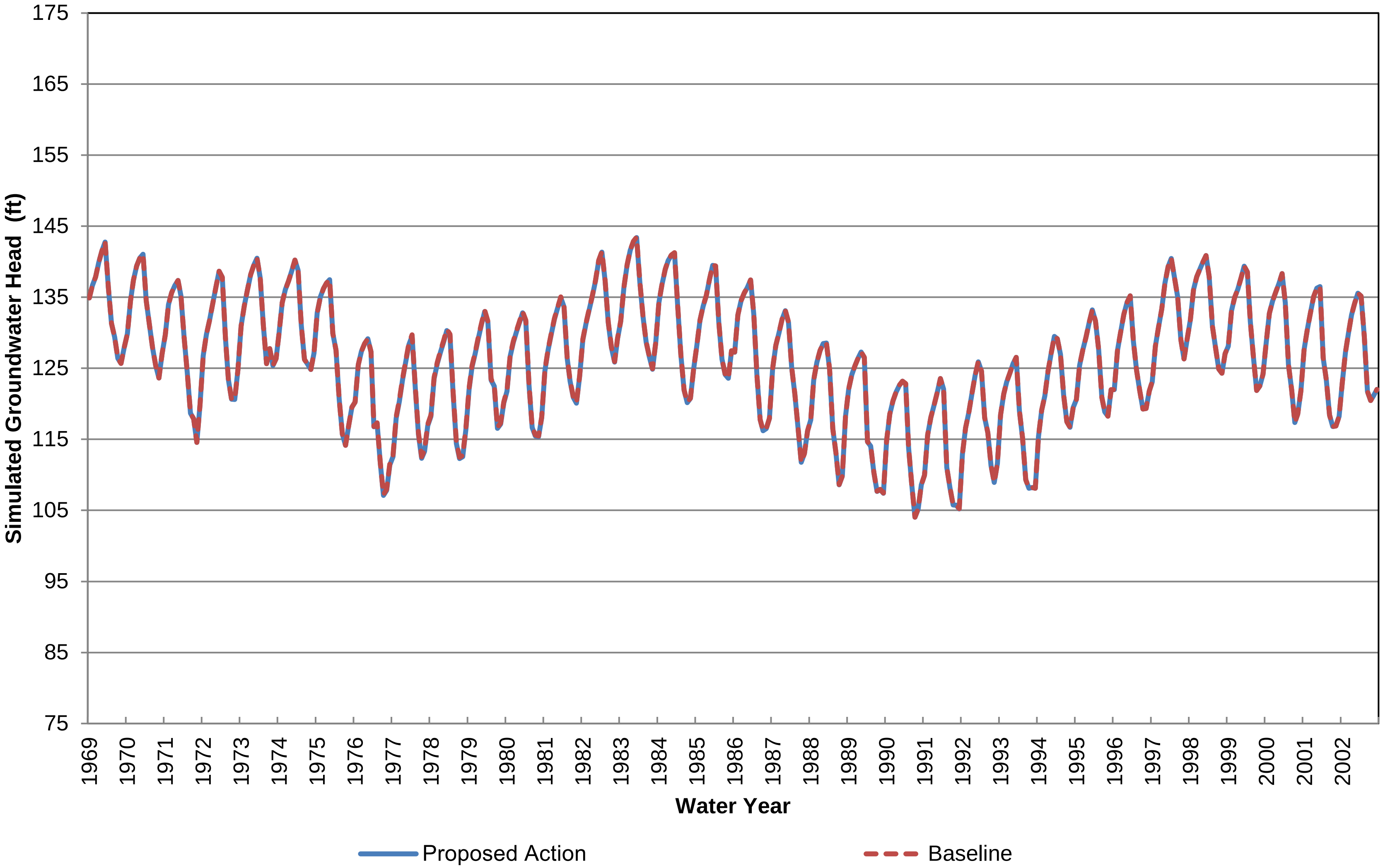
1999
2000
2001
2002
Water Year
Proposed Action
Baseline
Ground Surface Elevation

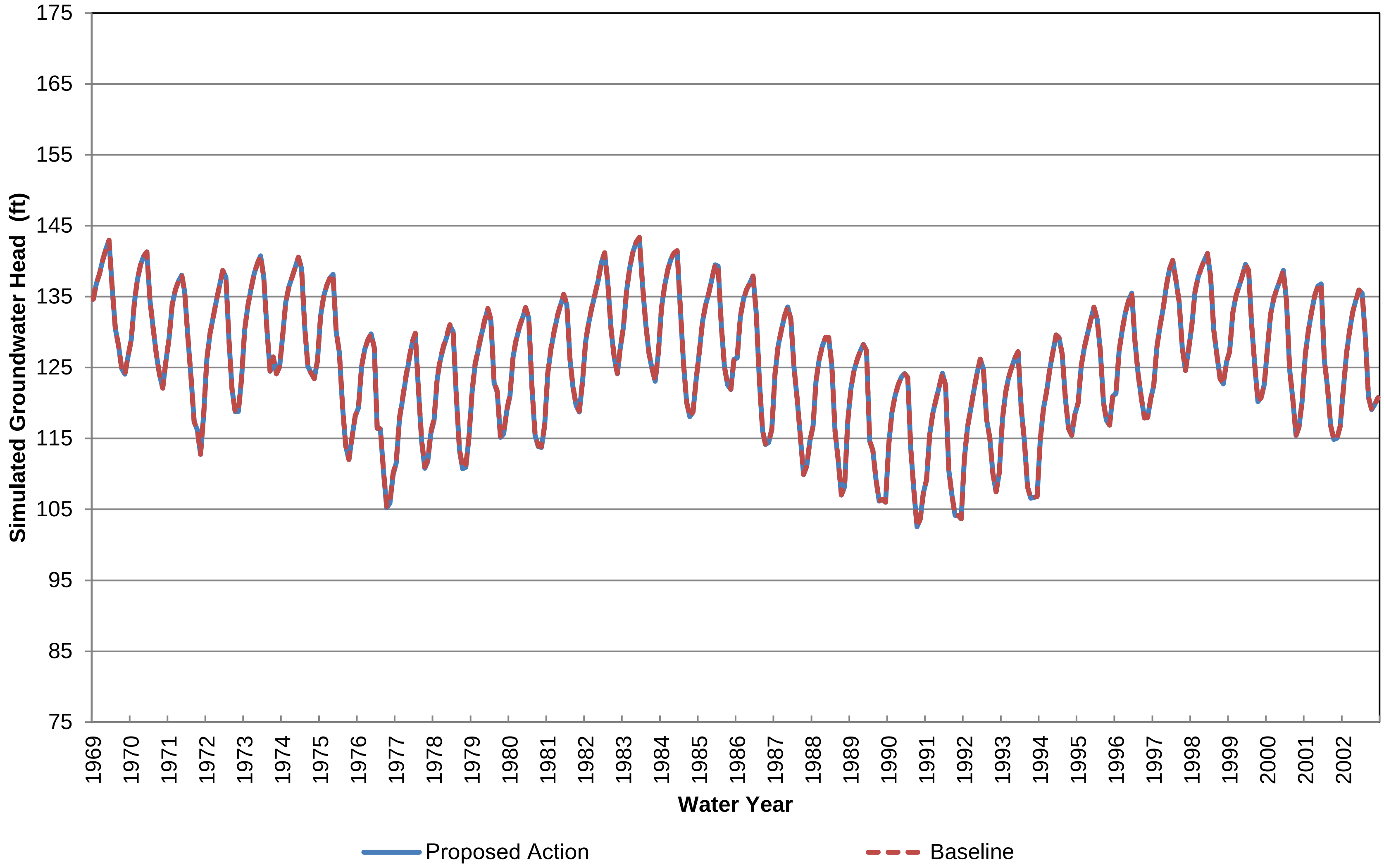
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 3 (Approximately 70-210 ft bgs)



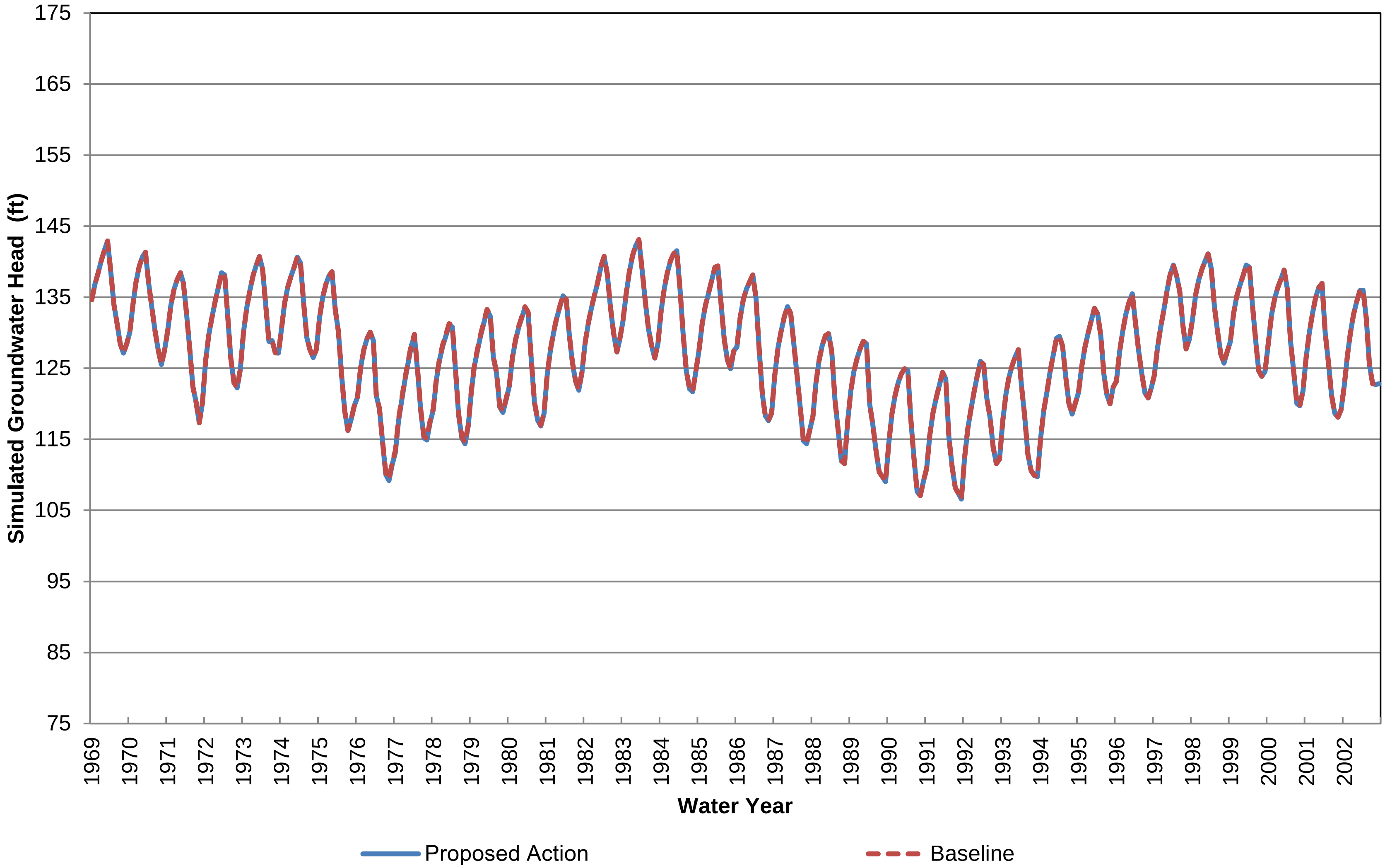
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 3 (Approximately 210-350 ft bgs)

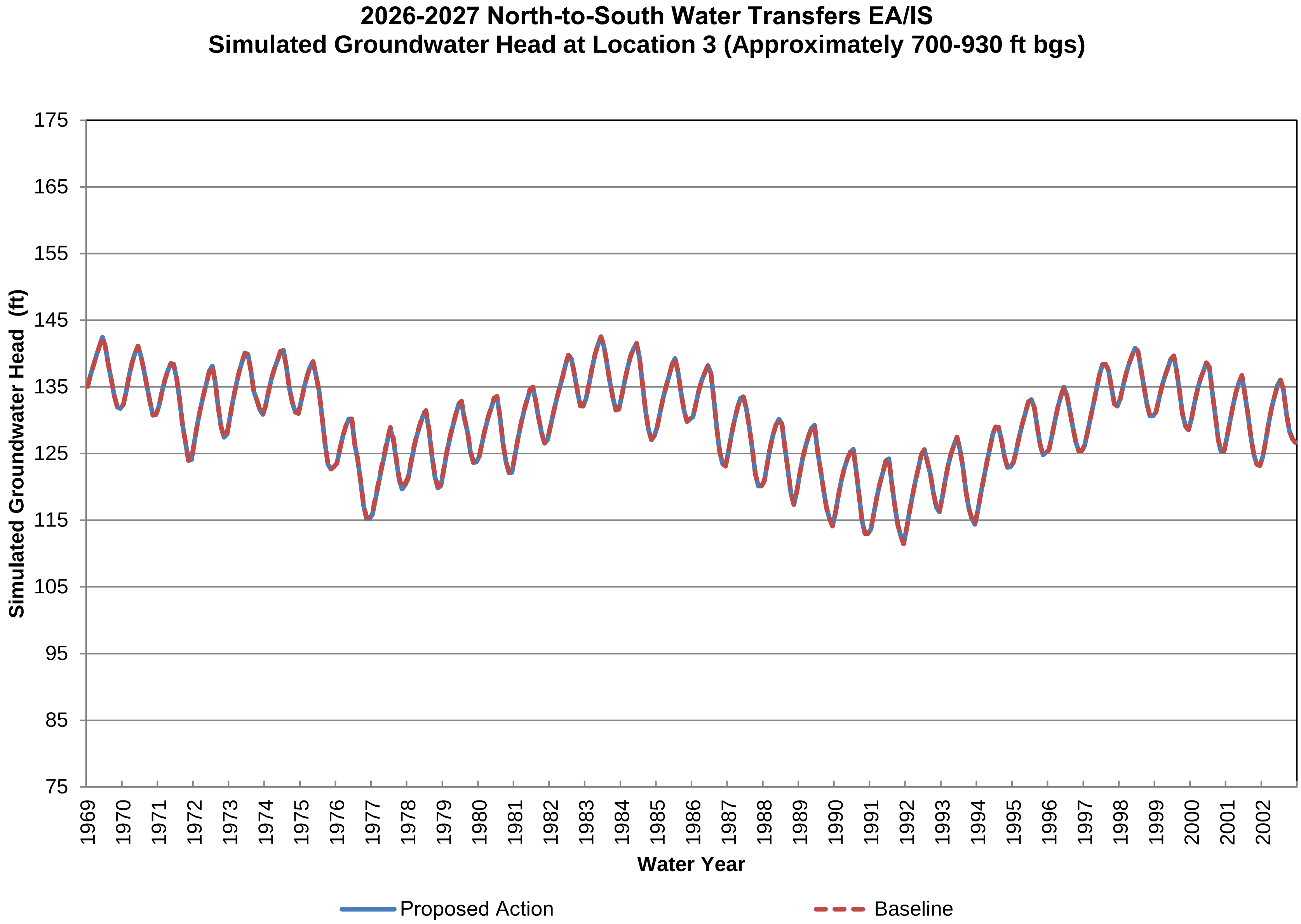


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 3 (Approximately 350-480 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 3 (Approximately 480-700 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 3 (Approximately 700-930 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1969
1970
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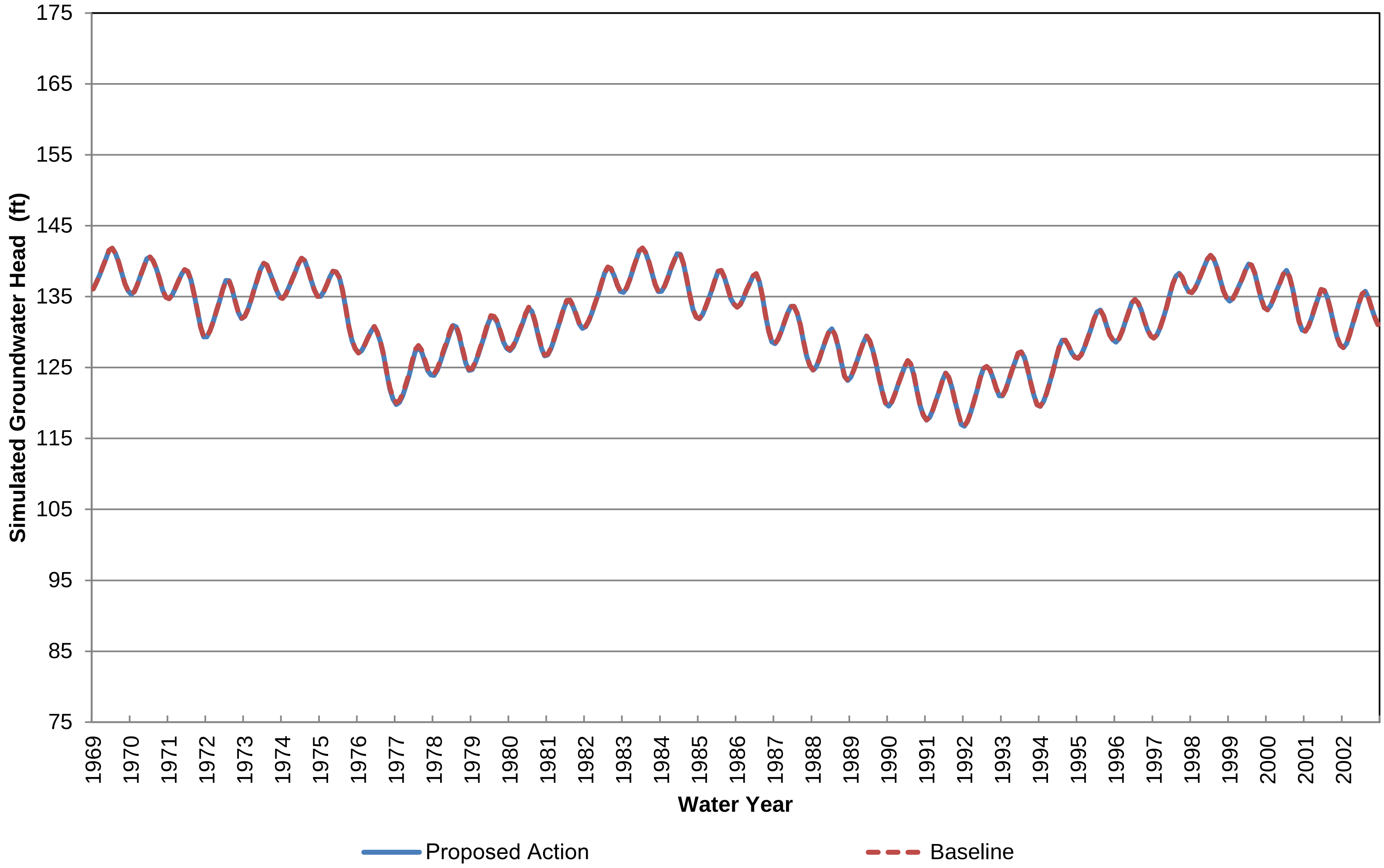
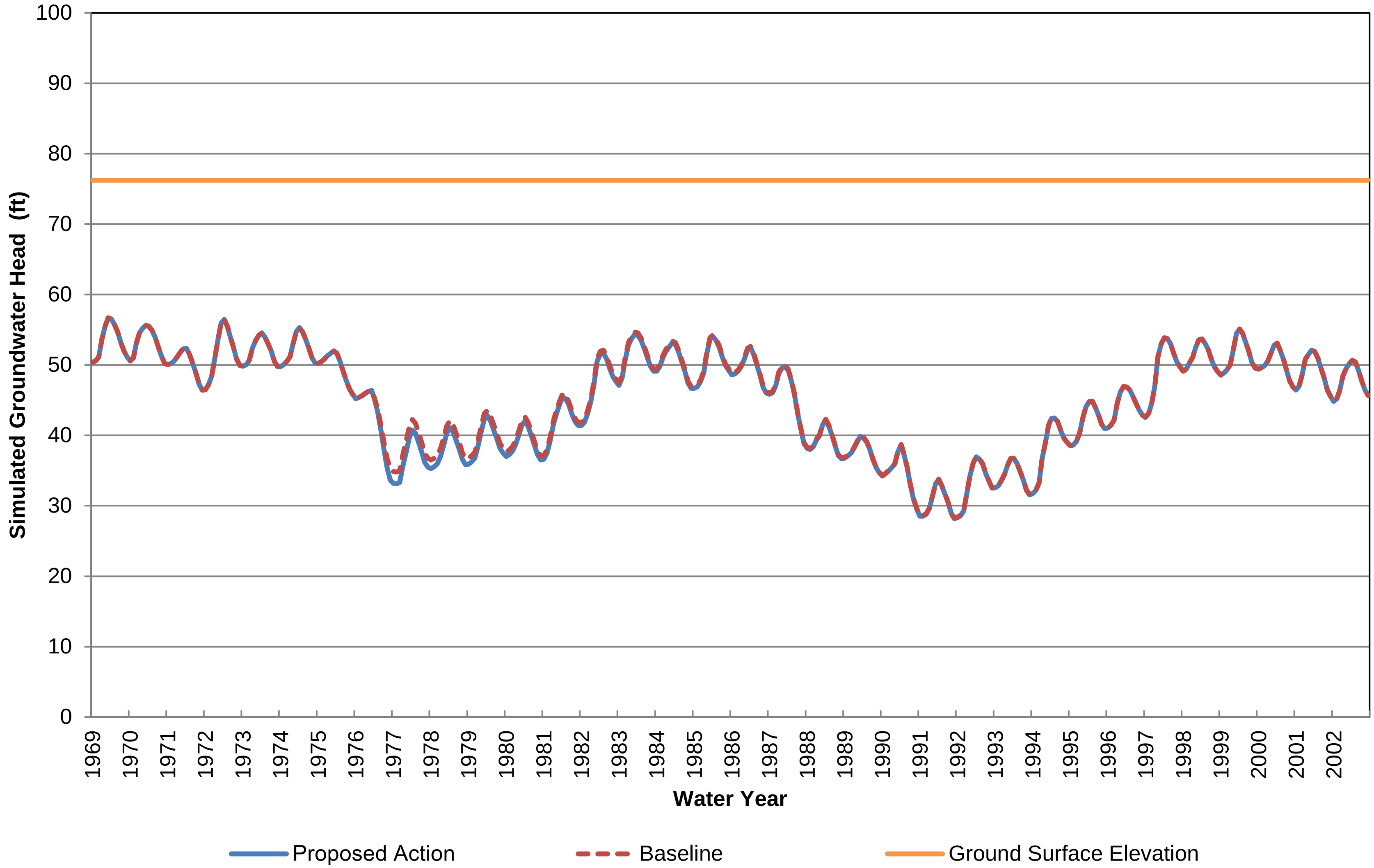
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

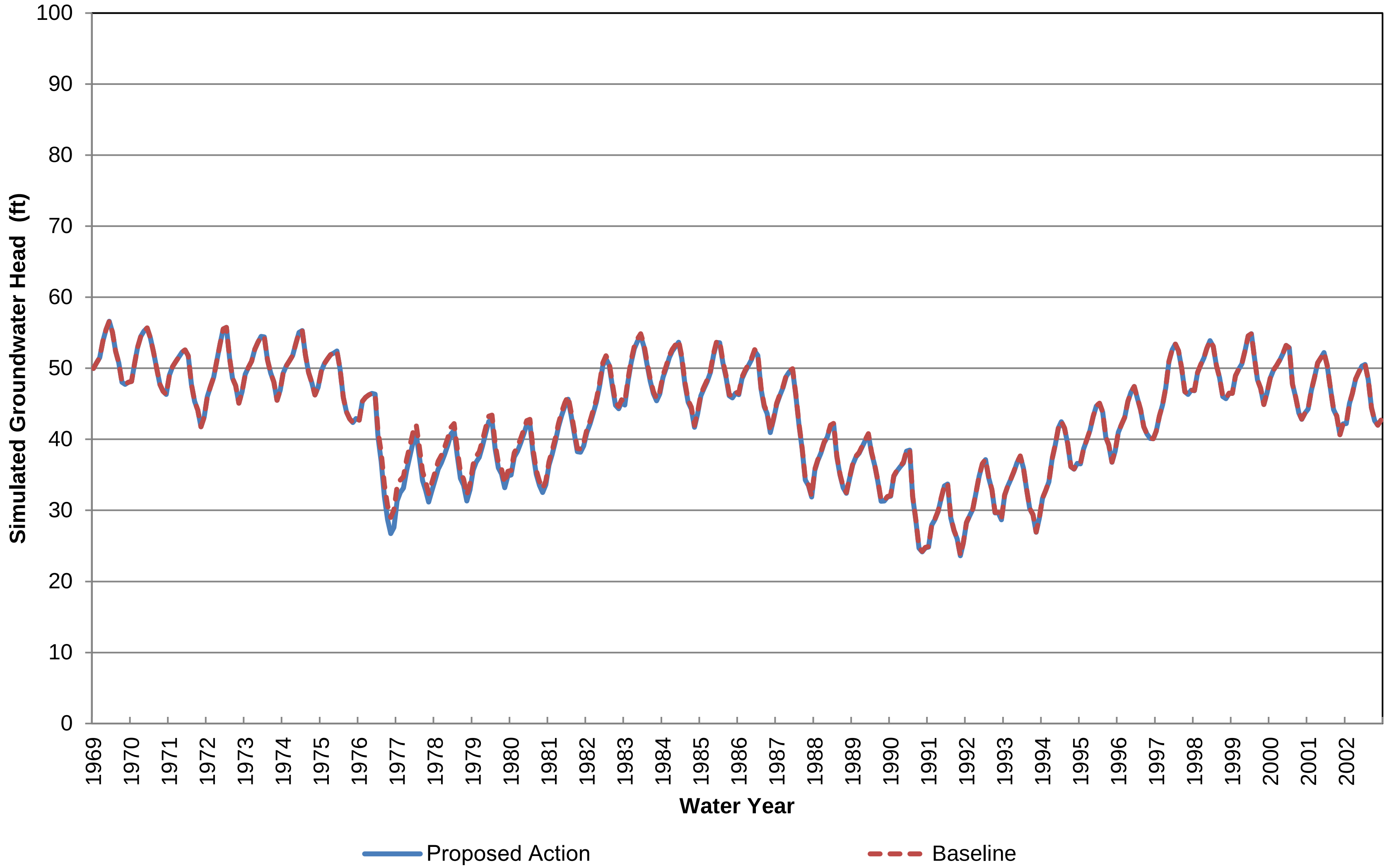
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 3 (Approximately 930-1290 ft bgs)



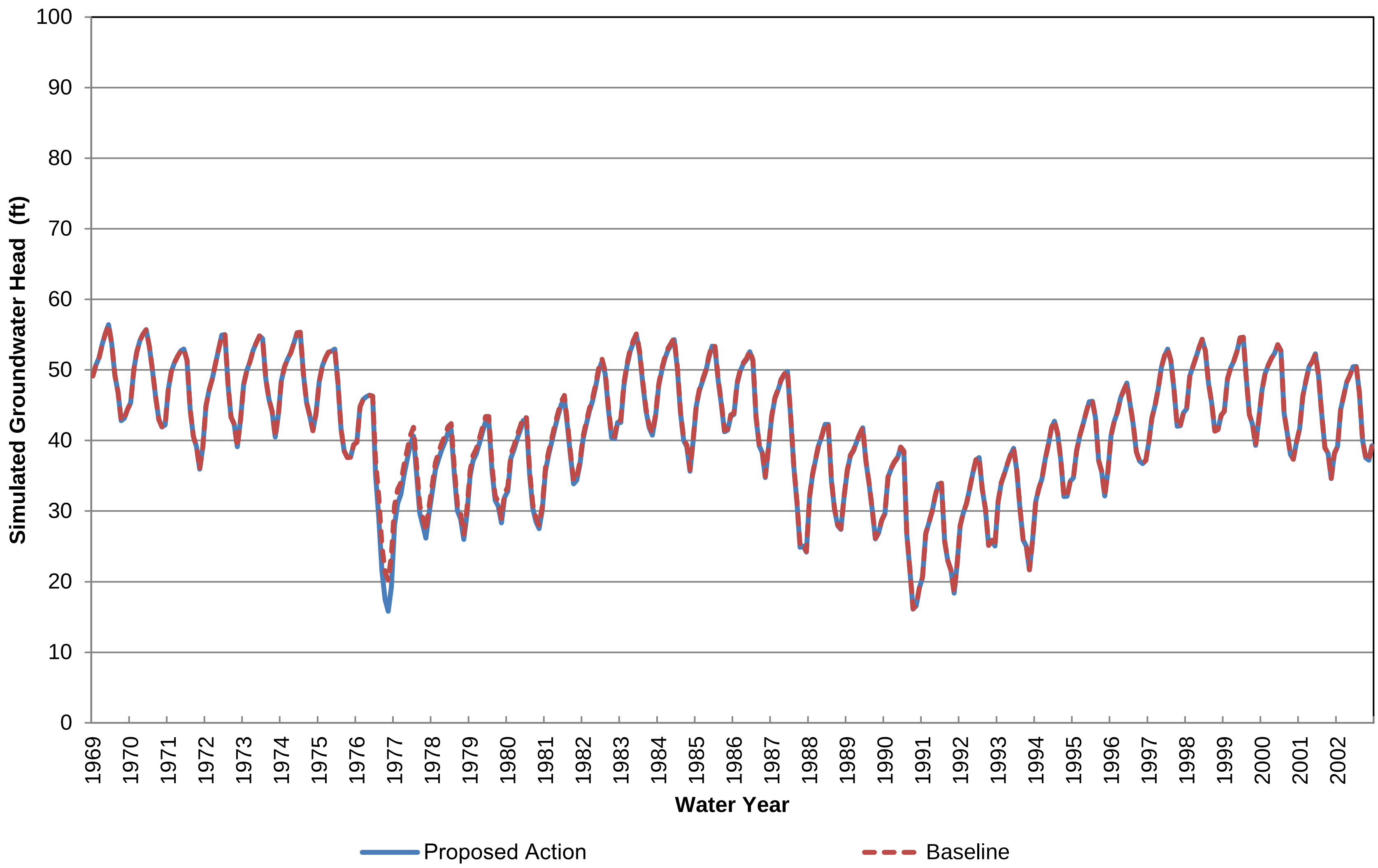
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 4 (Approximately 0-70 ft bgs)



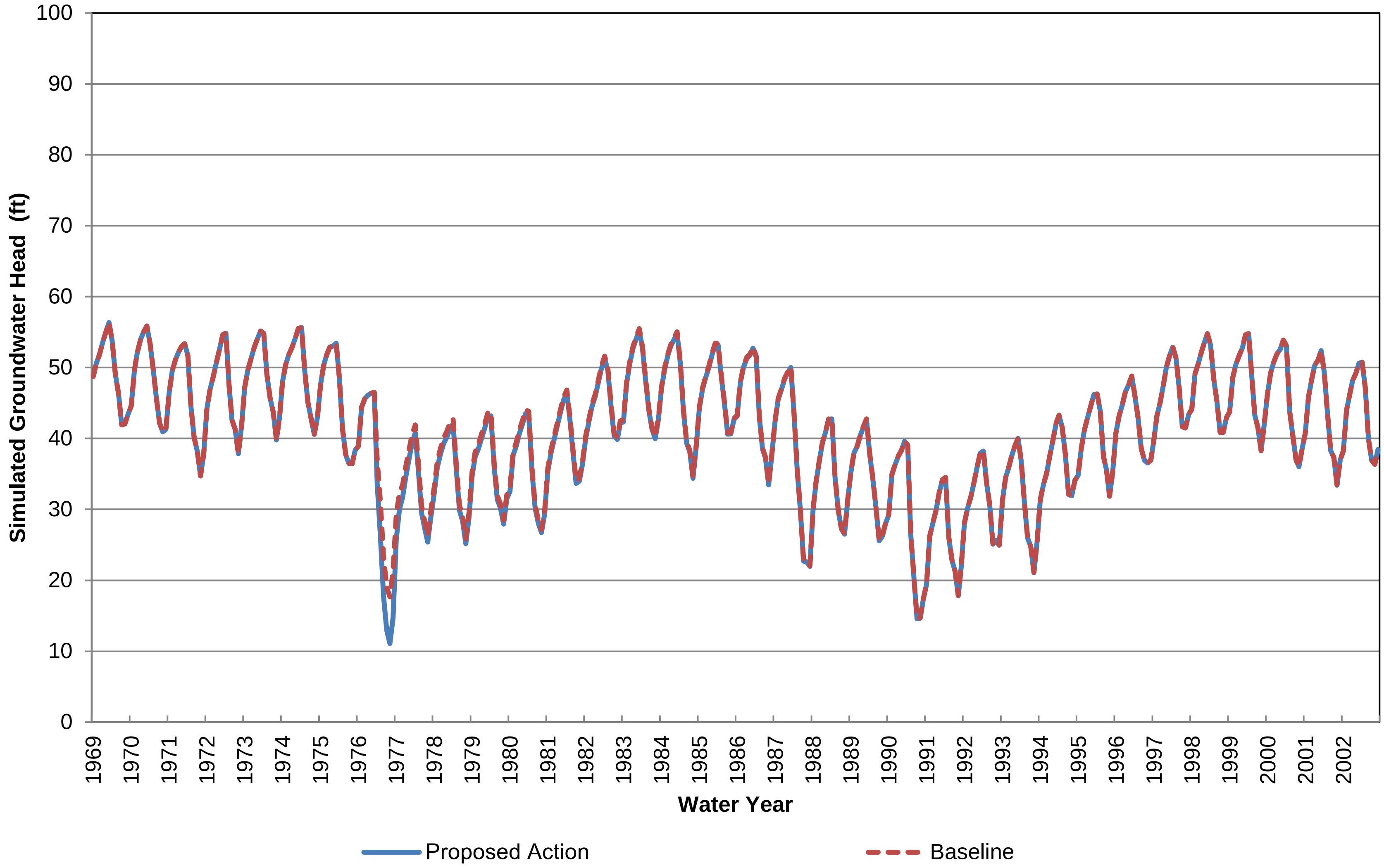
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 4 (Approximately 70-190 ft bgs)



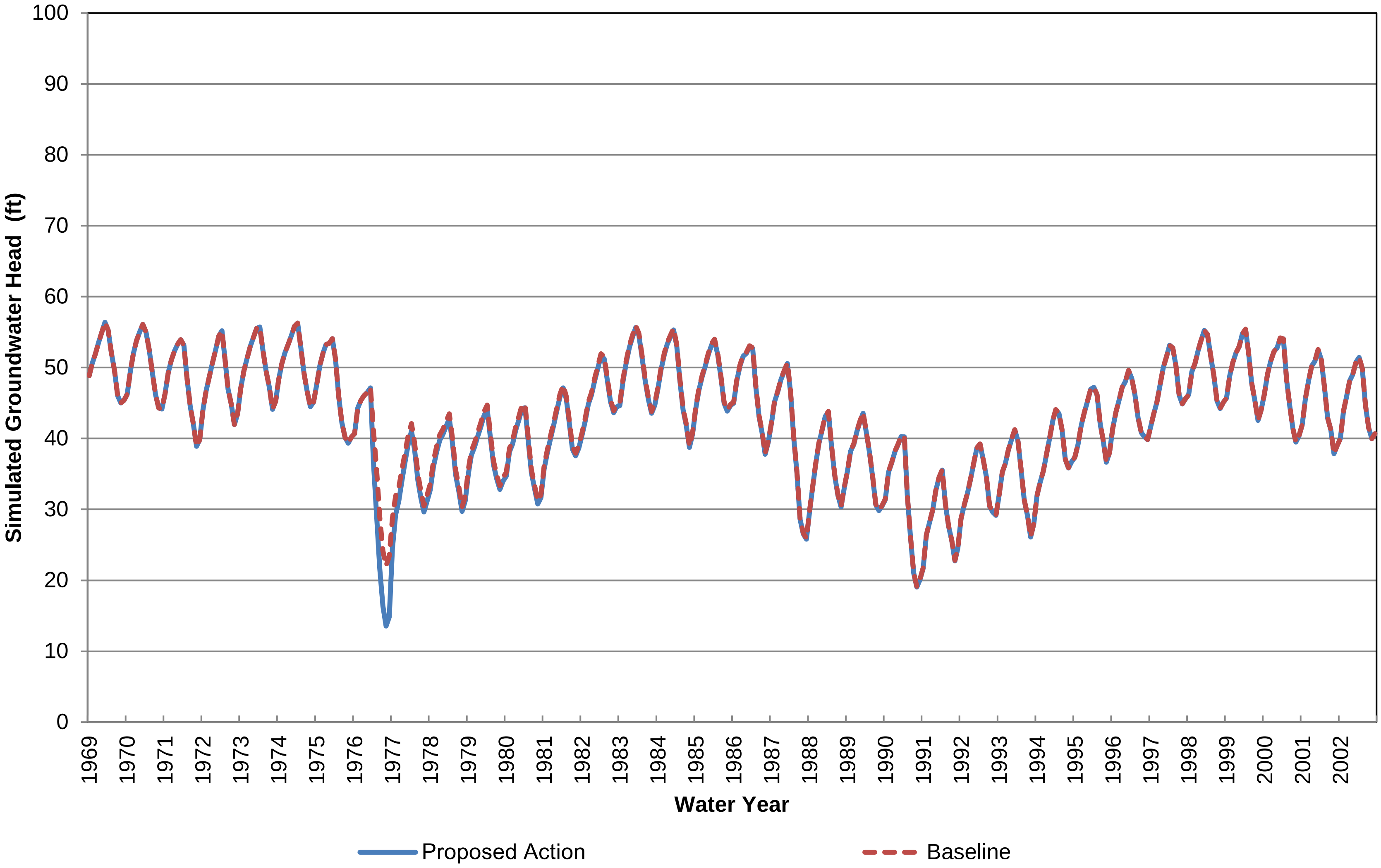
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 4 (Approximately 190-300 ft bgs)



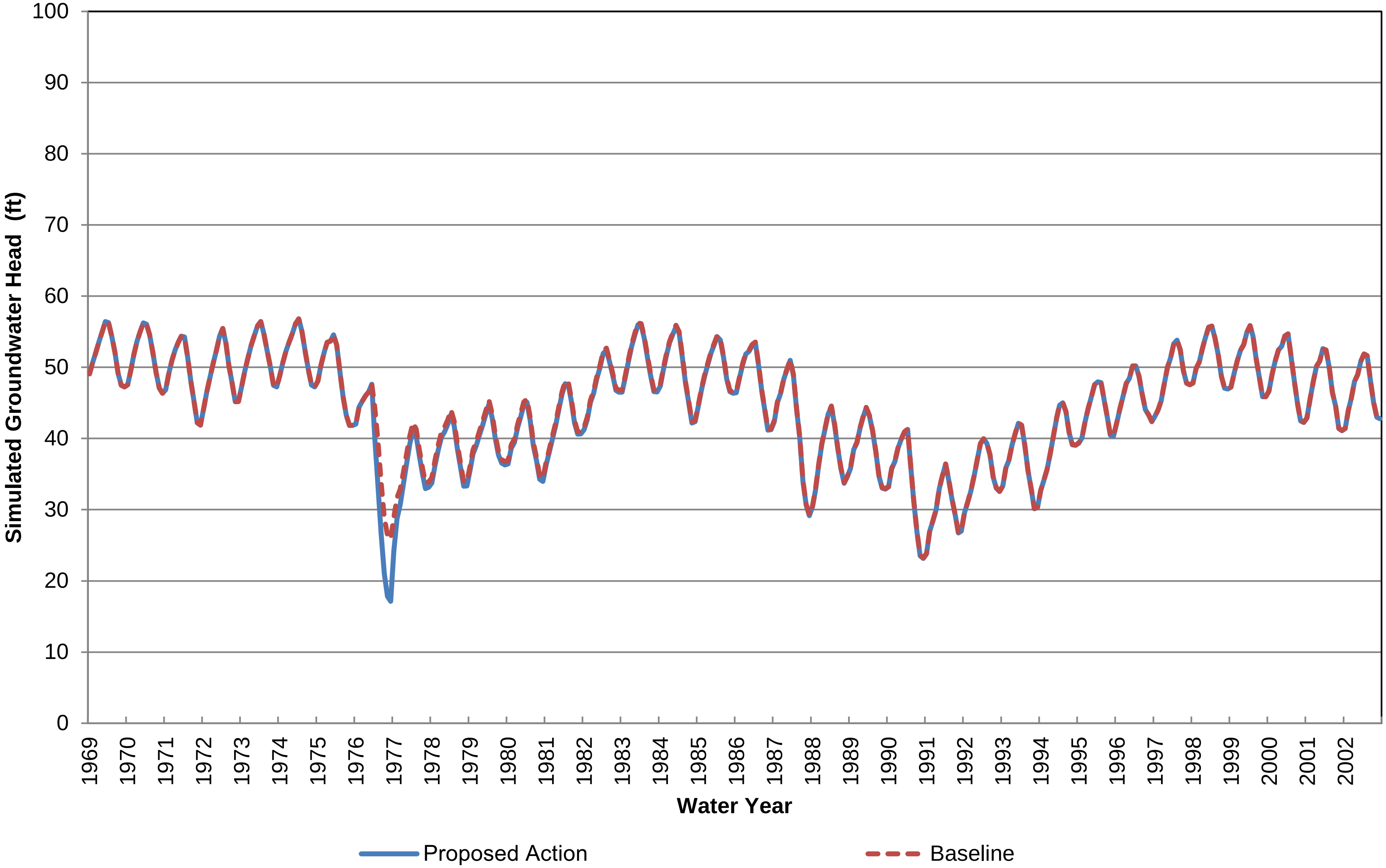
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 4 (Approximately 300-420 ft bgs)

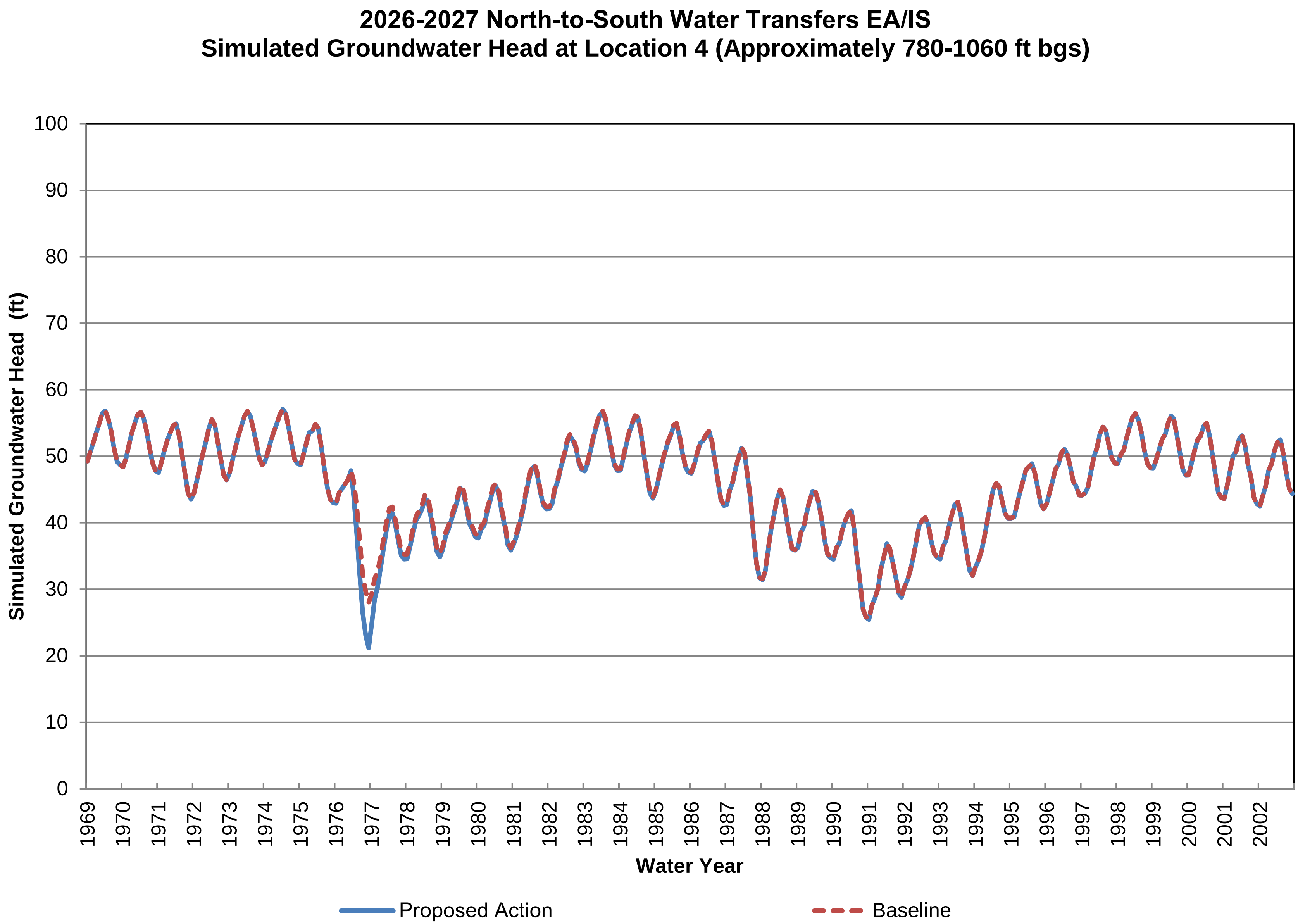


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 4 (Approximately 420-580 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 4 (Approximately 580-780 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 4 (Approximately 780-1060 ft bgs)
100
90
80
70
60
50
40
30
20
10
0
Simulated Groundwater Head (ft)
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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1988
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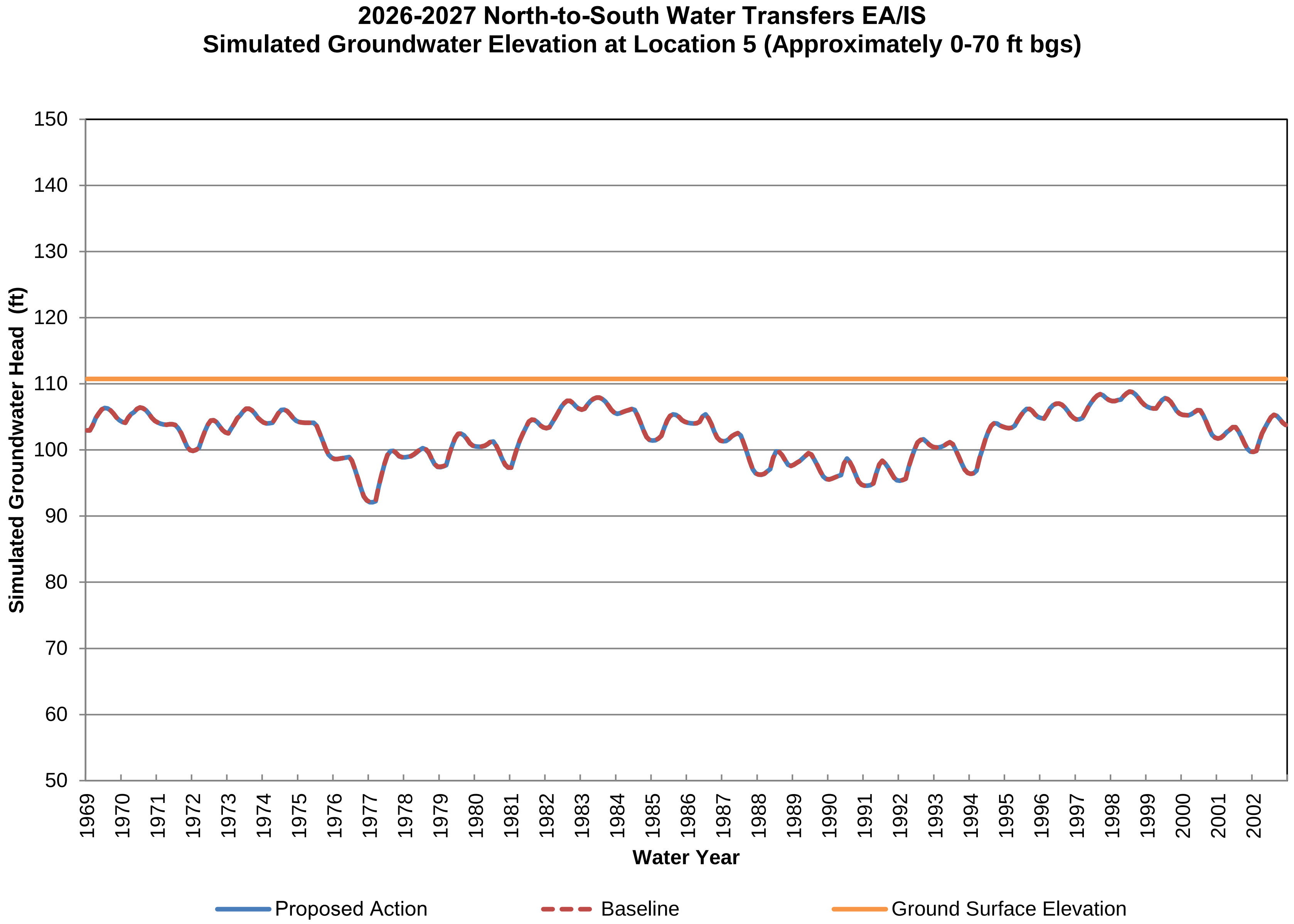
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 5 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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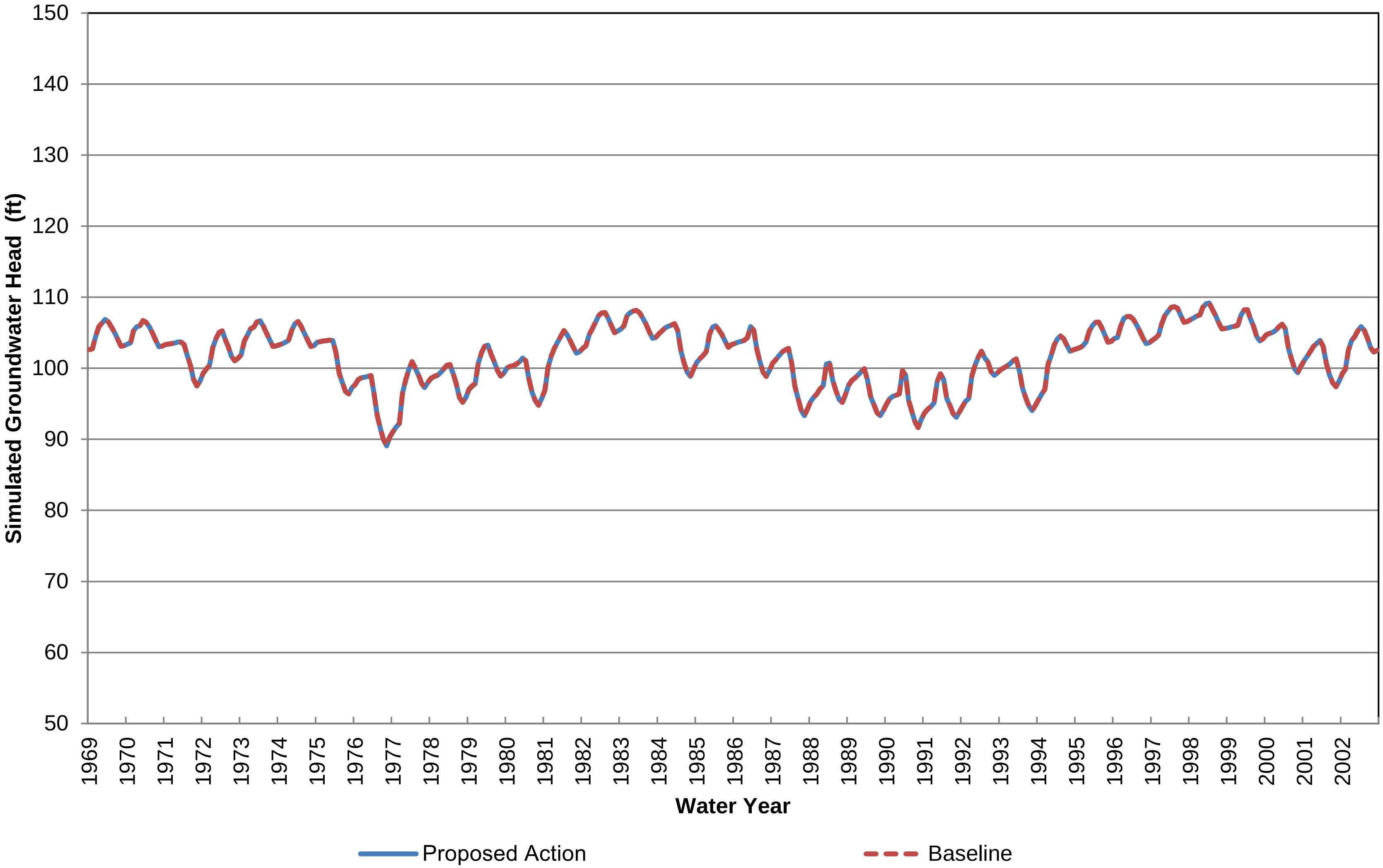
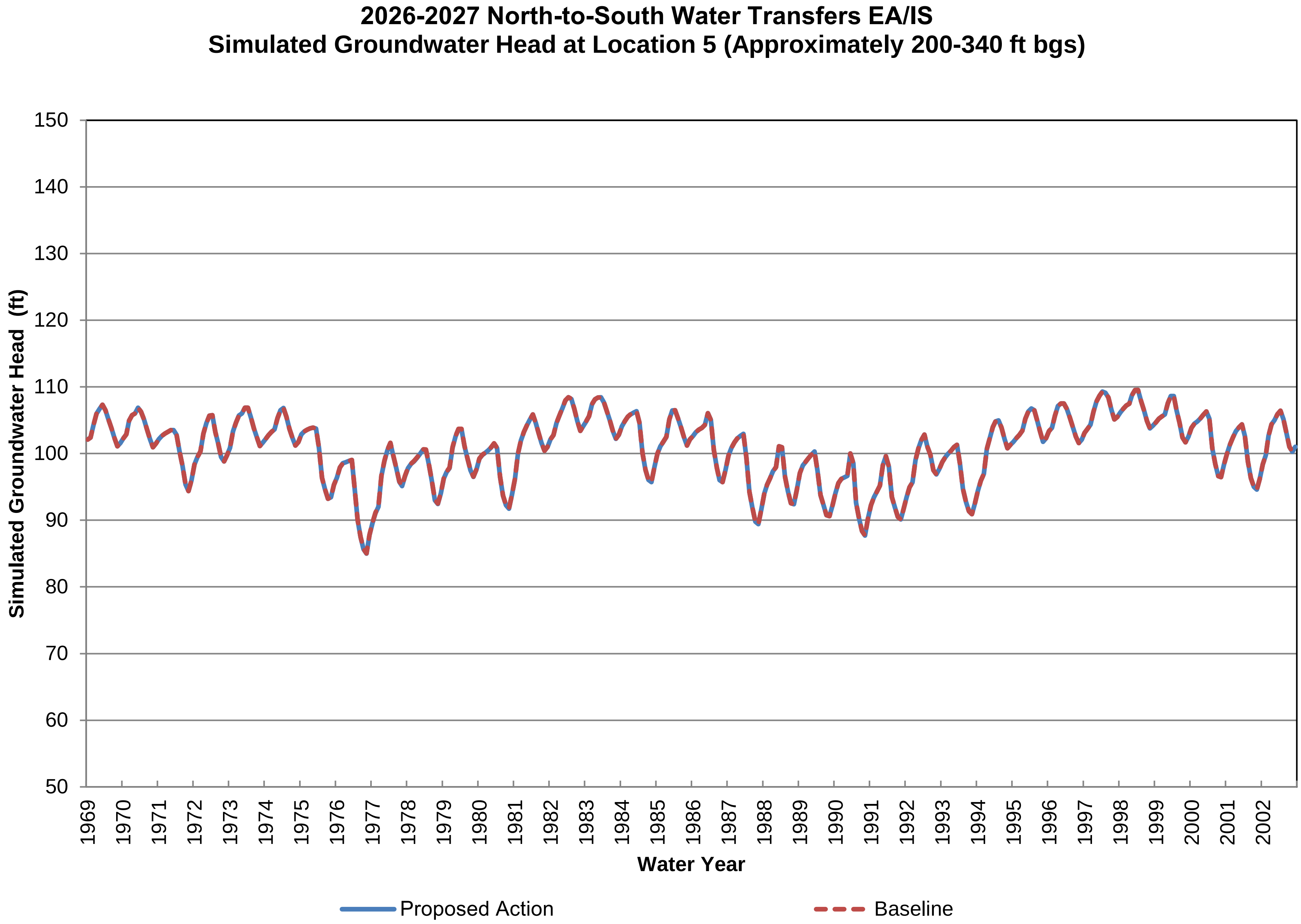
1995
1996
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline
Ground Surface Elevation

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 5 (Approximately 70-200 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 5 (Approximately 200-340 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
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1990
1991
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1997
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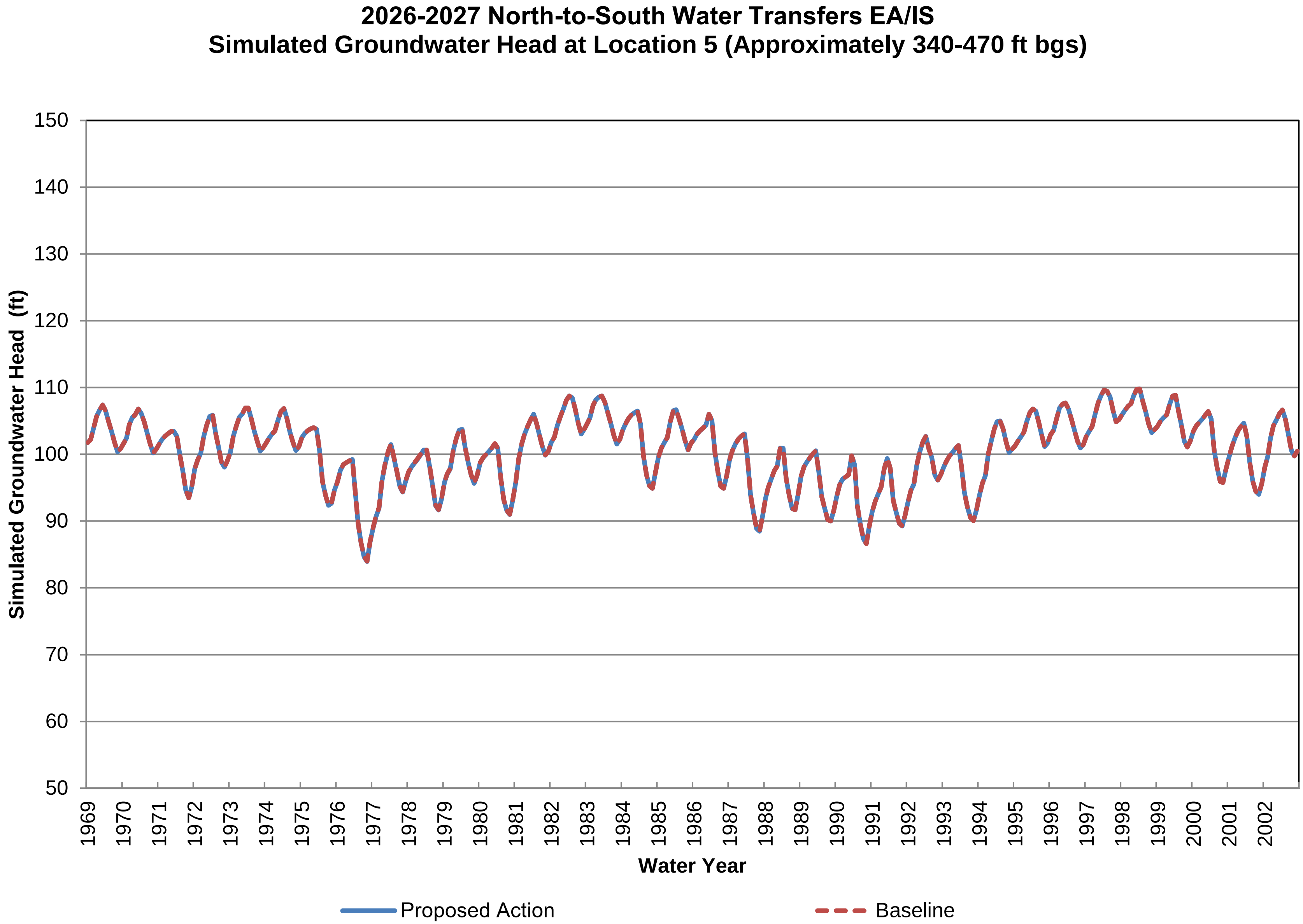
1999
2000
2001
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 5 (Approximately 340-470 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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1982
1983
1984
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1992
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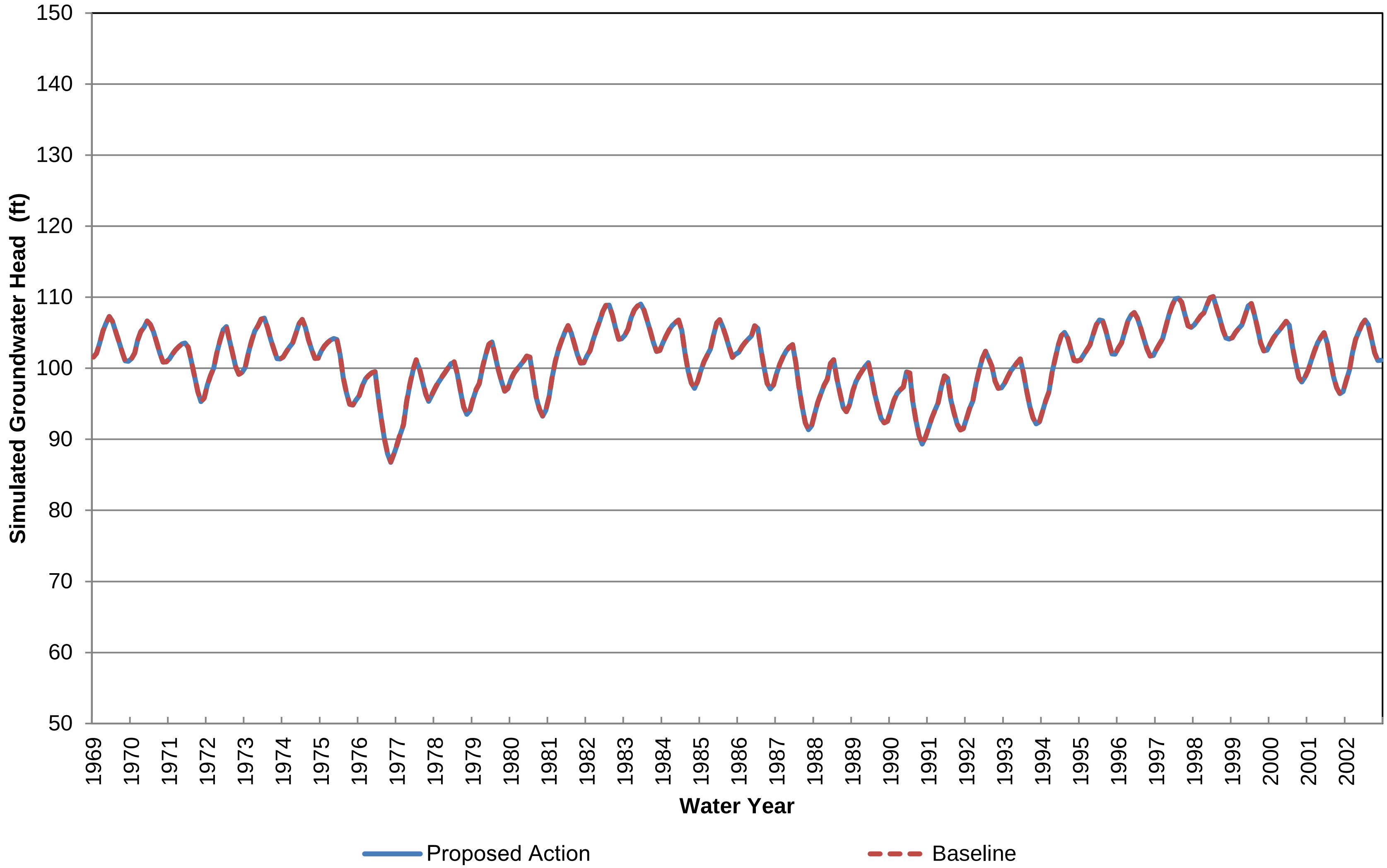
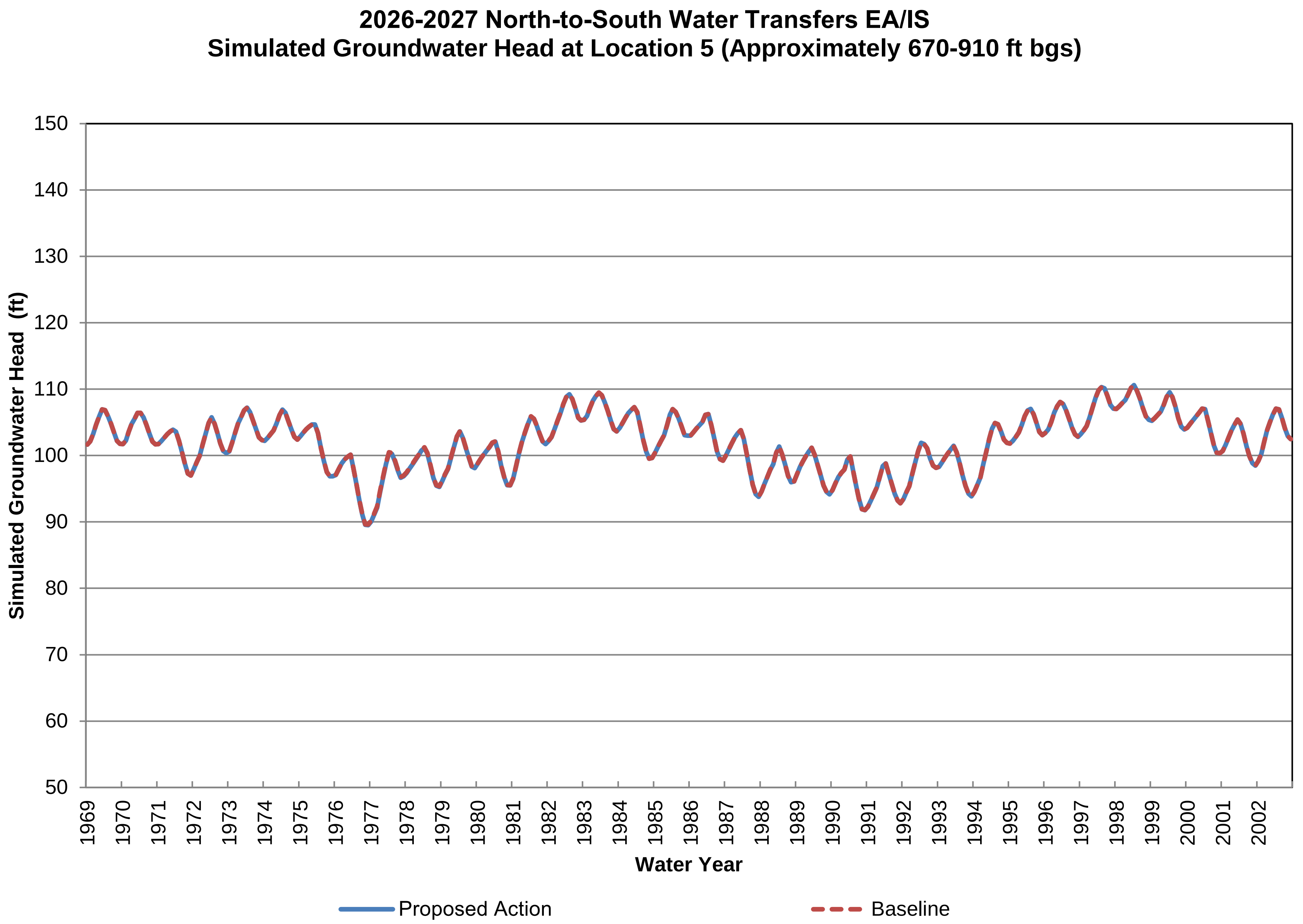
1994
1995
1996
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 5 (Approximately 470-670 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 5 (Approximately 670-910 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
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1987
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1989
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1991
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1993
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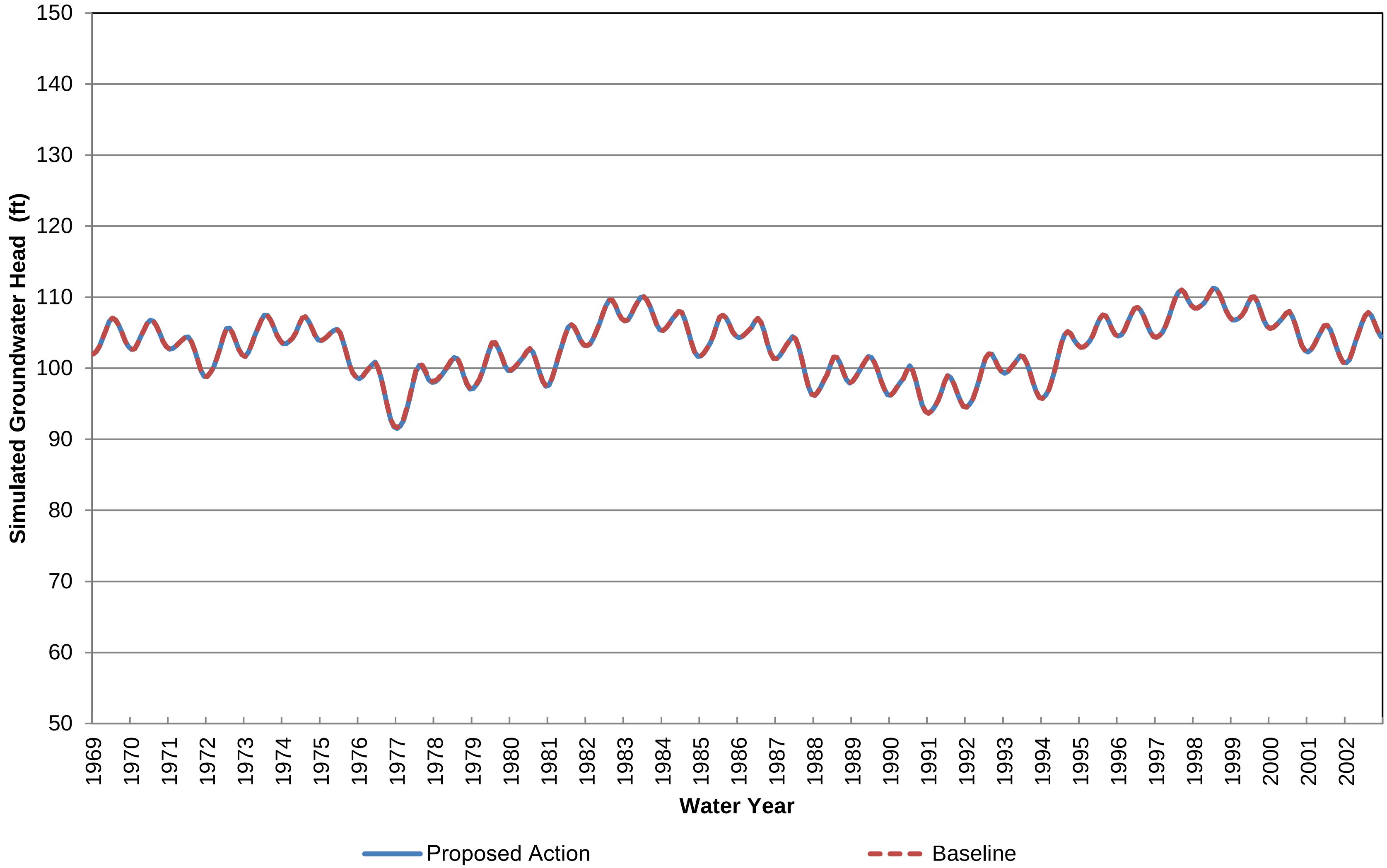
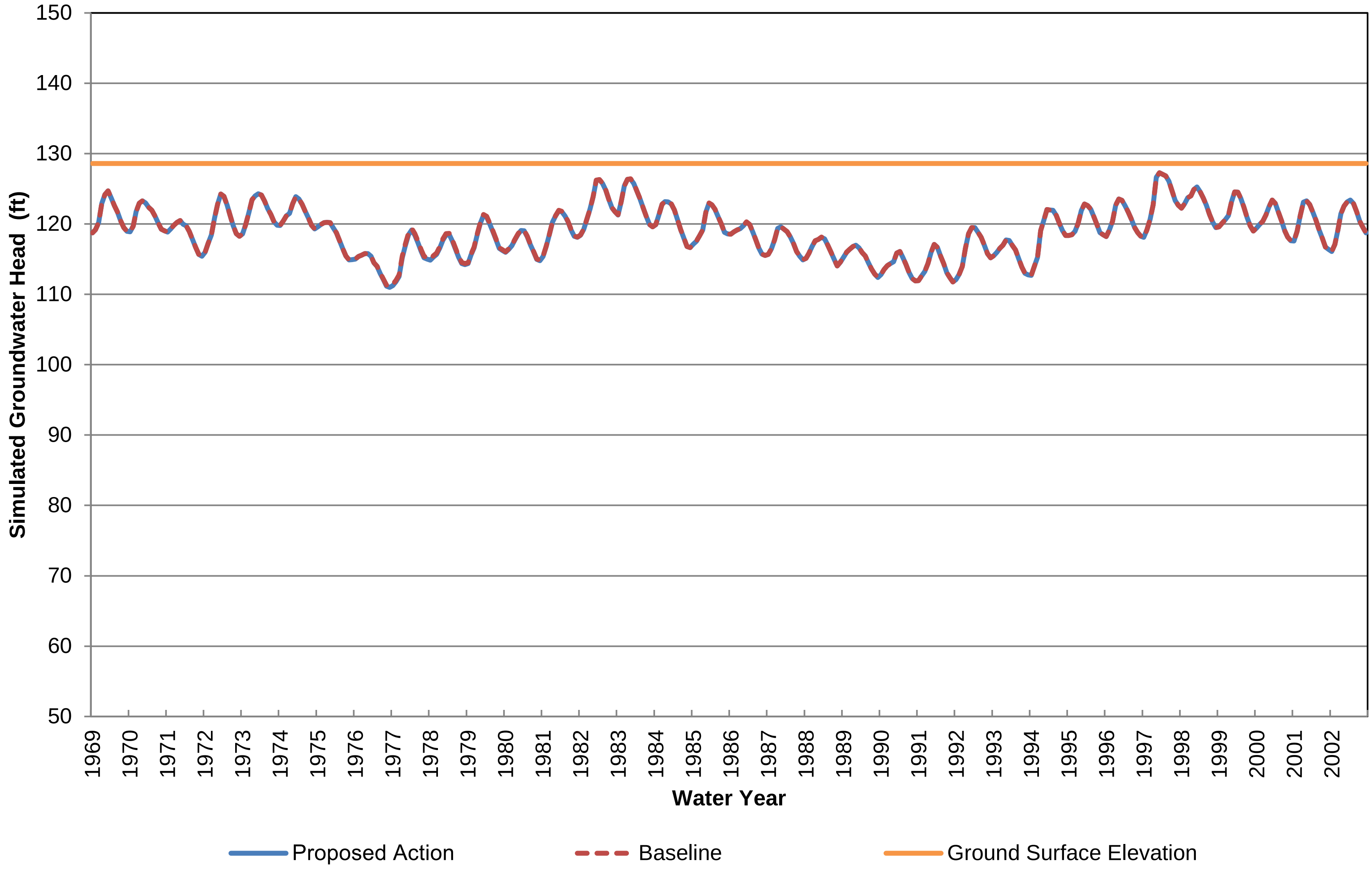
1996
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

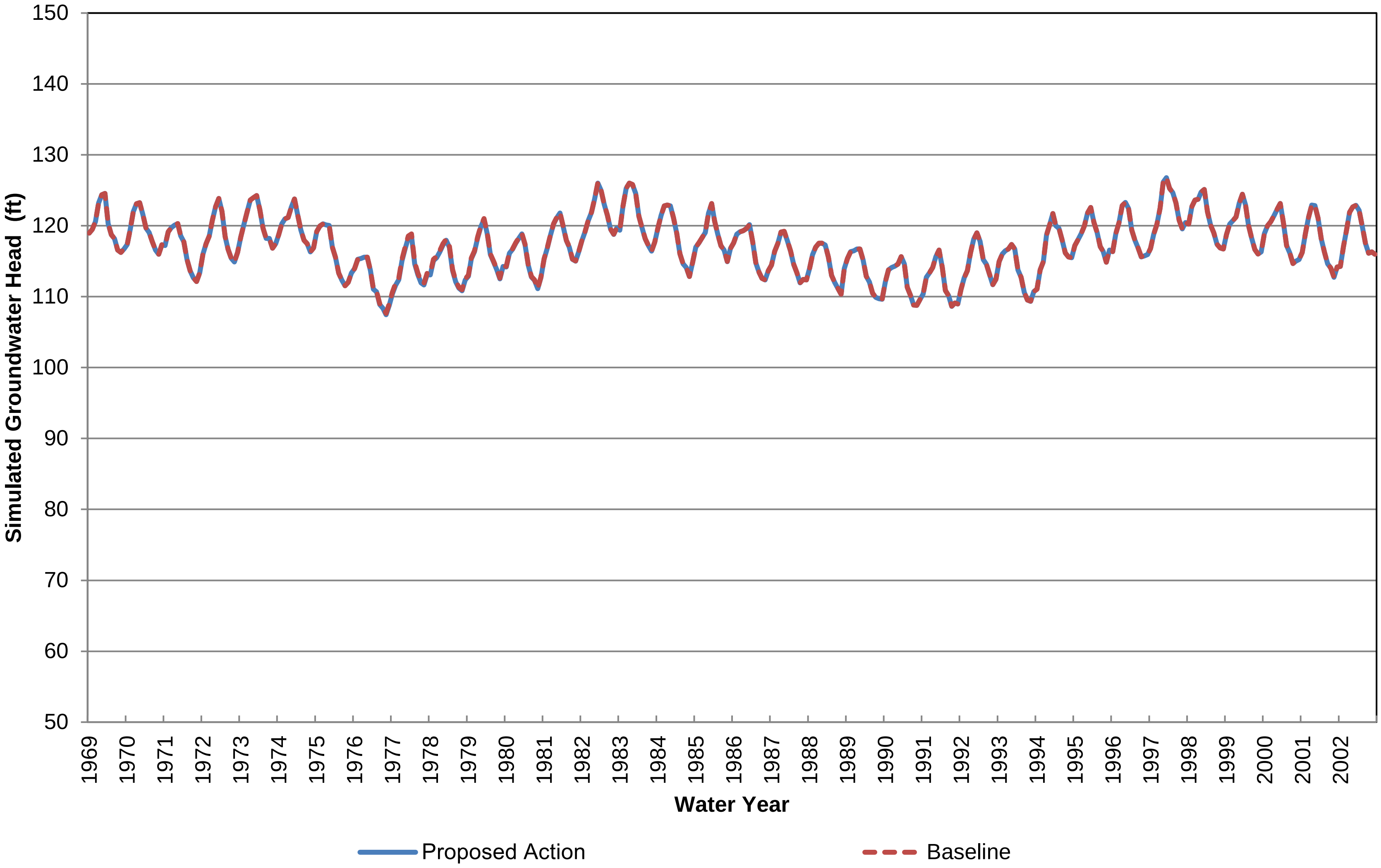
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 5 (Approximately 910-1310 ft bgs)

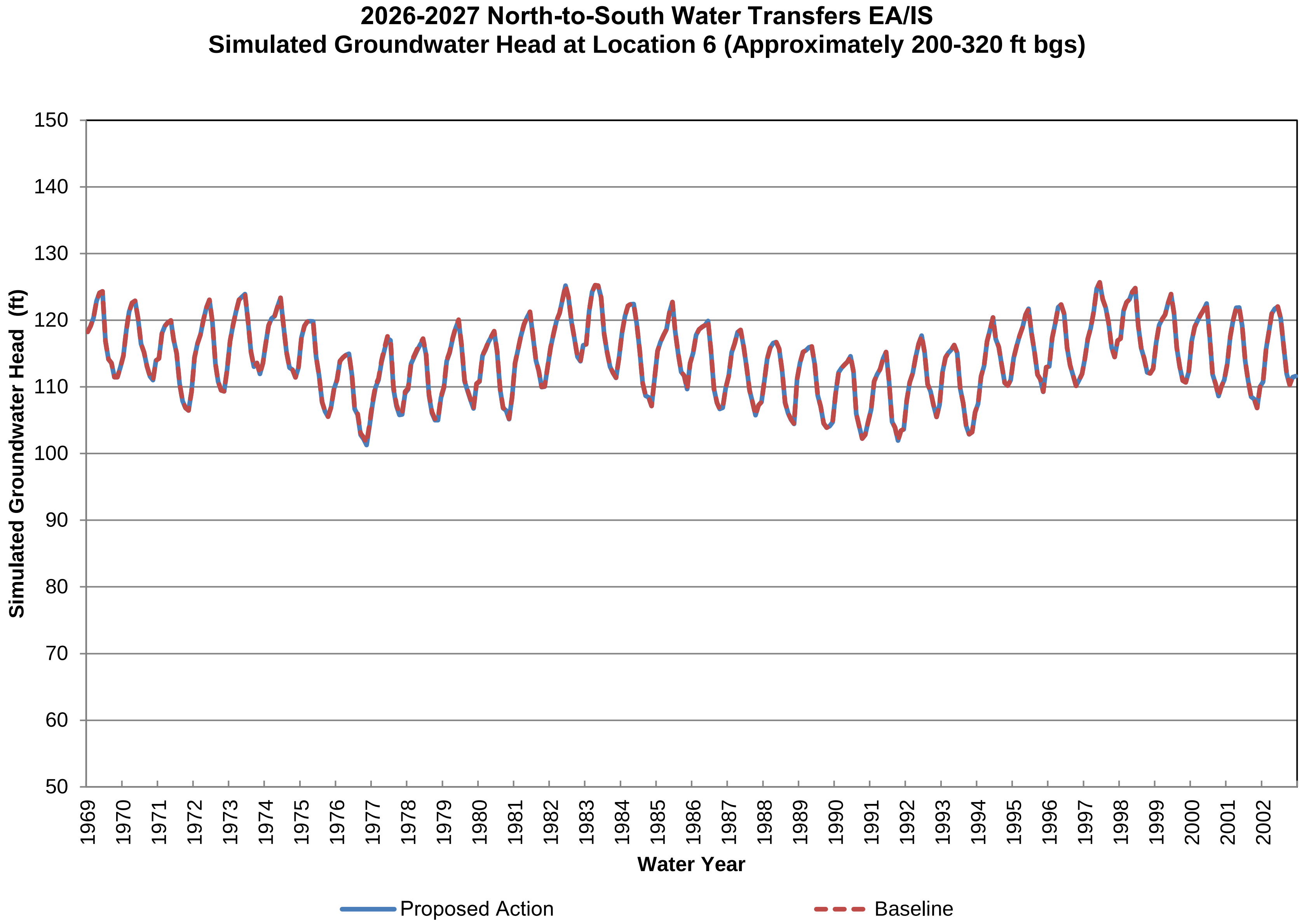


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 6 (Approximately 0-70 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 6 (Approximately 70-200 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 6 (Approximately 200-320 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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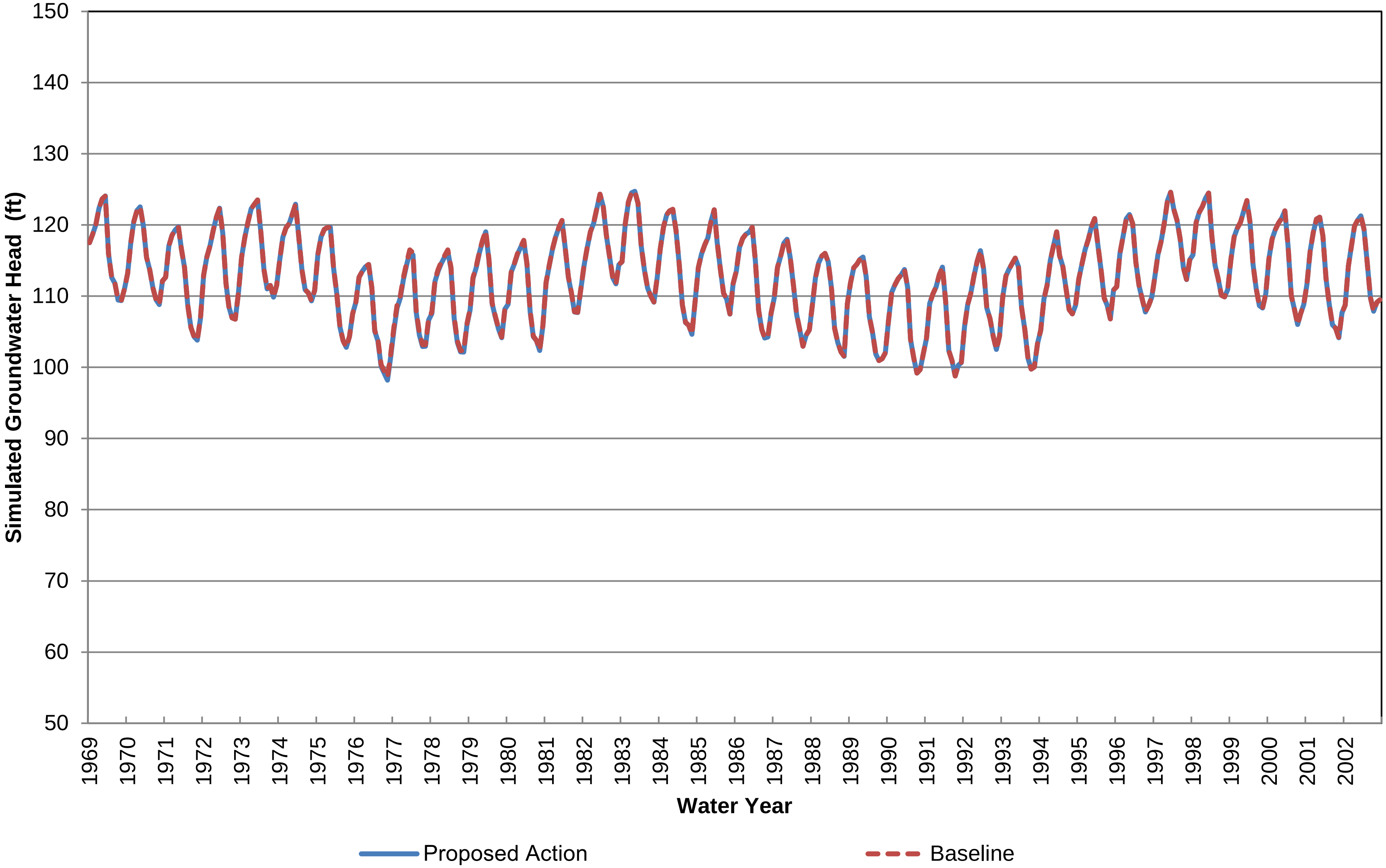
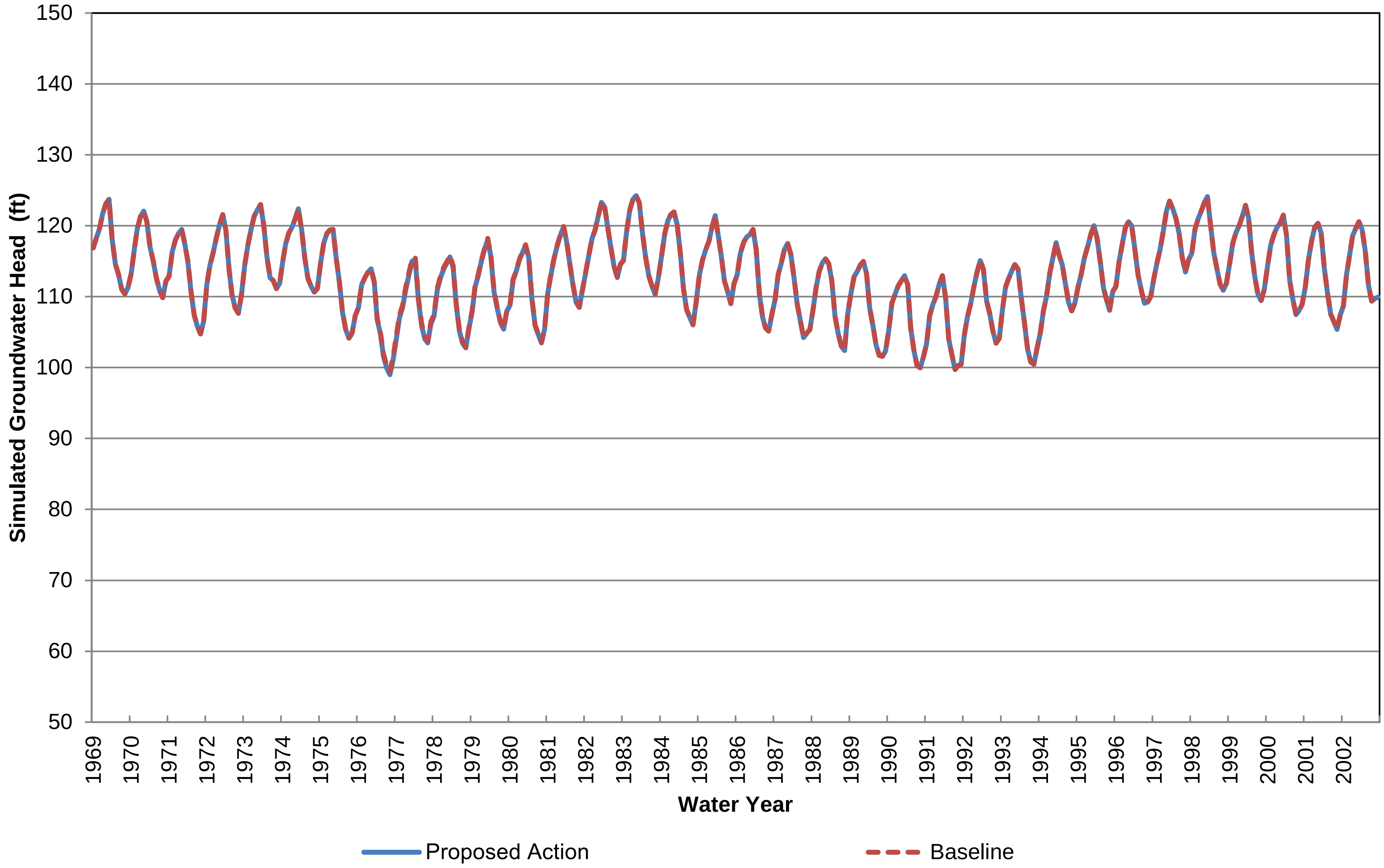
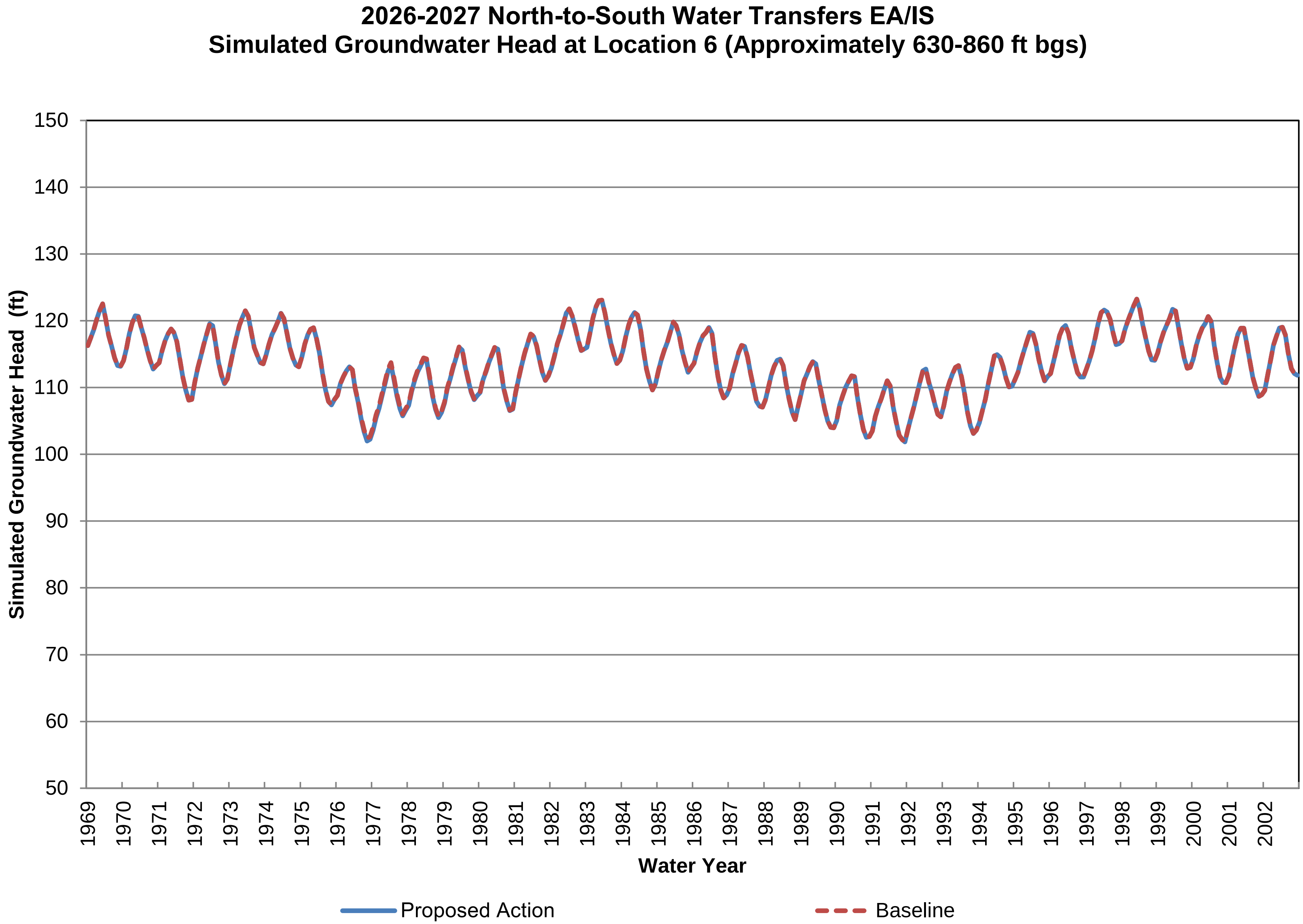
1994
1995
1996
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 6 (Approximately 320-440 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 6 (Approximately 440-630 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 6 (Approximately 630-860 ft bgs)
150
140
130
120
110
100
90
80
70
60
50
Simulated Groundwater Head (ft)
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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1986
1987
1988
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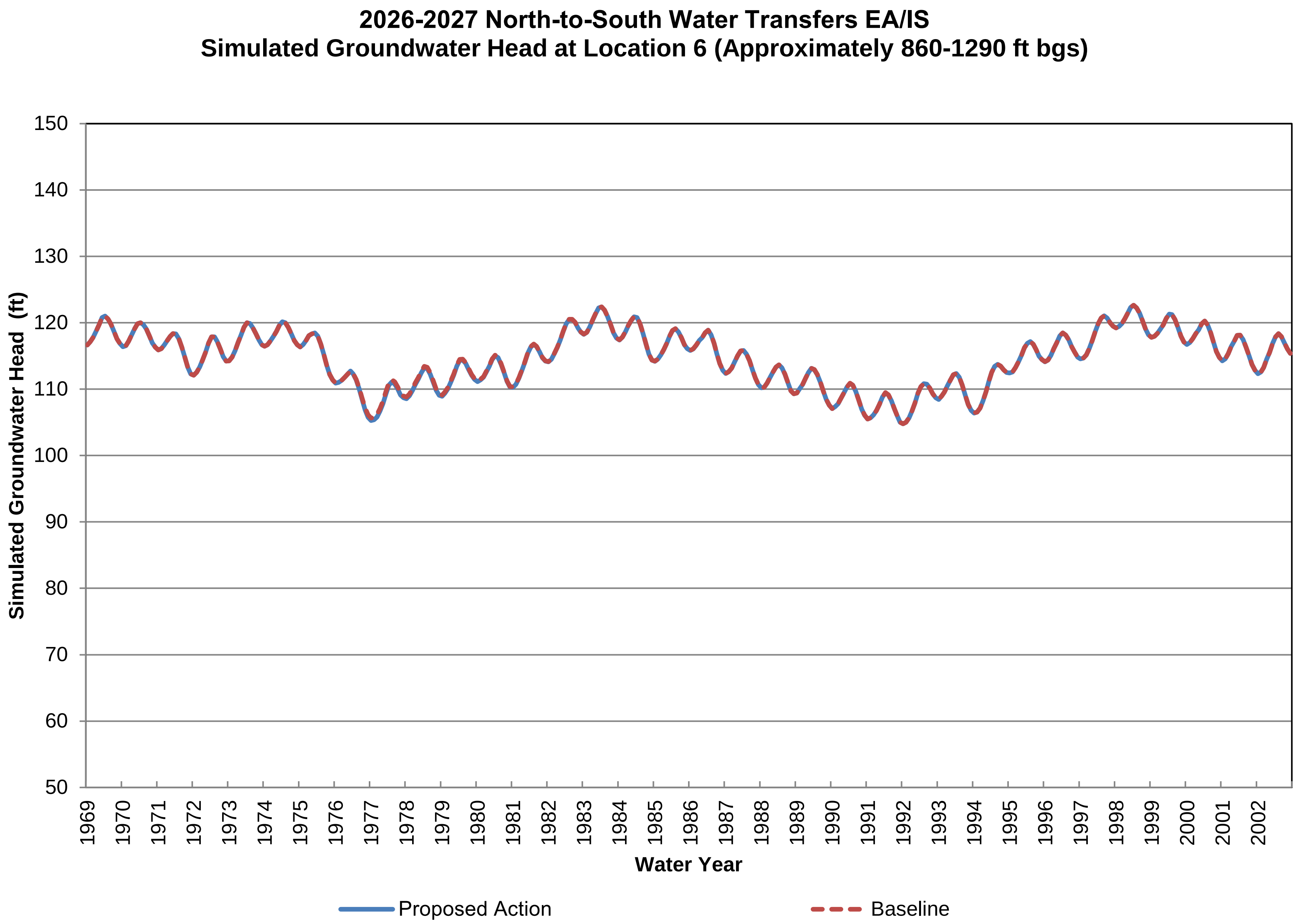
1999
2000
2001
2002
Water Year
Proposed Action
Baseline


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 6 (Approximately 860-1290 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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1986
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1988
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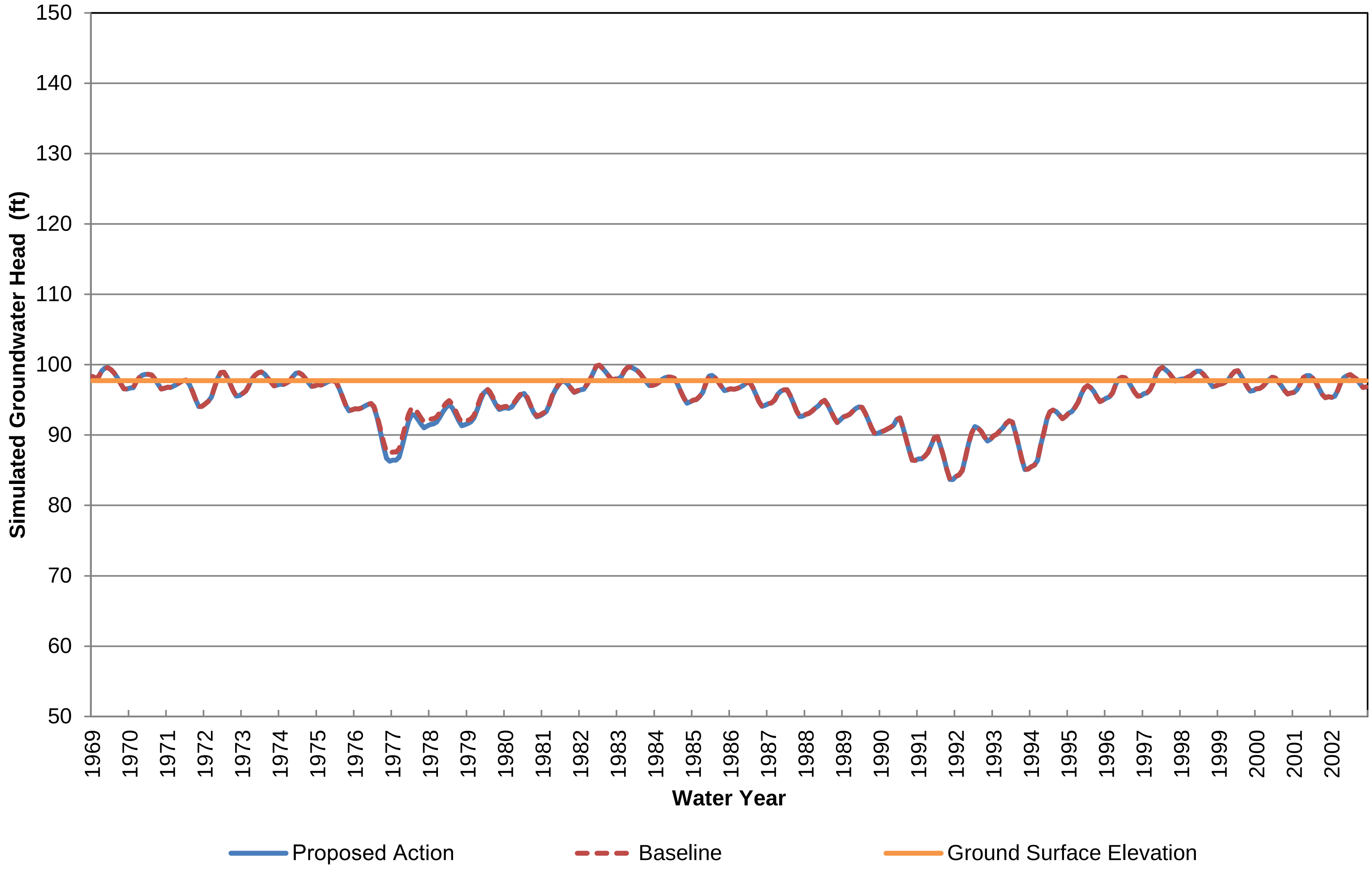
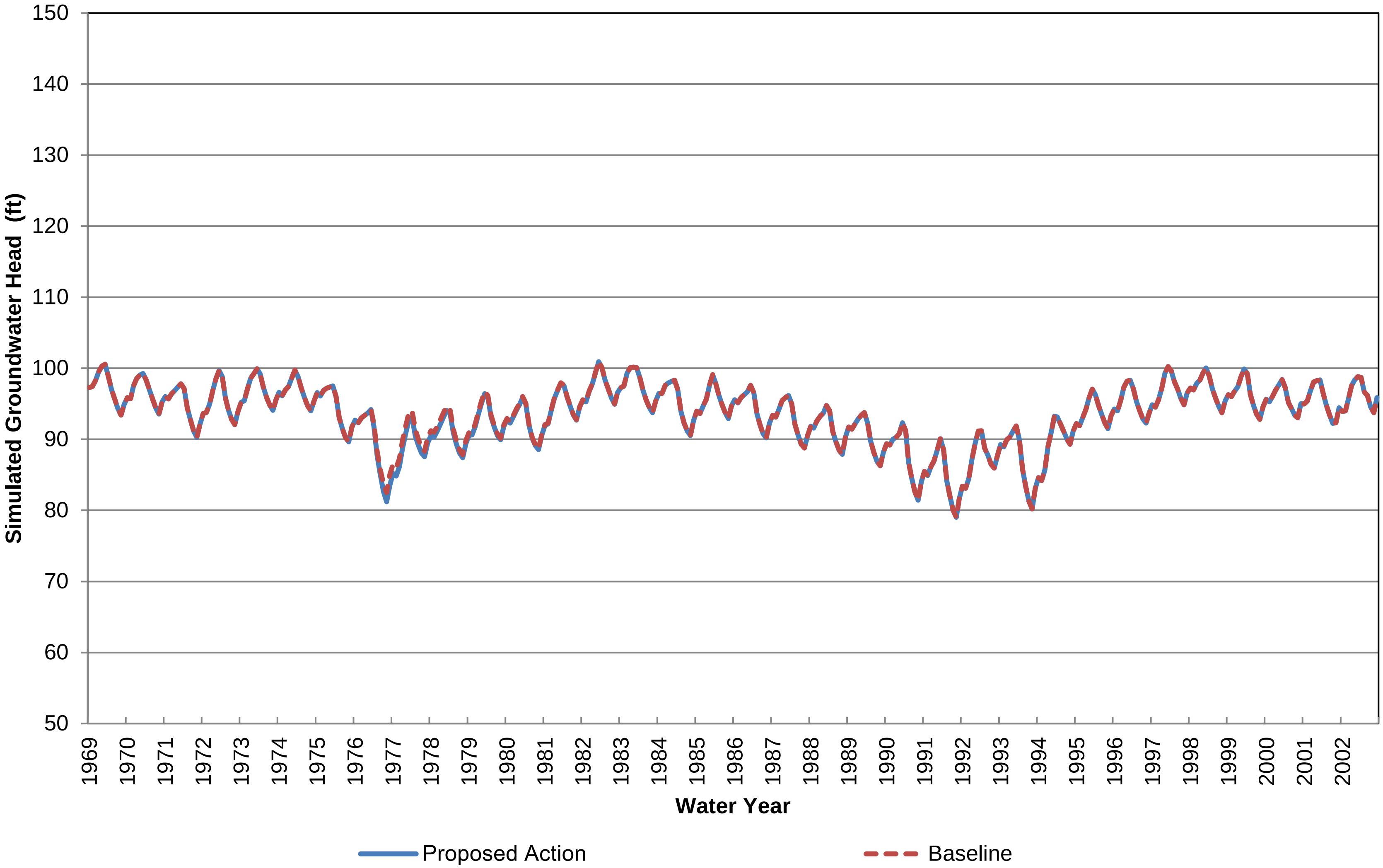
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

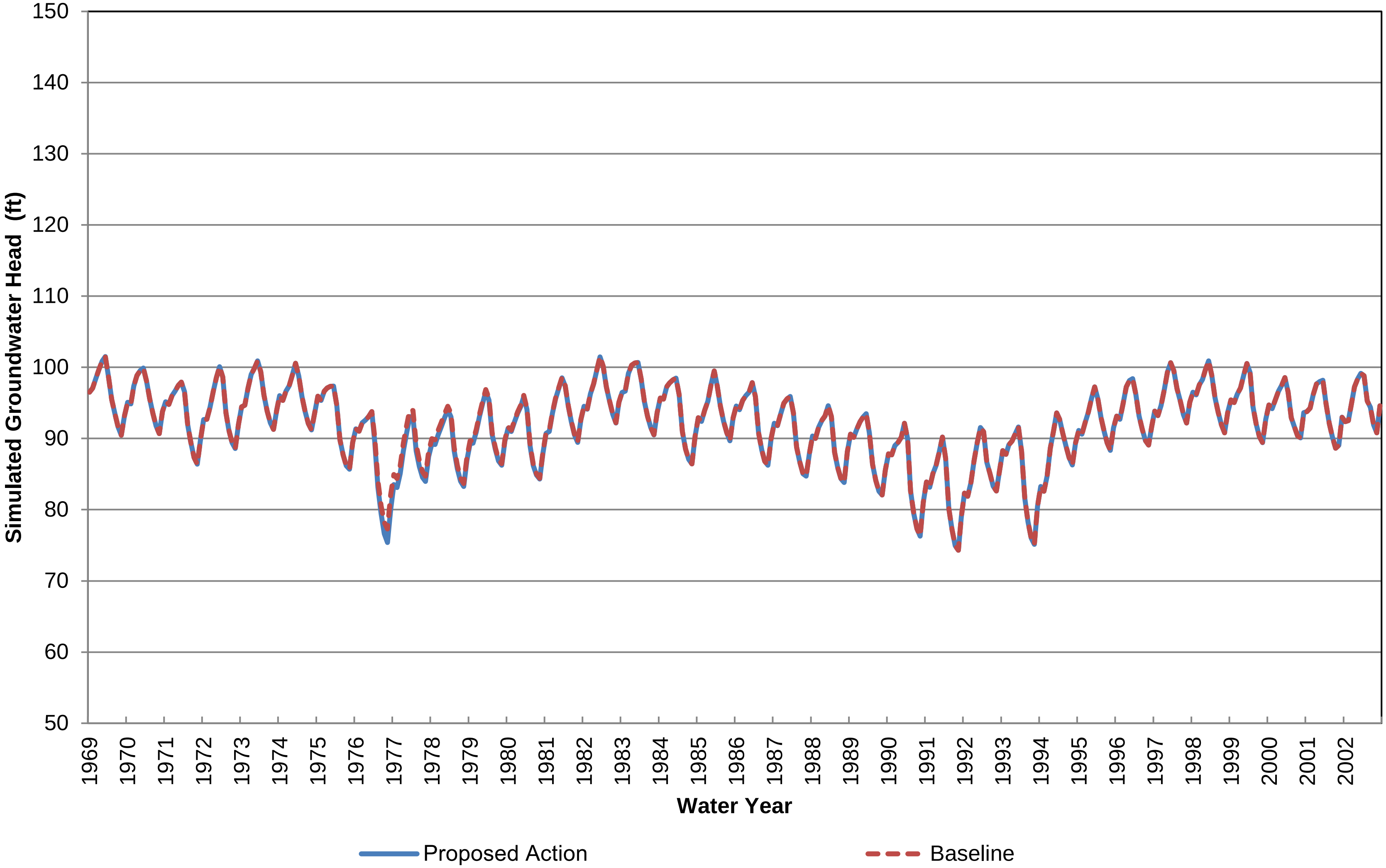
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 7 (Approximately 0-70 ft bgs)



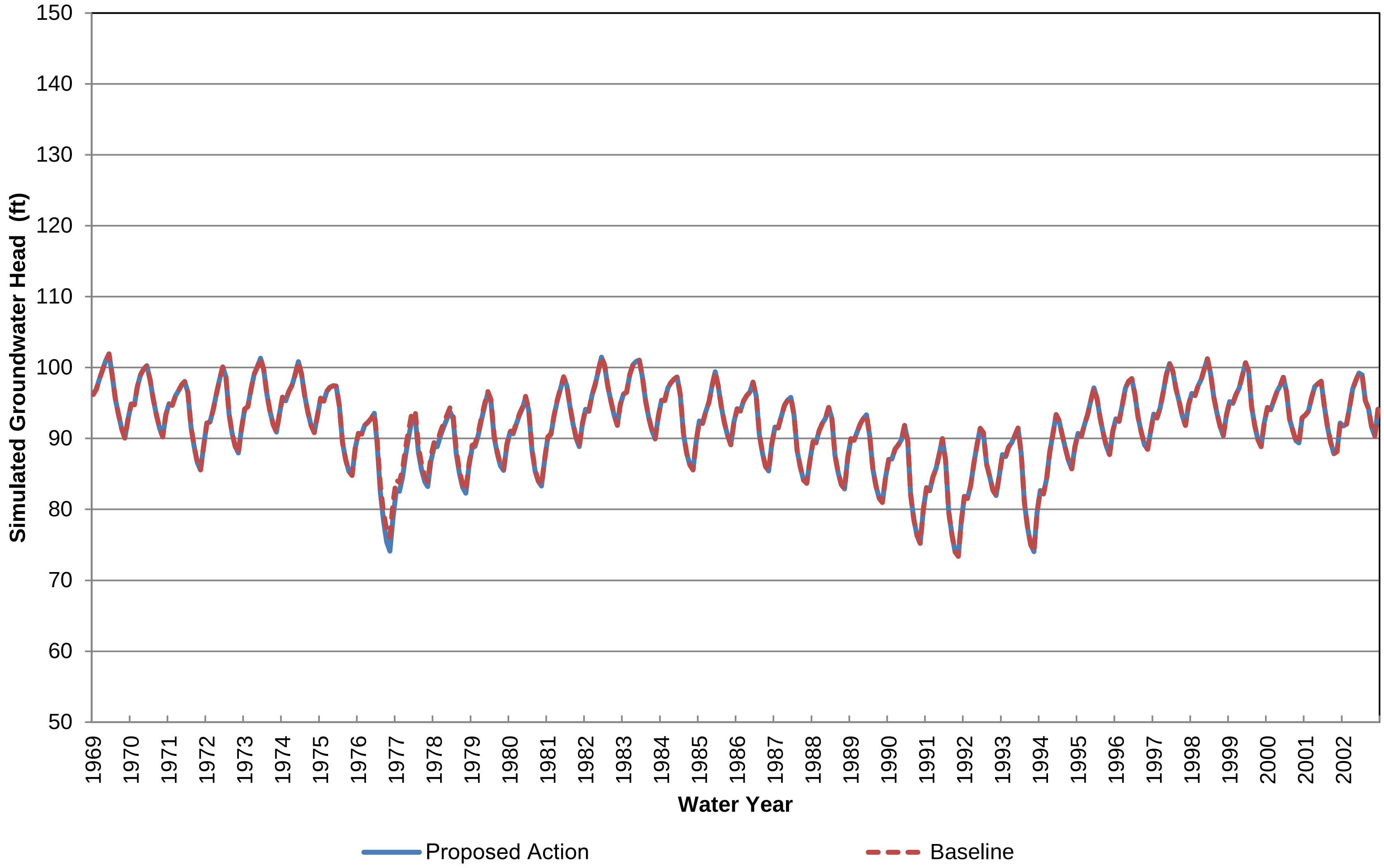
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 7 (Approximately 70-220 ft bgs)

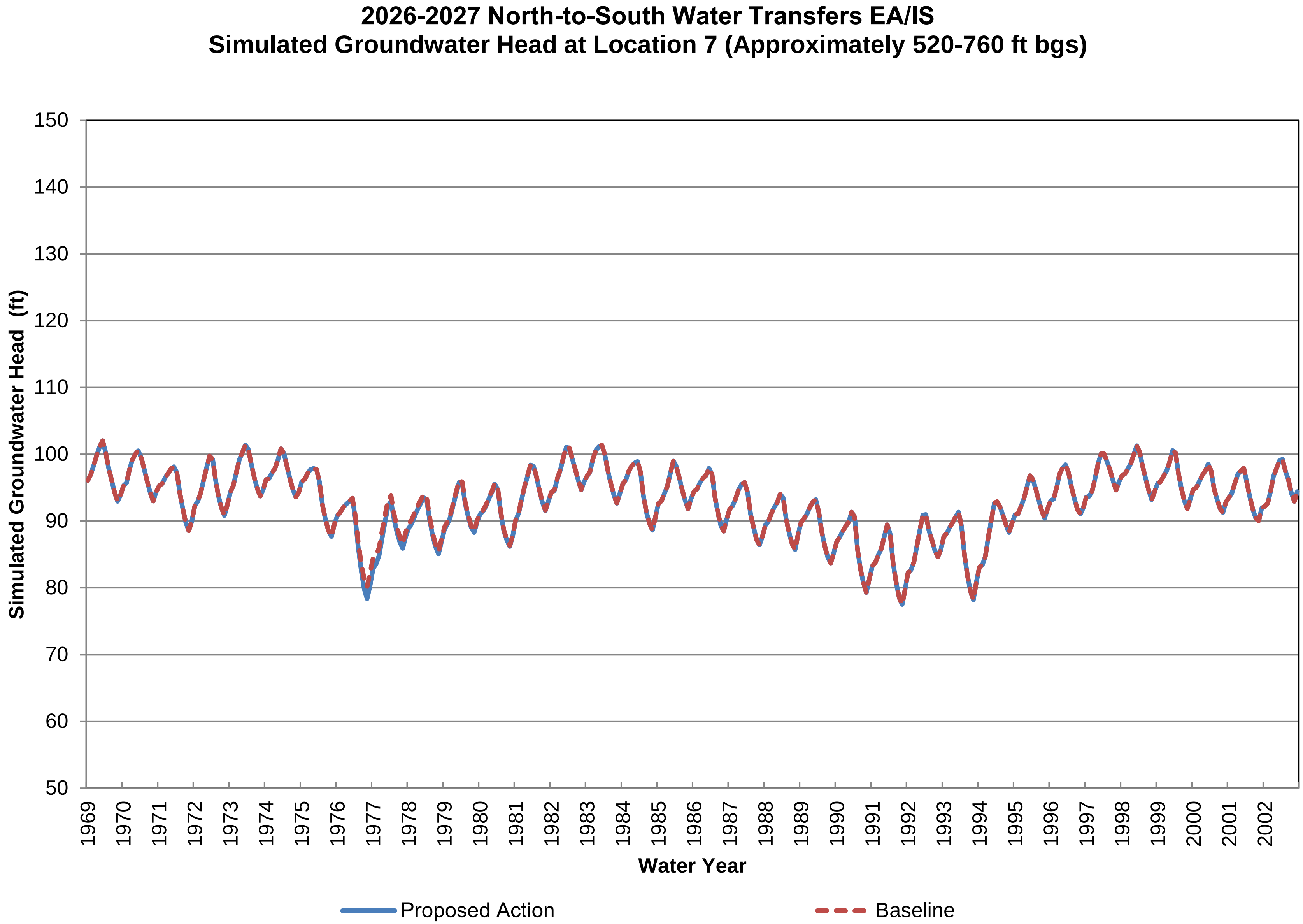


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 7 (Approximately 220-370 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 7 (Approximately 370-520 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 7 (Approximately 520-760 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
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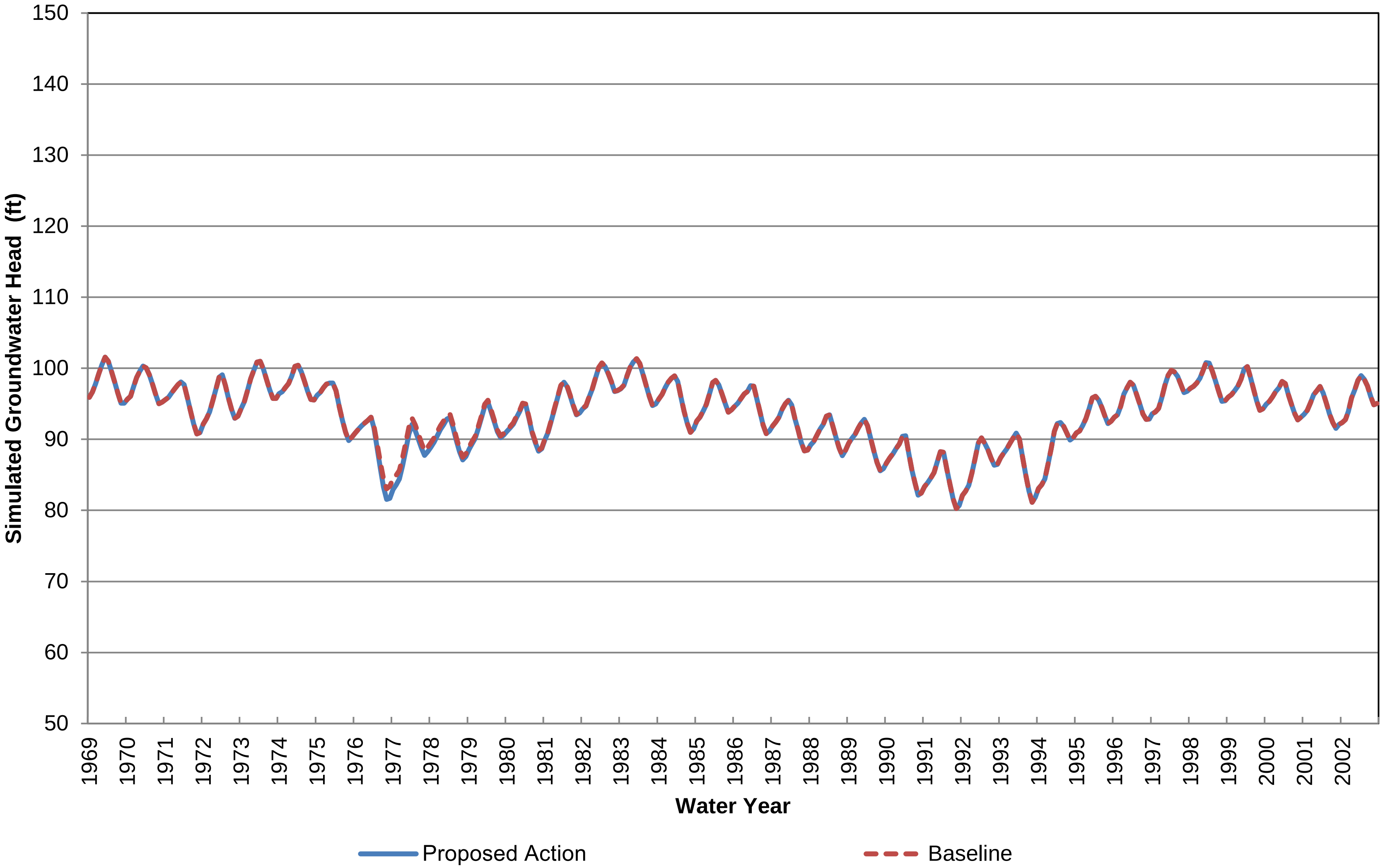
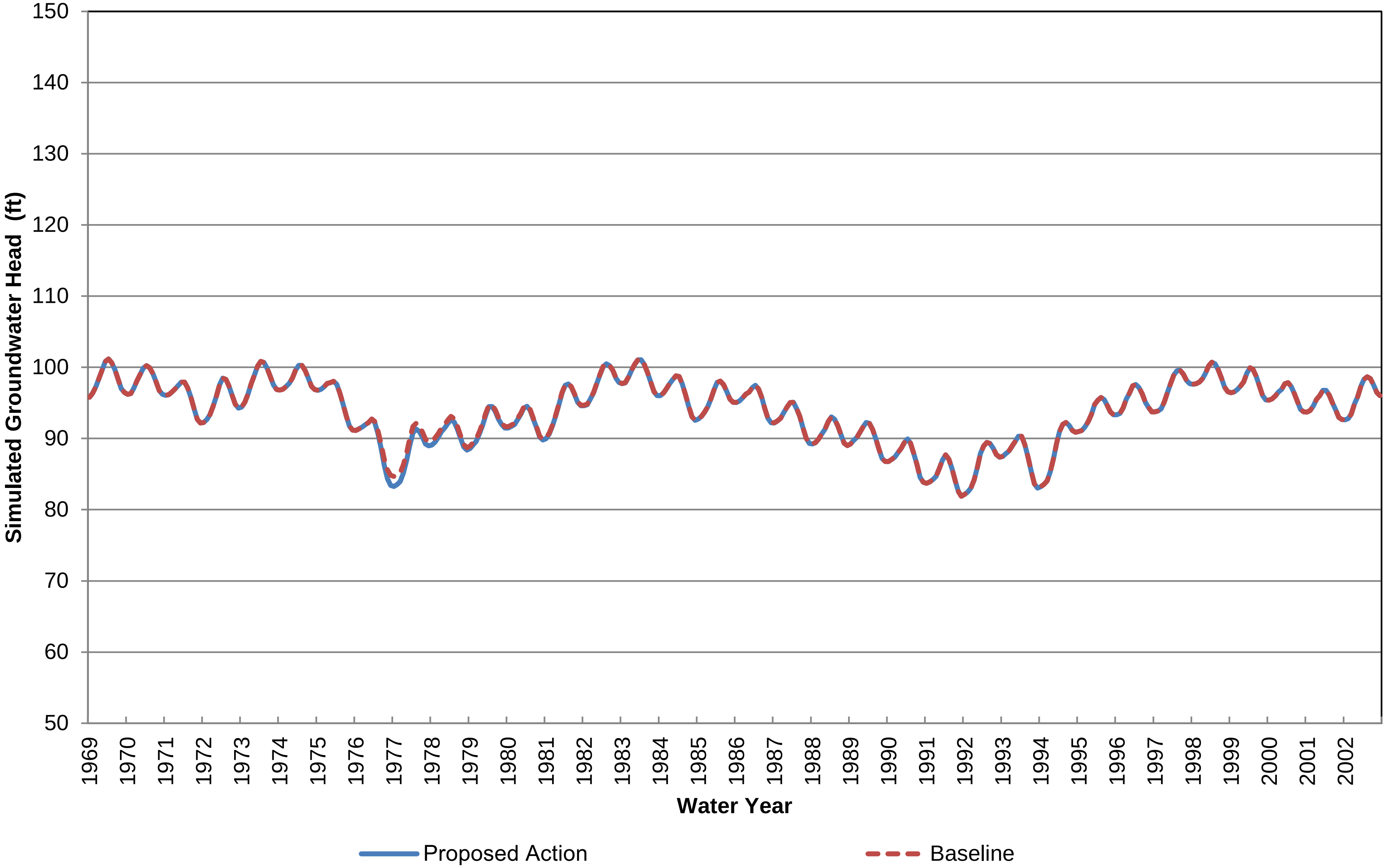
2002
Water Year
Proposed Action
Baseline

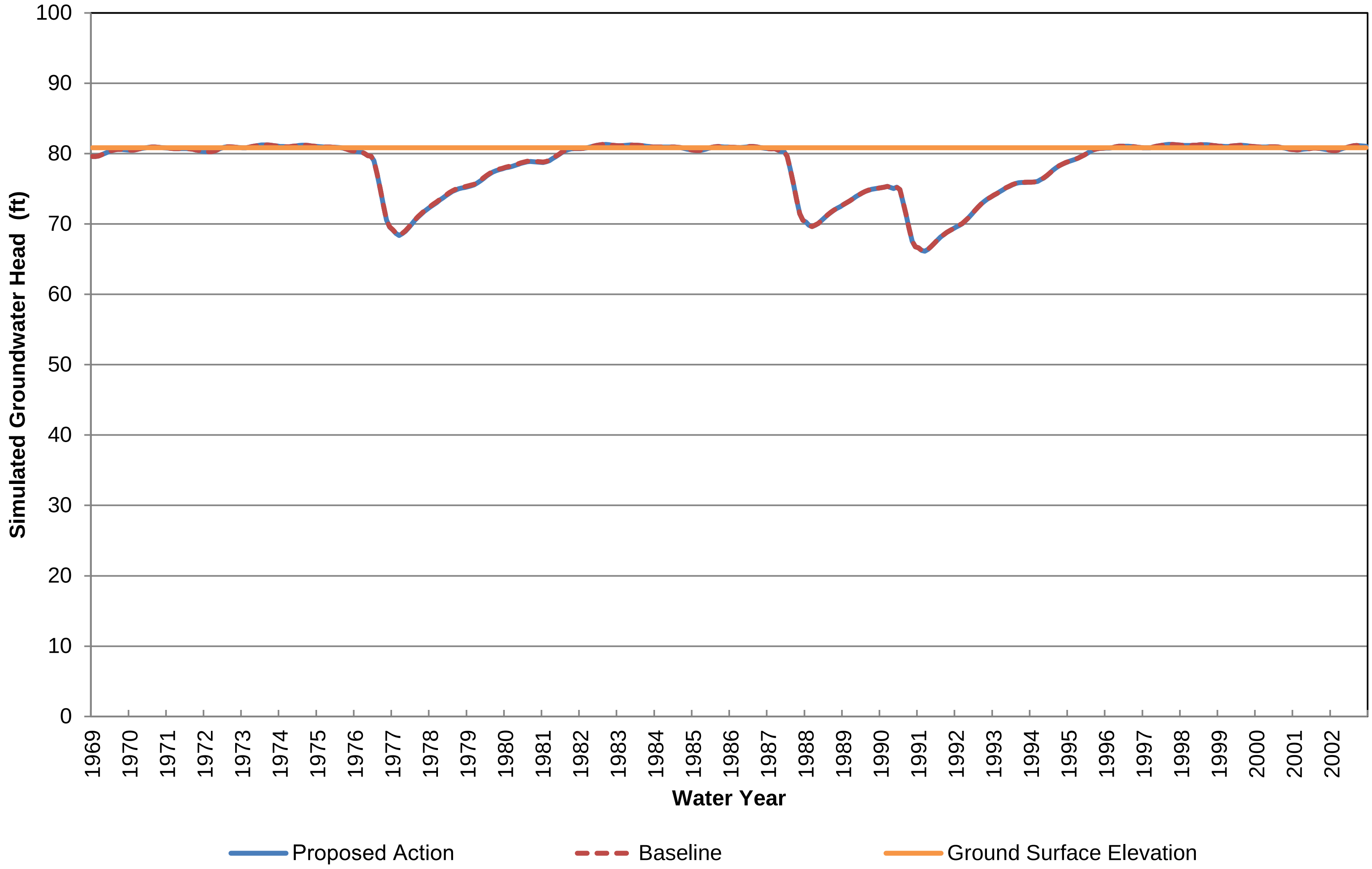
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 7 (Approximately 760-1030 ft bgs)



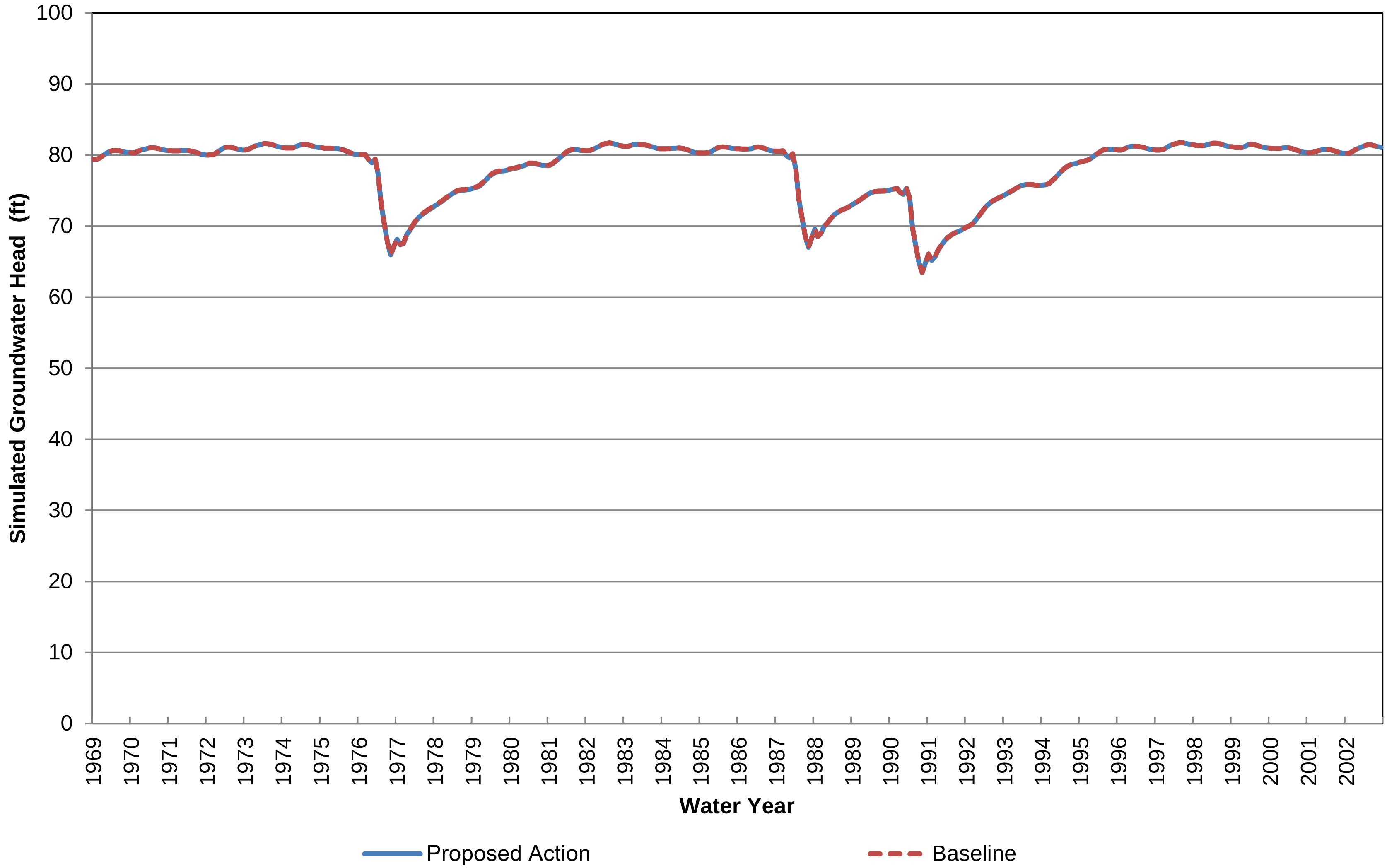
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 7 (Approximately 1030-1520 ft bgs)



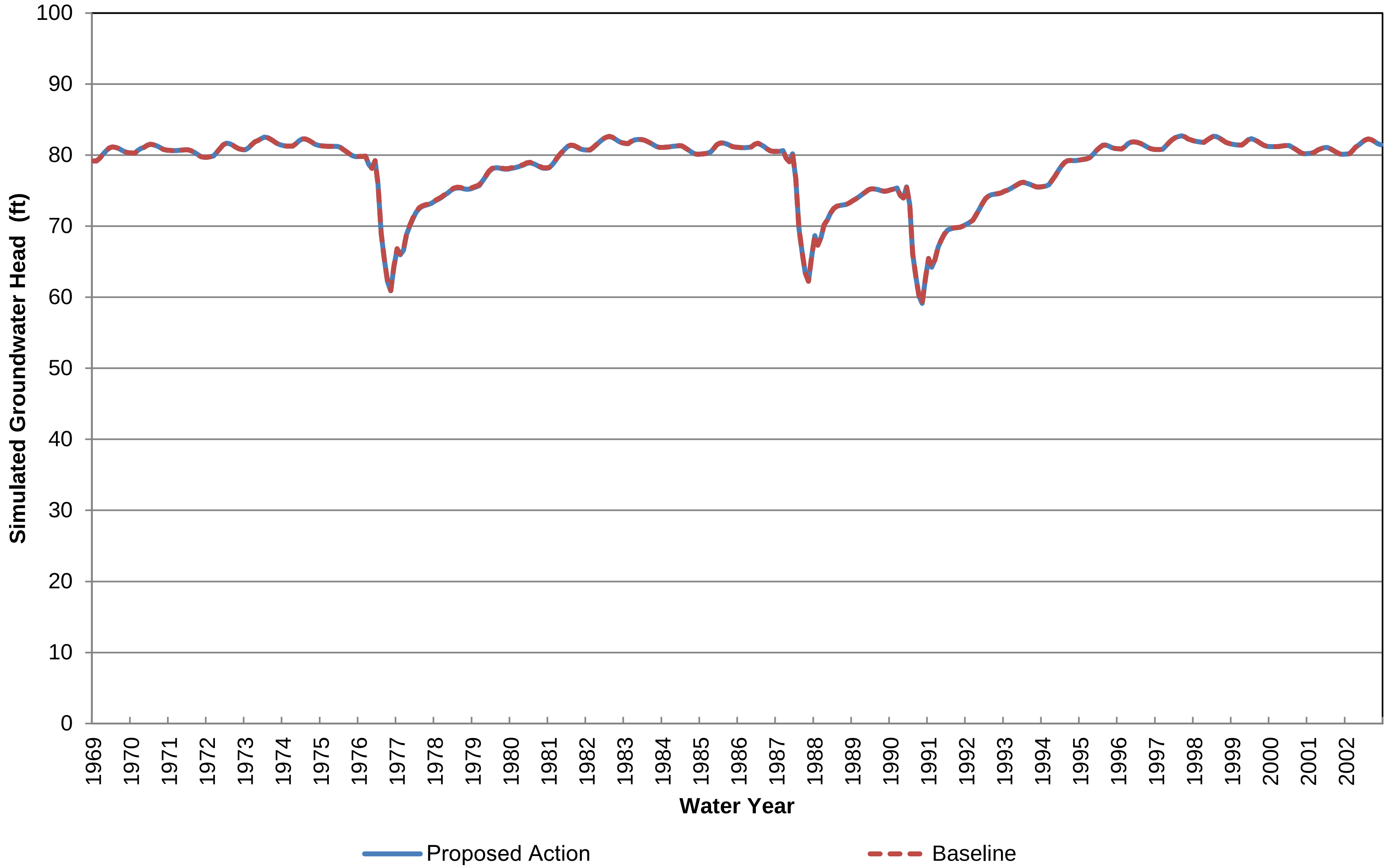
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 8 (Approximately 0-70 ft bgs)



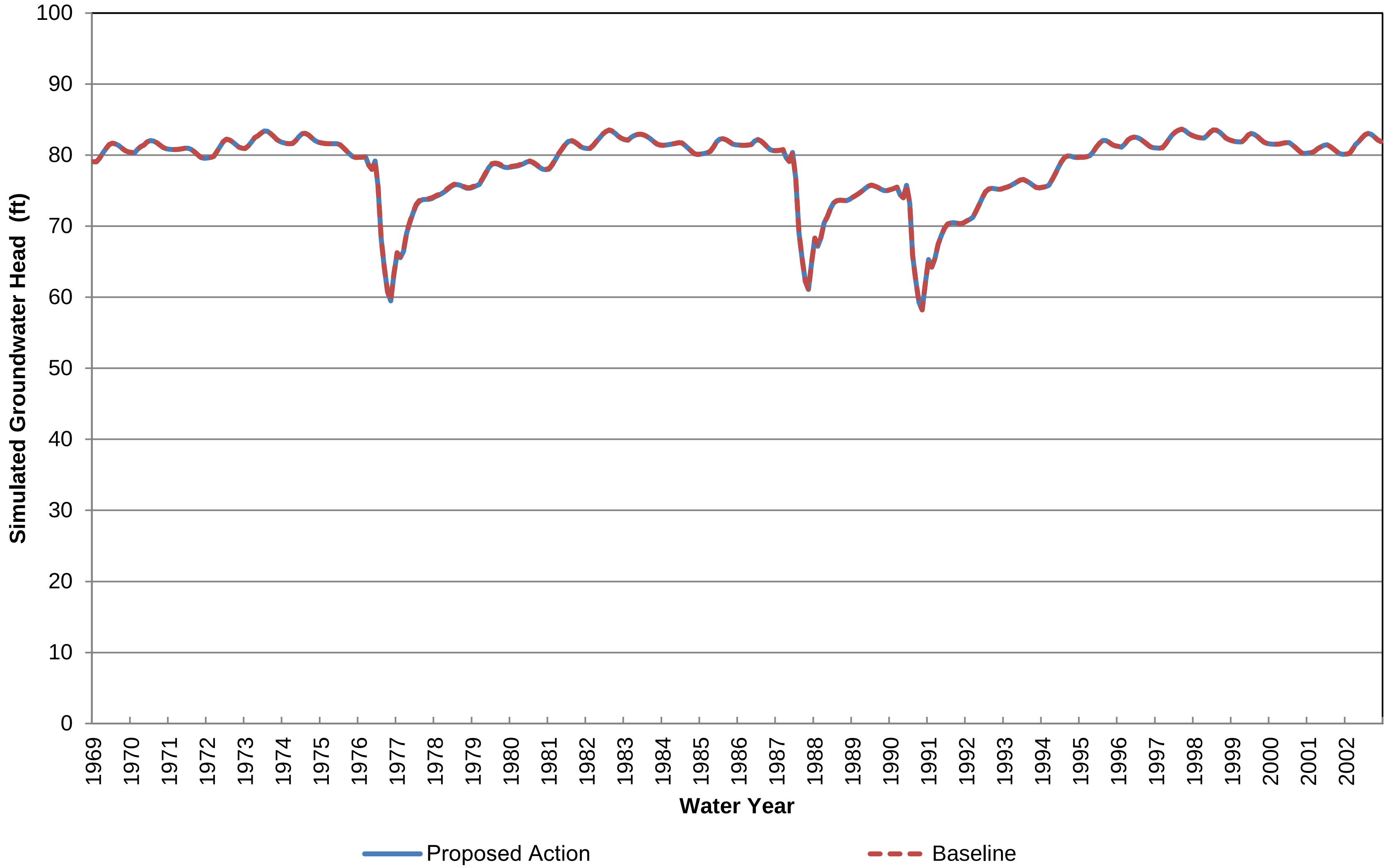
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 8 (Approximately 70-200 ft bgs)

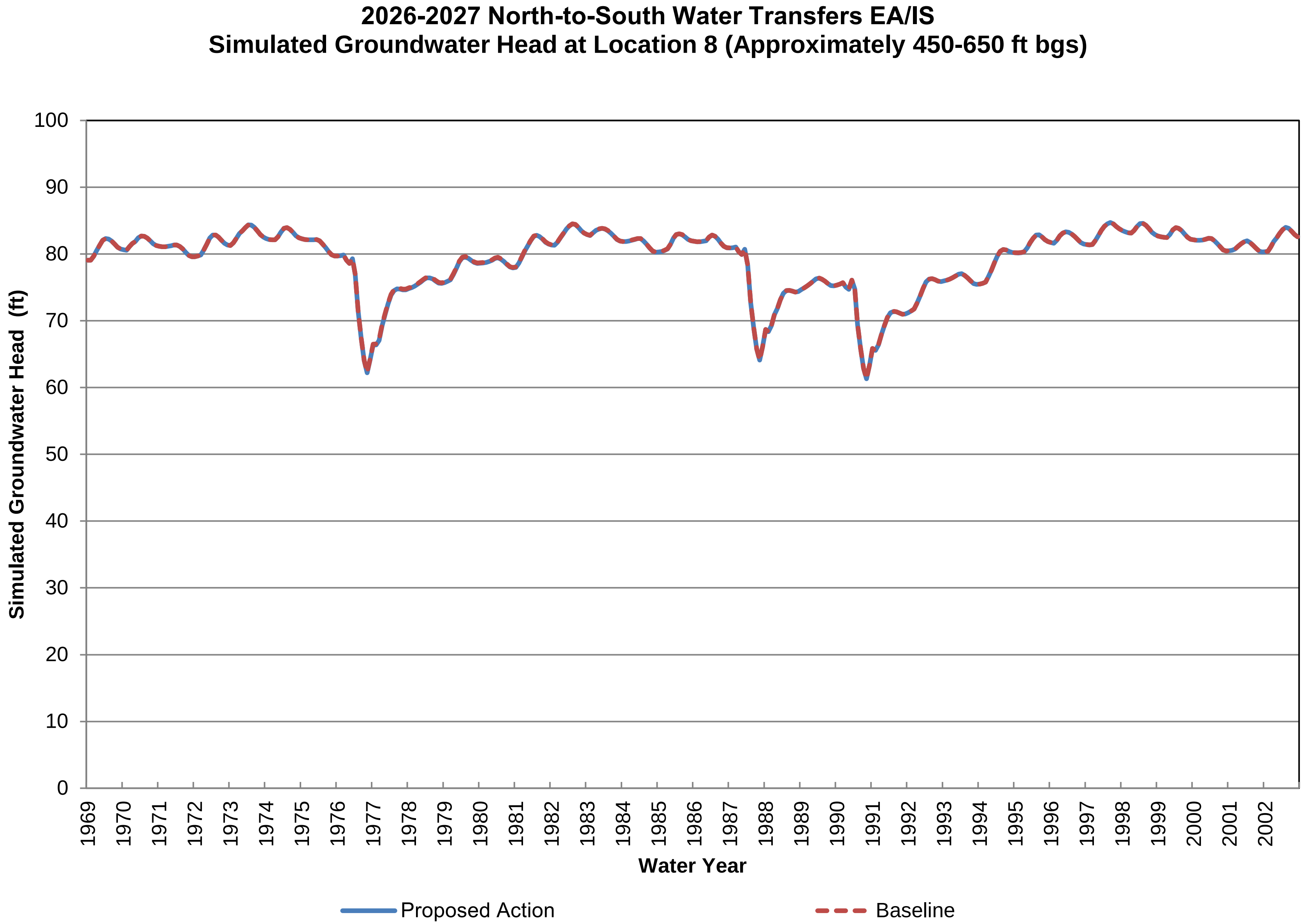


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 8 (Approximately 200-330 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 8 (Approximately 330-450 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 8 (Approximately 450-650 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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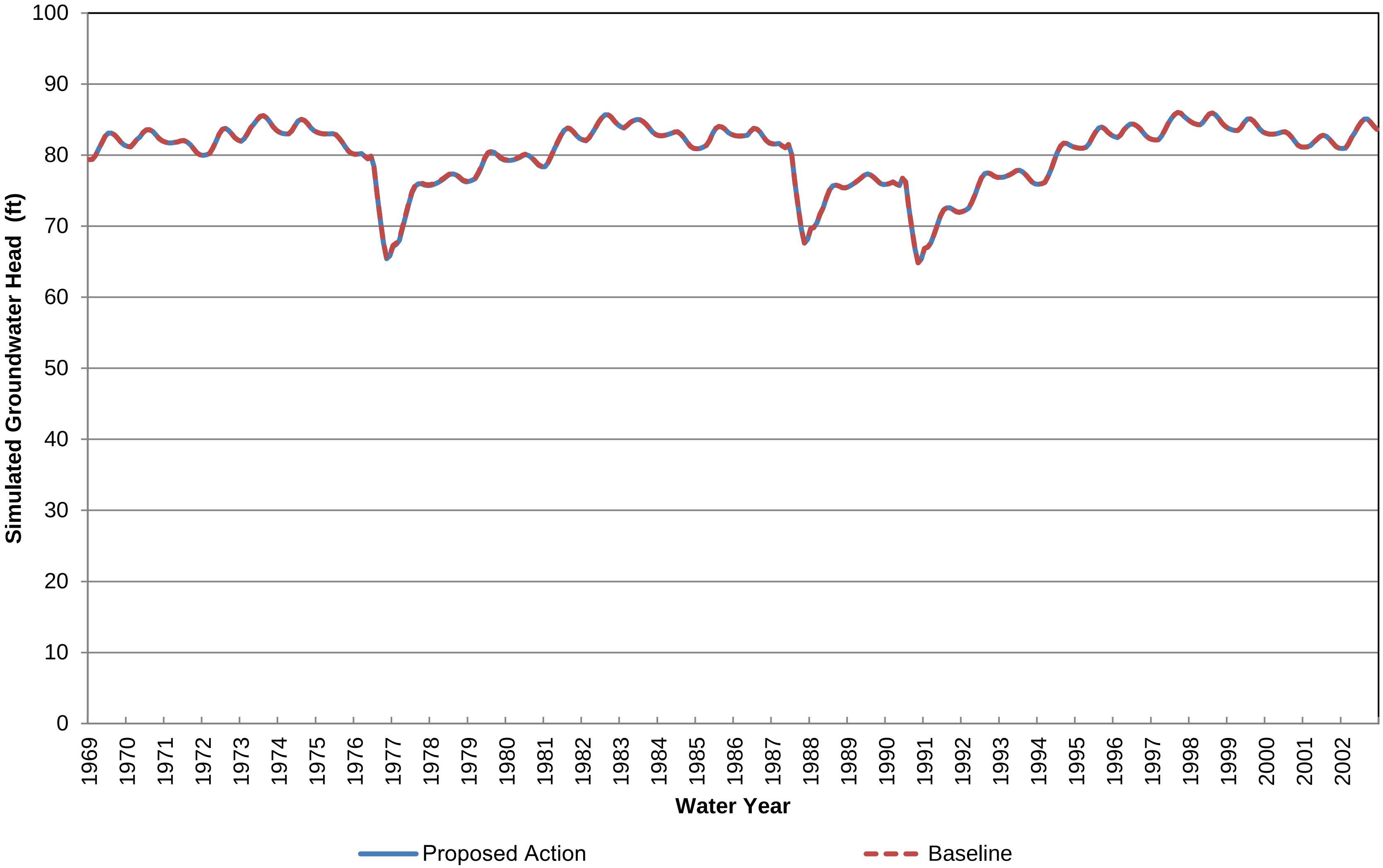
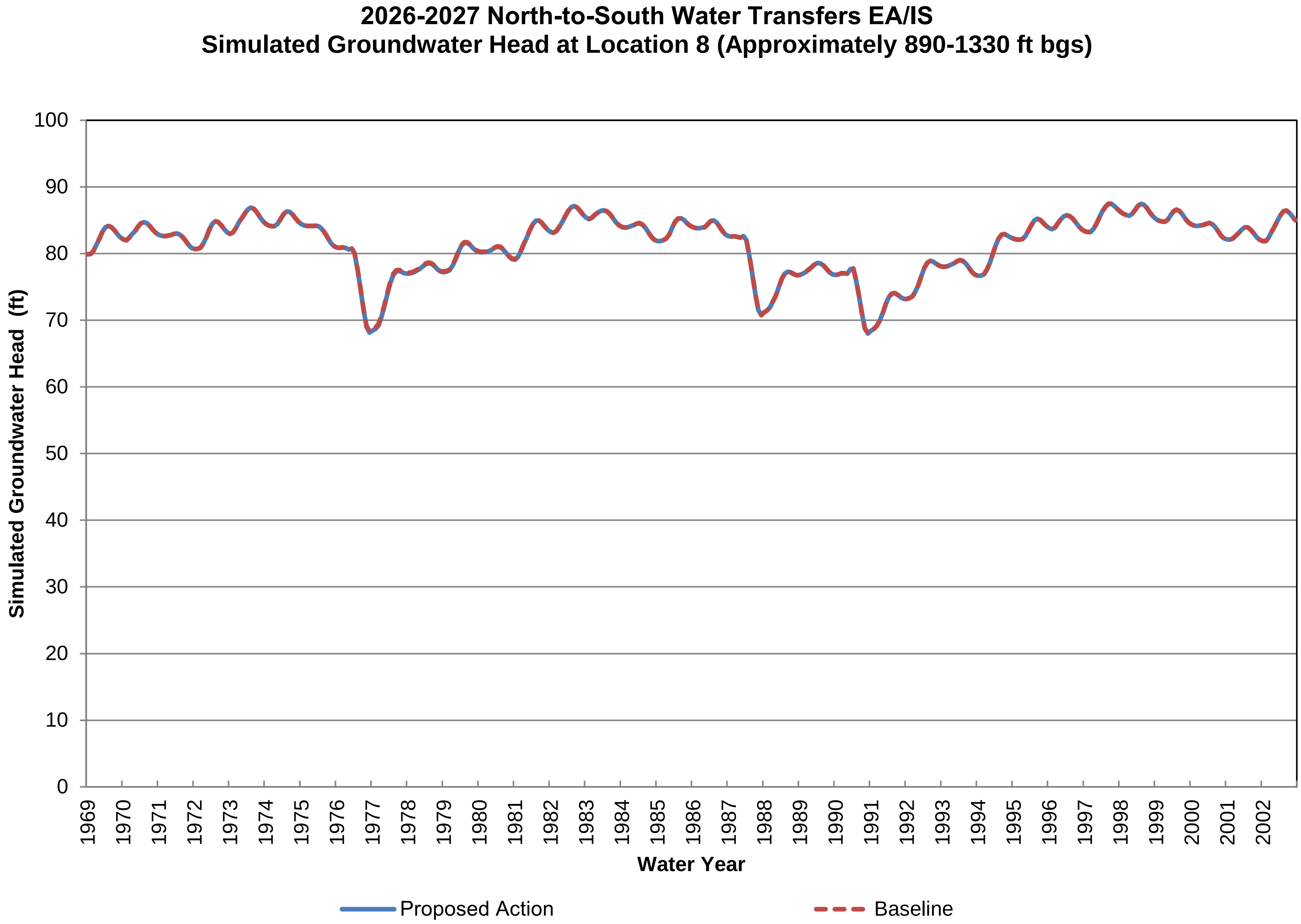
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 8 (Approximately 650-890 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 8 (Approximately 890-1330 ft bgs)
Simulated Groundwater Head (ft)
0
10
20
30
40
50
60
70
80
90
100
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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1981
1982
1983
1984
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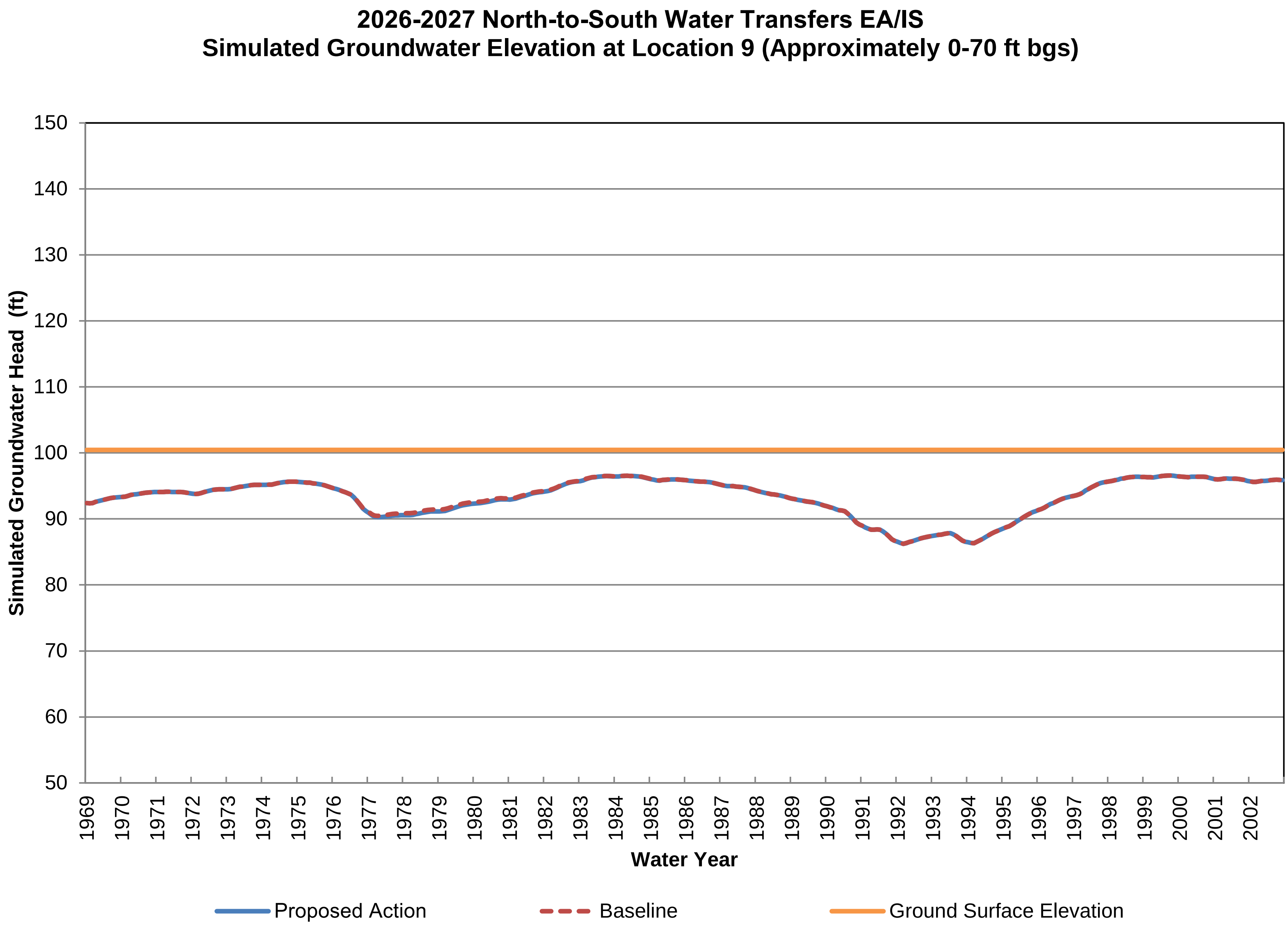
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 9 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1969
1970
1971
1972
1973
1974
1975
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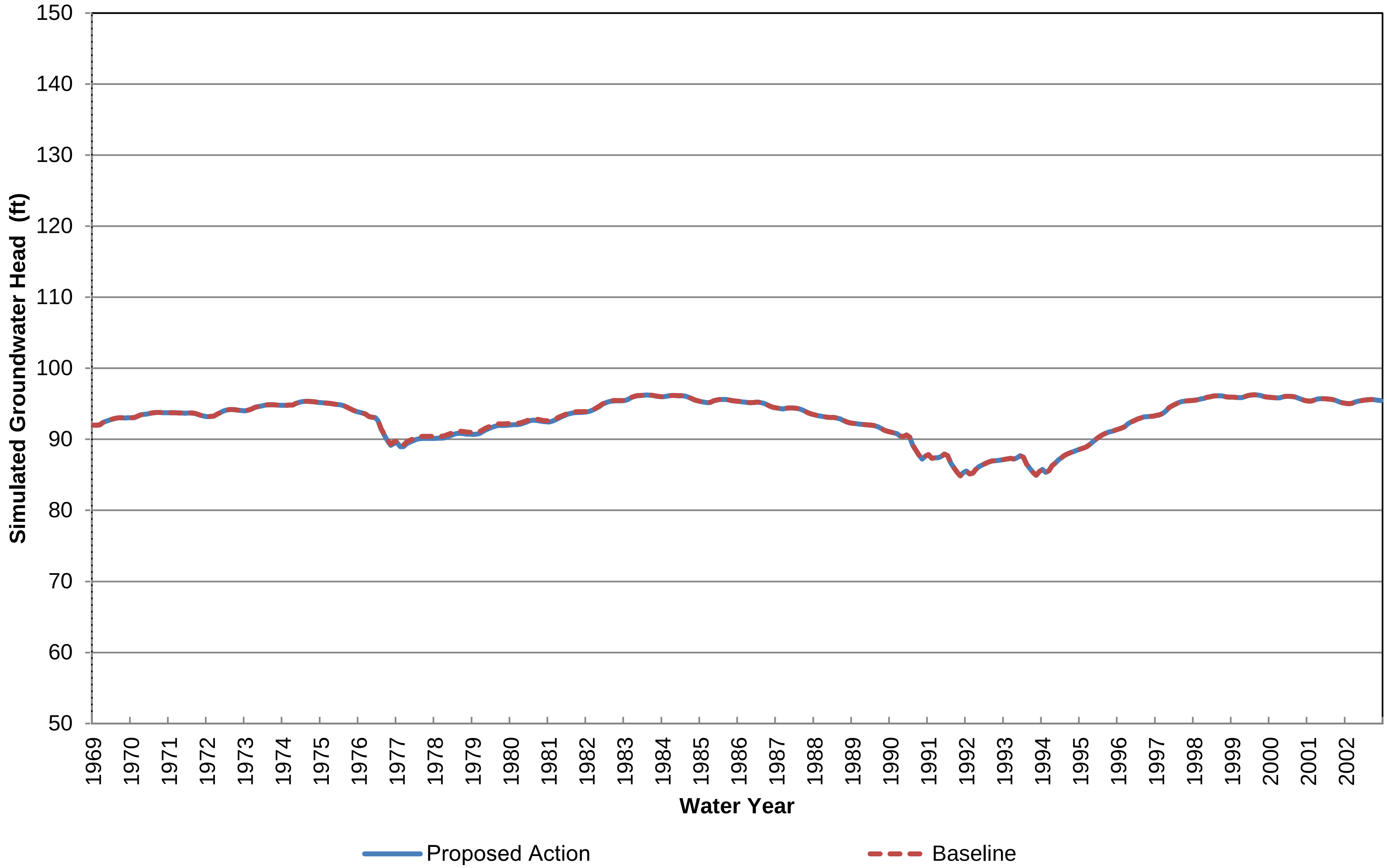
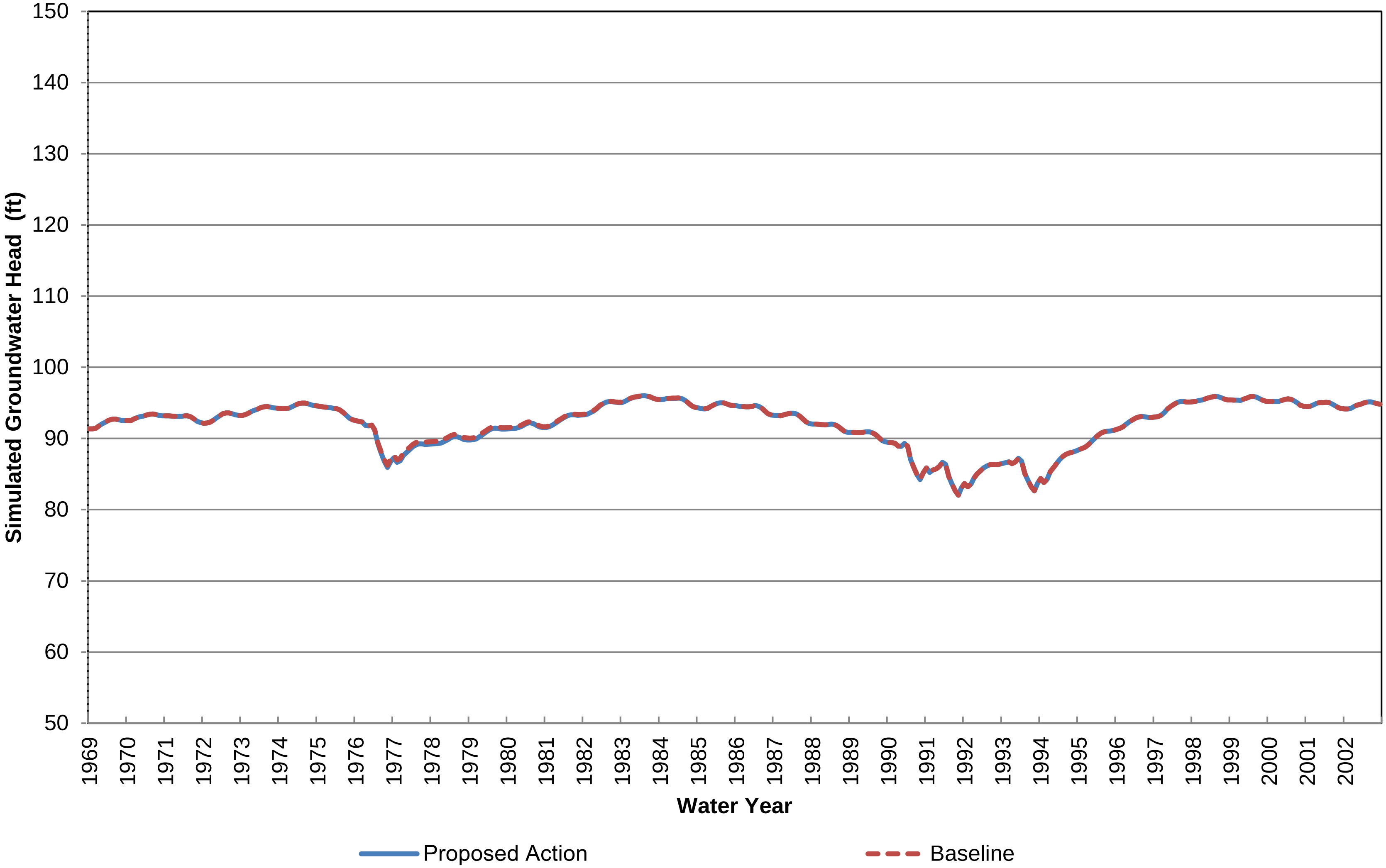
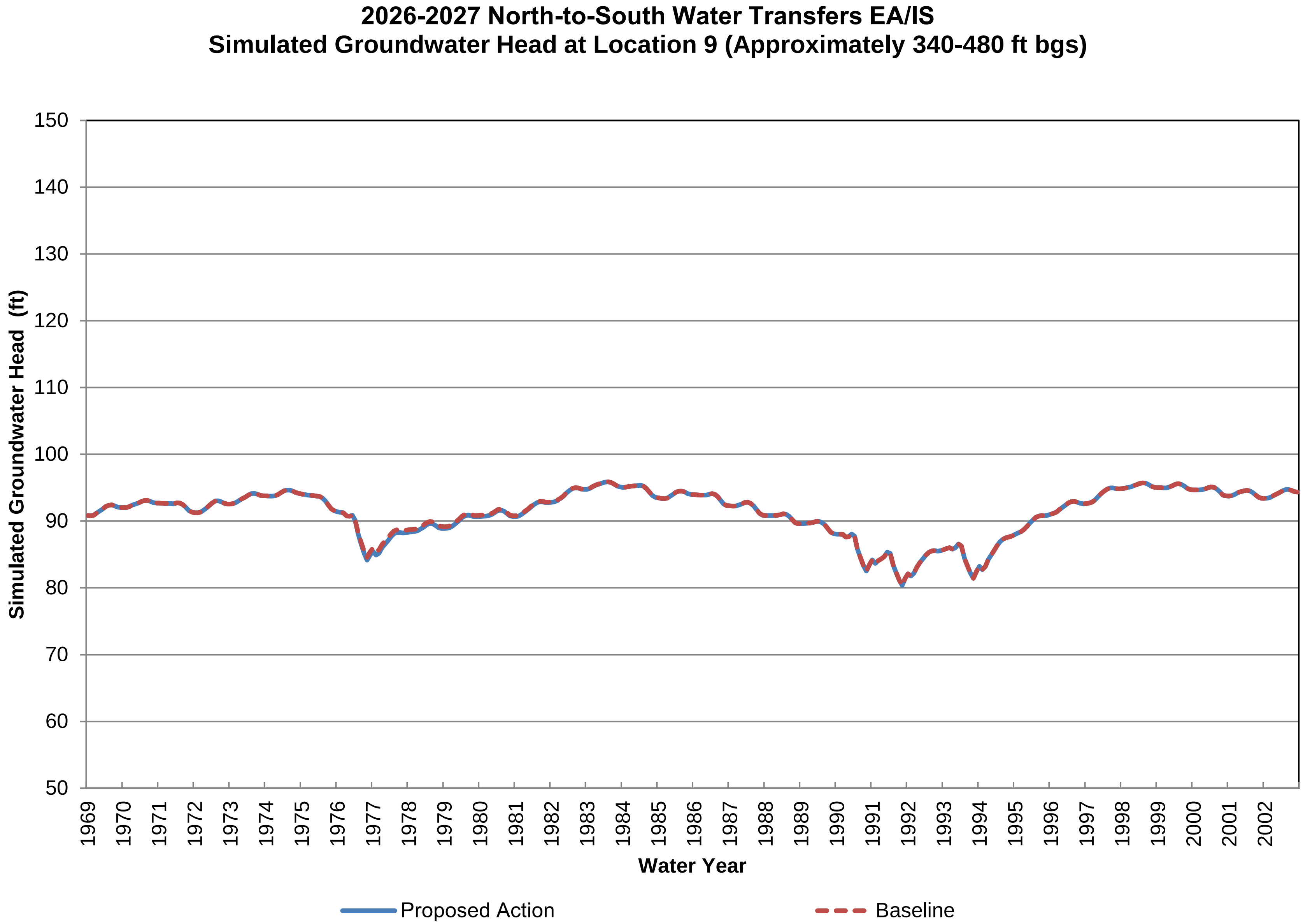
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline
Ground Surface Elevation

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 9 (Approximately 70-210 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 9 (Approximately 210-340 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 9 (Approximately 340-480 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1969
1970
1971
1972
1973
1974
1975
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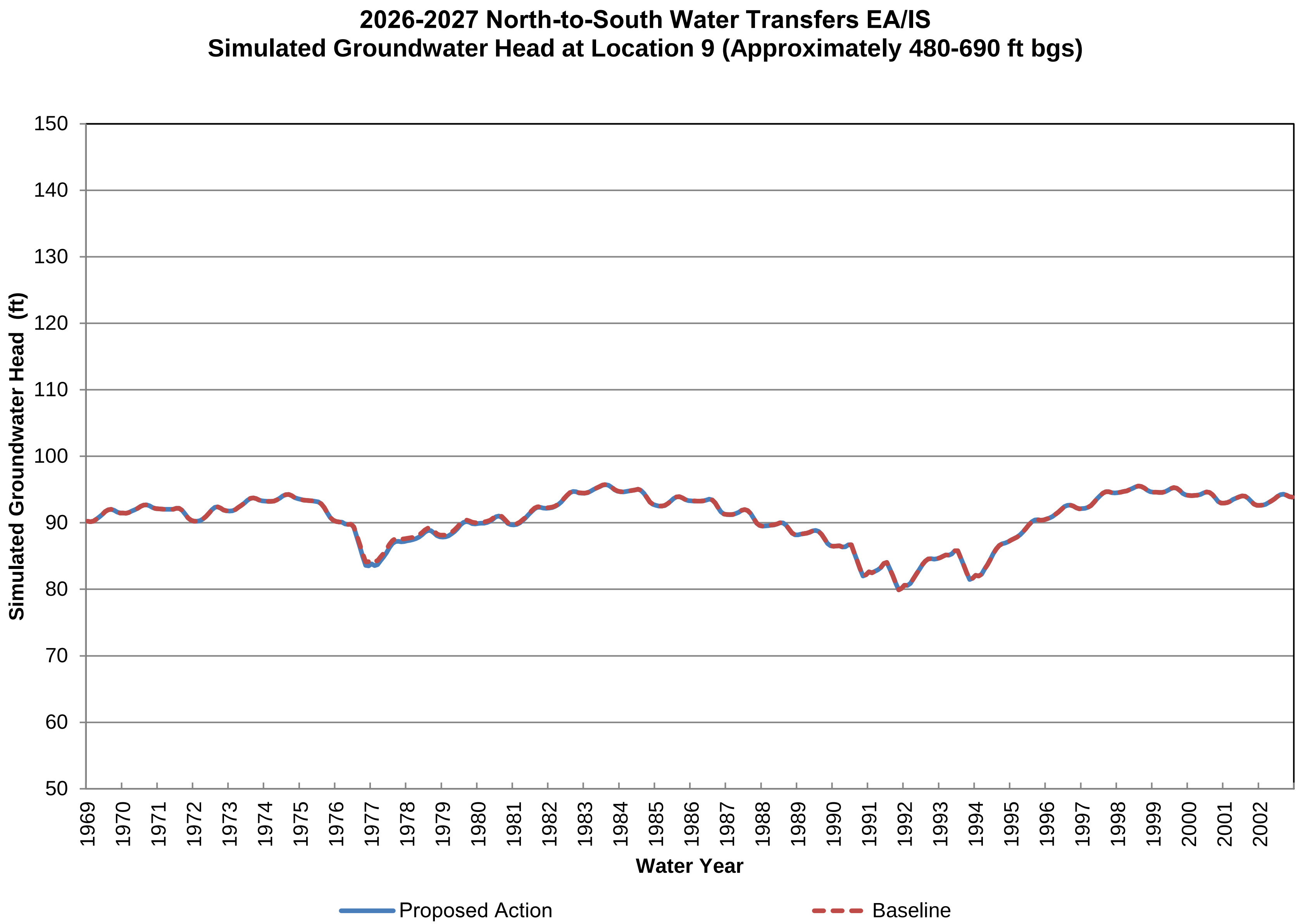
2000
2001
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 9 (Approximately 480-690 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
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1982
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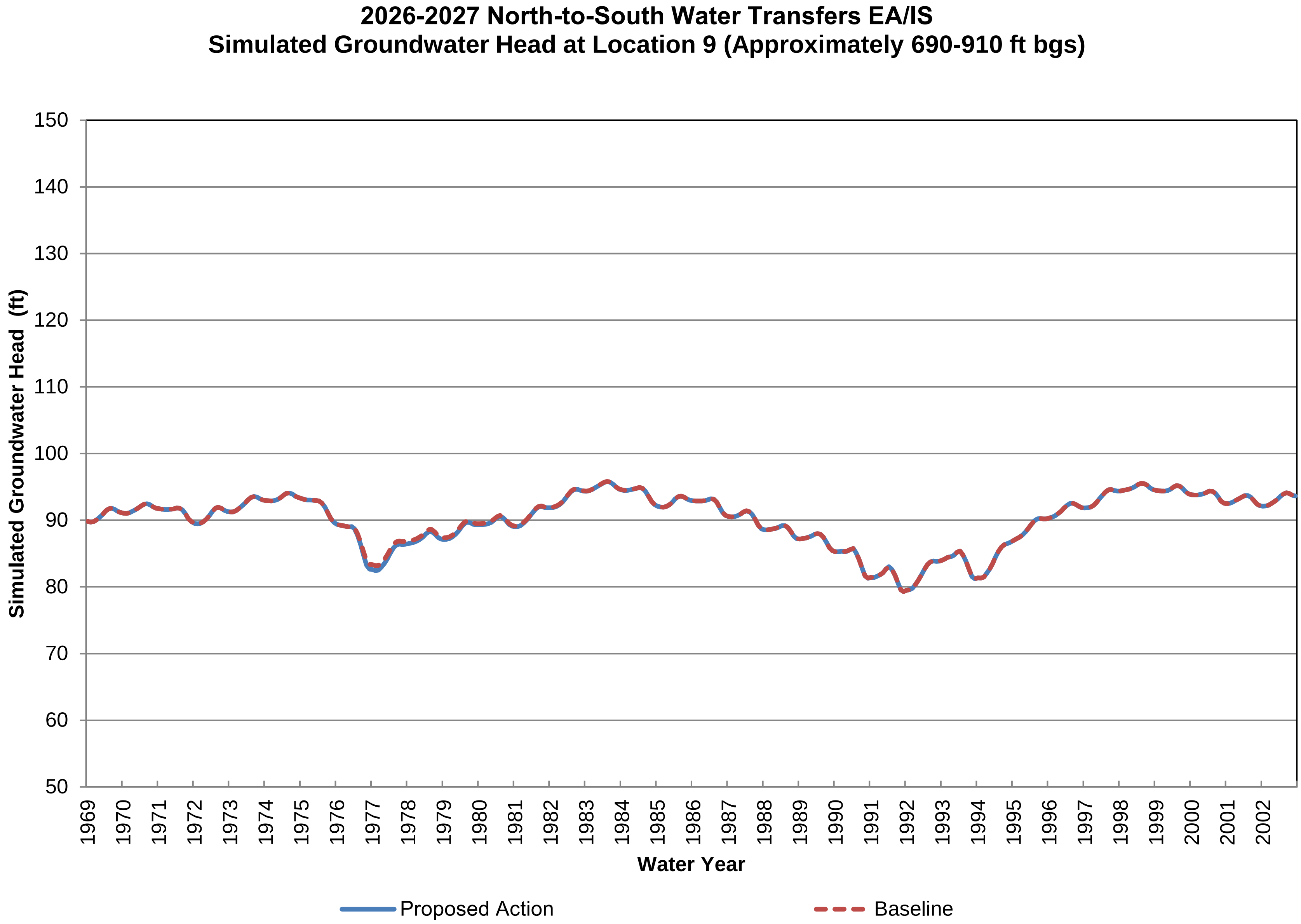
1999
2000
2001
2002
Water Year
Proposed Action
Baseline


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 9 (Approximately 690-910 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1969
1970
1971
1972
1973
1974
1975
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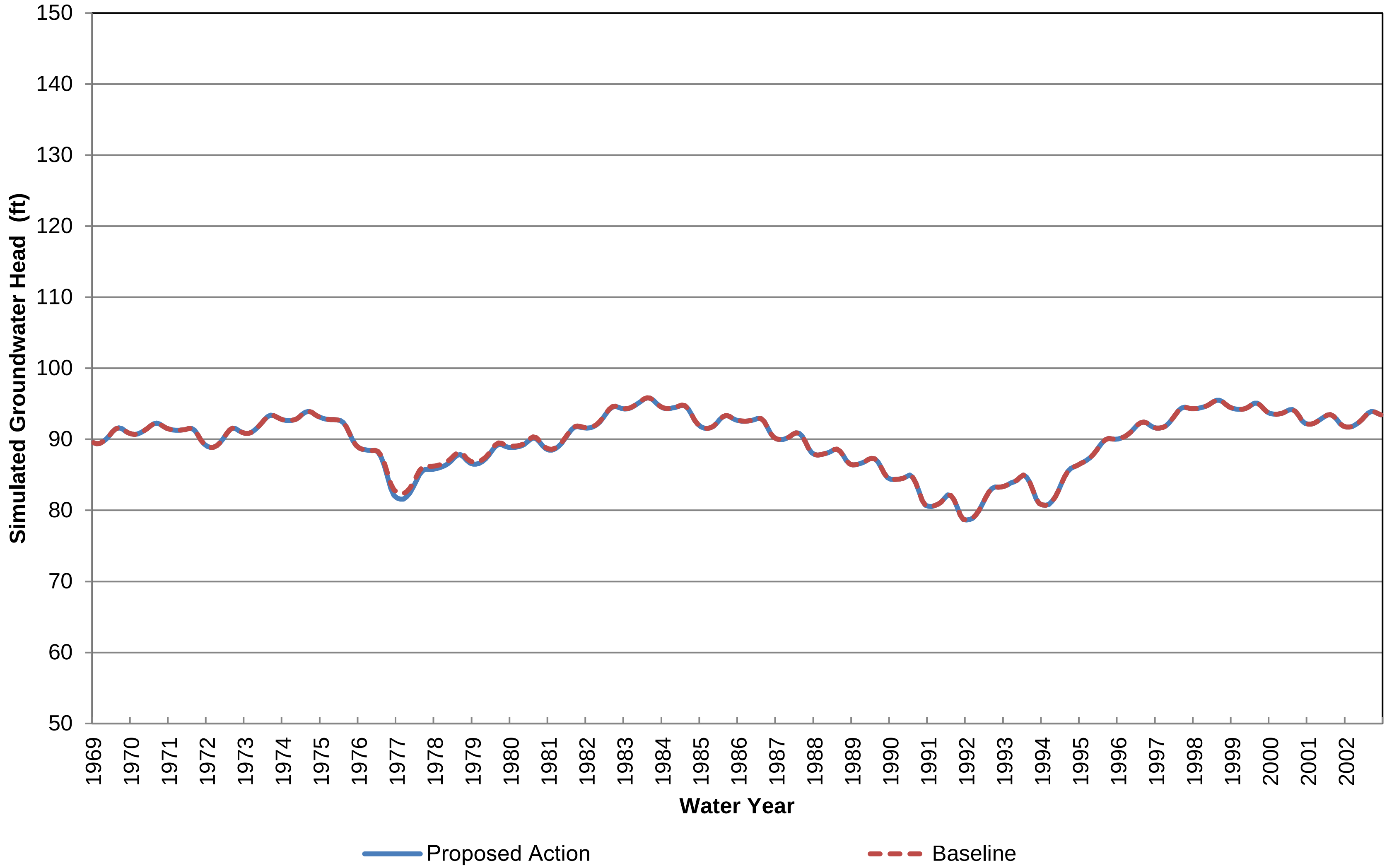
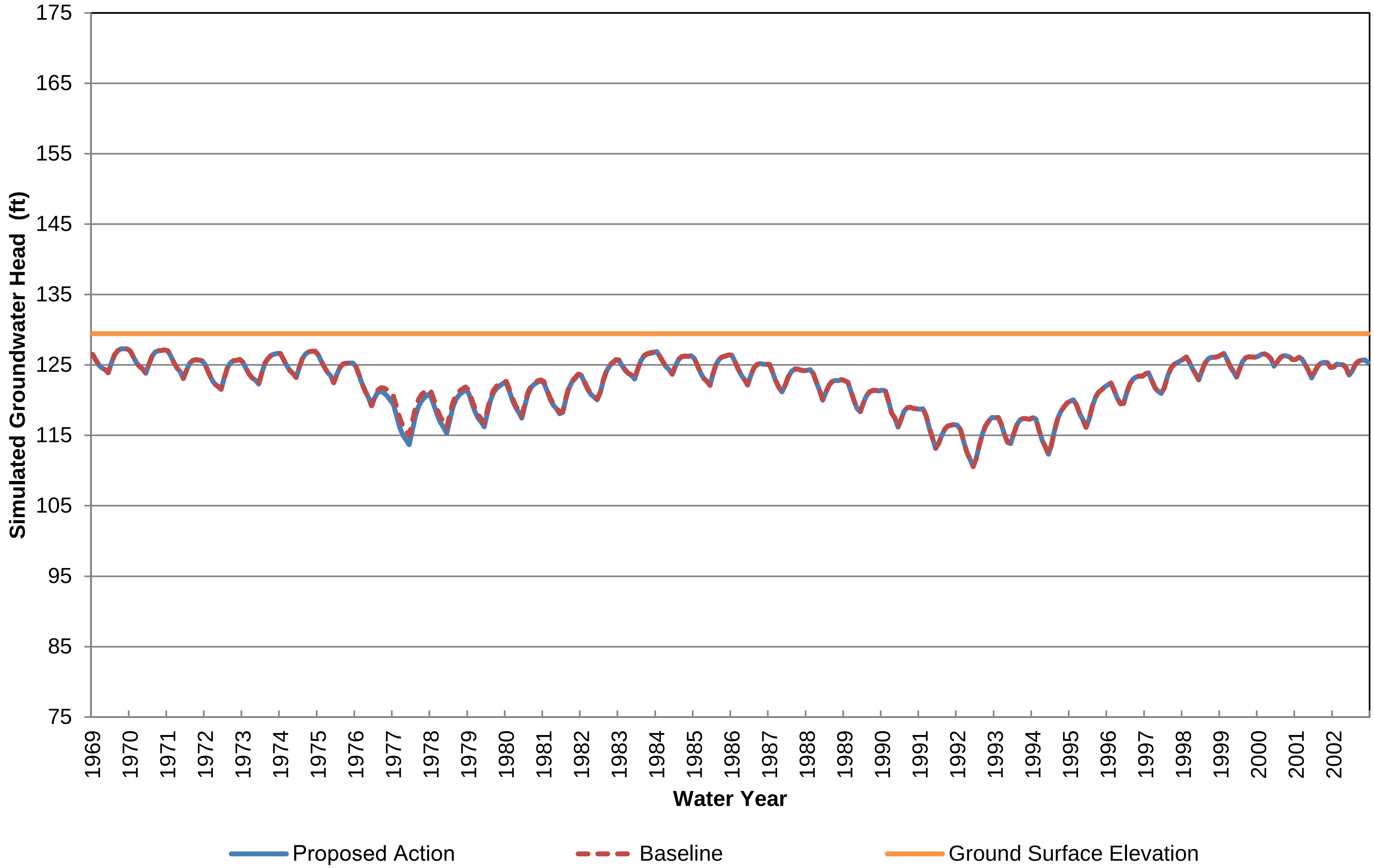
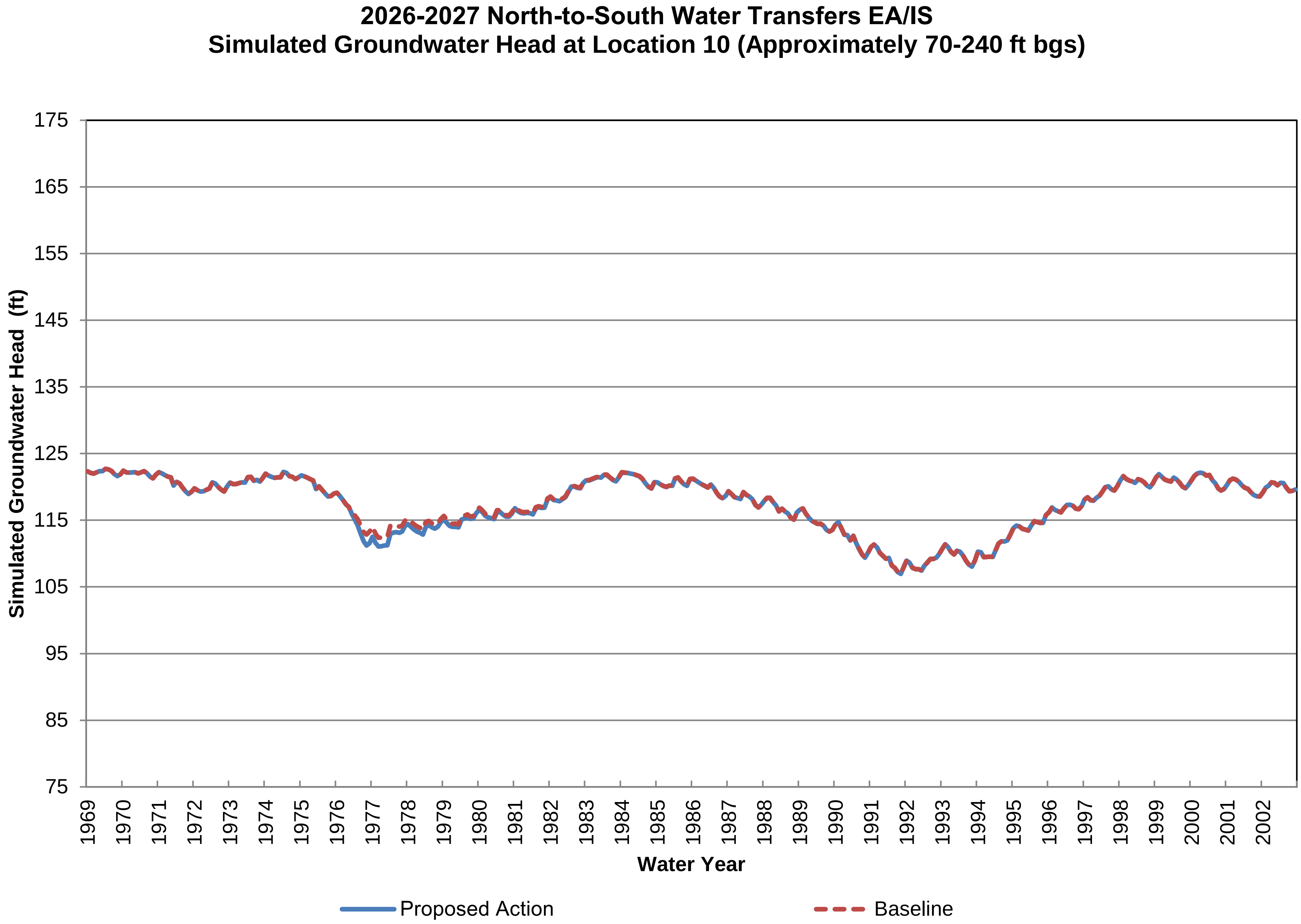
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 9 (Approximately 910-1250 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 10 (Approximately 0-70 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 10 (Approximately 70-240 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
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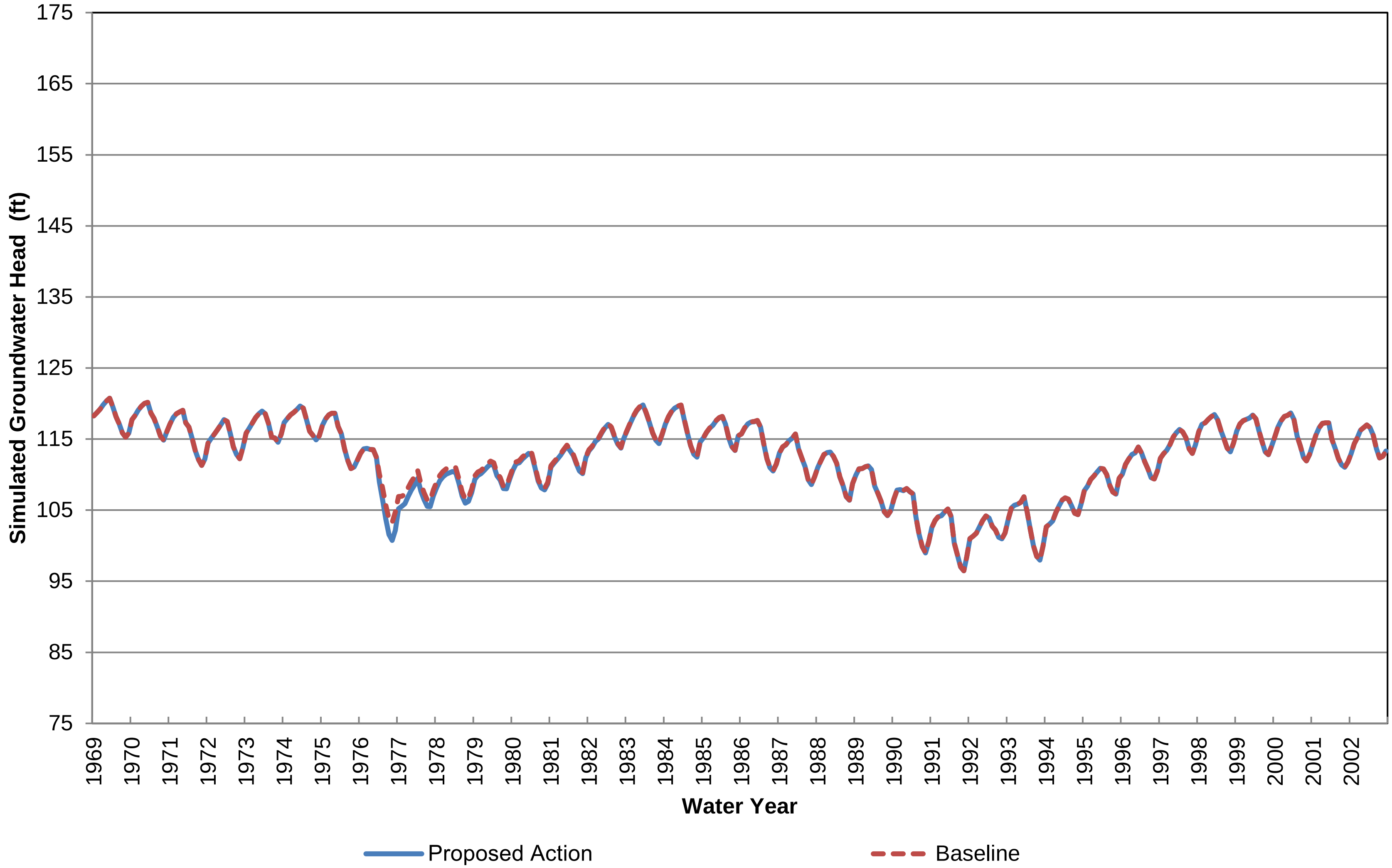
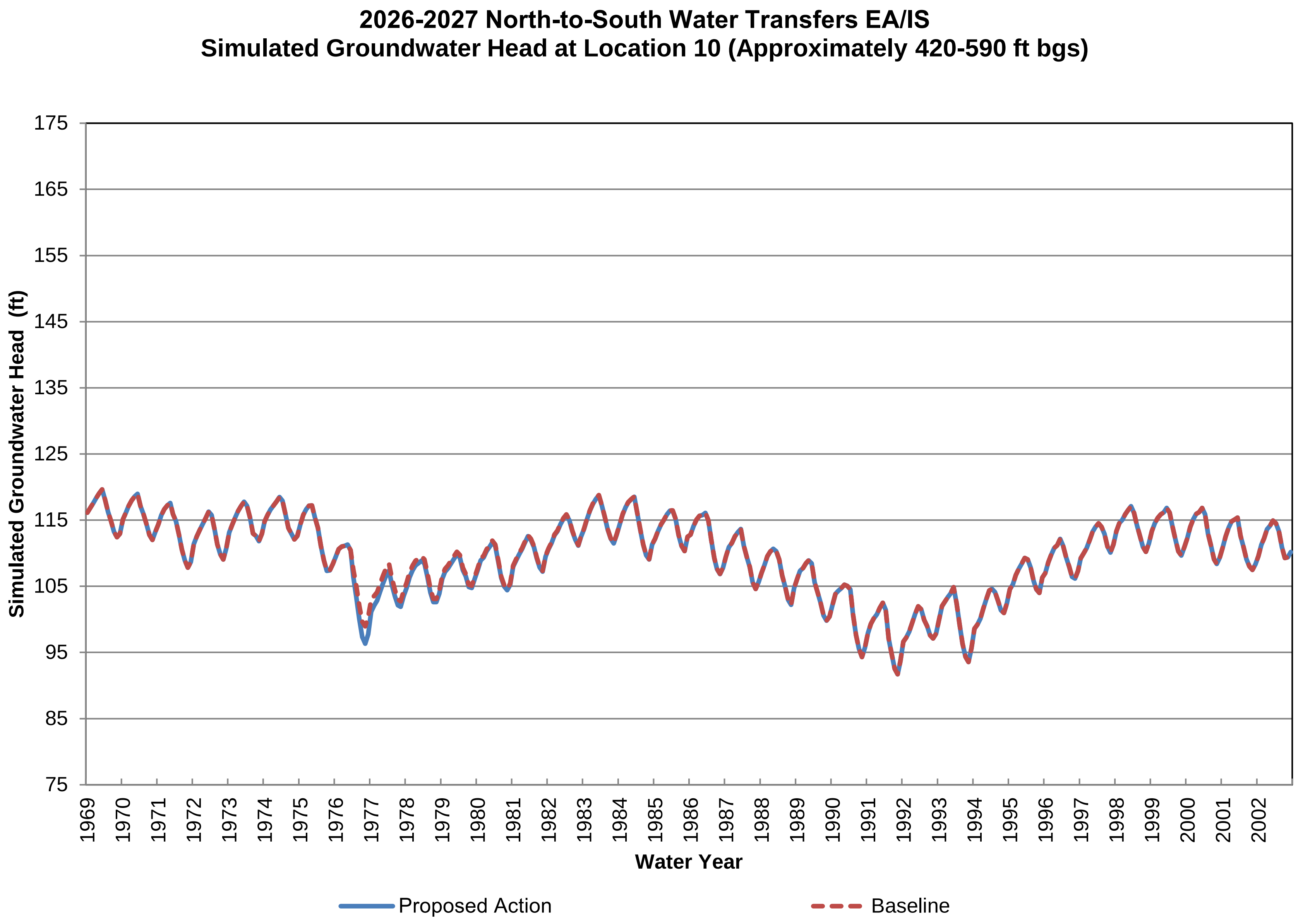
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 10 (Approximately 240-420 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 10 (Approximately 420-590 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1969
1970
1971
1972
1973
1974
1975
1976
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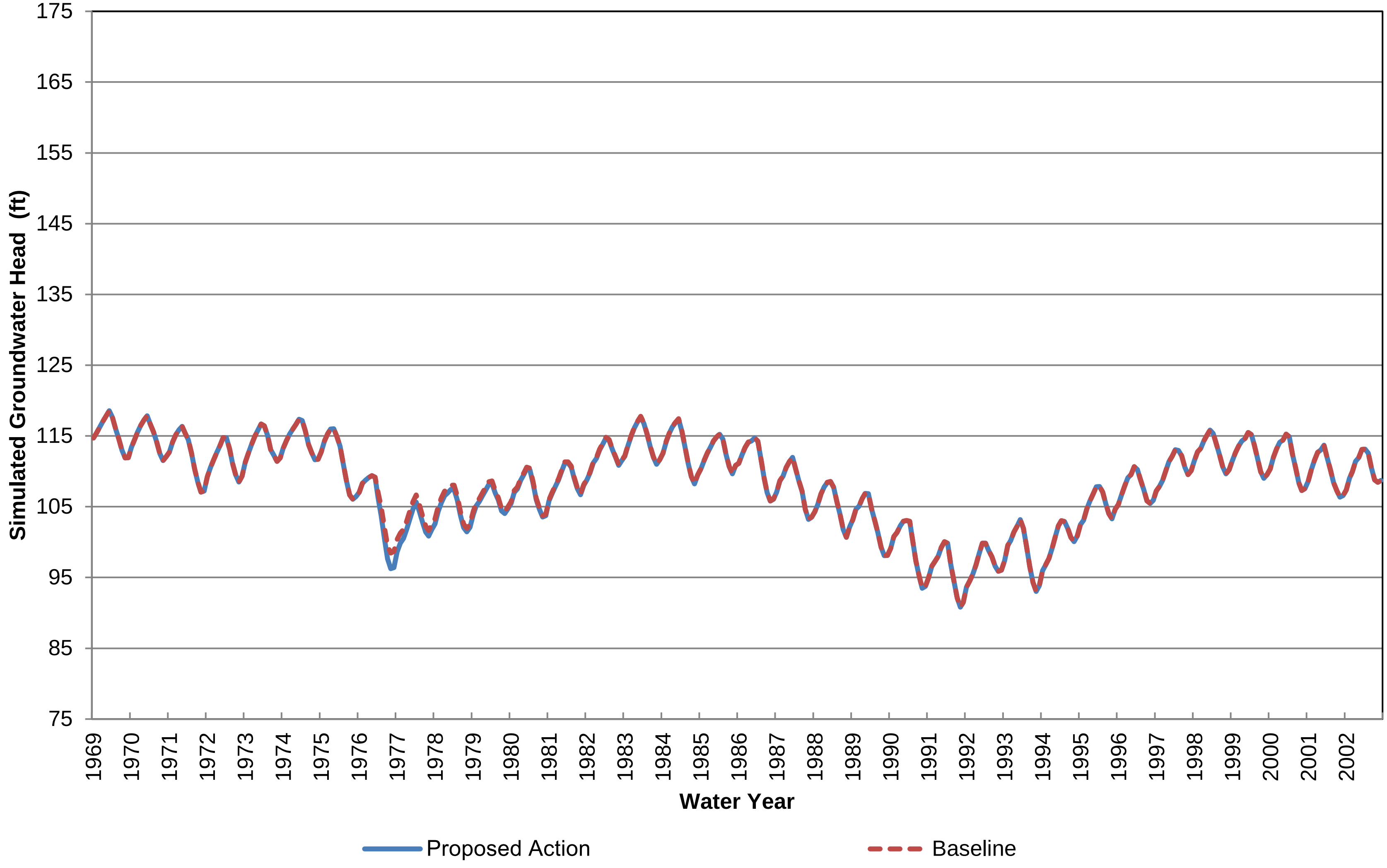
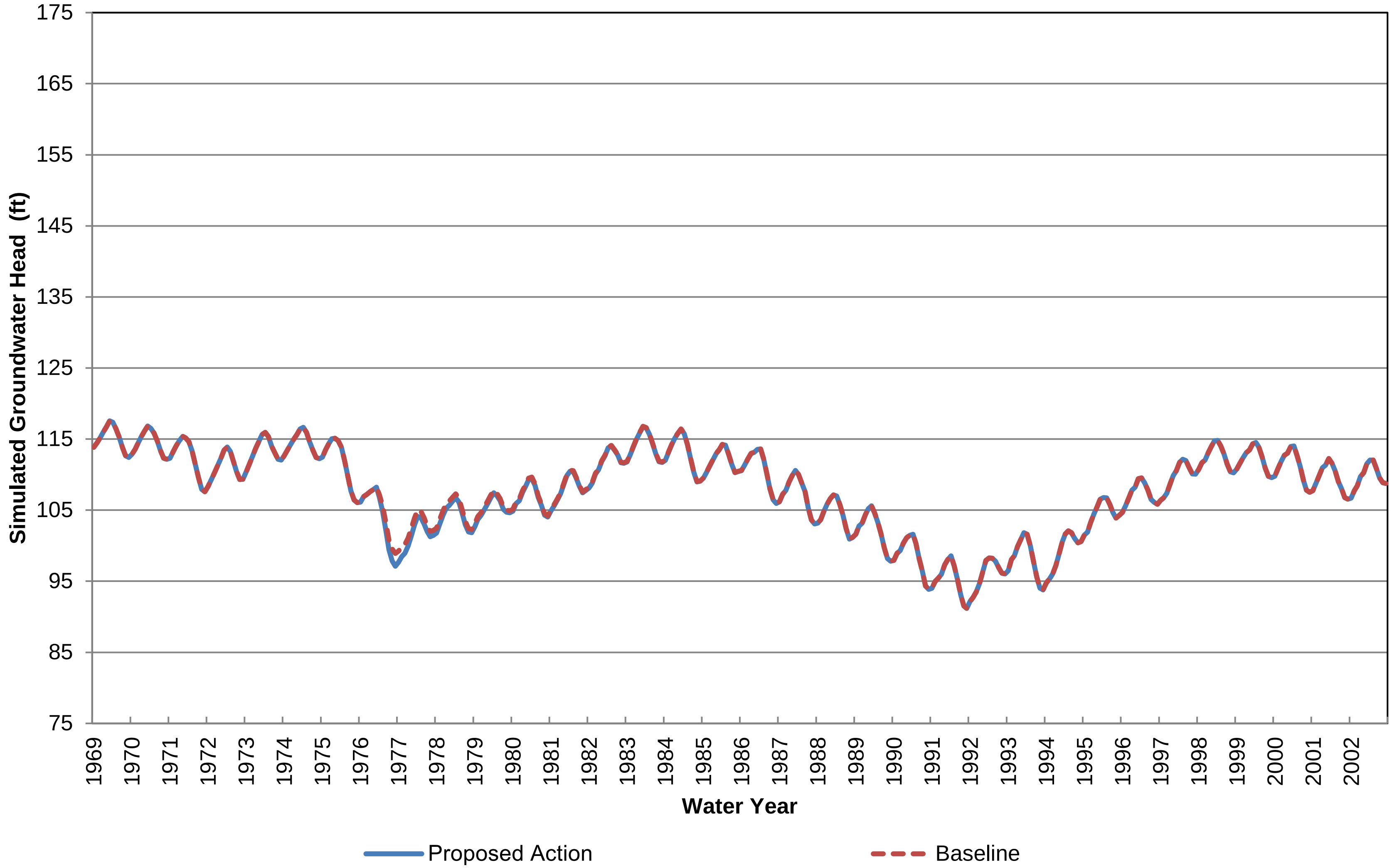
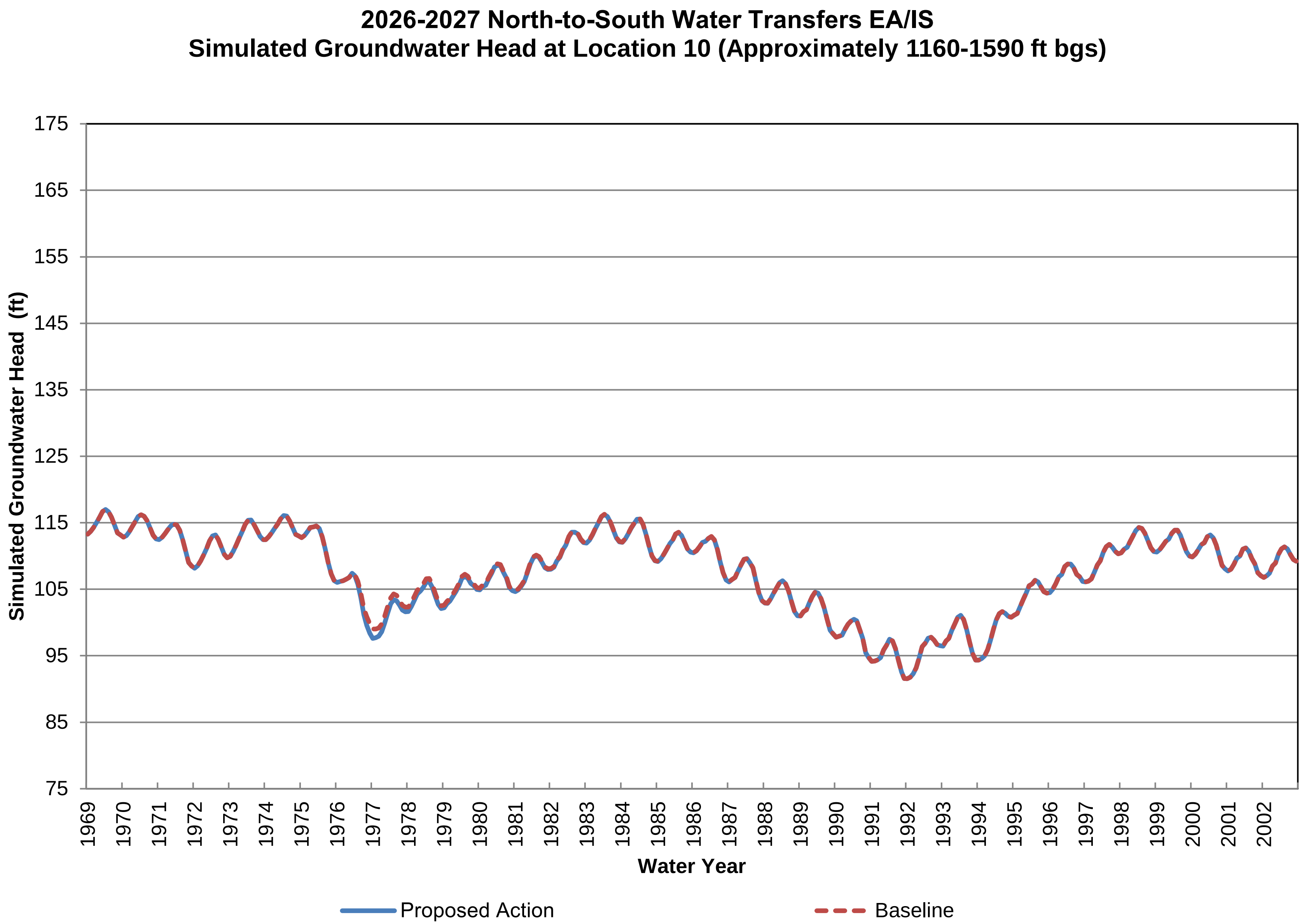
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 10 (Approximately 590-870 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 10 (Approximately 870-1160 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 10 (Approximately 1160-1590 ft bgs)
Simulated Groundwater Head (ft)
175
165
155
145
135
125
115
105
95
85
75
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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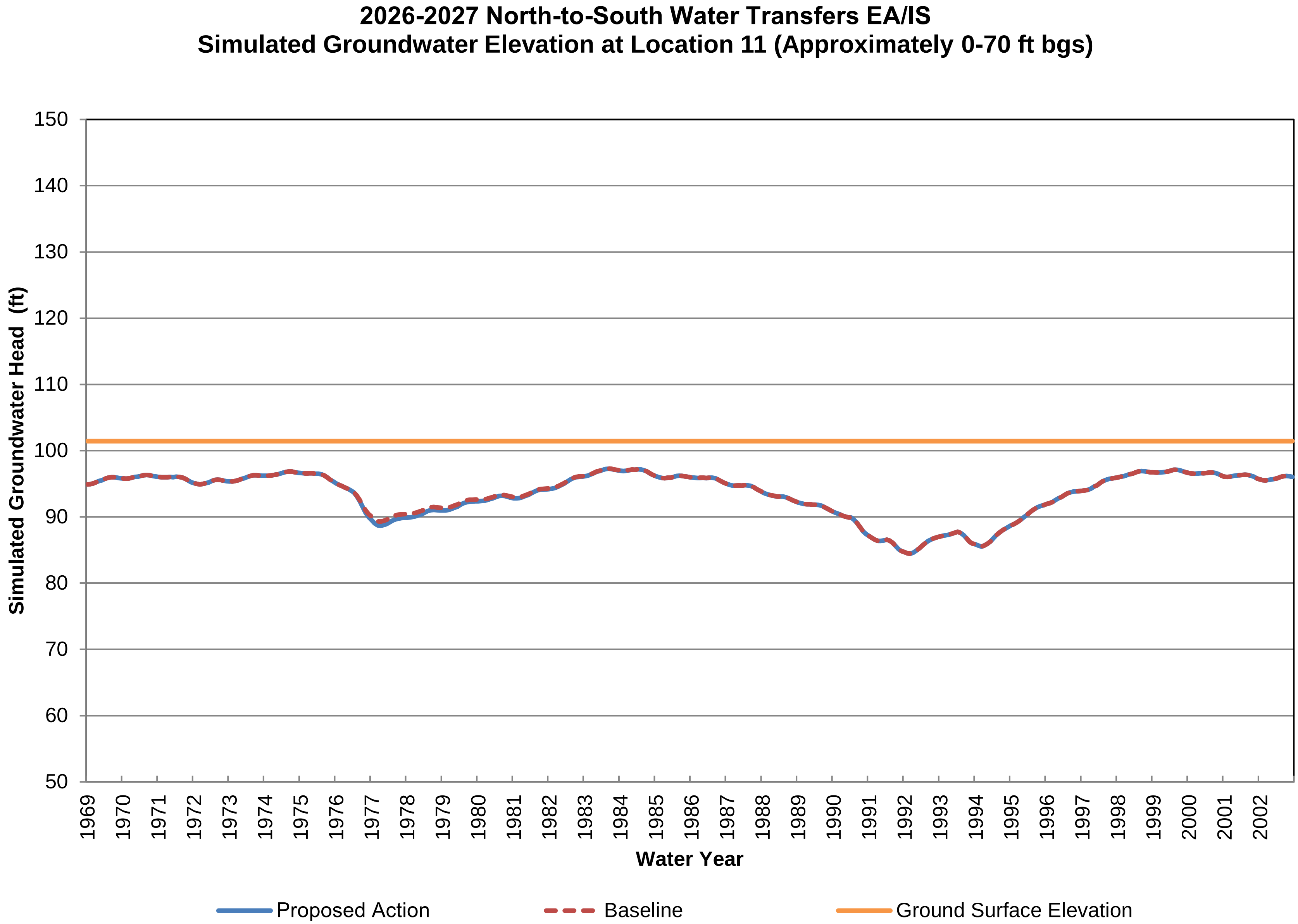
2001
2002
Water Year
Proposed Action
Baseline


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 11 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
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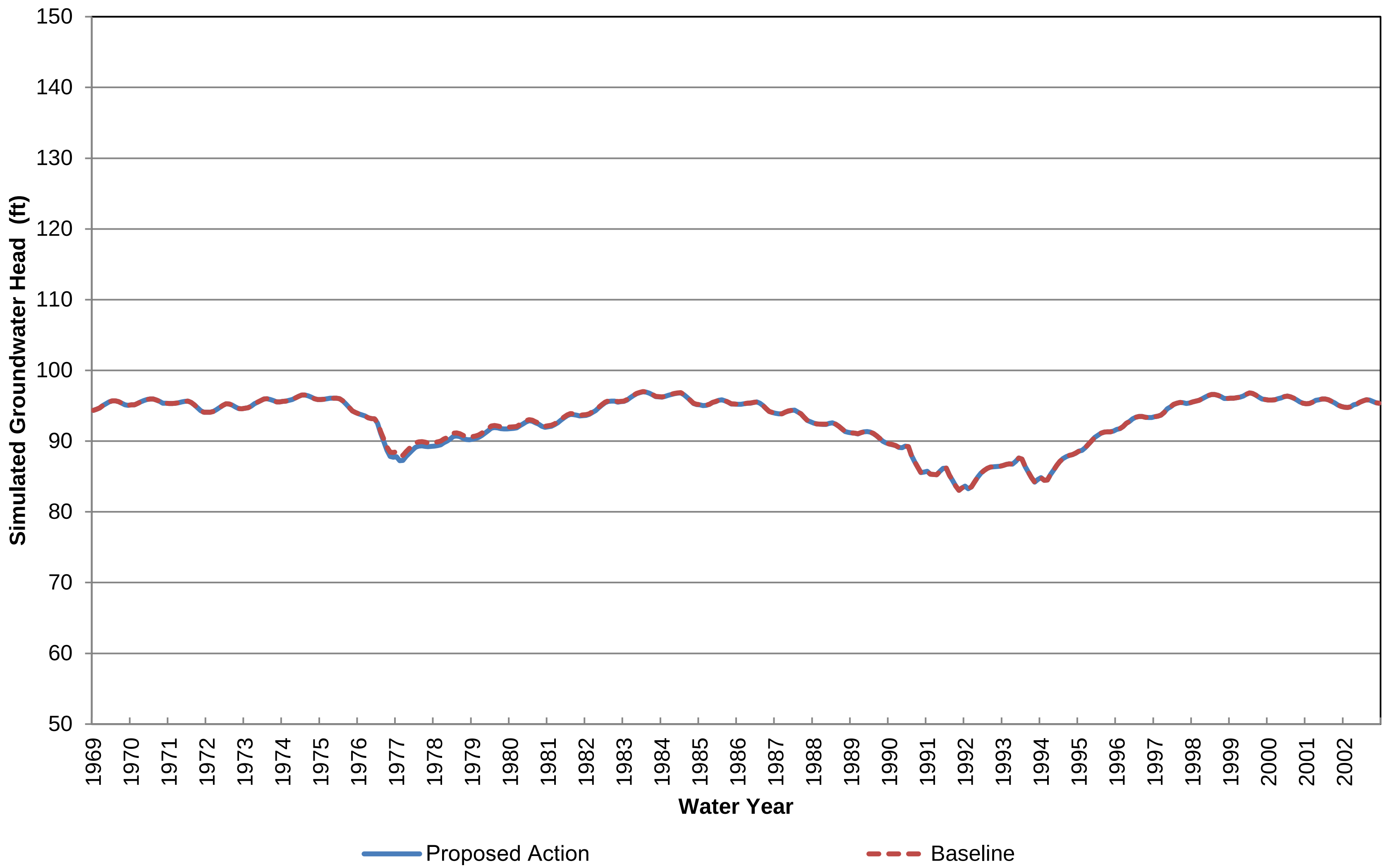
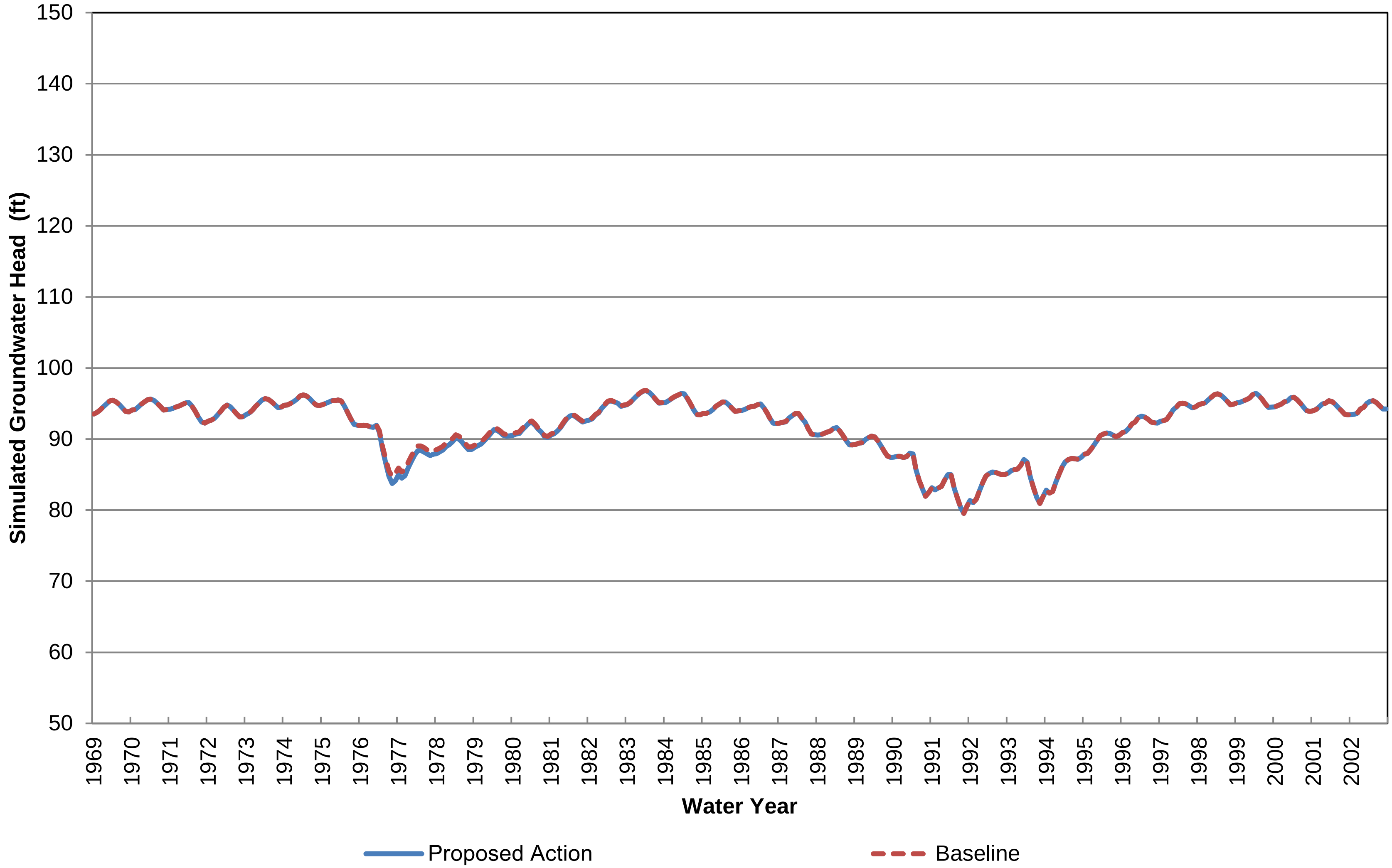
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline
Ground Surface Elevation

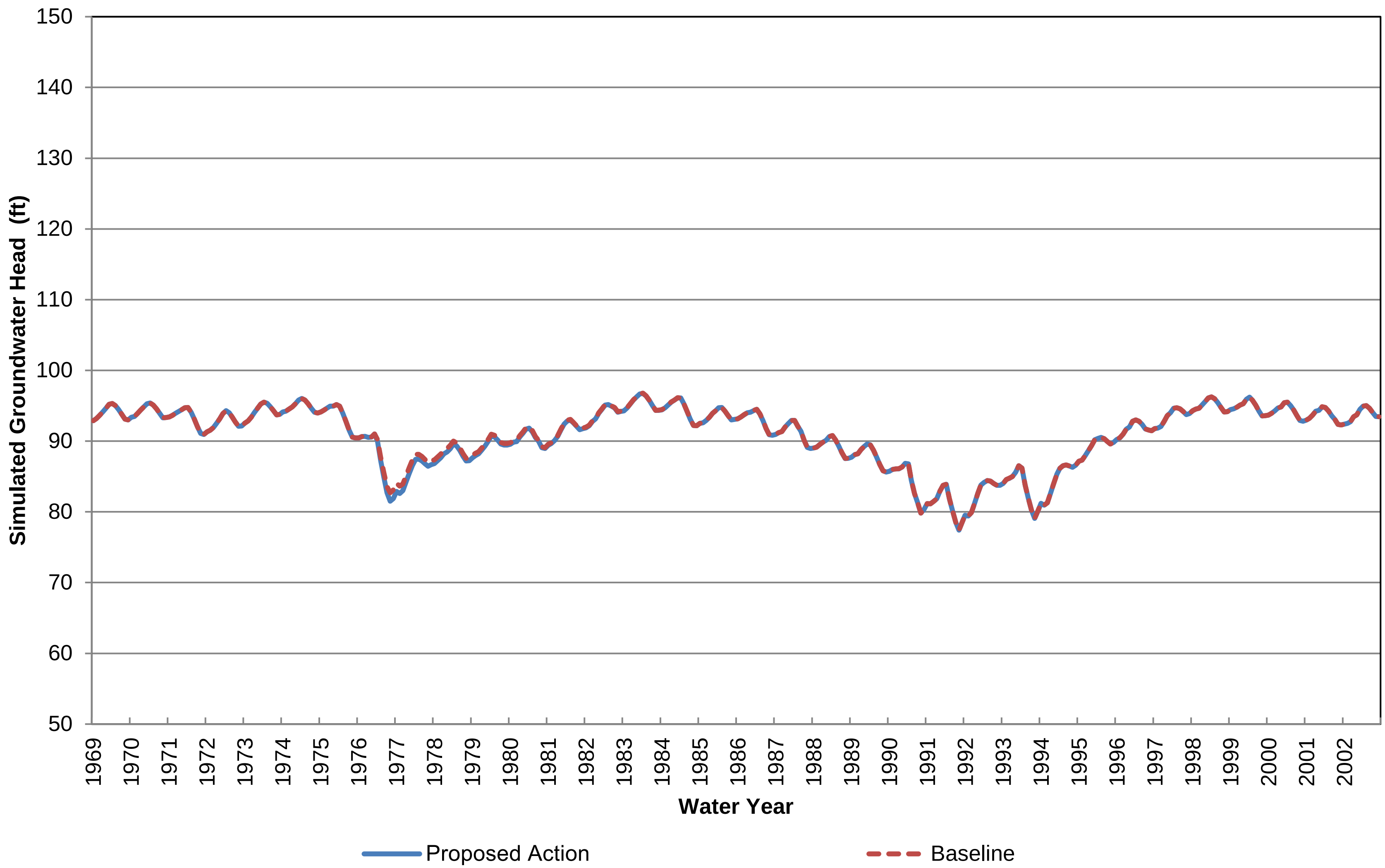
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 11 (Approximately 70-260 ft bgs)

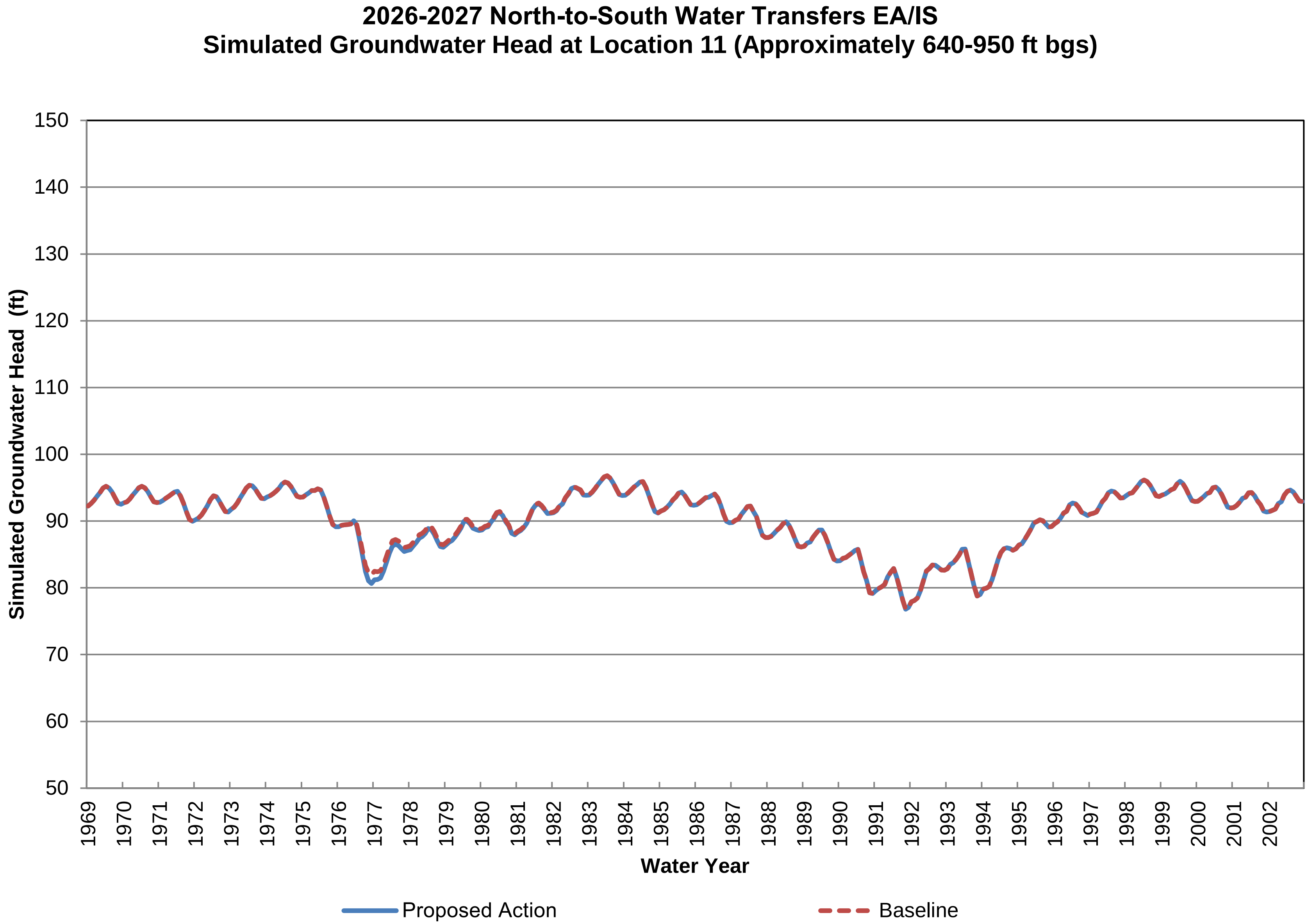


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 11 (Approximately 260-450 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 11 (Approximately 450-640 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 11 (Approximately 640-950 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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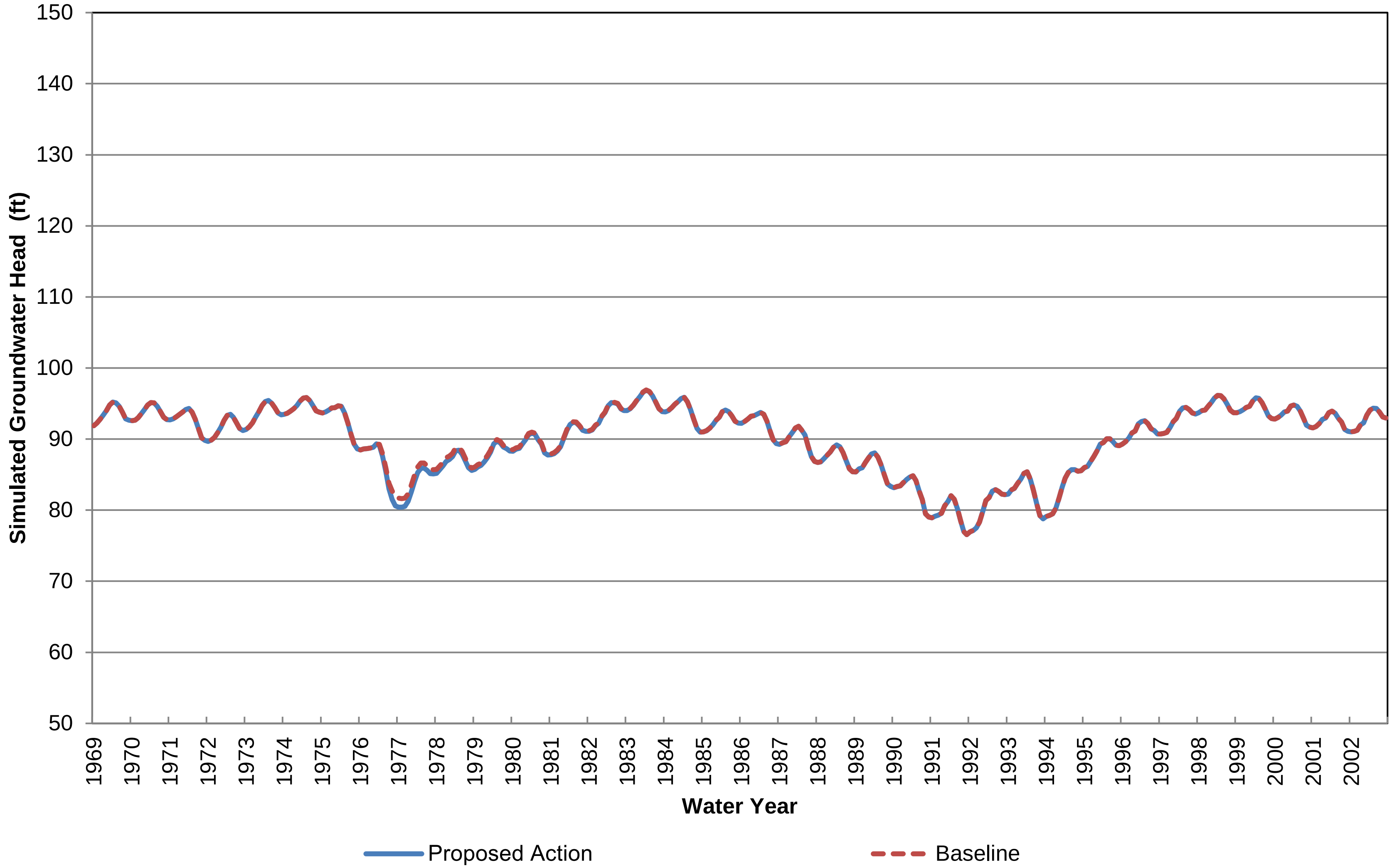
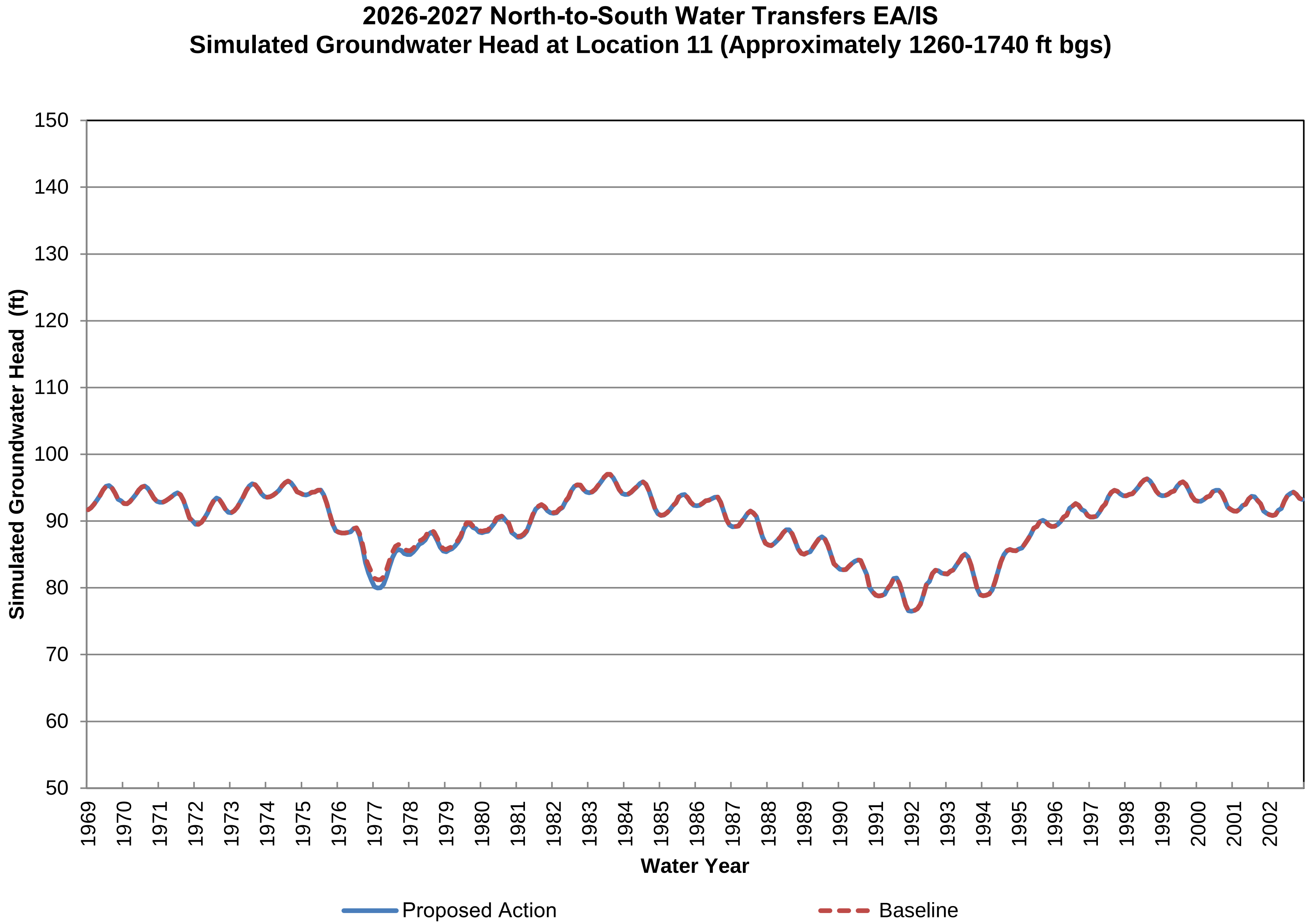
1996
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 11 (Approximately 950-1260 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 11 (Approximately 1260-1740 ft bgs)
Simulated Groundwater Head (ft)
150
140
130
120
110
100
90
80
70
60
50
1969
1970
1971
1972
1973
1974
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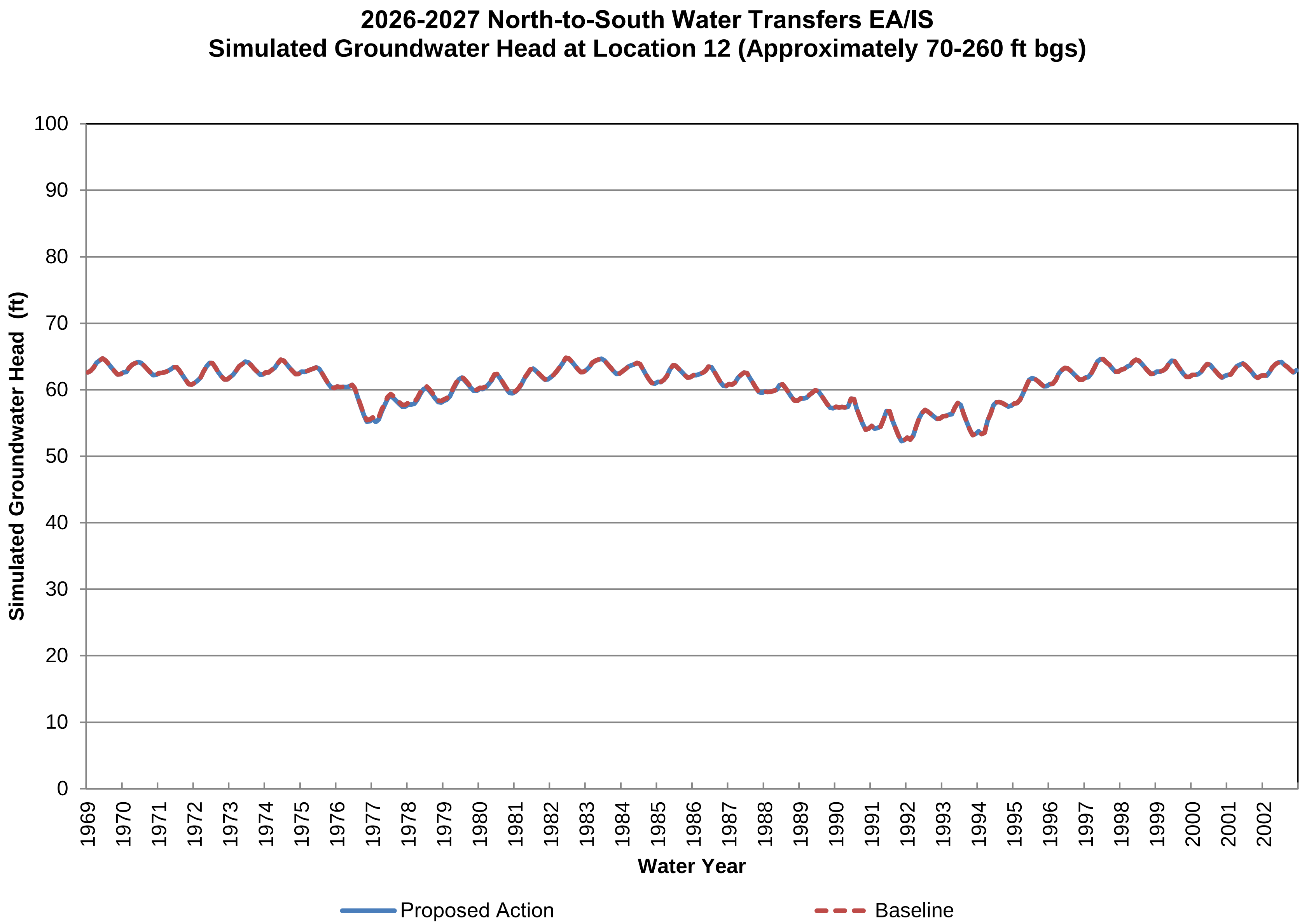
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 12 (Approximately 0-70 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 12 (Approximately 70-260 ft bgs)
Simulated Groundwater Head (ft)
0
10
20
30
40
50
60
70
80
90
100
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
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1987
1988
1989
1990
1991
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1997
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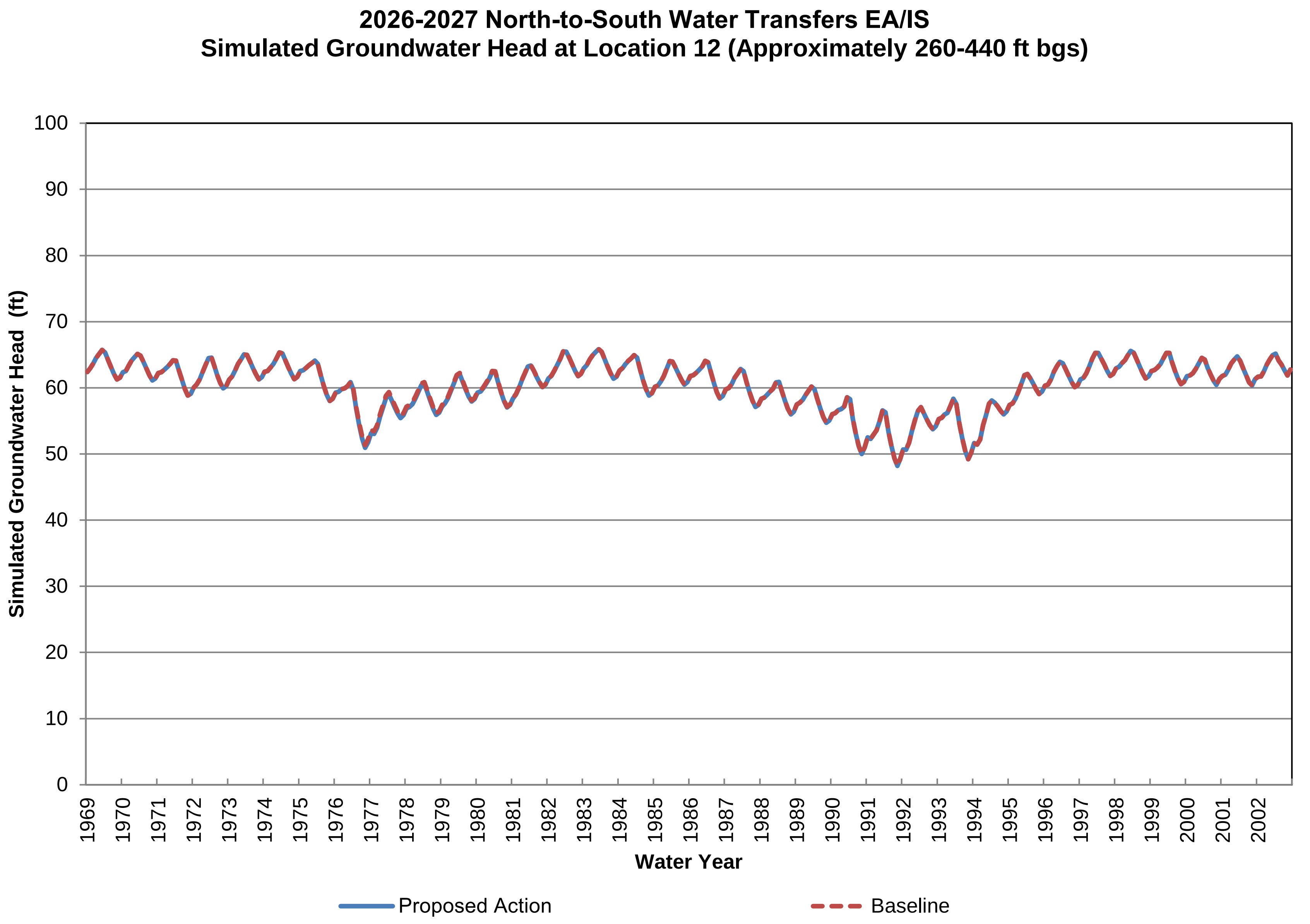
1999
2000
2001
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 12 (Approximately 260-440 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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1987
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1993
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1996
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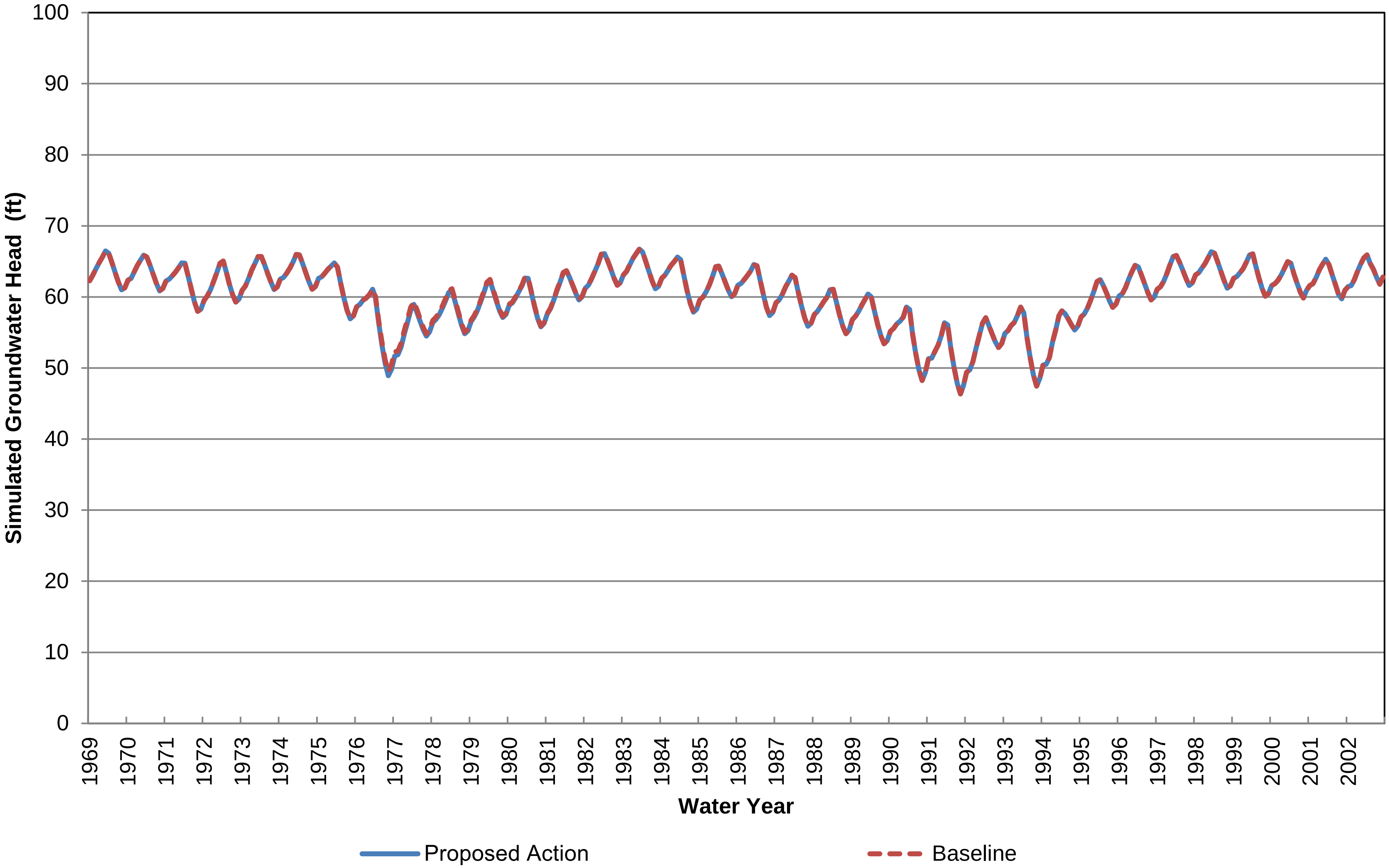
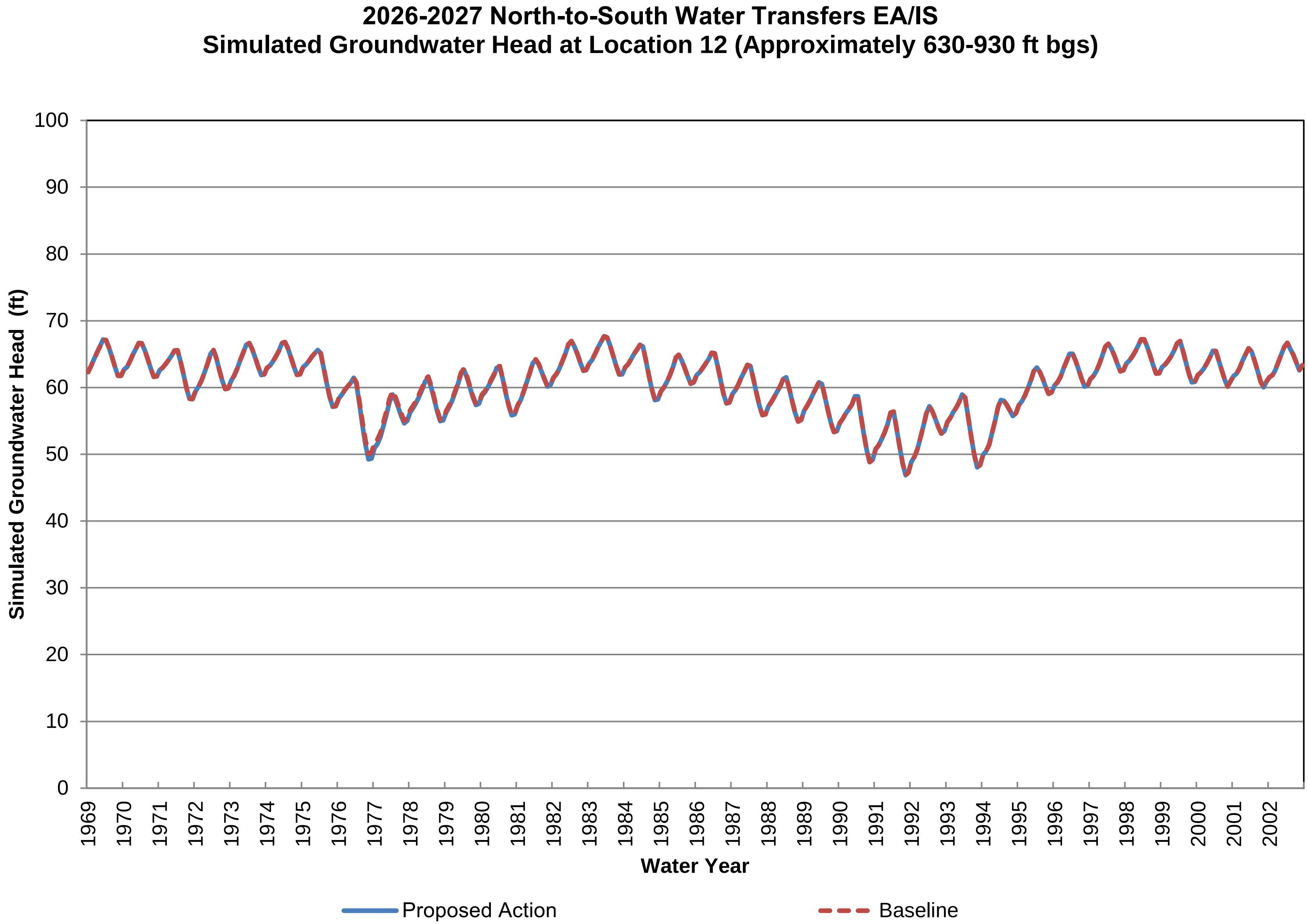
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 12 (Approximately 440-630 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 12 (Approximately 630-930 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
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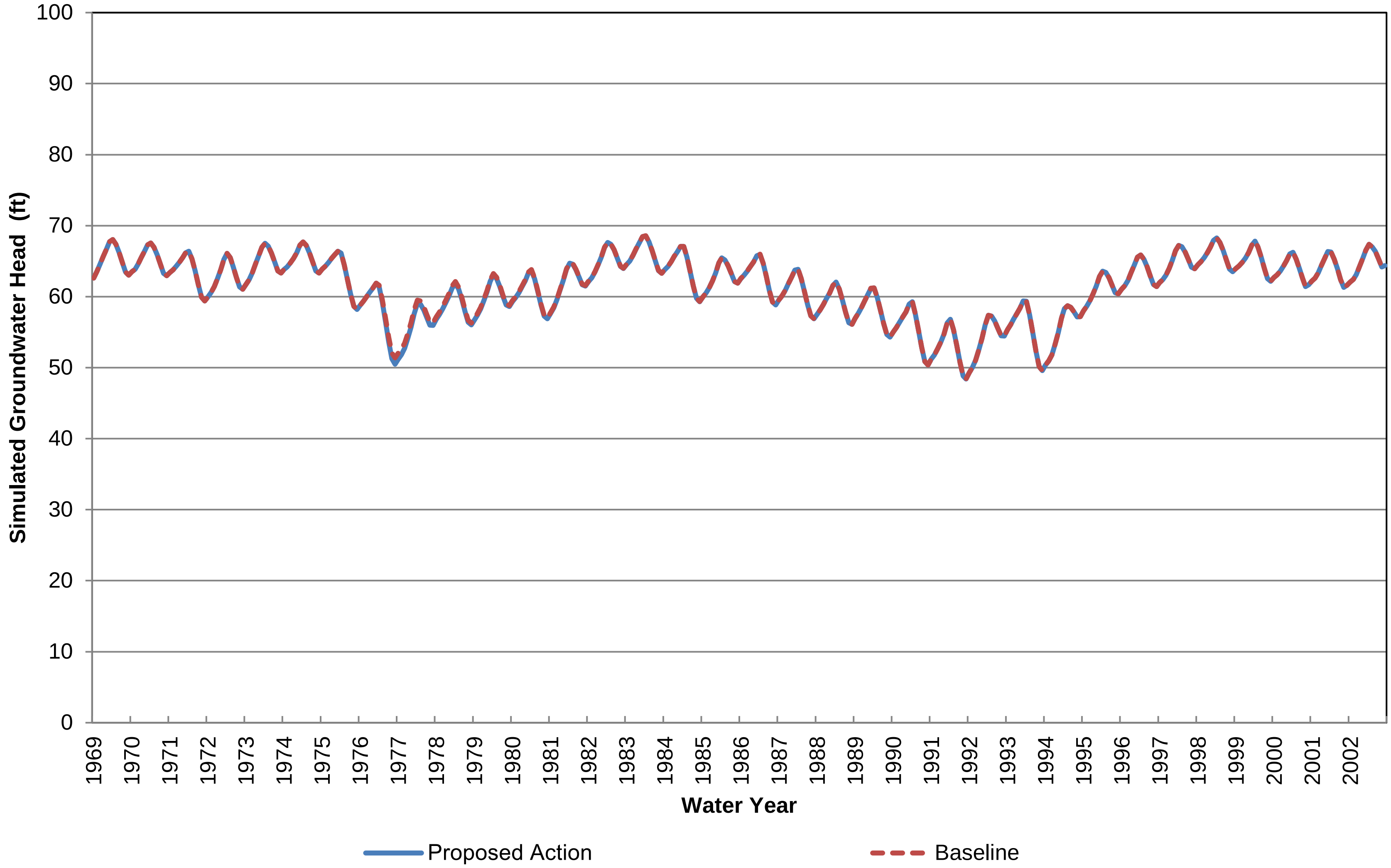
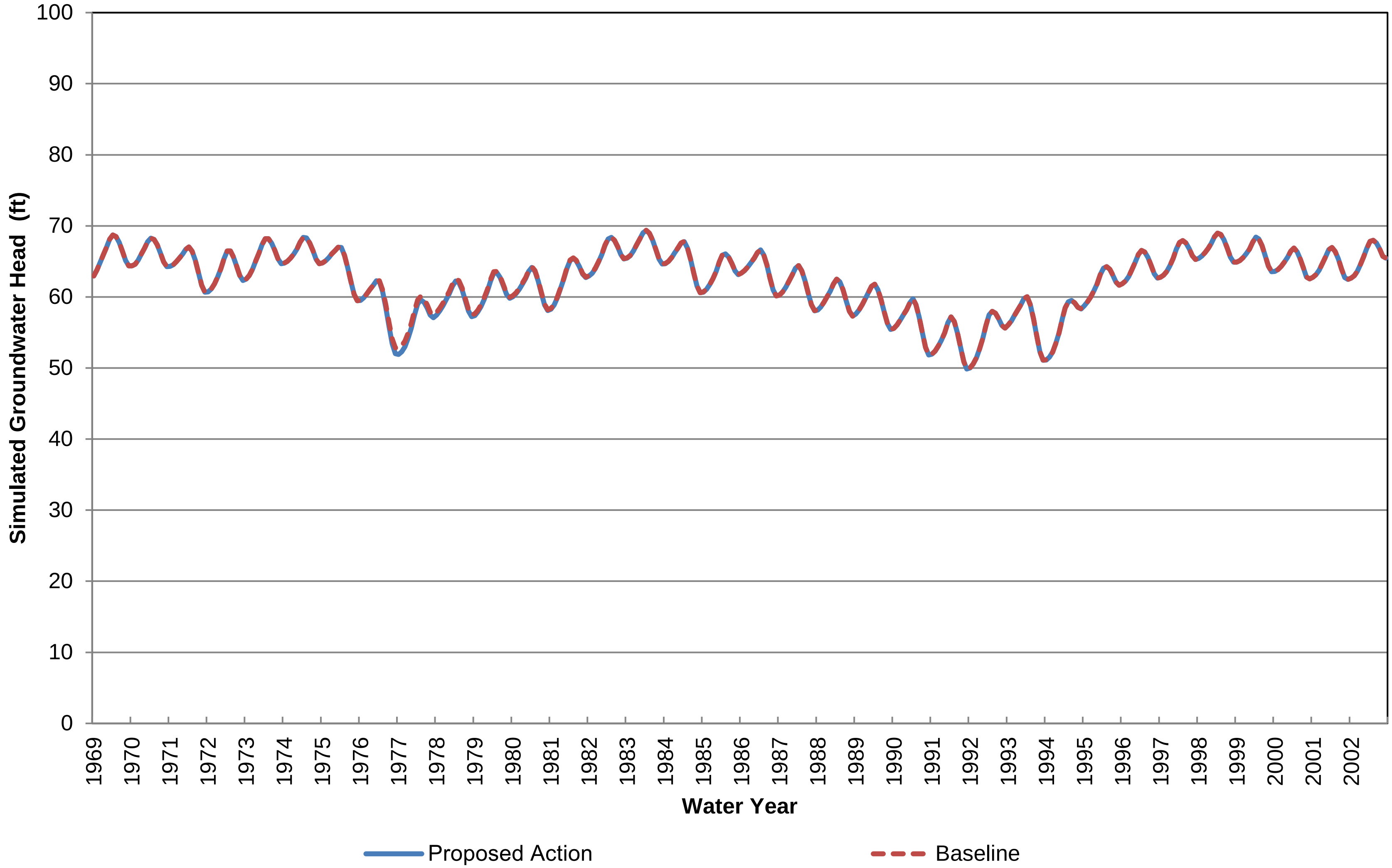
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

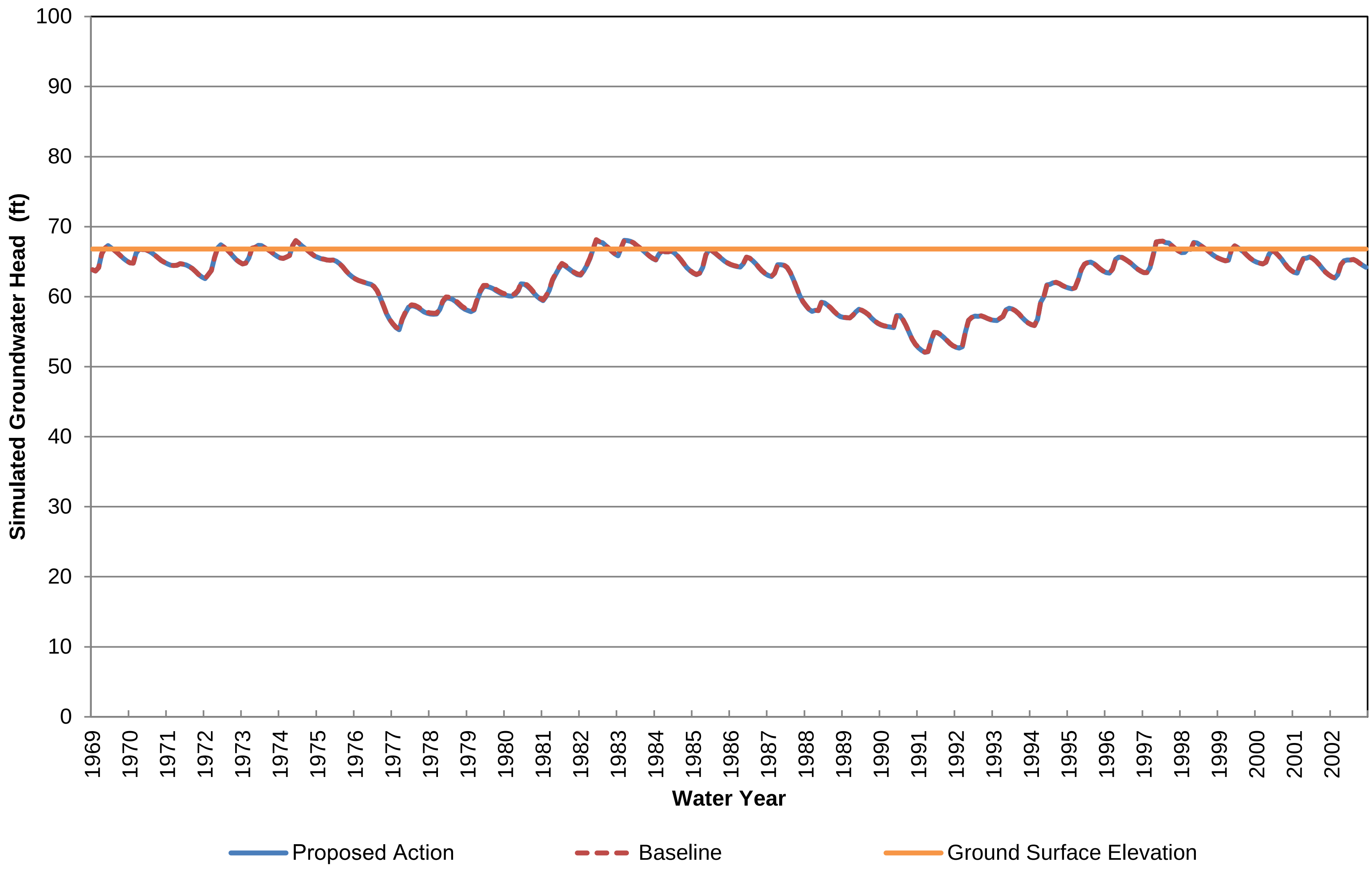
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 12 (Approximately 930-1240 ft bgs)



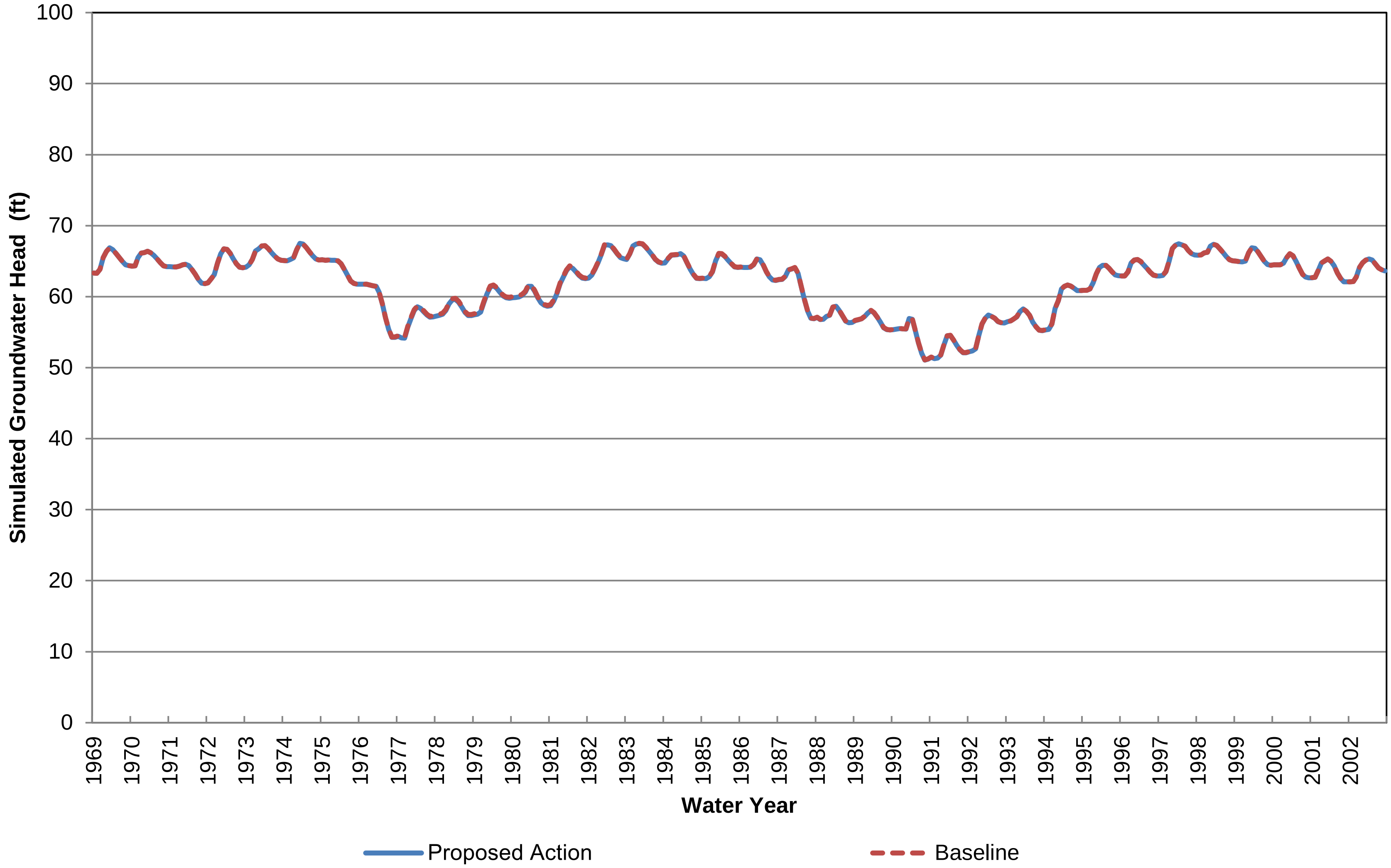
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 12 (Approximately 1240-1700 ft bgs)



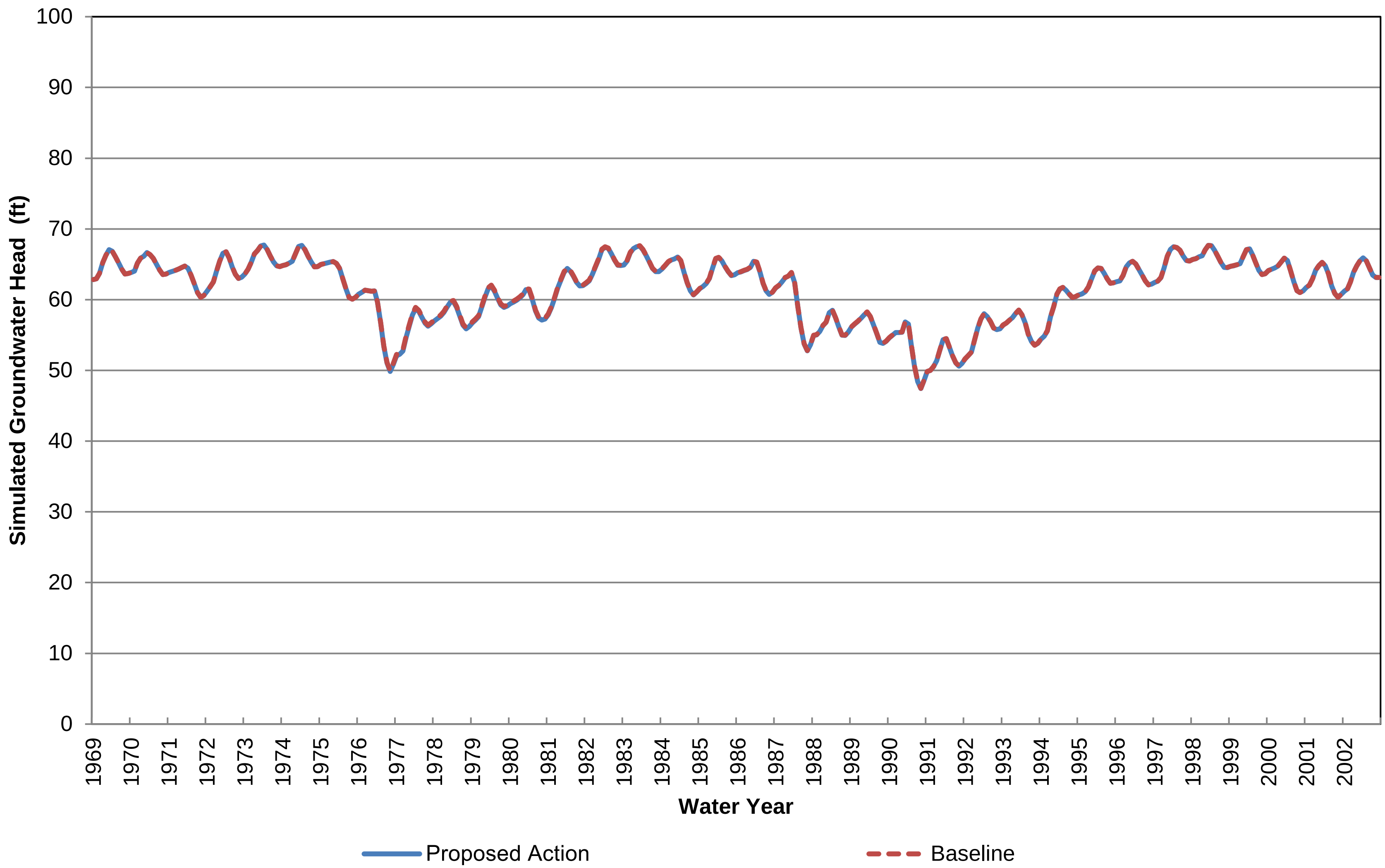
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 13 (Approximately 0-70 ft bgs)



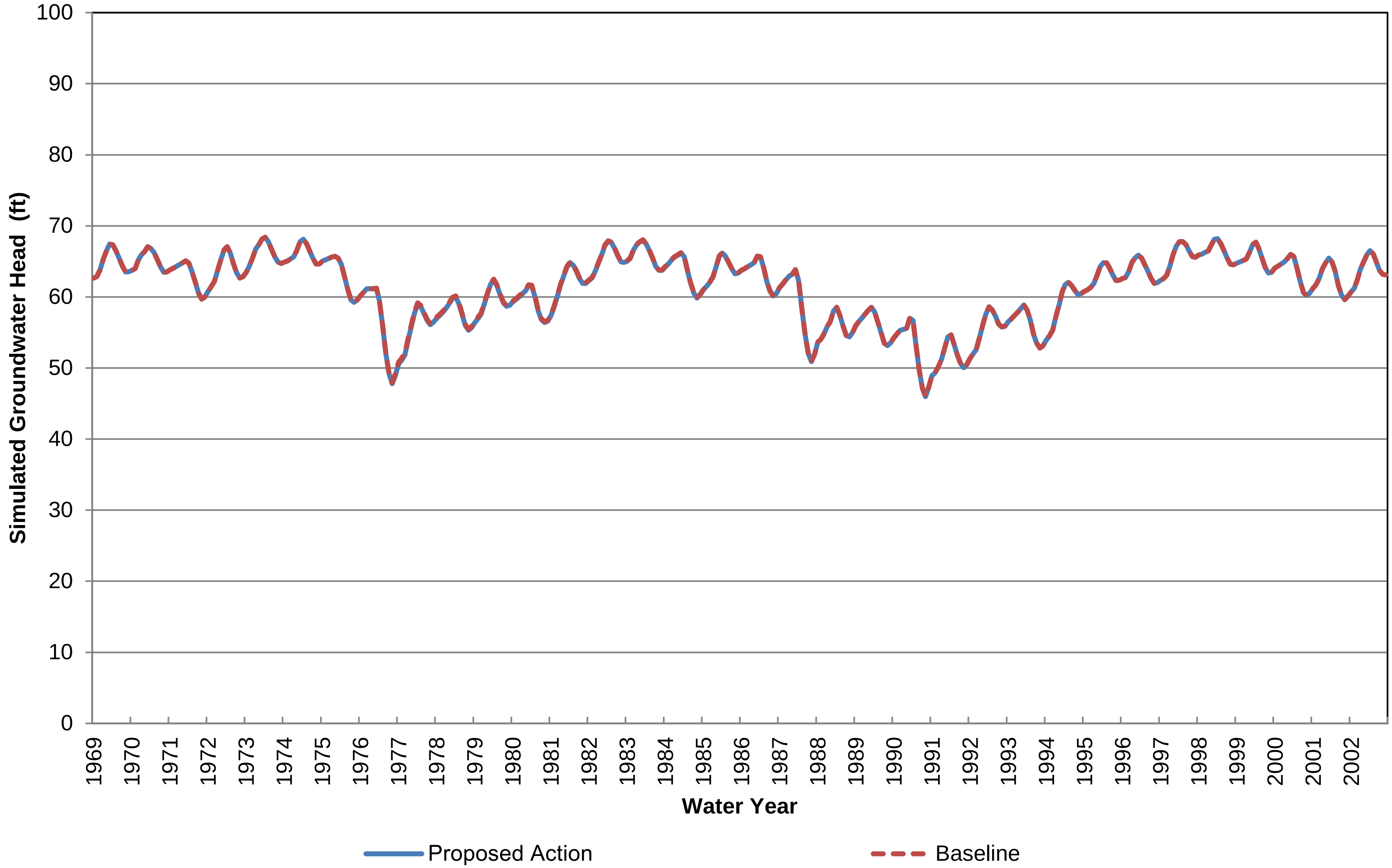
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 13 (Approximately 70-210 ft bgs)



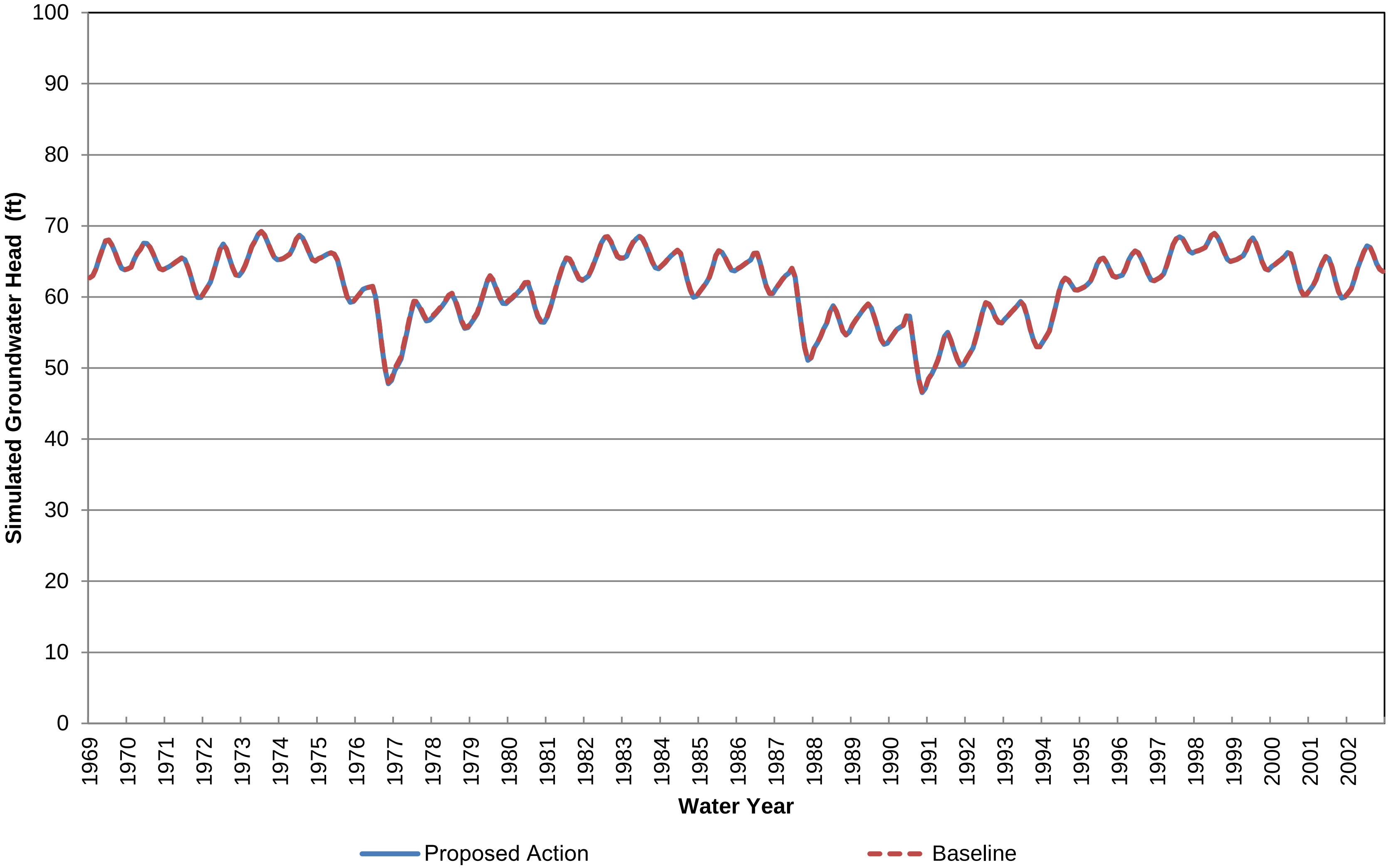
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 13 (Approximately 210-350 ft bgs)



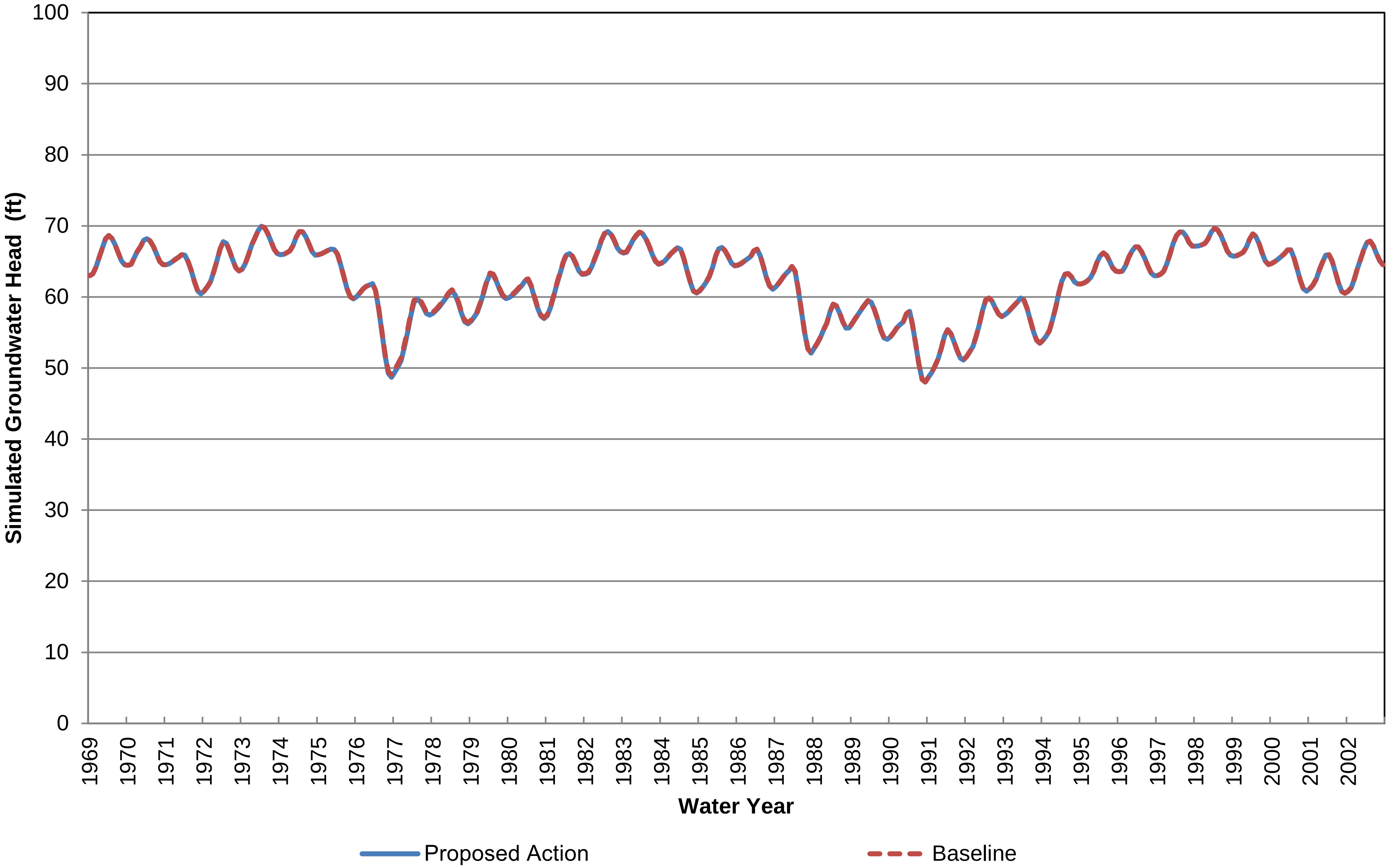
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 13 (Approximately 350-490 ft bgs)

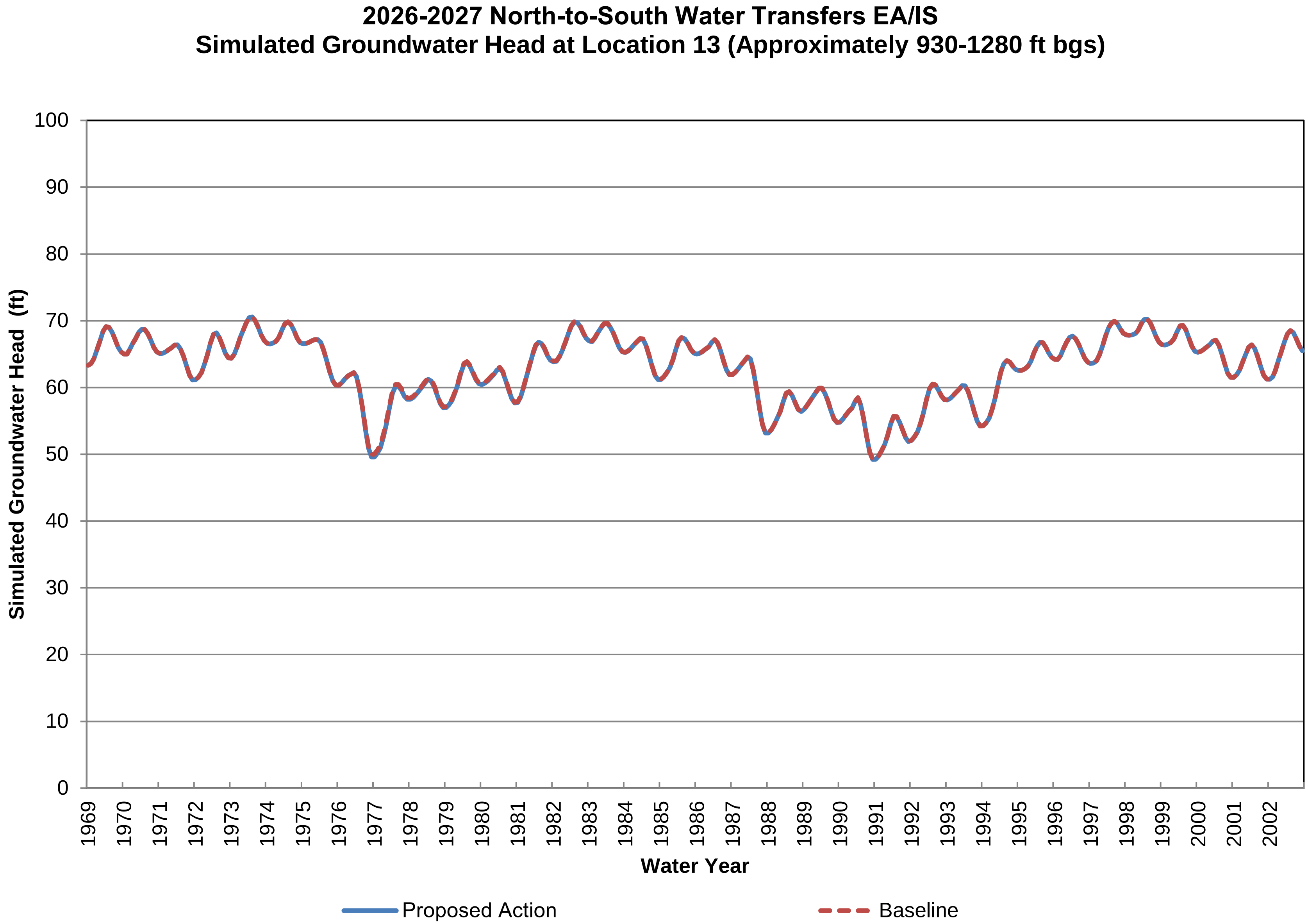


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 13 (Approximately 490-700 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 13 (Approximately 700-930 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 13 (Approximately 930-1280 ft bgs)
Simulated Groundwater Head (ft)
0
10
20
30
40
50
60
70
80
90
100
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
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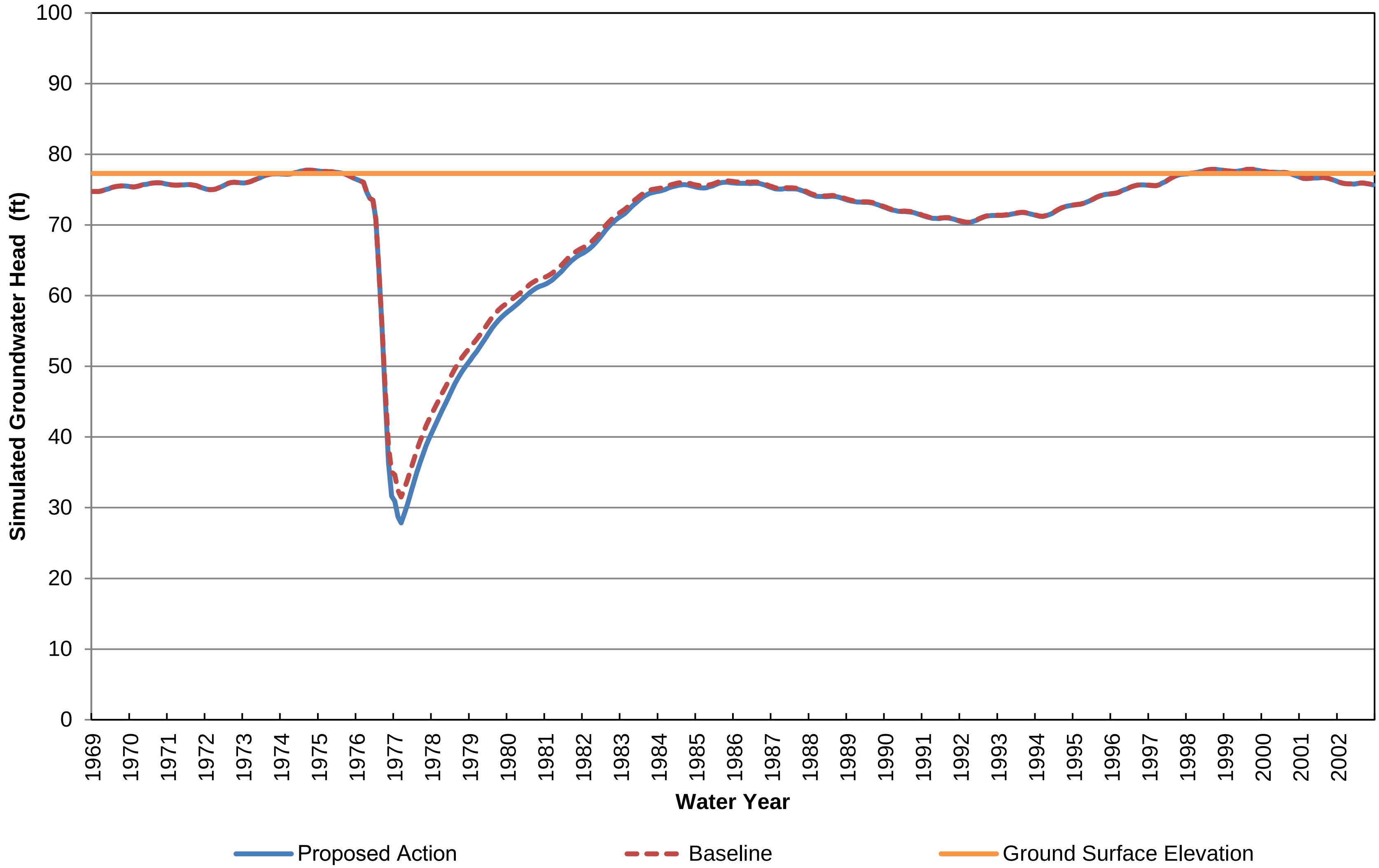
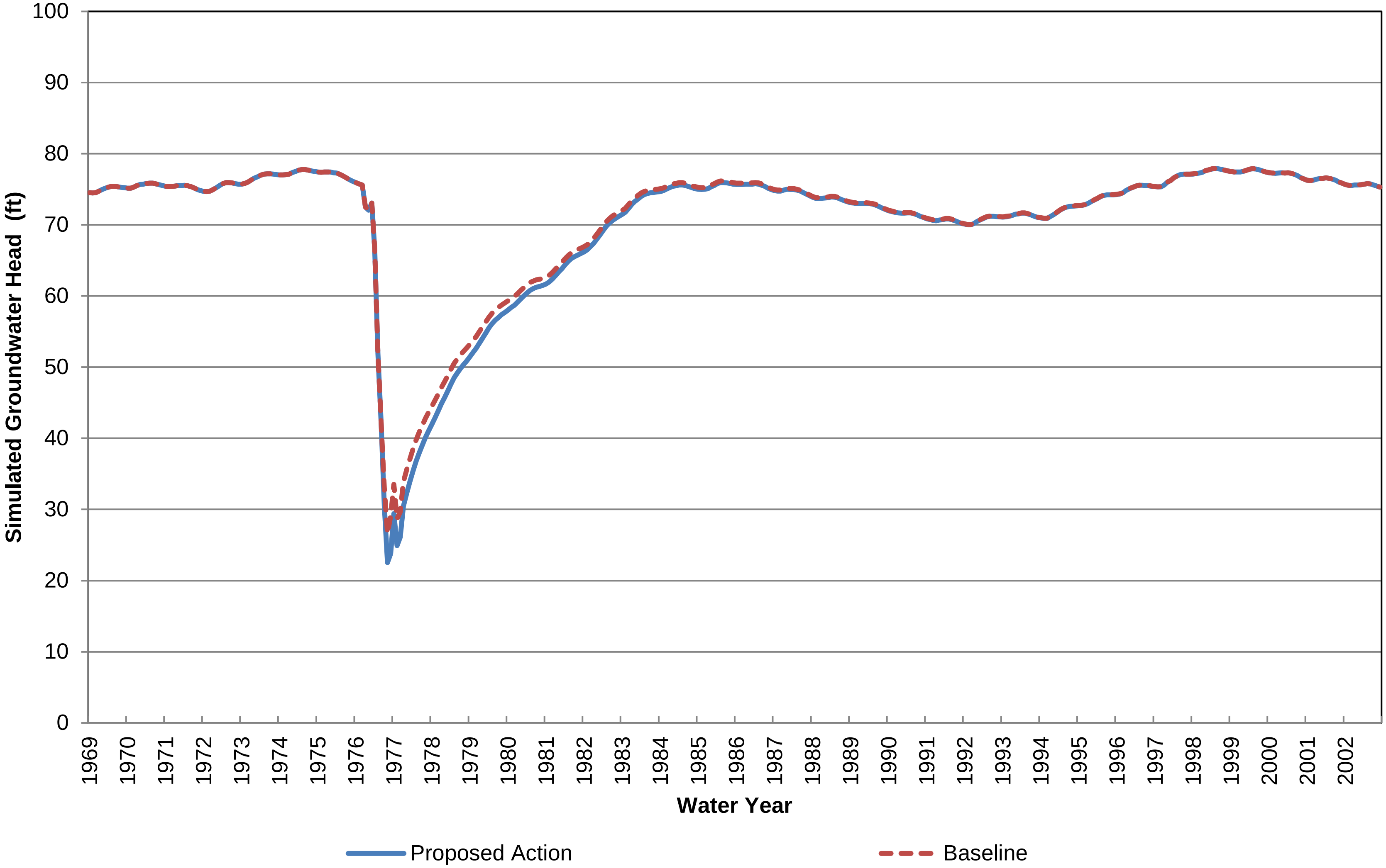
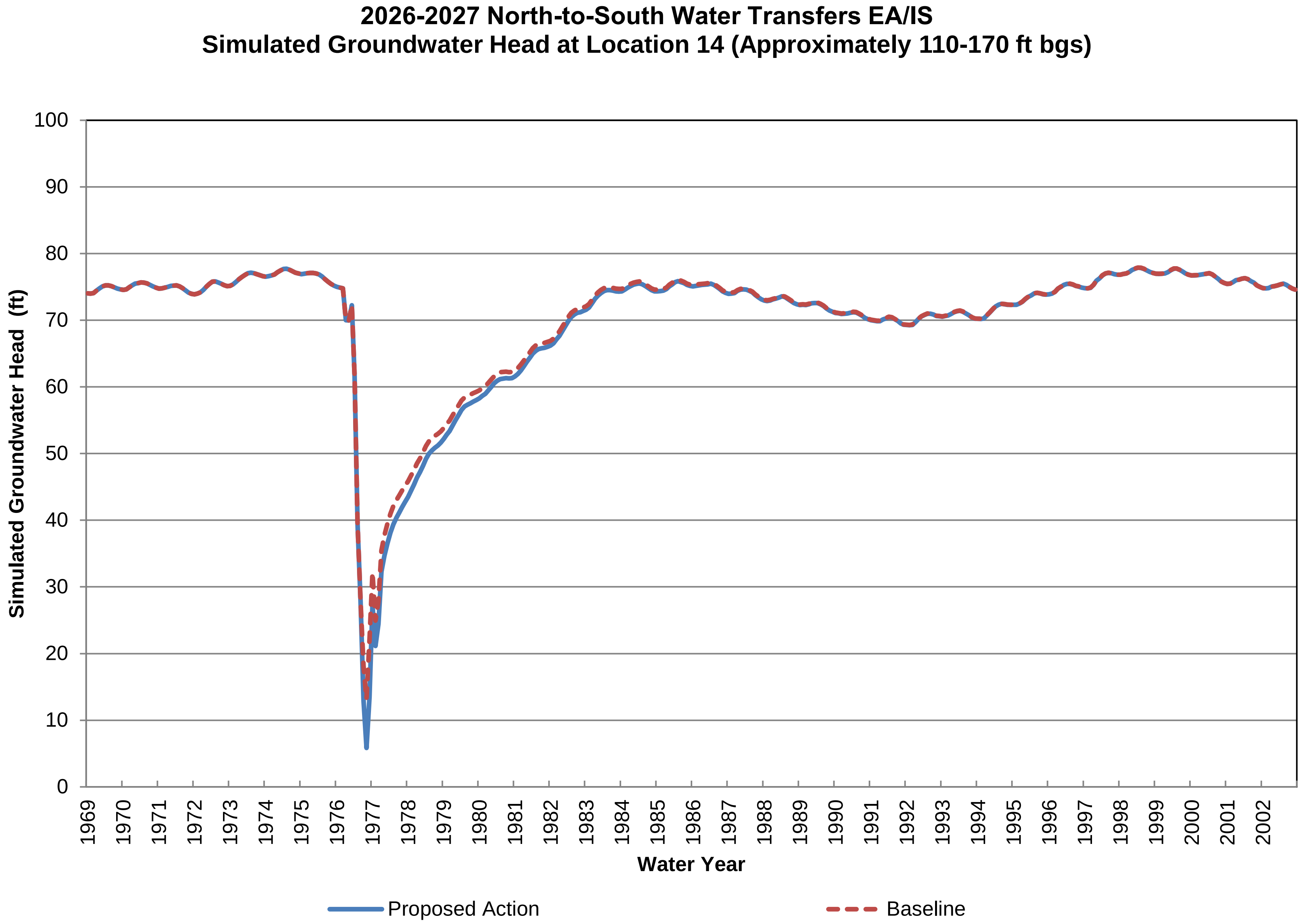
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 14 (Approximately 0-40 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 14 (Approximately 40-110 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 14 (Approximately 110-170 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
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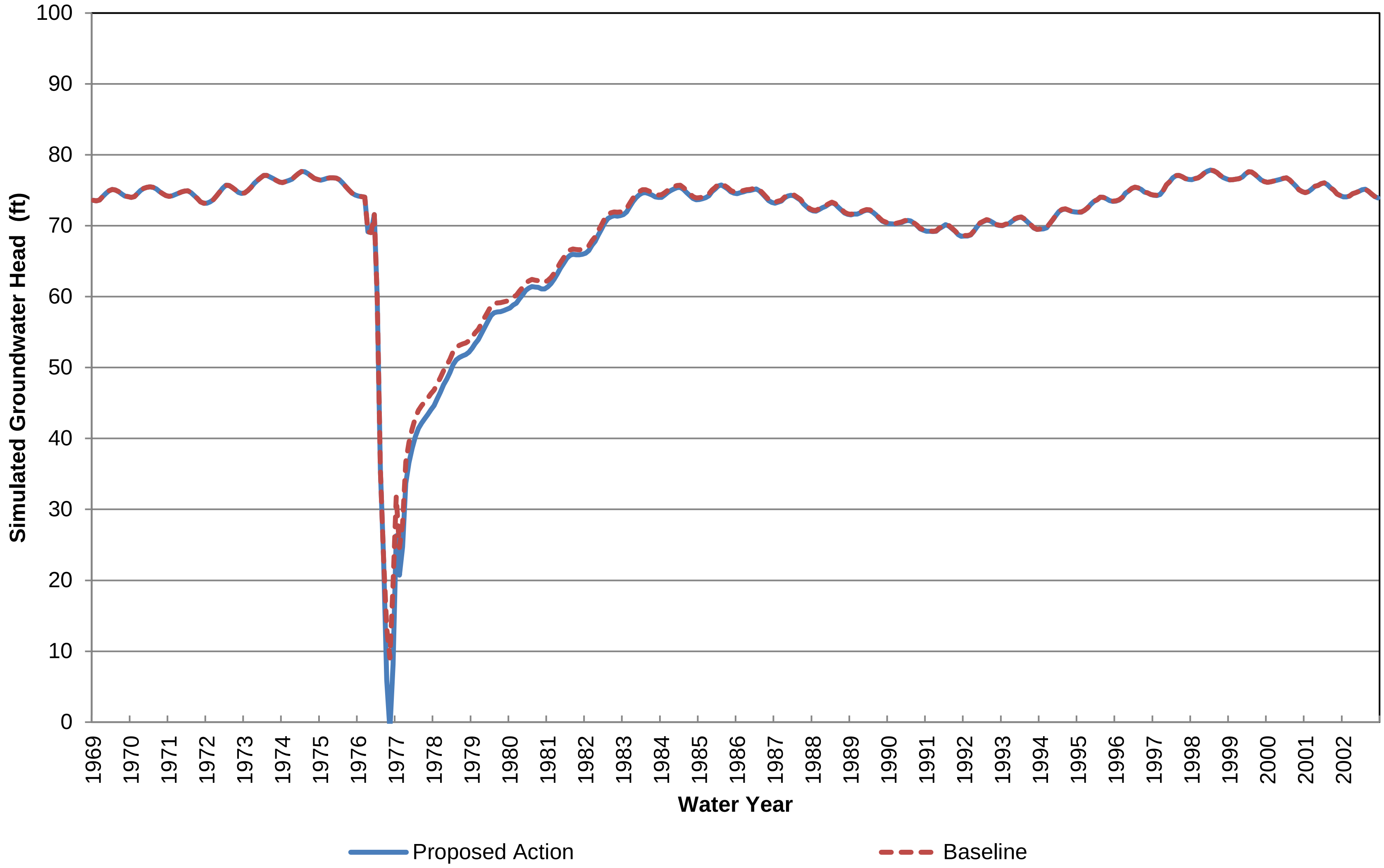
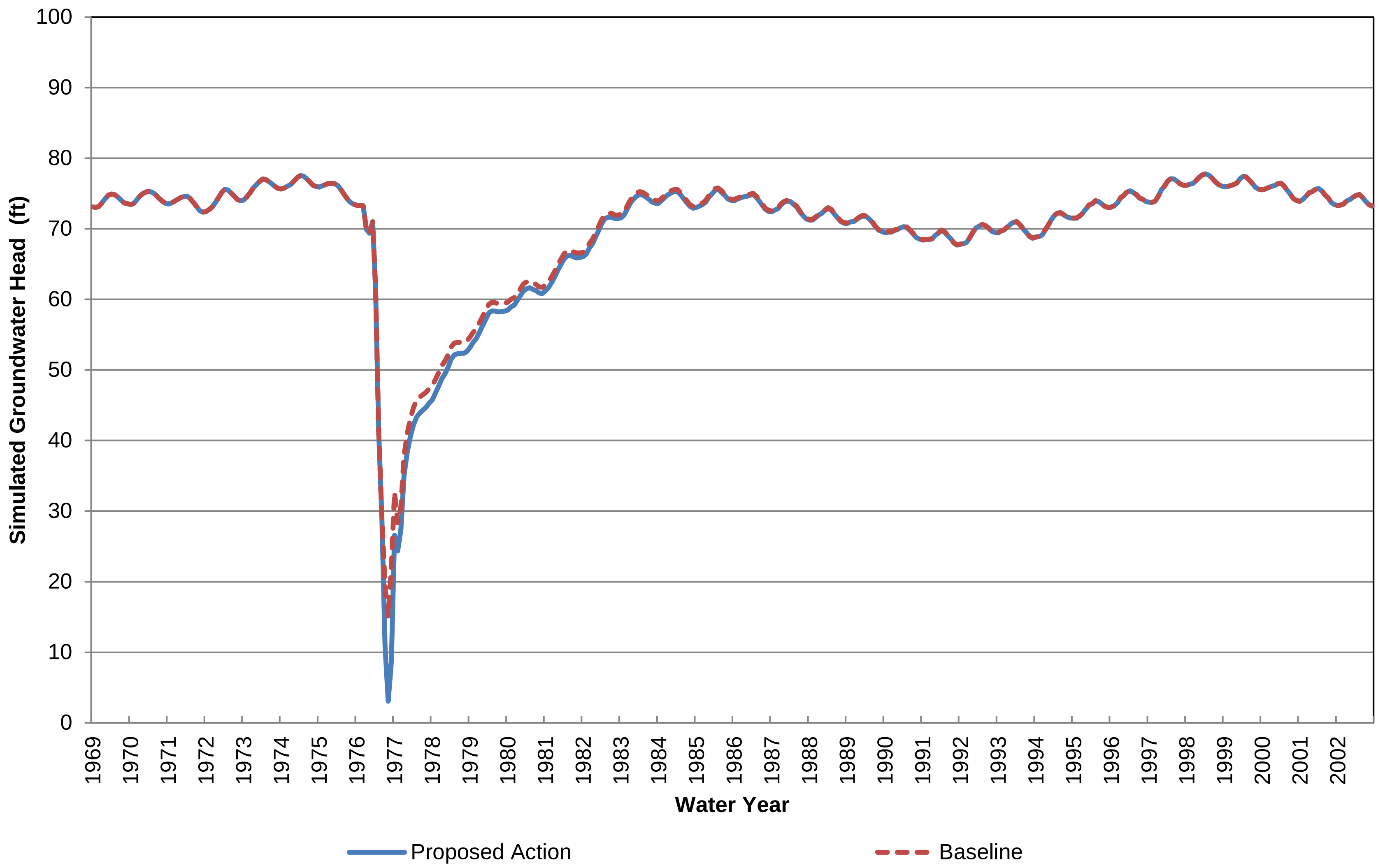
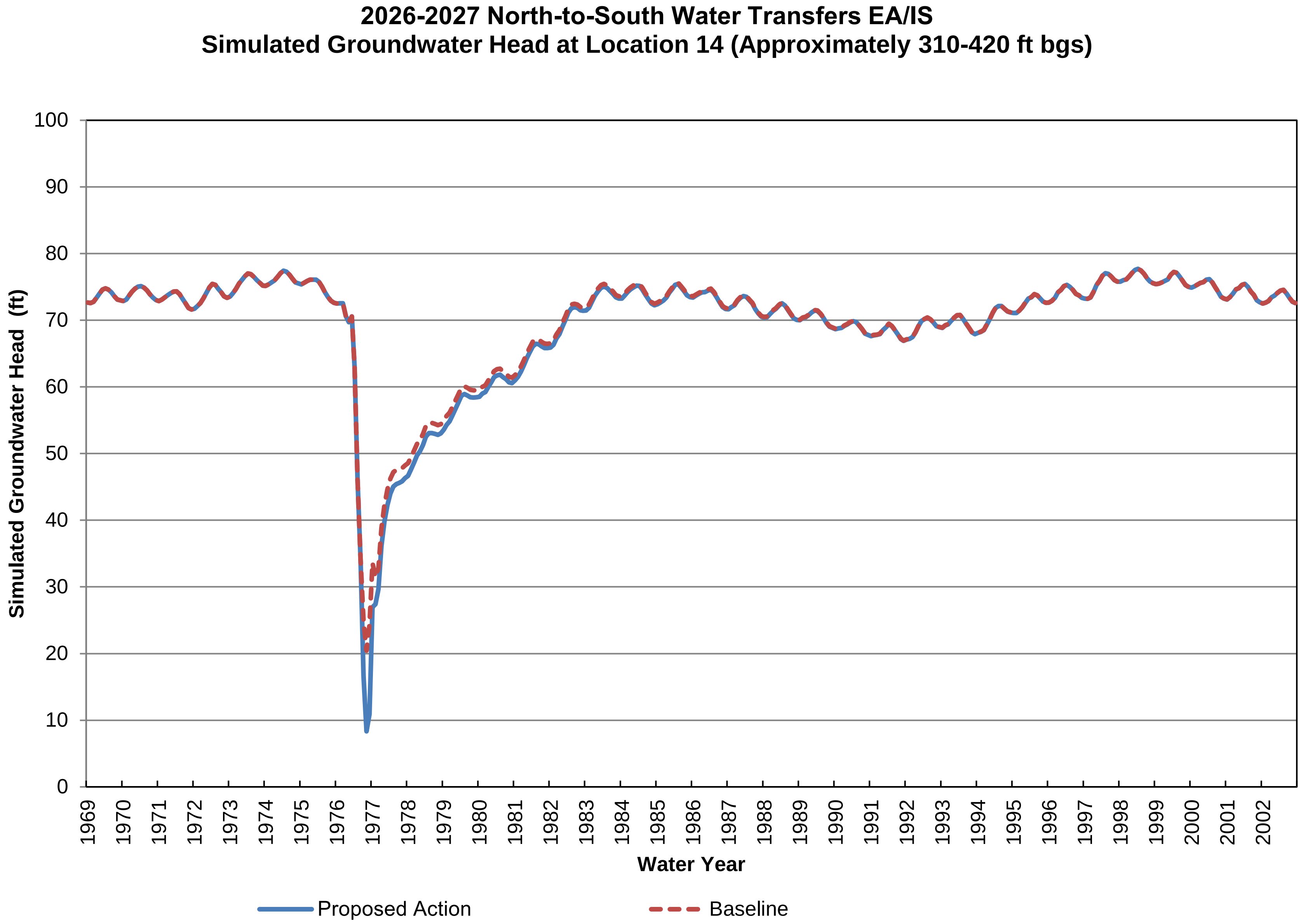
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 14 (Approximately 170-230 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 14 (Approximately 230-310 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 14 (Approximately 310-420 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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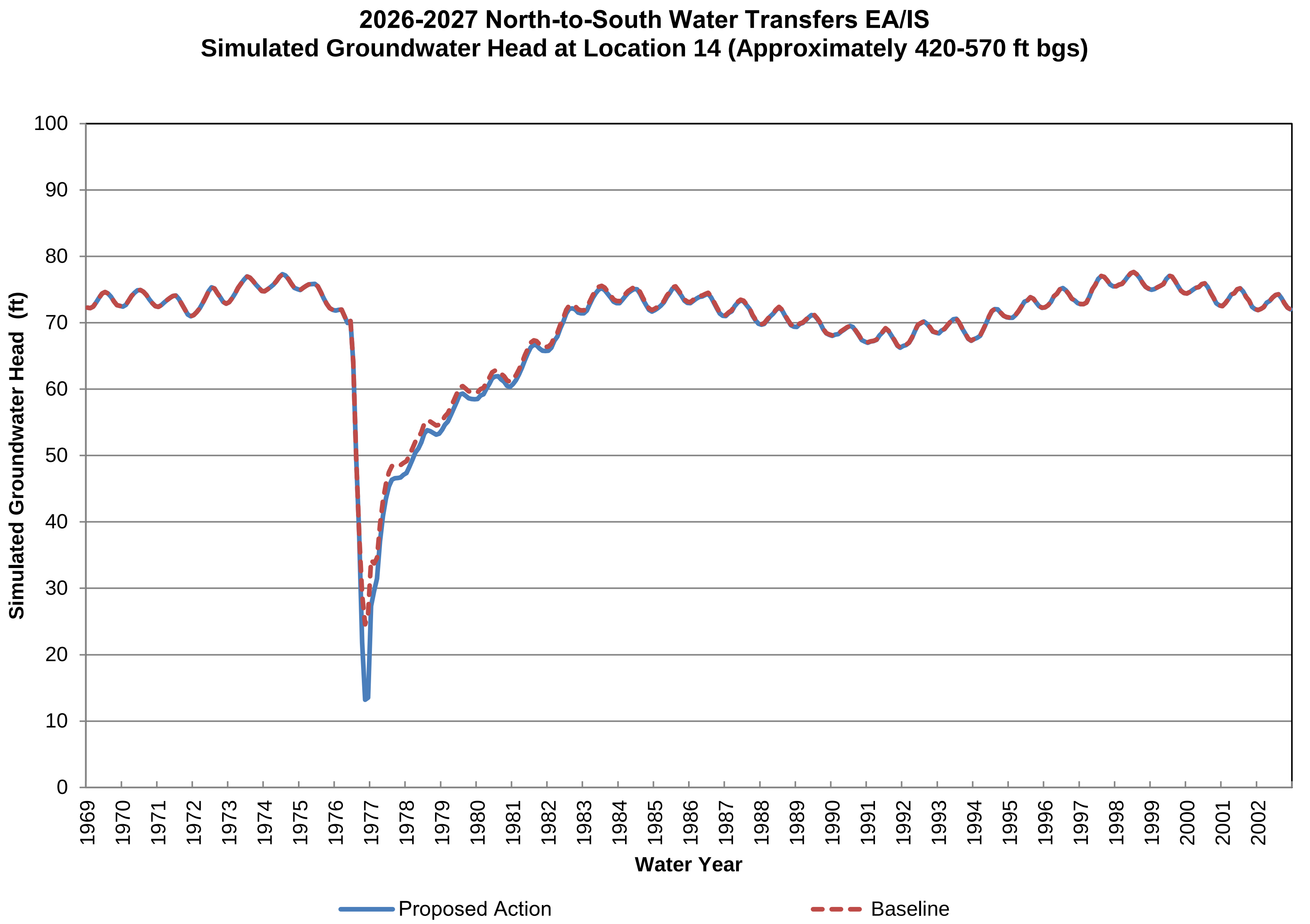
2001
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 14 (Approximately 420-570 ft bgs)
Simulated Groundwater Head (ft)
100
90
80
70
60
50
40
30
20
10
0
1969
1970
1971
1972
1973
1974
1975
1976
1977
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1979
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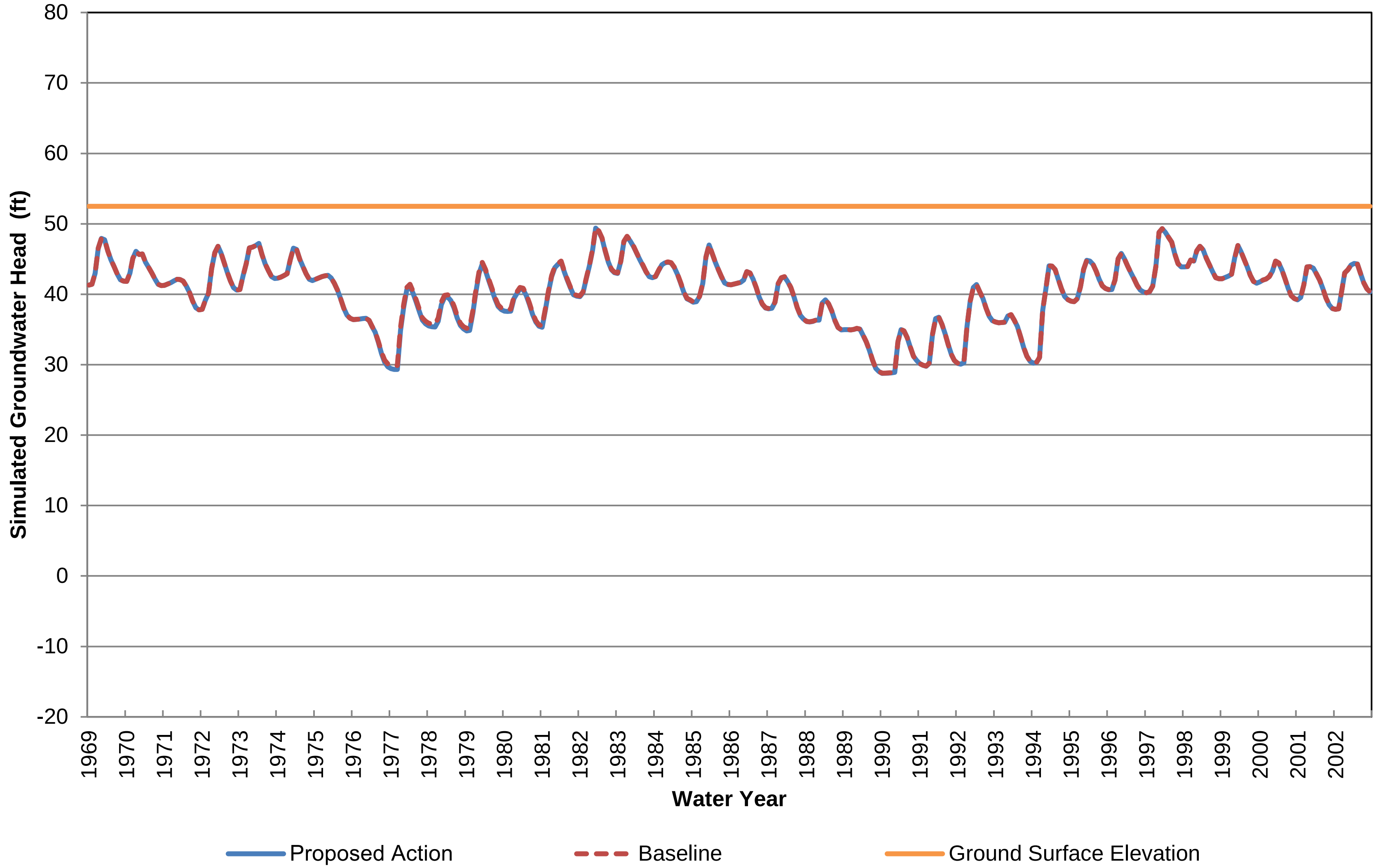
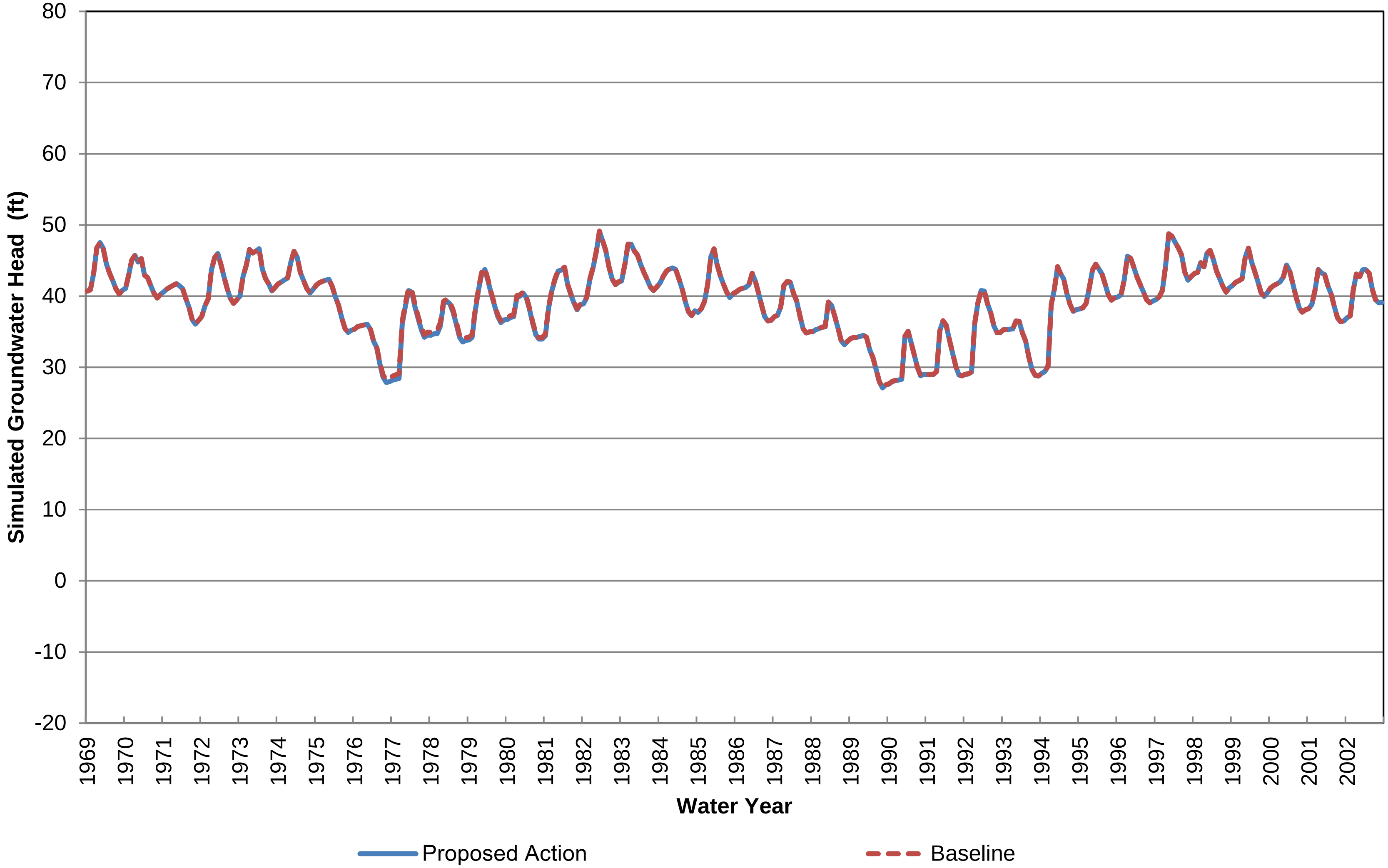
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

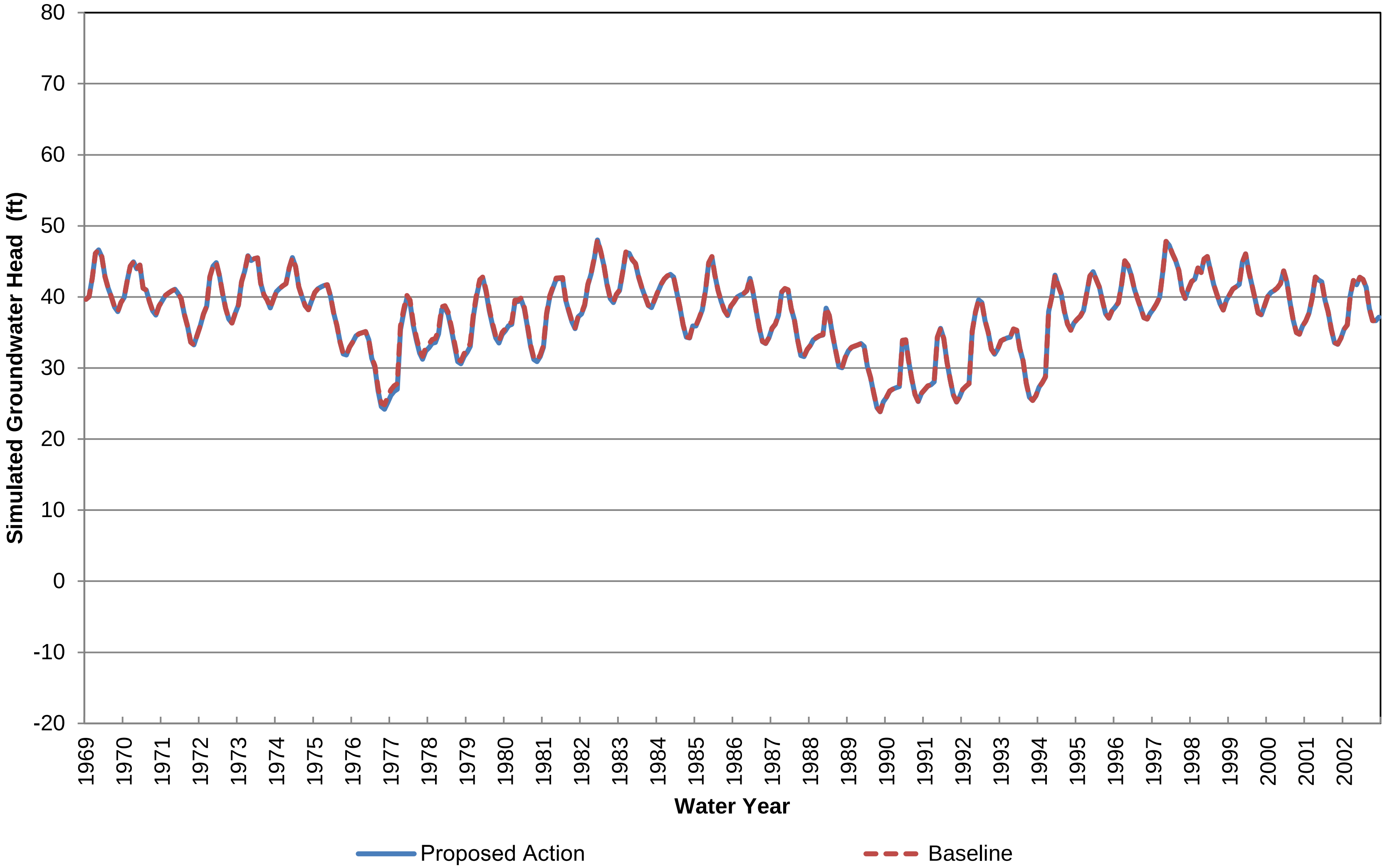
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 15 (Approximately 0-30 ft bgs)



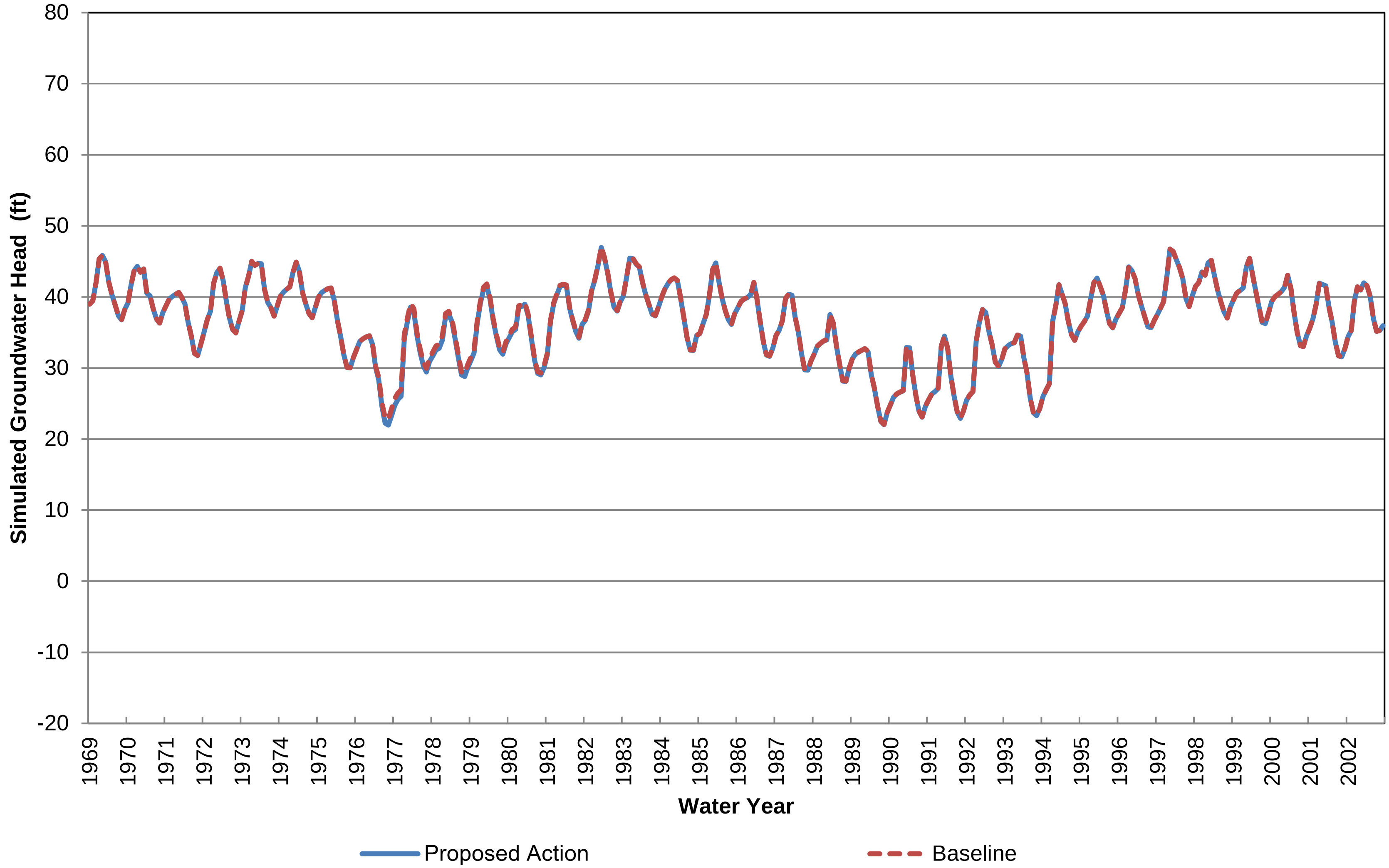
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 15 (Approximately 30-70 ft bgs)



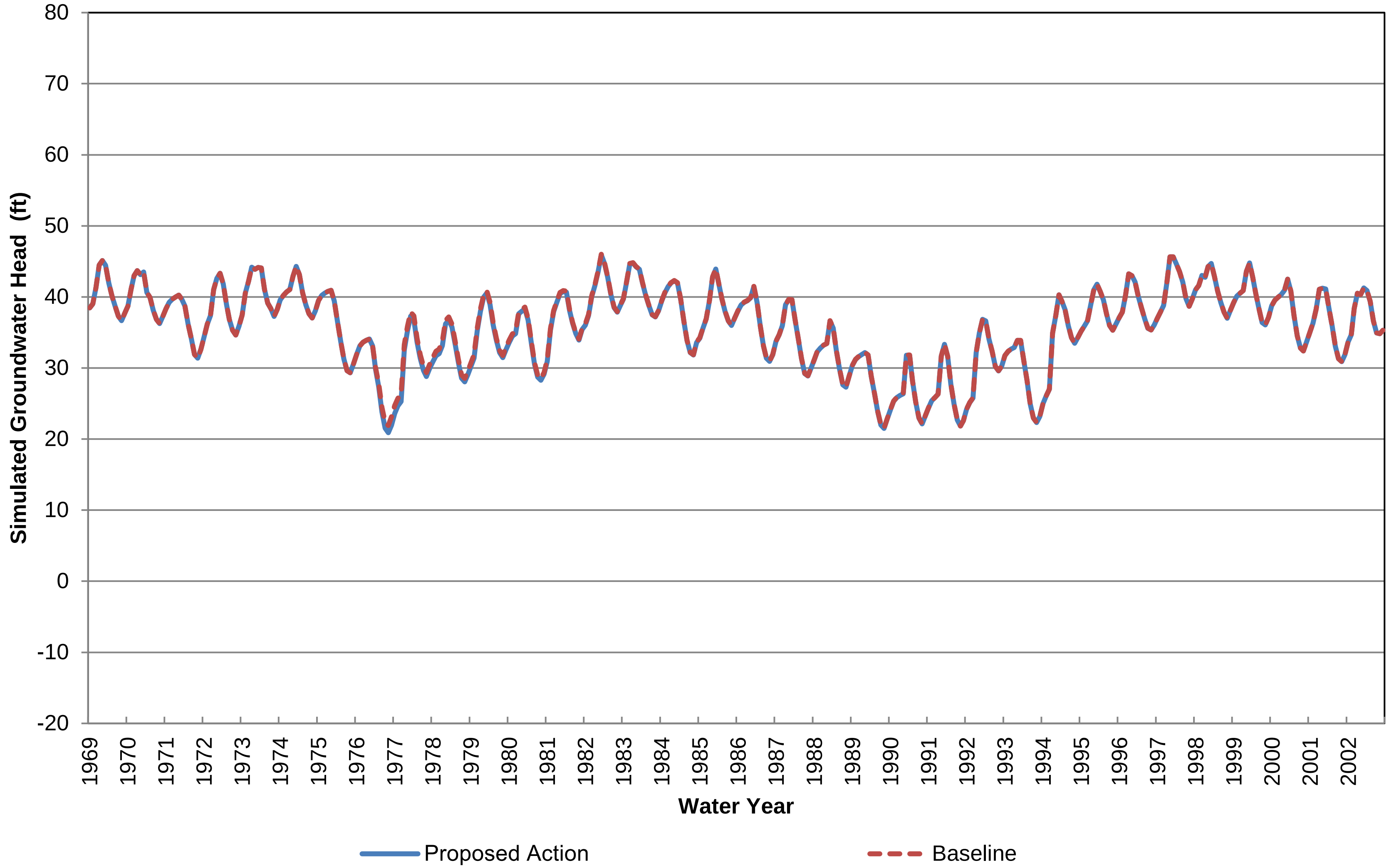
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 15 (Approximately 70-110 ft bgs)

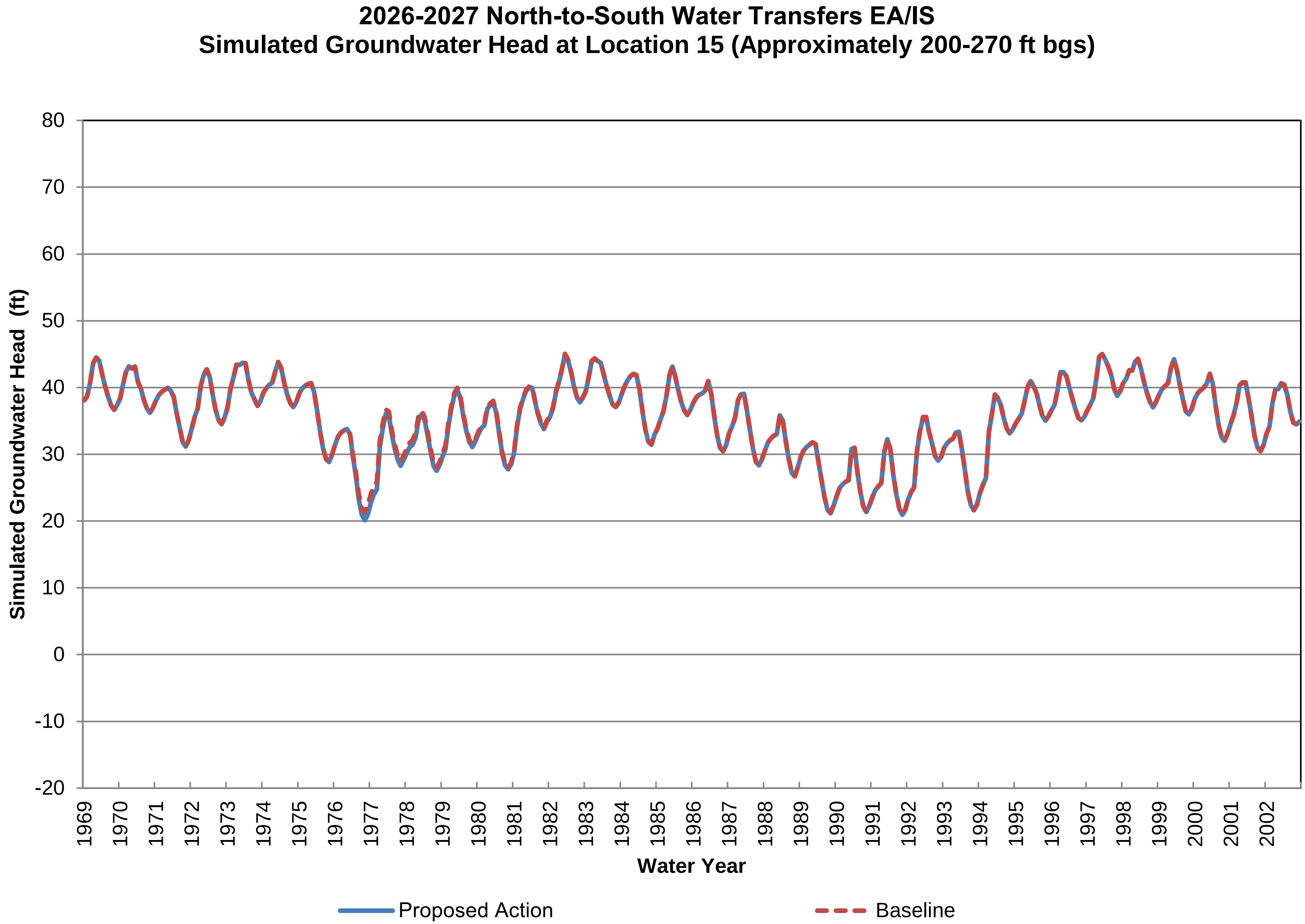


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 15 (Approximately 110-150 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 15 (Approximately 150-200 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 15 (Approximately 200-270 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
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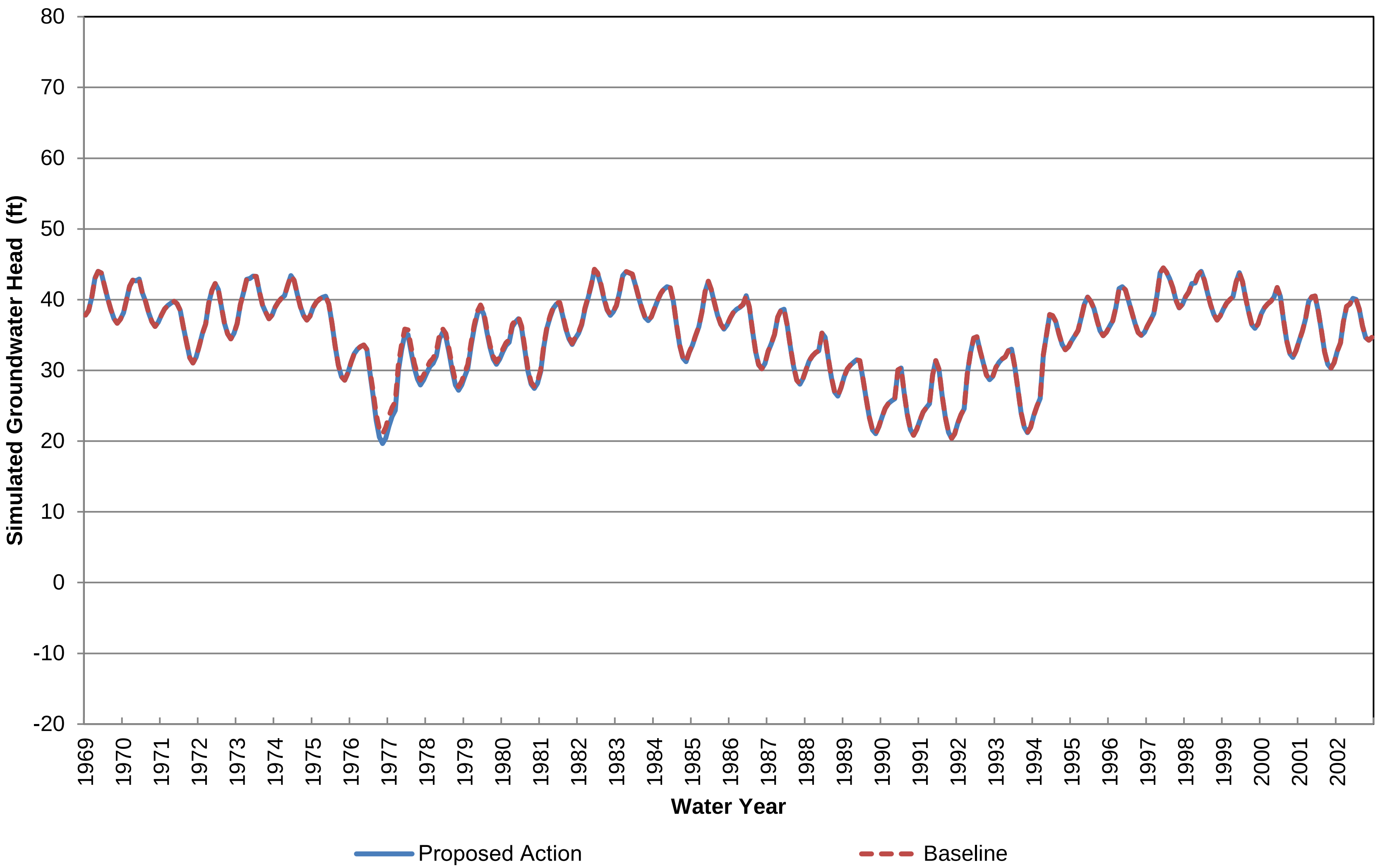
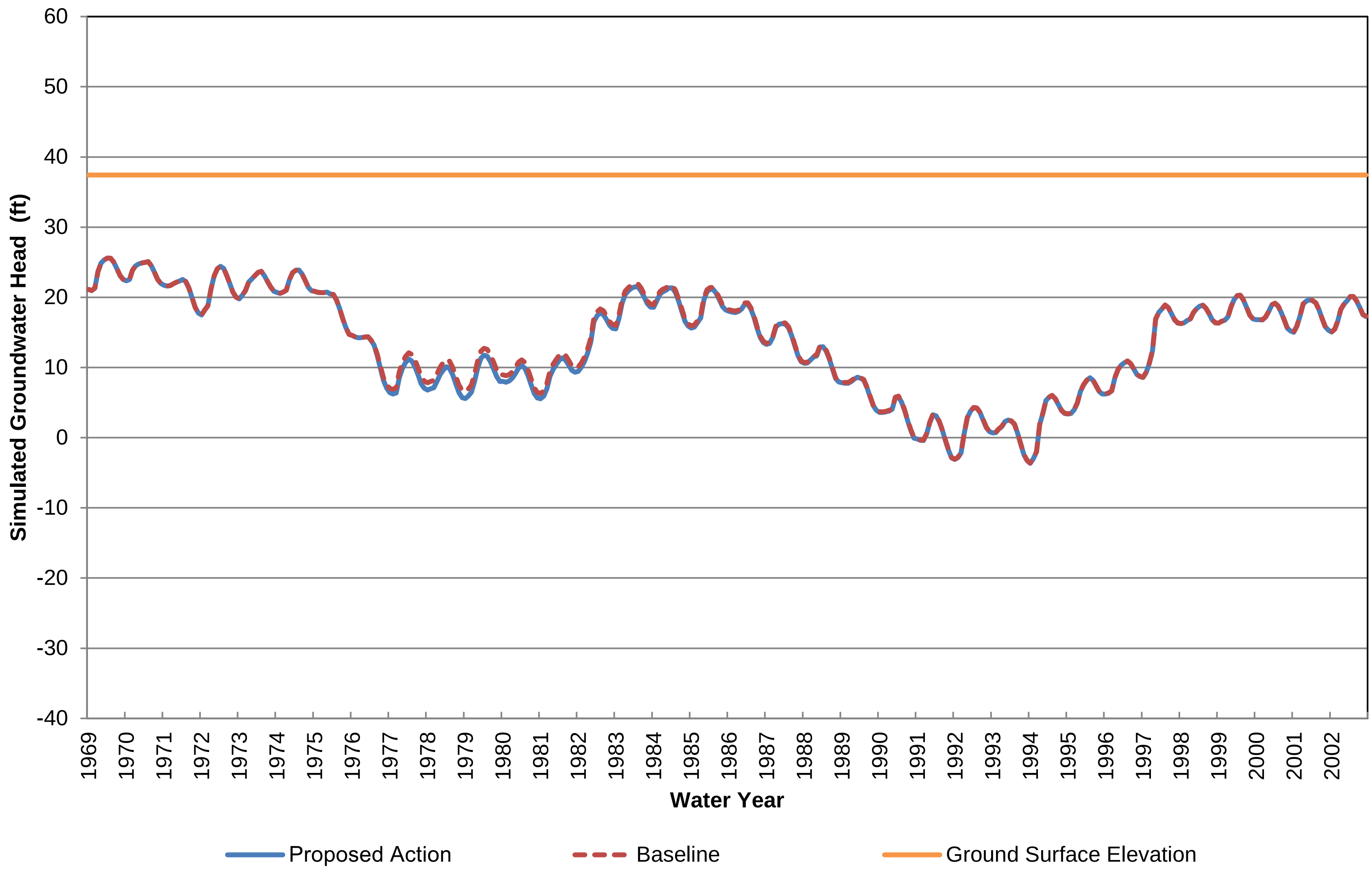
2001
2002
Water Year
Proposed Action
Baseline

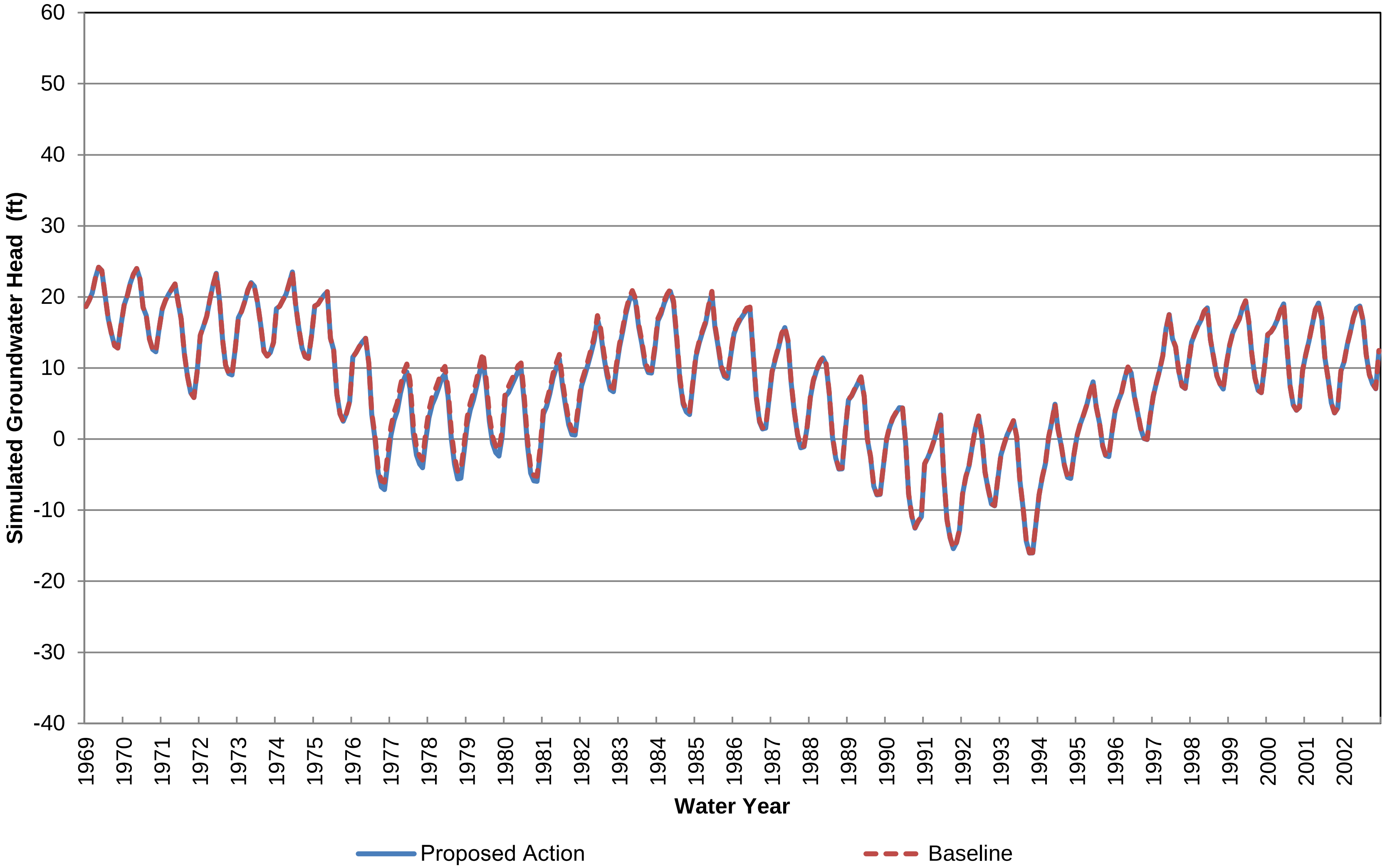
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 15 (Approximately 270-360 ft bgs)

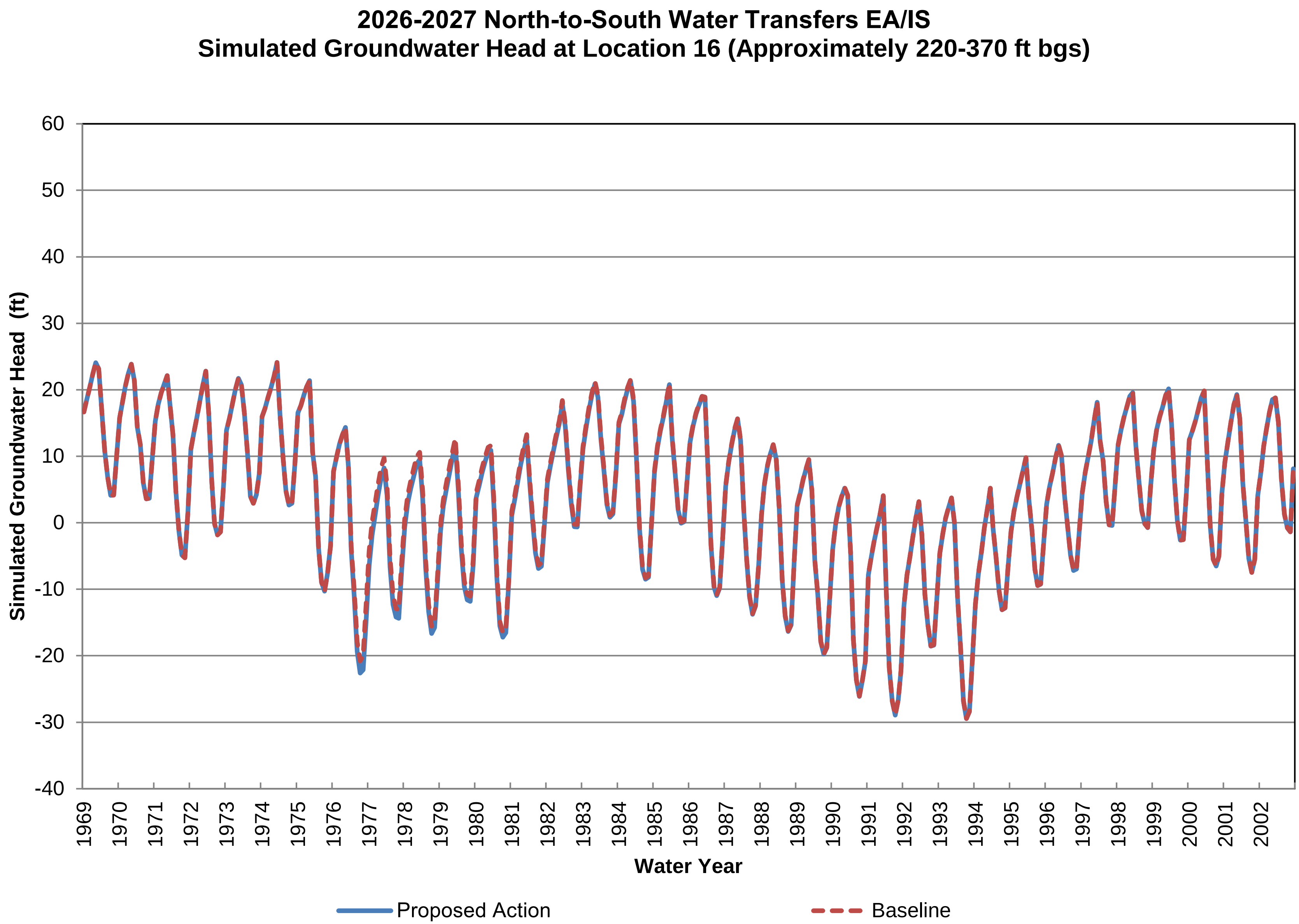


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 16 (Approximately 0-70 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 16 (Approximately 70-220 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 16 (Approximately 220-370 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
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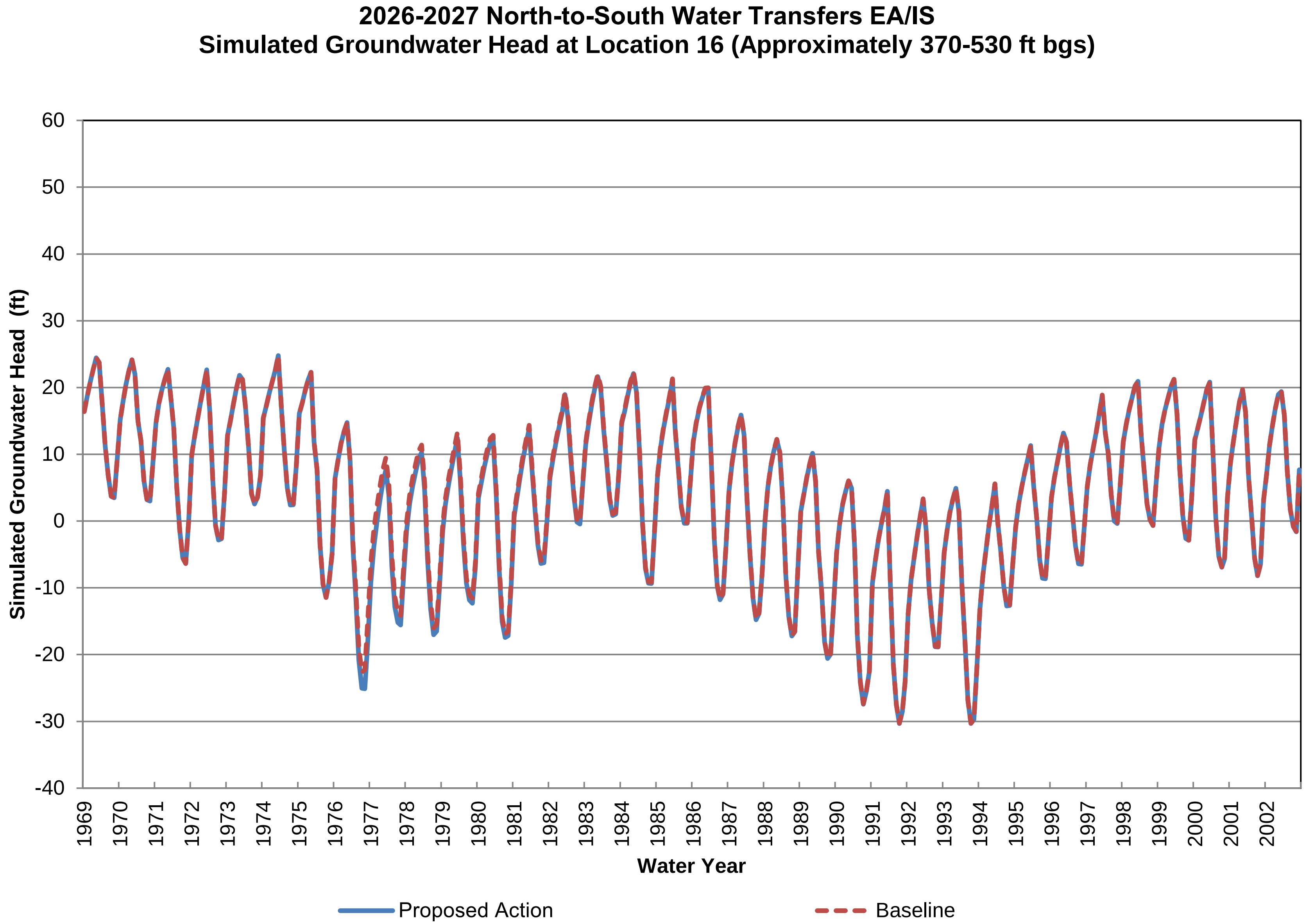
2000
2001
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 16 (Approximately 370-530 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
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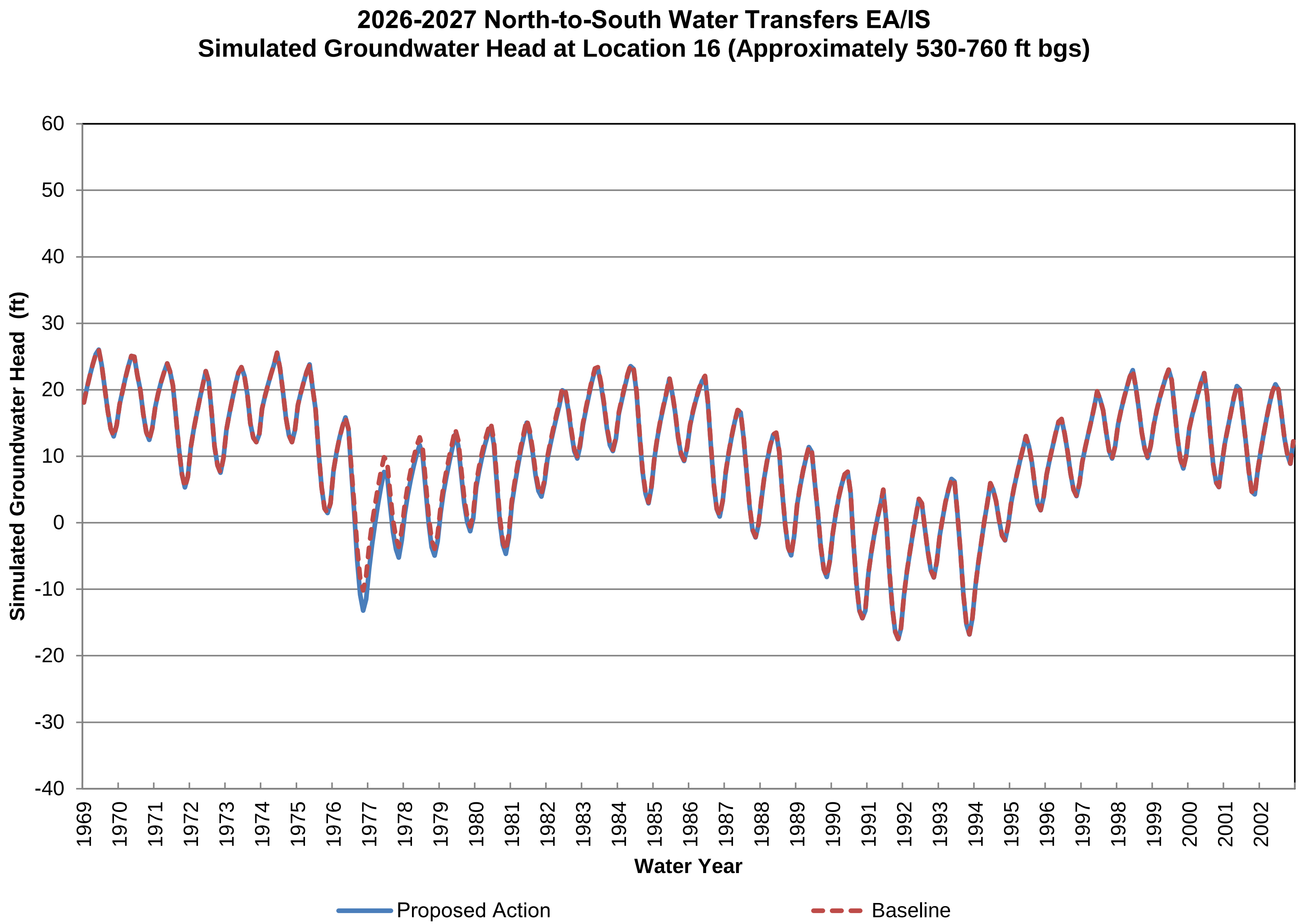
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 16 (Approximately 530-760 ft bgs)
60
50
40
30
20
10
0
-10
-20
-30
-40
Simulated Groundwater Head (ft)
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
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1993
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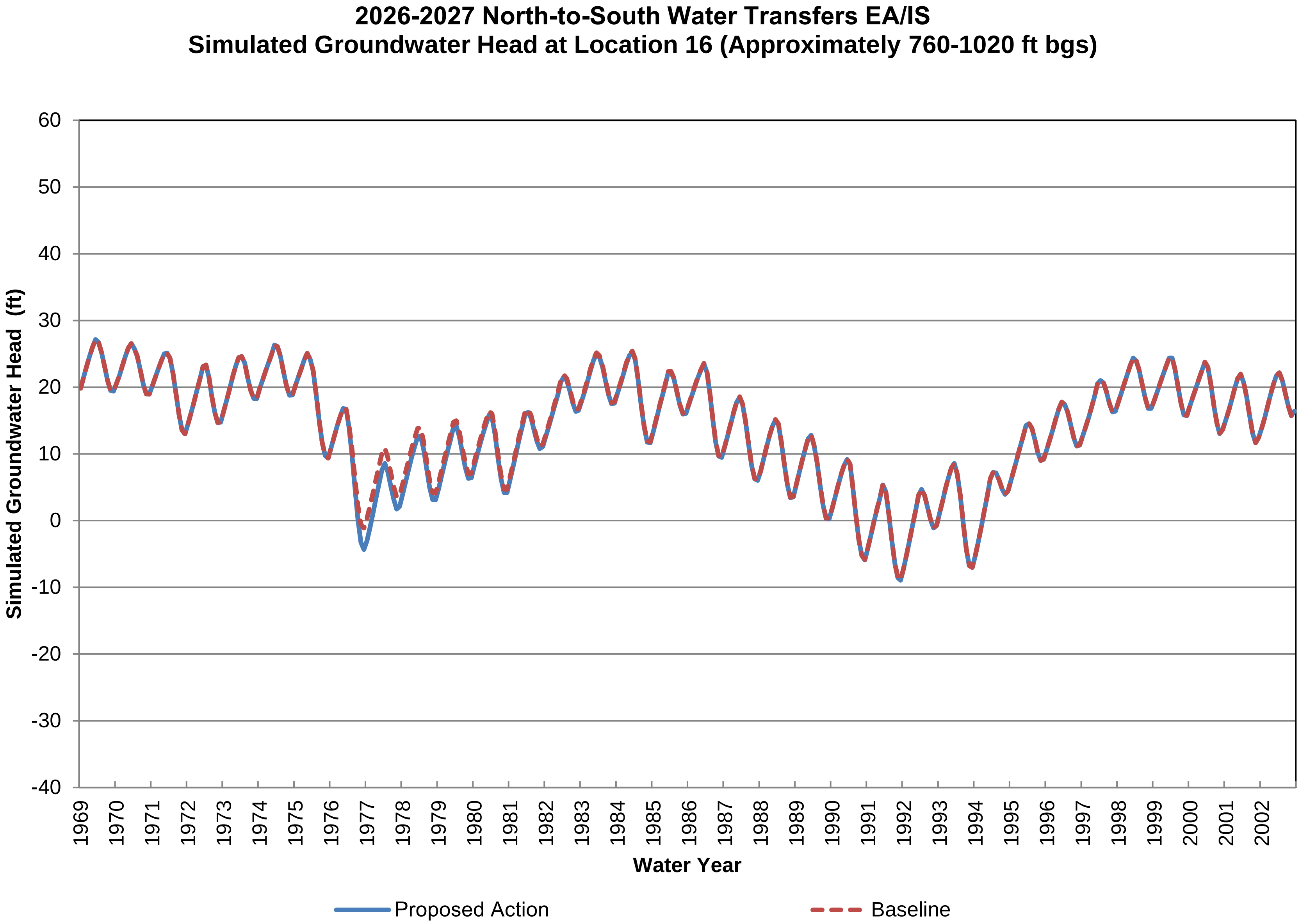
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 16 (Approximately 760-1020 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
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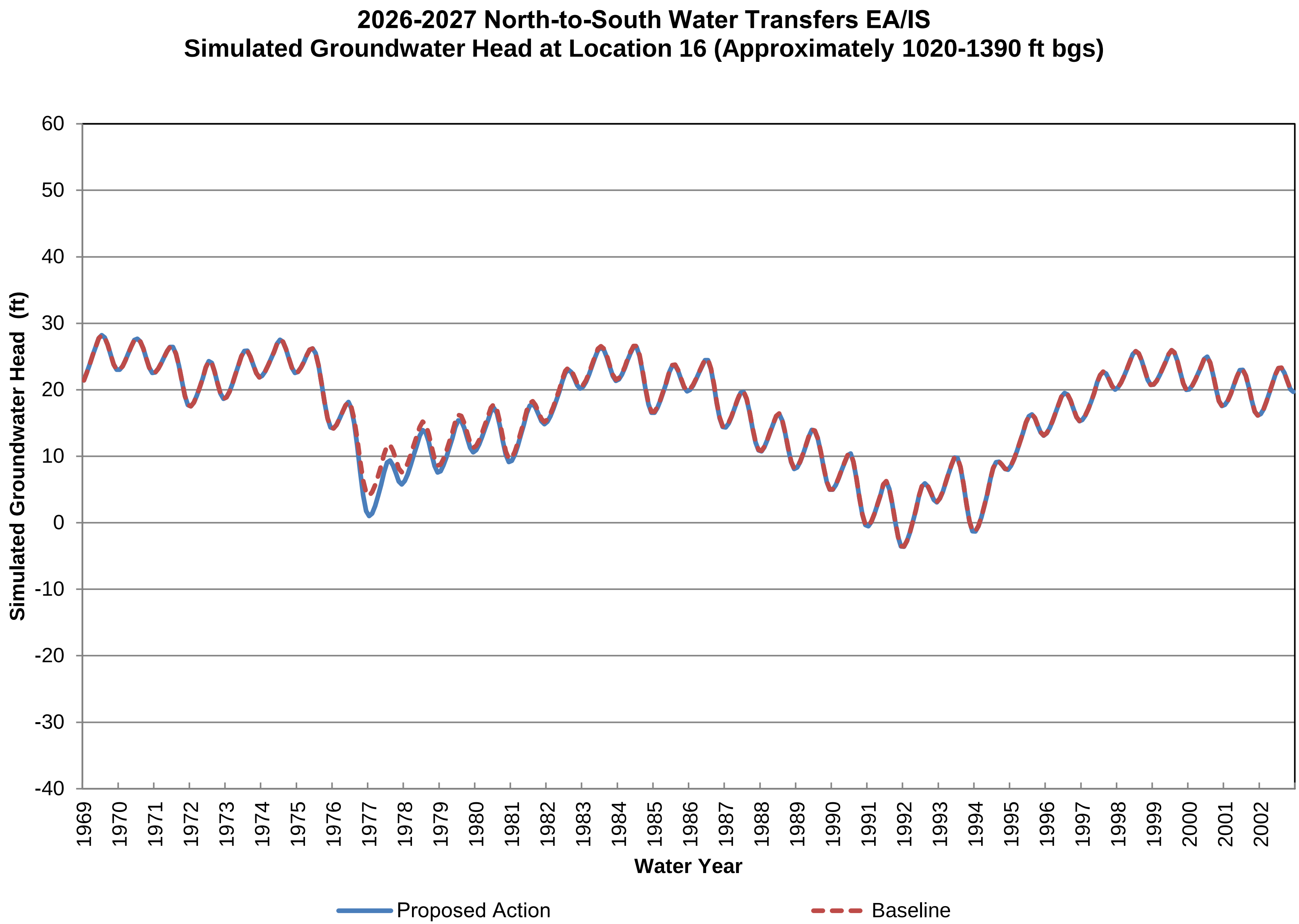
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 16 (Approximately 1020-1390 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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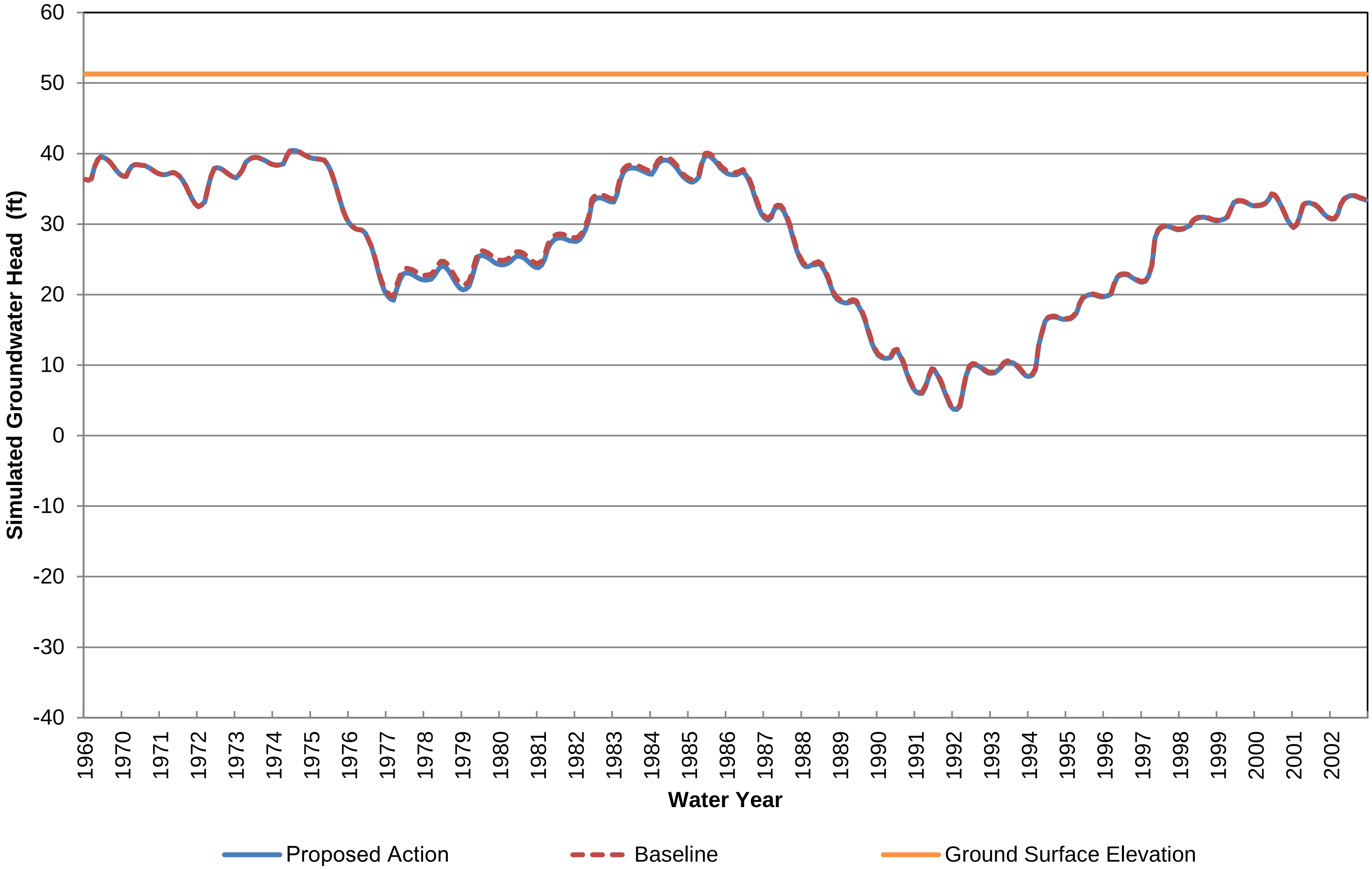
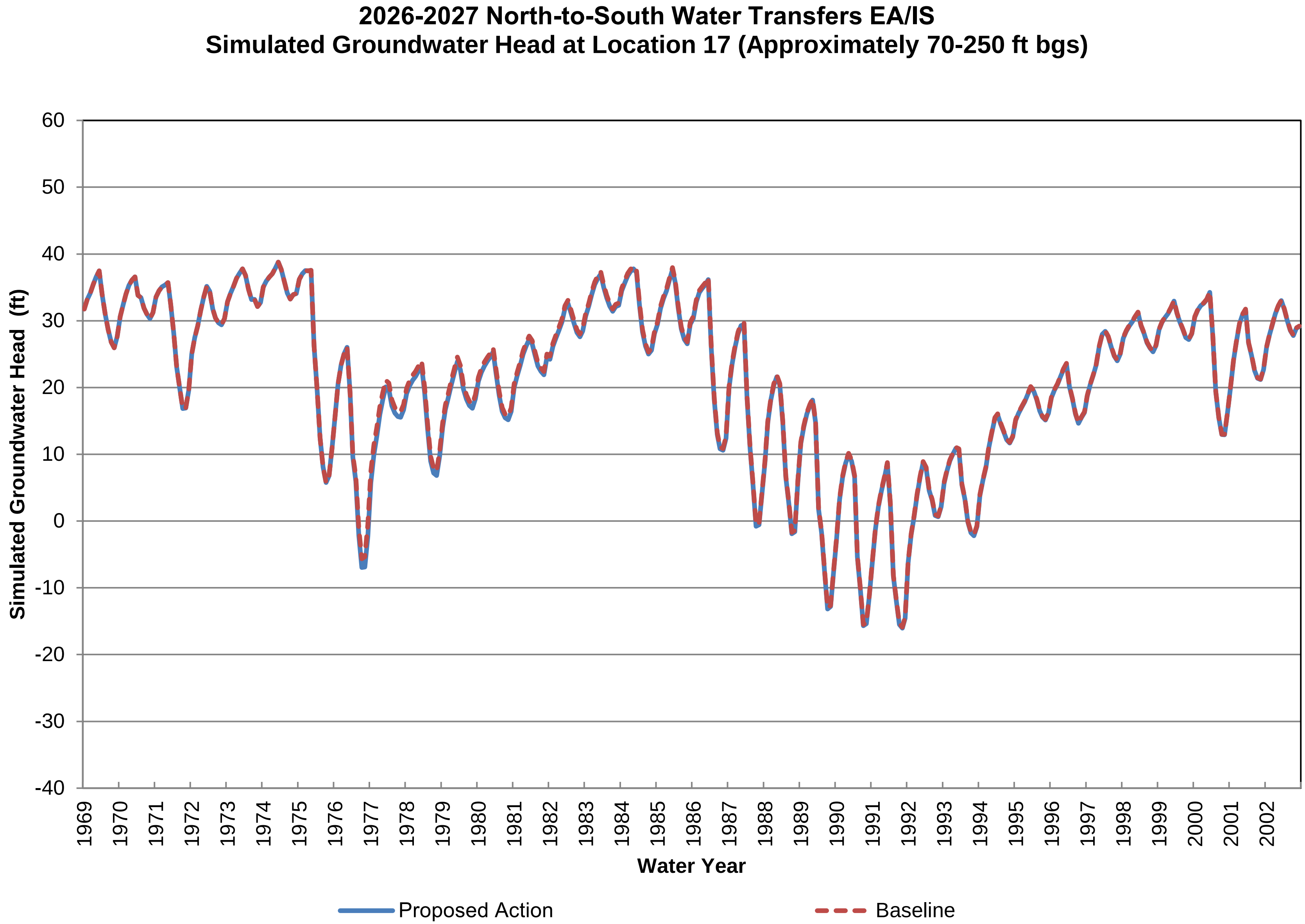
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 17 (Approximately 0-70 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 17 (Approximately 70-250 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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1999
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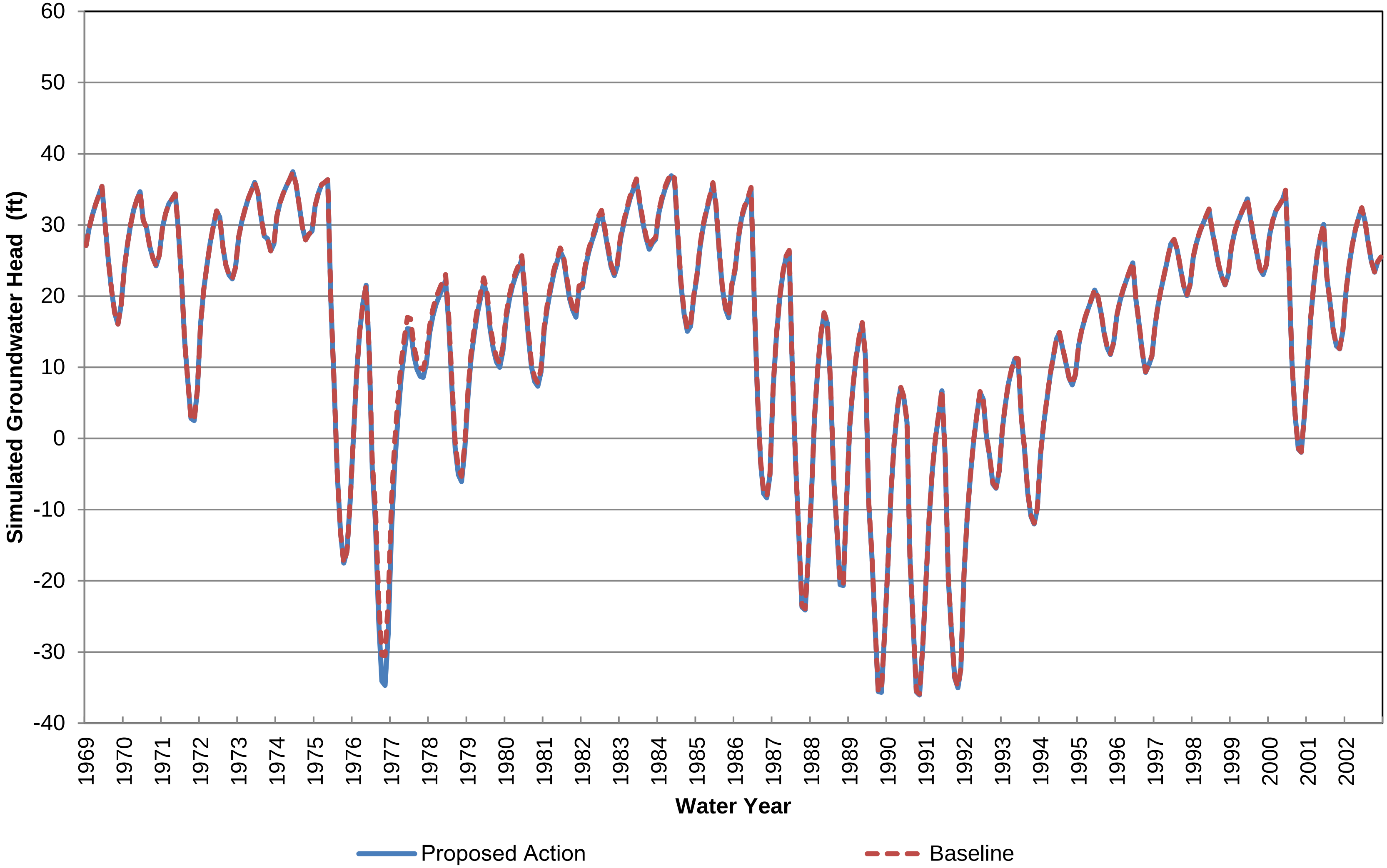
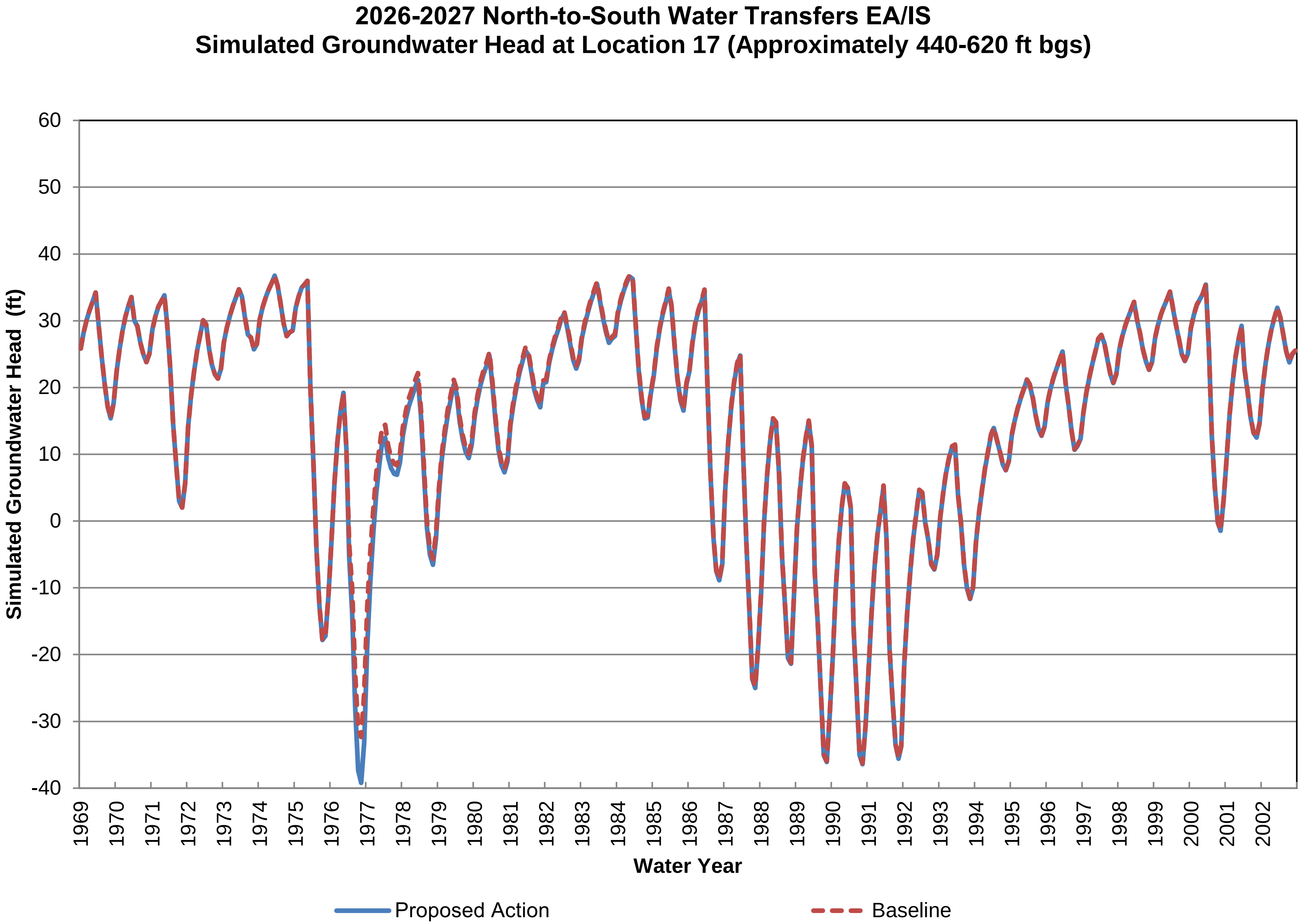
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 17 (Approximately 250-440 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 17 (Approximately 440-620 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
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1998
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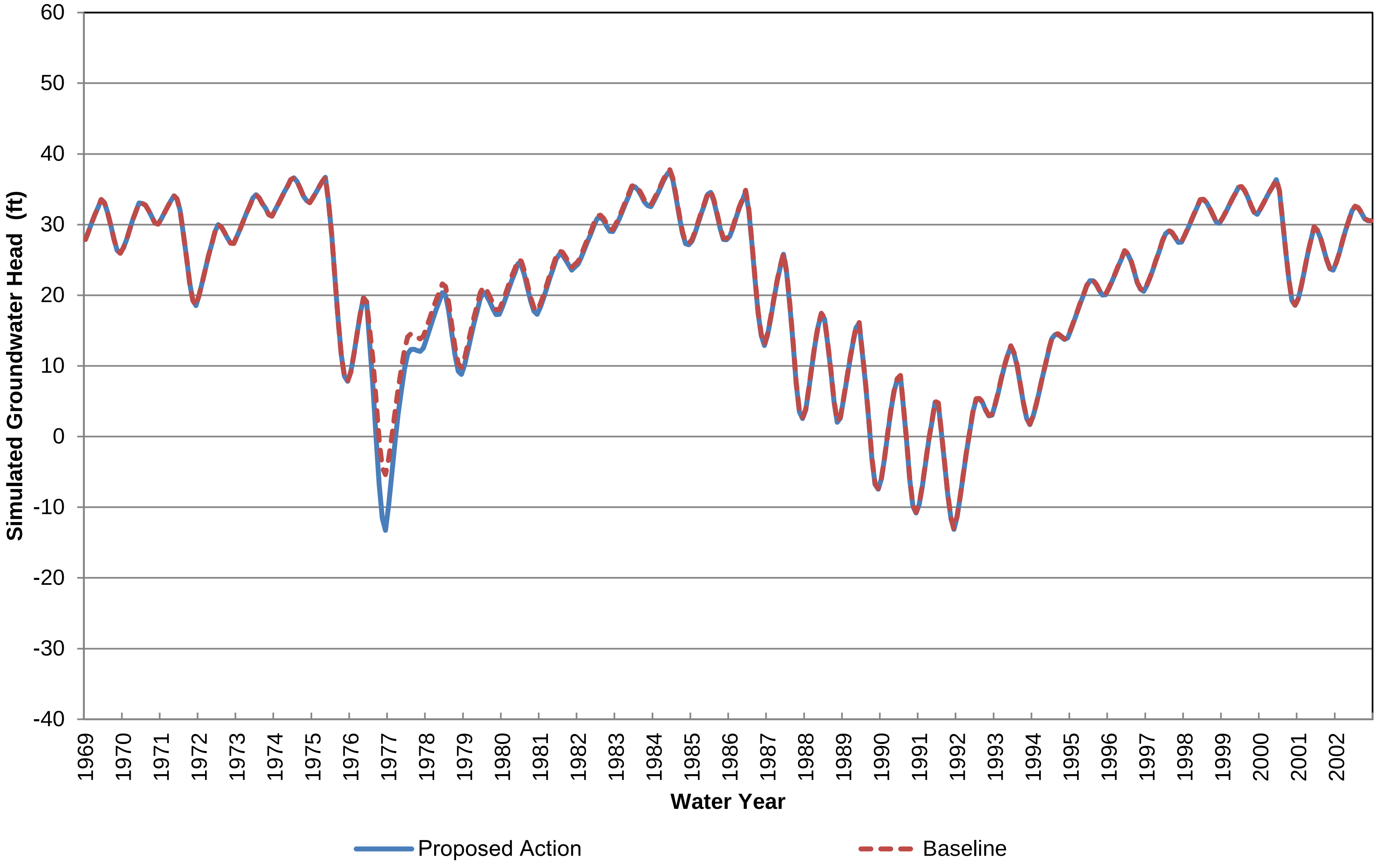
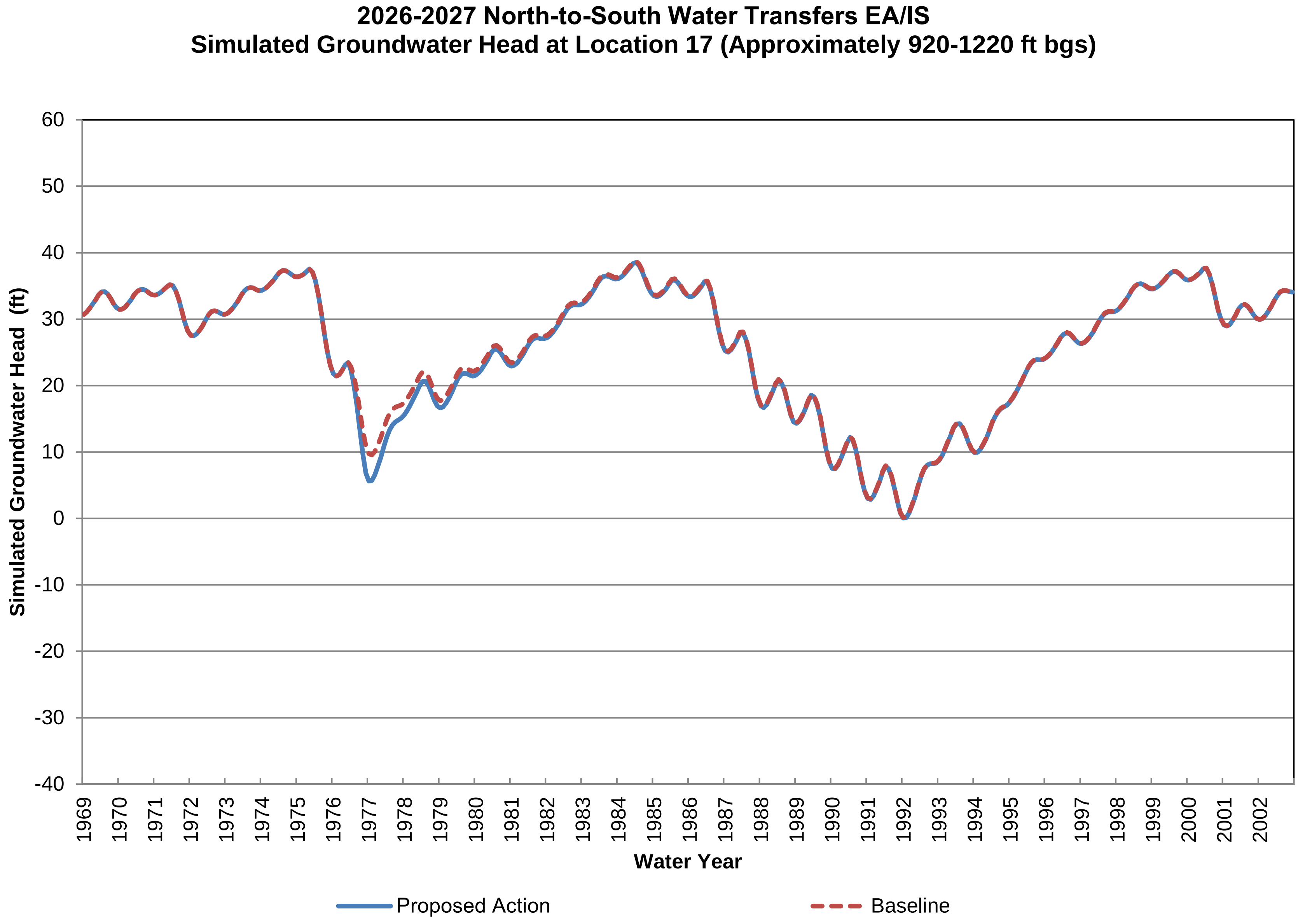
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 17 (Approximately 620-920 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 17 (Approximately 920-1220 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
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1988
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1990
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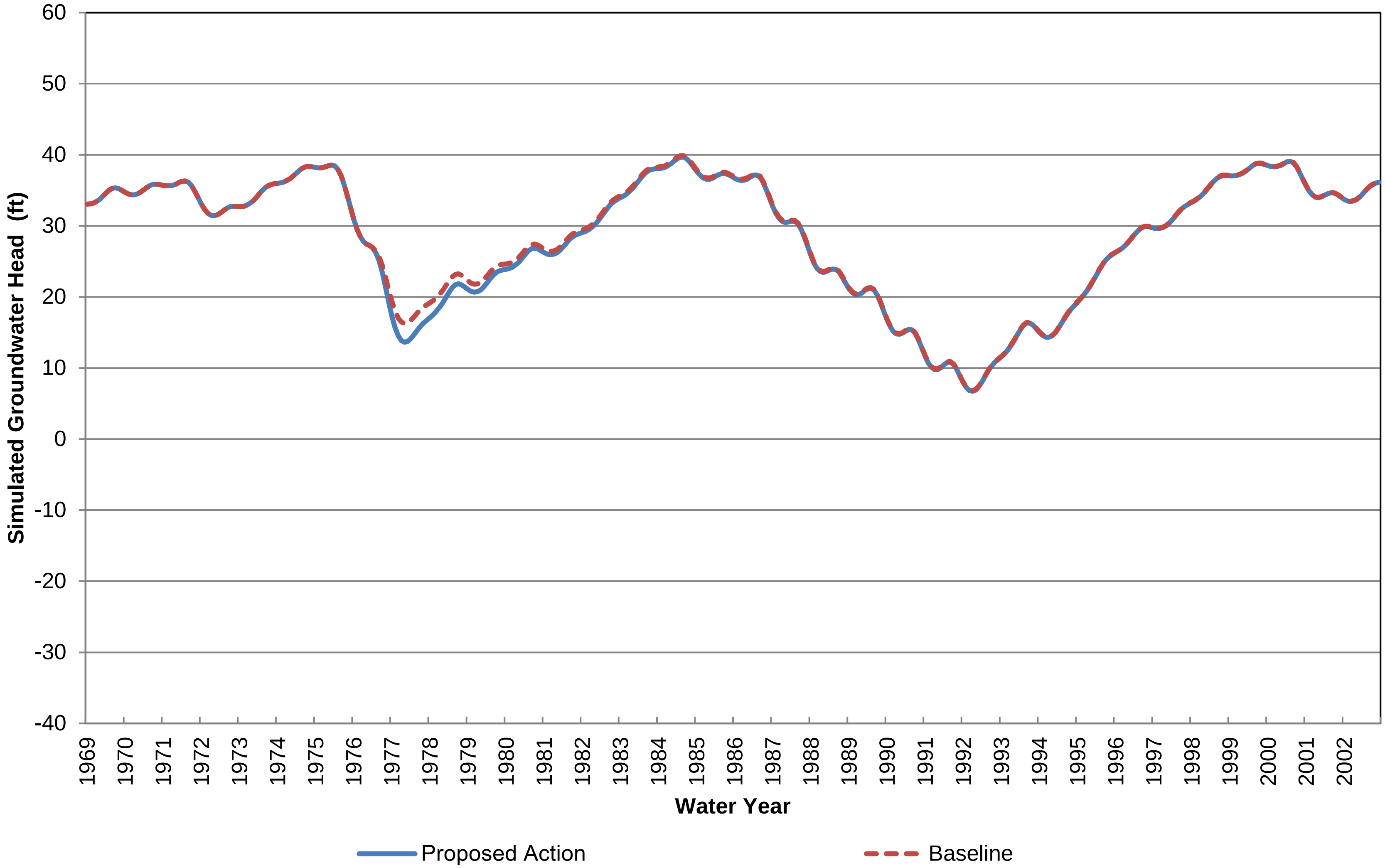
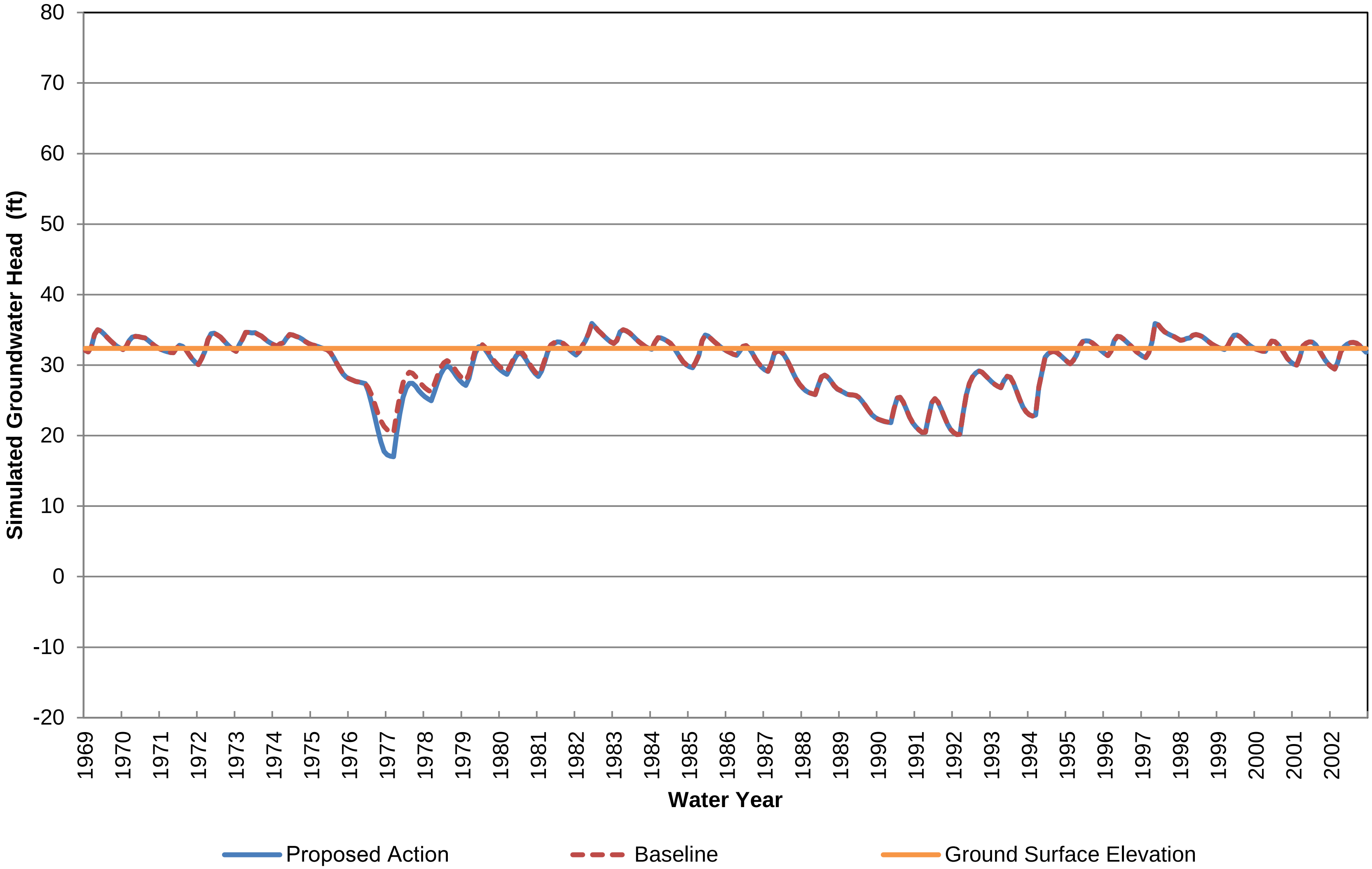
2002
Water Year
Proposed Action
Baseline

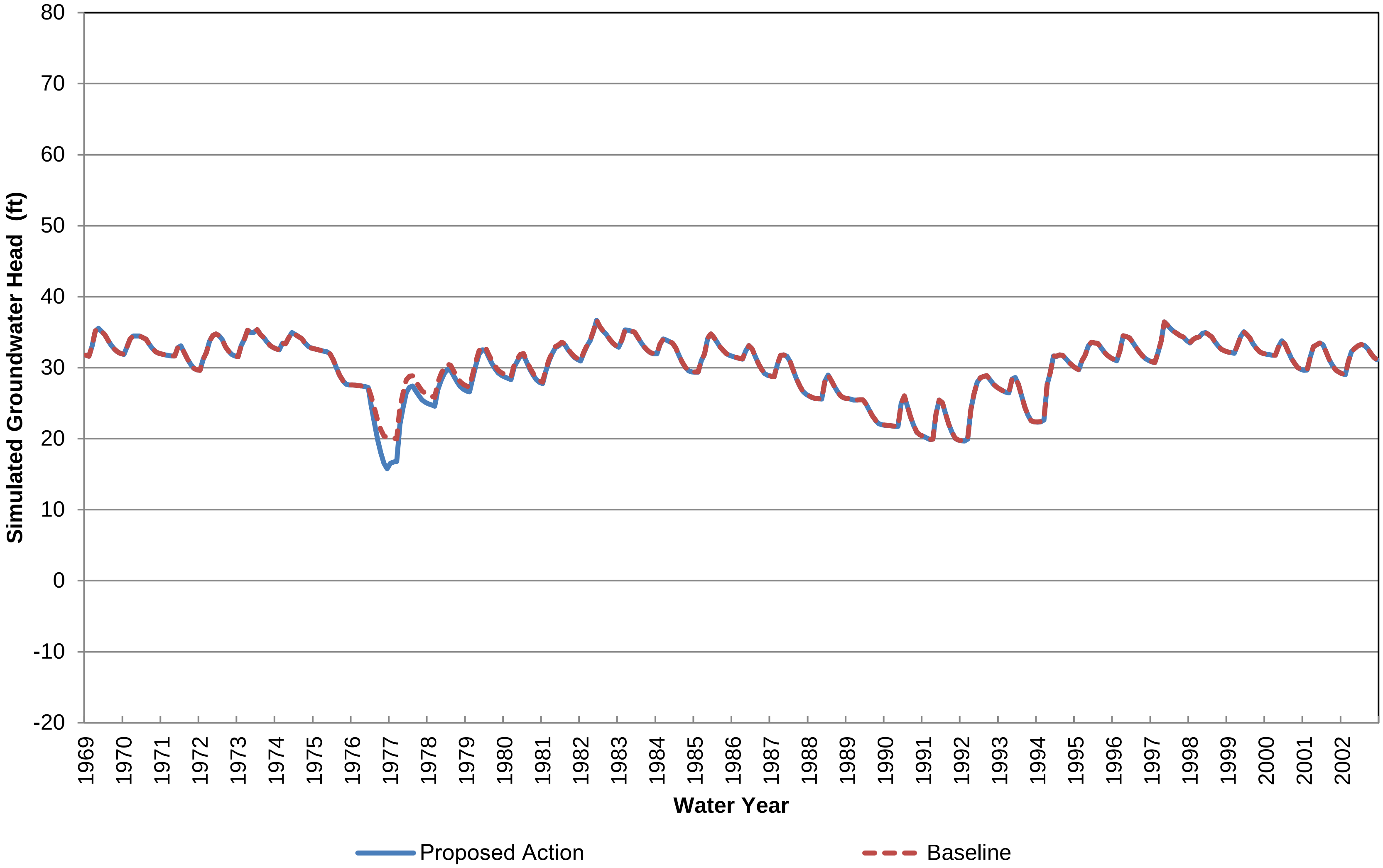
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 17 (Approximately 1220-1680 ft bgs)

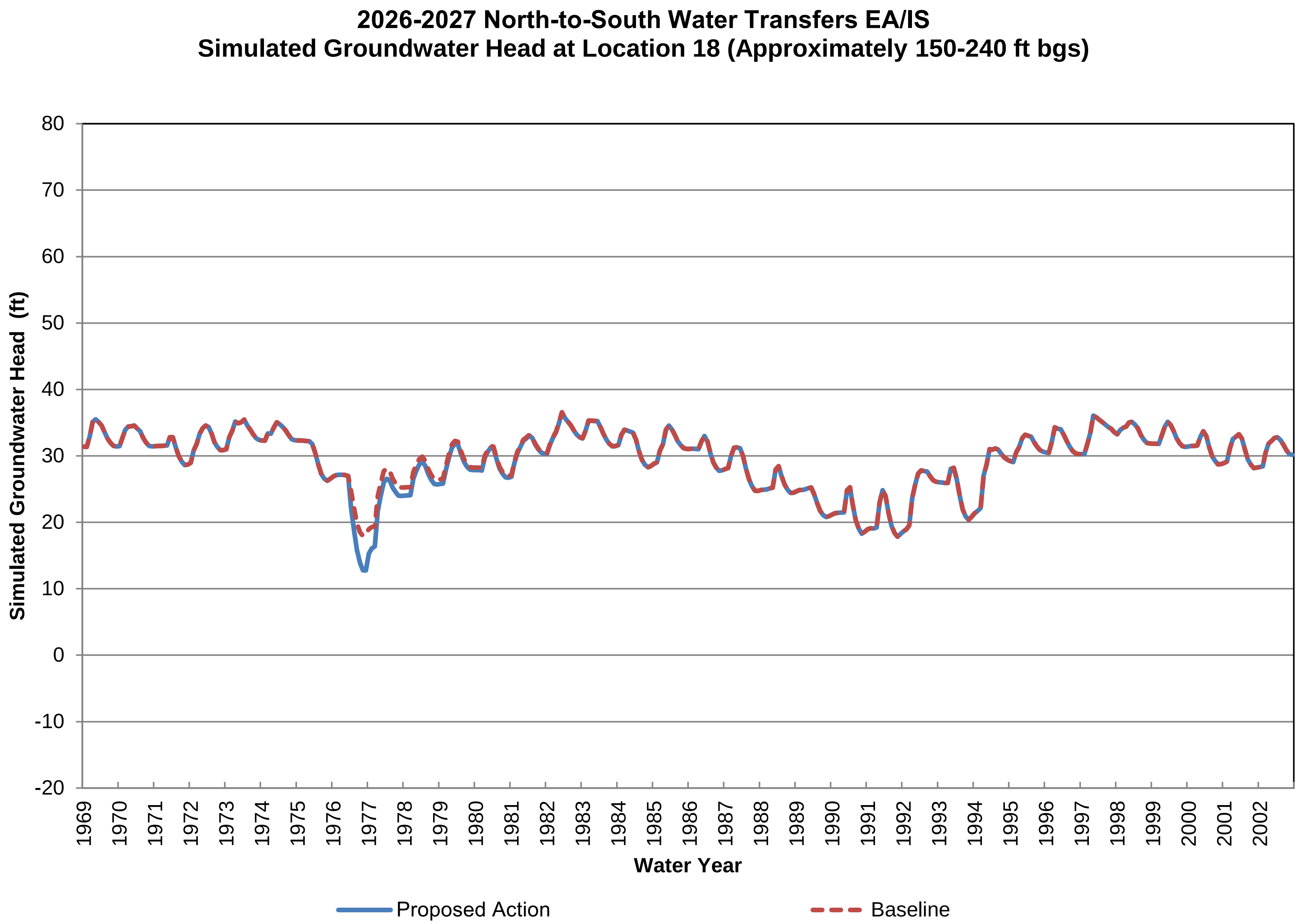


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 18 (Approximately 0-60 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 18 (Approximately 60-150 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 18 (Approximately 150-240 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
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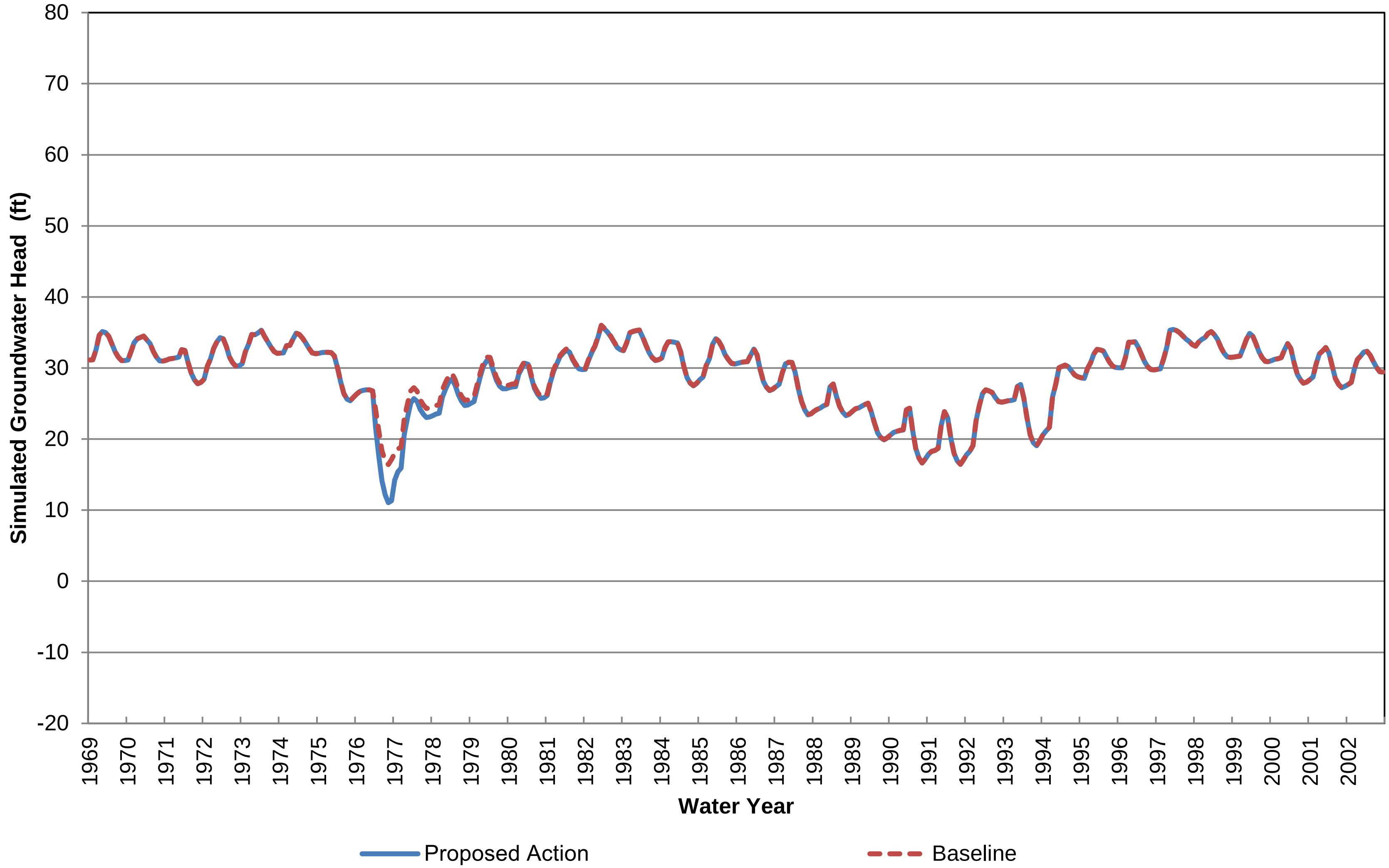
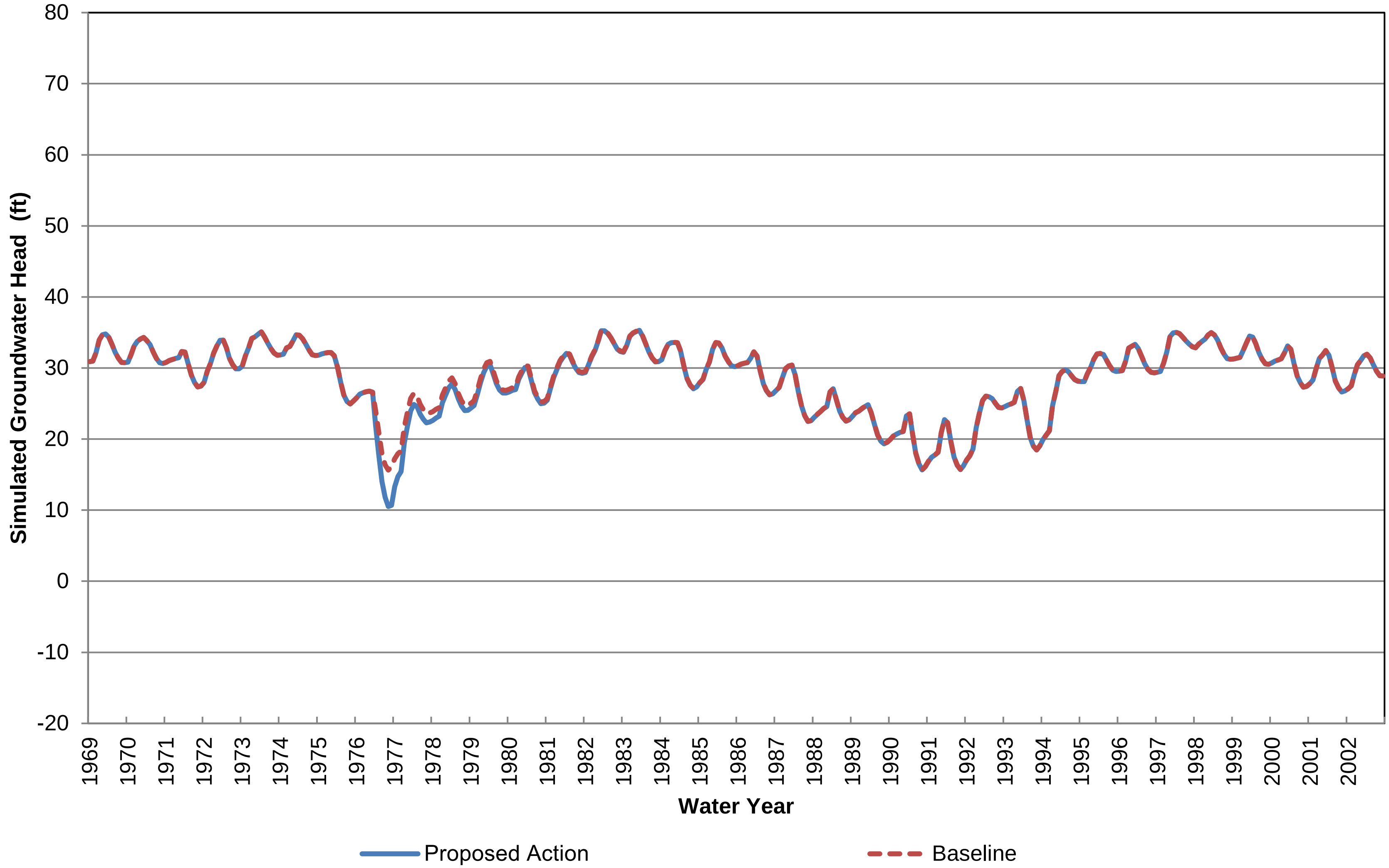
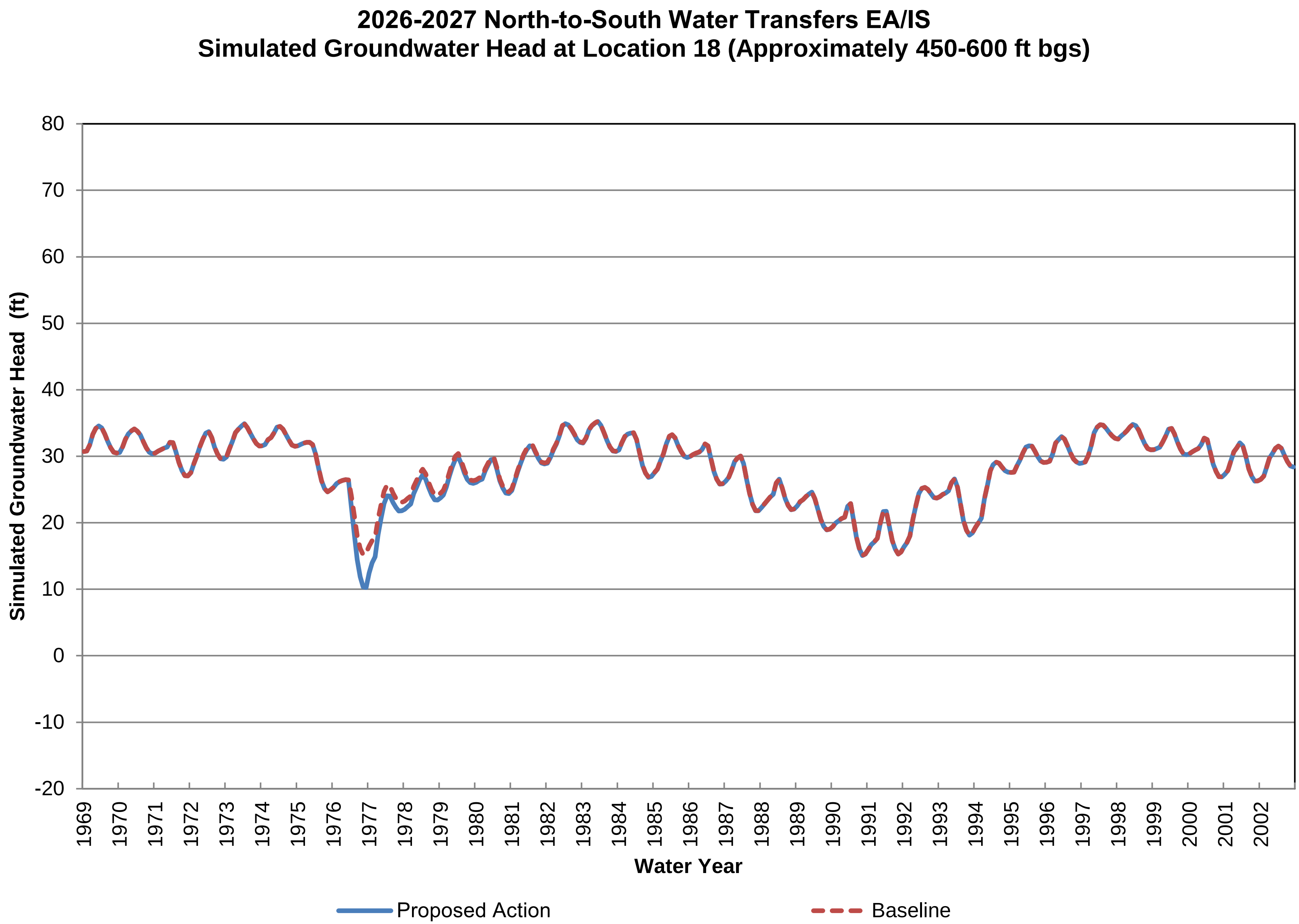
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 18 (Approximately 240-330 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 18 (Approximately 330-450 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 18 (Approximately 450-600 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
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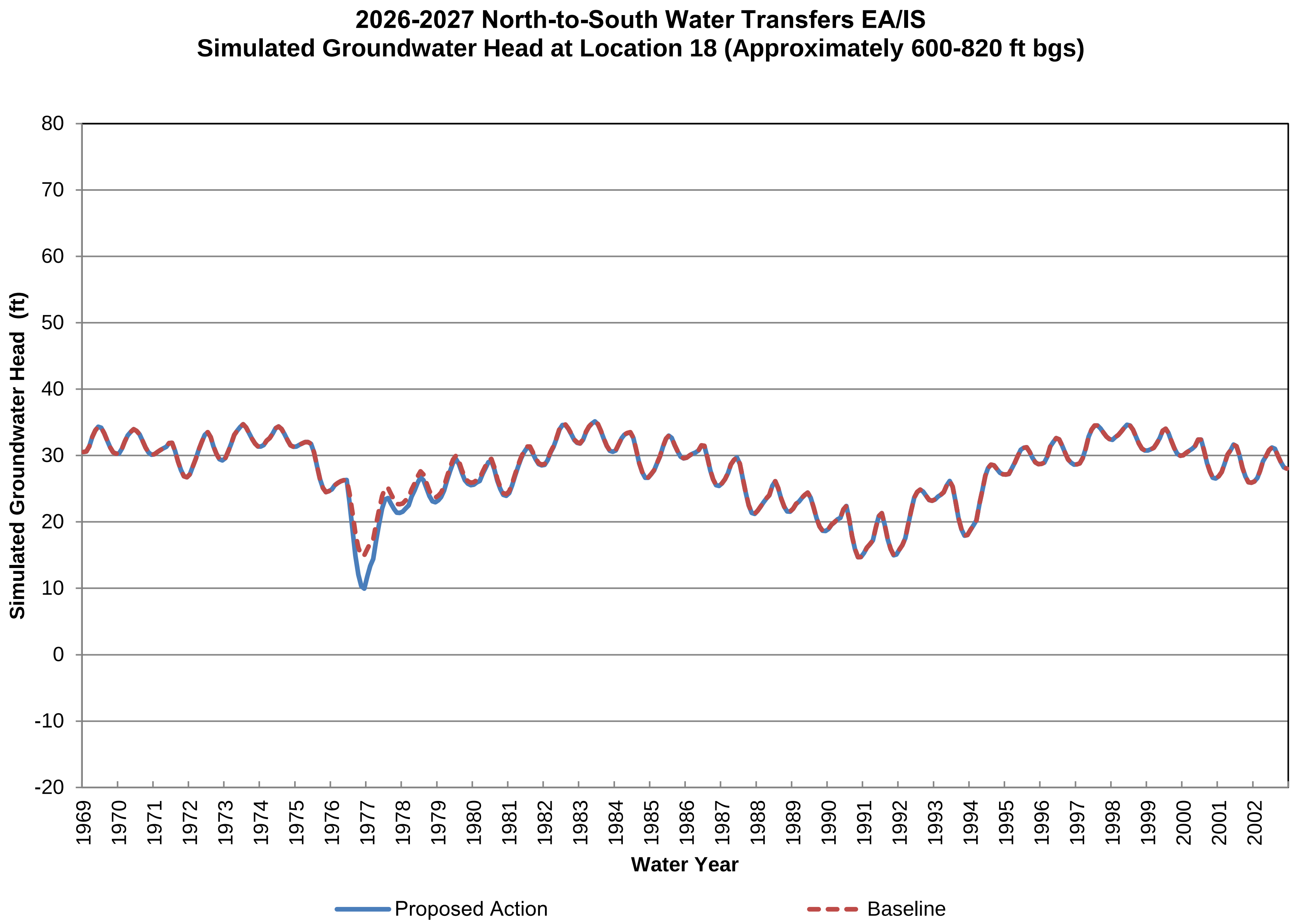
2000
2001
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 18 (Approximately 600-820 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
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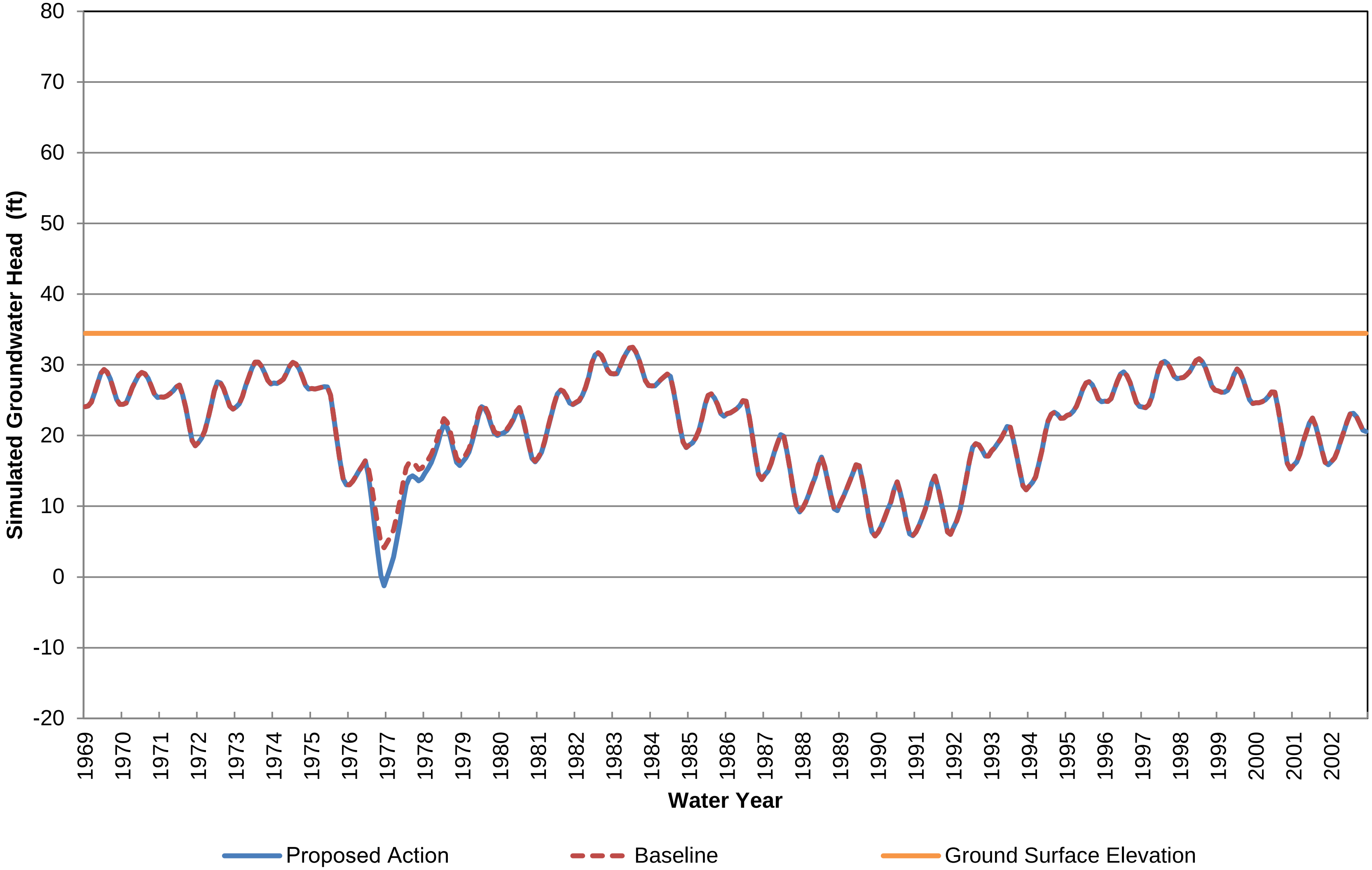
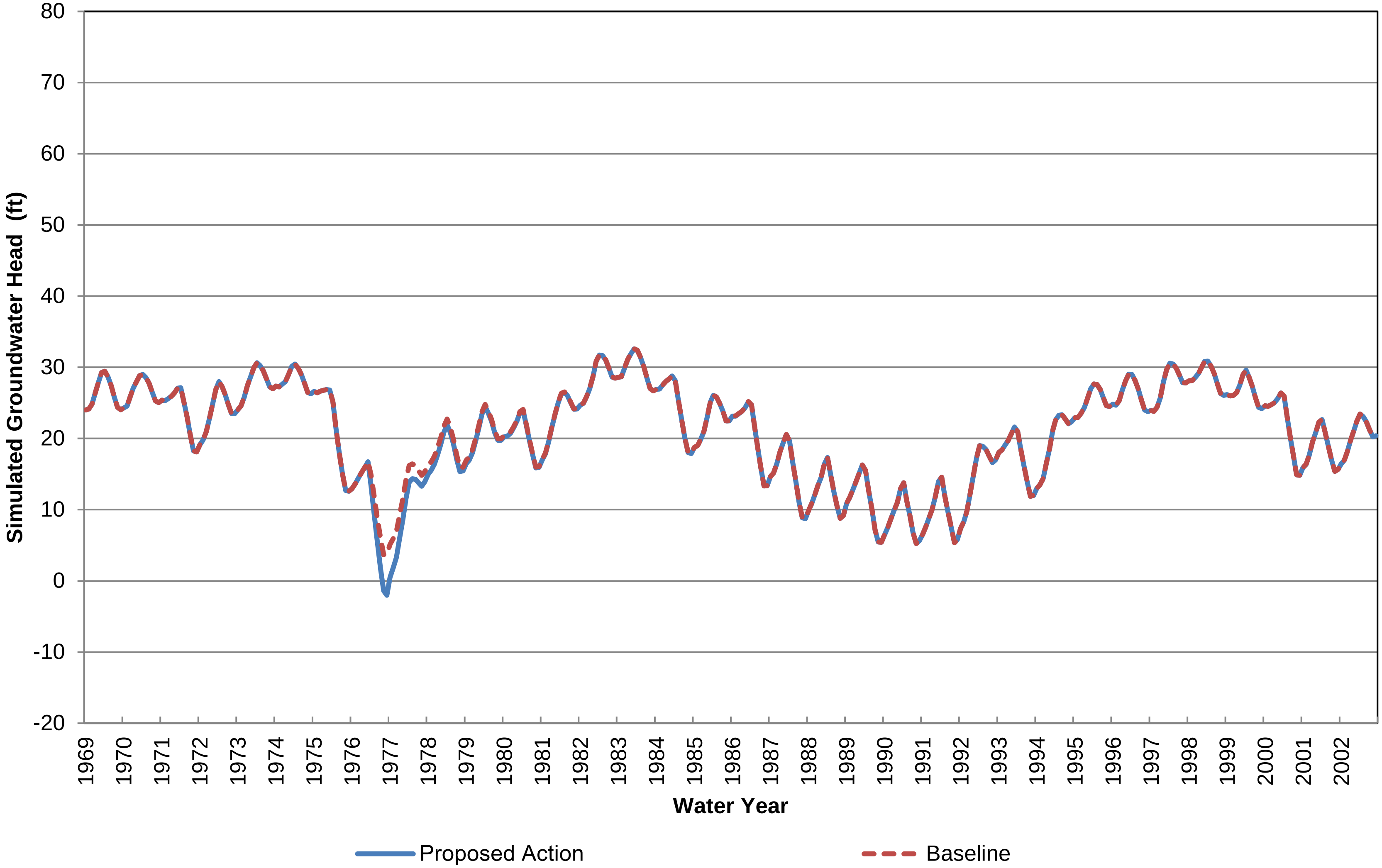
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

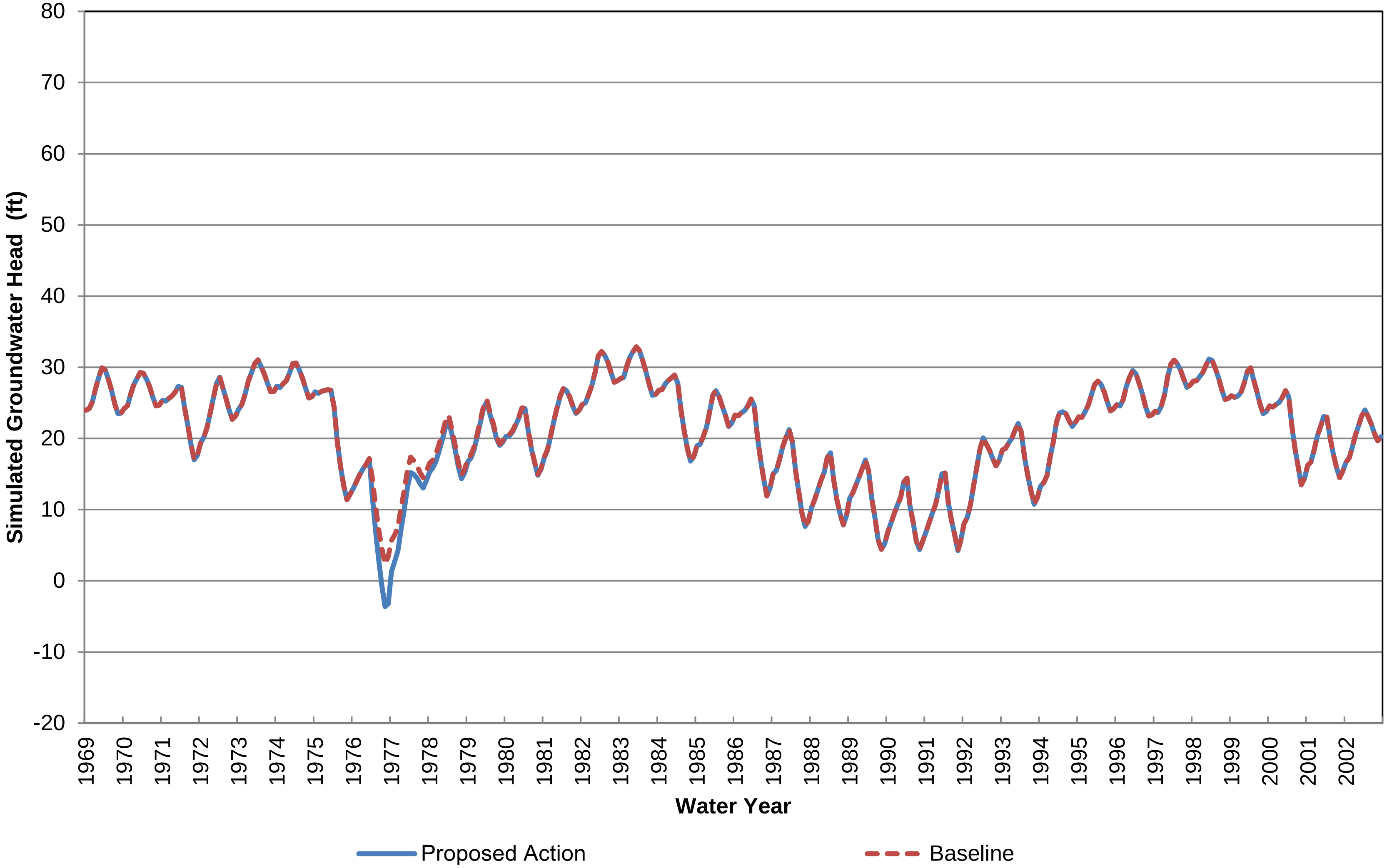
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 19 (Approximately 0-30 ft bgs)



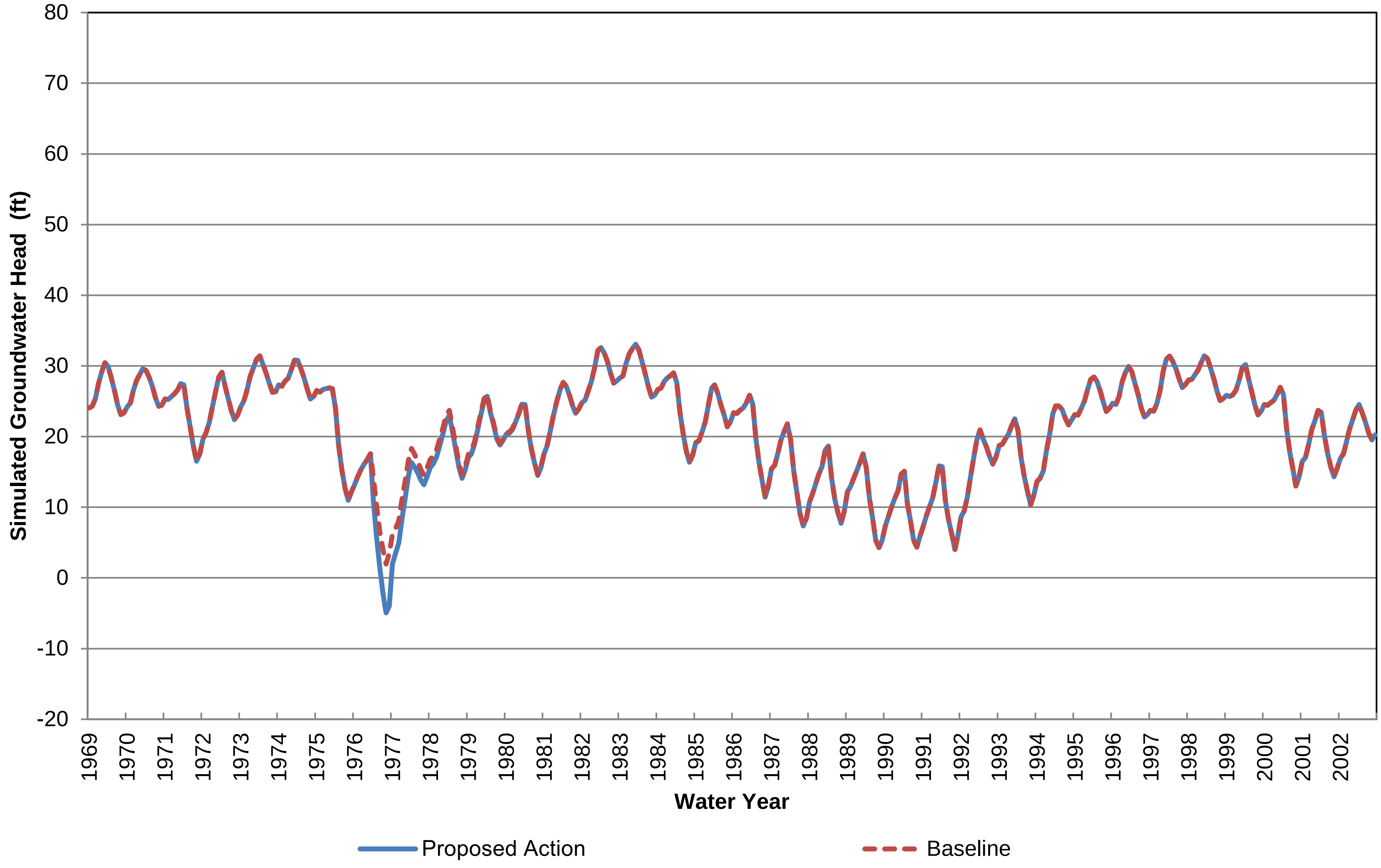
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 19 (Approximately 30-70 ft bgs)



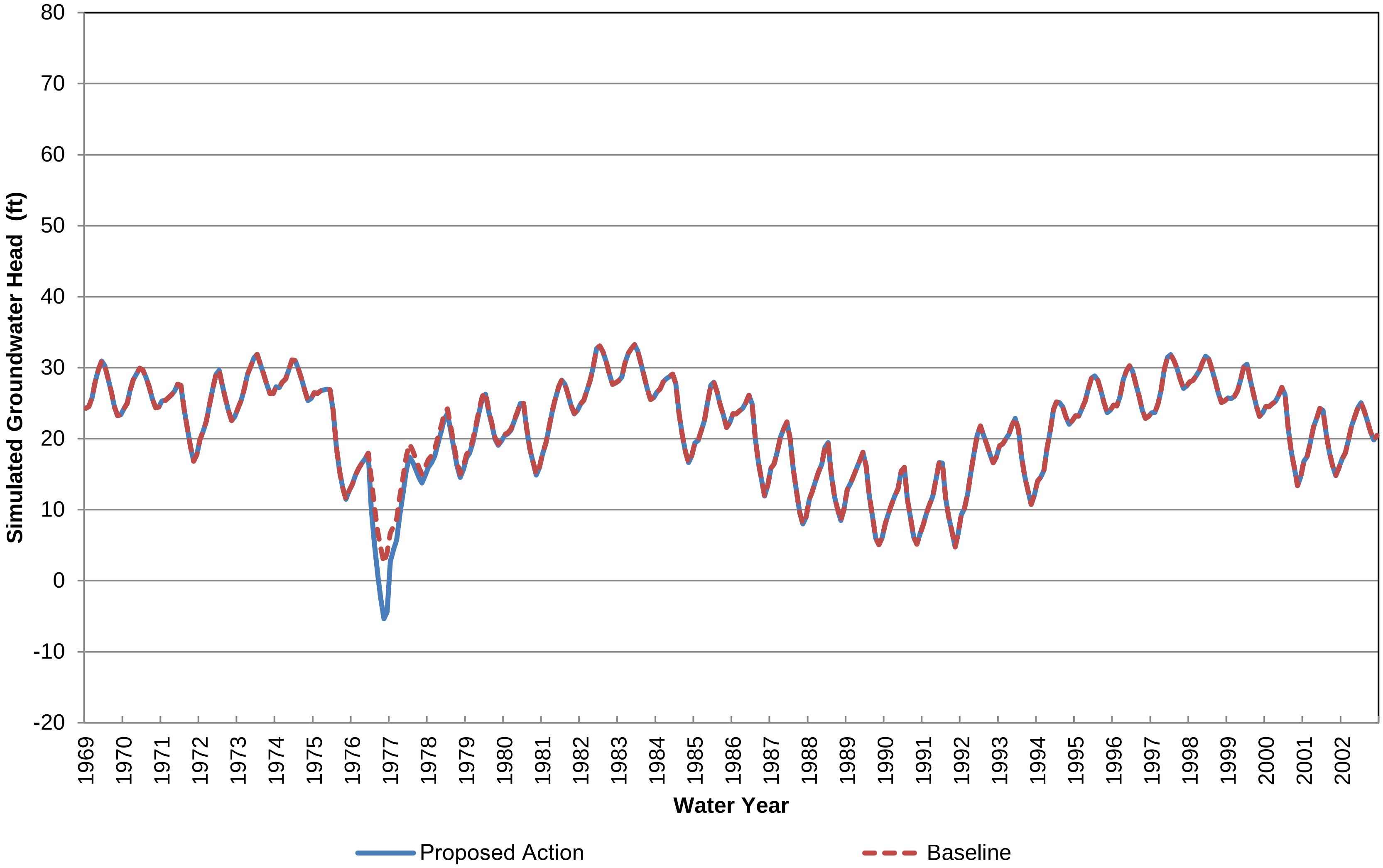
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 19 (Approximately 70-120 ft bgs)

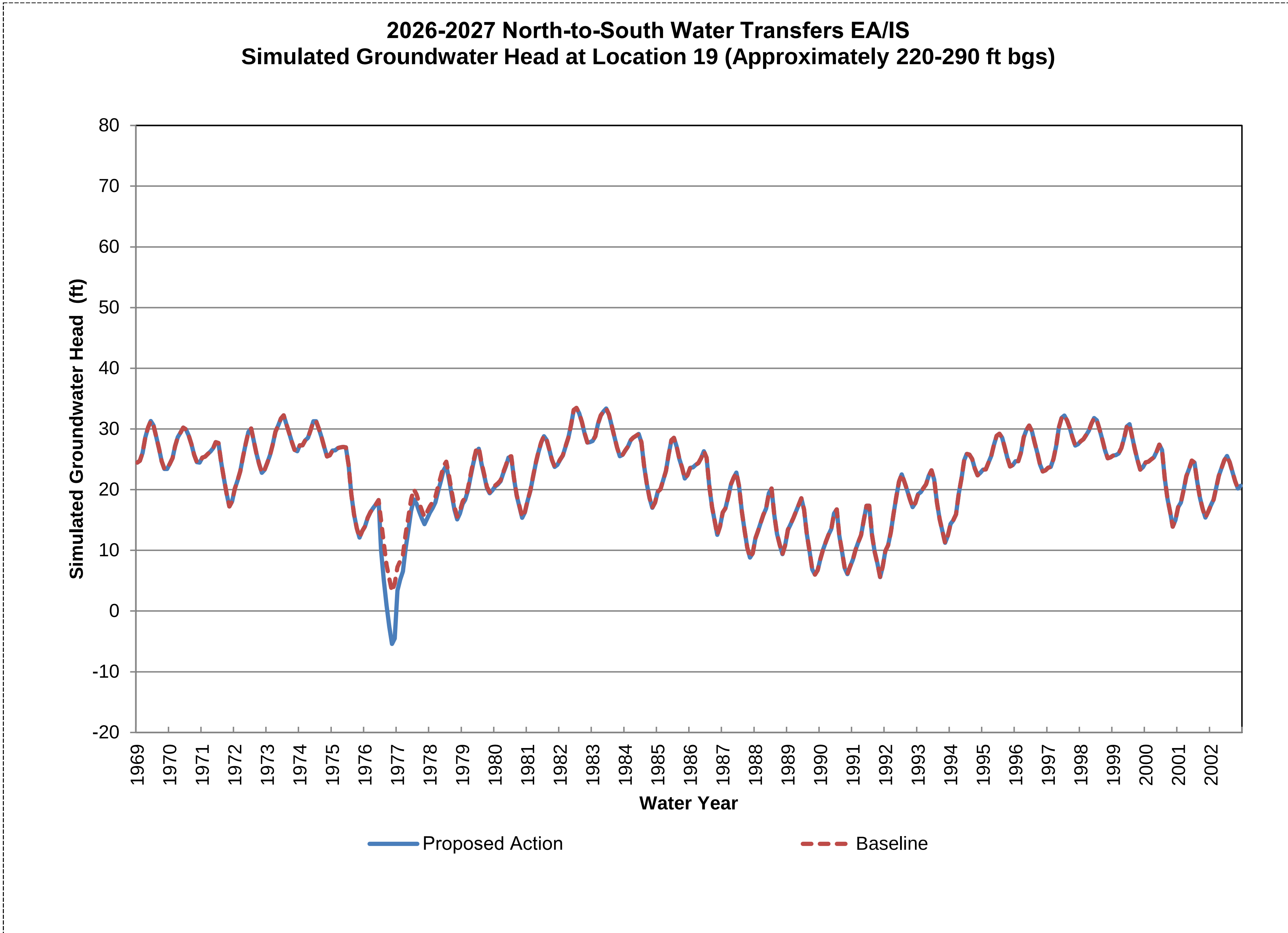


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 19 (Approximately 120-160 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 19 (Approximately 160-220 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 19 (Approximately 220-290 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
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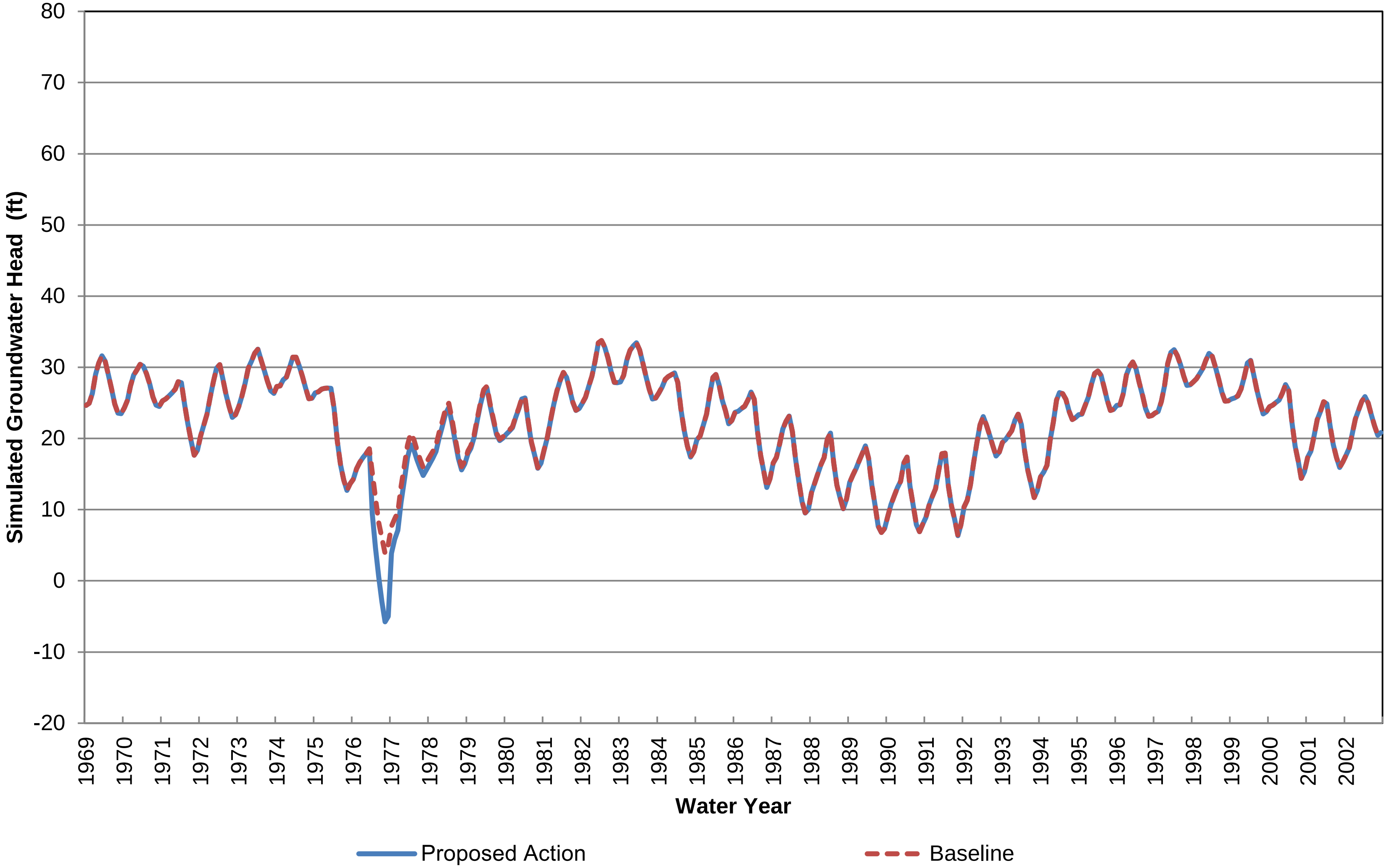
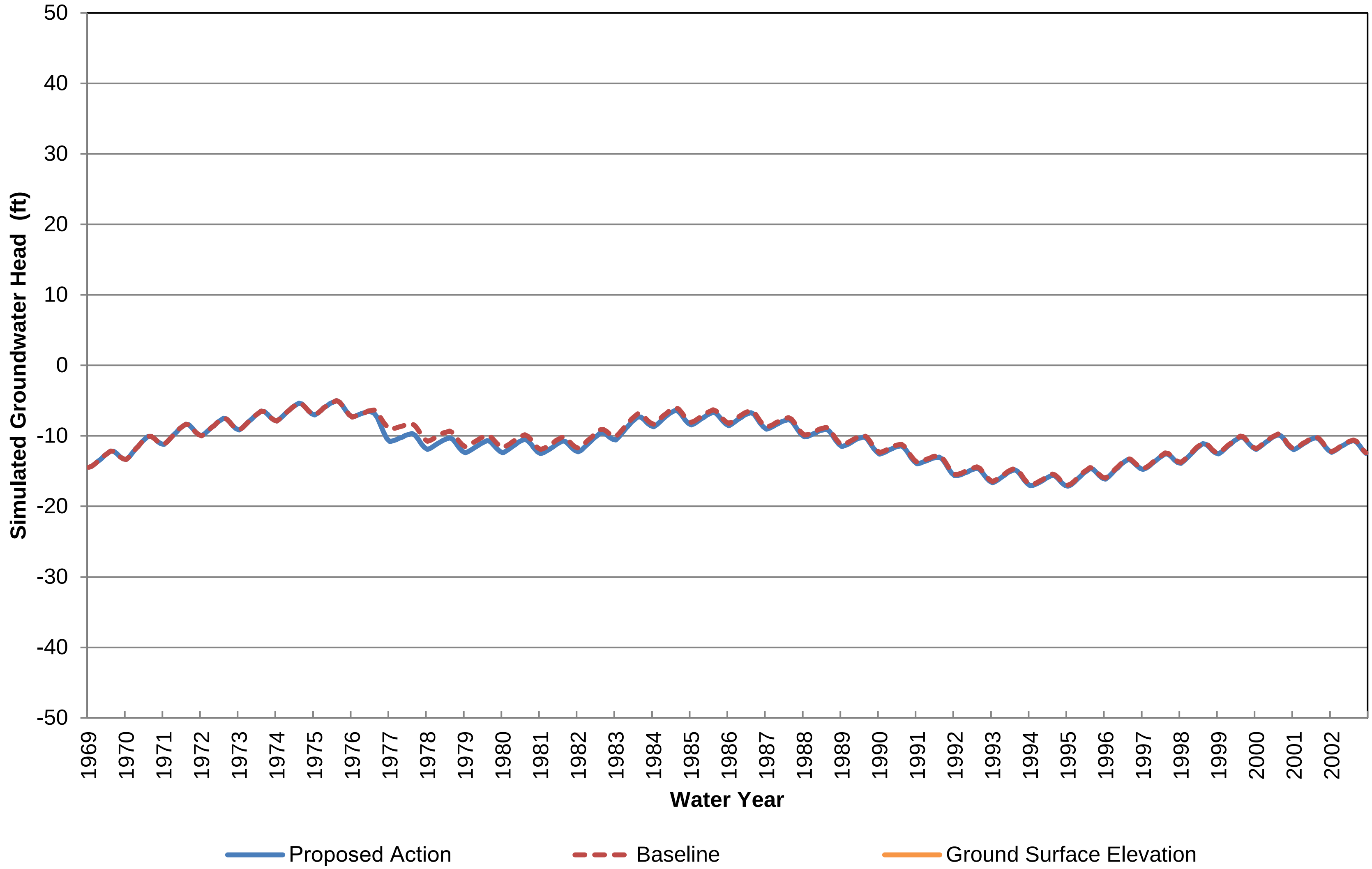
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

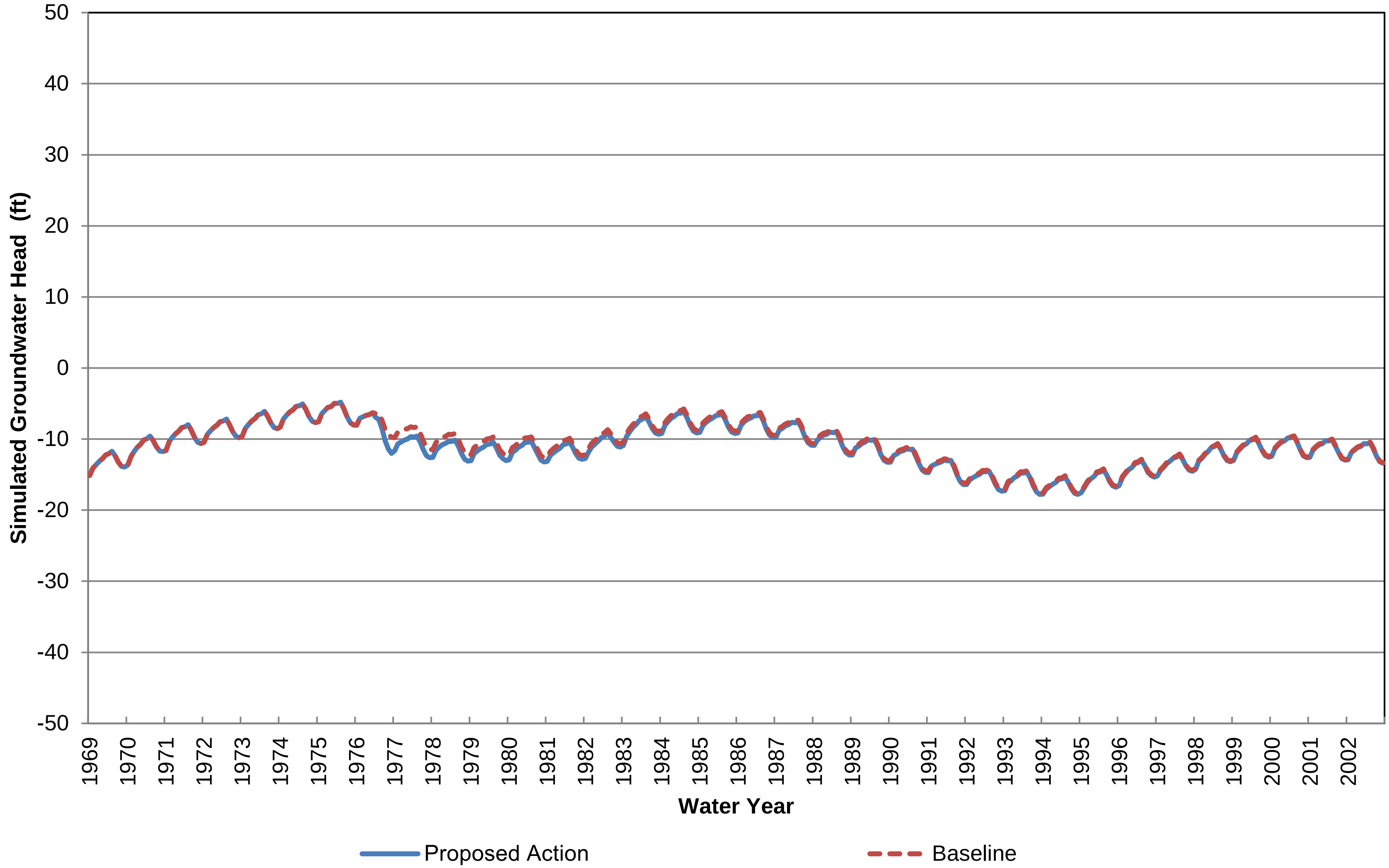
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 19 (Approximately 290-400 ft bgs)



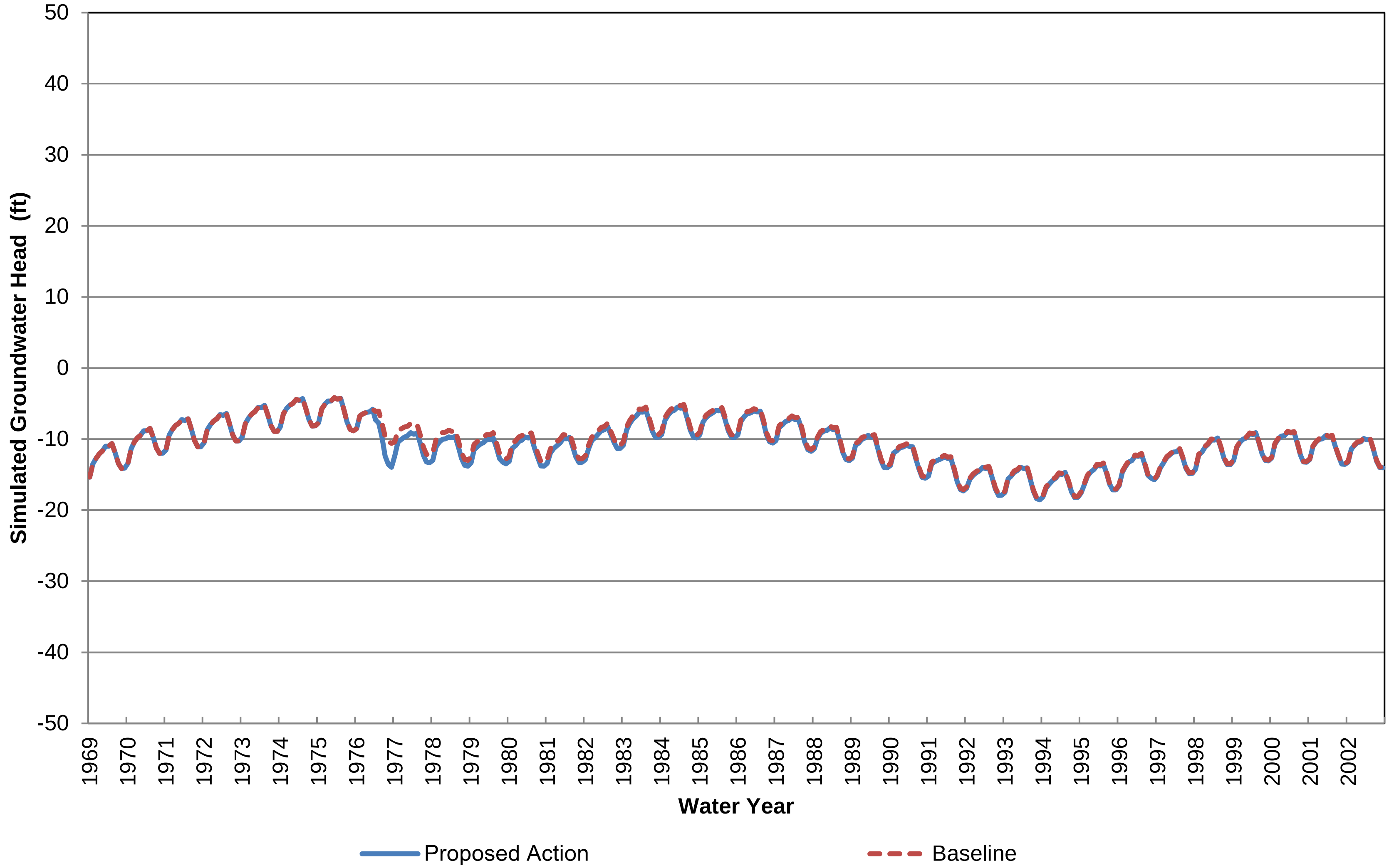
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 20 (Approximately 0-70 ft bgs)



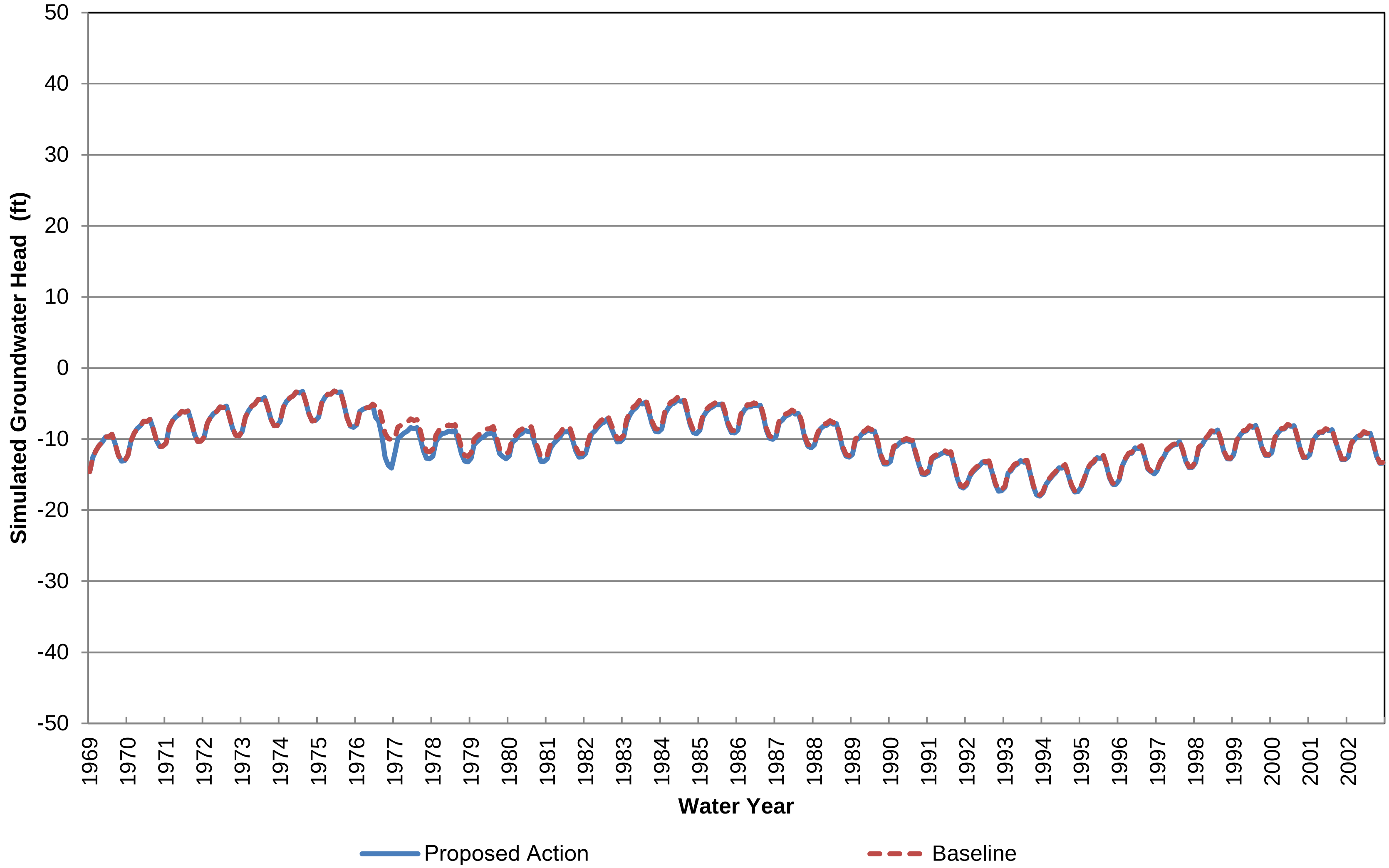
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 20 (Approximately 70-230 ft bgs)



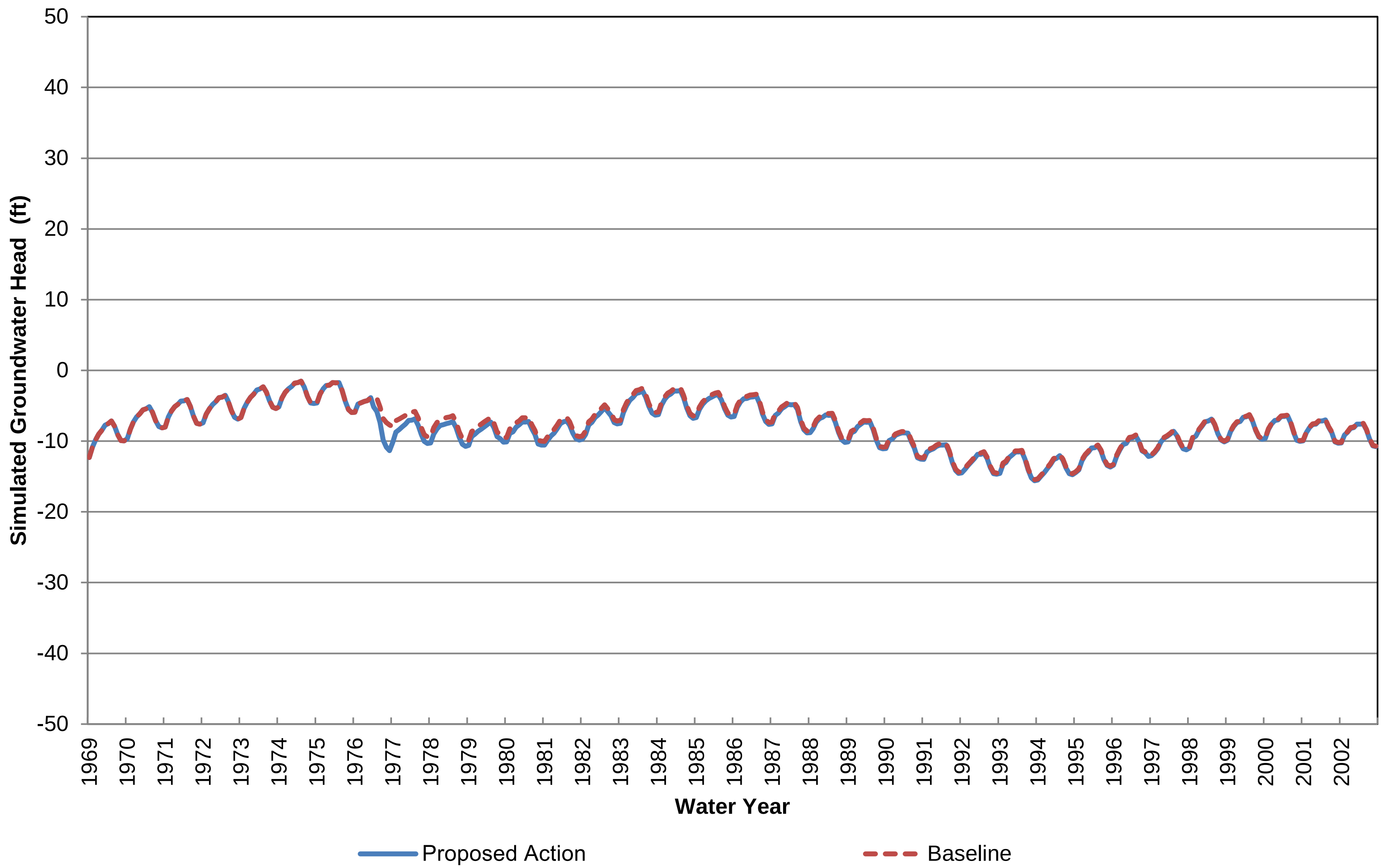
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 20 (Approximately 230-380 ft bgs)

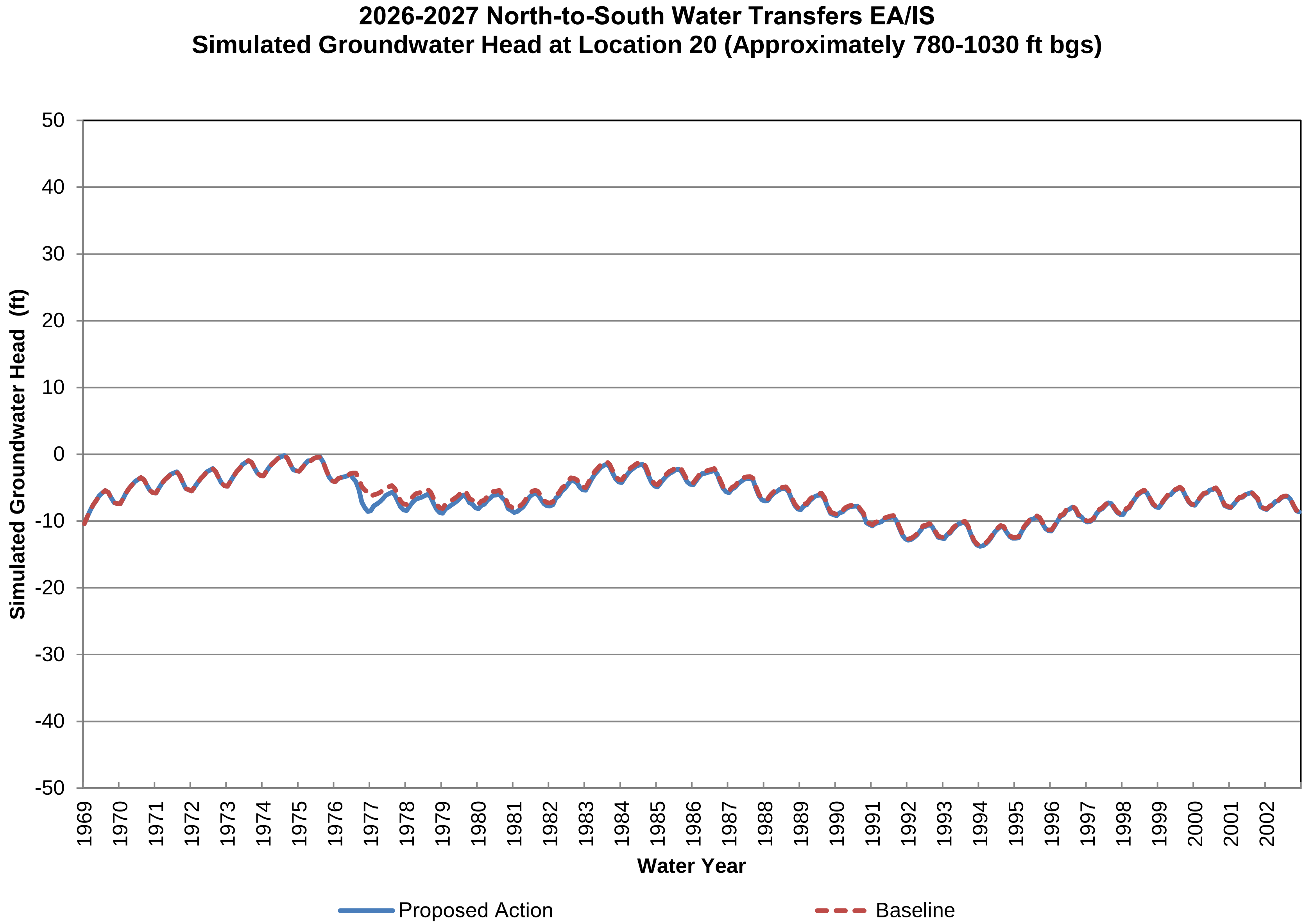


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 20 (Approximately 380-530 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 20 (Approximately 530-780 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 20 (Approximately 780-1030 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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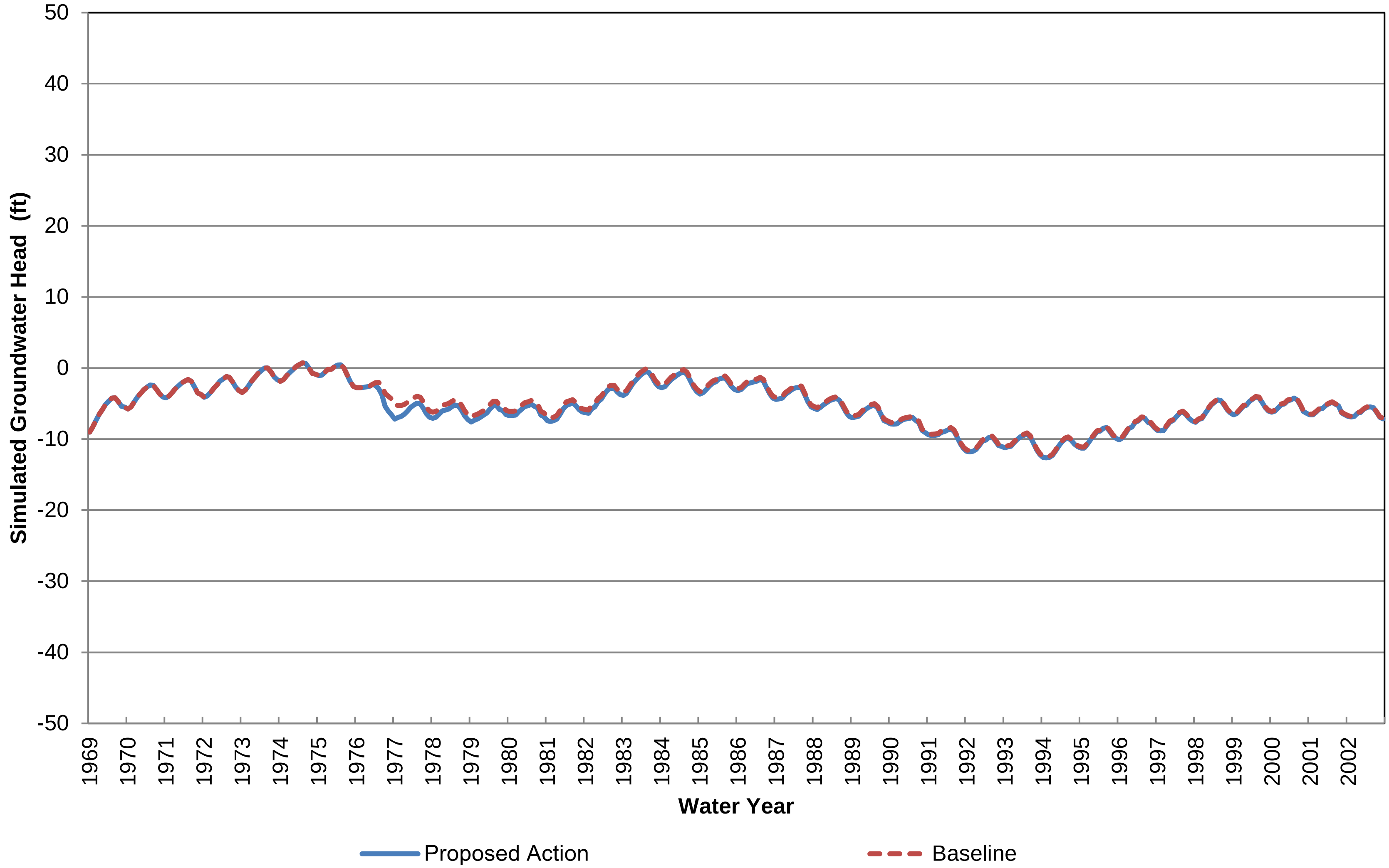
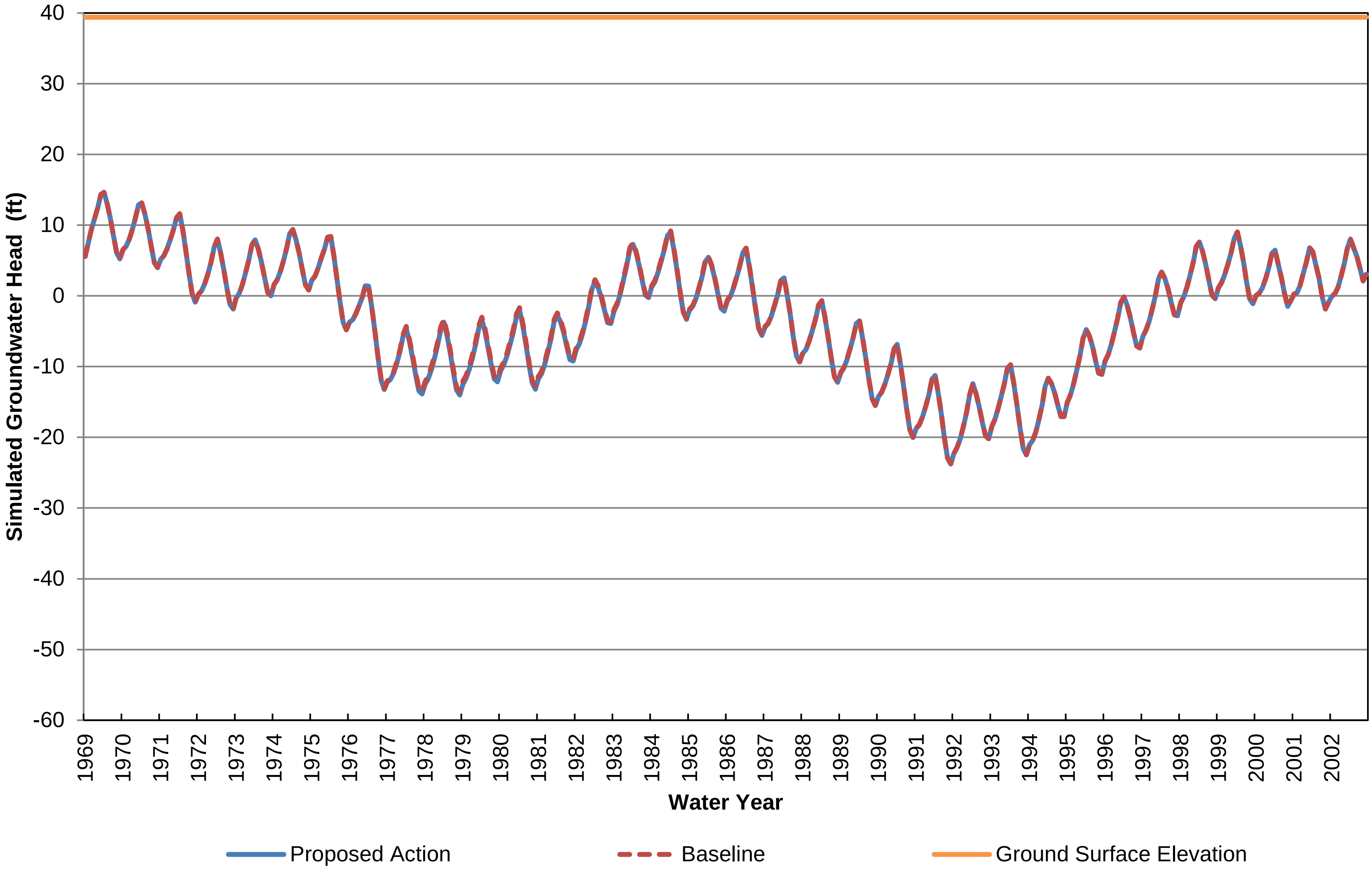
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

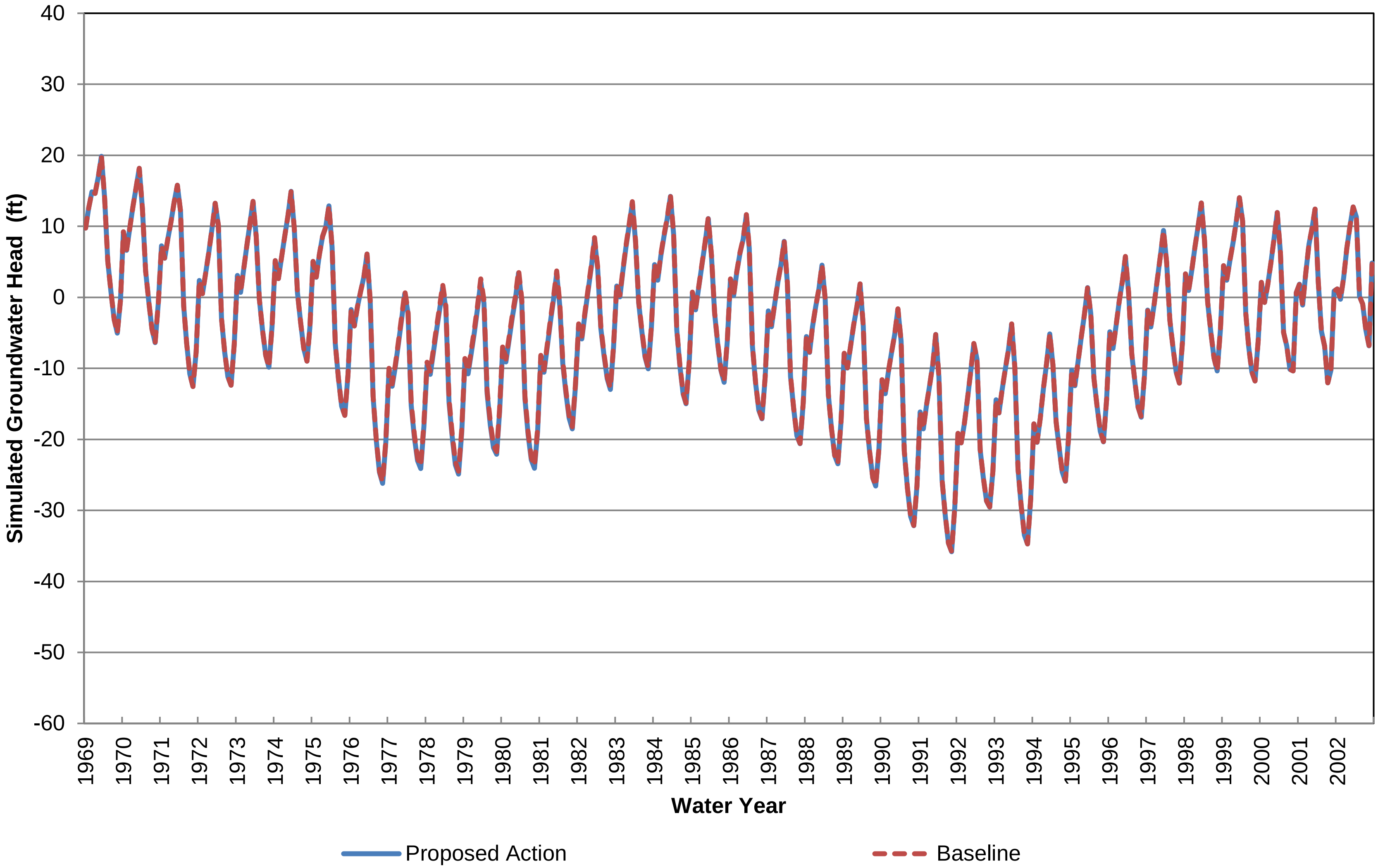
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 20 (Approximately 1030-1420 ft bgs)



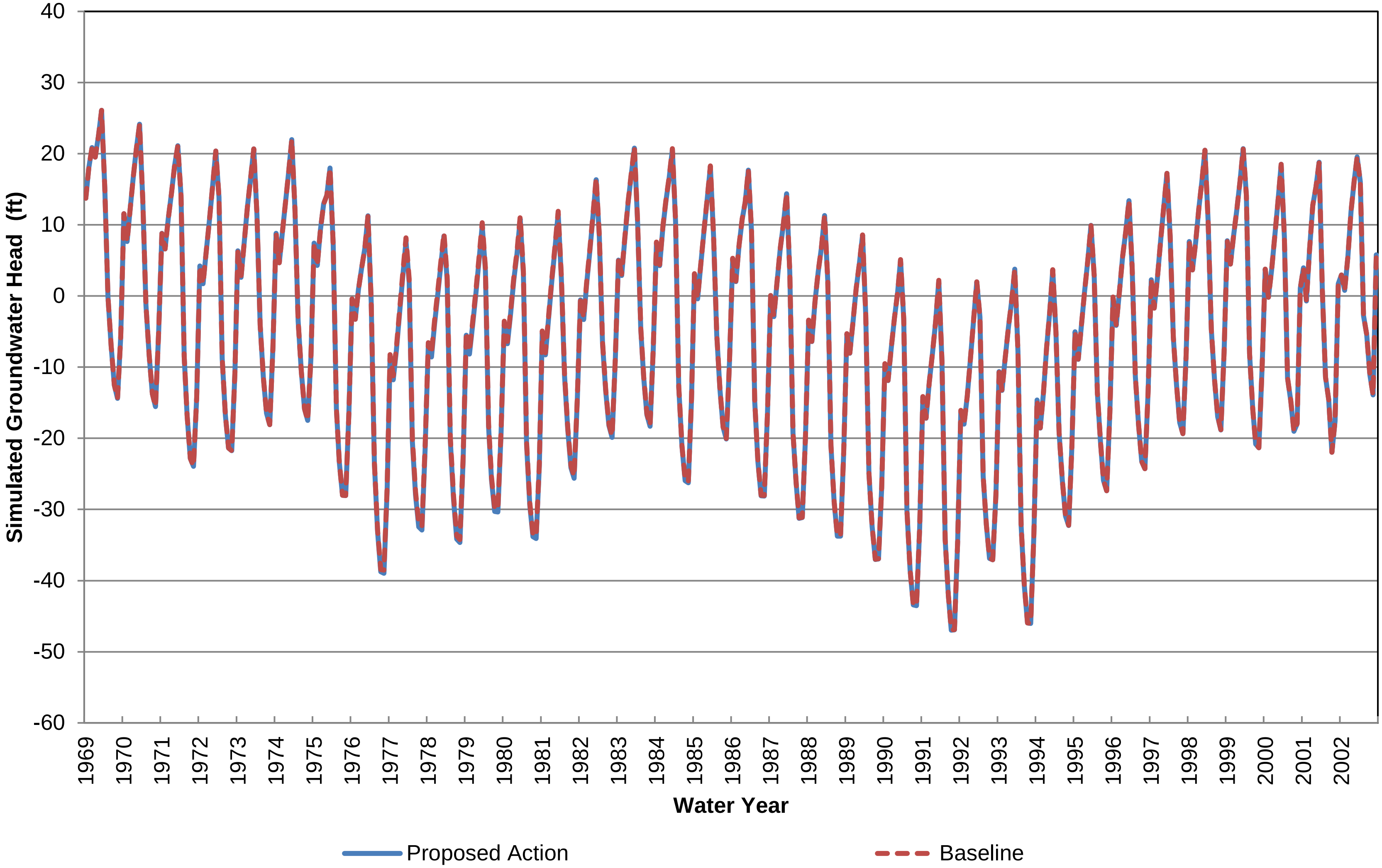
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 21 (Approximately 0-70 ft bgs)



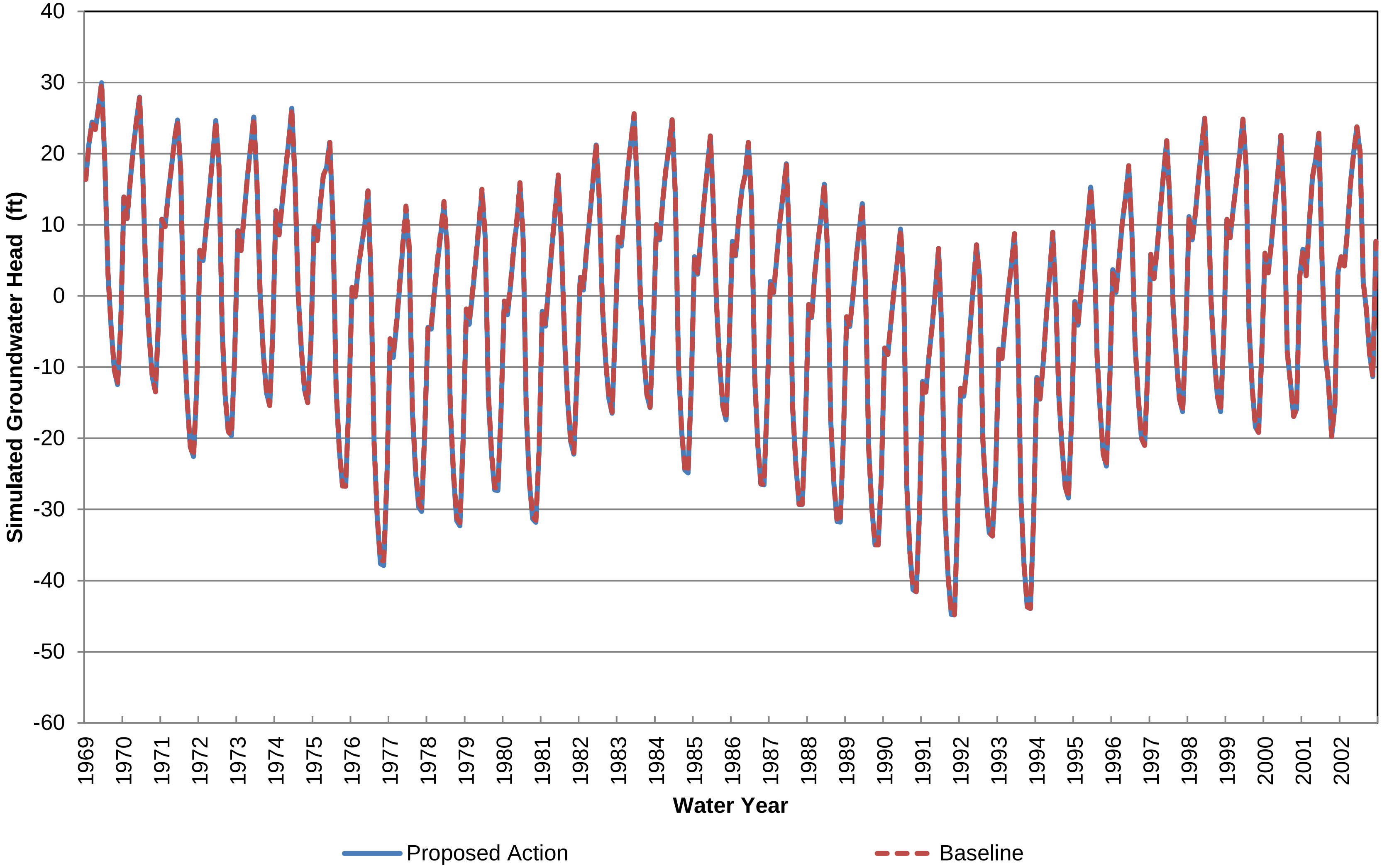
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 21 (Approximately 70-210 ft bgs)

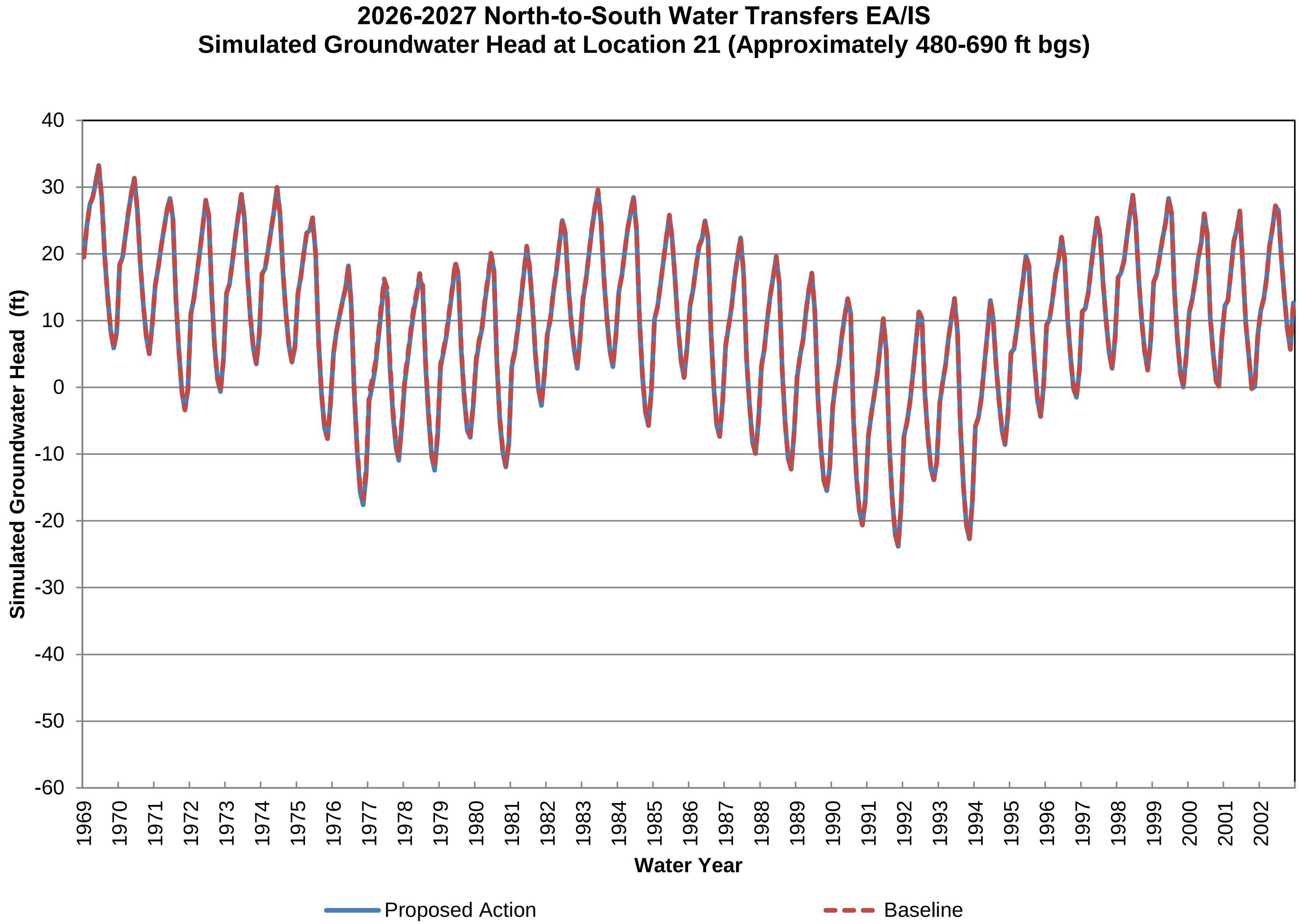


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 21 (Approximately 210-340 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 21 (Approximately 340-480 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 21 (Approximately 480-690 ft bgs)
Simulated Groundwater Head (ft)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
1969
1970
1971
1972
1973
1974
1975
1976
1977
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1983
1984
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1989
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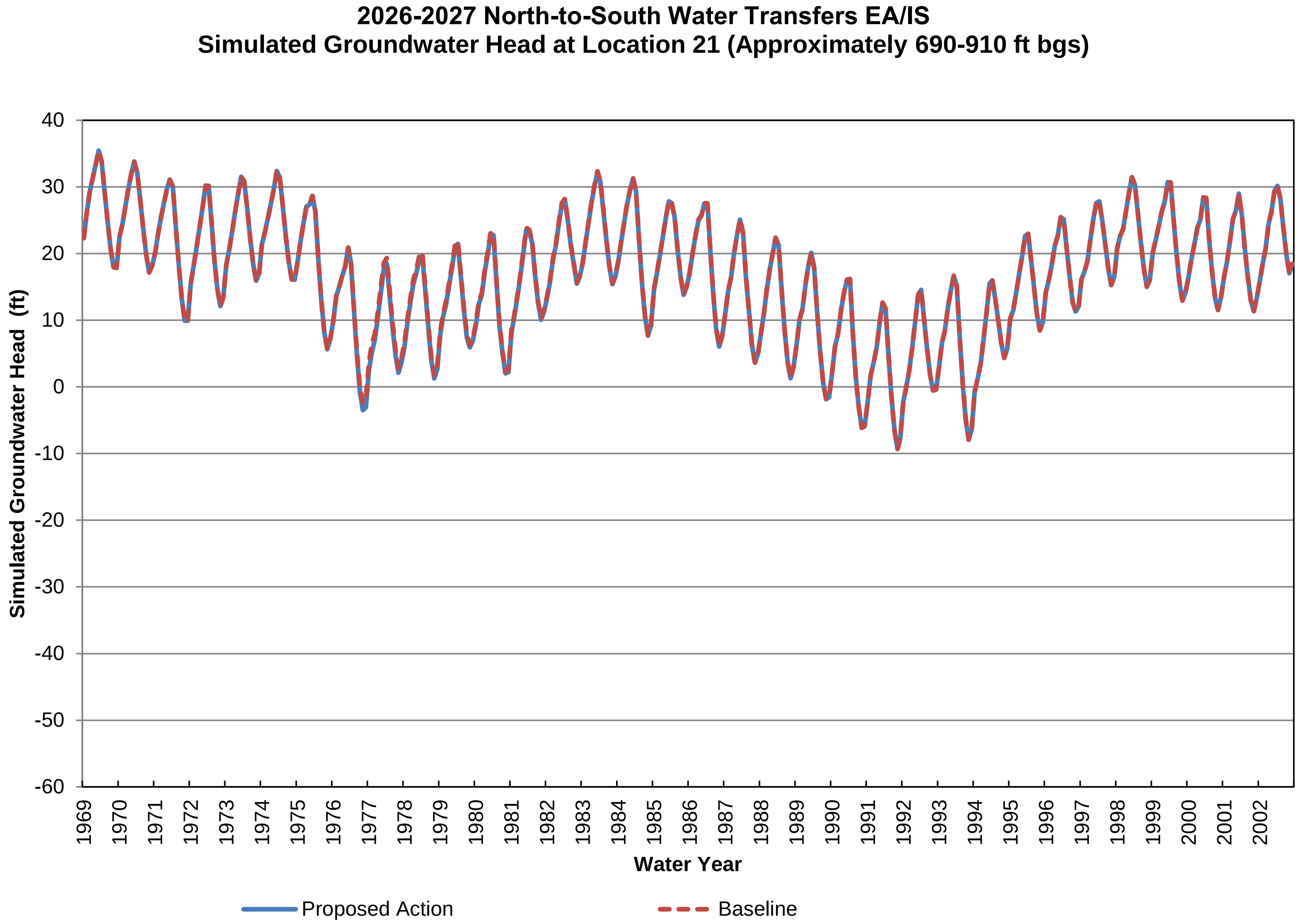
1999
2000
2001
2002
Water Year
Proposed Action
Baseline


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 21 (Approximately 690-910 ft bgs)
Simulated Groundwater Head (ft)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
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1983
1984
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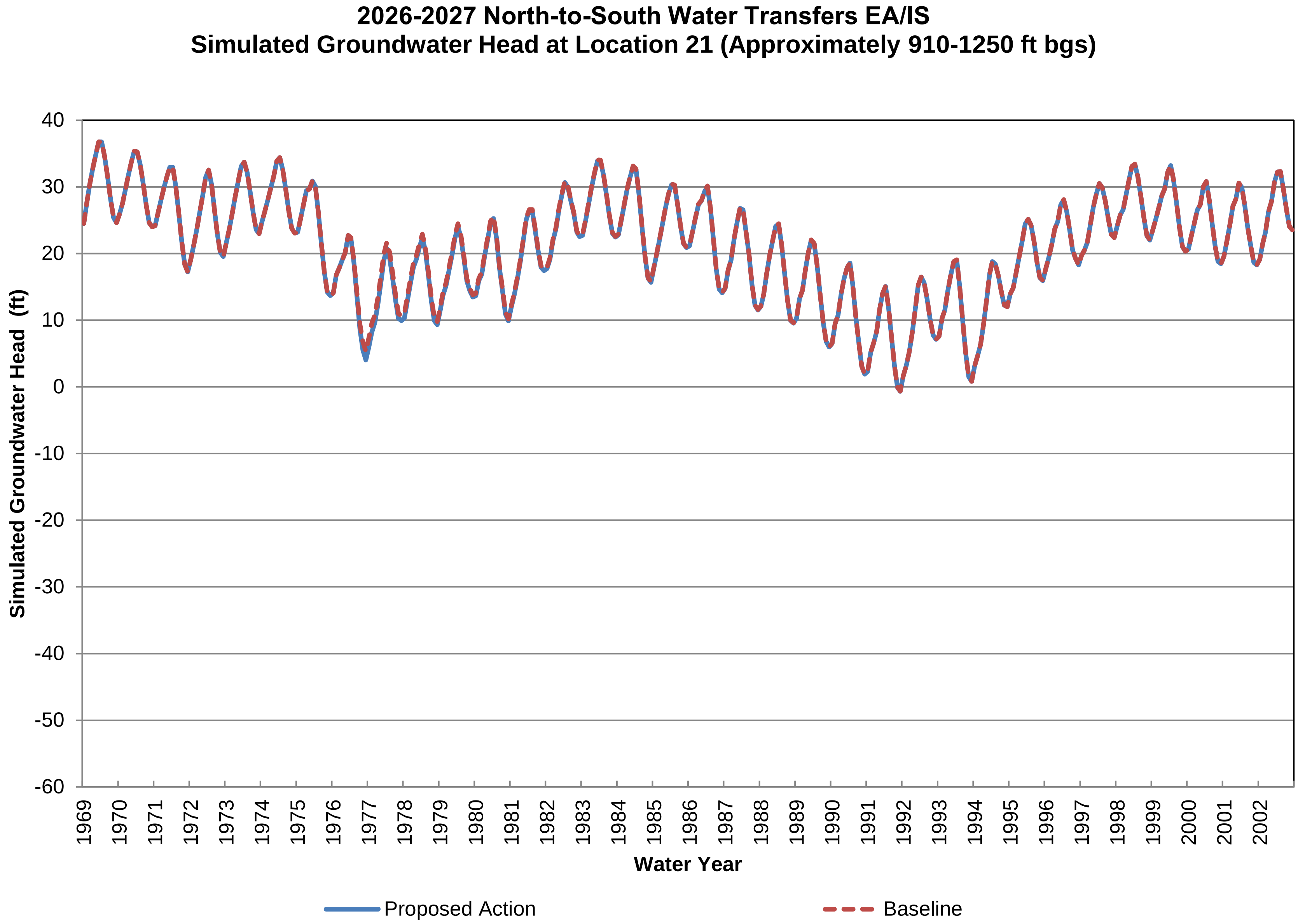
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 21 (Approximately 910-1250 ft bgs)
40
30
20
10
0
-10
-20
-30
-40
-50
-60
Simulated Groundwater Head (ft)
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
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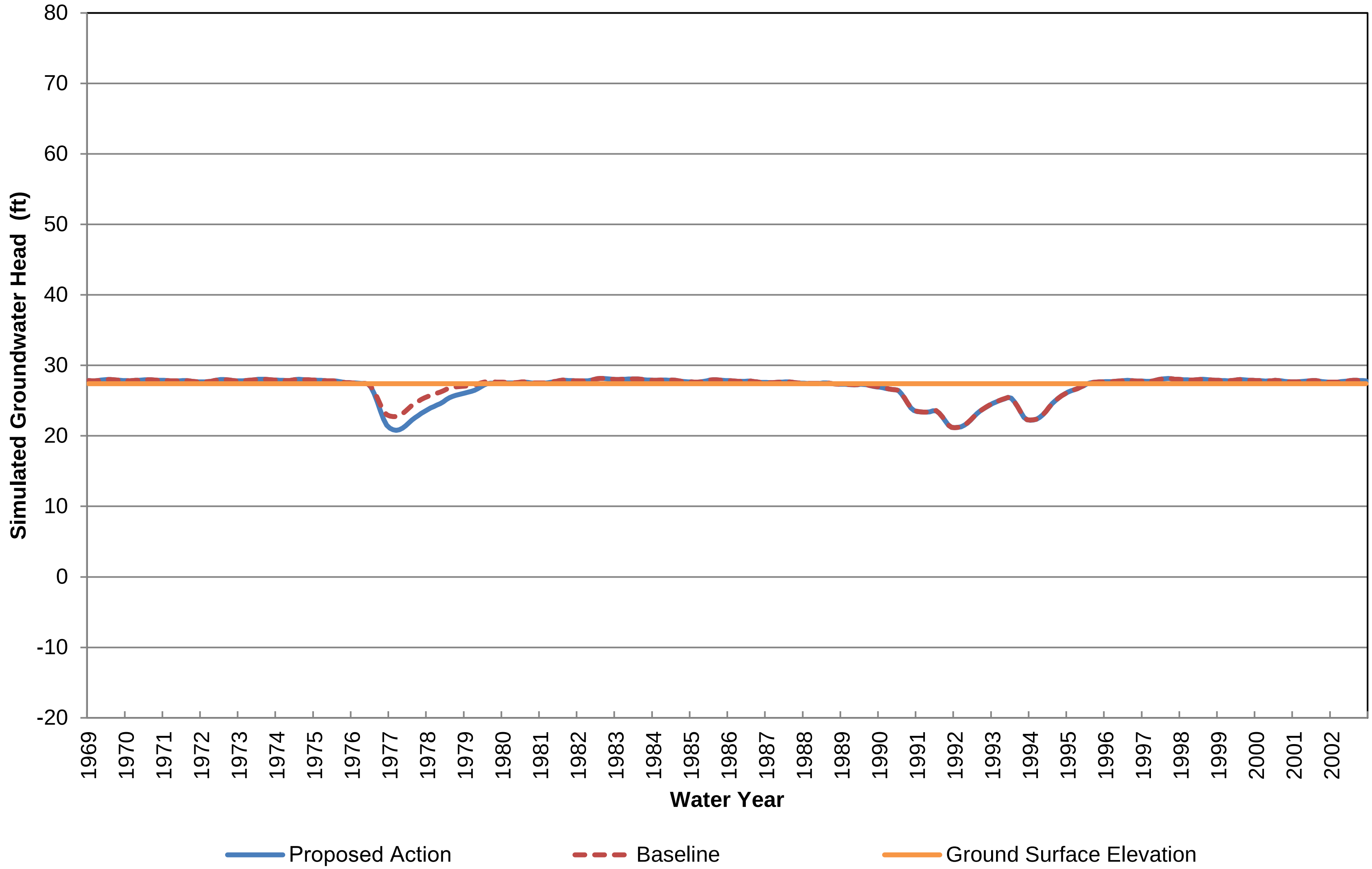
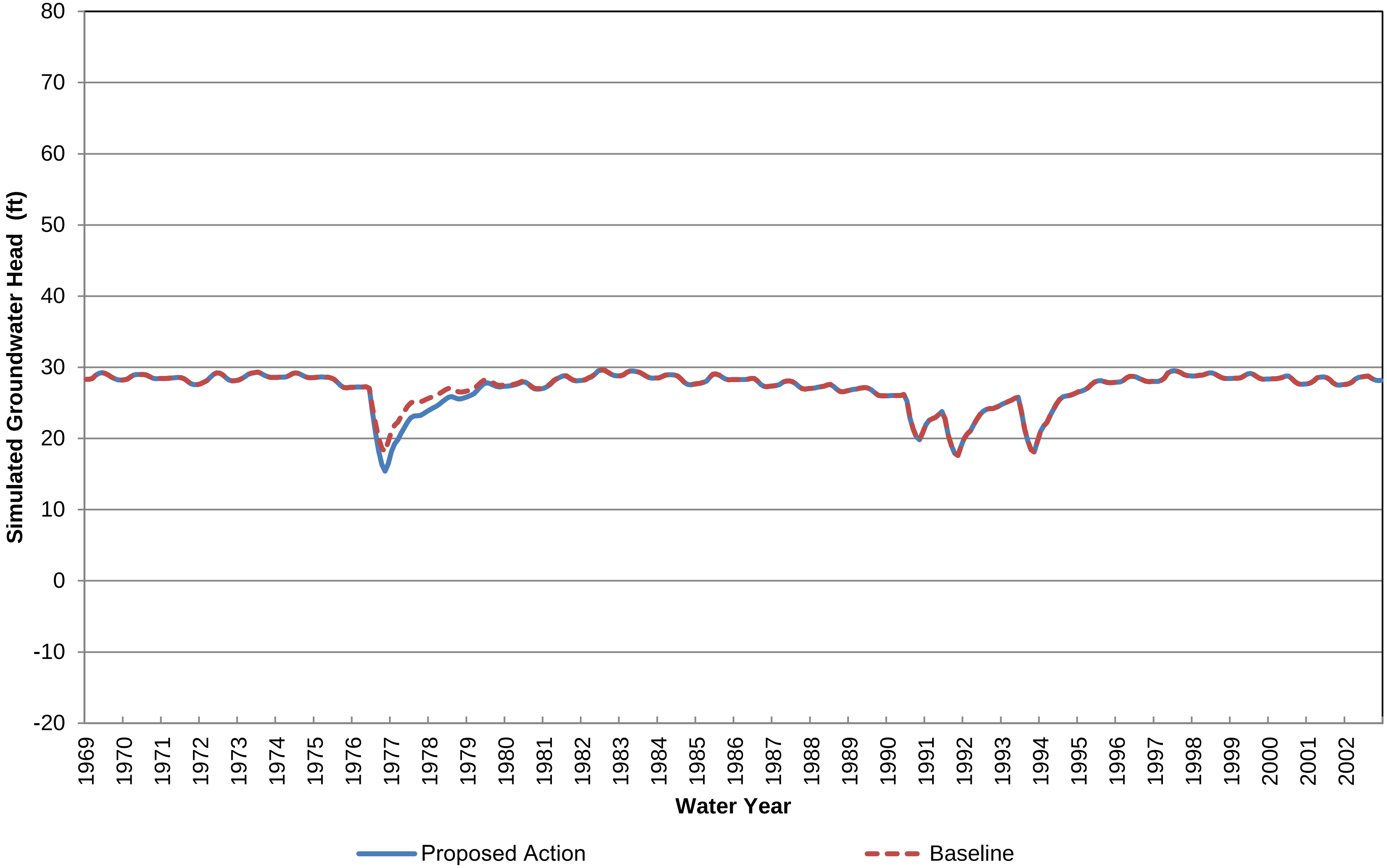
1994
1995
1996
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

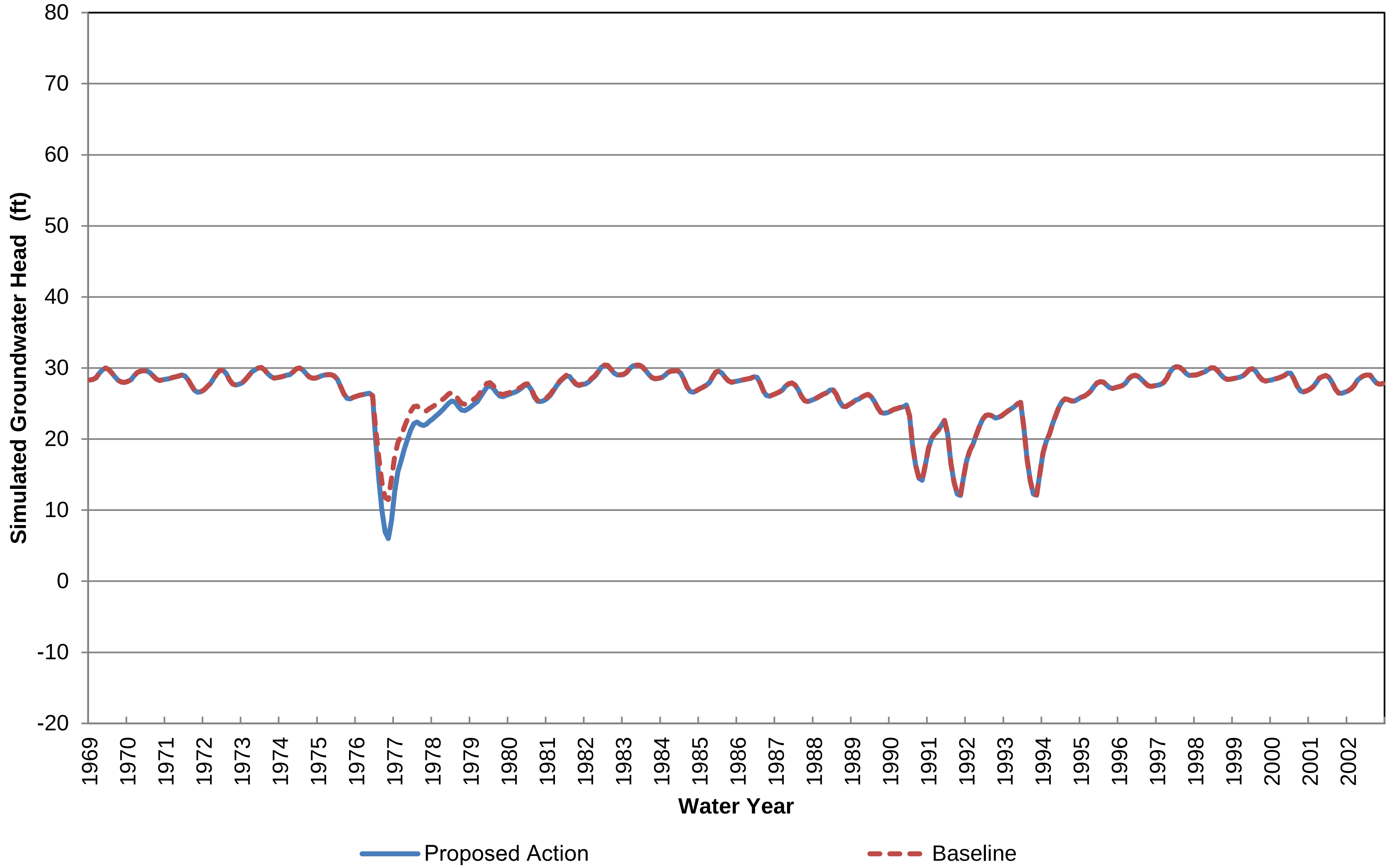
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 22 (Approximately 0-70 ft bgs)



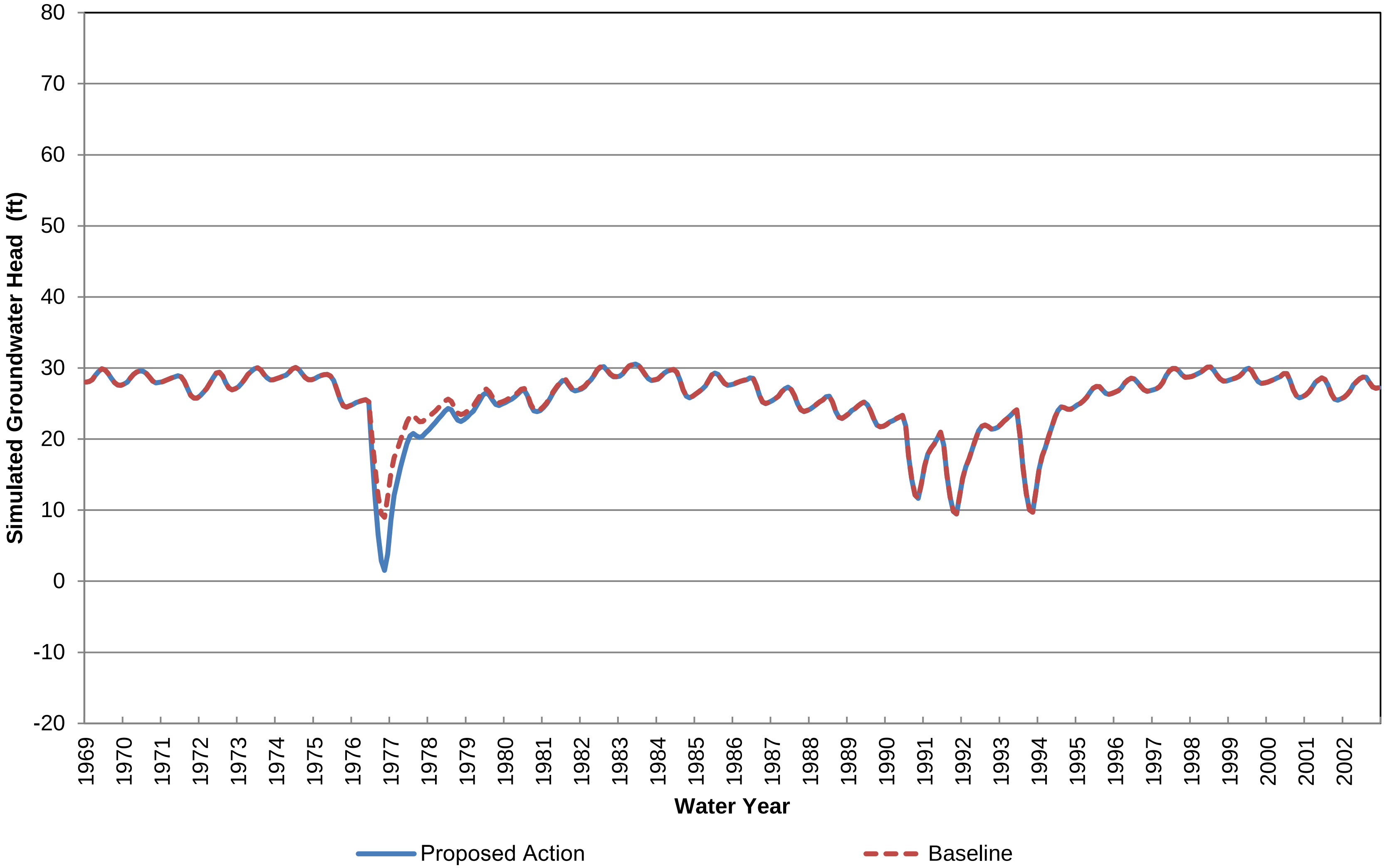
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 22 (Approximately 70-230 ft bgs)



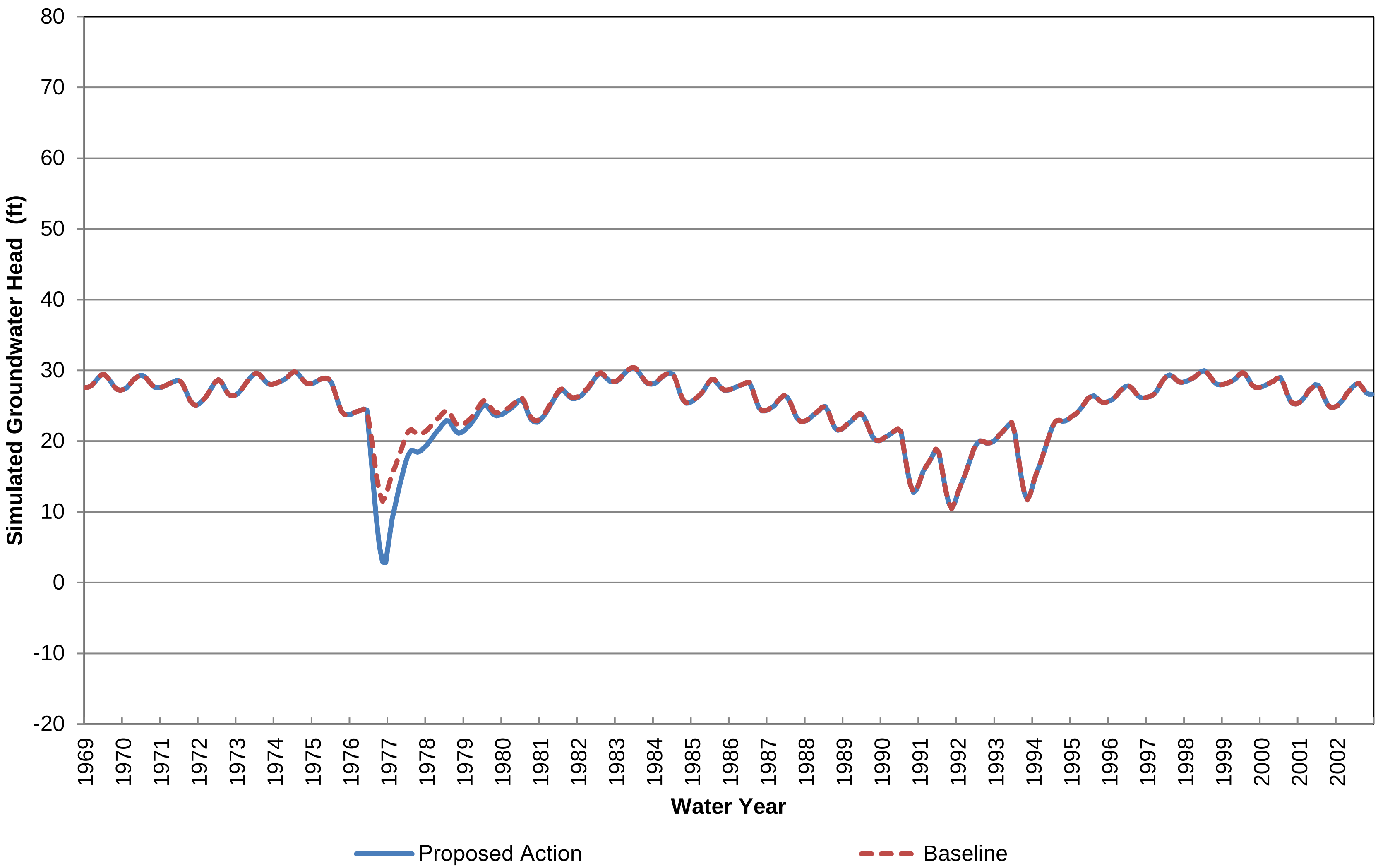
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 22 (Approximately 230-390 ft bgs)

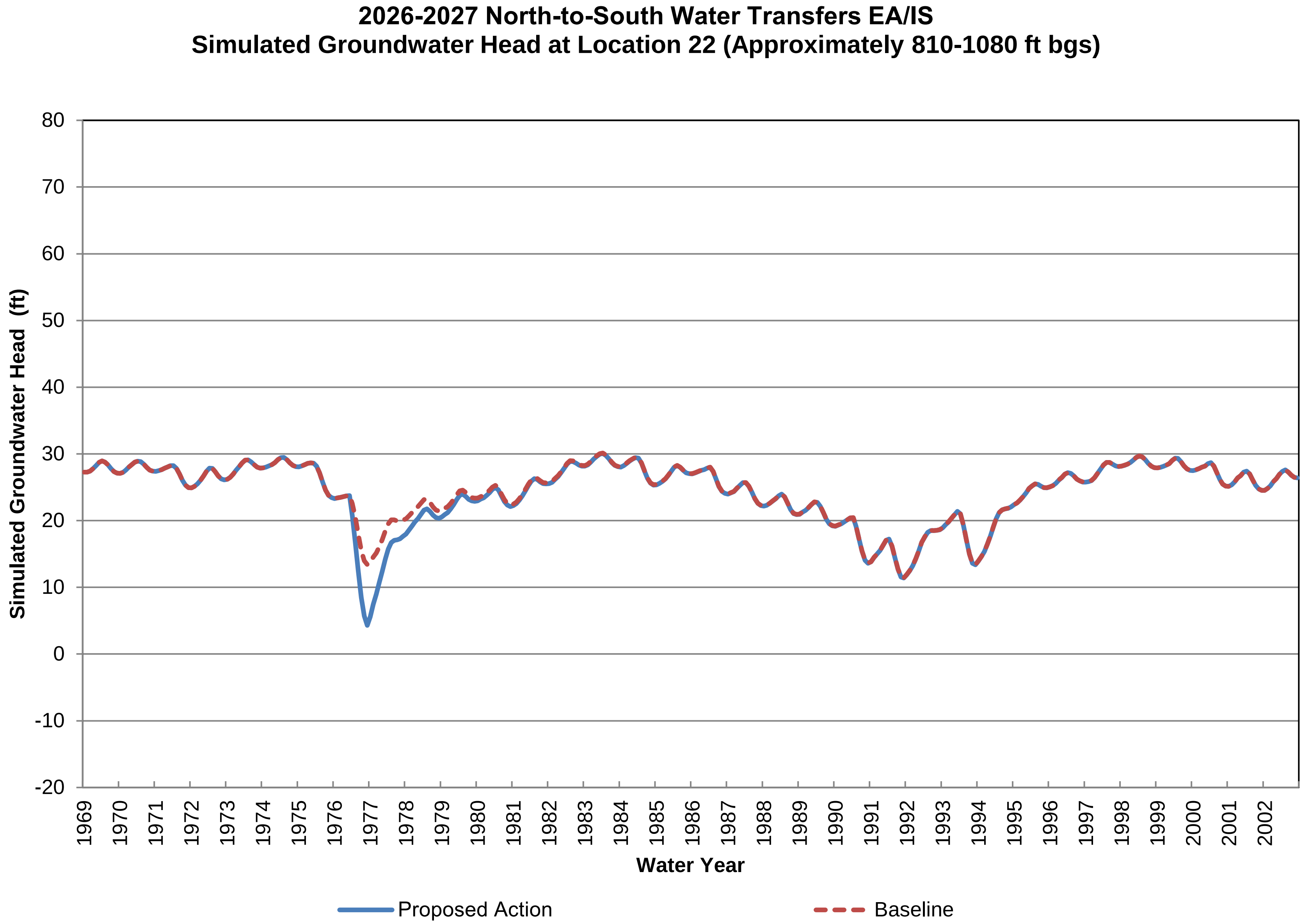


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 22 (Approximately 390-550 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 22 (Approximately 550-810 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 22 (Approximately 810-1080 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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1994
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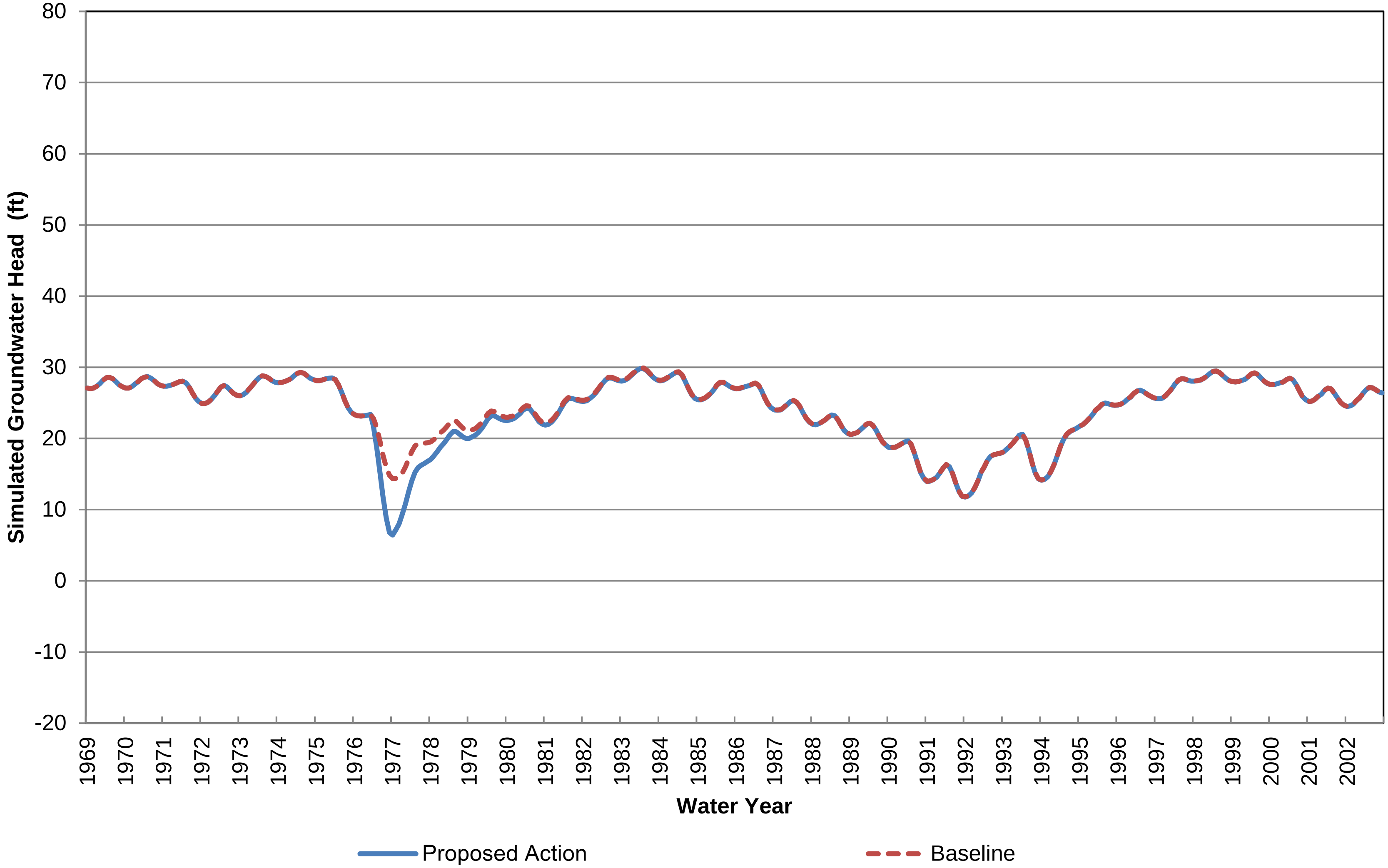
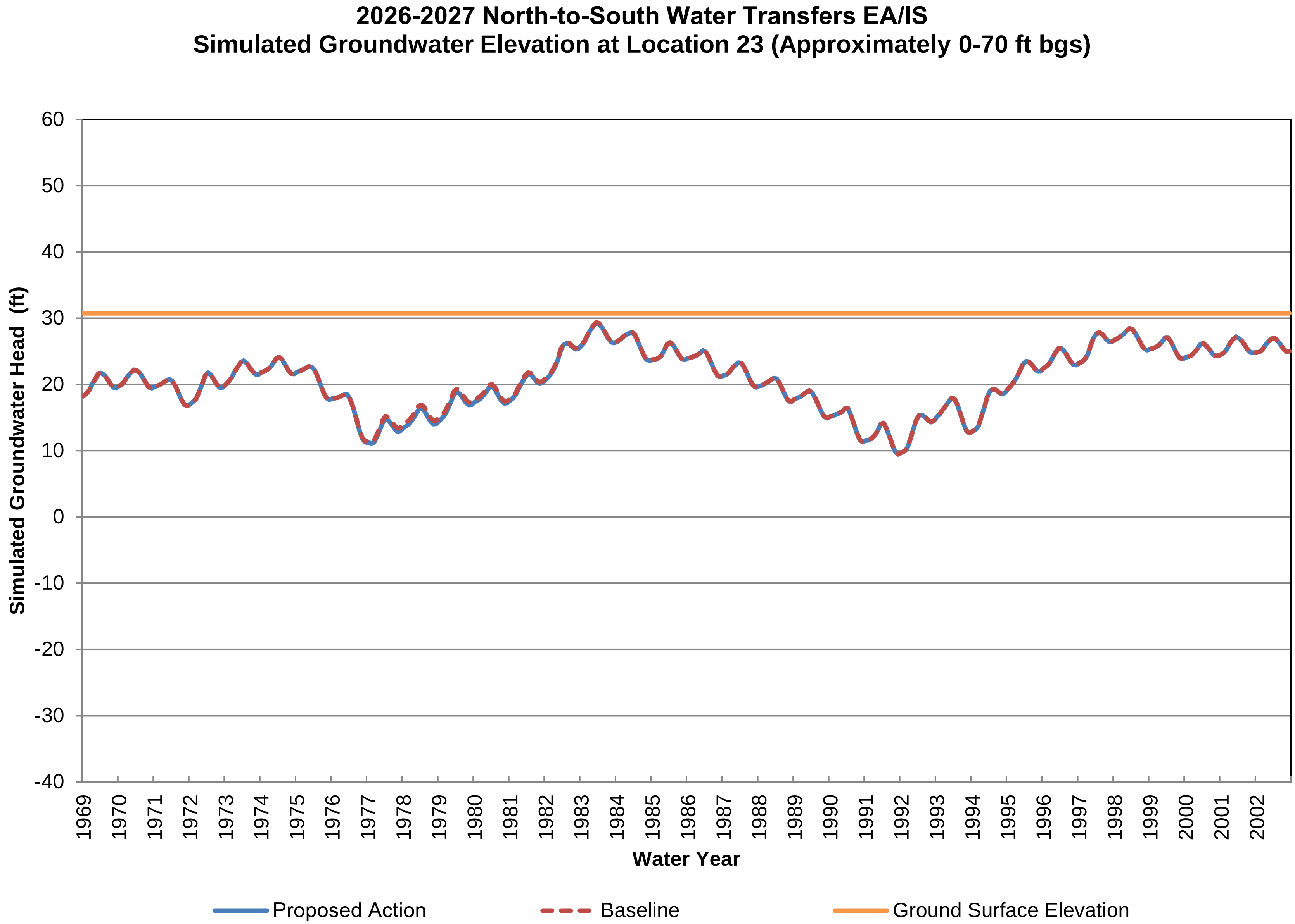
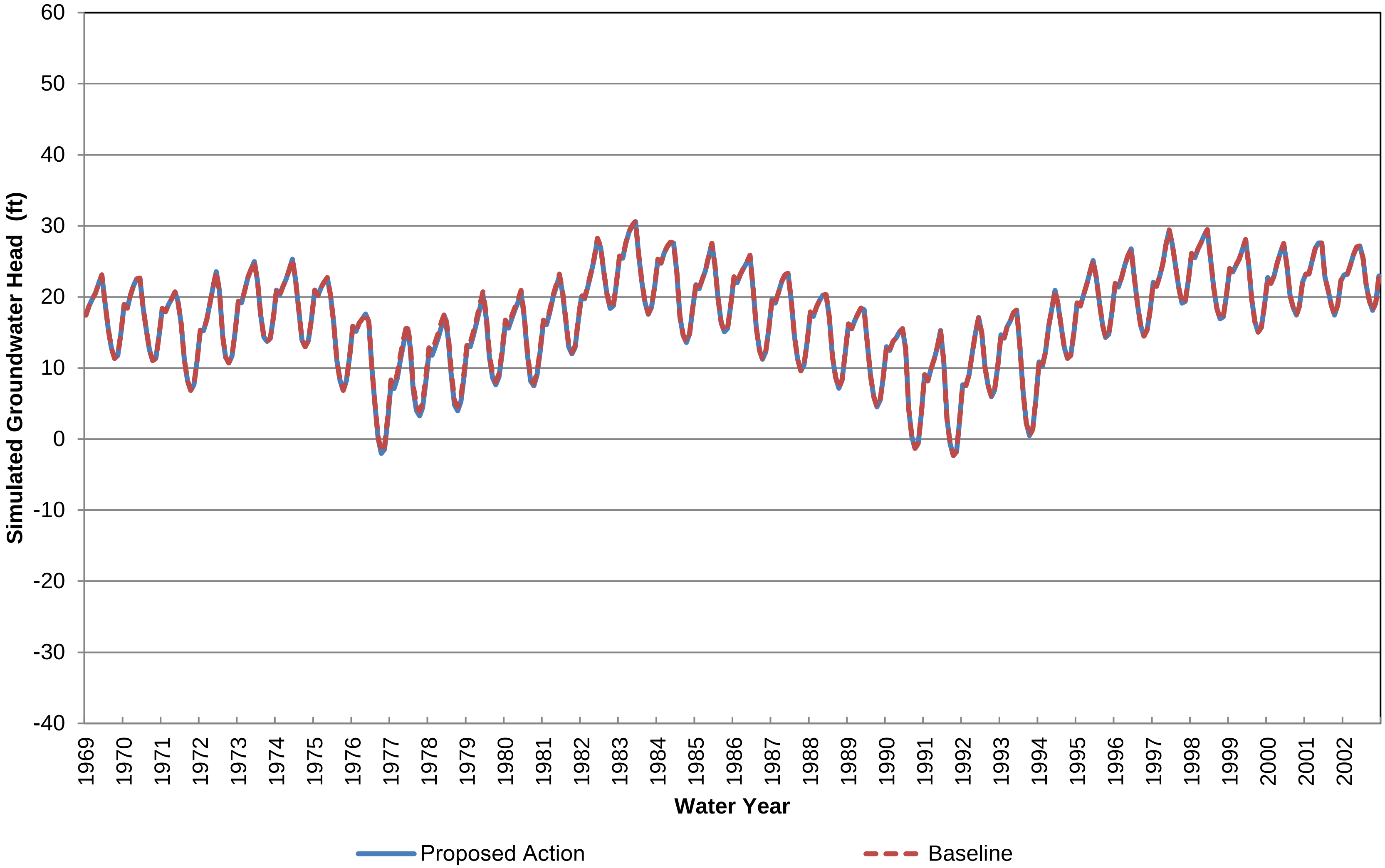
1996
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 22 (Approximately 1080-1480 ft bgs)

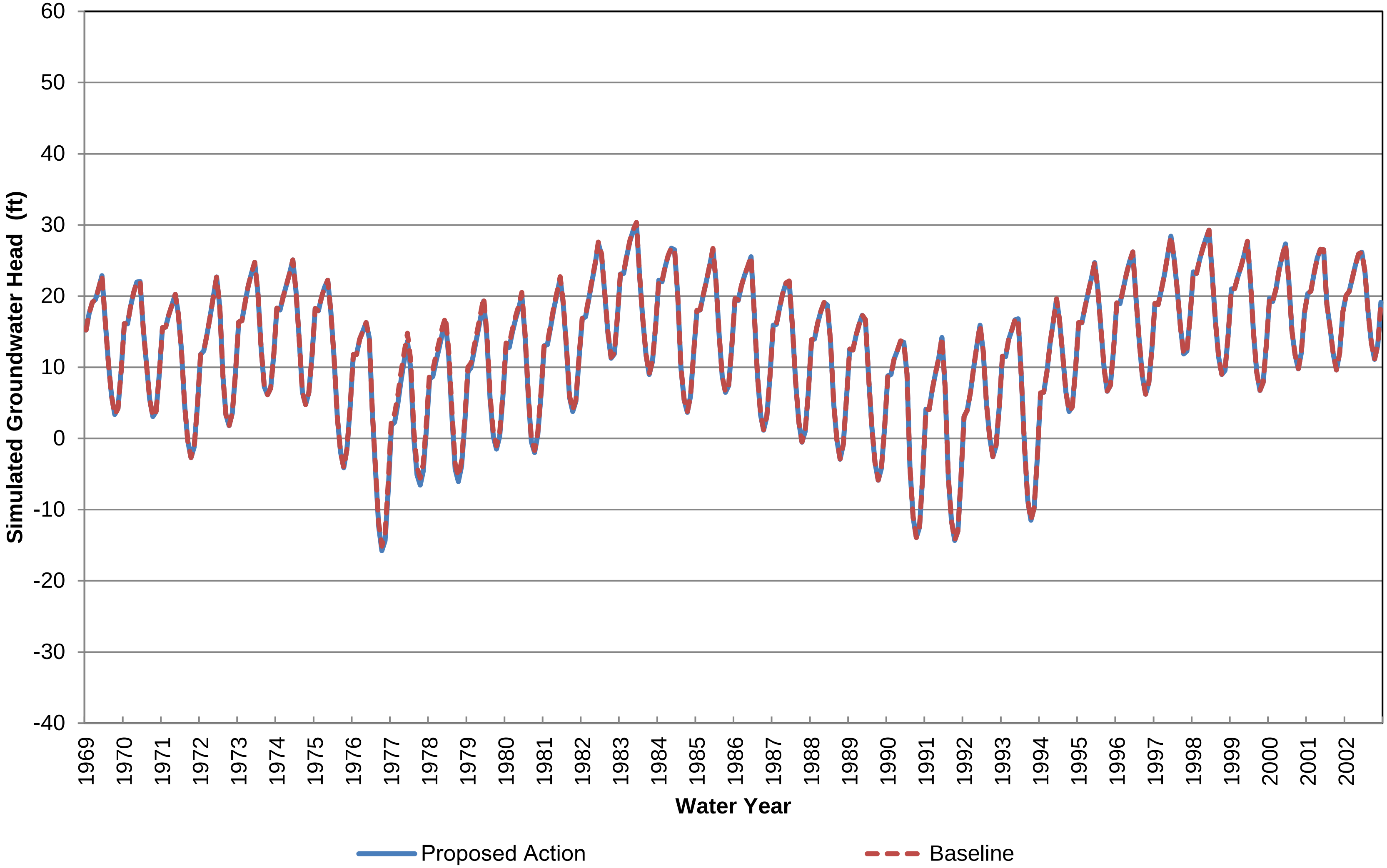



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 23 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline
Ground Surface Elevation

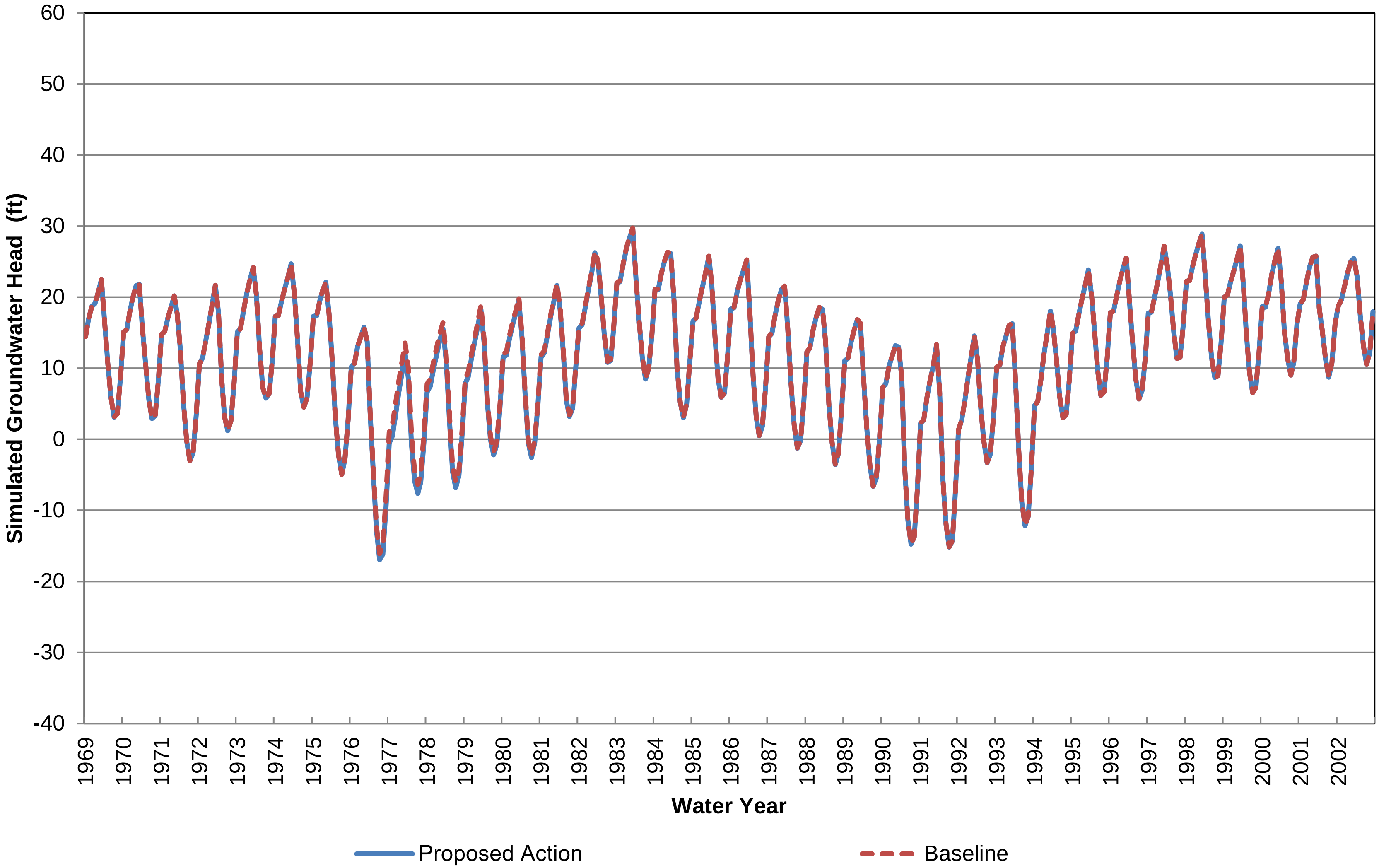
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 23 (Approximately 70-290 ft bgs)



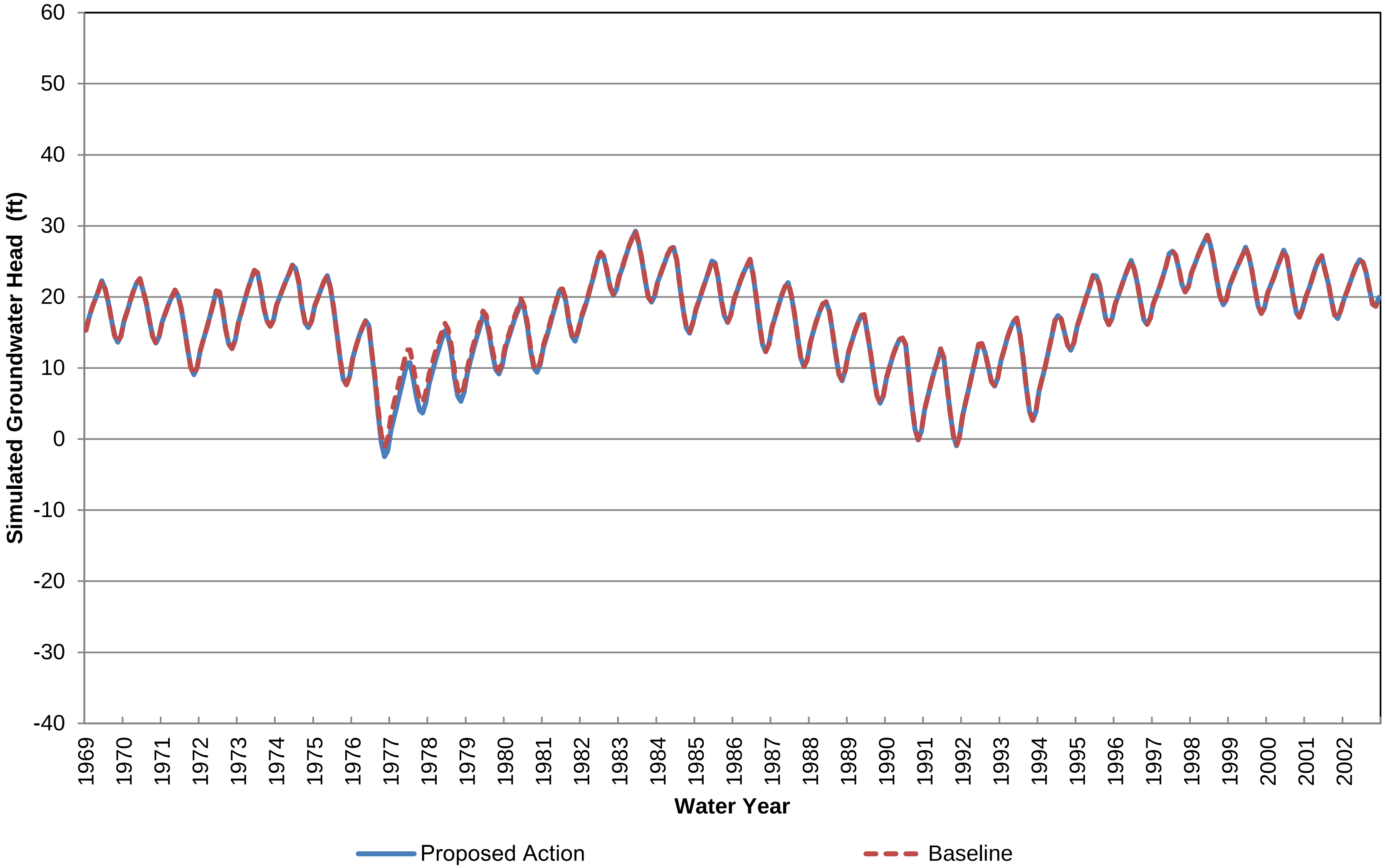
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 23 (Approximately 290-520 ft bgs)



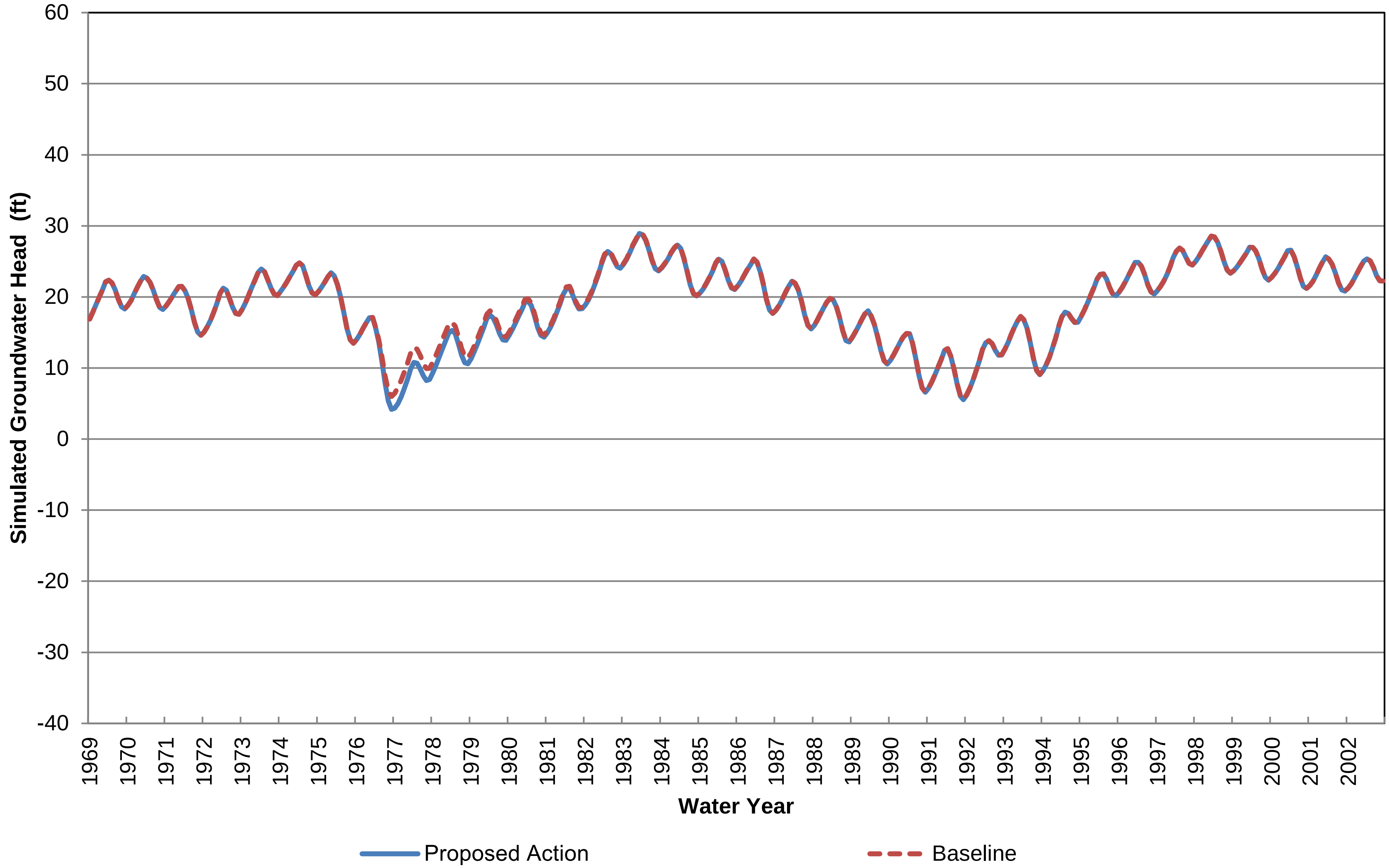
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 23 (Approximately 520-740 ft bgs)

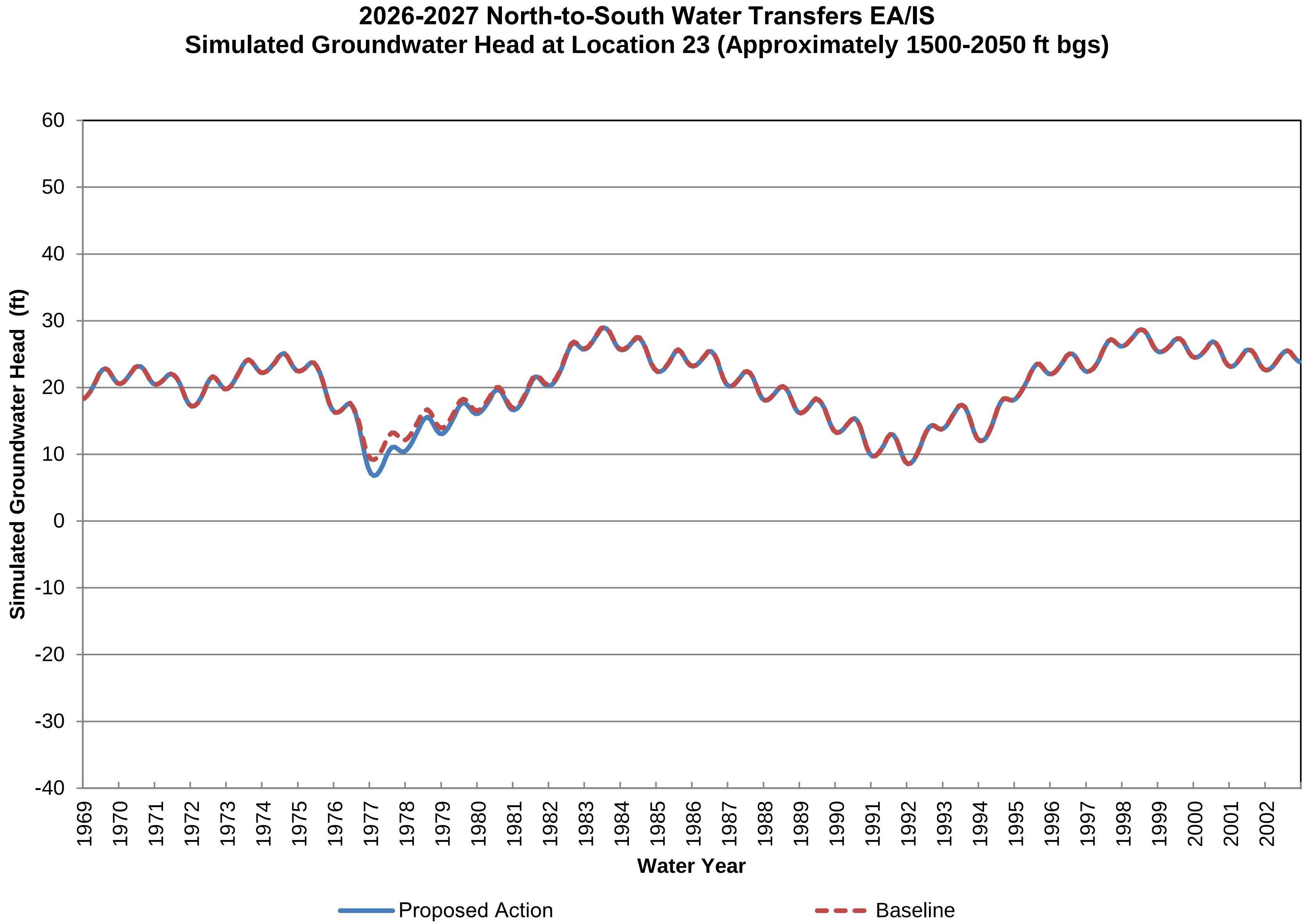


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 23 (Approximately 740-1120 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 23 (Approximately 1120-1500 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 23 (Approximately 1500-2050 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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1990
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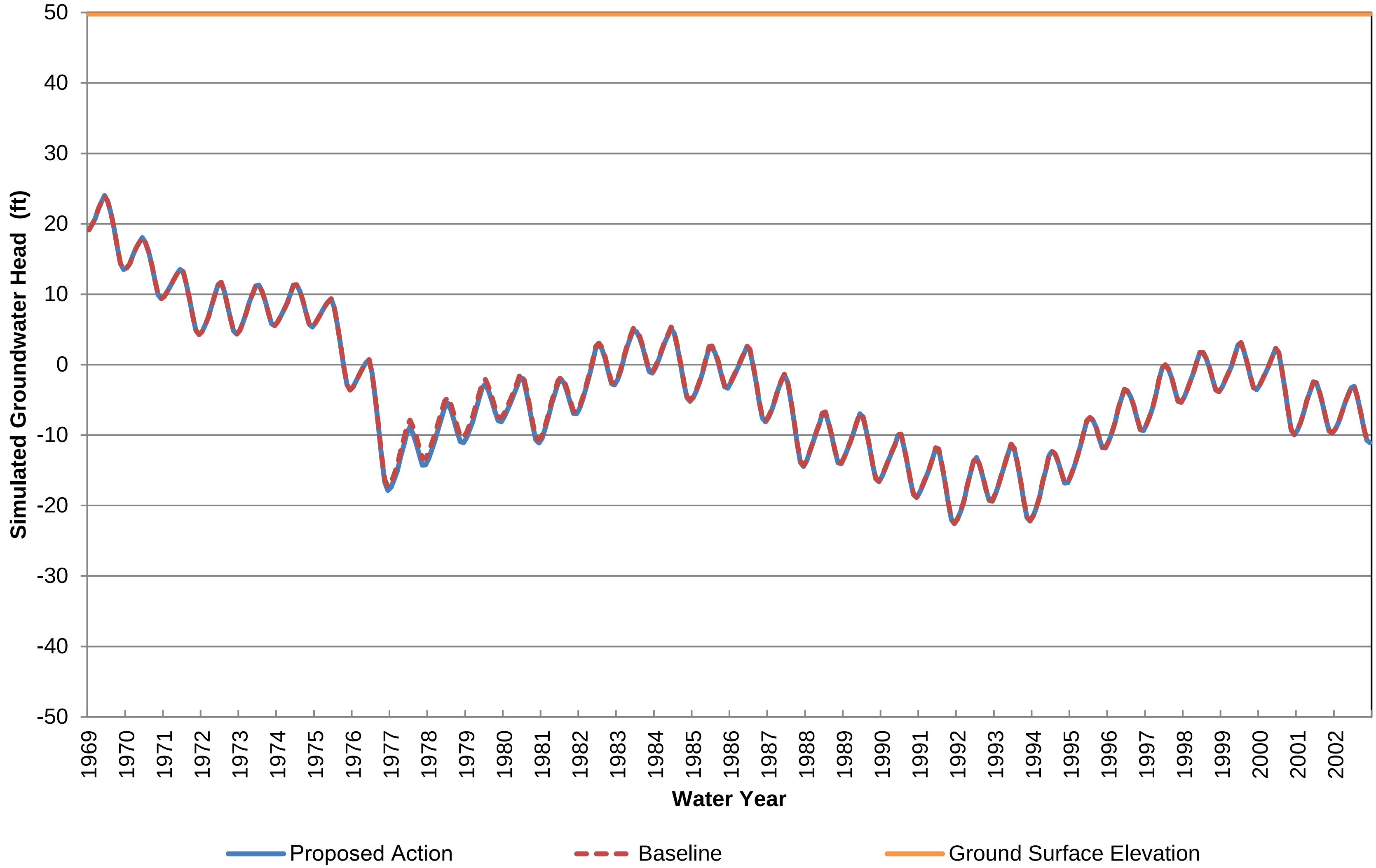
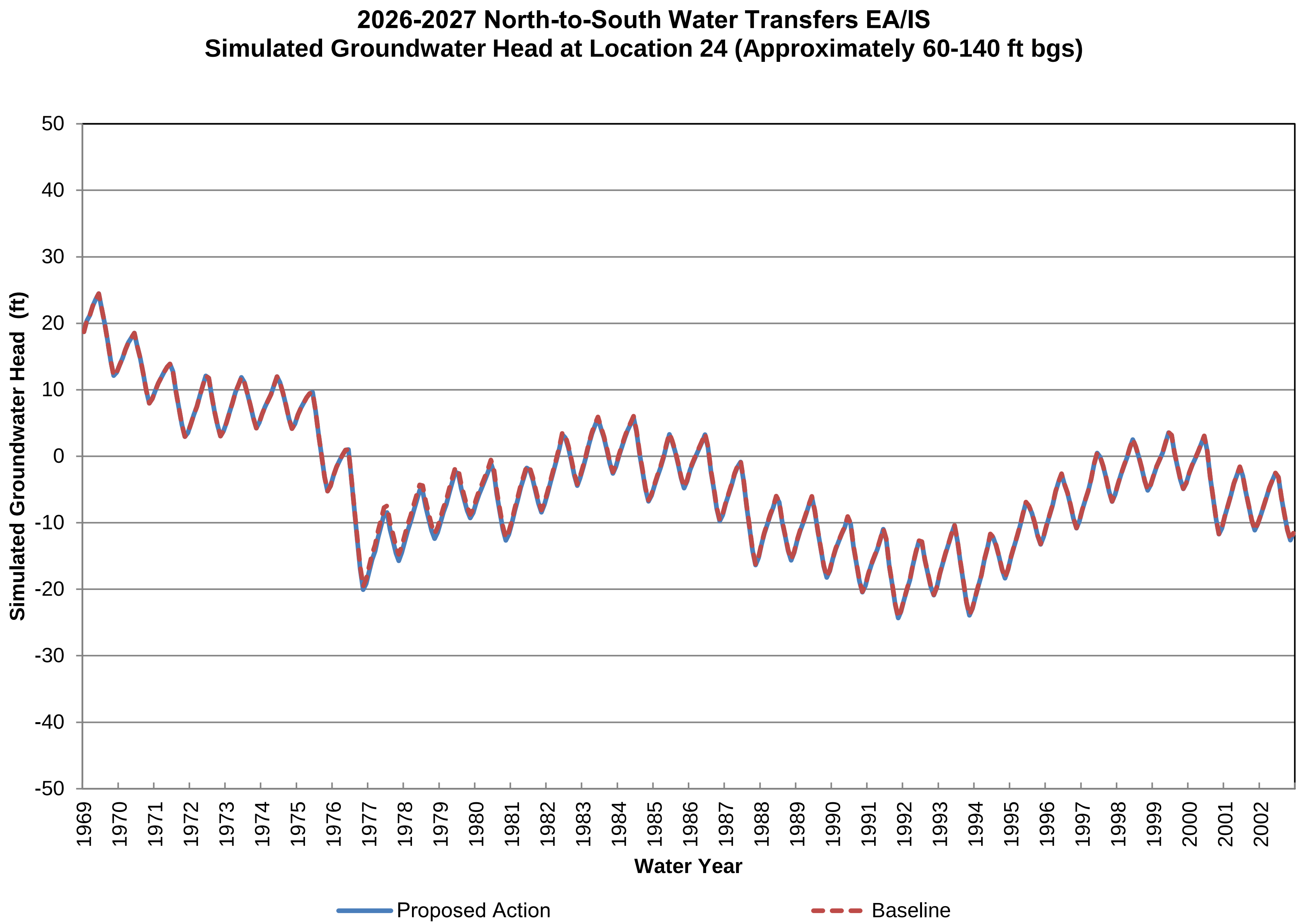
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 24 (Approximately 0-60 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 24 (Approximately 60-140 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
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1988
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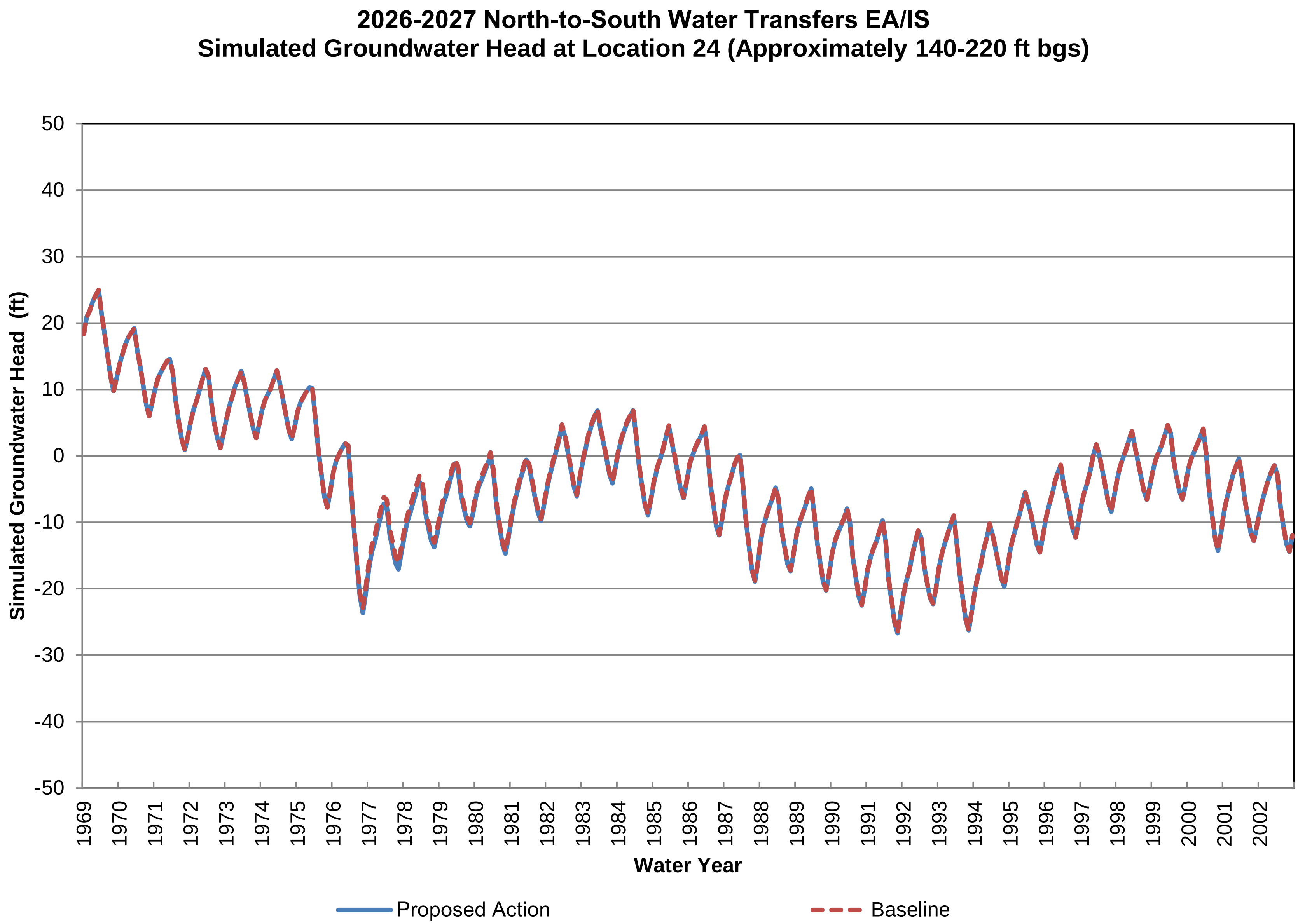
1999
2000
2001
2002
Water Year
Proposed Action
Baseline


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 24 (Approximately 140-220 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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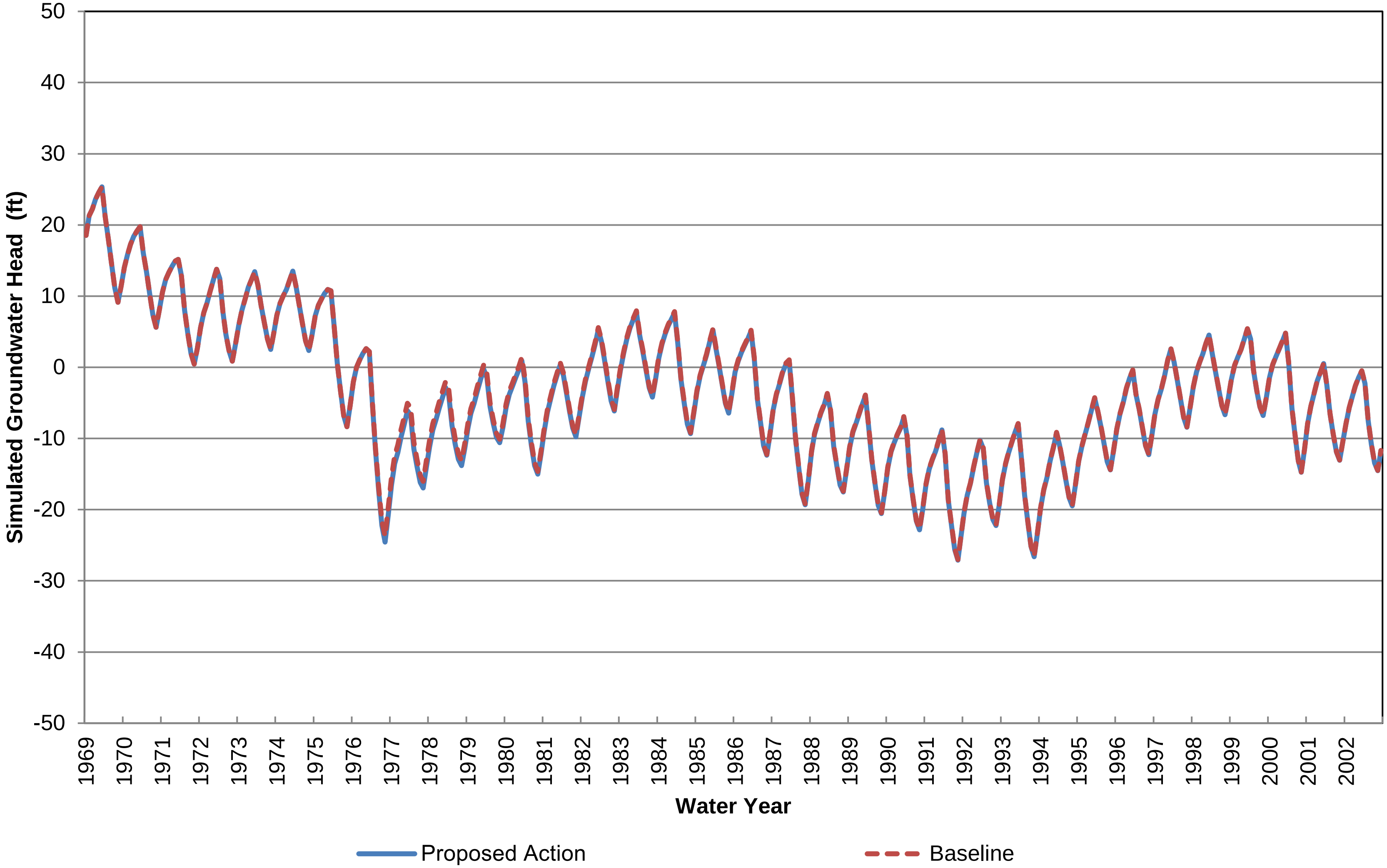
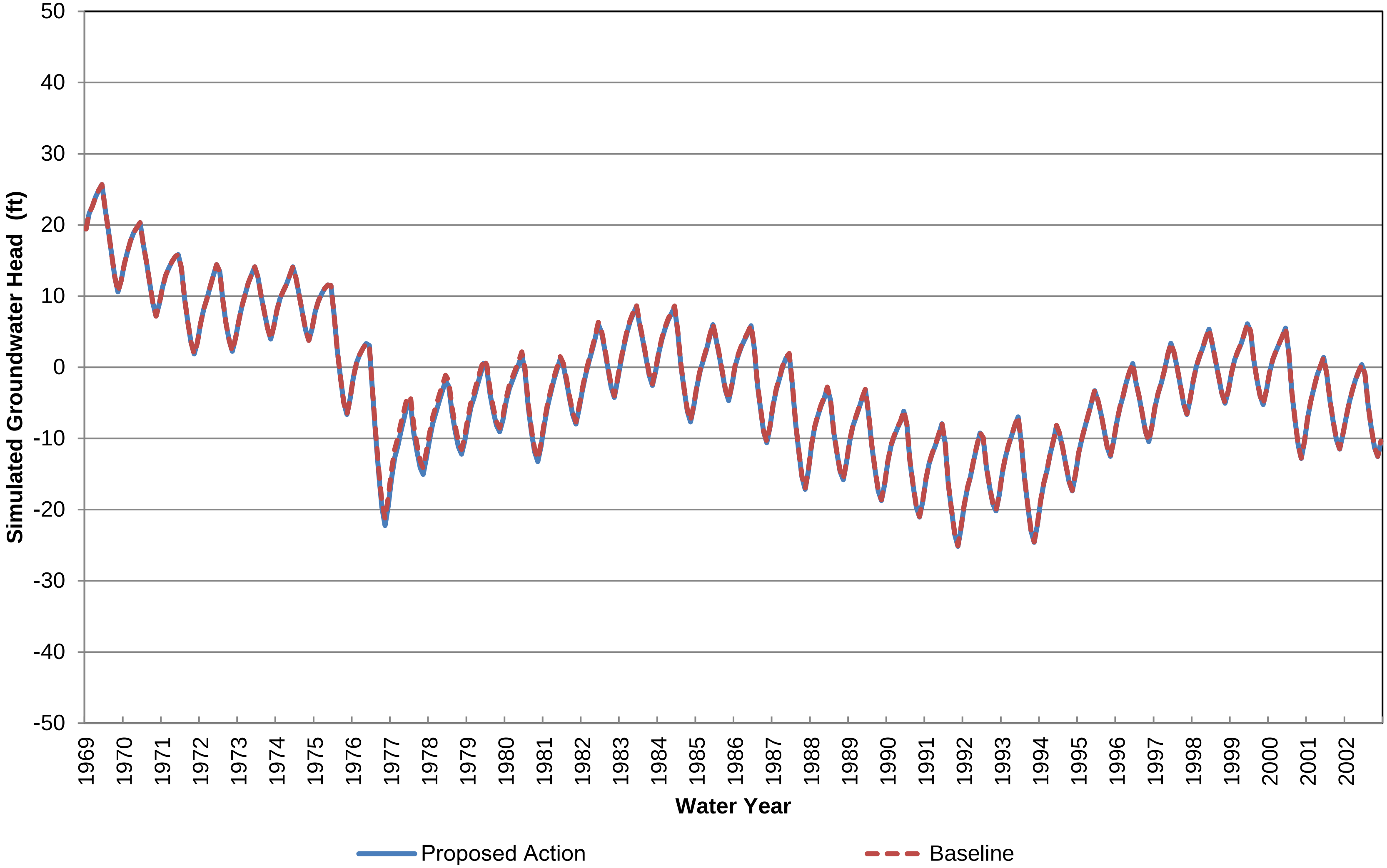
1996
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

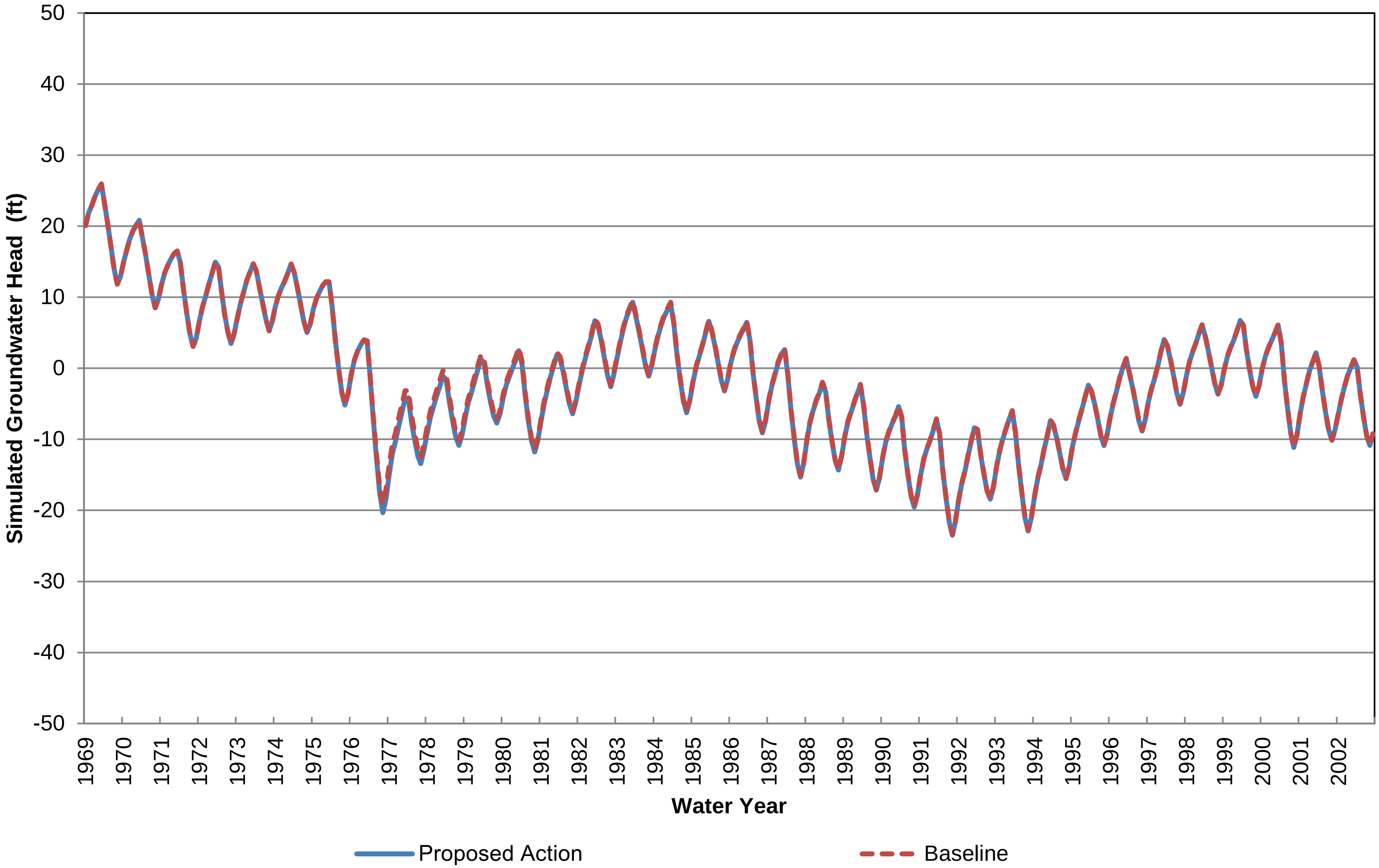
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 24 (Approximately 220-300 ft bgs)



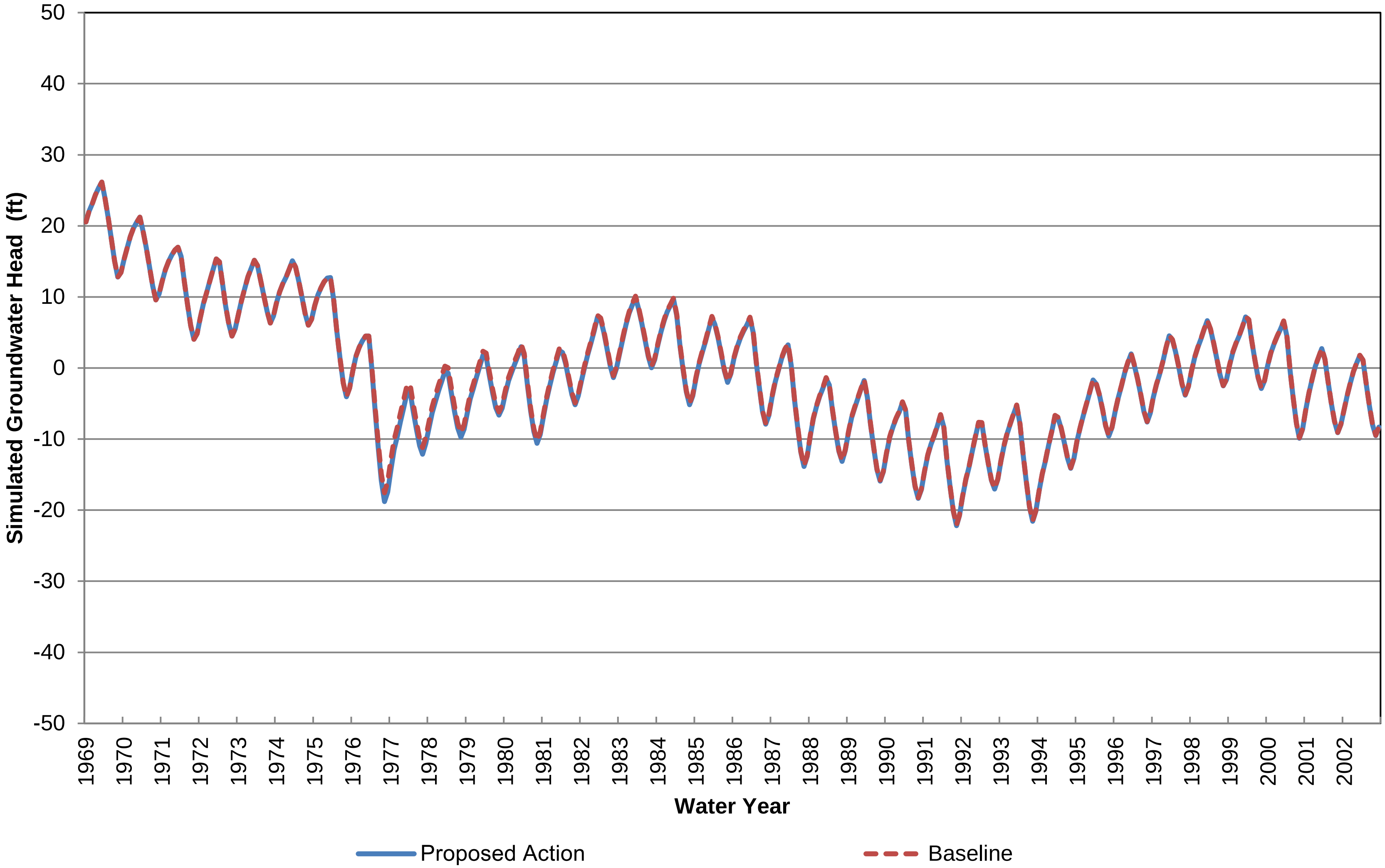
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 24 (Approximately 300-410 ft bgs)

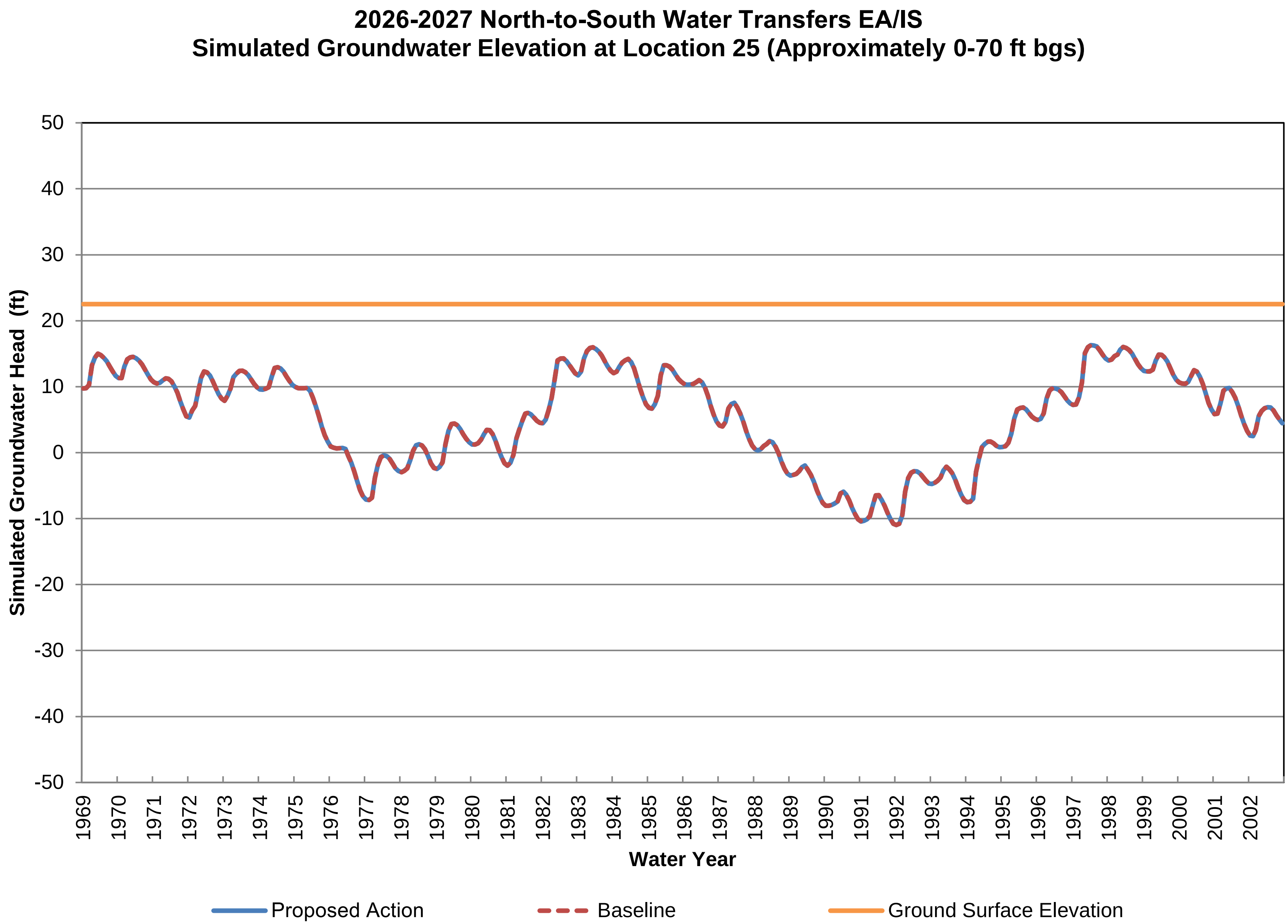


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 24 (Approximately 410-550 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 24 (Approximately 550-750 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 25 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
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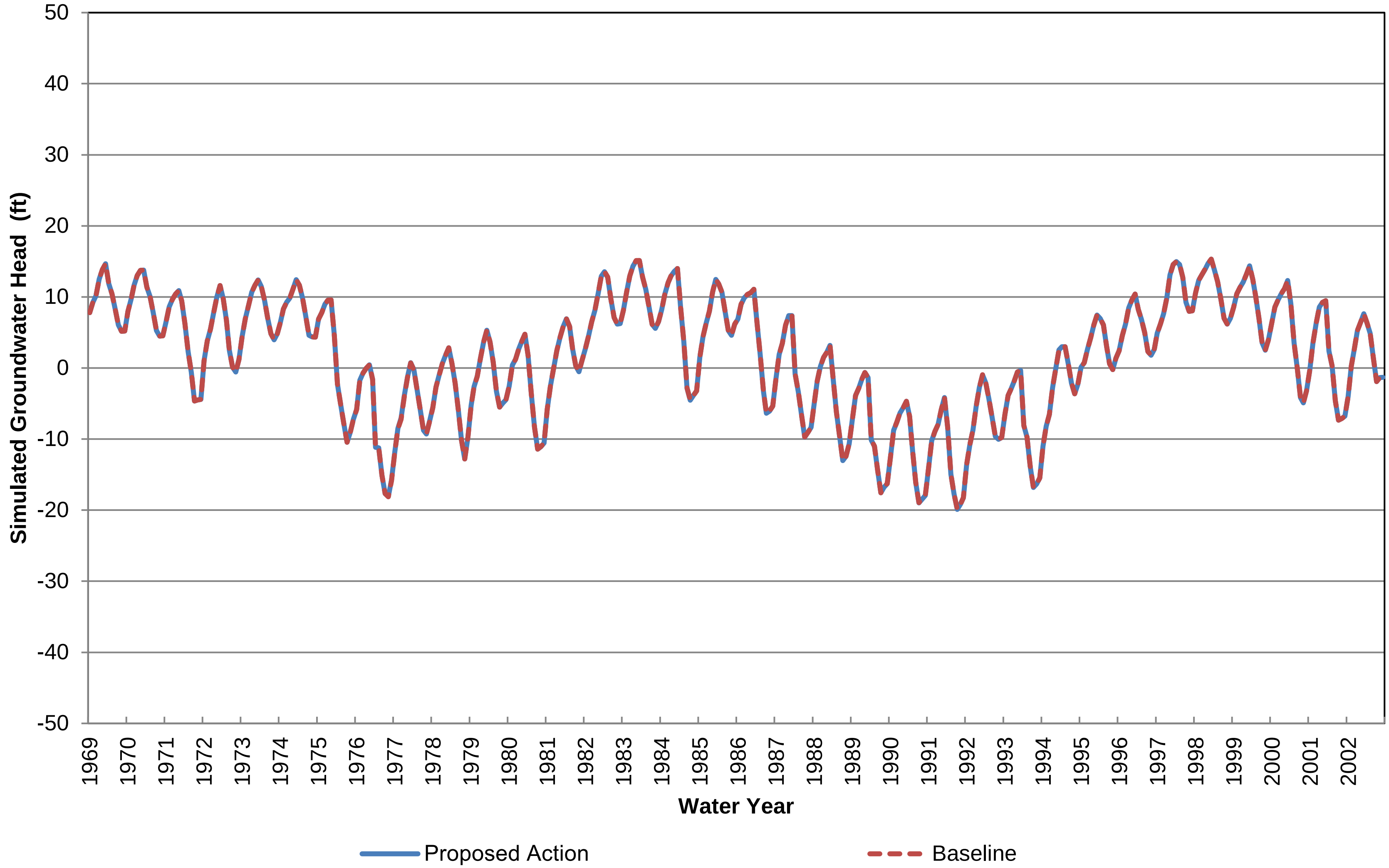
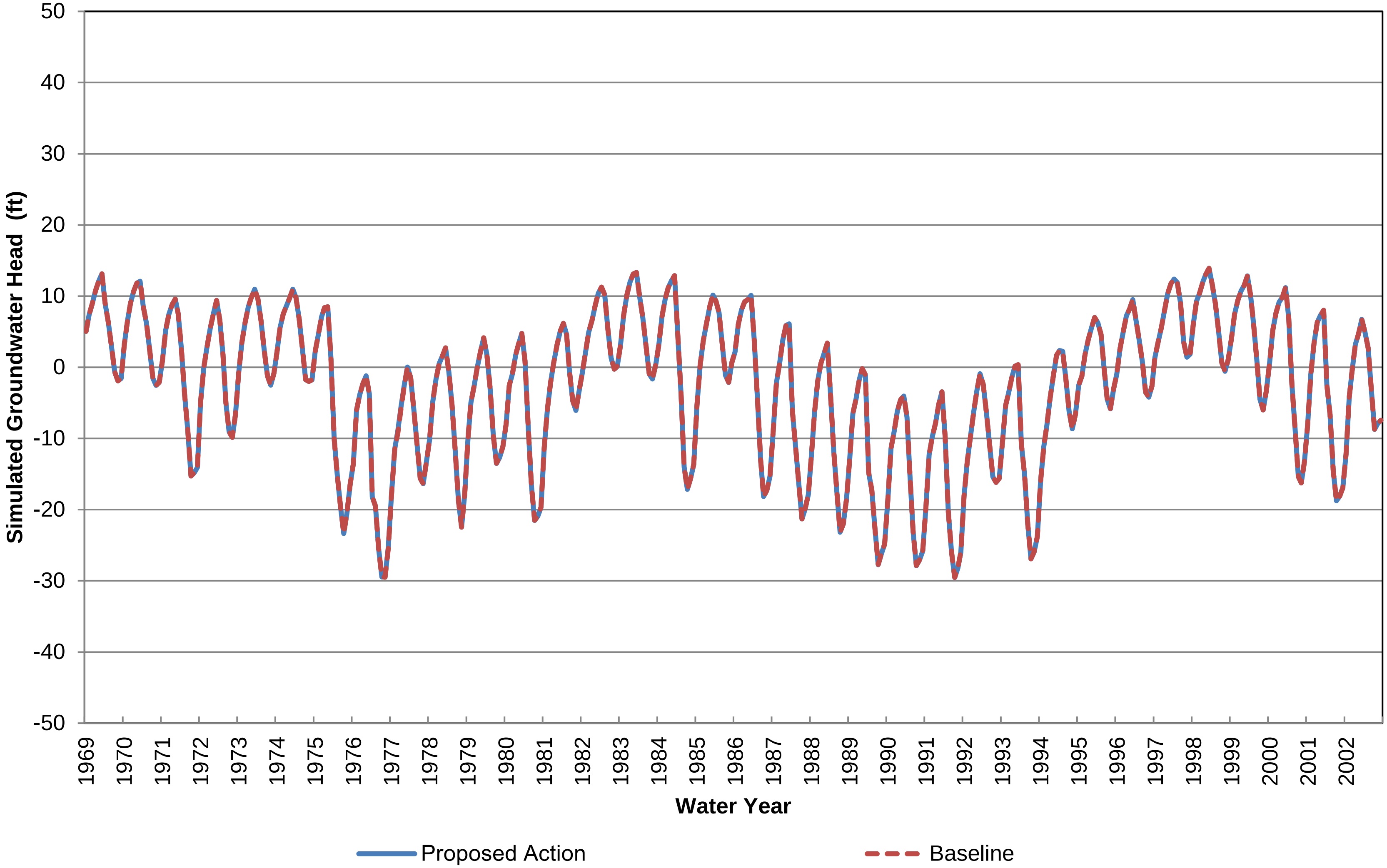
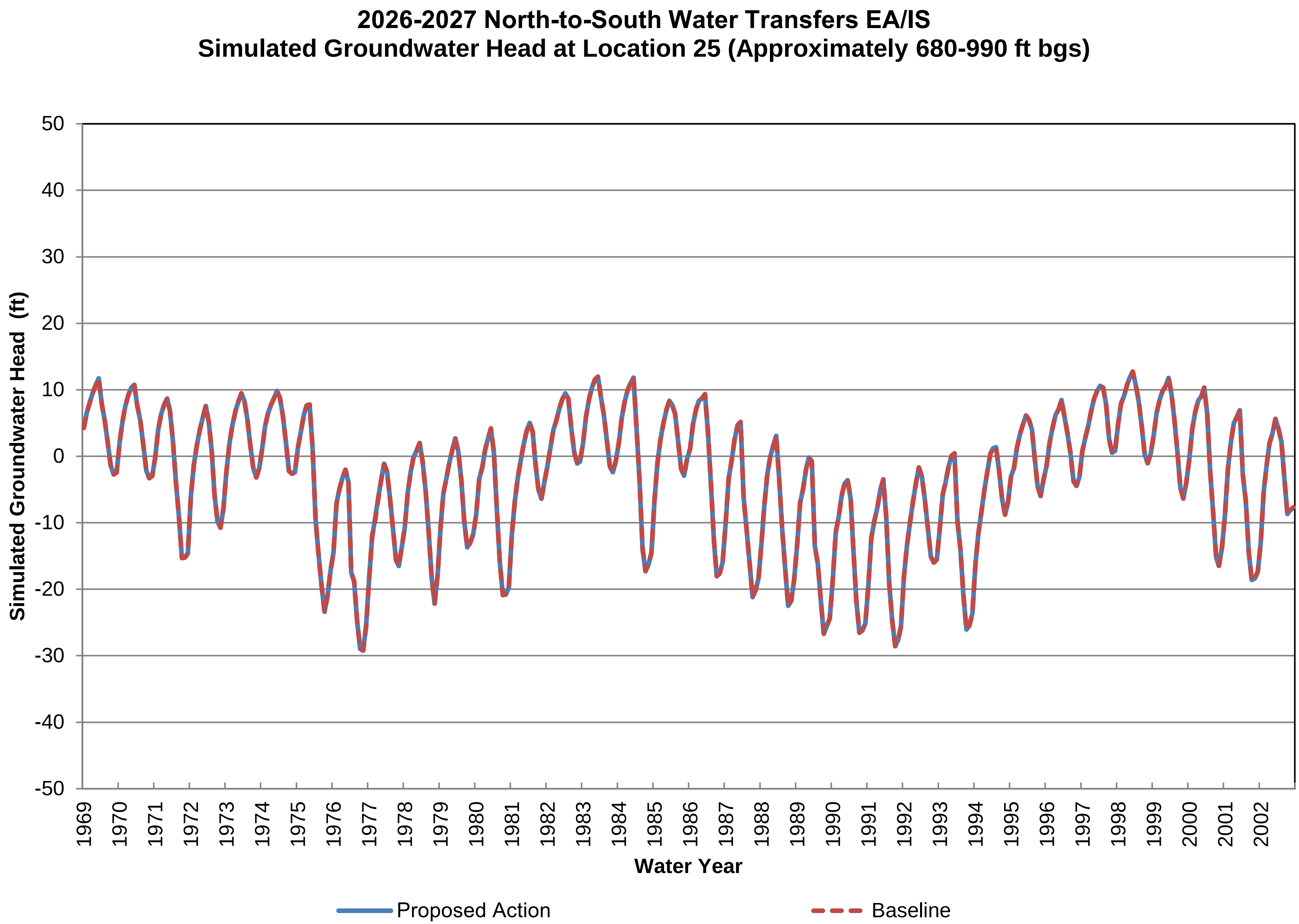
1999
2000
2001
2002
Water Year
Proposed Action
Baseline
Ground Surface Elevation

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 25 (Approximately 70-380 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 25 (Approximately 380-680 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 25 (Approximately 680-990 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
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1980
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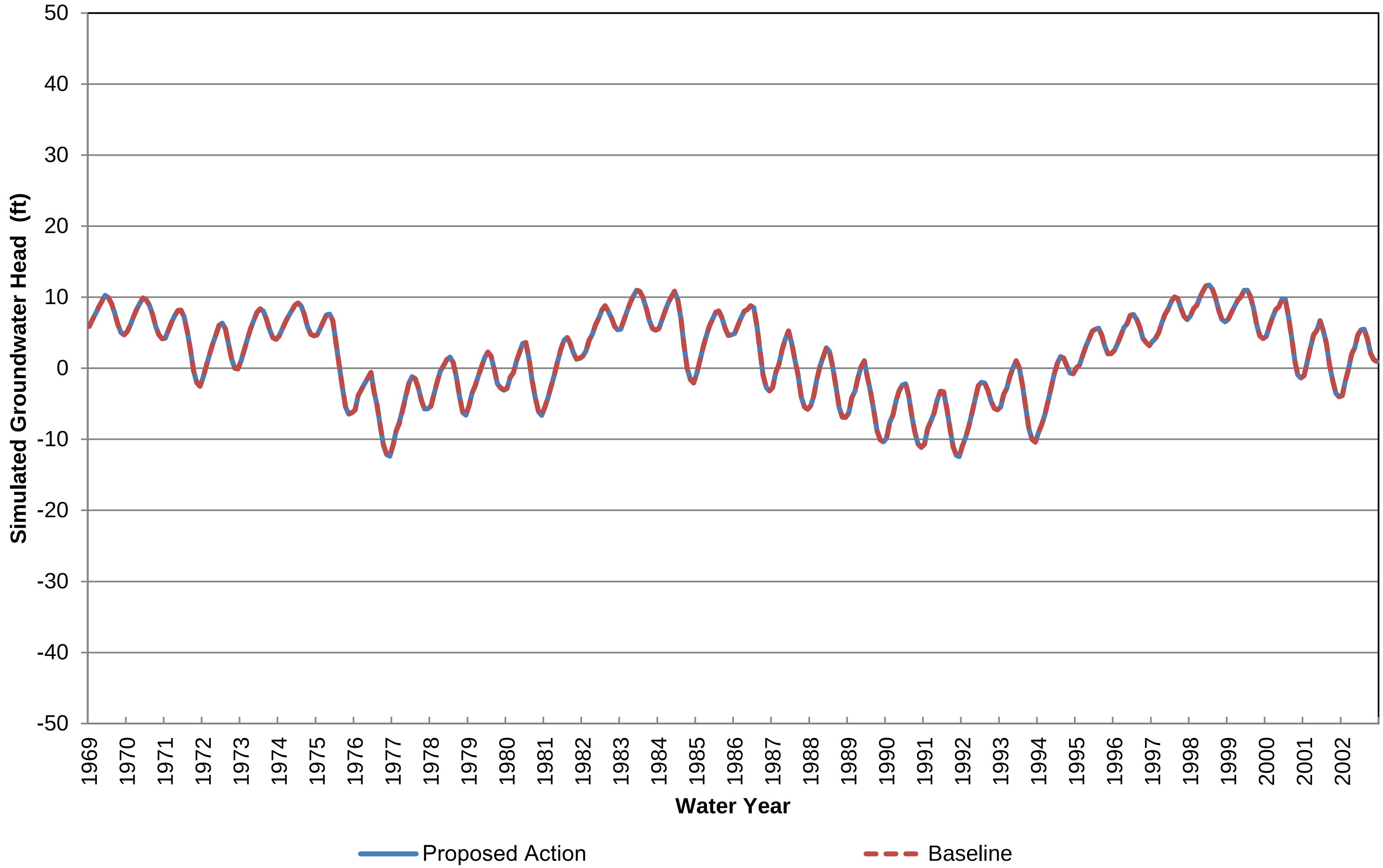
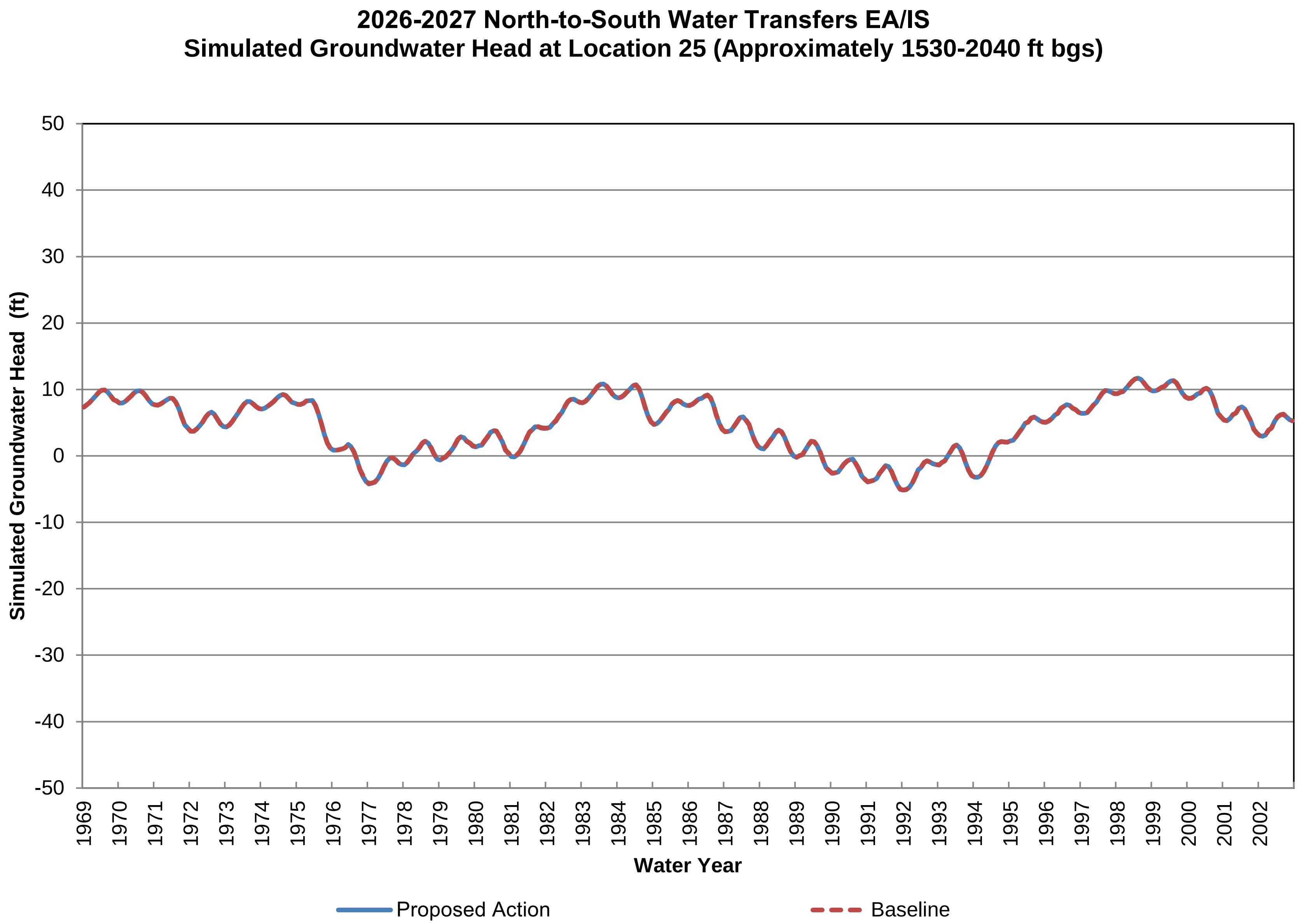
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 25 (Approximately 990-1530 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 25 (Approximately 1530-2040 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
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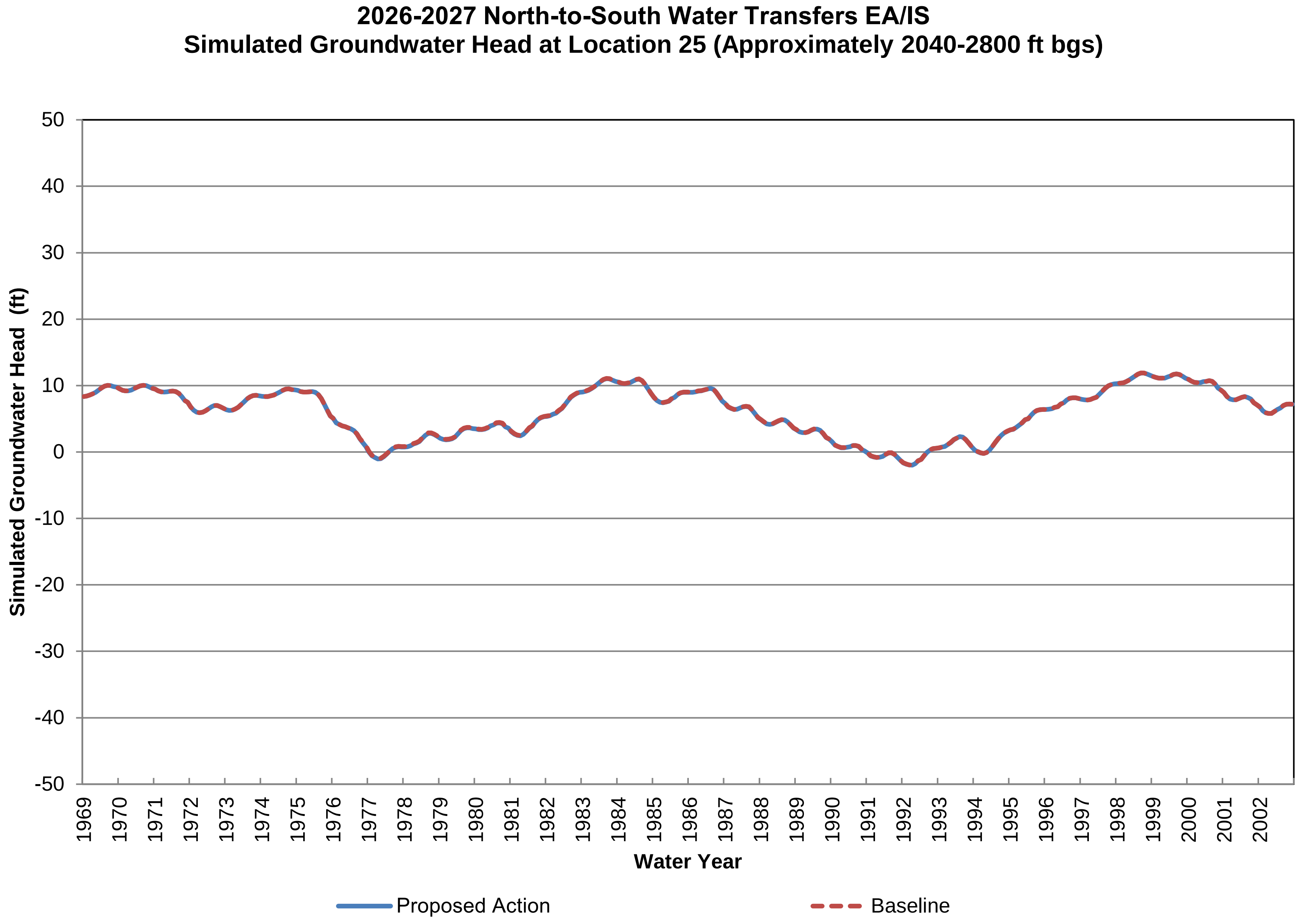
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 25 (Approximately 2040-2800 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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1988
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1990
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1994
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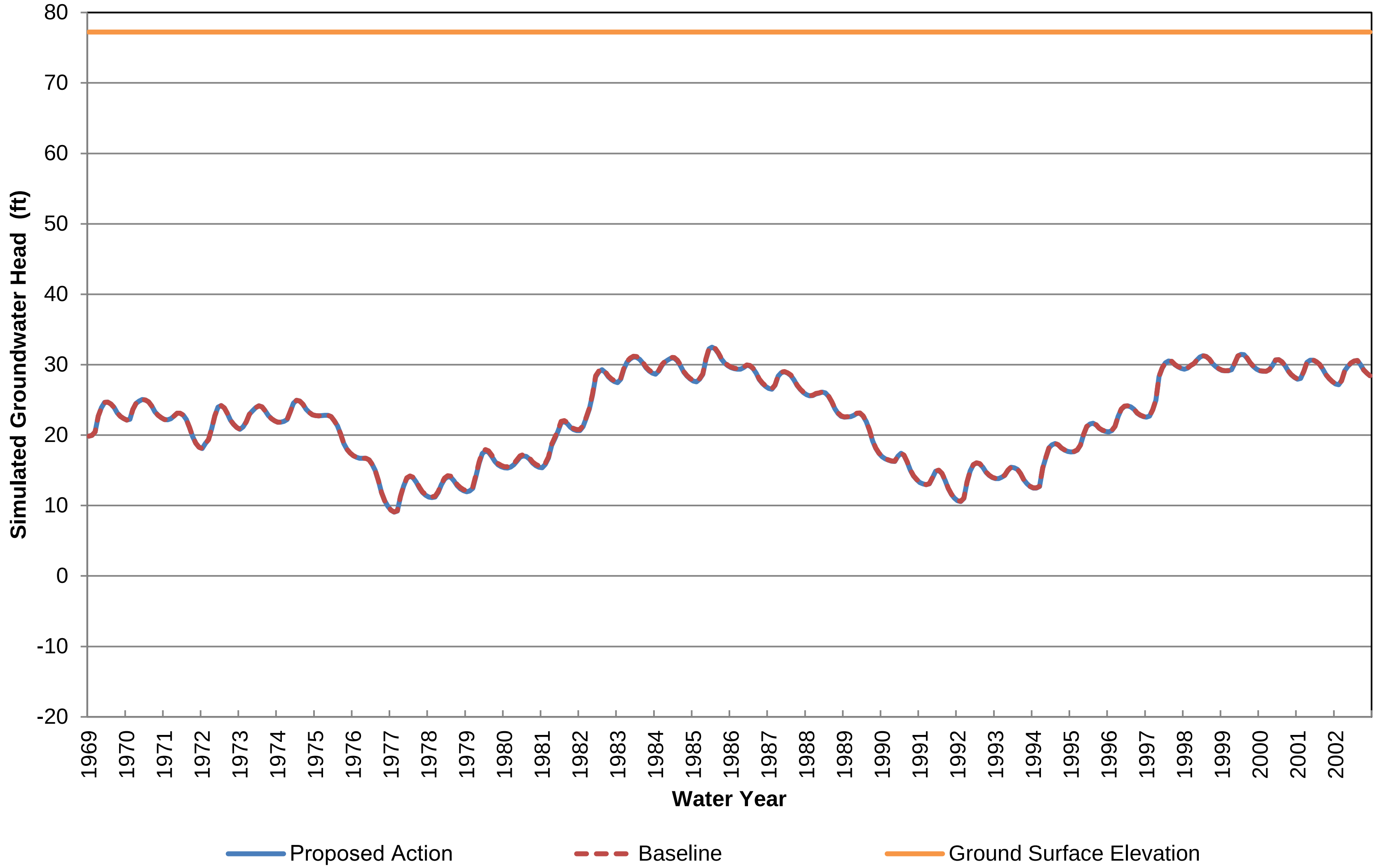
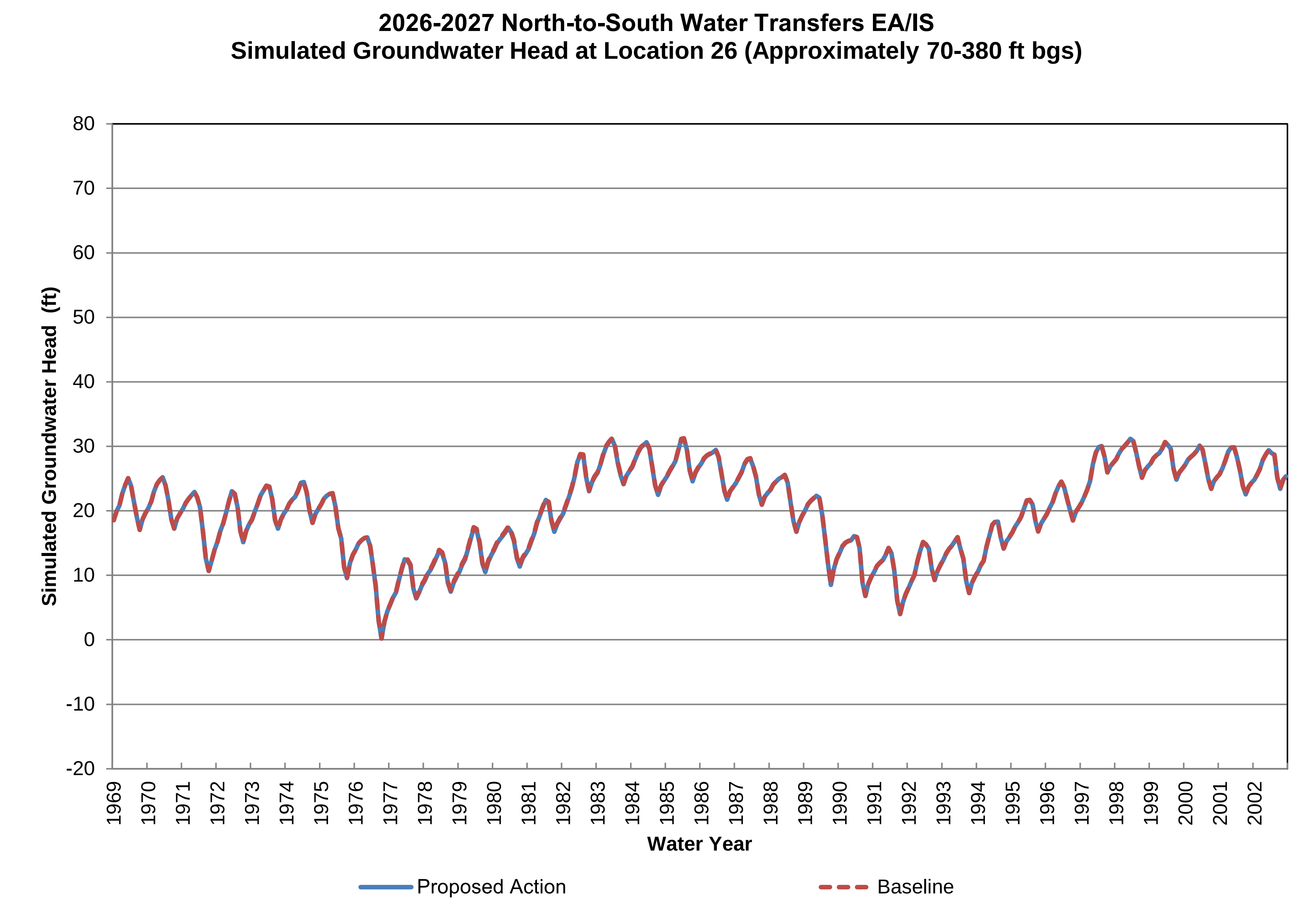
1996
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 26 (Approximately 0-70 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 26 (Approximately 70-380 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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1997
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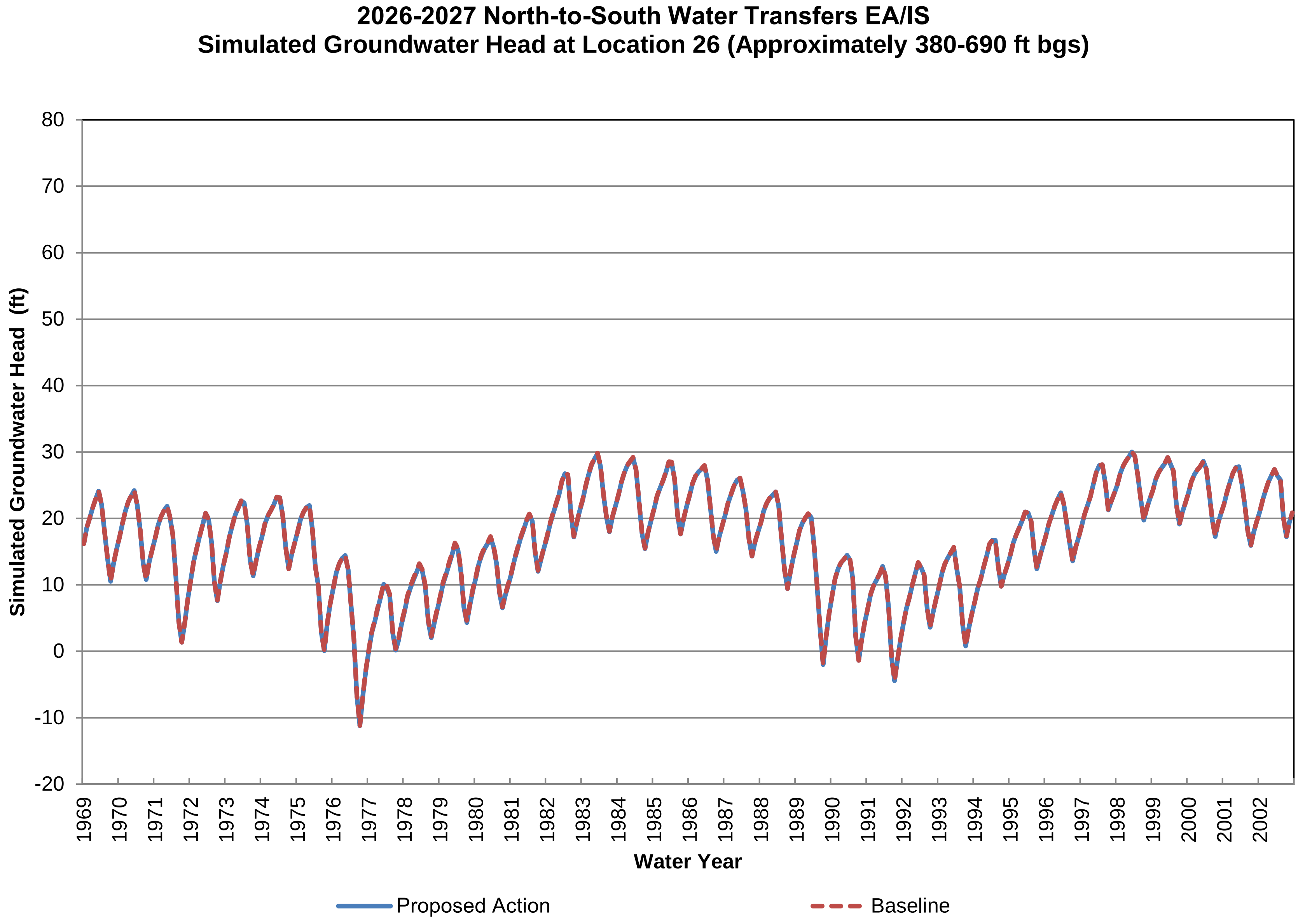
1999
2000
2001
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 26 (Approximately 380-690 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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1999
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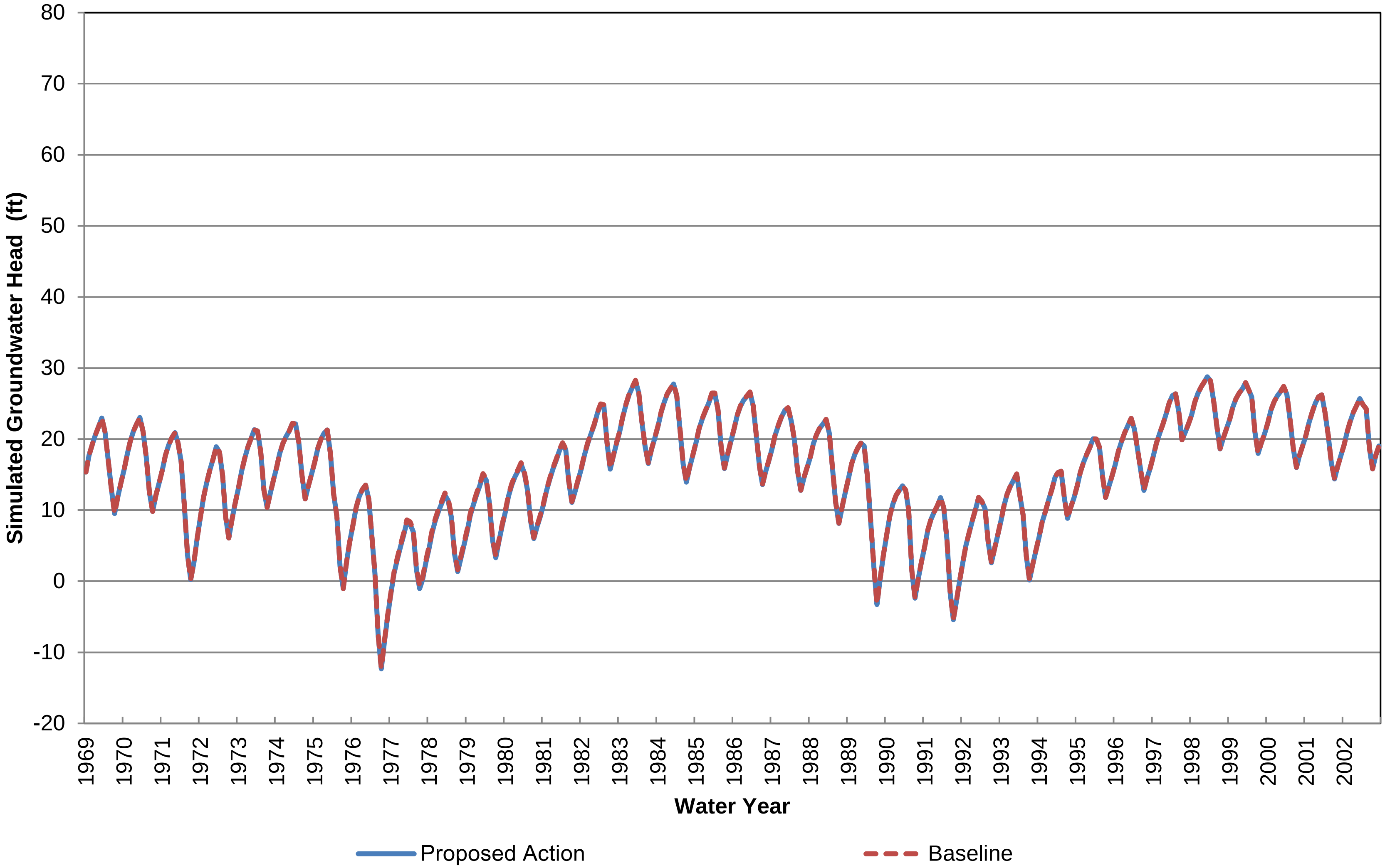
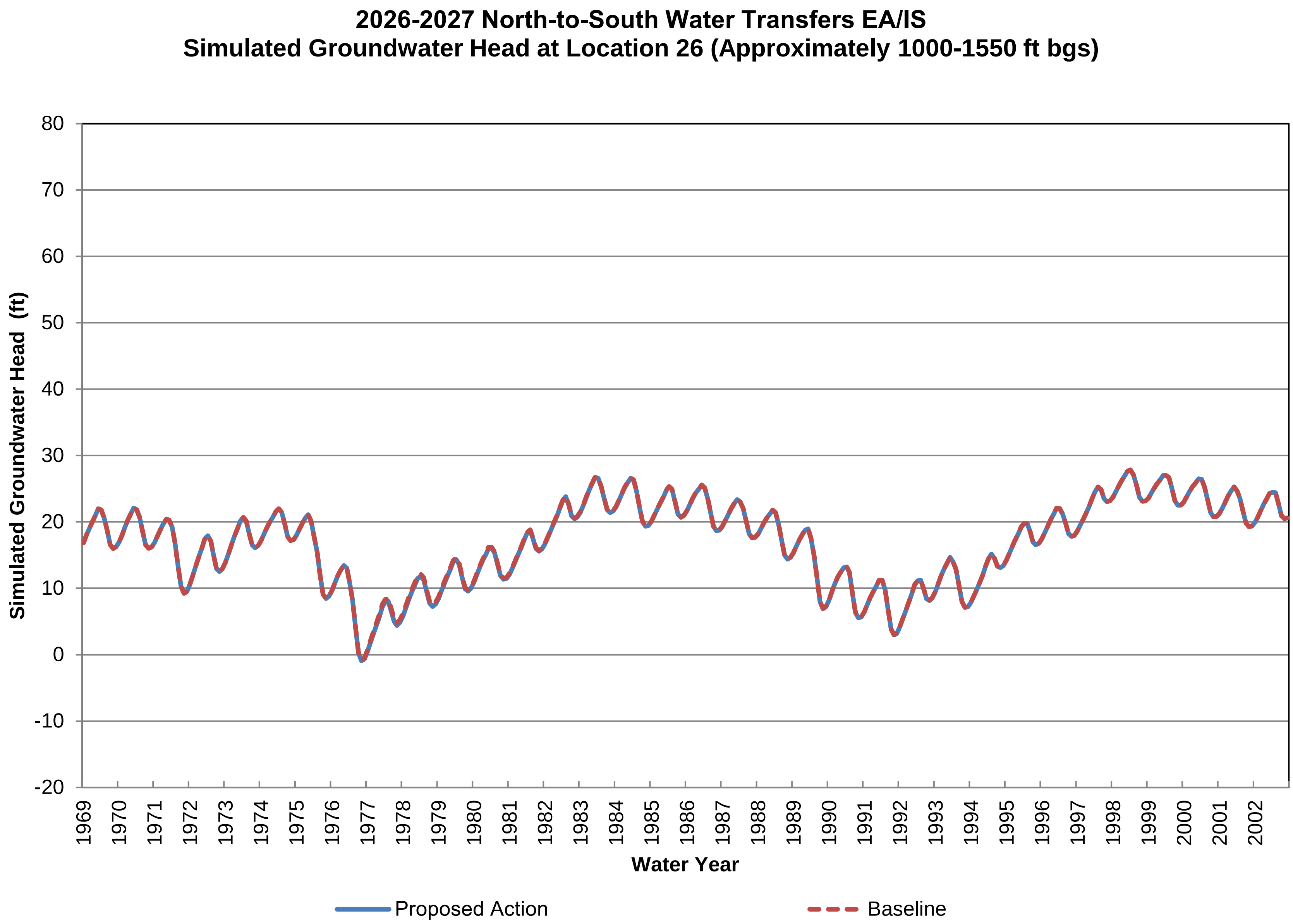
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 26 (Approximately 690-1000 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 26 (Approximately 1000-1550 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
1969
1970
1971
1972
1973
1974
1975
1976
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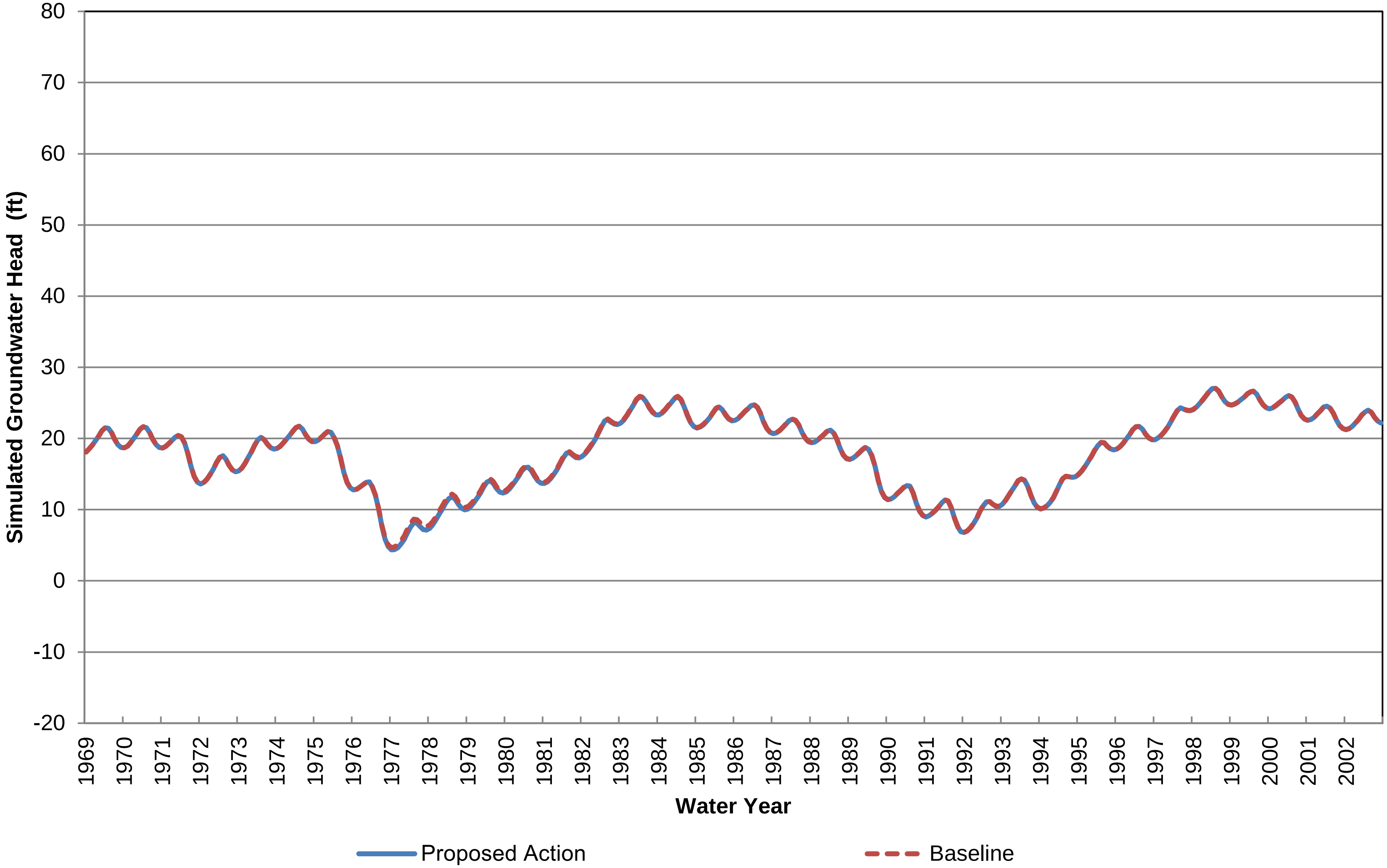
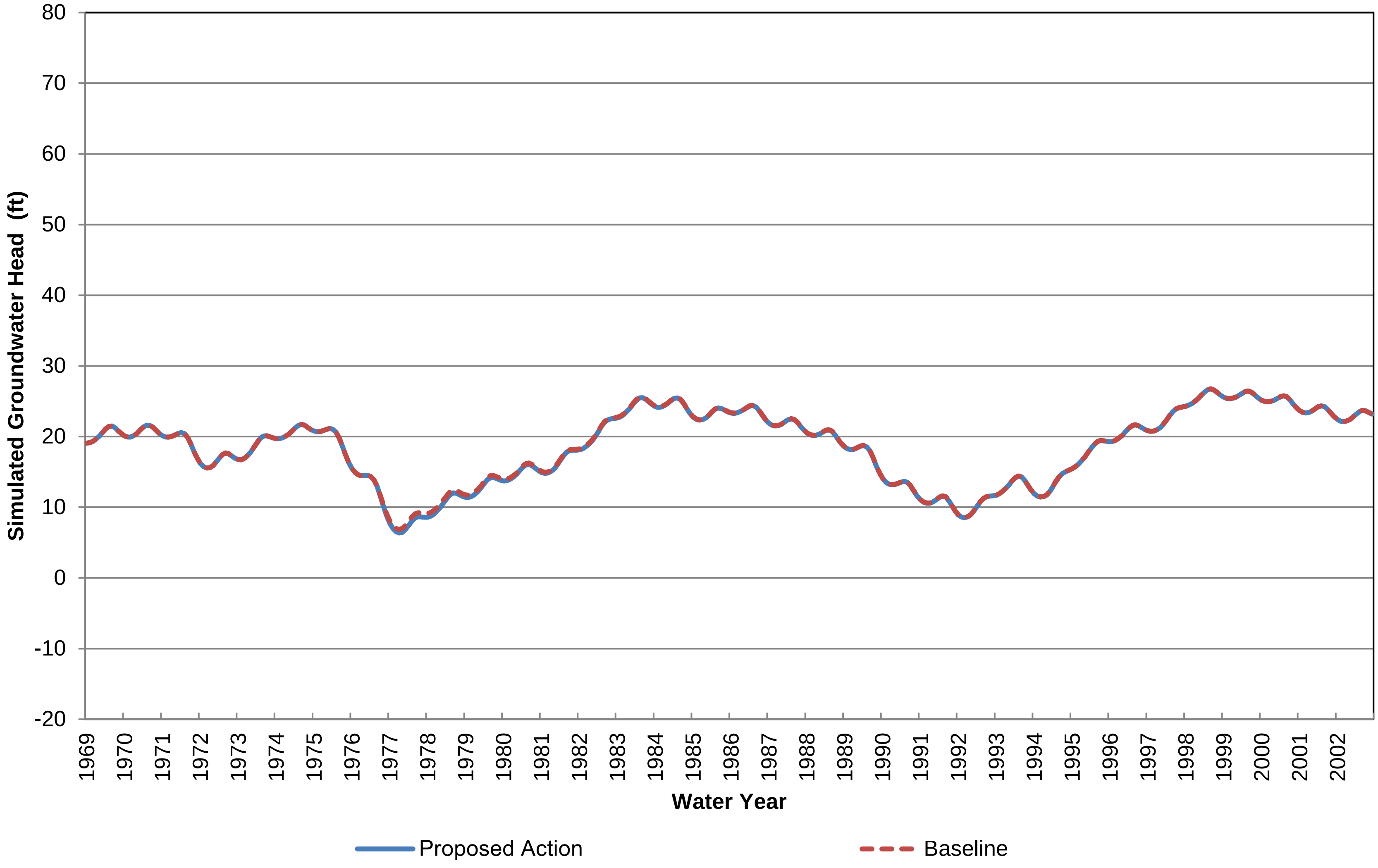
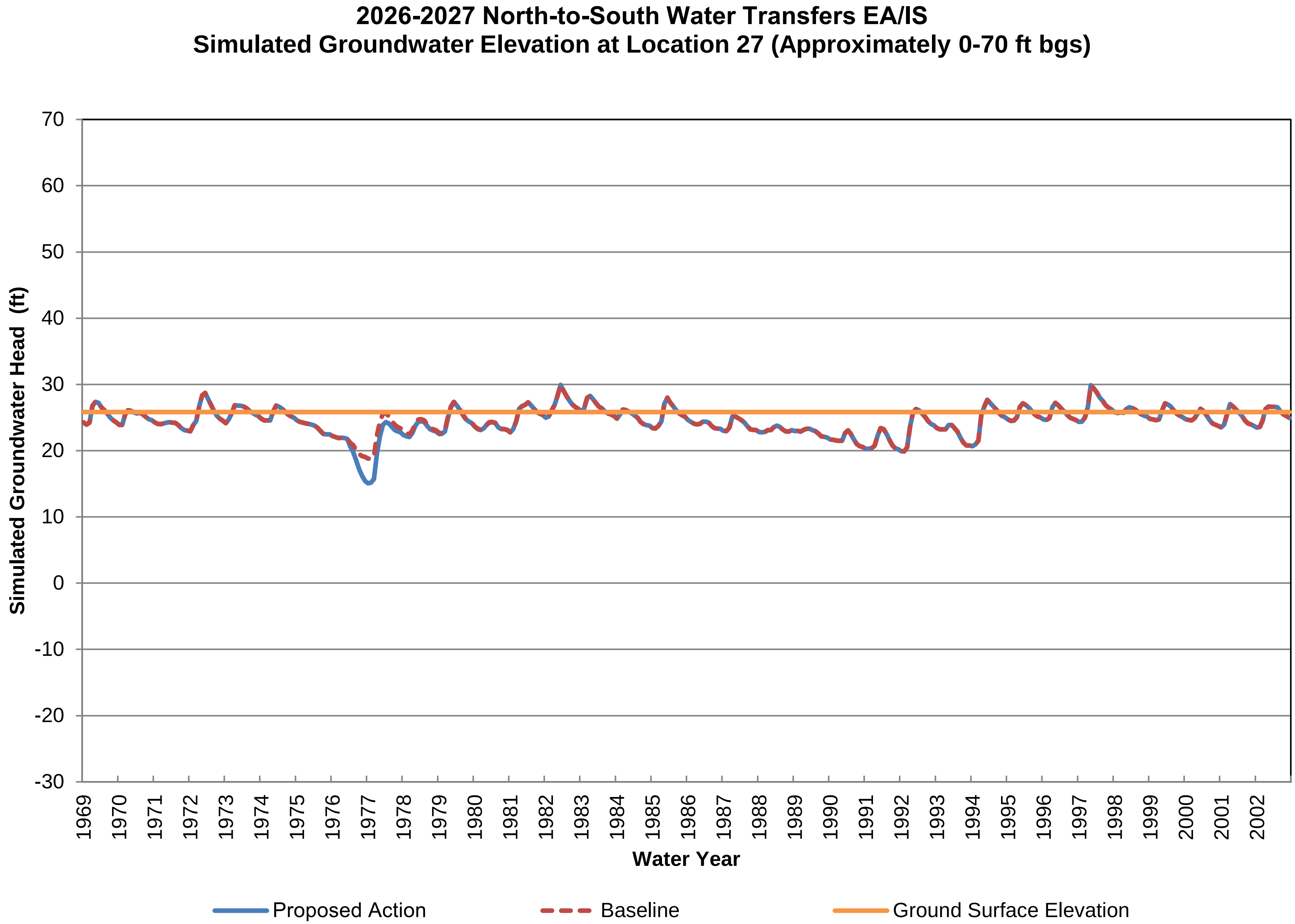
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 26 (Approximately 1550-2070 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 26 (Approximately 2070-2840 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 27 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
70
60
50
40
30
20
10
0
-10
-20
-30
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
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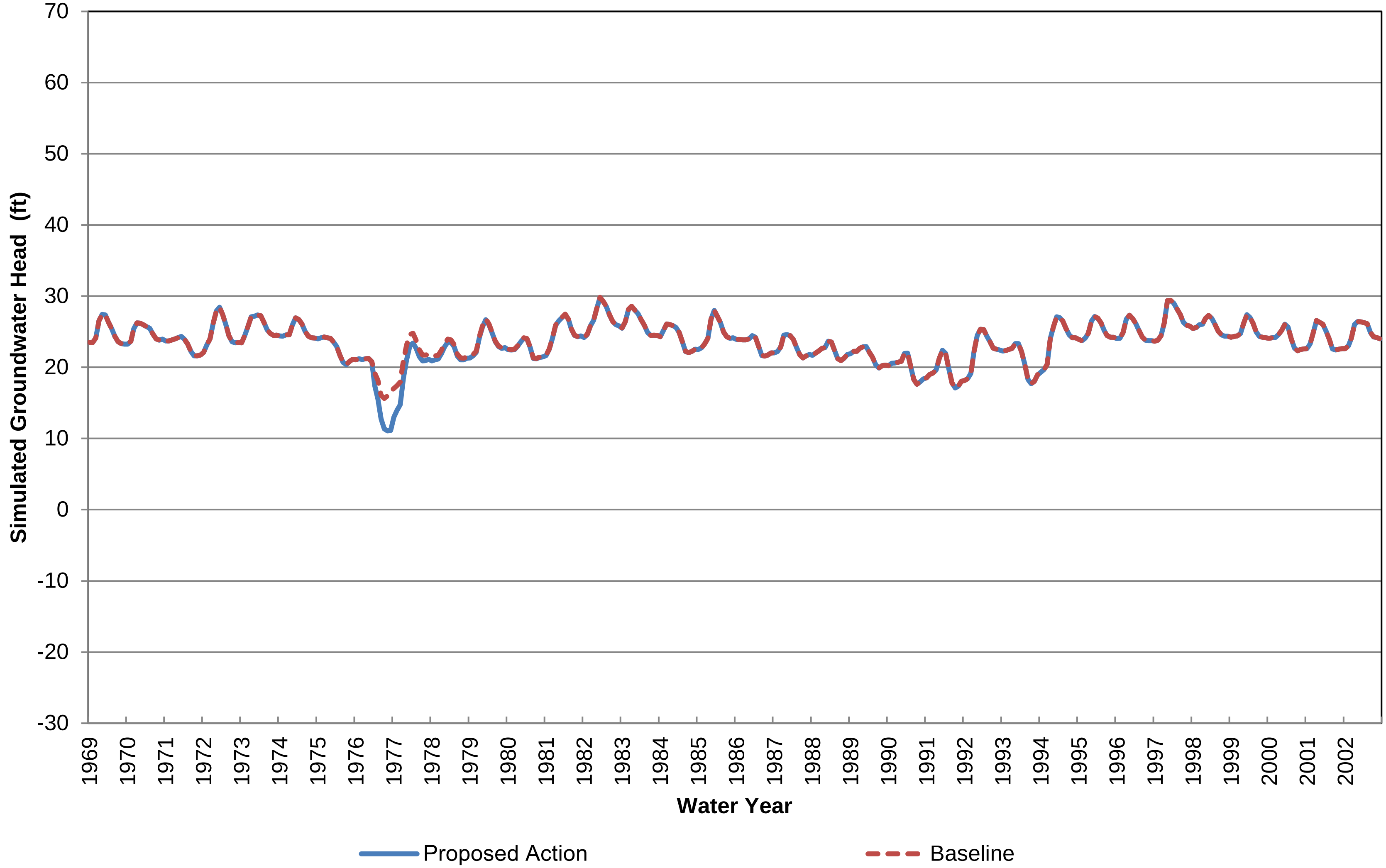
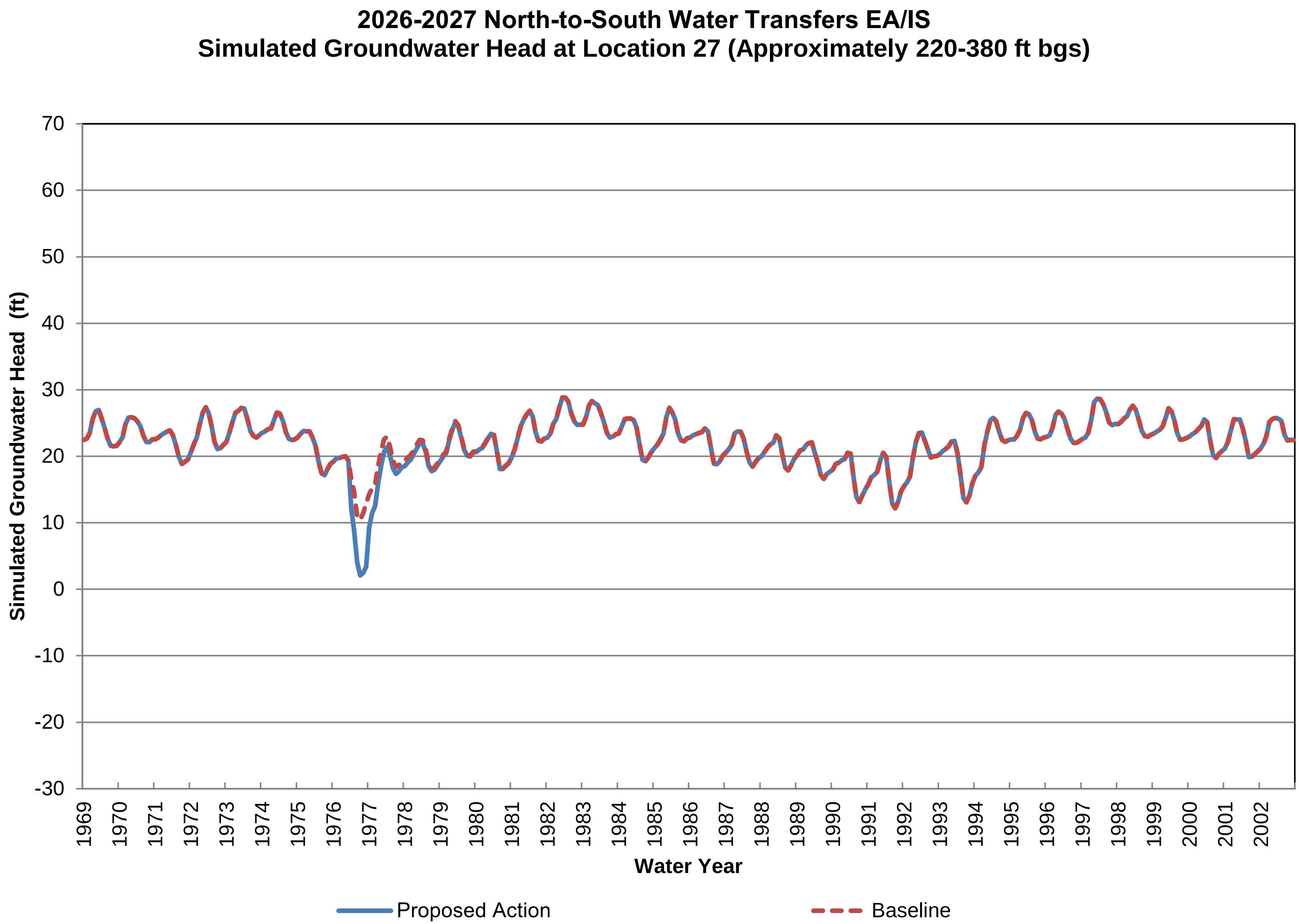
2001
2002
Water Year
Proposed Action
Baseline
Ground Surface Elevation

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 27 (Approximately 70-220 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 27 (Approximately 220-380 ft bgs)
Simulated Groundwater Head (ft)
70
60
50
40
30
20
10
0
-10
-20
-30
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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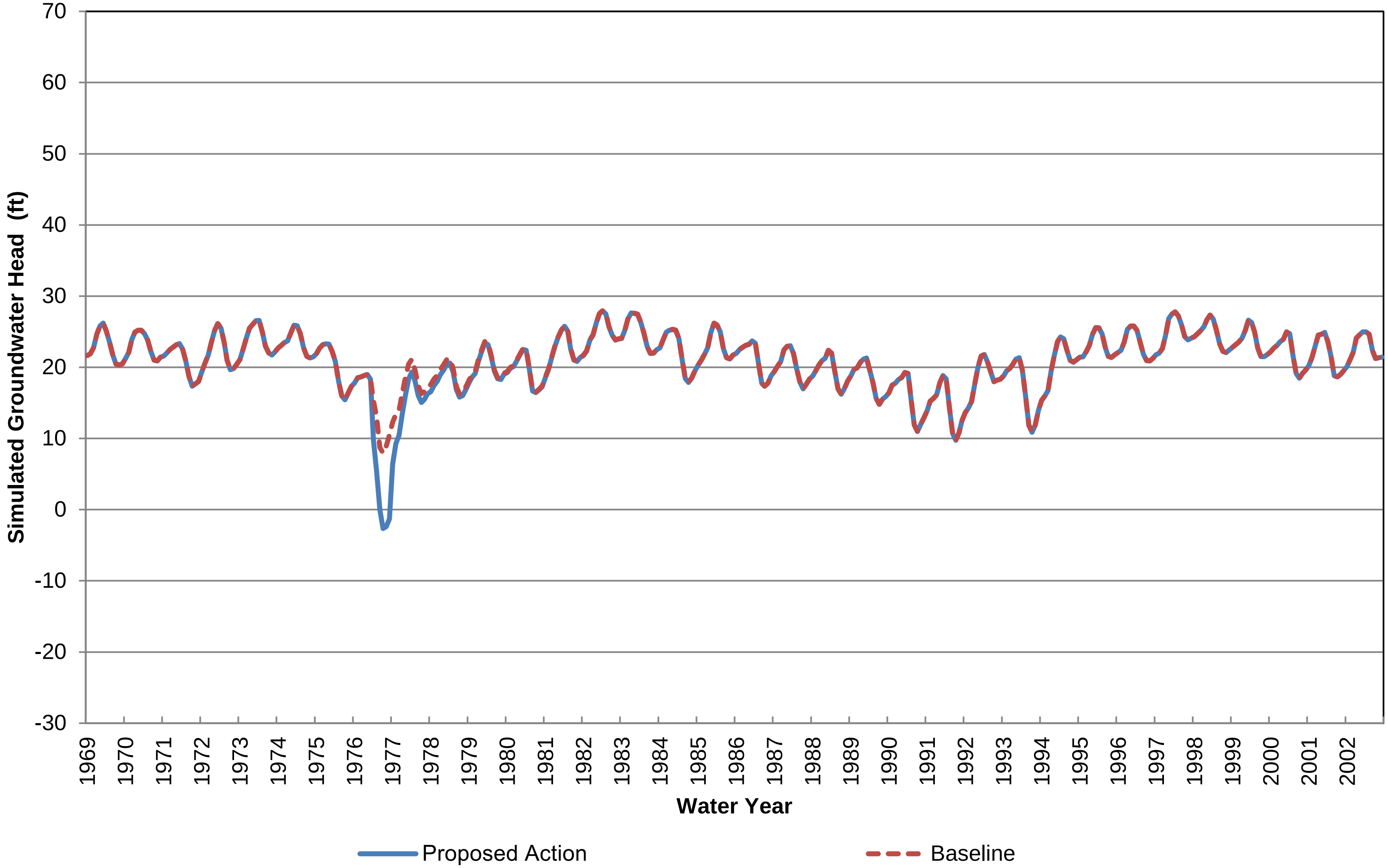
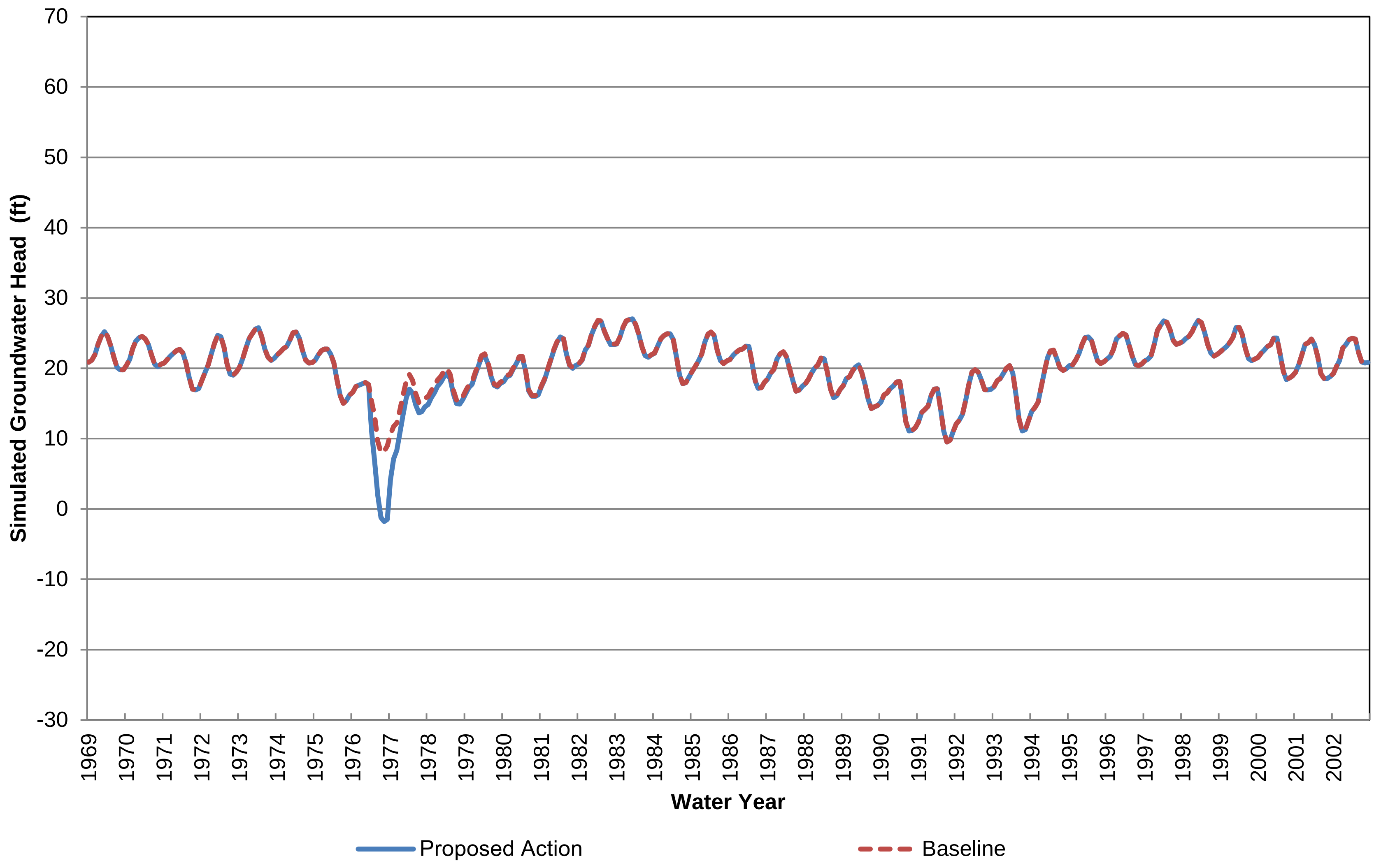
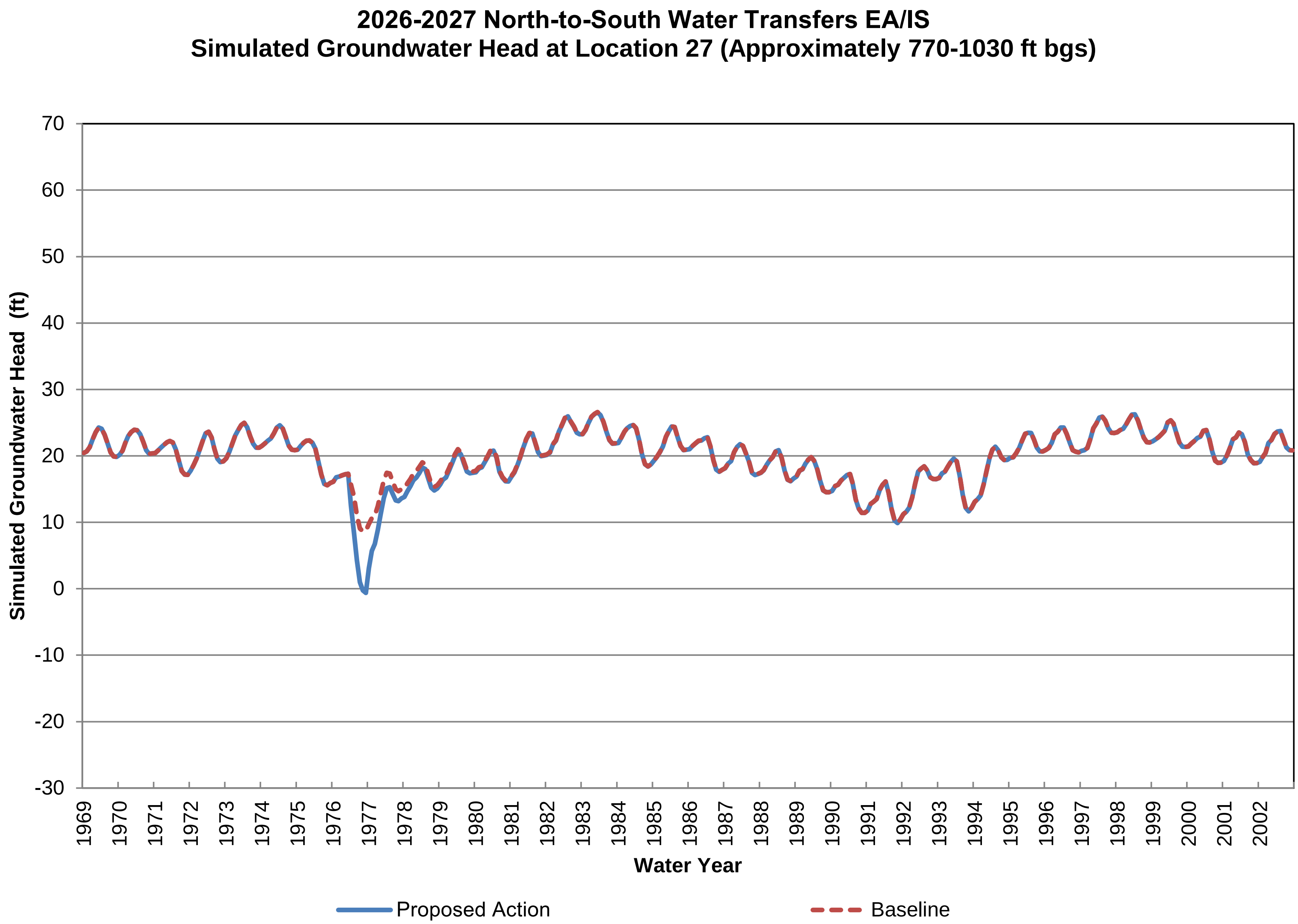
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 27 (Approximately 380-530 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 27 (Approximately 530-770 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 27 (Approximately 770-1030 ft bgs)
Simulated Groundwater Head (ft)
70
60
50
40
30
20
10
0
-10
-20
-30
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
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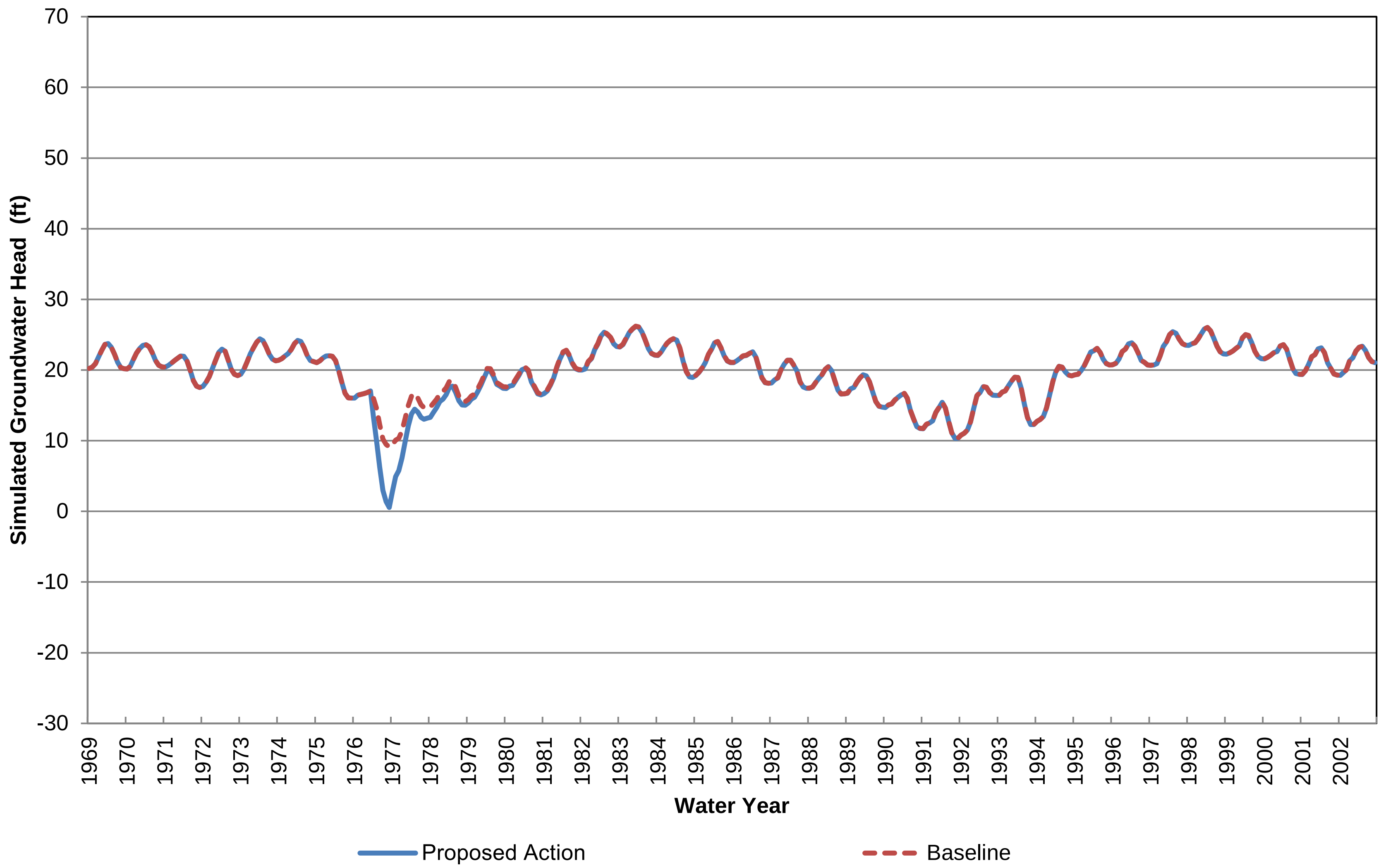
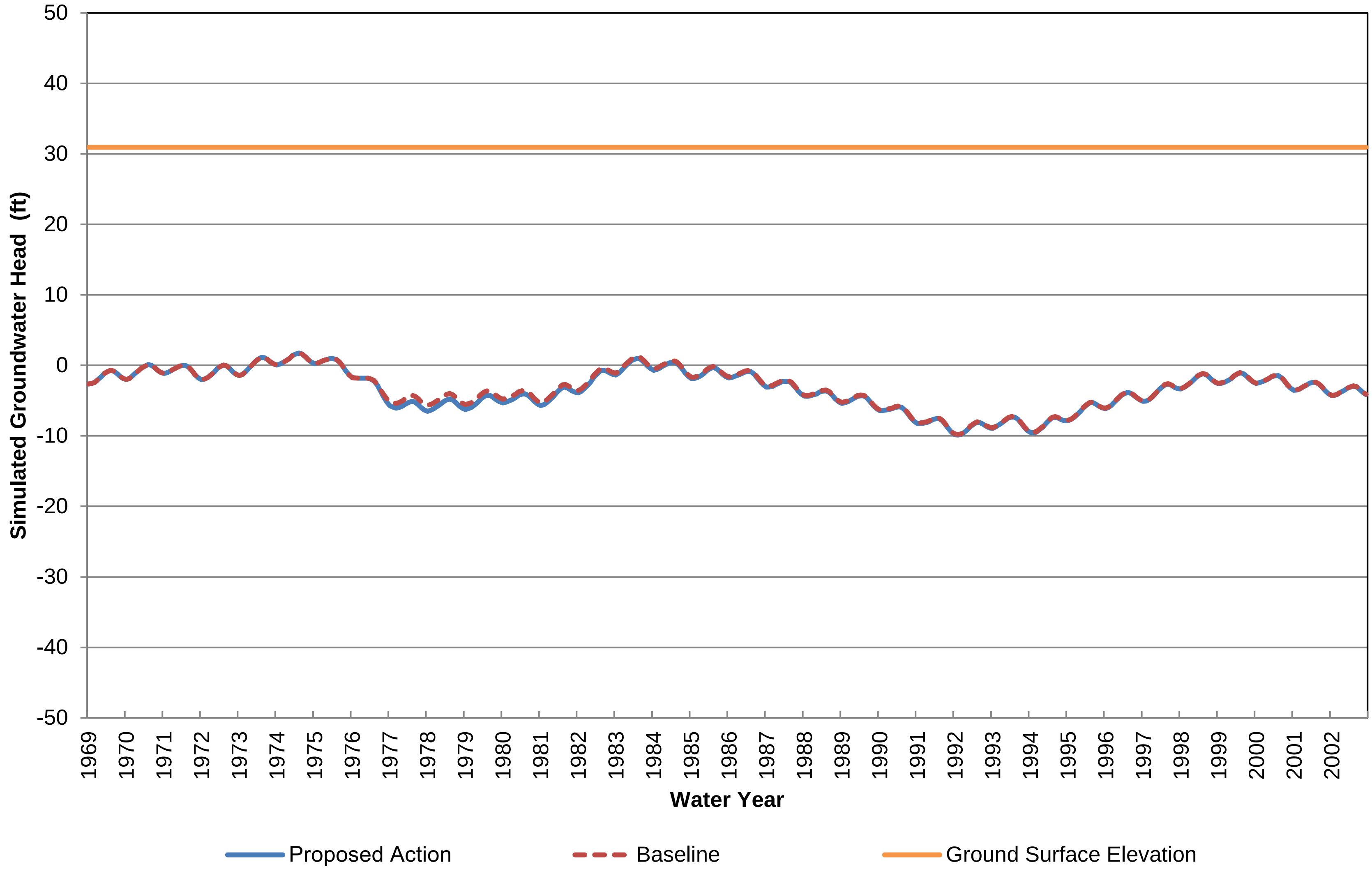
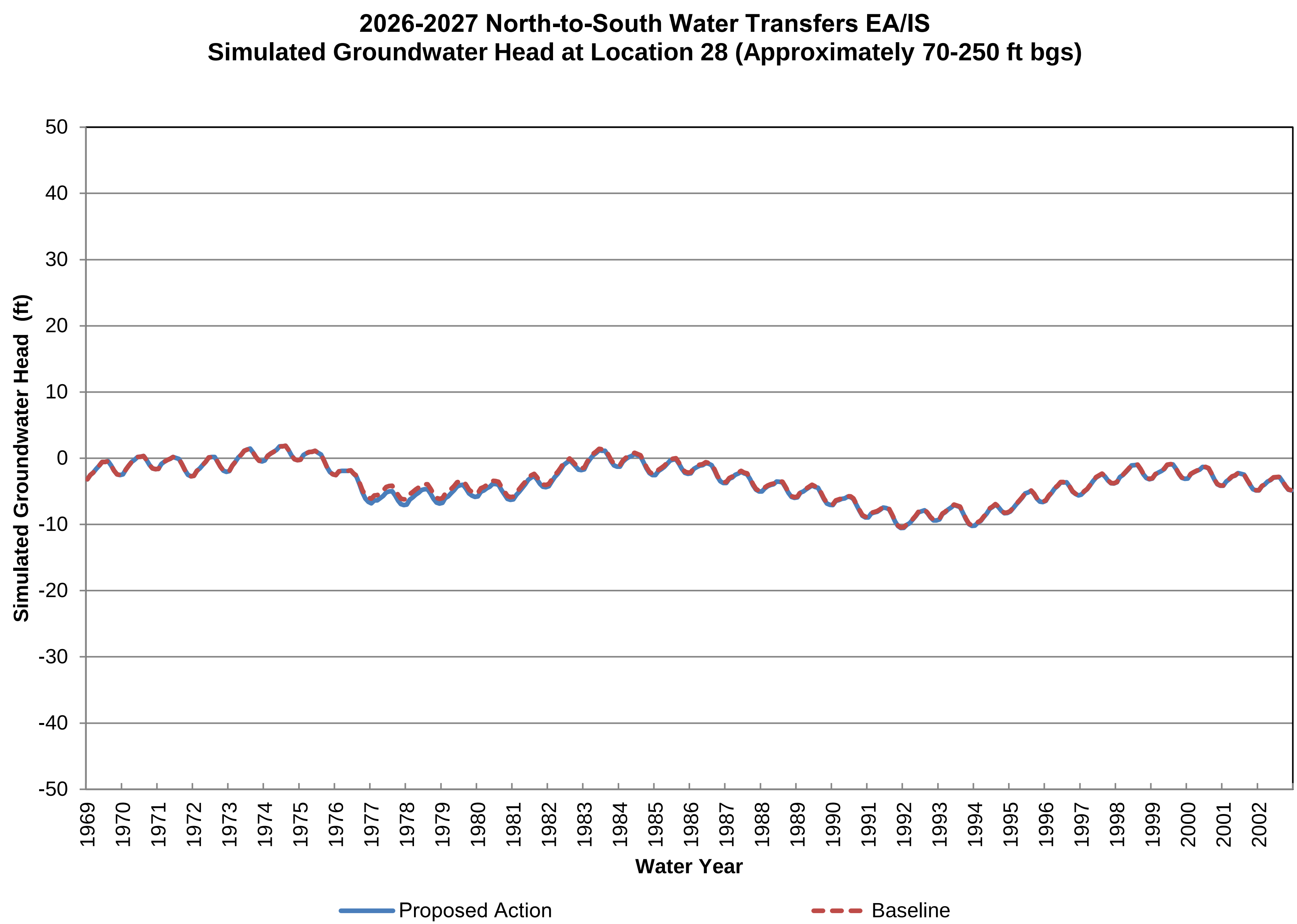
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 27 (Approximately 1030-1410 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 28 (Approximately 0-70 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 28 (Approximately 70-250 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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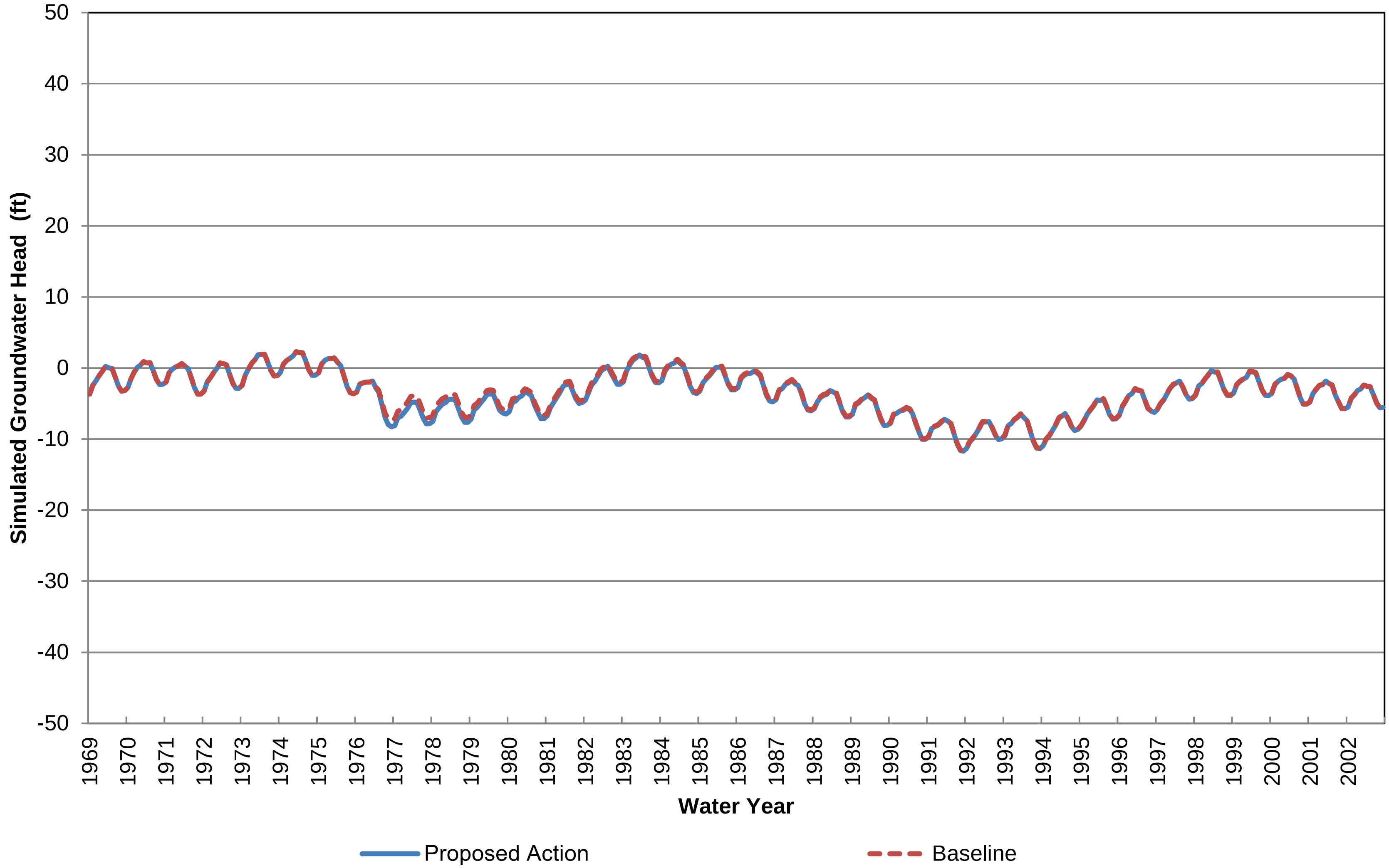
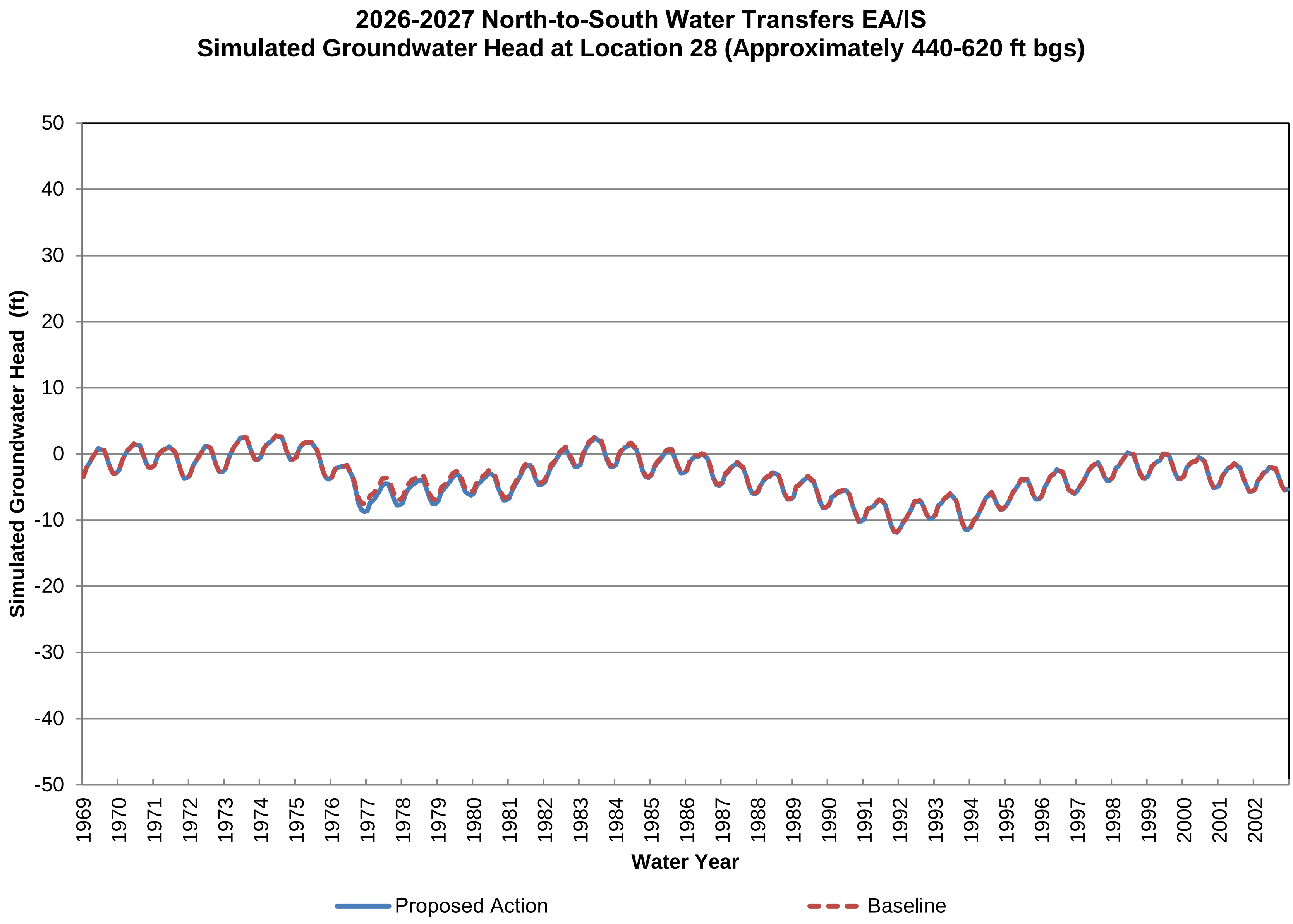
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 28 (Approximately 250-440 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 28 (Approximately 440-620 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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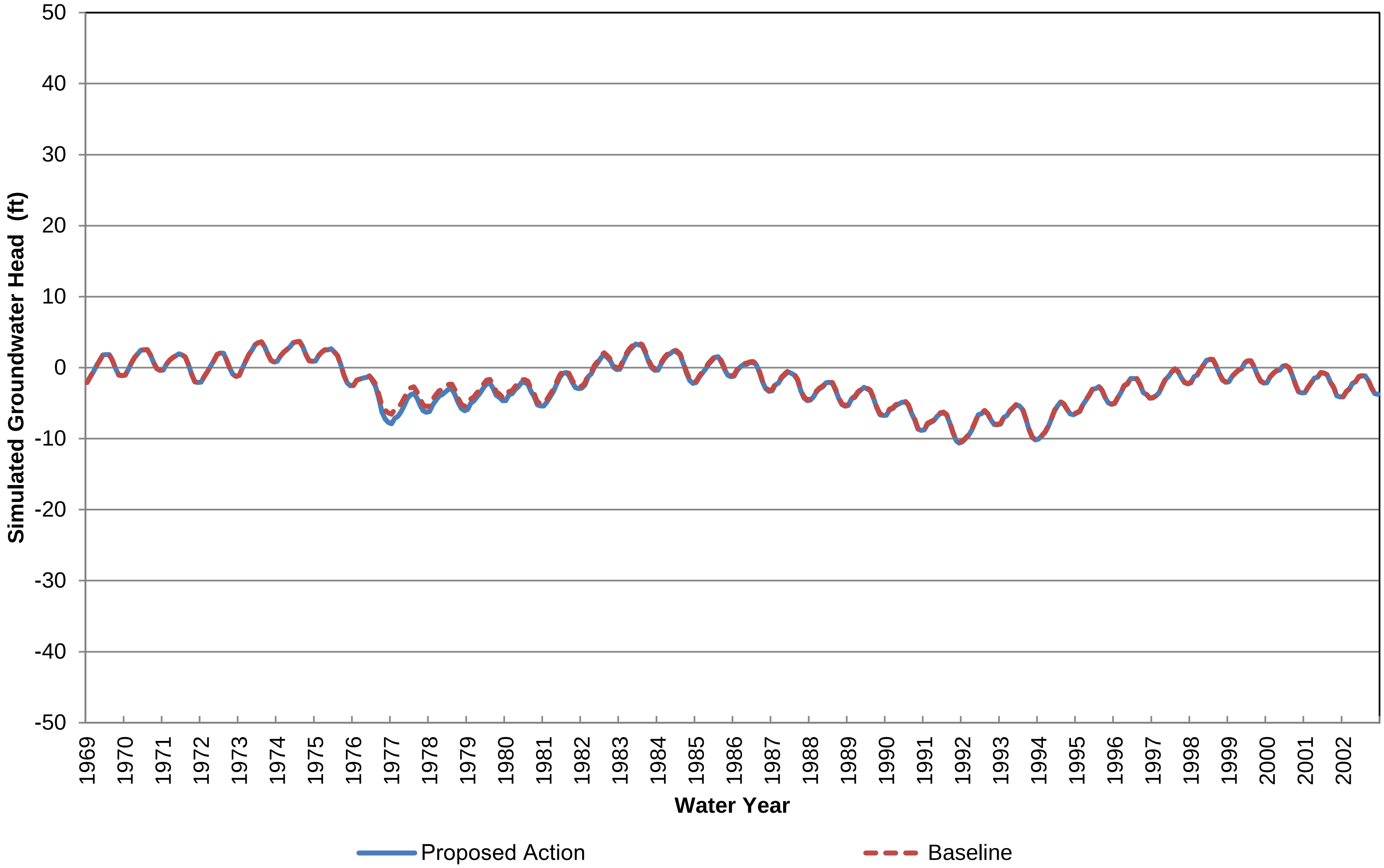
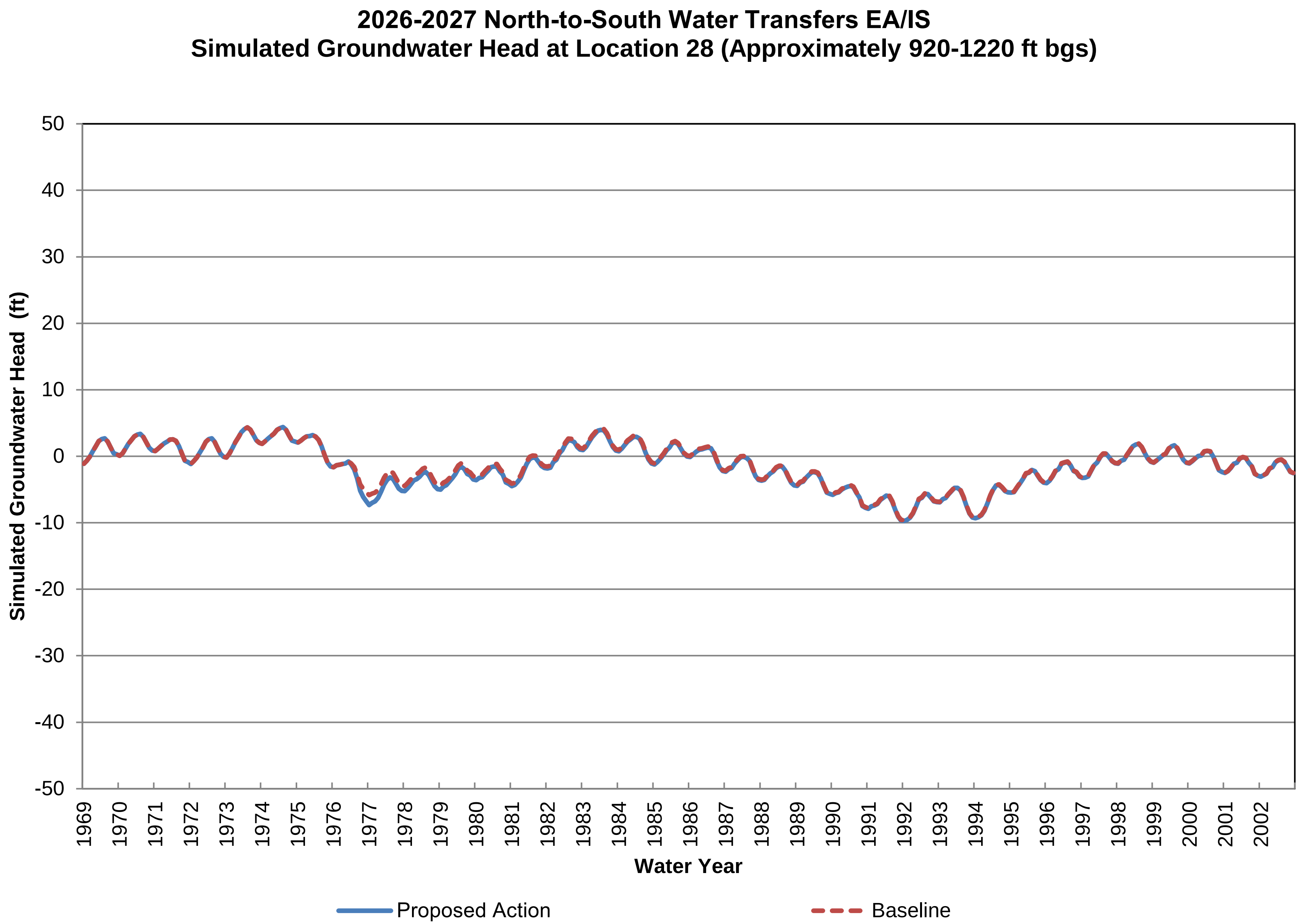
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 28 (Approximately 620-920 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 28 (Approximately 920-1220 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
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1997
1998
1999
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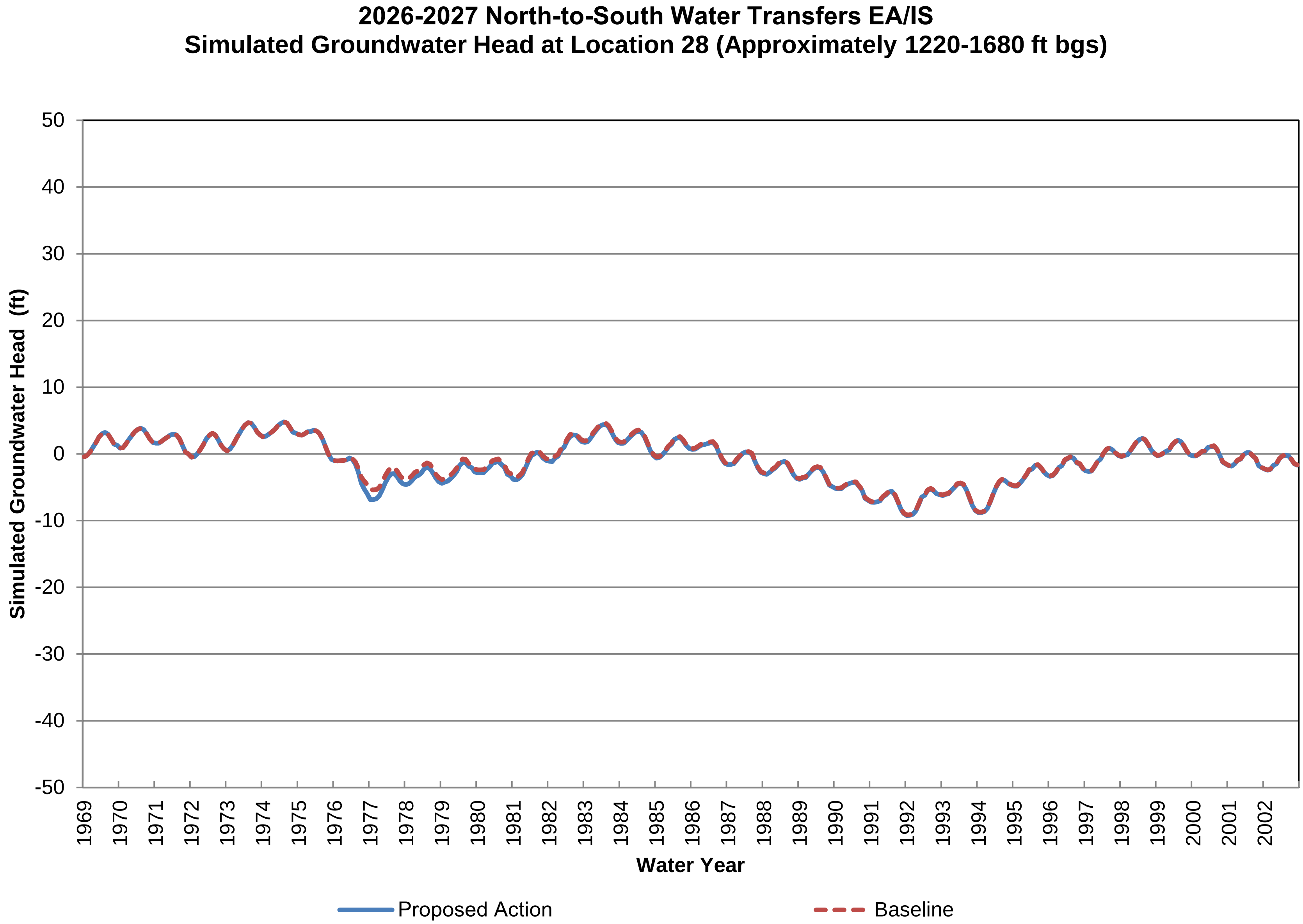
2001
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 28 (Approximately 1220-1680 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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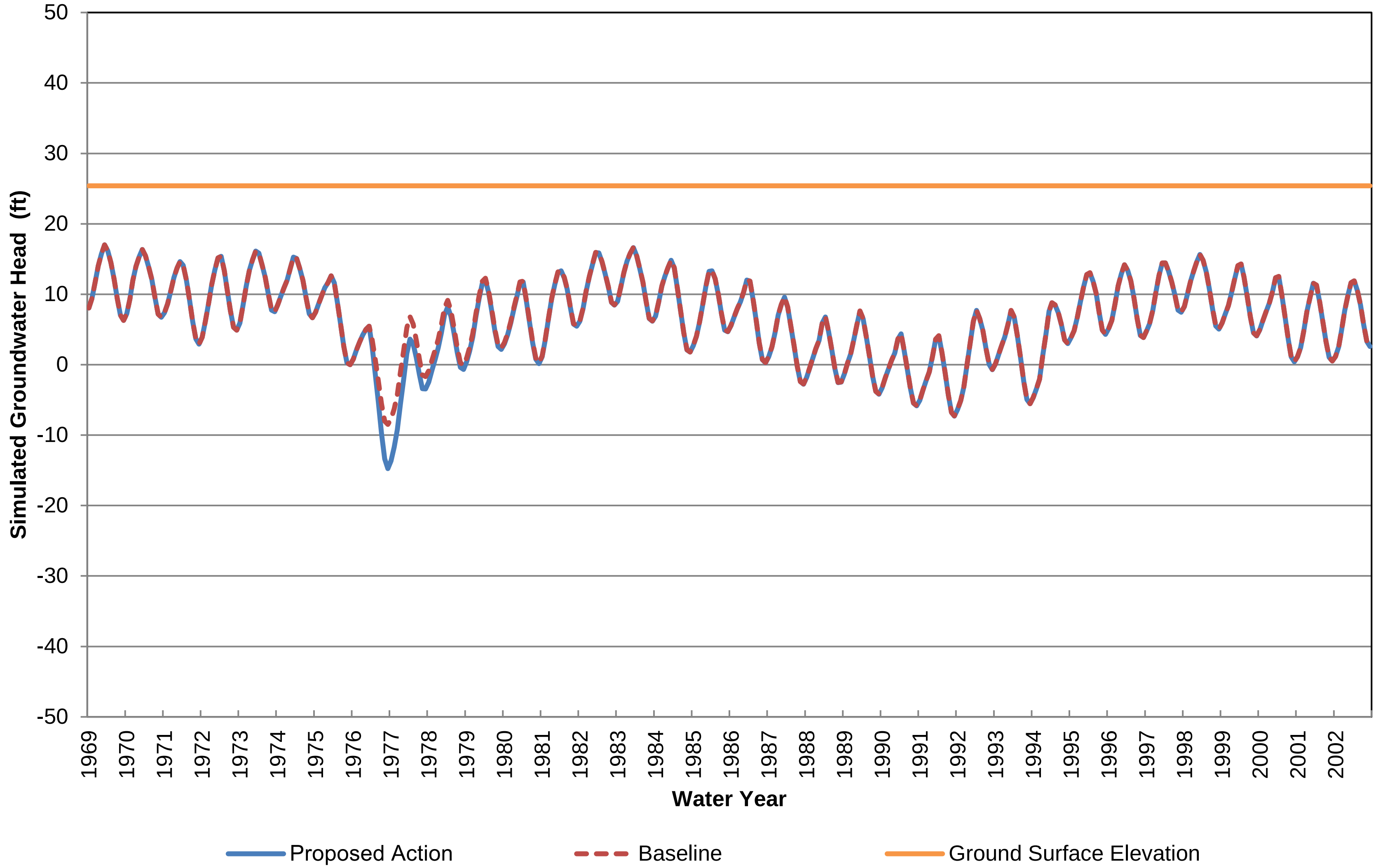
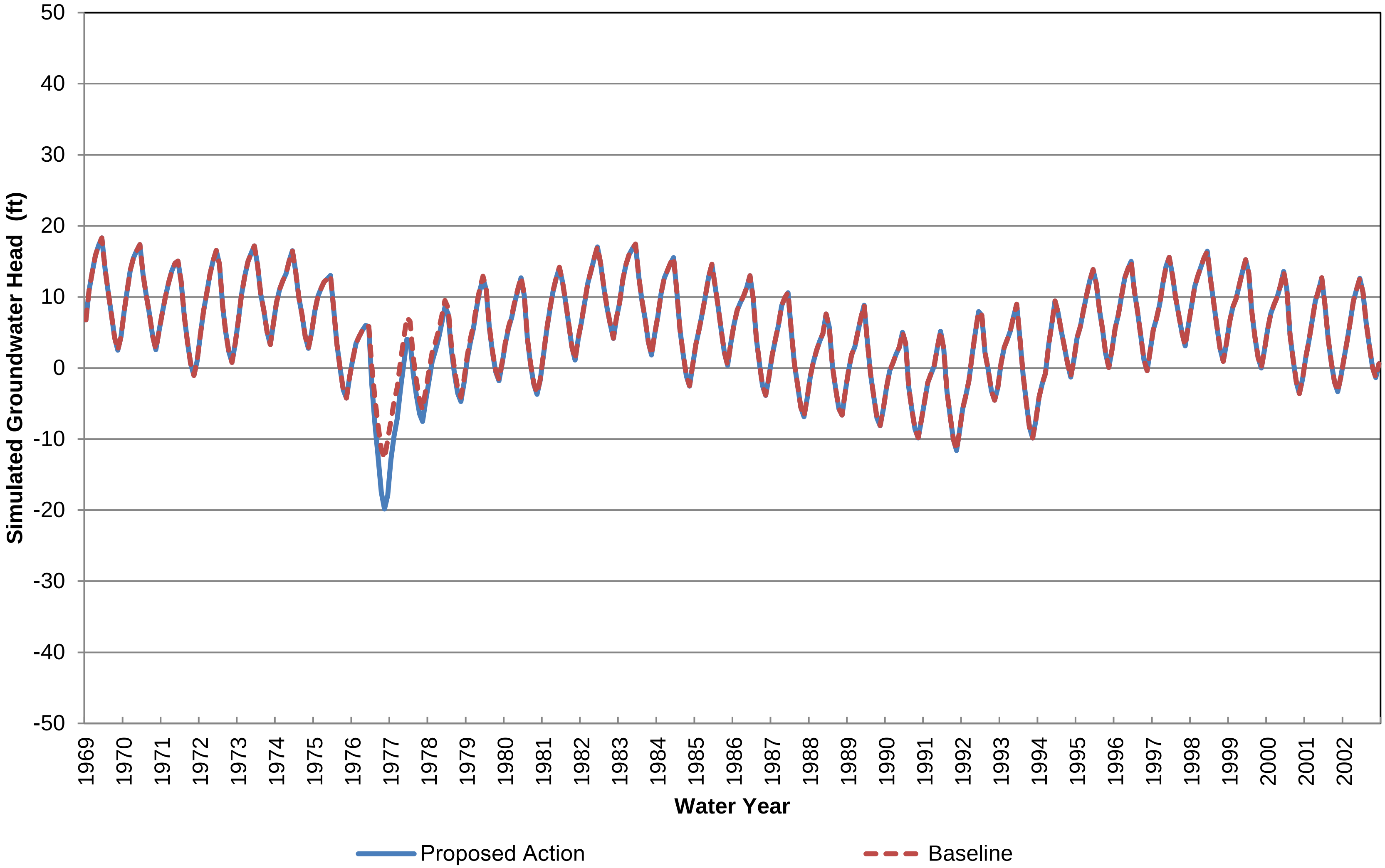
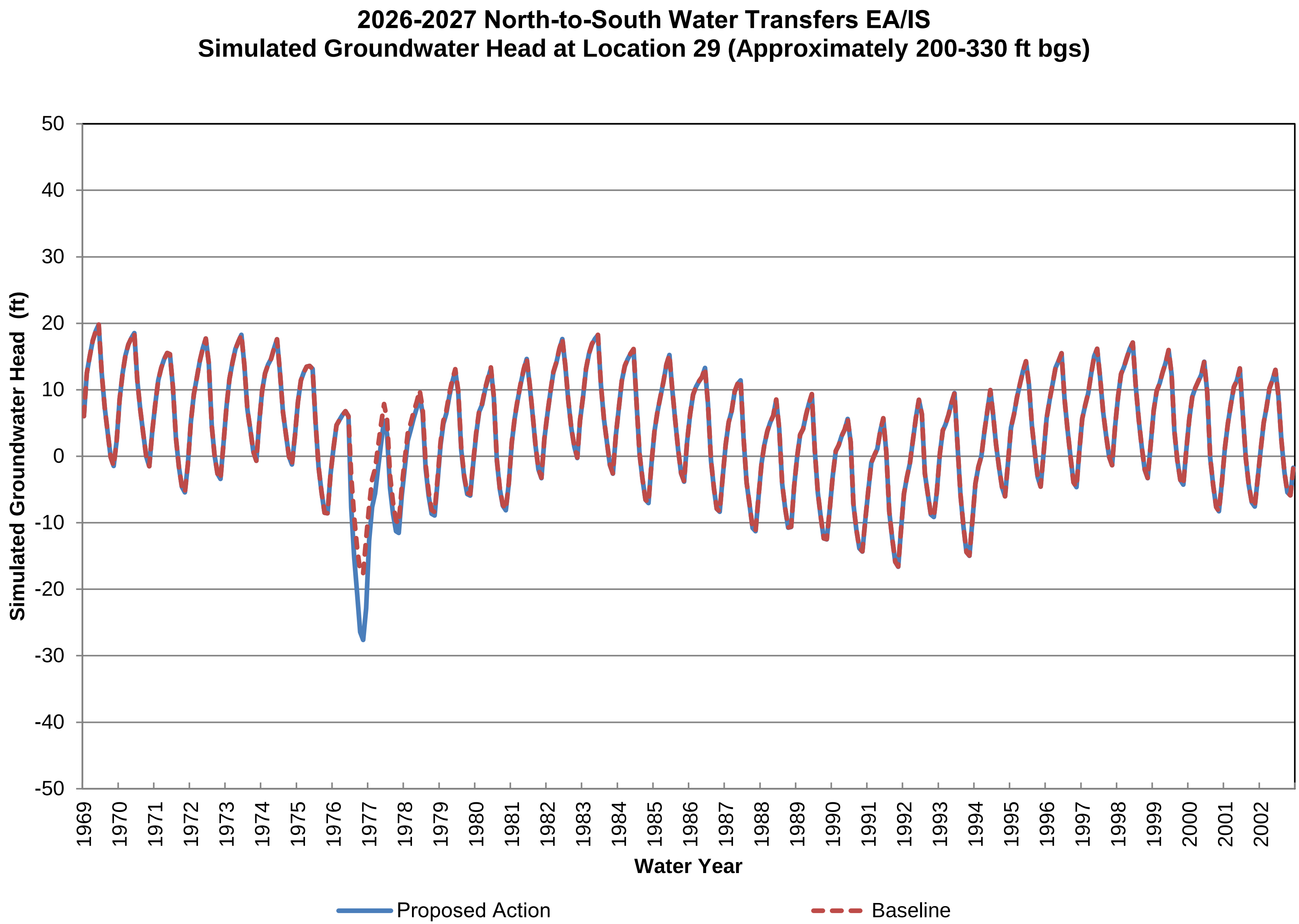
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 29 (Approximately 0-70 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 29 (Approximately 70-200 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 29 (Approximately 200-330 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
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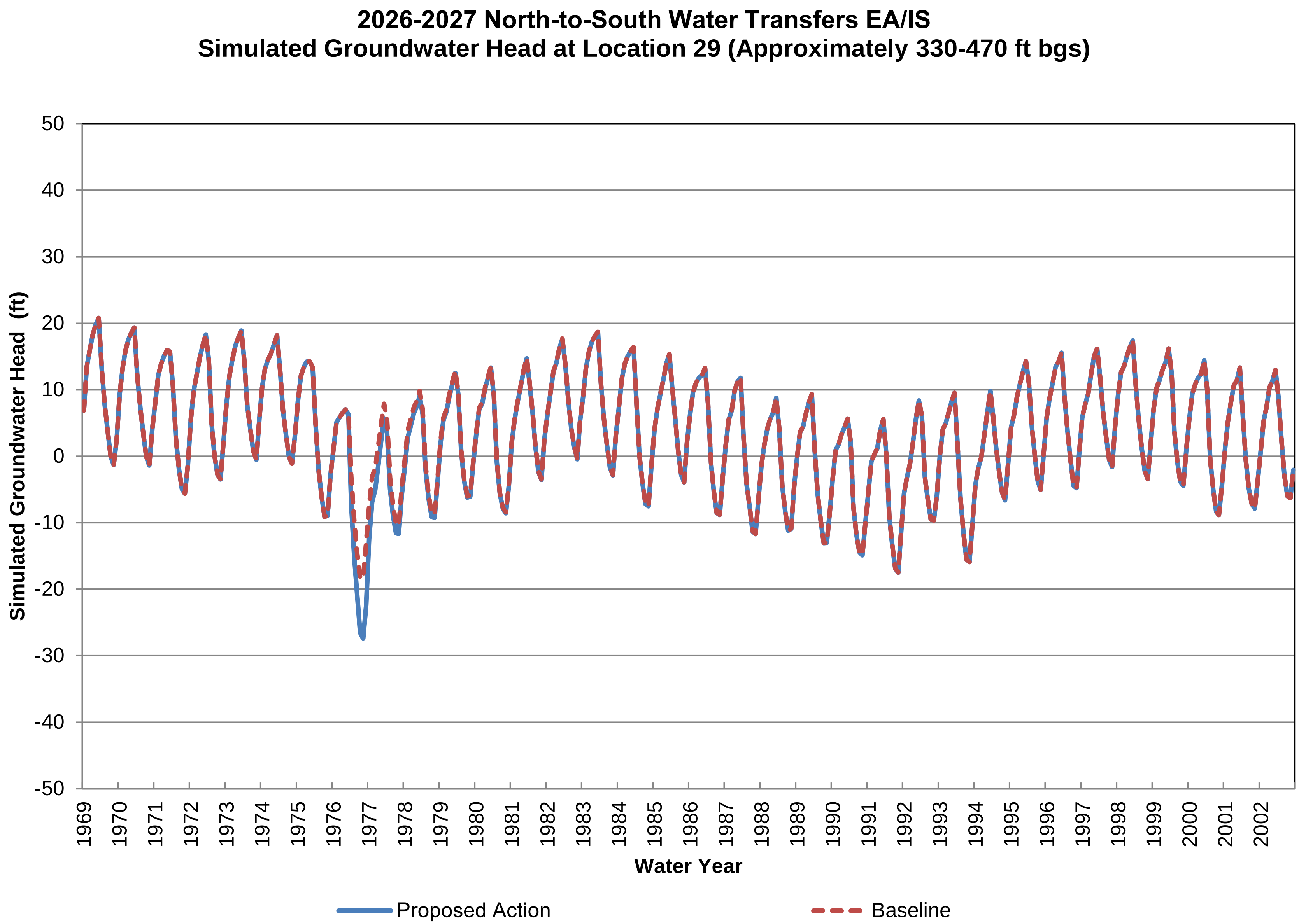
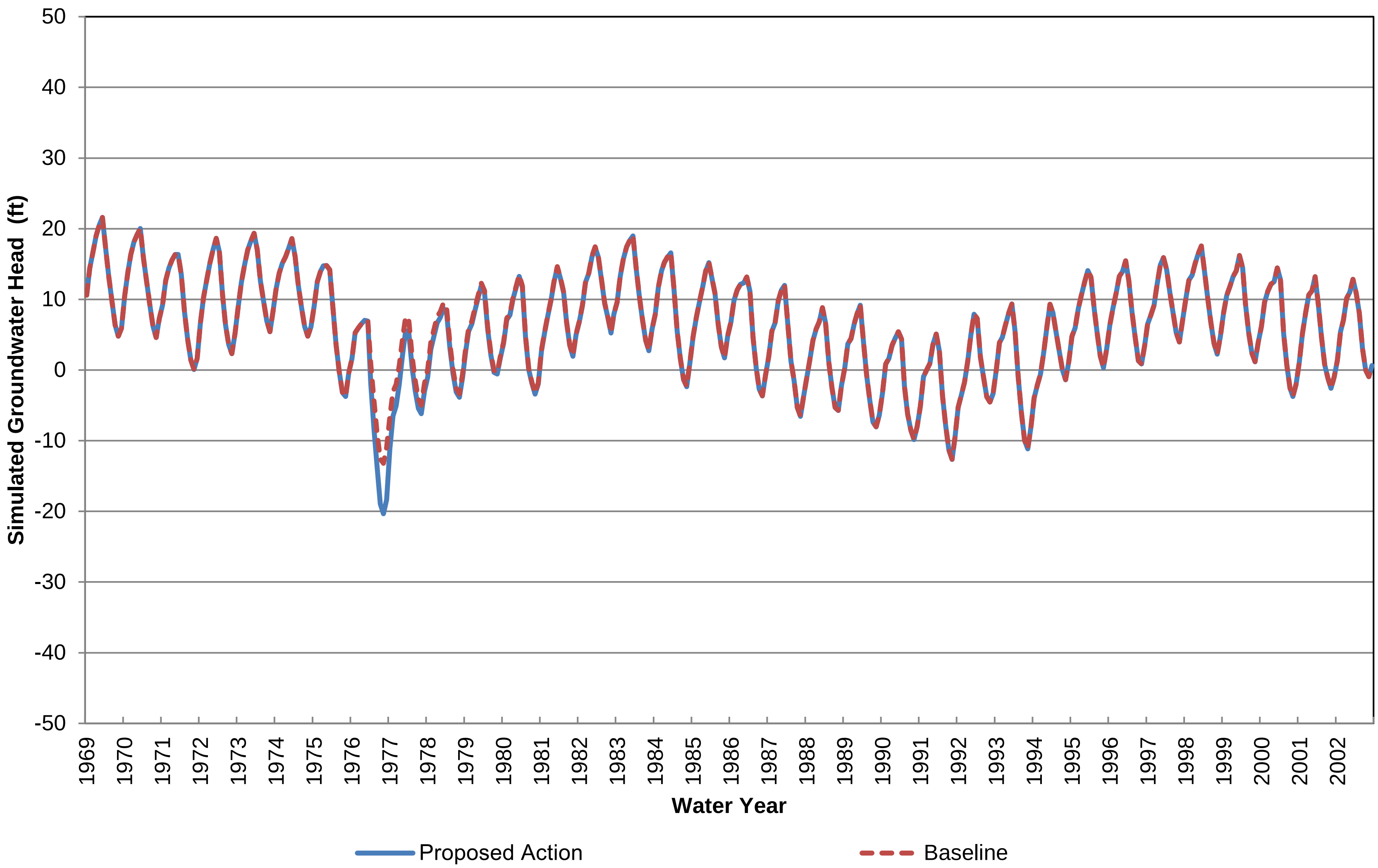
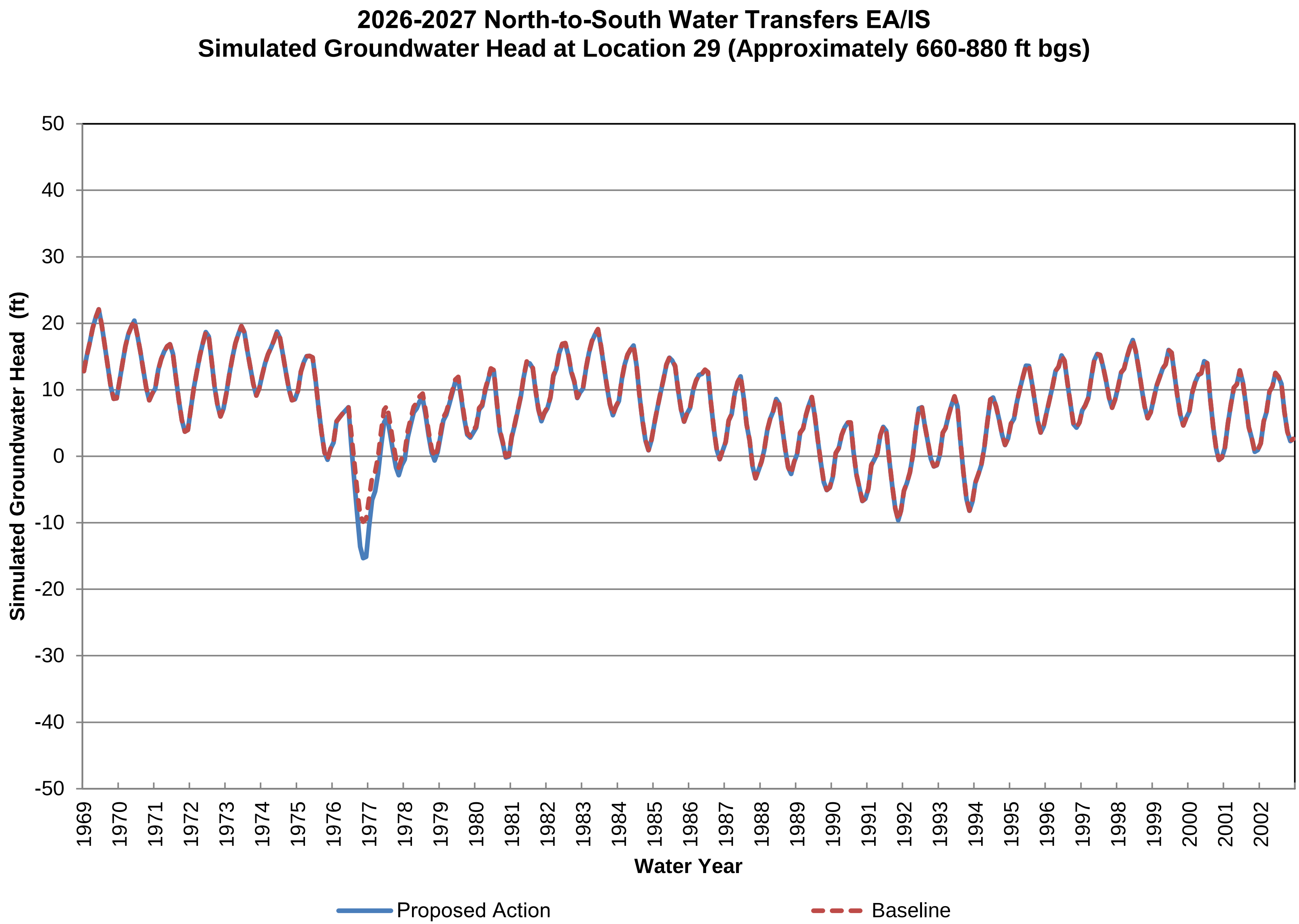
2001
2002
Water Year
Proposed Action
Baseline



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 29 (Approximately 330-470 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 29 (Approximately 470-660 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 29 (Approximately 660-880 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
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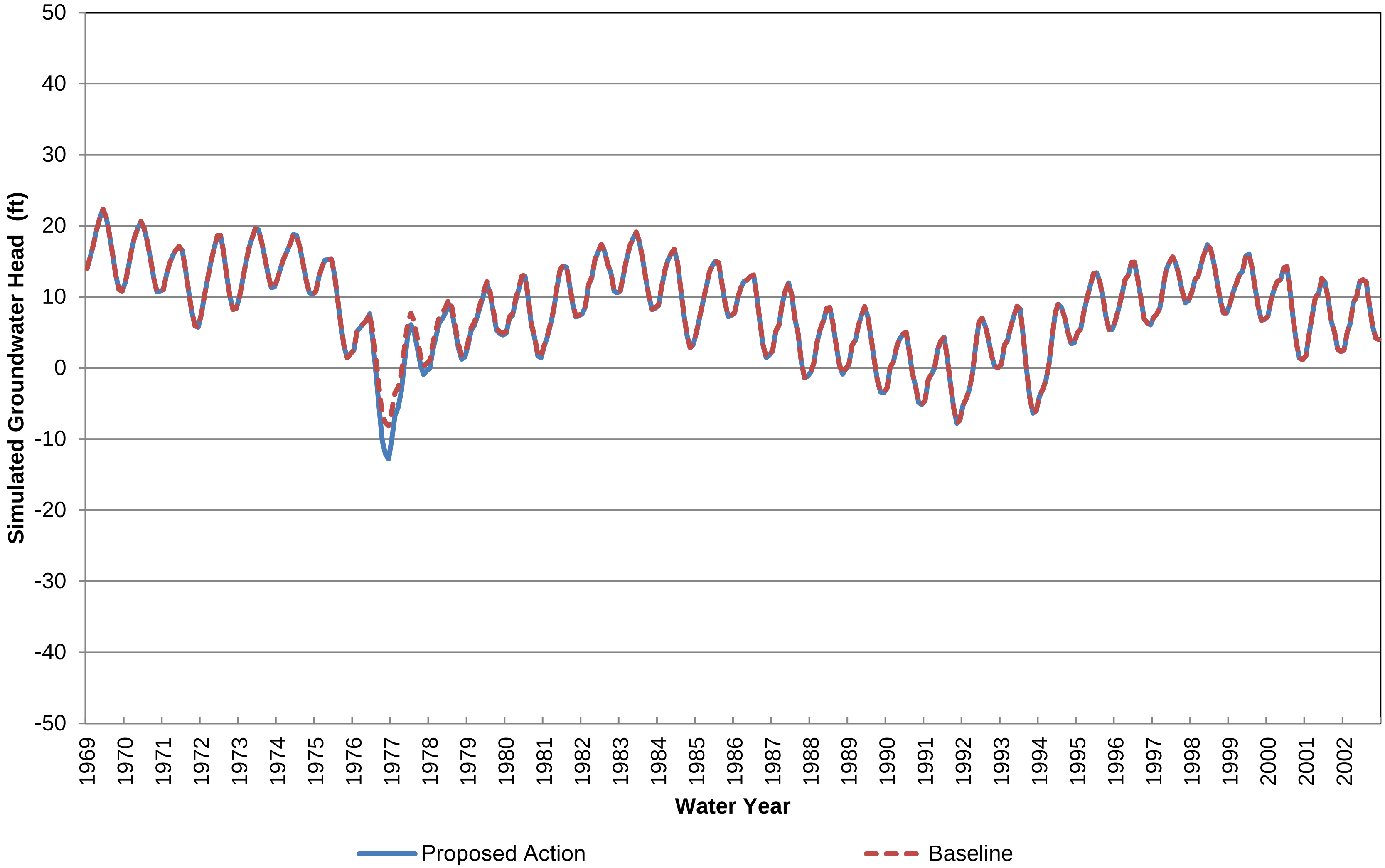
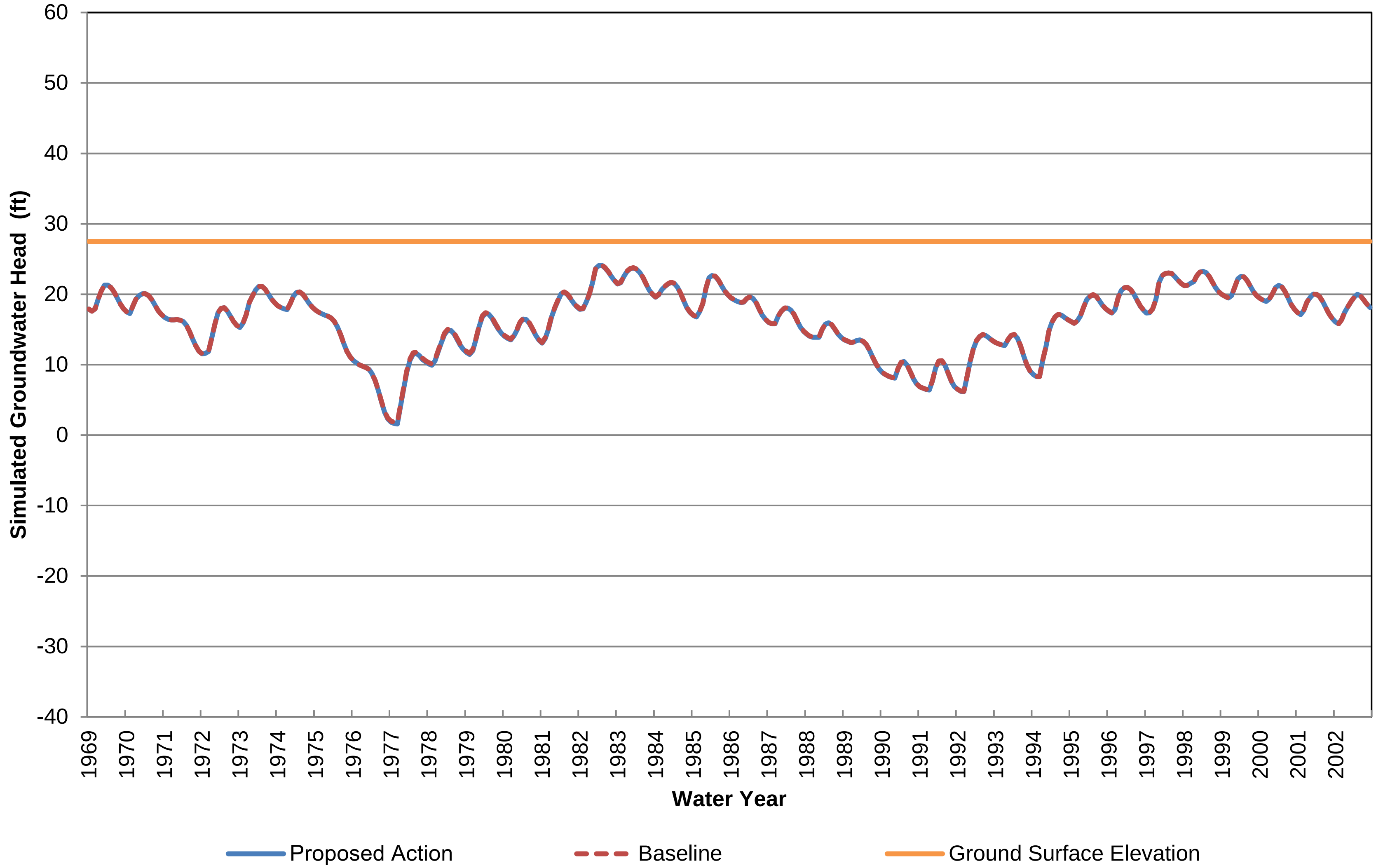
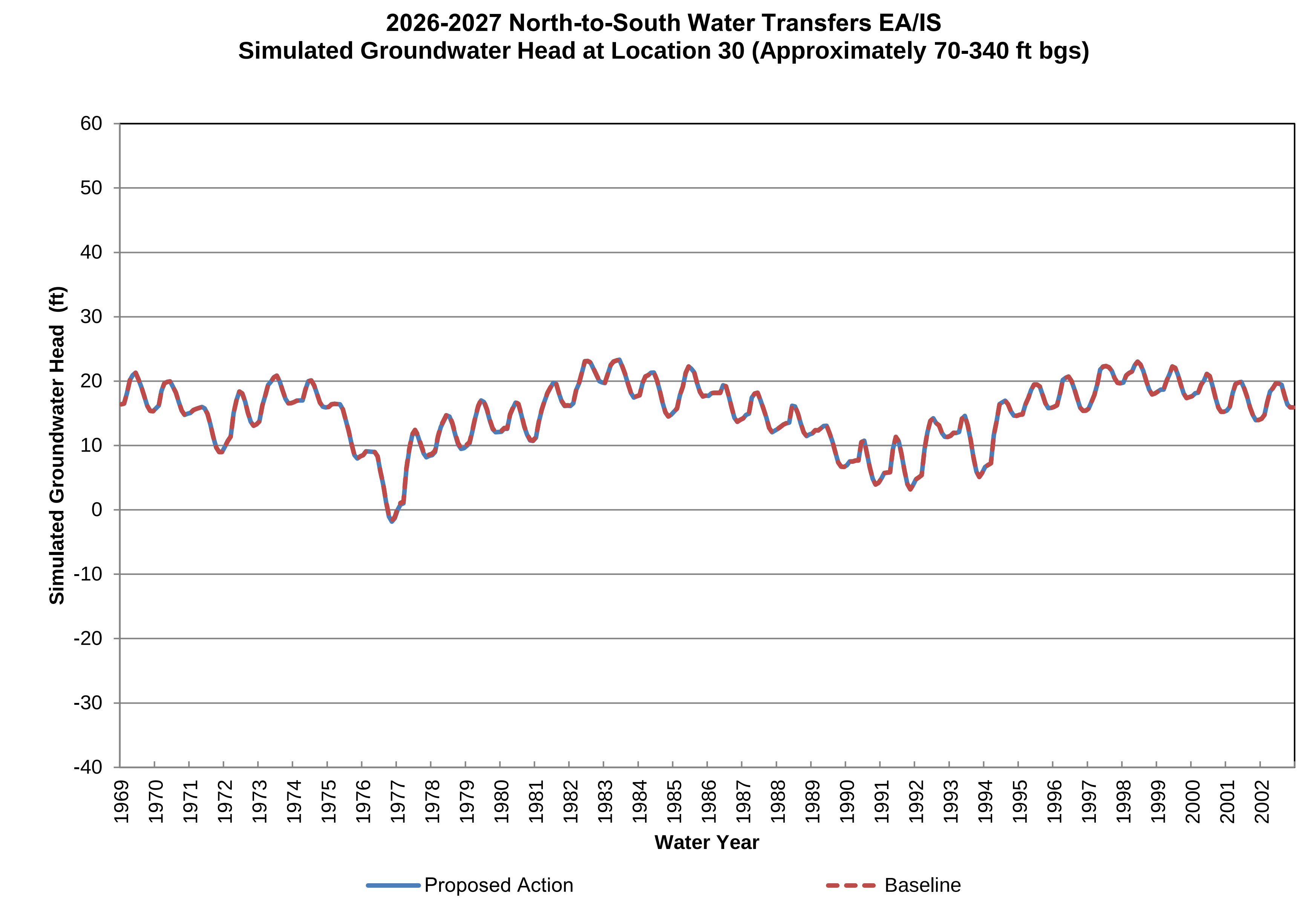
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 29 (Approximately 880-1210 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 30 (Approximately 0-70 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 30 (Approximately 70-340 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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1983
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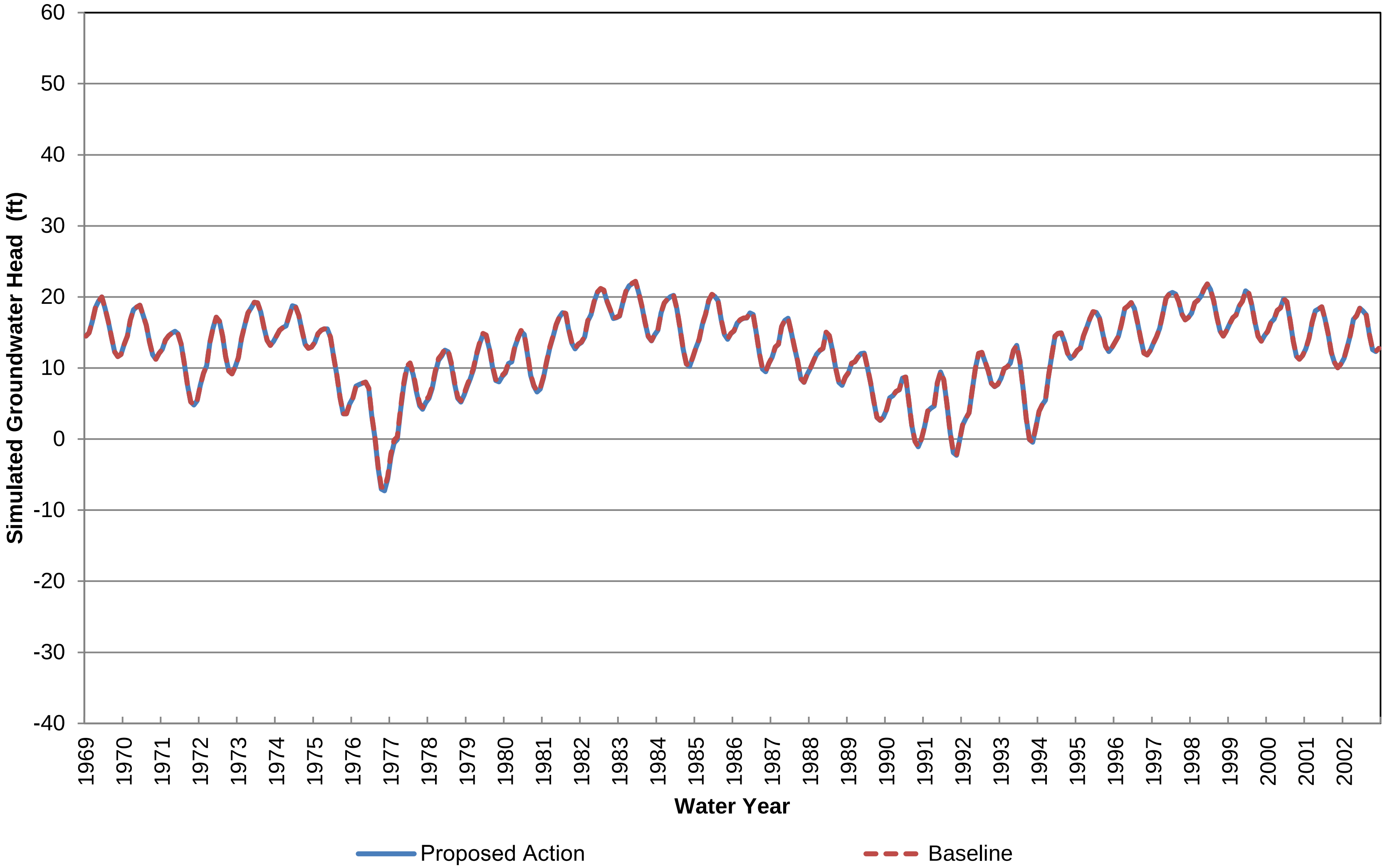
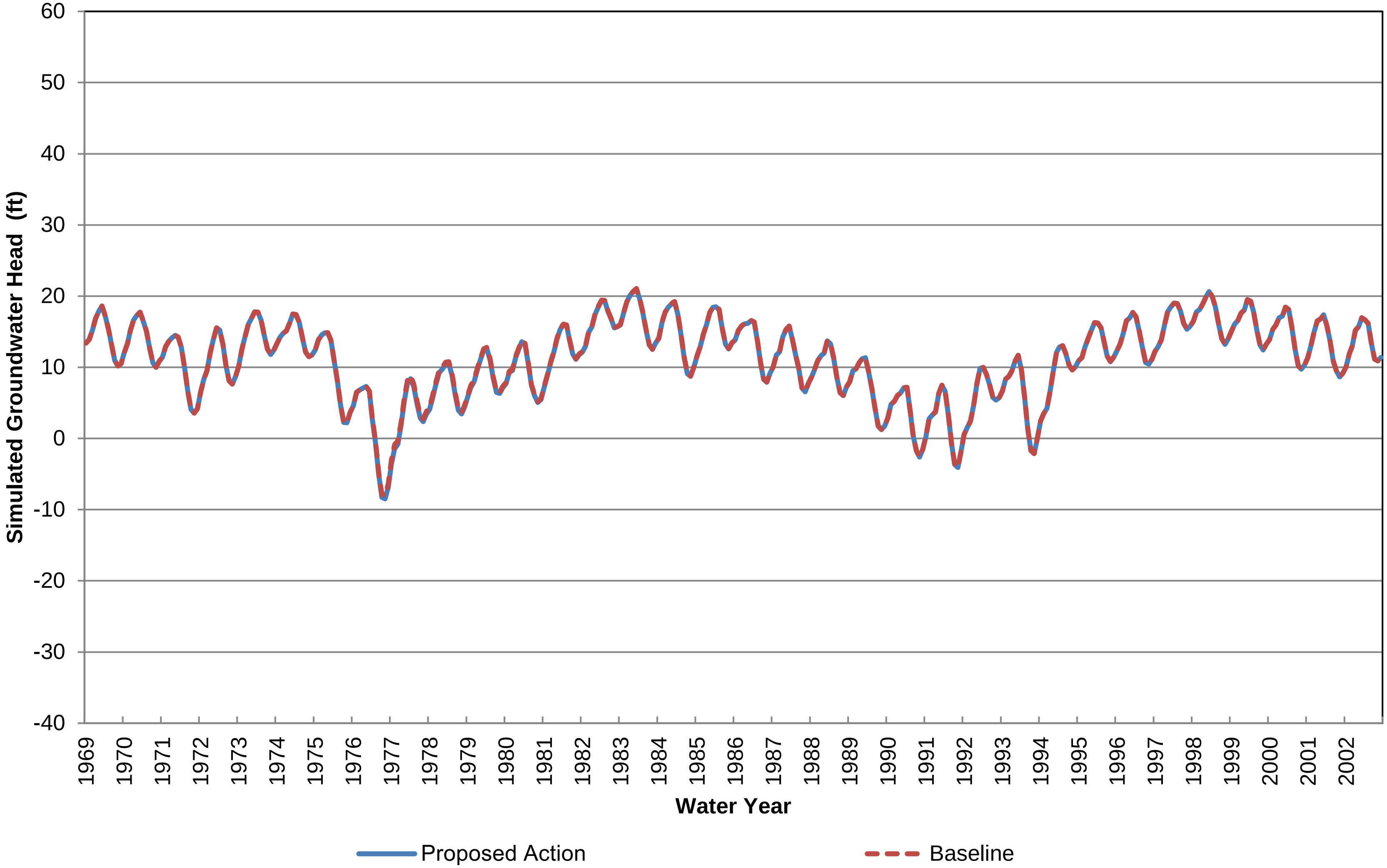
2001
2002
Water Year
Proposed Action
Baseline

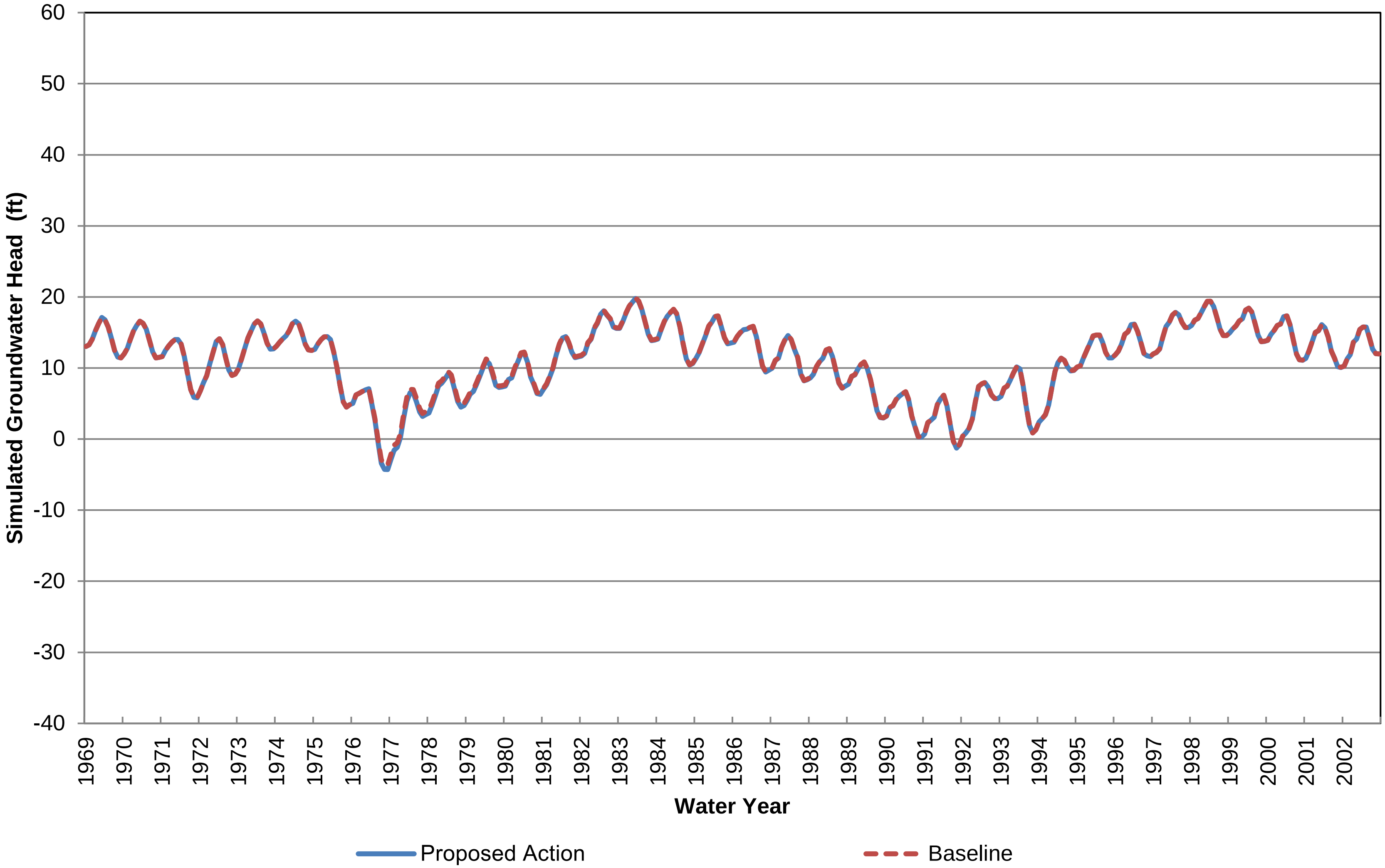
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 30 (Approximately 340-600 ft bgs)



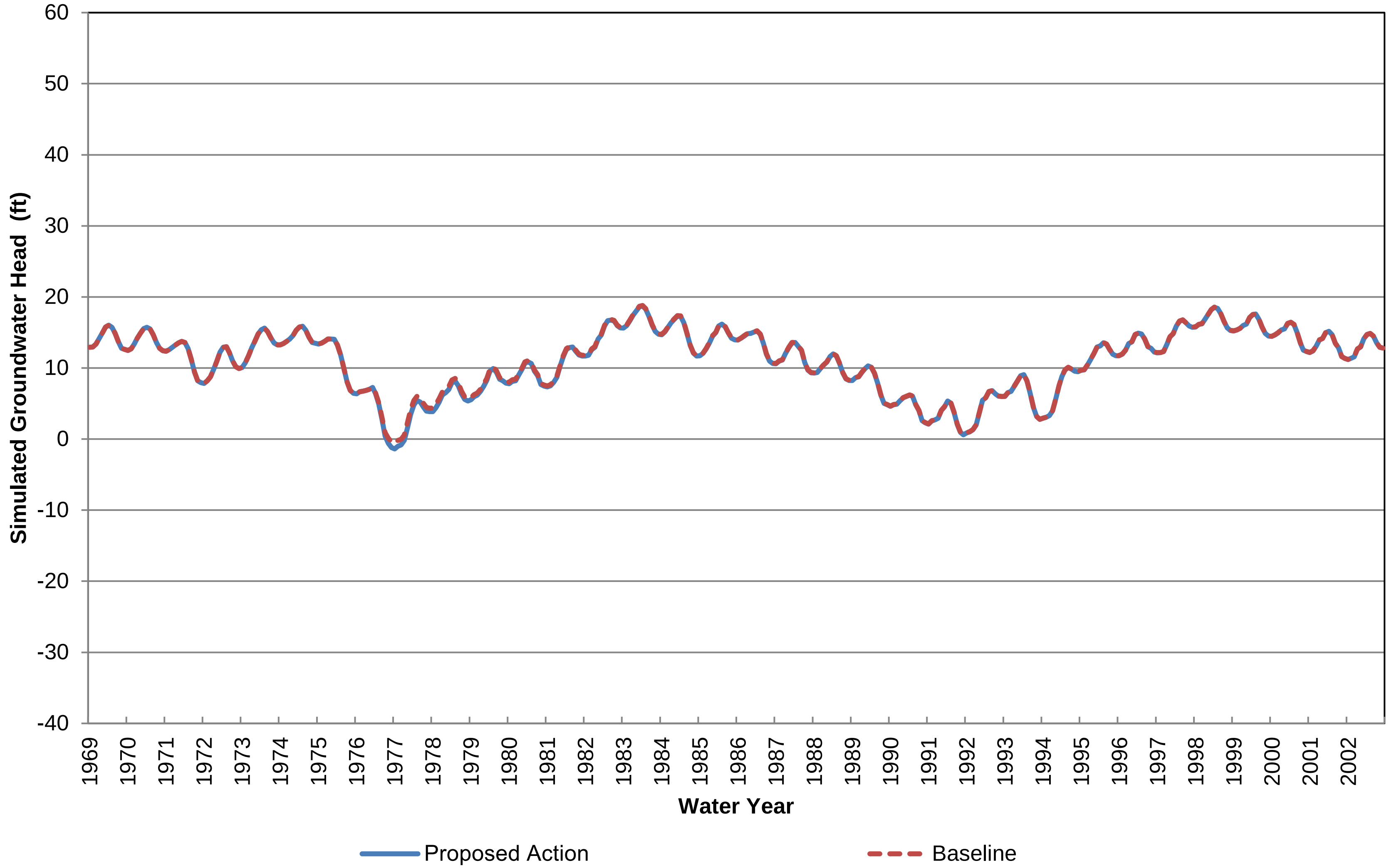
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 30 (Approximately 600-860 ft bgs)



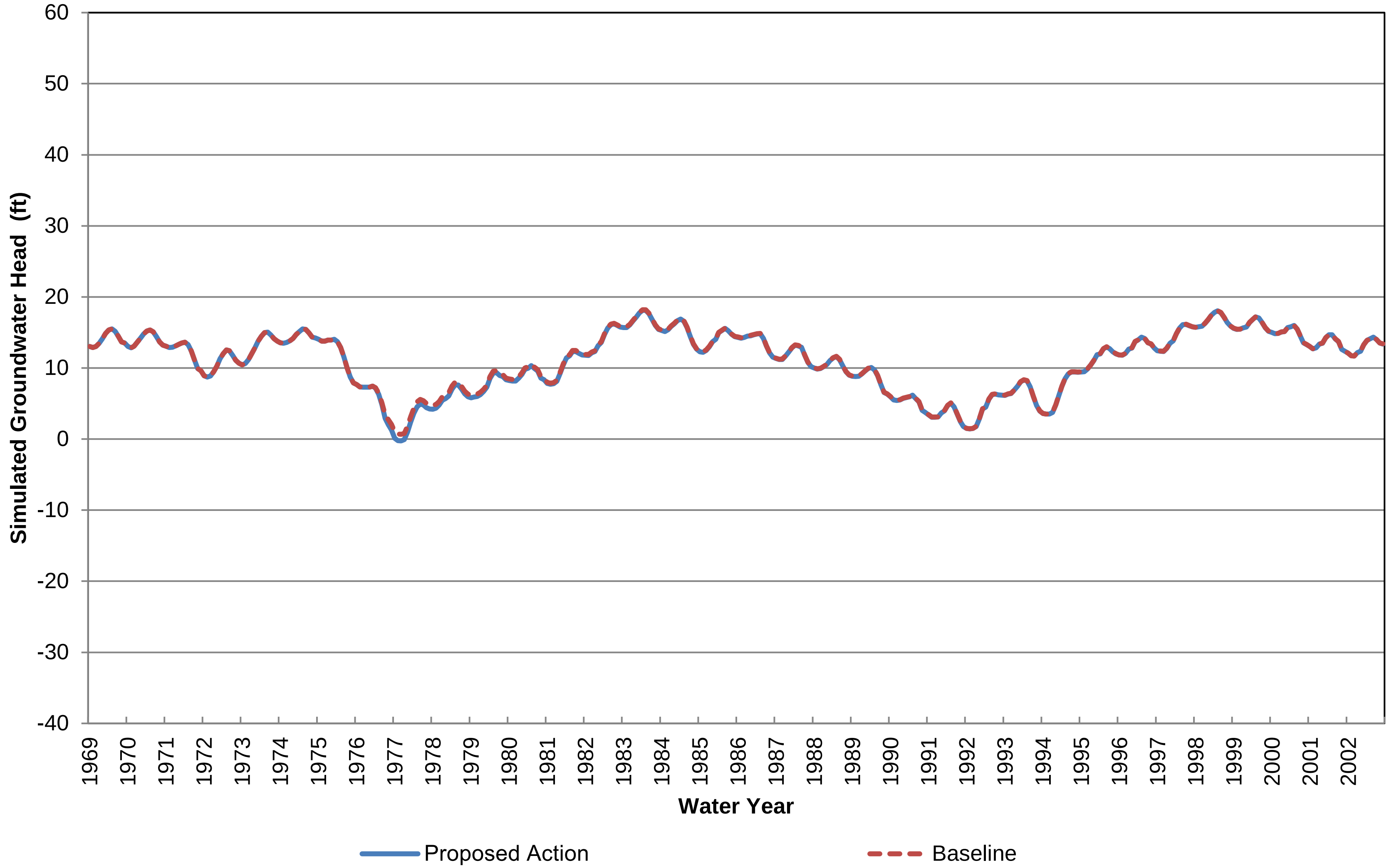
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 30 (Approximately 860-1330 ft bgs)



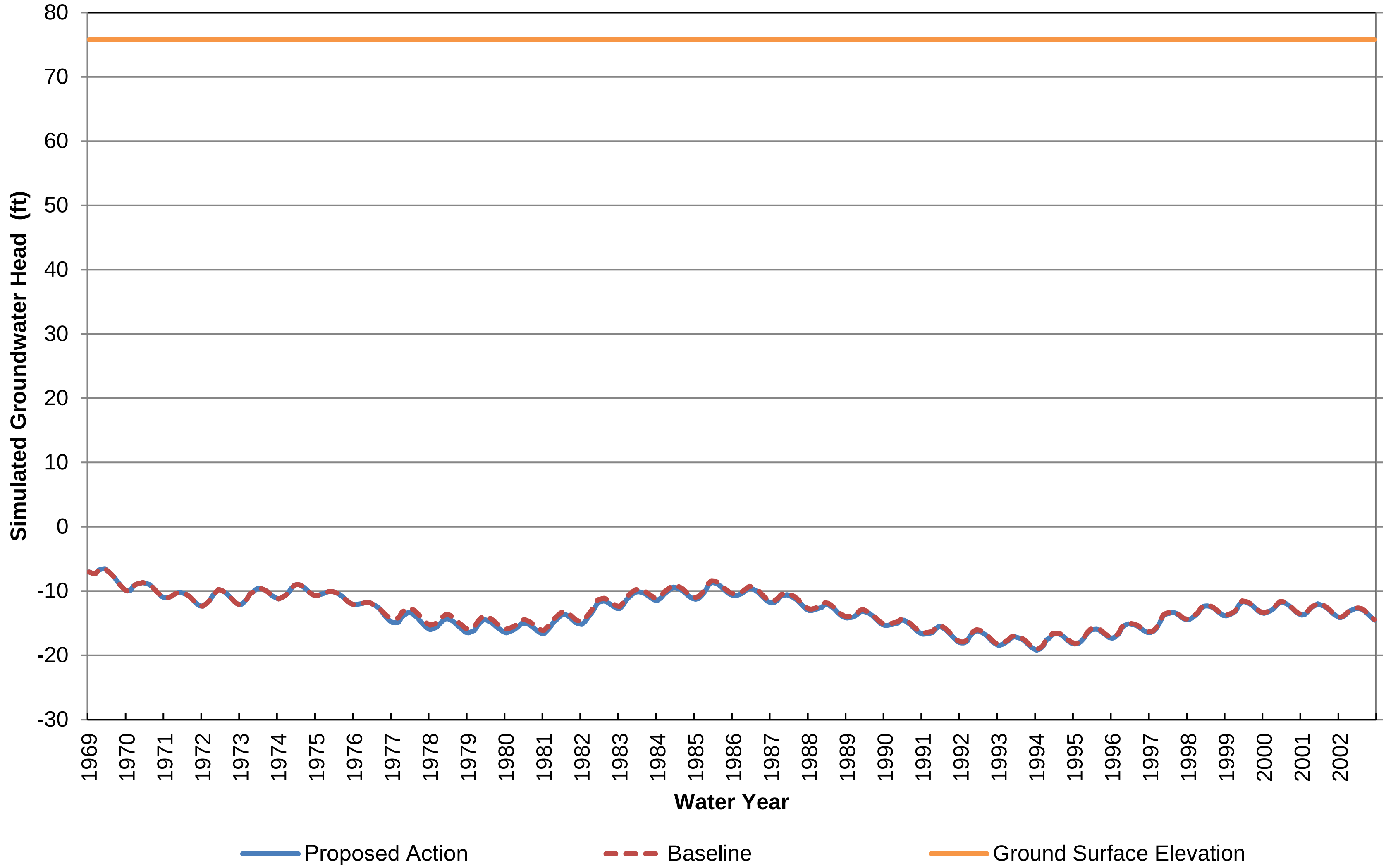
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 30 (Approximately 1330-1770 ft bgs)



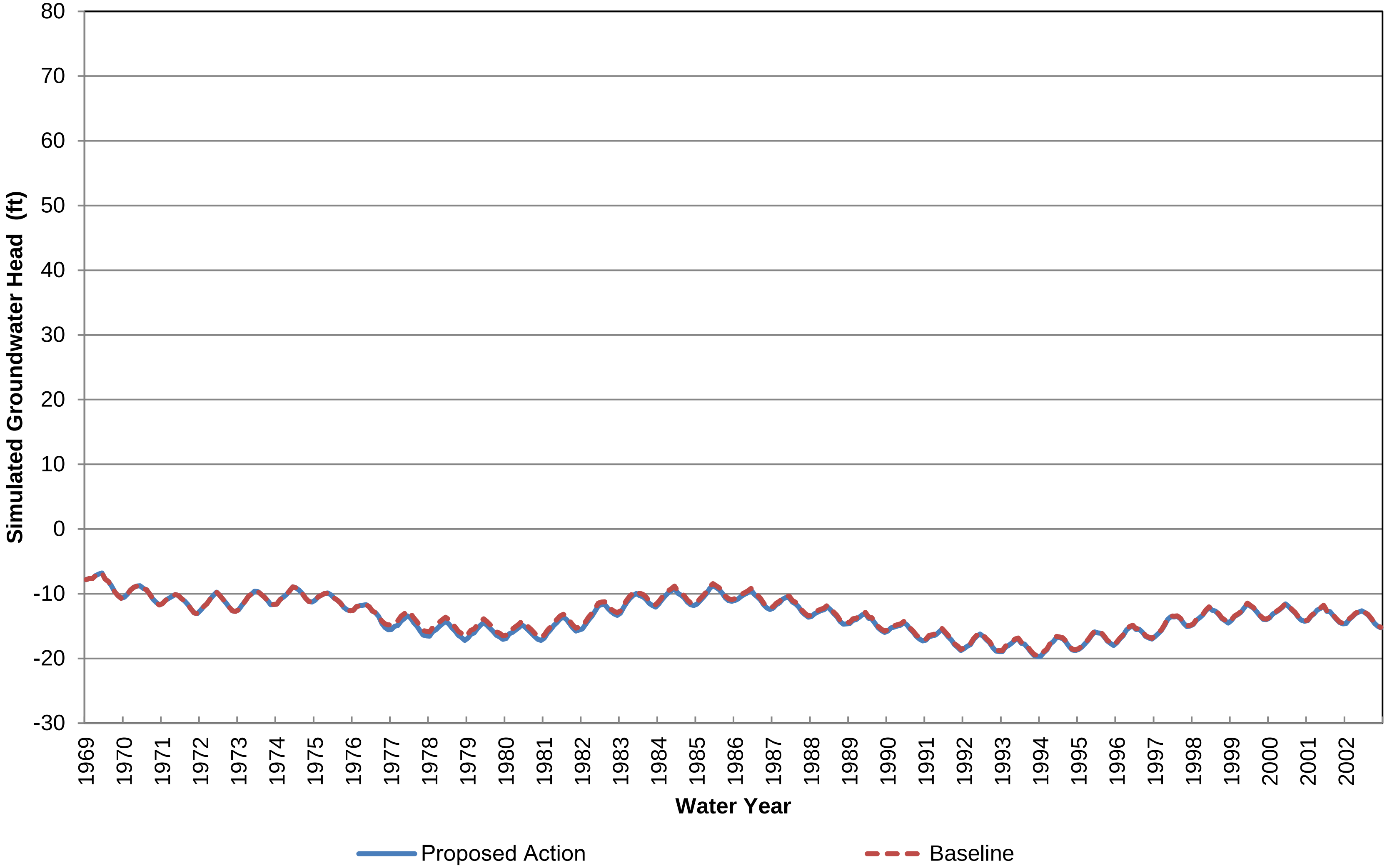
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 30 (Approximately 1770-2430 ft bgs)



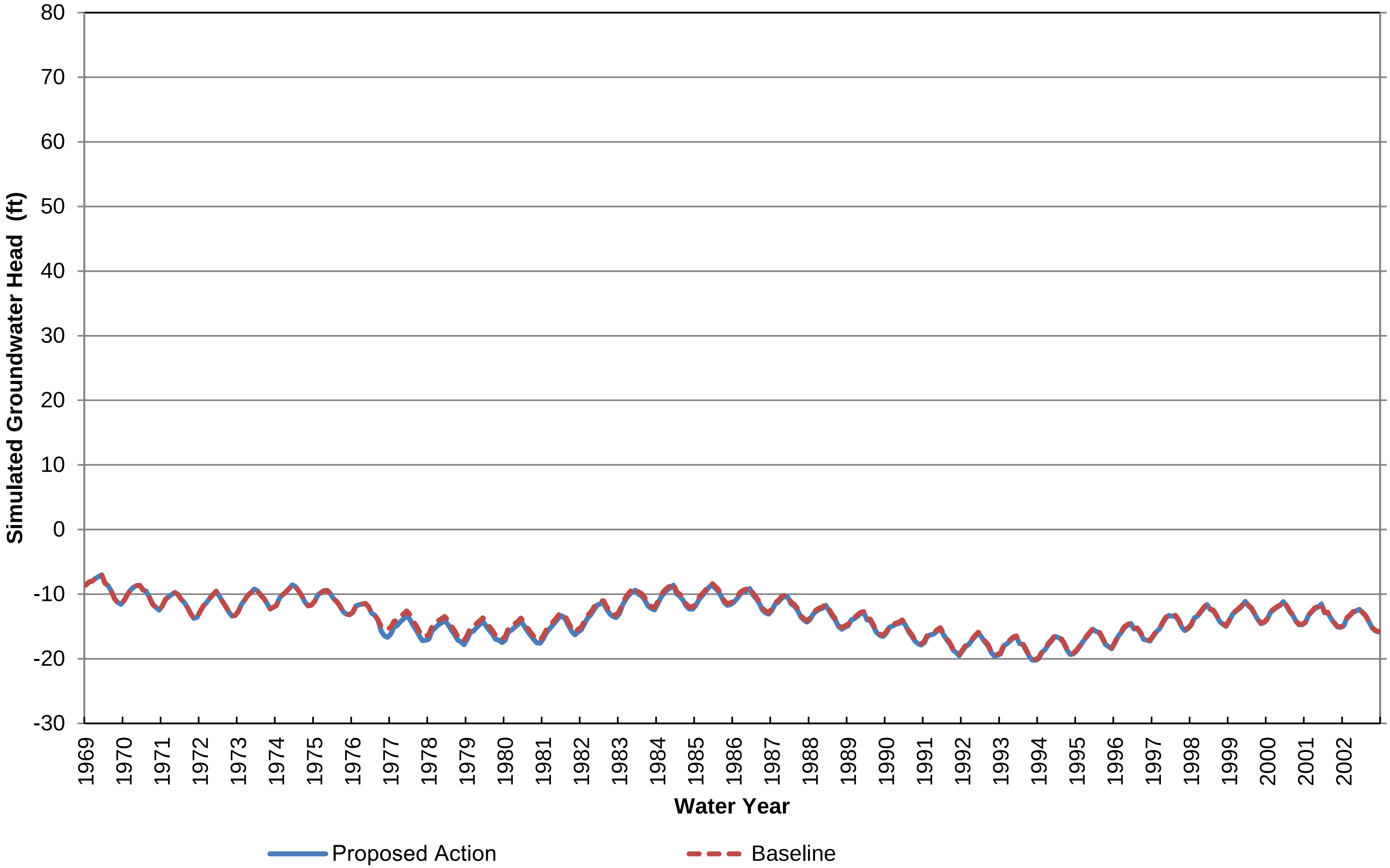
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 31 (Approximately 0-70 ft bgs)



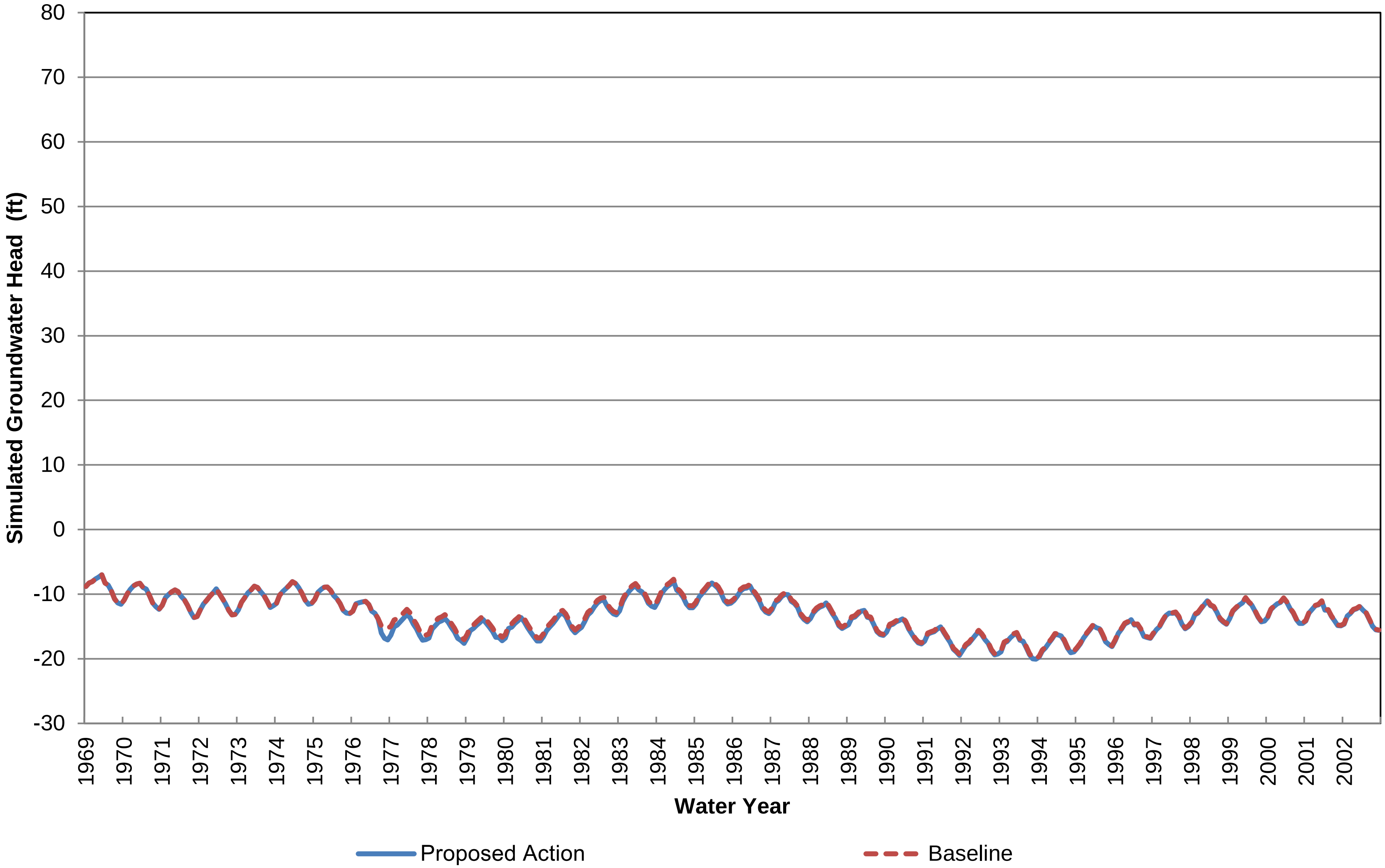
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 31 (Approximately 70-200 ft bgs)



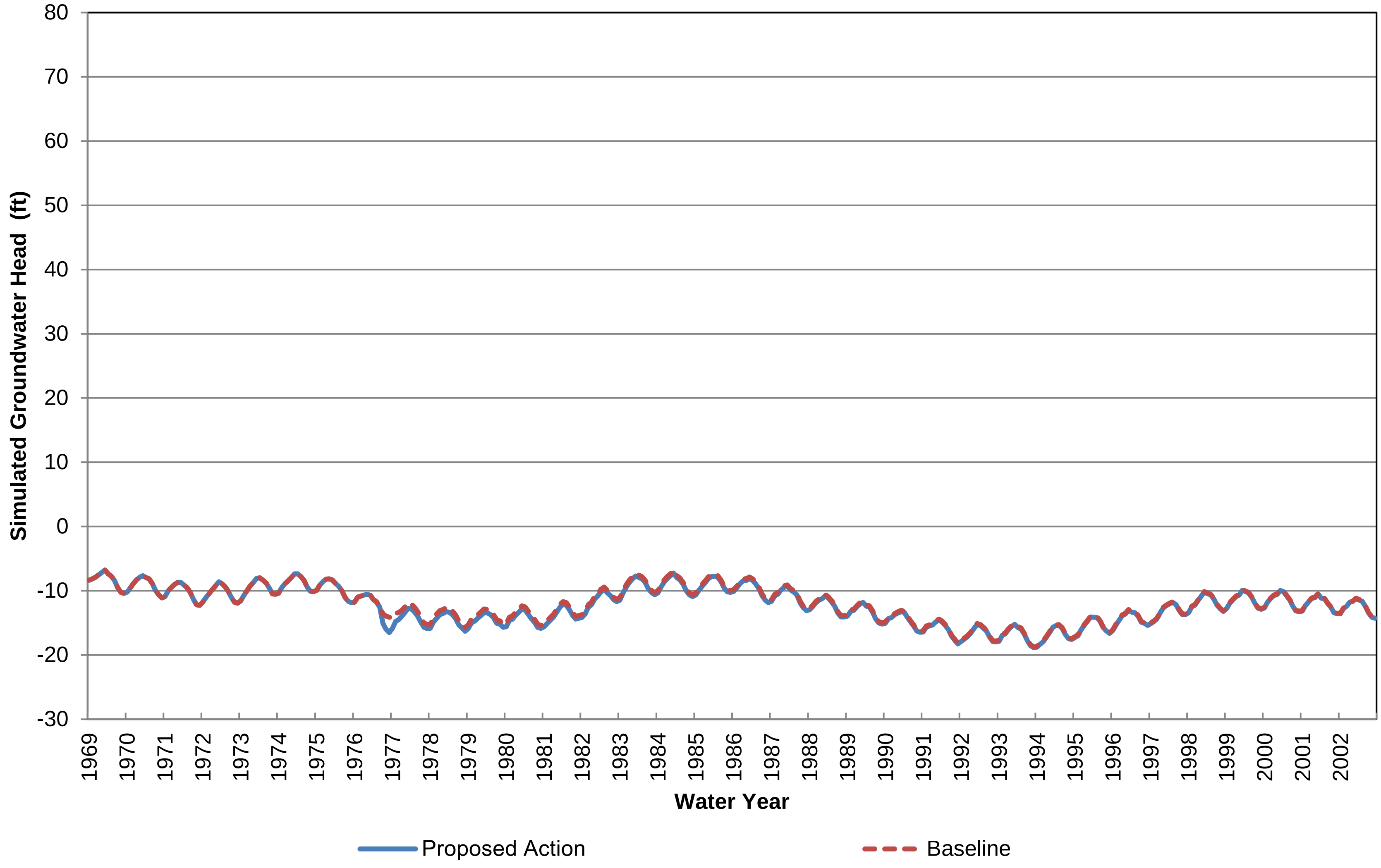
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 31 (Approximately 200-330 ft bgs)

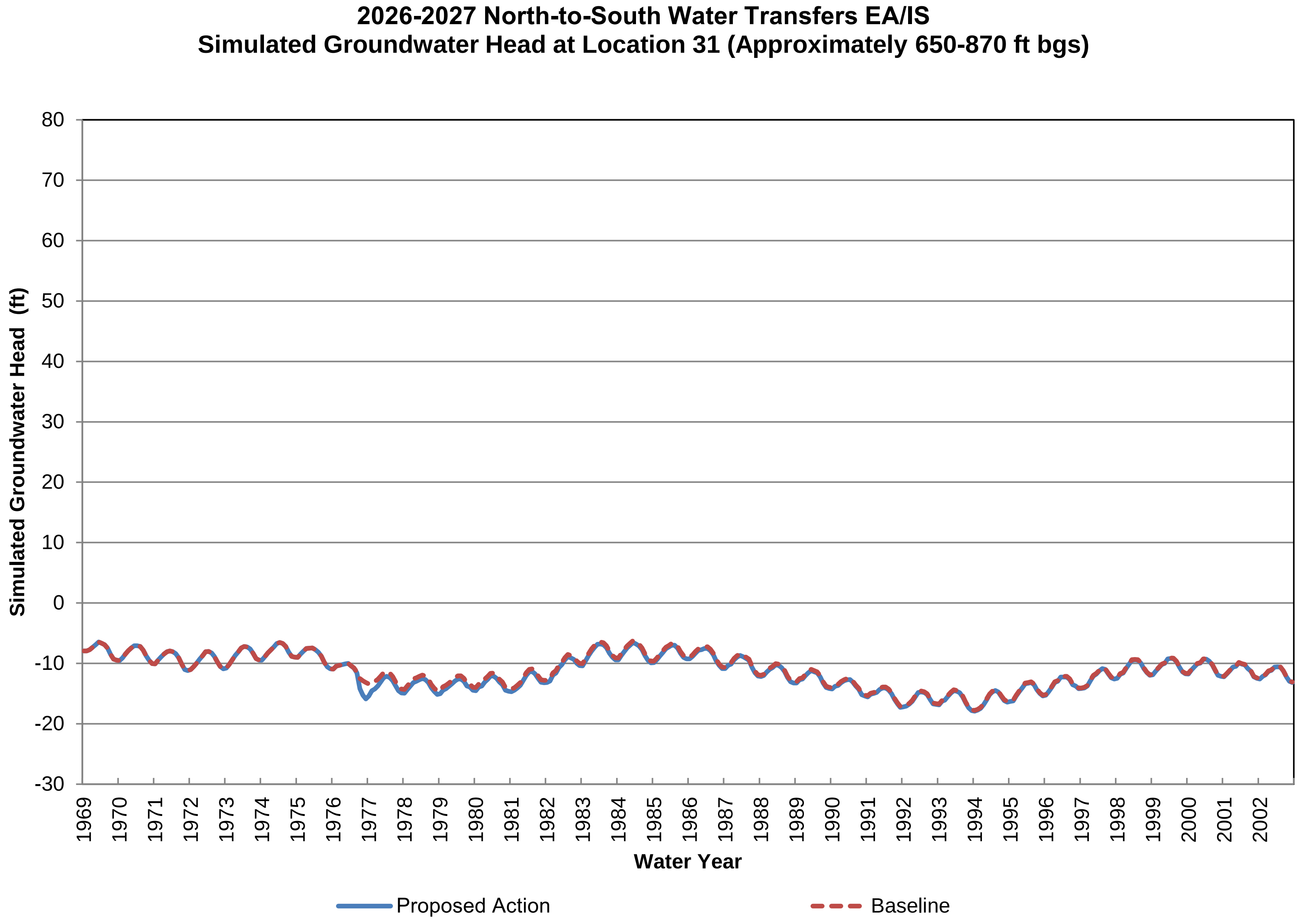


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 31 (Approximately 330-460 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 31 (Approximately 460-650 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 31 (Approximately 650-870 ft bgs)
Simulated Groundwater Head (ft)
80
70
60
50
40
30
20
10
0
-10
-20
-30
1969
1970
1971
1972
1973
1974
1975
1976
1977
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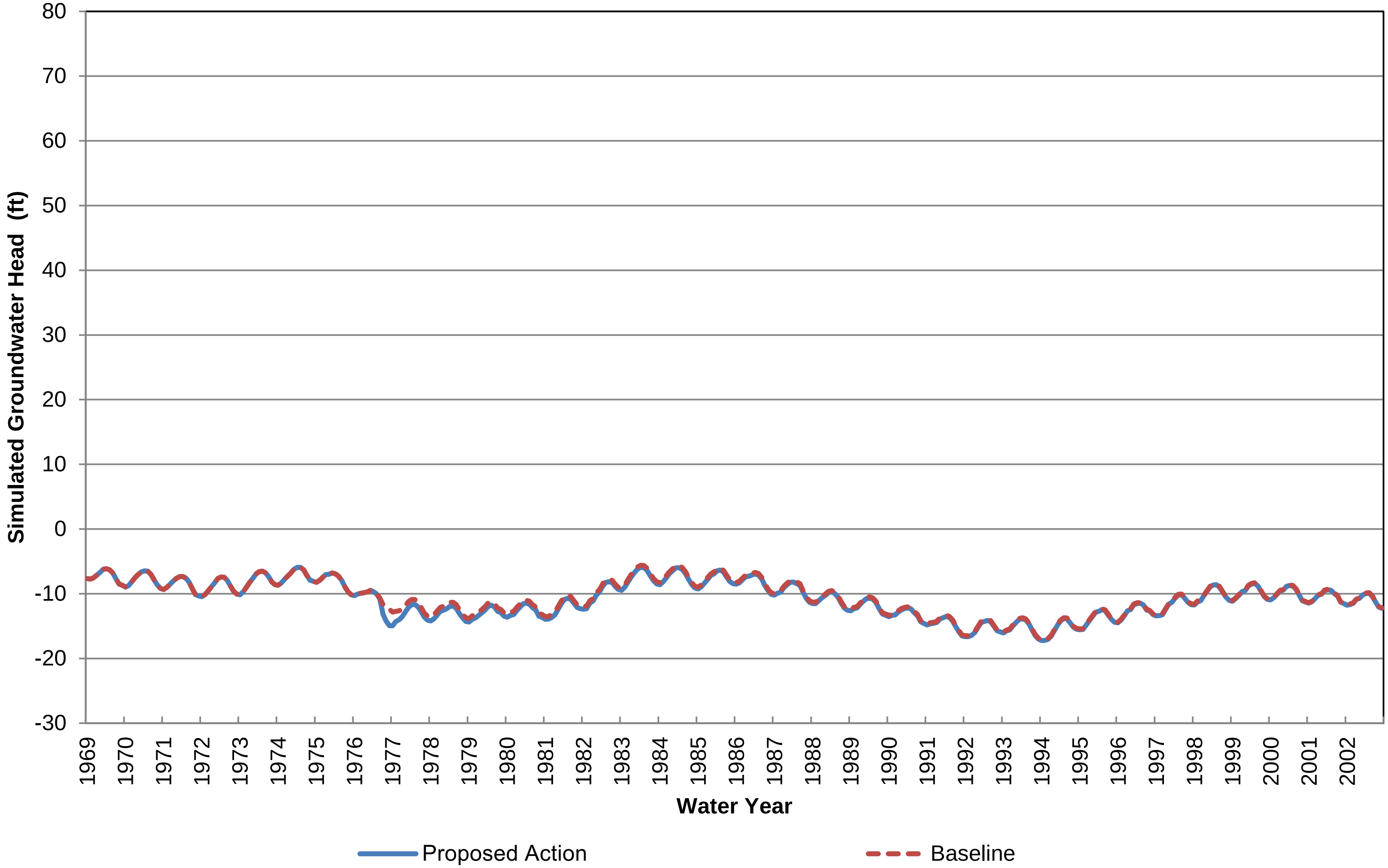
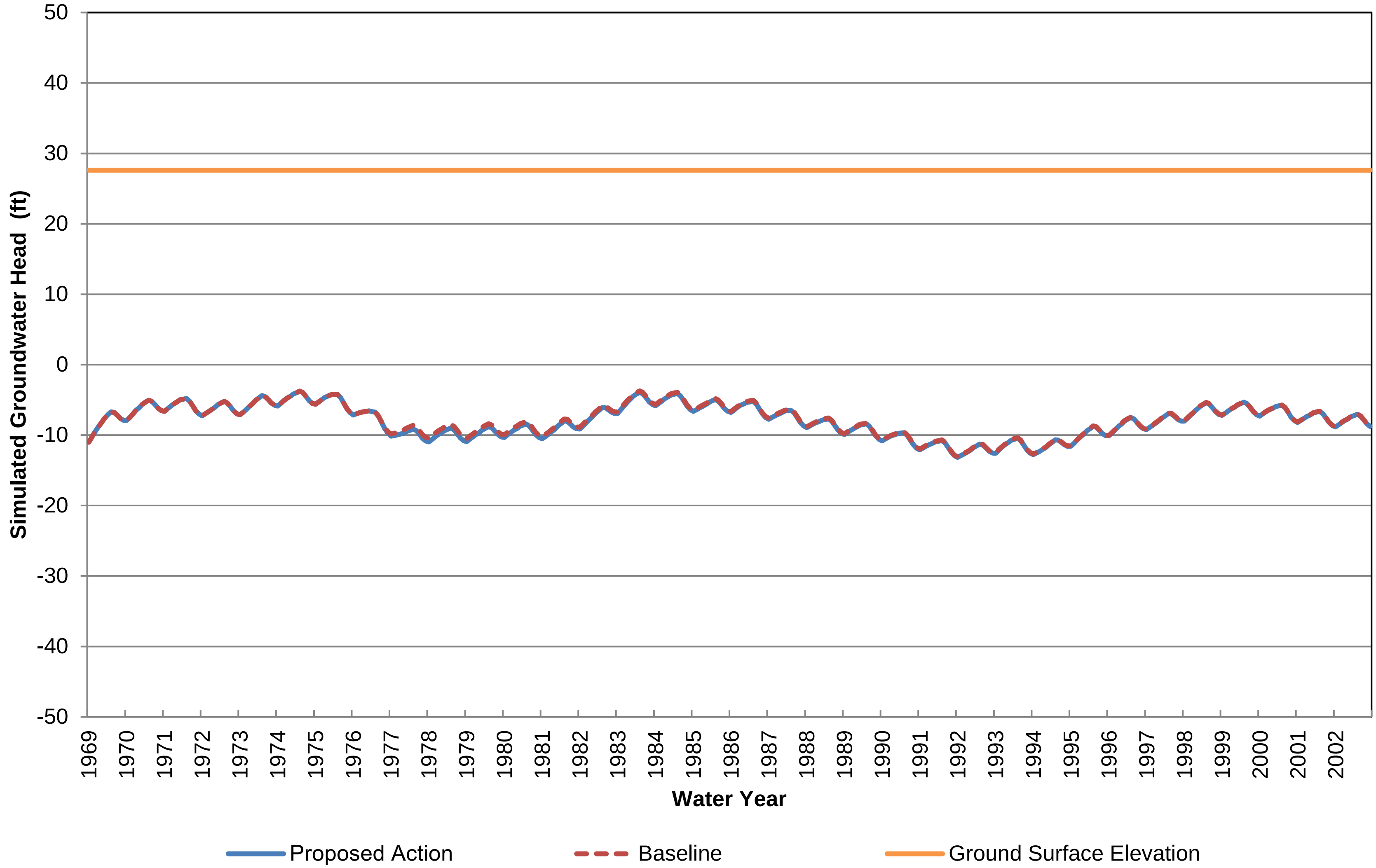
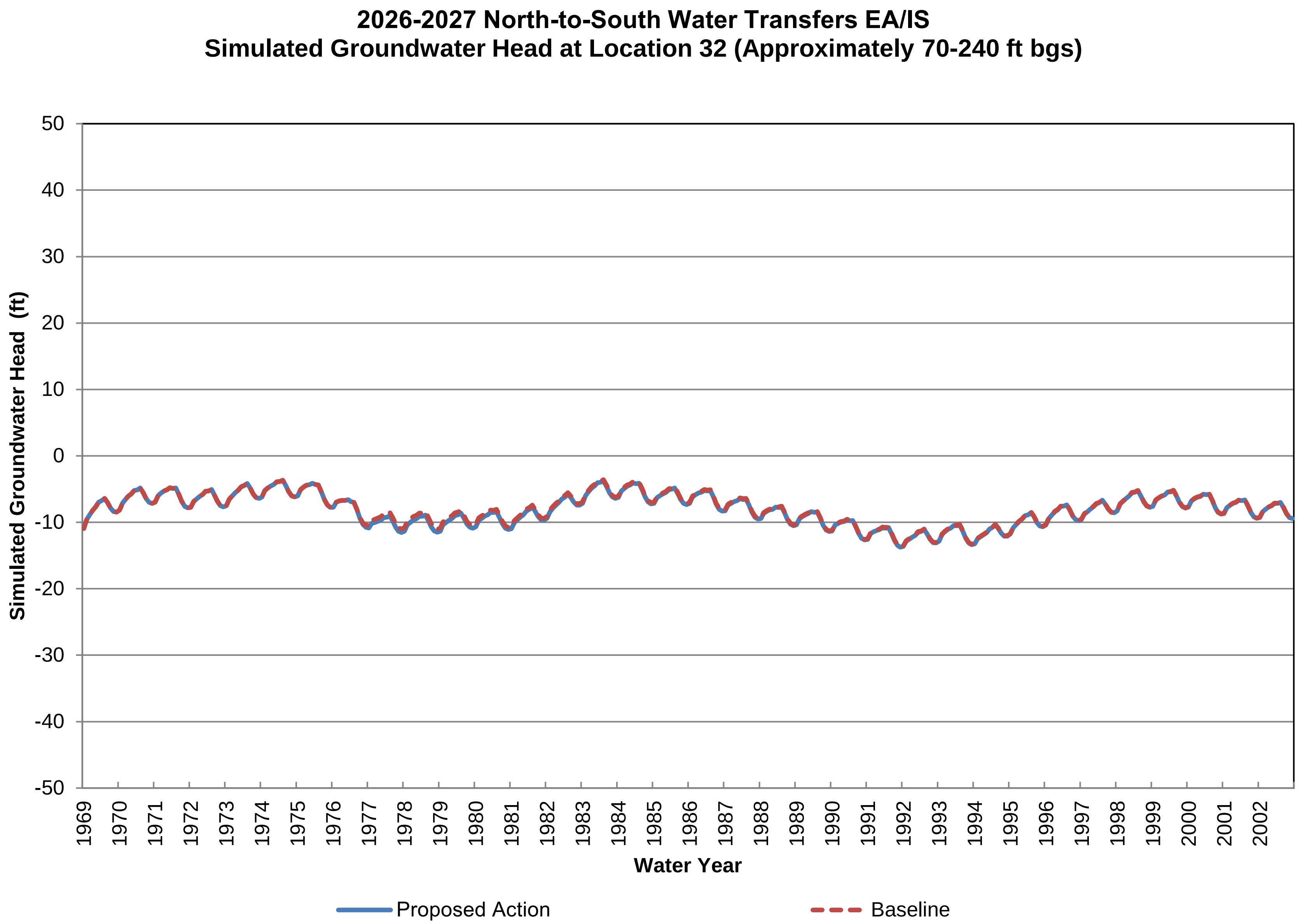
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 31 (Approximately 870-1190 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 32 (Approximately 0-70 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 32 (Approximately 70-240 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
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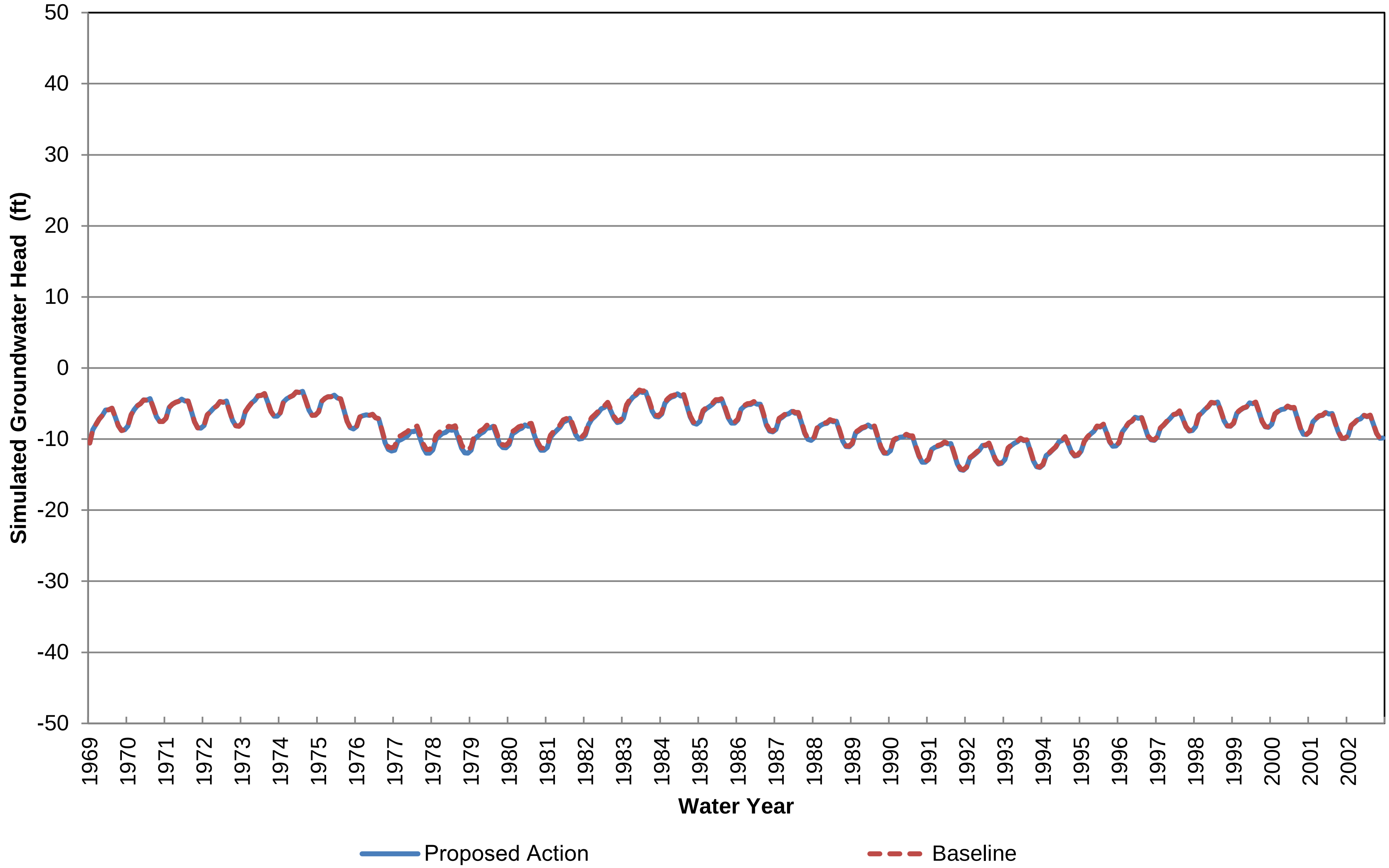
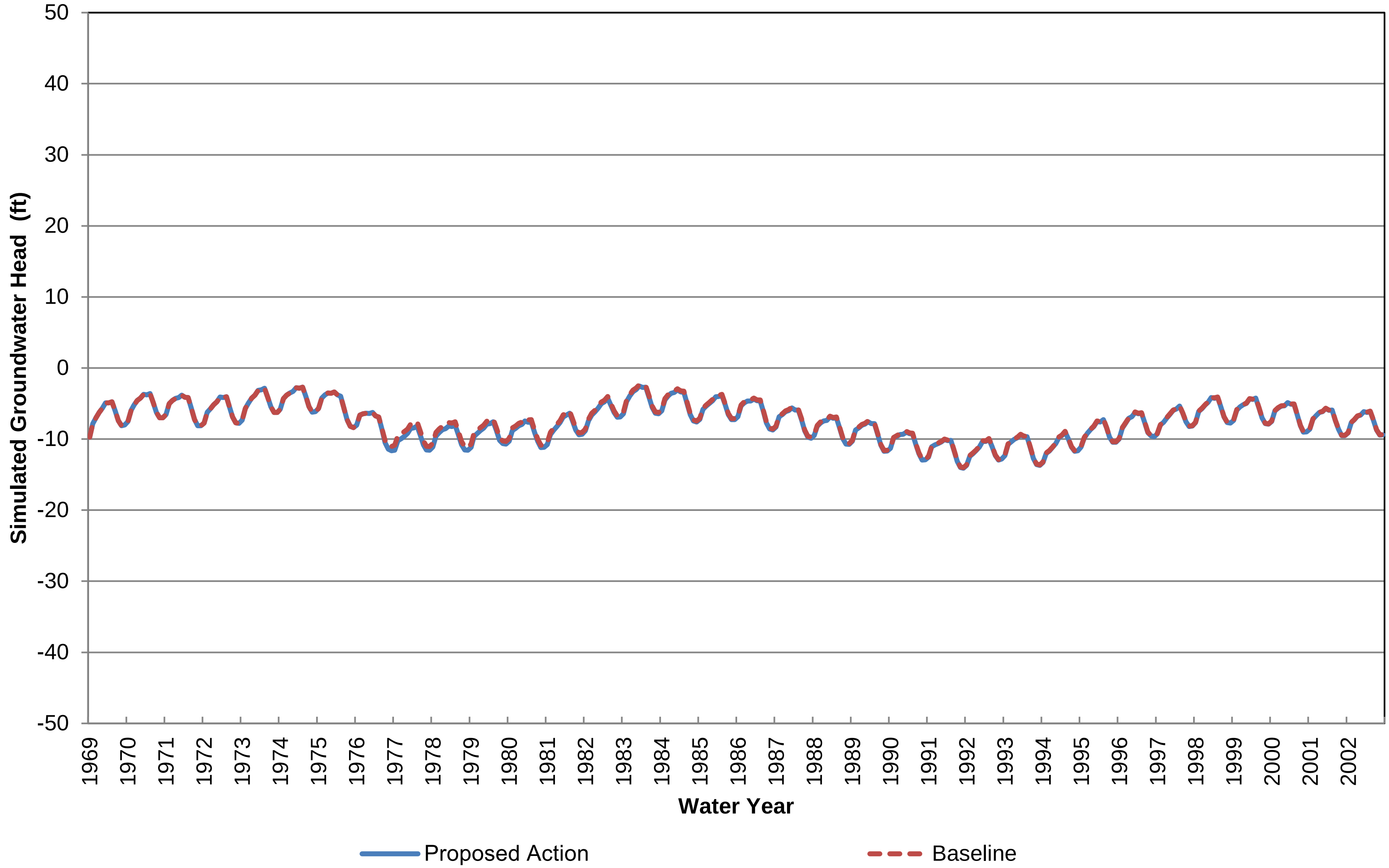
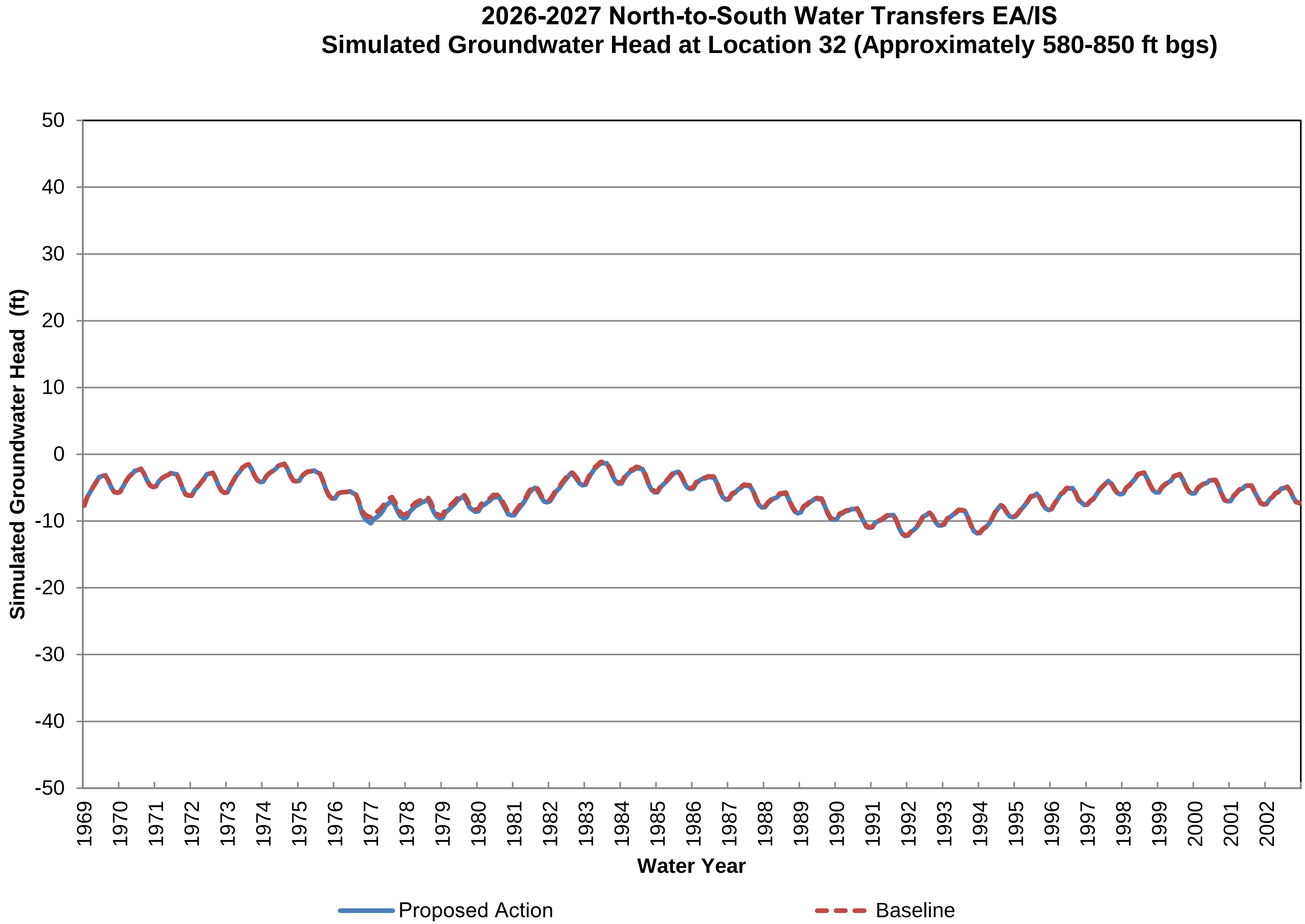
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 32 (Approximately 240-410 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 32 (Approximately 410-580 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 32 (Approximately 580-850 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
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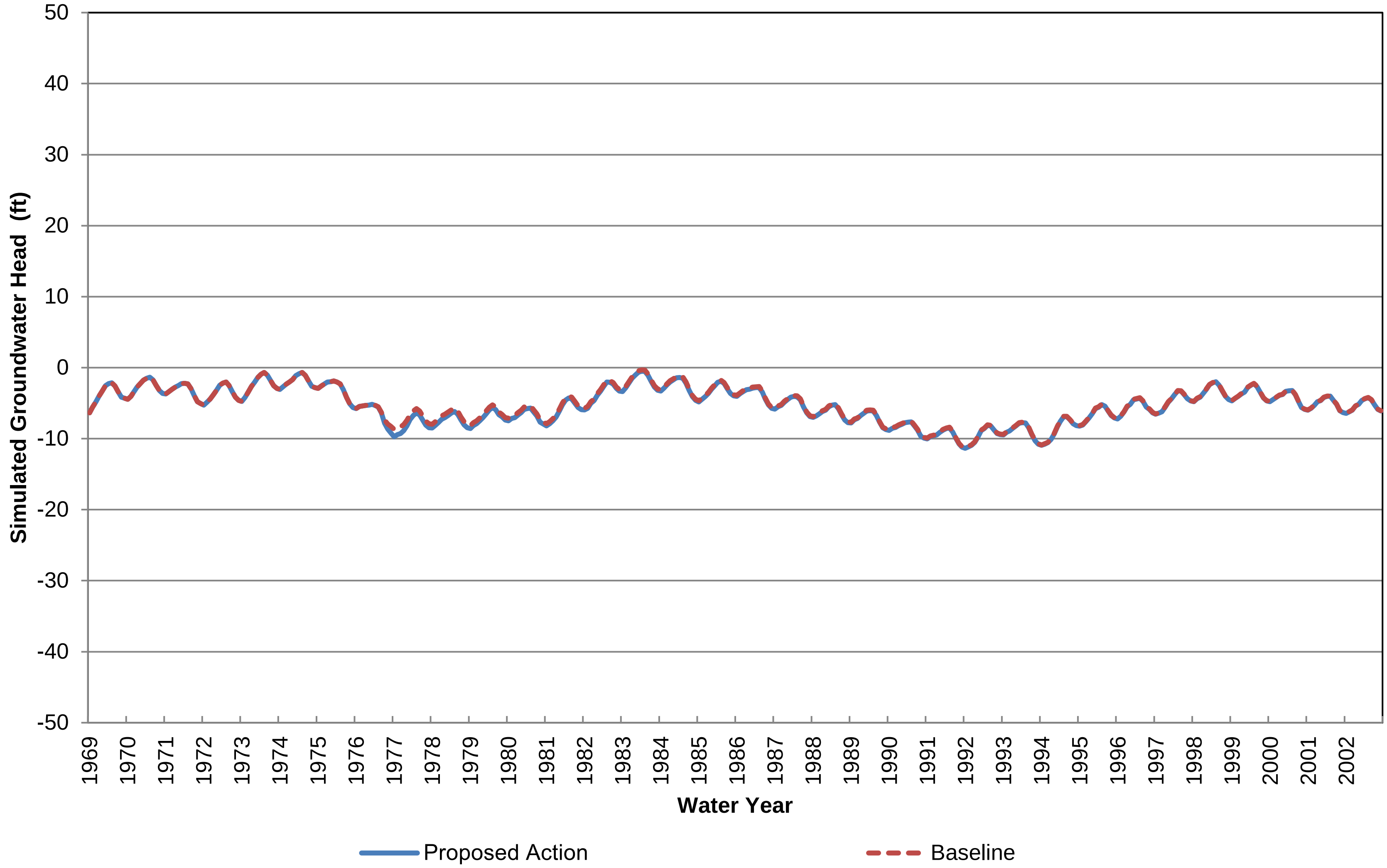
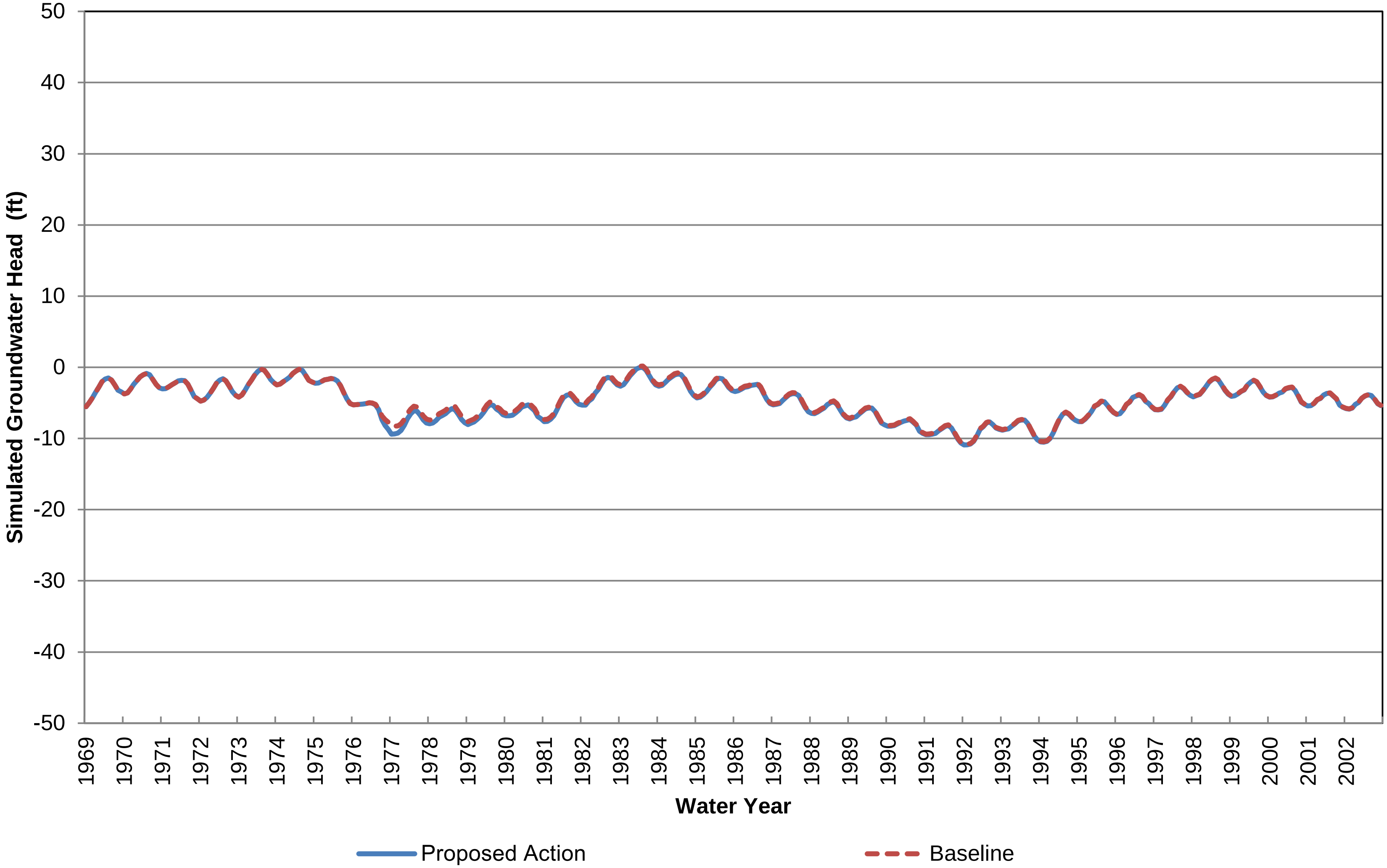
2001
2002
Water Year
Proposed Action
Baseline

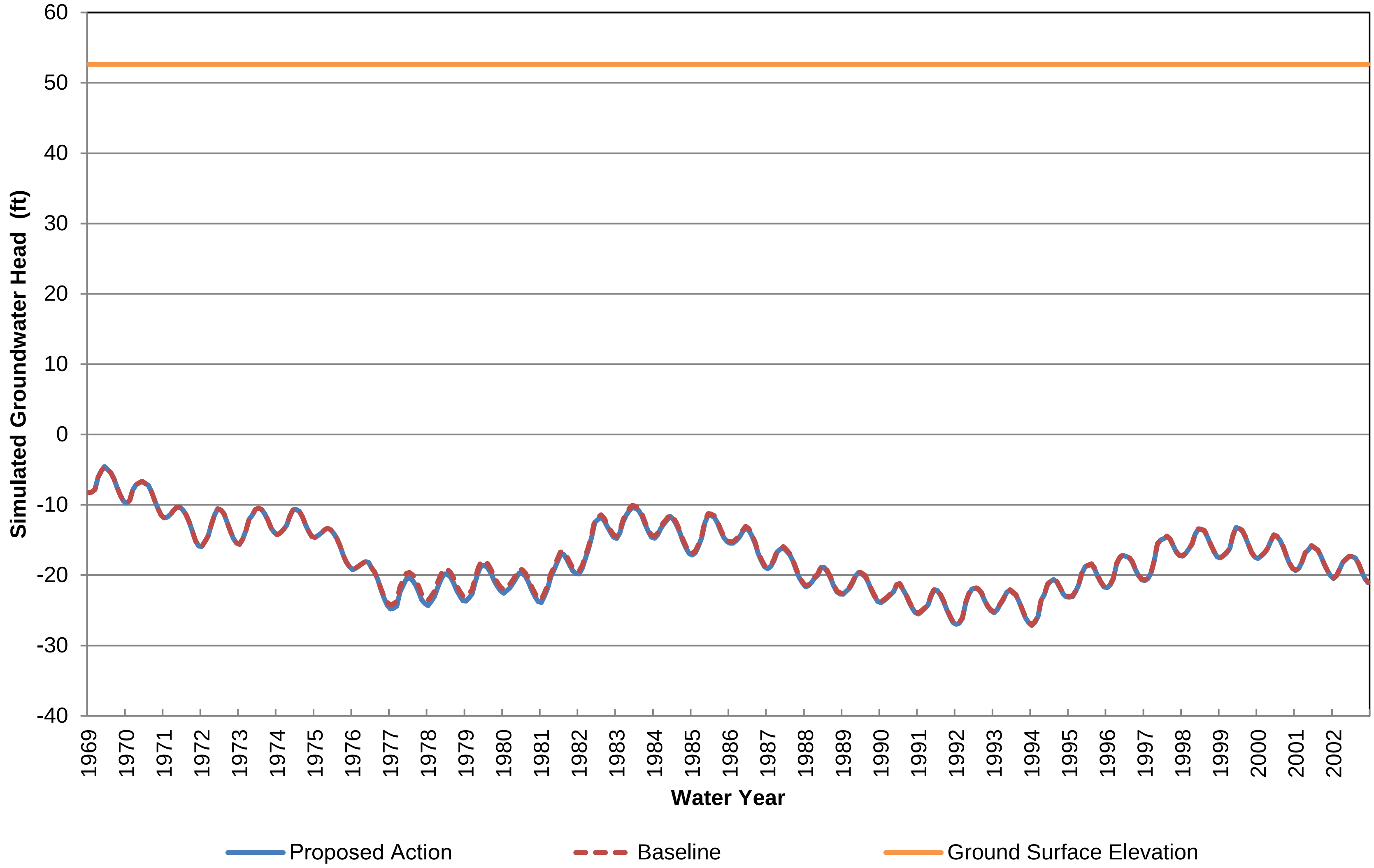
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 32 (Approximately 850-1140 ft bgs)



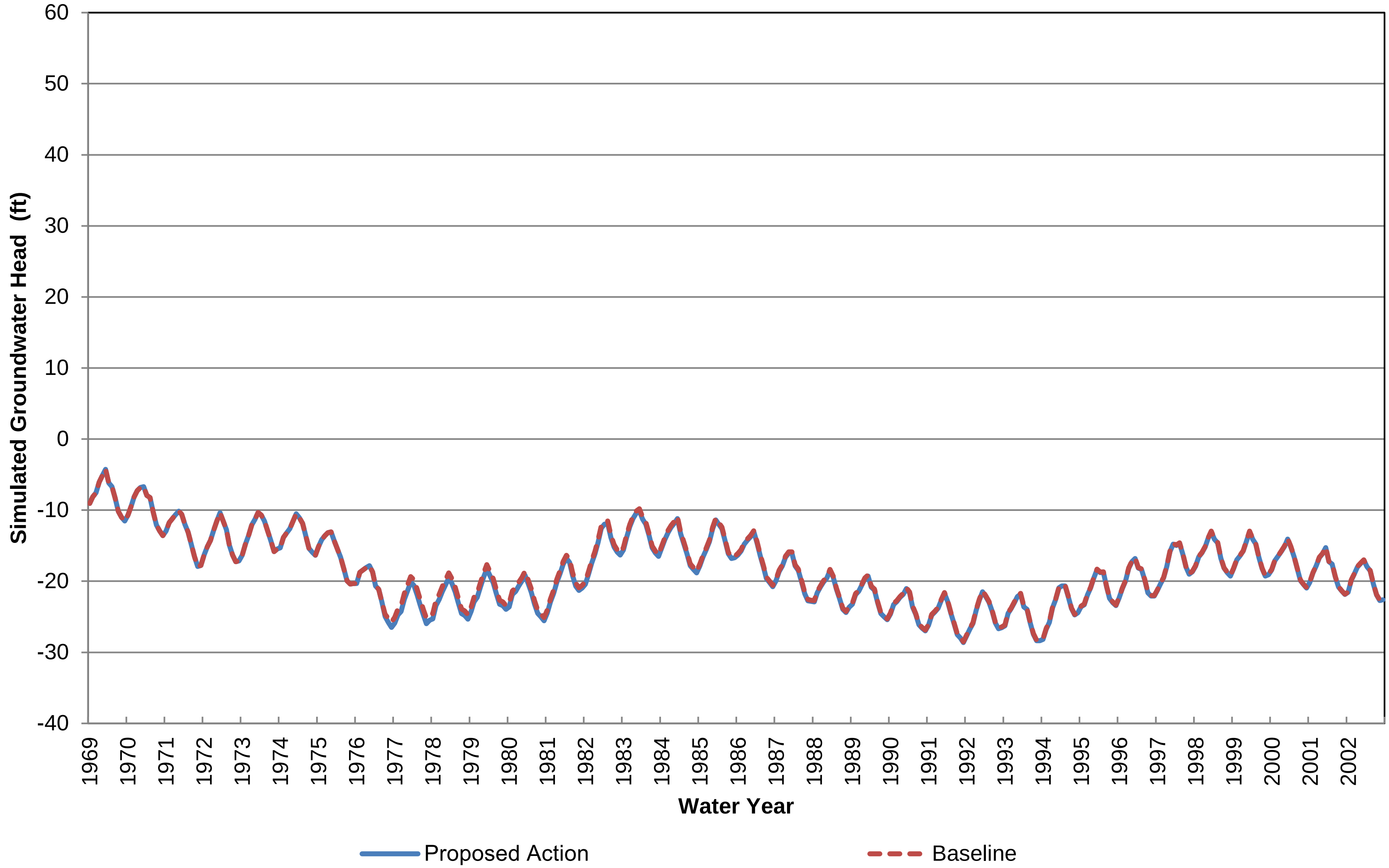
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 32 (Approximately 1140-1560 ft bgs)



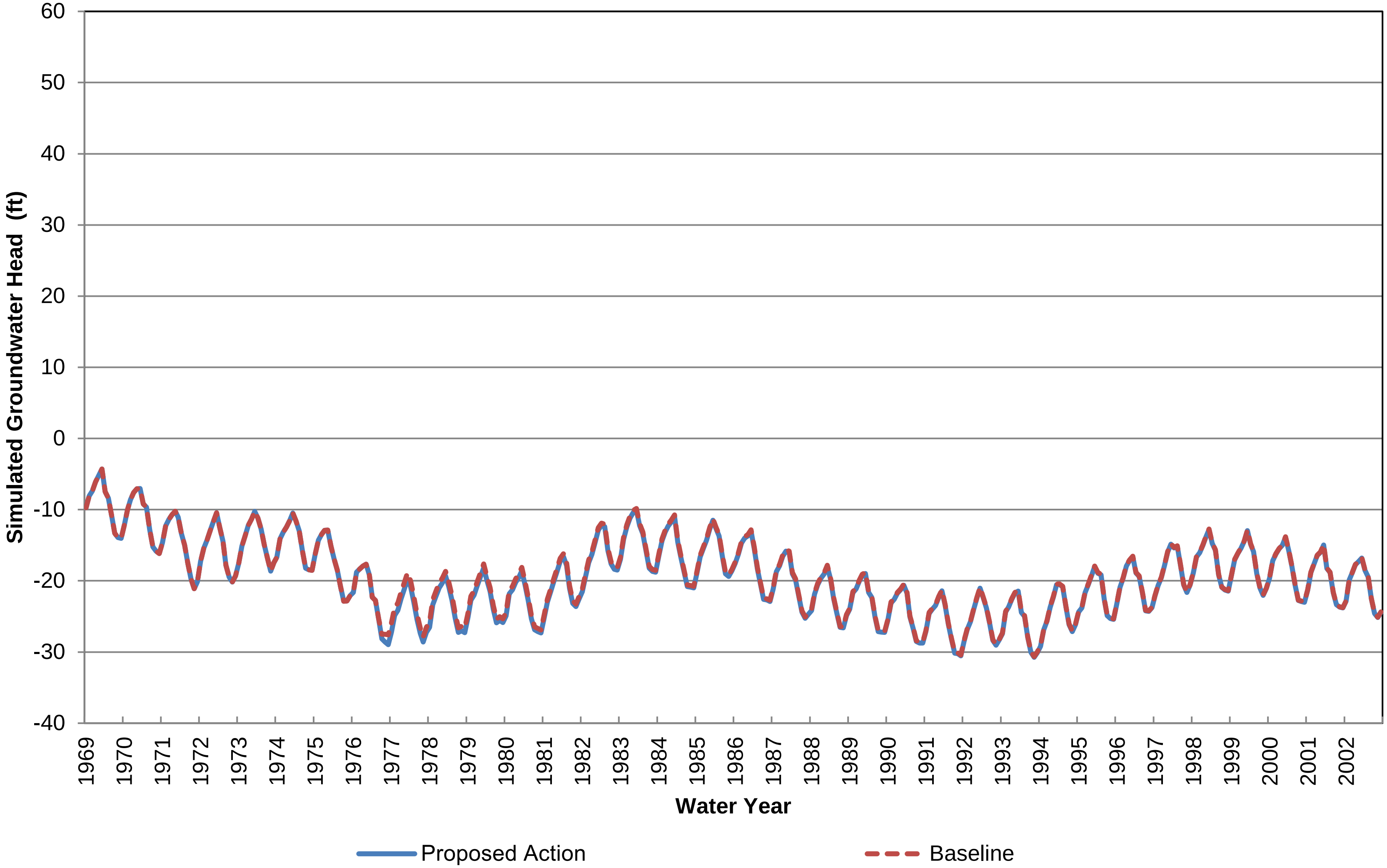
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 33 (Approximately 0-70 ft bgs)

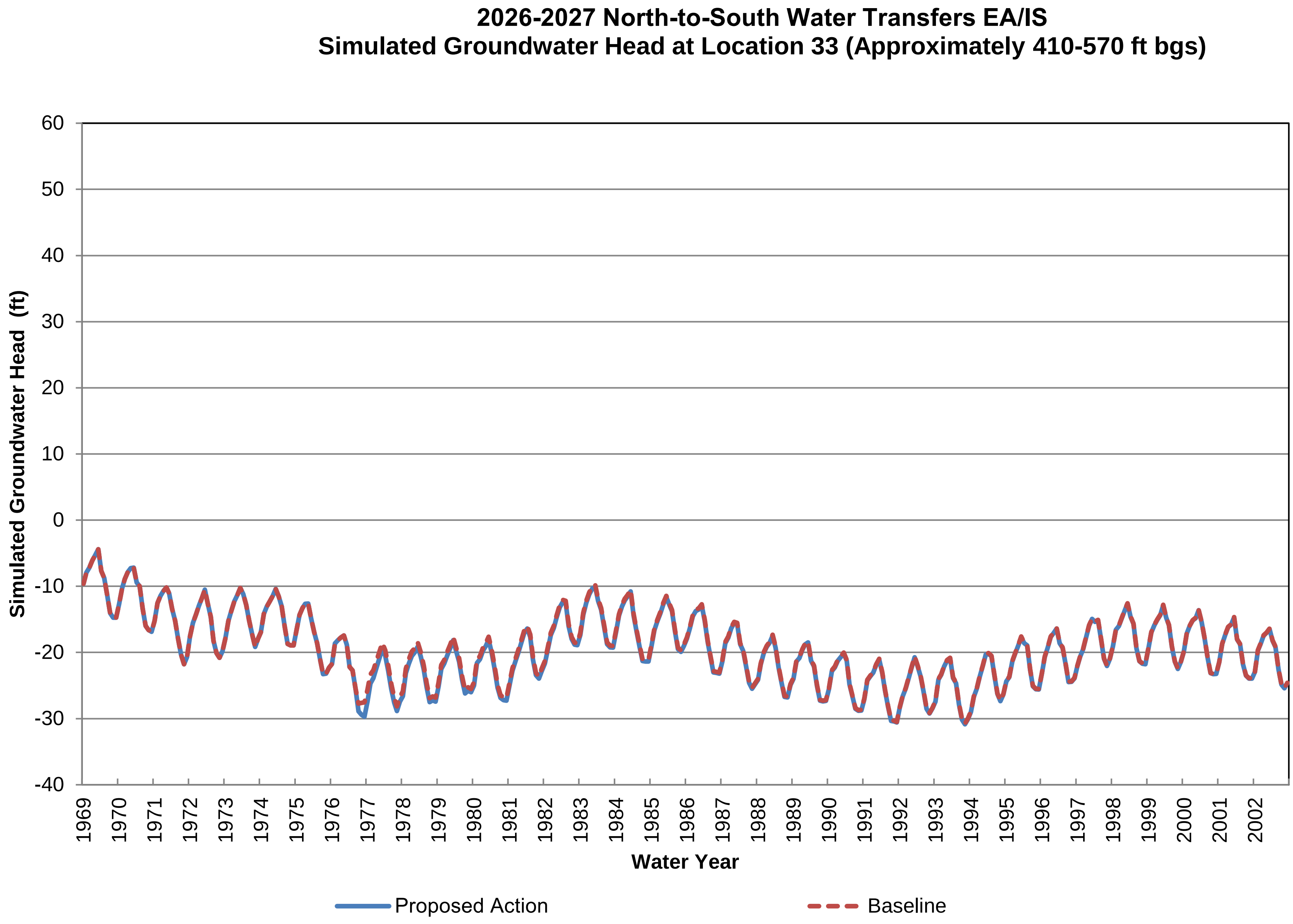


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 33 (Approximately 70-240 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 33 (Approximately 240-410 ft bgs)





2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 33 (Approximately 410-570 ft bgs)
Simulated Groundwater Head (ft)
60
50
40
30
20
10
0
-10
-20
-30
-40
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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1982
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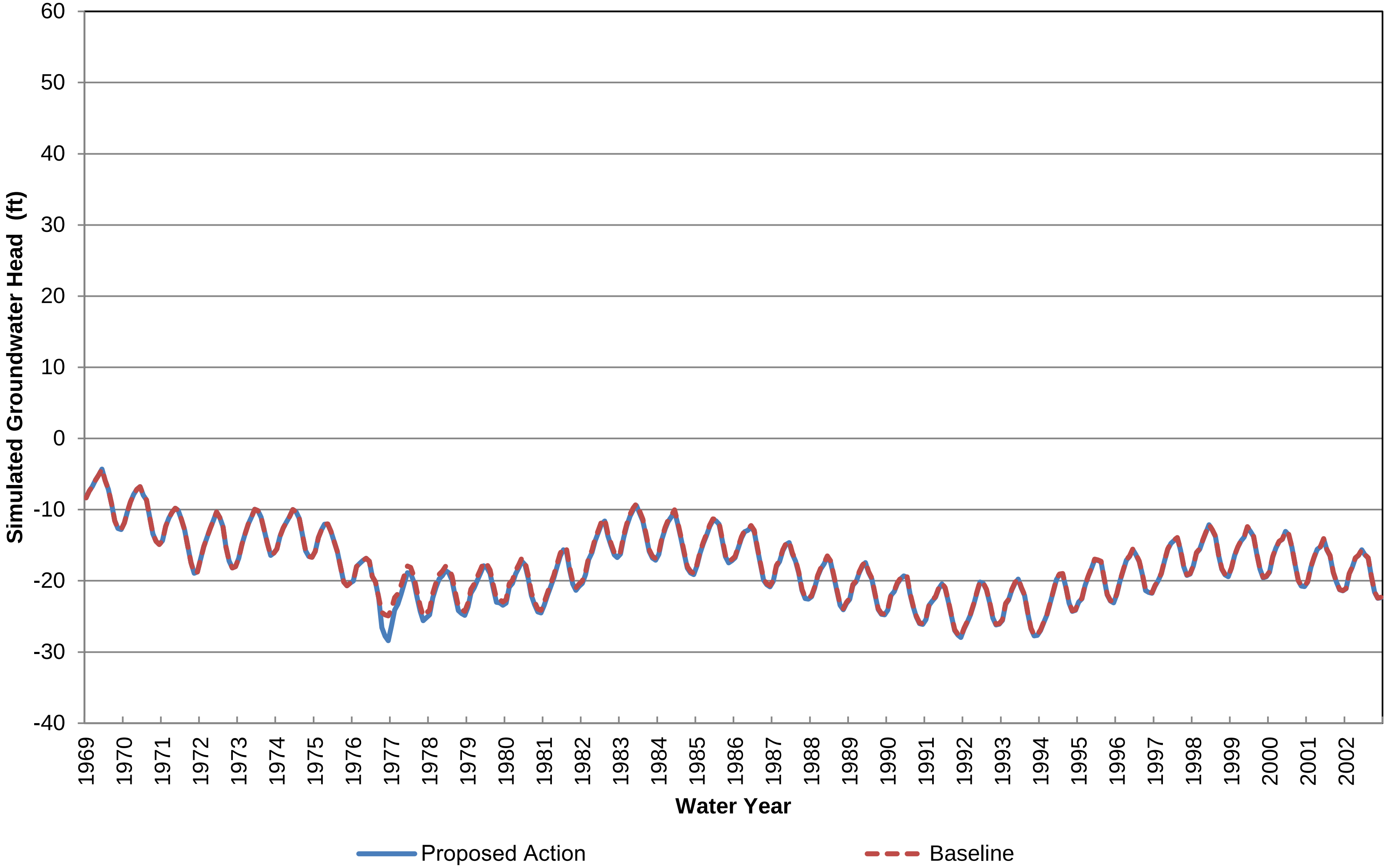
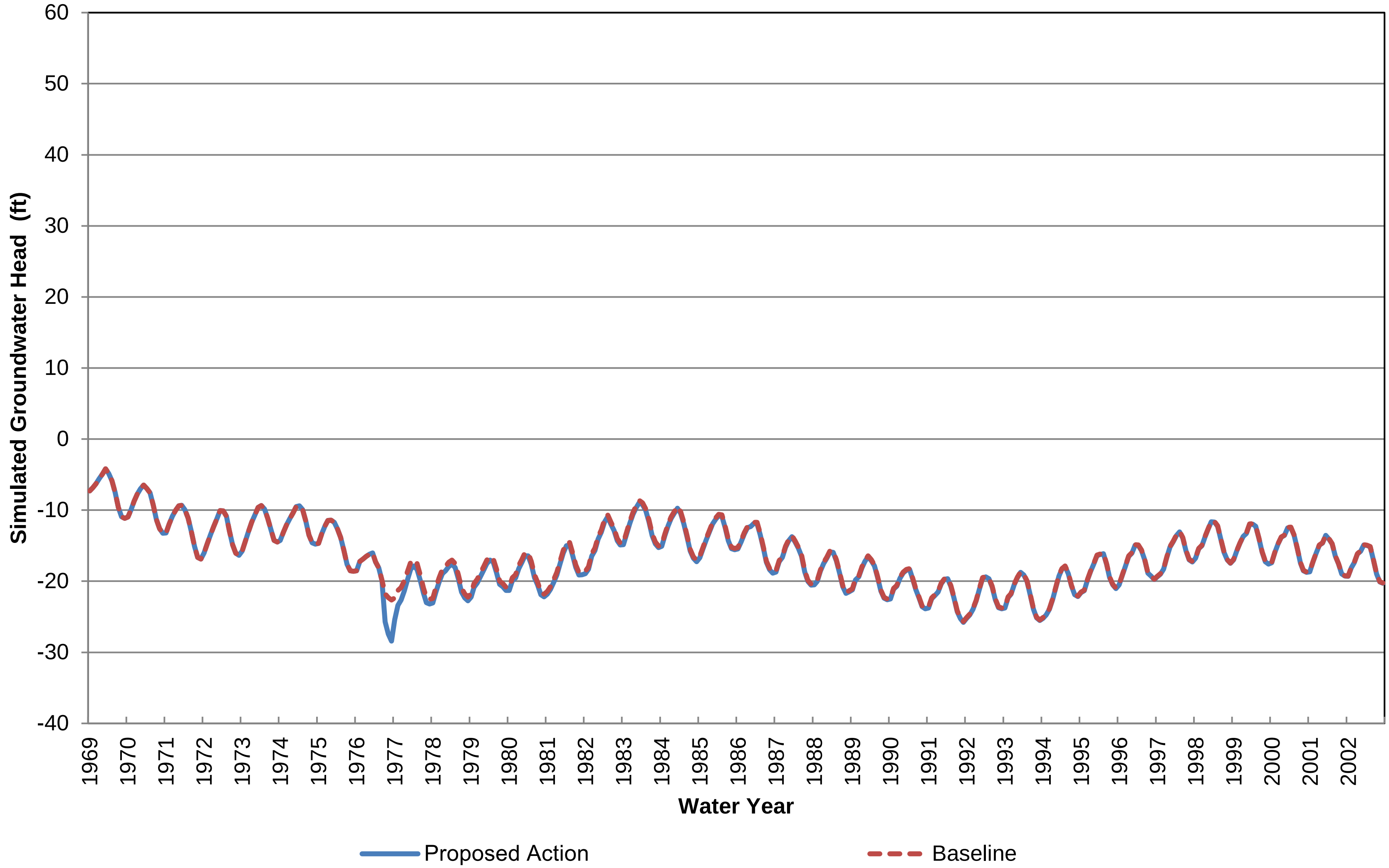
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline

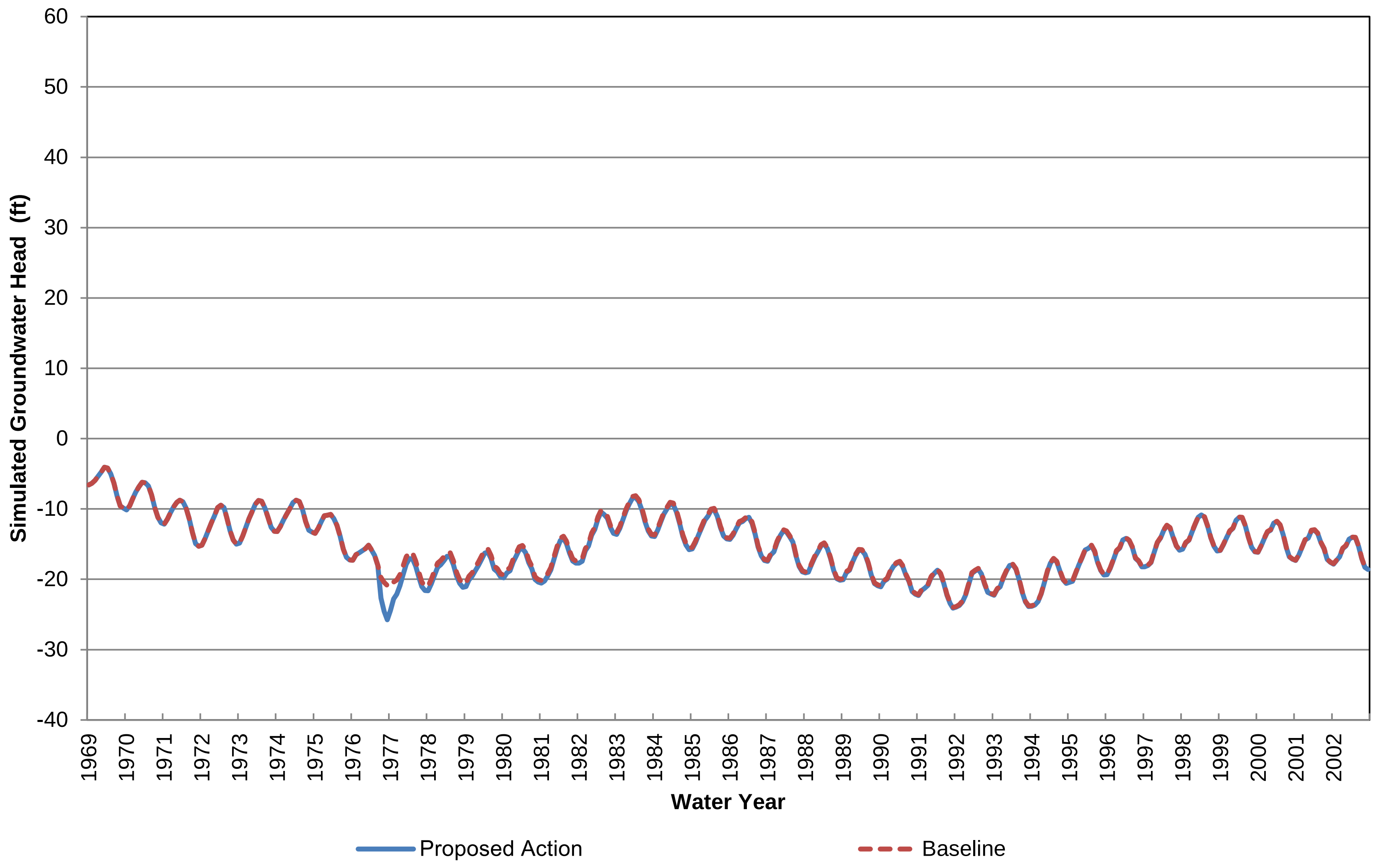
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 33 (Approximately 570-840 ft bgs)

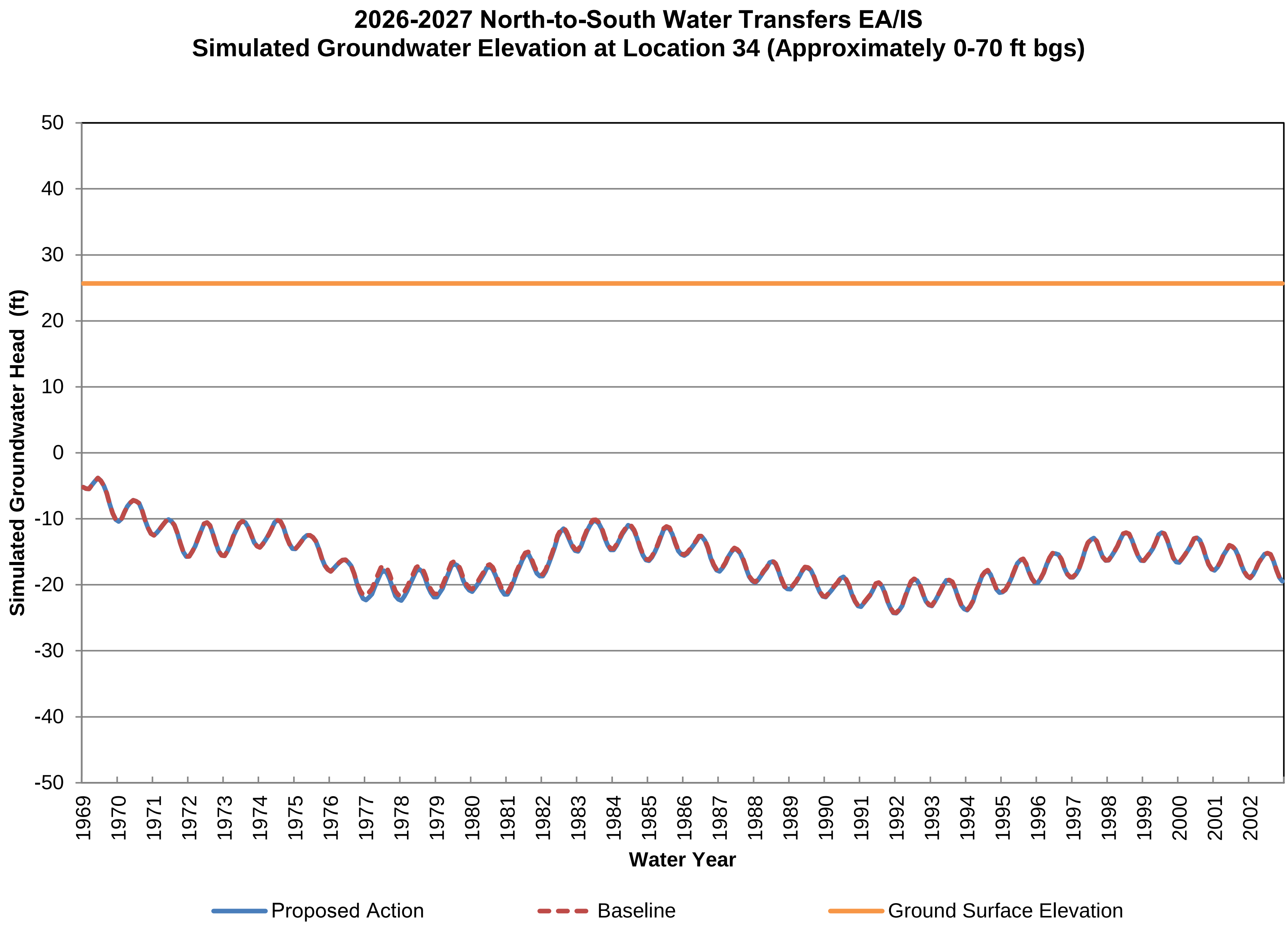


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 33 (Approximately 840-1120 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 33 (Approximately 1120-1540 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Elevation at Location 34 (Approximately 0-70 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
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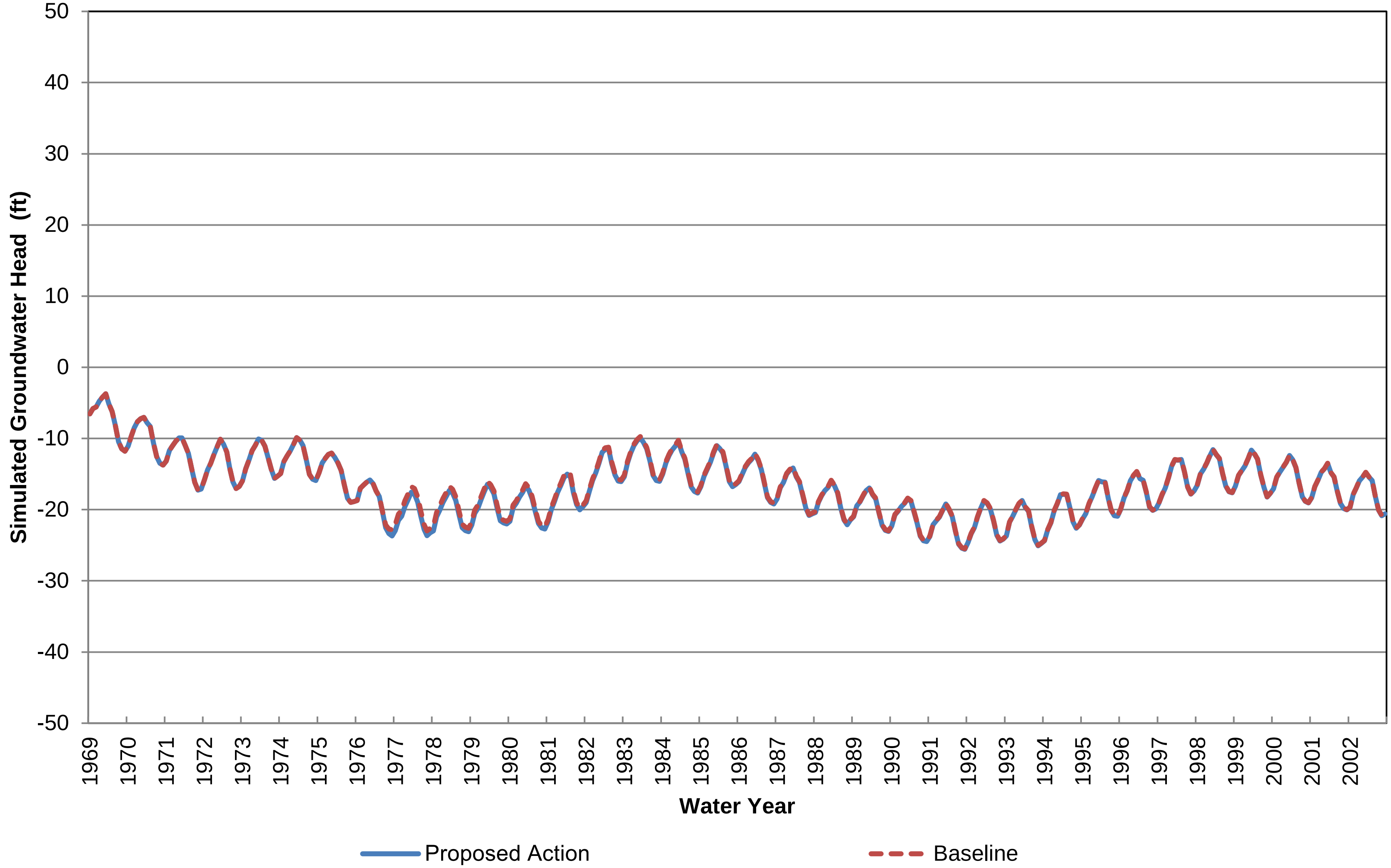
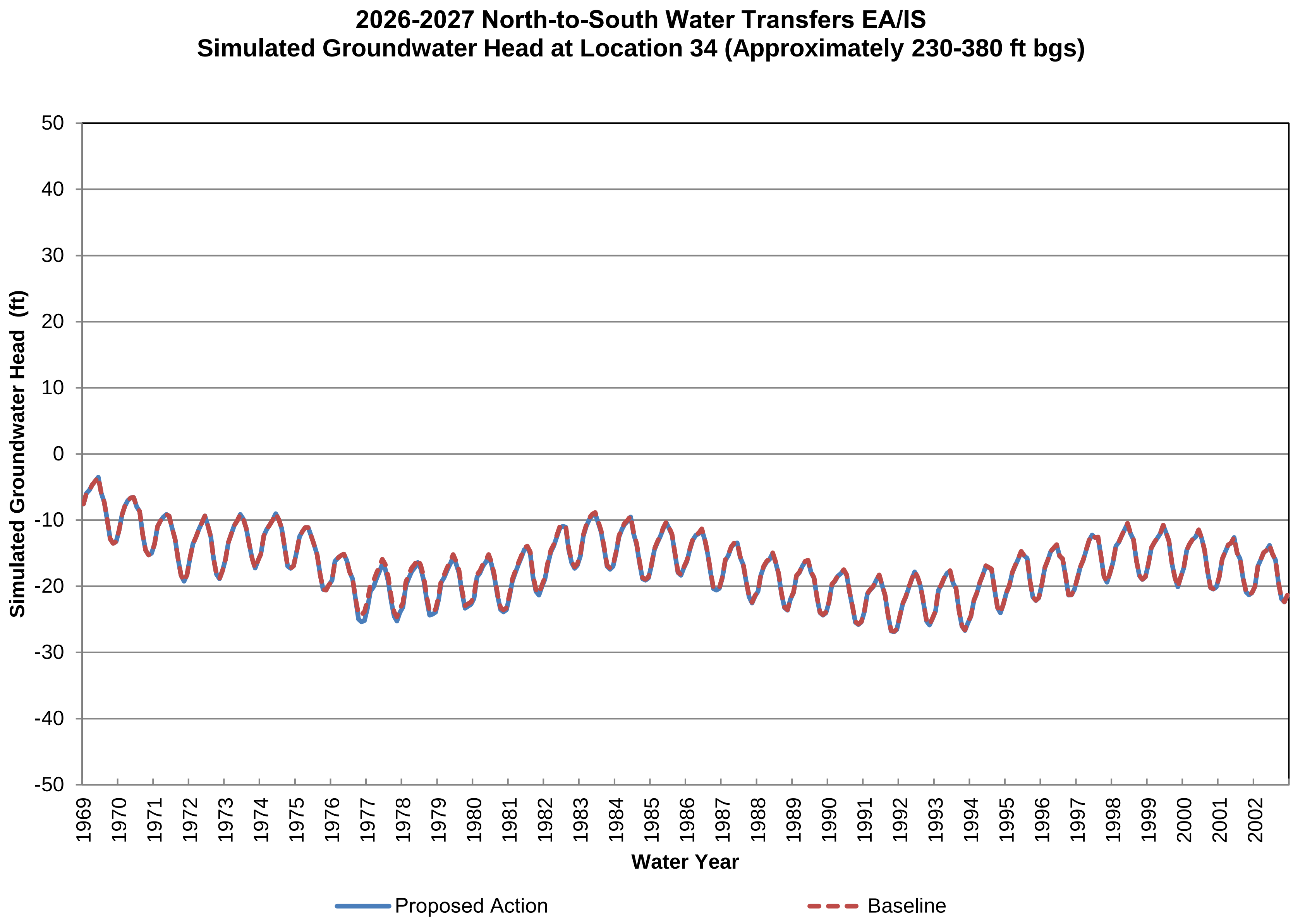
1997
1998
1999
2000
2001
2002
Water Year
Proposed Action
Baseline
Ground Surface Elevation

2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 34 (Approximately 70-230 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 34 (Approximately 230-380 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
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1984
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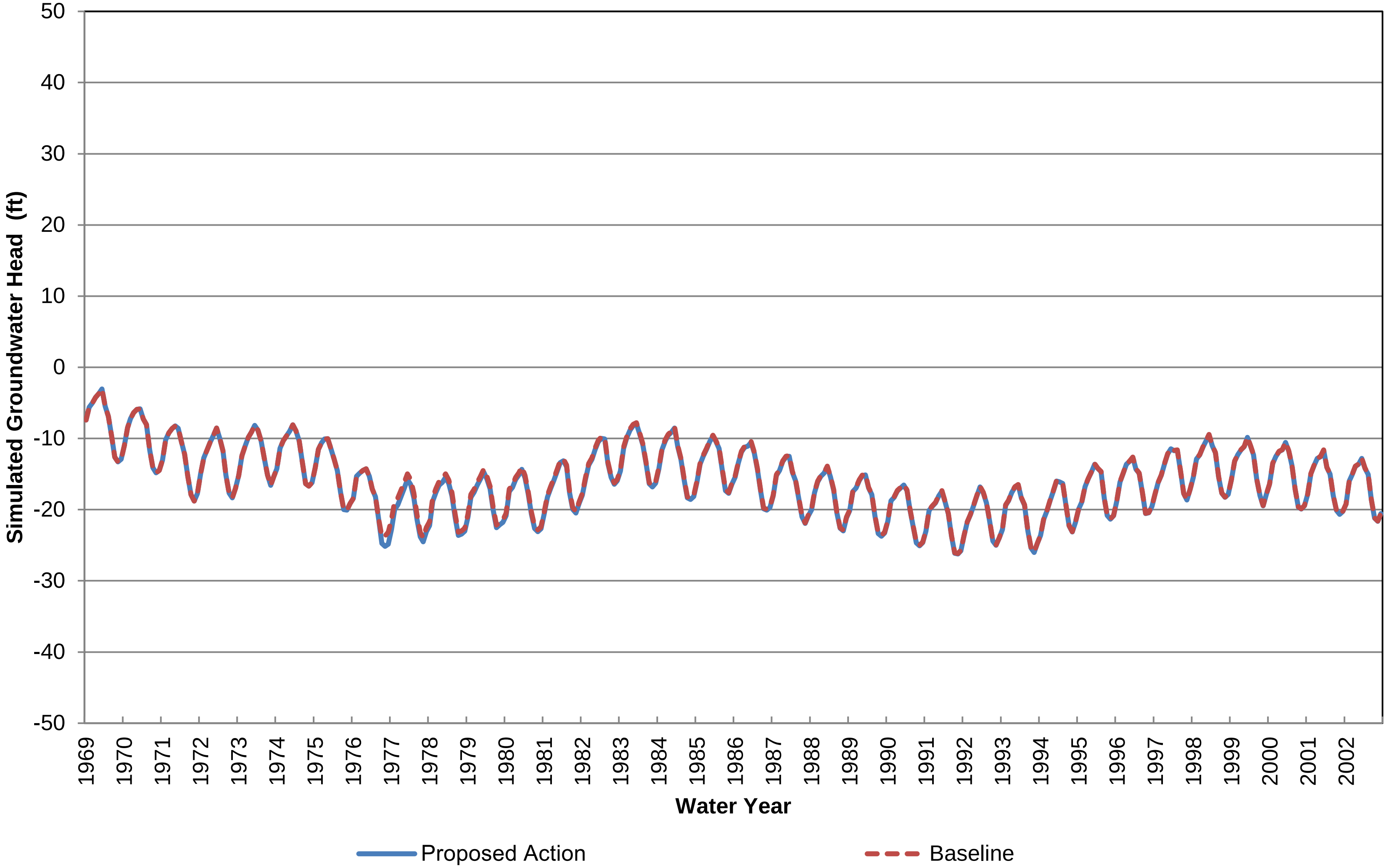
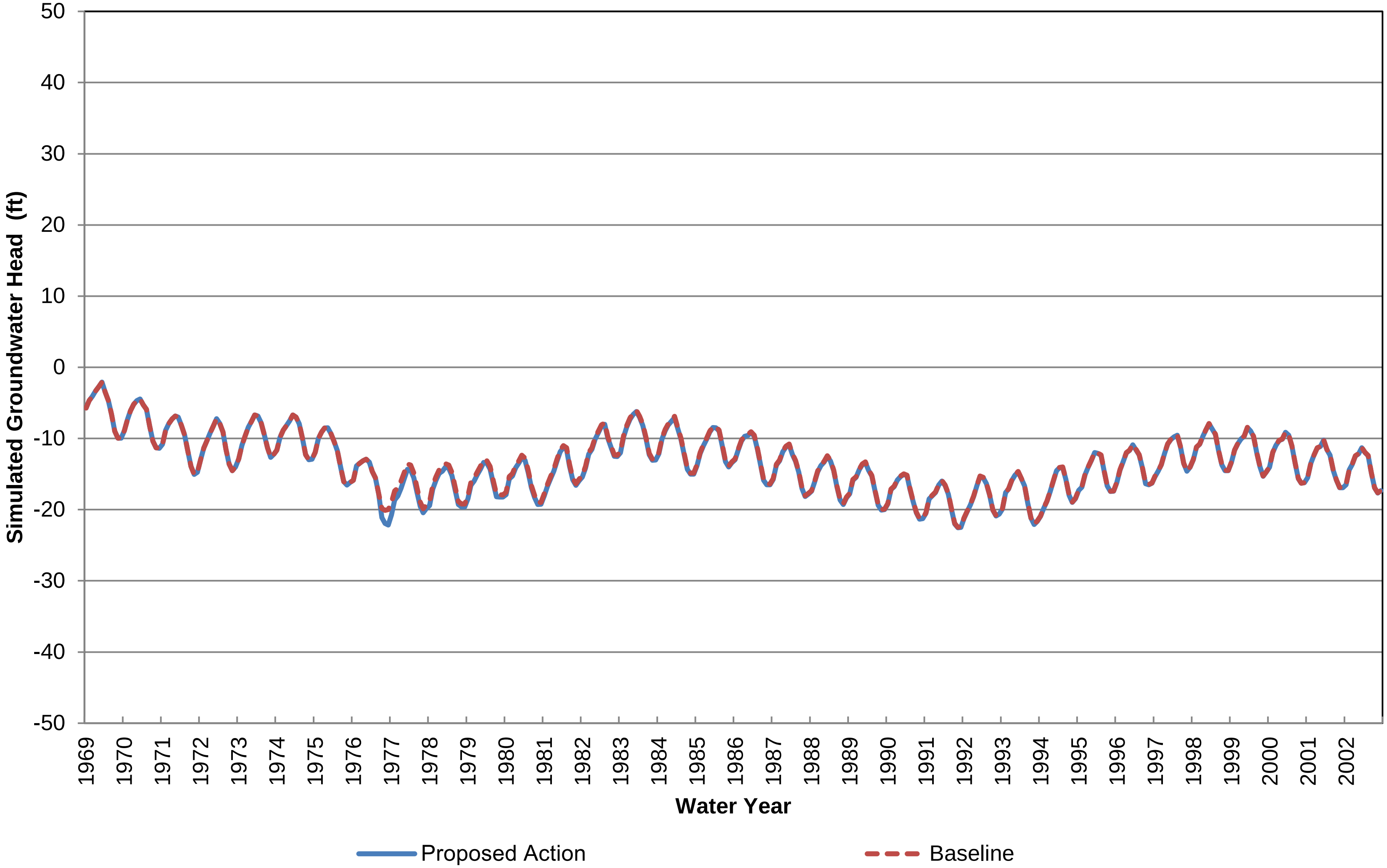
2002
Water Year
Proposed Action
Baseline

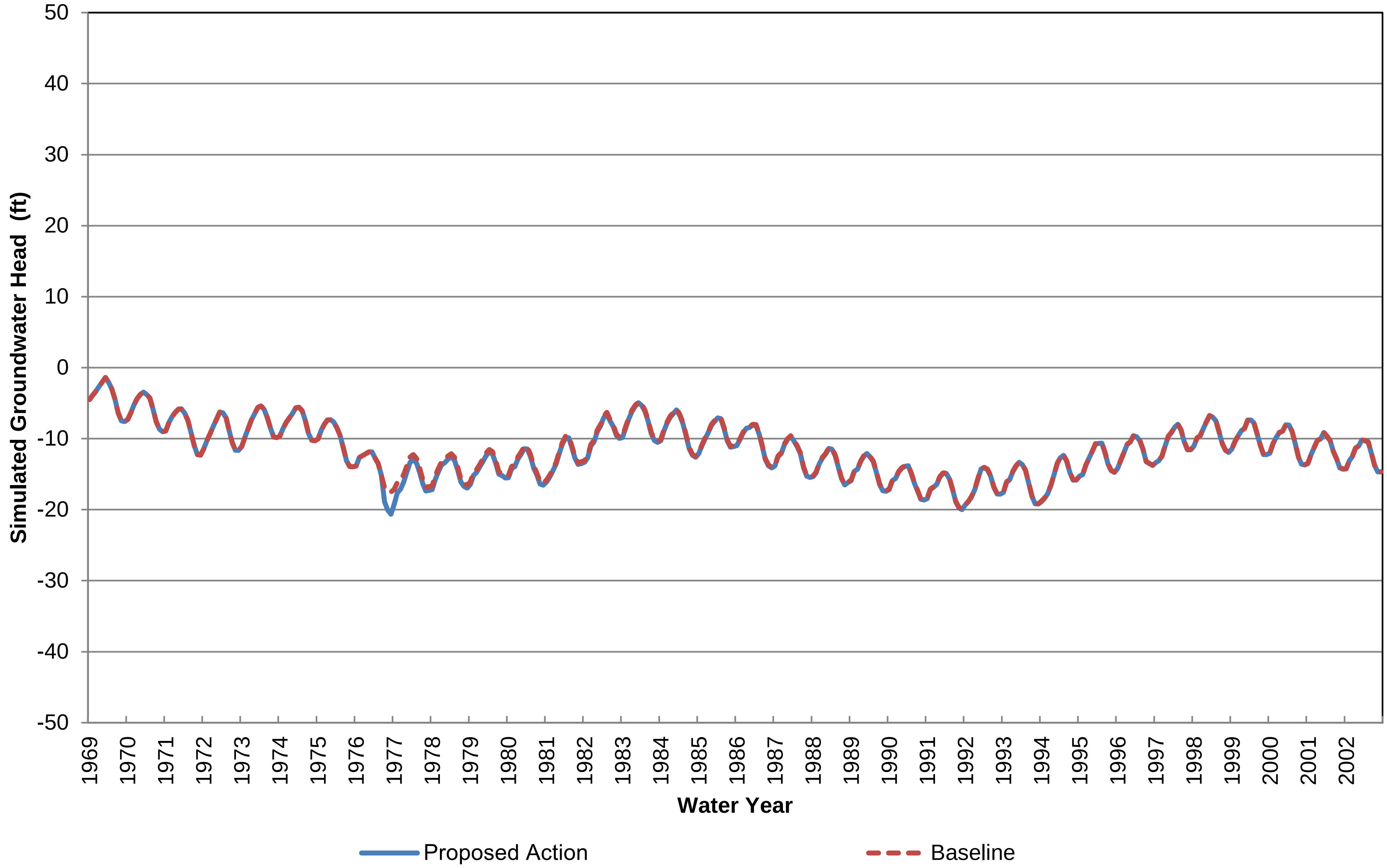
2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 34 (Approximately 380-540 ft bgs)

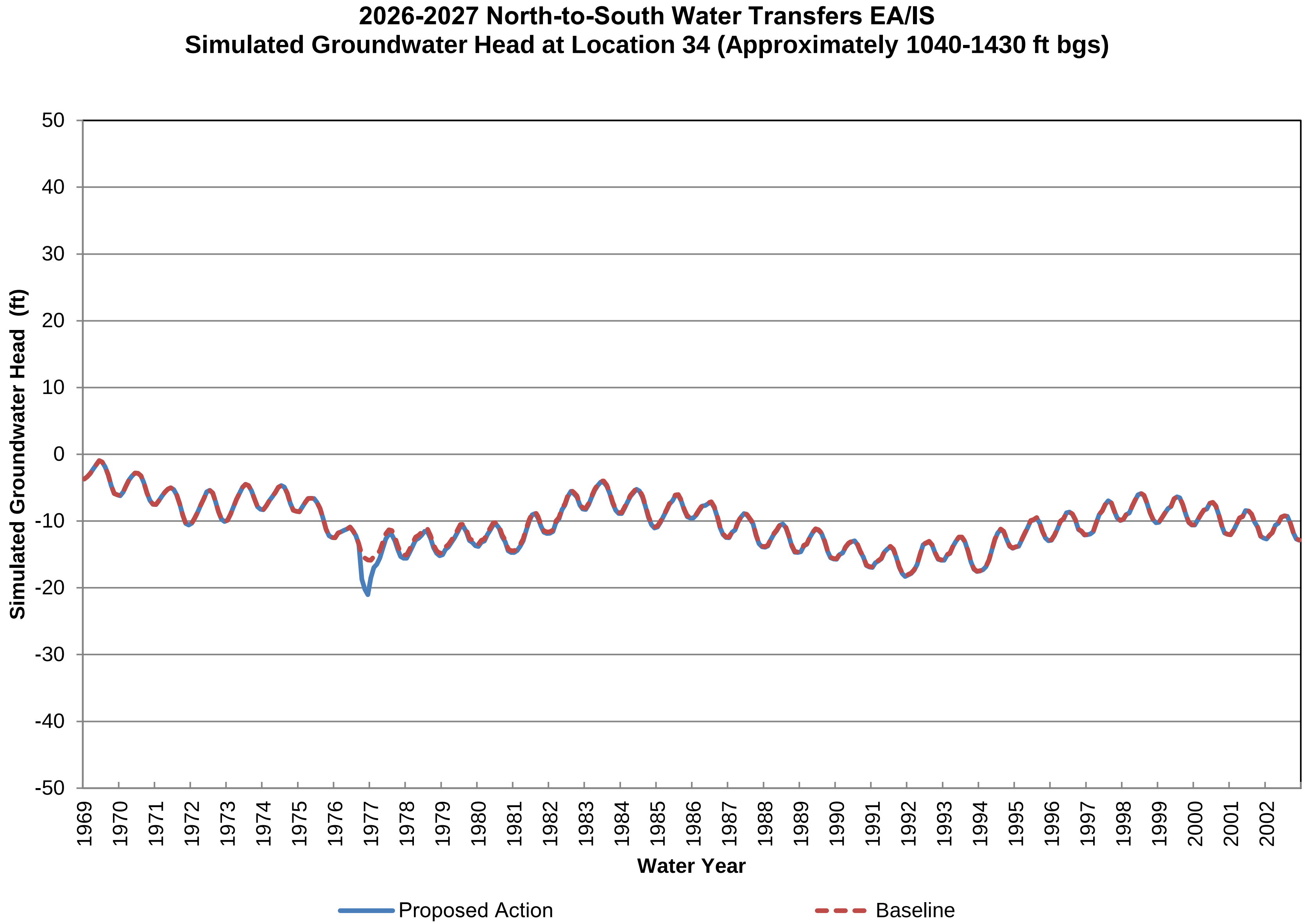


2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 34 (Approximately 540-780 ft bgs)



2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 34 (Approximately 780-1040 ft bgs)




2026-2027 North-to-South Water Transfers EA/IS
Simulated Groundwater Head at Location 34 (Approximately 1040-1430 ft bgs)
Simulated Groundwater Head (ft)
50
40
30
20
10
0
-10
-20
-30
-40
-50
1969
1970
1971
1972
1973
1974
1975
1976
1977
1978
1979
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
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1999
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2001
2002
Water Year
Proposed Action
Baseline

Appendix E3
Water Transfer Information Checklists

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Appendix B Water Transfer Information Checklists

The Project Agencies have developed checklists to aid sellers proposing to transfer water made available through crop idling, groundwater substitution and reservoir reoperation that will require conveyance by DWR or Reclamation through SWP or CVP facilities. The checklists summarize the information requirements contained in the Draft Technical Information for Preparing Water Transfer Proposals. The checklists are intended to assist sellers in developing a complete proposal which will facilitate review by the Project Agencies including the calculation of the amount of the water made available by the proposal. While the checklists summarize the information requirements, additional information may be required if questions arise during the review of a specific proposal.

Information Requirements for Sellers Proposing to Transfer Water Made Available Through Crop Idling

The following information should be submitted to the appropriate Project Agency for review and approval with any water transfer proposal based on crop idling or crop shifting. The information should be submitted <u>by March 1 of the transfer year.</u>

- Seller Contact Information.
- Identify the surface water rights covering the proposed transfer.
    - Type of appropriative right and Permit/License number if right is permitted by the State Water Resources Control Board.
    - Historic surface water diversions.
- Provide documentation demonstrating compliance with the California Environmental Quality Act or the State Water Resources Control Board approval process as appropriate.
- Location Information (County, contact).
- Seller acreage to be idled for transfer.
- Historic Cropping Information – past 5 years cropping history.
    - Total acreage.
    - Total farmable acreage.
    - Acreage by crop.
    - Identify any fields that were double-cropped in previous years and identify the crops.
    - Acreage fallowed each year.

Provide explanation for idling, i.e., normal crop rotation, water transfer idling, land maintenance, weed control, conversion to organic farming, etc.

Land already being idled for other purposes in the year of the water transfer (i.e., for the purposes of converting the acreage to organic farming, conversion to orchard or other permanent crop, or normal crop rotation) is not eligible for transfer idling

  - Non-irrigated cropped acreage.
  - Participating owner or growers.
  - Proposed crop for Transfer Year if proposal includes crop shifting.
- Maps showing:
  - Agency or farm boundary.
  - Field boundaries.
  - Field identification numbers (if applicable).
  - Fields currently irrigated.
  - Fields routinely irrigated.
  - Fields routinely not irrigated.
  - Fields to be idled as part of water transfer.
  - Current year FSA acreage of each field.
  - Areas known to have high seepage.
  - Areas adjacent to wildlife refuge or areas managed to provide wildlife habitat outside the crop season.
  - Portion of any fields dedicated to non-cropping purposes such as equipment storage.
- Maintenance and Monitoring Proposal for idled acreage.
  - Plan for remnant vegetation on idled land.
  - Conservation easements or similar restrictions on vegetation control methods.
  - Actions to be taken to prevent seepage onto idled fields or control vegetation in high water table or seepage areas.

Information Requirements for Sellers Proposing to Transfer Water Made Available Through Groundwater Substitution

The following information should be submitted to the appropriate Project Agency for review and approval with any water transfer proposal based on groundwater substitution. The information should be submitted by March 1 of the transfer year.

- Seller contact Information.

- Surface water source that will be replaced by groundwater pumping.
- Written concurrence from the corresponding GSAs on the proposal.
- Identify the surface water rights covering the proposed transfer and provide documentation demonstrating compliance with the California Environmental Quality Act or the State Water Resources Control Board approval process as appropriate.
- Location, construction details, and other relevant information for each proposed transfer well.
    - Well Identification: Well owner name and identification number, water district, and district's well identification number
    - Well Location: Latitude and longitude (DWR standard coordinate system and datum (GCS, NAD 83, decimal degrees)), map (similar detail to 7.5-minute USGS quad sheet) with well location and all surface water features within two miles of District boundary.
    - Well Completion Report.
    - Well Construction: well depth, depth of annular surface seal, gravel pack interval(s), casing size, casing perforation interval, and well's construction method.
    - Geologic Log.
    - Estimated Well Capacity.
    - Photographic evidence of an instantaneous reading and totalizing flow meter installed on each participating well.
    - Certification by a Professional Engineer or Professional Geologist of flow meter installation consistent with the manufacturer's specifications and calibrated in accordance with Section 3.3.1, Item 4.b (template can be downloaded from WTIMS).
    - If applicable, for Project Agencies consideration, technical analysis that supports a streamflow depletion factor other than a minimum of 13 percent and/or information sufficient to demonstrate that a well likely does not have a significant hydraulic connection to the surface water system tributary to the Delta according to the well acceptance criteria (Appendix D). For this specific information, it is recommended transfer proponents provide adequate time for Project Agency review and consideration.
    - Additional Information (If available): PG&E well pump efficiency test, independent well drawdown tests, water quality data, and/or site-specific studies with aquifer properties surrounding the well or extent of the well's hydrologic connection with any surface waters.
    - Pump Power: Verification of an electric power source for each well, or if a pump is diesel or natural gas powered, verification of compliance with California Air Resources Board or local Air Pollution Control District Rules and Regulations.

- Schedule and volume of water to be pumped.
  - Proposed Operations: Description of the well's projected operation and the beneficial use of pumped groundwater.
- Baseline from which the additional groundwater pumping will be measured.
- Historic Operations: Operation records indicating the volume of groundwater pumped from each proposed transfer well for the three previous non- transfer years during the months when transfer pumping will occur; identify and document area(s) normally irrigated by wells.

Monitoring Program – submit the monitoring plan to the Project Agencies along with the transfer proposal. The seller shall begin monitoring groundwater levels in March of the transfer year.

- A monitoring well network that adequately covers the surface area and aquifer intervals within the affected pumping area. The Project Agencies recommend using dedicated monitoring wells to the maximum extent possible.
- Meter readings of instantaneous flow (gpm or cfs) and total discharge volume (af) at each of the transfer wells (collected as specified).
- Groundwater level measurements (collected as specified)
- Groundwater quality monitoring (when groundwater pumping is initiated, monthly during the transfer period, and at the termination of pumping).
- Method to detect land subsidence or a determination that land subsidence is unlikely to occur.
- Plans to coordinate data collection and cooperate with regional monitoring efforts.
- Data evaluation and reporting.

Mitigation Plan – submit a mitigation plan to the Project Agencies at the time the transfer proposal is submitted.

- A procedure for the seller to receive reports of purported environmental or local economic effects and to report that information to the Project Agencies and, as required, to local agencies.
- A procedure for investigating any reported effect.
- Development of mitigation options, in cooperation with the affected third parties, for legitimate effects.
- Assurances that adequate financial resources are available to cover reasonably anticipated mitigation needs.

Information Requirements for Sellers Proposing to Transfer Water Made Available Through Reservoir Reoperation

The following information should be submitted to the appropriate Project Agency for review and approval with any water transfer proposal based on reservoir reoperation. Data should span a variety of hydrologic conditions sufficient to develop normal operating conditions for various hydrologic year types. The information should be submitted by March 1 of the transfer year.

- Seller contact information.
- Identify the surface water rights covering the proposed transfer and provide documentation demonstrating compliance with the California Environmental Quality Act or the State Water Resources Control Board approval process as appropriate.
- A minimum of 5 years' reservoir operating data including:
  - Daily reservoir storage.
  - End of month storage.
  - Daily inflow and reservoir releases.
- Top of allowable conservation storage and Flood Control Diagram, if applicable.
- Instream flow requirements downstream of the reservoir.
- Forecasted operations for the year of the transfer including projected inflows.
- Historic demands and forecasted water supply demands for the year of the transfer.
- End-of-Season target storage, if applicable.
- Any regulatory or operational obligations affecting reservoir operations.
- Location, type and ownership of proposed water measurement device downstream of the reservoir.
- Proposed schedule and volume of transfer water release.
- Reservoir Area-Capacity curve, if available.

Reservoir operations data must be provided to the Project Agencies throughout the term of the transfer through the reservoir refill period to verify the transfer and account for any potential refill impacts.

Refill criteria are required for all reservoir release based water transfers to ensure that the transfer does not injure any other legal user of water, including the State Water Project and Central Valley Project. Refill criteria are developed based on the specific conditions for each project. Typically, reservoir storage space vacated by the transfer may only be refilled during periods when any downstream reservoir has filled or reached flood control operations or if there are no other reservoirs downstream of the seller's facility, when the Delta is in excess conditions.

Appendix E4
Streamflow Modeling Results

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Appendix E4 Streamflow Modeling Results

E4.1 SACFEM2013 Modeling Background and Methods

Numerical groundwater modeling analysis was performed using the Sacramento Valley Finite Element Groundwater Model (SACFEM2013) which was developed to simulate groundwater conditions in the Sacramento Valley Groundwater Basin (Reclamation 2015). SACFEM2013 was selected as the numerical modeling tool for this analysis based on the state of the model and its capabilities to simulate groundwater conditions at a greater level of detail than other potential modeling tools within the Seller Service Area. SACFEM2013 is capable of simulating groundwater and surface water interactions in the Sacramento Valley and was used to estimate how groundwater pumping and recharge affects surface water.

The modeled volume of water made available by groundwater substitution transfer under the Proposed Action was 297,155 acre-feet (upper groundwater substitution quantities). The modeled volume of water available by groundwater substitution transfer adds up to more than the Buyers' transfer demand of 250,000 acre-feet, so the analysis provides a conservative analysis of potential environmental impacts by assessing impacts of the entire range of potential water transfers in any one year.

The modeling also used the driest period of record available during the SACFEM2013 simulation period (Water Year 1970 to Water Year 2003). Potential water transfers were simulated under September 1977 hydrologic conditions, which was selected because Water Year 1977 was a critically dry year that followed a critically dry water year (WY1976). Therefore, the modeling presents a worst-case scenario that could occur under very dry conditions.

E4.2 Streamflow Depletion Analysis

As discussed in Section 3.3.2 of the EA/IS, the threshold for the potential for flow-related effects was identified as both a minimum decrease in mean (average) monthly flow of one cfs as compared to the modeled Proposed Action flows under the No Action/No Project Alternative and a ten percent decrease in modeled Proposed Action flows compared to the No Action/No Project flows. Groundwater modeling data was used to determine the rivers and creeks in which both the modeled flow reductions under the Proposed Action were greater than one cfs and ten percent during any month of any of the water years compared to the No Action/No Project Alternative. The comparison analysis determined that three waterbodies, Lower Sycamore Slough, Colusa Basin Drain, and Eastside/Cross Canal, exceeded the threshold with greater than one cfs depletion compared to the modeled No Action streamflow and greater than ten percent average monthly flow reduction compared to the modeled No Action streamflow. Table E4-1 shows modeled streamflow in Lower Sycamore Slough under the Proposed Action in comparison to No Action/No Project Alternative, Table E4-2 shows modeled streamflow in Colusa Basin Drain under the Proposed Action in comparison to No Action/No Project Alternative, and Table E4-3 shows modeled streamflow in Eastside/Cross Canal under the Proposed Action in comparison to No Action/No Project Alternative. Modeled reduction in flow that resulted in a reduction greater than one cfs or ten percent between the Proposed Action and the No Action/No Project Alternative are shaded and in bold.

Table E4-1. Modeled Streamflow in Lower Sycamore Slough under Proposed Action in Comparison to No Action/No Project Alternative

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
September 1969	0.00	0.0%
October 1969	0.00	0.0%
November 1969	0.00	0.0%
December 1969	0.00	0.0%
January 1970	0.00	0.0%
February 1970	0.00	0.0%
March 1970	0.00	0.0%
April 1970	0.00	0.0%
May 1970	0.00	0.0%
June 1970	0.00	0.0%
July 1970	0.00	0.0%
August 1970	0.00	0.0%
September 1970	0.00	0.0%
October 1970	0.00	0.0%
November 1970	0.00	0.0%
December 1970	0.00	0.0%
January 1971	0.00	0.0%
February 1971	0.00	0.0%
March 1971	0.00	0.0%
April 1971	0.00	0.0%
May 1971	0.00	0.0%
June 1971	0.00	0.0%
July 1971	0.00	0.0%
August 1971	0.00	0.0%
September 1971	0.00	0.0%
October 1971	0.00	0.0%
November 1971	0.00	0.0%
December 1971	0.00	0.0%
January 1972	0.00	0.0%
February 1972	0.00	0.0%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
March 1972	0.00	0.0%
April 1972	0.00	0.0%
May 1972	0.00	0.0%
June 1972	0.00	0.0%
July 1972	0.00	0.0%
August 1972	0.00	0.0%
September 1972	0.00	0.0%
October 1972	0.00	0.0%
November 1972	0.00	0.0%
December 1972	0.00	0.0%
January 1973	0.00	0.0%
February 1973	0.00	0.0%
March 1973	0.00	0.0%
April 1973	0.00	0.0%
May 1973	0.00	0.0%
June 1973	0.00	0.0%
July 1973	0.00	0.0%
August 1973	0.00	0.0%
September 1973	0.00	0.0%
October 1973	0.00	0.0%
November 1973	0.00	0.0%
December 1973	0.00	0.0%
January 1974	0.00	0.0%
February 1974	0.00	0.0%
March 1974	0.00	0.0%
April 1974	0.00	0.0%
May 1974	0.00	0.0%
June 1974	0.00	0.0%
July 1974	0.00	0.0%
August 1974	0.00	0.0%
September 1974	0.00	0.0%
October 1974	0.00	0.0%
November 1974	0.00	0.0%
December 1974	0.00	0.0%
January 1975	0.00	0.0%
February 1975	0.00	0.0%
March 1975	0.00	0.0%
April 1975	0.00	0.0%
May 1975	0.00	0.0%
June 1975	0.00	0.0%
July 1975	0.00	0.0%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
August 1975	0.00	0.0%
September 1975	0.00	0.0%
October 1975	0.00	0.0%
November 1975	0.00	0.0%
December 1975	0.00	0.0%
January 1976	0.00	0.0%
February 1976	0.00	0.0%
March 1976	0.00	0.0%
April 1976	0.00	0.0%
May 1976	0.00	0.0%
June 1976	0.00	0.0%
July 1976	0.00	0.0%
August 1976	0.00	0.0%
September 1976	0.00	0.0%
October 1976	0.00	0.0%
November 1976	0.00	0.0%
December 1976	0.00	0.0%
January 1977	0.00	0.0%
February 1977	0.00	0.0%
March 1977	0.00	0.0%
April 1977	-0.16	5.2%
May 1977	**-1.83**	**10.9%**
June 1977	**-2.09**	**12.4%**
July 1977	**-1.98**	**10.8%**
August 1977	**-1.98**	**10.5%**
September 1977	**-1.13**	7.2%
October 1977	-0.23	3.8%
November 1977	-0.33	3.3%
December 1977	-0.50	5.3%
January 1978	**-7.47**	**28.7%**
February 1978	**-6.04**	**47.9%**
March 1978	**-4.78**	**263.4%**
April 1978	**-3.89**	**-51.9%**
May 1978	**-3.29**	**124.5%**
June 1978	**-2.87**	**70.0%**
July 1978	**-2.56**	**34.9%**
August 1978	**-2.34**	**19.3%**
September 1978	**-2.15**	**24.4%**
October 1978	**-1.95**	**-199.4%**
November 1978	**-1.83**	**47.0%**
December 1978	**-1.55**	**89.4%**

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
January 1979	**-1.75**	**22.9%**
February 1979	**-1.67**	**36.6%**
March 1979	**-1.50**	**-43.4%**
April 1979	**-1.36**	**-84.7%**
May 1979	**-1.23**	**18.2%**
June 1979	**-1.13**	**26.1%**
July 1979	**-1.04**	**11.7%**
August 1979	-0.97	7.3%
September 1979	-0.91	9.5%
October 1979	-0.85	**-46.0%**
November 1979	-0.81	**13.9%**
December 1979	-0.78	**14.2%**
January 1980	-0.73	8.5%
February 1980	-0.63	**-105.4%**
March 1980	-0.53	-7.7%
April 1980	-0.45	-3.7%
May 1980	-0.40	**13.5%**
June 1980	-0.36	**-27.1%**
July 1980	-0.33	7.6%
August 1980	-0.32	3.0%
September 1980	-0.30	4.9%
October 1980	-0.29	-6.7%
November 1980	-0.28	**-122.5%**
December 1980	-0.28	**31.9%**
January 1981	-0.27	3.9%
February 1981	-0.25	7.8%
March 1981	-0.24	-6.8%
April 1981	-0.22	-7.3%
May 1981	-0.21	2.5%
June 1981	-0.20	6.3%
July 1981	-0.19	1.7%
August 1981	-0.19	1.3%
September 1981	-0.18	2.0%
October 1981	-0.18	-6.9%
November 1981	-0.18	2.7%
December 1981	-0.16	6.8%
January 1982	-0.15	4.1%
February 1982	-0.13	-1.0%
March 1982	-0.12	-1.0%
April 1982	-0.11	-1.4%
May 1982	-0.10	-2.4%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
June 1982	-0.09	9.5%
July 1982	-0.09	3.4%
August 1982	-0.09	1.0%
September 1982	-0.08	1.4%
October 1982	-0.08	-1.4%
November 1982	-0.08	-9.6%
December 1982	-0.08	**-26.1%**
January 1983	-0.07	-2.1%
February 1983	-0.06	1.7%
March 1983	-0.05	7.4%
April 1983	-0.05	-0.3%
May 1983	-0.04	-0.4%
June 1983	-0.04	-0.8%
July 1983	-0.04	-1.0%
August 1983	-0.04	4.6%
September 1983	-0.04	2.6%
October 1983	-0.04	-0.4%
November 1983	-0.04	1.5%
December 1983	-0.04	0.7%
January 1984	-0.03	-0.3%
February 1984	-0.03	-0.2%
March 1984	-0.03	-0.2%
April 1984	-0.03	-0.4%
May 1984	-0.03	1.0%
June 1984	-0.03	-1.6%
July 1984	-0.03	0.5%
August 1984	-0.03	0.4%
September 1984	-0.03	-7.8%
October 1984	-0.03	-0.4%
November 1984	-0.03	1.0%
December 1984	-0.03	-0.4%
January 1985	-0.03	-0.2%
February 1985	-0.03	-0.2%
March 1985	-0.03	-0.3%
April 1985	-0.03	-0.8%
May 1985	-0.02	0.4%
June 1985	-0.02	1.1%
July 1985	-0.03	0.3%
August 1985	-0.03	0.2%
September 1985	-0.03	0.3%
October 1985	-0.03	-0.5%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
November 1985	-0.03	0.8%
December 1985	-0.03	1.5%
January 1986	-0.03	-5.7%
February 1986	-0.02	0.2%
March 1986	-0.02	-0.3%
April 1986	-0.02	-0.1%
May 1986	-0.02	-0.6%
June 1986	-0.02	-0.8%
July 1986	-0.02	0.7%
August 1986	-0.02	0.3%
September 1986	-0.02	0.4%
October 1986	-0.02	-0.3%
November 1986	-0.02	-1.1%
December 1986	-0.02	-0.4%
January 1987	-0.02	-0.6%
February 1987	-0.02	-0.7%
March 1987	-0.02	-3.2%
April 1987	-0.02	-2.4%
May 1987	-0.02	0.3%
June 1987	-0.02	0.6%
July 1987	-0.02	0.2%
August 1987	-0.02	0.2%
September 1987	-0.02	0.2%
October 1987	-0.02	-0.8%
November 1987	-0.02	0.4%
December 1987	-0.02	-7.8%
January 1988	-0.02	0.5%
February 1988	-0.02	-0.2%
March 1988	-0.02	-0.5%
April 1988	-0.02	1.4%
May 1988	-0.02	0.4%
June 1988	-0.02	0.9%
July 1988	-0.02	0.4%
August 1988	-0.02	0.2%
September 1988	-0.02	0.2%
October 1988	-0.02	-3.6%
November 1988	-0.02	0.3%
December 1988	-0.02	2.0%
January 1989	-0.02	3.2%
February 1989	-0.02	-1.4%
March 1989	-0.02	1.9%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
April 1989	-0.02	1.5%
May 1989	-0.02	0.4%
June 1989	-0.02	0.3%
July 1989	-0.02	0.2%
August 1989	-0.02	0.1%
September 1989	-0.02	0.1%
October 1989	-0.02	-0.7%
November 1989	-0.02	0.9%
December 1989	-0.02	-1.5%
January 1990	-0.02	0.8%
February 1990	-0.02	-1.3%
March 1990	-0.02	-3.1%
April 1990	-0.02	0.4%
May 1990	-0.02	0.2%
June 1990	-0.02	0.2%
July 1990	-0.02	0.2%
August 1990	-0.02	0.1%
September 1990	-0.02	0.2%
October 1990	-0.02	0.6%
November 1990	-0.02	0.2%
December 1990	-0.02	0.5%
January 1991	-0.01	0.3%
February 1991	-0.02	0.3%
March 1991	-0.02	0.2%
April 1991	-0.02	0.9%
May 1991	-0.02	0.2%
June 1991	-0.02	0.1%
July 1991	-0.02	0.1%
August 1991	-0.01	0.1%
September 1991	-0.01	0.1%
October 1991	-0.01	0.1%
November 1991	-0.01	0.1%
December 1991	-0.01	0.1%
January 1992	-0.01	0.1%
February 1992	-0.02	0.1%
March 1992	-0.02	0.4%
April 1992	-0.02	1.7%
May 1992	-0.02	0.2%
June 1992	-0.02	0.1%
July 1992	-0.01	0.1%
August 1992	-0.01	0.1%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
September 1992	-0.01	0.1%
October 1992	0.00	0.1%
November 1992	0.00	0.0%
December 1992	-0.01	0.1%
January 1993	-0.03	0.1%
February 1993	-0.02	0.2%
March 1993	-0.02	-0.3%
April 1993	-0.02	-0.2%
May 1993	-0.02	1.3%
June 1993	-0.02	0.6%
July 1993	-0.01	0.3%
August 1993	-0.01	0.3%
September 1993	-0.01	0.2%
October 1993	-0.01	**10.4%**
November 1993	-0.01	0.3%
December 1993	-0.01	0.3%
January 1994	-0.01	0.9%
February 1994	-0.01	0.2%
March 1994	-0.01	-1.7%
April 1994	-0.01	0.6%
May 1994	-0.01	0.1%
June 1994	-0.01	0.1%
July 1994	-0.01	0.1%
August 1994	-0.01	0.1%
September 1994	-0.01	0.1%
October 1994	-0.01	0.1%
November 1994	-0.01	0.1%
December 1994	-0.01	0.1%
January 1995	-0.02	0.1%
February 1995	-0.01	-2.2%
March 1995	-0.01	0.5%
April 1995	-0.01	-0.1%
May 1995	-0.01	-0.2%
June 1995	-0.01	-0.3%
July 1995	-0.01	-1.5%
August 1995	-0.01	1.0%
September 1995	-0.01	0.2%
October 1995	-0.01	2.4%
November 1995	-0.01	0.3%
December 1995	-0.01	0.2%
January 1996	-0.01	0.4%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
February 1996	-0.01	0.1%
March 1996	-0.01	-0.1%
April 1996	-0.01	-0.1%
May 1996	-0.01	-0.2%
June 1996	-0.01	-0.2%
July 1996	-0.01	-0.4%
August 1996	-0.01	0.3%
September 1996	-0.01	0.1%
October 1996	-0.01	-0.3%
November 1996	-0.01	0.2%
December 1996	-0.01	-3.1%
January 1997	-0.01	0.1%
February 1997	-0.01	-0.1%
March 1997	-0.01	-0.1%
April 1997	-0.01	-0.1%
May 1997	-0.01	-0.2%
June 1997	-0.01	-0.3%
July 1997	-0.01	0.3%
August 1997	-0.01	0.1%
September 1997	-0.01	0.2%
October 1997	-0.01	-0.4%
November 1997	-0.01	0.1%
December 1997	0.00	0.2%
January 1998	0.00	0.3%
February 1998	0.00	0.1%
March 1998	0.00	0.0%
April 1998	0.00	0.0%
May 1998	0.00	0.0%
June 1998	0.00	-0.1%
July 1998	0.00	0.0%
August 1998	0.00	1.5%
September 1998	0.00	0.3%
October 1998	0.00	0.0%
November 1998	0.00	-0.4%
December 1998	0.00	-0.1%
January 1999	0.00	0.0%
February 1999	0.00	-0.1%
March 1999	0.00	0.0%
April 1999	0.00	0.0%
May 1999	0.00	-0.1%
June 1999	0.00	-0.2%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
July 1999	0.00	0.3%
August 1999	0.00	0.1%
September 1999	0.00	0.1%
October 1999	0.00	-0.1%
November 1999	0.00	0.1%
December 1999	0.00	-0.3%
January 2000	0.00	0.8%
February 2000	0.00	0.1%
March 2000	0.00	0.0%
April 2000	0.00	0.0%
May 2000	0.00	-0.1%
June 2000	0.00	-0.1%
July 2000	0.00	0.5%
August 2000	0.00	0.1%
September 2000	0.00	0.1%
October 2000	0.00	-0.2%
November 2000	0.00	0.4%
December 2000	0.00	0.4%
January 2001	0.00	0.1%
February 2001	0.00	-0.2%
March 2001	0.00	-0.1%
April 2001	0.00	0.0%
May 2001	0.00	-0.2%
June 2001	0.00	0.3%
July 2001	0.00	0.1%
August 2001	0.00	0.0%
September 2001	0.00	0.1%
October 2001	0.00	0.4%
November 2001	0.00	0.0%
December 2001	0.00	0.1%
January 2002	0.00	0.4%
February 2002	0.00	0.0%
March 2002	0.00	0.0%
April 2002	0.00	-0.1%
May 2002	0.00	0.2%
June 2002	0.00	0.5%
July 2002	0.00	0.1%
August 2002	0.00	0.0%
September 2002	0.00	0.2%
October 2002	0.00	-2.0%
November 2002	0.00	0.0%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
December 2002	0.00	0.0%
January 2003	0.00	0.1%
February 2003	0.00	0.0%
March 2003	0.00	0.0%
April 2003	0.00	0.0%
May 2003	0.00	0.0%
June 2003	0.00	-0.1%
July 2003	0.00	0.5%
August 2003	0.00	0.0%
September 2003	0.00	0.3%

Table E4-2. Modeled Streamflow Depletion in Colusa Basin Drain under Proposed Action in Comparison to No Action/No Project Alternative

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
September 1969	0.00	0.0%
October 1969	0.00	0.0%
November 1969	0.00	0.0%
December 1969	0.00	0.0%
January 1970	0.00	0.0%
February 1970	0.00	0.0%
March 1970	0.00	0.0%
April 1970	0.00	0.0%
May 1970	0.00	0.0%
June 1970	0.00	0.0%
July 1970	0.00	0.0%
August 1970	0.00	0.0%
September 1970	0.00	0.0%
October 1970	0.00	0.0%
November 1970	0.00	0.0%
December 1970	0.00	0.0%
January 1971	0.00	0.0%
February 1971	0.00	0.0%
March 1971	0.00	0.0%
April 1971	0.00	0.0%
May 1971	0.00	0.0%
June 1971	0.00	0.0%
July 1971	0.00	0.0%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
August 1971	0.00	0.0%
September 1971	0.00	0.0%
October 1971	0.00	0.0%
November 1971	0.00	0.0%
December 1971	0.00	0.0%
January 1972	0.00	0.0%
February 1972	0.00	0.0%
March 1972	0.00	0.0%
April 1972	0.00	0.0%
May 1972	0.00	0.0%
June 1972	0.00	0.0%
July 1972	0.00	0.0%
August 1972	0.00	0.0%
September 1972	0.00	0.0%
October 1972	0.00	0.0%
November 1972	0.00	0.0%
December 1972	0.00	0.0%
January 1973	0.00	0.0%
February 1973	0.00	0.0%
March 1973	0.00	0.0%
April 1973	0.00	0.0%
May 1973	0.00	0.0%
June 1973	0.00	0.0%
July 1973	0.00	0.0%
August 1973	0.00	0.0%
September 1973	0.00	0.0%
October 1973	0.00	0.0%
November 1973	0.00	0.0%
December 1973	0.00	0.0%
January 1974	0.00	0.0%
February 1974	0.00	0.0%
March 1974	0.00	0.0%
April 1974	0.00	0.0%
May 1974	0.00	0.0%
June 1974	0.00	0.0%
July 1974	0.00	0.0%
August 1974	0.00	0.0%
September 1974	0.00	0.0%
October 1974	0.00	0.0%
November 1974	0.00	0.0%
December 1974	0.00	0.0%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
January 1975	0.00	0.0%
February 1975	0.00	0.0%
March 1975	0.00	0.0%
April 1975	0.00	0.0%
May 1975	0.00	0.0%
June 1975	0.00	0.0%
July 1975	0.00	0.0%
August 1975	0.00	0.0%
September 1975	0.00	0.0%
October 1975	0.00	0.0%
November 1975	0.00	0.0%
December 1975	0.00	0.0%
January 1976	0.00	0.0%
February 1976	0.00	0.0%
March 1976	0.00	0.0%
April 1976	0.00	0.0%
May 1976	0.00	0.0%
June 1976	0.00	0.0%
July 1976	0.00	0.0%
August 1976	0.00	0.0%
September 1976	0.00	0.0%
October 1976	0.00	0.0%
November 1976	0.00	0.0%
December 1976	0.00	0.0%
January 1977	0.00	0.0%
February 1977	0.00	0.0%
March 1977	0.00	0.0%
April 1977	-0.43	4.0%
May 1977	-0.80	0.8%
June 1977	-0.69	2.1%
July 1977	-0.87	1.9%
August 1977	**-1.13**	1.3%
September 1977	**-1.32**	1.8%
October 1977	**-1.24**	5.4%
November 1977	**-1.20**	2.9%
December 1977	**-1.16**	3.0%
January 1978	**-4.06**	1.9%
February 1978	**-5.08**	3.0%
March 1978	**-4.99**	4.7%
April 1978	**-4.22**	**19.6%**
May 1978	**-3.83**	5.0%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
June 1978	**-2.68**	4.4%
July 1978	**-2.49**	2.7%
August 1978	**-2.74**	2.2%
September 1978	**-2.69**	2.6%
October 1978	**-1.20**	7.7%
November 1978	**-1.17**	3.1%
December 1978	**-1.07**	7.4%
January 1979	**-1.76**	2.2%
February 1979	**-3.09**	3.5%
March 1979	**-2.74**	8.4%
April 1979	**-2.53**	6.8%
May 1979	**-2.75**	2.9%
June 1979	**-1.85**	3.1%
July 1979	**-1.82**	1.8%
August 1979	**-2.10**	1.5%
September 1979	**-1.95**	1.7%
October 1979	-1.00	7.5%
November 1979	**-1.35**	2.1%
December 1979	**-1.58**	2.2%
January 1980	**-2.22**	1.6%
February 1980	**-2.20**	2.0%
March 1980	**-2.20**	3.1%
April 1980	**-1.98**	**32.5%**
May 1980	**-1.85**	1.9%
June 1980	**-1.54**	2.6%
July 1980	**-1.40**	1.5%
August 1980	**-1.32**	1.0%
September 1980	**-1.29**	1.3%
October 1980	**-1.11**	9.2%
November 1980	-0.94	3.3%
December 1980	-0.93	2.9%
January 1981	**-1.25**	1.5%
February 1981	**-1.30**	1.8%
March 1981	**-1.26**	5.1%
April 1981	**-1.14**	5.0%
May 1981	**-1.13**	1.1%
June 1981	-0.91	1.6%
July 1981	-0.91	0.7%
August 1981	-0.88	0.6%
September 1981	-0.85	0.7%
October 1981	-0.72	3.9%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
November 1981	-0.82	0.9%
December 1981	-0.82	1.0%
January 1982	-0.92	0.7%
February 1982	-0.86	7.6%
March 1982	-0.87	6.2%
April 1982	-0.85	1.9%
May 1982	-0.80	1.4%
June 1982	-0.75	0.9%
July 1982	-0.71	0.8%
August 1982	-0.71	0.5%
September 1982	-0.75	0.7%
October 1982	-0.64	3.3%
November 1982	-0.62	1.1%
December 1982	-0.66	0.9%
January 1983	-0.74	1.1%
February 1983	**-1.03**	0.7%
March 1983	**-1.03**	0.7%
April 1983	-0.87	**-12.5%**
May 1983	-0.67	4.2%
June 1983	-0.59	1.2%
July 1983	-0.52	1.0%
August 1983	-0.50	0.6%
September 1983	-0.50	0.6%
October 1983	-0.39	**-10.7%**
November 1983	-0.53	0.6%
December 1983	-0.63	0.5%
January 1984	-0.56	1.8%
February 1984	-0.44	-1.1%
March 1984	-0.38	-1.1%
April 1984	-0.37	4.1%
May 1984	-0.40	0.5%
June 1984	-0.35	0.8%
July 1984	-0.36	0.4%
August 1984	-0.38	0.3%
September 1984	-0.33	0.6%
October 1984	-0.27	**16.1%**
November 1984	-0.34	0.4%
December 1984	-0.32	1.3%
January 1985	-0.26	-2.1%
February 1985	-0.24	-1.1%
March 1985	-0.23	-1.9%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
April 1985	-0.24	1.3%
May 1985	-0.28	0.3%
June 1985	-0.23	0.4%
July 1985	-0.26	0.2%
August 1985	-0.25	0.2%
September 1985	-0.25	0.2%
October 1985	-0.19	4.0%
November 1985	-0.20	0.3%
December 1985	-0.20	0.4%
January 1986	-0.21	0.4%
February 1986	-0.38	0.2%
March 1986	-0.33	0.5%
April 1986	-0.25	-1.5%
May 1986	-0.24	0.5%
June 1986	-0.22	0.4%
July 1986	-0.21	0.3%
August 1986	-0.21	0.2%
September 1986	-0.21	0.2%
October 1986	-0.17	**16.3%**
November 1986	-0.16	0.6%
December 1986	-0.15	4.0%
January 1987	-0.15	1.7%
February 1987	-0.15	1.0%
March 1987	-0.16	0.5%
April 1987	-0.16	0.5%
May 1987	-0.18	0.2%
June 1987	-0.15	0.2%
July 1987	-0.14	0.2%
August 1987	-0.14	0.1%
September 1987	-0.14	0.1%
October 1987	-0.13	0.7%
November 1987	-0.13	0.2%
December 1987	-0.13	0.3%
January 1988	-0.15	0.2%
February 1988	-0.14	-7.3%
March 1988	-0.13	0.5%
April 1988	-0.14	0.3%
May 1988	-0.13	0.2%
June 1988	-0.12	0.2%
July 1988	-0.11	0.1%
August 1988	-0.12	0.1%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
September 1988	-0.12	0.1%
October 1988	-0.11	0.3%
November 1988	-0.11	0.2%
December 1988	-0.10	0.3%
January 1989	-0.10	0.3%
February 1989	-0.09	0.4%
March 1989	-0.11	0.2%
April 1989	-0.10	0.2%
May 1989	-0.11	0.1%
June 1989	-0.10	0.1%
July 1989	-0.11	0.1%
August 1989	-0.11	0.1%
September 1989	-0.11	0.1%
October 1989	-0.10	0.4%
November 1989	-0.08	0.2%
December 1989	-0.07	0.4%
January 1990	-0.08	0.2%
February 1990	-0.08	0.4%
March 1990	-0.08	0.3%
April 1990	-0.08	0.2%
May 1990	-0.09	0.1%
June 1990	-0.07	0.1%
July 1990	-0.07	0.1%
August 1990	-0.08	0.1%
September 1990	-0.08	0.1%
October 1990	-0.06	0.2%
November 1990	-0.07	0.1%
December 1990	-0.05	0.2%
January 1991	-0.04	0.2%
February 1991	-0.04	0.1%
March 1991	-0.10	0.1%
April 1991	-0.09	0.2%
May 1991	-0.07	0.1%
June 1991	-0.05	0.1%
July 1991	-0.04	0.1%
August 1991	-0.04	0.0%
September 1991	-0.06	0.1%
October 1991	-0.04	0.1%
November 1991	-0.04	0.1%
December 1991	-0.03	0.1%
January 1992	-0.03	0.1%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
February 1992	-0.08	0.1%
March 1992	-0.08	0.1%
April 1992	-0.06	0.2%
May 1992	-0.03	0.1%
June 1992	-0.03	0.1%
July 1992	-0.02	0.1%
August 1992	-0.02	0.0%
September 1992	-0.03	0.0%
October 1992	-0.03	0.1%
November 1992	-0.03	0.1%
December 1992	-0.03	0.1%
January 1993	-0.11	0.0%
February 1993	-0.11	0.1%
March 1993	-0.09	0.1%
April 1993	-0.08	0.3%
May 1993	-0.07	0.2%
June 1993	-0.05	0.1%
July 1993	-0.04	0.1%
August 1993	-0.05	0.1%
September 1993	-0.06	0.1%
October 1993	-0.04	0.1%
November 1993	-0.05	0.1%
December 1993	-0.06	0.1%
January 1994	-0.05	0.1%
February 1994	-0.07	0.1%
March 1994	-0.06	0.2%
April 1994	-0.05	0.1%
May 1994	-0.04	0.1%
June 1994	-0.02	0.1%
July 1994	-0.02	0.1%
August 1994	-0.03	0.0%
September 1994	-0.03	0.0%
October 1994	-0.02	0.1%
November 1994	-0.03	0.0%
December 1994	-0.04	0.1%
January 1995	-0.09	0.0%
February 1995	-0.09	0.1%
March 1995	-0.09	0.1%
April 1995	-0.08	0.3%
May 1995	-0.06	0.2%
June 1995	-0.05	0.1%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
July 1995	-0.05	0.1%
August 1995	-0.05	0.1%
September 1995	-0.05	0.0%
October 1995	-0.05	0.1%
November 1995	-0.05	0.1%
December 1995	-0.06	0.1%
January 1996	-0.07	0.1%
February 1996	-0.06	0.0%
March 1996	-0.06	0.1%
April 1996	-0.06	0.1%
May 1996	-0.06	0.1%
June 1996	-0.05	0.1%
July 1996	-0.05	0.1%
August 1996	-0.05	0.1%
September 1996	-0.05	0.1%
October 1996	-0.05	0.1%
November 1996	-0.05	0.1%
December 1996	-0.05	0.1%
January 1997	-0.05	0.0%
February 1997	-0.06	0.1%
March 1997	-0.05	0.3%
April 1997	-0.05	0.2%
May 1997	-0.05	0.1%
June 1997	-0.04	0.1%
July 1997	-0.04	0.1%
August 1997	-0.04	0.0%
September 1997	-0.04	0.1%
October 1997	-0.04	0.1%
November 1997	-0.04	0.0%
December 1997	-0.04	0.1%
January 1998	-0.06	0.1%
February 1998	-0.07	0.0%
March 1998	-0.06	0.2%
April 1998	-0.05	0.2%
May 1998	-0.05	0.3%
June 1998	-0.04	0.1%
July 1998	-0.04	0.1%
August 1998	-0.04	0.0%
September 1998	-0.04	0.0%
October 1998	-0.03	0.7%
November 1998	-0.04	0.1%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
December 1998	-0.03	0.1%
January 1999	-0.03	34.1%
February 1999	-0.04	0.1%
March 1999	-0.04	0.8%
April 1999	-0.03	0.5%
May 1999	-0.03	0.1%
June 1999	-0.03	0.1%
July 1999	-0.03	0.0%
August 1999	-0.03	0.0%
September 1999	-0.04	0.0%
October 1999	-0.03	0.1%
November 1999	-0.03	0.1%
December 1999	-0.03	0.1%
January 2000	-0.03	0.1%
February 2000	-0.04	0.0%
March 2000	-0.04	0.1%
April 2000	-0.03	-0.9%
May 2000	-0.03	0.1%
June 2000	-0.03	0.1%
July 2000	-0.03	0.0%
August 2000	-0.03	0.0%
September 2000	-0.03	0.0%
October 2000	-0.03	0.1%
November 2000	-0.03	0.1%
December 2000	-0.03	0.1%
January 2001	-0.03	0.0%
February 2001	-0.03	0.1%
March 2001	-0.03	0.1%
April 2001	-0.03	0.2%
May 2001	-0.03	0.1%
June 2001	-0.03	0.1%
July 2001	-0.03	0.0%
August 2001	-0.03	0.0%
September 2001	-0.03	0.0%
October 2001	-0.03	0.1%
November 2001	-0.03	0.0%
December 2001	-0.03	0.0%
January 2002	-0.03	0.0%
February 2002	-0.03	-0.1%
March 2002	-0.03	**2.3%**
April 2002	-0.03	0.1%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
May 2002	-0.03	0.0%
June 2002	-0.02	0.0%
July 2002	-0.02	0.0%
August 2002	-0.02	0.0%
September 2002	-0.02	0.0%
October 2002	-0.02	0.1%
November 2002	-0.02	0.0%
December 2002	-0.03	0.0%
January 2003	-0.03	0.0%
February 2003	-0.03	0.2%
March 2003	-0.02	-0.2%
April 2003	-0.02	0.2%
May 2003	-0.02	0.1%
June 2003	-0.02	0.1%
July 2003	-0.02	0.0%
August 2003	-0.02	0.0%
September 2003	-0.02	0.0%

Table E4-3. Modeled Streamflow Depletion in Eastside/Cross Canal under Proposed Action in Comparison to No Action/No Project Alternative

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
September 1969	0.00	0.0%
October 1969	0.00	0.0%
November 1969	0.00	0.0%
December 1969	0.00	0.0%
January 1970	0.00	0.0%
February 1970	0.00	0.0%
March 1970	0.00	0.0%
April 1970	0.00	0.0%
May 1970	0.00	0.0%
June 1970	0.00	0.0%
July 1970	0.00	0.0%
August 1970	0.00	0.0%
September 1970	0.00	0.0%
October 1970	0.00	0.0%
November 1970	0.00	0.0%
December 1970	0.00	0.0%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
January 1971	0.00	0.0%
February 1971	0.00	0.0%
March 1971	0.00	0.0%
April 1971	0.00	0.0%
May 1971	0.00	0.0%
June 1971	0.00	0.0%
July 1971	0.00	0.0%
August 1971	0.00	0.0%
September 1971	0.00	0.0%
October 1971	0.00	0.0%
November 1971	0.00	0.0%
December 1971	0.00	0.0%
January 1972	0.00	0.0%
February 1972	0.00	0.0%
March 1972	0.00	0.0%
April 1972	0.00	0.0%
May 1972	0.00	0.0%
June 1972	0.00	0.0%
July 1972	0.00	0.0%
August 1972	0.00	0.0%
September 1972	0.00	0.0%
October 1972	0.00	0.0%
November 1972	0.00	0.0%
December 1972	0.00	0.0%
January 1973	0.00	0.0%
February 1973	0.00	0.0%
March 1973	0.00	0.0%
April 1973	0.00	0.0%
May 1973	0.00	0.0%
June 1973	0.00	0.0%
July 1973	0.00	0.0%
August 1973	0.00	0.0%
September 1973	0.00	0.0%
October 1973	0.00	0.0%
November 1973	0.00	0.0%
December 1973	0.00	0.0%
January 1974	0.00	0.0%
February 1974	0.00	0.0%
March 1974	0.00	0.0%
April 1974	0.00	0.0%
May 1974	0.00	0.0%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
June 1974	0.00	0.0%
July 1974	0.00	0.0%
August 1974	0.00	0.0%
September 1974	0.00	0.0%
October 1974	0.00	0.0%
November 1974	0.00	0.0%
December 1974	0.00	0.0%
January 1975	0.00	0.0%
February 1975	0.00	0.0%
March 1975	0.00	0.0%
April 1975	0.00	0.0%
May 1975	0.00	0.0%
June 1975	0.00	0.0%
July 1975	0.00	0.0%
August 1975	0.00	0.0%
September 1975	0.00	0.0%
October 1975	0.00	0.0%
November 1975	0.00	0.0%
December 1975	0.00	0.0%
January 1976	0.00	0.0%
February 1976	0.00	0.0%
March 1976	0.00	0.0%
April 1976	0.00	0.0%
May 1976	0.00	0.0%
June 1976	0.00	0.0%
July 1976	0.00	0.0%
August 1976	0.00	0.0%
September 1976	0.00	0.0%
October 1976	0.00	0.0%
November 1976	0.00	0.0%
December 1976	0.00	0.0%
January 1977	0.00	0.0%
February 1977	0.00	0.0%
March 1977	0.00	0.0%
April 1977	-0.87	3.9%
May 1977	**-7.42**	9.9%
June 1977	**-2.02**	4.5%
July 1977	**-2.38**	4.3%
August 1977	**-15.00**	**17.1%**
September 1977	**-13.72**	**17.8%**
October 1977	-0.62	2.0%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
November 1977	**-2.12**	4.3%
December 1977	**-3.04**	6.7%
January 1978	**-16.05**	**15.2%**
February 1978	**-9.74**	**14.1%**
March 1978	**-7.57**	**16.4%**
April 1978	**-5.70**	**20.7%**
May 1978	**-5.33**	**10.2%**
June 1978	**-4.56**	8.5%
July 1978	**-4.26**	6.3%
August 1978	**-3.95**	5.0%
September 1978	**-3.72**	5.3%
October 1978	-0.99	2.9%
November 1978	**-2.80**	6.2%
December 1978	-0.84	3.5%
January 1979	**-3.65**	7.1%
February 1979	**-2.99**	6.9%
March 1979	**-2.53**	**10.6%**
April 1979	**-2.25**	7.8%
May 1979	**-2.24**	4.4%
June 1979	**-1.92**	4.2%
July 1979	**-1.80**	2.8%
August 1979	**-1.92**	2.6%
September 1979	**-1.75**	2.7%
October 1979	-0.85	2.8%
November 1979	**-1.57**	3.3%
December 1979	**-1.47**	3.4%
January 1980	**-1.60**	3.4%
February 1980	**-1.39**	4.5%
March 1980	**-1.28**	6.3%
April 1980	**-1.07**	7.7%
May 1980	**-1.16**	2.7%
June 1980	**-1.01**	2.5%
July 1980	-0.97	1.8%
August 1980	-0.99	1.5%
September 1980	-0.88	1.6%
October 1980	-0.71	2.4%
November 1980	-0.72	2.1%
December 1980	-0.77	2.4%
January 1981	-0.81	2.0%
February 1981	-0.74	2.4%
March 1981	-0.70	4.5%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
April 1981	-0.61	2.9%
May 1981	-0.66	1.3%
June 1981	-0.57	1.3%
July 1981	-0.63	0.9%
August 1981	-0.59	0.8%
September 1981	-0.58	0.9%
October 1981	-0.45	1.2%
November 1981	-0.55	1.1%
December 1981	-0.54	1.4%
January 1982	-0.54	1.5%
February 1982	-0.48	5.3%
March 1982	-0.46	4.7%
April 1982	-0.48	3.1%
May 1982	-0.45	1.8%
June 1982	-0.44	1.2%
July 1982	-0.43	0.9%
August 1982	-0.42	0.7%
September 1982	-0.41	0.8%
October 1982	-0.37	1.3%
November 1982	-0.38	1.2%
December 1982	-0.39	1.5%
January 1983	-0.37	2.0%
February 1983	-0.36	1.4%
March 1983	-0.34	1.8%
April 1983	-0.33	-4.7%
May 1983	-0.32	4.2%
June 1983	-0.31	1.4%
July 1983	-0.30	1.1%
August 1983	-0.30	0.7%
September 1983	-0.30	0.8%
October 1983	-0.26	1.5%
November 1983	-0.30	0.9%
December 1983	-0.28	1.0%
January 1984	-0.28	6.4%
February 1984	-0.27	-3.6%
March 1984	-0.27	-4.9%
April 1984	-0.26	2.5%
May 1984	-0.25	0.9%
June 1984	-0.25	1.0%
July 1984	-0.25	0.6%
August 1984	-0.24	0.5%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
September 1984	-0.24	0.7%
October 1984	-0.23	1.0%
November 1984	-0.24	0.7%
December 1984	-0.23	1.6%
January 1985	-0.22	2.7%
February 1985	-0.20	6.7%
March 1985	-0.20	3.8%
April 1985	-0.22	1.1%
May 1985	-0.23	0.5%
June 1985	-0.21	0.5%
July 1985	-0.22	0.4%
August 1985	-0.22	0.3%
September 1985	-0.21	0.4%
October 1985	-0.18	0.6%
November 1985	-0.20	0.4%
December 1985	-0.20	0.6%
January 1986	-0.20	0.7%
February 1986	-0.21	0.5%
March 1986	-0.20	1.6%
April 1986	-0.19	4.2%
May 1986	-0.19	0.7%
June 1986	-0.19	0.6%
July 1986	-0.19	0.4%
August 1986	-0.18	0.3%
September 1986	-0.18	0.4%
October 1986	-0.16	0.7%
November 1986	-0.16	0.5%
December 1986	-0.16	0.8%
January 1987	-0.16	0.8%
February 1987	-0.16	0.9%
March 1987	-0.18	0.9%
April 1987	-0.17	0.7%
May 1987	-0.16	0.4%
June 1987	-0.16	0.3%
July 1987	-0.16	0.3%
August 1987	-0.16	0.2%
September 1987	-0.16	0.2%
October 1987	-0.12	0.3%
November 1987	-0.15	0.3%
December 1987	-0.14	0.4%
January 1988	-0.18	0.4%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
February 1988	-0.14	0.9%
March 1988	-0.14	0.5%
April 1988	-0.16	0.4%
May 1988	-0.15	0.3%
June 1988	-0.14	0.3%
July 1988	-0.14	0.2%
August 1988	-0.14	0.2%
September 1988	-0.15	0.2%
October 1988	-0.10	0.2%
November 1988	-0.13	0.2%
December 1988	-0.11	0.3%
January 1989	-0.12	0.3%
February 1989	-0.08	0.3%
March 1989	-0.14	0.4%
April 1989	-0.13	0.4%
May 1989	-0.13	0.2%
June 1989	-0.13	0.2%
July 1989	-0.12	0.2%
August 1989	-0.13	0.2%
September 1989	-0.14	0.2%
October 1989	-0.10	0.2%
November 1989	-0.11	0.2%
December 1989	-0.07	0.2%
January 1990	-0.11	0.3%
February 1990	-0.10	0.4%
March 1990	-0.10	0.4%
April 1990	-0.10	0.2%
May 1990	-0.13	0.2%
June 1990	-0.11	0.2%
July 1990	-0.12	0.2%
August 1990	-0.12	0.1%
September 1990	-0.12	0.2%
October 1990	-0.06	0.1%
November 1990	-0.11	0.2%
December 1990	-0.02	0.1%
January 1991	-0.02	0.1%
February 1991	-0.05	0.1%
March 1991	-0.18	0.3%
April 1991	-0.12	0.3%
May 1991	-0.11	0.2%
June 1991	-0.09	0.2%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
July 1991	-0.08	0.1%
August 1991	-0.09	0.1%
September 1991	-0.11	0.1%
October 1991	-0.01	0.0%
November 1991	-0.07	0.1%
December 1991	-0.06	0.1%
January 1992	-0.05	0.1%
February 1992	-0.16	0.2%
March 1992	-0.12	0.2%
April 1992	-0.08	0.2%
May 1992	-0.01	0.0%
June 1992	-0.02	0.0%
July 1992	0.00	0.0%
August 1992	-0.01	0.0%
September 1992	-0.09	0.1%
October 1992	0.00	0.0%
November 1992	-0.01	0.0%
December 1992	-0.04	0.1%
January 1993	-0.21	0.2%
February 1993	-0.15	0.2%
March 1993	-0.12	0.3%
April 1993	-0.09	0.3%
May 1993	-0.08	0.2%
June 1993	-0.07	0.1%
July 1993	-0.04	0.1%
August 1993	-0.08	0.1%
September 1993	-0.11	0.1%
October 1993	-0.04	0.1%
November 1993	-0.09	0.2%
December 1993	-0.08	0.2%
January 1994	-0.08	0.2%
February 1994	-0.10	0.2%
March 1994	-0.08	0.3%
April 1994	-0.07	0.2%
May 1994	-0.04	0.1%
June 1994	-0.01	0.0%
July 1994	0.00	0.0%
August 1994	-0.06	0.1%
September 1994	-0.08	0.1%
October 1994	0.00	0.0%
November 1994	-0.07	0.1%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
December 1994	-0.10	0.1%
January 1995	-0.13	0.1%
February 1995	-0.11	0.2%
March 1995	-0.10	0.2%
April 1995	-0.09	0.4%
May 1995	-0.08	0.2%
June 1995	-0.08	0.2%
July 1995	-0.06	0.1%
August 1995	-0.07	0.1%
September 1995	-0.08	0.1%
October 1995	-0.07	0.1%
November 1995	-0.08	0.1%
December 1995	-0.08	0.2%
January 1996	-0.08	0.2%
February 1996	-0.08	0.2%
March 1996	-0.08	0.4%
April 1996	-0.08	0.3%
May 1996	-0.07	0.2%
June 1996	-0.07	0.2%
July 1996	-0.06	0.1%
August 1996	-0.07	0.1%
September 1996	-0.07	0.1%
October 1996	-0.07	0.2%
November 1996	-0.07	0.1%
December 1996	-0.07	0.2%
January 1997	-0.07	0.2%
February 1997	-0.07	0.3%
March 1997	-0.07	0.6%
April 1997	-0.07	0.3%
May 1997	-0.07	0.2%
June 1997	-0.06	0.2%
July 1997	-0.06	0.1%
August 1997	-0.06	0.1%
September 1997	-0.06	0.1%
October 1997	-0.06	0.1%
November 1997	-0.06	0.1%
December 1997	-0.07	0.2%
January 1998	-0.06	0.2%
February 1998	-0.06	0.2%
March 1998	-0.06	1.2%
April 1998	-0.06	0.6%

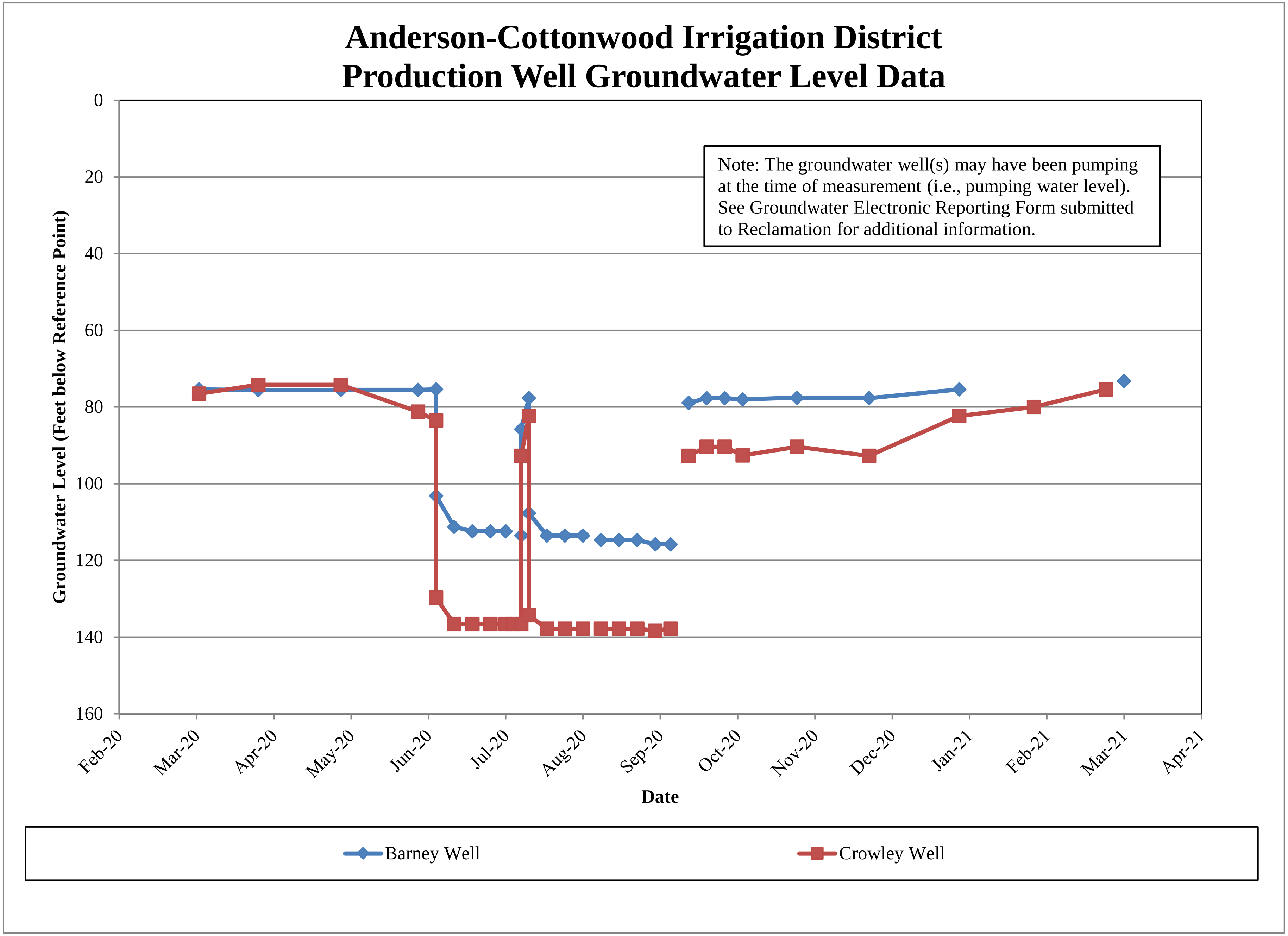
Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
May 1998	-0.06	0.4%
June 1998	-0.06	0.2%
July 1998	-0.06	0.2%
August 1998	-0.06	0.1%
September 1998	-0.06	0.1%
October 1998	-0.05	0.2%
November 1998	-0.06	0.2%
December 1998	-0.05	0.3%
January 1999	-0.05	0.5%
February 1999	-0.06	0.5%
March 1999	-0.05	2.0%
April 1999	-0.05	0.5%
May 1999	-0.05	0.2%
June 1999	-0.05	0.2%
July 1999	-0.05	0.1%
August 1999	-0.05	0.1%
September 1999	-0.05	0.1%
October 1999	-0.05	0.2%
November 1999	-0.05	0.1%
December 1999	-0.05	0.2%
January 2000	-0.05	0.2%
February 2000	-0.05	0.2%
March 2000	-0.05	0.8%
April 2000	-0.05	0.8%
May 2000	-0.05	0.2%
June 2000	-0.05	0.1%
July 2000	-0.05	0.1%
August 2000	-0.05	0.1%
September 2000	-0.05	0.1%
October 2000	-0.05	0.1%
November 2000	-0.05	0.1%
December 2000	-0.05	0.1%
January 2001	-0.05	0.2%
February 2001	-0.05	0.2%
March 2001	-0.05	0.3%
April 2001	-0.05	0.2%
May 2001	-0.04	0.1%
June 2001	-0.04	0.1%
July 2001	-0.04	0.1%
August 2001	-0.05	0.1%
September 2001	-0.04	0.1%

Date	Proposed Action in Comparison to No Action/No Project Alternative (cfs)	Proposed Action in Comparison to No Action/No Project Alternative (Percent Change)
October 2001	-0.04	0.1%
November 2001	-0.05	0.1%
December 2001	-0.05	0.1%
January 2002	-0.05	0.1%
February 2002	-0.04	0.3%
March 2002	-0.04	0.2%
April 2002	-0.04	0.1%
May 2002	-0.04	0.1%
June 2002	-0.04	0.1%
July 2002	-0.04	0.1%
August 2002	-0.04	0.1%
September 2002	-0.04	0.1%
October 2002	-0.04	0.1%
November 2002	-0.04	0.1%
December 2002	-0.04	0.1%
January 2003	-0.04	0.1%
February 2003	-0.04	0.2%
March 2003	-0.04	0.2%
April 2003	-0.04	0.1%
May 2003	-0.04	0.1%
June 2003	-0.04	0.1%
July 2003	-0.04	0.1%
August 2003	-0.04	0.1%
September 2003	-0.04	0.1%

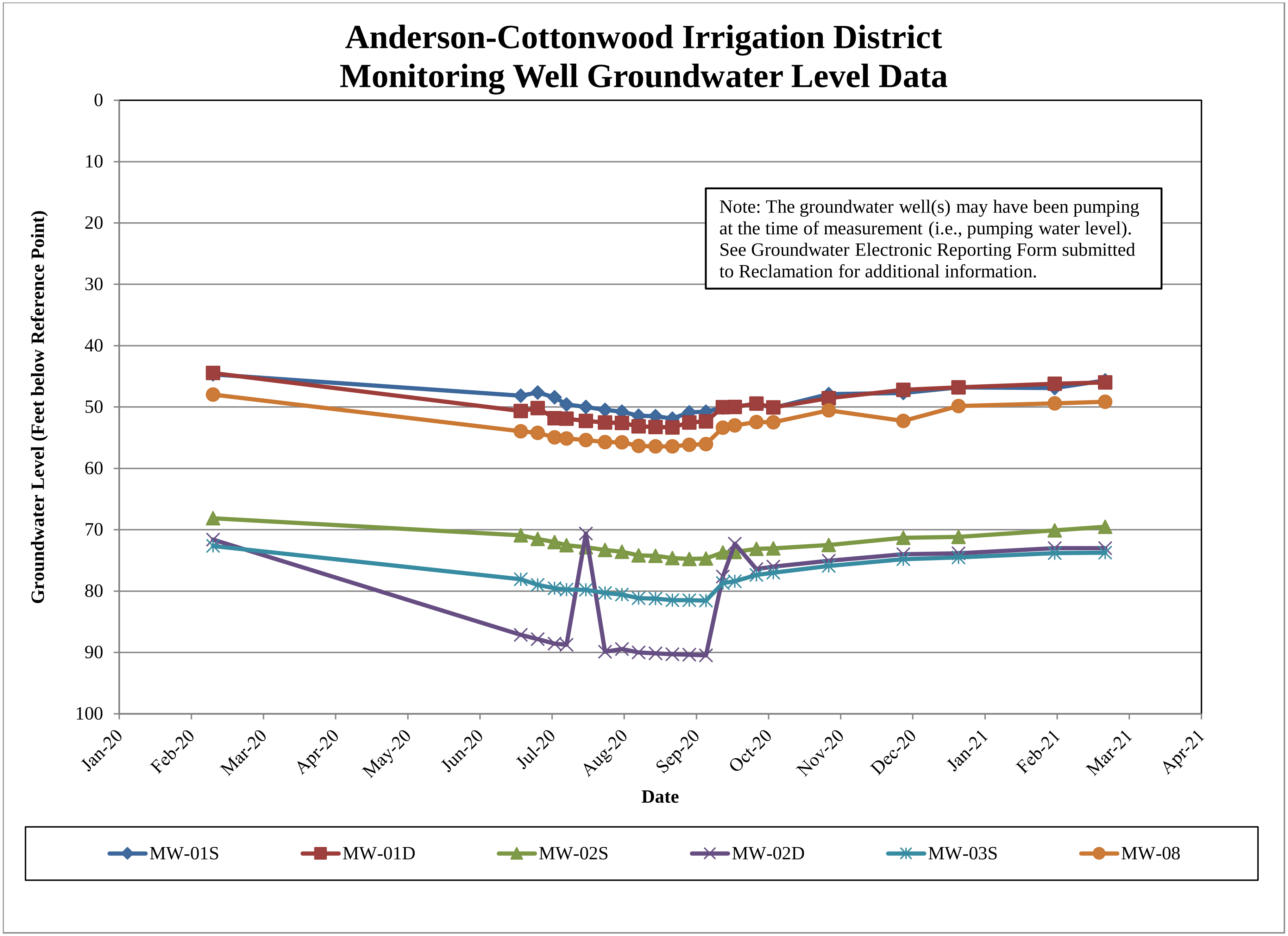
E4.3 References

Bureau of Reclamation. (Reclamation). 2015. SACFEM2013: Sacramento Valley Finite Element Groundwater Flow Model User's Manual. Prepared by CH2M HILL and MBK Engineers, Inc. February.

Appendix F1
2020 Water Transfers Data Reports



Anderson-Cottonwood Irrigation District
Production Well Groundwater Level Data
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Barney Well
Crowley Well


Anderson-Cottonwood Irrigation District
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
100
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
MW-01S
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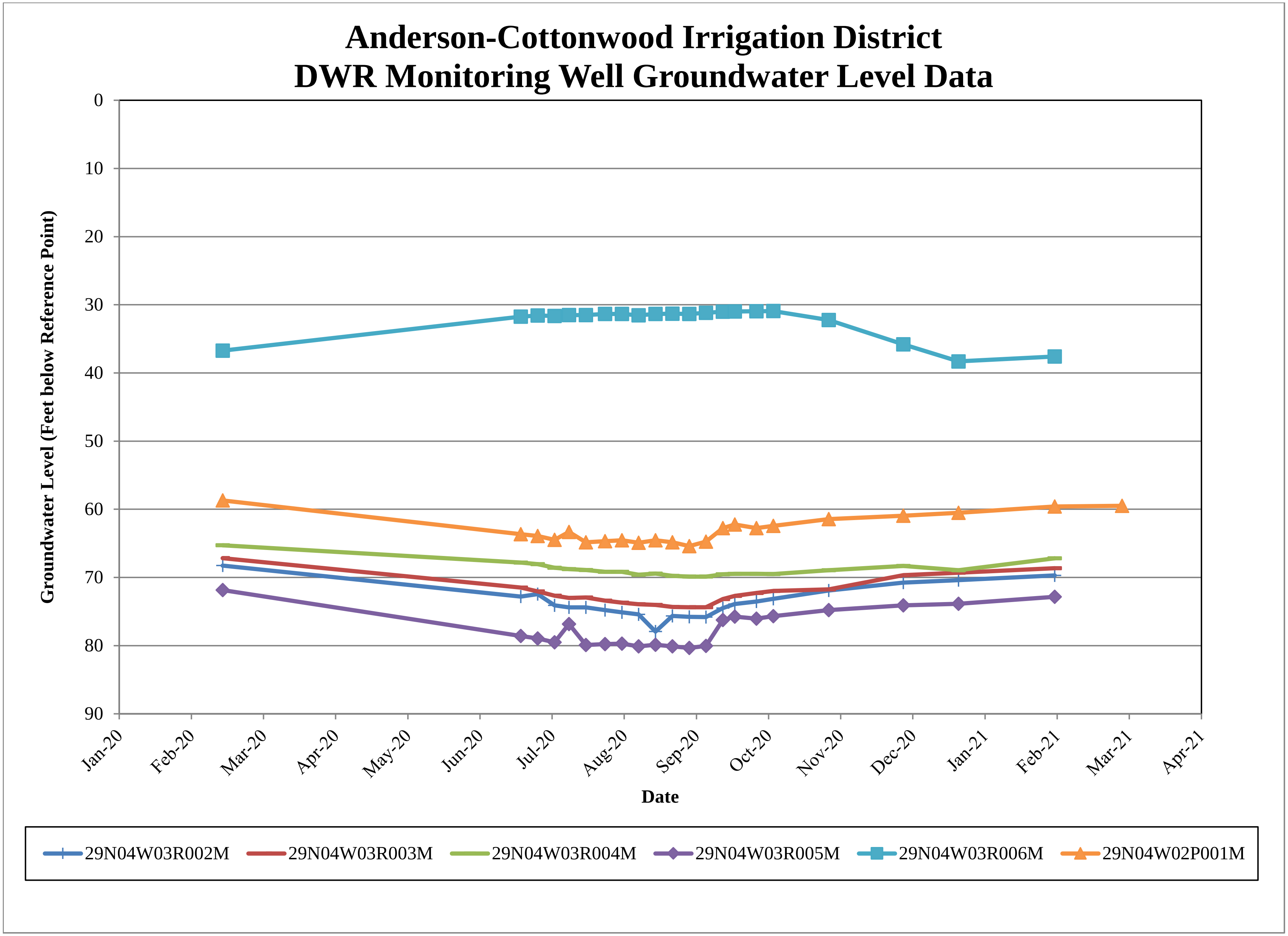
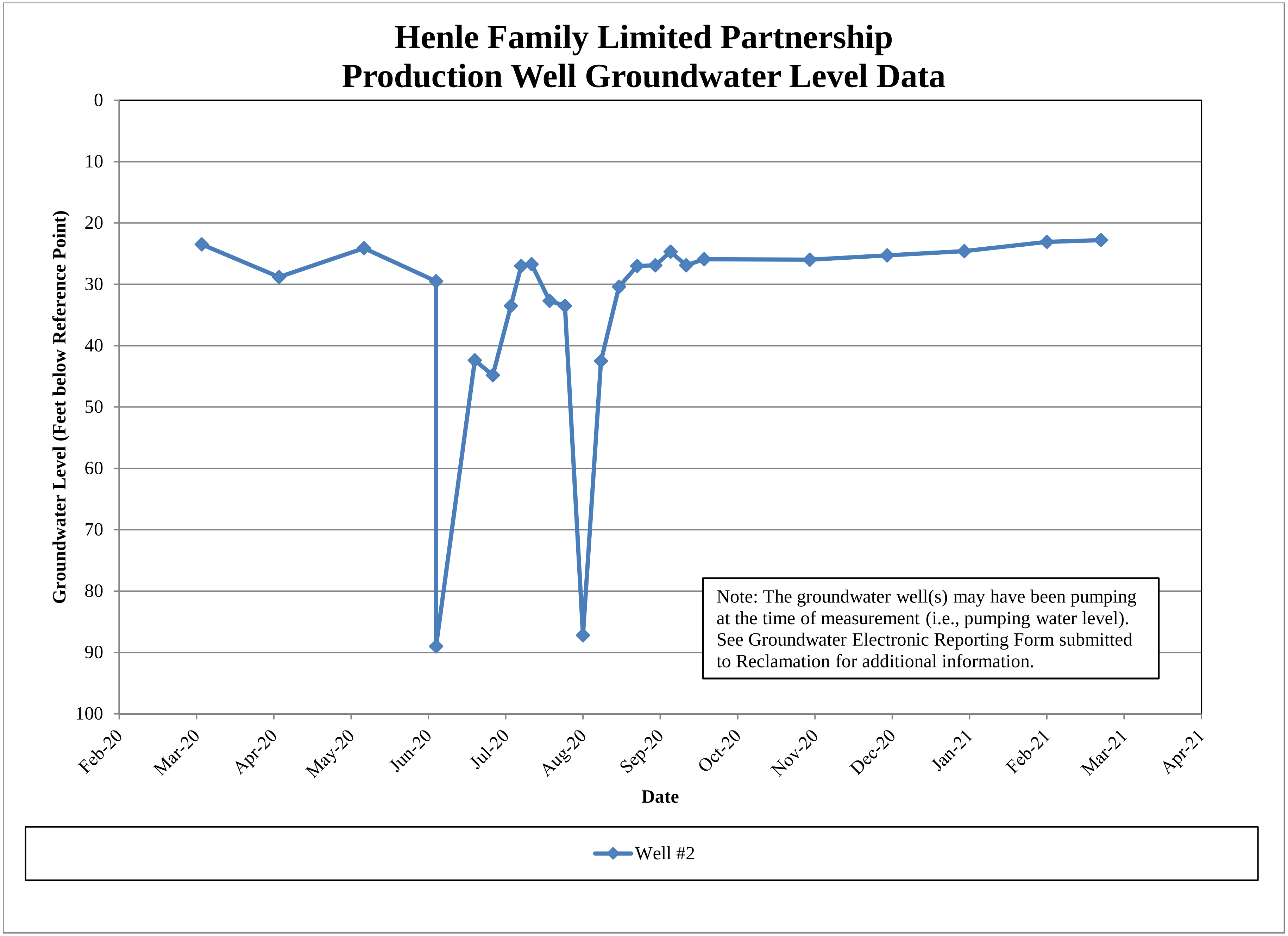
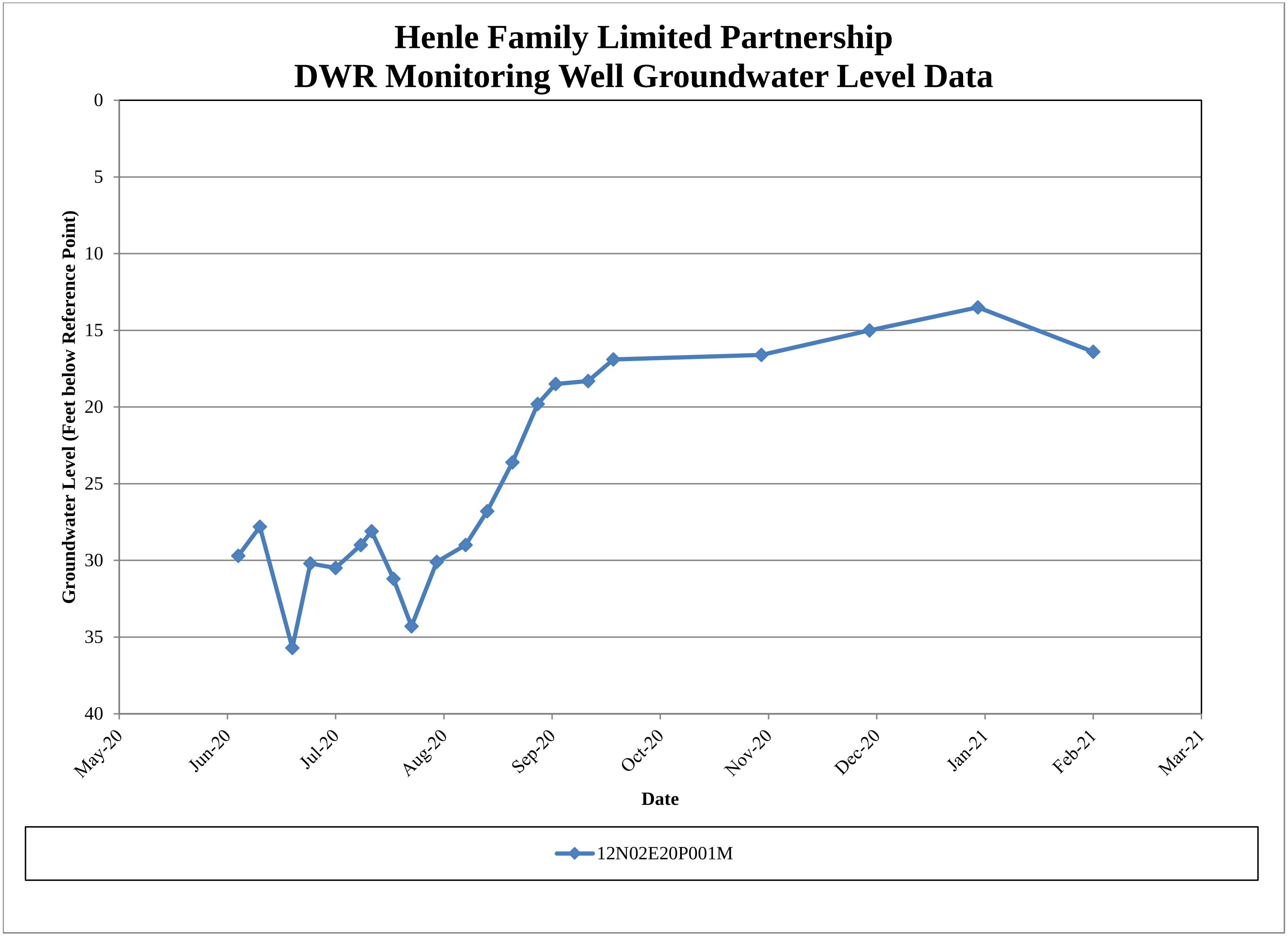
MW-02S
MW-02D
MW-03S
MW-08

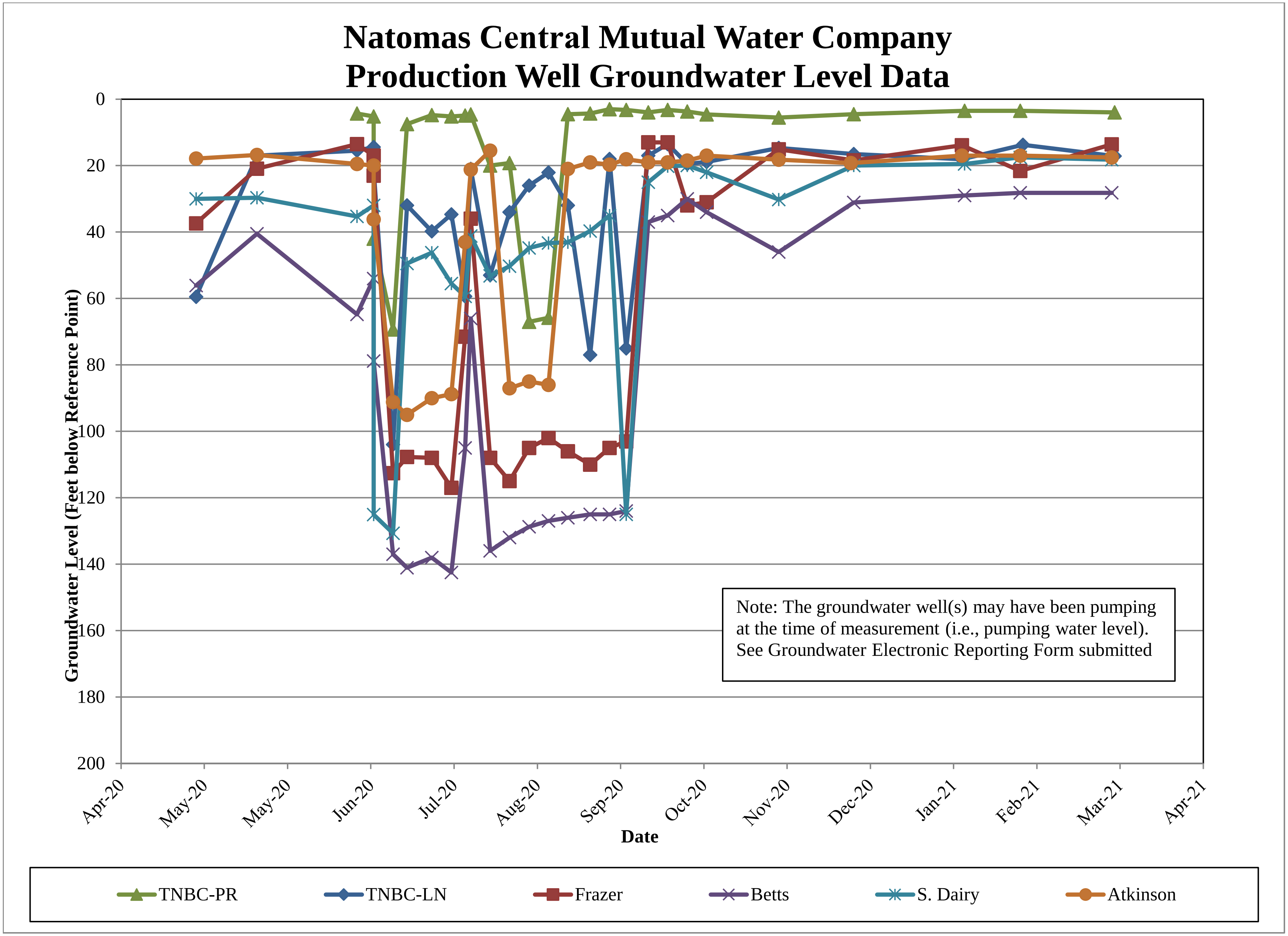


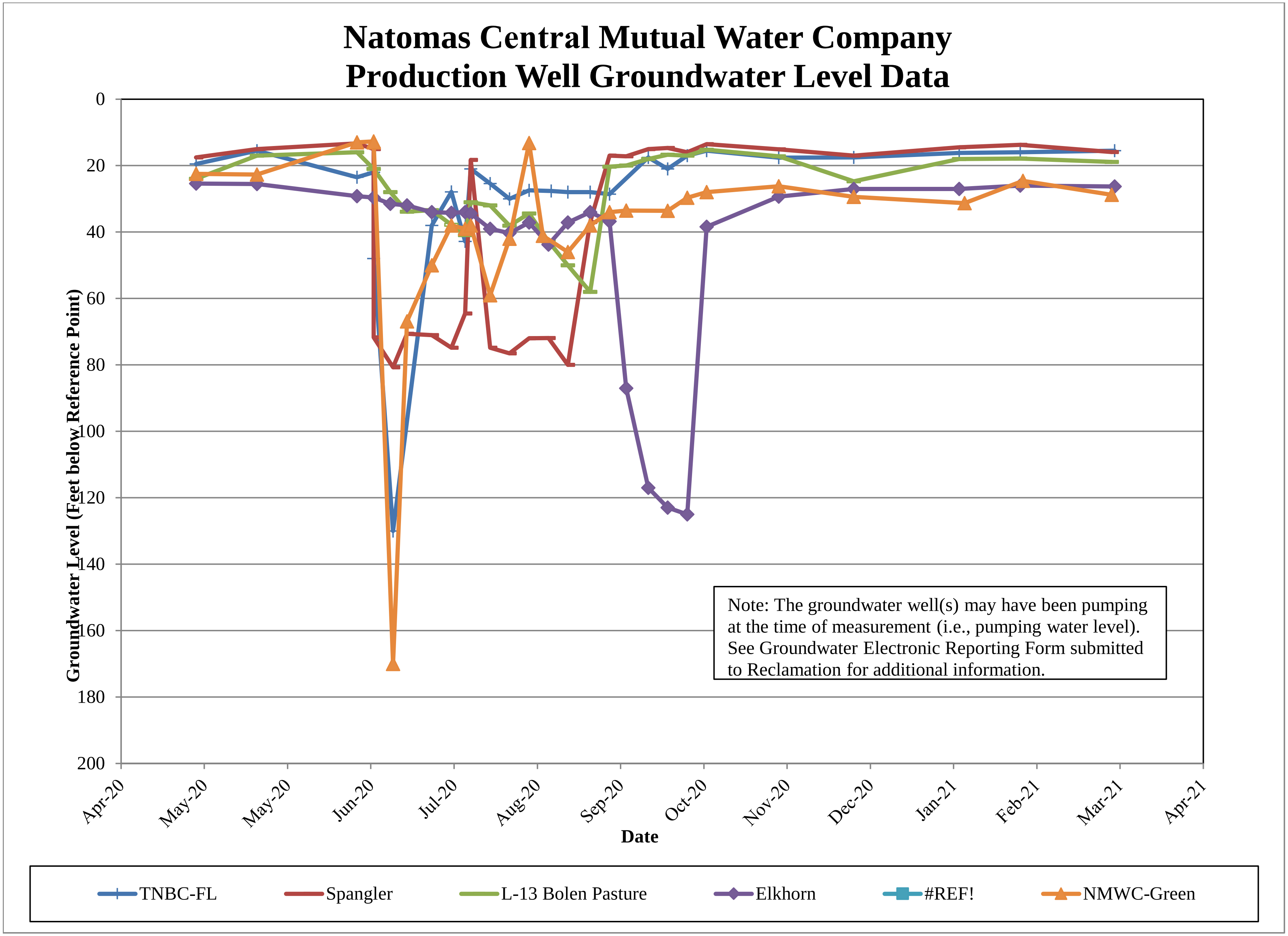
Anderson-Cottonwood Irrigation District
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
29N04W03R002M
29N04W03R003M
29N04W03R004M
29N04W03R005M
29N04W03R006M
29N04W02P001M


Henle Family Limited Partnership
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
100
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
Well #2

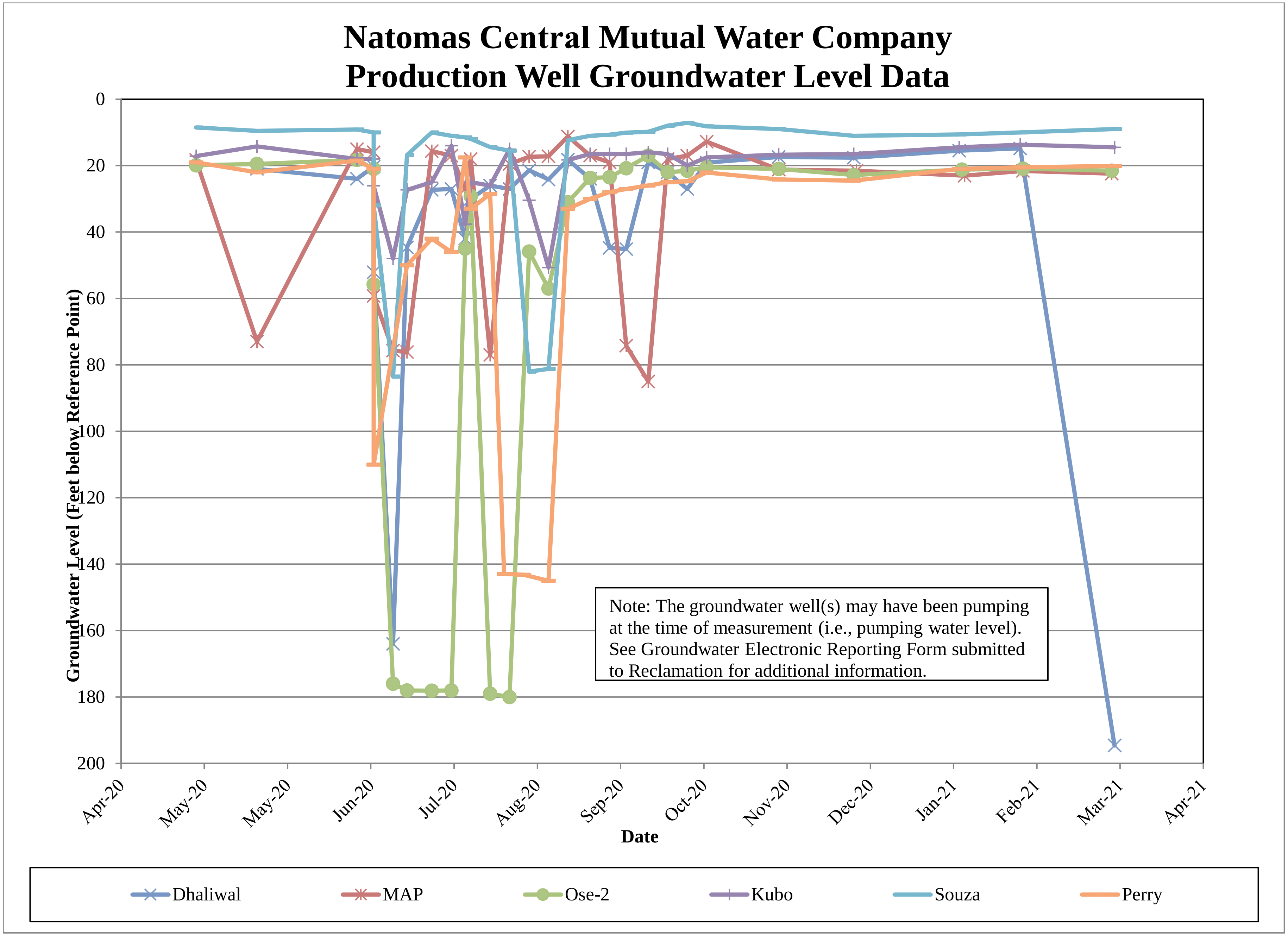


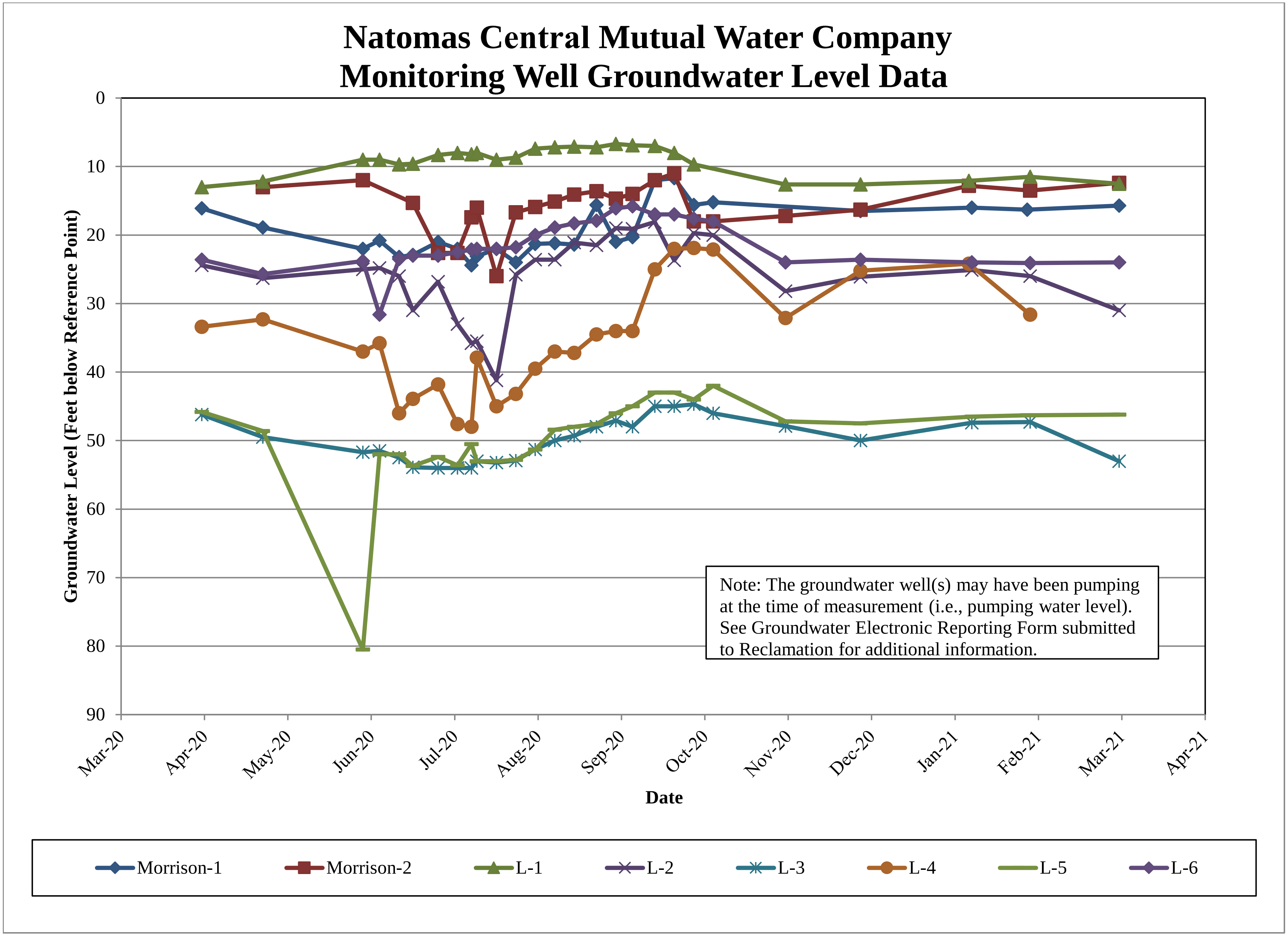
Henle Family Limited Partnership
DWR Monitoring Well Groundwater Level Data
0
5
10
15
20
25
30
35
40
Groundwater Level (Feet below Reference Point)
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Date
12N02E20P001M

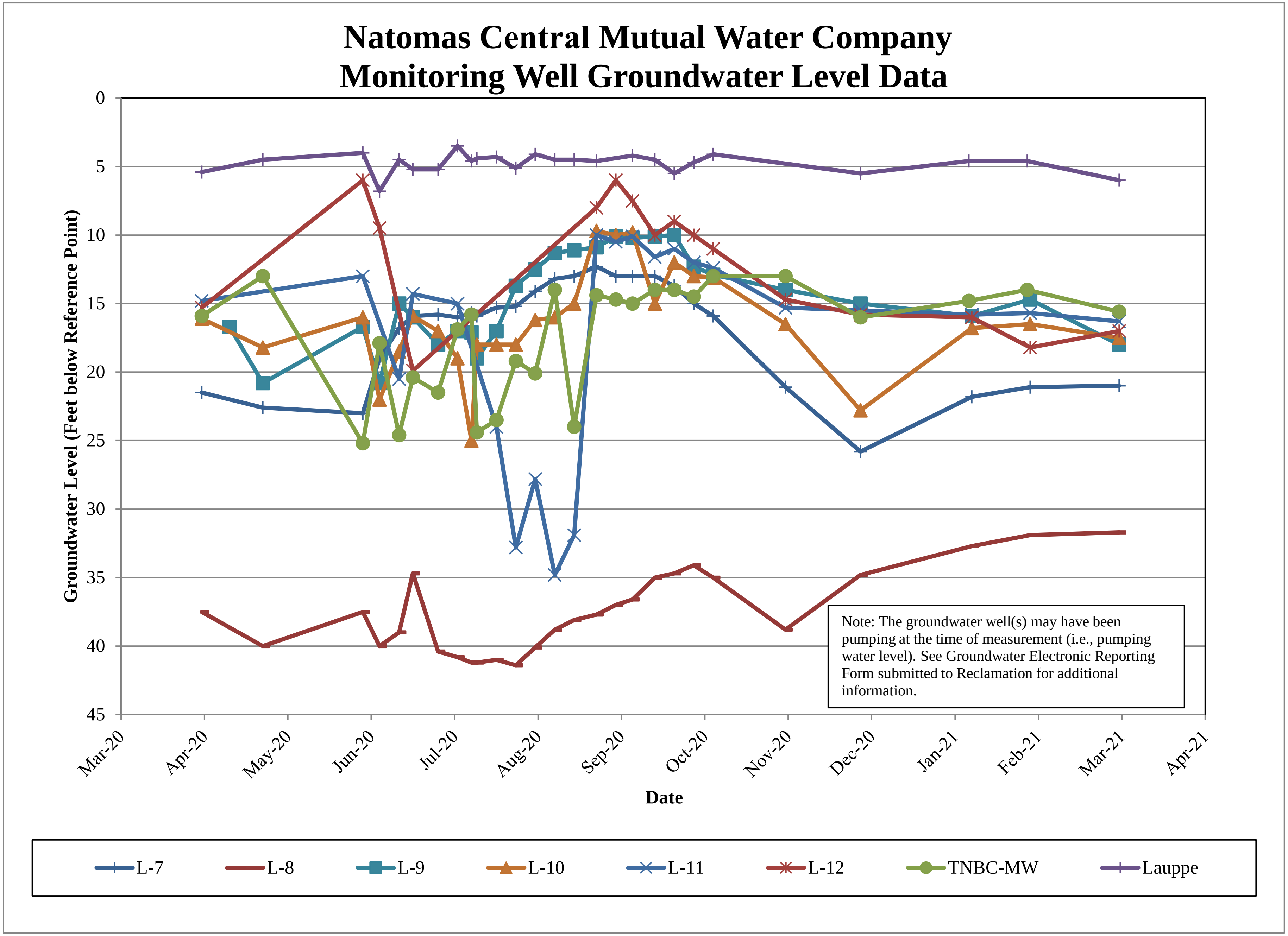

Natomas Central Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
180
200
Apr-20
May-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted
TNBC-PR
TNBC-LN
Frazer
Betts
S. Dairy
Atkinson



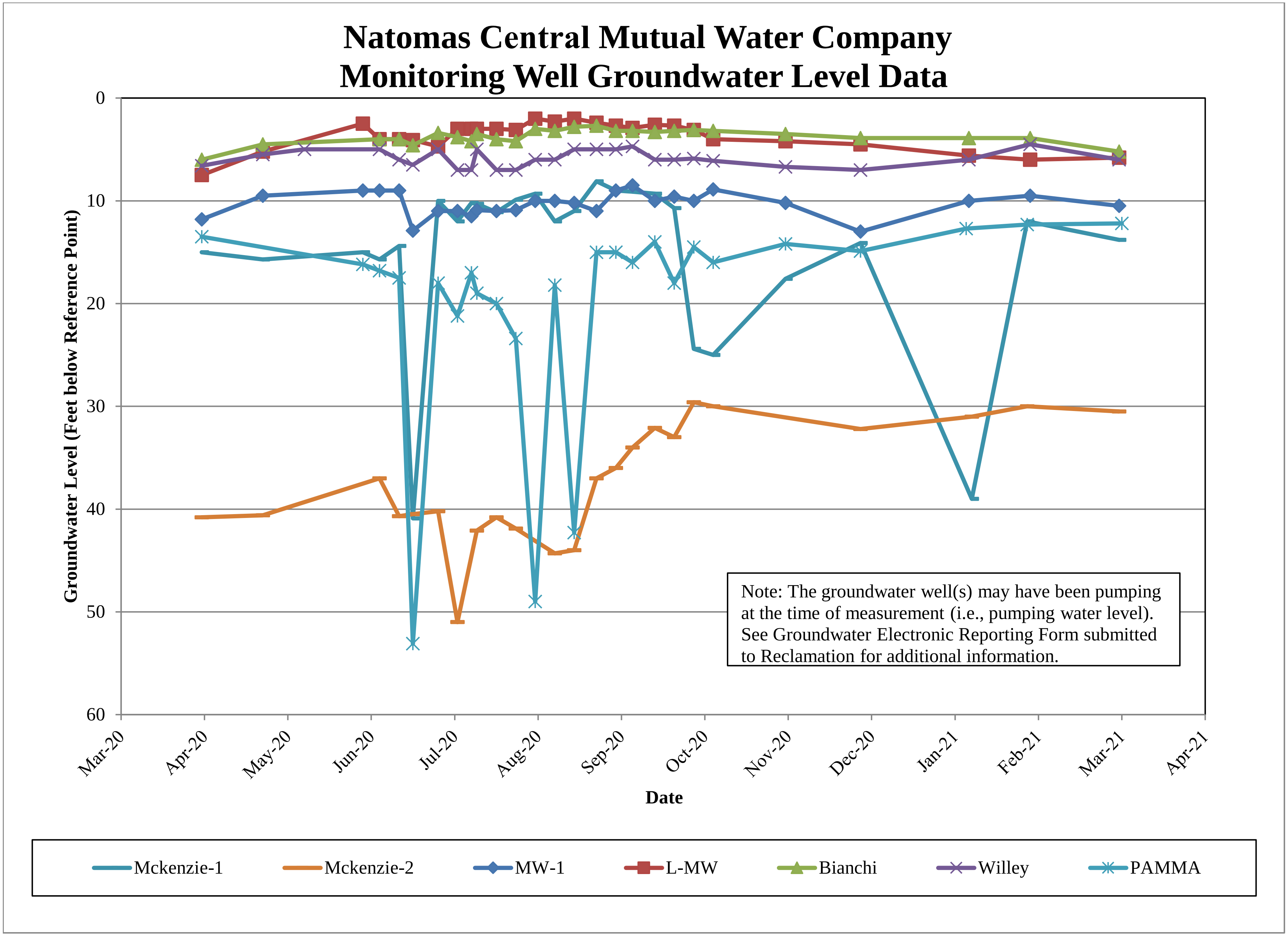
Natomas Central Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
180
200
Apr-20
May-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
TNBC-FL
Spangler
L-13 Bolen Pasture
Elkhorn
#REF!
NMWC-Green

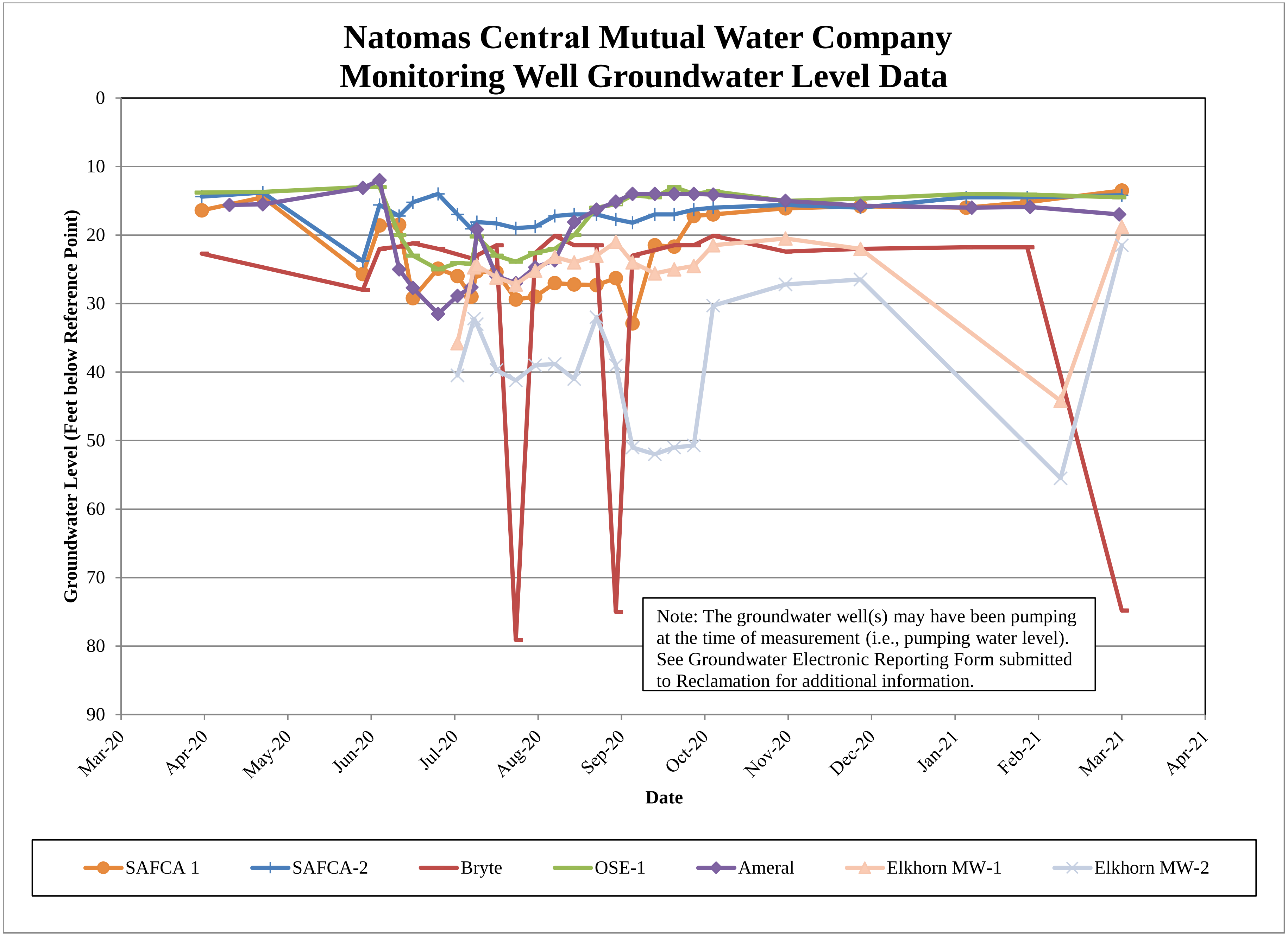

Natomas Central Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
180
200
Apr-20
May-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
Dhaliwal
MAP
Ose-2
Kubo
Souza
Perry


Natomas Central Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
Morrison-1
Morrison-2
L-1
L-2
L-3
L-4
L-5
L-6

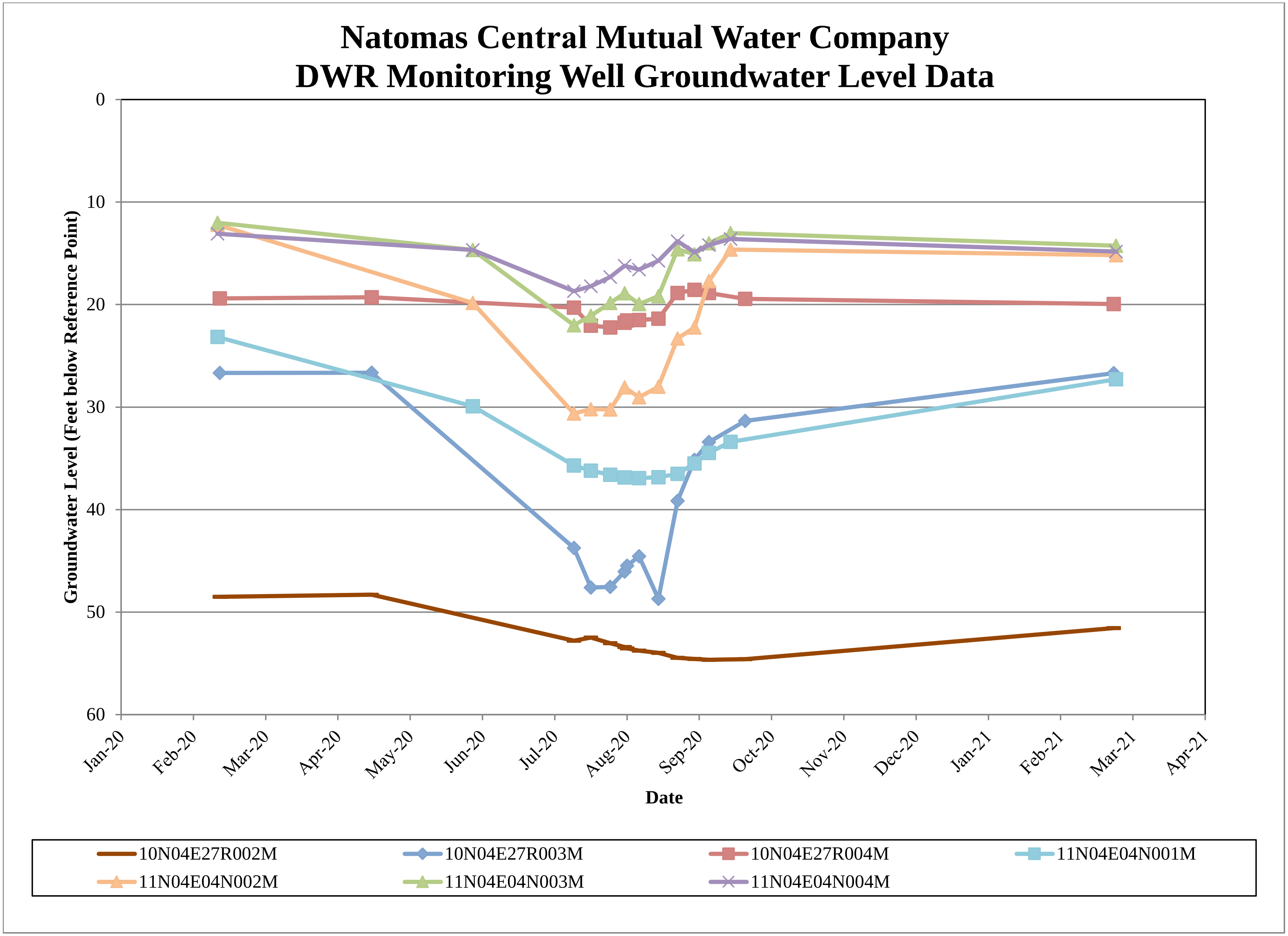


Natomas Central Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
5
10
15
20
25
30
35
40
45
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
L-7
L-8
L-9
L-10
L-11
L-12
TNBC-MW
Lauppe


Natomas Central Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
Mckenzie-1
Mckenzie-2
MW-1
L-MW
Bianchi
Willey
PAMMA



Natomas Central Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
SAFCA 1
SAFCA-2
Bryte
OSE-1
Ameral
Elkhorn MW-1
Elkhorn MW-2



Natomas Central Mutual Water Company
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
10N04E27R002M
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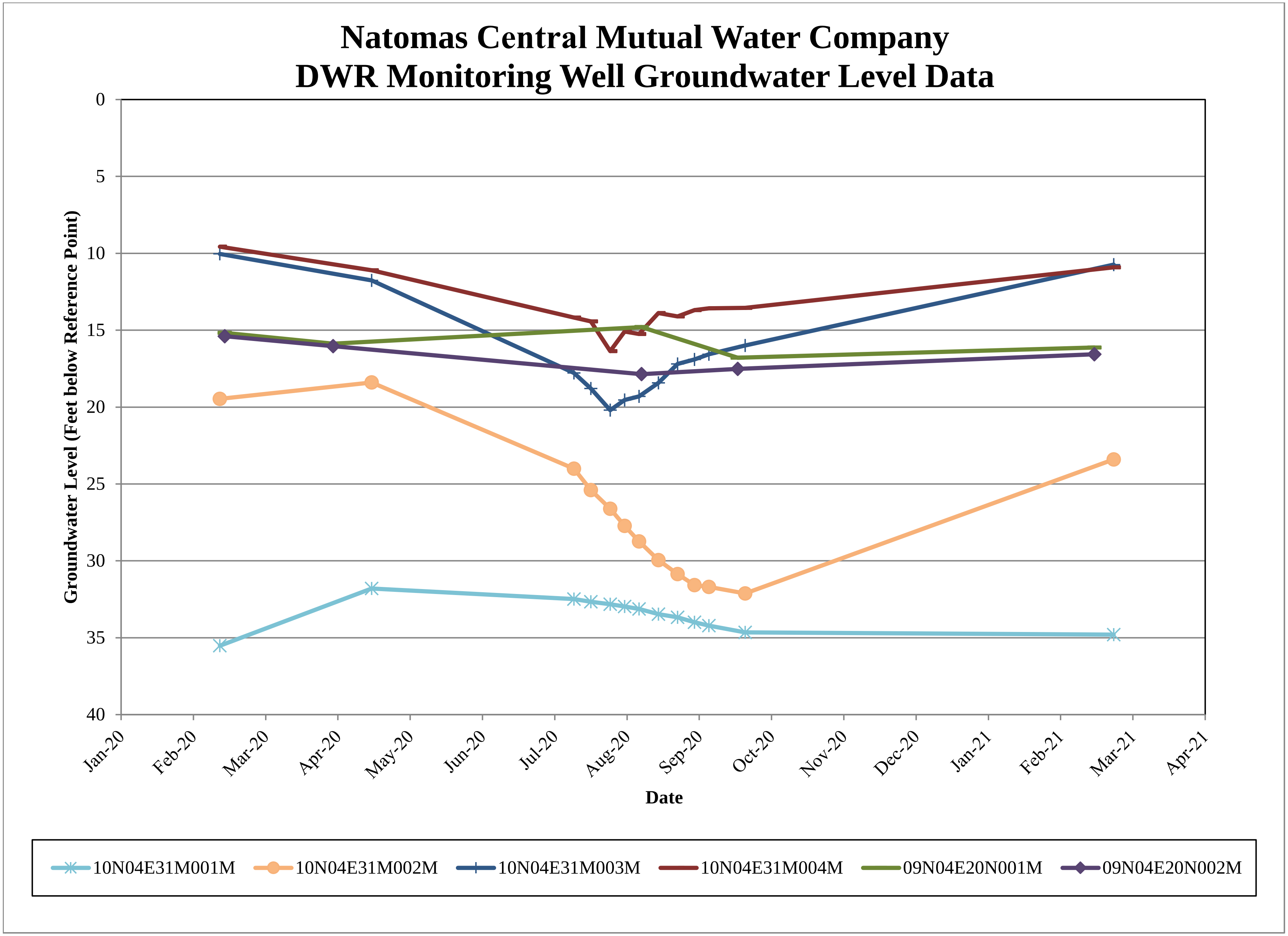
11N04E04N004M


Natomas Central Mutual Water Company
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
5
10
15
20
25
30
35
40
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
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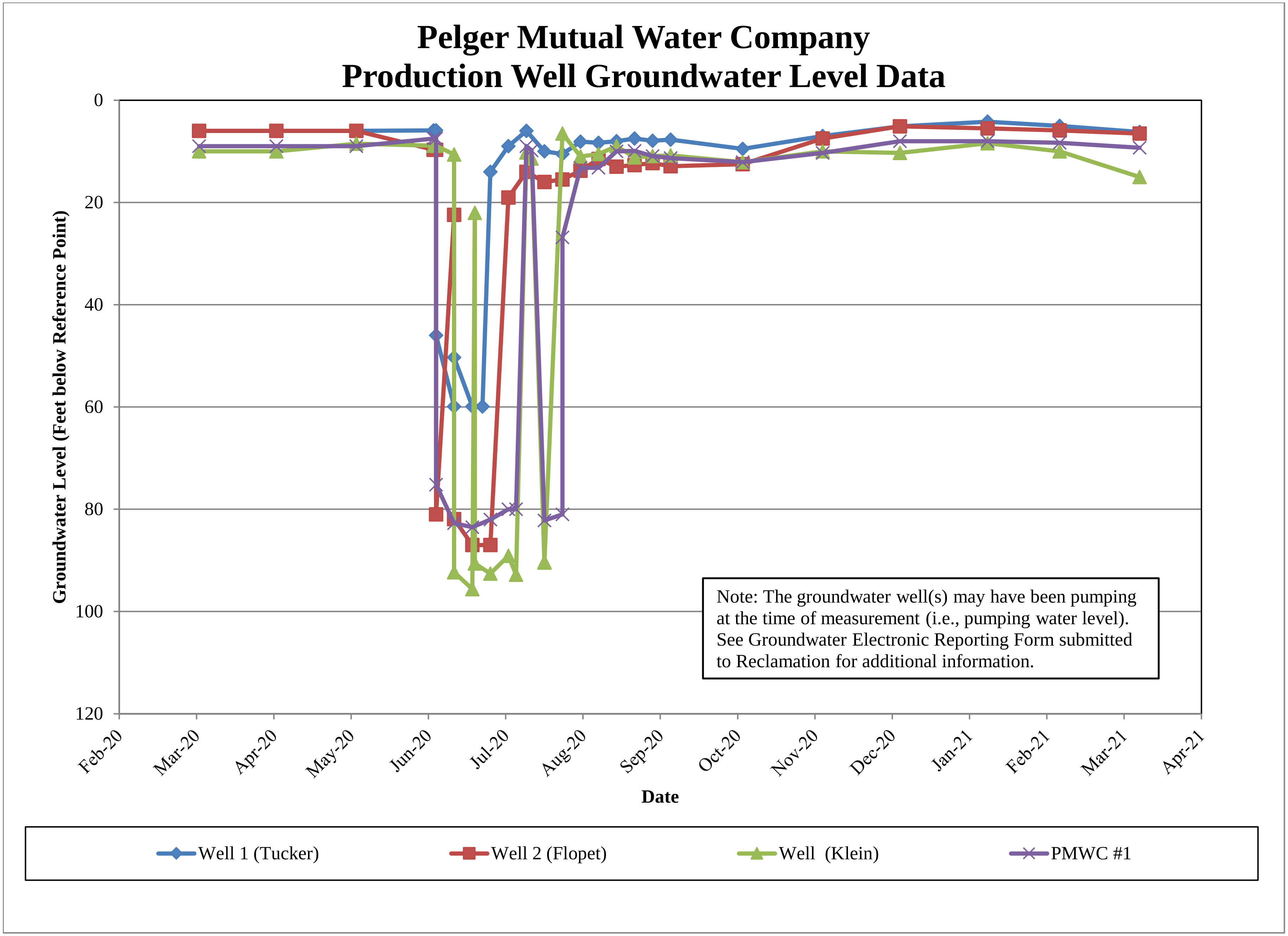
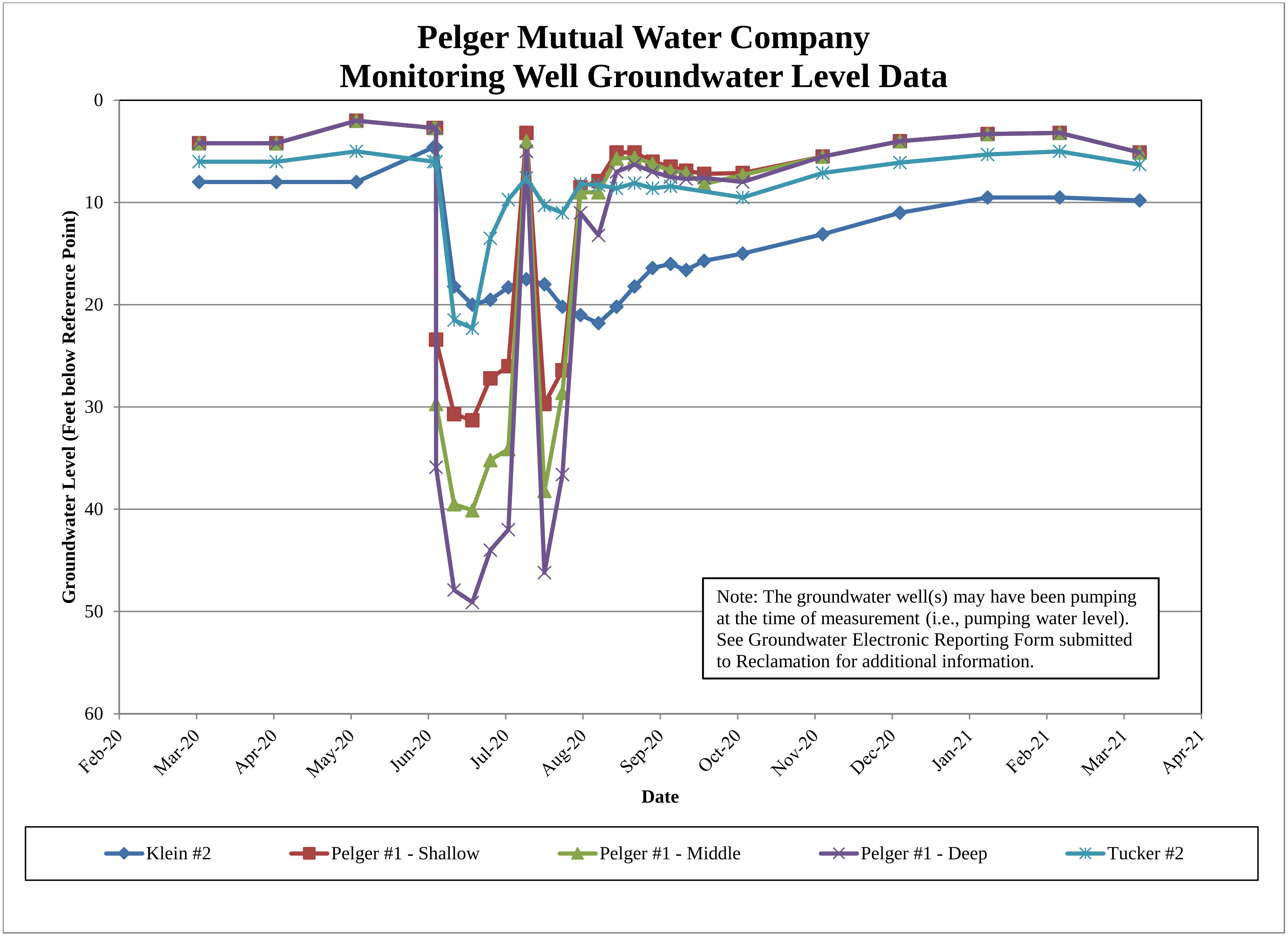
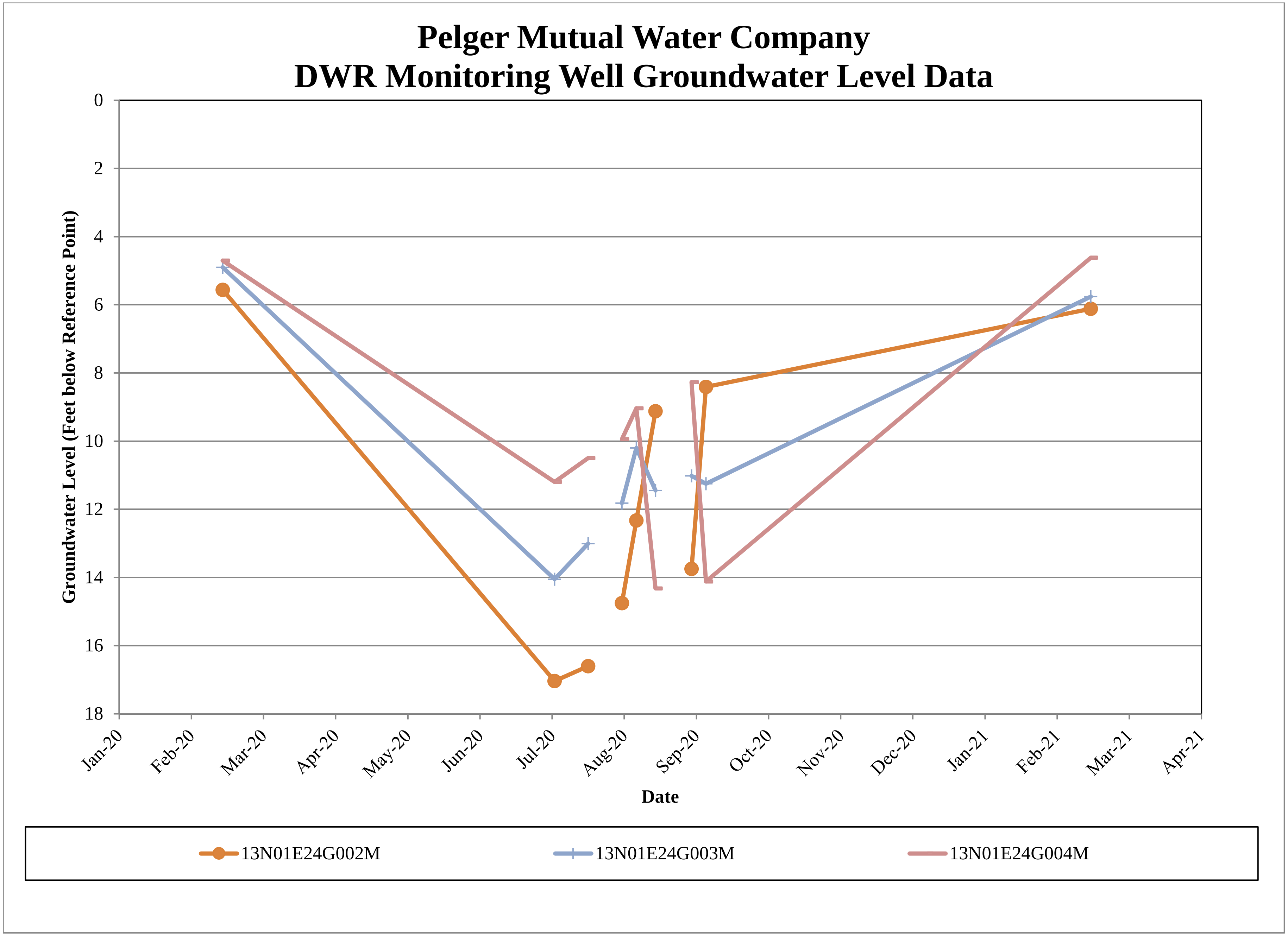
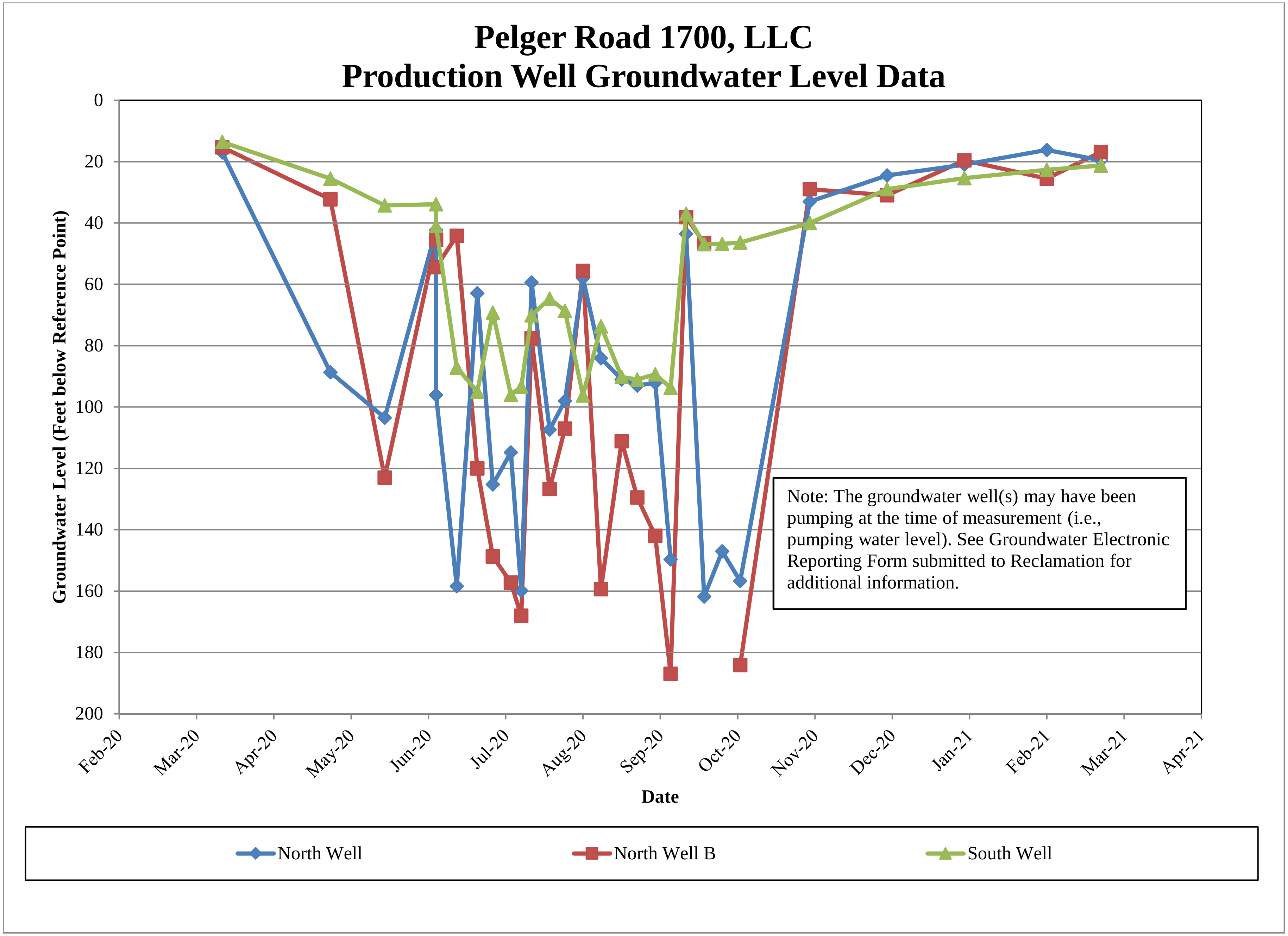
09N04E20N002M

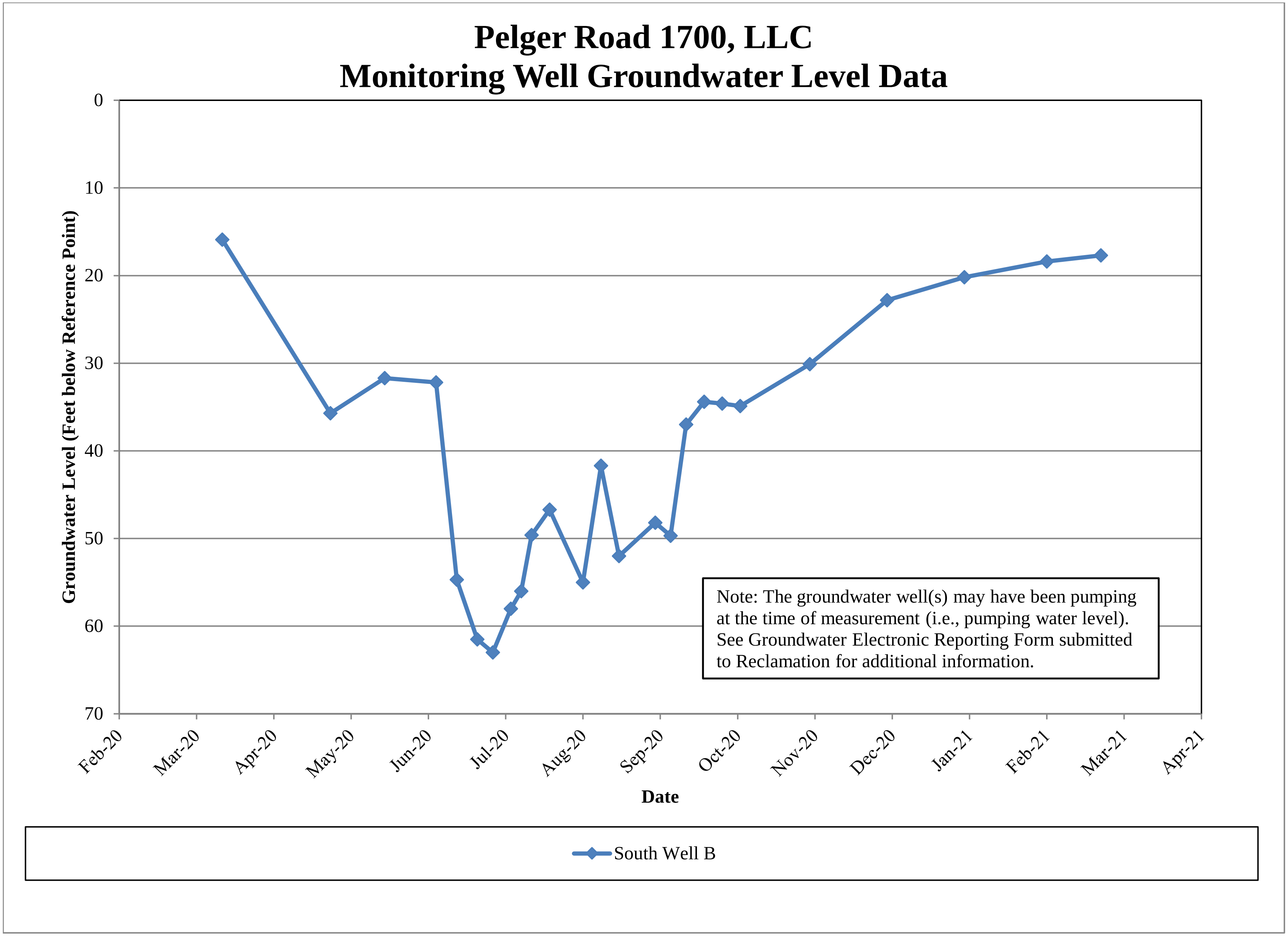

Pelger Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
Well 1 (Tucker)
Well 2 (Flopet)
Well (Klein)
PMWC #1

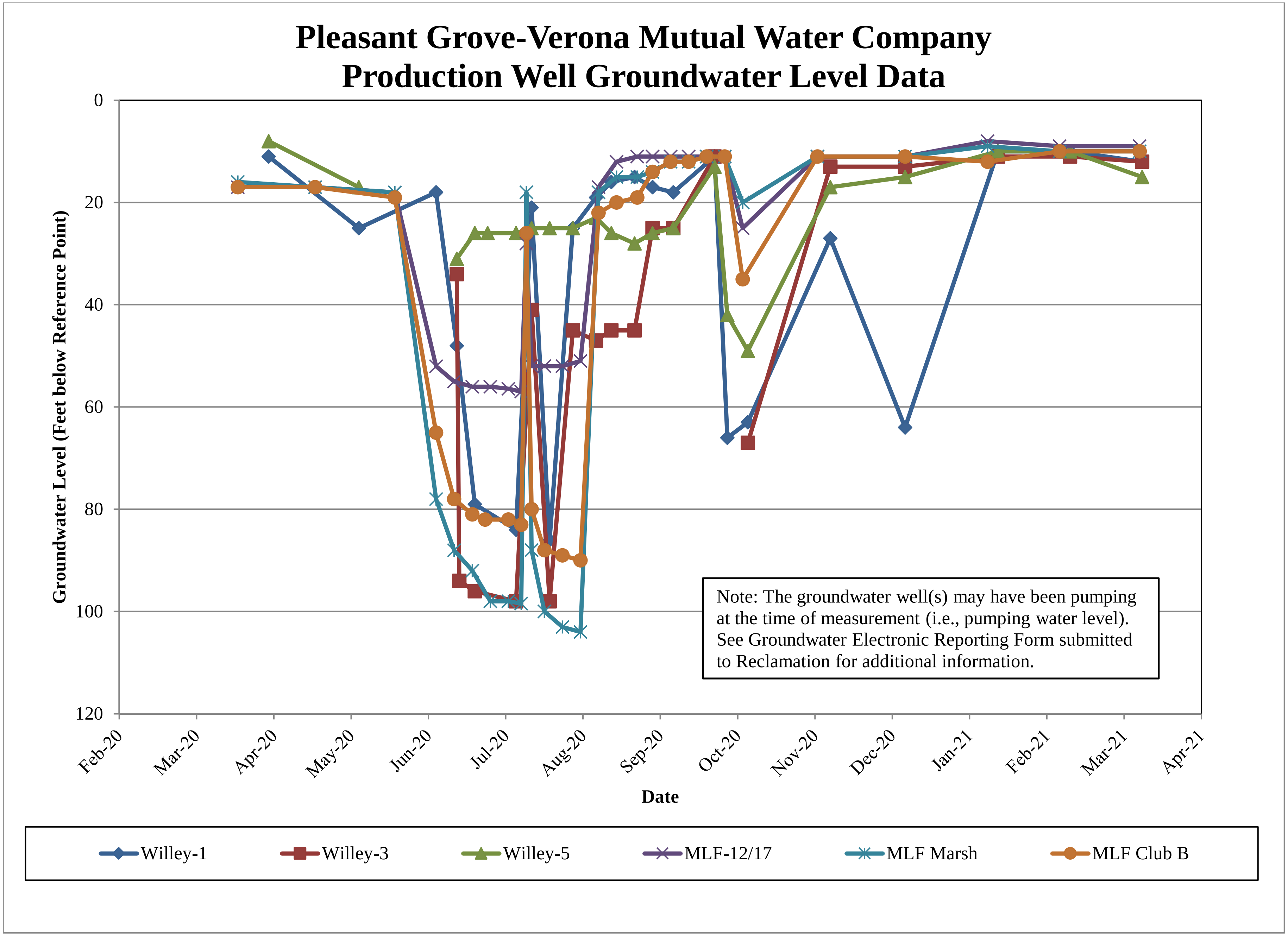

Pelger Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
Klein #2
Pelger #1 - Shallow
Pelger #1 - Middle
Pelger #1 - Deep
Tucker #2

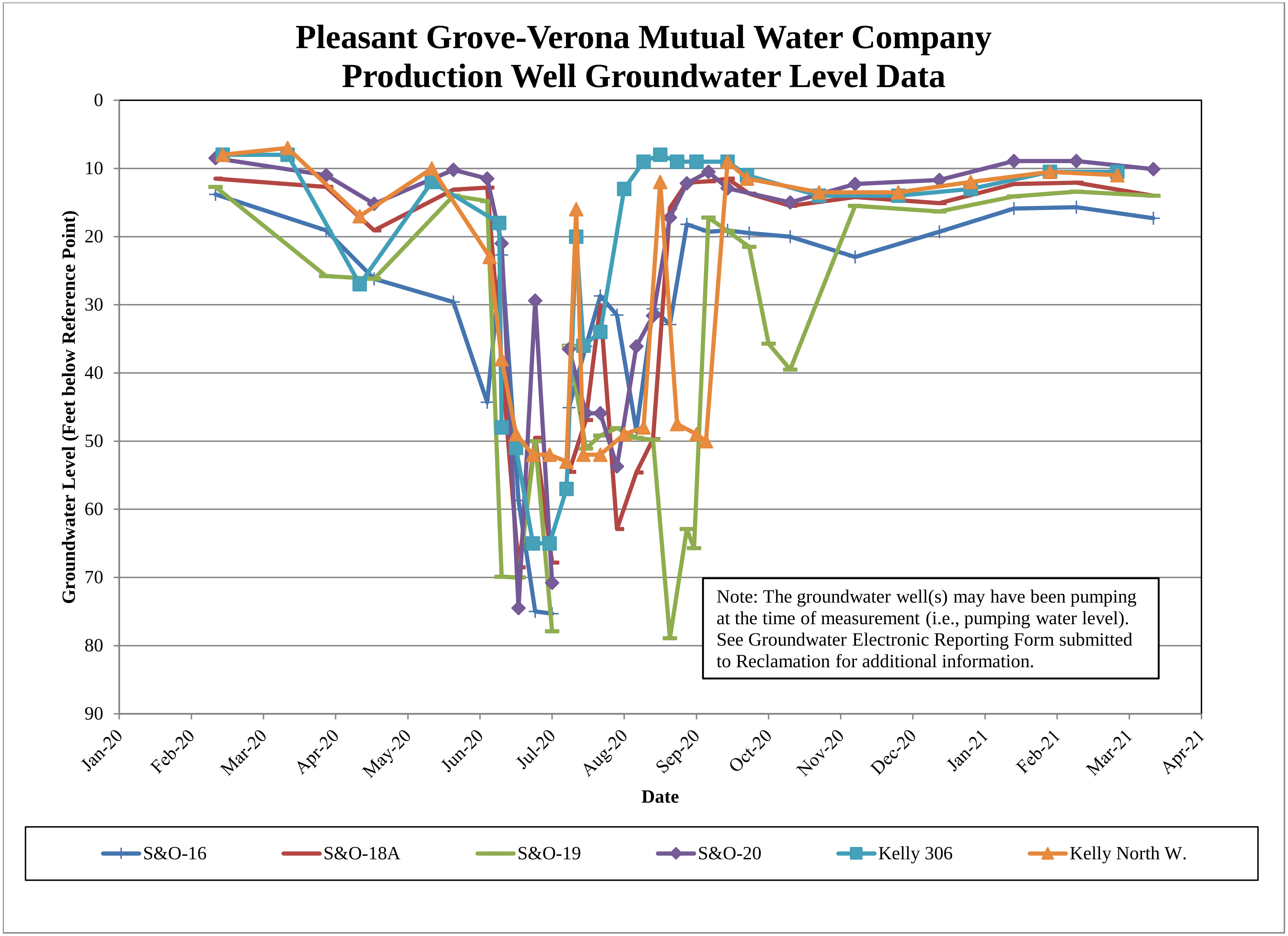

Pelger Mutual Water Company
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
2
4
6
8
10
12
14
16
18
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
13N01E24G002M
13N01E24G003M
13N01E24G004M



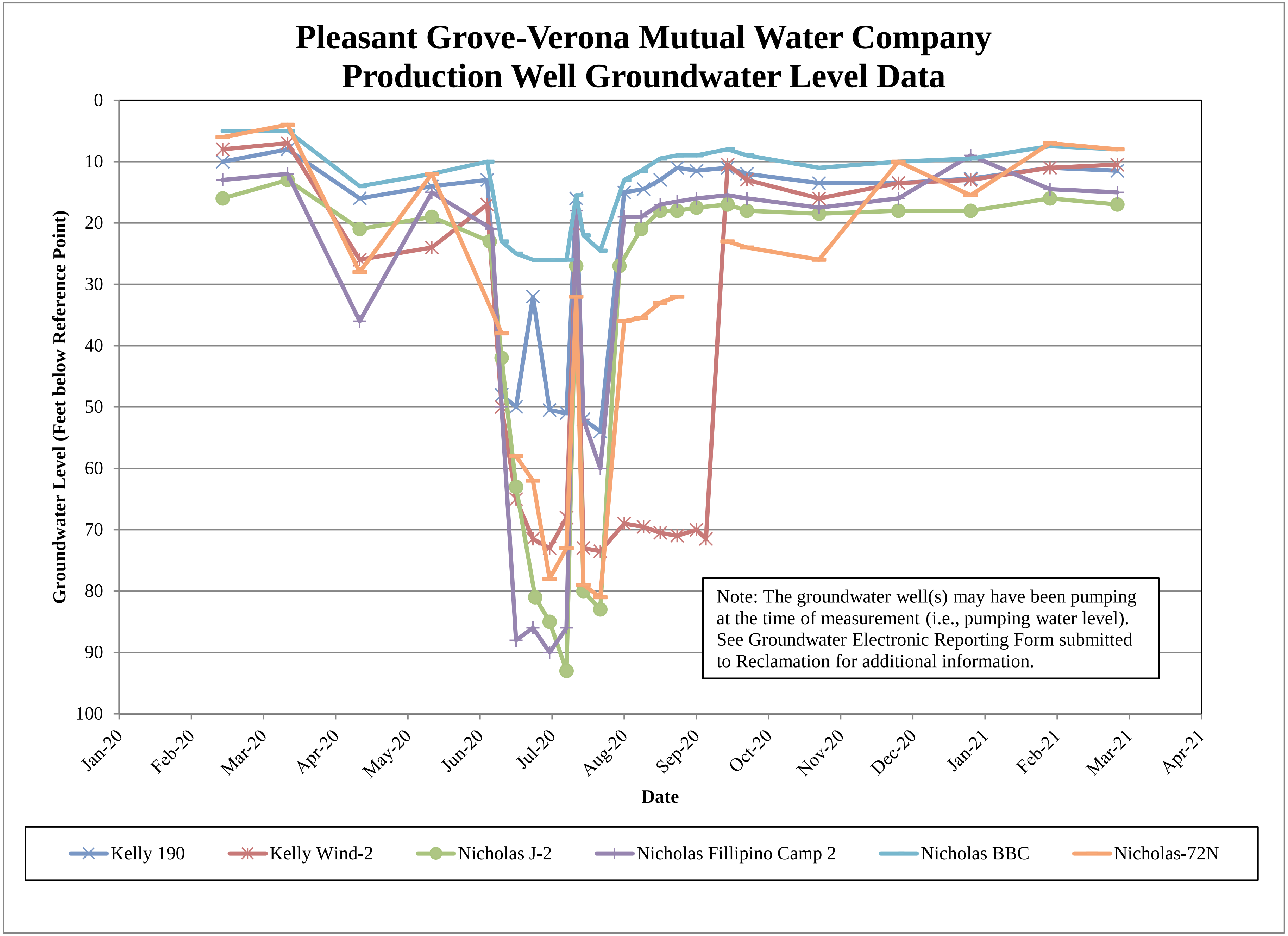
Pelger Road 1700, LLC
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
180
200
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
North Well
North Well B
South Well


Pelger Road 1700, LLC
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
South Well B

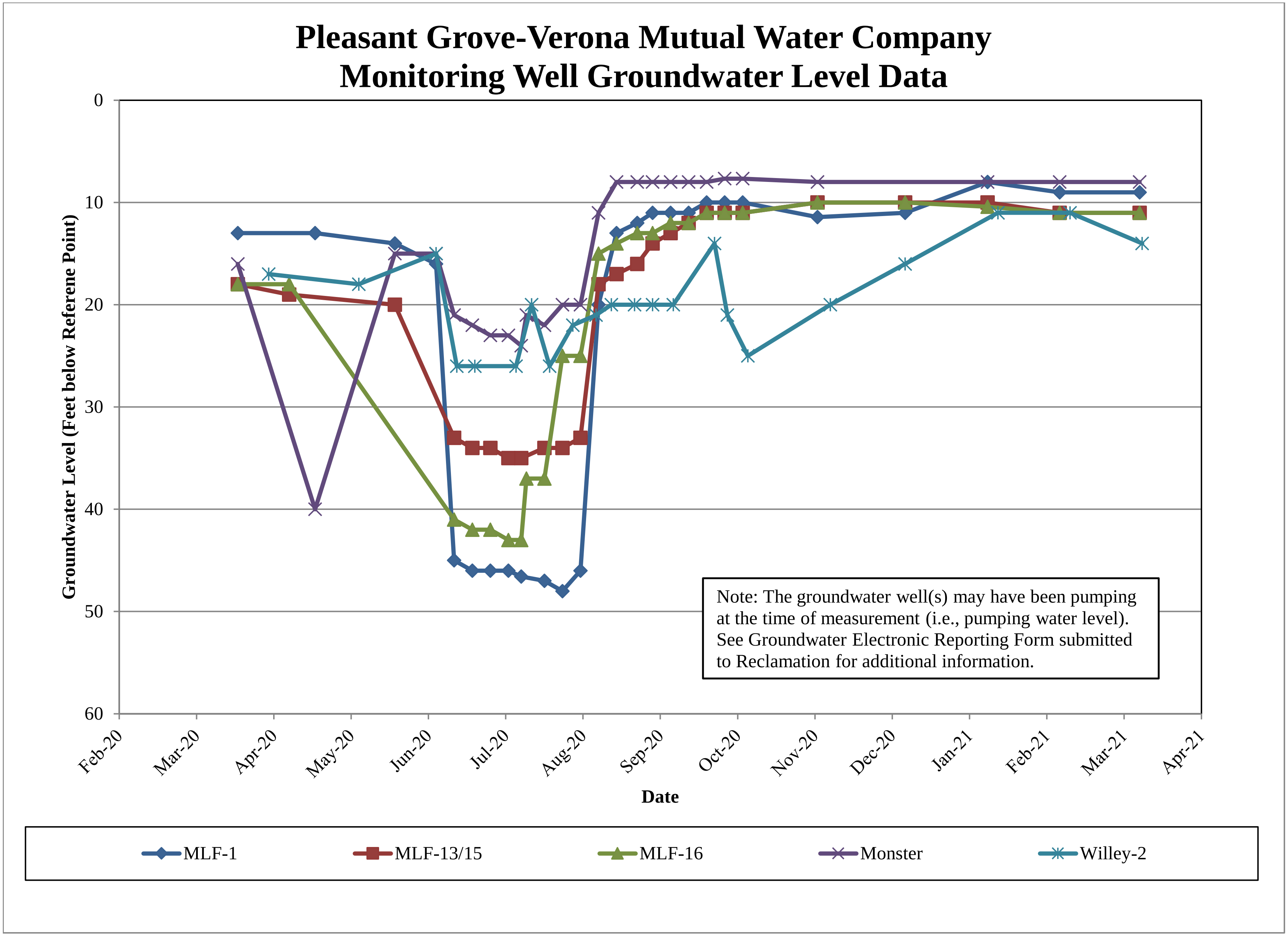

Pleasant Grove-Verona Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
Willey-1
Willey-3
Willey-5
MLF-12/17
MLF Marsh
MLF Club B



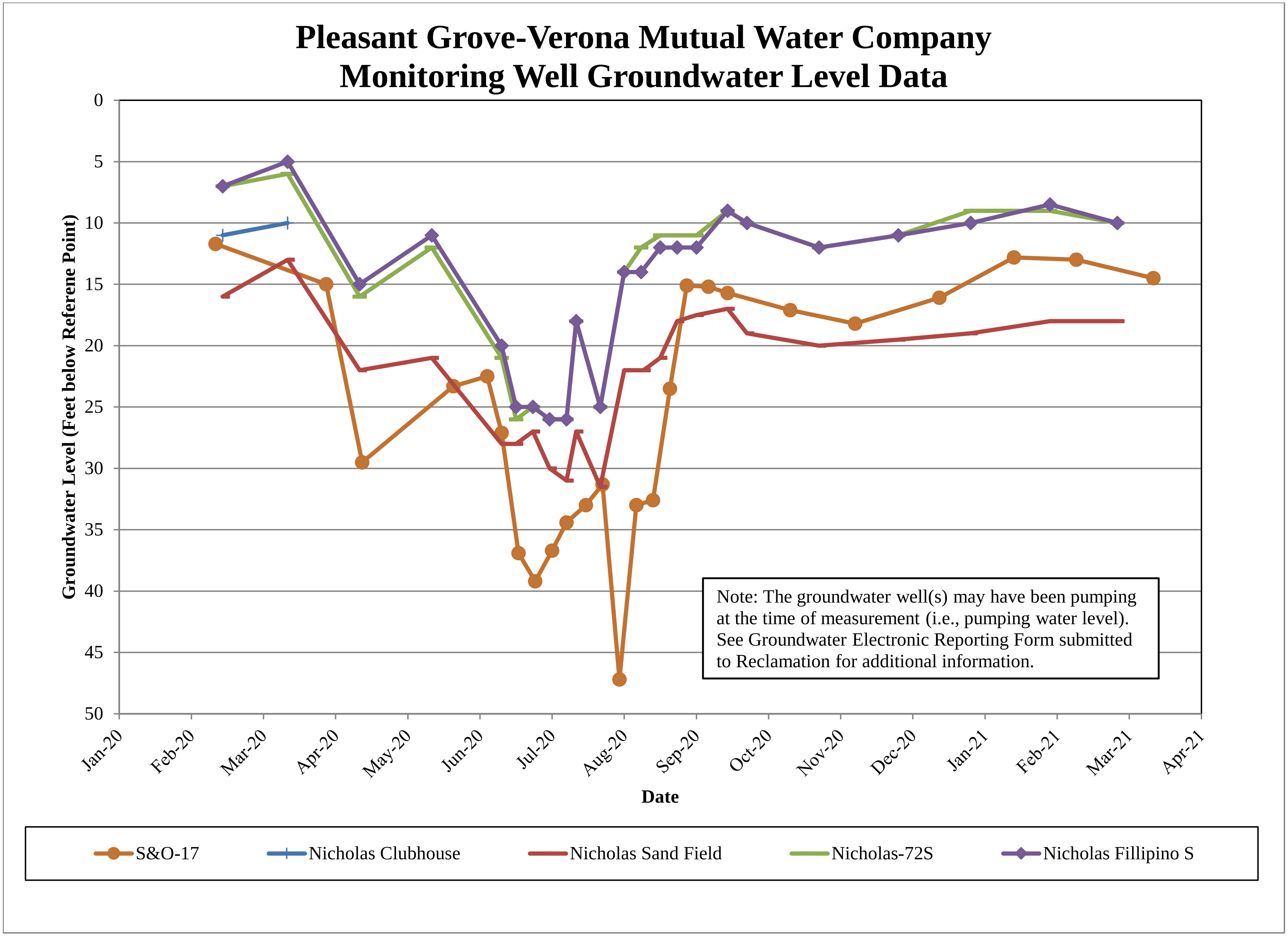
Pleasant Grove-Verona Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
S&O-16
S&O-18A
S&O-19
S&O-20
Kelly 306
Kelly North W.



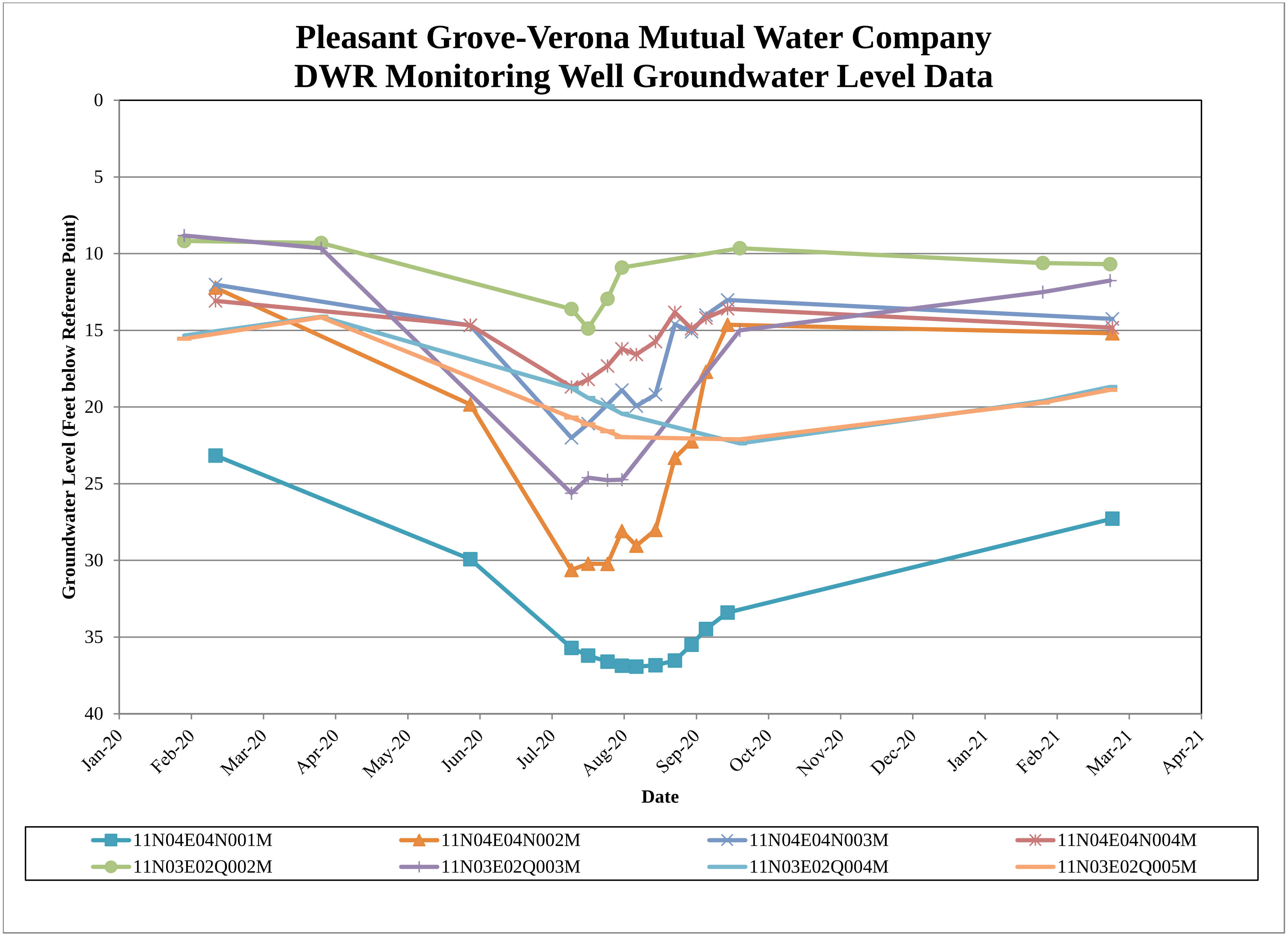
Pleasant Grove-Verona Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
100
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
Kelly 190
Kelly Wind-2
Nicholas J-2
Nicholas Fillipino Camp 2
Nicholas BBC
Nicholas-72N

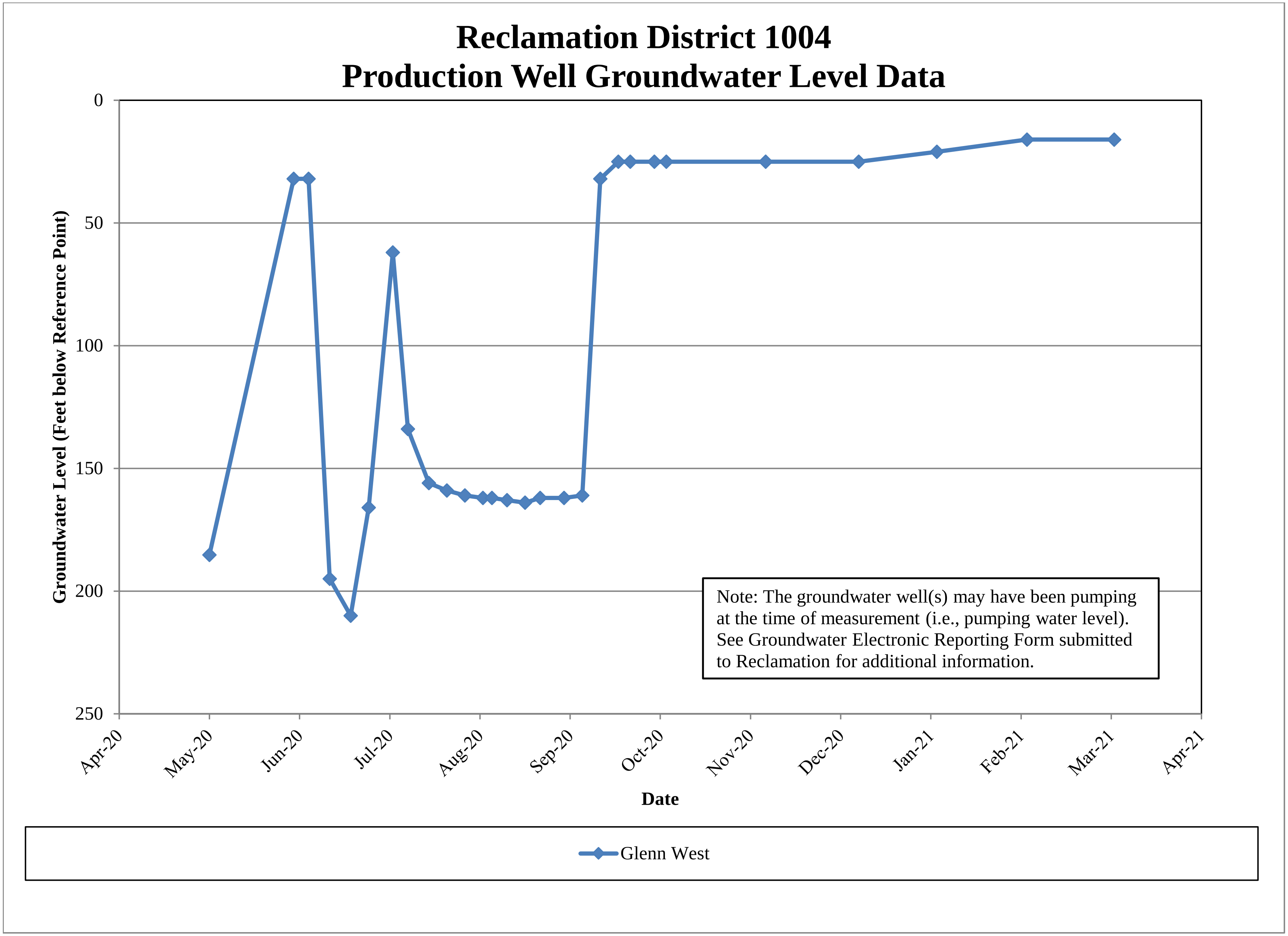


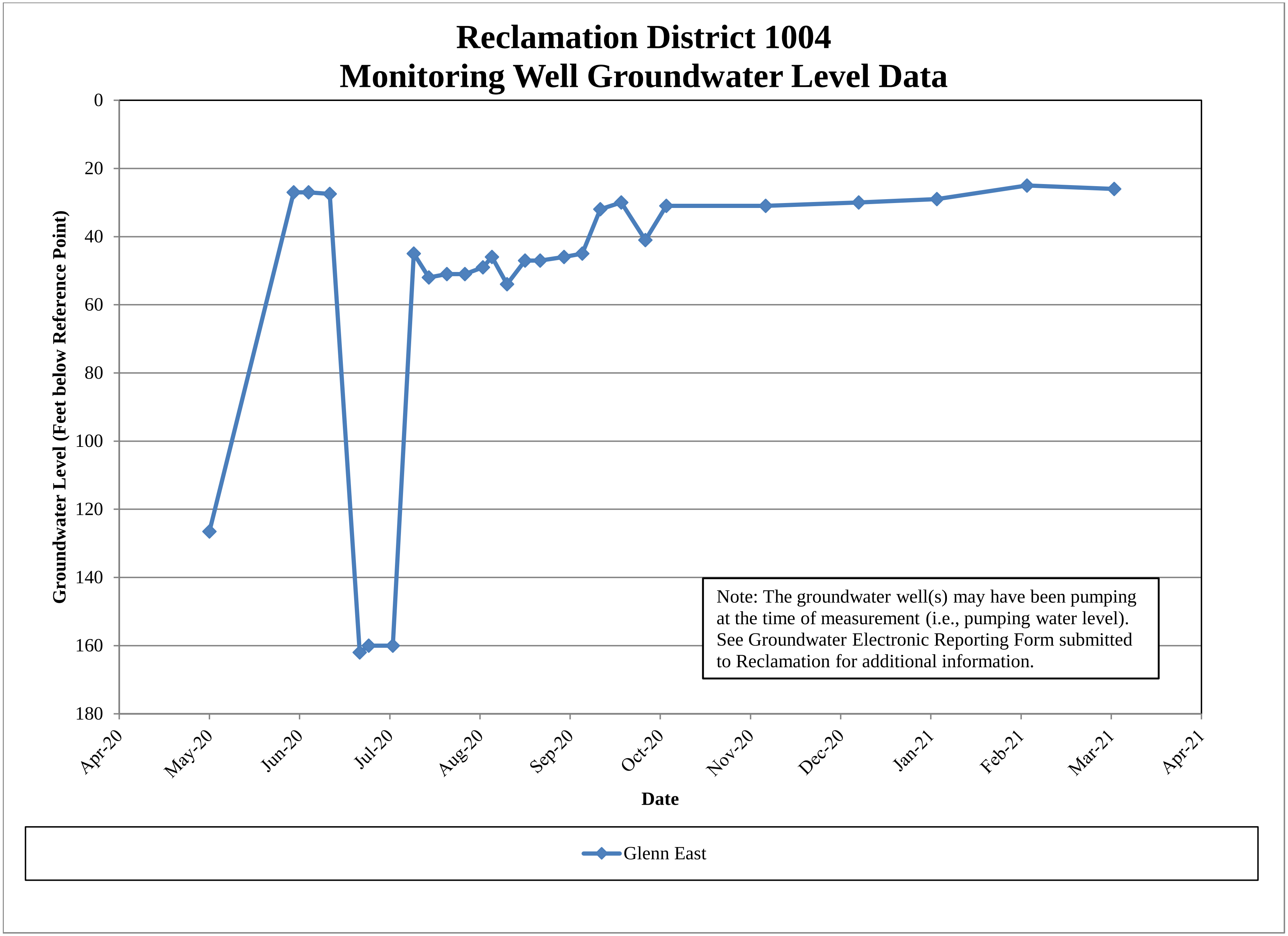
Pleasant Grove-Verona Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Referene Point)
0
10
20
30
40
50
60
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
MLF-1
MLF-13/15
MLF-16
Monster
Willey-2

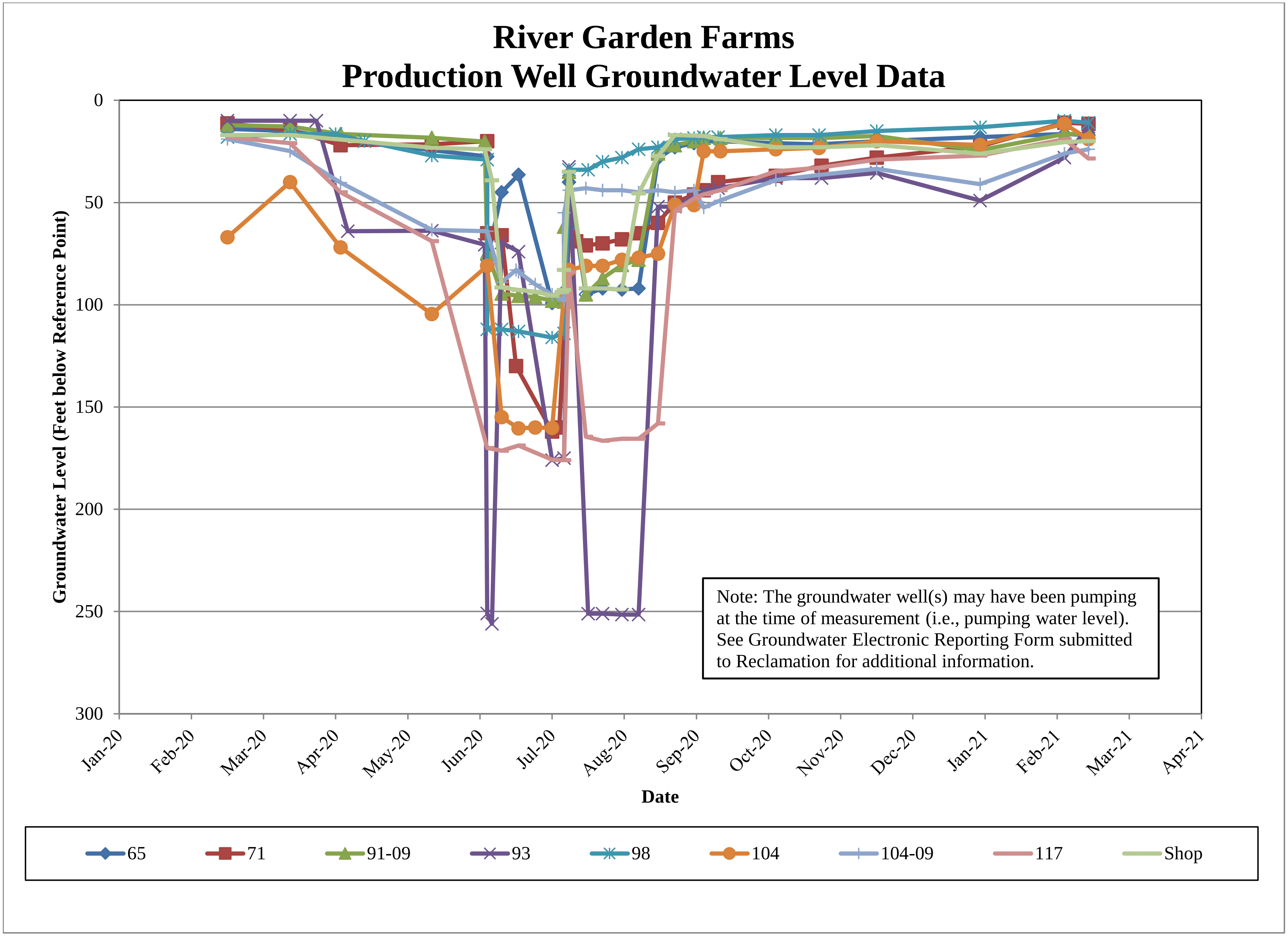


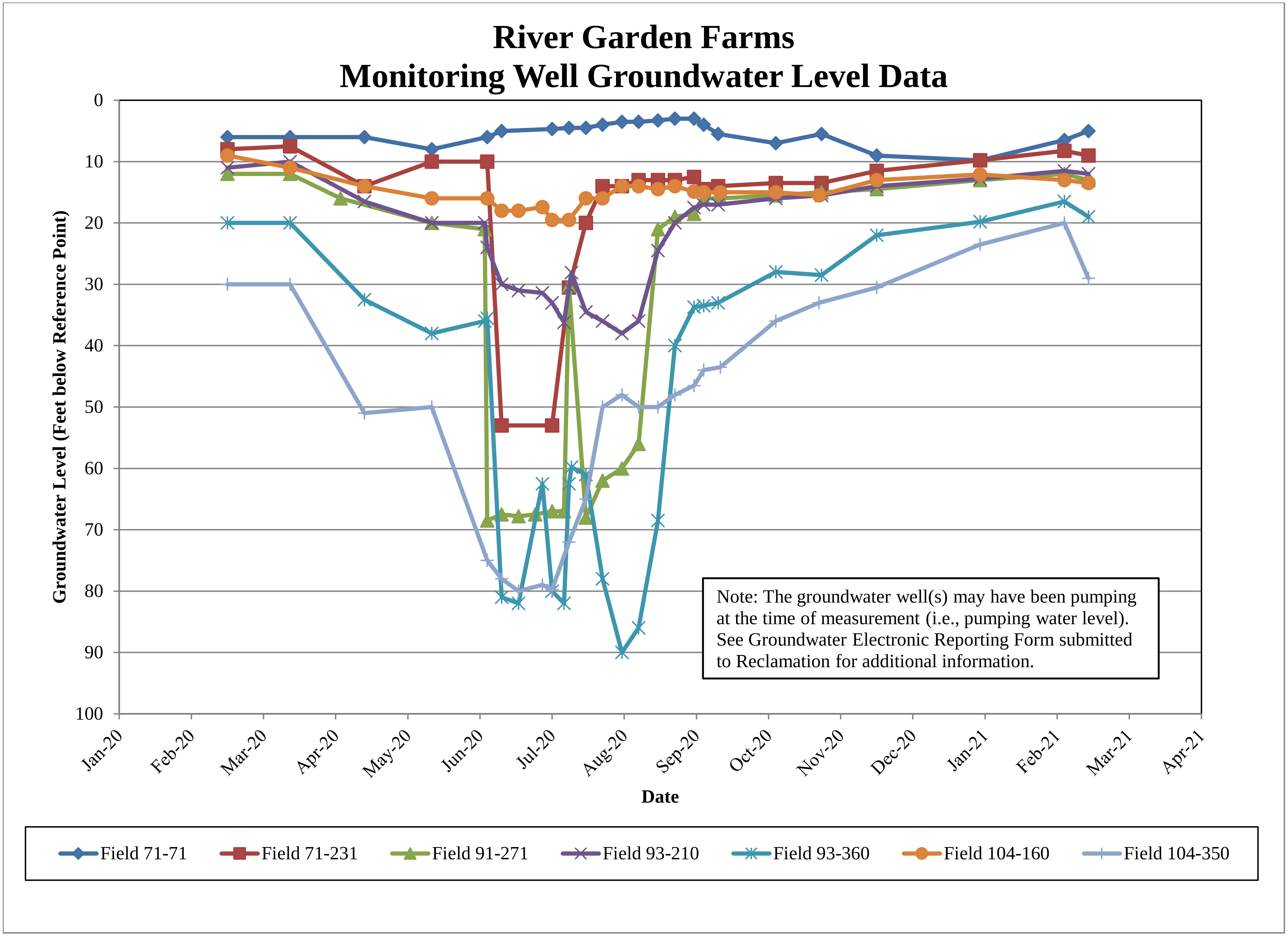
Pleasant Grove-Verona Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Referene Point)
0
5
10
15
20
25
30
35
40
45
50
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
S&O-17
Nicholas Clubhouse
Nicholas Sand Field
Nicholas-72S
Nicholas Fillipino S

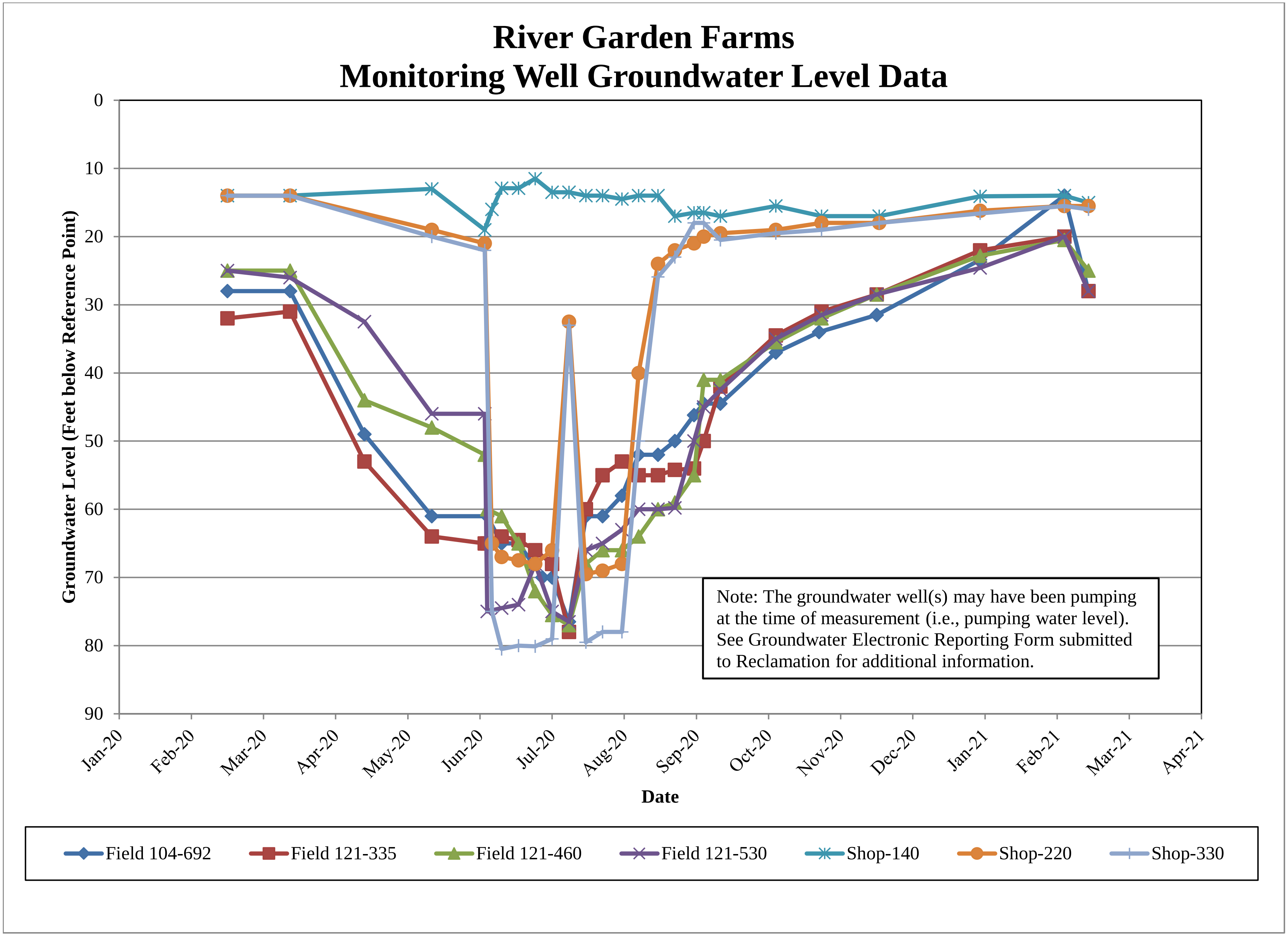

Pleasant Grove-Verona Mutual Water Company
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Referene Point)
0
5
10
15
20
25
30
35
40
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
11N04E04N001M
11N04E04N002M
11N04E04N003M
11N04E04N004M
11N03E02Q002M
11N03E02Q003M
11N03E02Q004M
11N03E02Q005M

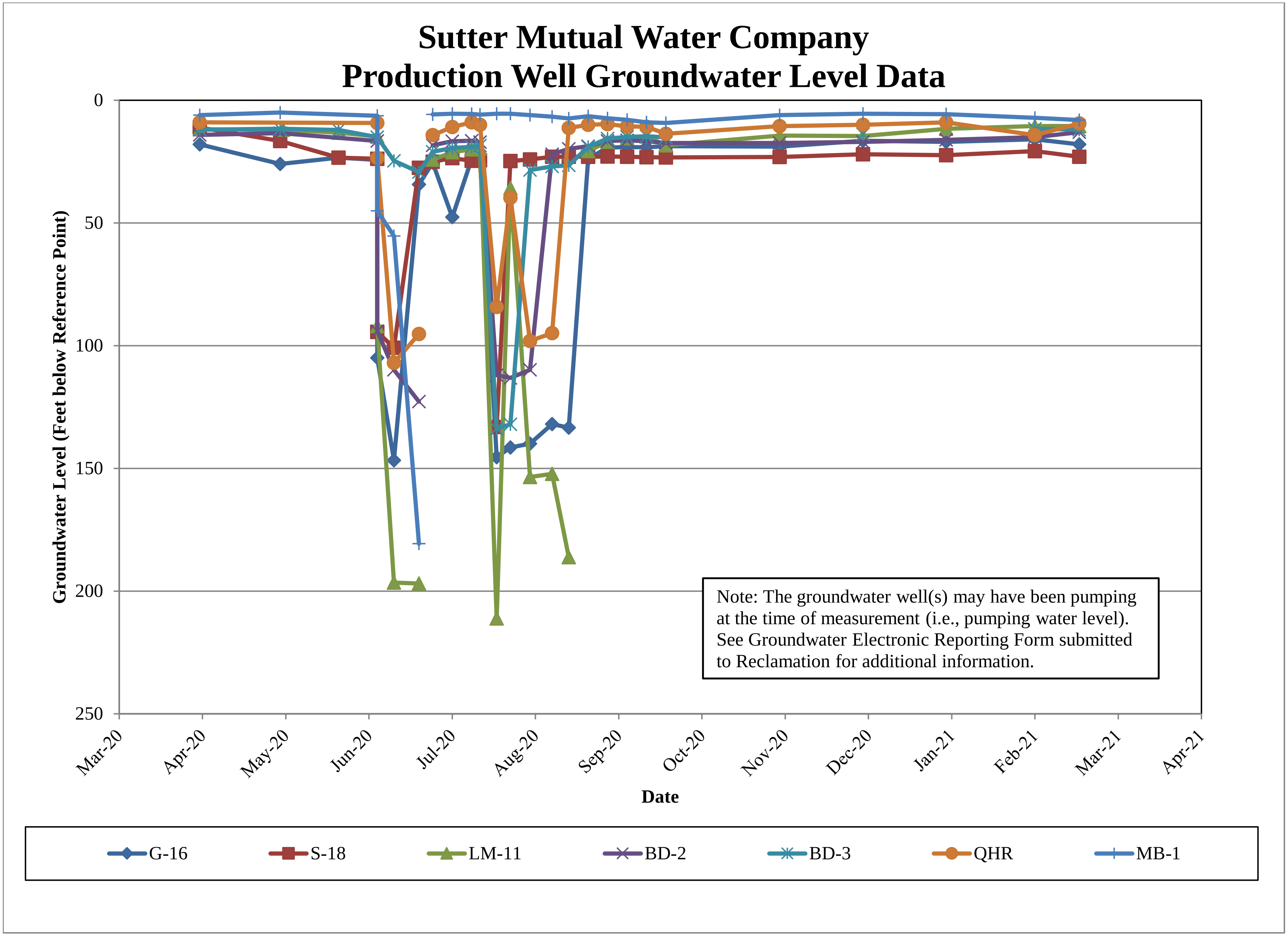

Reclamation District 1004
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
50
100
150
200
250
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
Glenn West


Reclamation District 1004
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
180
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
Glenn East

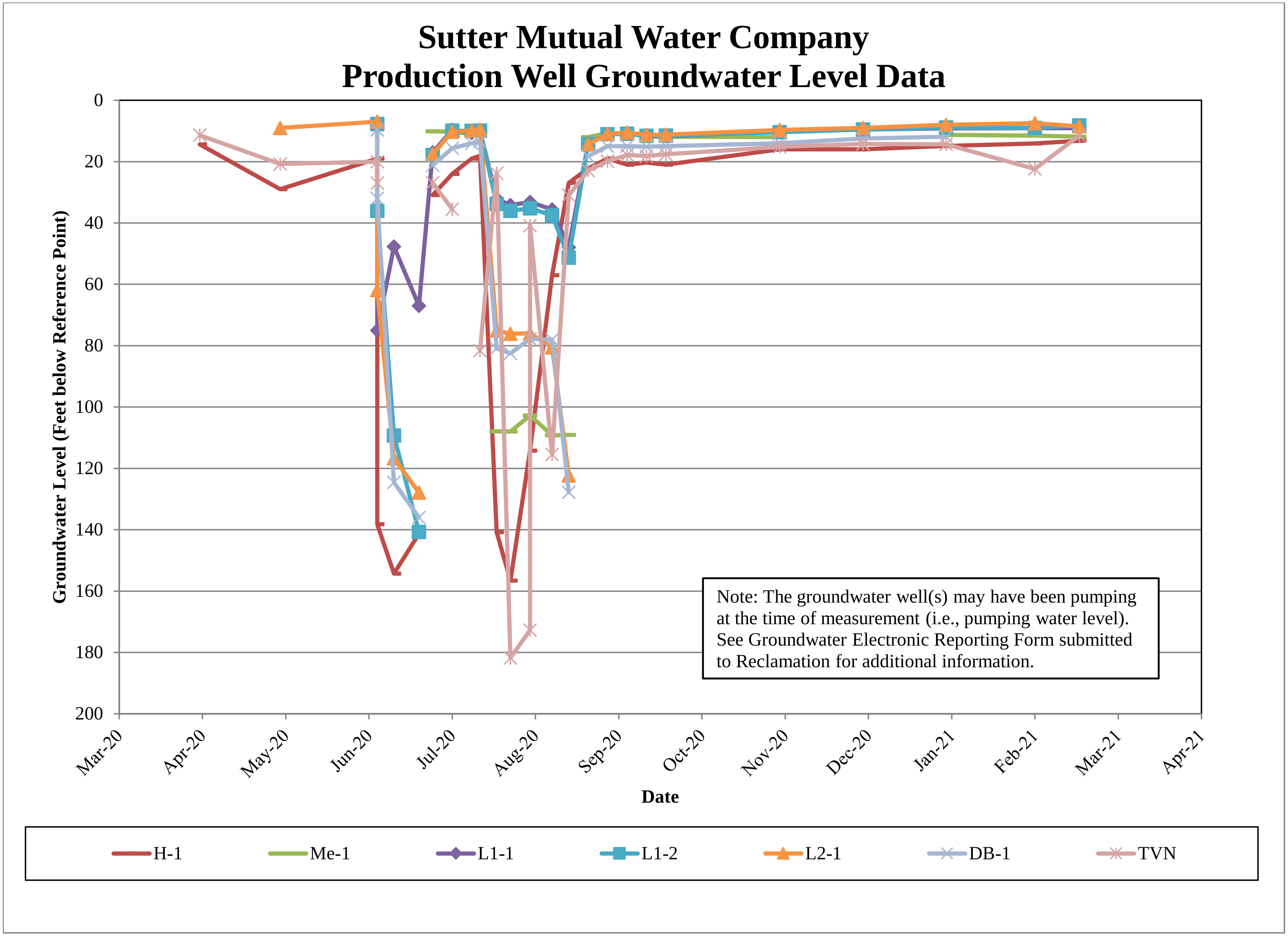

River Garden Farms
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
50
100
150
200
250
300
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
65
71
91-09
93
98
104
104-09
117
Shop


River Garden Farms
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
100
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
Field 71-71
Field 71-231
Field 91-271
Field 93-210
Field 93-360
Field 104-160
Field 104-350

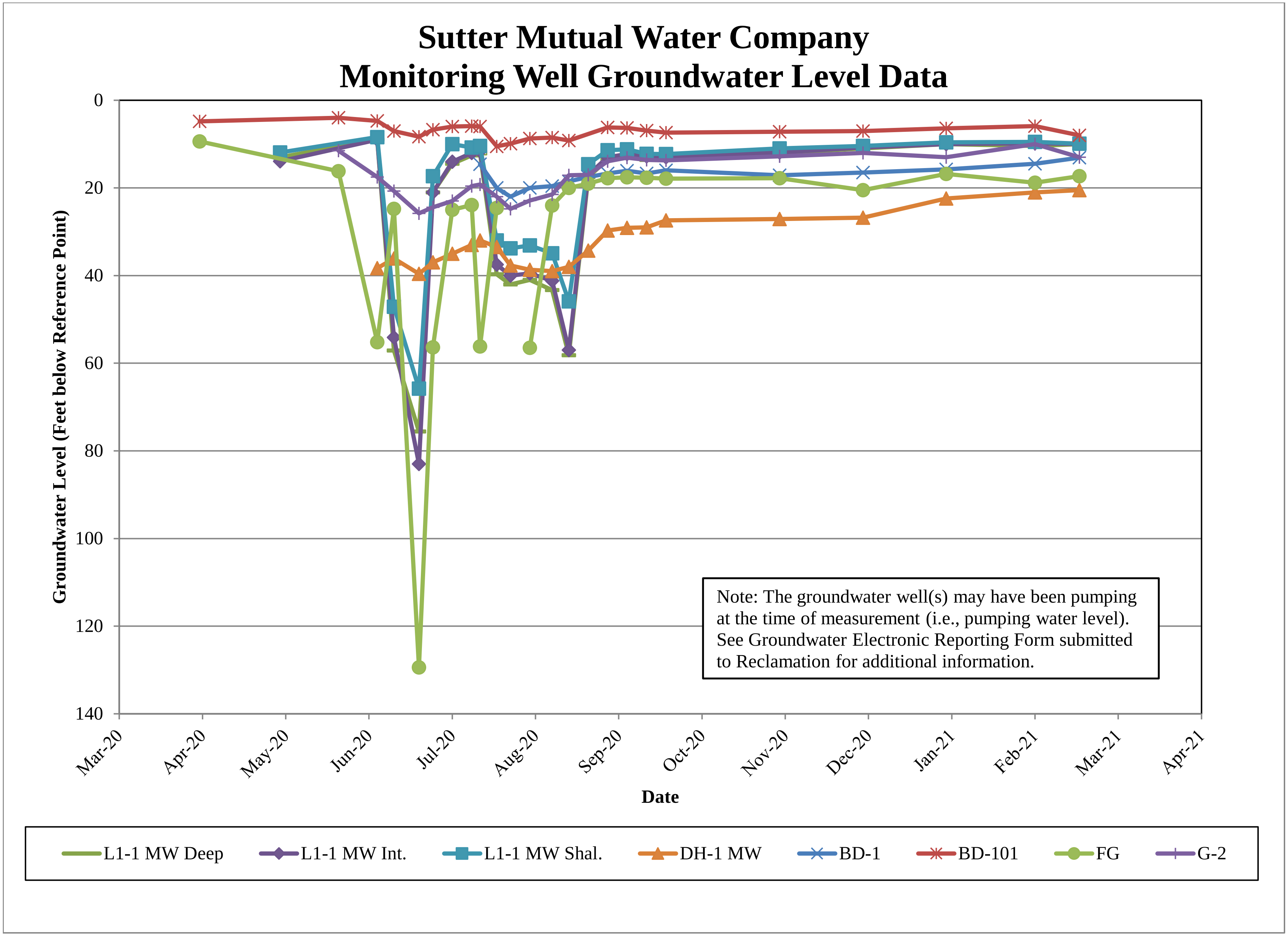

River Garden Farms
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
Field 104-692
Field 121-335
Field 121-460
Field 121-530
Shop-140
Shop-220
Shop-330

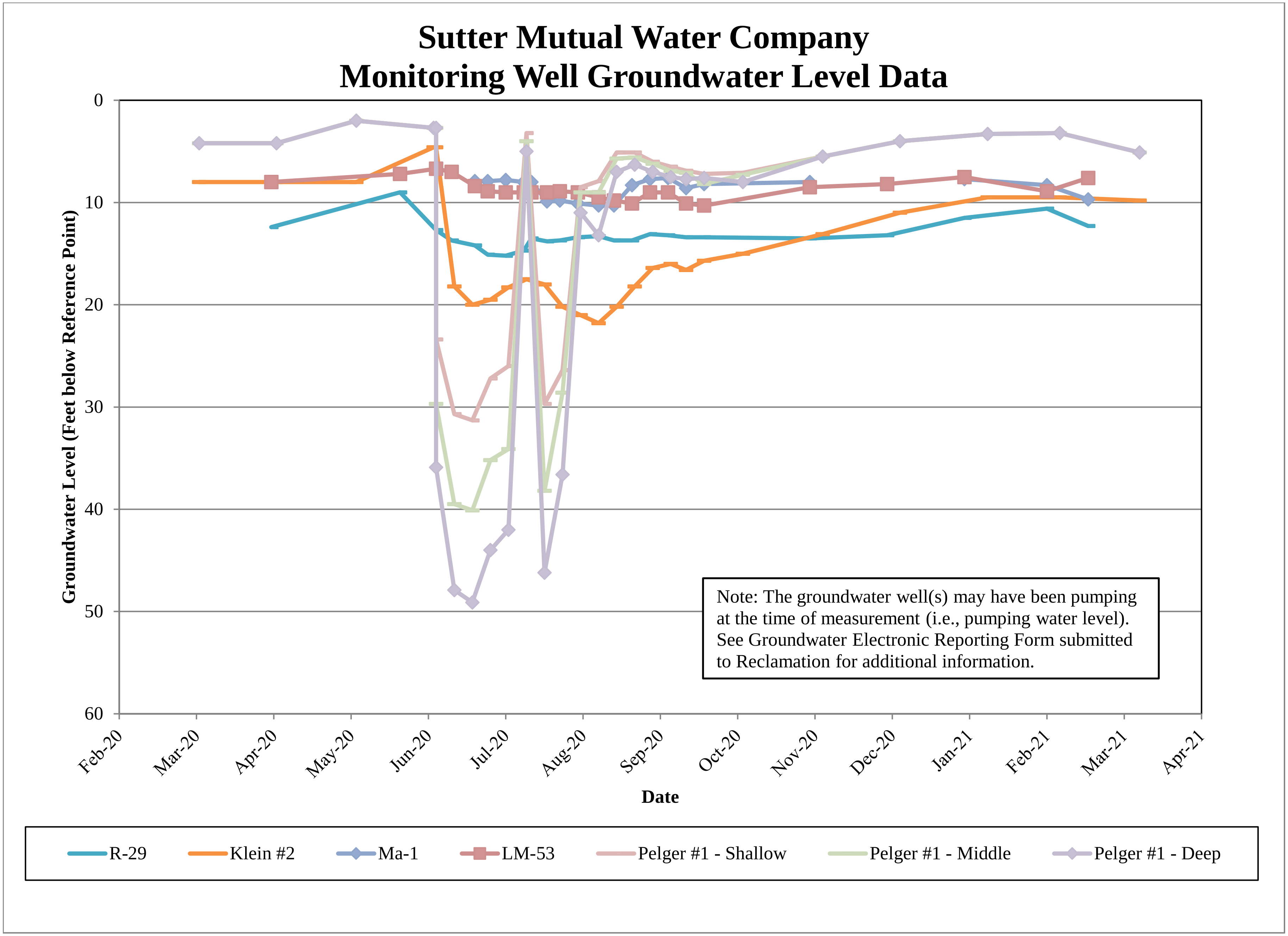


Sutter Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
50
100
150
200
250
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
G-16
S-18
LM-11
BD-2
BD-3
QHR
MB-1

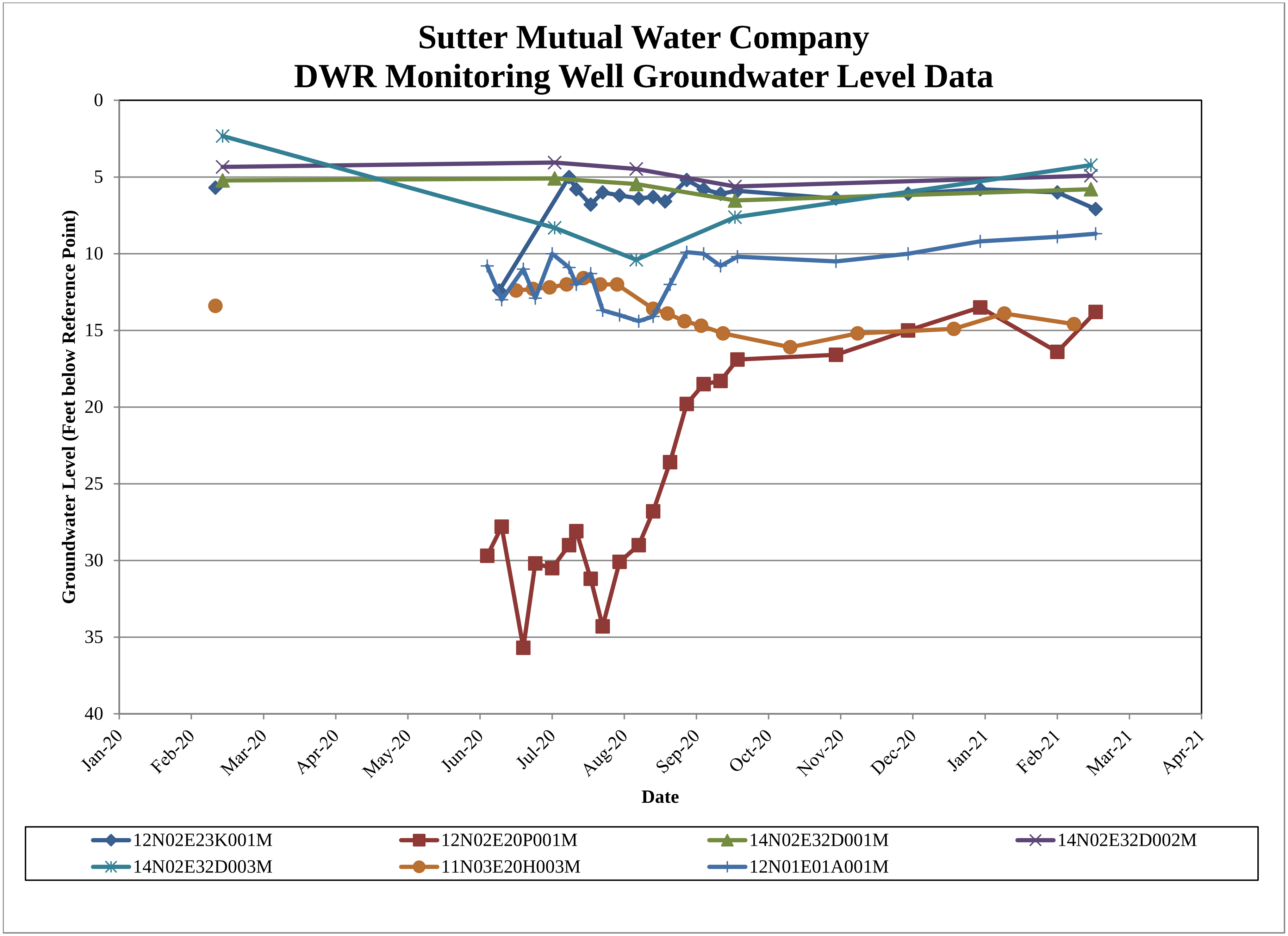


Sutter Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
180
200
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
H-1
Me-1
L1-1
L1-2
L2-1
DB-1
TVN

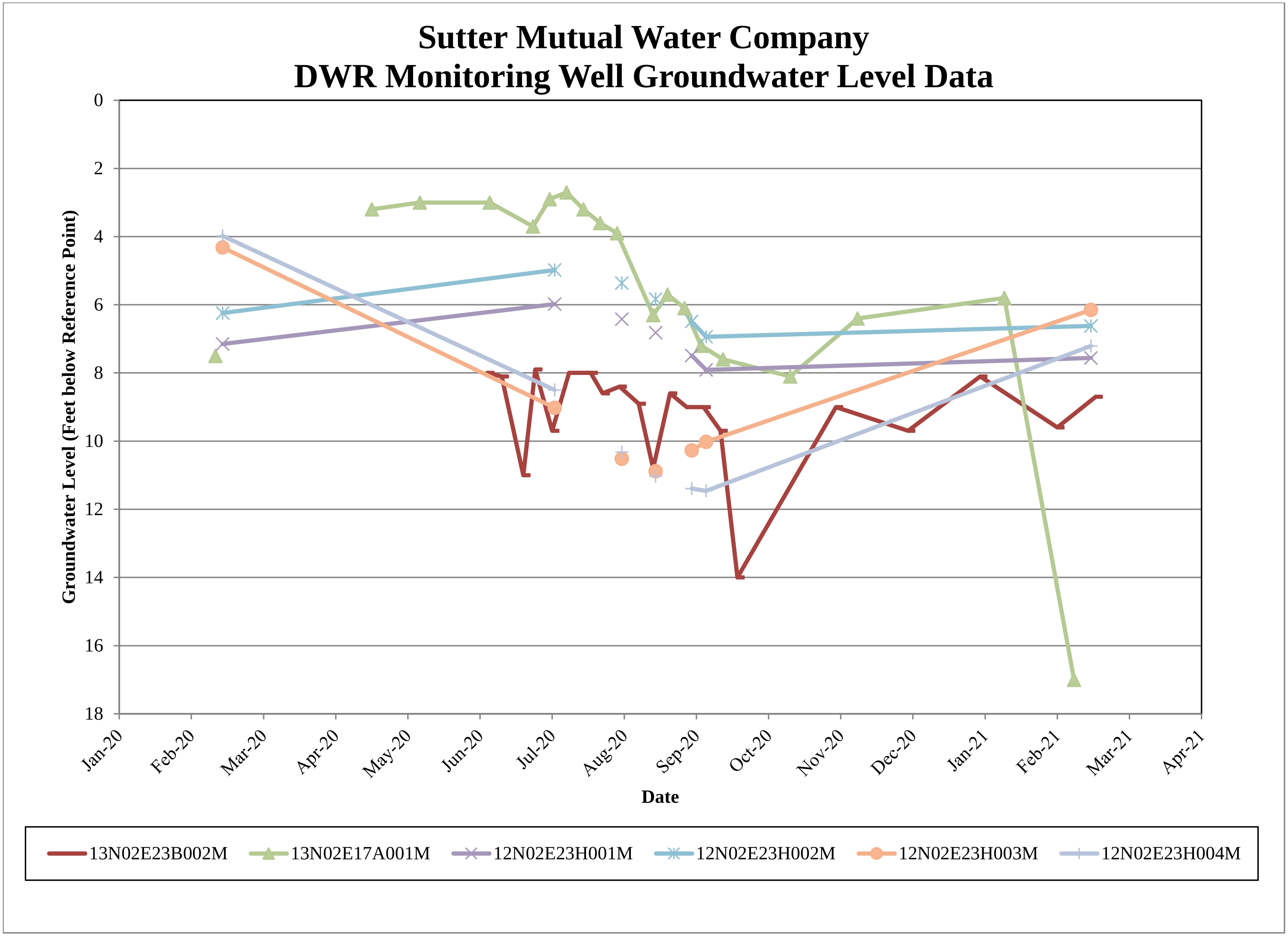

Sutter Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
L1-1 MW Deep
L1-1 MW Int.
L1-1 MW Shal.
DH-1 MW
BD-1
BD-101
FG
G-2



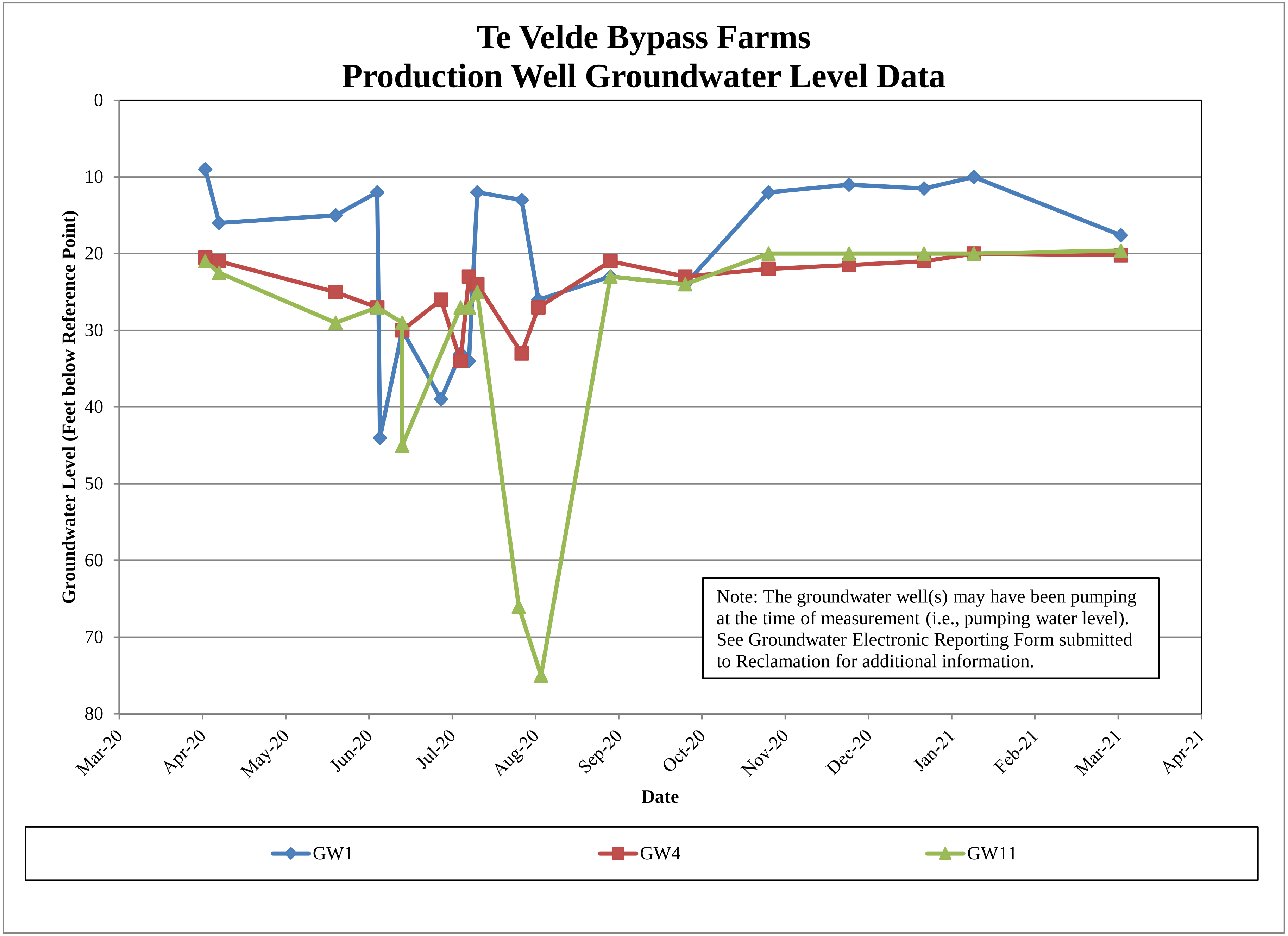
Sutter Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
R-29
Klein #2
Ma-1
LM-53
Pelger #1 - Shallow
Pelger #1 - Middle
Pelger #1 - Deep



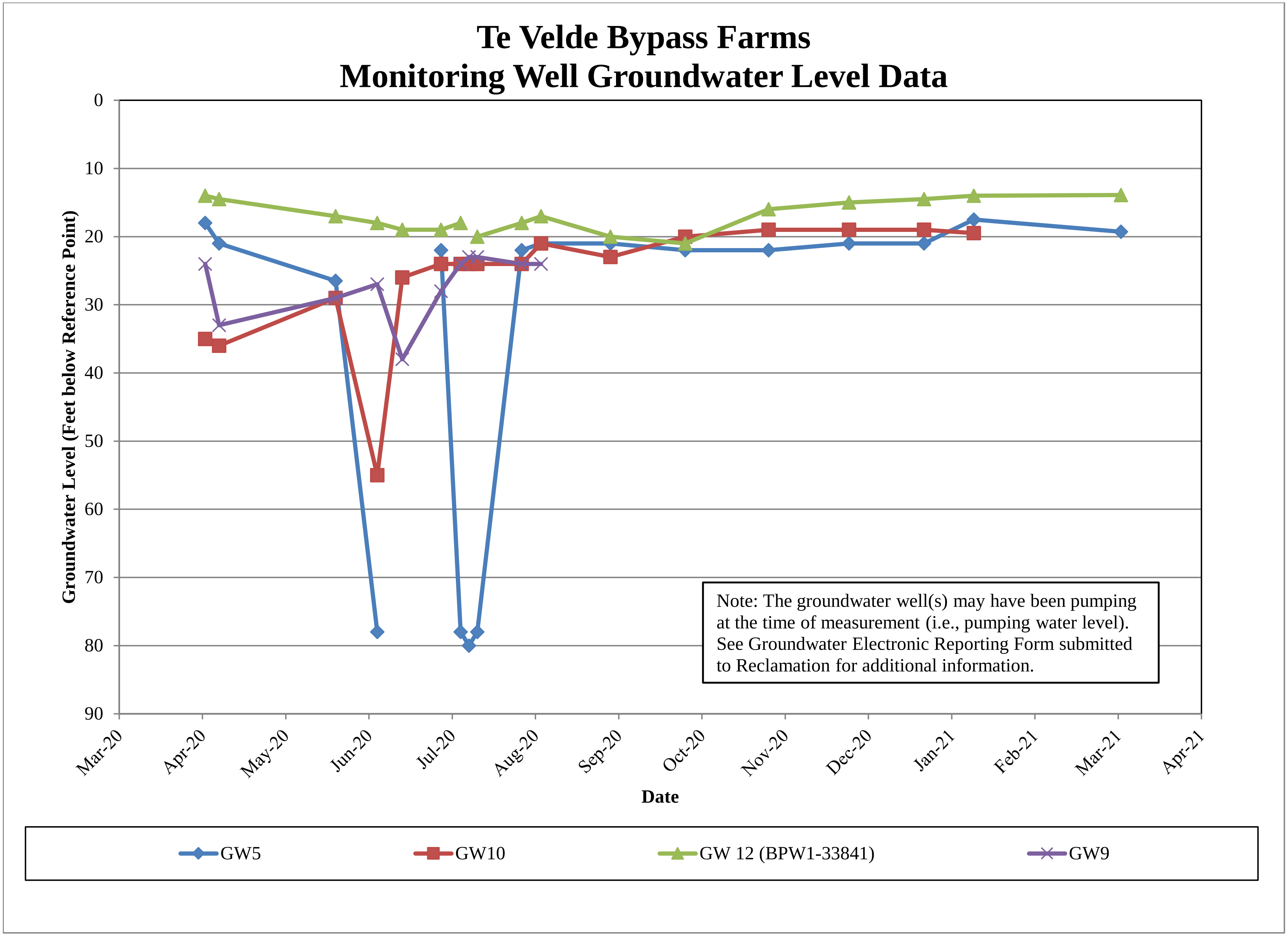
Sutter Mutual Water Company
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
5
10
15
20
25
30
35
40
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
12N02E23K001M
12N02E20P001M
14N02E32D001M
14N02E32D002M
14N02E32D003M
11N03E20H003M
12N01E01A001M



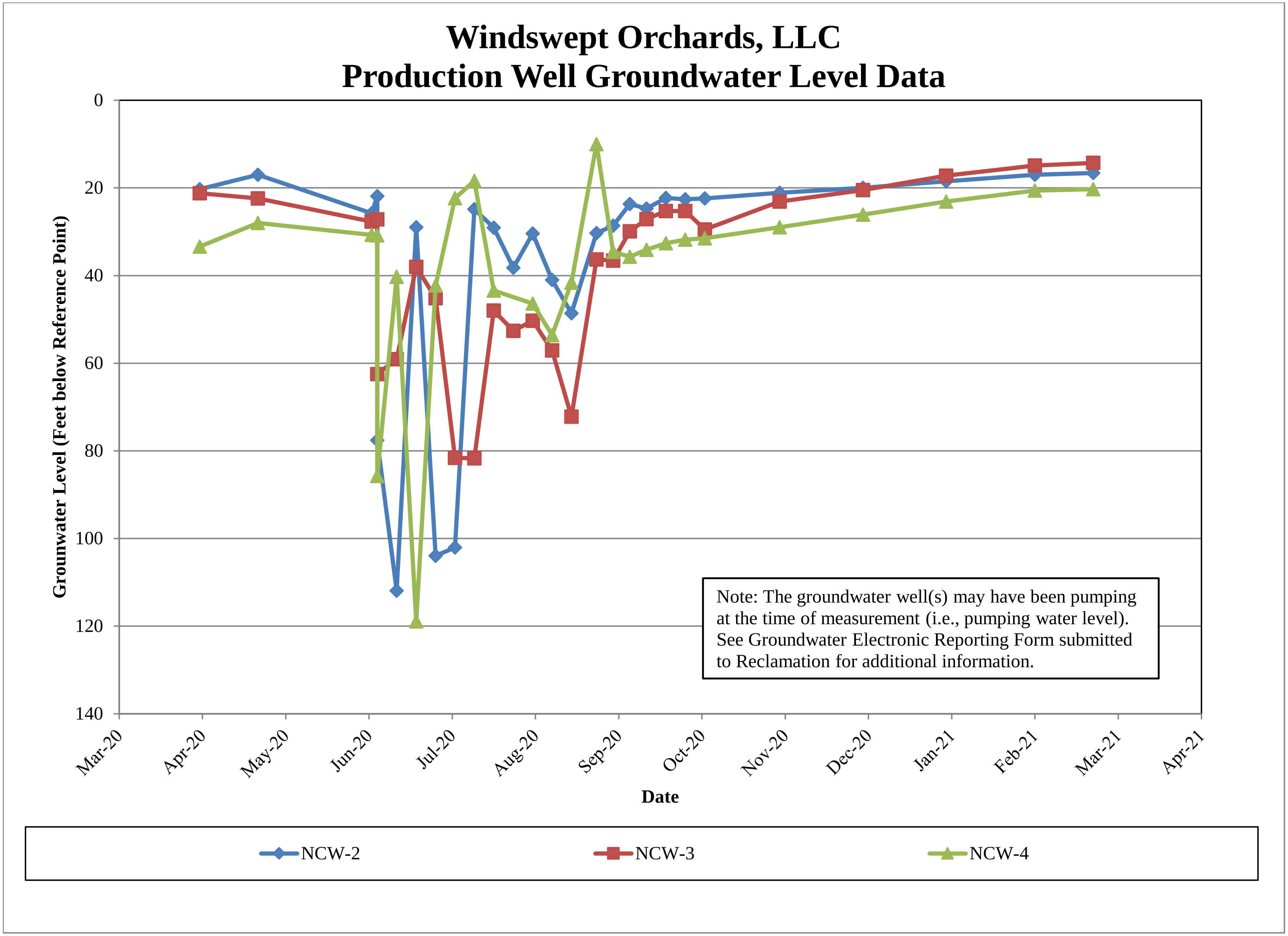
Sutter Mutual Water Company
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
2
4
6
8
10
12
14
16
18
Jan-20
Feb-20
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
13N02E23B002M
13N02E17A001M
12N02E23H001M
12N02E23H002M
12N02E23H003M
12N02E23H004M



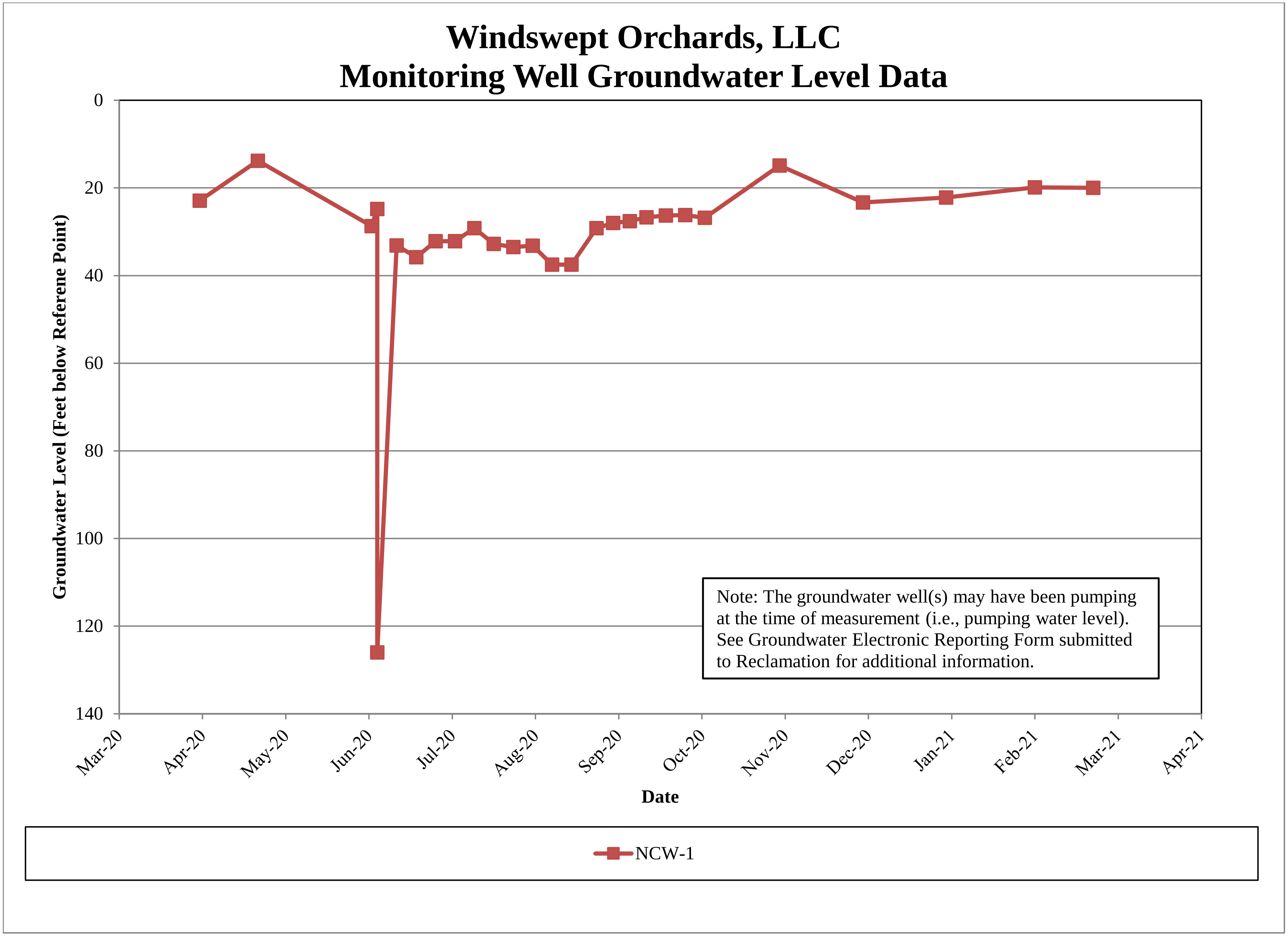
Te Velde Bypass Farms
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
GW1
GW4
GW11

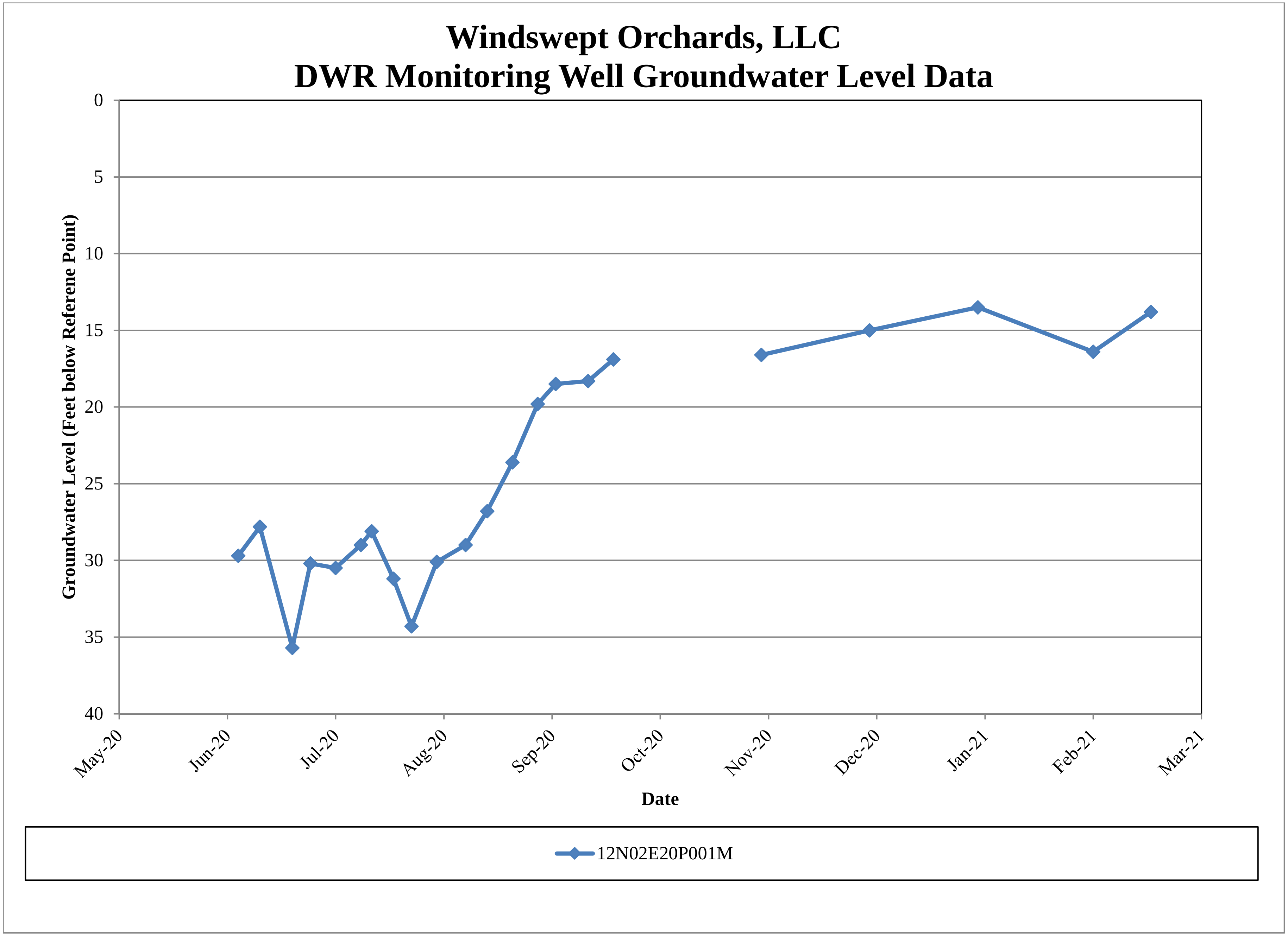


Te Velde Bypass Farms
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
GW5
GW10
GW 12 (BPW1-33841)
GW9



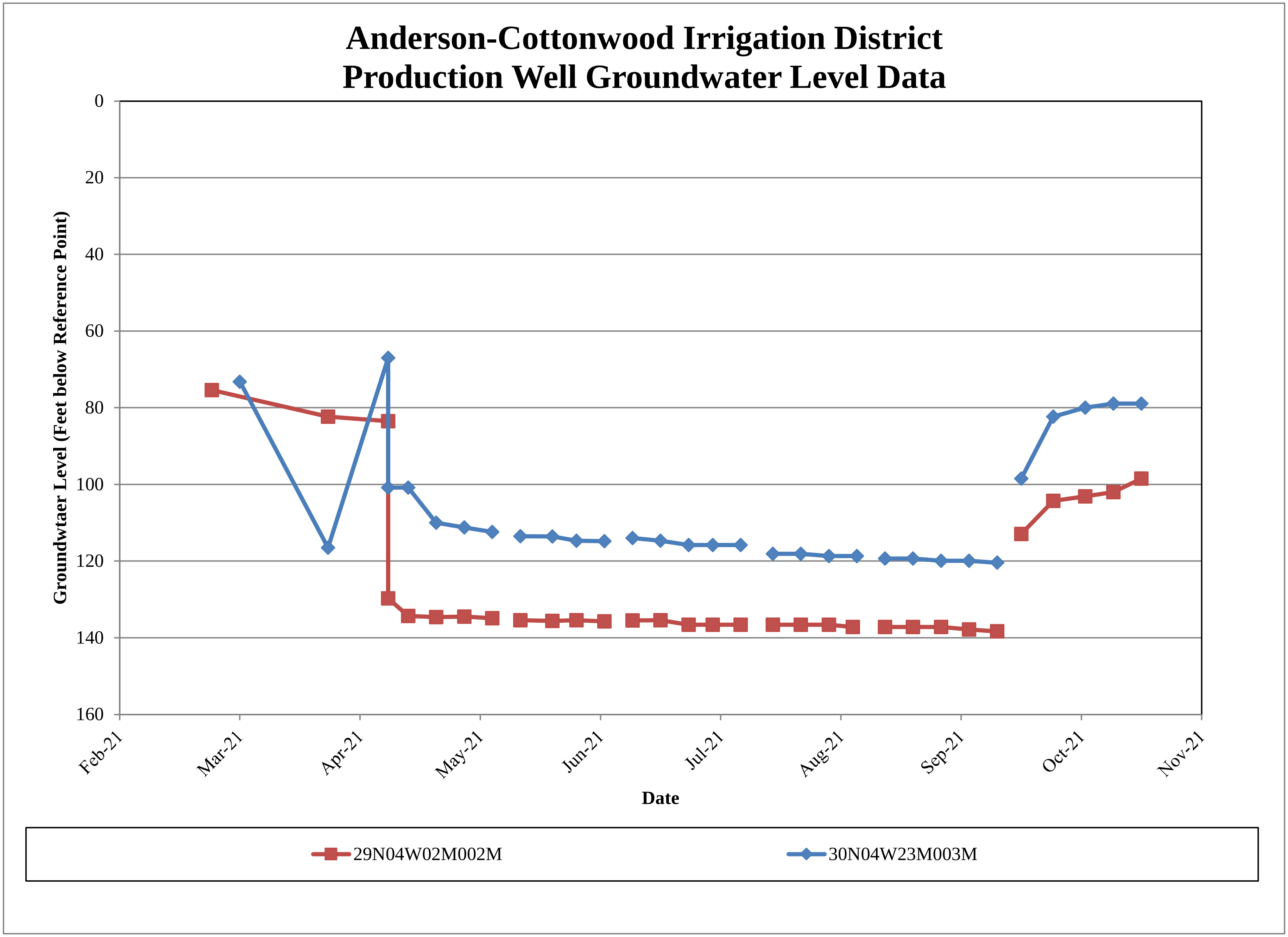
Windswept Orchards, LLC
Production Well Groundwater Level Data
Grounwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
NCW-2
NCW-3
NCW-4

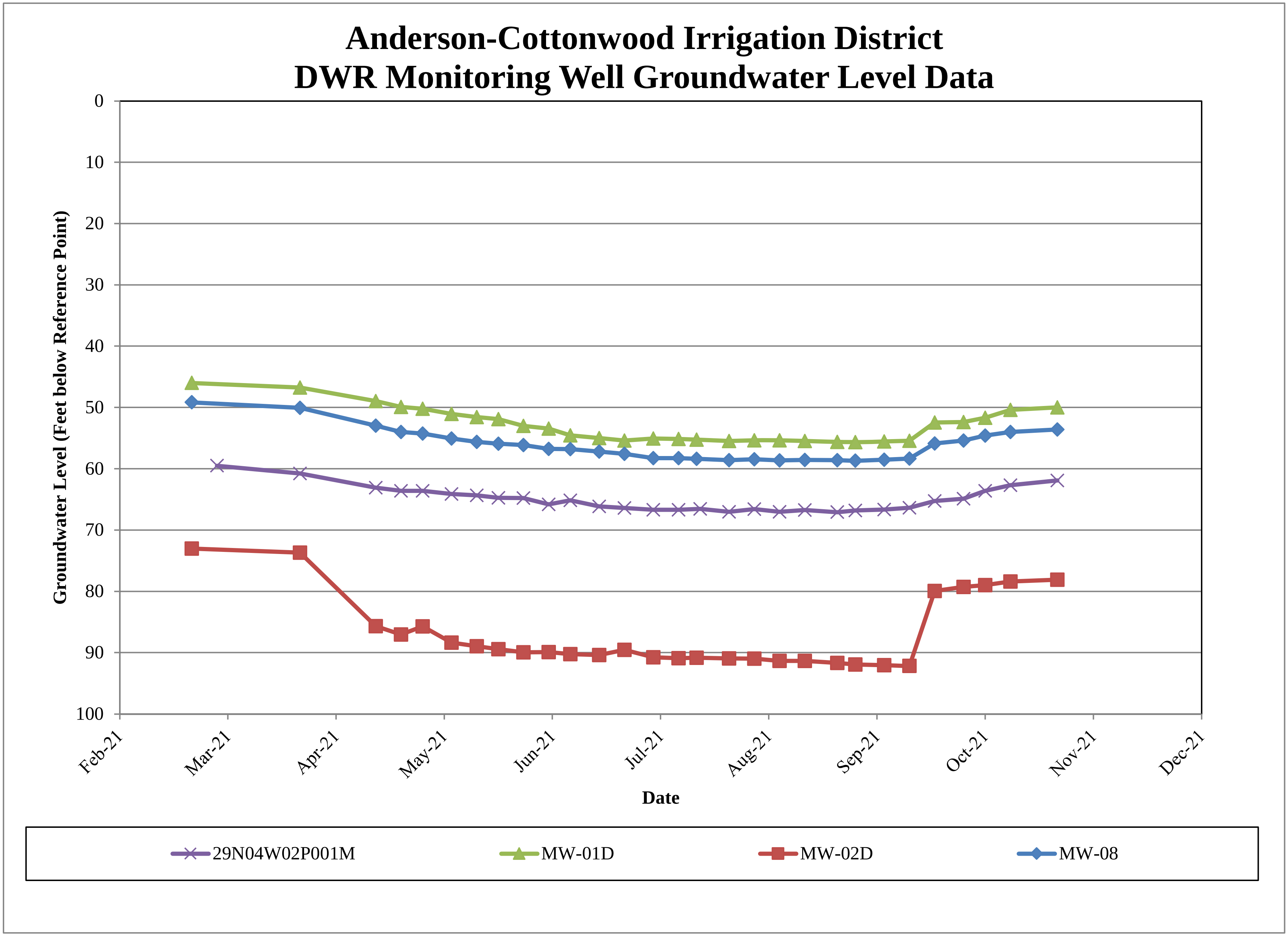

Windswept Orchards, LLC
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Referene Point)
0
20
40
60
80
100
120
140
Mar-20
Apr-20
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Apr-21
Date
Note: The groundwater well(s) may have been pumping at the time of measurement (i.e., pumping water level). See Groundwater Electronic Reporting Form submitted to Reclamation for additional information.
NCW-1



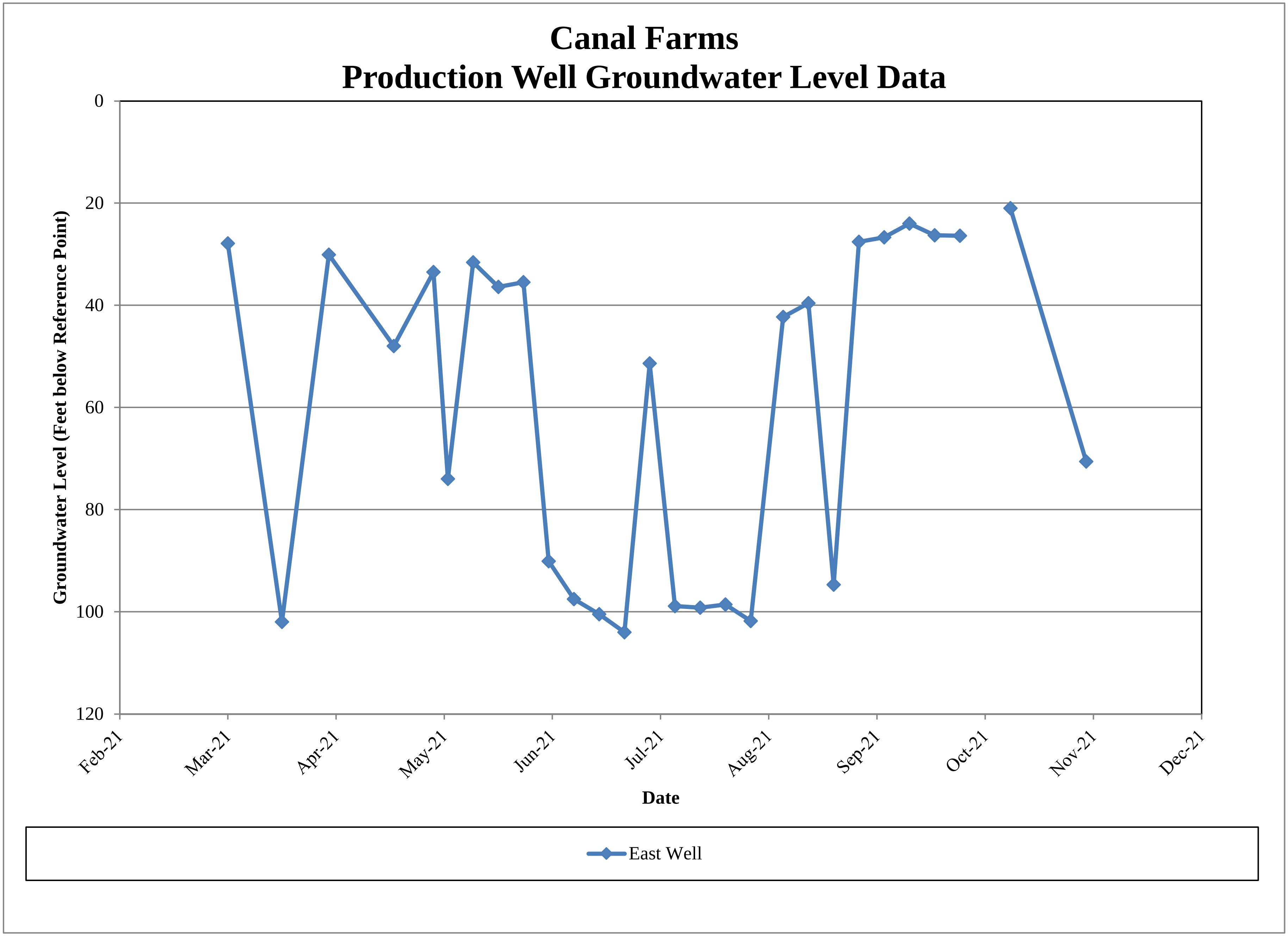
Windswept Orchards, LLC
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Referene Point)
0
5
10
15
20
25
30
35
40
May-20
Jun-20
Jul-20
Aug-20
Sep-20
Oct-20
Nov-20
Dec-20
Jan-21
Feb-21
Mar-21
Date
12N02E20P001M

Appendix F2
2021 Water Transfers Data Reports

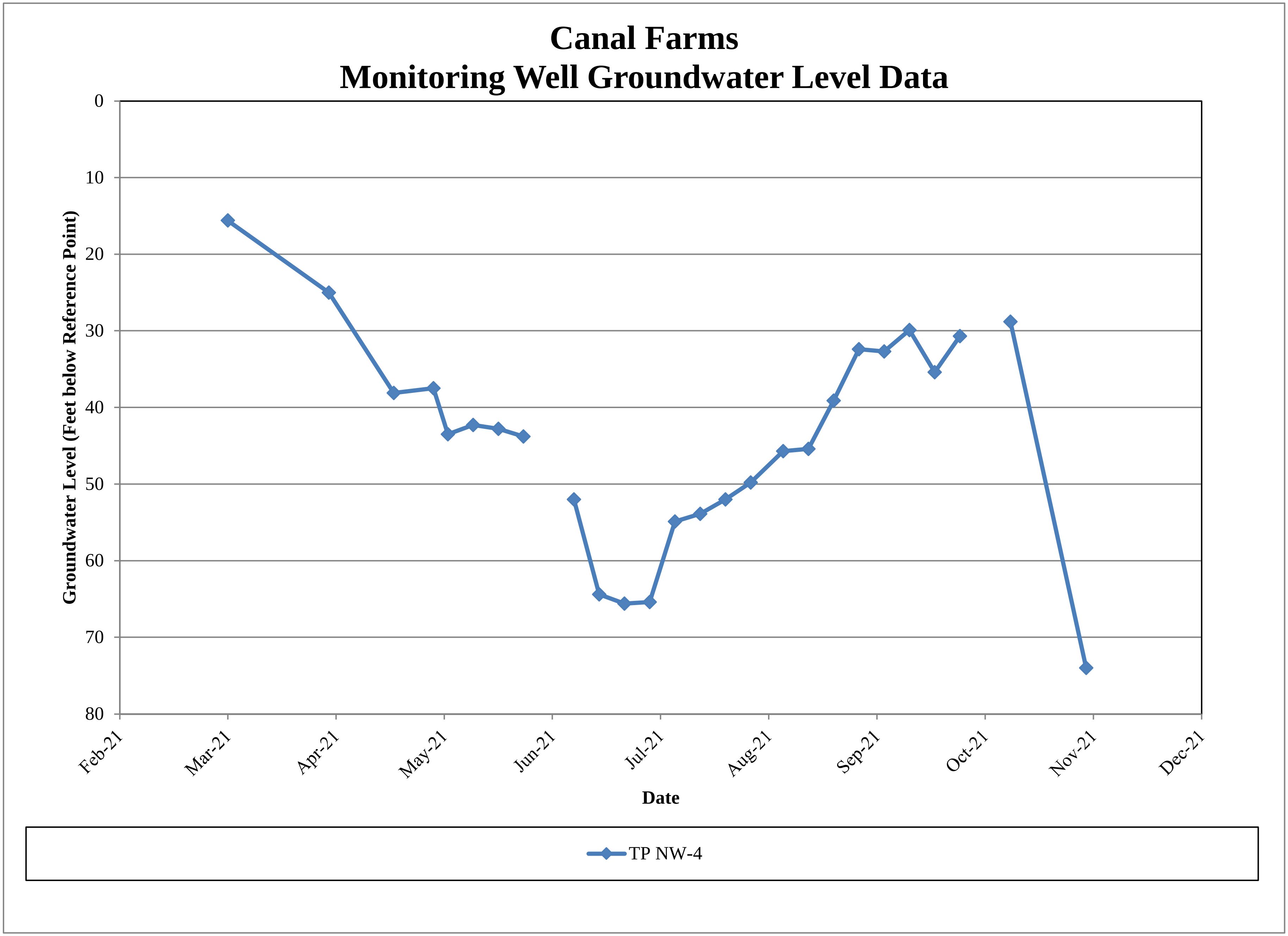

Anderson-Cottonwood Irrigation District
Production Well Groundwater Level Data
Groundwtaer Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Date
29N04W02M002M
30N04W23M003M

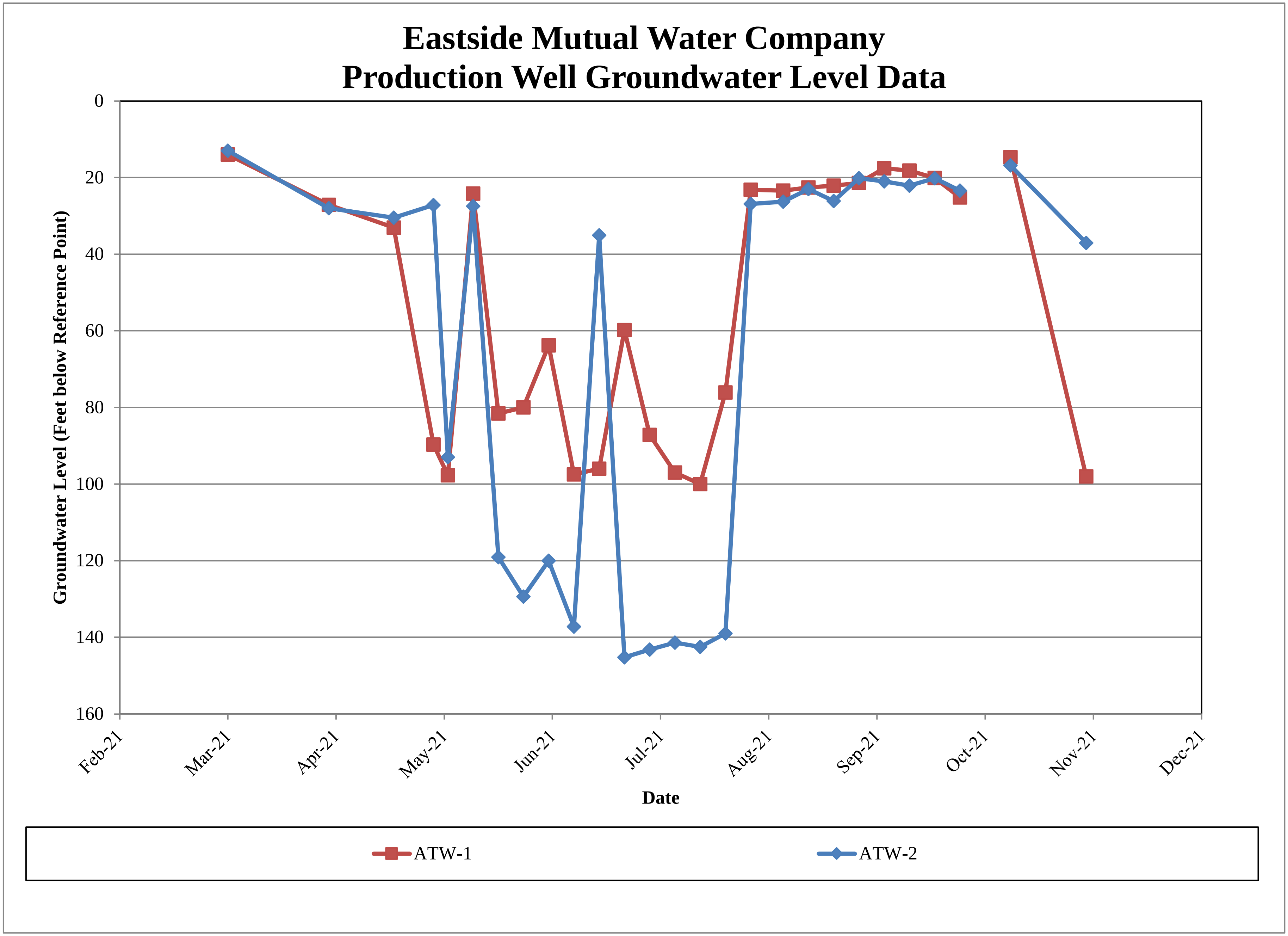


Anderson-Cottonwood Irrigation District
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
100
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
29N04W02P001M
MW-01D
MW-02D
MW-08

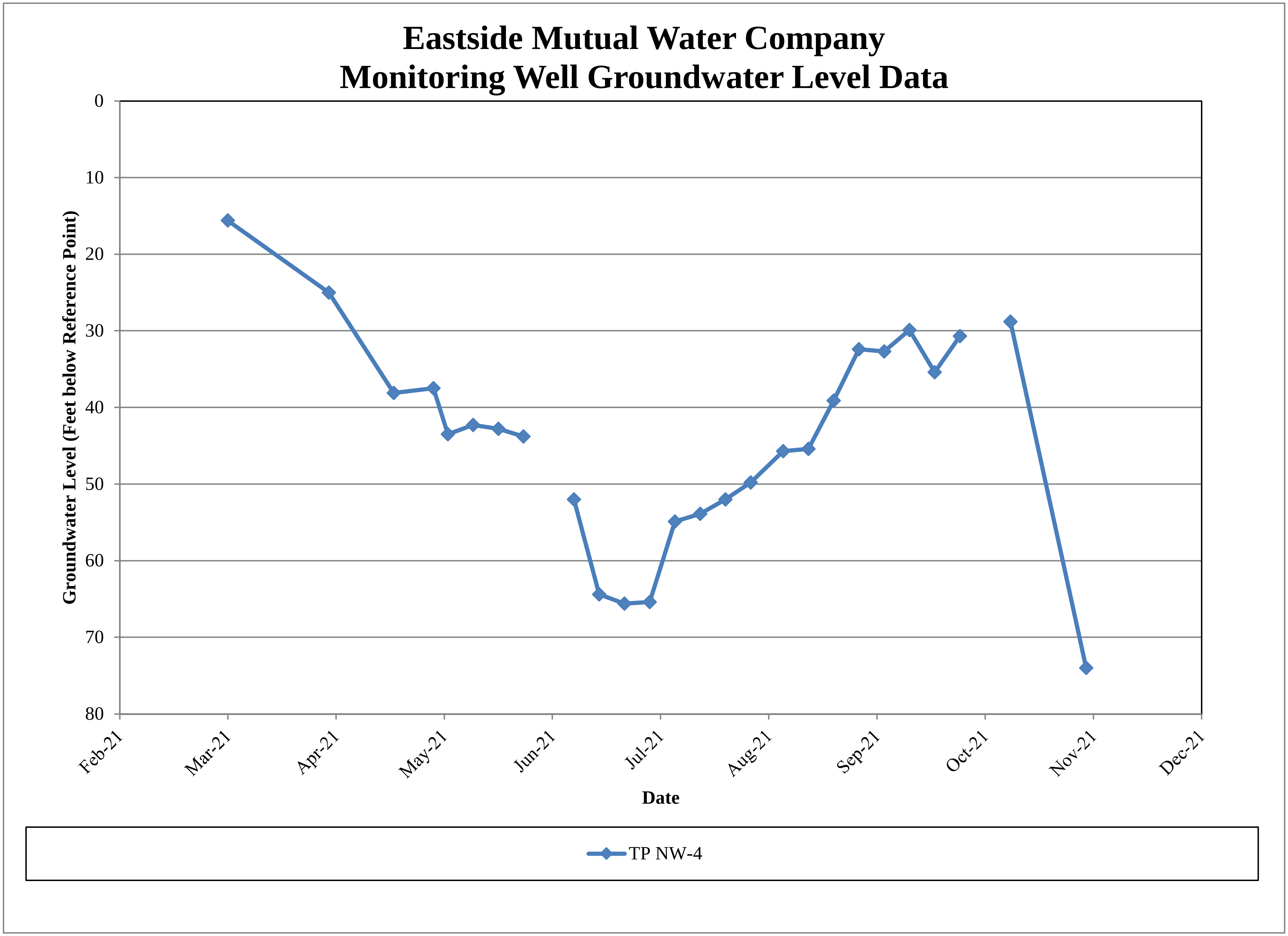


Canal Farms
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
East Well


Canal Farms
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
TP NW-4



Eastside Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
ATW-1
ATW-2


Eastside Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
Feb-21
Mar-21
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May-21
Jun-21
Jul-21
Aug-21
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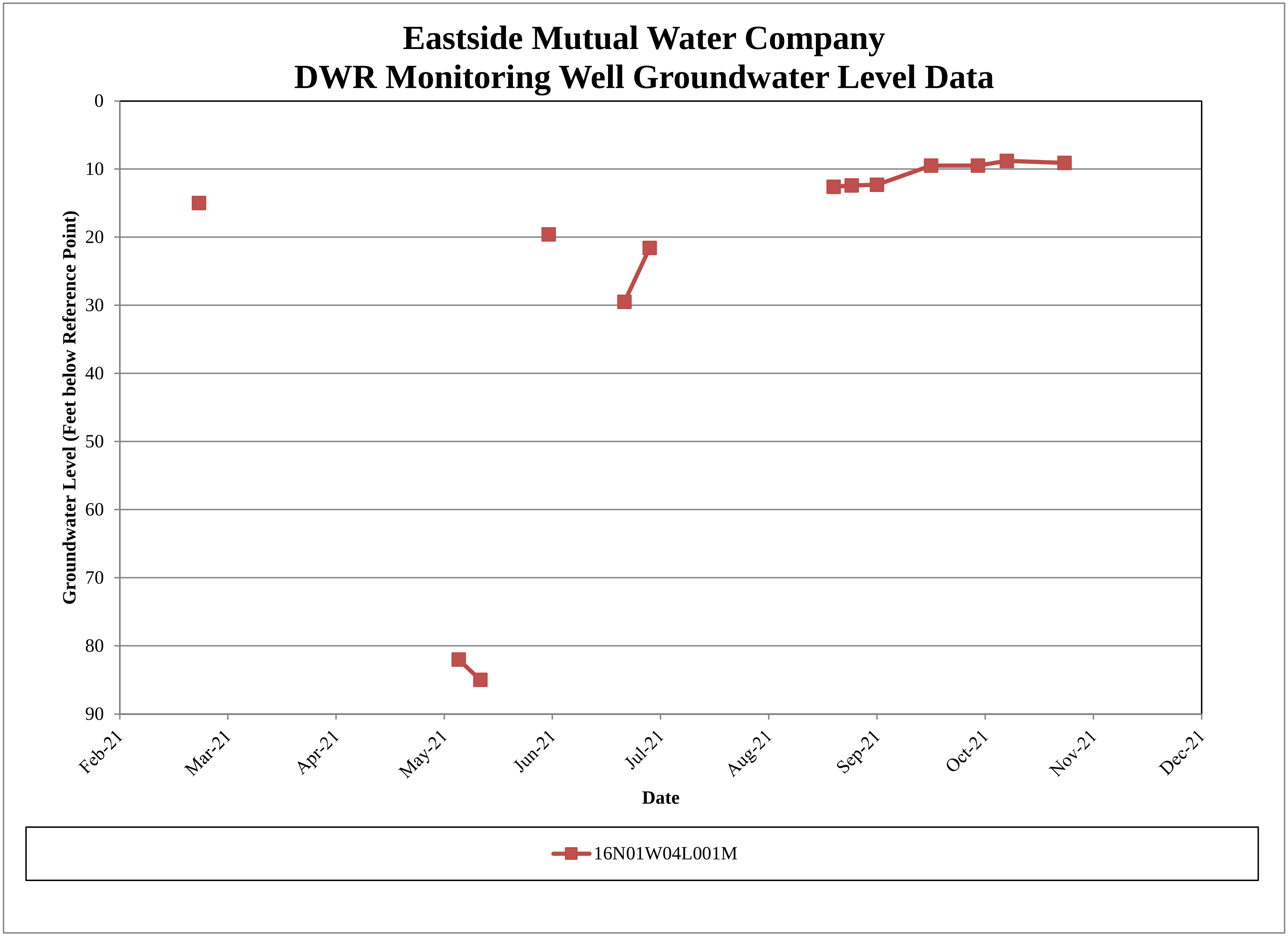
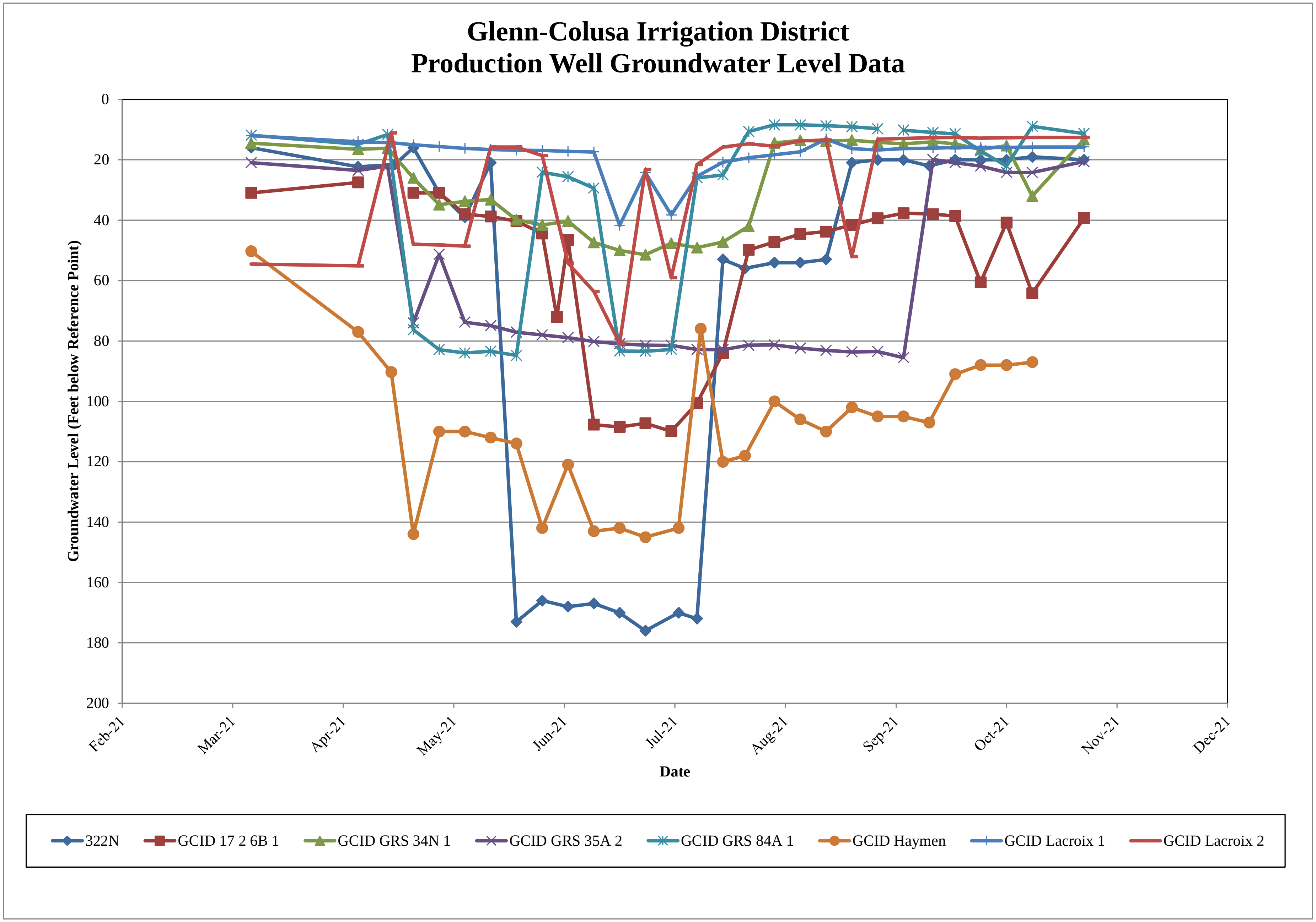
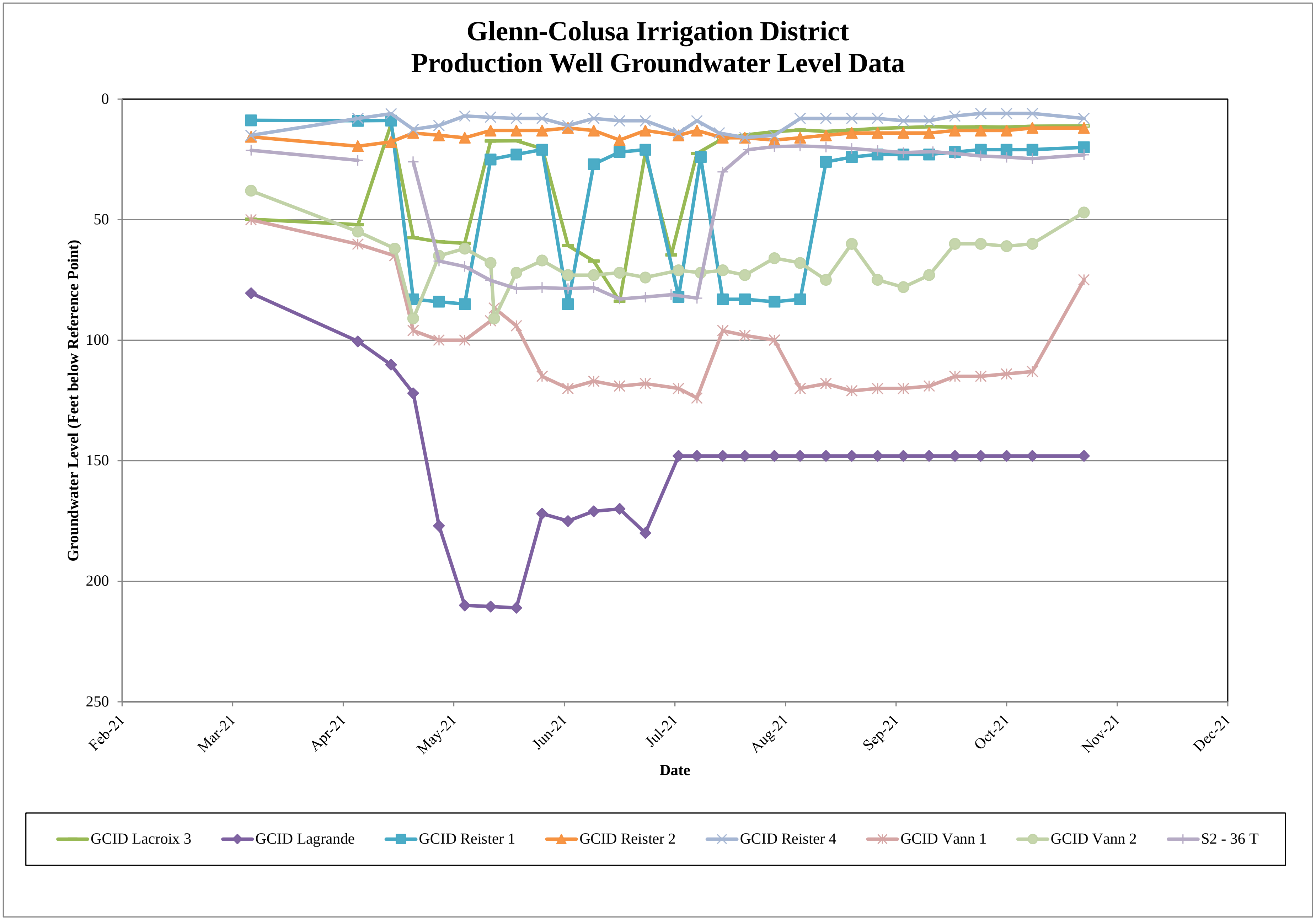
Oct-21
Nov-21
Dec-21
Date
TP NW-4



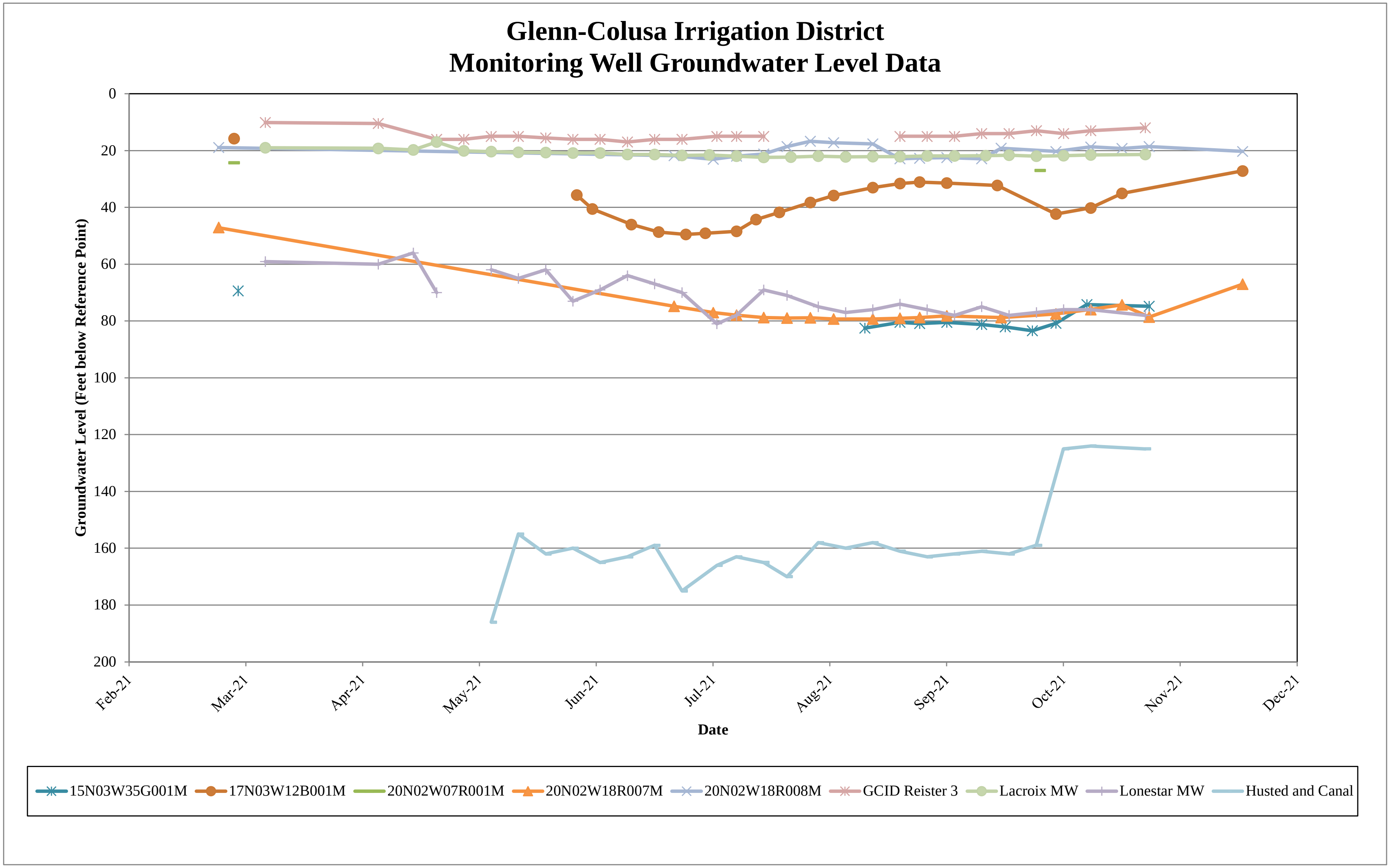
Eastside Mutual Water Company
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
16N01W04L001M



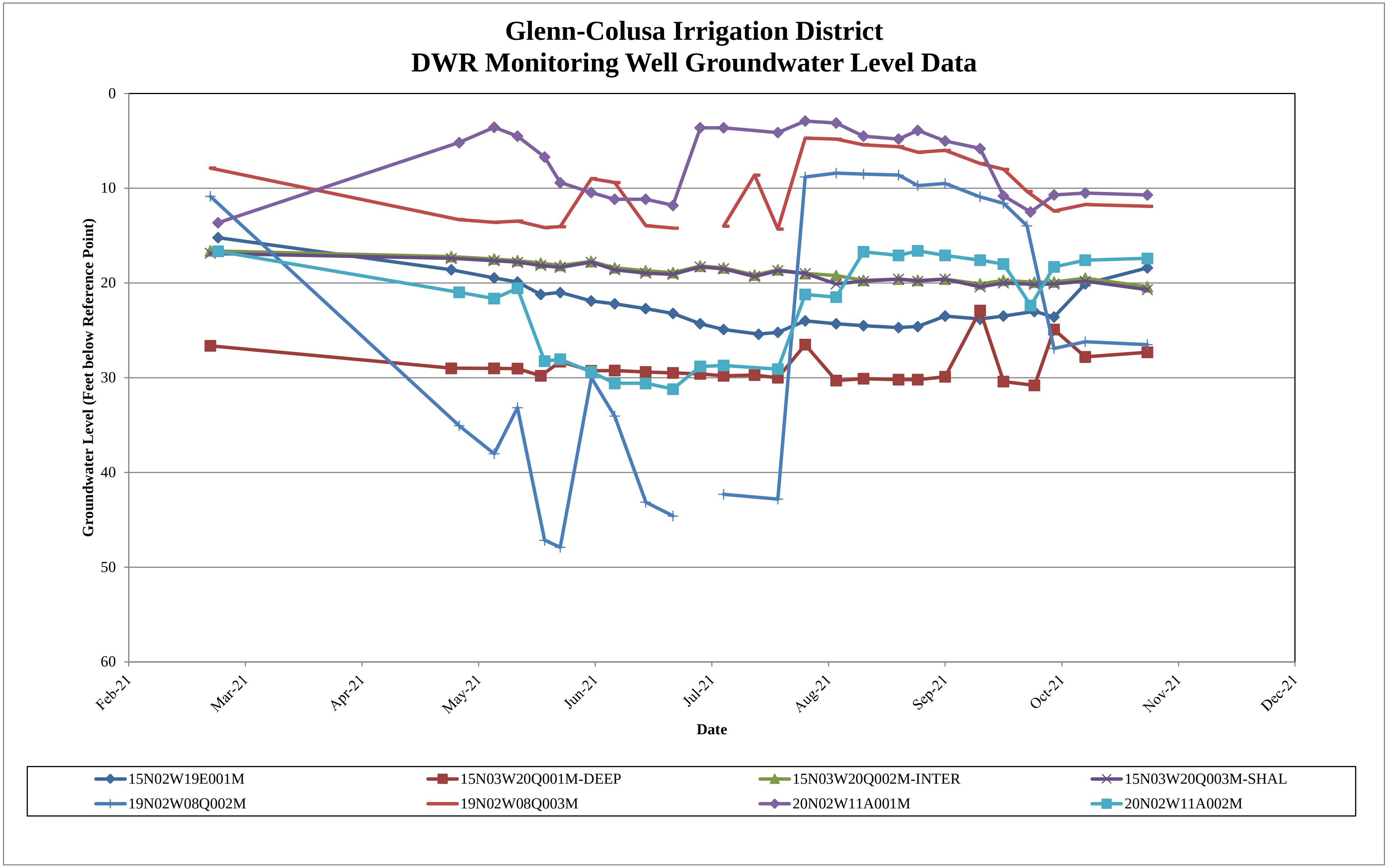
Glenn-Colusa Irrigation District
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
180
200
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
322N
GCID 17 2 6B 1
GCID GRS 34N 1
GCID GRS 35A 2
GCID GRS 84A 1
GCID Haymen
GCID Lacroix 1
GCID Lacroix 2



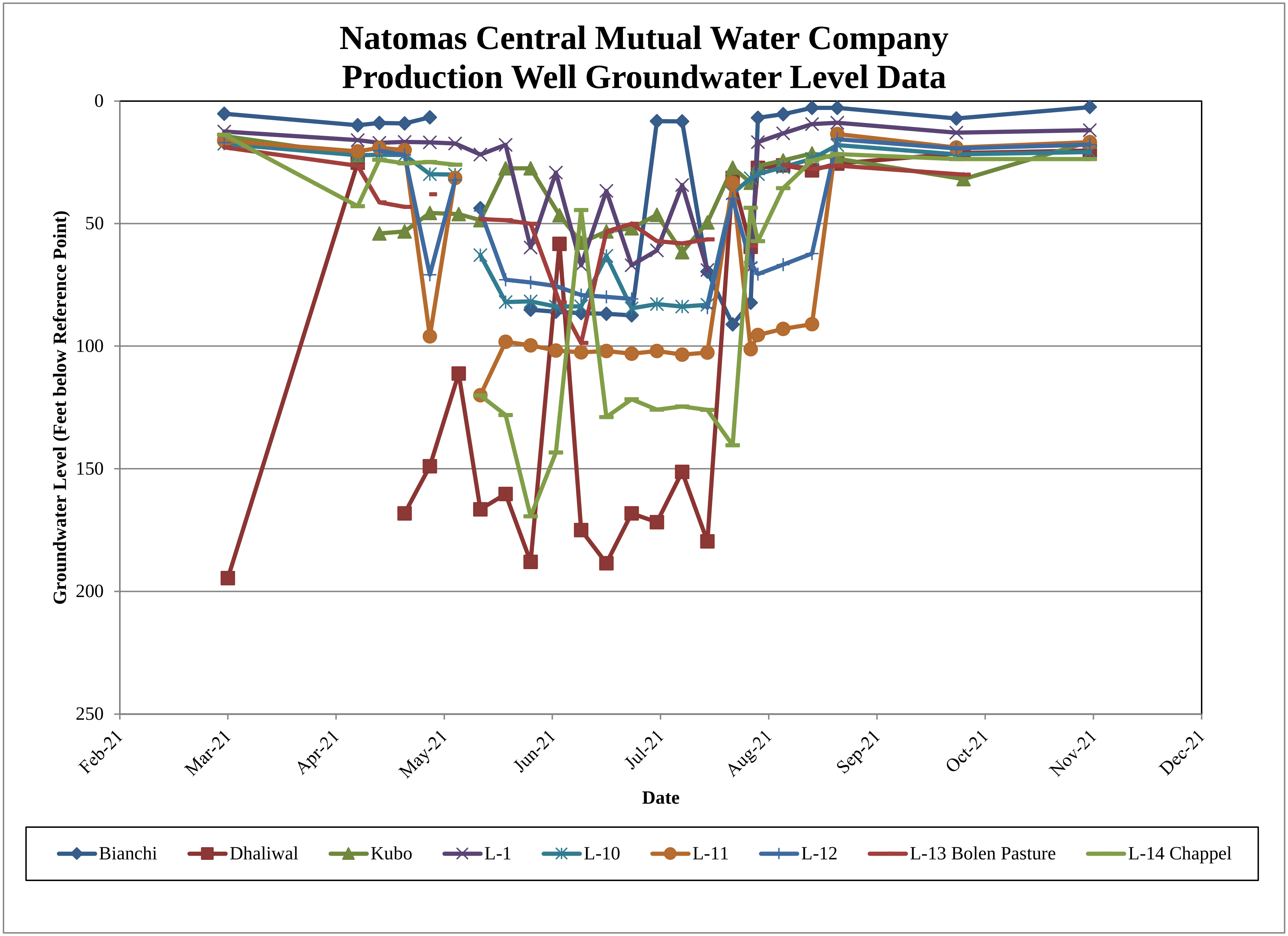
Glenn-Colusa Irrigation District
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
50
100
150
200
250
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
GCID Lacroix 3
GCID Lagrande
GCID Reister 1
GCID Reister 2
GCID Reister 4
GCID Vann 1
GCID Vann 2
S2 - 36 T



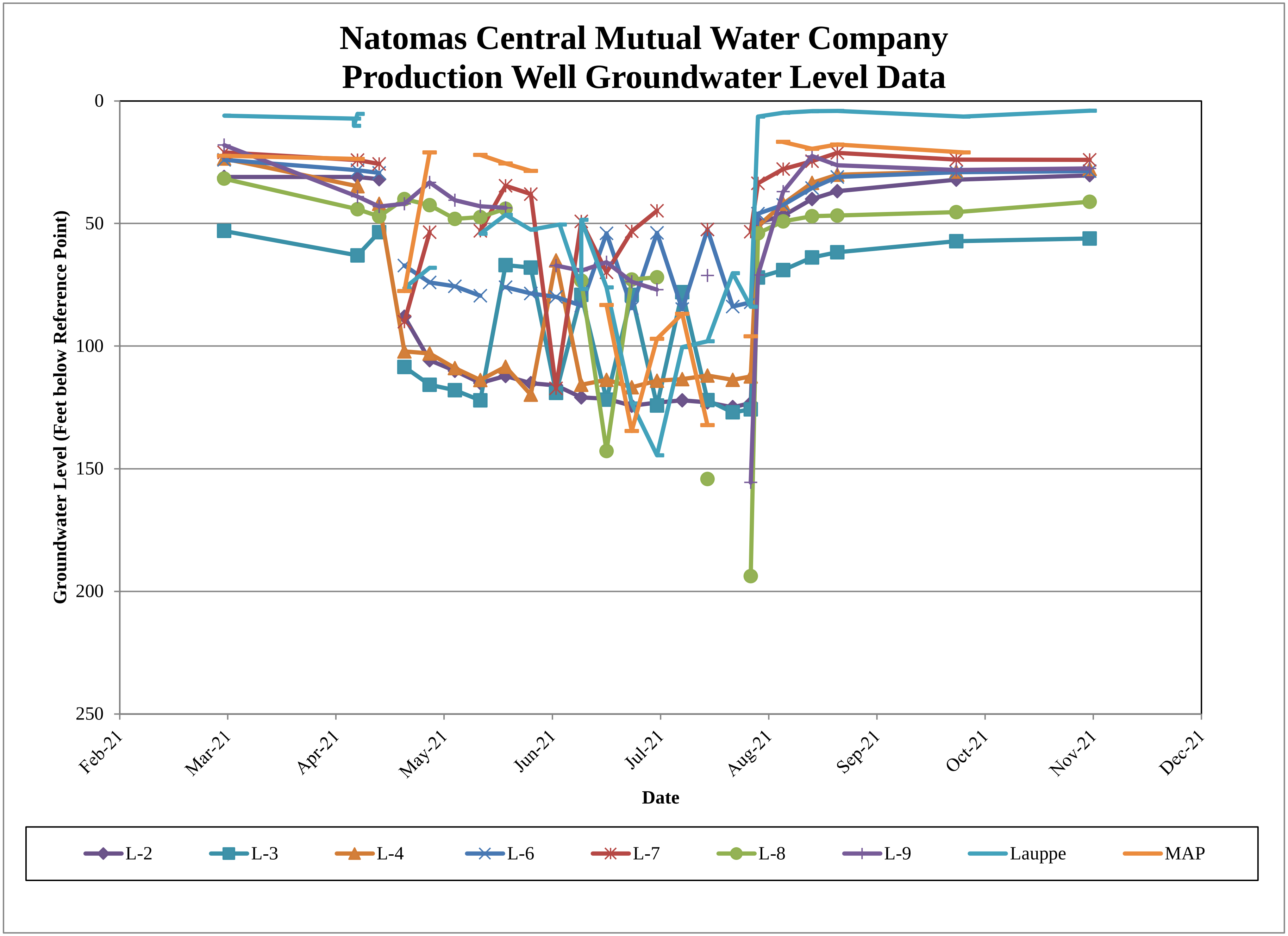
Glenn-Colusa Irrigation District
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
180
200
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
15N03W35G001M
17N03W12B001M
20N02W07R001M
20N02W18R007M
20N02W18R008M
GCID Reister 3
Lacroix MW
Lonestar MW
Husted and Canal



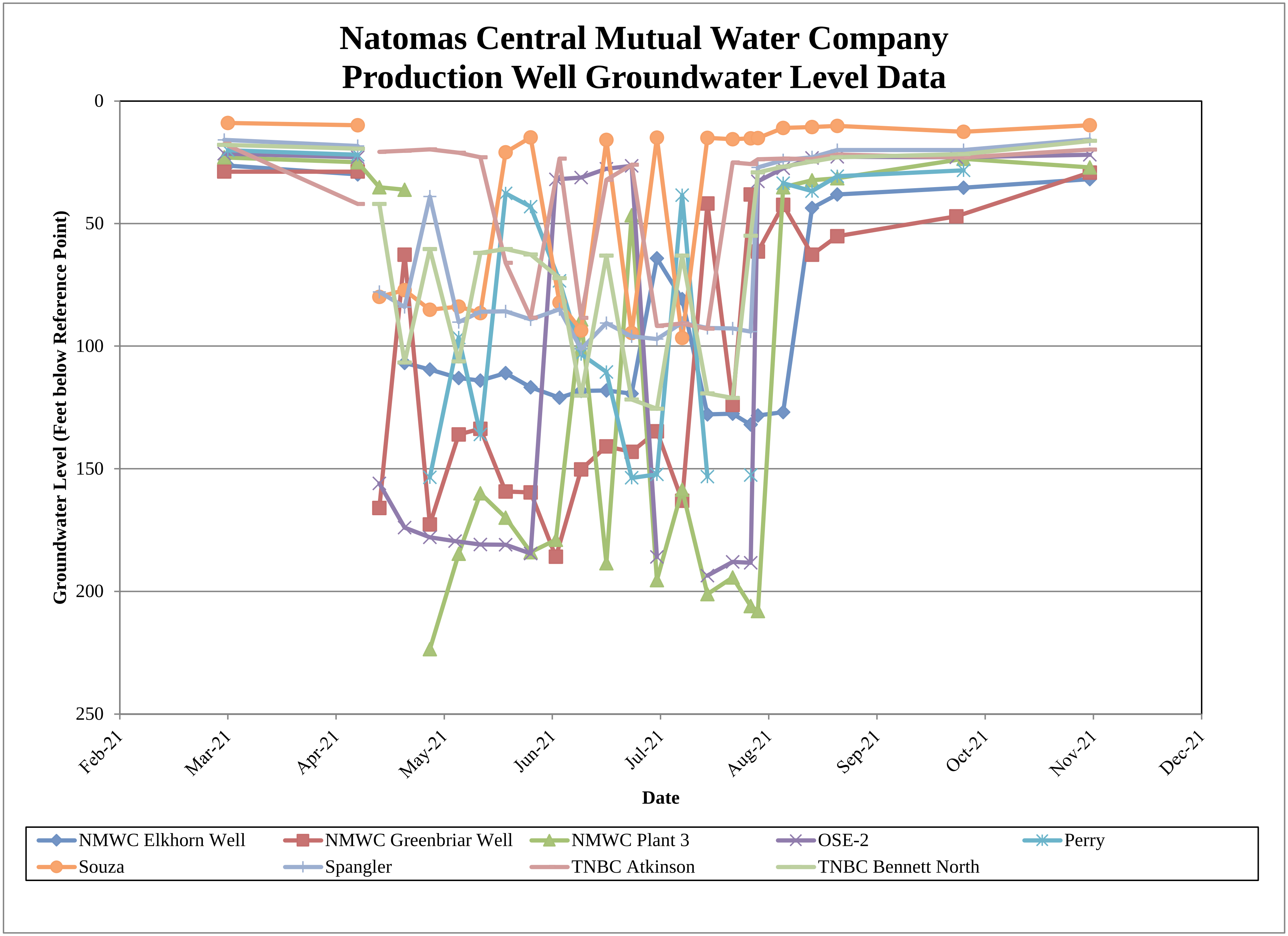
Glenn-Colusa Irrigation District
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
15N02W19E001M
15N03W20Q001M-DEEP
15N03W20Q002M-INTER
15N03W20Q003M-SHAL
19N02W08Q002M
19N02W08Q003M
20N02W11A001M
20N02W11A002M

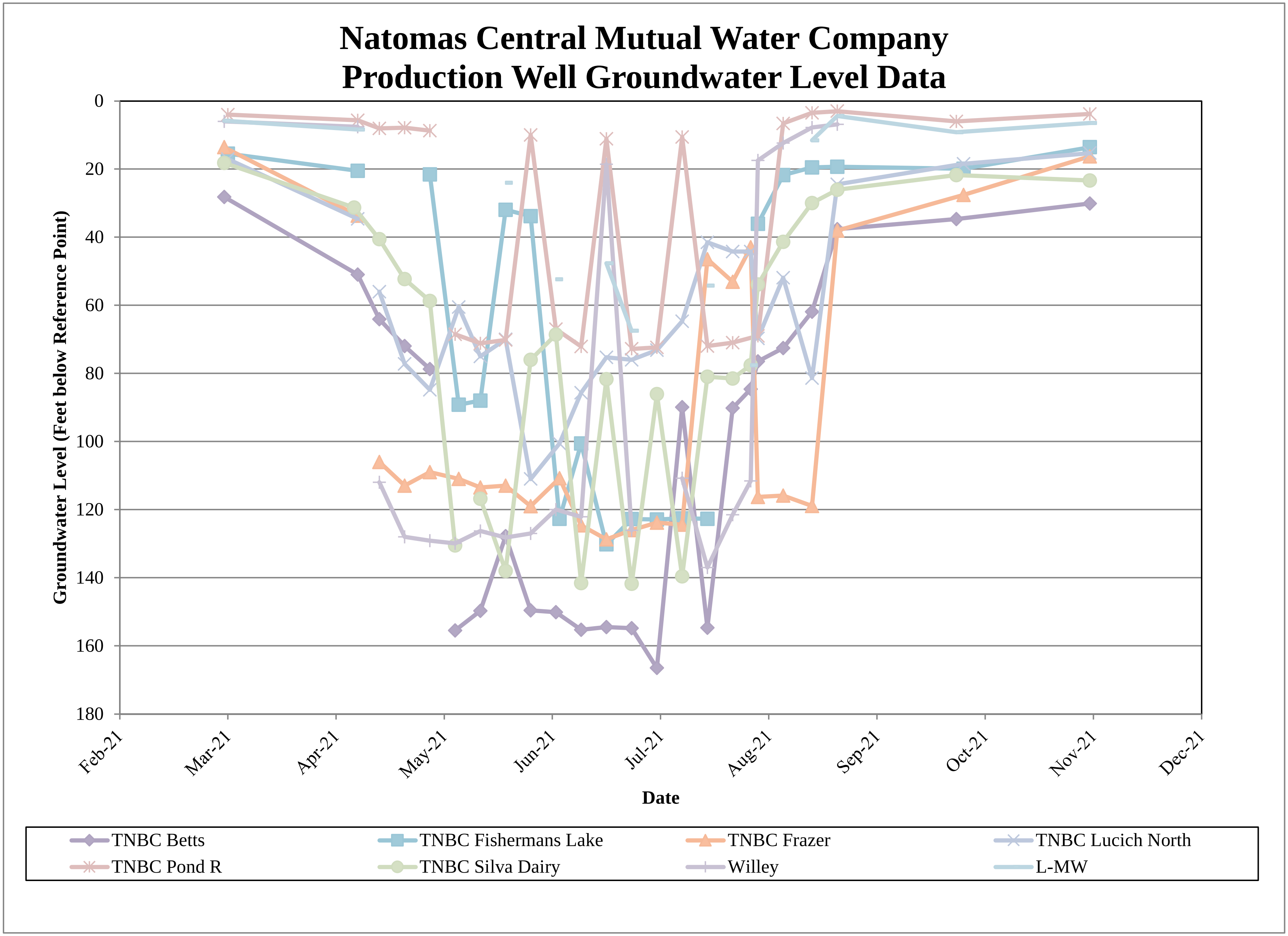


Natomas Central Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
50
100
150
200
250
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
Bianchi
Dhaliwal
Kubo
L-1
L-10
L-11
L-12
L-13 Bolen Pasture
L-14 Chappel

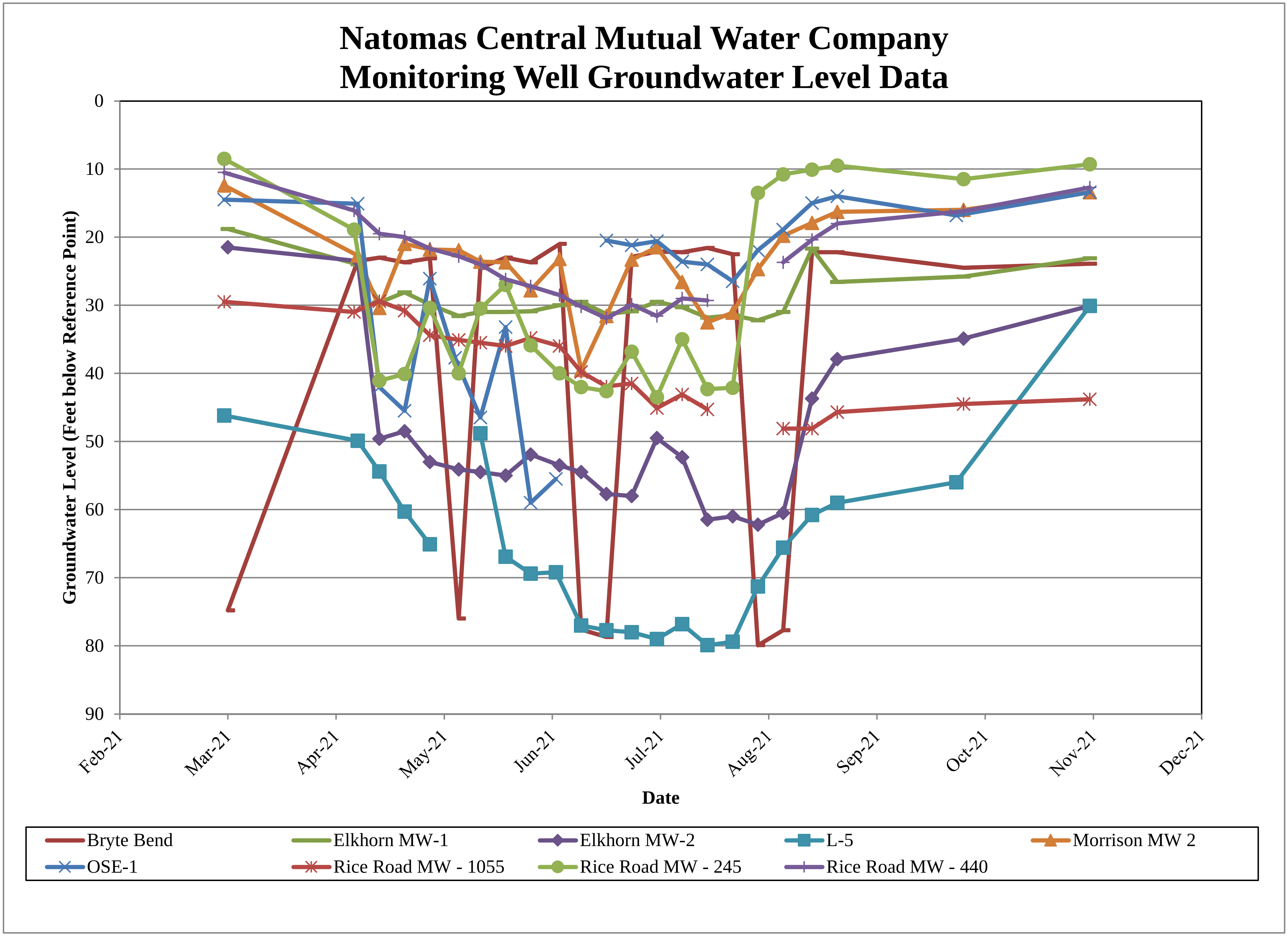


Natomas Central Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
50
100
150
200
250
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
L-2
L-3
L-4
L-6
L-7
L-8
L-9
Lauppe
MAP

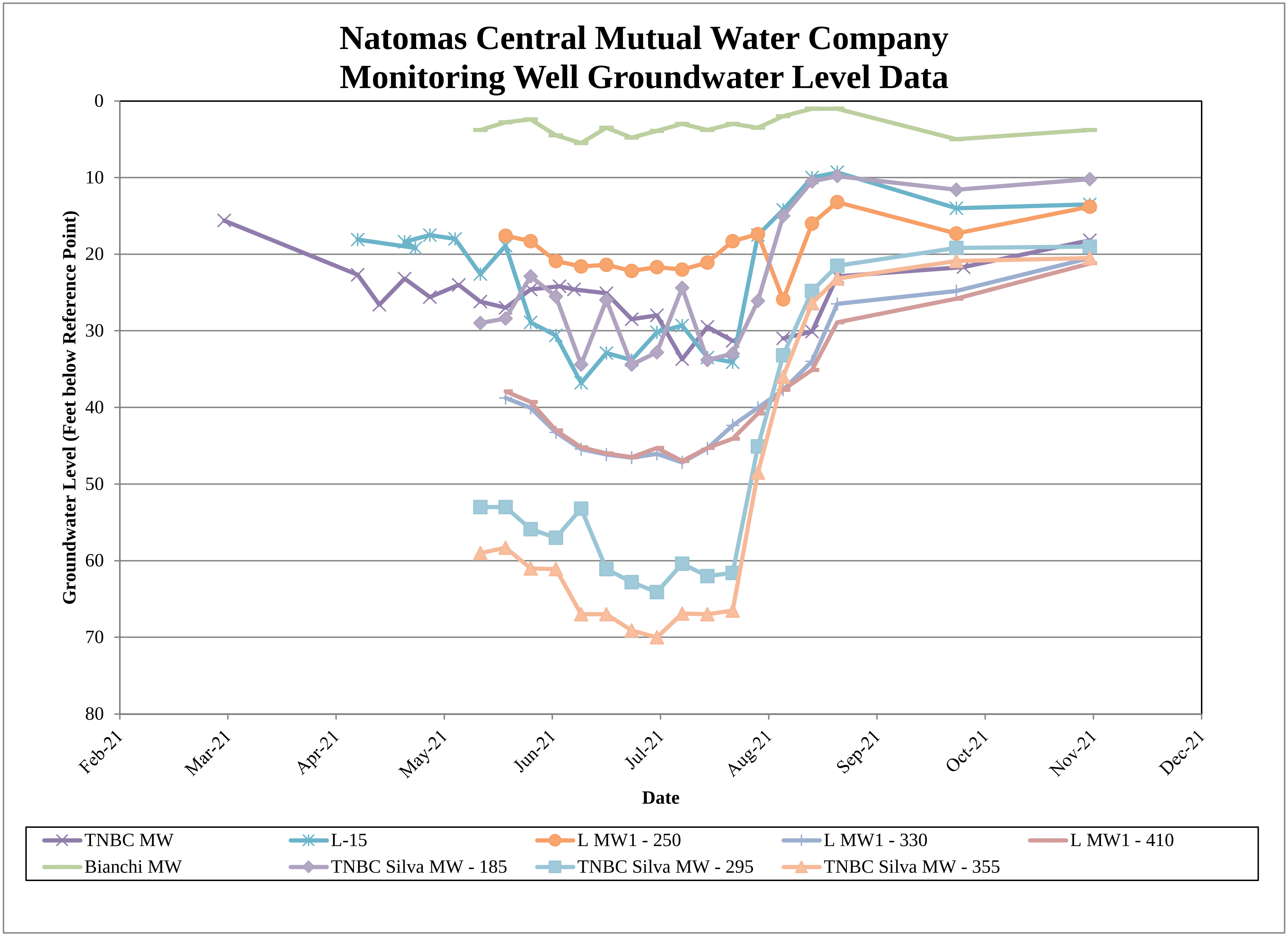

Natomas Central Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
50
100
150
200
250
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
NMWC Elkhorn Well
NMWC Greenbriar Well
NMWC Plant 3
OSE-2
Perry
Souza
Spangler
TNBC Atkinson
TNBC Bennett North



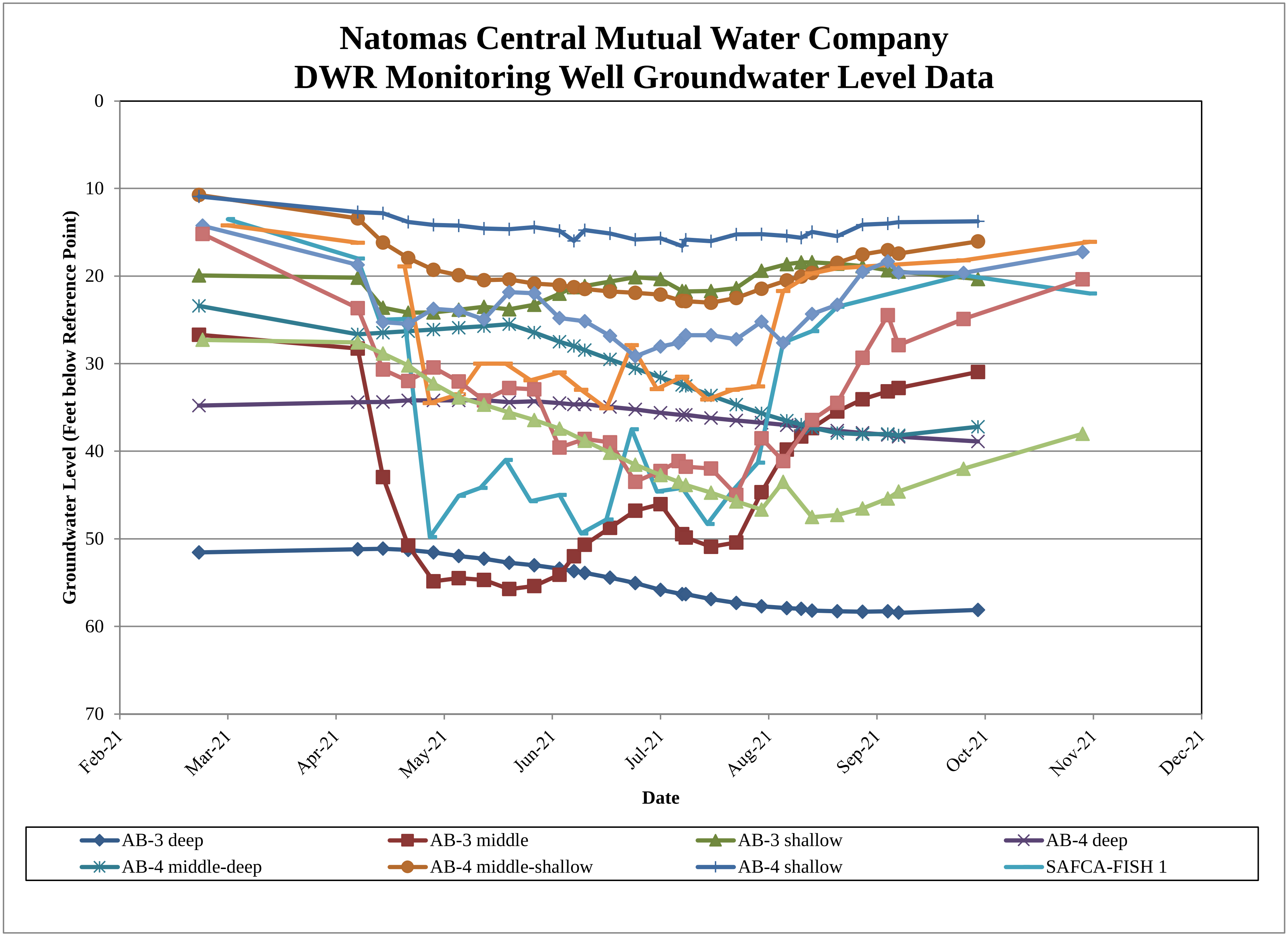
Natomas Central Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
180
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
TNBC Betts
TNBC Fishermans Lake
TNBC Frazer
TNBC Lucich North
TNBC Pond R
TNBC Silva Dairy
Willey
L-MW



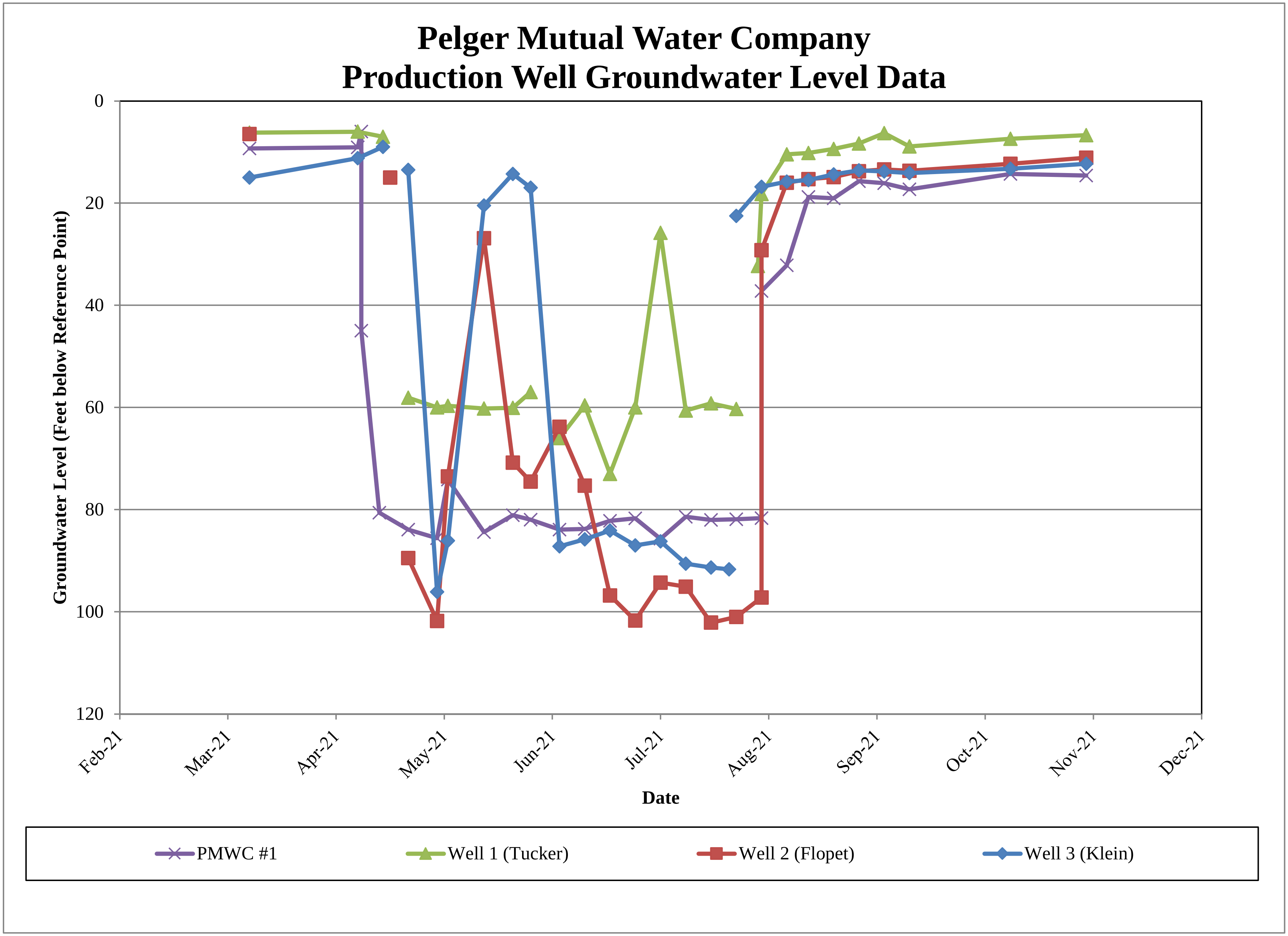
Natomas Central Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
Bryte Bend
Elkhorn MW-1
Elkhorn MW-2
L-5
Morrison MW 2
OSE-1
Rice Road MW - 1055
Rice Road MW - 245
Rice Road MW - 440



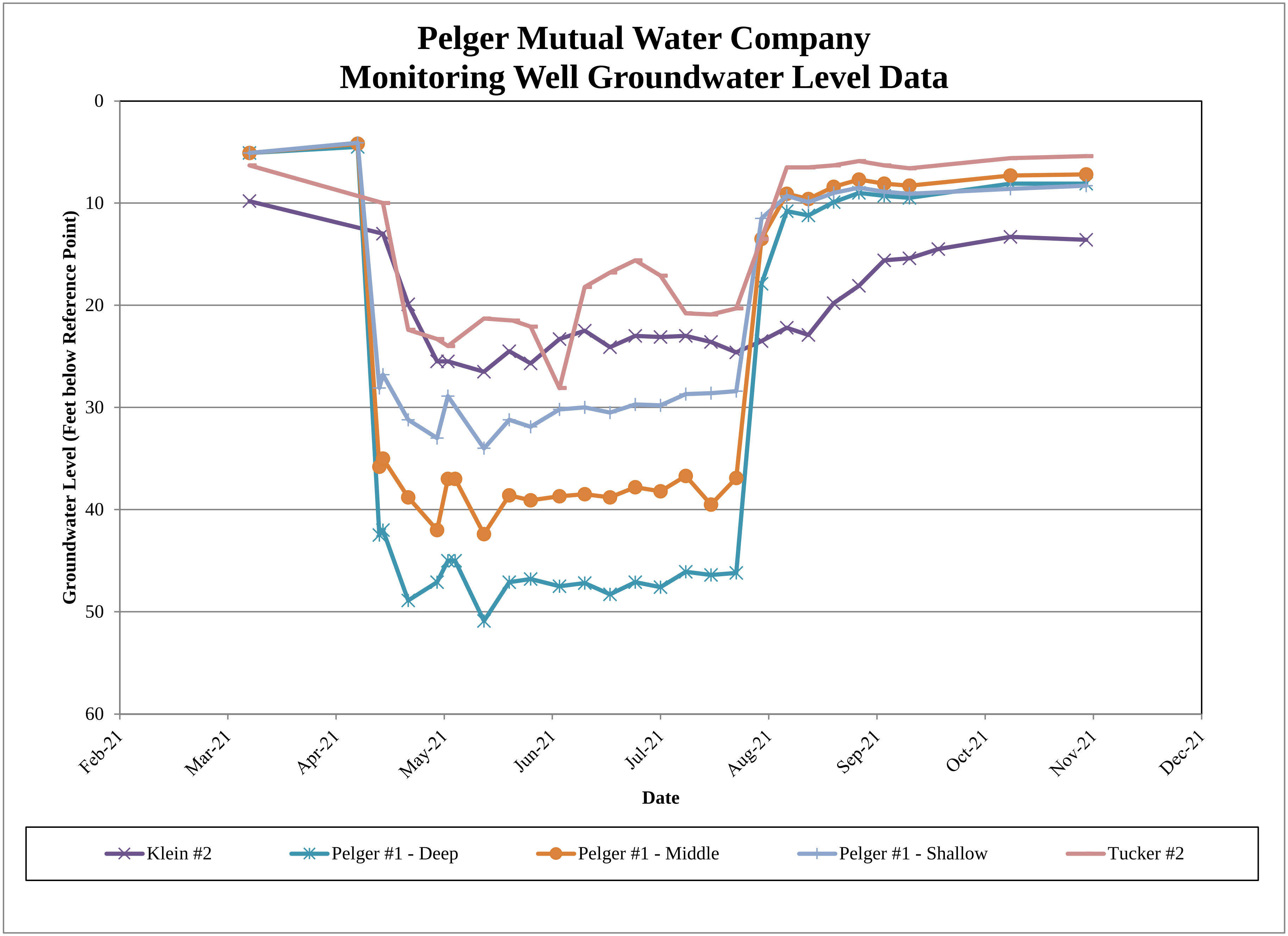
Natomas Central Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
TNBC MW
L-15
L MW1 - 250
L MW1 - 330
L MW1 - 410
Bianchi MW
TNBC Silva MW - 185
TNBC Silva MW - 295
TNBC Silva MW - 355

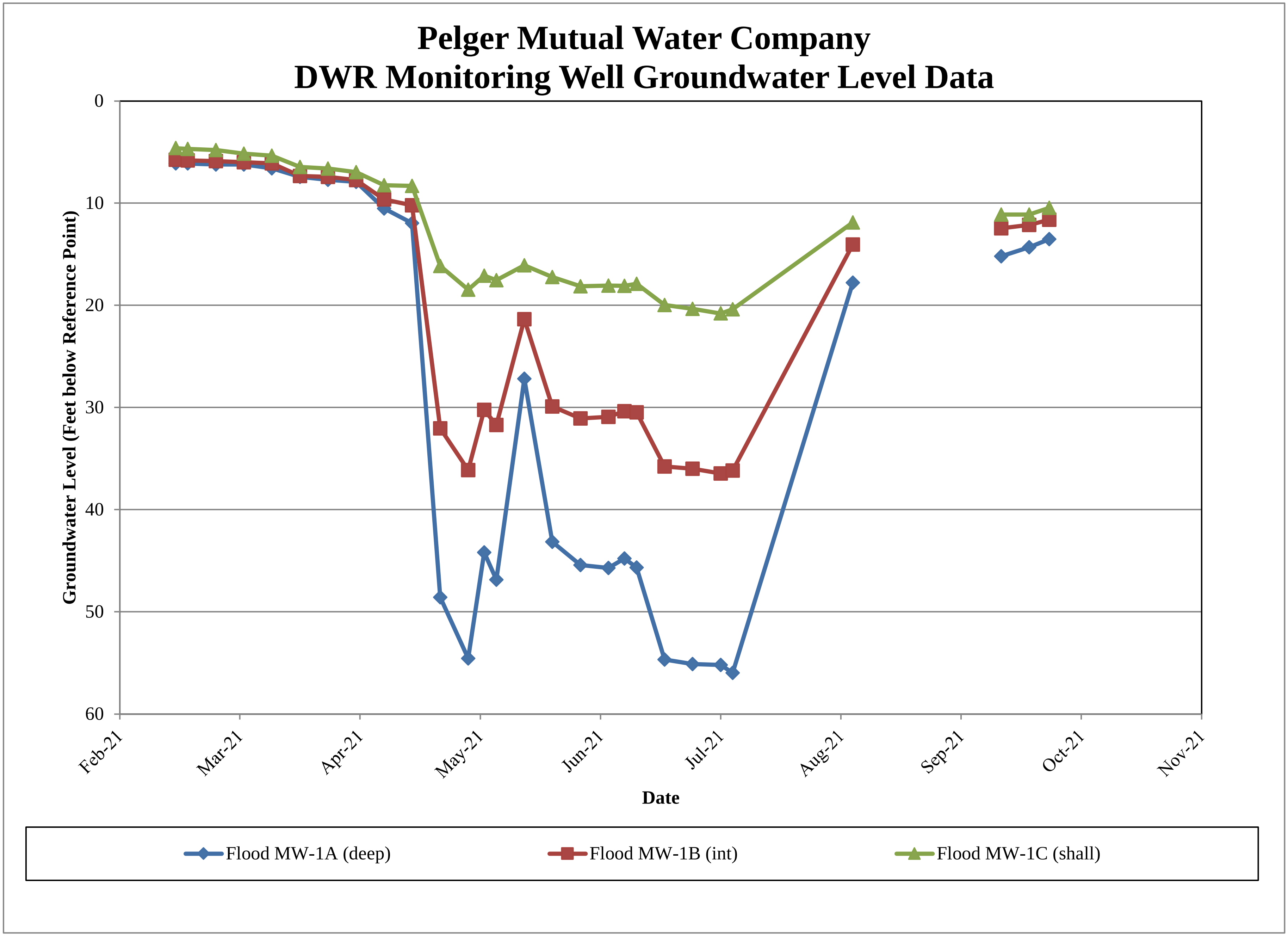


Natomas Central Mutual Water Company
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
AB-3 deep
AB-3 middle
AB-3 shallow
AB-4 deep
AB-4 middle-deep
AB-4 middle-shallow
AB-4 shallow
SAFCA-FISH 1

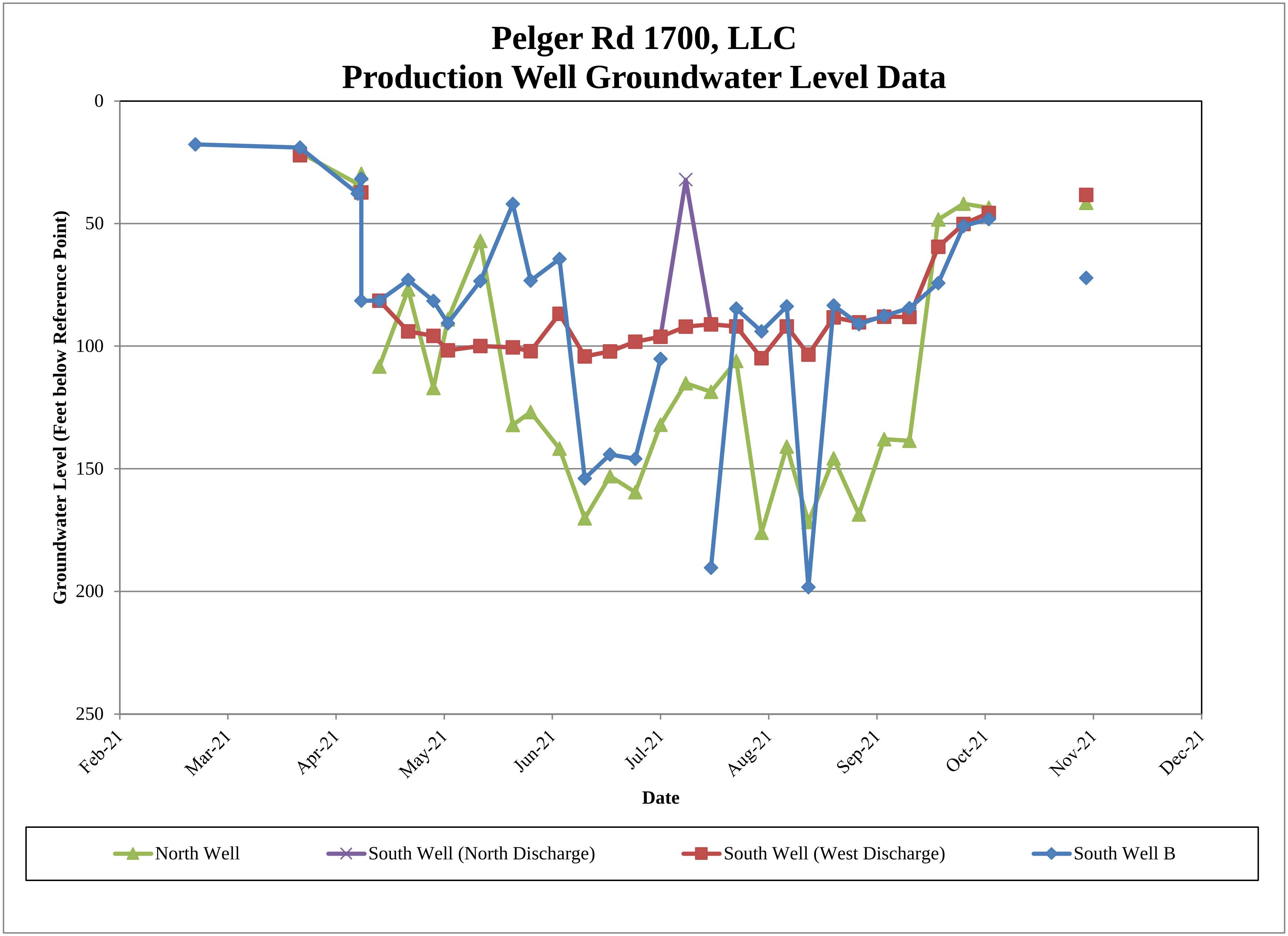


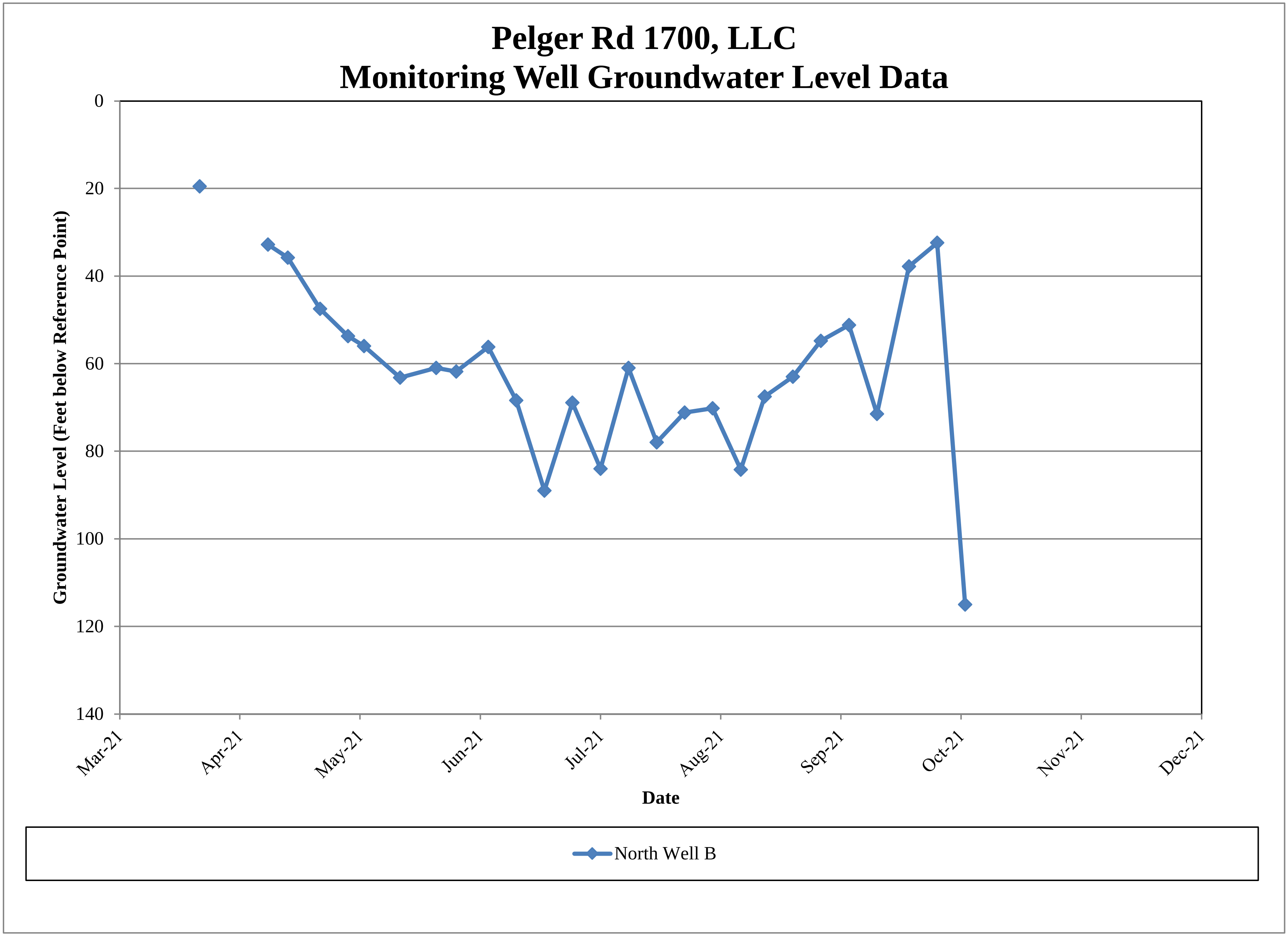
Pelger Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
PMWC #1
Well 1 (Tucker)
Well 2 (Flopet)
Well 3 (Klein)


Pelger Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
Klein #2
Pelger #1 - Deep
Pelger #1 - Middle
Pelger #1 - Shallow
Tucker #2

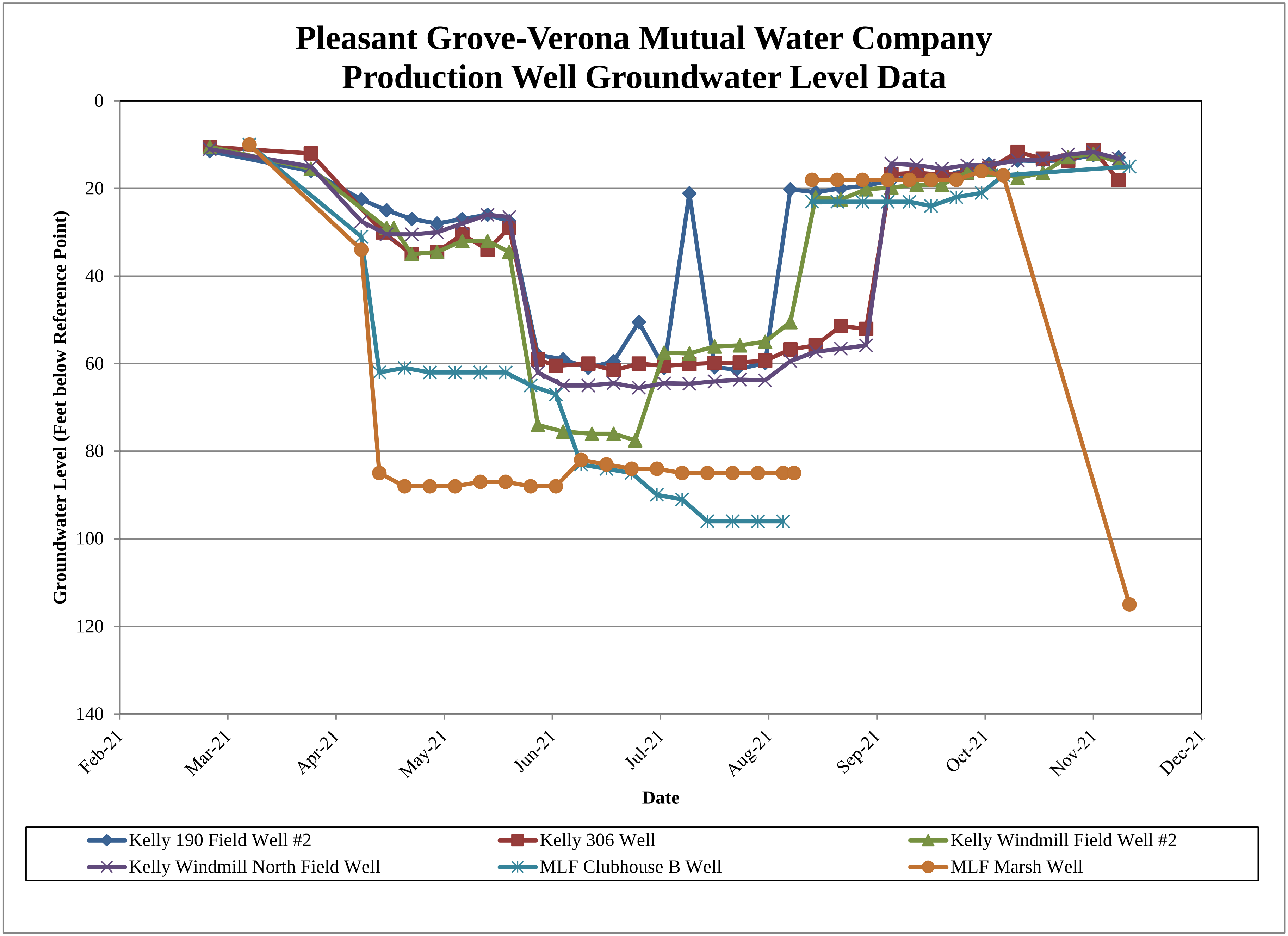


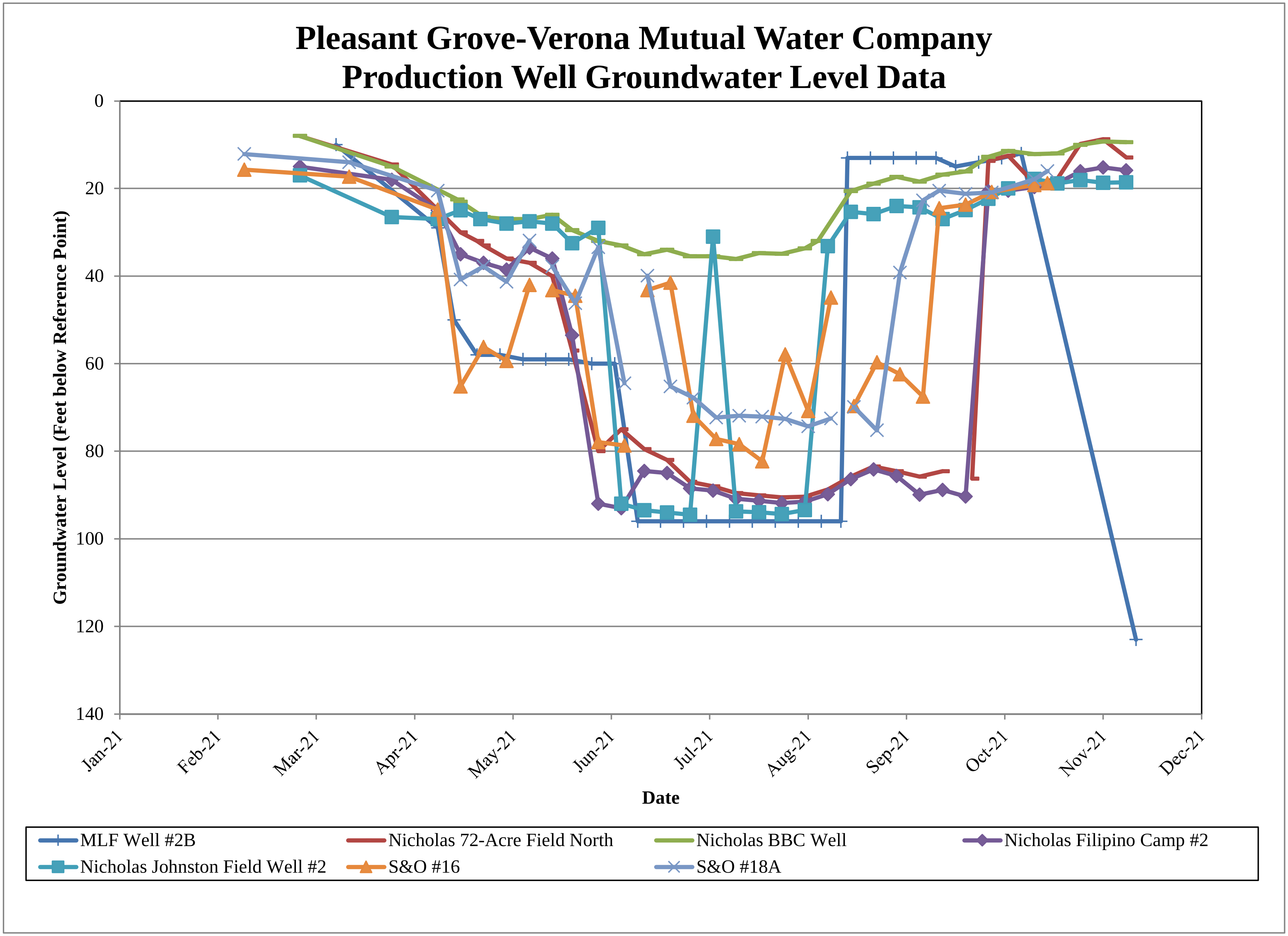
Pelger Mutual Water Company
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Date
Flood MW-1A (deep)
Flood MW-1B (int)
Flood MW-1C (shall)


Pelger Rd 1700, LLC
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
50
100
150
200
250
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
North Well
South Well (North Discharge)
South Well (West Discharge)
South Well B

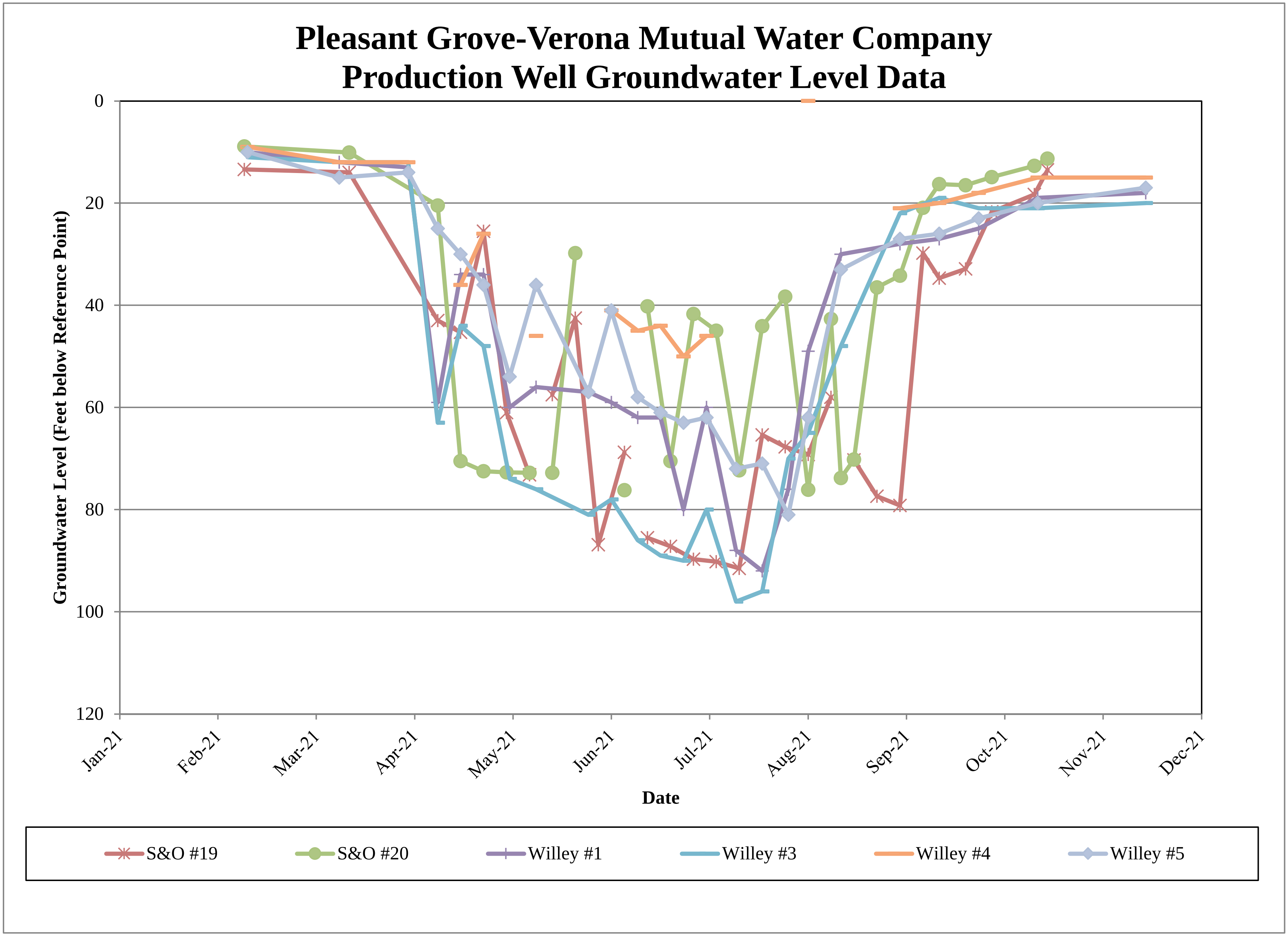


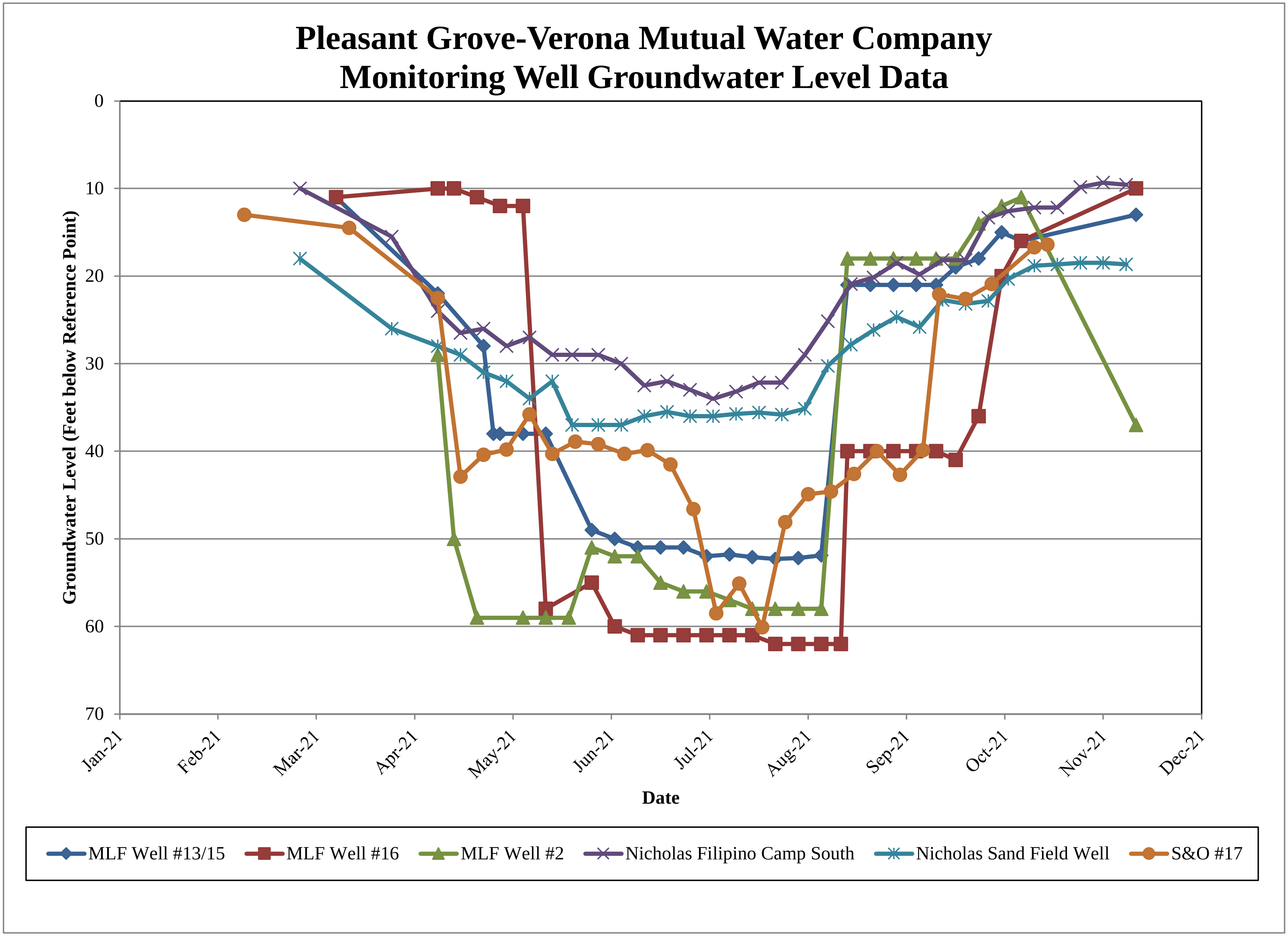
Pelger Rd 1700, LLC
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
North Well B


Pleasant Grove-Verona Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
Kelly 190 Field Well #2
Kelly 306 Well
Kelly Windmill Field Well #2
Kelly Windmill North Field Well
MLF Clubhouse B Well
MLF Marsh Well

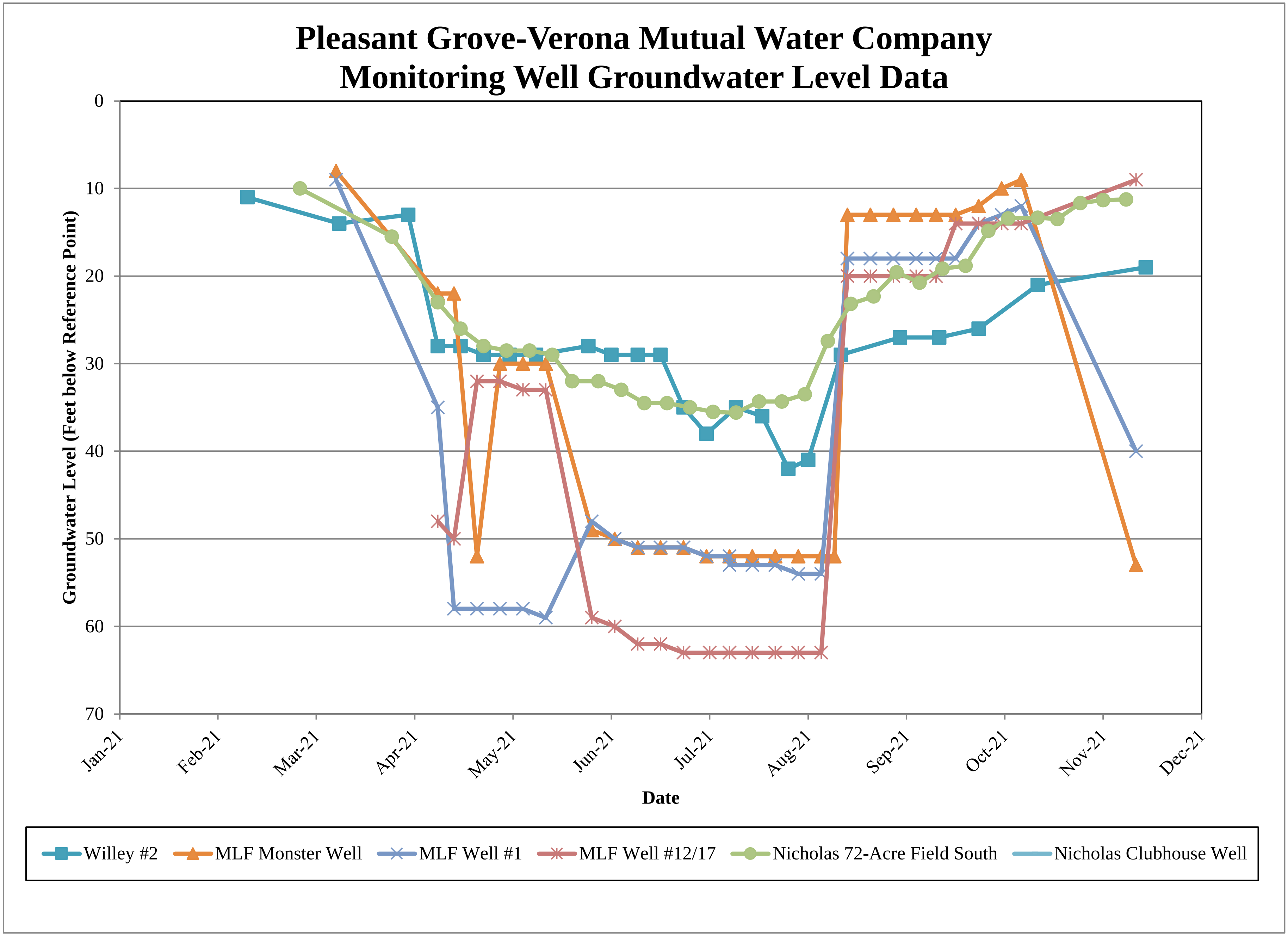


Pleasant Grove-Verona Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
MLF Well #2B
Nicholas 72-Acre Field North
Nicholas BBC Well
Nicholas Filipino Camp #2
Nicholas Johnston Field Well #2
S&O #16
S&O #18A

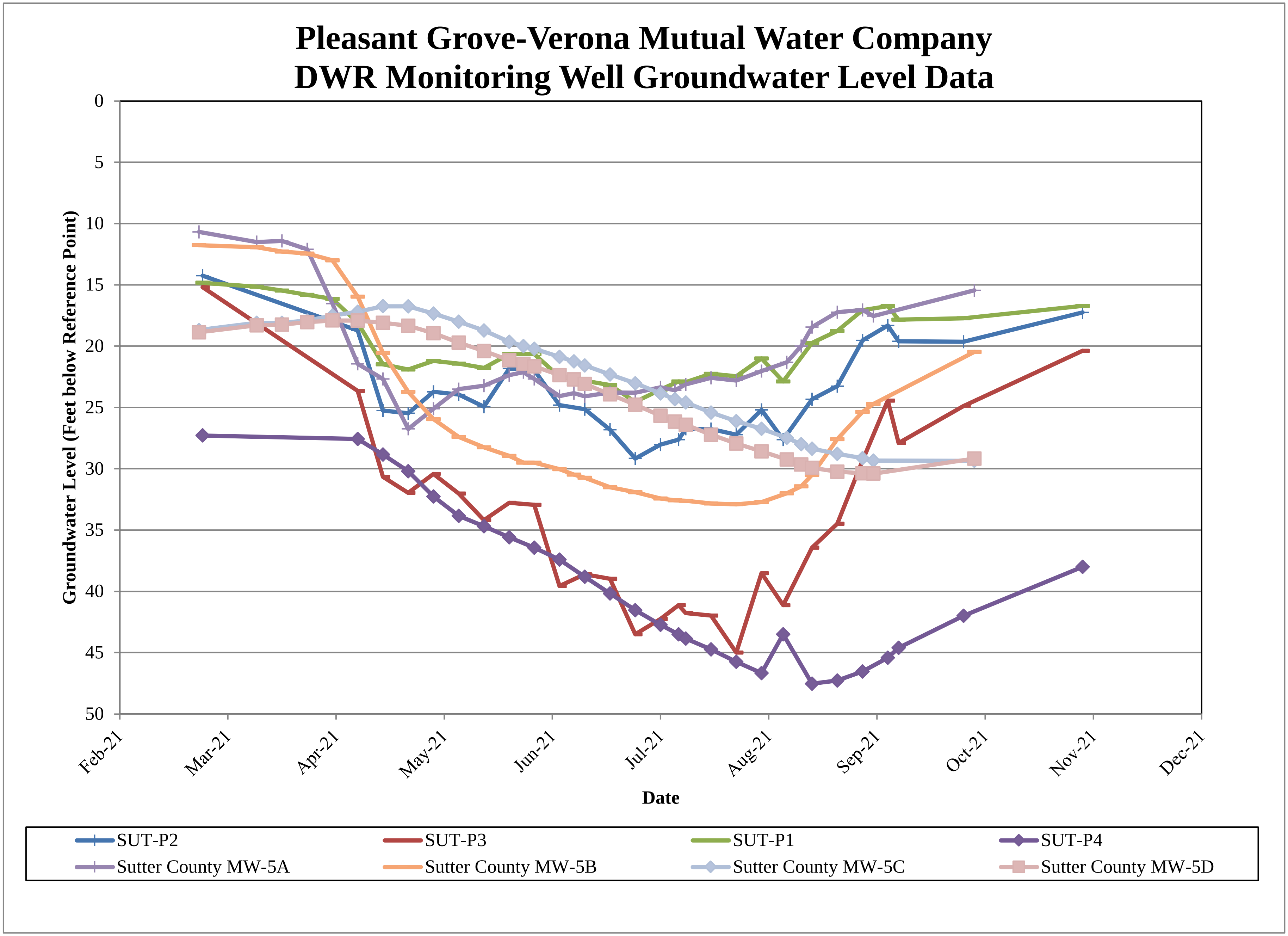

Pleasant Grove-Verona Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
S&O #19
S&O #20
Willey #1
Willey #3
Willey #4
Willey #5



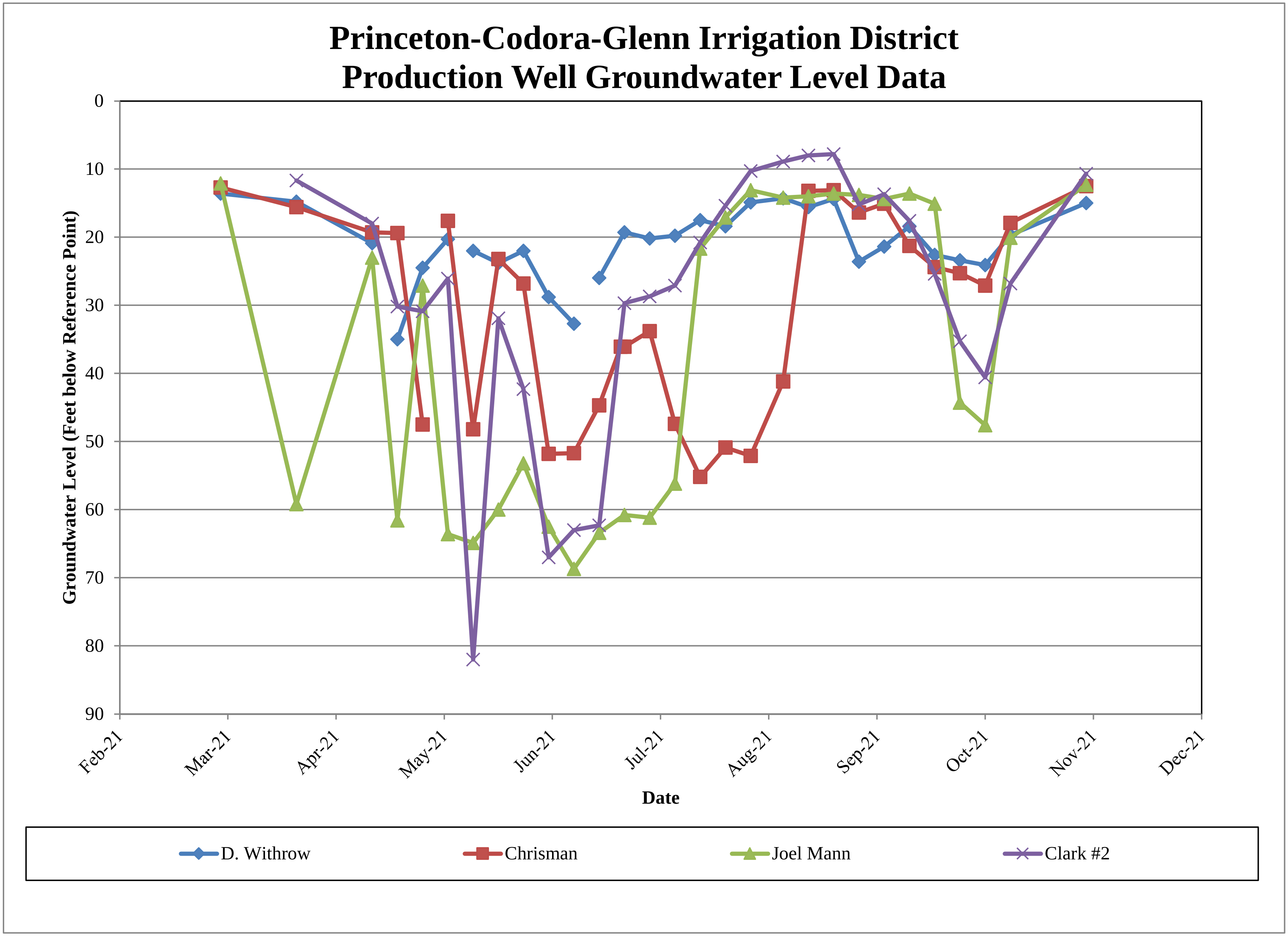
Pleasant Grove-Verona Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
MLF Well #13/15
MLF Well #16
MLF Well #2
Nicholas Filipino Camp South
Nicholas Sand Field Well
S&O #17



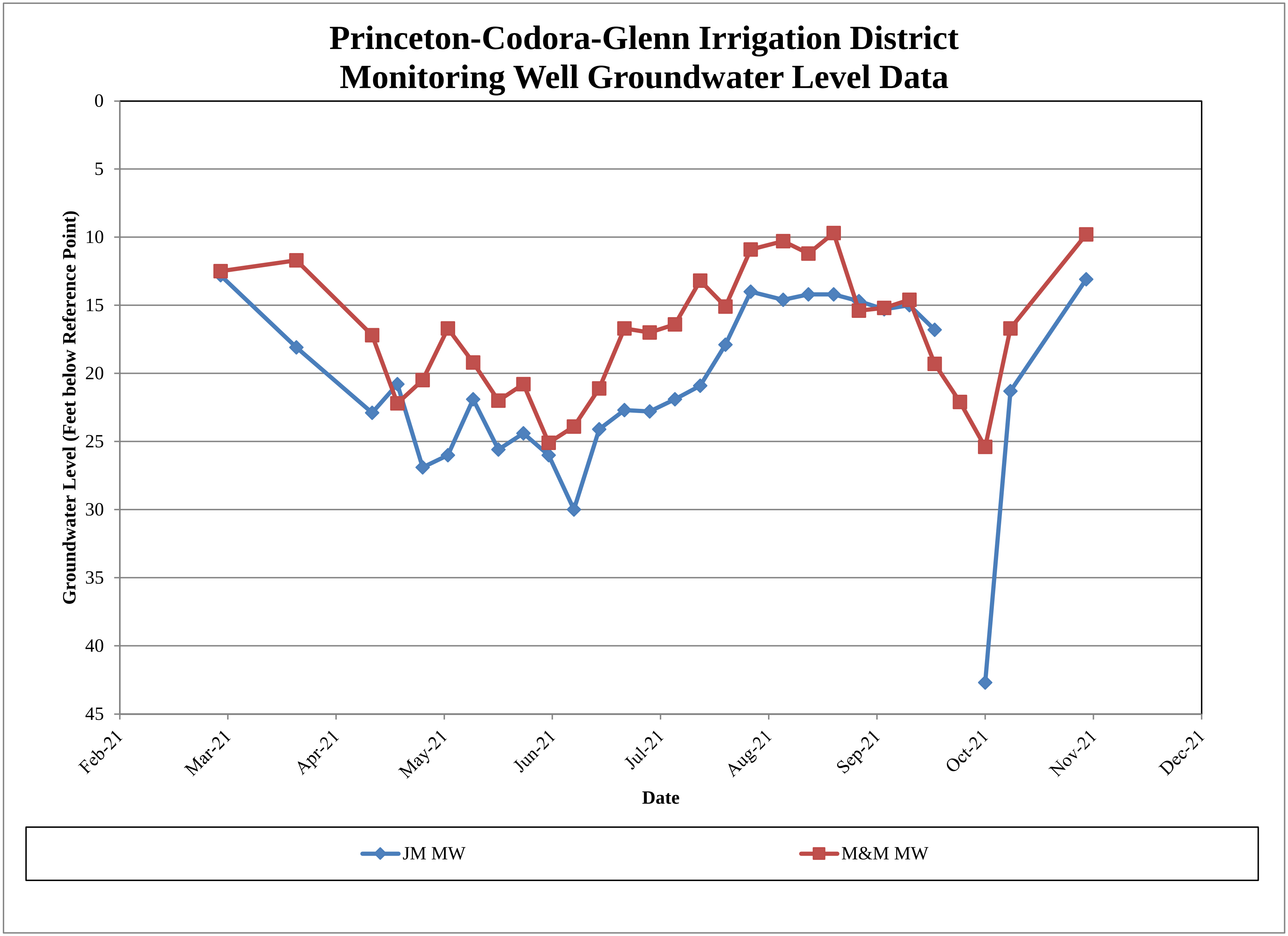
Pleasant Grove-Verona Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
Jan-21
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
Willey #2
MLF Monster Well
MLF Well #1
MLF Well #12/17
Nicholas 72-Acre Field South
Nicholas Clubhouse Well

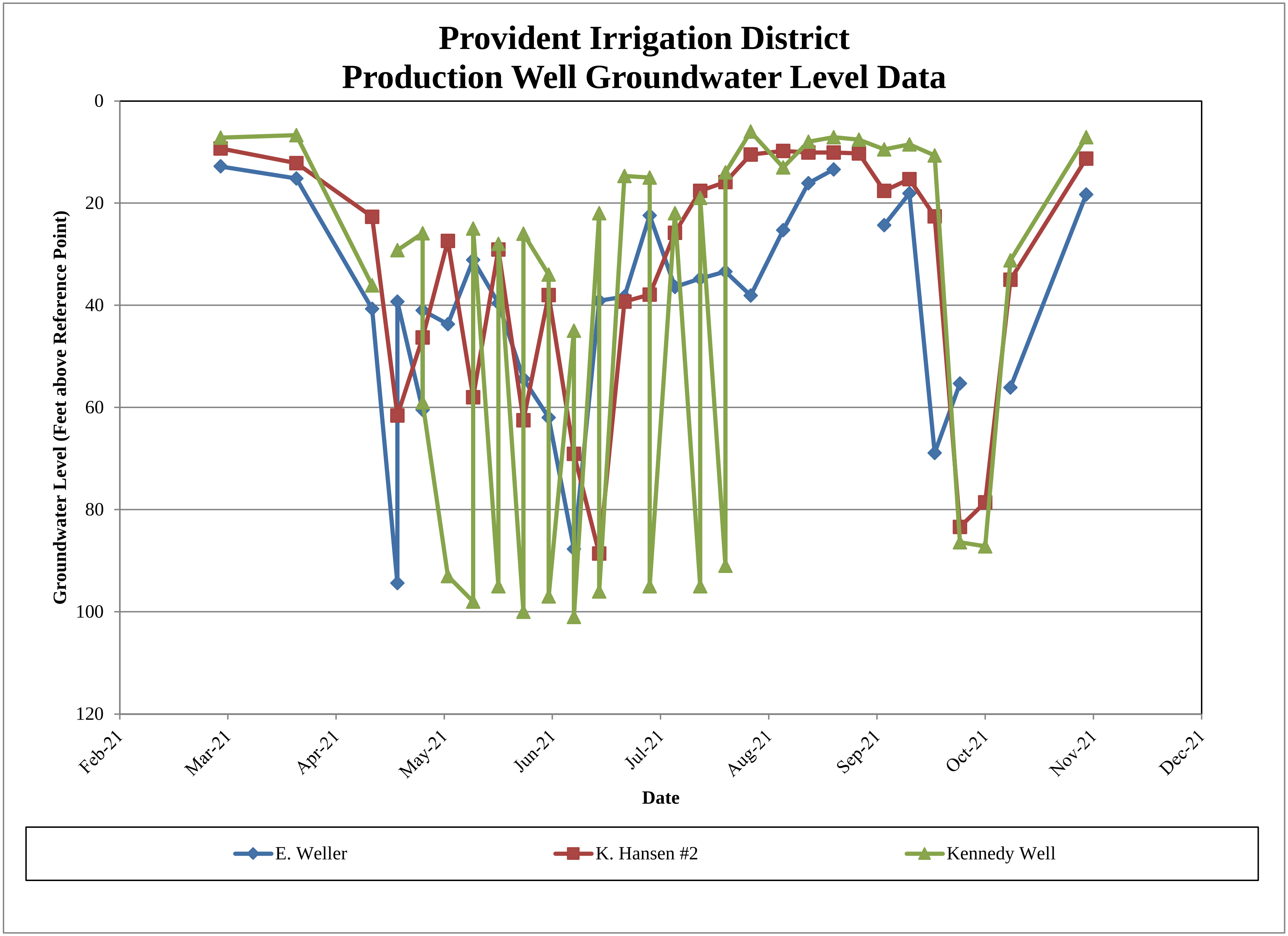


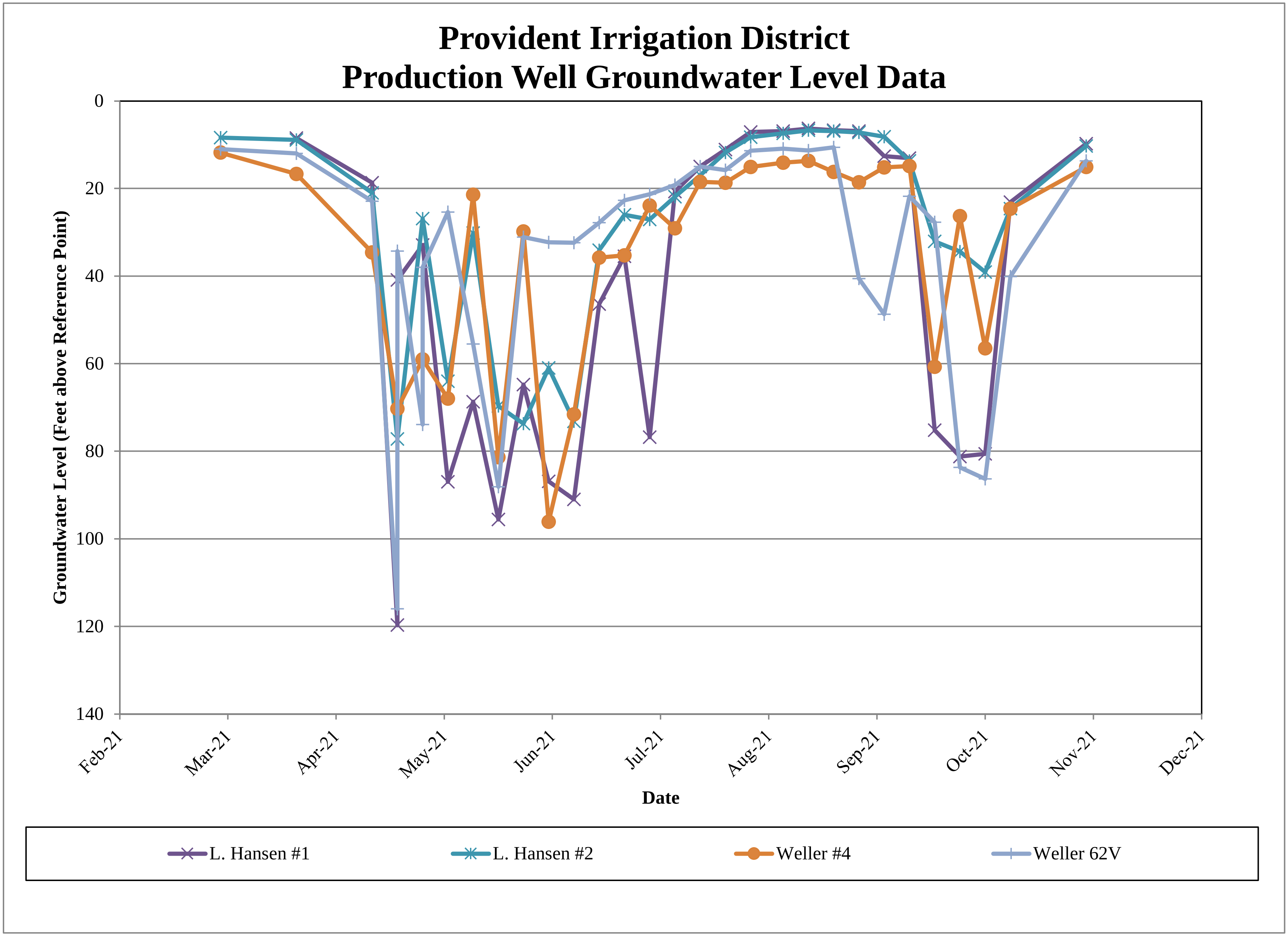
Pleasant Grove-Verona Mutual Water Company
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
5
10
15
20
25
30
35
40
45
50
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
SUT-P2
SUT-P3
SUT-P1
SUT-P4
Sutter County MW-5A
Sutter County MW-5B
Sutter County MW-5C
Sutter County MW-5D



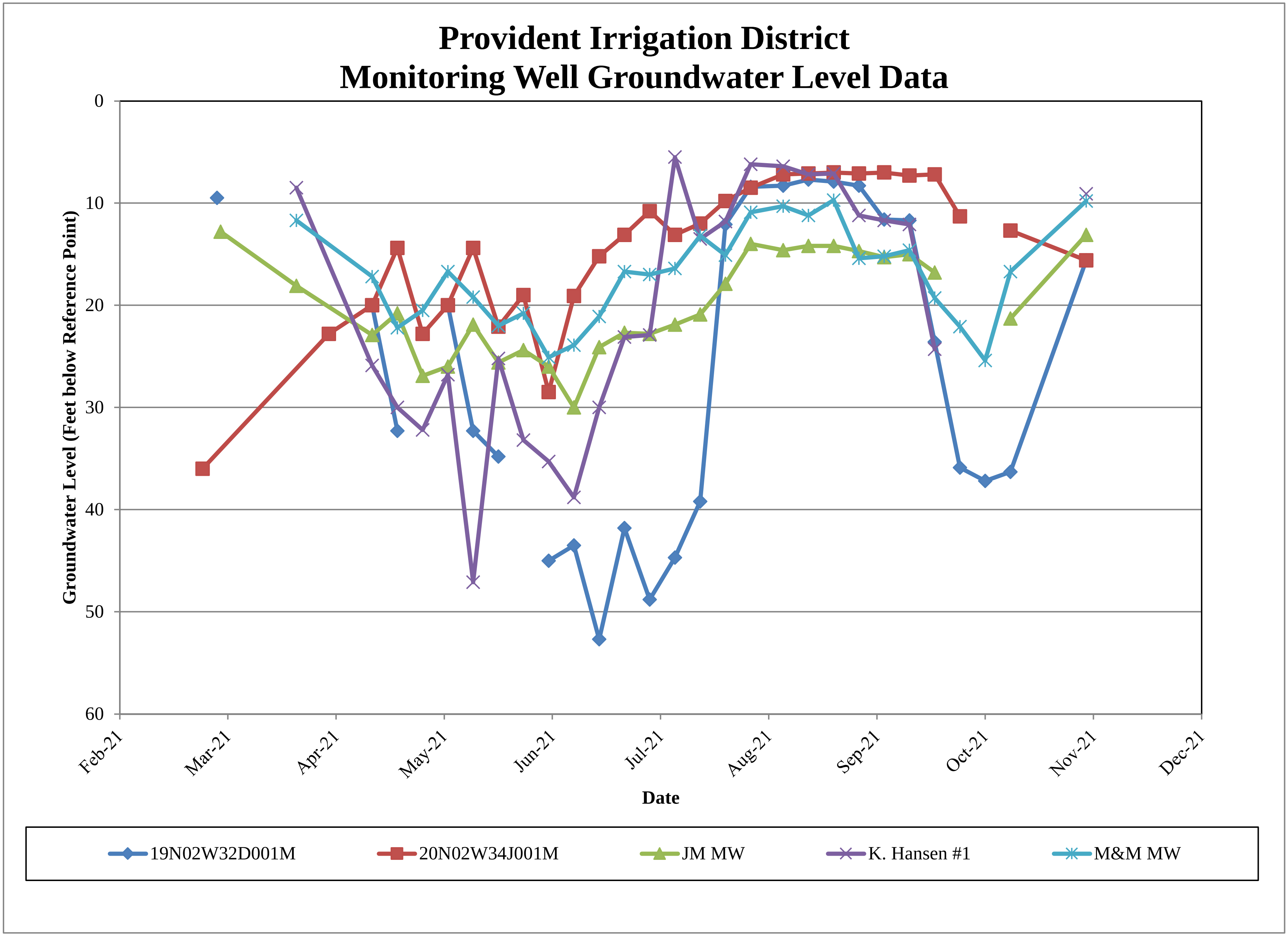
Princeton-Codora-Glenn Irrigation District
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
D. Withrow
Chrisman
Joel Mann
Clark #2

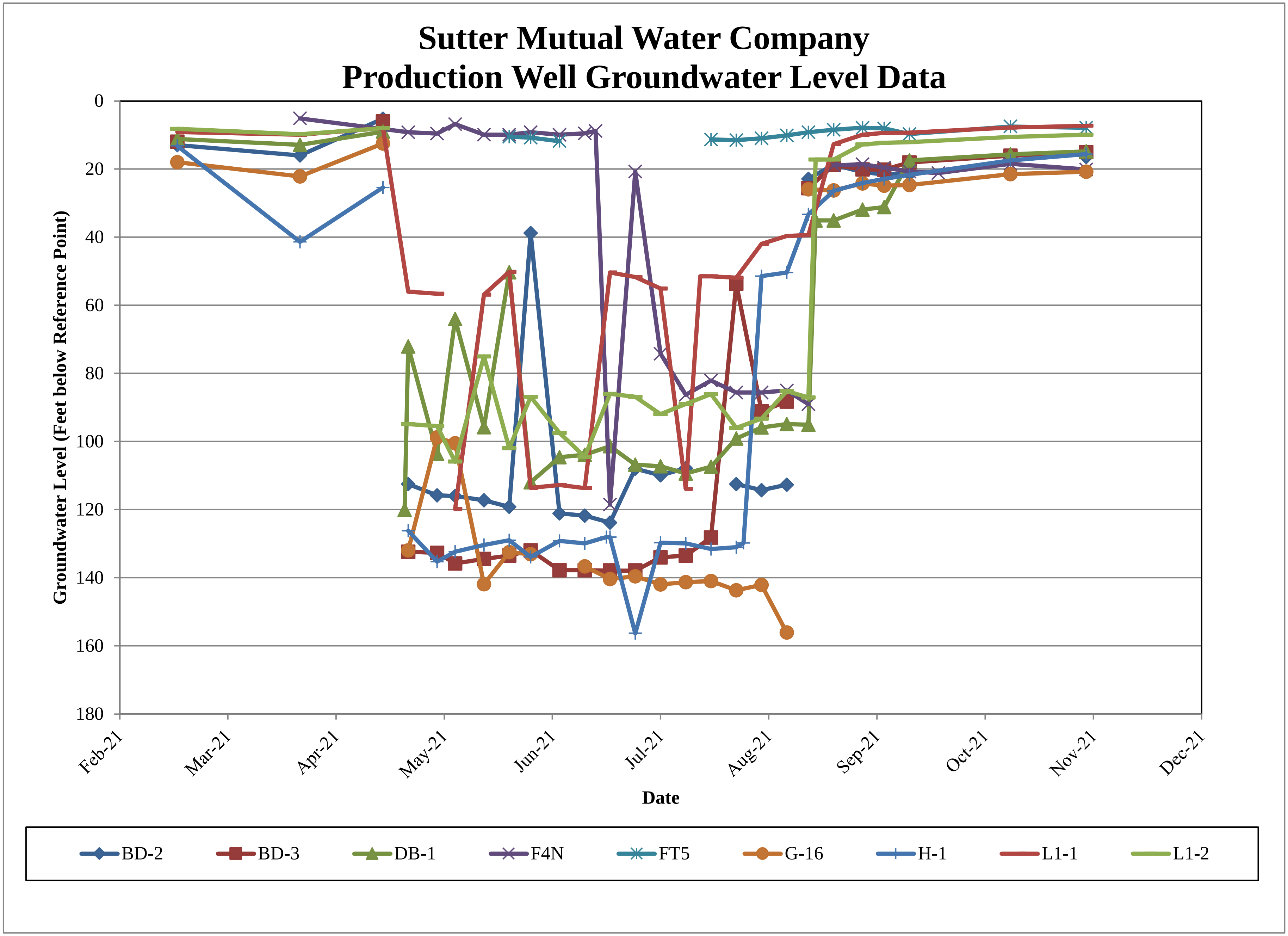

Princeton-Codora-Glenn Irrigation District
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
5
10
15
20
25
30
35
40
45
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
JM MW
M&M MW


Provident Irrigation District
Production Well Groundwater Level Data
Groundwater Level (Feet above Reference Point)
0
20
40
60
80
100
120
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
E. Weller
K. Hansen #2
Kennedy Well

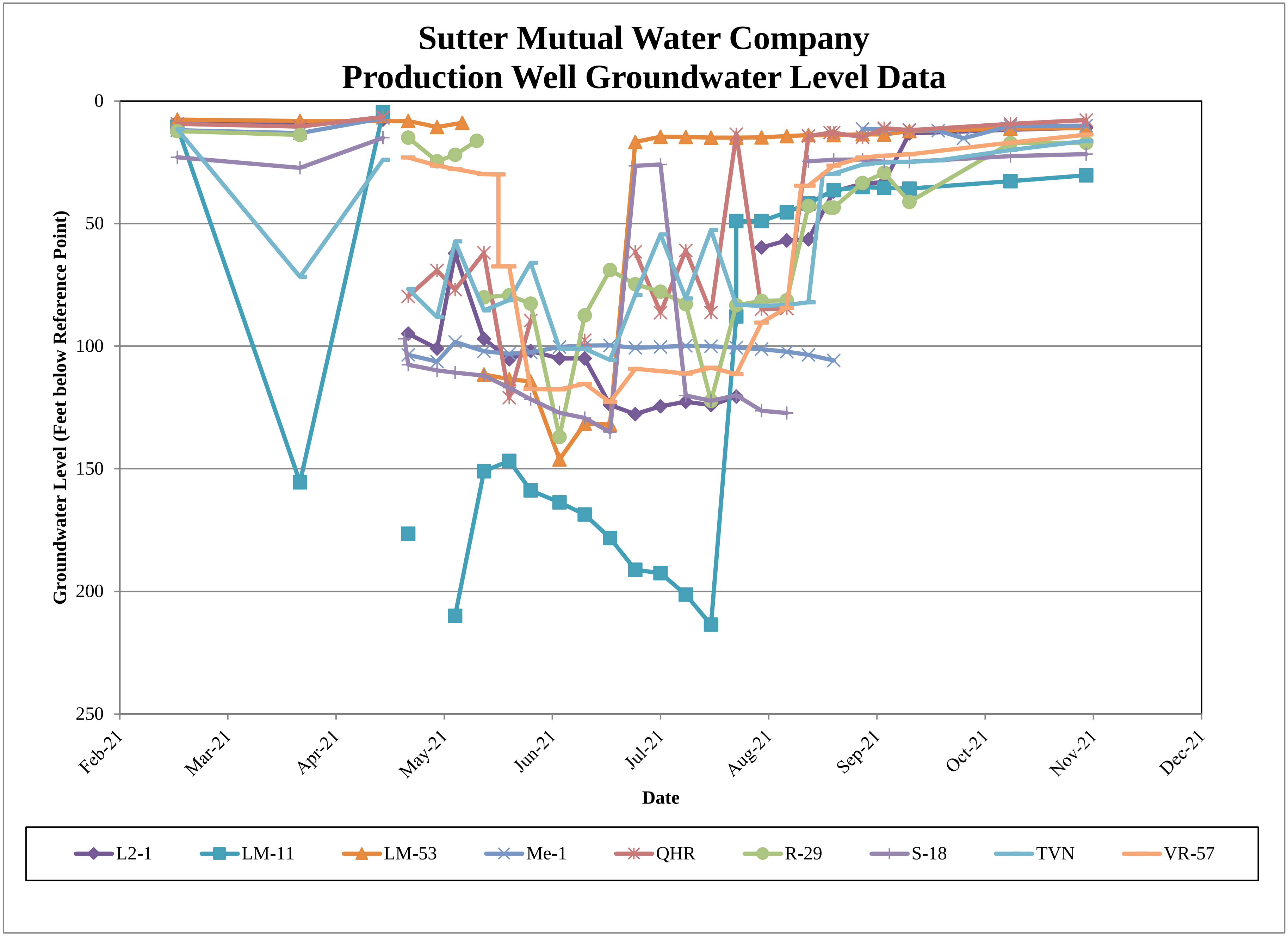


Provident Irrigation District
Production Well Groundwater Level Data
Groundwater Level (Feet above Reference Point)
0
20
40
60
80
100
120
140
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
L. Hansen #1
L. Hansen #2
Weller #4
Weller 62V

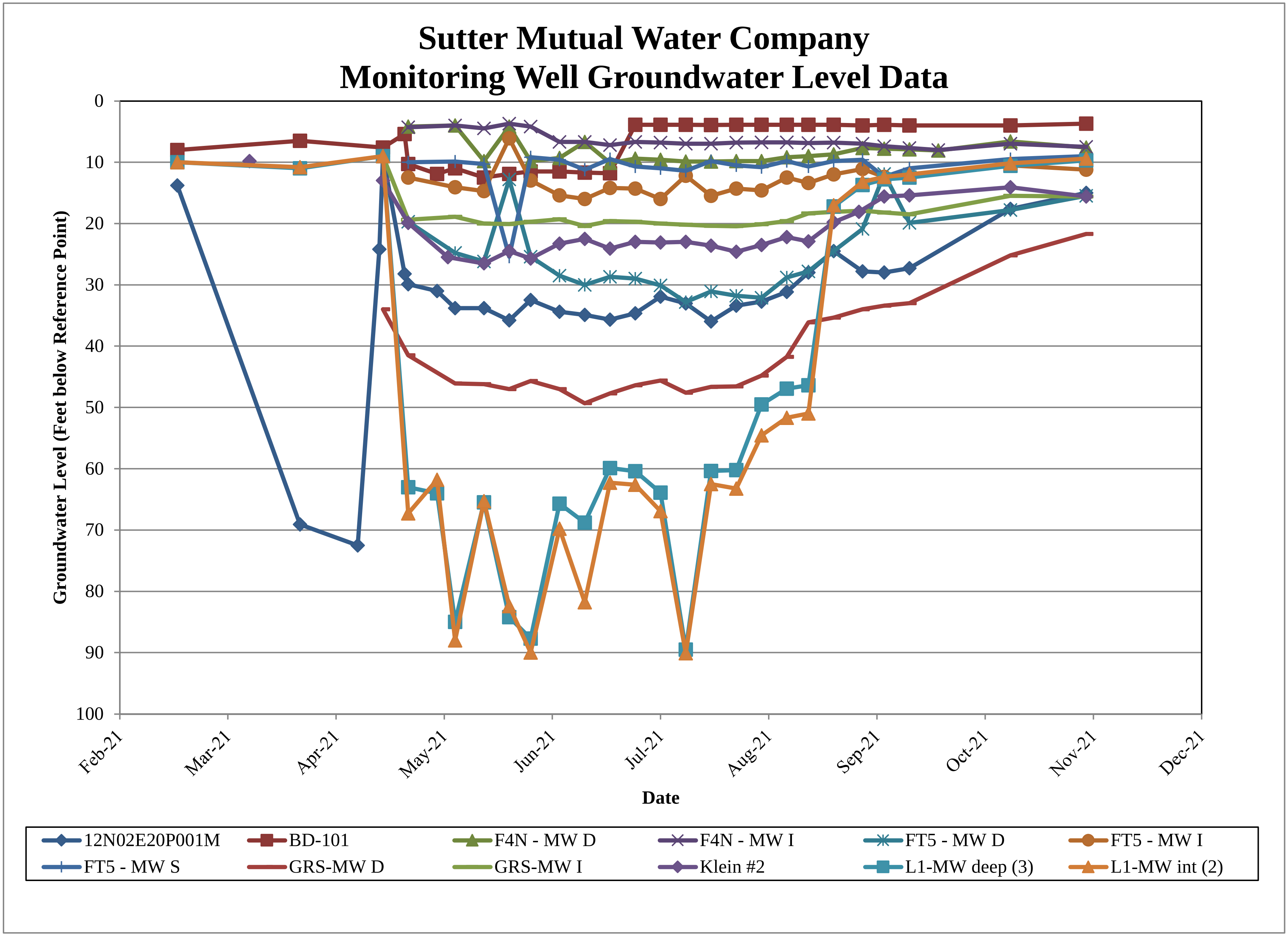

Provident Irrigation District
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
19N02W32D001M
20N02W34J001M
JM MW
K. Hansen #1
M&M MW



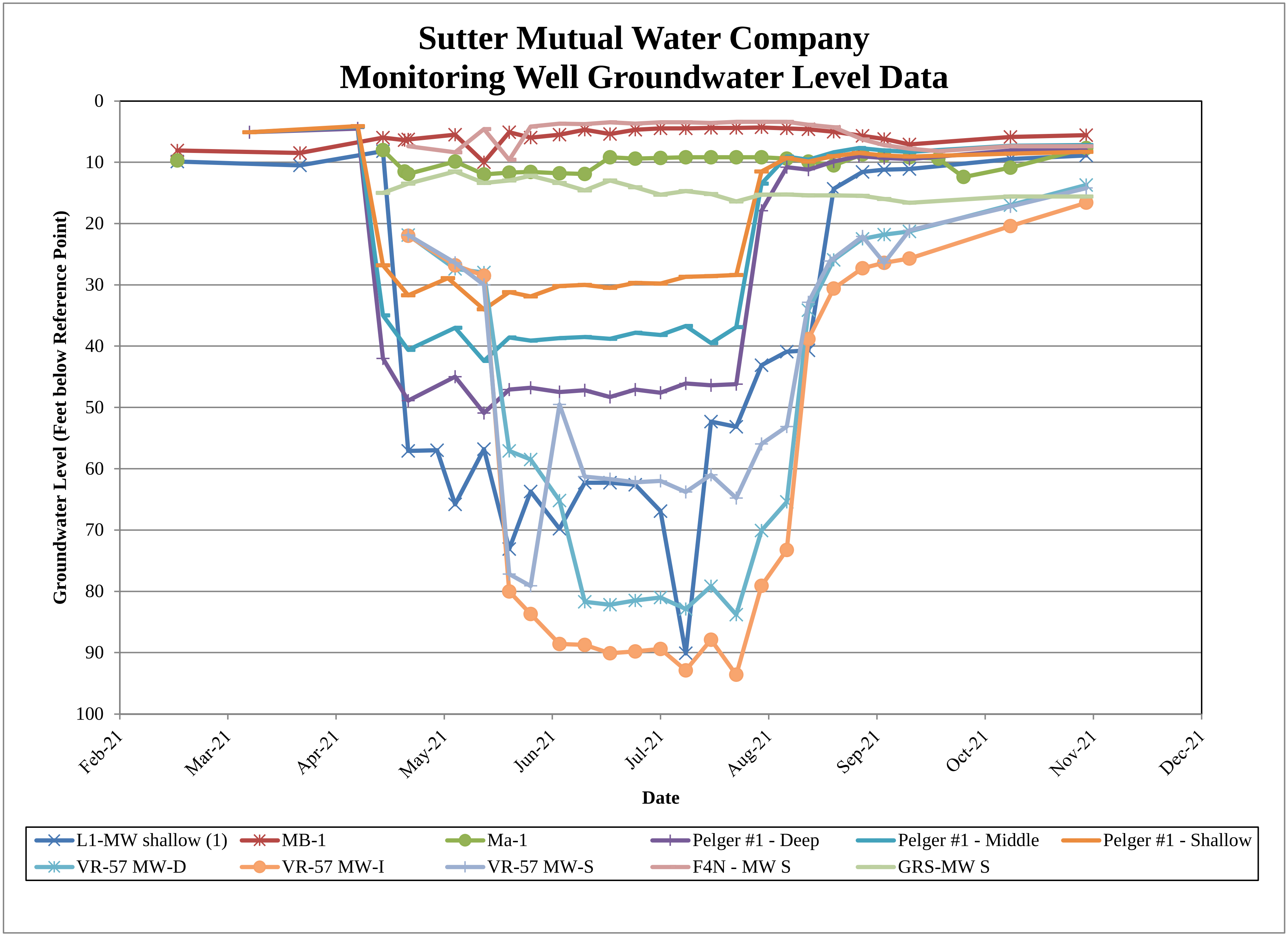
Sutter Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
180
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
BD-2
BD-3
DB-1
F4N
FT5
G-16
H-1
L1-1
L1-2



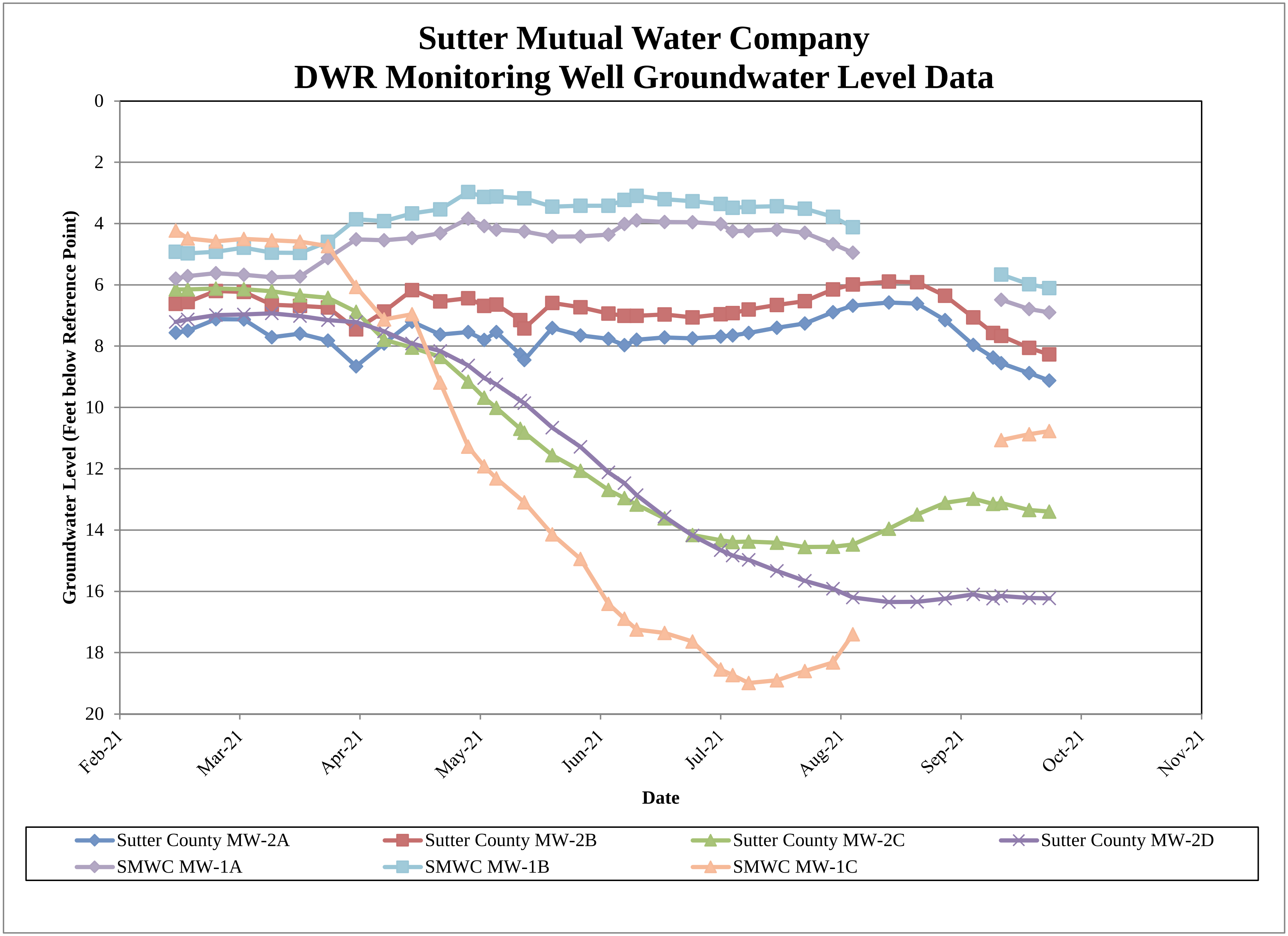
Sutter Mutual Water Company
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
50
100
150
200
250
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
L2-1
LM-11
LM-53
Me-1
QHR
R-29
S-18
TVN
VR-57

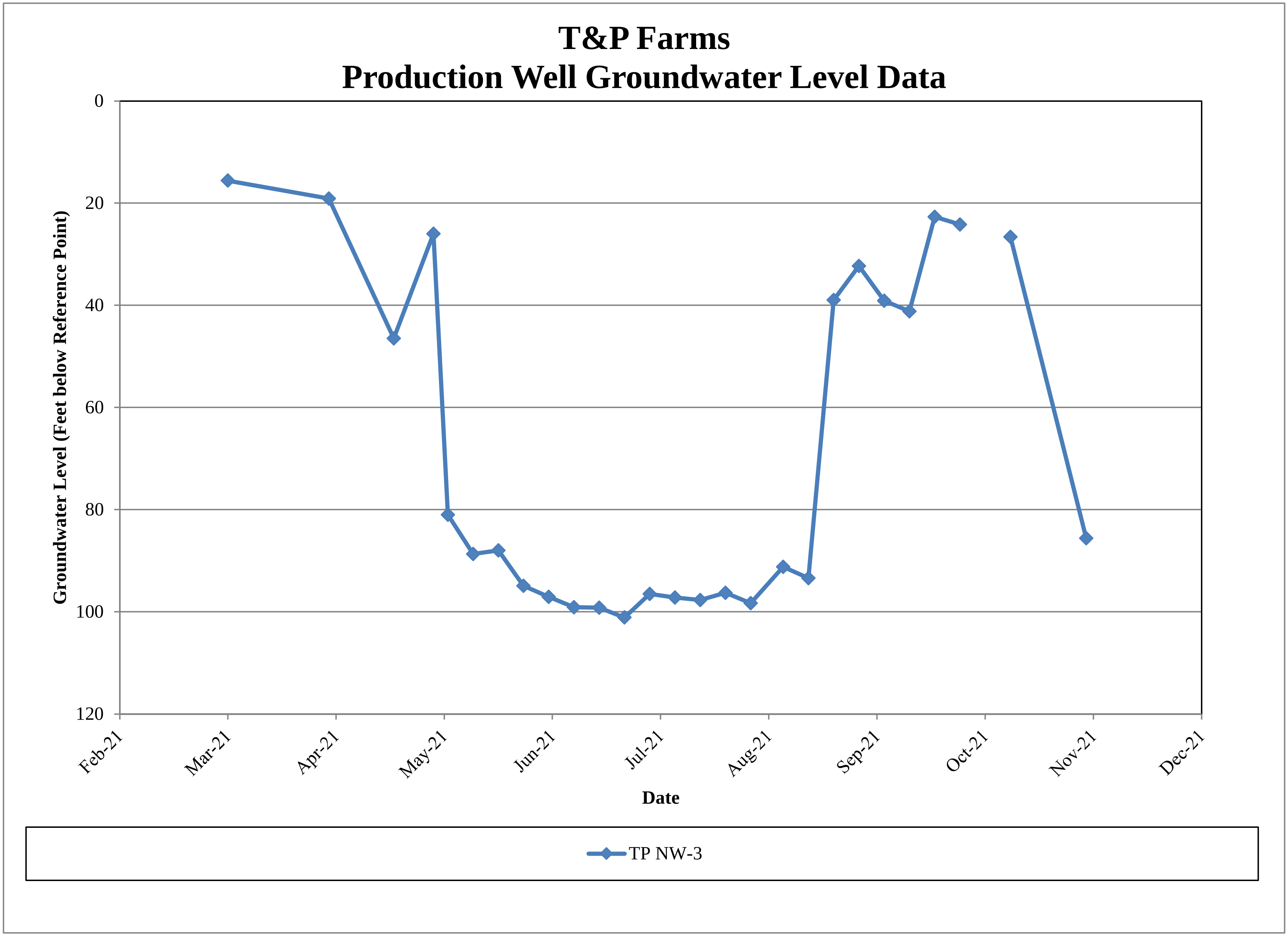


Sutter Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
100
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
12N02E20P001M
BD-101
F4N - MW D
F4N - MW I
FT5 - MW D
FT5 - MW I
FT5 - MW S
GRS-MW D
GRS-MW I
Klein #2
L1-MW deep (3)
L1-MW int (2)

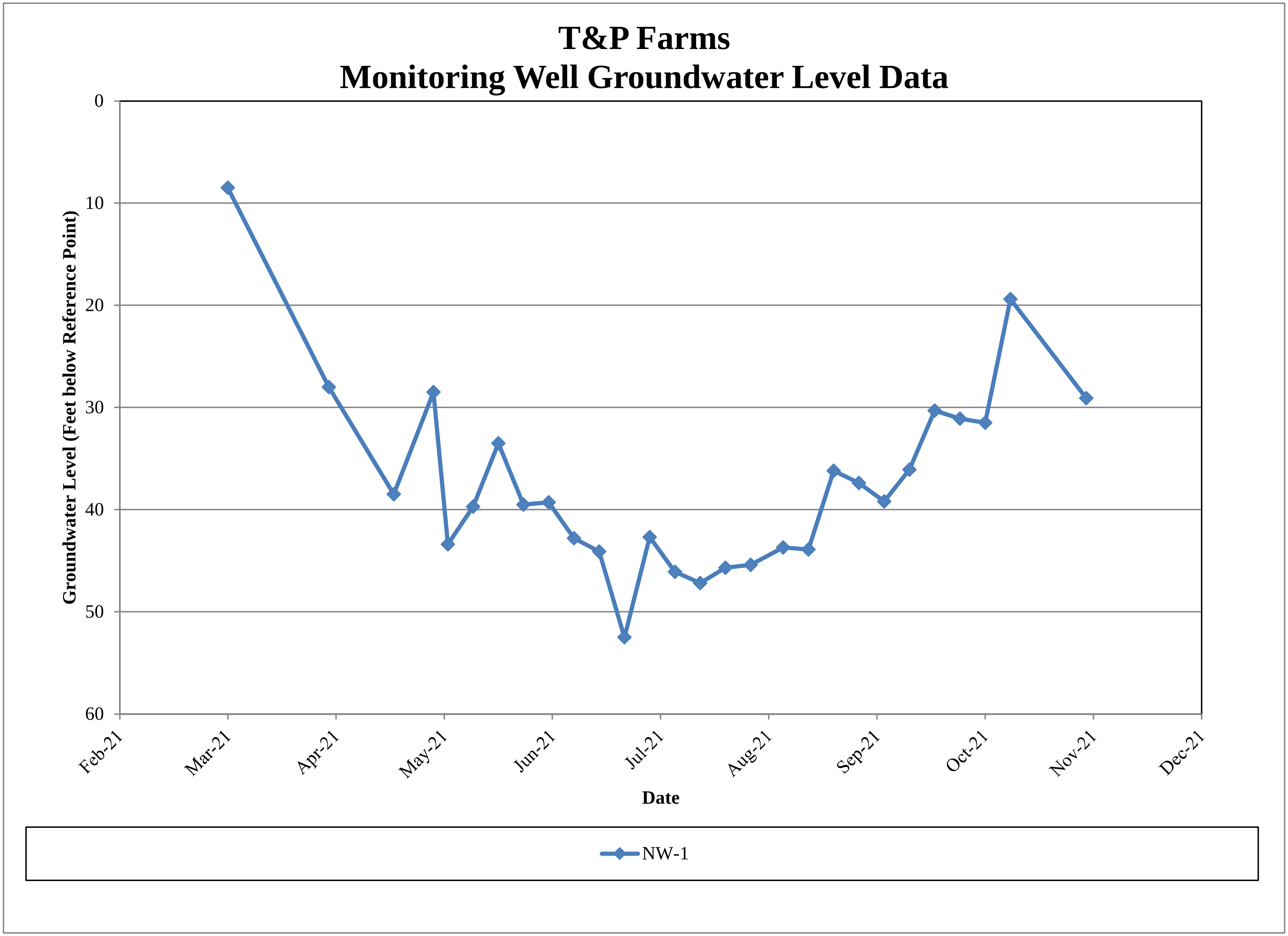


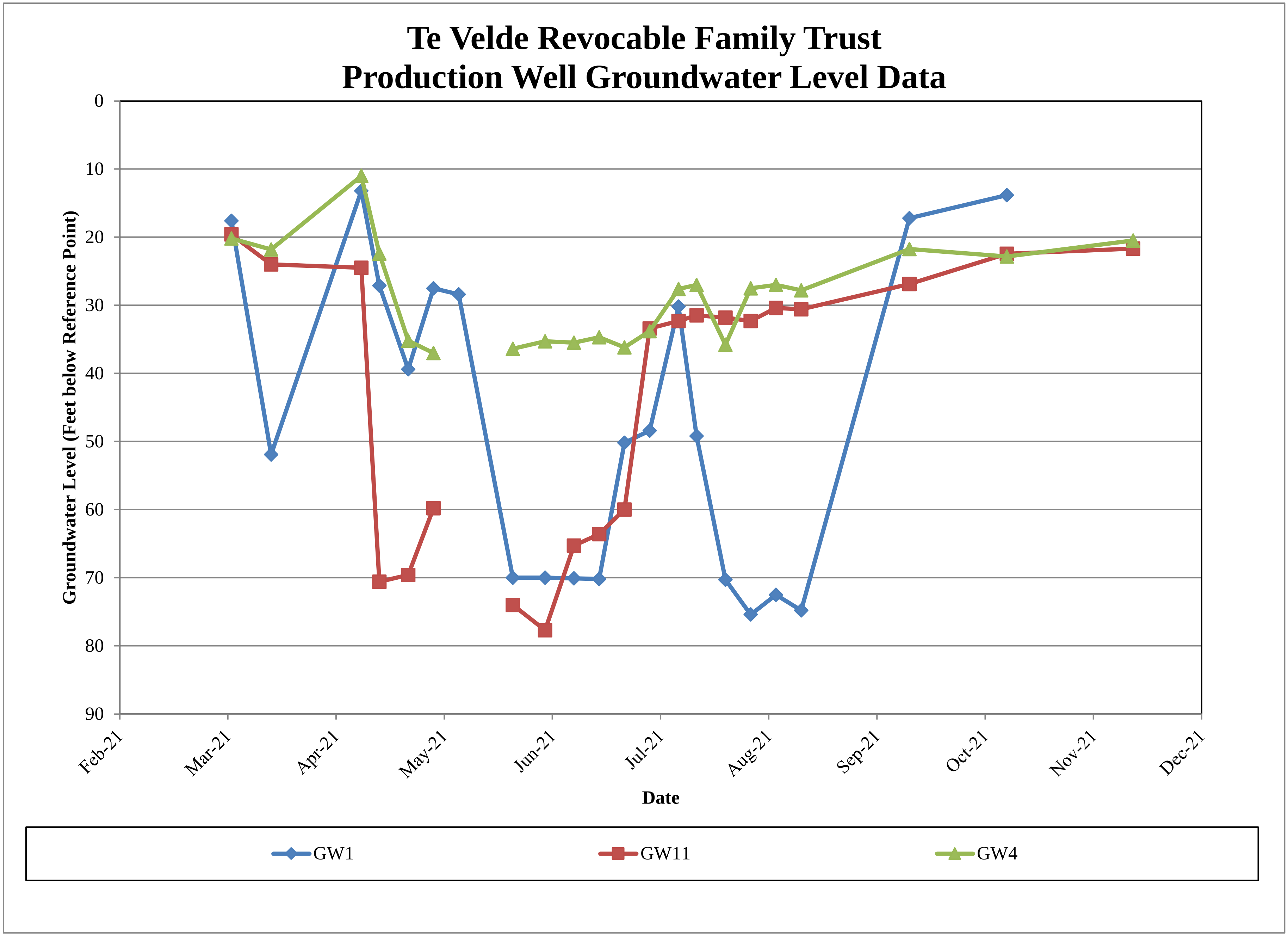
Sutter Mutual Water Company
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
100
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
L1-MW shallow (1)
MB-1
Ma-1
Pelger #1 - Deep
Pelger #1 - Middle
Pelger #1 - Shallow
VR-57 MW-D
VR-57 MW-I
VR-57 MW-S
F4N - MW S
GRS-MW S


Sutter Mutual Water Company
DWR Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
2
4
6
8
10
12
14
16
18
20
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Date
Sutter County MW-2A
Sutter County MW-2B
Sutter County MW-2C
Sutter County MW-2D
SMWC MW-1A
SMWC MW-1B
SMWC MW-1C

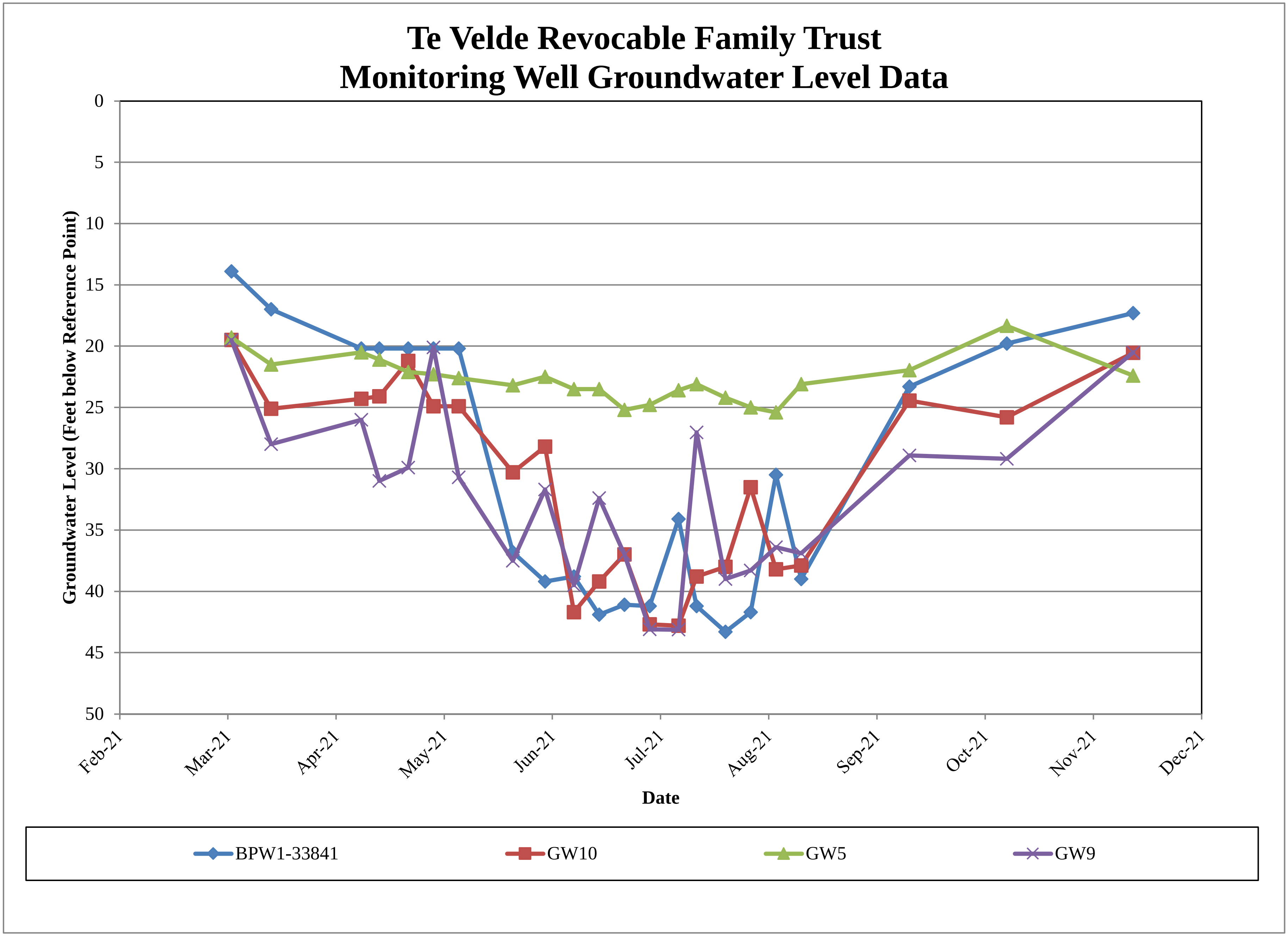


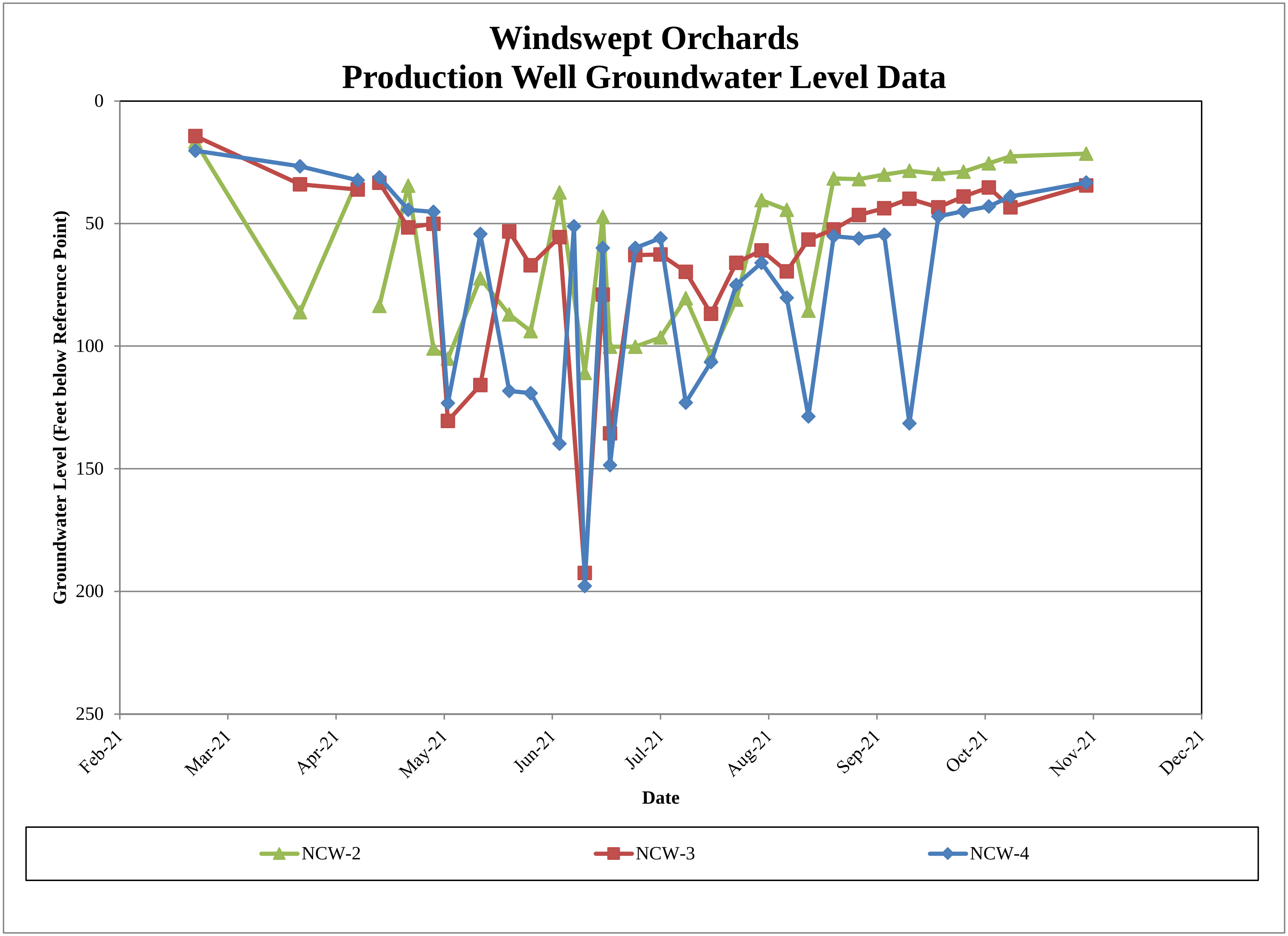
T&P Farms
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
TP NW-3

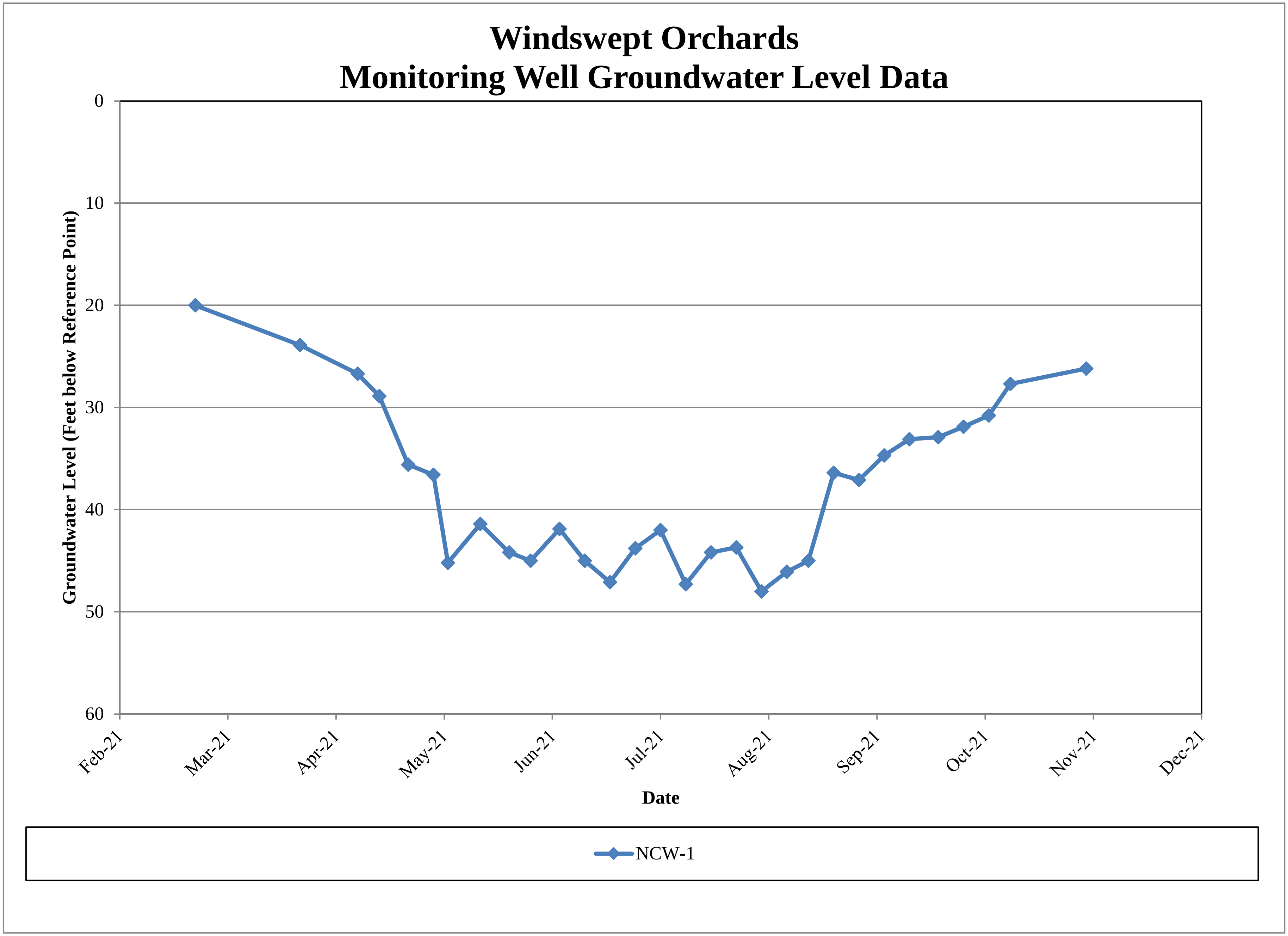

T&P Farms
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
NW-1



Te Velde Revocable Family Trust
Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
70
80
90
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
GW1
GW11
GW4

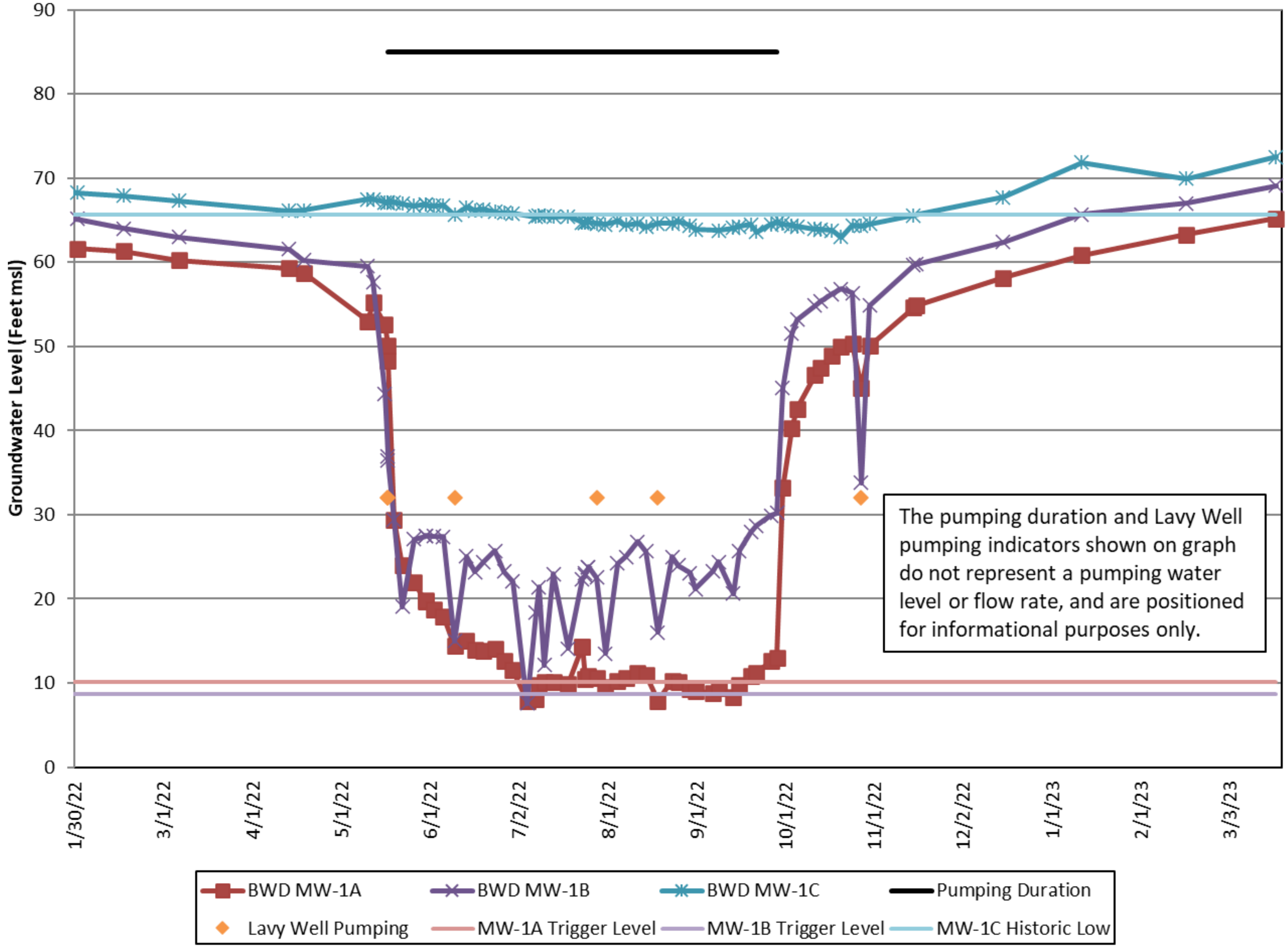

Te Velde Revocable Family Trust
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
5
10
15
20
25
30
35
40
45
50
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
BPW1-33841
GW10
GW5
GW9

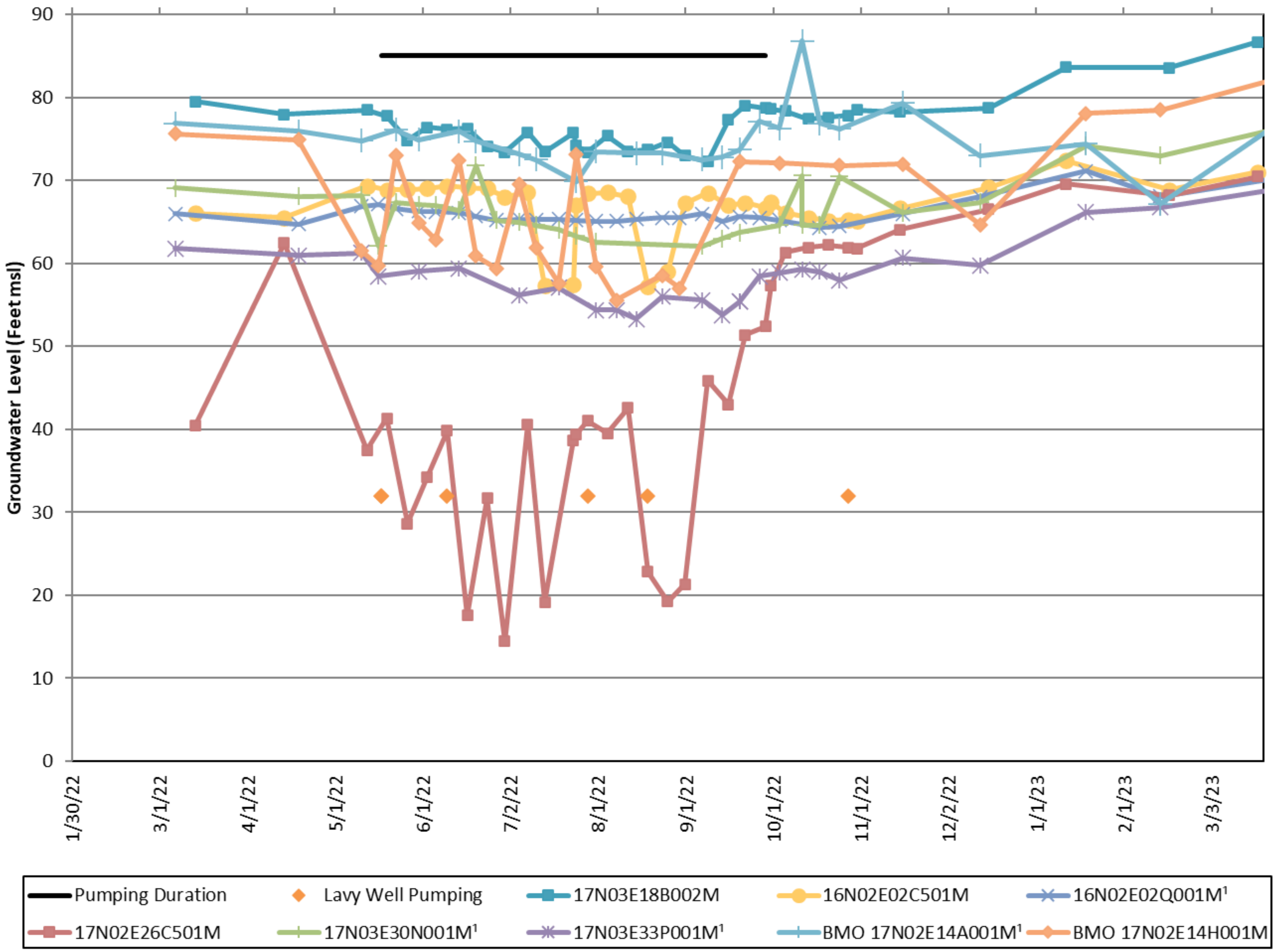

Windswept Orchards
Production Well Groundwater Level Data
0
50
100
150
200
250
Groundwater Level (Feet below Reference Point)
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
NCW-2
NCW-3
NCW-4


Windswept Orchards
Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
Feb-21
Mar-21
Apr-21
May-21
Jun-21
Jul-21
Aug-21
Sep-21
Oct-21
Nov-21
Dec-21
Date
NCW-1

Appendix F3
2022 Water Transfers Data Reports

BWD MW-1 A/B/C Hydrographs





Monitoring Well Hydrographs

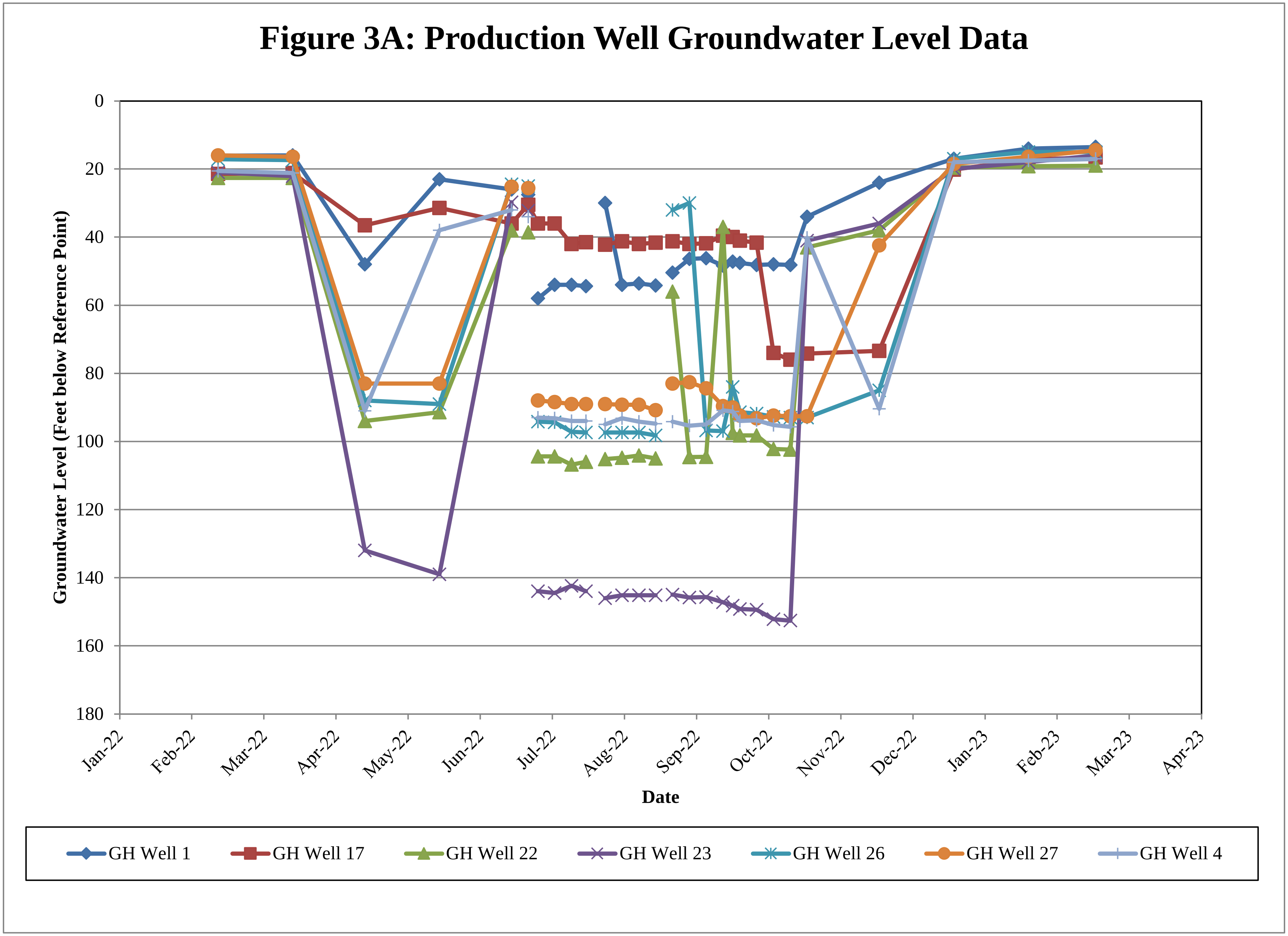


Figure 3A: Production Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
20
40
60
80
100
120
140
160
180
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Jan-23
Feb-23
Mar-23
Apr-23
Date
GH Well 1
GH Well 17
GH Well 22
GH Well 23
GH Well 26
GH Well 27
GH Well 4

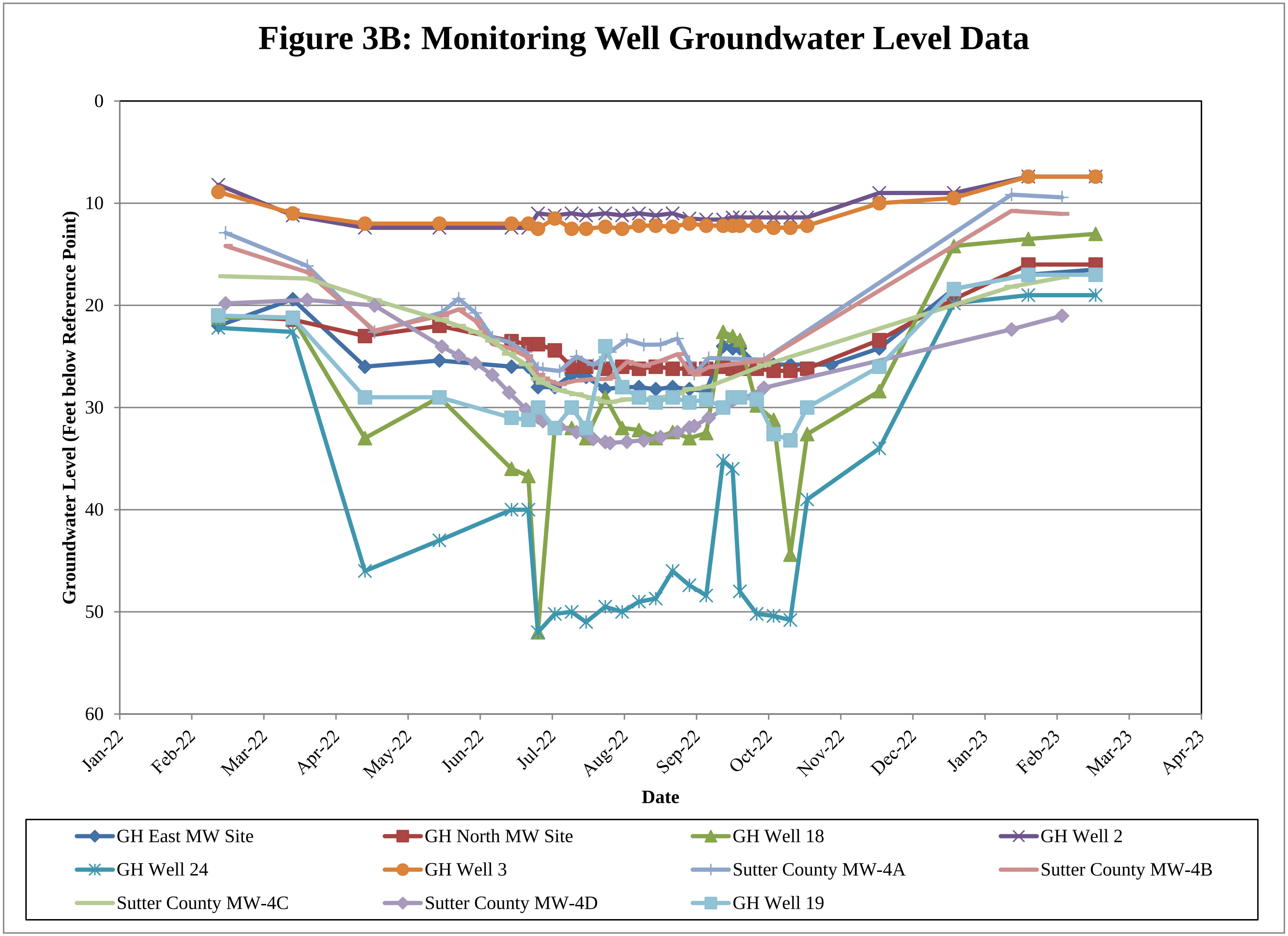


Figure 3B: Monitoring Well Groundwater Level Data
Groundwater Level (Feet below Reference Point)
0
10
20
30
40
50
60
Jan-22
Feb-22
Mar-22
Apr-22
May-22
Jun-22
Jul-22
Aug-22
Sep-22
Oct-22
Nov-22
Dec-22
Jan-23
Feb-23
Mar-23
Apr-23
Date
GH East MW Site
GH North MW Site
GH Well 18
GH Well 2
GH Well 24
GH Well 3
Sutter County MW-4A
Sutter County MW-4B
Sutter County MW-4C
Sutter County MW-4D
GH Well 19

Appendix G
Air Quality Emissions Calculations

Table G-1. Unmitigated Emission Levels Compared to General Conformity De Minimis Thresholds

County/ Nonattainment Area	Emissions (tons per year)					
	VOC	NOx	CO	SOx	PM10	PM2.5
	Sacramento Metro[1]	Sacramento Metro[1]	Sacramento Area[2]	Sacramento[3,4]	Sacramento Co.	Sacramento[4]
Colusa	n/a	n/a	n/a	n/a	n/a	n/a
Glenn	n/a	n/a	n/a	n/a	n/a	n/a
Sacramento	0.44	0.88	3.35	0.60	0.01	0.01
Shasta	n/a	n/a	n/a	n/a	n/a	n/a
Sutter[5]	13.66	64.76	n/a	n/a	n/a	n/a
Yolo	0.94	8.51	2.92	0.52	n/a	0.08
Yuba	n/a	n/a	n/a	0.00	n/a	0.00
Total	15.0	74.2	6.3	1.1	0.0	0.1
Classification	Severe-15	Severe-15	Maintenance	PM2.5 Precursor	Maintenance	Nonattainment
De Minimis Threshold (tpy)	25	25	100	100	100	100
Exceed?	No	Yes	No	No	No	No

Note:

[1]The Sacramento Metro 8-hour O3 nonattainment area consist of Sacramento and Yolo Counties and parts of El Dorado, Placer, Solano, and Sutter Counties. Emissions occurring within the attainment area of these counties are excluded from the total emissions.

[2]The Sacramento Area CO maintenance area is based on the Census Bureau Urbanized Area and consists of parts of Placer, Sacramento, and Yolo Counties. The general conformity applicability evaluation is based on emissions that would occur within the entire county to be conservative.

[3]All counties are designated as attainment areas for SO2; however, since SO2 is a precursor to PM2.5, its emissions must be evaluated under general conformity.

[4]The 24-hour PM2.5 nonattainment area for Sacramento includes Sacramento County and parts of El Dorado, Placer, Solano, and Yolo Counties. The general conformity applicability analysis assumes that all emissions that could occur within each county would occur within the Sacramento nonattainment area to be conservative.

[5]VOC and NOx emissions are excluded from water agencies shown in table below because they are located in areas designated as attainment for the federal 8-hour O3 NAAQS.

Table G-2. Emissions Outside of 8-Hour Ozone Nonattainment Area (tons per year)

Water Agency	County	VOC	NOx
Andreotti	Sutter	0.4	0.7
Butte Water District	Sutter	All Electric	All Electric
Garden Highway Mutual Water Company	Sutter	0.3	0.6
Gilsizer Slough Ranch	Sutter	All Electric	All Electric
Meridian Farms Water Company	Sutter	0.4	2.8
Pelger Mutual Water Company	Sutter	0.0	0.6
Pelger Road 1700 LLC	Sutter	All Electric	All Electric
Tule Basin Farms	Sutter	0.5	1.0
Total		**1.7**	**5.9**

Note:

Totals may not add exactly because of rounding.

Summary of Daily Groundwater Substitution Emissions by County (Unmitigated)

Table G-3. Daily VOC Emissions (Unmitigated)

Water Agency	Daily VOC Emissions (pounds per day)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					4.83			4.83
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					3.67			3.67
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					4.83			4.83
Glenn-Colusa Irrigation District	32.73	2.82						35.54
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					4.41			4.41
Natomas Central Mutual Water Company			6.25		20.16			26.41
Pelger Mutual Water Company					0.46			0.46
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					16.65			16.65
Princeton-Codora-Glenn Irrigation District	8.25	15.81						24.06
Provident Irrigation District		34.09						34.09
Reclamation District 1004		All Electric						0.00
Reclamation District 108	41.79					10.16		51.94
Roberts Ditch Irrigation Company	0.80							0.80
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					111.91			111.91
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					5.60			5.60
Windswept Land and Livestock					All Electric			325.20
Total	**83.56**	**52.72**	**6.25**	**0.00**	**172.52**	**10.16**	**0.00**	**650.40**

Key:
VOC = volatile organic compounds

Table G-4. Daily NOx Emissions (Unmitigated)

Water Agency	Daily NOx Emissions (pounds per day)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					9.66			9.66
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					7.34			7.34
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					9.66			9.66
Glenn-Colusa Irrigation District	371.71	53.49						425.20
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					30.38			30.38
Natomas Central Mutual Water Company			12.63		40.36			53.00
Pelger Mutual Water Company					8.74			8.74
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					100.22			100.22
Princeton-Codora-Glenn Irrigation District	101.70	174.34						276.05
Provident Irrigation District		416.10						416.10
Reclamation District 1004		All Electric						0.00
Reclamation District 108	372.88					91.51		464.39
Roberts Ditch Irrigation Company	1.60							1.60
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					566.27			566.27
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					11.20			11.20
Windswept Land and Livestock					All Electric			2,379.78
Total	**847.88**	**643.93**	**12.63**	**0.00**	**783.82**	**91.51**	**0.00**	**4,759.55**

Key:
NOx = nitrogen oxides

Table G-5. Daily CO Emissions (Unmitigated)

Water Agency	Daily CO Emissions (pounds per day)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					19.31			19.31
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					14.68			14.68
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					19.31			19.31
Glenn-Colusa Irrigation District	146.12	17.62						163.74
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					20.52			20.52
Natomas Central Mutual Water Company			48.05		90.01			138.06
Pelger Mutual Water Company					11.50			11.50
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					88.80			88.80
Princeton-Codora-Glenn Irrigation District	21.91	65.95						87.86
Provident Irrigation District		104.47						104.47
Reclamation District 1004		All Electric						0.00
Reclamation District 108	129.54					31.38		160.91
Roberts Ditch Irrigation Company	3.19							3.19
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					466.40			466.40
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					22.41			22.41
Windswept Land and Livestock					All Electric			1,321.17
Total	**300.77**	**188.04**	**48.05**	**0.00**	**752.94**	**31.38**	**0.00**	**2,642.34**

Key:
CO = carbon monoxide

Table G-6. Daily SOx Emissions (Unmitigated)

Water Agency	Daily SOx Emissions (pounds per day)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.00			0.00
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.00			0.00
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.00			0.00
Glenn-Colusa Irrigation District	44.58	7.24						51.82
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					2.90			2.90
Natomas Central Mutual Water Company			8.61		2.77			11.37
Pelger Mutual Water Company					2.87			2.87
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					10.58			10.58
Princeton-Codora-Glenn Irrigation District	6.73	13.45						20.18
Provident Irrigation District		32.25						32.25
Reclamation District 1004		All Electric						0.00
Reclamation District 108	22.84					5.62		28.47
Roberts Ditch Irrigation Company	0.00							0.00
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					55.80			55.80
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					0.00			0.00
Windswept Land and Livestock					All Electric			216.25
Total	**74.15**	**52.95**	**8.61**	**0.00**	**74.92**	**5.62**	**0.00**	**432.49**

Key:
SOx = sulfur oxides

Summary of Daily Groundwater Substitution Emissions by County (Unmitigated)

Table G-7. Daily PM10 Emissions (Unmitigated)

Water Agency	Daily PM10 Emissions (pounds per day)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.00			0.00
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.00			0.00
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.00			0.00
Glenn-Colusa Irrigation District	26.24	0.08						26.32
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.69			0.69
Natomas Central Mutual Water Company			0.14		0.05			0.18
Pelger Mutual Water Company					0.69			0.69
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					1.07			1.07
Princeton-Codora-Glenn Irrigation District	7.22	10.45						17.66
Provident Irrigation District		29.54						29.54
Reclamation District 1004		All Electric						0.00
Reclamation District 108	24.51					0.91		25.41
Roberts Ditch Irrigation Company	0.00							0.00
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					4.82			4.82
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					0.00			0.00
Windswept Land and Livestock					All Electric			106.39
Total	**57.97**	**40.06**	**0.14**	**0.00**	**7.32**	**0.91**	**0.00**	**212.79**

Key:
PM10 = inhalable particulate matter

Table G-8. Daily PM2.5 Emissions (Unmitigated)

Water Agency	Daily PM2.5 Emissions (pounds per day)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.00			0.00
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.00			0.00
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.00			0.00
Glenn-Colusa Irrigation District	25.61	0.08						25.69
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.68			0.68
Natomas Central Mutual Water Company			0.14		0.04			0.18
Pelger Mutual Water Company					0.67			0.67
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					1.04			1.04
Princeton-Codora-Glenn Irrigation District	7.04	10.20						17.24
Provident Irrigation District		28.83						28.83
Reclamation District 1004		All Electric						0.00
Reclamation District 108	23.92					0.89		24.81
Roberts Ditch Irrigation Company	0.00							0.00
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					4.71			4.71
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					0.00			0.00
Windswept Land and Livestock					All Electric			103.85
Total	**56.58**	**39.10**	**0.14**	**0.00**	**7.15**	**0.89**	**0.00**	**207.69**

Key:
PM2.5 = fine particulate matter

Summary of Annual Groundwater Substitution Emissions by County (Unmitigated)

Table G-9. Annual VOC Emissions (Unmitigated)

Water Agency	Annual VOC Emissions (tons per year)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.37			0.37
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.32			0.32
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.45			0.45
Glenn-Colusa Irrigation District	3.04	0.26						3.31
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.41			0.41
Natomas Central Mutual Water Company			0.44		1.41			1.84
Pelger Mutual Water Company					0.03			0.03
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					1.39			1.39
Princeton-Codora-Glenn Irrigation District	0.61	1.18						1.79
Provident Irrigation District		2.60						2.60
Reclamation District 1004		All Electric						0.00
Reclamation District 108	3.89					0.94		4.83
Roberts Ditch Irrigation Company	0.07							0.07
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					10.41			10.41
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					0.52			0.52
Windswept Land and Livestock					All Electric			28.35
Total	**7.62**	**4.04**	**0.44**	**0.00**	**15.31**	**0.94**	**0.00**	**56.70**

Key:
VOC = volatile organic compounds

Table G-10. Annual NOx Emissions (Unmitigated)

Water Agency	Annual NOx Emissions (tons per year)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.75			0.75
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.64			0.64
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.90			0.90
Glenn-Colusa Irrigation District	34.57	4.97						39.54
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					2.83			2.83
Natomas Central Mutual Water Company			0.88		2.82			3.70
Pelger Mutual Water Company					0.61			0.61
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					8.39			8.39
Princeton-Codora-Glenn Irrigation District	7.57	12.97						20.54
Provident Irrigation District		31.79						31.79
Reclamation District 1004		All Electric						0.00
Reclamation District 108	34.68					8.51		43.19
Roberts Ditch Irrigation Company	0.15							0.15
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					52.66			52.66
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					1.04			1.04
Windswept Land and Livestock					All Electric			206.71
Total	**76.96**	**49.73**	**0.88**	**0.00**	**70.63**	**8.51**	**0.00**	**413.43**

Key:
NOx = nitrogen oxides

Summary of Annual Groundwater Substitution Emissions by County (Unmitigated)

Table G-11. Annual CO Emissions (Unmitigated)

	Annual CO Emissions (tons per year)							
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Yuba**	**Total**
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					1.50			1.50
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					1.27			1.27
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					1.80			1.80
Glenn-Colusa Irrigation District	13.59	1.64						15.23
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					1.91			1.91
Natomas Central Mutual Water Company			3.35		6.28			9.63
Pelger Mutual Water Company					0.81			0.81
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					7.43			7.43
Princeton-Codora-Glenn Irrigation District	1.63	4.91						6.54
Provident Irrigation District		7.98						7.98
Reclamation District 1004		All Electric						0.00
Reclamation District 108	12.05					2.92		14.96
Roberts Ditch Irrigation Company	0.29							0.29
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					43.38			43.38
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					2.08			2.08
Windswept Land and Livestock					All Electric			114.81
Total	**27.56**	**14.53**	**3.35**	**0.00**	**66.45**	**2.92**	**0.00**	**229.61**

Key:
CO = carbon monoxide

Table G-12. Annual SOx Emissions (Unmitigated)

	Annual SOx Emissions (tons per year)							
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Yuba**	**Total**
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.00			0.00
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.00			0.00
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.00			0.00
Glenn-Colusa Irrigation District	4.15	0.67						4.82
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.27			0.27
Natomas Central Mutual Water Company			0.60		0.19			0.79
Pelger Mutual Water Company					0.20			0.20
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					0.89			0.89
Princeton-Codora-Glenn Irrigation District	0.50	1.00						1.50
Provident Irrigation District		2.46						2.46
Reclamation District 1004		All Electric						0.00
Reclamation District 108	2.12					0.52		2.65
Roberts Ditch Irrigation Company	0.00							0.00
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					5.19			5.19
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					0.00			0.00
Windswept Land and Livestock					All Electric			18.77
Total	**6.77**	**4.14**	**0.60**	**0.00**	**6.74**	**0.52**	**0.00**	**37.54**

Key:
SOx = sulfur oxides

Summary of Annual Groundwater Substitution Emissions by County (Unmitigated)

Table G-13. Annual PM10 Emissions (Unmitigated)

	Annual PM10 Emissions (tons per year)							
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Yuba**	**Total**
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.00			0.00
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.00			0.00
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.00			0.00
Glenn-Colusa Irrigation District	2.44	0.01						2.45
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.06			0.06
Natomas Central Mutual Water Company			0.01		0.00			0.01
Pelger Mutual Water Company					0.05			0.05
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					0.09			0.09
Princeton-Codora-Glenn Irrigation District	0.54	0.78						1.31
Provident Irrigation District		2.26						2.26
Reclamation District 1004		All Electric						0.00
Reclamation District 108	2.28					0.08		2.36
Roberts Ditch Irrigation Company	0.00							0.00
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					0.45			0.45
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					0.00			0.00
Windswept Land and Livestock					All Electric			9.05
Total	**5.26**	**3.04**	**0.01**	**0.00**	**0.65**	**0.08**	**0.00**	**18.09**

Key:
PM10 = inhalable particulate matter

Table G-14. Annual PM2.5 Emissions (Unmitigated)

	Annual PM2.5 Emissions (tons per year)							
Water Agency	**Colusa**	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Yuba**	**Total**
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.00			0.00
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.00			0.00
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.00			0.00
Glenn-Colusa Irrigation District	2.38	0.01						2.39
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.06			0.06
Natomas Central Mutual Water Company			0.01		0.00			0.01
Pelger Mutual Water Company					0.05			0.05
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					0.09			0.09
Princeton-Codora-Glenn Irrigation District	0.52	0.76						1.28
Provident Irrigation District		2.20						2.20
Reclamation District 1004		All Electric						0.00
Reclamation District 108	2.22					0.08		2.31
Roberts Ditch Irrigation Company	0.00							0.00
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					0.44			0.44
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					0.00			0.00
Windswept Land and Livestock					All Electric			8.83
Total	**5.13**	**2.97**	**0.01**	**0.00**	**0.64**	**0.08**	**0.00**	**17.66**

Key:
PM2.5 = fine particulate matter

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Anderson-Cottonwood Irrigation District				Peak Pumping by Transfer Period	
Transfer Volume	2,450	acre-feet	(Apr-Jun)		817	AF/month
	2,450	acre-feet	(Jul-Sep)		817	AF/month
	4,900	**acre-feet/year**	**Maximum**	*ok*		

Table G-15. Anderson-Cottonwood Irrigation District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Shasta	0	2	0	0	2	Yes
Total	0	2	0	0	2	

Table G-16. Anderson-Cottonwood Irrigation District Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
Crowley	Shasta	Electric	2012	50	n/a	1,200	19%	158	948	23	4,292
Barney	Shasta	Electric	2012	200	n/a	5,000	81%	659	3,952	23	4,292
					Total	**6,200**	**100%**	**817**	**4,900**	**46**	**8,584**
					Shasta County Subtotal	**6,200**	**100%**	**817**	**4,900**	**46**	**8,584**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
817 AF/month
5,961 gallons/minute
96% peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Andreotti			Peak Pumping by Transfer Period	
Transfer Volume	1,000	acre-feet	(Apr-Jun)	333	AF/month
	1,500	acre-feet	(Jul-Sep)	500	AF/month
	2,500	acre-feet/year	Maximum	ok	

Table G-17. Andreotti Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	0	0	0	1	1	No
Total	0	0	0	1	1	

Table G-18. Andreotti Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Transfer Volume (% of Total)	Transfer Volume (AF/month)	Operations (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
Proposed Well	Sutter	Propane	Unknown	150	n/a	6,000	100%	500	2,500	15	2,263	864	1.0	2.0	4.0	0.0	0.0	0.00	4.83	9.66	19.31	0.00	0.00	0.00	0.37	0.75	1.50	0.00	0.00	0.00
					Total	**6,000**	**100%**	**500**	**2,500**	**15**	**2,263**								**4.83**	**9.66**	**19.31**	**0.00**	**0.00**	**0.00**	**0.37**	**0.75**	**1.50**	**0.00**	**0.00**	**0.00**
					Sutter County Subtotal	**6,000**	**100%**	**500**	**2,500**	**15**	**2,263**								**4.83**	**9.66**	**19.31**	**0.00**	**0.00**	**0.00**	**0.37**	**0.75**	**1.50**	**0.00**	**0.00**	**0.00**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

	Peak Month
500	AF/month
3,650	gallons/minute
61%	peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency Butte Water District

Transfer Volume 3,000 acre-feet (Apr-Jun)

3,000 acre-feet (Jul-Sep)

6,000 acre-feet/year Maximum

Peak Pumping by Transfer Period

1,000 AF/month

1,000 AF/month

Table G-19. Butte Water District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	0	3	0	0	3	No
Total	0	3	0	0	3	

Table G-20. Butte Water District Criteria Pollutant Emissions

	Well Location			**Power Rating**	**Diesel Emission**	**Pump Rate**		**Transfer Volume**		**Operations**	
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**Tier**	**(gpm)**	**(% of Total)**	**(AF/month)**	**(AF/year)**	**(hours/day)**	**(hours/year)**
26R1 - Well #2	Sutter	Electric	Unknown	350	n/a	4,150	35%	349	2,092	15	2,738
30E1 - Well #1	Sutter	Electric	Unknown	300	n/a	3,600	30%	303	1,815	15	2,738
Pippitt Well	Sutter	Electric	Unknown	350	n/a	4,150	35%	349	2,092	15	2,738
					Total	**11,900**	**100%**	**1,000**	**6,000**	**44**	**8,215**
					Sutter County Subtotal	**11,900**	**100%**	**1,000**	**6,000**	**44**	**8,215**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
1,000 AF/month
7,300 gallons/minute
61% peak pump rate

Conversion Factors
1 day = 24 hours
1 month = 31 days
1 hour = 60 minutes
1 acre-foot = 325,851 gallons

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Cordua Irrigation District				Peak Pumping by Transfer Period
Transfer Volume	0 acre-feet	(Apr-Jun)			0 AF/month
	12,000 acre-feet	(Jul-Sep)			4,000 AF/month
	12,000 acre-feet/year	**Maximum**	*ok*		

Table G-21. Cordua Irrigation District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Yuba	0	37	0	0	37	No
Total	0	37	0	0	37	

Table G-22. Cordua Irrigation District Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
COR-01	Yuba	Electric	Unknown	60	n/a	1,100	2%	71	213	11	1,049
COR-02	Yuba	Electric	Unknown	50	n/a	900	1%	58	174	11	1,049
COR-03	Yuba	Electric	Unknown	50	n/a	1,000	2%	64	193	11	1,049
COR-04	Yuba	Electric	Unknown	75	n/a	1,400	2%	90	271	11	1,049
COR-05	Yuba	Electric	Unknown	75	n/a	1,200	2%	77	232	11	1,049
COR-07	Yuba	Electric	Unknown	40	n/a	1,200	2%	77	232	11	1,049
COR-08	Yuba	Electric	Unknown	75	n/a	1,600	3%	103	309	11	1,049
COR-09	Yuba	Electric	Unknown	60	n/a	1,400	2%	90	271	11	1,049
COR-10	Yuba	Electric	Unknown	60	n/a	1,000	2%	64	193	11	1,049
COR-11	Yuba	Electric	Unknown	75	n/a	1,500	2%	97	290	11	1,049
COR-12	Yuba	Electric	Unknown	75	n/a	1,400	2%	90	271	11	1,049
COR-13	Yuba	Electric	Unknown	100	n/a	2,000	3%	129	386	11	1,049
COR-14	Yuba	Electric	Unknown	75	n/a	1,600	3%	103	309	11	1,049
COR-15	Yuba	Electric	Unknown	75	n/a	1,600	3%	103	309	11	1,049
COR-16	Yuba	Electric	Unknown	75	n/a	1,800	3%	116	348	11	1,049
COR-17	Yuba	Electric	Unknown	75	n/a	2,500	4%	161	483	11	1,049
COR-18	Yuba	Electric	Unknown	75	n/a	1,700	3%	110	329	11	1,049
COR-19	Yuba	Electric	Unknown	75	n/a	1,000	2%	64	193	11	1,049
COR-20	Yuba	Electric	Unknown	125	n/a	1,800	3%	116	348	11	1,049
COR-21	Yuba	Electric	Unknown	60	n/a	1,200	2%	77	232	11	1,049
COR-22	Yuba	Electric	Unknown	60	n/a	1,500	2%	97	290	11	1,049
COR-23	Yuba	Electric	Unknown	75	n/a	2,000	3%	129	386	11	1,049
COR-24	Yuba	Electric	Unknown	75	n/a	1,700	3%	110	329	11	1,049
COR-25	Yuba	Electric	Unknown	75	n/a	2,000	3%	129	386	11	1,049
COR-26	Yuba	Electric	Unknown	100	n/a	1,400	2%	90	271	11	1,049
COR-27	Yuba	Electric	Unknown	100	n/a	1,200	2%	77	232	11	1,049
COR-28	Yuba	Electric	Unknown	50	n/a	800	1%	52	155	11	1,049
COR-30	Yuba	Electric	Unknown	100	n/a	2,500	4%	161	483	11	1,049
COR-31	Yuba	Electric	Unknown	100	n/a	1,700	3%	110	329	11	1,049
COR-32	Yuba	Electric	Unknown	100	n/a	3,100	5%	200	599	11	1,049
COR-33	Yuba	Electric	Unknown	75	n/a	2,200	4%	142	425	11	1,049
COR-34	Yuba	Electric	Unknown	100	n/a	2,600	4%	167	502	11	1,049
COR-35	Yuba	Electric	Unknown	125	n/a	2,700	4%	174	522	11	1,049
COR-36	Yuba	Electric	Unknown	60	n/a	1,100	2%	71	213	11	1,049
COR-37	Yuba	Electric	Unknown	75	n/a	2,000	3%	129	386	11	1,049
COR-38	Yuba	Electric	Unknown	75	n/a	2,700	4%	174	522	11	1,049
COR-39	Yuba	Electric	Unknown	75	n/a	2,000	3%	129	386	11	1,049
					Total	**62,100**	**100%**	**4,000**	**12,000**	**418**	**38,829**
					Yuba County Subtotal	**62,100**	**100%**	**4,000**	**12,000**	**418**	**38,829**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
4,000 AF/month
29,198 gallons/minute
47% peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Garden Highway Mutual Water Company				Peak Pumping by Transfer Period	
Transfer Volume	6,500	acre-feet	(Apr-Jun)		2,167	AF/month
	7,500	acre-feet	(Jul-Sep)		2,500	AF/month
	14,000	**acre-feet/year**	**Maximum**	*ok*		

Table G-23. Garden Highway Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	0	8	0	1	9	No
Total	0	8	0	1	9	

Table G-24. Garden Highway Mutual Water Company Criteria Pollutant Emissions

	Well Location			Power Rating	Diesel Emission	Pump Rate		Transfer Volume		Operations		Fuel Consumption	Emission Factors (g/bhp-hr)						Daily Emissions (pounds per day)						Annual Emissions (tons per year)					
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**Tier**	**(gpm)**	**(% of Total)**	**(AF/month)**	**(AF/year)**	**(hours/day)**	**(hours/year)**	**(gal/yr) - diesel (MMBtu/yr) - propane or NG**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
GH Well 1	Sutter	Propane	Unknown	80	n/a	1,500	7%	178	998	21	3,612	735	1.0	2.0	4.0	0.0	0.0	0.00	3.67	7.34	14.68	0.00	0.00	0.00	0.32	0.64	1.27	0.00	0.00	0.00
GH Well 17	Sutter	Electric	Unknown	60	n/a	2,900	14%	344	1,929	21	3,612	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GH Well 22	Sutter	Electric	Unknown	100	n/a	2,500	12%	297	1,663	21	3,612	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GH Well 23	Sutter	Electric	Unknown	100	n/a	2,000	10%	238	1,330	21	3,612	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GH Well 26	Sutter	Electric	Unknown	100	n/a	3,500	17%	416	2,328	21	3,612	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GH Well 27	Sutter	Electric	Unknown	100	n/a	3,000	14%	356	1,995	21	3,612	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GH Well 4	Sutter	Electric	Unknown	100	n/a	2,100	10%	249	1,397	21	3,612	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GH Well 18	Sutter	Electric	Unknown	60	n/a	1,800	9%	214	1,197	21	3,612	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GH Well 24	Sutter	Electric	Unknown	60	n/a	1,750	8%	208	1,164	21	3,612	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
					Total	**21,050**	**100%**	**2,500**	**14,000**	**187**	**32,508**								**3.67**	**7.34**	**14.68**	**0.00**	**0.00**	**0.00**	**0.32**	**0.64**	**1.27**	**0.00**	**0.00**	**0.00**
					Sutter County Subtotal	**21,050**	**100%**	**2,500**	**14,000**	**187**	**32,508**								**3.67**	**7.34**	**14.68**	**0.00**	**0.00**	**0.00**	**0.32**	**0.64**	**1.27**	**0.00**	**0.00**	**0.00**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month

2,500	AF/month
18,249	gallons/minute
87%	peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Gilsizer Slough Ranch				Peak Pumping by Transfer Period	
Transfer Volume	1,600	acre-feet	(Apr-Jun)		533	AF/month
	1,600	acre-feet	(Jul-Sep)		533	AF/month
	3,200	**acre-feet/year**	**Maximum**	*ok*		

Table G-25. Gilsizer Slough Ranch Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	0	1	0	0	1	No
Total	0	1	0	0	1	

Table G-26. Gilsizer Slough Ranch Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
WCR-0949068	Sutter	Electric	Unknown	100	n/a	4,000	100%	533	3,200	23	4,345
					Total	**4,000**	**100%**	**533**	**3,200**	**23**	**4,345**
					Sutter County Subtotal	**4,000**	**100%**	**533**	**3,200**	**23**	**4,345**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month

533	AF/month
3,893	gallons/minute
97%	peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Giusti Farms			Peak Pumping by Transfer Period	
Transfer Volume	500	acre-feet	(Apr-Jun)	167	AF/month
	500	acre-feet	(Jul-Sep)	167	AF/month
	1,000	**acre-feet/year**	**Maximum** *ok*		

Table G-27. Giusti Farms Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	0	0	0	2	2	No
Total	0	0	0	2	2	

Table G-28. Giusti Farms Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
G-1	Sutter	Propane	Unknown	250	n/a	1,500	30%	50	300	6	1,086	691	1.0	2.0	4.0	0.0	0.0	0.00	3.22	6.44	12.87	0.00	0.00	0.00	0.30	0.60	1.20	0.00	0.00	0.00
G-2	Sutter	Propane	Unknown	125	n/a	3,500	70%	117	700	6	1,086	345	1.0	2.0	4.0	0.0	0.0	0.00	1.61	3.22	6.44	0.00	0.00	0.00	0.15	0.30	0.60	0.00	0.00	0.00
Total						**5,000**	**100%**	**167**	**1,000**	**12**	**2,172**								**4.83**	**9.66**	**19.31**	**0.00**	**0.00**	**0.00**	**0.45**	**0.90**	**1.80**	**0.00**	**0.00**	**0.00**
Sutter County Subtotal						**5,000**	**100%**	**167**	**1,000**	**12**	**2,172**								**4.83**	**9.66**	**19.31**	**0.00**	**0.00**	**0.00**	**0.45**	**0.90**	**1.80**	**0.00**	**0.00**	**0.00**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
167 AF/month
1,217 gallons/minute
24% peak pump rate

Conversion Factors
1 day = 24 hours
1 month = 31 days
1 hour = 60 minutes
1 acre-foot = 325,851 gallons

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Glenn-Colusa Irrigation District				Peak Pumping by Transfer Period	
Transfer Volume	11,800	acre-feet	(Apr-Jun)		3,933	AF/month
	11,800	acre-feet	(Jul-Sep)		3,933	AF/month
	23,600	**acre-feet/year**	**Maximum**	*ok*		

Table G-29. Glenn-Colusa Irrigation District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Colusa	4	6	0	0	10	Yes
Glenn	1	7	0	0	8	Yes
Total	5	13	0	0	18	

Table G-30. Glenn-Colusa Irrigation District Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG
17-2-6B-1	Colusa	Electric	Unknown	250	n/a	2,050	7%	276	1,654	24	4,382	n/a
GRS-34N-1	Glenn	Diesel	Unknown	150	T1	1,350	5%	182	1,089	24	4,382	36,874
GRS-35A-2	Glenn	Electric	Unknown	125	n/a	3,500	12%	471	2,824	24	4,382	n/a
GRS-84A-1	Glenn	Electric	Unknown	125	n/a	2,500	9%	336	2,017	24	4,382	n/a
Haymen	Colusa	Diesel	Unknown	250	T0	2,000	7%	269	1,614	24	4,382	61,456
LaCroix 1	Glenn	Electric	Unknown	100	n/a	400	1%	54	323	24	4,382	n/a
LaCroix 2	Glenn	Electric	Unknown	100	n/a	400	1%	54	323	24	4,382	n/a
LaCroix 3	Glenn	Electric	Unknown	100	n/a	400	1%	54	323	24	4,382	n/a
Lagrande	Colusa	Diesel	2012	250	T4	2,800	10%	377	2,259	24	4,382	61,456
Reister 1	Colusa	Electric	Unknown	100	n/a	500	2%	67	403	24	4,382	n/a
Reister 2	Colusa	Electric	Unknown	100	n/a	500	2%	67	403	24	4,382	n/a
Reister 4	Colusa	Electric	Unknown	100	n/a	900	3%	121	726	24	4,382	n/a
Vann 1	Colusa	Diesel	2014	173	T4	1,500	5%	202	1,210	24	4,382	42,528
Vann 2	Colusa	Electric	Unknown	300	n/a	2,500	9%	336	2,017	24	4,382	n/a
322N	Colusa	Diesel	Unknown	250	T0	2,000	7%	269	1,614	24	4,382	61,456
S2-36T	Glenn	Electric	Unknown	100	n/a	2,800	10%	377	2,259	24	4,382	n/a
Reister 3	Colusa	Electric	Unknown	100	n/a	850	3%	114	686	24	4,382	n/a
GRS-22H-1	Glenn	Electric	Unknown	125	n/a	2,300	8%	309	1,856	24	4,382	n/a
Total						**29,250**	**100%**	**3,933**	**23,600**	**424**	**78,873**	
Colusa County Subtotal						**15,600**	**53%**	**2,098**	**12,587**	**236**	**43,818**	
Glenn County Subtotal						**13,650**	**47%**	**1,836**	**11,013**	**188**	**35,055**	

Well ID	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
17-2-6B-1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GRS-34N-1	0.4	6.9	2.3	0.9	0.0	0.01	2.82	53.49	17.62	7.24	0.08	0.08	0.26	4.97	1.64	0.67	0.01	0.01
GRS-35A-2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GRS-84A-1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Haymen	1.1	14.1	3.0	0.9	1.0	0.97	14.81	182.58	39.34	12.07	12.96	12.65	1.38	16.98	3.66	1.12	1.20	1.18
LaCroix 1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
LaCroix 2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
LaCroix 3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lagrande	0.1	0.3	2.6	0.9	0.0	0.01	1.84	3.88	33.91	12.07	0.19	0.19	0.17	0.36	3.15	1.12	0.02	0.02
Reister 1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Reister 2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Reister 4	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Vann 1	0.1	0.3	3.7	0.9	0.0	0.01	1.27	2.68	33.53	8.35	0.13	0.13	0.12	0.25	3.12	0.78	0.01	0.01
Vann 2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
322N	1.1	14.1	3.0	0.9	1.0	0.97	14.81	182.58	39.34	12.07	12.96	12.65	1.38	16.98	3.66	1.12	1.20	1.18
S2-36T	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Reister 3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GRS-22H-1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total							**35.54**	**425.20**	**163.74**	**51.82**	**26.32**	**25.69**	**3.31**	**39.54**	**15.23**	**4.82**	**2.45**	**2.39**
Colusa County Subtotal							**32.73**	**371.71**	**146.12**	**44.58**	**26.24**	**25.61**	**3.04**	**34.57**	**13.59**	**4.15**	**2.44**	**2.38**
Glenn County Subtotal							**2.82**	**53.49**	**17.62**	**7.24**	**0.08**	**0.08**	**0.26**	**4.97**	**1.64**	**0.67**	**0.01**	**0.01**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
3,933 AF/month
28,711 gallons/minute
98% peak pump rate

Conversion Factors
1 day = 24 hours
1 month = 31 days
1 hour = 60 minutes
1 acre-foot = 325,851 gallons

Diesel Engine Fuel Consumption
0.4 lb/hp-hr *(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855 g/mL *(Based on MSDS for Hess Diesel Fuel All Types)*
7.13 lb/gal

Groundwater Substitution Air Quality Emissions (Unmitigated)

					Peak Pumping by Transfer Period	
Agency	Henle Family Ltd. Partnership					
Transfer Volume	325	acre-feet	(Apr-Jun)		108	AF/month
	275	acre-feet	(Jul-Sep)		92	AF/month
	600	**acre-feet/year**	**Maximum**	*ok*		

Table G-31. Henle Family Ltd. Partnership Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	0	2	0	0	2	No
Total	0	2	0	0	2	

Table G-32. Henle Family Ltd. Partnership Criteria Pollutant Emissions

Well ID	Well Location	Fuel Type	Model Year	Power Rating	Diesel Emission	Pump Rate		Transfer Volume		Operations	
	(County)			(hp)	Tier	(gpm)	(% of Total)	(AF/month)	(AF/year)	(hours/day)	(hours/year)
H-2	Sutter	Electric	Unknown	200	n/a	3,600	58%	63	348	3	526
H-1	Sutter	Electric	Unknown	150	n/a	2,600	42%	45	252	3	526
					Total	**6,200**	**100%**	**108**	**600**	**6**	**1,051**
					Sutter County Subtotal	**6,200**	**100%**	**108**	**600**	**6**	**1,051**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
108 AF/month
791 gallons/minute
13% peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Meridian Farms Water Company				Peak Pumping by Transfer Period	
Transfer Volume	3,000	acre-feet	(Apr-Jun)		1,000	AF/month
	3,000	acre-feet	(Jul-Sep)		1,000	AF/month
	6,000	**acre-feet/year**	**Maximum**	*ok*		

Table G-33. Meridian Farms Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	2	9	0	2	13	No
Total	2	9	0	2	13	

Table G-34. Meridian Farms Water Company Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
Prop 50	Sutter	Electric	Unknown	100	n/a	2,500	8%	76	459	5	996	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Clark Well	Sutter	Electric	Unknown	75	n/a	3,000	9%	92	550	5	996	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Jim Chesini	Sutter	Diesel	Unknown	125	T0	2,500	8%	76	459	5	996	6,988	1.1	14.1	3.0	0.9	0.2	0.21	1.68	20.76	4.47	1.37	0.32	0.32	0.16	1.93	0.42	0.13	0.03	0.03
Meridian	Sutter	Propane	Unknown	60	n/a	1,500	5%	46	275	5	996	152	1.0	2.0	4.0	0.0	0.0	0.00	0.71	1.42	2.83	0.00	0.00	0.00	0.07	0.13	0.26	0.00	0.00	0.00
DoDo	Sutter	Diesel	Unknown	139	T3	1,200	4%	37	220	5	996	7,771	0.1	2.8	3.7	0.9	0.2	0.22	0.25	4.66	6.13	1.53	0.37	0.36	0.02	0.43	0.57	0.14	0.03	0.03
S Meridian	Sutter	Electric	Unknown	125	n/a	3,000	9%	92	550	5	996	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Taylor	Sutter	Propane	Unknown	150	n/a	2,500	8%	76	459	5	996	380	1.0	2.0	4.0	0.0	0.0	0.00	1.77	3.54	7.09	0.00	0.00	0.00	0.16	0.33	0.66	0.00	0.00	0.00
Park-Miller	Sutter	Electric	Unknown	125	n/a	3,000	9%	92	550	5	996	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Moroni	Sutter	Electric	Unknown	75	n/a	3,000	9%	92	550	5	996	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Cussick	Sutter	Electric	Unknown	125	n/a	2,000	6%	61	367	5	996	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Mike Chesini	Sutter	Electric	Unknown	75	n/a	2,500	8%	76	459	5	996	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pump 7 (Proposed well)	Sutter	Electric	Unknown	100	n/a	3,000	9%	92	550	5	996	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Filipino Camp (Proposed well)	Sutter	Electric	Unknown	100	n/a	3,000	9%	92	550	5	996	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
					Total	**32,700**	**100%**	**1,000**	**6,000**	**70**	**12,954**								**4.41**	**30.38**	**20.52**	**2.90**	**0.69**	**0.68**	**0.41**	**2.83**	**1.91**	**0.27**	**0.06**	**0.06**
					Sutter County Subtotal	**32,700**	**100%**	**1,000**	**6,000**	**70**	**12,954**								**4.41**	**30.38**	**20.52**	**2.90**	**0.69**	**0.68**	**0.41**	**2.83**	**1.91**	**0.27**	**0.06**	**0.06**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
1,000 AF/month
7,300 gallons/minute
22% peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Natomas Central Mutual Water Company			Peak Pumping by Transfer Period	
Transfer Volume	10,000	acre-feet	(Apr-Jun)	3,333	AF/month
	20,000	acre-feet	(Jul-Sep)	6,667	AF/month
	30,000	**acre-feet/year**	**Maximum** *ok*		

Table G-35. Natomas Central Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	1	22	0	4	27	No
Sacramento	2	21	0	1	24	No
Total	3	43	0	5	51	

Table G-36. Natomas Central Mutual Water Company Criteria Pollutant Emissions

	Well Location			Power Rating	Diesel Emission	Pump Rate		Transfer Volume		Operations		Fuel Consumption	Emission Factors (g/bhp-hr)						Daily Emissions (pounds per day)						Annual Emissions (tons per year)					
Well ID	(County)	Fuel Type	Model Year	(hp)	Tier	(gpm)	(% of Total)	(AF/month)	(AF/year)	(hours/day)	(hours/year)	(gal/yr) - diesel (MMBtu/yr) - propane or NG	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5
Frazer	Sutter	Electric	Unknown	50	n/a	2,000	2%	128	575	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Morrison 2	Sutter	Electric	Unknown	75	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lucich North	Sutter	Electric	Unknown	75	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bennett North	Sutter	Electric	Unknown	60	n/a	2,200	2%	141	632	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Atkinson	Sutter	Electric	Unknown	40	n/a	1,800	2%	115	517	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Natomas Farms (TNBC Fisherman's Lake)	Sacramento	Electric	Unknown	60	n/a	1,500	1%	96	431	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Silva	Sacramento	Electric	Unknown	40	n/a	1,000	1%	64	287	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Betts	Sacramento	Electric	Unknown	75	n/a	1,500	1%	96	431	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pond R	Sacramento	Electric	Unknown	30	n/a	2,300	2%	147	661	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bianchi	Sutter	Propane	Unknown	200	n/a	1,500	1%	96	431	11	1,561	795	1.0	2.0	4.0	0.0	0.0	0.00	4.93	9.87	19.74	0.00	0.00	0.00	0.34	0.69	1.38	0.00	0.00	0.00
Willey	Sacramento	Diesel	2012	225	T4	2,000	2%	128	575	11	1,561	19,708	0.1	0.3	2.6	0.9	0.0	0.01	0.79	1.66	14.50	5.16	0.08	0.08	0.05	0.12	1.01	0.36	0.01	0.01
L-MW	Sutter	Propane	Unknown	200	n/a	1,800	2%	115	517	11	1,561	795	1.0	2.0	4.0	0.0	0.0	0.00	4.93	9.87	19.74	0.00	0.00	0.00	0.34	0.69	1.38	0.00	0.00	0.00
L-1	Sutter	Diesel	Unknown	120	T4	1,600	2%	102	460	11	1,561	10,511	0.1	0.3	3.7	0.9	0.0	0.01	0.42	0.88	11.05	2.75	0.04	0.04	0.03	0.06	0.77	0.19	0.00	0.00
L-2	Sutter	Electric	Unknown	100	n/a	1,900	2%	121	546	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-3	Sutter	Electric	Unknown	50	n/a	1,300	1%	83	374	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-4	Sutter	Electric	Unknown	75	n/a	1,300	1%	83	374	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-6	Sutter	Electric	Unknown	50	n/a	2,000	2%	128	575	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-7	Sutter	Electric	Unknown	30	n/a	1,200	1%	77	345	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-8	Sutter	Electric	Unknown	200	n/a	2,800	3%	179	805	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-9	Sutter	Electric	Unknown	50	n/a	1,500	1%	96	431	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-10	Sutter	Electric	Unknown	30	n/a	1,000	1%	64	287	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-11	Sutter	Electric	Unknown	50	n/a	1,500	1%	96	431	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-12	Sutter	Electric	Unknown	50	n/a	1,500	1%	96	431	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-13 Bolen Pasture	Sutter	Propane	Unknown	200	n/a	2,800	3%	179	805	11	1,561	795	1.0	2.0	4.0	0.0	0.0	0.00	4.93	9.87	19.74	0.00	0.00	0.00	0.34	0.69	1.38	0.00	0.00	0.00
L-14 Chappell	Sutter	Electric	Unknown	75	n/a	1,800	2%	115	517	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MAP	Sacramento	Electric	Unknown	30	n/a	2,000	2%	128	575	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ose-1	Sacramento	Diesel	2013	150	T4I	1,800	2%	115	517	11	1,561	13,139	0.1	0.3	3.7	0.9	0.0	0.01	0.52	1.10	13.81	3.44	0.06	0.05	0.04	0.08	0.96	0.24	0.00	0.00
Ose-2	Sacramento	Electric	Unknown	150	n/a	2,400	2%	153	690	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Perry	Sacramento	Electric	Unknown	135	n/a	2,600	2%	166	747	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Spangler	Sutter	Electric	Unknown	60	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Elkhorn	Sacramento	Electric	Unknown	125	n/a	3,000	3%	192	862	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ameral	Sacramento	Propane	Unknown	200	n/a	1,500	1%	96	431	11	1,561	795	1.0	2.0	4.0	0.0	0.0	0.00	4.93	9.87	19.74	0.00	0.00	0.00	0.34	0.69	1.38	0.00	0.00	0.00
Dhaliwal	Sacramento	Electric	Unknown	125	n/a	3,000	3%	192	862	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Kubo	Sacramento	Electric	Unknown	25	n/a	1,300	1%	83	374	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Greenbriar	Sacramento	Electric	Unknown	150	n/a	3,200	3%	204	920	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Souza	Sacramento	Electric	Unknown	150	n/a	1,200	1%	77	345	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Plant 3	Sacramento	Electric	Unknown	150	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Fish 1	Sacramento	Electric	Unknown	75	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Fish 2	Sacramento	Electric	Unknown	75	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lauppe	Sutter	Propane	Unknown	200	n/a	1,050	1%	67	302	11	1,561	795	1.0	2.0	4.0	0.0	0.0	0.00	4.93	9.87	19.74	0.00	0.00	0.00	0.34	0.69	1.38	0.00	0.00	0.00
Bryte	Sacramento	Electric	Unknown	150	n/a	1,500	1%	96	431	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
TNBC MW	Sutter	Electric	Unknown	150	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NDC	Sutter	Electric	Unknown	150	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bennett	Sutter	Electric	Unknown	150	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pritchard	Sacramento	Electric	Unknown	150	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Elverta	Sacramento	Electric	Unknown	150	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Elkhorn North	Sacramento	Electric	Unknown	150	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Radio Road	Sacramento	Electric	Unknown	150	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sankey	Sutter	Electric	Unknown	150	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
T-Drain	Sutter	Electric	Unknown	150	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Powerline Road Well	Sacramento	Electric	Unknown	150	n/a	2,500	2%	160	719	11	1,561	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total						**104,350**	**100%**	**6,667**	**30,000**	**571**	**79,628**								**26.41**	**53.00**	**138.06**	**11.37**	**0.18**	**0.18**	**1.84**	**3.70**	**9.63**	**0.79**	**0.01**	**0.01**
Sutter County Subtotal						**52,550**	**50%**	**3,357**	**15,108**	**302**	**42,156**								**20.16**	**40.36**	**90.01**	**2.77**	**0.05**	**0.04**	**1.41**	**2.82**	**6.28**	**0.19**	**0.00**	**0.00**
Sacramento County Subtotal						**51,800**	**50%**	**3,309**	**14,892**	**269**	**37,472**								**6.25**	**12.63**	**48.05**	**8.61**	**0.14**	**0.14**	**0.44**	**0.88**	**3.35**	**0.60**	**0.01**	**0.01**
						0	**0%**	**0**	**0**	**0**	**0**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month

6,667	AF/month
48,664	gallons/minute
47%	peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Pelger Mutual Water Company				Peak Pumping by Transfer Period	
Transfer Volume	3,151	acre-feet	(Apr-Jun)		1,050	AF/month
	1,599	acre-feet	(Jul-Sep)		533	AF/month
	4,750	**acre-feet/year**	**Maximum**	*ok*		

Table G-37. Pelger Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	1	4	0	0	5	No
Total	1	4	0	0	5	

Table G-38. Pelger Mutual Water Company Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (MMBtu/yr) - propane or NG
Well1(Tucker)	Sutter	Electric	Unknown	150	n/a	3,000	16%	172	779	10	1,410	n/a
Well2(Flopet)	Sutter	Diesel	2008	139	T3	2,500	14%	143	649	10	1,410	10,992
Well3(Klein)	Sutter	Electric	Unknown	150	n/a	4,000	22%	230	1,038	10	1,410	n/a
PMWC#1	Sutter	Electric	Unknown	150	n/a	4,400	24%	253	1,142	10	1,410	n/a
Proposed Pelger Well	Sutter	Electric	Unknown	150	n/a	4,400	24%	253	1,142	10	1,410	n/a
Total						**18,300**	**100%**	**1,050**	**4,750**	**50**	**7,048**	
Sutter County Subtotal						**18,300**	**100%**	**1,050**	**4,750**	**50**	**7,048**	

Well ID	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
Well1(Tucker)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Well2(Flopet)	0.1	2.8	3.7	0.9	0.2	0.22	0.46	8.74	11.50	2.87	0.69	0.67	0.03	0.61	0.81	0.20	0.05	0.05
Well3(Klein)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
PMWC#1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Proposed Pelger Well	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total							**0.46**	**8.74**	**11.50**	**2.87**	**0.69**	**0.67**	**0.03**	**0.61**	**0.81**	**0.20**	**0.05**	**0.05**
Sutter County Subtotal							**0.46**	**8.74**	**11.50**	**2.87**	**0.69**	**0.67**	**0.03**	**0.61**	**0.81**	**0.20**	**0.05**	**0.05**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month

1,050	AF/month
7,667	gallons/minute
42%	peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Pelger Road 1700 LLC				Peak Pumping by Transfer Period	
Transfer Volume	2,600	acre-feet	(Apr-Jun)		867	AF/month
	3,000	acre-feet	(Jul-Sep)		1,000	AF/month
	5,600	**acre-feet/year**	**Maximum**	*ok*		

Table G-39. Pelger Road 1700 LLC Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	0	4	0	0	4	No
Total	0	4	0	0	4	

Table G-40. Pelger Road 1700 LLC Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
North Well	Sutter	Electric	Unknown	200	n/a	3,500	23%	233	1,307	12	2,028
South Well	Sutter	Electric	Unknown	150	n/a	5,000	33%	333	1,867	12	2,028
North Well B	Sutter	Electric	Unknown	200	n/a	3,500	23%	233	1,307	12	2,028
South Well B	Sutter	Electric	Unknown	200	n/a	3,000	20%	200	1,120	12	2,028
					Total	**15,000**	**100%**	**1,000**	**5,600**	**47**	**8,110**
					Sutter County Subtotal	**15,000**	**100%**	**1,000**	**5,600**	**47**	**8,110**

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Pleasant Grove-Verona Mutual Water Company			Peak Pumping by Transfer Period
Transfer Volume	8,000 acre-feet	(Apr-Jun)		2,667 AF/month
	10,000 acre-feet	(Jul-Sep)		3,333 AF/month
	18,000 acre-feet/year	**Maximum**	*ok*	

Table G-41. Pleasant Grove-Verona Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	6	29	0	6	41	No
	0	0	0	0	0	
	0	0	0	0	0	
Total	6	29	0	6	41	

Table G-42. Pleasant Grove-Verona Mutual Water Company Criteria Pollutant Emissions

	Well Location			Power Rating	Diesel Emission	Pump Rate		Transfer Volume		Operations		Fuel Consumption	Emission Factors (g/bhp-hr)						Daily Emissions (pounds per day)						Annual Emissions (tons per year)					
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**Tier**	**(gpm)**	**(% of Total)**	**(AF/month)**	**(AF/year)**	**(hours/day)**	**(hours/year)**	**(gal/yr) - diesel (MMBtu/yr) - propane or NG**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
Kelly 190 Field Well #2	Sutter	Electric	Unknown	30	n/a	1,800	2%	70	377	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Kelly Windmill Field Well #2	Sutter	Electric	2002	80	n/a	1,500	2%	58	314	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Kelly Windmill North Field Well	Sutter	Propane	2014	80	n/a	1,800	2%	70	377	7	1,137	232	1.0	2.0	4.0	0.0	0.0	0.00	1.20	2.40	4.79	0.00	0.00	0.00	0.10	0.20	0.40	0.00	0.00	0.00
Kelly306	Sutter	Electric	Unknown	60	n/a	3,100	4%	120	649	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Kelly New Well	Sutter	Electric	Unknown	30	n/a	1,800	2%	70	377	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MLF Clubhouse B Well	Sutter	Electric	Unknown	100	n/a	3,600	4%	140	754	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MLF Marsh Well	Sutter	Electric	Unknown	100	n/a	3,300	4%	128	691	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MLF Monster Well	Sutter	Electric	Unknown	60	n/a	3,100	4%	120	649	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MLF Well #1	Sutter	Electric	Unknown	30	n/a	2,000	2%	78	419	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MLF Well #16	Sutter	Diesel	Unknown	60	T0	1,700	2%	66	356	7	1,137	3,828	1.1	14.1	3.0	0.9	0.3	0.29	1.02	12.64	2.72	0.84	0.27	0.26	0.09	1.06	0.23	0.07	0.02	0.02
MLF Well#11	Sutter	Diesel	2004	240	T2	1,400	2%	54	293	7	1,137	15,314	0.2	4.7	2.6	0.9	0.0	0.01	0.89	16.82	9.39	3.34	0.04	0.04	0.07	1.41	0.79	0.28	0.00	0.00
MLF Well#12/17	Sutter	Electric	Unknown	50	n/a	2,200	3%	85	461	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MLF Well#13&#15	Sutter	Diesel	2000	215	T1	1,900	2%	74	398	7	1,137	13,718	1.0	6.9	8.5	0.9	0.0	0.01	3.12	22.11	27.40	2.99	0.03	0.03	0.26	1.85	2.29	0.25	0.00	0.00
MLF Well#2B	Sutter	Electric	2000	100	n/a	2,750	3%	107	576	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MLF New Well	Sutter	Electric	Unknown	100	n/a	2,750	3%	107	576	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nicholas 72-Acre Field North	Sutter	Electric	Unknown	40	n/a	1,800	2%	70	377	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nicholas 72-Acre Field South	Sutter	Electric	2002	30	n/a	2,000	2%	78	419	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nicholas BBC Well	Sutter	Electric	Unknown	30	n/a	2,000	2%	78	419	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nicholas Filipino Camp South	Sutter	Diesel	2002	84	T1	800	1%	31	168	7	1,137	5,360	0.4	6.9	2.3	0.9	0.0	0.01	0.45	8.64	2.85	1.17	0.01	0.01	0.04	0.72	0.24	0.10	0.00	0.00
Nicholas Filipino Camp#2	Sutter	Electric	Unknown	40	n/a	1,700	2%	66	356	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nicholas Johnston Field Well #2	Sutter	Electric	Unknown	40	n/a	1,550	2%	60	325	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nicholas Sand Field Well	Sutter	Electric	2002	30	n/a	2,000	2%	78	419	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nicholas New Well	Sutter	Electric	Unknown	30	n/a	1,800	2%	70	377	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RiverRanch#19	Sutter	Diesel	2008	80	T3	2,500	3%	97	524	7	1,137	5,105	0.2	3.3	3.7	0.9	0.3	0.29	0.21	3.99	4.47	1.11	0.36	0.35	0.02	0.33	0.37	0.09	0.03	0.03
River Ranch New Well	Sutter	Electric	Unknown	60	n/a	3,000	3%	116	628	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S&O#16	Sutter	Electric	2014	80	n/a	2,000	2%	78	419	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S&O#17	Sutter	Electric	1999	80	n/a	3,000	3%	116	628	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S&O#18A	Sutter	Diesel	1999	80	T0	1,800	2%	70	377	7	1,137	5,105	1.1	14.1	3.0	0.9	0.3	0.29	1.37	16.85	3.63	1.11	0.36	0.35	0.11	1.41	0.30	0.09	0.03	0.03
S&O#19	Sutter	Propane	2007	80	n/a	2,000	2%	78	419	7	1,137	232	1.0	2.0	4.0	0.0	0.0	0.00	1.20	2.40	4.79	0.00	0.00	0.00	0.10	0.20	0.40	0.00	0.00	0.00
S&O#20	Sutter	Propane	2014	80	n/a	2,000	2%	78	419	7	1,137	232	1.0	2.0	4.0	0.0	0.0	0.00	1.20	2.40	4.79	0.00	0.00	0.00	0.10	0.20	0.40	0.00	0.00	0.00
Willey#1	Sutter	Propane	2000	170	n/a	3,000	3%	116	628	7	1,137	492	1.0	2.0	4.0	0.0	0.0	0.00	2.55	5.09	10.19	0.00	0.00	0.00	0.21	0.43	0.85	0.00	0.00	0.00
Willey#2	Sutter	Electric	Unknown	30	n/a	1,500	2%	58	314	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Willey#3	Sutter	Electric	Unknown	75	n/a	1,500	2%	58	314	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Willey#4	Sutter	Propane	1974	170	n/a	2,000	2%	78	419	7	1,137	492	1.0	2.0	4.0	0.0	0.0	0.00	2.55	5.09	10.19	0.00	0.00	0.00	0.21	0.43	0.85	0.00	0.00	0.00
Willey#5	Sutter	Propane	Unknown	60	n/a	2,000	2%	78	419	7	1,137	174	1.0	2.0	4.0	0.0	0.0	0.00	0.90	1.80	3.59	0.00	0.00	0.00	0.08	0.15	0.30	0.00	0.00	0.00
Will-Lee Well#30	Sutter	Electric	Unknown	30	n/a	1,500	2%	58	314	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Will-Lee Well#31	Sutter	Electric	Unknown	30	n/a	1,500	2%	58	314	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Will-Lee Well#32	Sutter	Electric	Unknown	50	n/a	2,500	3%	97	524	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Will-Lee Well#33	Sutter	Electric	Unknown	50	n/a	2,500	3%	97	524	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Will-Lee Well#4A	Sutter	Electric	2000	30	n/a	1,500	2%	58	314	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Spangler Well	Sutter	Electric	Unknown	40	n/a	1,800	2%	70	377	7	1,137	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
					Total	**85,950**	**100%**	**3,333**	**18,000**	**279**	**46,631**								**16.65**	**100.22**	**88.80**	**10.58**	**1.07**	**1.04**	**1.39**	**8.39**	**7.43**	**0.89**	**0.09**	**0.09**
					Sutter County Subtotal	**85,950**	**100%**	**3,333**	**18,000**	**279**	**46,631**								**16.65**	**100.22**	**88.80**	**10.58**	**1.07**	**1.04**	**1.39**	**8.39**	**7.43**	**0.89**	**0.09**	**0.09**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
3,333 AF/month
24,332 gallons/minute
28% peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Princeton-Codora-Glenn Irrigation District				Peak Pumping by Transfer Period	
Transfer Volume	3,000	acre-feet	(Apr-Jun)		1,000	AF/month
	5,000	acre-feet	(Jul-Sep)		1,667	AF/month
	8,000	**acre-feet/year**	**Maximum**	*ok*		

Table G-43. Princeton-Codora-Glenn Irrigation District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Glenn	6	5	0	0	11	Yes
Colusa	4	2	0	0	6	Yes
	0	0	0	0	0	
Total	10	7	0	0	17	

Table G-44. Princeton-Codora-Glenn Irrigation District Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG
Joel Mann	Glenn	Diesel	1995	185	T0	3,500	7%	109	524	5	814	8,444
D.Withrow	Glenn	Diesel	1992	180	T0	2,000	4%	62	300	5	814	8,216
Chrisman	Glenn	Diesel	2001	335	T1	3,000	6%	94	449	5	814	15,291
D.Schmidt	Colusa	Diesel	Unknown	150	T0	3,000	6%	94	449	5	814	6,847
Argo B	Glenn	Diesel	Unknown	150	T0	3,000	6%	94	449	5	814	6,847
Argo C	Glenn	Diesel	Unknown	150	T0	3,000	6%	94	449	5	814	6,847
F. Gomes	Colusa	Diesel	Unknown	150	T0	3,300	6%	103	494	5	814	6,847
Jones Well	Glenn	Electric	2012	150	n/a	3,500	7%	109	524	5	814	n/a
M. Cota	Colusa	Diesel	Unknown	150	T0	3,000	6%	94	449	5	814	6,847
Zoller A	Colusa	Diesel	Unknown	150	T0	3,000	6%	94	449	5	814	6,847
Clark #1	Glenn	Electric	Unknown	150	n/a	4,000	7%	125	599	5	814	n/a
Clark #2	Glenn	Electric	Unknown	150	n/a	4,000	7%	125	599	5	814	n/a
J. Southam	Colusa	Electric	Unknown	150	n/a	4,000	7%	125	599	5	814	n/a
Marin & Mason	Glenn	Diesel	Unknown	200	T0	2,500	5%	78	375	5	814	9,129
Calvert	Glenn	Electric	Unknown	200	n/a	3,600	7%	112	539	5	814	n/a
Tobin	Glenn	Electric	Unknown	200	n/a	2,700	5%	84	404	5	814	n/a
Spencer	Colusa	Electric	Unknown	200	n/a	2,300	4%	72	345	5	814	n/a
					Total	**53,400**	**100%**	**1,667**	**8,000**	**93**	**13,831**	
					Glenn County Subtotal	**34,800**	**65%**	**1,086**	**5,213**	**60**	**8,950**	
					Colusa County Subtotal	**18,600**	**35%**	**581**	**2,787**	**33**	**4,882**	

Well ID	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
Joel Mann	1.1	14.1	3.0	0.9	1.0	0.97	2.54	31.36	6.76	2.07	2.23	2.17	0.19	2.33	0.50	0.15	0.17	0.16
D.Withrow	1.1	14.1	3.0	0.9	1.0	0.97	2.47	30.51	6.57	2.02	2.17	2.11	0.18	2.27	0.49	0.15	0.16	0.16
Chrisman	1.0	6.9	8.5	0.9	0.0	0.01	3.92	27.73	34.36	3.76	0.04	0.04	0.29	2.06	2.56	0.28	0.00	0.00
D.Schmidt	1.1	14.1	3.0	0.9	1.0	0.97	2.06	25.43	5.48	1.68	1.80	1.76	0.15	1.89	0.41	0.13	0.13	0.13
Argo B	1.1	14.1	3.0	0.9	1.0	0.97	2.06	25.43	5.48	1.68	1.80	1.76	0.15	1.89	0.41	0.13	0.13	0.13
Argo C	1.1	14.1	3.0	0.9	1.0	0.97	2.06	25.43	5.48	1.68	1.80	1.76	0.15	1.89	0.41	0.13	0.13	0.13
F. Gomes	1.1	14.1	3.0	0.9	1.0	0.97	2.06	25.43	5.48	1.68	1.80	1.76	0.15	1.89	0.41	0.13	0.13	0.13
Jones Well	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
M. Cota	1.1	14.1	3.0	0.9	1.0	0.97	2.06	25.43	5.48	1.68	1.80	1.76	0.15	1.89	0.41	0.13	0.13	0.13
Zoller A	1.1	14.1	3.0	0.9	1.0	0.97	2.06	25.43	5.48	1.68	1.80	1.76	0.15	1.89	0.41	0.13	0.13	0.13
Clark #1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Clark #2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
J. Southam	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Marin & Mason	1.1	14.1	3.0	0.9	1.0	0.97	2.75	33.90	7.30	2.24	2.41	2.35	0.20	2.52	0.54	0.17	0.18	0.17
Calvert	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Tobin	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Spencer	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total							**24.06**	**276.05**	**87.86**	**20.18**	**17.66**	**17.24**	**1.79**	**20.54**	**6.54**	**1.50**	**1.31**	**1.28**
Glenn County Subtotal							**15.81**	**174.34**	**65.95**	**13.45**	**10.45**	**10.20**	**1.18**	**12.97**	**4.91**	**1.00**	**0.78**	**0.76**
Colusa County Subtotal							**8.25**	**101.70**	**21.91**	**6.73**	**7.22**	**7.04**	**0.61**	**7.57**	**1.63**	**0.50**	**0.54**	**0.52**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
1,667 AF/month
12,166 gallons/minute
23% peak pump rate

Conversion Factors
1 day = 24 hours
1 month = 31 days
1 hour = 60 minutes
1 acre-foot = 325,851 gallons

Diesel Engine Fuel Consumption
0.4 lb/hp-hr *(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855 g/mL *(Based on MSDS for Hess Diesel Fuel All Types)*
7.13 lb/gal

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Provident Irrigation District				Peak Pumping by Transfer Period	
Transfer Volume	4,500	acre-feet	(Apr-Jun)		1,500	AF/month
	7,000	acre-feet	(Jul-Sep)		2,333	AF/month
	11,500	**acre-feet/year**	**Maximum**	*ok*		

Table G-45. Provident Irrigation District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Glenn	17	9	0	0	26	Yes
	0	0	0	0	0	
	0	0	0	0	0	
Total	17	9	0	0	26	

Table G-46. Provident Irrigation District Criteria Pollutant Emissions

Well ID	Well Location	Fuel Type	Model Year	Power Rating	Diesel Emission	Pump Rate		Transfer Volume		Operations		Fuel Consumption	Emission Factors (g/bhp-hr)						Daily Emissions (pounds per day)						Annual Emissions (tons per year)					
	(County)			(hp)	Tier	(gpm)	(% of Total)	(AF/month)	(AF/year)	(hours/day)	(hours/year)	(MMBtu/yr) - propane or NG	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5
Weller62V	Glenn	Diesel	2014	190	T4	2,000	2%	55	272	5	737	7,860	0.1	0.3	2.6	0.9	0.0	0.01	0.29	0.60	5.28	1.88	0.03	0.03	0.02	0.05	0.40	0.14	0.00	0.00
L Hansen#1	Glenn	Diesel	1991	210	T0	3,800	4%	105	516	5	737	8,687	1.1	14.1	3.0	0.9	1.0	0.97	2.55	31.42	6.77	2.08	2.23	2.18	0.19	2.40	0.52	0.16	0.17	0.17
L Hansen#2	Glenn	Diesel	2013	140	T3	4,500	5%	124	611	5	737	5,791	0.1	2.8	3.7	0.9	0.2	0.22	0.22	4.22	5.56	1.39	0.33	0.33	0.02	0.32	0.42	0.11	0.03	0.02
K Hansen#1	Glenn	Diesel	1992	185	T0	2,600	3%	72	353	5	737	7,653	1.1	14.1	3.0	0.9	1.0	0.97	2.24	27.68	5.96	1.83	1.96	1.92	0.17	2.11	0.46	0.14	0.15	0.15
K Hansen#2	Glenn	Electric	Unknown	200	n/a	3,500	4%	96	475	5	737	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
E Weller	Glenn	Diesel	2019	185	T4	2,500	3%	69	339	5	737	7,653	0.1	0.3	2.6	0.9	0.0	0.01	0.28	0.59	5.14	1.83	0.03	0.03	0.02	0.04	0.39	0.14	0.00	0.00
Weller#4	Glenn	Electric	Unknown	200	n/a	3,500	4%	96	475	5	737	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Calvert	Glenn	Diesel	Unknown	200	T0	3,000	4%	83	407	5	737	8,273	1.1	14.1	3.0	0.9	1.0	0.97	2.43	29.92	6.45	1.98	2.12	2.07	0.19	2.29	0.49	0.15	0.16	0.16
D. Alves	Glenn	Diesel	Unknown	200	T0	3,000	4%	83	407	5	737	8,273	1.1	14.1	3.0	0.9	1.0	0.97	2.43	29.92	6.45	1.98	2.12	2.07	0.19	2.29	0.49	0.15	0.16	0.16
D. Kennedy	Glenn	Electric	Unknown	200	n/a	3,000	4%	83	407	5	737	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
G. Clark #1	Glenn	Diesel	Unknown	200	T0	3,000	4%	83	407	5	737	8,273	1.1	14.1	3.0	0.9	1.0	0.97	2.43	29.92	6.45	1.98	2.12	2.07	0.19	2.29	0.49	0.15	0.16	0.16
M. Jones #1	Glenn	Diesel	Unknown	200	T0	3,000	4%	83	407	5	737	8,273	1.1	14.1	3.0	0.9	1.0	0.97	2.43	29.92	6.45	1.98	2.12	2.07	0.19	2.29	0.49	0.15	0.16	0.16
M. Jones #2	Glenn	Diesel	Unknown	200	T0	3,000	4%	83	407	5	737	8,273	1.1	14.1	3.0	0.9	1.0	0.97	2.43	29.92	6.45	1.98	2.12	2.07	0.19	2.29	0.49	0.15	0.16	0.16
Perez and Perez	Glenn	Diesel	Unknown	150	T0	3,200	4%	88	434	5	737	6,205	1.1	14.1	3.0	0.9	1.0	0.97	1.82	22.44	4.84	1.48	1.59	1.55	0.14	1.71	0.37	0.11	0.12	0.12
S. Jones #1	Glenn	Diesel	Unknown	200	T0	3,200	4%	88	434	5	737	8,273	1.1	14.1	3.0	0.9	1.0	0.97	2.43	29.92	6.45	1.98	2.12	2.07	0.19	2.29	0.49	0.15	0.16	0.16
S. Jones #2	Glenn	Diesel	Unknown	200	T0	3,200	4%	88	434	5	737	8,273	1.1	14.1	3.0	0.9	1.0	0.97	2.43	29.92	6.45	1.98	2.12	2.07	0.19	2.29	0.49	0.15	0.16	0.16
Joel Mann - North	Glenn	Diesel	Unknown	200	T0	2,500	3%	69	339	5	737	8,273	1.1	14.1	3.0	0.9	1.0	0.97	2.43	29.92	6.45	1.98	2.12	2.07	0.19	2.29	0.49	0.15	0.16	0.16
W-61 (Withrow)	Glenn	Diesel	Unknown	200	T0	2,200	3%	61	299	5	737	8,273	1.1	14.1	3.0	0.9	1.0	0.97	2.43	29.92	6.45	1.98	2.12	2.07	0.19	2.29	0.49	0.15	0.16	0.16
C. Newton (J.A. Cattle)	Glenn	Diesel	Unknown	200	T0	3,000	4%	83	407	5	737	8,273	1.1	14.1	3.0	0.9	1.0	0.97	2.43	29.92	6.45	1.98	2.12	2.07	0.19	2.29	0.49	0.15	0.16	0.16
R. Perez	Glenn	Electric	Unknown	150	n/a	3,500	4%	96	475	5	737	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Michael 2	Glenn	Diesel	Unknown	200	T0	2,500	3%	69	339	5	737	8,273	1.1	14.1	3.0	0.9	1.0	0.97	2.43	29.92	6.45	1.98	2.12	2.07	0.19	2.29	0.49	0.15	0.16	0.16
Carriere	Glenn	Electric	Unknown	200	n/a	2,000	2%	55	272	5	737	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
District Well #1	Glenn	Electric	Unknown	200	n/a	3,000	4%	83	407	5	737	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
District Well #2	Glenn	Electric	Unknown	200	n/a	6,000	7%	165	815	5	737	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
District Well #3	Glenn	Electric	Unknown	200	n/a	5,600	7%	154	760	5	737	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
District Well #4	Glenn	Electric	Unknown	200	n/a	4,400	5%	121	597	5	737	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
					Total	**84,700**	**100%**	**2,333**	**11,500**	**125**	**19,171**								**34.09**	**416.10**	**104.47**	**32.25**	**29.54**	**28.83**	**2.60**	**31.79**	**7.98**	**2.46**	**2.26**	**2.20**
					Glenn County Subtotal	**84,700**	**100%**	**2,333**	**11,500**	**125**	**19,171**								**34.09**	**416.10**	**104.47**	**32.25**	**29.54**	**28.83**	**2.60**	**31.79**	**7.98**	**2.46**	**2.26**	**2.20**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month

2,333	AF/month
17,032	gallons/minute
20%	peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Reclamation District 1004				Peak Pumping by Transfer Period	
Transfer Volume	3,588	acre-feet	(Apr-Jun)		1,196	AF/month
	3,588	acre-feet	(Jul-Sep)		1,196	AF/month
	7,175	**acre-feet/year**	**Maximum**	*ok*		

Table G-47. Reclamation District 1004 Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Glenn	0	3	0	0	3	Yes
Total	0	3	0	0	3	

Table G-48. Reclamation District 1004 Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
Glenn West	Glenn	Electric	Unknown	300	n/a	4,500	33%	399	2,392	16	2,886
Glenn East	Glenn	Electric	Unknown	300	n/a	4,500	33%	399	2,392	16	2,886
Distrct Well 3	Glenn	Electric	Unknown	300	n/a	4,500	33%	399	2,392	16	2,886
					Total	**13,500**	**100%**	**1,196**	**7,175**	**47**	**8,659**
					Glenn County Subtotal	**13,500**	**100%**	**1,196**	**7,175**	**47**	**8,659**

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Reclamation District 108				Peak Pumping by Transfer Period	
Transfer Volume	7,500	acre-feet	(Apr-Jun)		2,500	AF/month
	7,500	acre-feet	(Jul-Sep)		2,500	AF/month
	15,000	**acre-feet/year**	**Maximum**	*ok*		

Table G-49. Reclamation District 108 Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Colusa	6	10	0	5	21	Yes
Yolo	1	3	0	1	5	No
	0	0	0	0	0	
Total	7	13	0	6	26	

Table G-50. Reclamation District 108 Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
RD108 Well #1	Colusa	Electric	Unknown	100	n/a	2,550	3%	86	517	6	1,102	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RD108 Well #4	Colusa	Electric	Unknown	150	n/a	1,250	2%	42	254	6	1,102	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RD108 Well #5	Colusa	Electric	Unknown	250	n/a	4,950	7%	167	1,005	6	1,102	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RD108 Well #6	Yolo	Electric	Unknown	250	n/a	3,375	5%	114	685	6	1,102	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RD108 Well #7	Yolo	Electric	Unknown	250	n/a	3,195	4%	108	648	6	1,102	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Field 66C	Yolo	Electric	Unknown	150	n/a	1,620	2%	55	329	6	1,102	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Field 1	Colusa	Propane	Unknown	105	n/a	3,420	5%	116	694	6	1,102	294	1.0	2.0	4.0	0.0	0.0	0.00	1.37	2.74	5.49	0.00	0.00	0.00	0.13	0.26	0.51	0.00	0.00	0.00
Field 4	Colusa	Electric	Unknown	200	n/a	3,150	4%	107	639	6	1,102	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Field 53E	Yolo	Propane	Unknown	250	n/a	2,295	3%	78	466	6	1,102	701	1.0	2.0	4.0	0.0	0.0	0.00	3.27	6.53	13.06	0.00	0.00	0.00	0.30	0.61	1.21	0.00	0.00	0.00
Field 65E	Yolo	Diesel	Unknown	463	T0	3,195	4%	108	648	6	1,102	28,606	1.1	14.1	3.0	0.9	0.2	0.15	6.89	84.98	18.31	5.62	0.91	0.88	0.64	7.90	1.70	0.52	0.08	0.08
Field 90B	Colusa	Electric	Unknown	125	n/a	2,295	3%	78	466	6	1,102	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Field 100H	Colusa	Diesel	Unknown	320	T0	2,385	3%	81	484	6	1,102	19,785	1.1	14.1	3.0	0.9	1.0	0.97	4.77	58.78	12.67	3.89	4.17	4.07	0.44	5.47	1.18	0.36	0.39	0.38
Field 100L1 West	Colusa	Diesel	Unknown	275	T0	2,500	3%	85	507	6	1,102	16,998	1.1	14.1	3.0	0.9	1.0	0.97	4.10	50.50	10.88	3.34	3.58	3.50	0.38	4.70	1.01	0.31	0.33	0.33
Field 100M	Colusa	Diesel	Unknown	235	T0	2,200	3%	74	446	6	1,102	14,530	1.1	14.1	3.0	0.9	1.0	0.97	3.50	43.17	9.30	2.85	3.06	2.99	0.33	4.01	0.87	0.27	0.28	0.28
Field 119A	Colusa	Electric	Unknown	150	n/a	3,250	4%	110	660	6	1,102	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Field 125A	Colusa	Propane	Unknown	200	n/a	2,800	4%	95	568	6	1,102	561	1.0	2.0	4.0	0.0	0.0	0.00	2.61	5.23	10.45	0.00	0.00	0.00	0.24	0.49	0.97	0.00	0.00	0.00
Field 134	Colusa	Electric	Unknown	25	n/a	1,600	2%	54	325	6	1,102	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Field 107F	Colusa	Electric	Unknown	200	n/a	3,195	4%	108	648	6	1,102	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Field 100L1 East	Colusa	Electric	Unknown	125	n/a	1,950	3%	66	396	6	1,102	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Field 81D	Colusa	Diesel	Unknown	400	T0	4,250	6%	144	862	6	1,102	24,732	1.1	14.1	3.0	0.9	1.0	0.97	5.96	73.47	15.83	4.86	5.21	5.09	0.55	6.83	1.47	0.45	0.48	0.47
Field 81E	Colusa	Diesel	Unknown	400	T0	4,250	6%	144	862	6	1,102	24,732	1.1	14.1	3.0	0.9	1.0	0.97	5.96	73.47	15.83	4.86	5.21	5.09	0.55	6.83	1.47	0.45	0.48	0.47
Field 83	Colusa	Propane	Unknown	250	n/a	3,500	5%	118	710	6	1,102	701	1.0	2.0	4.0	0.0	0.0	0.00	3.27	6.53	13.06	0.00	0.00	0.00	0.30	0.61	1.21	0.00	0.00	0.00
Field 92C	Colusa	Diesel	Unknown	250	T0	1,440	2%	49	292	6	1,102	15,457	1.1	14.1	3.0	0.9	1.0	0.97	3.72	45.92	9.90	3.04	3.26	3.18	0.35	4.27	0.92	0.28	0.30	0.30
Field 93A	Colusa	Propane	Unknown	250	n/a	3,500	5%	118	710	6	1,102	701	1.0	2.0	4.0	0.0	0.0	0.00	3.27	6.53	13.06	0.00	0.00	0.00	0.30	0.61	1.21	0.00	0.00	0.00
Cecil	Colusa	Electric	Unknown	40	n/a	2,800	4%	95	568	6	1,102	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Field 111G	Colusa	Propane	Unknown	250	n/a	3,000	4%	101	609	6	1,102	701	1.0	2.0	4.0	0.0	0.0	0.00	3.27	6.53	13.06	0.00	0.00	0.00	0.30	0.61	1.21	0.00	0.00	0.00
					Total	**73,915**	**100%**	**2,500**	**15,000**	**154**	**28,655**								**51.94**	**464.39**	**160.91**	**28.47**	**25.41**	**24.81**	**4.83**	**43.19**	**14.96**	**2.65**	**2.36**	**2.31**
					Colusa County Subtotal	**60,235**	**81%**	**2,037**	**12,224**	**124**	**23,144**								**41.79**	**372.88**	**129.54**	**22.84**	**24.51**	**23.92**	**3.89**	**34.68**	**12.05**	**2.12**	**2.28**	**2.22**
					Yolo County Subtotal	**13,680**	**19%**	**463**	**2,776**	**30**	**5,511**								**10.16**	**91.51**	**31.38**	**5.62**	**0.91**	**0.89**	**0.94**	**8.51**	**2.92**	**0.52**	**0.08**	**0.08**
						0	**0%**	**0**	**0**	**0**	**0**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
2,500 AF/month
18,249 gallons/minute
25% peak pump rate

Conversion Factors
1 day = 24 hours
1 month = 31 days
1 hour = 60 minutes
1 acre-foot = 325,851 gallons

Diesel Engine Fuel Consumption
0.4 lb/hp-hr *(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855 g/mL *(Based on MSDS for Hess Diesel Fuel All Types)*
7.13 lb/gal

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Roberts Ditch Irrigation Company					Peak Pumping by Transfer Period	
Transfer Volume	1,700	acre-feet	(Apr-Jun)			567	AF/month
	1,760	acre-feet	(Jul-Sep)			587	AF/month
	3,460	**acre-feet/year**	**Maximum**	*ok*			

Table G-51. Roberts Ditch Irrigation Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Colusa	0	9	0	1	10	Yes
Total	0	9	0	1	10	

Table G-52. Roberts Ditch Irrigation Company Criteria Pollutant Emissions

	Well Location			Power Rating	Diesel Emission	Pump Rate		Transfer Volume		Operations		Fuel Consumption	Emission Factors (g/bhp-hr)						Daily Emissions (pounds per day)						Annual Emissions (tons per year)					
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**Tier**	**(gpm)**	**(% of Total)**	**(AF/month)**	**(AF/year)**	**(hours/day)**	**(hours/year)**	**(gal/yr) - diesel (MMBtu/yr) - propane or NG**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
Well #1	Colusa	Electric	Unknown	125	n/a	5,000	14%	83	487	3	529	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Well #2	Colusa	Electric	Unknown	125	n/a	5,000	14%	83	487	3	529	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Hickel	Colusa	Electric	Unknown	40	n/a	500	1%	8	49	3	529	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Stegals	Colusa	Electric	Unknown	75	n/a	2,500	7%	41	244	3	529	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ash	Colusa	Electric	Unknown	40	n/a	1,500	4%	25	146	3	529	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Yearxa North	Colusa	Electric	Unknown	150	n/a	4,000	11%	66	390	3	529	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Yearxa South	Colusa	Electric	Unknown	150	n/a	5,000	14%	83	487	3	529	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Andreotti	Colusa	Propane	Unknown	125	n/a	2,500	7%	41	244	3	529	168	1.0	2.0	4.0	0.0	0.0	0.00	0.80	1.60	3.19	0.00	0.00	0.00	0.07	0.15	0.29	0.00	0.00	0.00
Andreotti (New)	Colusa	Electric	Unknown	150	n/a	4,000	11%	66	390	3	529	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ottenwalter	Colusa	Electric	Unknown	150	n/a	5,500	15%	91	536	3	529	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
					Total	**35,500**	**100%**	**587**	**3,460**	**29**	**5,293**								**0.80**	**1.60**	**3.19**	**0.00**	**0.00**	**0.00**	**0.07**	**0.15**	**0.29**	**0.00**	**0.00**	**0.00**
					Colusa County Subtotal	**35,500**	**100%**	**587**	**3,460**	**29**	**5,293**								**0.80**	**1.60**	**3.19**	**0.00**	**0.00**	**0.00**	**0.07**	**0.15**	**0.29**	**0.00**	**0.00**	**0.00**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month

587	AF/month
4,282	gallons/minute
12%	peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	RRG Garden Properties LLC				Peak Pumping by Transfer Period
Transfer Volume	4,400	acre-feet	(Apr-Jun)		1,467 AF/month
	5,600	acre-feet	(Jul-Sep)		1,867 AF/month
	10,000	**acre-feet/year**	**Maximum**	*ok*	

Table G-53. RRG Garden Properties LLC Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Yolo	0	10	0	0	10	No
Total	0	10	0	0	10	

Table G-54. RRG Garden Properties LLC Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
Field 65 PW	Yolo	Electric	2008	125	n/a	2,900	11%	213	1,142	13	2,138
Field 71 PW	Yolo	Electric	2014	300	n/a	1,500	6%	110	591	13	2,138
Field 98 PW	Yolo	Electric	1963	100	n/a	2,500	10%	184	984	13	2,138
Field 104 PW	Yolo	Electric	2014	200	n/a	2,950	12%	217	1,161	13	2,138
Field 104-09 PW	Yolo	Electric	2009	200	n/a	2,600	10%	191	1,024	13	2,138
Field 93 PW	Yolo	Electric	2014	200	n/a	2,400	9%	176	945	13	2,138
Field 91-09 PW	Yolo	Electric	2009	100	n/a	2,400	9%	176	945	13	2,138
Field 117 PW	Yolo	Electric	2009	150	n/a	2,300	9%	169	906	13	2,138
Shop PW	Yolo	Electric	2009	100	n/a	2,450	10%	180	965	13	2,138
F-1	Yolo	Electric	Unknown	150	n/a	3,400	13%	250	1,339	13	2,138
					Total	**25,400**	**100%**	**1,867**	**10,000**	**129**	**21,381**
					Yolo County Subtotal	**25,400**	**100%**	**1,867**	**10,000**	**129**	**21,381**

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Sacramento County Water Agency				Peak Pumping by Transfer Period
Transfer Volume	0 acre-feet	(Apr-Jun)			0 AF/month
	15,000 acre-feet	(Jul-Sep)			5,000 AF/month
	15,000 acre-feet/year	**Maximum**	ok		

Table G-55. Sacramento County Water Agency Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sacramento	0	34	0	0	34	No
Total	0	34	0	0	34	

Table G-56. Sacramento County Water Agency Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
W-041	Sacramento	Electric	Unknown	75	n/a	650	1%	69	207	19	1,728
W-042	Sacramento	Electric	Unknown	75	n/a	760	2%	81	242	19	1,728
W-043	Sacramento	Electric	Unknown	100	n/a	1,000	2%	106	318	19	1,728
W-047	Sacramento	Electric	Unknown	100	n/a	1,000	2%	106	318	19	1,728
W-052	Sacramento	Electric	Unknown	100	n/a	1,050	2%	111	334	19	1,728
W-055	Sacramento	Electric	Unknown	100	n/a	1,700	4%	180	541	19	1,728
W-056	Sacramento	Electric	Unknown	100	n/a	1,500	3%	159	477	19	1,728
W-061	Sacramento	Electric	Unknown	150	n/a	1,600	3%	170	509	19	1,728
W-062	Sacramento	Electric	Unknown	100	n/a	1,100	2%	117	350	19	1,728
W-063	Sacramento	Electric	Unknown	100	n/a	1,000	2%	106	318	19	1,728
W-064	Sacramento	Electric	Unknown	150	n/a	1,500	3%	159	477	19	1,728
W-065	Sacramento	Electric	Unknown	50	n/a	608	1%	64	193	19	1,728
W-066	Sacramento	Electric	Unknown	125	n/a	1,700	4%	180	541	19	1,728
W-067	Sacramento	Electric	Unknown	125	n/a	1,500	3%	159	477	19	1,728
W-068	Sacramento	Electric	Unknown	125	n/a	1,500	3%	159	477	19	1,728
W-069	Sacramento	Electric	Unknown	150	n/a	1,500	3%	159	477	19	1,728
W-070	Sacramento	Electric	Unknown	125	n/a	1,500	3%	159	477	19	1,728
W-073	Sacramento	Electric	Unknown	200	n/a	1,915	4%	203	609	19	1,728
W-074	Sacramento	Electric	Unknown	50	n/a	600	1%	64	191	19	1,728
W-075	Sacramento	Electric	Unknown	100	n/a	1,600	3%	170	509	19	1,728
W-076	Sacramento	Electric	Unknown	150	n/a	1,750	4%	186	557	19	1,728
W-077	Sacramento	Electric	Unknown	150	n/a	1,500	3%	159	477	19	1,728
W-078	Sacramento	Electric	Unknown	125	n/a	1,500	3%	159	477	19	1,728
W-081	Sacramento	Electric	Unknown	150	n/a	1,500	3%	159	477	19	1,728
W-105	Sacramento	Electric	Unknown	150	n/a	1,800	4%	191	573	19	1,728
W-106	Sacramento	Electric	Unknown	150	n/a	1,800	4%	191	573	19	1,728
W-109	Sacramento	Electric	Unknown	125	n/a	1,500	3%	159	477	19	1,728
W-110	Sacramento	Electric	Unknown	150	n/a	1,500	3%	159	477	19	1,728
W-112	Sacramento	Electric	Unknown	150	n/a	1,500	3%	159	477	19	1,728
W-114	Sacramento	Electric	Unknown	125	n/a	1,500	3%	159	477	19	1,728
W-126	Sacramento	Electric	Unknown	150	n/a	1,500	3%	159	477	19	1,728
W-129	Sacramento	Electric	Unknown	150	n/a	1,500	3%	159	477	19	1,728
W-130	Sacramento	Electric	Unknown	150	n/a	1,500	3%	159	477	19	1,728
W-135	Sacramento	Electric	Unknown	150	n/a	1,500	3%	159	477	19	1,728
					Total	**47,133**	**100%**	**5,000**	**15,000**	**632**	**58,764**
					Sacramento County Subtotal	**47,133**	**100%**	**5,000**	**15,000**	**632**	**58,764**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
5,000 AF/month
36,498 gallons/minute
77% peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Sacramento Suburban Water District				Peak Pumping by Transfer Period
Transfer Volume	7,000	acre-feet	(Apr-Jun)		2,333 AF/month
	10,000	acre-feet	(Jul-Sep)		3,333 AF/month
	17,000	**acre-feet/year**	**Maximum**	*ok*	

Table G-57. Sacramento Suburban Water District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sacramento	0	64	0	0	64	No
Total	0	64	0	0	64	

Table G-58. Sacramento Suburban Water District Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
2A	Sacramento	Electric	Unknown	100	n/a	1,000	1%	37	188	6	1,021
3A	Sacramento	Electric	Unknown	75	n/a	900	1%	33	169	6	1,021
4B	Sacramento	Electric	Unknown	300	n/a	3,000	3%	111	564	6	1,021
9	Sacramento	Electric	Unknown	75	n/a	700	1%	26	132	6	1,021
13	Sacramento	Electric	Unknown	100	n/a	800	1%	29	150	6	1,021
18	Sacramento	Electric	Unknown	75	n/a	900	1%	33	169	6	1,021
20A	Sacramento	Electric	Unknown	100	n/a	1,100	1%	41	207	6	1,021
24	Sacramento	Electric	Unknown	75	n/a	1,200	1%	44	226	6	1,021
25	Sacramento	Electric	Unknown	60	n/a	400	0%	15	75	6	1,021
26	Sacramento	Electric	Unknown	75	n/a	1,000	1%	37	188	6	1,021
27	Sacramento	Electric	Unknown	75	n/a	600	1%	22	113	6	1,021
28	Sacramento	Electric	Unknown	75	n/a	1,190	1%	44	224	6	1,021
30	Sacramento	Electric	Unknown	75	n/a	500	1%	18	94	6	1,021
32A	Sacramento	Electric	Unknown	100	n/a	2,000	2%	74	376	6	1,021
33A	Sacramento	Electric	Unknown	250	n/a	2,250	2%	83	423	6	1,021
35	Sacramento	Electric	Unknown	75	n/a	850	1%	31	160	6	1,021
40A	Sacramento	Electric	Unknown	300	n/a	2,300	3%	85	432	6	1,021
41	Sacramento	Electric	Unknown	50	n/a	500	1%	18	94	6	1,021
43	Sacramento	Electric	Unknown	100	n/a	1,000	1%	37	188	6	1,021
47	Sacramento	Electric	Unknown	100	n/a	1,100	1%	41	207	6	1,021
52	Sacramento	Electric	Unknown	100	n/a	1,255	1%	46	236	6	1,021
55A	Sacramento	Electric	Unknown	200	n/a	1,900	2%	70	357	6	1,021
56A	Sacramento	Electric	Unknown	300	n/a	2,500	3%	92	470	6	1,021
59A	Sacramento	Electric	Unknown	300	n/a	2,700	3%	99	507	6	1,021
60	Sacramento	Electric	Unknown	60	n/a	530	1%	20	100	6	1,021
64	Sacramento	Electric	Unknown	100	n/a	1,200	1%	44	226	6	1,021
65	Sacramento	Electric	Unknown	100	n/a	1,200	1%	44	226	6	1,021
66	Sacramento	Electric	Unknown	125	n/a	1,300	1%	48	244	6	1,021
68	Sacramento	Electric	Unknown	150	n/a	1,600	2%	59	301	6	1,021
71	Sacramento	Electric	Unknown	200	n/a	2,200	2%	81	413	6	1,021
72	Sacramento	Electric	Unknown	200	n/a	700	1%	26	132	6	1,021
73	Sacramento	Electric	Unknown	300	n/a	3,500	4%	129	658	6	1,021
74	Sacramento	Electric	Unknown	250	n/a	2,500	3%	92	470	6	1,021
78	Sacramento	Electric	Unknown	200	n/a	1,700	2%	63	319	6	1,021
79	Sacramento	Electric	Unknown	150	n/a	1,600	2%	59	301	6	1,021
80	Sacramento	Electric	Unknown	150	n/a	1,500	2%	55	282	6	1,021
81	Sacramento	Electric	Unknown	150	n/a	1,500	2%	55	282	6	1,021
82	Sacramento	Electric	Unknown	150	n/a	1,500	2%	55	282	6	1,021
83	Sacramento	Electric	Unknown	150	n/a	1,500	2%	55	282	6	1,021
84	Sacramento	Electric	Unknown	300	n/a	3,000	3%	111	564	6	1,021
N3	Sacramento	Electric	Unknown	100	n/a	1,200	1%	44	226	6	1,021
N5	Sacramento	Electric	Unknown	150	n/a	1,300	1%	48	244	6	1,021
N6A	Sacramento	Electric	Unknown	200	n/a	1,500	2%	55	282	6	1,021
N9	Sacramento	Electric	Unknown	125	n/a	1,200	1%	44	226	6	1,021
N10	Sacramento	Electric	Unknown	150	n/a	1,041	1%	38	196	6	1,021
N12	Sacramento	Electric	Unknown	125	n/a	1,300	1%	48	244	6	1,021
N14	Sacramento	Electric	Unknown	125	n/a	1,200	1%	44	226	6	1,021
N17	Sacramento	Electric	Unknown	100	n/a	900	1%	33	169	6	1,021
N20	Sacramento	Electric	Unknown	125	n/a	1,000	1%	37	188	6	1,021
N22	Sacramento	Electric	Unknown	125	n/a	1,000	1%	37	188	6	1,021
N23A	Sacramento	Electric	Unknown	100	n/a	1,000	1%	37	188	6	1,021
N24	Sacramento	Electric	Unknown	150	n/a	1,200	1%	44	226	6	1,021
N25	Sacramento	Electric	Unknown	200	n/a	1,400	2%	52	263	6	1,021
N26	Sacramento	Electric	Unknown	100	n/a	700	1%	26	132	6	1,021
N29	Sacramento	Electric	Unknown	100	n/a	800	1%	29	150	6	1,021
N30	Sacramento	Electric	Unknown	100	n/a	1,100	1%	41	207	6	1,021
N32A	Sacramento	Electric	Unknown	200	n/a	1,900	2%	70	357	6	1,021
N32B	Sacramento	Electric	Unknown	300	n/a	2,300	3%	85	432	6	1,021
N32C	Sacramento	Electric	Unknown	100	n/a	740	1%	27	139	6	1,021
N34	Sacramento	Electric	Unknown	200	n/a	1,600	2%	59	301	6	1,021
N35	Sacramento	Electric	Unknown	250	n/a	2,400	3%	88	451	6	1,021
N36	Sacramento	Electric	Unknown	200	n/a	1,500	2%	55	282	6	1,021
N38	Sacramento	Electric	Unknown	100	n/a	2,000	2%	74	376	6	1,021
N39	Sacramento	Electric	Unknown	200	n/a	1,500	2%	55	282	6	1,021
					Total	**90,456**	**100%**	**3,333**	**17,000**	**413**	**65,322**
					Sacramento County Subtotal	**90,456**	**100%**	**3,333**	**17,000**	**413**	**65,322**

Note: All wells are electric; therefore, no local criteria pollutant emissions.

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
3,333 AF/month
24,332 gallons/minute
27% peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Sutter Mutual Water Company				Peak Pumping by Transfer Period	
Transfer Volume	20,000	acre-feet	(Apr-Jun)		6,667	AF/month
	20,000	acre-feet	(Jul-Sep)		6,667	AF/month
	40,000	**acre-feet/year**	**Maximum**	*ok*		

Table G-59. Sutter Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	10	9	0	12	31	No
Total	10	9	0	12	31	

Table G-60. Sutter Mutual Water Company Criteria Pollutant Emissions

	Well Location			Power Rating	Diesel Emission	Pump Rate		Transfer Volume		Operations		Fuel Consumption	Emission Factors (g/bhp-hr)						Daily Emissions (pounds per day)						Annual Emissions (tons per year)					
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**Tier**	**(gpm)**	**(% of Total)**	**(AF/month)**	**(AF/year)**	**(hours/day)**	**(hours/year)**	**(gal/yr) - diesel (MMBtu/yr) - propane or NG**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
G-16	Sutter	Electric	Unknown	250	n/a	4,500	4%	294	1,765	11	2,130	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
QHR	Sutter	Propane	Unknown	250	n/a	5,000	5%	327	1,961	11	2,130	1,355	1.0	2.0	4.0	0.0	0.0	0.00	6.31	12.62	25.24	0.00	0.00	0.00	0.59	1.17	2.35	0.00	0.00	0.00
MB-1	Sutter	Propane	Unknown	268	n/a	5,300	5%	346	2,078	11	2,130	1,452	1.0	2.0	4.0	0.0	0.0	0.00	6.77	13.53	27.06	0.00	0.00	0.00	0.63	1.26	2.52	0.00	0.00	0.00
LM-53	Sutter	Electric	Unknown	150	n/a	3,000	3%	196	1,176	11	2,130	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BD-1	Sutter	Diesel	Unknown	225	T0	2,500	2%	163	980	11	2,130	26,883	1.1	14.1	3.0	0.9	0.2	0.15	6.48	79.87	17.21	5.28	0.85	0.83	0.60	7.43	1.60	0.49	0.08	0.08
L1-1	Sutter	Diesel	Unknown	250	T4	3,800	4%	248	1,490	11	2,130	29,870	0.1	0.3	2.6	0.9	0.0	0.01	0.89	1.88	16.48	5.87	0.09	0.09	0.08	0.18	1.53	0.55	0.01	0.01
L1-2	Sutter	Diesel	Unknown	250	T4	4,200	4%	275	1,647	11	2,130	29,870	0.1	0.3	2.6	0.9	0.0	0.01	0.89	1.88	16.48	5.87	0.09	0.09	0.08	0.18	1.53	0.55	0.01	0.01
L2-1	Sutter	Diesel	Unknown	250	T4	5,500	5%	359	2,157	11	2,130	29,870	0.1	0.3	2.6	0.9	0.0	0.01	0.89	1.88	16.48	5.87	0.09	0.09	0.08	0.18	1.53	0.55	0.01	0.01
LM-11	Sutter	Electric	Unknown	150	n/a	3,100	3%	203	1,216	11	2,130	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S-18	Sutter	Electric	Unknown	160	n/a	1,400	1%	92	549	11	2,130	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BD-2	Sutter	Diesel	Unknown	225	T4	4,000	4%	261	1,569	11	2,130	26,883	0.1	0.3	2.6	0.9	0.0	0.01	0.81	1.70	14.84	5.28	0.08	0.08	0.07	0.16	1.38	0.49	0.01	0.01
BD-3	Sutter	Propane	Unknown	250	n/a	3,200	3%	209	1,255	11	2,130	1,355	1.0	2.0	4.0	0.0	0.0	0.00	6.31	12.62	25.24	0.00	0.00	0.00	0.59	1.17	2.35	0.00	0.00	0.00
FG	Sutter	Propane	Unknown	250	n/a	1,500	1%	98	588	11	2,130	1,355	1.0	2.0	4.0	0.0	0.0	0.00	6.31	12.62	25.24	0.00	0.00	0.00	0.59	1.17	2.35	0.00	0.00	0.00
R-29	Sutter	Propane	Unknown	150	n/a	--	--	--	--	--	--	--	1.0	2.0	4.0	0.0	0.0	0.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
TVN	Sutter	Electric	Unknown	75	n/a	3,000	3%	196	1,176	11	2,130	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DB-1	Sutter	Diesel	Unknown	250	T4	4,500	4%	294	1,765	11	2,130	29,870	0.1	0.3	2.6	0.9	0.0	0.01	0.89	1.88	16.48	5.87	0.09	0.09	0.08	0.18	1.53	0.55	0.01	0.01
ME-1	Sutter	Electric	Unknown	350	n/a	1,300	1%	85	510	11	2,130	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
R-24	Sutter	Diesel	Unknown	350	T0	2,500	2%	163	980	11	2,130	41,818	1.1	14.1	3.0	0.9	0.2	0.15	10.08	124.24	26.77	8.22	1.33	1.29	0.94	11.55	2.49	0.76	0.12	0.12
Hoppin	Sutter	Electric	Unknown	250	n/a	2,500	2%	163	980	11	2,130	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ag Industries - Sioux Creek	Sutter	Diesel	Unknown	350	T0	--	--	--	--	--	--	--	1.1	14.1	3.0	0.9	0.2	0.15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ag Industries - Sutter Basin	Sutter	Diesel	Unknown	350	T0	3,000	3%	196	1,176	11	2,130	41,818	1.1	14.1	3.0	0.9	0.2	0.15	10.08	124.24	26.77	8.22	1.33	1.29	0.94	11.55	2.49	0.76	0.12	0.12
VR-57	Sutter	Propane	Unknown	450	n/a	5,500	5%	359	2,157	11	2,130	2,439	1.0	2.0	4.0	0.0	0.0	0.00	11.36	22.72	45.44	0.01	0.00	0.00	1.06	2.11	4.23	0.00	0.00	0.00
F4N	Sutter	Propane	Unknown	290	n/a	3,000	3%	196	1,176	11	2,130	1,572	1.0	2.0	4.0	0.0	0.0	0.00	7.32	14.64	29.28	0.00	0.00	0.00	0.68	1.36	2.72	0.00	0.00	0.00
FT5	Sutter	Propane	Unknown	450	n/a	5,200	5%	340	2,039	11	2,130	2,439	1.0	2.0	4.0	0.0	0.0	0.00	11.36	22.72	45.44	0.01	0.00	0.00	1.06	2.11	4.23	0.00	0.00	0.00
BD-4	Sutter	Diesel	Unknown	225	T0	5,000	5%	327	1,961	11	2,130	26,883	1.1	14.1	3.0	0.9	0.2	0.15	6.48	79.87	17.21	5.28	0.85	0.83	0.60	7.43	1.60	0.49	0.08	0.08
BD-5?	Sutter	Propane	Unknown	310	n/a	4,000	4%	261	1,569	11	2,130	1,680	1.0	2.0	4.0	0.0	0.0	0.00	7.83	15.65	31.30	0.01	0.00	0.00	0.73	1.46	2.91	0.00	0.00	0.00
Previously Oji	Sutter	Propane	Unknown	250	n/a	2,800	3%	183	1,098	11	2,130	1,355	1.0	2.0	4.0	0.0	0.0	0.00	6.31	12.62	25.24	0.00	0.00	0.00	0.59	1.17	2.35	0.00	0.00	0.00
Dick Akin Well	Sutter	Electric	Unknown	250	n/a	4,000	4%	261	1,569	11	2,130	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Hwy 113-Cal West Walnut Well	Sutter	Electric	Unknown	250	n/a	4,500	4%	294	1,765	11	2,130	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Matteolli	Sutter	Propane	Unknown	250	n/a	--	--	--	--	--	--	--	1.0	2.0	4.0	0.0	0.0	0.00	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Oji	Sutter	Propane	Unknown	180	n/a	4,200	4%	275	1,647	11	2,130	975	1.0	2.0	4.0	0.0	0.0	0.00	4.54	9.09	18.18	0.00	0.00	0.00	0.42	0.85	1.69	0.00	0.00	0.00
					Total	**102,000**	**100%**	**6,667**	**40,000**	**321**	**59,633**								**111.91**	**566.27**	**466.40**	**55.80**	**4.82**	**4.71**	**10.41**	**52.66**	**43.38**	**5.19**	**0.45**	**0.44**
					Sutter County Subtotal	**102,000**	**100%**	**6,667**	**40,000**	**321**	**59,633**								**111.91**	**566.27**	**466.40**	**55.80**	**4.82**	**4.71**	**10.41**	**52.66**	**43.38**	**5.19**	**0.45**	**0.44**
						0	**0%**	**0**	**0**	**0**	**0**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
						0	**0%**	**0**	**0**	**0**	**0**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
6,667 AF/month
48,664 gallons/minute
48% peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Te Velde Revocable Family Trust			Peak Pumping by Transfer Period	
Transfer Volume	2,700 acre-feet	(Apr-Jun)		900	AF/month
	4,394 acre-feet	(Jul-Sep)		1,465	AF/month
	7,094 acre-feet/year	**Maximum**	*ok*		

Table G-61. Te Velde Revocable Family Trust Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Yolo	0	10	0	0	10	No
Total	0	10	0	0	10	

Table G-62. Te Velde Revocable Family Trust Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (MMBtu/yr) - propane or NG	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
GW1	Yolo	Electric	Unknown	125	n/a	4,500	14%	209	1,013	8	1,223	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GW3	Yolo	Electric	Unknown	125	n/a	3,000	10%	139	676	8	1,223	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GW4	Yolo	Electric	Unknown	125	n/a	3,500	11%	163	788	8	1,223	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GW 5	Yolo	Electric	Unknown	125	n/a	3,000	10%	139	676	8	1,223	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GW7	Yolo	Electric	Unknown	125	n/a	3,000	10%	139	676	8	1,223	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GW 8	Yolo	Electric	Unknown	125	n/a	3,000	10%	139	676	8	1,223	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GW9	Yolo	Electric	Unknown	100	n/a	3,000	10%	139	676	8	1,223	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GW10	Yolo	Electric	Unknown	125	n/a	3,000	10%	139	676	8	1,223	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
GW11	Yolo	Electric	Unknown	150	n/a	2,500	8%	116	563	8	1,223	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Possible Future well	Yolo	Electric	Unknown	125	n/a	3,000	10%	139	676	8	1,223	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
					Total	**31,500**	**100%**	**1,465**	**7,094**	**81**	**12,231**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
					Yolo County Subtotal	**31,500**	**100%**	**1,465**	**7,094**	**81**	**12,231**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
1,465 AF/month
10,691 gallons/minute
34% peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Tule Basin Farms				Peak Pumping by Transfer Period
Transfer Volume	3,000	acre-feet	(Apr-Jun)		1,000 AF/month
	3,000	acre-feet	(Jul-Sep)		1,000 AF/month
	6,000	**acre-feet/year**	**Maximum**	*ok*	

Table G-63. Tule Basin Farms Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	0	3	1	0	4	No
Total	0	3	1	0	4	

Table G-64. Tule Basin Farms Criteria Pollutant Emissions

	Well Location			Power Rating	Diesel Emission	Pump Rate		Transfer Volume		Operations		Fuel Consumption
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**Tier**	**(gpm)**	**(% of Total)**	**(AF/month)**	**(AF/year)**	**(hours/day)**	**(hours/year)**	**(gal/yr) - diesel (MMBtu/yr) - propane or NG**
TBF Well 1	Sutter	Electric	Unknown	125	n/a	2,500	19%	191	1,145	13	2,487	n/a
TBF Well 2	Sutter	Natural Gas	Unknown	190	n/a	3,500	27%	267	1,603	13	2,487	1,203
TBF Well 3	Sutter	Electric	Unknown	125	n/a	3,600	27%	275	1,649	13	2,487	n/a
TBF Well 10	Sutter	Electric	Unknown	125	n/a	3,500	27%	267	1,603	13	2,487	n/a
					Total	**13,100**	**100%**	**1,000**	**6,000**	**53**	**9,950**	
					Sutter County Subtotal	**13,100**	**100%**	**1,000**	**6,000**	**53**	**9,950**	

	Emission Factors (g/bhp-hr)						Daily Emissions (pounds per day)						Annual Emissions (tons per year)					
Well ID	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**	**VOC**	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
TBF Well 1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
TBF Well 2	1.0	2.0	4.0	0.0	0.0	0.00	5.60	11.20	22.41	0.00	0.00	0.00	0.52	1.04	2.08	0.00	0.00	0.00
TBF Well 3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
TBF Well 10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total							**5.60**	**11.20**	**22.41**	**0.00**	**0.00**	**0.00**	**0.52**	**1.04**	**2.08**	**0.00**	**0.00**	**0.00**
Sutter County Subtotal							**5.60**	**11.20**	**22.41**	**0.00**	**0.00**	**0.00**	**0.52**	**1.04**	**2.08**	**0.00**	**0.00**	**0.00**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
1,000 AF/month
7,300 gallons/minute
56% peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Groundwater Substitution Air Quality Emissions (Unmitigated)

Agency	Windswept Land and Livestock				Peak Pumping by Transfer Period	
Transfer Volume	775	acre-feet	(Apr-Jun)		258	AF/month
	1,000	acre-feet	(Jul-Sep)		333	AF/month
	1,775	**acre-feet/year**	**Maximum**	*ok*		

Table G-65. Windswept Land and Livestock Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	0	4	0	0	4	No
Total	0	4	0	0	4	

Table G-66. Windswept Land and Livestock Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)
NCW-1	Sutter	Electric	2013	150	n/a	3,200	26%	86	458	5	777
NCW-2	Sutter	Electric	Unknown	200	n/a	3,500	28%	94	501	5	777
NCW-3	Sutter	Electric	Unknown	150	n/a	2,500	20%	67	358	5	777
NCW-4	Sutter	Electric	Unknown	200	n/a	3,200	26%	86	458	5	777
					Total	**12,400**	**100%**	**333**	**1,775**	**19**	**3,110**
					Sutter County Subtotal	**12,400**	**100%**	**333**	**1,775**	**19**	**3,110**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
333 AF/month
2,433 gallons/minute
20% peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Table G-67. Diesel Engine Tier Matrix

HP Range	Year																			
	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
hp <11	T0	T0	T0	T0	T1	T1	T1	T1	T1	T2	T2	T2	T4	T4	T4	T4	T4	T4	T4	T4
11<=hp<25	T0	T0	T0	T0	T1	T1	T1	T1	T1	T2	T2	T2	T4	T4	T4	T4	T4	T4	T4	T4
25<=hp<50	T0	T0	T0	T0	T1	T1	T1	T1	T2	T2	T2	T2	T4I	T4I	T4I	T4I	T4I	T4	T4	T4
50<=hp<75	T0	T0	T0	T0	T1	T1	T1	T1	T2	T2	T2	T2	T4I	T4I	T4I	T4I	T4I	T4	T4	T4
75<=hp<100	T0	T0	T0	T0	T1	T1	T1	T1	T2	T2	T2	T2	T3	T3	T3	T3	T4I	T4I	T4I	T4
100<=hp<175	T0	T0	T0	T0	T1	T1	T1	T2	T2	T2	T2	T3	T3	T3	T3	T3	T4I	T4I	T4I	T4
175<=hp<300	T1	T1	T1	T1	T1	T1	T1	T2	T2	T2	T3	T3	T3	T3	T3	T4I	T4I	T4I	T4	T4
300<=hp<600	T1	T1	T1	T1	T1	T2	T2	T2	T2	T2	T3	T3	T3	T3	T3	T4I	T4I	T4I	T4	T4
600<=hp<750	T1	T1	T1	T1	T1	T1	T2	T2	T2	T2	T3	T3	T3	T3	T3	T4I	T4I	T4I	T4	T4
hp>750	T0	T0	T0	T0	T1	T1	T1	T1	T1	T1	T2	T2	T2	T2	T2	T4I	T4I	T4I	T4I	T4

Key:

T0 = Tier 0 (Noncertified)
T1 = Tier 1
T2 = Tier 2
T3 = Tier 3
T4 = Tier 4
T4I = Tier 4 Interim

CARB Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines

Table G-68. Emission Standards for New Stationary Diesel-Fueled CI Engines (> 50 bhp) Used in Agricultural Operations

Horsepower Range	Diesel PM [1] (g/bhp-hr)	HC (g/bhp-hr)	NOx (g/bhp-hr)	NMHC+NOx (g/bhp-hr)	CO (g/bhp-hr)
50<hp<100	0.3				
100<=hp<175	0.22				
175<=HP	0.15				

Source: Title 17, California Code of Regulations, Section 93115.8(a)

Notes:

[1] Less than or equal to the emission standard OR Off-Road CI Engine Certification Standard for an off-road engine of the maximum rated power, whichever is more stringent.

[2] Off-Road CI Engine Certification Standard for an off-road engine of the model year and maximum rated power of the engine installed to meet the applicable PM standard, or Tier 1 standards.

[3] Prior to January 1, 2008, these limits shall not apply to engines sold from one agricultural operation to another and funded under State or federal incentive.

Table G-69. Emission Standards for Noncertified Greater than 50 BHP In-Use Stationary Diesel-Fueled Engines Used in Agricultural Operations

Horsepower (HP) Range	Compliance Date [1]	PM (g/bhp-hr)	HC [2,3] (g/bhp-hr)	NOx [2,3] (g/bhp-hr)	NMHC+NOx [2,3] (g/bhp-hr)	CO [2,3] (g/bhp-hr)
50<=hp<75	2011	0.3				
75<=hp<100	2011	0.3				
100<=hp<175	2010	0.22				
175<=hp<=750	2010	0.15				
hp>750	2014	0.075				

Source: Title 17, California Code of Regulations, Sections 93115.8(b) (2) and (4)

Note:

[1] Compliance date on or after December 31

[2] Engine Certification Standards for off-road engine of the model year and maximum rated power of the engine installed to meet the applicable PM standard.

[3] If no limits have been established for an off-road engine of the same model year and maximum rated power, then the in-use stationary diesel-fueled engine used in an agricultural operation shall not exceed Tier 1 standards in Title 13.

Table G-70. Emission Standards Tier 1- and Tier 2-Certified Greater than 50 BHP In-Use Stationary Diesel-Fueled Engines Used in Agricultural Operations

Horsepower Range (hp)	Compliance Date	PM (g/bhp-hr)	HC [2,3] (g/bhp-hr)	NOx [2,3] (g/bhp-hr)	NMHC+NOx [2,3] (g/bhp-hr)	CO [2,3] (g/bhp-hr)
50<hp<75	2015	0.02				
75<=hp<175	2015	0.01				
175<=hp<=750	2014	0.01				
750<hp	2014	0.075				

Source: Title 17, California Code of Regulations, Sections 93115.8(b)(3) and (4)

Notes:

[1] Compliance date on or after December 31 or 12 years after the date of initial installation, whichever is later.

[2] Off-Road CI Engine Certification Standards for an off-road engine of the model year and maximum rated power of the engine installed to meet the applicable PM standard.

[3] If no limits have been established for an off-road engine of the same model year and maximum rated power, then the in-use stationary diesel-fueled engine used in agricultural operation shall not exceed Tier 1 standards in Tier 13, CCR, section 2423 for an off-road engine of the same maximum rated power irrespective of model year.

Table G-71. Tier 1, Tier 2, and Tier 3 Exhaust Emission Standards

			(g/kW-hr)					(g/hp-hr)				
Maximum Rated Power	**Tier**	**Model Year**	**NOx**	**HC**	**NMHC+NOx**	**CO**	**PM**	**NOx**	**HC**	**NMHC+NOx**	**CO**	**PM**
kW<8	T1	2000-2004	10.0	0.5	10.5	8.0	1.0	7.4	0.4	7.8	6.0	0.75
hp <11	T2	2005 -2007	7.1	0.4	7.5	8.0	0.8	5.3	0.3	5.6	6.0	0.60
8≤kW<19	T1	2000-2004	9.0	0.5	9.5	6.6	0.8	6.7	0.4	7.1	4.9	0.60
11<=hp<25	T2	2005 -2007	7.1	0.4	7.5	6.6	0.8	5.3	0.3	5.6	4.9	0.60
19≤kW<37	T1	2000-2003	9.0	0.5	9.5	5.5	0.8	6.7	0.4	7.1	4.1	0.60
25<=hp<50	T2	2004 -2007	7.1	0.4	7.5	5.5	0.6	5.3	0.3	5.6	4.1	0.45
37≤kW<56	T1	2000-2003	9.2	0.5	9.7	3.0	1.0	6.9	0.4	7.2	2.3	0.74
50<=hp<75	T2	2004-2007	7.1	0.4	7.5	5.0	0.4	5.3	0.3	5.6	3.7	0.30
	T3	2008 -2011	4.5	0.2	4.7	5.0	0.4	3.3	0.2	3.5	3.7	0.30
56≤kW<75	T1	2000-2003	9.2	0.5	9.7	3.0	1.0	6.9	0.4	7.2	2.3	0.74
75<=hp<100	T2	2004-2007	7.1	0.4	7.5	5.0	0.4	5.3	0.3	5.6	3.7	0.30
	T3	2008-2011	4.5	0.2	4.7	5.0	0.4	3.3	0.2	3.5	3.7	0.30
75≤kW<130	T1	2000-2002	9.2	0.5	9.7	3.0	1.0	6.9	0.4	7.2	2.3	0.74
100<=hp<175	T2	2003-2006	6.3	0.3	6.6	5.0	0.3	4.7	0.2	4.9	3.7	0.22
	T3	2007 -2011	3.8	0.2	4.0	5.0	0.3	2.8	0.1	3.0	3.7	0.22
130≤kW<225	T1	1996-2002	9.2	1.3	10.5	11.4	0.54	6.9	1.0	7.8	8.5	0.40
175<=hp<300	T2	2003-2005	6.3	0.3	6.6	3.5	0.2	4.7	0.2	4.9	2.6	0.15
	T3	2006 -2010	3.8	0.2	4.0	3.5	0.2	2.8	0.1	3.0	2.6	0.15
225≤kW<450	T1	1996-2000	9.2	1.3	10.5	11.4	0.54	6.9	1.0	7.8	8.5	0.40
300<=hp<600	T2	2001-2005	6.1	0.3	6.4	3.5	0.2	4.5	0.2	4.8	2.6	0.15
	T3	2006 -2010	3.8	0.2	4.0	3.5	0.2	2.8	0.1	3.0	2.6	0.15
450≤kW≤560	T1	1996-2001	9.2	1.3	10.5	11.4	0.54	6.9	1.0	7.8	8.5	0.40
600<=hp<750	T2	2002-2005	6.1	0.3	6.4	3.5	0.2	4.5	0.2	4.8	2.6	0.15
	T3	2006 -2010	3.8	0.2	4.0	3.5	0.2	2.8	0.1	3.0	2.6	0.15
kW>560	T1	2000-2005	9.2	1.3	10.5	11.4	0.54	6.9	1.0	7.8	8.5	0.40
hp>750	T2	2006 -2010	6.1	0.3	6.4	3.5	0.2	4.5	0.2	4.8	2.6	0.15

Source: Title 13, California Code of Regulations, Division 3, Chapter 9, Article 4, Section 2423, "Off-Road Compression-Ignition Engines and Equipment."

Note: Cells highlighted orange are derived from the NMHC+NOx regulatory levels based on the NOx and NMHC fractions.

<u>NOx and NMHC fraction - Table B-26</u>

NOx	95%
NMHC	5%

http://www.arb.ca.gov/msprog/moyer/guidelines/cmp_guidelines_part4.pdf

<u>PM Size Fractions</u>

PM10	0.96	
PM2.5	0.937	
Ratio	0.98	
CARB PMSIZE Profile No.		116

Table G-72. Tier 4 Exhaust Emission Standards

MAXIMUM ENGINE POWER	MODEL YEAR	TYPE	PM	NMHC+ NOx	NMHC	NOx	CO
			grams per horsepower-hour				
hp<11	2008 and later	FINAL	0.30	5.6	0.28	5.3	6.0
11<=hp<25							4.9
25<=hp<50	2008-2012	INTERIM	0.22	5.6	0.28	5.3	4.1
	2013 and later	FINAL	0.02	3.5	0.18	3.3	4.1
50<=hp<75	2008-2012	INTERIM	0.22	3.5	0.18	3.3	3.7
	2013 and later	FINAL	0.02	3.5	0.18	3.3	3.7
75<=hp<100	2012-2014	PHASE-IN	0.01	-	0.14	0.3	3.7
		PHASE-OUT		3.5	-	-	
		or/ ALT NOx			0.14	2.5	
	2015 and later	FINAL	0.01	-	0.14	0.3	3.7
100<=hp<175	2012-2014	PHASE-IN	0.01	-	0.14	0.3	3.7
		PHASE-OUT		3.0	-	-	
		or/ ALT NOx		-	0.14	2.5	
	2015 and later	FINAL	0.01		0.14	0.3	3.7
175<=hp<=750	2011-2013	PHASE-IN	0.01	-	0.14	0.3	2.6
	2014 and later	PHASE-OUT		3.0	-	-	
		or/ ALT NOx		-	0.14	1.5	
		FINAL	0.01		0.14	0.3	2.6
750 hp<GEN<=1205 hp	2011-2014	INTERIM	0.07	-	0.30	2.6	2.6
	2015 and later	FINAL	0.02		0.14	0.5	
GEN>1205 hp	2011-2014	INTERIM	0.07	-	0.30		2.6
	2015 and later	FINAL	0.02		0.14	0.5	
ELSE>750 hp	2011-2014	INTERIM	0.07	-	0.30	2.6	2.6
	2015 and later	FINAL	0.03	-	0.14	2.6	2.6

Source: Title 13, California Code of Regulations, Article 4, Section 2423, "Off-Road Compression-Ignition Engines and Equipment."

Notes:

1. Propulsion marine compression-ignition engines below 37 kW are not subject to Tier 4 standards or requirements. Allpreviously adopted requirements remain applicable for these engines.
2. The Tier 4 PM standard for hand-start, air cooled, direct injection engines below 8 kW is 0.60 g/kW-hr, but is notrequired until 2010.
3. Engine families in this power category may alternately meet Tier 3 PM standards from 2008-2011 in exchange forintroducing final PM standards in 2012.
4. Manufacturers have the option of complying with the Tier 4 standards over a two year period at 50% per year using banked Tier 2 credits or over a three year period at 25% per year without the use of Tier 2 credits. The three year phase-in period is shown. The 2014 model year cannot extend beyond December 30, 2014, when the 3 year phase-in option isused.
5. Manufacturers may comply with the standards during the transitional implementation years using either a phase-in /phase-out approach or by using the Alternate NOx approach. The three year 25% alternate NOx and alternate NOx +NMHC standards are shown in the table. The two year 50% alternate NOx standard would be 2.3 g/kW-hr. The two year50% alternate NOx + NMHC standard would be 2.4 g/kW-hr.
6. “GEN” refers to generator engines only.
7. “ELSE” refers to all mobile machinery excluding generator engines.
8. An ALT NOx+NMHC standard equal to 0.5 g/kW-hr is available for one additional model year following the last modelyear of the ALT NOx+NMHC phase-in shown in the table.

AP-42 Emission Factors

Table G-73. Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines [a]

Pollutant	Gasoline Fuel Emission Factor (lb/hp-hr) (power output)	Gasoline Fuel Emission Factor (lb/MMBtu) (fuel input)	Diesel Fuel Emission Factor (lb/hp-hr) (power output)	Diesel Fuel Emission Factor (lb/MMBtu) (fuel input)	Emission Factor Rating
NOx	0.011	1.63	0.031	4.41	D
CO	6.96E-03 [d]	0.99 [d]	6.68E-03	0.95	D
SOx	5.91E-04	0.084	2.05E-03	0.29	D
PM-10 [b]	7.21E-04	0.1	2.20E-03	0.31	D
CO2 [c]	1.08	154	1.15	164	B
Aldehydes	4.85E-04	0.07	4.63E-04	0.07	D
TOC					
Exhaust	0.015	2.1	2.47E-03	0.35	D
Evaporative	6.61E-04	0.09	0.00	0.00	E
Crankcase	4.85E-03	0.69	4.41E-05	0.01	E
Refueling	1.08E-03	0.15	0.00	0.00	E

Source: U.S. Environmental Protection Agency. 1996. Compilation of Air Pollutant Emission Factors (AP-42). Chapter 3.3: Gasoline and Diesel Industrial Engines.

Notes:

[a] References 2,5-6,9-14. When necessary, an average brake-specific fuel consumption (BSFC) of 7,000 Btu/hp-hr was used to convert from lb/MMBtu to lb/hp-hr. To convert from lb/hp-hr to kg/kwhr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code. TOC = total organic compounds.

[b] PM-10 = particulate matter less than or equal to 10 :m aerodynamic diameter. All particulate is assumed to be 10 µm in size.

[c] Assumes 99% conversion of carbon in fuel to CO2 with 87 weight % carbon in diesel, 86 weight % carbon in gasoline, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and gasoline heating value of 20,300 Btu/lb.

[d] Instead of 0.439 lb/hp-hr (power output) and 62.7 lb/mmBtu (fuel input), the correct emissions factors values are 6.96 E-03 lb/hp-hr (power output) and 0.99 lb/mmBtu (fuel input), respectively. This is an editorial correction. March 24, 2009

For large stationary diesel engines (greater than 600 horsepower [hp]) see Chapter 3.4: Large Stationary Diesel and All Stationary Dual-Fuel Engines.

Table G-74. Uncontrolled Emission Factors for Natural Gas-Fired 4-Stroke Lean-Burn Engines [a]

Pollutant	Emission Factor (lb/MMBtu) [b] (fuel input)	Emission Factor (g/hp-hr)	Emission Factor Rating
NOx [c] 90 - 105% Load	4.08E+00	4.71E+00	B
NOx [c] <90% Load	8.47E-01	9.78E-01	B
CO [c] 90 - 105% Load	3.17E-01	3.66E-01	C
CO [c] <90% Load	5.57E-01	6.43E-01	B
CO2 [d]	1.10E+02	1.27E+02	A
SO2 [e]	5.88E-04	6.79E-04	A
TOC [f]	1.47E+00	1.70E+00	A
Methane[g]	1.25E+00	1.44E+00	C
VOC [h]	1.18E-01	1.36E-01	C
PM10 (filterable) [i]	7.71E-05	8.90E-05	D
PM2.5 (filterable) [i]	7.71E-05	8.90E-05	D
PM Condensable [j]	9.91E-03	1.14E-02	D

Source: U.S. Environmental Protection Agency. 2000. Compilation of Air Pollutant Emission Factors (AP-42). Chapter 3.2: Natural Gas-Fired Reciprocating Engines. July.

Notes:

[a] Reference 7. Factors represent uncontrolled levels. For NOx, CO, and PM10, "uncontrolled" means no combustion or add-on controls; however, the factor may include turbocharged units. For all other pollutants, the data set may include units with control techniques used for NOx control, such as PCC"uncontrolled" means no oxidation control; and SCR for lean burn engines, and PSC for rich burn engines. Factors are based on large population of engines. Factors are for engines at all loads, except as indicated. SCC = Source Classification Code. TOC = Total Organic Compounds. PM-10 = Particulate Matter ≤ 10 microns (μ) aerodynamic diameter. A "<" sign in front of a factor means that the corresponding emission factor is based on one-half of the method detection limit.

[b] Emission factors were calculated in units of (lb/MMBtu) based on procedures in EPA Method 19. To convert from (lb/MMBtu) to (lb/10^6 scf), multiply by the heat content of the fuel. If the heat content is not available, use 1020 Btu/scf. To convert from (lb/MMBtu) to (lb/hp-hr) use the following equation:

lb/hp-hr = (lb/MMBtu) (heat input, MMBtu/hr) (1/operating HP, 1/hp)

[c] Emission tests with unreported load conditions were not included in the data set.

[d] Based on 99.5% conversion of the fuel carbon to CO2. CO2 [lb/MMBtu] = (3.67)(%CON)(C)(D)(1/h), where %CON = percent conversion of fuel carbon to CO2, C = carbon content of fuel by weight (0.75), D = density of fuel, 4.1 E+04 lb/10^6 scf, and h = heating value of natural gas (assume 1020 Btu/scf at 60EF).

[e] Based on 100% conversion of fuel sulfur to SO2. Assumes sulfur content in natural gas of 2,000 gr/10^6scf.

[f] Emission factor for TOC is based on measured emission levels from 22 source tests.

[g] Emission factor for methane is determined by subtracting the VOC and ethane emission factors from the TOC emission factor. Measured emission factor for methane compares well with the calculated emission factor, 1.31 lb/MMBtu vs. 1.25 lb/MMBtu, respectively.

[h] VOC emission factor is based on the sum of the emission factors for all speciated organic compounds less ethane and methane.

[i] Considered ≤ 1 μ in aerodynamic diameter. Therefore, for filterable PM emissions, PM10(filterable) = PM2.5(filterable).

[j] PM Condensable = PM Condensable Inorganic + PM-Condensable Organic

Table G-75. Emission Standards for Stationary Spark Ignition Engines

Engine type and fuel	Maximum engine power	Manufacture date	Emission standards a					
			g/HP-hr			ppmvd at 15% O2		
			NOX	CO	VOC d	NOX	CO	VOC d
Non-Emergency SI Natural Gas b and Non-Emergency SI Lean Burn LPG b.	100<=HP<500	7/1/2008	2.0	4.0	1.0	160	540	86
Non-Emergency SI Lean Burn Natural Gas and LPG.	500<=HP<1,350	1/1/2011	1.0	2.0	0.7	82	270	60
		1/1/2008	2.0	4.0	1.0	160	540	86
Non-Emergency SI Natural Gas and Non-Emergency SI Lean Burn LPG (except lean burn 500<=HP<1,350).	HP>=500	7/1/2010	1.0	2.0	0.7	82	270	60
		7/1/2007	2.0	4.0	1.0	160	540	86
Landfill/Digester Gas (except lean burn 500<=HP<1,350).	HP>=500	7/1/2010	1.0	2.0	0.7	82	270	60
	HP<500	7/1/2008	3.0	5.0	1.0	220	610	80
Landfill/Digester Gas Lean Burn	HP>=500	1/1/2011	2.0	5.0	1.0	150	610	80
		7/1/2007	3.0	5.0	1.0	220	610	80
	500<=HP<1,350	7/1/2010	2.0	5.0	1.0	150	610	80
		1/1/2008	3.0	5.0	1.0	220	610	80
		7/1/2010	2.0	5.0	1.0	150	610	80
Emergency	25<HP<130	1/1/2009	c 10	387	N/A	N/A	N/A	N/A
	HP>=130		2.0	4.0	1.0	160	540	86

Source: 40 CFR 60, Subpart JJJJ, Table 1.

Notes:

a Owners and operators of stationary non-certified SI engines may choose to comply with the emission standards in units of either g/HP-hr or ppmvd at 15 percent O2.

b Owners and operators of new or reconstructed non-emergency lean burn SI stationary engines with a site rating of greater than or equal to 250 brake HP located at a major source that are meeting the requirements of 40 CFR part 63, subpart ZZZZ, Table 2a do not have to comply with the CO emission standards of Table 1 of this subpart.

c The emission standards applicable to emergency engines between 25 HP and 130 HP are in terms of NOX + HC.

d For purposes of this subpart, when calculating emissions of volatile organic compounds, emissions of formaldehyde should not be included.

Engine Size Summary

Table G-76. Engine Power Rating Summary by Fuel Type

Fuel Type	No. Engines	Avg. HP	Max HP	Min HP
Propane	37	160	450	25
Electric	354	135	400	0
Diesel	62	185	450	30
Natural Gas	1	50	50	50

Table G-77. General Conformity Applicability Evaluation (Mitigated Emissions)

County/ Nonattainment Area	Emissions (tons per year)					
	VOC	NOx	CO	SOx	PM10	PM2.5
	Sacramento Metro[1]	Sacramento Metro[1]	Sacramento Area[2]	Sacramento[3,4]	Sacramento Co.	Sacramento[4]
Colusa	n/a	n/a	n/a	n/a	n/a	n/a
Glenn	n/a	n/a	n/a	n/a	n/a	n/a
Sacramento	0.00	0.00	0.00	0.00	0.00	0.00
Shasta	n/a	n/a	n/a	n/a	n/a	n/a
Sutter[5]	0.88	3.22	n/a	n/a	n/a	n/a
Yolo	0.94	8.51	2.92	0.52	n/a	0.08
Yuba	n/a	n/a	n/a	0.00	n/a	0.00
Total	1.8	11.7	2.9	0.5	0.0	0.1
Classification	Severe-15	Severe-15	Maintenance	PM2.5 Precursor	Maintenance	Nonattainment
De Minimis Threshold (tpy)	25	25	100	100	100	100
Exceed?	No	No	No	No	No	No

Note:

[1]The Sacramento Metro 8-hour O3 nonattainment area consist of Sacramento and Yolo Counties and parts of El Dorado, Placer, Solano, and Sutter Counties. Emissions occurring within the attainment area of these counties are excluded from the total emissions.

[2]The Sacramento Area CO maintenance area is based on the Census Bureau Urbanized Area and consists of parts of Placer, Sacramento, and Yolo Counties. The general conformity applicability evaluation is based on emissions that would occur within the entire county to be conservative.

[3]All counties are designated as attainment areas for SO2; however, since SO2 is a precursor to PM2.5, its emissions must be evaluated under general conformity.

[4]The 24-hour PM2.5 nonattainment area for Sacramento includes Sacramento County and parts of El Dorado, Placer, Solano, and Yolo Counties. The general conformity applicability analysis assumes that all emissions that could occur within each county would occur within the Sacramento nonattainment area to be conservative.

[5]VOC and NOx emissions are excluded from water agencies shown in table below because they are located in areas designated as attainment for the federal 8-hour O3 NAAQS.

Table G-78. Emissions Outside of 8-Hour Ozone Nonattainment Area (tons per year)

Water Agency	County	VOC	NOx
Andreotti	Sutter	0.4	0.7
Butte Water District	Sutter	All Electric	All Electric
Garden Highway Mutual Water Company	Sutter	0.3	0.6
Gilsizer Slough Ranch	Sutter	All Electric	All Electric
Meridian Farms Water Company	Sutter	0.0	0.0
Pelger Mutual Water Company	Sutter	0.0	0.6
Pelger Road 1700 LLC	Sutter	All Electric	All Electric
Tule Basin Farms	Sutter	0.5	1.0
Total		**1.2**	**3.0**

Note:

Totals may not add exactly because of rounding.

Summary of Daily Groundwater Substitution Emissions by County (Mitigated)

Table G-79. Daily VOC Emissions (Mitigated)

Water Agency	Daily VOC Emissions (pounds per day)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					4.83			4.83
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					3.67			3.67
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					4.83			4.83
Glenn-Colusa Irrigation District	32.73	8.88						41.61
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.00			0.00
Natomas Central Mutual Water Company			0.00		0.00			0.00
Pelger Mutual Water Company					0.46			0.46
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					0.00			0.00
Princeton-Codora-Glenn Irrigation District	8.25	12.86						21.10
Provident Irrigation District		34.08						34.08
Reclamation District 1004		All Electric						0.00
Reclamation District 108	41.79					10.16		51.94
Roberts Ditch Irrigation Company	0.80							0.80
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					4.65			4.65
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					5.60			5.60
Windswept Land and Livestock					All Electric			173.57
Total	**83.56**	**55.82**	**0.00**	**0.00**	**24.03**	**10.16**	**0.00**	**347.15**

Key:
VOC = volatile organic compounds

Table G-80. Daily NOx Emissions (Mitigated)

Water Agency	Daily NOx Emissions (pounds per day)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					9.66			9.66
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					7.34			7.34
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					9.66			9.66
Glenn-Colusa Irrigation District	371.71	109.55						481.25
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.00			0.00
Natomas Central Mutual Water Company			0.00		0.00			0.00
Pelger Mutual Water Company					8.74			8.74
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					0.00			0.00
Princeton-Codora-Glenn Irrigation District	101.70	164.94						266.64
Provident Irrigation District		412.32						412.32
Reclamation District 1004		All Electric						0.00
Reclamation District 108	372.88					91.51		464.39
Roberts Ditch Irrigation Company	1.60							1.60
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					25.00			25.00
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					11.20			11.20
Windswept Land and Livestock					All Electric			1,697.79
Total	**847.88**	**686.80**	**0.00**	**0.00**	**71.59**	**91.51**	**0.00**	**3,395.58**

Key:
NOx = nitrogen oxides

Summary of Daily Groundwater Substitution Emissions by County (Mitigated)

Table G-81. Daily CO Emissions (Mitigated)

Water Agency	Daily CO Emissions (pounds per day)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					19.31			19.31
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					14.68			14.68
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					19.31			19.31
Glenn-Colusa Irrigation District	146.12	23.61						169.73
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.00			0.00
Natomas Central Mutual Water Company			0.00		0.00			0.00
Pelger Mutual Water Company					11.50			11.50
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					0.00			0.00
Princeton-Codora-Glenn Irrigation District	21.91	42.14						64.06
Provident Irrigation District		104.47						104.47
Reclamation District 1004		All Electric						0.00
Reclamation District 108	129.54					31.38		160.91
Roberts Ditch Irrigation Company	3.19							3.19
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					18.77			18.77
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					22.41			22.41
Windswept Land and Livestock					All Electric			608.34
Total	**300.77**	**170.22**	**0.00**	**0.00**	**105.97**	**31.38**	**0.00**	**1,216.68**

Key:
CO = carbon monoxide

Table G-82. Daily SOx Emissions (Mitigated)

Water Agency	Daily SOx Emissions (pounds per day)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.00			0.00
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.00			0.00
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.00			0.00
Glenn-Colusa Irrigation District	44.58	7.24						51.82
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.00			0.00
Natomas Central Mutual Water Company			0.00		0.00			0.00
Pelger Mutual Water Company					2.87			2.87
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					0.00			0.00
Princeton-Codora-Glenn Irrigation District	6.73	13.45						20.18
Provident Irrigation District		32.25						32.25
Reclamation District 1004		All Electric						0.00
Reclamation District 108	22.84					5.62		28.47
Roberts Ditch Irrigation Company	0.00							0.00
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					2.25			2.25
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					0.00			0.00
Windswept Land and Livestock					All Electric			137.85
Total	**74.15**	**52.95**	**0.00**	**0.00**	**5.13**	**5.62**	**0.00**	**275.69**

Key:
SOx = sulfur oxides

Summary of Daily Groundwater Substitution Emissions by County (Mitigated)

Table G-83. Daily PM10 Emissions (Mitigated)

Water Agency	Daily PM10 Emissions (pounds per day)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.00			0.00
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.00			0.00
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.00			0.00
Glenn-Colusa Irrigation District	26.24	7.77						34.02
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.00			0.00
Natomas Central Mutual Water Company			0.00		0.00			0.00
Pelger Mutual Water Company					0.69			0.69
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					0.00			0.00
Princeton-Codora-Glenn Irrigation District	7.22	10.45						17.66
Provident Irrigation District		29.23						29.23
Reclamation District 1004		All Electric						0.00
Reclamation District 108	24.51					0.91		25.41
Roberts Ditch Irrigation Company	0.00							0.00
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					0.22			0.22
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					0.00			0.00
Windswept Land and Livestock					All Electric			107.23
Total	**57.97**	**47.45**	**0.00**	**0.00**	**0.91**	**0.91**	**0.00**	**214.46**

Key:
PM10 = inhalable particulate matter

Table G-84. Daily PM2.5 Emissions (Mitigated)

Water Agency	Daily PM2.5 Emissions (pounds per day)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.00			0.00
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.00			0.00
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.00			0.00
Glenn-Colusa Irrigation District	25.61	7.59						33.20
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.00			0.00
Natomas Central Mutual Water Company			0.00		0.00			0.00
Pelger Mutual Water Company					0.67			0.67
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					0.00			0.00
Princeton-Codora-Glenn Irrigation District	7.04	10.20						17.24
Provident Irrigation District		28.53						28.53
Reclamation District 1004		All Electric						0.00
Reclamation District 108	23.92					0.89		24.81
Roberts Ditch Irrigation Company	0.00							0.00
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					0.21			0.21
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					0.00			0.00
Windswept Land and Livestock					All Electric			104.66
Total	**56.58**	**46.31**	**0.00**	**0.00**	**0.89**	**0.89**	**0.00**	**209.32**

Key:
PM2.5 = fine particulate matter

Summary of Annual Groundwater Substitution Emissions by County (Mitigated)

Table G-85. Annual VOC Emissions (Mitigated)

Water Agency	Annual VOC Emissions (tons per year)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.37			0.37
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.32			0.32
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.45			0.45
Glenn-Colusa Irrigation District	3.04	0.83						3.87
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.00			0.00
Natomas Central Mutual Water Company			0.00		0.00			0.00
Pelger Mutual Water Company					0.03			0.03
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					0.00			0.00
Princeton-Codora-Glenn Irrigation District	0.61	0.96						1.57
Provident Irrigation District		2.60						2.60
Reclamation District 1004		All Electric						0.00
Reclamation District 108	3.89					0.94		4.83
Roberts Ditch Irrigation Company	0.07							0.07
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					0.43			0.43
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					0.52			0.52
Windswept Land and Livestock					All Electric			15.07
Total	**7.62**	**4.39**	**0.00**	**0.00**	**2.13**	**0.94**	**0.00**	**30.15**

Key:
VOC = volatile organic compounds

Table G-86. Annual NOx Emissions (Mitigated)

Water Agency	Annual NOx Emissions (tons per year)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.75			0.75
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.64			0.64
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.90			0.90
Glenn-Colusa Irrigation District	34.57	10.19						44.76
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.00			0.00
Natomas Central Mutual Water Company			0.00		0.00			0.00
Pelger Mutual Water Company					0.61			0.61
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					0.00			0.00
Princeton-Codora-Glenn Irrigation District	7.57	12.27						19.84
Provident Irrigation District		31.50						31.50
Reclamation District 1004		All Electric						0.00
Reclamation District 108	34.68					8.51		43.19
Roberts Ditch Irrigation Company	0.15							0.15
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					2.33			2.33
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					1.04			1.04
Windswept Land and Livestock					All Electric			145.69
Total	**76.96**	**53.96**	**0.00**	**0.00**	**6.26**	**8.51**	**0.00**	**291.38**

Key:
NOx = nitrogen oxides

Summary of Annual Groundwater Substitution Emissions by County (Mitigated)

Table G-87. Annual CO Emissions (Mitigated)

Water Agency	Annual CO Emissions (tons per year)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Yuba**	**Total**
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					1.50			1.50
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					1.27			1.27
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					1.80			1.80
Glenn-Colusa Irrigation District	13.59	2.20						15.78
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.00			0.00
Natomas Central Mutual Water Company			0.00		0.00			0.00
Pelger Mutual Water Company					0.81			0.81
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					0.00			0.00
Princeton-Codora-Glenn Irrigation District	1.63	3.14						4.77
Provident Irrigation District		7.98						7.98
Reclamation District 1004		All Electric						0.00
Reclamation District 108	12.05					2.92		14.96
Roberts Ditch Irrigation Company	0.29							0.29
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					1.75			1.75
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					2.08			2.08
Windswept Land and Livestock					All Electric			52.99
Total	**27.56**	**13.31**	**0.00**	**0.00**	**9.20**	**2.92**	**0.00**	**105.98**

Key:
CO = carbon monoxide

Table G-88. Annual SOx Emissions (Mitigated)

Water Agency	Annual SOx Emissions (tons per year)							
	Colusa	**Glenn**	**Sacramento**	**Shasta**	**Sutter**	**Yolo**	**Yuba**	**Total**
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.00			0.00
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.00			0.00
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.00			0.00
Glenn-Colusa Irrigation District	4.15	0.67						4.82
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.00			0.00
Natomas Central Mutual Water Company			0.00		0.00			0.00
Pelger Mutual Water Company					0.20			0.20
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					0.00			0.00
Princeton-Codora-Glenn Irrigation District	0.50	1.00						1.50
Provident Irrigation District		2.46						2.46
Reclamation District 1004		All Electric						0.00
Reclamation District 108	2.12					0.52		2.65
Roberts Ditch Irrigation Company	0.00							0.00
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					0.21			0.21
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					0.00			0.00
Windswept Land and Livestock					All Electric			11.84
Total	**6.77**	**4.14**	**0.00**	**0.00**	**0.41**	**0.52**	**0.00**	**23.69**

Key:
SOx = sulfur oxides

Summary of Annual Groundwater Substitution Emissions by County (Mitigated)

Table G-89. Annual PM10 Emissions (Mitigated)

Water Agency	Annual PM10 Emissions (tons per year)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.00			0.00
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.00			0.00
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.00			0.00
Glenn-Colusa Irrigation District	2.44	0.72						3.16
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.00			0.00
Natomas Central Mutual Water Company			0.00		0.00			0.00
Pelger Mutual Water Company					0.05			0.05
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					0.00			0.00
Princeton-Codora-Glenn Irrigation District	0.54	0.78						1.31
Provident Irrigation District		2.23						2.23
Reclamation District 1004		All Electric						0.00
Reclamation District 108	2.28					0.08		2.36
Roberts Ditch Irrigation Company	0.00							0.00
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					0.02			0.02
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					0.00			0.00
Windswept Land and Livestock					All Electric			9.14
Total	**5.26**	**3.73**	**0.00**	**0.00**	**0.07**	**0.08**	**0.00**	**18.28**

Key:
PM10 = inhalable particulate matter

Table G-90. Annual PM2.5 Emissions (Mitigated)

Water Agency	Annual PM2.5 Emissions (tons per year)							
	Colusa	Glenn	Sacramento	Shasta	Sutter	Yolo	Yuba	Total
Anderson-Cottonwood Irrigation District				All Electric				0.00
Andreotti					0.00			0.00
Butte Water District					All Electric			0.00
Cordua Irrigation District							All Electric	0.00
Garden Highway Mutual Water Company					0.00			0.00
Gilsizer Slough Ranch					All Electric			0.00
Giusti Farms					0.00			0.00
Glenn-Colusa Irrigation District	2.38	0.71						3.09
Henle Family Ltd. Partnership					All Electric			0.00
Meridian Farms Water Company					0.00			0.00
Natomas Central Mutual Water Company			0.00		0.00			0.00
Pelger Mutual Water Company					0.05			0.05
Pelger Road 1700 LLC					All Electric			0.00
Pleasant Grove-Verona Mutual Water Company					0.00			0.00
Princeton-Codora-Glenn Irrigation District	0.52	0.76						1.28
Provident Irrigation District		2.18						2.18
Reclamation District 1004		All Electric						0.00
Reclamation District 108	2.22					0.08		2.31
Roberts Ditch Irrigation Company	0.00							0.00
RRG Garden Properties LLC						All Electric		0.00
Sacramento County Water Agency			All Electric					0.00
Sacramento Suburban Water District			All Electric					0.00
Sutter Mutual Water Company					0.02			0.02
Te Velde Revocable Family Trust						All Electric		0.00
Tule Basin Farms					0.00			0.00
Windswept Land and Livestock					All Electric			8.92
Total	**5.13**	**3.64**	**0.00**	**0.00**	**0.07**	**0.08**	**0.00**	**17.85**

Key:
PM2.5 = fine particulate matter

Groundwater Substitution Air Quality Emissions (Mitigated)

Agency	Meridian Farms Water Company				Peak Pumping by Transfer Period		
Transfer Volume	3,000	acre-feet	(Apr-Jun)		1,000	AF/month	
	3,000	acre-feet	(Jul-Sep)		1,000	AF/month	
	6,000	**acre-feet/year**	**Maximum**	*ok*			

Decreased well usage (mitigation)
n/a

Increased pumping at other wells
31%

Table G-91. Meridian Farms Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	2	9	0	2	13	No
Total	2	9	0	2	13	

Table G-92. Meridian Farms Water Company Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
Prop 50	Sutter	Electric	Unknown	100	n/a	2,500	8%	100	600	7	1,303	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Clark Well	Sutter	Electric	Unknown	75	n/a	3,000	9%	120	720	7	1,303	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Jim Chesini	Sutter	Diesel	Unknown	125	T0	2,500	8%	0	0	0	0	0	1.1	14.1	3.0	0.9	0.2	0.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Meridian	Sutter	Propane	Unknown	60	n/a	1,500	5%	0	0	0	0	0	1.0	2.0	4.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
DoDo	Sutter	Diesel	Unknown	139	T3	1,200	4%	0	0	0	0	0	0.1	2.8	3.7	0.9	0.2	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S Meridian	Sutter	Electric	Unknown	125	n/a	3,000	9%	120	720	7	1,303	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Taylor	Sutter	Propane	Unknown	150	n/a	2,500	8%	0	0	0	0	0	1.0	2.0	4.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Park-Miller	Sutter	Electric	Unknown	125	n/a	3,000	9%	120	720	7	1,303	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Moroni	Sutter	Electric	Unknown	75	n/a	3,000	9%	120	720	7	1,303	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Cussick	Sutter	Electric	Unknown	125	n/a	2,000	6%	80	480	7	1,303	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Mike Chesini	Sutter	Electric	Unknown	75	n/a	2,500	8%	100	600	7	1,303	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pump 7 (Proposed well)	Sutter	Electric	Unknown	100	n/a	3,000	9%	120	720	7	1,303	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Filipino Camp (Proposed well)	Sutter	Electric	Unknown	100	n/a	3,000	9%	120	720	7	1,303	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
					Total	**32,700**	**100%**	**1,000**	**6,000**	**63**	**11,731**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
					Sutter County Subtotal	**32,700**	**100%**	**1,000**	**6,000**	**63**	**11,731**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

Peak Month
1,000 AF/month
7,300 gallons/minute
22% peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Mitigated)

Agency Natomas Central Mutual Water Company

Transfer Volume

10,000	acre-feet	(Apr-Jun)	3,333	AF/month	
20,000	acre-feet	(Jul-Sep)	6,667	AF/month	
30,000	acre-feet/year	Maximum			

Peak Pumping by Transfer Period

Decreased well usage (mitigation)

n/a

Increased pumping at other wells

16%

Table G-93. Natomas Central Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	1	22	0	4	27	No
Sacramento	2	21	0	1	24	No
Total	3	43	0	5	51	

Table G-94. Natomas Central Mutual Water Company Criteria Pollutant Emissions

	Well				Diesel							Fuel	Emission Factors						Daily Emissions						Annual Emissions					
	Location			Power Rating	Emission	Pump Rate		Transfer Volume		Operations		Consumption	(g/bhp-hr)						(pounds per day)						(tons per year)					
Well ID	(County)	Fuel Type	Model Year	(hp)	Tier	(gpm)	(% of Total)	(AF/month)	(AF/year)	(hours/day)	(hours/year)	(gal/yr) - diesel (MMBtu/yr) - propane or NG	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5	VOC	NOx	CO	SOx	PM10	PM2.5
Frazer	Sutter	Electric	Unknown	50	n/a	2,000	2%	148	664	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Morrison 2	Sutter	Electric	Unknown	75	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lucich North	Sutter	Electric	Unknown	75	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bennett North	Sutter	Electric	Unknown	60	n/a	2,200	2%	162	731	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Atkinson	Sutter	Electric	Unknown	40	n/a	1,800	2%	133	598	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Natomas Farms (TNBC Fisherman's Lake)	Sacramento	Electric	Unknown	60	n/a	1,500	1%	111	498	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Silva	Sacramento	Electric	Unknown	40	n/a	1,000	1%	74	332	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Betts	Sacramento	Electric	Unknown	75	n/a	1,500	1%	111	498	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pond R	Sacramento	Electric	Unknown	30	n/a	2,300	2%	170	764	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bianchi	Sutter	Propane	Unknown	200	n/a	1,500	1%	0	0	0	0	0	1.0	2.0	4.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Willey	Sacramento	Diesel	2012	225	T4	2,000	2%	0	0	0	0	0	0.1	0.3	2.6	0.9	0.0	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L-MW	Sutter	Propane	Unknown	200	n/a	1,800	2%	0	0	0	0	0	1.0	2.0	4.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L-1	Sutter	Diesel	Unknown	120	T4	1,600	2%	0	0	0	0	0	0.1	0.3	3.7	0.9	0.0	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L-2	Sutter	Electric	Unknown	100	n/a	1,900	2%	140	631	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-3	Sutter	Electric	Unknown	50	n/a	1,300	1%	96	432	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-4	Sutter	Electric	Unknown	75	n/a	1,300	1%	96	432	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-6	Sutter	Electric	Unknown	50	n/a	2,000	2%	148	664	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-7	Sutter	Electric	Unknown	30	n/a	1,200	1%	89	399	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-8	Sutter	Electric	Unknown	200	n/a	2,800	3%	207	930	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-9	Sutter	Electric	Unknown	50	n/a	1,500	1%	111	498	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-10	Sutter	Electric	Unknown	30	n/a	1,000	1%	74	332	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-11	Sutter	Electric	Unknown	50	n/a	1,500	1%	111	498	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-12	Sutter	Electric	Unknown	50	n/a	1,500	1%	111	498	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L-13 Bolen Pasture	Sutter	Propane	Unknown	200	n/a	2,800	3%	0	0	0	0	0	1.0	2.0	4.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
L-14 Chappell	Sutter	Electric	Unknown	75	n/a	1,800	2%	133	598	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MAP	Sacramento	Electric	Unknown	30	n/a	2,000	2%	148	664	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ose-1	Sacramento	Diesel	2013	150	T4I	1,800	2%	0	0	0	0	0	0.1	0.3	3.7	0.9	0.0	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ose-2	Sacramento	Electric	Unknown	150	n/a	2,400	2%	177	797	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Perry	Sacramento	Electric	Unknown	135	n/a	2,600	2%	192	864	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Spangler	Sutter	Electric	Unknown	60	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Elkhorn	Sacramento	Electric	Unknown	125	n/a	3,000	3%	221	997	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ameral	Sacramento	Propane	Unknown	200	n/a	1,500	1%	0	0	0	0	0	1.0	2.0	4.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dhaliwal	Sacramento	Electric	Unknown	125	n/a	3,000	3%	221	997	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Kubo	Sacramento	Electric	Unknown	25	n/a	1,300	1%	96	432	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Greenbriar	Sacramento	Electric	Unknown	150	n/a	3,200	3%	236	1,063	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Souza	Sacramento	Electric	Unknown	150	n/a	1,200	1%	89	399	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Plant 3	Sacramento	Electric	Unknown	150	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Fish 1	Sacramento	Electric	Unknown	75	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Fish 2	Sacramento	Electric	Unknown	75	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Lauppe	Sutter	Propane	Unknown	200	n/a	1,050	1%	0	0	0	0	0	1.0	2.0	4.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bryte	Sacramento	Electric	Unknown	150	n/a	1,500	1%	111	498	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
TNBC MW	Sutter	Electric	Unknown	150	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
NDC	Sutter	Electric	Unknown	150	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bennett	Sutter	Electric	Unknown	150	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pritchard	Sacramento	Electric	Unknown	150	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Elverta	Sacramento	Electric	Unknown	150	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Elkhorn North	Sacramento	Electric	Unknown	150	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Radio Road	Sacramento	Electric	Unknown	150	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Sankey	Sutter	Electric	Unknown	150	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
T-Drain	Sutter	Electric	Unknown	150	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Powerline Road Well	Sacramento	Electric	Unknown	150	n/a	2,500	2%	185	831	13	1,804	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
					Total	**104,350**	**100%**	**6,667**	**30,000**	**556**	**77,584**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
					Sutter County Subtotal	**52,550**	**50%**	**3,234**	**14,551**	**285**	**39,694**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
					Sacramento County Subtotal	**51,800**	**50%**	**3,433**	**15,449**	**272**	**37,890**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
						0	**0%**	**0**	**0**	**0**	**0**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Key:

AF = acre-feet

CO = carbon monoxide

g/bhp-hr = grams per brake-horsepower hour

gal/yr = gallons per year

gpm = gallons per minute

hp = horsepower

NOx = nitrogen oxides

PM10 = inhalable particulate matter

PM2.5 = fine particulate matter

SOx = sulfur oxides

VOC = volatile organic compound

Peak Month

6,667	AF/month
48,664	gallons/minute
47%	peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)
0.855	g/mL	(Based on MSDS for Hess Diesel Fuel All Types)
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Mitigated)

Agency Pleasant Grove-Verona Mutual Water Company

Transfer Volume

8,000	acre-feet	(Apr-Jun)		
	10,000	acre-feet	(Jul-Sep)	
	18,000	acre-feet/year	Maximum	

Peak Pumping by Transfer Period

2,667	AF/month
3,333	AF/month

Decreased well usage (mitigation)
n/a

Increased pumping at other wells
36%

Table G-95. Pleasant Grove-Verona Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	6	29	0	6	41	No
	0	0	0	0	0	
	0	0	0	0	0	
Total	6	29	0	6	41	

Table G-96. Pleasant Grove-Verona Mutual Water Company Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
Kelly 190 Field Well #2	Sutter	Electric	Unknown	30	n/a	1,800	2%	95	514	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Kelly Windmill Field Well #2	Sutter	Electric	2002	80	n/a	1,500	2%	79	428	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Kelly Windmill North Field Well	Sutter	Propane	2014	80	n/a	1,800	2%	0	0	0	0	0	1.0	2.0	4.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kelly306	Sutter	Electric	Unknown	60	n/a	3,100	4%	164	885	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Kelly New Well	Sutter	Electric	Unknown	30	n/a	1,800	2%	95	514	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MLF Clubhouse B Well	Sutter	Electric	Unknown	100	n/a	3,600	4%	190	1,028	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MLF Marsh Well	Sutter	Electric	Unknown	100	n/a	3,300	4%	174	942	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MLF Monster Well	Sutter	Electric	Unknown	60	n/a	3,100	4%	164	885	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MLF Well #1	Sutter	Electric	Unknown	30	n/a	2,000	2%	106	571	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MLF Well #16	Sutter	Diesel	Unknown	60	T0	1,700	2%	0	0	0	0	0	1.1	14.1	3.0	0.9	0.3	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MLF Well#11	Sutter	Diesel	2004	240	T2	1,400	2%	0	0	0	0	0	0.2	4.7	2.6	0.9	0.0	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MLF Well#12/17	Sutter	Electric	Unknown	50	n/a	2,200	3%	116	628	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MLF Well#13&#15	Sutter	Diesel	2000	215	T1	1,900	2%	0	0	0	0	0	1.0	6.9	8.5	0.9	0.0	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MLF Well#2B	Sutter	Electric	2000	100	n/a	2,750	3%	145	785	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MLF New Well	Sutter	Electric	Unknown	100	n/a	2,750	3%	145	785	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nicholas 72-Acre Field North	Sutter	Electric	Unknown	40	n/a	1,800	2%	95	514	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nicholas 72-Acre Field South	Sutter	Electric	2002	30	n/a	2,000	2%	106	571	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nicholas BBC Well	Sutter	Electric	Unknown	30	n/a	2,000	2%	106	571	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nicholas Filipino Camp South	Sutter	Diesel	2002	84	T1	800	1%	0	0	0	0	0	0.4	6.9	2.3	0.9	0.0	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nicholas Filipino Camp#2	Sutter	Electric	Unknown	40	n/a	1,700	2%	90	485	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nicholas Johnston Field Well #2	Sutter	Electric	Unknown	40	n/a	1,550	2%	82	443	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nicholas Sand Field Well	Sutter	Electric	2002	30	n/a	2,000	2%	106	571	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Nicholas New Well	Sutter	Electric	Unknown	30	n/a	1,800	2%	95	514	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
RiverRanch#19	Sutter	Diesel	2008	80	T3	2,500	3%	0	0	0	0	0	0.2	3.3	3.7	0.9	0.3	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
River Ranch New Well	Sutter	Electric	Unknown	60	n/a	3,000	3%	159	856	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S&O#16	Sutter	Electric	2014	80	n/a	2,000	2%	106	571	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S&O#17	Sutter	Electric	1999	80	n/a	3,000	3%	159	856	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S&O#18A	Sutter	Diesel	1999	80	T0	1,800	2%	0	0	0	0	0	1.1	14.1	3.0	0.9	0.3	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S&O#19	Sutter	Propane	2007	80	n/a	2,000	2%	0	0	0	0	0	1.0	2.0	4.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
S&O#20	Sutter	Propane	2014	80	n/a	2,000	2%	0	0	0	0	0	1.0	2.0	4.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Willey#1	Sutter	Propane	2000	170	n/a	3,000	3%	0	0	0	0	0	1.0	2.0	4.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Willey#2	Sutter	Electric	Unknown	30	n/a	1,500	2%	79	428	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Willey#3	Sutter	Electric	Unknown	75	n/a	1,500	2%	79	428	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Willey#4	Sutter	Propane	1974	170	n/a	2,000	2%	0	0	0	0	0	1.0	2.0	4.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Willey#5	Sutter	Propane	Unknown	60	n/a	2,000	2%	0	0	0	0	0	1.0	2.0	4.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Will-Lee Well#30	Sutter	Electric	Unknown	30	n/a	1,500	2%	79	428	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Will-Lee Well#31	Sutter	Electric	Unknown	30	n/a	1,500	2%	79	428	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Will-Lee Well#32	Sutter	Electric	Unknown	50	n/a	2,500	3%	132	714	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Will-Lee Well#33	Sutter	Electric	Unknown	50	n/a	2,500	3%	132	714	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Will-Lee Well#4A	Sutter	Electric	2000	30	n/a	1,500	2%	79	428	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Spangler Well	Sutter	Electric	Unknown	40	n/a	1,800	2%	95	514	9	1,550	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
					Total	**85,950**	**100%**	**3,333**	**18,000**	**269**	**44,963**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
					Sutter County Subtotal	**85,950**	**100%**	**3,333**	**18,000**	**269**	**44,963**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
						0	**0%**	**0**	**0**	**0**	**0**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
						0	**0%**	**0**	**0**	**0**	**0**								**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Key:
AF = acre-feet
CO = carbon monoxide
g/bhp-hr = grams per brake-horsepower hour
gal/yr = gallons per year
gpm = gallons per minute
hp = horsepower
NOx = nitrogen oxides
PM10 = inhalable particulate matter
PM2.5 = fine particulate matter
SOx = sulfur oxides
VOC = volatile organic compound

		Peak Month
	3,333	AF/month
24,332	gallons/minute	
	28%	peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)
0.855	g/mL	(Based on MSDS for Hess Diesel Fuel All Types)
7.13	lb/gal	

Groundwater Substitution Air Quality Emissions (Mitigated)

Groundwater Substitution Air Quality Emissions (Mitigated)

Agency Sutter Mutual Water Company   Peak Pumping by Transfer Period

Transfer Volume

20,000	acre-feet	(Apr-Jun)	6,667	AF/month
20,000	acre-feet	(Jul-Sep)	6,667	AF/month
40,000	acre-feet/year	Maximum		

Decreased well usage (mitigation)

-96%

Increased pumping at other wells

129%

Table G-97. Sutter Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	10	9	0	12	31	No
Total	10	9	0	12	31	

Table G-97. Sutter Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total	Remotely-Located?
Sutter	10	9	0	12	31	No
Total	10	9	0	12	31	

Table G-98. Sutter Mutual Water Company Criteria Pollutant Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Diesel Emission Tier	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/month)	Transfer Volume (AF/year)	Operations (hours/day)	Operations (hours/year)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors (g/bhp-hr) VOC	NOx	CO	SOx	PM10	PM2.5	Daily Emissions (pounds per day) VOC	NOx	CO	SOx	PM10	PM2.5	Annual Emissions (tons per year) VOC	NOx	CO	SOx	PM10	PM2.5
G-16	Sutter	Electric	Unknown	250	n/a	4,500	4%	616	3,699	24	4,464	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
QHR	Sutter	Propane	Unknown	250	n/a	5,000	4%	11	69	0	75	48	1.0	2.0	4.0	0.0	0.0	0.00	0.22	0.44	0.89	0.00	0.00	0.00	0.02	0.04	0.08	0.00	0.00	0.00
MB-1	Sutter	Propane	Unknown	268	n/a	5,300	5%	12	73	0	75	51	1.0	2.0	4.0	0.0	0.0	0.00	0.24	0.48	0.95	0.00	0.00	0.00	0.02	0.04	0.09	0.00	0.00	0.00
LM-53	Sutter	Electric	Unknown	150	n/a	3,000	3%	411	2,466	24	4,464	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BD-1	Sutter	Diesel	Unknown	225	T0	2,500	2%	6	34	0	75	946	1.1	14.1	3.0	0.9	0.2	0.15	0.23	2.81	0.61	0.19	0.03	0.03	0.02	0.26	0.06	0.02	0.00	0.00
L1-1	Sutter	Diesel	Unknown	250	T4	3,800	3%	9	52	0	75	1,051	0.1	0.3	2.6	0.9	0.0	0.01	0.03	0.07	0.58	0.21	0.00	0.00	0.00	0.01	0.05	0.02	0.00	0.00
L1-2	Sutter	Diesel	Unknown	250	T4	4,200	4%	10	58	0	75	1,051	0.1	0.3	2.6	0.9	0.0	0.01	0.03	0.07	0.58	0.21	0.00	0.00	0.00	0.01	0.05	0.02	0.00	0.00
L2-1	Sutter	Diesel	Unknown	250	T4	5,500	5%	13	76	0	75	1,051	0.1	0.3	2.6	0.9	0.0	0.01	0.03	0.07	0.58	0.21	0.00	0.00	0.00	0.01	0.05	0.02	0.00	0.00
LM-11	Sutter	Electric	Unknown	150	n/a	3,100	3%	425	2,548	24	4,464	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
S-18	Sutter	Electric	Unknown	160	n/a	1,400	1%	192	1,151	24	4,464	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BD-2	Sutter	Diesel	Unknown	225	T4	4,000	4%	9	55	0	75	946	0.1	0.3	2.6	0.9	0.0	0.01	0.03	0.06	0.52	0.19	0.00	0.00	0.00	0.01	0.05	0.02	0.00	0.00
BD-3	Sutter	Propane	Unknown	250	n/a	3,200	3%	7	44	0	75	48	1.0	2.0	4.0	0.0	0.0	0.00	0.22	0.44	0.89	0.00	0.00	0.00	0.02	0.04	0.08	0.00	0.00	0.00
FG	Sutter	Propane	Unknown	250	n/a	1,500	1%	3	21	0	75	48	1.0	2.0	4.0	0.0	0.0	0.00	0.22	0.44	0.89	0.00	0.00	0.00	0.02	0.04	0.08	0.00	0.00	0.00
R-29	Sutter	Propane	Unknown	150	n/a	2,500	2%	6	34	0	75	29	1.0	2.0	4.0	0.0	0.0	0.00	0.13	0.27	0.53	0.00	0.00	0.00	0.01	0.02	0.05	0.00	0.00	0.00
TVN	Sutter	Electric	Unknown	75	n/a	3,000	3%	411	2,466	24	4,464	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DB-1	Sutter	Diesel	Unknown	250	T4	4,500	4%	10	62	0	75	1,051	0.1	0.3	2.6	0.9	0.0	0.01	0.03	0.07	0.58	0.21	0.00	0.00	0.00	0.01	0.05	0.02	0.00	0.00
ME-1	Sutter	Electric	Unknown	350	n/a	1,300	1%	178	1,069	24	4,464	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
R-24	Sutter	Diesel	Unknown	350	T0	2,500	2%	6	34	0	75	1,471	1.1	14.1	3.0	0.9	0.2	0.15	0.35	4.37	0.94	0.29	0.05	0.05	0.03	0.41	0.09	0.03	0.00	0.00
Hoppin	Sutter	Electric	Unknown	250	n/a	2,500	2%	342	2,055	24	4,464	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ag Industries - Sioux Creek	Sutter	Diesel	Unknown	350	T0	2,800	3%	6	39	0	75	1,471	1.1	14.1	3.0	0.9	0.2	0.15	0.35	4.37	0.94	0.29	0.05	0.05	0.03	0.41	0.09	0.03	0.00	0.00
Ag Industries - Sutter Basin	Sutter	Diesel	Unknown	350	T0	3,000	3%	7	41	0	75	1,471	1.1	14.1	3.0	0.9	0.2	0.15	0.35	4.37	0.94	0.29	0.05	0.05	0.03	0.41	0.09	0.03	0.00	0.00
VR-57	Sutter	Propane	Unknown	450	n/a	5,500	5%	13	76	0	75	86	1.0	2.0	4.0	0.0	0.0	0.00	0.40	0.80	1.60	0.00	0.00	0.00	0.04	0.07	0.15	0.00	0.00	0.00
F4N	Sutter	Propane	Unknown	290	n/a	3,000	3%	7	41	0	75	55	1.0	2.0	4.0	0.0	0.0	0.00	0.26	0.52	1.03	0.00	0.00	0.00	0.02	0.05	0.10	0.00	0.00	0.00
FT5	Sutter	Propane	Unknown	450	n/a	5,200	5%	12	72	0	75	86	1.0	2.0	4.0	0.0	0.0	0.00	0.40	0.80	1.60	0.00	0.00	0.00	0.04	0.07	0.15	0.00	0.00	0.00
BD-4	Sutter	Diesel	Unknown	225	T0	5,000	4%	11	69	0	75	946	1.1	14.1	3.0	0.9	0.2	0.15	0.23	2.81	0.61	0.19	0.03	0.03	0.02	0.26	0.06	0.02	0.00	0.00
BD-5?	Sutter	Propane	Unknown	310	n/a	4,000	4%	9	55	0	75	59	1.0	2.0	4.0	0.0	0.0	0.00	0.28	0.55	1.10	0.00	0.00	0.00	0.03	0.05	0.10	0.00	0.00	0.00
Previously Oji	Sutter	Propane	Unknown	250	n/a	2,800	3%	6	39	0	75	48	1.0	2.0	4.0	0.0	0.0	0.00	0.22	0.44	0.89	0.00	0.00	0.00	0.02	0.04	0.08	0.00	0.00	0.00
Dick Akin Well	Sutter	Electric	Unknown	250	n/a	4,000	4%	548	3,288	24	4,464	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Hwy 113-Cal West Walnut Well	Sutter	Electric	Unknown	250	n/a	4,500	4%	616	3,699	24	4,464	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Matteolli	Sutter	Propane	Unknown	250	n/a	4,000	4%	9	55	0	75	48	1.0	2.0	4.0	0.0	0.0	0.00	0.22	0.44	0.89	0.00	0.00	0.00	0.02	0.04	0.08	0.00	0.00	0.00
Oji	Sutter	Propane	Unknown	180	n/a	4,200	4%	10	58	0	75	34	1.0	2.0	4.0	0.0	0.0	0.00	0.16	0.32	0.64	0.00	0.00	0.00	0.01	0.03	0.06	0.00	0.00	0.00
					Total	**111,300**	**100%**	**3,933**	**23,599**	**225**	**41,824**								**4.65**	**25.00**	**18.77**	**2.25**	**0.22**	**0.21**	**0.43**	**2.33**	**1.75**	**0.21**	**0.02**	**0.02**
					Sutter County Subtotal	**111,300**	**100%**	**3,933**	**23,599**	**225**	**41,824**								**4.65**	**25.00**	**18.77**	**2.25**	**0.22**	**0.21**	**0.43**	**2.33**	**1.75**	**0.21**	**0.02**	**0.02**

Key:

AF = acre-feet

CO = carbon monoxide

g/bhp-hr = grams per brake-horsepower hour

gal/yr = gallons per year

gpm = gallons per minute

hp = horsepower

NOx = nitrogen oxides

PM10 = inhalable particulate matter

PM2.5 = fine particulate matter

SOx = sulfur oxides

VOC = volatile organic compound

Peak Month

6,667	AF/month
48,664	gallons/minute
44%	peak pump rate

Conversion Factors

1 day =	24	hours
1 month =	31	days
1 hour =	60	minutes
1 acre-foot =	325,851	gallons

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)
0.855	g/mL	(Based on MSDS for Hess Diesel Fuel All Types)
7.13	lb/gal	

Table G-99. Diesel Engine Tier Matrix

HP Range	Year																			
	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
hp <11	T0	T0	T0	T0	T1	T1	T1	T1	T1	T2	T2	T2	T4	T4	T4	T4	T4	T4	T4	T4
11<=hp<25	T0	T0	T0	T0	T1	T1	T1	T1	T1	T2	T2	T2	T4	T4	T4	T4	T4	T4	T4	T4
25<=hp<50	T0	T0	T0	T0	T1	T1	T1	T1	T2	T2	T2	T2	T4I	T4I	T4I	T4I	T4I	T4	T4	T4
50<=hp<75	T0	T0	T0	T0	T1	T1	T1	T1	T2	T2	T2	T2	T4I	T4I	T4I	T4I	T4I	T4	T4	T4
75<=hp<100	T0	T0	T0	T0	T1	T1	T1	T1	T2	T2	T2	T2	T3	T3	T3	T3	T4I	T4I	T4I	T4
100<=hp<175	T0	T0	T0	T0	T1	T1	T1	T2	T2	T2	T2	T3	T3	T3	T3	T3	T4I	T4I	T4I	T4
175<=hp<300	T1	T1	T1	T1	T1	T1	T1	T2	T2	T2	T3	T3	T3	T3	T3	T4I	T4I	T4I	T4	T4
300<=hp<600	T1	T1	T1	T1	T1	T2	T2	T2	T2	T2	T3	T3	T3	T3	T3	T4I	T4I	T4I	T4	T4
600<=hp<750	T1	T1	T1	T1	T1	T1	T2	T2	T2	T2	T3	T3	T3	T3	T3	T4I	T4I	T4I	T4	T4
hp>750	T0	T0	T0	T0	T1	T1	T1	T1	T1	T1	T2	T2	T2	T2	T2	T4I	T4I	T4I	T4I	T4

Key:

T0 = Tier 0 (Noncertified)
T1 = Tier 1
T2 = Tier 2
T3 = Tier 3
T4 = Tier 4
T4I = Tier 4 Interim

CARB Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines

Table G-100. Emission Standards for New Stationary Diesel-Fueled CI Engines (> 50 bhp) Used in Agricultural Operations

Horsepower Range	Diesel PM [1] (g/bhp-hr)	HC (g/bhp-hr)	NOx (g/bhp-hr)	NMHC+NOx (g/bhp-hr)	CO (g/bhp-hr)
50<hp<100	0.3				
100<=hp<175	0.22				
175<=HP	0.15				

Source: Title 17, California Code of Regulations, Section 93115.8(a)

Notes:

[1] Less than or equal to the emission standard OR Off-Road CI Engine Certification Standard for an off-road engine of the maximum rated power, whichever is more stringent.

[2] Off-Road CI Engine Certification Standard for an off-road engine of the model year and maximum rated power of the engine installed to meet the applicable PM standard, or Tier 1 standards.

[3] Prior to January 1, 2008, these limits shall not apply to engines sold from one agricultural operation to another and funded under State or federal incentive.

Table G-101. Emission Standards for Noncertified Greater than 50 BHP In-Use Stationary Diesel-Fueled Engines Used in Agricultural Operations

Horsepower (HP) Range	Compliance Date [1]	PM (g/bhp-hr)	HC [2,3] (g/bhp-hr)	NOx [2,3] (g/bhp-hr)	NMHC+NOx [2,3] (g/bhp-hr)	CO [2,3] (g/bhp-hr)
50<=hp<75	2011	0.3				
75<=hp<100	2011	0.3				
100<=hp<175	2010	0.22				
175<=hp<=750	2010	0.15				
hp>750	2014	0.075				

Source: Title 17, California Code of Regulations, Sections 93115.8(b) (2) and (4)

Note:

[1] Compliance date on or after December 31

[2] Engine Certification Standards for off-road engine of the model year and maximum rated power of the engine installed to meet the applicable PM standard.

[3] If no limits have been established for an off-road engine of the same model year and maximum rated power, then the in-use stationary diesel-fueled engine used in an agricultural operation shall not exceed Tier 1 standards in Title 13.

Table G-102. Emission Standards Tier 1- and Tier 2-Certified Greater than 50 BHP In-Use Stationary Diesel-Fueled Engines Used in Agricultural Operations

Horsepower Range (hp)	Compliance Date	PM (g/bhp-hr)	HC [2,3] (g/bhp-hr)	NOx [2,3] (g/bhp-hr)	NMHC+NOx [2,3] (g/bhp-hr)	CO [2,3] (g/bhp-hr)
50<hp<75	2015	0.02				
75<=hp<175	2015	0.01				
175<=hp<=750	2014	0.01				
750<hp	2014	0.075				

Source: Title 17, California Code of Regulations, Sections 93115.8(b)(3) and (4)

Notes:

[1] Compliance date on or after December 31 or 12 years after the date of initial installation, whichever is later.

[2] Off-Road CI Engine Certification Standards for an off-road engine of the model year and maximum rated power of the engine installed to meet the applicable PM standard.

[3] If no limits have been established for an off-road engine of the same model year and maximum rated power, then the in-use stationary diesel-fueled engine used in agricultural operation shall not exceed Tier 1 standards in Tier 13, CCR, section 2423 for an off-road engine of the same maximum rated power irrespective of model year.

Table G-103. Tier 1, Tier 2, and Tier 3 Exhaust Emission Standards

			(g/kW-hr)					(g/hp-hr)				
Maximum Rated Power	**Tier**	**Model Year**	**NOx**	**HC**	**NMHC+NOx**	**CO**	**PM**	**NOx**	**HC**	**NMHC+NOx**	**CO**	**PM**
kW<8	T1	2000-2004	10.0	0.5	10.5	8.0	1.0	7.4	0.4	7.8	6.0	0.75
hp <11	T2	2005 -2007	7.1	0.4	7.5	8.0	0.8	5.3	0.3	5.6	6.0	0.60
8≤kW<19	T1	2000-2004	9.0	0.5	9.5	6.6	0.8	6.7	0.4	7.1	4.9	0.60
11<=hp<25	T2	2005 -2007	7.1	0.4	7.5	6.6	0.8	5.3	0.3	5.6	4.9	0.60
19≤kW<37	T1	2000-2003	9.0	0.5	9.5	5.5	0.8	6.7	0.4	7.1	4.1	0.60
25<=hp<50	T2	2004 -2007	7.1	0.4	7.5	5.5	0.6	5.3	0.3	5.6	4.1	0.45
37≤kW<56	T1	2000-2003	9.2	0.5	9.7	3.0	1.0	6.9	0.4	7.2	2.3	0.74
50<=hp<75	T2	2004-2007	7.1	0.4	7.5	5.0	0.4	5.3	0.3	5.6	3.7	0.30
	T3	2008 -2011	4.5	0.2	4.7	5.0	0.4	3.3	0.2	3.5	3.7	0.30
56≤kW<75	T1	2000-2003	9.2	0.5	9.7	3.0	1.0	6.9	0.4	7.2	2.3	0.74
75<=hp<100	T2	2004-2007	7.1	0.4	7.5	5.0	0.4	5.3	0.3	5.6	3.7	0.30
	T3	2008-2011	4.5	0.2	4.7	5.0	0.4	3.3	0.2	3.5	3.7	0.30
75≤kW<130	T1	2000-2002	9.2	0.5	9.7	3.0	1.0	6.9	0.4	7.2	2.3	0.74
100<=hp<175	T2	2003-2006	6.3	0.3	6.6	5.0	0.3	4.7	0.2	4.9	3.7	0.22
	T3	2007 -2011	3.8	0.2	4.0	5.0	0.3	2.8	0.1	3.0	3.7	0.22
130≤kW<225	T1	1996-2002	9.2	1.3	10.5	11.4	0.54	6.9	1.0	7.8	8.5	0.40
175<=hp<300	T2	2003-2005	6.3	0.3	6.6	3.5	0.2	4.7	0.2	4.9	2.6	0.15
	T3	2006 -2010	3.8	0.2	4.0	3.5	0.2	2.8	0.1	3.0	2.6	0.15
225≤kW<450	T1	1996-2000	9.2	1.3	10.5	11.4	0.54	6.9	1.0	7.8	8.5	0.40
300<=hp<600	T2	2001-2005	6.1	0.3	6.4	3.5	0.2	4.5	0.2	4.8	2.6	0.15
	T3	2006 -2010	3.8	0.2	4.0	3.5	0.2	2.8	0.1	3.0	2.6	0.15
450≤kW≤560	T1	1996-2001	9.2	1.3	10.5	11.4	0.54	6.9	1.0	7.8	8.5	0.40
600<=hp<750	T2	2002-2005	6.1	0.3	6.4	3.5	0.2	4.5	0.2	4.8	2.6	0.15
	T3	2006 -2010	3.8	0.2	4.0	3.5	0.2	2.8	0.1	3.0	2.6	0.15
kW>560	T1	2000-2005	9.2	1.3	10.5	11.4	0.54	6.9	1.0	7.8	8.5	0.40
hp>750	T2	2006 -2010	6.1	0.3	6.4	3.5	0.2	4.5	0.2	4.8	2.6	0.15

Source: Title 13, California Code of Regulations, Division 3, Chapter 9, Article 4, Section 2423, "Off-Road Compression-Ignition Engines and Equipment."

Note: Cells highlighted orange are derived from the NMHC+NOx regulatory levels based on the NOx and NMHC fractions.

NOx and NMHC fraction - Table B-26	
NOx	95%
NMHC	5%

http://www.arb.ca.gov/msprog/moyer/guidelines/cmp_guidelines_part4.pdf

PM Size Fractions		
PM10	0.96	
PM2.5	0.937	
Ratio	0.98	
CARB PMSIZE Profile No.		116

Table G-104. Tier 4 Exhaust Emission Standards

MAXIMUM ENGINE POWER	MODEL YEAR	TYPE	PM	NMHC+ NOx	NMHC	NOx	CO
			grams per horsepower-hour				
hp<11	2008 and later	FINAL	0.30	5.6	0.28	5.3	6.0
11<=hp<25							4.9
25<=hp<50	2008-2012	INTERIM	0.22	5.6	0.28	5.3	4.1
	2013 and later	FINAL	0.02	3.5	0.18	3.3	4.1
50<=hp<75	2008-2012	INTERIM	0.22	3.5	0.18	3.3	3.7
	2013 and later	FINAL	0.02	3.5	0.18	3.3	3.7
75<=hp<100	2012-2014	PHASE-IN	0.01	-	0.14	0.3	3.7
		PHASE-OUT		3.5	-	-	
		or/ ALT NOx			0.14	2.5	
	2015 and later	FINAL	0.01	-	0.14	0.3	3.7
100<=hp<175	2012-2014	PHASE-IN	0.01	-	0.14	0.3	3.7
		PHASE-OUT		3.0	-	-	
		or/ ALT NOx		-	0.14	2.5	
	2015 and later	FINAL	0.01		0.14	0.3	3.7
175<=hp<=750	2011-2013	PHASE-IN	0.01	-	0.14	0.3	2.6
	2014 and later	PHASE-OUT		3.0	-	-	
		or/ ALT NOx		-	0.14	1.5	
		FINAL	0.01		0.14	0.3	2.6
750 hp<GEN<=1205 hp	2011-2014	INTERIM	0.07	-	0.30	2.6	2.6
	2015 and later	FINAL	0.02		0.14	0.5	
GEN>1205 hp	2011-2014	INTERIM	0.07	-	0.30		2.6
	2015 and later	FINAL	0.02		0.14	0.5	
ELSE>750 hp	2011-2014	INTERIM	0.07	-	0.30	2.6	2.6
	2015 and later	FINAL	0.03	-	0.14	2.6	2.6

Source: Title 13, California Code of Regulations, Article 4, Section 2423, "Off-Road Compression-Ignition Engines and Equipment."

Notes:

1. Propulsion marine compression-ignition engines below 37 kW are not subject to Tier 4 standards or requirements. Allpreviously adopted requirements remain applicable for these engines.
2. The Tier 4 PM standard for hand-start, air cooled, direct injection engines below 8 kW is 0.60 g/kW-hr, but is notrequired until 2010.
3. Engine families in this power category may alternately meet Tier 3 PM standards from 2008-2011 in exchange forintroducing final PM standards in 2012.
4. Manufacturers have the option of complying with the Tier 4 standards over a two year period at 50% per year using banked Tier 2 credits or over a three year period at 25% per year without the use of Tier 2 credits. The three year phase-in period is shown. The 2014 model year cannot extend beyond December 30, 2014, when the 3 year phase-in option isused.
5. Manufacturers may comply with the standards during the transitional implementation years using either a phase-in /phase-out approach or by using the Alternate NOx approach. The three year 25% alternate NOx and alternate NOx +NMHC standards are shown in the table. The two year 50% alternate NOx standard would be 2.3 g/kW-hr. The two year50% alternate NOx + NMHC standard would be 2.4 g/kW-hr.
6. “GEN” refers to generator engines only.
7. “ELSE” refers to all mobile machinery excluding generator engines.
8. An ALT NOx+NMHC standard equal to 0.5 g/kW-hr is available for one additional model year following the last modelyear of the ALT NOx+NMHC phase-in shown in the table.

AP-42 Emission Factors

Table G-105. Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines [a]

	Gasoline Fuel		Diesel Fuel		
	Emission Factor		Emission Factor		Emission
Pollutant	(lb/hp-hr) (power output)	(lb/MMBtu) (fuel input)	(lb/hp-hr) (power output)	(lb/MMBtu) (fuel input)	Factor Rating
NOx	0.011	1.63	0.031	4.41	D
CO	6.96E-03 [d]	0.99 [d]	6.68E-03	0.95	D
SOx	5.91E-04	0.084	2.05E-03	0.29	D
PM-10 [b]	7.21E-04	0.1	2.20E-03	0.31	D
CO2 [c]	1.08	154	1.15	164	B
Aldehydes	4.85E-04	0.07	4.63E-04	0.07	D
TOC					
Exhaust	0.015	2.1	2.47E-03	0.35	D
Evaporative	6.61E-04	0.09	0.00	0.00	E
Crankcase	4.85E-03	0.69	4.41E-05	0.01	E
Refueling	1.08E-03	0.15	0.00	0.00	E

Source: U.S. Environmental Protection Agency. 1996. Compilation of Air Pollutant Emission Factors (AP-42). Chapter 3.3: Gasoline and Diesel Industrial Engines.

Notes:

[a] References 2,5-6,9-14. When necessary, an average brake-specific fuel consumption (BSFC) of 7,000 Btu/hp-hr was used to convert from lb/MMBtu to lb/hp-hr. To convert from lb/hp-hr to kg/kwhr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code. TOC = total organic compounds.

[b] PM-10 = particulate matter less than or equal to 10 :m aerodynamic diameter. All particulate is assumed to be 10 µm in size.

[c] Assumes 99% conversion of carbon in fuel to CO2 with 87 weight % carbon in diesel, 86 weight % carbon in gasoline, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and gasoline heating value of 20,300 Btu/lb.

[d] Instead of 0.439 lb/hp-hr (power output) and 62.7 lb/mmBtu (fuel input), the correct emissions factors values are 6.96 E-03 lb/hp-hr (power output) and 0.99 lb/mmBtu (fuel input), respectively. This is an editorial correction. March 24, 2009

For large stationary diesel engines (greater than 600 horsepower [hp]) see Chapter 3.4: Large Stationary Diesel and All Stationary Dual-Fuel Engines.

Table G-106. Uncontrolled Emission Factors for Natural Gas-Fired 4-Stroke Lean-Burn Engines [a]

Pollutant	Emission Factor (lb/MMBtu) [b] (fuel input)	Emission Factor (g/hp-hr)	Emission Factor Rating
NOx [c] 90 - 105% Load	4.08E+00	4.71E+00	B
NOx [c] <90% Load	8.47E-01	9.78E-01	B
CO [c] 90 - 105% Load	3.17E-01	3.66E-01	C
CO [c] <90% Load	5.57E-01	6.43E-01	B
CO2 [d]	1.10E+02	1.27E+02	A
SO2 [e]	5.88E-04	6.79E-04	A
TOC [f]	1.47E+00	1.70E+00	A
Methane[g]	1.25E+00	1.44E+00	C
VOC [h]	1.18E-01	1.36E-01	C
PM10 (filterable) [i]	7.71E-05	8.90E-05	D
PM2.5 (filterable) [i]	7.71E-05	8.90E-05	D
PM Condensable [j]	9.91E-03	1.14E-02	D

Source: U.S. Environmental Protection Agency. 2000. Compilation of Air Pollutant Emission Factors (AP-42). Chapter 3.2: Natural Gas-Fired Reciprocating Engines. July.

Notes:

[a] Reference 7. Factors represent uncontrolled levels. For NOx, CO, and PM10, “uncontrolled” means no combustion or add-on controls; however, the factor may include turbocharged units. For all other pollutants, the data set may include units with control techniques used for NOx control, such as PCC“uncontrolled” means no oxidation control; and SCR for lean burn engines, and PSC for rich burn engines. Factors are based on large population of engines. Factors are for engines at all loads, except as indicated. SCC = Source Classification Code. TOC = Total Organic Compounds. PM-10 = Particulate Matter ≤ 10 microns (μ) aerodynamic diameter. A “<“ sign in front of a factor means that the corresponding emission factor is based on one-half of the method detection limit.

[b] Emission factors were calculated in units of (lb/MMBtu) based on procedures in EPA Method 19. To convert from (lb/MMBtu) to (lb/10^6 scf), multiply by the heat content of the fuel. If the heat content is not available, use 1020 Btu/scf. To convert from (lb/MMBtu) to (lb/hp-hr) use the following equation:

lb/hp-hr = (lb/MMBtu) (heat input, MMBtu/hr) (1/operating HP, 1/hp)

[c] Emission tests with unreported load conditions were not included in the data set.

[d] Based on 99.5% conversion of the fuel carbon to CO2. CO2 [lb/MMBtu] = (3.67)(%CON)(C)(D)(1/h), where %CON = percent conversion of fuel carbon to CO2, C = carbon content of fuel by weight (0.75), D = density of fuel, 4.1 E+04 lb/10^6 scf, and h = heating value of natural gas (assume 1020 Btu/scf at 60EF).

[e] Based on 100% conversion of fuel sulfur to SO2. Assumes sulfur content in natural gas of 2,000 gr/10^6scf.

[f] Emission factor for TOC is based on measured emission levels from 22 source tests.

[g] Emission factor for methane is determined by subtracting the VOC and ethane emission factors from the TOC emission factor. Measured emission factor for methane compares well with the calculated emission factor, 1.31 lb/MMBtu vs. 1.25 lb/MMBtu, respectively.

[h] VOC emission factor is based on the sum of the emission factors for all speciated organic compounds less ethane and methane.

[i] Considered ≤ 1 μ in aerodynamic diameter. Therefore, for filterable PM emissions, PM10(filterable) = PM2.5(filterable).

[j] PM Condensable = PM Condensable Inorganic + PM-Condensable Organic

Table G-107. Emission Standards for Stationary Spark Ignition Engines

Engine type and fuel	Maximum engine power	Manufacture date	Emission standards a					
			g/HP-hr			ppmvd at 15% O2		
			NOX	CO	VOC d	NOX	CO	VOC d
Non-Emergency SI Natural Gas b and Non-Emergency SI Lean Burn LPG b.	100<=HP<500	7/1/2008	2.0	4.0	1.0	160	540	86
Non-Emergency SI Lean Burn Natural Gas and LPG.	500<=HP<1,350	1/1/2011	1.0	2.0	0.7	82	270	60
		1/1/2008	2.0	4.0	1.0	160	540	86
Non-Emergency SI Natural Gas and Non-Emergency SI Lean Burn LPG (except lean burn 500<=HP<1,350).	HP>=500	7/1/2010	1.0	2.0	0.7	82	270	60
		7/1/2007	2.0	4.0	1.0	160	540	86
Landfill/Digester Gas (except lean burn 500<=HP<1,350).	HP>=500	7/1/2010	1.0	2.0	0.7	82	270	60
	HP<500	7/1/2008	3.0	5.0	1.0	220	610	80
Landfill/Digester Gas Lean Burn	HP>=500	1/1/2011	2.0	5.0	1.0	150	610	80
		7/1/2007	3.0	5.0	1.0	220	610	80
	500<=HP<1,350	7/1/2010	2.0	5.0	1.0	150	610	80
		1/1/2008	3.0	5.0	1.0	220	610	80
		7/1/2010	2.0	5.0	1.0	150	610	80
Emergency	25<HP<130	1/1/2009	c 10	387	N/A	N/A	N/A	N/A
	HP>=130		2.0	4.0	1.0	160	540	86

Source: 40 CFR 60, Subpart JJJJ, Table 1.

Notes:

a Owners and operators of stationary non-certified SI engines may choose to comply with the emission standards in units of either g/HP-hr or ppmvd at 15 percent O2.

b Owners and operators of new or reconstructed non-emergency lean burn SI stationary engines with a site rating of greater than or equal to 250 brake HP located at a major source that are meeting the requirements of 40 CFR part 63, subpart ZZZZ, Table 2a do not have to comply with the CO emission standards of Table 1 of this subpart.

c The emission standards applicable to emergency engines between 25 HP and 130 HP are in terms of NOX + HC.

d For purposes of this subpart, when calculating emissions of volatile organic compounds, emissions of formaldehyde should not be included.

Engine Size Summary

Table G-108. Engine Power Rating Summary by Fuel Type

Fuel Type	No. Engines	Avg. HP	Max HP	Min HP
Propane	37	160	450	25
Electric	354	135	400	0
Diesel	62	185	450	30
Natural Gas	1	50	50	50

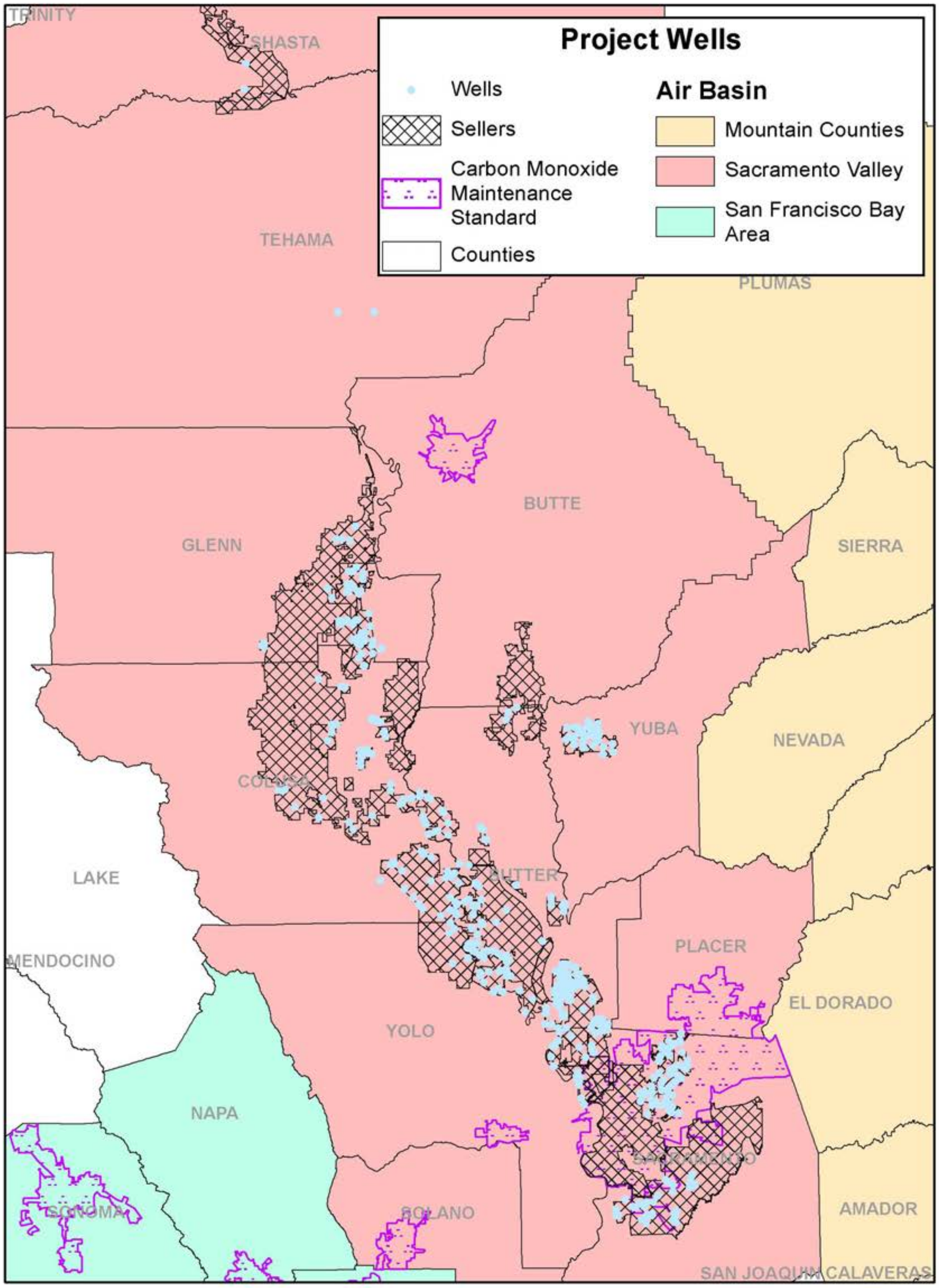


Figure F-1. Location of CO Maintenance Area in Seller Service Area

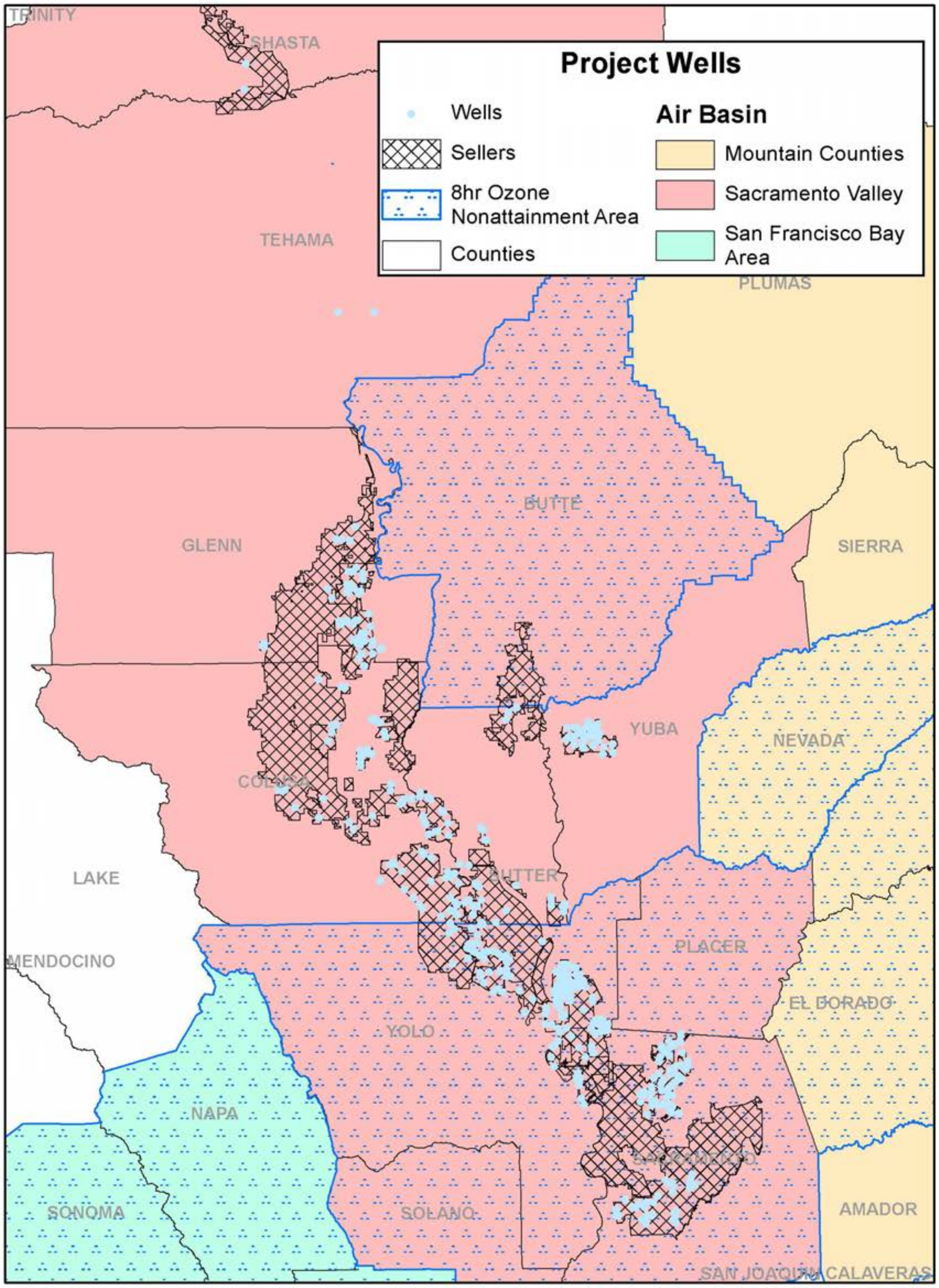


Figure F-2. Location of O_3 Nonattainment Area in Seller Service Area

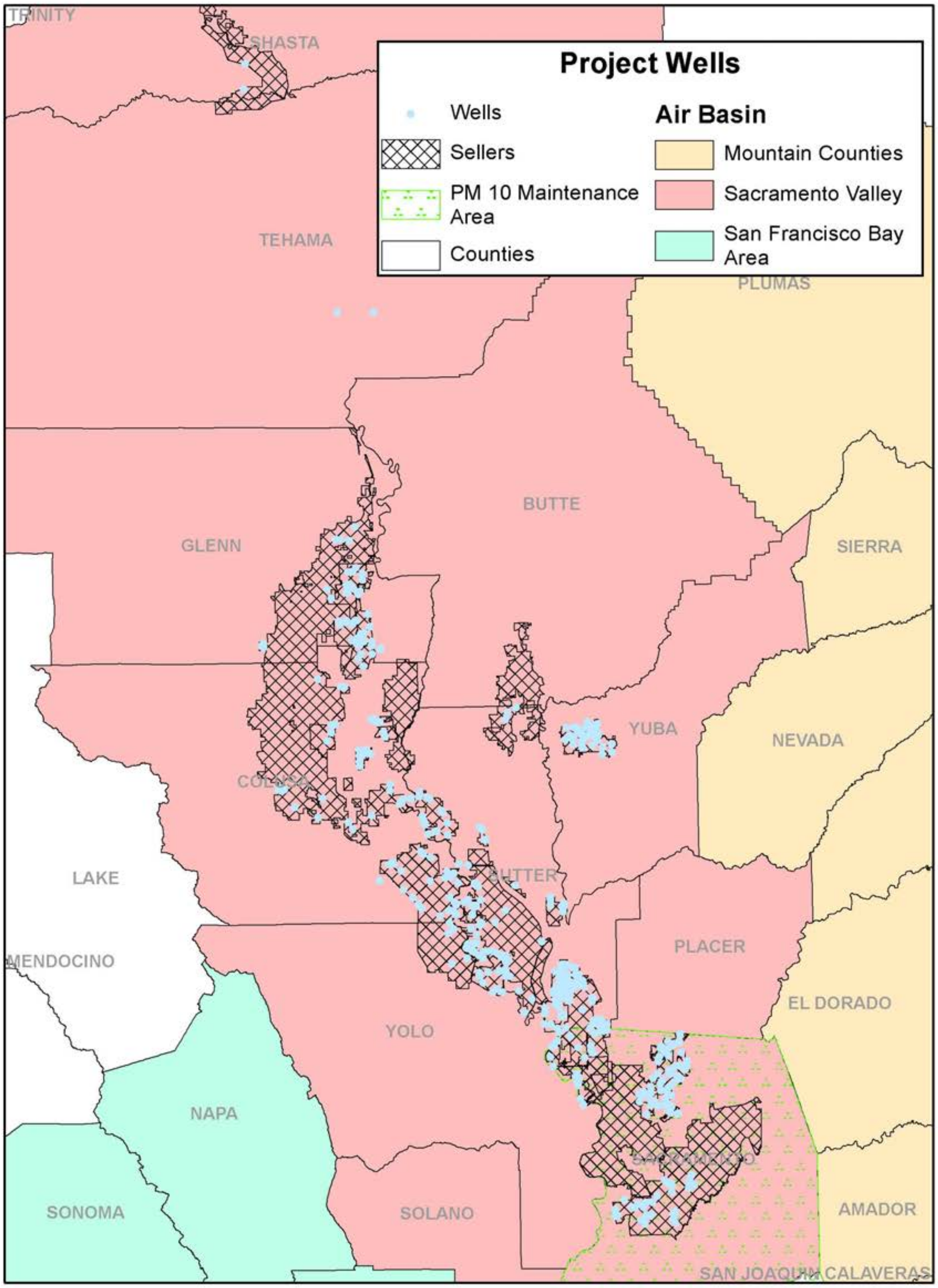


Figure F-3. Location of PM_{10} Maintenance Area in Seller Service Area

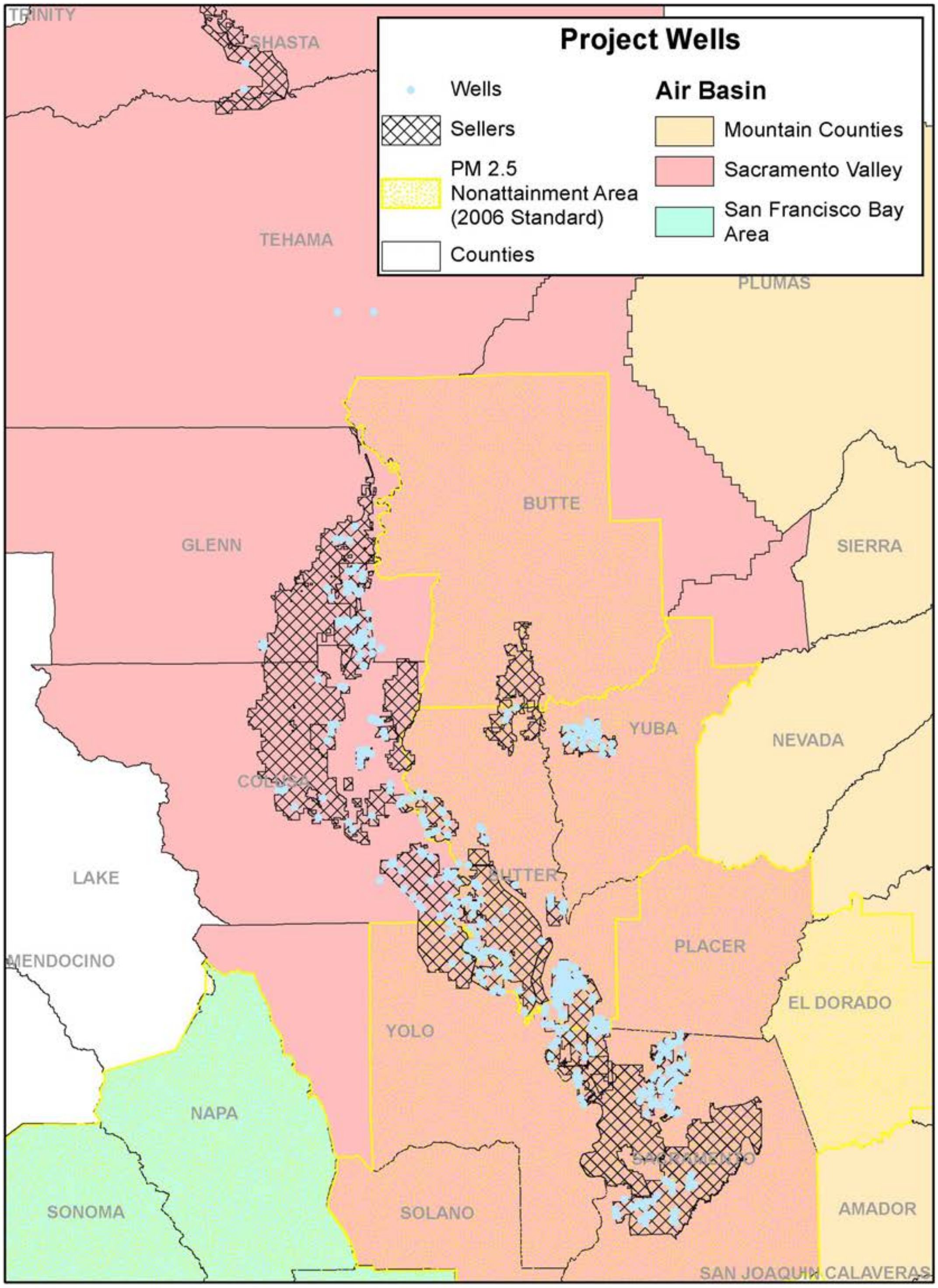


Figure F-4. Location of $PM_{2.5}$ Nonattainment and Maintenance Areas in Seller Service Area

Appendix H

Greenhouse Gas

Emissions Calculations

Summary of Annual Groundwater Substitution Emissions by County (Unmitigated)

Table H-1. GHG Emissions from Groundwater Substitution

Water Agency	Annual GHG Emissions (metric tons per year)			
	CO2	CH4	N2O	CO2e
Anderson-Cottonwood Irrigation District	36	0.01	0.00	36
Andreotti	54	0.00	0.00	55
Butte Water District	91	0.03	0.00	93
Cordua Irrigation District	100	0.03	0.00	102
Garden Highway Mutual Water Company	128	0.03	0.00	130
Gilsizer Slough Ranch	14	0.00	0.00	15
Giusti Farms	65	0.00	0.00	65
Glenn-Colusa Irrigation District	2,945	0.19	0.03	2,959
Henle Family Ltd. Partnership	6	0.00	0.00	6
Meridian Farms Water Company	214	0.02	0.00	215
Natomas Central Mutual Water Company	1,423	0.10	0.01	1,429
Pelger Mutual Water Company	140	0.01	0.00	141
Pelger Road 1700 LLC	51	0.02	0.00	52
Pleasant Grove-Verona Mutual Water Company	669	0.04	0.01	672
Princeton-Codora-Glenn Irrigation District	871	0.04	0.01	875
Provident Irrigation District	1,420	0.07	0.01	1,425
Reclamation District 1004	87	0.03	0.00	88
Reclamation District 108	1,783	0.09	0.02	1,790
Roberts Ditch Irrigation Company	28	0.01	0.00	29
RRG Garden Properties LLC	116	0.04	0.00	118
Sacramento County Water Agency	1,290	0.07	0.01	1,295
Sacramento Suburban Water District	1,712	0.10	0.01	1,718
Sutter Mutual Water Company	4,214	0.21	0.04	4,231
Te Velde Revocable Family Trust	51	0.02	0.00	52
Tule Basin Farms	95	0.01	0.00	96
Windswept Land and Livestock	18	0.01	0.00	18
Total	**17,621**	**1.17**	**0.19**	**17,705**

Key:
GHG = greenhouse gas
CO2 = carbon dioxide
CH4 = methane
N2O = nitrous oxide
CO2e = carbon dioxide equivalent

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Anderson-Cottonwood Irrigation District			
Transfer Volume	2,450	acre-feet	(Apr-Jun)	
	2,450	acre-feet	(Jul-Sep)	
	4,900	**acre-feet/year**	**Maximum**	*ok*

Table H-2. Anderson-Cottonwood Irrigation District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Shasta	0	2	0	0	2
Total	0	2	0	0	2

Table H-3. Anderson-Cottonwood Irrigation District GHG Emissions

	Well Location			Power Rating	Pump Rate		Transfer Volume	Operations		Fuel Consumption	Emission Factors						Annual Emissions (metric tons per year)			
Well ID	(County)	Fuel Type	Model Year	(hp)	(gpm)	(% of Total)	(AF/year)	(hours/year)	(kWh/yr)	(gal/yr) - diesel (MMBtu/yr) - propane or NG	CO_2	Units	CH_4	Units	N_2O	Units	CO_2	CH_4	N_2O	CO_2e
Crowley	Shasta	Electric	2012	50	1,200	19%	948	4,292	160,032	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.15	0.00	0.00	7.29
Barney	Shasta	Electric	2012	200	5,000	81%	3,952	4,292	640,127	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	28.59	0.01	0.00	29.14
				Total	**6,200**	**100%**	**4,900**	**8,584**	**800,159**								**35.74**	**0.01**	**0.00**	**36.43**

Key:
AF = acre-feet
CH_4 = methane
CO_2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
$MTCO_2e$ = metric tons carbon dioxide equivalent
N_2O = nitrous oxide

<u>Conversion Factors</u>
1 acre-foot = 325,851 gallons

<u>Global Warming Potential (AR6)</u>

CO_2	1
CH_4	27
N_2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Andreotti			
Transfer Volume	1,000	acre-feet	(Apr-Jun)	
	1,500	acre-feet	(Jul-Sep)	
	2,500	**acre-feet/year**	**Maximum**	*ok*

Table H-4. Andreotti Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	0	0	0	1	1
Total	0	0	0	1	1

Table H-5. Andreotti GHG Emissions

	Well Location			Power Rating	Pump Rate		Transfer Volume	Operations		Fuel Consumption	Emission Factors						Annual Emissions (metric tons per year)			
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**(gpm)**	**(% of Total)**	**(AF/year)**	**(hours/year)**	**(kWh/yr)**	**(gal/yr) - diesel (MMBtu/yr) - propane or NG**	**CO2**	**Units**	**CH4**	**Units**	**N2O**	**Units**	**CO2**	**CH4**	**N2O**	**CO2e**
Proposed Well	Sutter	Propane	Unknown	150	6,000	100%	2,500	2,263	n/a	864	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	54.30	0.00	0.00	54.51
				Total	**6,000**	**100%**	**2,500**	**2,263**	**0**								**54.30**	**0.00**	**0.00**	**54.51**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors
1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Butte Water District				
Transfer Volume	3,000	acre-feet	(Apr-Jun)		
	3,000	acre-feet	(Jul-Sep)		
	6,000	**acre-feet/year**	**Maximum**	*ok*	

Table H-6. Butte Water District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	0	3	0	0	3
Total	0	3	0	0	3

Table H-7. Butte Water District GHG Emissions

	Well Location			Power Rating	Pump Rate		Transfer Volume	Operations		Fuel Consumption	Emission Factors						Annual Emissions (metric tons per year)			
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**(gpm)**	**(% of Total)**	**(AF/year)**	**(hours/year)**	**(kWh/yr)**	**(gal/yr) - diesel (MMBtu/yr) - propane or NG**	**CO2**	**Units**	**CH4**	**Units**	**N2O**	**Units**	**CO2**	**CH4**	**N2O**	**CO2e**
26R1 - Well #2	Sutter	Electric	Unknown	350	4,150	35%	2,092	2,738	714,668	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	31.92	0.01	0.00	32.54
30E1 - Well #1	Sutter	Electric	Unknown	300	3,600	30%	1,815	2,738	612,572	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	27.36	0.01	0.00	27.89
Pippitt Well	Sutter	Electric	Unknown	350	4,150	35%	2,092	2,738	714,668	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	31.92	0.01	0.00	32.54
				Total	**11,900**	**100%**	**6,000**	**8,215**	**2,041,908**								**91.20**	**0.03**	**0.00**	**92.96**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors
1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Cordua Irrigation District				
Transfer Volume	0	acre-feet	(Apr-Jun)		
	12,000	acre-feet	(Jul-Sep)		
	12,000	**acre-feet/year**	**Maximum**	*ok*	

Table H-8. Cordua Irrigation District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Yuba	0	37	0	0	37
Total	0	37	0	0	37

Table H-9. Cordua Irrigation District GHG Emissions

					Pump Rate		Transfer Volume	Operations		Fuel Consumption	Emission Factors						Annual Emissions (metric tons per year)			
Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	(gpm)	(% of Total)	(AF/year)	(hours/year)	(kWh/yr)	(gal/yr) - diesel (MMBtu/yr) - propane or NG	CO2	Units	CH4	Units	N2O	Units	CO2	CH4	N2O	CO2e
COR-01	Yuba	Electric	Unknown	60	1,100	2%	213	1,049	46,954	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.10	0.00	0.00	2.14
COR-02	Yuba	Electric	Unknown	50	900	1%	174	1,049	39,128	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.75	0.00	0.00	1.78
COR-03	Yuba	Electric	Unknown	50	1,000	2%	193	1,049	39,128	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.75	0.00	0.00	1.78
COR-04	Yuba	Electric	Unknown	75	1,400	2%	271	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-05	Yuba	Electric	Unknown	75	1,200	2%	232	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-07	Yuba	Electric	Unknown	40	1,200	2%	232	1,049	31,303	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.40	0.00	0.00	1.43
COR-08	Yuba	Electric	Unknown	75	1,600	3%	309	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-09	Yuba	Electric	Unknown	60	1,400	2%	271	1,049	46,954	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.10	0.00	0.00	2.14
COR-10	Yuba	Electric	Unknown	60	1,000	2%	193	1,049	46,954	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.10	0.00	0.00	2.14
COR-11	Yuba	Electric	Unknown	75	1,500	2%	290	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-12	Yuba	Electric	Unknown	75	1,400	2%	271	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-13	Yuba	Electric	Unknown	100	2,000	3%	386	1,049	78,257	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.50	0.00	0.00	3.56
COR-14	Yuba	Electric	Unknown	75	1,600	3%	309	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-15	Yuba	Electric	Unknown	75	1,600	3%	309	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-16	Yuba	Electric	Unknown	75	1,800	3%	348	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-17	Yuba	Electric	Unknown	75	2,500	4%	483	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-18	Yuba	Electric	Unknown	75	1,700	3%	329	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-19	Yuba	Electric	Unknown	75	1,000	2%	193	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-20	Yuba	Electric	Unknown	125	1,800	3%	348	1,049	97,821	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.37	0.00	0.00	4.45
COR-21	Yuba	Electric	Unknown	60	1,200	2%	232	1,049	46,954	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.10	0.00	0.00	2.14
COR-22	Yuba	Electric	Unknown	60	1,500	2%	290	1,049	46,954	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.10	0.00	0.00	2.14
COR-23	Yuba	Electric	Unknown	75	2,000	3%	386	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-24	Yuba	Electric	Unknown	75	1,700	3%	329	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-25	Yuba	Electric	Unknown	75	2,000	3%	386	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-26	Yuba	Electric	Unknown	100	1,400	2%	271	1,049	78,257	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.50	0.00	0.00	3.56
COR-27	Yuba	Electric	Unknown	100	1,200	2%	232	1,049	78,257	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.50	0.00	0.00	3.56
COR-28	Yuba	Electric	Unknown	50	800	1%	155	1,049	39,128	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.75	0.00	0.00	1.78
COR-30	Yuba	Electric	Unknown	100	2,500	4%	483	1,049	78,257	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.50	0.00	0.00	3.56
COR-31	Yuba	Electric	Unknown	100	1,700	3%	329	1,049	78,257	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.50	0.00	0.00	3.56
COR-32	Yuba	Electric	Unknown	100	3,100	5%	599	1,049	78,257	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.50	0.00	0.00	3.56
COR-33	Yuba	Electric	Unknown	75	2,200	4%	425	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-34	Yuba	Electric	Unknown	100	2,600	4%	502	1,049	78,257	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.50	0.00	0.00	3.56
COR-35	Yuba	Electric	Unknown	125	2,700	4%	522	1,049	97,821	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.37	0.00	0.00	4.45
COR-36	Yuba	Electric	Unknown	60	1,100	2%	213	1,049	46,954	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.10	0.00	0.00	2.14
COR-37	Yuba	Electric	Unknown	75	2,000	3%	386	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-38	Yuba	Electric	Unknown	75	2,700	4%	522	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
COR-39	Yuba	Electric	Unknown	75	2,000	3%	386	1,049	58,693	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.62	0.00	0.00	2.67
				Total	**62,100**	**100%**	**12,000**	**38,829**	**2,230,316**	-	-	-	-	-	-	-	**99.62**	**0.03**	**0.00**	**101.54**

Key:
AF = acre-feet; CH4 = methane; CO2 = carbon dioxide; gal/yr = gallons per year; GHG = greenhouse gas; gpm = gallons per minute; hp = horsepower; kW/yr = kilowatt hours per year; MTCO2e = metric tons carbon dioxide equivalent; N2O = nitrous oxide

Conversion Factors
1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Garden Highway Mutual Water Company			
Transfer Volume	6,500	acre-feet	(Apr-Jun)	
	7,500	acre-feet	(Jul-Sep)	
	14,000	**acre-feet/year**	**Maximum**	*ok*

Table H-10. Garden Highway Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	0	8	0	1	9
Total	0	8	0	1	9

Table H-11. Garden Highway Mutual Water Company GHG Emissions

	Well Location			Power Rating	Pump Rate		Transfer Volume	Operations		Fuel Consumption	Emission Factors						Annual Emissions (metric tons per year)			
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**(gpm)**	**(% of Total)**	**(AF/year)**	**(hours/year)**	**(kWh/yr)**	**(gal/yr) - diesel (MMBtu/yr) - propane or NG**	**CO2**	**Units**	**CH4**	**Units**	**N2O**	**Units**	**CO2**	**CH4**	**N2O**	**CO2e**
GH Well 1	Sutter	Propane	Unknown	80	1,500	7%	998	3,612	n/a	735	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	46.22	0.00	0.00	46.40
GH Well 17	Sutter	Electric	Unknown	60	2,900	14%	1,929	3,612	161,607	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.22	0.00	0.00	7.36
GH Well 22	Sutter	Electric	Unknown	100	2,500	12%	1,663	3,612	269,344	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	12.03	0.00	0.00	12.26
GH Well 23	Sutter	Electric	Unknown	100	2,000	10%	1,330	3,612	269,344	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	12.03	0.00	0.00	12.26
GH Well 26	Sutter	Electric	Unknown	100	3,500	17%	2,328	3,612	269,344	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	12.03	0.00	0.00	12.26
GH Well 27	Sutter	Electric	Unknown	100	3,000	14%	1,995	3,612	269,344	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	12.03	0.00	0.00	12.26
GH Well 4	Sutter	Electric	Unknown	100	2,100	10%	1,397	3,612	269,344	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	12.03	0.00	0.00	12.26
GH Well 18	Sutter	Electric	Unknown	60	1,800	9%	1,197	3,612	161,607	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.22	0.00	0.00	7.36
GH Well 24	Sutter	Electric	Unknown	60	1,750	8%	1,164	3,612	161,607	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.22	0.00	0.00	7.36
				Total	**21,050**	**100%**	**14,000**	**32,508**	**1,831,541**								**128.03**	**0.03**	**0.00**	**129.79**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors

1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Gilsizer Slough Ranch			
Transfer Volume	1,600	acre-feet	(Apr-Jun)	
	1,600	acre-feet	(Jul-Sep)	
	3,200	**acre-feet/year**	**Maximum**	*ok*

Table H-12. Gilsizer Slough Ranch Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	0	1	0	0	1
Total	0	1	0	0	1

Table H-13. Gilsizer Slough Ranch GHG Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/year)	Operations (hours/year)	Operations (kWh/yr)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors CO2	Units	CH4	Units	N2O	Units	Annual Emissions (metric tons per year) CO2	CH4	N2O	CO2e
WCR-0949068	Sutter	Electric	Unknown	100	4,000	100%	3,200	4,345	323,983	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	14.47	0.00	0.00	14.75
				Total	**4,000**	**100%**	**3,200**	**4,345**	**323,983**								**14.47**	**0.00**	**0.00**	**14.75**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors
1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Giusti Farms			
Transfer Volume	500	acre-feet	(Apr-Jun)	
	500	acre-feet	(Jul-Sep)	
	1,000	**acre-feet/year**	**Maximum**	*ok*

Table H-14. Giusti Farms Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	0	0	0	2	2
Total	0	0	0	2	2

Table H-15. Giusti Farms GHG Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/year)	Operations (hours/year)	Operations (kWh/yr)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors CO2	Units	CH4	Units	N2O	Units	Annual Emissions (metric tons per year) CO2	CH4	N2O	CO2e
G-1	Sutter	Propane	Unknown	250	1,500	30%	300	1,086	n/a	691	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	43.44	0.00	0.00	43.61
G-2	Sutter	Propane	Unknown	125	3,500	70%	700	1,086	n/a	345	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	21.72	0.00	0.00	21.80
				Total	**5,000**	**100%**	**1,000**	**2,172**	**0**								**65.16**	**0.00**	**0.00**	**65.41**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors

1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Glenn-Colusa Irrigation District				
Transfer Volume	11,800	acre-feet	(Apr-Jun)		
	11,800	acre-feet	(Jul-Sep)		
	23,600	**acre-feet/year**	**Maximum**	*ok*	

Table H-16. Glenn-Colusa Irrigation District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Colusa	4	6	0	0	10
Glenn	1	7	0	0	8
Total	5	13	0	0	18

Table H-17. Glenn-Colusa Irrigation District GHG Emissions

	Well Location			Power Rating	Pump Rate		Transfer Volume	Operations		Fuel Consumption	Emission Factors						Annual Emissions (metric tons per year)			
Well ID	(County)	Fuel Type	Model Year	(hp)	(gpm)	(% of Total)	(AF/year)	(hours/year)	(kWh/yr)	(gal/yr) - diesel (MMBtu/yr) - propane or NG	CO2	Units	CH4	Units	N2O	Units	CO2	CH4	N2O	CO2e
17-2-6B-1	Colusa	Electric	Unknown	250	2,050	7%	1,654	4,382	816,880	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	36.49	0.01	0.00	37.19
GRS-34N-1	Glenn	Diesel	Unknown	150	1,350	5%	1,089	4,382	n/a	36,874	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	376.48	0.02	0.00	377.73
GRS-35A-2	Glenn	Electric	Unknown	125	3,500	12%	2,824	4,382	408,440	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.24	0.01	0.00	18.60
GRS-84A-1	Glenn	Electric	Unknown	125	2,500	9%	2,017	4,382	408,440	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.24	0.01	0.00	18.60
Haymen	Colusa	Diesel	Unknown	250	2,000	7%	1,614	4,382	n/a	61,456	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	627.47	0.03	0.01	629.54
LaCroix 1	Glenn	Electric	Unknown	100	400	1%	323	4,382	326,752	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	14.59	0.00	0.00	14.88
LaCroix 2	Glenn	Electric	Unknown	100	400	1%	323	4,382	326,752	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	14.59	0.00	0.00	14.88
LaCroix 3	Glenn	Electric	Unknown	100	400	1%	323	4,382	326,752	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	14.59	0.00	0.00	14.88
Lagrande	Colusa	Diesel	2012	250	2,800	10%	2,259	4,382	n/a	61,456	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	627.47	0.03	0.01	629.54
Reister 1	Colusa	Electric	Unknown	100	500	2%	403	4,382	326,752	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	14.59	0.00	0.00	14.88
Reister 2	Colusa	Electric	Unknown	100	500	2%	403	4,382	326,752	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	14.59	0.00	0.00	14.88
Reister 4	Colusa	Electric	Unknown	100	900	3%	726	4,382	326,752	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	14.59	0.00	0.00	14.88
Vann 1	Colusa	Diesel	2014	173	1,500	5%	1,210	4,382	n/a	42,528	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	434.21	0.02	0.00	435.64
Vann 2	Colusa	Electric	Unknown	300	2,500	9%	2,017	4,382	980,255	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	43.78	0.01	0.00	44.63
322N	Colusa	Diesel	Unknown	250	2,000	7%	1,614	4,382	n/a	61,456	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	627.47	0.03	0.01	629.54
S2-36T	Glenn	Electric	Unknown	100	2,800	10%	2,259	4,382	326,752	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	14.59	0.00	0.00	14.88
Reister 3	Colusa	Electric	Unknown	100	850	3%	686	4,382	326,752	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	14.59	0.00	0.00	14.88
GRS-22H-1	Glenn	Electric	Unknown	125	2,300	8%	1,856	4,382	408,440	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.24	0.01	0.00	18.60
				Total	**29,250**	**100%**	**23,600**	**78,873**	**5,636,469**								**2,944.84**	**0.19**	**0.03**	**2,958.61**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors
1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Henle Family Ltd. Partnership				
Transfer Volume	325	acre-feet	(Apr-Jun)		
	275	acre-feet	(Jul-Sep)		
	600	**acre-feet/year**	**Maximum**	*ok*	

Table H-18. Henle Family Ltd. Partnership Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	0	2	0	0	2
Total	0	2	0	0	2

Table H-19. Henle Family Ltd. Partnership GHG Emissions

	Well Location			Power Rating	Pump Rate		Transfer Volume	Operations		Fuel Consumption	Emission Factors						Annual Emissions (metric tons per year)			
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**(gpm)**	**(% of Total)**	**(AF/year)**	**(hours/year)**	**(kWh/yr)**	**(gal/yr) - diesel (MMBtu/yr) - propane or NG**	**CO2**	**Units**	**CH4**	**Units**	**N2O**	**Units**	**CO2**	**CH4**	**N2O**	**CO2e**
H-2	Sutter	Electric	Unknown	200	3,600	58%	348	526	78,383	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.50	0.00	0.00	3.57
H-1	Sutter	Electric	Unknown	150	2,600	42%	252	526	58,787	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.63	0.00	0.00	2.68
				Total	**6,200**	**100%**	**600**	**1,051**	**137,170**								**6.13**	**0.00**	**0.00**	**6.25**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors
1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Meridian Farms Water Company			
Transfer Volume	3,000	acre-feet	(Apr-Jun)	
	3,000	acre-feet	(Jul-Sep)	
	6,000	**acre-feet/year**	**Maximum**	*ok*

Table H-20. Meridian Farms Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	2	9	0	2	13
Total	2	9	0	2	13

Table H-21. Meridian Farms Water Company GHG Emissions

	Well Location			Power Rating	Pump Rate		Transfer Volume	Operations		Fuel Consumption	Emission Factors						Annual Emissions (metric tons per year)			
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**(gpm)**	**(% of Total)**	**(AF/year)**	**(hours/year)**	**(kWh/yr)**	**(gal/yr) - diesel (MMBtu/yr) - propane or NG**	**CO2**	**Units**	**CH4**	**Units**	**N2O**	**Units**	**CO2**	**CH4**	**N2O**	**CO2e**
Prop 50	Sutter	Electric	Unknown	100	2,500	8%	459	996	74,308	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.32	0.00	0.00	3.38
Clark Well	Sutter	Electric	Unknown	75	3,000	9%	550	996	55,731	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.49	0.00	0.00	2.54
Jim Chesini	Sutter	Diesel	Unknown	125	2,500	8%	459	996	n/a	6,988	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	71.35	0.00	0.00	71.58
Meridian	Sutter	Propane	Unknown	60	1,500	5%	275	996	n/a	152	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	9.56	0.00	0.00	9.60
DoDo	Sutter	Diesel	Unknown	139	1,200	4%	220	996	n/a	7,771	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	79.34	0.00	0.00	79.60
S Meridian	Sutter	Electric	Unknown	125	3,000	9%	550	996	92,885	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.15	0.00	0.00	4.23
Taylor	Sutter	Propane	Unknown	150	2,500	8%	459	996	n/a	380	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	23.91	0.00	0.00	24.00
Park-Miller	Sutter	Electric	Unknown	125	3,000	9%	550	996	92,885	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.15	0.00	0.00	4.23
Moroni	Sutter	Electric	Unknown	75	3,000	9%	550	996	55,731	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.49	0.00	0.00	2.54
Cussick	Sutter	Electric	Unknown	125	2,000	6%	367	996	92,885	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.15	0.00	0.00	4.23
Mike Chesini	Sutter	Electric	Unknown	75	2,500	8%	459	996	55,731	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.49	0.00	0.00	2.54
Pump 7 (Proposed well)	Sutter	Electric	Unknown	100	3,000	9%	550	996	74,308	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.32	0.00	0.00	3.38
Filipino Camp (Proposed well)	Sutter	Electric	Unknown	100	3,000	9%	550	996	74,308	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.32	0.00	0.00	3.38
				Total	**32,700**	**100%**	**6,000**	**12,954**	**668,772**								**214.03**	**0.02**	**0.00**	**215.24**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

<u>Conversion Factors</u>

1 acre-foot = 325,851 gallons

<u>Global Warming Potential (AR6)</u>

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

<u>Diesel Engine Fuel Consumption</u>

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Natomas Central Mutual Water Company			
Transfer Volume	10,000	acre-feet	(Apr-Jun)	
	20,000	acre-feet	(Jul-Sep)	
	30,000	**acre-feet/year**	**Maximum**	*ok*

Table H-22. Natomas Central Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	1	22	0	4	**27**
Sacramento	2	21	0	1	**24**
Total	**3**	**43**	**0**	**5**	**51**

Table H-23. Natomas Central Mutual Water Company GHG Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/year)	Operations (hours/year)	Operations (kWh/yr)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors CO2	Units	CH4	Units	N2O	Units	Annual Emissions (metric tons per year) CO2	CH4	N2O	CO2e
Frazer	Sutter	Electric	Unknown	50	2,000	2%	575	1,561	58,214	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.60	0.00	0.00	2.65
Morrison 2	Sutter	Electric	Unknown	75	2,500	2%	719	1,561	87,322	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.90	0.00	0.00	3.98
Lucich North	Sutter	Electric	Unknown	75	2,500	2%	719	1,561	87,322	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.90	0.00	0.00	3.98
Bennett North	Sutter	Electric	Unknown	60	2,200	2%	632	1,561	69,857	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.12	0.00	0.00	3.18
Atkinson	Sutter	Electric	Unknown	40	1,800	2%	517	1,561	46,572	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.08	0.00	0.00	2.12
Natomas Farms (TNBC Fisherman's Lake)	Sacramento	Electric	Unknown	60	1,500	1%	431	1,561	69,857	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	16.55	0.00	0.00	16.61
Silva	Sacramento	Electric	Unknown	40	1,000	1%	287	1,561	46,572	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	11.03	0.00	0.00	11.07
Betts	Sacramento	Electric	Unknown	75	1,500	1%	431	1,561	87,322	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	20.69	0.00	0.00	20.76
Pond R	Sacramento	Electric	Unknown	30	2,300	2%	661	1,561	34,929	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	8.27	0.00	0.00	8.30
Bianchi	Sutter	Propane	Unknown	200	1,500	1%	431	1,561	n/a	795	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	49.95	0.00	0.00	50.15
Willey	Sacramento	Diesel	2012	225	2,000	2%	575	1,561	n/a	19,708	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	201.22	0.01	0.00	201.89
L-MW	Sutter	Propane	Unknown	200	1,800	2%	517	1,561	n/a	795	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	49.95	0.00	0.00	50.15
L-1	Sutter	Diesel	Unknown	120	1,600	2%	460	1,561	n/a	10,511	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	107.32	0.00	0.00	107.67
L-2	Sutter	Electric	Unknown	100	1,900	2%	546	1,561	116,429	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.20	0.00	0.00	5.30
L-3	Sutter	Electric	Unknown	50	1,300	1%	374	1,561	58,214	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.60	0.00	0.00	2.65
L-4	Sutter	Electric	Unknown	75	1,300	1%	374	1,561	87,322	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.90	0.00	0.00	3.98
L-6	Sutter	Electric	Unknown	50	2,000	2%	575	1,561	58,214	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.60	0.00	0.00	2.65
L-7	Sutter	Electric	Unknown	30	1,200	1%	345	1,561	34,929	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.56	0.00	0.00	1.59
L-8	Sutter	Electric	Unknown	200	2,800	3%	805	1,561	232,858	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	10.40	0.00	0.00	10.60
L-9	Sutter	Electric	Unknown	50	1,500	1%	431	1,561	58,214	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.60	0.00	0.00	2.65
L-10	Sutter	Electric	Unknown	30	1,000	1%	287	1,561	34,929	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.56	0.00	0.00	1.59
L-11	Sutter	Electric	Unknown	50	1,500	1%	431	1,561	58,214	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.60	0.00	0.00	2.65
L-12	Sutter	Electric	Unknown	50	1,500	1%	431	1,561	58,214	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.60	0.00	0.00	2.65
L-13 Bolen Pasture	Sutter	Propane	Unknown	200	2,800	3%	805	1,561	n/a	795	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	49.95	0.00	0.00	50.15
L-14 Chappell	Sutter	Electric	Unknown	75	1,800	2%	517	1,561	87,322	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.90	0.00	0.00	3.98
MAP	Sacramento	Electric	Unknown	30	2,000	2%	575	1,561	34,929	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	8.27	0.00	0.00	8.30
Ose-1	Sacramento	Diesel	2013	150	1,800	2%	517	1,561	n/a	13,139	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	134.15	0.01	0.00	134.59
Ose-2	Sacramento	Electric	Unknown	150	2,400	2%	690	1,561	174,643	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	41.37	0.00	0.00	41.52
Perry	Sacramento	Electric	Unknown	135	2,600	2%	747	1,561	157,179	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	37.24	0.00	0.00	37.37
Spangler	Sutter	Electric	Unknown	60	2,500	2%	719	1,561	69,857	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.12	0.00	0.00	3.18
Elkhorn	Sacramento	Electric	Unknown	125	3,000	3%	862	1,561	145,536	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	34.48	0.00	0.00	34.60
Ameral	Sacramento	Propane	Unknown	200	1,500	1%	431	1,561	n/a	795	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	49.95	0.00	0.00	50.15
Dhaliwal	Sacramento	Electric	Unknown	125	3,000	3%	862	1,561	145,536	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	34.48	0.00	0.00	34.60
Kubo	Sacramento	Electric	Unknown	25	1,300	1%	374	1,561	29,107	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	6.90	0.00	0.00	6.92
Greenbriar	Sacramento	Electric	Unknown	150	3,200	3%	920	1,561	174,643	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	41.37	0.00	0.00	41.52
Souza	Sacramento	Electric	Unknown	150	1,200	1%	345	1,561	174,643	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	41.37	0.00	0.00	41.52
Plant 3	Sacramento	Electric	Unknown	150	2,500	2%	719	1,561	174,643	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	41.37	0.00	0.00	41.52
Fish 1	Sacramento	Electric	Unknown	75	2,500	2%	719	1,561	87,322	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	20.69	0.00	0.00	20.76
Fish 2	Sacramento	Electric	Unknown	75	2,500	2%	719	1,561	87,322	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	20.69	0.00	0.00	20.76
Lauppe	Sutter	Propane	Unknown	200	1,050	1%	302	1,561	n/a	795	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	49.95	0.00	0.00	50.15
Bryte	Sacramento	Electric	Unknown	150	1,500	1%	431	1,561	174,643	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	41.37	0.00	0.00	41.52
TNBC MW	Sutter	Electric	Unknown	150	2,500	2%	719	1,561	174,643	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.80	0.00	0.00	7.95
NDC	Sutter	Electric	Unknown	150	2,500	2%	719	1,561	174,643	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.80	0.00	0.00	7.95
Bennett	Sutter	Electric	Unknown	150	2,500	2%	719	1,561	174,643	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.80	0.00	0.00	7.95
Pritchard	Sacramento	Electric	Unknown	150	2,500	2%	719	1,561	174,643	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	41.37	0.00	0.00	41.52
Elverta	Sacramento	Electric	Unknown	150	2,500	2%	719	1,561	174,643	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	41.37	0.00	0.00	41.52
Elkhorn North	Sacramento	Electric	Unknown	150	2,500	2%	719	1,561	174,643	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	41.37	0.00	0.00	41.52
Radio Road	Sacramento	Electric	Unknown	150	2,500	2%	719	1,561	174,643	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	41.37	0.00	0.00	41.52
Sankey	Sutter	Electric	Unknown	150	2,500	2%	719	1,561	174,643	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.80	0.00	0.00	7.95
T-Drain	Sutter	Electric	Unknown	150	2,500	2%	719	1,561	174,643	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.80	0.00	0.00	7.95
Powerline Road Well	Sacramento	Electric	Unknown	150	2,500	2%	719	1,561	174,643	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	41.37	0.00	0.00	41.52
				Total	**104,350**	**100%**	**30,000**	**79,628**	**4,849,262**	-	-	-	-	-	-	-	**1,422.70**	**0.10**	**0.01**	**1,429.32**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

<u>Conversion Factors</u>
1 acre-foot = 325,851 gallons

<u>Global Warming Potential (AR6)</u>

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

<u>Diesel Engine Fuel Consumption</u>

0.4	lb/hp-hr	(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)
0.855	g/mL	(Based on MSDS for Hess Diesel Fuel All Types)
7.13	lb/gal	

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Pelger Mutual Water Company				
Transfer Volume	3,151	acre-feet (	Apr-Jun)		
	1,599	acre-feet	(Jul-Sep)		
	4,750	**acre-feet/year**	**Maximum**	*ok*	

Table H-24. Pelger Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	1	4	0	0	5
Total	1	4	0	0	5

Table H-25. Pelger Mutual Water Company GHG Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/year)	Operations (hours/year)	Operations (kWh/yr)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors CO2	Units	CH4	Units	N2O	Units	Annual Emissions (metric tons per year) CO2	CH4	N2O	CO2e
Well1(Tucker)	Sutter	Electric	Unknown	150	3,000	16%	779	1,410	157,676	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.04	0.00	0.00	7.18
Well2(Flopet)	Sutter	Diesel	2008	139	2,500	14%	649	1,410	n/a	10,992	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	112.23	0.00	0.00	112.60
Well3(Klein)	Sutter	Electric	Unknown	150	4,000	22%	1,038	1,410	157,676	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.04	0.00	0.00	7.18
PMWC#1	Sutter	Electric	Unknown	150	4,400	24%	1,142	1,410	157,676	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.04	0.00	0.00	7.18
Proposed Pelger Well	Sutter	Electric	Unknown	150	4,400	24%	1,142	1,410	157,676	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.04	0.00	0.00	7.18
				Total	**18,300**	**100%**	**4,750**	**7,048**	**630,704**	-	**-**	**-**	**-**	**-**	**-**	**-**	**140.40**	**0.01**	**0.00**	**141.32**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors
1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)
CO2 1
CH4 27
N2O 273
Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Diesel Engine Fuel Consumption
0.4 lb/hp-hr (Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)
0.855 g/mL (Based on MSDS for Hess Diesel Fuel All Types)
7.13 lb/gal

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Pelger Road 1700 LLC			
Transfer Volume	2,600	acre-feet	(Apr-Jun)	
	3,000	acre-feet	(Jul-Sep)	
	5,600	**acre-feet/year**	**Maximum**	*ok*

Table H-26. Pelger Road 1700 LLC Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	0	4	0	0	4
Total	0	4	0	0	4

Table H-27. Pelger Road 1700 LLC GHG Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/year)	Operations (hours/year)	Operations (kWh/yr)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors CO2	Units	CH4	Units	N2O	Units	Annual Emissions (metric tons per year) CO2	CH4	N2O	CO2e
North Well	Sutter	Electric	Unknown	200	3,500	23%	1,307	2,028	302,384	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	13.51	0.00	0.00	13.77
South Well	Sutter	Electric	Unknown	150	5,000	33%	1,867	2,028	226,788	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	10.13	0.00	0.00	10.33
North Well B	Sutter	Electric	Unknown	200	3,500	23%	1,307	2,028	302,384	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	13.51	0.00	0.00	13.77
South Well B	Sutter	Electric	Unknown	200	3,000	20%	1,120	2,028	302,384	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	13.51	0.00	0.00	13.77
				Total	**15,000**	**100%**	**5,600**	**8,110**	**1,133,940**								**50.65**	**0.02**	**0.00**	**51.63**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors
1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Pleasant Grove-Verona Mutual Water Company			
Transfer Volume	8,000	acre-feet	(Apr-Jun)	
	10,000	acre-feet	(Jul-Sep)	
	18,000	**acre-feet/year**	**Maximum**	*ok*

Table H-28. Pleasant Grove-Verona Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	6	29	0	6	41
Total	**6**	**29**	**0**	**6**	**41**

Table H-29. Pleasant Grove-Verona Mutual Water Company GHG Emissions

				Power Rating	Pump Rate		Transfer Volume	Operations		Fuel Consumption	Emission Factors						Annual Emissions (metric tons per year)			
Well ID	Well Location (County)	Fuel Type	Model Year	(hp)	(gpm)	(% of Total)	(AF/year)	(hours/year)	(kWh/yr)	(gal/yr) - diesel (MMBtu/yr) - propane or NG	CO2	Units	CH4	Units	N2O	Units	CO2	CH4	N2O	CO2e
Kelly 190 Field Well #2	Sutter	Electric	Unknown	30	1,800	2%	377	1,137	25,444	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.14	0.00	0.00	1.16
Kelly Windmill Field Well #2	Sutter	Electric	2002	80	1,500	2%	314	1,137	67,850	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.03	0.00	0.00	3.09
Kelly Windmill North Field Well	Sutter	Propane	2014	80	1,800	2%	377	1,137	n/a	232	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	14.56	0.00	0.00	14.61
Kelly306	Sutter	Electric	Unknown	60	3,100	4%	649	1,137	50,887	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.27	0.00	0.00	2.32
Kelly New Well	Sutter	Electric	Unknown	30	1,800	2%	377	1,137	25,444	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.14	0.00	0.00	1.16
MLF Clubhouse B Well	Sutter	Electric	Unknown	100	3,600	4%	754	1,137	84,812	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.79	0.00	0.00	3.86
MLF Marsh Well	Sutter	Electric	Unknown	100	3,300	4%	691	1,137	84,812	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.79	0.00	0.00	3.86
MLF Monster Well	Sutter	Electric	Unknown	60	3,100	4%	649	1,137	50,887	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.27	0.00	0.00	2.32
MLF Well #1	Sutter	Electric	Unknown	30	2,000	2%	419	1,137	25,444	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.14	0.00	0.00	1.16
MLF Well #16	Sutter	Diesel	Unknown	60	1,700	2%	356	1,137	n/a	3,828	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	39.09	0.00	0.00	39.22
MLF Well#11	Sutter	Diesel	2004	240	1,400	2%	293	1,137	n/a	15,314	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	156.35	0.01	0.00	156.87
MLF Well#12/17	Sutter	Electric	Unknown	50	2,200	3%	461	1,137	42,406	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.89	0.00	0.00	1.93
MLF Well#13&#15	Sutter	Diesel	2000	215	1,900	2%	398	1,137	n/a	13,718	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	140.06	0.01	0.00	140.53
MLF Well#2B	Sutter	Electric	2000	100	2,750	3%	576	1,137	84,812	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.79	0.00	0.00	3.86
MLF New Well	Sutter	Electric	Unknown	100	2,750	3%	576	1,137	84,812	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.79	0.00	0.00	3.86
Nicholas 72-Acre Field North	Sutter	Electric	Unknown	40	1,800	2%	377	1,137	33,925	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.52	0.00	0.00	1.54
Nicholas 72-Acre Field South	Sutter	Electric	2002	30	2,000	2%	419	1,137	25,444	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.14	0.00	0.00	1.16
Nicholas BBC Well	Sutter	Electric	Unknown	30	2,000	2%	419	1,137	25,444	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.14	0.00	0.00	1.16
Nicholas Filipino Camp South	Sutter	Diesel	2002	84	800	1%	168	1,137	n/a	5,360	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	54.72	0.00	0.00	54.90
Nicholas Filipino Camp#2	Sutter	Electric	Unknown	40	1,700	2%	356	1,137	33,925	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.52	0.00	0.00	1.54
Nicholas Johnston Field Well #2	Sutter	Electric	Unknown	40	1,550	2%	325	1,137	33,925	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.52	0.00	0.00	1.54
Nicholas Sand Field Well	Sutter	Electric	2002	30	2,000	2%	419	1,137	25,444	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.14	0.00	0.00	1.16
Nicholas New Well	Sutter	Electric	Unknown	30	1,800	2%	377	1,137	25,444	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.14	0.00	0.00	1.16
RiverRanch#19	Sutter	Diesel	2008	80	2,500	3%	524	1,137	n/a	5,105	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	52.12	0.00	0.00	52.29
River Ranch New Well	Sutter	Electric	Unknown	60	3,000	3%	628	1,137	50,887	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.27	0.00	0.00	2.32
S&O#16	Sutter	Electric	2014	80	2,000	2%	419	1,137	67,850	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.03	0.00	0.00	3.09
S&O#17	Sutter	Electric	1999	80	3,000	3%	628	1,137	67,850	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.03	0.00	0.00	3.09
S&O#18A	Sutter	Diesel	1999	80	1,800	2%	377	1,137	n/a	5,105	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	52.12	0.00	0.00	52.29
S&O#19	Sutter	Propane	2007	80	2,000	2%	419	1,137	n/a	232	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	14.56	0.00	0.00	14.61
S&O#20	Sutter	Propane	2014	80	2,000	2%	419	1,137	n/a	232	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	14.56	0.00	0.00	14.61
Willey#1	Sutter	Propane	2000	170	3,000	3%	628	1,137	n/a	492	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	30.93	0.00	0.00	31.05
Willey#2	Sutter	Electric	Unknown	30	1,500	2%	314	1,137	25,444	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.14	0.00	0.00	1.16
Willey#3	Sutter	Electric	Unknown	75	1,500	2%	314	1,137	63,609	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.84	0.00	0.00	2.90
Willey#4	Sutter	Propane	1974	170	2,000	2%	419	1,137	n/a	492	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	30.93	0.00	0.00	31.05
Willey#5	Sutter	Propane	Unknown	60	2,000	2%	419	1,137	n/a	174	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	10.92	0.00	0.00	10.96
Will-Lee Well#30	Sutter	Electric	Unknown	30	1,500	2%	314	1,137	25,444	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.14	0.00	0.00	1.16
Will-Lee Well#31	Sutter	Electric	Unknown	30	1,500	2%	314	1,137	25,444	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.14	0.00	0.00	1.16
Will-Lee Well#32	Sutter	Electric	Unknown	50	2,500	3%	524	1,137	42,406	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.89	0.00	0.00	1.93
Will-Lee Well#33	Sutter	Electric	Unknown	50	2,500	3%	524	1,137	42,406	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.89	0.00	0.00	1.93
Will-Lee Well#4A	Sutter	Electric	2000	30	1,500	2%	314	1,137	25,444	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.14	0.00	0.00	1.16
Spangler Well	Sutter	Electric	Unknown	40	1,800	2%	377	1,137	33,925	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.52	0.00	0.00	1.54
				Total	**85,950**	**100%**	**18,000**	**46,631**	**1,301,868**								**669.05**	**0.04**	**0.01**	**672.26**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors

1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Princeton-Codora-Glenn Irrigation District				
Transfer Volume	3,000	acre-feet	(Apr-Jun)		
	5,000	acre-feet	(Jul-Sep)		
	8,000	**acre-feet/year**	**Maximum**	*ok*	

Table H-30. Princeton-Codora-Glenn Irrigation District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Glenn	6	5	0	0	11
Colusa	4	2	0	0	6
	0	0	0	0	0
Total	10	7	0	0	17

Table H-31. Princeton-Codora-Glenn Irrigation District GHG Emissions

	Well Location			Power Rating	Pump Rate		Transfer Volume	Operations		Fuel Consumption	Emission Factors						Annual Emissions (metric tons per year)			
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**(gpm)**	**(% of Total)**	**(AF/year)**	**(hours/year)**	**(kWh/yr)**	**(gal/yr) - diesel (MMBtu/yr) - propane or NG**	**CO2**	**Units**	**CH4**	**Units**	**N2O**	**Units**	**CO2**	**CH4**	**N2O**	**CO2e**
Joel Mann	Glenn	Diesel	1995	185	3,500	7%	524	814	n/a	8,444	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	86.22	0.00	0.00	86.50
D.Withrow	Glenn	Diesel	1992	180	2,000	4%	300	814	n/a	8,216	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	83.89	0.00	0.00	84.16
Chrisman	Glenn	Diesel	2001	335	3,000	6%	449	814	n/a	15,291	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	156.12	0.01	0.00	156.64
D.Schmidt	Colusa	Diesel	Unknown	150	3,000	6%	449	814	n/a	6,847	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	69.90	0.00	0.00	70.14
Argo B	Glenn	Diesel	Unknown	150	3,000	6%	449	814	n/a	6,847	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	69.90	0.00	0.00	70.14
Argo C	Glenn	Diesel	Unknown	150	3,000	6%	449	814	n/a	6,847	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	69.90	0.00	0.00	70.14
F. Gomes	Colusa	Diesel	Unknown	150	3,300	6%	494	814	n/a	6,847	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	69.90	0.00	0.00	70.14
Jones Well	Glenn	Electric	2012	150	3,500	7%	524	814	91,006	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.06	0.00	0.00	4.14
M. Cota	Colusa	Diesel	Unknown	150	3,000	6%	449	814	n/a	6,847	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	69.90	0.00	0.00	70.14
Zoller A	Colusa	Diesel	Unknown	150	3,000	6%	449	814	n/a	6,847	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	69.90	0.00	0.00	70.14
Clark #1	Glenn	Electric	Unknown	150	4,000	7%	599	814	91,006	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.06	0.00	0.00	4.14
Clark #2	Glenn	Electric	Unknown	150	4,000	7%	599	814	91,006	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.06	0.00	0.00	4.14
J. Southam	Colusa	Electric	Unknown	150	4,000	7%	599	814	91,006	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.06	0.00	0.00	4.14
Marin & Mason	Glenn	Diesel	Unknown	200	2,500	5%	375	814	n/a	9,129	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	93.21	0.00	0.00	93.51
Calvert	Glenn	Electric	Unknown	200	3,600	7%	539	814	121,342	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.42	0.00	0.00	5.52
Tobin	Glenn	Electric	Unknown	200	2,700	5%	404	814	121,342	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.42	0.00	0.00	5.52
Spencer	Colusa	Electric	Unknown	200	2,300	4%	345	814	121,342	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.42	0.00	0.00	5.52
				Total	**53,400**	**100%**	**8,000**	**13,831**	**728,051**								**871.37**	**0.04**	**0.01**	**874.77**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors

1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Provident Irrigation District			
Transfer Volume	4,500	acre-feet	(Apr-Jun)	
	7,000	acre-feet	(Jul-Sep)	
	11,500	**acre-feet/year**	**Maximum**	*ok*

Table H-32. Provident Irrigation District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Glenn	17	9	0	0	26
	0	0	0	0	0
	0	0	0	0	0
Total	17	9	0	0	26

Table H-33. Provident Irrigation District GHG Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/year)	Operations (hours/year)	Operations (kWh/yr)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors CO2	Units	CH4	Units	N2O	Units	Annual Emissions (metric tons per year) CO2	CH4	N2O	CO2e
Weller62V	Glenn	Diesel	2014	190	2,000	2%	272	737	n/a	7,860	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	80.25	0.00	0.00	80.51
L Hansen#1	Glenn	Diesel	1991	210	3,800	4%	516	737	n/a	8,687	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	88.69	0.00	0.00	88.99
L Hansen#2	Glenn	Diesel	2013	140	4,500	5%	611	737	n/a	5,791	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	59.13	0.00	0.00	59.33
K Hansen#1	Glenn	Diesel	1992	185	2,600	3%	353	737	n/a	7,653	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	78.14	0.00	0.00	78.39
K Hansen#2	Glenn	Electric	Unknown	200	3,500	4%	475	737	109,971	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.91	0.00	0.00	5.01
E Weller	Glenn	Diesel	2019	185	2,500	3%	339	737	n/a	7,653	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	78.14	0.00	0.00	78.39
Weller#4	Glenn	Electric	Unknown	200	3,500	4%	475	737	109,971	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.91	0.00	0.00	5.01
Calvert	Glenn	Diesel	Unknown	200	3,000	4%	407	737	n/a	8,273	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	84.47	0.00	0.00	84.75
D. Alves	Glenn	Diesel	Unknown	200	3,000	4%	407	737	n/a	8,273	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	84.47	0.00	0.00	84.75
D. Kennedy	Glenn	Electric	Unknown	200	3,000	4%	407	737	109,971	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.91	0.00	0.00	5.01
G. Clark #1	Glenn	Diesel	Unknown	200	3,000	4%	407	737	n/a	8,273	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	84.47	0.00	0.00	84.75
M. Jones #1	Glenn	Diesel	Unknown	200	3,000	4%	407	737	n/a	8,273	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	84.47	0.00	0.00	84.75
M. Jones #2	Glenn	Diesel	Unknown	200	3,200	4%	434	737	n/a	8,273	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	84.47	0.00	0.00	84.75
Perez and Perez	Glenn	Diesel	Unknown	150	3,200	4%	434	737	n/a	6,205	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	63.35	0.00	0.00	63.56
S. Jones #1	Glenn	Diesel	Unknown	200	3,200	4%	434	737	n/a	8,273	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	84.47	0.00	0.00	84.75
S. Jones #2	Glenn	Diesel	Unknown	200	3,200	4%	434	737	n/a	8,273	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	84.47	0.00	0.00	84.75
Joel Mann - North	Glenn	Diesel	Unknown	200	2,500	3%	339	737	n/a	8,273	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	84.47	0.00	0.00	84.75
W-61 (Withrow)	Glenn	Diesel	Unknown	200	2,200	3%	299	737	n/a	8,273	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	84.47	0.00	0.00	84.75
C. Newton (J.A. Cattle)	Glenn	Diesel	Unknown	200	3,000	4%	407	737	n/a	8,273	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	84.47	0.00	0.00	84.75
R. Perez	Glenn	Electric	Unknown	150	3,500	4%	475	737	82,478	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.68	0.00	0.00	3.76
Michael 2	Glenn	Diesel	Unknown	200	2,500	3%	339	737	n/a	8,273	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	84.47	0.00	0.00	84.75
Carriere	Glenn	Electric	Unknown	200	2,000	2%	272	737	109,971	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.91	0.00	0.00	5.01
District Well #1	Glenn	Electric	Unknown	200	3,000	4%	407	737	109,971	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.91	0.00	0.00	5.01
District Well #2	Glenn	Electric	Unknown	200	6,000	7%	815	737	109,971	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.91	0.00	0.00	5.01
District Well #3	Glenn	Electric	Unknown	200	5,600	7%	760	737	109,971	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.91	0.00	0.00	5.01
District Well #4	Glenn	Electric	Unknown	200	4,400	5%	597	737	109,971	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.91	0.00	0.00	5.01
				Total	**84,700**	**100%**	**11,500**	**19,171**	**962,242**								**1,419.86**	**0.07**	**0.01**	**1,425.24**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors
1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Reclamation District 1004			
Transfer Volume	3,588	acre-feet	(Apr-Jun)	
	3,588	acre-feet	(Jul-Sep)	
	7,175	**acre-feet/year**	**Maximum**	*ok*

Table H-34. Reclamation District 1004 Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Glenn	0	3	0	0	3
Total	0	3	0	0	3

Table H-35. Reclamation District 1004 GHG Emissions

	Well Location			**Power Rating**	**Pump Rate**		**Transfer Volume**	**Operations**		**Fuel Consumption**	**Emission Factors**						**Annual Emissions (metric tons per year)**			
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**(gpm)**	**(% of Total)**	**(AF/year)**	**(hours/year)**	**(kWh/yr)**	**(gal/yr) - diesel (MMBtu/yr) - propane or NG**	**CO2**	**Units**	**CH4**	**Units**	**N2O**	**Units**	**CO2**	**CH4**	**N2O**	**CO2e**
Glenn West	Glenn	Electric	Unknown	300	4,500	33%	2,392	2,886	645,716	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	28.84	0.01	0.00	29.40
Glenn East	Glenn	Electric	Unknown	300	4,500	33%	2,392	2,886	645,716	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	28.84	0.01	0.00	29.40
Distrct Well 3	Glenn	Electric	Unknown	300	4,500	33%	2,392	2,886	645,716	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	28.84	0.01	0.00	29.40
				Total	**13,500**	**100%**	**7,175**	**8,659**	**1,937,147**								**86.52**	**0.03**	**0.00**	**88.19**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors
1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Reclamation District 108			
Transfer Volume	7,500	acre-feet	(Apr-Jun)	
	7,500	acre-feet	(Jul-Sep)	
	15,000	**acre-feet/year**	**Maximum**	*ok*

Table H-36. Reclamation District 108 Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Colusa	6	10	0	5	21
Yolo	1	3	0	1	5
Total	7	13	0	6	26

Table H-37. Reclamation District 108 GHG Emissions

				Power Rating	Pump Rate		Transfer Volume	Operations		Fuel Consumption	Emission Factors						Annual Emissions (metric tons per year)			
Well ID	Well Location (County)	Fuel Type	Model Year	(hp)	(gpm)	(% of Total)	(AF/year)	(hours/year)	(kWh/yr)	(gal/yr) - diesel (MMBtu/yr) - propane or NG	CO2	Units	CH4	Units	N2O	Units	CO2	CH4	N2O	CO2e
RD108 Well #1	Colusa	Electric	Unknown	100	2,550	3%	517	1,102	82,185	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.67	0.00	0.00	3.74
RD108 Well #4	Colusa	Electric	Unknown	150	1,250	2%	254	1,102	123,277	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.51	0.00	0.00	5.61
RD108 Well #5	Colusa	Electric	Unknown	250	4,950	7%	1,005	1,102	205,462	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	9.18	0.00	0.00	9.35
RD108 Well #6	Yolo	Electric	Unknown	250	3,375	5%	685	1,102	205,462	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	9.18	0.00	0.00	9.35
RD108 Well #7	Yolo	Electric	Unknown	250	3,195	4%	648	1,102	205,462	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	9.18	0.00	0.00	9.35
Field 66C	Yolo	Electric	Unknown	150	1,620	2%	329	1,102	123,277	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.51	0.00	0.00	5.61
Field 1	Colusa	Propane	Unknown	105	3,420	5%	694	1,102	n/a	294	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	18.51	0.00	0.00	18.58
Field 4	Colusa	Electric	Unknown	200	3,150	4%	639	1,102	164,369	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.34	0.00	0.00	7.48
Field 53E	Yolo	Propane	Unknown	250	2,295	3%	466	1,102	n/a	701	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	44.08	0.00	0.00	44.25
Field 65E	Yolo	Diesel	Unknown	463	3,195	4%	648	1,102	n/a	28,606	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	292.06	0.01	0.00	293.03
Field 90B	Colusa	Electric	Unknown	125	2,295	3%	466	1,102	102,731	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.59	0.00	0.00	4.68
Field 100H	Colusa	Diesel	Unknown	320	2,385	3%	484	1,102	n/a	19,785	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	202.01	0.01	0.00	202.68
Field 100L1 West	Colusa	Diesel	Unknown	275	2,500	3%	507	1,102	n/a	16,998	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	173.55	0.01	0.00	174.12
Field 100M	Colusa	Diesel	Unknown	235	2,200	3%	446	1,102	n/a	14,530	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	148.35	0.01	0.00	148.84
Field 119A	Colusa	Electric	Unknown	150	3,250	4%	660	1,102	123,277	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.51	0.00	0.00	5.61
Field 125A	Colusa	Propane	Unknown	200	2,800	4%	568	1,102	n/a	561	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	35.26	0.00	0.00	35.40
Field 134	Colusa	Electric	Unknown	25	1,600	2%	325	1,102	20,546	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	0.92	0.00	0.00	0.94
Field 107F	Colusa	Electric	Unknown	200	3,195	4%	648	1,102	164,369	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.34	0.00	0.00	7.48
Field 100L1 East	Colusa	Electric	Unknown	125	1,950	3%	396	1,102	102,731	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.59	0.00	0.00	4.68
Field 81D	Colusa	Diesel	Unknown	400	4,250	6%	862	1,102	n/a	24,732	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	252.51	0.01	0.00	253.35
Field 81E	Colusa	Diesel	Unknown	400	4,250	6%	862	1,102	n/a	24,732	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	252.51	0.01	0.00	253.35
Field 83	Colusa	Propane	Unknown	250	3,500	5%	710	1,102	n/a	701	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	44.08	0.00	0.00	44.25
Field 92C	Colusa	Diesel	Unknown	250	1,440	2%	292	1,102	n/a	15,457	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	157.82	0.01	0.00	158.34
Field 93A	Colusa	Propane	Unknown	250	3,500	5%	710	1,102	n/a	701	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	44.08	0.00	0.00	44.25
Cecil	Colusa	Electric	Unknown	40	2,800	4%	568	1,102	32,874	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.47	0.00	0.00	1.50
Field 111G	Colusa	Propane	Unknown	250	3,000	4%	609	1,102	n/a	701	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	44.08	0.00	0.00	44.25
				Total	**73,915**	**100%**	**15,000**	**28,655**	**1,656,020**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1,782.86**	**0.09**	**0.02**	**1,790.08**

Key:
AF = acre-feet; CH4 = methane; CO2 = carbon dioxide; gal/yr = gallons per year; GHG = greenhouse gas; gpm = gallons per minute; hp = horsepower; kW/yr = kilowatt hours per year; MTCO2e = metric tons carbon dioxide equivalent; N2O = nitrous oxide

<u>Conversion Factors</u>
1 acre-foot = 25,851 gallons

<u>Global Warming Potential (AR6)</u>
CO2 1
CH4 27
N2O 273
Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

<u>Diesel Engine Fuel Consumption</u>
0.4 lb/hp-hr (Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)
0.855 g/mL (Based on MSDS for Hess Diesel Fuel All Types)
7.13 lb/gal

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Roberts Ditch Irrigation Company			
Transfer Volume	1,700	acre-feet	(Apr-Jun)	
	1,760	acre-feet	(Jul-Sep)	
	3,460	**acre-feet/year**	**Maximum**	*ok*

Table H-38. Roberts Ditch Irrigation Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Colusa	0	9	0	1	10
Total	0	9	0	1	10

Table H-39. Roberts Ditch Irrigation Company GHG Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/year)	Operations (hours/year)	Operations (kWh/yr)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors CO2	Units	CH4	Units	N2O	Units	Annual Emissions (metric tons per year) CO2	CH4	N2O	CO2e
Well #1	Colusa	Electric	Unknown	125	5,000	14%	487	529	49,339	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.20	0.00	0.00	2.25
Well #2	Colusa	Electric	Unknown	125	5,000	14%	487	529	49,339	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.20	0.00	0.00	2.25
Hickel	Colusa	Electric	Unknown	40	500	1%	49	529	15,788	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	0.71	0.00	0.00	0.72
Stegals	Colusa	Electric	Unknown	75	2,500	7%	244	529	29,603	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	1.32	0.00	0.00	1.35
Ash	Colusa	Electric	Unknown	40	1,500	4%	146	529	15,788	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	0.71	0.00	0.00	0.72
Yearxa North	Colusa	Electric	Unknown	150	4,000	11%	390	529	59,207	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.64	0.00	0.00	2.70
Yearxa South	Colusa	Electric	Unknown	150	5,000	14%	487	529	59,207	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.64	0.00	0.00	2.70
Andreotti	Colusa	Propane	Unknown	125	2,500	7%	244	529	n/a	168	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	10.58	0.00	0.00	10.63
Andreotti (New)	Colusa	Electric	Unknown	150	4,000	11%	390	529	59,207	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.64	0.00	0.00	2.70
Ottenwalter	Colusa	Electric	Unknown	150	5,500	15%	536	529	59,207	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	2.64	0.00	0.00	2.70
				Total	**35,500**	**100%**	**3,460**	**5,293**	**396,685**								**28.30**	**0.01**	**0.00**	**28.69**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors

1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	RRG Garden Properties LLC			
Transfer Volume	4,400	acre-feet	(Apr-Jun)	
	5,600	acre-feet	(Jul-Sep)	
	10,000	**acre-feet/year**	**Maximum**	*ok*

Table H-40. RRG Garden Properties LLC Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Yolo	0	10	0	0	10
Total	0	10	0	0	10

Table H-41. RRG Garden Properties LLC GHG Emissions

	Well Location			Power Rating	Pump Rate		Transfer Volume	Operations		Fuel Consumption	Emission Factors						Annual Emissions (metric tons per year)			
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**(gpm)**	**(% of Total)**	**(AF/year)**	**(hours/year)**	**(kWh/yr)**	**(gal/yr) - diesel (MMBtu/yr) - propane or NG**	**CO2**	**Units**	**CH4**	**Units**	**N2O**	**Units**	**CO2**	**CH4**	**N2O**	**CO2e**
Field 65 PW	Yolo	Electric	2008	125	2,900	11%	1,142	2,138	199,300	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	8.90	0.00	0.00	9.07
Field 71 PW	Yolo	Electric	#VALUE!	300	1,500	6%	591	2,138	478,321	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	21.36	0.01	0.00	21.78
Field 98 PW	Yolo	Electric	1963	100	2,500	10%	984	2,138	159,440	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.12	0.00	0.00	7.26
Field 104 PW	Yolo	Electric	#VALUE!	200	2,950	12%	1,161	2,138	318,881	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	14.24	0.00	0.00	14.52
Field 104-09 PW	Yolo	Electric	2009	200	2,600	10%	1,024	2,138	318,881	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	14.24	0.00	0.00	14.52
Field 93 PW	Yolo	Electric	#VALUE!	200	2,400	9%	945	2,138	318,881	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	14.24	0.00	0.00	14.52
Field 91-09 PW	Yolo	Electric	2009	100	2,400	9%	945	2,138	159,440	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.12	0.00	0.00	7.26
Field 117 PW	Yolo	Electric	2009	150	2,300	9%	906	2,138	239,160	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	10.68	0.00	0.00	10.89
Shop PW	Yolo	Electric	2009	100	2,450	10%	965	2,138	159,440	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	7.12	0.00	0.00	7.26
F-1	Yolo	Electric	Unknown	150	3,400	13%	1,339	2,138	239,160	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	10.68	0.00	0.00	10.89
				Total	**25,400**	**100%**	**10,000**	**21,381**	**2,590,905**								**115.72**	**0.04**	**0.00**	**117.96**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors
1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Sacramento County Water Agency			
Transfer Volume	0	acre-feet (Apr-Jun)		
	15,000	acre-feet (Jul-Sep)		
	15,000	acre-feet/year	Maximum	

Table H-42. Sacramento County Water Agency Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sacramento	0	34	0	0	34
Total	0	34	0	0	34

Table H-43. Sacramento County Water Agency GHG Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Pump Rate (gpm)	(% of Total)	Transfer Volume (AF/year)	Operations (hours/year)	(kWh/yr)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors CO2	Units	CH4	Units	N2O	Units	Annual Emissions (metric tons per year) CO2	CH4	N2O	CO2e
W-041	Sacramento	Electric	Unknown	75	650	1%	207	1,728	96,663	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	22.90	0.00	0.00	22.98
W-042	Sacramento	Electric	Unknown	75	760	2%	242	1,728	96,663	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	22.90	0.00	0.00	22.98
W-043	Sacramento	Electric	Unknown	100	1,000	2%	318	1,728	128,884	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	30.53	0.00	0.00	30.64
W-047	Sacramento	Electric	Unknown	100	1,000	2%	318	1,728	128,884	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	30.53	0.00	0.00	30.64
W-052	Sacramento	Electric	Unknown	100	1,050	2%	334	1,728	128,884	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	30.53	0.00	0.00	30.64
W-055	Sacramento	Electric	Unknown	100	1,700	4%	541	1,728	128,884	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	30.53	0.00	0.00	30.64
W-056	Sacramento	Electric	Unknown	100	1,500	3%	477	1,728	128,884	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	30.53	0.00	0.00	30.64
W-061	Sacramento	Electric	Unknown	150	1,600	3%	509	1,728	193,326	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.80	0.00	0.00	45.97
W-062	Sacramento	Electric	Unknown	100	1,100	2%	350	1,728	128,884	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	30.53	0.00	0.00	30.64
W-063	Sacramento	Electric	Unknown	100	1,000	2%	318	1,728	128,884	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	30.53	0.00	0.00	30.64
W-064	Sacramento	Electric	Unknown	150	1,500	3%	477	1,728	193,326	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.80	0.00	0.00	45.97
W-065	Sacramento	Electric	Unknown	50	608	1%	193	1,728	64,442	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	15.27	0.00	0.00	15.32
W-066	Sacramento	Electric	Unknown	125	1,700	4%	541	1,728	161,105	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	38.17	0.00	0.00	38.30
W-067	Sacramento	Electric	Unknown	125	1,500	3%	477	1,728	161,105	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	38.17	0.00	0.00	38.30
W-068	Sacramento	Electric	Unknown	125	1,500	3%	477	1,728	161,105	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	38.17	0.00	0.00	38.30
W-069	Sacramento	Electric	Unknown	150	1,500	3%	477	1,728	193,326	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.80	0.00	0.00	45.97
W-070	Sacramento	Electric	Unknown	125	1,500	3%	477	1,728	161,105	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	38.17	0.00	0.00	38.30
W-073	Sacramento	Electric	Unknown	200	1,915	4%	609	1,728	257,767	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	61.06	0.00	0.00	61.29
W-074	Sacramento	Electric	Unknown	50	600	1%	191	1,728	64,442	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	15.27	0.00	0.00	15.32
W-075	Sacramento	Electric	Unknown	100	1,600	3%	509	1,728	128,884	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	30.53	0.00	0.00	30.64
W-076	Sacramento	Electric	Unknown	150	1,750	4%	557	1,728	193,326	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.80	0.00	0.00	45.97
W-077	Sacramento	Electric	Unknown	150	1,500	3%	477	1,728	193,326	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.80	0.00	0.00	45.97
W-078	Sacramento	Electric	Unknown	125	1,500	3%	477	1,728	161,105	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	38.17	0.00	0.00	38.30
W-081	Sacramento	Electric	Unknown	150	1,500	3%	477	1,728	193,326	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.80	0.00	0.00	45.97
W-105	Sacramento	Electric	Unknown	150	1,800	4%	573	1,728	193,326	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.80	0.00	0.00	45.97
W-106	Sacramento	Electric	Unknown	150	1,800	4%	573	1,728	193,326	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.80	0.00	0.00	45.97
W-109	Sacramento	Electric	Unknown	125	1,500	3%	477	1,728	161,105	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	38.17	0.00	0.00	38.30
W-110	Sacramento	Electric	Unknown	150	1,500	3%	477	1,728	193,326	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.80	0.00	0.00	45.97
W-112	Sacramento	Electric	Unknown	150	1,500	3%	477	1,728	193,326	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.80	0.00	0.00	45.97
W-114	Sacramento	Electric	Unknown	125	1,500	3%	477	1,728	161,105	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	38.17	0.00	0.00	38.30
W-126	Sacramento	Electric	Unknown	150	1,500	3%	477	1,728	193,326	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.80	0.00	0.00	45.97
W-129	Sacramento	Electric	Unknown	150	1,500	3%	477	1,728	193,326	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.80	0.00	0.00	45.97
W-130	Sacramento	Electric	Unknown	150	1,500	3%	477	1,728	193,326	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.80	0.00	0.00	45.97
W-135	Sacramento	Electric	Unknown	150	1,500	3%	477	1,728	193,326	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.80	0.00	0.00	45.97
				Total	**47,133**	**100%**	**15,000**	**58,764**	**5,445,337**								**1,289.99**	**0.07**	**0.01**	**1,294.69**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors

1 acre-foot =	325,851	gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Sacramento Suburban Water District		
Transfer Volume	7,000	acre-feet (Apr-Jun)	
	10,000	acre-feet (Jul-Sep)	
	17,000	acre-feet/year	Maximum

Table H-44. Sacramento Suburban Water District Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sacramento	0	64	0	0	64
Total	0	64	0	0	64

Table H-45. Sacramento Suburban Water District GHG Emissions

	Well Location			Power Rating	Pump Rate		Transfer Volume	Operations		Fuel Consumption	Emission Factors						Annual Emissions (metric tons per year)			
Well ID	(County)	Fuel Type	Model Year	(hp)	(gpm)	(% of Total)	(AF/year)	(hours/year)	(kWh/yr)	(gal/yr) - diesel (MMBtu/yr) - propane or NG	CO2	Units	CH4	Units	N2O	Units	CO2	CH4	N2O	CO2e
2A	Sacramento	Electric	Unknown	100	1,000	1%	188	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
3A	Sacramento	Electric	Unknown	75	900	1%	169	1,021	57,083	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	13.52	0.00	0.00	13.57
4B	Sacramento	Electric	Unknown	300	3,000	3%	564	1,021	228,331	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	54.09	0.00	0.00	54.29
9	Sacramento	Electric	Unknown	75	700	1%	132	1,021	57,083	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	13.52	0.00	0.00	13.57
13	Sacramento	Electric	Unknown	100	800	1%	150	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
18	Sacramento	Electric	Unknown	75	900	1%	169	1,021	57,083	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	13.52	0.00	0.00	13.57
20A	Sacramento	Electric	Unknown	100	1,100	1%	207	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
24	Sacramento	Electric	Unknown	75	1,200	1%	226	1,021	57,083	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	13.52	0.00	0.00	13.57
25	Sacramento	Electric	Unknown	60	400	0%	75	1,021	45,666	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	10.82	0.00	0.00	10.86
26	Sacramento	Electric	Unknown	75	1,000	1%	188	1,021	57,083	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	13.52	0.00	0.00	13.57
27	Sacramento	Electric	Unknown	75	600	1%	113	1,021	57,083	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	13.52	0.00	0.00	13.57
28	Sacramento	Electric	Unknown	75	1,190	1%	224	1,021	57,083	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	13.52	0.00	0.00	13.57
30	Sacramento	Electric	Unknown	75	500	1%	94	1,021	57,083	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	13.52	0.00	0.00	13.57
32A	Sacramento	Electric	Unknown	100	2,000	2%	376	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
33A	Sacramento	Electric	Unknown	250	2,250	2%	423	1,021	190,276	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.08	0.00	0.00	45.24
35	Sacramento	Electric	Unknown	75	850	1%	160	1,021	57,083	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	13.52	0.00	0.00	13.57
40A	Sacramento	Electric	Unknown	300	2,300	3%	432	1,021	228,331	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	54.09	0.00	0.00	54.29
41	Sacramento	Electric	Unknown	50	500	1%	94	1,021	38,055	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	9.02	0.00	0.00	9.05
43	Sacramento	Electric	Unknown	100	1,000	1%	188	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
47	Sacramento	Electric	Unknown	100	1,100	1%	207	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
52	Sacramento	Electric	Unknown	100	1,255	1%	236	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
55A	Sacramento	Electric	Unknown	200	1,900	2%	357	1,021	152,221	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	36.06	0.00	0.00	36.19
56A	Sacramento	Electric	Unknown	300	2,500	3%	470	1,021	228,331	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	54.09	0.00	0.00	54.29
59A	Sacramento	Electric	Unknown	300	2,700	3%	507	1,021	228,331	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	54.09	0.00	0.00	54.29
60	Sacramento	Electric	Unknown	60	530	1%	100	1,021	45,666	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	10.82	0.00	0.00	10.86
64	Sacramento	Electric	Unknown	100	1,200	1%	226	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
65	Sacramento	Electric	Unknown	100	1,200	1%	226	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
66	Sacramento	Electric	Unknown	125	1,300	1%	244	1,021	95,138	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	22.54	0.00	0.00	22.62
68	Sacramento	Electric	Unknown	150	1,600	2%	301	1,021	114,165	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	27.05	0.00	0.00	27.14
71	Sacramento	Electric	Unknown	200	2,200	2%	413	1,021	152,221	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	36.06	0.00	0.00	36.19
72	Sacramento	Electric	Unknown	200	700	1%	132	1,021	152,221	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	36.06	0.00	0.00	36.19
73	Sacramento	Electric	Unknown	300	3,500	4%	658	1,021	228,331	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	54.09	0.00	0.00	54.29
74	Sacramento	Electric	Unknown	250	2,500	3%	470	1,021	190,276	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.08	0.00	0.00	45.24
78	Sacramento	Electric	Unknown	200	1,700	2%	319	1,021	152,221	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	36.06	0.00	0.00	36.19
79	Sacramento	Electric	Unknown	150	1,600	2%	301	1,021	114,165	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	27.05	0.00	0.00	27.14
80	Sacramento	Electric	Unknown	150	1,500	2%	282	1,021	114,165	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	27.05	0.00	0.00	27.14
81	Sacramento	Electric	Unknown	150	1,500	2%	282	1,021	114,165	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	27.05	0.00	0.00	27.14
82	Sacramento	Electric	Unknown	150	1,500	2%	282	1,021	114,165	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	27.05	0.00	0.00	27.14
83	Sacramento	Electric	Unknown	150	1,500	2%	282	1,021	114,165	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	27.05	0.00	0.00	27.14
84	Sacramento	Electric	Unknown	300	3,000	3%	564	1,021	228,331	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	54.09	0.00	0.00	54.29
N3	Sacramento	Electric	Unknown	100	1,200	1%	226	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
N5	Sacramento	Electric	Unknown	150	1,300	1%	244	1,021	114,165	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	27.05	0.00	0.00	27.14
N6A	Sacramento	Electric	Unknown	200	1,500	2%	282	1,021	152,221	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	36.06	0.00	0.00	36.19
N9	Sacramento	Electric	Unknown	125	1,200	1%	226	1,021	95,138	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	22.54	0.00	0.00	22.62
N10	Sacramento	Electric	Unknown	150	1,041	1%	196	1,021	114,165	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	27.05	0.00	0.00	27.14
N12	Sacramento	Electric	Unknown	125	1,300	1%	244	1,021	95,138	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	22.54	0.00	0.00	22.62
N14	Sacramento	Electric	Unknown	125	1,200	1%	226	1,021	95,138	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	22.54	0.00	0.00	22.62
N17	Sacramento	Electric	Unknown	100	900	1%	169	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
N20	Sacramento	Electric	Unknown	125	1,000	1%	188	1,021	95,138	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	22.54	0.00	0.00	22.62
N22	Sacramento	Electric	Unknown	125	1,000	1%	188	1,021	95,138	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	22.54	0.00	0.00	22.62
N23A	Sacramento	Electric	Unknown	100	1,000	1%	188	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
N24	Sacramento	Electric	Unknown	150	1,200	1%	226	1,021	114,165	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	27.05	0.00	0.00	27.14
N25	Sacramento	Electric	Unknown	200	1,400	2%	263	1,021	152,221	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	36.06	0.00	0.00	36.19
N26	Sacramento	Electric	Unknown	100	700	1%	132	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
N29	Sacramento	Electric	Unknown	100	800	1%	150	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
N30	Sacramento	Electric	Unknown	100	1,100	1%	207	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
N32A	Sacramento	Electric	Unknown	200	1,900	2%	357	1,021	152,221	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	36.06	0.00	0.00	36.19
N32B	Sacramento	Electric	Unknown	300	2,300	3%	432	1,021	228,331	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	54.09	0.00	0.00	54.29
N32C	Sacramento	Electric	Unknown	100	740	1%	139	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
N34	Sacramento	Electric	Unknown	200	1,600	2%	301	1,021	152,221	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	36.06	0.00	0.00	36.19
N35	Sacramento	Electric	Unknown	250	2,400	3%	451	1,021	190,276	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	45.08	0.00	0.00	45.24
N36	Sacramento	Electric	Unknown	200	1,500	2%	282	1,021	152,221	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	36.06	0.00	0.00	36.19
N38	Sacramento	Electric	Unknown	100	2,000	2%	376	1,021	76,110	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	18.03	0.00	0.00	18.10
N39	Sacramento	Electric	Unknown	200	1,500	2%	282	1,021	152,221	n/a	522.27	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	36.06	0.00	0.00	36.19
				Total	**90,456**	**100%**	**17,000**	**65,322**	**7,226,673**								**1,711.98**	**0.10**	**0.01**	**1,718.22**

Note: All wells are electric; therefore, no local criteria pollutant emissions.

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors

1 acre-foot =	325,851	gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)
0.855	g/mL	(Based on MSDS for Hess Diesel Fuel All Types)
7.13	lb/gal	

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Sutter Mutual Water Company				
Transfer Volume	20,000	acre-feet (Apr-Jun)			
	20,000	acre-feet (Jul-Sep)			
	40,000	acre-feet/year	Maximum	ok	

Table H-46. Sutter Mutual Water Company Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	10	9	0	12	31
Total	10	9	0	12	31

Table H-47. Sutter Mutual Water Company GHG Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Pump Rate (gpm)	(% of Total)	Transfer Volume (AF/year)	Operations (hours/year)	(kWh/yr)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors CO2	Units	CH4	Units	N2O	Units	Annual Emissions (metric tons per year) CO2	CH4	N2O	CO2e
G-16	Sutter	Electric	Unknown	250	4,500	4%	1,617	1,952	363,862	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	16.25	0.00	0.00	16.57
QHR	Sutter	Propane	Unknown	250	5,000	4%	1,797	1,952	n/a	1,242	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	78.06	0.00	0.00	78.36
MB-1	Sutter	Propane	Unknown	268	5,300	5%	1,905	1,952	n/a	1,331	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	83.68	0.00	0.00	84.00
LM-53	Sutter	Electric	Unknown	150	3,000	3%	1,078	1,952	218,317	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	9.75	0.00	0.00	9.94
BD-1	Sutter	Diesel	Unknown	225	2,500	2%	898	1,952	n/a	24,637	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	251.54	0.01	0.00	252.37
L1-1	Sutter	Diesel	Unknown	250	3,800	3%	1,366	1,952	n/a	27,374	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	279.49	0.01	0.00	280.42
L1-2	Sutter	Diesel	Unknown	250	4,200	4%	1,509	1,952	n/a	27,374	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	279.49	0.01	0.00	280.42
L2-1	Sutter	Diesel	Unknown	250	5,500	5%	1,977	1,952	n/a	27,374	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	279.49	0.01	0.00	280.42
LM-11	Sutter	Electric	Unknown	150	3,100	3%	1,114	1,952	218,317	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	9.75	0.00	0.00	9.94
S-18	Sutter	Electric	Unknown	160	1,400	1%	503	1,952	232,872	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	10.40	0.00	0.00	10.60
BD-2	Sutter	Diesel	Unknown	225	4,000	4%	1,438	1,952	n/a	24,637	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	251.54	0.01	0.00	252.37
BD-3	Sutter	Propane	Unknown	250	3,200	3%	1,150	1,952	n/a	1,242	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	78.06	0.00	0.00	78.36
FG	Sutter	Propane	Unknown	250	1,500	1%	539	1,952	n/a	1,242	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	78.06	0.00	0.00	78.36
R-29	Sutter	Propane	Unknown	150	2,500	2%	898	1,952	n/a	745	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	46.83	0.00	0.00	47.02
TVN	Sutter	Electric	Unknown	75	3,000	3%	1,078	1,952	109,159	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.88	0.00	0.00	4.97
DB-1	Sutter	Diesel	Unknown	250	4,500	4%	1,617	1,952	n/a	27,374	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	279.49	0.01	0.00	280.42
ME-1	Sutter	Electric	Unknown	350	1,300	1%	467	1,952	509,407	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	22.75	0.01	0.00	23.19
R-24	Sutter	Diesel	Unknown	350	2,500	2%	898	1,952	n/a	38,324	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	391.29	0.02	0.00	392.58
Hoppin	Sutter	Electric	Unknown	250	2,500	2%	898	1,952	363,862	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	16.25	0.00	0.00	16.57
Ag Industries - Sioux Creek	Sutter	Diesel	Unknown	350	2,800	3%	1,006	1,952	n/a	38,324	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	391.29	0.02	0.00	392.58
Ag Industries - Sutter Basin	Sutter	Diesel	Unknown	350	3,000	3%	1,078	1,952	n/a	38,324	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	391.29	0.02	0.00	392.58
VR-57	Sutter	Propane	Unknown	450	5,500	5%	1,977	1,952	n/a	2,235	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	140.50	0.01	0.00	141.05
F4N	Sutter	Propane	Unknown	290	3,000	3%	1,078	1,952	n/a	1,440	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	90.55	0.00	0.00	90.90
FT5	Sutter	Propane	Unknown	450	5,200	5%	1,869	1,952	n/a	2,235	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	140.50	0.01	0.00	141.05
BD-4	Sutter	Diesel	Unknown	225	5,000	4%	1,797	1,952	n/a	24,637	10.21	kg/gal	0.0030	kg/MMBtu	0.0006	kg/MMBtu	251.54	0.01	0.00	252.37
BD-5?	Sutter	Propane	Unknown	310	4,000	4%	1,438	1,952	n/a	1,540	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	96.79	0.00	0.00	97.17
Previously Oji	Sutter	Propane	Unknown	250	2,800	3%	1,006	1,952	n/a	1,242	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	78.06	0.00	0.00	78.36
Dick Akin Well	Sutter	Electric	Unknown	250	4,000	4%	1,438	1,952	363,862	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	16.25	0.00	0.00	16.57
Hwy 113-Cal West Walnut Well	Sutter	Electric	Unknown	250	4,500	4%	1,617	1,952	363,862	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	16.25	0.00	0.00	16.57
Matteolli	Sutter	Propane	Unknown	250	4,000	4%	1,438	1,952	n/a	1,242	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	78.06	0.00	0.00	78.36
Oji	Sutter	Propane	Unknown	180	4,200	4%	1,509	1,952	n/a	894	62.87	kg/MMBtu	0.0030	kg/MMBtu	0.0006	kg/MMBtu	56.20	0.00	0.00	56.42
				Total	**111,300**	**100%**	**40,000**	**60,505**	**2,743,520**								**4,214.33**	**0.21**	**0.04**	**4,230.84**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors
1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Diesel Engine Fuel Consumption

0.4	lb/hp-hr	(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)
0.855	g/mL	(Based on MSDS for Hess Diesel Fuel All Types)
7.13	lb/gal	

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Te Velde Revocable Family Trust			
Transfer Volume	2,700 acre-feet	(Apr-Jun)		
	4,394 acre-feet	(Jul-Sep)		
	7,094 acre-feet/year	**Maximum**	*ok*	

Table H-48. Te Velde Revocable Family Trust Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Yolo	0	10	0	0	10
Total	0	10	0	0	10

Table H-49. Te Velde Revocable Family Trust GHG Emissions

	Well Location			**Power Rating**	**Pump Rate**		**Transfer Volume**	**Operations**		**Fuel Consumption**	**Emission Factors**						**Annual Emissions (metric tons per year)**			
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**(gpm)**	**(% of Total)**	**(AF/year)**	**(hours/year)**	**(kWh/yr)**	**(gal/yr) - diesel (MMBtu/yr) - propane or NG**	**CO2**	**Units**	**CH4**	**Units**	**N2O**	**Units**	**CO2**	**CH4**	**N2O**	**CO2e**
GW1	Yolo	Electric	Unknown	125	4,500	14%	1,013	1,223	114,005	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.09	0.00	0.00	5.19
GW3	Yolo	Electric	Unknown	125	3,000	10%	676	1,223	114,005	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.09	0.00	0.00	5.19
GW4	Yolo	Electric	Unknown	125	3,500	11%	788	1,223	114,005	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.09	0.00	0.00	5.19
GW 5	Yolo	Electric	Unknown	125	3,000	10%	676	1,223	114,005	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.09	0.00	0.00	5.19
GW7	Yolo	Electric	Unknown	125	3,000	10%	676	1,223	114,005	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.09	0.00	0.00	5.19
GW 8	Yolo	Electric	Unknown	125	3,000	10%	676	1,223	114,005	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.09	0.00	0.00	5.19
GW9	Yolo	Electric	Unknown	100	3,000	10%	676	1,223	91,204	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	4.07	0.00	0.00	4.15
GW10	Yolo	Electric	Unknown	125	3,000	10%	676	1,223	114,005	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.09	0.00	0.00	5.19
GW11	Yolo	Electric	Unknown	150	2,500	8%	563	1,223	136,806	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	6.11	0.00	0.00	6.23
Possible Future well	Yolo	Electric	Unknown	125	3,000	10%	676	1,223	114,005	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.09	0.00	0.00	5.19
				Total	**31,500**	**100%**	**7,094**	**12,231**	**1,140,046**								**50.92**	**0.02**	**0.00**	**51.90**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors
1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Tule Basin Farms			
Transfer Volume	3,000	acre-feet	(Apr-Jun)	
	3,000	acre-feet	(Jul-Sep)	
	6,000	**acre-feet/year**	**Maximum**	*ok*

Table H-50. Tule Basin Farms Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	0	3	1	0	4
Total	0	3	1	0	4

Table H-51. Tule Basin Farms GHG Emissions

	Well Location			Power Rating	Pump Rate		Transfer Volume	Operations		Fuel Consumption	Emission Factors						Annual Emissions (metric tons per year)			
Well ID	**(County)**	**Fuel Type**	**Model Year**	**(hp)**	**(gpm)**	**(% of Total)**	**(AF/year)**	**(hours/year)**	**(kWh/yr)**	**(gal/yr) - diesel (MMBtu/yr) - propane or NG**	**CO2**	**Units**	**CH4**	**Units**	**N2O**	**Units**	**CO2**	**CH4**	**N2O**	**CO2e**
TBF Well 1	Sutter	Electric	Unknown	125	2,500	19%	1,145	2,487	231,858	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	10.36	0.00	0.00	10.56
TBF Well 2	Sutter	Natural Gas	Unknown	190	3,500	27%	1,603	2,487	n/a	1,203	53.06	kg/MMBtu	0.0010	kg/MMBtu	0.0001	kg/MMBtu	63.81	0.00	0.00	63.87
TBF Well 3	Sutter	Electric	Unknown	125	3,600	27%	1,649	2,487	231,858	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	10.36	0.00	0.00	10.56
TBF Well 10	Sutter	Electric	Unknown	125	3,500	27%	1,603	2,487	231,858	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	10.36	0.00	0.00	10.56
				Total	**13,100**	**100%**	**6,000**	**9,950**	**695,574**								**94.87**	**0.01**	**0.00**	**95.54**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

<u>Conversion Factors</u>

1 acre-foot = 325,851 gallons

<u>Global Warming Potential (AR6)</u>

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

<u>Diesel Engine Fuel Consumption</u>

0.4	lb/hp-hr	*(Based on spec sheet for John Deere 6068H, 6.8L Engine, 173 HP)*
0.855	g/mL	*(Based on MSDS for Hess Diesel Fuel All Types)*
7.13	lb/gal	

Groundwater Substitution Greenhouse Gas Emissions (Unmitigated)

Agency	Windswept Land and Livestock			
Transfer Volume	775	acre-feet	(Apr-Jun)	
	1,000	acre-feet	(Jul-Sep)	
	1,775	**acre-feet/year**	**Maximum**	*ok*

Table H-52. Windswept Land and Livestock Summary of Engines by Fuel Type and Location

County	Diesel	Electric	Natural Gas	Propane	Total
Sutter	0	4	0	0	4
Total	0	4	0	0	4

Table H-53. Windswept Land and Livestock GHG Emissions

Well ID	Well Location (County)	Fuel Type	Model Year	Power Rating (hp)	Pump Rate (gpm)	Pump Rate (% of Total)	Transfer Volume (AF/year)	Operations (hours/year)	Operations (kWh/yr)	Fuel Consumption (gal/yr) - diesel (MMBtu/yr) - propane or NG	Emission Factors CO2	Units	CH4	Units	N2O	Units	Annual Emissions (metric tons per year) CO2	CH4	N2O	CO2e
NCW-1	Sutter	Electric	2013	150	3,200	26%	458	777	86,956	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.88	0.00	0.00	3.96
NCW-2	Sutter	Electric	Unknown	200	3,500	28%	501	777	115,941	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.18	0.00	0.00	5.28
NCW-3	Sutter	Electric	Unknown	150	2,500	20%	358	777	86,956	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	3.88	0.00	0.00	3.96
NCW-4	Sutter	Electric	Unknown	200	3,200	26%	458	777	115,941	n/a	98.47	lbs/MWh	0.0300	lbs/MWh	0.0040	lbs/MWh	5.18	0.00	0.00	5.28
				Total	**12,400**	**100%**	**1,775**	**3,110**	**405,795**								**18.12**	**0.01**	**0.00**	**18.48**

Key:
AF = acre-feet
CH4 = methane
CO2 = carbon dioxide
gal/yr = gallons per year
GHG = greenhouse gas
gpm = gallons per minute
hp = horsepower
kW/yr = kilowatt hours per year
MTCO2e = metric tons carbon dioxide equivalent
N2O = nitrous oxide

Conversion Factors
1 acre-foot = 325,851 gallons

Global Warming Potential (AR6)

CO2	1
CH4	27
N2O	273

Source: The Climate Registry. 2024. 2024 Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

GHG Emission Factors

Table H-54. GHG Emission Factors for Electric Pumps

County	Utility Company	Emission Factors		
		CO2 (lbs/MWh)	CH4 (lbs/MWh)	N2O (lbs/MWh)
Colusa	Pacific Gas & Electric	98.47	0.030	0.004
Glenn	Pacific Gas & Electric	98.47	0.030	0.004
Sacramento	Sacramento Municipal Utility District	522.27	0.030	0.004
Shasta	Pacific Gas & Electric	98.47	0.030	0.004
Sutter	Pacific Gas & Electric	98.47	0.030	0.004
Yolo	Pacific Gas & Electric	98.47	0.030	0.004
Yuba	Pacific Gas & Electric	98.47	0.030	0.004

Table H-55. Utility-Specific CO2 Emission Factors

Emission Rates			
Utility	Factor Type	Emission Factor (lbs CO_2/MWh)	Emission Rate Year
Sacramento Municipal Utility District	Retail Power	522.27	2021
	Self-Consumed Power	503.30	2021
	Special Power	0.00	2021
	Wholesale Power	534.47	2021
Pacific Gas & Electric	System average	98.47	2021

Source:

Source: The Climate Registry. 2024. 2024 Climate Registry Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Table H-56. Diesel Emission Factors

Pollutant	Emission Factor	Unit	Emission Factor Description
CO2	10.21	kg/gallon	Table 1.1, Distillate Fuel Oil No. 2
CH4	3.00E-03	kg/MMBtu	Table 1.9, Petroleum Products, Industrial
N2O	6.00E-04	kg/MMBtu	Table 1.9, Petroleum Products, Industrial
Heat Content	0.138	MMBtu/gallon	Table 1.1, Distillate Fuel Oil No. 2

Source: The Climate Registry. 2024. 2024 Climate Registry Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Table H-57. Natural Gas Emission Factors

Pollutant	Emission Factor	Unit	Emission Factor Description
CO2	53.06	kg/MMBtu	Table 1.1, US Weighted Average
CH4	1.00E-03	kg/MMBtu	Table 1.9, Natural Gas, Industrial
N2O	1.00E-04	kg/MMBtu	Table 1.9, Natural Gas, Industrial
Heat Content	1,026	Btu/scf	Table 1.1, US Weighted Average

Source: The Climate Registry. 2024. 2024 Climate Registry Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Table H-58. Propane Emission Factors

Pollutant	Emission Factor	Unit	Emission Factor Description
CO2	62.87	kg/MMBtu	Table 1.1, Propane (liquid)
CH4	3.00E-03	kg/MMBtu	Table 1.9, Petroleum Products, Industrial
N2O	6.00E-04	kg/MMBtu	Table 1.9, Petroleum Products, Industrial
Heat Content	0.091	MMBtu/gal	Table 1.1, Propane (liquid)

Source: The Climate Registry. 2024. 2024 Climate Registry Default Emission Factors. Accessed July 24, 2024, https://theclimateregistry.org/wp-content/uploads/2024/03/2024-Emission-Factor-Document_FINAL.pdf.

Table H-59. Subregion Output Emission Rates (eGRID2022)

Data Year	eGRID subregion acronym	eGRID subregion name	eGRID subregion annual CO2 total output emission rate (lb/MWh)	eGRID subregion annual CH4 total output emission rate (lb/MWh)	eGRID subregion annual N2O total output emission rate (lb/MWh)	eGRID subregion annual CO2 equivalent total output emission rate (lb/MWh)	eGRID subregion annual CO2 non-baseload output emission rate (lb/MWh)	eGRID subregion annual CH4 non-baseload output emission rate (lb/MWh)	eGRID subregion annual N2O non-baseload output emission rate (lb/MWh)	eGRID subregion annual CO2e non-baseload output emission rate (lb/MWh)
YEAR	SUBRGN	SRNAME	SRCO2RTA	SRCH4RTA	SRN2ORTA	SRC2ERTA	SRNBCO2	SRNBCH4	SRNBN2O	SRNBC2E
2022	AKGD	ASCC Alaska Grid	1,052.114	0.088	0.012	1,057.841	1,224.498	0.123	0.017	1,232.508
2022	AKMS	ASCC Miscellaneous	495.772	0.023	0.004	497.557	1,587.893	0.069	0.012	1,593.296
2022	AZNM	WECC Southwest	776.036	0.051	0.007	779.382	1,205.221	0.065	0.009	1,209.480
2022	CAMX	WECC California	497.443	0.030	0.004	499.278	1,054.982	0.049	0.006	1,058.038
2022	ERCT	ERCOT All	771.083	0.049	0.007	774.298	1,194.876	0.067	0.009	1,199.153
2022	FRCC	FRCC All	813.846	0.048	0.006	816.893	1,044.441	0.056	0.007	1,048.048
2022	HIMS	HICC Miscellaneous	1,155.486	0.124	0.019	1,163.065	1,619.210	0.157	0.025	1,629.568
2022	HIOA	HICC Oahu	1,575.407	0.163	0.025	1,586.947	1,810.290	0.177	0.028	1,822.919
2022	MROE	MRO East	1,479.621	0.133	0.019	1,488.688	1,672.860	0.147	0.021	1,682.837
2022	MROW	MRO West	936.485	0.102	0.015	943.418	1,794.666	0.183	0.026	1,807.049
2022	NEWE	NPCC New England	536.428	0.063	0.008	540.480	923.348	0.073	0.010	928.058
2022	NWPP	WECC Northwest	602.088	0.056	0.008	605.872	1,515.676	0.134	0.019	1,524.699
2022	NYCW	NPCC NYC/Westchester	885.233	0.023	0.003	886.580	971.780	0.021	0.002	972.967
2022	NYLI	NPCC Long Island	1,200.708	0.135	0.018	1,209.311	1,316.653	0.039	0.005	1,319.074
2022	NYUP	NPCC Upstate NY	274.559	0.015	0.002	275.389	920.115	0.043	0.005	922.457
2022	PRMS	Puerto Rico Miscellaneous	1,593.481	0.087	0.014	1,599.922	1,670.902	0.074	0.013	1,676.699
2022	RFCE	RFC East	657.386	0.045	0.006	660.311	1,278.704	0.097	0.013	1,285.111
2022	RFCM	RFC Michigan	1,216.404	0.116	0.016	1,224.187	1,597.326	0.149	0.021	1,607.386
2022	RFCW	RFC West	1,000.053	0.087	0.012	1,005.904	1,843.591	0.178	0.026	1,855.683
2022	RMPA	WECC Rockies	1,124.887	0.101	0.014	1,131.733	1,676.390	0.129	0.018	1,685.051
2022	SPNO	SPP North	952.575	0.100	0.014	959.381	1,942.976	0.198	0.029	1,956.470
2022	SPSO	SPP South	970.398	0.072	0.010	975.253	1,528.168	0.105	0.015	1,535.231
2022	SRMV	SERC Mississippi Valley	801.015	0.040	0.006	803.658	1,220.738	0.073	0.010	1,225.618
2022	SRMW	SERC Midwest	1,369.887	0.151	0.022	1,380.154	1,808.621	0.186	0.027	1,821.235
2022	SRSO	SERC South	893.290	0.064	0.009	897.659	1,354.798	0.092	0.013	1,361.062
2022	SRTV	SERC Tennessee Valley	933.067	0.082	0.012	938.625	1,671.028	0.152	0.022	1,681.327
2022	SRVC	SERC Virginia/Carolina	622.987	0.047	0.007	625.874	1,308.837	0.099	0.014	1,315.098

Source: U.S. Environmental Protection Agency. 2024. eGRID with 2022 Data. Accessed July 24, 2024, https://www.epa.gov/egrid/download-data.

Engine Size Summary

Table H-60. Engine Power Rating Summary by Fuel Type

Fuel Type	No. Engines	Avg. HP	Max HP	Min HP
Propane	37	160	450	25
Electric	354	130	400	0
Diesel	62	185	450	30
Natural Gas	1	50	50	50

Appendix I
Special-Status Wildlife with Potential to Occur in the Project Area

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Appendix I Special-Status Wildlife Species with Potential to Occur in the Project Area

Table I-1. Special-Status Wildlife Species with Potential to Occur in the Project Area

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Invertebrates						
Bay checkerspot butterfly *Euphydryas editha bayensis*	T	--	Current distribution is limited to Santa Clara and San Mateo counties	Native grasslands on serpentine outcrops. Primary larval host plant is California plantain (*Plantago erecta*). May also use purple owl's clover (*Castilleja densiflora*) and exserted paintbrush (*C. exserta*).	Adult flight period is from late February to early May.	Occurrences have been documented in the Buyer Service Area in Contra Costa, Alameda, and Santa Clara Counties. No impacts on butterflies or butterfly host plants are anticipated.
Conservancy fairy shrimp *Branchinecta conservation*	E	--	Northern two-thirds of the Central Valley. It ranges from Vina Plains of Tehama County; Sacramento NWR in Glenn County; Jepson Prairie Preserve and surrounding area east of Travis Air Force Base, Solano County; Mapes Ranch west of Modesto, Stanislaus County.	Inhabits the ephemeral water of swales and vernal pools. It is most commonly found in grass or mud bottomed swales, earth sump, or basalt flow depression pools in unplowed grasslands.	Has been collected from early December to early May.	Suitable habitat is present in the area of analysis in Stanislaus and Merced counties. No impacts on vernal pool or other habitats occupied by this species are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Crotch's bumble bee *Bombus crotchii*	--	CE	This species occurs primarily in California, including the Mediterranean region, Pacific Coast, Western Desert, Great Valley, and adjacent foothills through most of southwestern California. It has also been documented in southwest Nevada, near the California border.	Inhabits grasslands and shrublands and requires a hotter and drier environment. Prefers milkweeds, dusty maidens, lupines, medics, phacelias, sages, clarkias, poppies, and wild buckwheat for food sources.	Spring to fall	Occurrences have been documented within the Seller Service Area in Colusa and Sacramento counties and in the Buyer Service Area in Contra Costa, Alameda, Santa Clara, San Benito, and Fresco counties. No impacts on upland habitats, including grasslands or shrublands, would occur. Therefore, no impacts on this species are anticipated.
Lange's metalmark butterfly *Apodemia mormo langei*	E	--	Found in the Antioch dunes along the San Joaquin River.	All life stages are closely associated with naked-stemmed buckwheat which is the primary nectar source for adult and larval food plant. It also uses other flowering plants as nectar and food resources.	Adults emerge August to mid- or late-September	Occurrences have been documented within the area of analysis, however no impacts on sand dunes are anticipated. Therefore, no impacts on this species are anticipated.
Longhorn fairy shrimp *Branchinecta longiantenna*	E	--	Endemic to the eastern margin of the central coast mountains	Found in seasonally astatic grassland vernal pools. Inhabit small, clear-water depressions in sandstone and clear to turbid clay/grass-bottomed pools in shallow swales.	Has been collected from late winter to early spring	Occurrences have been documented within the area of analysis in Contra Costa, Alameda, Merced, and Fresno counties. No impacts to vernal pool or other habitats occupied by this species will occur, therefore, no impacts on this species are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Monarch butterfly *Danaus Plexippus*	C	--	Found throughout North America wherever suitable habitat exists. Overwinter along the coast in California.	Requires the presence of milkweed and flowering plants. Adult monarchs feed on the nectar of many flowers during breeding and migration, but they can only lay eggs on milkweed plants. Typical roosting plants include eucalyptus, Monterey pines, and Monterey cypress trees.	Spring and Summer	No overwintering occurrences have been documented within the Seller Service Area. Overwintering sites are known to occur in the Buyer Service Area in Contra Costa and Alameda counties. No impacts on known overwintering sites, milkweed or flowering plants are anticipated, therefore, no impacts on this species are anticipated.
Mount Hermon June beetle *Polyphylla barbata*	E	--	Santa Cruz Mountains Zayante Sand Hills formation.	Found in patches of sandy soils.	Year round	No occurrence records have been documented in the area of analysis. No impacts on suitable habitat are anticipated.
Smith's blue butterfly *Euphilotes enoptes smithi*	E	--	Occurs in fragmented populations along the central coast of California from Monterey Bay south to Punta Gorda.	Primarily associated with sand dune habitat. Requires the presence of host plants: the seacliff buckwheat and coast buckwheat.	Fall with a August or September emergence.	One occurrence documented in the Buyer Service Area in Santa Clara County. No impacts to butterflies or host plants is anticipated.
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	T, X	--	Central Valley and surrounding foothills below 3,000 feet elevation.	Dependent on elderberry shrubs (host plant) as a food source. Potential habitat is shrubs with stems 1 inch in diameter within Central Valley.	Year round for host plant and exit holes; March- June for adults	Occurs widely in the Seller Service Area, including along the Sacramento, Feather, and American, and Stanislaus rivers. With the implementation of GW-1, no impacts on riparian vegetation including elderberry shrubs will be impacted, therefore no impacts are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Vernal pool fairy shrimp *Branchinecta lynchi*	T, X	--	Endemic to the Central Valley, Central Coast Mountains, and South Coast Mountains of California. It ranges from the Stillwater Plain in Shasta County through most of the length of the Central Valley to Paisley in Tulare County, and along the central Coast Range from northern Solano County to Pinnacles National Monument in San Benito County.	Inhabits the ephemeral water of swales and vernal pools. It is most commonly found in grassed or mud bottomed swales, earth sump, or basalt flow depression pools in unplowed grasslands.	Has been collected from early December to early May.	Occurrences have been documented in the Seller Service Areas including in Shasta, Placer, Sacramento, and Merced counties. Occurs in the Buyer Service Area in Contra Costa and San Benito counties. Transfers are not expected to impact vernal pools or natural wetlands. Therefore, no impacts on the species are anticipated.
Vernal pool tadpole shrimp *Lepidurus packardi*	E, X	--	Endemic to the Central Valley of California, with the majority of the populations occurring in the Sacramento Valley. This species has also been reported from the Sacramento River Delta to the east side of San Francisco Bay, and from a few scattered localities in the San Joaquin Valley from San Joaquin County to Madera County	Found in a variety of natural and artificial seasonally ponded habitat types including vernal pools, swales, ephemeral drainages, stock ponds, ditches, pits, and ruts caused by vehicular activities.	Has been collected from early December to early May.	Occurrences have been documented in the area of analysis including in Shasta, Glenn, Colusa, Sutter, Placer, Sacramento, and Contra Costa counties. Transfers are not expected to impact vernal pools or natural wetlands. Therefore, no impacts on the species are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Western bumble bee *Bombus occidentalis*	--	CE	Can be found along Western United States from Alaska to New Mexico/Arizona and as far east as South Dakota.	Wet/moist meadows with abundant floral resources, roadside areas, and other areas containing forage species preferred by bumble bees.	Late winter to Fall	Occurrences have been documented within the Seller Service Area in San Joaquin County and in the Buyer Service Area in Contra Costa and Santa Clara counties. Suitable habitat could occur in other portions of the area of analysis. Transfers will not impact suitable habitat, therefore, no impacts on this species are anticipated.
Zayante band-winged grasshopper *Trimerotropis infantilis*	E	--	Found in Santa Cruz County within the Zayante sandhill.	Found only in the Zayante sandhills areas among chaparral or ponderosa pine stands. Often occurs with Santa Cruz wallflower and other endemics.	May through October	One occurrence documented in the Buyer Service Area in Santa Clara County. No impacts to the grasshopper or habitat are anticipated.
Amphibians						
California giant salamander *Dicamptodon ensatus*	--	SSC	Southern Santa Cruz County to Southern Mendocino County.	Primarily found in humid coastal forest including douglas fir, redwood, and montane. Occur in or near streams; aquatic adults and larvae are found in cool rocky streams.	Year round	Suitable habitat is within the Buyer Service Area in western Santa Clara County in the Santa Cruz Mountains.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
California red-legged frog *Rana draytonii*	T, X	SSC	Occurs along the Coast Range from southern Mendocino County to Santa Barbara County, from Santa Barbara County to Los Angeles County, and in isolated populations in the Sierra Nevada foothills, Riverside County, and San Diego County. It is no longer found in the Central Valley, but is still common in the San Francisco Bay Area and along the Central Coast.	Found mostly near ponds in humid forests, woodlands, grasslands, coastal scrub, and streamside with plant cover. Frequently found in woods adjacent to streams.	Year round	Within the Seller Service Area suitable habitat is limited primarily to Alameda County where no groundwater substitution will occur. This species occurs more widely within the Buyer Service Area, primarily in Contra Costa, Santa Clara, and portions of San Benito County. No impacts on this species are anticipated.
California tiger salamander Central California DPS *Ambystoma californiense*	T, X	T, WL	Found in annual grassland habitat, grassy understories of valley-foothill hardwood habitats, and uncommonly along stream courses in valley- foothill riparian habitats. Occurs from near Petaluma, Sonoma Co., east through the Central Valley to Yolo and Sacramento Counties and south to Tulare Co., and from the vicinity of San Francisco Bay south to Santa Barbara County.	Lives in vacant or mammal-occupied burrows, occasionally other underground retreats, throughout most of the year, in grassland, savanna, or open woodland habitats. Lays eggs on submerged stems and leaves, usually in shallow ephemeral or semi-permanent pools and ponds that fill during heavy winter rains, sometimes in permanent ponds; breeding takes place in fish free pools and ponds.	Migrates up to about two km between terrestrial habitat and breeding pond. Migrations may occur from November through April.	Within the Seller Service Area suitable habitat is limited primarily to Alameda County where no groundwater substitution will occur. Occurs more widely within the Buyer Service Area, primarily in Contra Costa, Santa Clara and portions of San Benito County. No impacts on this species or suitable habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Coast range newt *Taricha torosa*	--	SSC	Central Mendocino south to the coast ranges of San Diego County. Species of Special Concern designation extends only to those populations from Monterey County south to San Diego County and excludes the southern Sierra Nevada populations.	Northern populations occur in mesic forests in hilly or mountainous terrain while southern populations occur in direr habitats such as oak, chapparal, and grassland with permanent streams.	Year round	There is one occurrence within the Buyer Service Area in western San Benito County. No impacts on this species or its habitats are anticipated.
Foothill yellow-legged frog North Sierra DPS *Rana boylii* pop. 3	--	E	North Sierra DPS includes Yuba, Sierra, Nevada, and Placer Counties	This species inhabits partially shaded, rocky streams at low to moderate elevations, in areas of chaparral, open woodland, and forest.	Year round	There are occurrences documented within the Middle and South Yuba, Canyon Creek, Bear River, Middle and North Fork American, and Rubicon River. Water transfers affecting these streams would be conducted according to existing water release requirements, therefore no impact on the species is anticipated.
Foothill yellow-legged frog - South Sierra DPS *Rana boylii* pop. 5	E	E	Sierra Nevada Mountains south of the American river to Kern County	This species inhabits partially shaded, rocky streams at low to moderate elevations, in areas of chaparral, open woodland, and forest.	Year round	There are occurrences of this DPS documented within the South Fork American River and suitable habitat is present in the Silver Fork American River. Water transfers affecting these streams would be conducted according to existing water release requirements, therefore no impact on the species is anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Foothill yellow-legged frog – Feather River DPS *Rana boylii* pop. 2	T	T	This species is known from the Pacific drainages from Oregon to the upper San Gabriel River, Los Angeles County, California, including the coast ranges and Sierra Nevada foothills in the United States.	This species inhabits partially shaded, rocky streams at low to moderate elevations, in areas of chaparral, open woodland, and forest.	Year round	There are occurrences of this DPS documented within Butte Creek. Water transfers affecting these streams would be conducted according to existing water release requirements, therefore no impact on the species is anticipated.
Foothill yellow-legged frog – West/Central Coast DPS *Rana boylii* pop. 4	T	E	San Francisco Bay Area south to Monterey, San Benito and San Luis Obispo Counties.	This species inhabits partially shaded, rocky streams at low to moderate elevations, in areas of chaparral, open woodland, and forest.	Year round	There is one extirpated and one possibly extant occurrence of this DPS documented within the Seller Service Areas. Occurs within the Buyer Service Area in Contra Costa County, Santa Clara and San Benito counties. With the implementation of GW-1, no impacts on the species are anticipated.
Red-bellied newt *Taricha rivularis*	--	SSC	Occurs along the coast from southern Humbolt County to Sonoma County with a disjunct population in Santa Clara County.	Coastal redwood and douglas fir forests. Aquatic habitat includes moderate to fast-flowing mountain streams with rocky bottoms.	Year round	A disjunct and isolated population in Santa Clara County is present within the Buyer Service Area within the upper Stevens Creek watershed. No impacts on this species or its habitats are anticipated.
Sierra Nevada yellow-legged frog *Rana sierrae*	E	T, WL	Their range extends from the western Sierra Nevada north of Fresno County and the eastern Sierra Nevada in Inyo and Mono counties.	Found in California's Sierra Nevada mountains in lakes, ponds, marshes, meadows and streams at elevations ranging from 4,500 to 12,000 feet (1,370 to 3,660 meters).	Year round	Suitable habitat is present along the shorelines of Silver Lake, Caples Lake, and the South Yuba River. Water transfers affecting these reservoirs and streams would be conducted according to existing water release requirements, therefore no impact on the species is anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Southern long-toed salamander *Ambystoma macrodactyllum sigillatum*	--	SSC	Occurs at moderate to high elevation, 2,300 to about 10,000 feet from south-central Oregon in Klamath County to the Stanislaus River in California.	Breeds in lakes, ponds, ephemeral pools, and constructed wetlands. Eggs are deposited in bunches and attached to submerged logs or other wood material.	Year round	This species has been documented to occur within Silver Lake. Water transfers affecting Silver Lake and other reservoirs would be conducted according to existing water release requirements, therefore no impact on the species is anticipated.
Santa Cruz black salamander *Aneides niger*	--	SSC	Occurs in the Santa Cruz Mountains in western Santa Clara, northern Santa Cruz, and southern San Mateo Counties.	Mesic forests along the fog belt of the outer coast range. Usually moist stream side microhabitats.	Year round	Occurrences have been documented throughout western Santa Clara County. No impacts on this species or its habitats are anticipated.
Western spadefoot *Spea hammondii*	PT	SSC	This species occurs in the Central Valley and bordering foothills of California and along the Coast Ranges into northwestern Baja California, Mexico.	Lowlands to foothills, grasslands, open chaparral, pine- oak woodlands. Prefers shortgrass plains, sandy or gravelly soil. It is fossorial and breeds in temporary rain pools and slow-moving streams that do not contain bullfrogs, fish, or crayfish.	Year round. Usually in underground burrows most of year but will travel several meters on rainy nights. Movement is rarely extensive.	Occurs within the Seller Service Area in Placer and Sacramento counties and in the Buyer Service Area in San Benito and Fresno counties. Suitable habitat is present in the area of analysis. Transfers are not expected to impact suitable uplands, vernal pools or natural wetlands. Therefore, no impacts on the species are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Reptiles						
Alameda whipsnake *Masticophis lateralis euryxanthus*	T, X	T	Alameda and Contra Costa Counties.	Typically found in chaparral and scrub habitats but will also use adjacent grassland, oak savanna and woodland habitats. Mostly south-facing slopes & ravines, with rock outcrops, deep crevices or abundant rodent burrows	Year round	Occurs within the Seller Service Area and Buyer Service Area in Alameda and Contra Costa counties. No impacts on this species or on suitable habitat are anticipated.
Blunt-nosed leopard lizard *Gambelia silus*	E	E	San Joaquin Valley floor from Merced County in the north to Santa Barbara and Ventura counties in the south.	Arid, open areas that have patchy or sparse vegetation, that is characterized by low, drought-tolerant shrubs. Found below 2,600 feet (800 meters) in elevation.	Year round	Absent from the Seller Service Area. Occurs in Merced, San Benito, and Fresno counties within the Buyer Service Area No impacts on this species or on suitable habitat are anticipated.
California glossy snake *Arizona elegans occidentalis*	--	SSC	Throughout California especially in desert regions and interior coast ranges.	Habitat is normally semi-arid grasslands. in desert habitats but also occur in chaparral, sagebrush, valley-foothill hardwood, pine-juniper, and annual grass. Elevation from below sea level to 1830 m (6,000 ft)	Year round	Occurs in the Sellers and Buyer Service Areas in Contra Costa, Santa Clara, San Benito and Fresno counties. No impacts on this species or on suitable habitat are anticipated.
Coast horned lizard *Phrynosoma blainvillii*	--	SSC	Historically found along the Pacific coast from Baja California to the Bay Area and north to Shasta Reservoir.	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes	Year round	Occurs in the Seller Service Area in Nevada and Placer counties and in the Buyer Service Area in Contra, Santa Clara, and San Benito counties. No potential impacts on this species or on suitable habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Giant garter snake *Thamnophis gigas*	T	T	Sacramento and San Joaquin Valleys from Butte County in the north to Kern County in the south.	Primarily associated with marshes, sloughs, and irrigation ditches. Generally absent in larger rivers.	Year round	Occurs widely within the Seller Service Area and may occur in portions of the Buyer Service Area. Based on the streamflow analysis presented in the Biological Resources Section, Colusa Basin Drain, lower Sycamore Slough, and the Eastside and Cross Canals were identified to have exceeded the thresholds for the potential for flow-related effects and the potential for giant garter snake (GGS) presence. The analysis concludes that any potential effects to GGS would not substantially affect the species' ability to feed, breed, shelter, or migrate within the sloughs and canals.
Green sea turtle *Chelonia midas*	T	--	Found during summer months in waters off the coast of California, Oregon, and sometimes as far north as Alaska.	Shallow waters of lagoons, bays, estuaries, mangroves, eelgrass and seaweed beds with abundant aquatic vegetation, in shallow, protected water.	Year round	No impacts on this species or on suitable habitat are anticipated.
Northern California legless lizard *Anniella pulchra*	--	SSC	In suitable habitats in the Coast Ranges from the vicinity of Antioch, Contra Costa Co. south to the Mexican border	Sandy or loose loamy soils under sparse vegetation. Soil moisture is essential. They prefer soils with a high moisture content.	Year round	Occurs within the Seller Service Area in San Joaquin County. Suitable habitat is present within the Buyers Service Area in Contra Costa, Santa Clara, San Benito, Merced, and Fresno counties. No impacts on this species or on suitable habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Northwestern pond turtle *Actinemys marmorata*	PT	SSC	Ranged from extreme western Washington and British Columbia to north of the San Francisco Bay Area and in the Central Valley.	The northwestern pond turtle occupies a wide variety of wetland habitats including rivers and streams (both permanent and intermittent), lakes, ponds, reservoirs, permanent and ephemeral shallow wetlands, abandoned gravel pits, stock ponds, and sewage treatment.	Year round	Occurs in a variety of habitats within the Sellers and Buyer Service Area. Based on the streamflow analysis presented in the Biological Resources Section, Colusa Basin Drain, lower Sycamore Slough, and the Eastside and Cross Canals were identified to have exceeded the thresholds for the potential for flow-related effects and the potential for northwestern pond turtle presence. The analysis concludes that any potential effects to northwestern pond turtles would not substantially affect the species' ability to feed, breed, shelter, or migrate within the sloughs and canals.
San Francisco garter snake *Thamnophis sirtalis tetrataenia*	E	E, FP	San Mateo and northern Santa Cruz counties.	Vegetated ponds near open hillsides. aquatic habitats with shallow water edges, rodent burrows or thick mats of grass for shelter and hibernacula.	Year round	May occur in the Buyer Service Area. No impacts on this species or on suitable habitat are anticipated.
San Joaquin coachwhip *Masticophis flagellum ruddocki*	--	SSC	They are found in the deserts south of Mono Co. and the foothills of the coast ranges south of San Francisco Bay. There is an isolated population in the Sutter Buttes, Sutter Co.	Open, dry habitats with little or no tree cover. Found in valley grassland & saltbush scrub in the San Joaquin valley. Needs mammal burrows for refuge and oviposition sites.	Year round	Occurs in the Buyer Service Area in Contra Costa, San Benito, Merced, and Fresno counties. No impacts on this species or on suitable habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Southwestern pond turtle *Actinemys pallida*	PT	SSC	Distributed from the central coast range south of the San Francisco Bay area to the species' southern range boundary, including the Mojave River.	Ponds, lakes, rivers, streams, creeks, marshes, and ditches, with abundant vegetation, and rocky or muddy bottoms. Logs, rocks, cattail mats, and exposed banks are required for basking.	Year round	Occurs within the Buyer Service Area in San Benito County and potentially in Fresco County. No impacts on this species or on suitable habitat are anticipated.
Two-striped gartersnake *Thamnophis hammondii*	--	SSC	Occurs from Salinas, Monterey County, south along the coast to Baja California, Mexico.	Found in or near permanent and intermittent freshwater streams, creeks, and pools.	Year round	Occurrences have been documented in southern San Benito County. No impacts on this species or its habitats are anticipated.
Birds						
Alameda song sparrow *Melospiza melodia pusillula*	--	SSC	Restricted to the fringes of the San Francisco Bay.	Resident of salt marshes bordering south San Francisco Bay. Tidal salt marshes dominated by pickleweed. Requires exposed ground for foraging and upper marsh vegetation for nesting.	Year round	May occur in portions of the Buyer Service Area in Santa Clara and Contra Costa Counties. No impacts on suitable nesting habitat are anticipated.
American peregrine falcon *Falco peregrinus anatum*	D	D	Throughout California.	Breed in open landscapes with cliffs (or skyscrapers) for nest sites.	Year round	May occur in portions of the Buyer Service Area in Santa Clara and Contra Costa Counties. No impacts on suitable nesting habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
American goshawk *Accipiter gentilis*	--	SSC	Core breeding range includes the Coast Ranges, the Klamath and Siskiyou mountains, across the Cascades, Modoc Plateau, and Warner Mountains, and south through the Sierra Nevada	Nests in old-growth Douglas-fir and pine forests and aspen groves in the west. Generally near breaks in canopy (man-made or natural) and near riparian areas or lakes.	Year round	May occur in portions of the Seller Service Area in the Sierra Nevada. No impacts on suitable nesting habitat are anticipated.
Bald eagle *Haliaeetus leucocephalus*	D, BGEPA	E, FP	Throughout California.	Riparian areas near coasts, rivers, and lakes. Nesting generally occurs in large old- growth trees in areas with little disturbance.	Year round	Occurs in the Seller Service Area and Buyer Service Area where suitable habitat is present, including around reservoirs where releases will occur. No impacts on suitable nesting habitat are anticipated.
Bank swallow *Riparia riparia*	--	T	A neotropical migrant found primarily in riparian and other lowland habitats in California west of the deserts during the spring-fall period. Breeding population in California occurs along banks of the Sacramento and Feather rivers in the northern Central Valley.	Requires vertical banks and cliffs with fine-textured or sandy soils near streams, rivers, ponds, lakes, and the ocean for nesting. Feeds primarily over grassland, shrub land, savannah, and open riparian areas during breeding season and over grassland, brushland, wetlands, and cropland during migration.	March-mid-September	Occurs in the Seller Service Area, primarily along the Sacramento and Feather rivers, and in the Buyer Service Area along the San Benito River. No impacts on suitable nesting habitat are anticipated.
Black skimmer *Rynchops niger*	--	SSC	Coastal areas in California.	Live entirely in coastal areas, usually around sandy beach and islands. Use open sandy areas, gravel or shell bars with sparse vegetation.	March-mid-September	One occurrence in Buyer Service Area in Santa Clara County. No impacts on suitable nesting habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Black swift *Cypseloides niger*	--	SSC	Occur in wide range from British Columbia to Mexico.	Breed on cliff ledges behind or near waterfalls and sea caves.	March-mid-September	One occurrence in Buyer Service Area in Santa Clara County. No impacts on suitable nesting habitat are anticipated.
Burrowing owl *Athene cunicularia*	BCC	SSC	Central and southern coastal habitats, Central Valley, Great Basin, and deserts.	Open annual grasslands or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation. Dependent upon burrowing mammals (especially California ground squirrel) for burrows.	Year round	Occurs widely throughout the Seller and Buyer Service Area where suitable habitat is present. No impacts on suitable nesting habitat are anticipated.
Cackling (=Aleutian Canada) goose *Branta hutchinsii leucopareia*	D	WL	Northern San Joaquin Valley, the delta of central California, and the Humboldt Bay area	Lakes, marshes and fields, often foraging in open prairies and farm fields	Wintering in California from mid-October to mid-April	Occurs in Sutter and Colusa counties within the Seller Service Area and in Contra Costa County within the Buyer Service Area. No impacts on suitable nesting habitat are anticipated.
California black rail *Laterallus jamaicensis coturniculus*	--	T, FP	Pacific coast of California, along the lower Colorado River. During breeding season, the species can be found north of San Francisco	Tidal marshes and freshwater marshes, inhabit the drier portions of wetlands with vegetation dominated by fine-stemmed bulrush or grasses.	Year round	Occurs in the Seller Service Area in Yuba, Placer, Nevada, and El Dorado counties. No impacts on suitable nesting habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
California condor *Gymnogyps californianus*	E	E, FP	Reintroduced into the mountains of southern California north of the Los Angeles basin, in the Big Sur vicinity of the central California coast, near the Grand Canyon in Arizona, and in the mountains of Baja California	Year-round resident in vast expanses of open savannah, grasslands, and foothill chaparral in mountain ranges of moderate altitude. Deep canyons containing clefts in the rocky walls provide nesting sites. Forages up to 250 miles from roost/nest	Year round	There are no occurrences documented within the Seller Service Area. May occur in the Buyer Service Area. No impacts on suitable nesting habitat are anticipated.
California horned lark *Eremophila alpestris actia*	--	WL	Throughout California.	Found in grasslands along the coast and deserts near sea level.	Year round	Multiple occurrences have been documented in Merced County within the Buyer Service Area. No impacts to on suitable nesting habitat are anticipated.
California least tern *Sternula antilarum browni*	E	E, FP	Nests along the coast from San Francisco Bay south to northern Baja California. Migratory in California. Breeding colonies in Southern California near marine and estuarine shores. In SF Bay found near salt ponds and estuarine shores.	Breeds on bare or sparsely vegetated, flat substrates, sand beaches, alkali flats, landfills or paved areas. Feeds in shallow, estuarine waters.	Late April in southern California to mid-May in northern California. Winters south of California. Absent from mid-October to late April.	Occurrences have been documented in Contra Costa County and Santa Clara County within the Buyer Service Area. No impacts on suitable nesting habitat are anticipated.
California Ridgway's rail *Rallus obsoletus obsoletus*	E	E, FP	Common locally around San Francisco, Monterey, and Morro Bay.	Found in salt-water and brackish marshes traversed by tidal sloughs. The bird is associated with abundant growths of pickle weed, but feeds on mud- bottomed sloughs.	Year round. Non-migratory in coastal wetlands. Juveniles may disperse to freshwater wetlands in late summer and autumn.	Occurrences have been documented in the Buyer Service Areas in Contra Costa and Santa Clara counties. No impacts on suitable nesting habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
California spotted owl *Strix occidentalis occidentalis*	PT/PE, BCC	SSC	Occurs throughout the Sierra Nevada Mountain range in California and Nevada; in Southern and Coastal California in the Costal, Transverse, and Peninsular mountain ranges. Occurs mostly on lands managed by U.S Forest Service and National Park Service.	Inhabit older forests that contain structural characteristics necessary for nesting, roosting, and foraging. On the central coast and southern California, they are found in riparian /hardwood forests and woodlands, live oak/big cone fir forests, and redwood/California laurel forests.	Year round	Suitable habitat may occur within portions of the Seller Service Area. No impacts on suitable nesting habitat are anticipated.
Cooper's hawk *Accipiter cooperii*	--	WL	Throughout California.	Frequents landscapes where wooded areas occur in patches and groves. Often uses patchy woodlands and edges with snags for perching. Dense stands with moderate crown-depths used for nesting.	Year round	Occurrences have been documented within the Seller Service Area and Buyer Service Area. No impacts on suitable nesting habitat are anticipated.
Double-crested cormorant *Nannopterum auritum*	--	WL	Throughout California	Require aquatic bodies large enough to support a mostly fish diet.	Year round	Occurrences have been documented in the Buyer Service Area in Contra Costa County. No impacts on suitable nesting habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Ferruginous hawk *Buteo regalis*	--	WL	Winter resident and migrant at lower elevations and open grasslands in Modoc Plateau, Central Valley, and Coast ranges. Common winter resident of grassland and agriculture areas in southwestern California. Casual in northeast in summer.	Found in open grasslands, sagebrush flats, desert scrub, low foothills and fringes of pinyon- juniper habitats.	Migratory. Present in CA from Sept. to mid-April, non-breeding.	Occurrences have been documented in Sacramento County within the Seller Service Area and within Contra Costa and Merced counties in the Buyer Service Area. No impacts on suitable foraging habitat are anticipated.
Golden eagle *Aquila chrysaetos*	BGEPA	FP, WL	Throughout California.	Riparian areas near coasts, rivers, and lakes. Nesting generally occurs in large old- growth trees in areas with little disturbance.	Year round	Occurrences have been documented within the Seller Service Area in Sacramento and El Dorado counties, and within the Buyer Service Area in Contra Costa, Santa Clara, San Benito, and Merced counties. No impacts on suitable nesting habitat are anticipated.
Grasshopper sparrow *Ammodramus savannarum*	--	SSC	Throughout California's coastline and central valley	Breeds in open grasslands, prairies, hayfields, and pastures, typically with some bare ground.	Year round	Documented to occur in the Seller Service Area and suitable habitat may occur in other portions of the area of analysis. The species' habitat (i.e. dense grassland, lowland plain areas) would not be affected by Transfers. No impacts on suitable nesting habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Greater sandhill crane *Antigone canadensis tabida*	--	T, FP	Breeds only in Siskiyou, Modoc and Lassen counties and in Sierra Valley, Plumas and Sierra counties. Winters primarily in the Sacramento and San Joaquin valleys from Tehama south to Kings Counties.	In summer, this race occurs in and near wet meadow, shallow lacustrine, and fresh emergent wetland habitats. Frequents annual and perennial grassland habitats, moist croplands with rice or corn stubble, and open, emergent wetlands. It prefers relatively treeless plains.	Migration southward is September-October and northward is March- April.	Occurrences have been recorded in Butte and Sutter Counties and suitable habitat is present in portions of the Seller Service Area. With the implementation of GW-1, no impacts to wetland habitats or suitable nesting habitats are anticipated.
Le Conte's thrasher *Toxostoma lecontei*	--	SSC	Southern Central Valley and southeastern California.	Occur in low, sandy, open deserts. Usually in saltbush, shadscale, cholla cactus, creosote, yucca, mesquite, and ocotillo are common plants.	Year round	One occurrence has been documented in the Buyer Service Area in Fresno County. No impacts on suitable nesting habitat are anticipated.
Least Bell's vireo *Vireo bellii pusillus*	E	E	California to northern Baja.	Inhabits low, dense riparian growth along water or along dry parts of intermittent streams. Typically associated with willow, cottonwood, baccharis, wild blackberry, or mesquite in desert localities.	March-August	Known to occur in Yolo County in or near the Seller Service Area, and in the Buyer Service Area in Santa Clara and San Benito counties. Suitable habitat may occur in other locations within the area of analysis. With the implementation of GW-1, transfers are not expected to impact any suitable willow or dense riparian habitat, therefore no impacts on the species are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Loggerhead shrike *Lanius ludovicianus*	--	SSC	Throughout California.	Common resident and winter visitor in lowlands and foothills throughout California. Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches.	Year round	Occurrences have been documented in the Seller and Buyer Service Area. Suitable habitat may be present in other portions of the area of analysis. No impacts are anticipated on breeding or foraging habitats.
Long-eared owl *Asio otus*	BCC	SSC	Occurs within southern deserts and densely forested areas throughout California. Extirpated from the central valley and southern coast.	Inhabits a wide variety of habitats, including forest with extensive meadows, groves of conifers or deciduous trees in prairie country, streamside groves in desert. Generally avoids unbroken forest.	Year round	There is one occurrence documented in the Seller Service Area and others documented in the Buyer Service Area. Transfers are not expected to impact any suitable forest or woodland habitats.
Merlin *Falco columbarius*	--	WL	Throughout California	Open to semi-open areas, usually near forested opening near rivers, lakes, or bogs.	Winter/non-breeding	Two occurrences have been documented in San Benito and Fresno counties within the Buyer Service Area. No impacts on suitable nesting habitat are anticipated.
Marbled murrelet *Brachyramphus marmoratus*	T	E	Occur from the Aleutian Islands and southern Alaska to southern California	Forages in ocean, nests inland up to 60 km from coast. Mainly tree in old-growth and mature coniferous forests or in younger forests with structural elements similar to old growth.	Early April to late September	No records have been documented within the area of analysis but may occur in the Buyer Service Area. No impacts on suitable habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Mountain plover *Charadrius montanus*	BCC	SSC	Found in Central Valley from Sutter and Yuba counties southward, foothill valleys west of San Joaquin Valley, Imperial Valley, plowed fields of Los Angeles and western San Bernardino County, and central Colorado river valley. Does not breed in California.	Found in short grasslands, freshly plowed fields, newly sprouting grain fields, and sod farms. Prefers grazed areas and areas with burrowing rodents.	Winter resident Sept. - March	Occurrences have been documented in the Buyer Service Area in San Benito and Fresno counties. No impacts on suitable nesting habitat are anticipated.
Northern harrier *Circus cyaneus*	BCC	SSC	Throughout lowland California, concentrated in the Central Valley and coastal valleys.	Breeds in annual grasslands and wetlands. Prefers marshes and grasslands for foraging and nesting. Also uses agricultural fields for nesting and foraging, although nests may be destroyed by agricultural activities.	Year round, nomadic	Occurrences have been documented within the Buyer Service Area and suitable habitat is present in other portions of the area of analysis. No impacts on suitable nesting habitat are anticipated.
Northern spotted owl *Strix occidentalis caurina*	T	T	Distributed through the Cascade Range, coastal ranges, and as far south as Marin County.	Associated with forests characterized by dense canopy closer of mature and old-growth tree, abundant logs, and live trees with broken tops.	Year round	There are no occurrences documented within the area of analysis. No impacts on suitable nesting habitat are anticipated.
Osprey *Pandion haliaetus*	--	WL	Northern California from Cascade Ranges south to Lake Tahoe, and along the coast south to Marin County.	Associated strictly with large, fish-bearing waters, primarily in ponderosa pine through mixed conifer habitats.	Year round	Few documented occurrences are present within the Seller and Buyer Service Area but suitable habitat is present in other portions of the area of analysis. No impacts on suitable nesting habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Prairie falcon *Falco mexicanus*	--	WL	Found from southeastern deserts northwest throughout Central Valley and inner Coast Ranges and Sierra Nevada. Mostly absent from northern coastal fog belt. Not found in upper elevation of Sierra Nevada.	Inhabits dry, open level or hilly terrain. Breeds on cliffs, forages far afield. Annual grassland to alpine meadows, but primarily perennial grasslands, rangeland, agricultural fields and desert scrub.	Permanent resident. Northern migrants winter in California. Upslope in summer, down slope in winter.	There are occurrences documented within the Seller and Buyer Service Area. No impacts on suitable nesting habitat are anticipated.
Purple martin *Progne subis*	--	SSC	In south, found on the coast and interior mountain ranges. Absent from higher desert regions. In north, found on coast and inland to Modoc and Lassen counties. Absent from higher slopes of Sierra Nevada. Current breeding populations are known from western Santa Clara and Alameda counties, and western Placer County.	Inhabits woodlands, low elevation coniferous forest of Douglas-fir, ponderosa pine and Monterey pine. Uses open habitats during migration, including grassland, wet meadows, and fresh emergent wetlands. Requires cavities for nesting and abundant insect prey.	Summer resident throughout California	Documented occurrences are present within the Seller Service Area in Sacramento and Placer counties and in the Buyer Service Area in Santa Clara County. Suitable habitat is present in other portions of the area of analysis. No impacts on suitable nesting habitat are anticipated.
Saltmarsh common yellowthroat *Geothlypis trichas sinuosa*	BCC	SSC	Resident and summer visitor in San Francisco Bay area. Winter south along coast to San Diego County. Found in No. CA in summer months.	Found in fresh and saltwater marshes. Requires thick, continuous cover to water surface for foraging and tall grasses, tulle and willows for nesting.	Year-round in southern California and San Francisco Bay, summer resident in northern California.	There are occurrences documented within the Buyer Service Area in Contra Costa and Santa Clara counties. No impacts on suitable breeding or foraging habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Short-eared owl *Asio flammeus*	BCC	SSC	Endemic to marshes bordering the San Francisco, San Pablo Bays and Suisun Bay. Winter migrant in Central Valley, western Sierra Nevada foothills and coastline. Uncommon winter migrant in southern California. Breeding range includes: Del Norte, Humboldt, SF Bay Delta, northeastern Modoc plateau, south Lake Tahoe to Inyo County and San Joaquin valley.	Usually found in open areas with few trees, including grasslands, wet meadows, irrigated lands, saline and fresh emergent wetlands, and cleared forests. Occasionally in estuaries during breeding season. Ground nester in tall grasses, brush, ditches, and wetlands	Year round. Migrants in California from Sept. – April.	There are no occurrences documented within the Seller Service Area, but occurrences have been documented from the Buyer Service Area in Fresno County. Suitable habitat is present in other portions of the area of analysis. No impacts on suitable breeding or foraging habitat are anticipated.
San Pablo song sparrow *Melospiza melodia samuelis*	--	SSC	Restricted to the fringes of San Pablo Bay portion of the San Francisco Bay estuary.	Tidal salt marsh in San Pablo Bay.	Year round	Multiple occurrences have been documented within the area of analysis along San Pablo Bay within the Buyer Service Area. No impacts on suitable nesting habitat are anticipated.
Sharp-shinned hawk *Accipiter striatus*	--	SSC	Throughout California.	Found in forests and forest edges. Require dense forest with dense canopy.	Year round	Two occurrences have been documented within the Buyer Service Area in Fresno County. No impacts on suitable nesting habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Song sparrow *(Modesto population)* *Melospiza melodia* pop. 1	--	SSC	Distributed through the Central Valley from Butte to Stanislaus counties	Enormous variety of open habitats, including tidal marshes, arctic grasslands, desert scrub, chaparral agricultural fields, forest edges, and deciduous woodlands.	Year round. Breeds from mid-March to early August	Occurrences have been documented within the Seller and Buyer Service Areas. No impacts on suitable nesting habitat are anticipated.
Suisun song sparrow *Melospiza melodia maxillaris*	--	SSC	Endemic, restrict to Suisun Marsh from Carquinez Strait east to the confluence of the Sacramento and San Joaquin rivers near Antioch. Highest numbers near Benicia State Park and Martinez shoreline.	Resident of brackish-water marshes. Inhabits cattails, tulles, sedges, and *Salicornia*.	Year round. Non-migratory. Breeds early March to July.	Occurrences have been documented within the area of analysis in Contra Costa County. No impacts on suitable nesting habitat are anticipated.
Swainson's hawk *Buteo swainsoni*	--	T	Lower Sacramento and San Joaquin Valleys, the Klamath Basin, and Butte Valley.	Nests in mature trees, including valley oaks or cottonwoods in or near riparian habitats; forages in grasslands, irrigated pastures, and grain and row crop fields.	Spring and Summer; small wintering population in the Delta	Numerous occurrences have been documented within the Seller and Buyer Service Areas. No impacts on suitable nesting habitat are anticipated.
Tricolored blackbird *Agelaius tricolor*	BCC	T, SSC	A resident in California found throughout the Central Valley and in coastal districts from Sonoma County south.	Breeds near fresh water, preferably in emergent wetlands with tall, dense cattails or tules, but also in thickets of willow, blackberry, wild rose, tall herbs. Feeds in grassland and cropland habitats.	Year round	Numerous occurrences have been documented within the Seller and Buyer Service Areas. With the implementation of GW-1 impacts to suitable nesting habitat will be avoided. Therefore, no impacts on this species are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Western snowy plover *Charadrius nivosus nivosus*	T	SSC	Along the west coast states, with inland nesting taking place at the Salton Sea, Mono Lake, and at isolated sites on the shores of alkali lakes in northeastern California, in the Central Valley, and southeastern deserts.	Nests, feeds, and takes cover on sandy or gravelly beaches along the coast, on estuarine salt ponds, alkali lakes, and at the Salton Sea.	Migration is from July-March (some year-round populations).	There is one occurrence documented within the Seller Service Area in Yolo County. Occurrences have been documented in the Buyer Service Area in Contra Costa and Santa Clara counties. No impacts on suitable nesting habitat are anticipated.
Western yellow-billed cuckoo *Coccyzus americanus*	T, X	E	Uncommon to rare summer resident in scattered locations throughout California. Breeding population along Colorado river, Sacramento and Owen Valley, along South Fork of Kern River, Santa Ana River and Amargosa River. May be present along San Luis Rey River.	Deciduous riparian thickets or forests with dense, low-level or understory foliage, and which abut on slow-moving watercourses, backwaters, or seeps. Willow almost always a dominant component of the vegetation. In Sacramento Valley, also utilizes adjacent orchards, especially of walnut. Nests in sites with some willows, dense low-level or understory foliage, high humidity, and wooded foraging spaces.	Summer migration is from June-September.	Occurrences have been documented within the Seller Service Area in Glenn, Colusa, and Sutter counties. Occurrences have been documented in the Buyer Service Area in Santa Clara and San Benito counties. With the implementation of GW-1, no impacts on suitable nesting habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
White-faced ibis *Plegadis chihi*	--	WL	Uncommon summer resident in sections of southern California, a rare visitor in the Central Valley, and is more widespread in migration.	Feeds in fresh emergent wetlands, shallow lacustrine waters, muddy grounds of wet meadows, and irrigated or flooded pastures and croplands. Nests in dense, fresh emergent wetlands.	Present in California from April-October.	Documented to occur within the Seller Service Area in Colusa County. Suitable habitat is present in other portions of the Seller Service Area. With the implementation of GW-1, no impacts on suitable nesting habitat are anticipated.
White tailed kite *Elanus leucurus*	--	FP	Central Valley, coastal valleys, San Francisco Bay area, and low foothills of Sierra Nevada.	Savanna, open woodlands, marshes, partially cleared lands and cultivated fields, mostly in lowland situations (Tropical to Temperate zones).	Year round	Occurrences have been documented within the area of analysis in Placer, Sacramento, Contra Costa, Santa Clara, and San Benito counties. No impacts on suitable nesting habitat are anticipated.
Willow flycatcher *Empidonax traillii*	--	E	Throughout California but mainly in Sierra Nevada and Cascade ranges.	Occupy areas with willows or other shrubs near standing or running water (wet meadow and montane riparian habitats)	Spring (mid-May to early June) through fall (mid-August to early September)	There is one occurrence documented within the Seller Service Area along the Middle Yuba River, but this species does not occur in most portions of the area of analysis. No impacts on suitable nesting habitat are anticipated.
Yellow-breasted chat *Icteria virens*	--	SSC	Throughout California	Nests in dense stands of willows and other riparian habitats.	Year round	There are two occurrences documented within the Seller Service Area in Nevada County, and occurrences have been documented in the Buyer Service Area in Santa Clara and San Benito counties. Suitable habitat is present in other portions of the area of analysis. With the implementation of GW-1, no impacts on suitable nesting habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Yellow-headed blackbird *Xanthocephalus xanthocephalus*	--	SSC	Breeds east of Cascade Range and Sierra Nevada, Imperial and Colorado River valley, in Central Valley and select locations in coast range west of Central Valley. Common in winter in Imperial Valley. Found as high as 2000m (6600ft) in San Bernardino Mountains.	Associated with freshwater emergent wetlands along lakes and ponds. Nesting timed with maximum emergence of aquatic insects. Feeds on cultivated grains, in emergent vegetation, and in nearby grasslands and croplands.	Year round, in parts of Central Valley. Summer range in eastern California, and parts of Central Valley. Present April through early May, and in September.	Occurrences have been documented within or near the Seller Service Area in Sacramento and San Joaquin counties and within the Buyer Service Area in Fresno and Kings counties. No impacts on suitable nesting habitat are anticipated.
Yellow rail *Coturnicops noveboracensis*	BCC	SSC	Historically in Northeastern California for breeding. Coastal areas during non-breeding.	Sedge marshes and meadows with moist soil or shallow standing water and densely vegetated montane sedge (*Carex* sp. and *Juncus* sp.) between 4150–5000 ft in elevation.	Breeding: May – September Non-breeding: October - April	Occurrences have been documented within the area of analysis in Contra Costa and Santa Clara counties. No impacts on suitable nesting habitat are anticipated.
Yellow warbler *Setophaga petechia*	--	SSC	Throughout California	Nests in riparian habitat with mature overstory of cottonwood and sycamore, a midstory of box elder and willow and a dense understory of vines, blackberry, and forbs.	Year round	There is one occurrence documented within the Seller Service Area in Nevada County and one occurrence from the Buyer Service Area in Alameda County. No impacts on suitable nesting habitat are anticipated.
Yellow-breasted chat *Icteria virens*	--	SSC	Throughout California	Breeds in areas of dense shrubbery, including abandoned farm fields, clearcuts, powerline corridors, fencerows, forest edges and openings, swamps, and edges of streams and ponds. Its habitat often includes blackberry bushes.	Breeds from late April through early August	Two occurrences in Santa Clara and San Benito Counties. No impacts on suitable nesting habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Yellow-headed blackbird *Xanthocephalus xanthocephalus*	--	SSC	Western Central Valley in California	Breeds in wetlands in prairies, mountain meadows, quaking aspen parklands, and shallow areas of marshes, ponds, and rivers.	Breeds from mid-April to late July	Three occurrences in Contra Costa, Fresno, and King counties. No impacts on suitable nesting habitat are anticipated.
Mammals						
Buena Vista Lake Ornate Shrew *Sorex ornatus relictus*	E	SSC	Found only in the Tulare Basin of the San Joaquin Valley	Wet areas with dense groundcover and moist soil that support diverse prey populations of insects, earthworms and other small invertebrates.	Year round	May occur in the Buyer Service Area. No impacts on suitable habitat are anticipated.
Alameda Island mole *Scapanus latimanus parvus*	--	SSC	Alameda Island, Alameda County	Inhabits underground tunnel complexes.	Year round	May occur in the Buyer Service Area. No impacts on suitable habitat are anticipated.
American badger *Taxidea taxus*	--	SSC	Throughout California.	Found in dry, open stages of most shrub, forest, and herbaceous habitats with friable soils.	Year round. Permanent resident except in North Coast area.	Occurrences have been documented in the area of analysis in Colusa, Sacramento, Contra Costa, Santa Clara, San Benito, Merced, Fresno, and Kings counties. Suitable habitat is also present in other portions of the area of analysis. Suitable habitats are not expected to be impacted, therefore no impacts on the species are anticipated.
Big free-tailed bat *Nyctinomops macrotis*	--	SSC	Species' range does not include northern California. Observations in northern California are considered vagrants or extralimital records.	Roosts in desert and arid grassland areas where rocky out-crops, canyons, or cliffs provide ideal roosts. Occasionally in buildings.	Fall and winter	Occurrences have been documented in the area of analysis in Contra Costa County. Transfers would not impact suitable roost habitat, therefore no impacts on the species are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Fisher *Pekania pennanti*	--	SSC	Sierra Nevada, Cascades, and Klamath Mountain ranges and sometimes in the Coast Ranges.	Occurs in intermediate to large-tree stages of coniferous forests and deciduous-riparian habitats with high canopy closure.	Year round	There is one occurrence documented with the Seller Service Area in Sierra County. Suitable habitat is present in other portions of the area of analysis. No impacts are anticipated on suitable habitat (i.e. mixed conifer habitats) therefore no impacts on the species are anticipated.
Fresno kangaroo rat *Dipodomys nitraoides exilis*	E	E	Western Fresno County. on the Alkali Sink Ecological Reserve and adjacent privately owned land.	Found in alkali sink-open grassland habitats. Prefers bare alkaline clay-based soils subject to seasonal inundation with more friable soil mounds around shrubs and grasses.	Year round. Breeds largely from March - June.	There are no occurrences documented in the Seller Service Area. One occurrence has been documented from the Buyer Service Area in Kings County. Transfers would not impact suitable habitat, therefore no impacts on the species are anticipated.
Giant kangaroo rat *Dipodomys ingens*	E	E	Western edge of the San Joaquin Valley from Fresno County in the north to Kern County in the south and the Carrizo Plain and Cuyama Valley in San Luis Obispo County.	Prefers annual grassland on gentle slopes with sandy soils. Most remaining populations are on marginal habitats which include shrub communities on a variety of soil types and steeper slopes.	Year round	Occurrences have been documented in the Buyer Service Area in Merced, San Benito, and Fresno counties. No impacts on this species or on suitable habitat are anticipated.
Nelson's (=San Joaquin) antelope squirrel *Ammospermophilus nelsoni*	--	T	Northwestern Merced and Eastern San Benito Counties south to the northern border of Santa Barbara Counties.	Inhabits arid grassland, shrubland, and alkali sink habitat of the San Joaquin Valley and the adjacent foothills.	Year round	Occurrences have been documented in the Buyer Service Area in Merced, San Benito, Fresno, and King counties. No impacts on this species or on suitable habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Pallid bat *Antrozous pallidus*	--	SSC	Throughout California, except for high Sierra Nevada from Shasta to Kern counties, northwestern corner of state from Del Norte & western Siskiyou County. To northern Mendocino County.	Found in deserts, grasslands, scrublands, woodlands and forests. Most common in open, dry habitats with rocky areas for roosting.	Year round	Occurrences have been documented in the area of analysis in Contra Costa, Santa Clara, and San Benito counties. Suitable habitat is present in other portions the area of analysis. No impacts on this species or on suitable habitat are anticipated.
Ring-tailed cat *Brassariscus astutus*	--	FP	Ringtails are found in a variety of habitats centered around the semi-arid to arid climates of the west and southwest. Little information available on distribution and relative abundance among habitats	Occurs in various riparian habitats, and in brush stands of most forest and shrub habitats, at low to middle elevations. Uses hollow trees, logs, snags, cavities in talus and other rocky areas, and other recesses are for cover.	Year round (nocturnal)	There are no occurrences documented in the area of analysis but suitable habitat present. No impacts on this species or on suitable habitat are anticipated.
Riparian brush rabbit *Sylvilagus bachmani riparius*	E	E	Isolated populations on Caswell Memorial State Park on the Stanislaus River and along an overflow channel of the San Joaquin River.	Riparian thickets	Year round	There are no occurrences documented in the Seller Service Area. Suitable habitat may be present in the Buyer Service Area. No impacts on this species or on suitable habitat are anticipated.
Riparian woodrat *Neotoma fuscipes riparia*	E	SSC	Restricted to 100 hectares (250 acres) of riparian forest on the Stanislaus River in Caswell Memorial State Park.	Inhabit evergreen or live oak and other thick-leaved trees and shrubs. They are most numerous where shrub cover is dense.	Year round	There are no occurrences documented in the Seller Service Area but suitable habitat may be present in the area of analysis in San Joaquin and Stanislaus counties. No impacts on this species or on suitable habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Salt marsh harvest mouse *Reithrodontomys raviventris*	E	E, FP	Found in San Francisco Bay and its tributaries.	Found in saline emergent wetlands. Pickle weed is the primary habitat for the species. Requires higher grassland areas for flood escape.	Year round	There are occurrences documented in the area of analysis within Contra Costa, Alameda, and Santa Clara counties. No impacts on this species or on suitable habitat are anticipated.
Salt-marsh wandering shrew *Sorex vagrans halicoetes*	--	SSC	Found on the coastlines of Contra Costa, Alameda, Santa Clara and San Mateo counties.	Found in moist soils of the San Francisco Bay. Prefer high grounds where Salicornia is more prominent.	Year round	Occurrences have been documented in the Buyer Service Area in Alameda, Contra Costa, and Santa Clara Counties. No impacts on this species or on suitable habitat are anticipated.
San Francisco dusky-footed woodrat *Neotoma fuscipes annectens*	--	SSC	Santa Cruz mountain ranges in San Mateo, Santa Cruz, and Santa Clara Counties. Also in southern Marin County and Alameda and Contra Costa Counties.	Common in appropriate habitat which includes chaparral, mixed evergreen forest, and riparian areas. Their houses or lodges are usually a conspicuous feature of inhabited areas.	Year round	There are occurrences documented in the area of analysis within Contra Costa, Alameda, and Santa Clara counties. No impacts on this species or on suitable habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
San Joaquin kit fox *Vulpes macrotis mutica*	E	T	Found only in the Central Valley area of California. Kit foxes currently inhabit suitable habitat in the San Joaquin valley and in surrounding foothills of the Coast Ranges, Sierra Nevada, and Tehachapi Mountains; from southern Kern County north to Contra Costa, Alameda, and San Joaquin counties on the west; and near La Grange, Stanislaus County on the east.	Found in annual grasslands or grassy open stages of vegetation dominated by scattered brush, shrubs, and scrub. Build dens for cover. Some agricultural areas may support these foxes.	Year round (mostly nocturnal, but often active during daytime in cool weather)	Occurrences have been documented and suitable habitat is widespread throughout the Buyer Service Area. No impacts on this species or on suitable habitat are anticipated.
San Pablo vole *Microtus californicus sanpabloensis*	--	SSC	Northwest of Richmond and west of San Pablo and Giant, Contra Costa County, California	Marshes adjacent to the southeastern part of San Pablo Bay.	Year round	Occurrences have been documented in the Buyer Service Area in Contra Costa County. No impacts on this species or on suitable habitat are anticipated.
Short-nosed kangaroo rat *Dipodomys nitratoides nitratoides*	--	SSC	Along the western half of the Central Valley floor and hills from San Benito and Merced Counties to the Tehachapi Range.	Grassland and shrublands	Year round	Occurrences have been documented in the Buyer Service Area in Fresno County. No impacts on this species or on suitable habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Sierra Nevada mountain beaver *Aplodontia rufa californica*		SSC	Cascade, Klamath and Sierra Nevada ranges. Distribution is often scattered, and populations are local and uncommon in the Sierra Nevada and other interior areas.	Dense riparian-deciduous and open, brushy stages of most forest types. Typically, montane riparian habitat in the Sierra Nevada Mountain.	Year round	Suitable habitat is present in the area of analysis in Sierra, Nevada, Placer, and El Dorado counties. No impacts on this species or on suitable habitat are anticipated.
Sierra Nevada red fox – Southern Cascades DPS *Vulpes vulpes necator* pop. 1	--	T	Sierra Nevada, Southern Cascades, and Klamath Ranges at elevations above 2,500 feet.	Prefers forests interspersed with meadows or alpine fell-fields. Open areas are used for hunting. In lowlands, uses fence lines, hedgerows, woodlots, and other brushy, wooded areas for cover and reproduction. Hunts in cropland, wetland, urban habitats and other open areas.	Year round	There are no occurrences documented in the area of analysis but suitable habitat is present. No impacts on this species or on suitable habitat are anticipated.
Sierra Nevada red fox – Sierra Nevada DPS *Vulpes vulpes necator* pop. 2	E	T	Sierra Nevada, Southern Cascades, and Klamath Ranges at elevations above 2,500 feet.	Prefers forests interspersed with meadows or alpine fell-fields. Open areas are used for hunting. In lowlands, uses fence lines, hedgerows, woodlots, and other brushy, wooded areas for cover and reproduction. Hunts in cropland, wetland, urban habitats and other open areas.	Year round	Suitable habitat is present in the area of analysis in Sierra, Nevada, Placer, and El Dorado counties. No impacts on this species or on suitable habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Townsend's big-eared bat *Corynorhinus townsendii*	--	SSC	Along the California coast in lowlands and agricultural areas of Marin, Napa, Alameda, and San Mateo Counties and nearby hills. Occurs in other parts of California except alpine and subalpine habitats.	Habitat associations include coniferous forests, deserts, native prairies, riparian communities, active agricultural areas, and coastal habitat types. Populations centers occurring in areas dominated by exposed, cavity forming rock and/or historic mining districts.	Year round	There are occurrences documented in the area of analysis along the Sacramento River in Tehama County, along the Feather, South Yuba, and North Fork American rivers and in other portions of the Seller Service Area. Occurrences are also known from Contra Costa, Santa Clara, and San Benito counties. No impacts on this species or on suitable habitat are anticipated.
Tipton kangaroo rat *Dipodomys nitratoides nitratoides*	E	E	Arid areas in the San Joaquin Valley	lives in underground burrow systems, with their burrows being located in slightly elevated mounds, the berms of roads, canal embankments, railroad beds and the bases of shrubs.	Year round	May occur in and around the Buyer Service Area in Kings County. No impacts on this species or on suitable habitat are anticipated.
Western mastiff bat *Eumops perotis californicus*	--	SSC	Found in southeastern San Joaquin Valley and Coastal ranges from Monterey County southward through southern California and from the coast eastward to Colorado Desert.	Found in open, semi-arid habitats, including conifer and deciduous woodlands, coastal scrub, grasslands, and chaparral. Roost in crevices in cliff faces, high buildings, trees and tunnels	Year round	There are occurrences documented in the Seller Service Area in Stanislaus and Merced counties, and suitable habitat is present in other portions of the area of analysis including in San Benito and Fresno counties. No impacts on this species or on suitable habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Western red bat *Lasiurus frantzii*	--	SSC	Occurs from Shasta County to Mexican border, west of Sierra Nevada/Cascade crest and deserts. Winters in western lowlands and coastal regions south of SF bay. Not found in desert areas.	Found in trees 2-40ft above ground, from sea level up through mixed conifer forests. Prefers habitat edges and mosaics with trees. Feeds over a wide variety of habitats including grasslands, scrublands and croplands.	Year round	Occurrences have been documented in multiple locations throughout the area of analysis where suitable habitat is present. With the implementation of GW-1, no impacts on this species or on roosting habitat are anticipated.
Fish						
Chinook salmon – (Central Valley Spring Run ESU) *Oncorhynchus tshawytscha* pop. 11	T, X	T	The Sacramento and San Joaquin Rivers and their tributaries	Cold-water streams with adequate dissolved oxygen for spawning and rearing. Spawning habitat generally consists of clean, loose gravel, in swift, relatively shallow riffles.	Fish enter the Sacramento River between March and September, but primarily in May and June. Typically enter as sexually immature fish and hold in deep, cold, pools for up to several months before spawning. Spawning occurs between mid-August and early October, peaking in September. Fry emerge from the gravel from November-March. Juveniles may reside in freshwater for 12-16 months.	Suitable habitat is present within the Seller Service Area and upstream in some locations. Habitat would not be affected by groundwater withdrawals since streamflow in the tributaries would not be significantly affected or would remain within the range of flows as under existing conditions. Potential impacts would not occur on the mainstem Sacramento River or the Feather River where the operating requirements specified in the Biological Opinions and D1641 would be met. Impacts on this species and its habitat would be less than significant.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Chinook salmon – (Sacramento River Winter Run ESU) *Oncorhynchus tshawytscha* pop. 7	E, X	E	Distributed throughout northern California	Cold-water streams with adequate dissolved oxygen for spawning and rearing. Spawning habitat generally consists of clean, loose gravel, in swift, relatively shallow riffles.	Spawning occurs from late-April to mid-August, peaking in June and July, in the Sacramento River. Incubation occurs from late April through mid-October. Fry emerge from mid-June through mid-October and then seek streamside habitats which provide a more productive rearing habitat than the main river channels. Fry and juvenile emigration out of rearing creeks and side channels into the Sacramento River primarily occurs from July through November.	Known to spawn in the mainstem Sacramento River between Keswick Dam and the Red Bluff Diversion Dam. Lower Sacramento River is likely only used by adults as a migration corridor. Habitat would not be affected by groundwater withdrawals since streamflow would not be significantly affected or would remain within the range of flows as under existing conditions. Potential impacts would not occur on the mainstem Sacramento River where flows are conducted in compliance with the 2024 USFWS and NMFS Long-Term Operation of the Central Valley Project and State Water Project Biological Opinions. Impacts on this species and its habitat would be less than significant.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Chinook salmon – (Central Valley Fall/Late Fall Run ESU) *Oncorhynchus tshawytscha* pop. 13	-	SSC	Freshwater habitat use in the Central Valley occurs in the Sacramento River and all major tributaries and many minor ones, as well as in tributaries to the major tributaries to San Joaquin River, including the Merced River. In the Sacramento River, most spawning occurs between the Red Bluff Diversion Dam and Keswick Dam, although some fish spawn downstream of Red Bluff Diversion Dam. Small numbers also spawn in Battle Creek, Cottonwood Creek, Clear Creek, Mill Creek, as well as the Yuba and Bear rivers.	Cold-water streams with adequate dissolved oxygen for spawning and rearing. Spawning habitat generally consists of clean, loose gravel, in swift, relatively shallow riffles.	Fall Run: Upstream Migration: Jun-Dec. Spawning: late Sep to Dec. Fry remain in river one to seven months Emigration Dec-Mar. Late fall run: Upstream Migration: Oct-Apr. Spawning: Jan-Apr Fry remain in river seven to 13 months Emigration Dec-Mar.	Operating requirements for all of the mainstem rivers would meet existing flow and temperature requirements as specified by the NMFS and USFWS BOs for the Long-term Operations of the State and Federal Water Projects and State Water Board Decision 1641. Water transfers from sellers upstream of the Delta may still result in some flow changes that would overlap spatially and temporally with the distribution of fall-run Chinook salmon emigrants, but flows would continue to meet regulatory requirements protective of this species. Transfers would not overlap the Chinook upstream migration, spawning or incubation periods.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Coho Salmon – Central California Coast ESU *Oncorhynchus kisutch* pop. 11	E, X	E	Native to streams along the Pacific coast of North America. The Central California Coast evolutionarily significant unit (ESU) ranges from rivers south of Punta Gorda, California to Aptos Creek. Includes tributaries originating from the San Francisco Bay.	Populations inhabit small coastal streams, as well as large rivers. Juveniles thrive in streams that are cool with adequate oxygen and unobstructed water flow.	Year round	No occurrence records have been documented in the area of analysis. The nearest records are from San Lorenzo Creek and its tributaries in Santa Cruz County less than one mile from the Buyer Service Area. No impacts on this species or on suitable habitat are anticipated.
Delta smelt *Hypomesus transpacificus*	T, X	E	Restricted to the upper reaches of the San Francisco Bay and Sacramento-San Joaquin Delta Estuary, from San Pablo Bay upstream to Sacramento on the Sacramento River and Mossdale on the San Joaquin River.	This species can tolerate a wide range of salinity and temperatures. Shallow, fresh, or slightly brackish backwater sloughs and edge waters with good water quality and substrate are used for spawning.	Year round in Sacramento-San Joaquin Delta and Suisun Bay.	Potential impacts would not occur in the Delta as the operating requirements specified in the Biological Opinions and D1641 would be met. Minor changes in flow could occur in the Delta as a result of water transfers, but these flows would be small. Principal rearing areas during the summer and fall are in and around Suisun Bay and in the Cache Slough region. Impacts on this species and its habitat would be less than significant.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Eulachon *Thaleichthys pacificus*	T	SSC	Found from northern California to southwest Alaska.	Adults spend most of their life in the ocean and migrate into freshwater to spawn. Most spawning occurs within tidal influence through some spawning areas area located farther upstream of the river mouth. The species is susceptible to poor water quality.	Spawning between December and May	One record has been documented in the Seller Service Area. Habitat would not be affected by groundwater withdrawals since streamflow would not be significantly affected or would remain within the range of flows as under existing conditions.
Green sturgeon (Southern DPS) *Acipenser medirostris* pop. 1	T, X	SSC	Throughout northern and central California; Humboldt Bay, San Francisco Bay and Delta, Monterey Bay, Sacramento, Feather, and Yuba Rivers	Using both freshwater and saltwater habitat, this species spawns in deep pools, in large turbulent freshwater river mainstems.	Immigration from late February to June. Spawning March to July	Potential impacts would not occur on the mainstem Sacramento River or the Feather River where the operating requirements specified in the Biological Opinions and D1641 would be met. Habitat would not be affected by groundwater withdrawals since streamflow would not be significantly affected or would remain within the range of flows as under existing conditions. Impacts on this species and its habitat would be less than significant.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Hardhead *Mylopharodon conocephalus*	--	SSC	Widely distributed in streams at low to mid-elevations in the Sacramento-San Joaquin and Russian River Drainages. Range extends from the Pit River, Modoc County to the Kern River, Kern County. Also present in the Coast ranges.	Found in low to mid-elevations in undisturbed habitat of larger stream with high water quality (clear, cool). Stream-dwelling juveniles are found in pools and runs during the day feeding of drifting materials. Adults school in deepest parts of pools.	Year round	Occurrences documented in the Merced River downstream from Lake McClure and in the Stanislaus River downstream from New Melones Reservoir. Largely excluded from the valley floor reaches of the streams and rivers within the Area of Analysis due to warm summer temperatures and the abundance of introduced fish. Habitat would not be affected by groundwater withdrawals since streamflow would not be significantly affected or would remain within the range of flows as under existing conditions. Impacts on this species and its habitat would be less than significant.
Lahontan cutthroat trout *Oncorhynchus clarkia henshawi*	T	SSC	Sierra Nevada Crest in California northeast into Nevada, including a small portion of Oregon. Historic range include Lake Tahoe and the Carson, Truckee, and Walker river basins.	Cold, well-vegetated, high elevation freshwater lakes, rivers and streams	Year round. Spawning April – July.	Occurrences have been documented near the area of analysis, but no records are present in streams that would convey water transfers or in the Seller Service Area. Impacts on this species and its habitat would be less than significant.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Longfin smelt *Spirinchus thaleichthys*	E	T	Found on the Sacramento and San Joaquin Rivers in the Delta through Suisun Bay and Suisun Marsh, San Pablo Bay, San Francisco Bay, the Gulf of the Farallon's, Humboldt Bay, Eel River estuary and other local coastal areas.	Adult longfin smelt migrate into low salinity or freshwater reaches of coastal rivers and tributary streams to spawn. Encounter a wide variety of water temperatures and salinities during their life cycle but are rarely found in water temperatures greater than 71 degrees F.	Spawning occurs November to June, peaking from January – March. Fry and juveniles generally have left the Delta by May or June.	Potential impacts would not occur in the Delta as the operating requirements specified in the Biological Opinions and D1641 would be met. Minor changes in flow could occur in the Delta as a result of water transfers, but these flows would be small. Longfin smelt do not occur in the Delta during the transfer period. Impacts on this species and its habitat would be less than significant.
Monterey hitch *Lavinia exilicauda harengus*	--	SSC	Found in the Pajaro, Salinas, and San Benito River watersheds in Monterey, San Benito, and Santa Clara Counties.	Slow warm water, including lakes and quite stretches of rivers. Often found hiding among aquatic vegetation in sandy runs and pools.	Spawning May through June	Occurrences have been documented within the Buyer Service Area in Santa Clara and San Benito counties. No impacts on this species or on suitable habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Sacramento perch *Archoplites interruptus*	--	SSC	Found in Clear Lake and Alameda Creek/Calaveras Reservoir, as well as in some farm ponds and reservoirs. The species has been introduced through the state including the upper Klamath basin, upper Pit River watershed, Walker River watershed, Mono Lake watershed, and Owens River watershed, and may exist in Sonoma Reservoir in the Russian River watershed.	Inhabit warm reservoirs and ponds where summer temperatures range from 64 to 82 degrees F. Often found in clear water among beds of aquatic vegetation, but can thrive in turbid lakes absent of plants. The species is found along the bottom of inshore regions.	Spawning March through early August	Occurrences have been documented within the area of analysis in Sacramento and Contra Costa counties. Habitat would not be affected by groundwater withdrawals or water transfers since streamflow would not be significantly affected or would remain within the range of flows as under existing conditions. Impacts on this species and its habitat would be less than significant.
Sacramento splittail *Pogonichthys macrolepidotus*	--	SSC	Largely confined to the Delta, Suisun Bay, Suisun Marsh, Napa River, Petaluma River, and other parts of the San Francisco Estuary, while spawning on upstream floodplains and channel edges.	Adapted to estuarine life so that are tolerant of a wide range of salinities and temperatures. Require a rising hydrograph for upstream migration and flooded vegetation for spawning and rearing areas for their early life history stages.	Year round	Occurrences have been documented within the area of analysis in the Sacramento and Feather rivers. Operating requirements for all of the mainstem rivers would meet existing flow and temperature requirements as specified by the NMFS and USFWS BOs for the Long-term Operations of the State and Federal Water Projects and State Water Board Decision 1641. Impacts on this species and its habitat would be less than significant.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Southern coastal roach *Hesperoleucus venustus subditus*	--	SSC	Restricted to Tomales Bay in the northern San Francisco Bay and Monterey Bay in the South.	Occur mainly in small warm streams but also occur in larger colder streams with diverse conditions.	Year round	One occurrence has been documented in the Buyer Service Area in Upper Llagas Creek in Santa Clara County. No impacts on this species or on suitable habitat are anticipated.
Steelhead – Central California Coast DPS *Oncorhynchus mykiss irideus* pop. 8	T, X	SSC	Native to streams along the Pacific coast of North America. CCC DPS from the Russian River to Aptos Creek including all drainages from San Francisco and San Pablo Bays east to the confluence of Sacramento and San Joaquin Rivers.	Populations inhabit small headwater streams, large rivers, lakes, or reservoirs; often in cool clear lakes and cool swift streams with silt-free substrate. Usually requires a gravel riffle for successful spawning.	Year round	Occurs in the Buyer Service Area in Santa Clara County. No impacts on this species or on suitable habitat are anticipated.
Steelhead – South Central California Coast DPS *Oncorhynchus mykiss irideus* pop. 9	T, X	SSC	Native to streams along the Pacific coast of North America. SCCC DPS from the Pajaro River to (but not including) the Santa Maria River.	Populations inhabit small headwater streams, large rivers, lakes, or reservoirs; often in cool clear lakes and cool swift streams with silt-free substrate. Usually requires a gravel riffle for successful spawning.	Year round	Occurs in the Buyer Service Area in Santa Clara and San Benito counties. No impacts on this species or on suitable habitat are anticipated.

Common Name Scientific Name	Federal Status[1]	State Status[2]	Distribution	Habitat Association	Seasonal Occurrence	Potential for Impact
Steelhead – Central Valley DPS *Oncorhynchus mykiss irideus* pop. 11	T, X	SSC	Native to streams along the Pacific coast of North America	Populations inhabit small headwater streams, large rivers, lakes, or reservoirs; often in cool clear lakes and cool swift streams with silt-free substrate. Usually requires a gravel riffle for successful spawning.	Year round	Potential impacts would not occur on the mainstem Sacramento River or the Feather River where operations are conducted in compliance with the 2024 USFWS and NMFS Long-Term Operation of the Central Valley Project and State Water Project Biological Opinions and D1641. Based on the streamflow analysis presented in the Biological Resources Section, only East Side/Cross Canal was identified to have exceeded the threshold for the potential for flow-related effects and the potential for steelhead presence. The analysis concludes that the magnitude of reduction in streamflow would not affect steelhead migration or emigration. Any potential effects to steelhead would not substantially impact the ability of steelhead to access upstream habitat or juveniles to emigrate through the canals to the Sacramento River.
Tidewater goby *Eucyclogobius newberryi*	E	SSC	Brackish water lagoons, estuaries, and marshes along the California coast.	Found in lagoons, estuaries, marshes and freshwater tributaries with shallow, still, but not stagnant, water. These habitats are freshwater or brackish water, a varying mixture of fresh and saltwater, much of the year.	Year round	May occur in the Buyer Service Area. Impacts on this species and its habitat would be less than significant.

Sources:

US Fish and Wildlife Service IPaC list. Accessed September 2024.
US Fish and Wildlife Service Birds of Conservation Concern 2021; Migratory Bird Program
California Department of Fish and Wildlife (CDFW) September 2024 Special Animals List.
CDFW California Natural Diversity Database (CNDDB) Rarefind 5. Accessed September 2024.
National Marine Fisheries Service (NMFS) / National Oceanic and Atmospheric Administration (NOAA) West Coast Region Endangered Species List, December 2022. Accessed September 2024.
Notes:
[1]Federal Status
E = listed as endangered under the federal Endangered Species Act
T = listed as threatened under the federal Endangered Species Act
C = candidate for listing as threatened or endangered
PT = listed as proposed threatened under Federal Endangered Species Act
SC = species of concern; formerly Category 2 candidate for federal listing
BGEPA = Bald and Golden Eagle Protection Act
MNBMC = Migratory Nongame Birds of Management Concern
-- = no designations
X = critical habitat
PX = proposed critical habitat
D = delisted
[2]State Status
E = listed as endangered under the California Endangered Species Act
T = listed as threatened under the California Endangered Species Act
CE = candidate endangered under the California Endangered Species Act
FP = fully protected under the California Fish and Game Code
SSC = species of special concern
D= delisted
WL = Watch List
-- = no designations

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Appendix J
Special-Status Plants with Potential to Occur in the Project Area

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Appendix J Special-Status Plants with Potential to Occur in the Project Area

Table J-1. Special-Status Plants with Potential to Occur in the Project Area

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Plants					
Adobe sanicle *Sanicula maritima*	-/R/1B.1	Alameda, Monterey, San Francisco, and San Luis Obispo Counties	Chaparral; coastal prairie; meadows, prairie; meadows and seeps; valley and foothill grassland	February-May	One documented occurrence is present in the Buyer Service Area but is considered to be extirpated. Transfers would not impact suitable habitat for this species.
Ahart's dwarf rush *Juncus leiospermus* var. *ahartii*	-/-/1B.2	Butte, Calaveras, Placer, Sacramento, Tehama, and Yuba Counties.	Valley and foothill grassland (mesic).	March-May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Ahart's paronychia *Paronychia ahartii*	-/-/1B.1	Butte, Shasta, Tehama	Cismontane woodland, valley and foothill grassland, vernal pools	February - June	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Alkali milk-vetch *Astragalus tener* var. *tener*	-/-/1B.2	Alameda, Contra Costa, Merced, Monterey, Napa, San Benito, San Francisco, San Joaquin, Santa Clara, Solano, Sonoma, Stanislaus, and Yolo Counties	Playas, valley and foothill grassland (adobe clay), vernal pools; alkaline soils.	March-June	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Alkali-sink goldfields *Lasthenia chrysantha*	-/-/1B.1	Fresno, Kern, Kings, Madera, Merced, Sacramento, Solano, Stanislaus, and Tulare Counties	Vernal pools in Alkaline soils	February-April	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Anderson's manzanita *Arctostaphylos andersonii*	-/-/1B.2	San Mateo, Santa Clara, Santa Cruz	Broadleaf upland forest; chaparral; north coast coniferous forest	November-May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Antioch Dunes buckwheat *Eriogonum nudum* var. *psychicola*	-/-/1B.1	Sacramento Valley and San Joaquin Valley	Occurs in inland dunes.	July - October	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Antioch Dunes evening-primrose *Oenothera deltoides* ssp. *howellii*	E,X/E/1B.1	Found only in Contra Costa and Sacramento Counties.	Occurs in inland dunes.	March-September	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Arcuate bushmallow *Malacothamnus arcuatus* var. *arcuatus*	-/-/1B.2	San Mateo, Santa Clara, and Santa Cruz Counties	Chaparral; cismontane woodland	April-September	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Buyer Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Baker's navarretia *Navarretia leucocephala* ssp. *bakeri*	-/-/1B.1	Colusa, Glenn, Lake, Lassen, Mendocino, Marin, Napa, Solano, Sonoma, Sutter, Tehama, and Yolo Counties.	Cismontane woodland, meadows and seeps, vernal pools, valley and foothill grassland, lower montane coniferous forest. Vernal pools and swales, adobe or alkaline soils from 5 - 950m.	April - July	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Beaked clarkia *Clarkia rostrata*	-/-/1B.3	Calaveras, Madera, Mariposa, Merced, Stanislaus, and Tuolumne Counties.	Cismontane woodland; valley and foothill grassland	April - May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Bearded popcornflower *Plagiobothrys hystriculus*	-/-/1B.1	Napa, Solano, and Yolo Counties	Valley and foothill grassland (mesic), vernal pools (margins) often vernal swales	April-May	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Ben Lomond spineflower *Chorizanthe pungens* var. *hartwegiana*	E/-/1B.1	Known only from sandhill parklands in the Santa Cruz Mountains.	Inhabits open areas in sand hills and canopy gaps within sand chaparral.	April-July	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Ben Lomond wallflower *Erysimum teretifolium*	E/E/1B.1	Sand Hills of Santa Cruz County.	Nutrient-poor, coarse sand soil in chaparral and lower montane coniferous forest.	February-May	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Bent-flowered fiddleneck *Amsinckia lunaris*	-/-/1B.2	Alameda, Contra Costa, Colusa, Lake, Marin, Napa, San Benito, Santa Clara, Santa Cruz, San Mateo, Sonoma, and Yolo Counties.	Cismontane woodland, valley and foothill grassland from 50 - 500m.	March - June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Big tarplant *Blepharizonia plumosa*	-/-/1B.1	Alameda, Contra Costa, San Joaquin, Solano, and Stanislaus counties.	Valley and foothill grassland usually in clay soils	July - October	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Big-scale balsamroot *Balsamorhiza macrolepis*	-/-/1B.2	Alameda, Amador, Butte, Colusa, El Dorado, Lake, Mariposa, Napa Placer, Santa Clara, Solano, Sonoma, Tehama, and Tuolumne Counties.	Chaparral, cismontane woodland, and Valley and foothill grasslands.	March - June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Boggs Lake hedge-hyssop *Gratiola heterosepala*	-/E/1B.2	Dispersed throughout the Sacramento and Central Valley, and also occurs in Oregon.	Marsh's, swamps, and vernal pools (clay).	April-August	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species. No marsh or vernal pool habitat would be affected by the proposed Transfers.
Bolander's horkelia *Horkelia bolanderi*	-/-/1B.2	Colusa, Lake, and Mendocino counties	Chaparral, lower montane coniferous forest, meadows and seeps, valley and foothill grassland; Usually edges with vernally mesic areas.	May-August	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Bolander's water-hemlock *Cicuta maculata* var. *bolanderi*	-/-/2B.1	Contra Costa, Marin, Sacramento, and Solano counties.	Marshes and swamps (brackish, coastal, and freshwater)	July - September	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species. No marsh, fresh or brackish water habitat would be affected by the proposed Transfers.
Brazilian watermeal *Wolffia brasiliensis*	-/-/2B.3	Butte, Glenn, Sutter, and Yuba Counties	Marshes and swamps (shallow freshwater)	April-December	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Brewer's western flax *Hesperolinon breweri*	-/-/1B.2	Alameda, Contra Costa, Napa, and Solano Counties.	Chaparral, cismontane woodland, and Valley and foothill grasslands.	May - July	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Bristly sedge *Carex comosa*	-/-/2B.1	Contra Costa, Fresno, Lake, Mendocino, Sacramento, San Bernardino, San Francisco, San Joaquin, San Mateo, Santa Cruz, Shasta, and Sonoma Counties	Coastal prairie, marshes and swamps (lake margins), valley and foothill grassland	May-September	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Brittlescale *Atriplex depressa*	-/-/1B.2	Alameda, Colusa, Contra Costa, Fresno, Glenn, Kinds, Merced, Solano, Tulare, and Yolo counties.	Chenopod scrub, meadows, and seeps, playas, valley and foothill grasslands, and vernal pools.	April - October	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Brownish beaked-rush *Rhynchospora capitellata*	-/-/2B.2	Butte, El Dorado, Mariposa, Nevada, Plumas, Sonoma, Tehama, Trinity, Tuolumne, and Yuba Counties.	Lower and upper montane coniferous forest, meadows and seeps, marshes and swamps	July - August	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Butte County meadowfoam *Limnanthes floccosa* ssp. *californica*	E/E/1B.1	Occurs along a narrow 28-mile strip along the eastern Sacramento Valley in Butte County.	Freshwater Wetlands, Valley Grassland, wetland-riparian	March-May	This species is not known to occur within the Seller Service Area or Buyer Service Area. Occurrences have been documented near Big Chico Creek and Butte Creek within the area of analysis. Transfers would not impact suitable habitat for this species.
California alkali grass *Puccinellia simplex*	-/-/1B.2	Alameda, Butte, Contra Costa, Colusa, Fresno, Glenn, Kings, Kern, Lake, Los Angeles, Madera, Merced, Napa, San Bernardino, Santa Clara, Santa Cruz, San Luis Obispo, Solano, Stanislaus, Tulare, and Yolo counties	Alkaline, vernally mesic sinks, flats, and lake margins of chenopod scrub, meadows and seeps, valley and foothill grasslands, and vernal pools	March-May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
California jewelflower *Caulanthus californicus*	E/E/1B.1	Occurs in a few locations in Fresno, Kern, Kings, San Luis Obispo, and Santa Barbara counties. Presumed to have been extirpated from Tulare County.	Sandy soils, chenopod scrub, Pinyon and juniper woodland and valley and foothill grassland.	February-June	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
California seablite *Suaeda californica*	E/-/1B.1	Has been recorded from Alameda, Contra Costa, Santa Clara, and San Luis Obispo counties.	Occurs in the upper intertidal zone of coastal salt marshes on coarse, well-drained sediment deposits composed of sand and shell fragments.	July-October	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Cantelow's lewisia *Lewisia cantelovii*	-/-/1B.2	Butte, Nevada, Plumas, Shasta, Sierra, and Yuba Counties.	Broad-leafed upland forest, chaparral, cismontane woodland, lower montane coniferous forest.	May - October	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Caper-fruited tropidocarpum *Tropidocarpum capparideum*	-/-/1B.1	Alameda, Contra Costa, Monterey, San Joaquin, and San Luis Obispo	Valley and foothill grassland (Alkaline hills)	March - April	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Carmel Valley malacothrix *Malacothrix saxatilis* var. *arachnoidea*	-/-/1B.2	Monterey, San Benito, and Santa Barbara Counties	Chaparral (rocky); coastal scrub	March-December	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Carquinez goldenbush *Isocoma arguta*	-/-/1B.1	Contra Costa and Solano Counties.	Valley and foothill grassland (Alkaline)	August - December	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Chaparral harebell *Ravenella exigua*	-/-/1B.2	Alameda, Contra Costa, Fresno, Merced, San Benito, Santa Clara, and Stanislaus Counties	Chaparral (rocky, usually serpentinite)	May - June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Chaparral ragwort *Senecio aphanactis*	-/-/2B.2	Alameda, Contra Costa, Fresno, Los Angeles, Merced, Monterey, Orange, Riverside, San Benito, San Bernardino, San Diego, San Francisco, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Tulare, and Ventura Counties	Chaparral, cismontane woodland, coastal scrub; sometimes in alkaline soils.	January-May	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Chaparral sedge *Carex xerophila*	-/-/1B.2	Butte, El Dorado, Nevada, and Yuba Counties.	Chaparral, cismontane woodland, and lower montane coniferous forest.	March - June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Chinese camp brodiaea *Brodiaea pallida*	T/E/1B.1	Tuolumne County	Grows in overflow channels and seeps and springs in clays derived from serpentine soils.	May-June	Suitable habitat could occur within the area of analysis; however, this species has not been previously documented within the Seller Service Area or Buyer Service Area. Transfers would not impact suitable habitat for this species
Choris' popcornflower *Calystegia purpurata* ssp. *saxicola*	-/-/1B.2	Alameda, Monterey, San Francisco, San Mateo, Santa Clara, and Santa Cruz Counties	Chaparral; coastal prairie; coastal scrub	March-June	Suitable habitat could occur within the Buyer Service Area although no extant records of occurrence are present. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Coastal bluff morning-glory *Carex xerophila*	-/-/1B.2	Contra Costa, Marin, Mendocino and Sonoma Counties	Coastal bluff scrub; coastal dunes; coastal scrub; north coast coniferous forest	March - September	One extant record has been documented in the Buyer Service Area and suitable habitat could occur in other portions of the area of analysis in Contra Costa County. Transfers would not impact suitable habitat for this species.
Coastal triquetrella moss *Triquetrella californica*	-/-/1B.2	Contra Costa, Del Norte, Marin, Mendocino, San Diego, San Francisco, San Mateo, and Sonoma Counties	Coastal bluff scrub, coastal scrub	n/a	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Colusa grass *Neostapfia colusana*	T,X/E/1B.1	Southern Sacramento Valley, and northern San Joaquin Valley.	Vernal pools.	May-August	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Colusa layia *Layia septentrionalis*	-/-/1B.2	Butte, Colusa, Glenn, Lake, Mendocino, Napa, Sonoma, Sutter, Tehama, and Yolo Counties	Chaparral, cismontane woodland, valley and foothill grassland; Sandy and serpentine soils	April-May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Congdon's tarplant *Centromadia parryi* ssp. *congdonii*	-/-/1B.1	Alameda, Contra Costa, Monterey, San Luis Obispo, San Mateo, Santa Clara, Santa Cruz, and Solano Counties.	Valley and foothill grassland	April - November	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Contra Costa goldfields *Lasthenia conjugens*	E,X/-/1B.1	San Francisco Bay Delta Regions, and scattered coastal areas.	Cismontane woodlands, playas, valley and foothill grasslands, and vernal pools. Often occurs in vernal pools, swales, and low depressions in open grassy areas 1 - 445m asl.	March-June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Contra Costa manzanita *Arctostaphylos manzanita* ssp. *laevigata*	-/-/1B.2	Contra Costa County	Chaparral (rocky)	January - April	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Contra Costa wallflower *Erysimum capitatum* var. *angustatum*	E,X/E/1B.1	Contra Costa County	Inland dunes	March - July	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Coulter's goldfields *Lasthenia glabrata* ssp. *coulteri*	-/-/1B.1	Colusa, Kern, Los Angeles, Merced, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Solano, Tehama, Tulare, Ventura, and Yolo Counties	Marshes and swamps (coastal salt), playas, vernal pools	February-June	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Coyote ceanothus *Ceanothus ferrisiae*	E/-/1B.1	Known from only three locations within a few miles of each other in Santa Clara County	Dry slopes in chaparral, grassland, and coastal scrub on serpentine soils.	January-May	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Dark-eyed gilia *Gilia millefoliata*	-/-/1B.2	Alameda, Contra Costa, Del Norte, Humboldt, Marin, Mendocino, San Francisco, San Mateo and Sonoma Counties	Coastal dunes	April-July	Suitable habitat could occur within the Buyer Service Area although no extant records of occurrence are present. Transfers would not impact suitable habitat for this species.
Delta button-celery *Eryngium racemosum*	-/E/1B.1	Colusa, Kern, Los Angeles, Merced, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Solano, Tehama, Tulare, Ventura, and Yolo Counties	Riparian scrub (vernally mesic clay depressions)	May-October	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Delta mudwort *Limosella australis*	-/-/2B.1	Contra Costa, Sacramento, San Joaquin, and Solano Counties.	Marshes and swamps (brackish and freshwater) and riparian scrub.	March - August	None. Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Delta tule pea *Lathyrus jepsonii* var. *jepsonii*	-/-/1B.2	Contra Costa, Napa, Sacramento, San Joaquin, Solano, Sonoma and Yolo Counties.	Marshes and swamps (freshwater and brackish)	May-July	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Diablo helianthella *Helianthella castanea*	-/-/1B.2	Alameda, Contra Costa, Marin, San Francisco, and San Mateo Counties.	Broad-leafed upland forest, chaparral, cismontane woodland, coastal scrub, riparian woodland, and valley and foothill grassland	March - June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Diablo Range hare-leaf *Lagophylla diabolensis*	-/-/1B.2	Alameda, Contra Costa, Del Norte, Humboldt, Marin, Mendocino, San Francisco, San Mateo, and Sonoma Counties	Coastal dunes	April-July	Occurrences have been documented within the Buyer Service Area in San Benito County. Transfers would not impact suitable habitat for this species.
Diamond-petaled California poppy *Eschscholzia rhombipetala*	-/-/1B.1	Alameda, Contra Costa, Colusa, San Joaquin, San Luis Obispo, Stanislaus Counties.	Valley and foothill grassland. Alkaline clay slopes and flats. 0 - 975m asl.	March - April	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Dwarf downingia *Downingia pusilla*	-/-/2B.2	Fresno, Merced, Placer, Sacramento, San Joaquin, Solano, Sonoma, Stanislaus, Tehama, and Yuba Counties.	Valley and foothill grassland and Vernal pools.	March - May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Dwarf soaproot *Chlorogalum pomeridianum* var. *minus*	-/-/1B.2	Alameda, Colusa, Glenn, Lake, San Luis Obispo, Santa Clara, Sonoma, and Tehama Counties	Chaparral in serpentinite soils	May-August	One occurrence is known from the Buyer Service Area in Santa Clara County. Transfers would not impact suitable habitat for this species.
eel-grass pondweed *Potamogeton zosteriformis*	-/-/2B.2	Contra Costa, Lake, Lassen, Mariposa, Merced, Modoc, Mono, and Shasta Counties	Marshes and swamps (freshwater)	June-July	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
El Dorado bedstraw *Galium californicum* ssp. *sierrae*	E/R/1B.2	El Dorado County	Gabbroic chaparral, cismontane woodland, and lower montane coniferous forest	May-June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
El Dorado County mule ears *Wyethia reticulata*	-/-/1B.2	El Dorado County	Chaparral, cismontane woodland, and lower montane coniferous forest.	April - August	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Ferris' milk-vetch *Astragalus tener* var. *ferrisiae*	-/-/1B.1	Sacramento Valley.	Subalkaline flats and areas around vernal pools.	March-June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Finger rush *Juncus digitatus*	-/-/1B.1	Nevada (NEV), Shasta (SHA)	Cismontane woodland (openings), lower montane coniferous forest (openings), and vernal pools (xeric)	May - June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Fleshy owl's-clover *Castilleja campestris* ssp. *succulenta*	T/E/1B.2	Most occurrences from eastern Merced County, with its range extending from northern San Joaquin County to Fresno County.	Occurs in vernal pools with a variety of characteristics.	April-May	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Forked hare-leaf *Lagophylla dichotoma*	-/-/1B.1	Calaveras (CAL), Fresno (FRE), Merced (MER)*, Stanislaus (STA)	Cismontane woodland and valley and foothill grassland	Apr-May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Fountain thistle *Cirsium fontinale* var. *fontinale*	E/E/1B.1	Serpentine soils in San Mateo County	Seeps and openings in chaparral, valley grassland, wetland-riparian habitats.	May-October	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Fragrant fritillary *Fritillaria liliacea*	-/-/1B.2	Alameda, Contra Costa, Marin, Monterey, San Benito, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma Counties	Cismontane woodland, coastal prairie, coastal scrub, and valley and foothill grassland	February-April	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Franciscan onion *Allium peninsulare* var. *franciscanum*	-/-/1B.2	Mendocino, Napa, San Mateo, Santa Clara and Sonoma Counties	Cismontane woodland; Valley and foothill grassland	April-June	One occurrence is known from the Buyer Service Area in Santa Clara County. Transfers would not impact suitable habitat for this species.
Franciscan thistle *Cirsium andrewsii*	-/-/1B.2	Contra Costa, Marin, San Francisco, San Mateo, and Sonoma Counties	Broad-leafed upland forest; Coastal bluff scrub; Coastal prairie; Coastal scrub	March-July	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Gabilan Mountains manzanita *Arctostaphylos gabilanensis*	-/-/1B.2	Monterey and San Benito Counties	Chaparral; Cismontane woodland	January	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Greene's tuctoria *Tuctoria greenei*	E,X/R/1B.1	Butte, Colusa, Fresno, Glenn, Madera, Merced, Modoc, Shasta, San Joaquin, Stanislaus, Tehama, and Tulare Counties.	Vernal pools.	May-July	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Hairless popcornflower *Plagiobothrys glaber*	-/-/1A	Alameda, Marin, San Benito, and Santa Clara Counties	Alkaline meadows and seeps or coastal marshes	Mar-May	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Hairy Orcutt grass *Orcuttia pilosa*	E,X/E/1B.1	Northern Sacramento Valley, Pit River Valley; isolated populations in Lake and Sacramento counties.	Vernal pools.	May-September	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Hall's bushmallow *Malacothamnus hallii*	-/-/1B.2	Contra Costa, Merced, Santa Clara, and Stanislaus Counties	Chaparral and coastal scrub	April - October	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Hall's tarplant *Deinandra halliana*	-/-/1B.2	Fresno, Kern, Kings, Monterey, San Benito, San Luis Obispo Counties	Chenopod scrub; Cismontane woodland; Valley and foothill grassland	March-May	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Hartweg's golden sunburst *Pseudobahia bahiifolia*	E/E/1B.1	Fresno, Madera, Merced, Stanislaus, Tuolumne, and Yuba counties	Clay and often acidic, cismontane woodland, and valley and foothill grassland	March-April	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Heartscale *Atriplex cordulata* var. *cordulata*	-/-/1B.2	Western Central Valley and valleys of adjacent foothills.	Alkali grasslands, alkali meadows, and alkali scrub.	May-October	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Heckard's pepper-grass *Lepidium latipes* var. *heckardii*	-/-/1B.2	Glenn, Solano, and Yolo Counties.	Valley and foothill grassland alkaline flats.	March-May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Hernandez spineflower *Chorizanthe biloba* var. *immemora*	-/-/1B.2	Monterey and San Benito Counties	Chaparral; Cismontane woodland	May-September	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Hispid salty bird's-beak *Chloropyron molle* ssp. *hispidum*	-/-/1B.1	Alameda, Kern, Merced, Placer, and Solano Counties	Alkaline areas in meadows and seeps, playas, and valley and foothill grassland	June-September	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Hooked popcornflower *Plagiobothrys uncinatus*	-/-/1B.2	Monterey, San Benito, and San Luis Obispo Counties	Chaparral (sandy); Cismontane woodland; Valley and foothill grassland	April-May	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Hoover's button-celery *Eryngium aristulatum* var. *hooveri*	-/-/1B.1	Alameda, San Benito, San Luis Obispo, San Mateo, and Santa Clara Counties	Vernal pools	June-August	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Hoover's calycadenia *Calycadenia hooveri*	-/-/1B.3	Calaveras, Madera, Mariposa, Merced, San Joaquin, and Stanislaus Counties	Cismontane woodland, valley and foothill grassland; rocky soils	July-September	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Hoover's cryptantha *Cryptantha hooveri*	-/-/1A	Contra Costa, Madera, Sacramento, and Stanislaus Counties	Inland dunes, valley and foothill grassland (sandy)	April-May	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Hoover's spurge *Euphorbia hooveri*	T,X/-/1B.2	Scattered in Glenn, Butte, Colusa, Merced, Stanislaus, Tehama, and Tulare Counties	Vernal pools.	July-September	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Hospital Canyon larkspur *Delphinium californicum* ssp. *interius*	-/-/1B.2	Alameda, Contra Costa, Merced, Monterey, San Benito, San Joaquin, Santa Clara, and Stanislaus Counties	Chaparral (openings), cismontane woodland (mesic) and coastal scrub	April-June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Indian Valley bushmallow *Malacothamnus aboriginum*	-/-/1B.2	Fresno, Kings, Monterey, and San Benito Counties	Chaparral; Cismontane woodland	April-October	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Inundated bog-clubmoss *Lycopodiella inundata*	-/-/2B.2	Humboldt and Nevada Counties	Bogs and fens (coastal), lower montane coniferous forest (mesic), marshes and swamps (lake margins)	June-September	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area or Buyer Service Area. Transfers would not impact suitable habitat for this species
Ione Buckwheat *Eriogonum apricum (incl.* var. *prostratum)*	E/E/-	Amador County	Only five occurrences of Ione buckwheat are presumed to still exist and all are located in Amador County.	July-October	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area or Buyer Service Area. Transfers would not impact suitable habitat for this species
Ione Manzanita *Arctostaphylos myrtifolia*	T/-/1B.2	Amador and Calaveras counties	Chaparral	November-March	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area or Buyer Service Area. Transfers would not impact suitable habitat for this species
Jepson's coyote-thistle *Eryngium jepsonii*	-/-/1B.2	Alameda, Amador, Calaveras, Contra Costa, Fresno, Napa, San Mateo, Solano, Stanislaus, Tuolumne, and Yolo counties	Clay soils of valley and foothill grassland and vernal pools	April-August	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Jepson's milk-vetch *Astragalus rattanii* var. *jepsonianus*	-/-/1B.2	Colusa, Glenn, Lake, Napa, San Benito, Sonoma, Tehama and Yolo Counties	Chaparral; Cismontane woodland; Valley and foothill grassland in serpentine soils	March-June	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Jepson's onion *Allium jepsonii*	-/-/1B.2	Butte, El Dorado, Placer, and Tuolumne Counties	In serpentine or volcanic soils in, Chaparral, cismontane woodland, and lower montane coniferous forest	Apr-Aug	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Keck's checkerbloom *Sidalcea keckii*	E/-/1B.1	Colusa, Fresno, Glenn, Lake, Merced, Napa, Solano, Tulare, and Yolo Counties	Cismontane woodland, valley and foothill grassland; clay and serpentine soils	April-June	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Kellogg's horkelia *Horkelia cuneata* var. *sericea*	-/-/1B.1	Alameda, Marin, Monterey, San Francisco, San Luis Obispo, San Mateo, Santa Barbara, and Santa Cruz Counties	Closed-cone coniferous forest; Chaparral (maritime); Coastal dunes; Coastal scrub	April-September	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Kings Mountain manzanita *Arctostaphylos regismontana*	-/-/1B.2	San Mateo, Santa Clara and Santa Cruz Counties	Broadleafed upland forest; Chaparral; North Coast coniferous forest	December-April	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Large-flowered fiddleneck *Amsinckia grandiflora*	E/E/1B.1	Alameda, Contra Costa, and San Joaquin Counties.	Cismontane woodland, valley and foothill grassland. Annual grassland in various soils 275 - 550m asl.	April - May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Layne's butterweed *Senecio layneae*	T/R/1B.2	El Dorado, Yuba and Tuolumne counties	Openings in rocky chaparral on Gabbro and serpentine soil formations in Sierran foothills	April-August	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Layne's ragwort *Packera layneae*	T/R/1B.2	El Dorado, Placer, Tuolumne, and Yuba counties	Serpentinite or gabbroic, rocky soils of chaparral and cismontane woodland	April-August	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Legenere *Legenere limosa*	-/-/1B.1	Sacramento Valley and south of the North Coast Ranges.	Vernal pools.	May-June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Lime Ridge eriastrum *Eriastrum ertterae*	-/CE/1B.1	Contra Costa County	Alkaline or sandy area of Chaparral (edges, openings)	June-July	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Lime Ridge navarretia *Navarretia gowenii*	-/-/1B.1	Contra Costa and Stanislaus Counties	Chaparral	May-June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Long-styled sand-spurrey *Spergularia macrotheca* var. *longistyla*	-/-/1B.2	Alameda, Contra Costa, Napa, and Solano Counties	Alkaline area of meadows and seeps and marshes and swamps	February-May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Loma Prieta hoita *Hoita strobilina*	-/-/1B.1	Alameda, Contra Costa, Santa Clara, and Santa Cruz Counties	Chaparral; Cismontane woodland; Riparian woodland	May-October	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Long-styled sand-spurrey *Spergularia macrotheca* var. *longistyla*	-/-/1B.1	Alameda, Contra Costa, Napa, and Solano	Meadows and seeps; Marshes and swamps	February-May	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Lost Hills crownscale *Atriplex coronata* var. *vallicola*	-/-/1B.2	Fresno, Kern, Kings, Merced, Monterey, San Benito, San Luis Obispo, and Tulare	Chenopod scrub; Valley and foothill grassland; Vernal pools	April-September	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Lost thistle *Cirsium praeteriens*	-/-/1A	San Mateo and Santa Clara Counties	Presumed extripated	June-July	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Marin dwarf-flax *Hesperolinon congestum*	T/T/1B.1	Occurs only in San Mateo, San Francisco and Marin County.	Serpentine soils, especially in dry native bunch grasses, chaparral or other grasslands at elevations less than 200 meters.	April-July	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Mason's lilaeopsis *Lilaeopsis masonii*	-/R/1B.1	Alameda, Contra Costa, Marin, Napa, Sacramento, San Joaquin, Solano, and Yolo Counties.	Freshwater and brackish marshes, riparian scrub. Tidal zones, in muddy or silty soil formed through river deposition or riverbank erosion 0 - 10m asl. Populations may be ephemeral, using freshly deposited or exposed	April - November	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Maverick clover *Trifolium piorkowskii*	-/-/1B.2	Shasta County	Chaparral, cismontane woodland, lower montane coniferous forest, valley and foothill grassland (mesic), vernal pools; Clay and volcanic soils, often on streambanks and in openings.	April-May	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Merced monardella *Monardella leucocephala*	-/-/1A	Merced and Stanislaus Counties	Valley and foothill grassland (mesic, sandy)	May-August	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Metcalf Canyon jewelflower *Streptanthus albidus* ssp. *albidus*	E/-/1B.1	Serpentine grasslands. Tends to grow on slopes and flats, at elevations from 500-2600 feet.	Restricted to Santa Clara County.	April-July	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Minute pocket moss *Fissidens pauperculus*	-/-/1B.2	Alameda, Butte, Del Norte, Humboldt, Marin, Mendocino, San Mateo, Santa Cruz, Sonoma, and Yuba Counties	North Coast coniferous forest (damp coastal soil)	n/a	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Monterey gilia *Gilia tenuiflora arenaria*	E/T/1B.2	Grows along the coast near Monterey	Coastal dunes and inland maritime chaparral habitat.	April-June	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Monterey spineflower *Chorizanthe pungens* var. *pungens*	T/-/1B.2	Along Monterey Bay in Monterey, and Santa Cruz counties.	Openings in dune scrub, sandy openings in maritime chaparral, and recent sandy alluvium in a riparian community with open cover of sandbar willow	April-July	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Most beautiful jewelflower *Streptanthus albidus* ssp. *peramoenus*	-/-/1B.2	Alameda, Contra Costa, Monterey, San Luis Obispo and Santa Clara Counties	Serpentine, chaparral, cismontane woodland and valley and foothill grassland	March-October	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Mt. Day rockcress *Boechera rubicundula*	-/-/1B.1	Santa Clara County	Rocky slopes of chaparral.	April-May	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Mt. Diablo bird's-beak *Cordylanthus nidularius*	-/R/1B.1	Contra Costa County	Chaparral (serpentinite)	June-August	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Mt. Diablo buckwheat *Eriogonum truncatum*	-/-/1B.1	Contra Costa and Solano Counties	Sandy areas of chaparral, coastal scrub and valley and foothill grassland habitats	April-September and November-December	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Mt. Diablo fairy-lantern *Calochortus pulchellus*	-/-/1B.2	Alameda and Contra Costa Counties	Chaparral, cismontane woodland, riparian woodland, and valley and foothill grassland	April-June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Mt. Diablo jewelflower *Streptanthus hispidus*	-/-/1B.3	Contra Costa County	Rocky areas of chaparral, and valley and foothill grassland habitat	March-June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Mt. Diablo manzanita *Arctostaphylos auriculata*	-/-/1B.3	Contra Costa County	Chaparral (sandstone)and Cismontane woodland	January-March	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Mt. Diablo phacelia *Phacelia phacelioides*	-/-/1B.2	Contra Costa, San Benito, Santa Clara, and Stanislaus Counties	Rocky areas in chaparral and cismontane woodland	April-May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Mt. Hamilton coreopsis *Leptosyne hamiltonii*	-/-/1B.2	Alameda, Santa Clara and Stanislaus Counties	Cismontane woodland	March-May	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Mt. Hamilton jewelflower *Streptanthus callistus*	-/-/1B.2	Santa Clara County	Chaparral (sandstone)and Cismontane woodland	April-May	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Mt. Hamilton lomatium *Lomatium observatorium*	-/-/1B.2	Santa Clara and Stanislaus County	Cismontane woodland	March-May	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Mt. Hamilton thistle *Cirsium fontinale* var. *campylon*	-/-/1B.2	Alameda, Santa Clara and Stanislaus Counties	Valley and foothill grassland, chaparral (sandstone)and cismontane woodland	February-October	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Munz's tidy-tips *Layia munzii*	-/-/1B.2	Fresno, Kern, Madera, Merced, San Benito, San Luis Obispo, and Ventura	Chenopod scrub; Valley and foothill grassland (alkaline clay)	March-Apr	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Northern slender pondweed *Stuckenia filiformis* ssp. *alpina*	-/-/2B.2	Alameda, Butte, Contra Costa, El Dorado, Lassen, Mariposa, Merced, Modoc, Mono, Placer, San Mateo, Santa Clara, Shasta, Sierra, Solano, and Sonoma Counties	Marshes and swamps (shallow freshwater)	May-July	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Oregon meconella *Meconella oregana*	-/-/1B.1	Contra Costa, Monterey, San Luis Obispo, and Santa Clara Counties	Coastal prairie, coastal scrub	March-April	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Oval-leaved viburnum *Viburnum ellipticum*	-/-/2B.3	Alameda, Contra Costa, El Dorado, Fresno, Glenn, Humboldt, Lake, Mendocino, Napa, Placer, Shasta, Solano, Sonoma, and Tehama Counties	Chaparral, cismontane woodland and lower montane coniferous forest.	May-June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Pajaro manzanita *Arctostaphylos pajaroensis*	-/-/1B.1	Monterey, San Benito, and Santa Cruz Counties	Chaparral (sandy)	December-March	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Pale-yellow layia *Layia heterotricha*	-/-/1B.1	Fresno, Kern, Kings, Monterey, San Benito, San Luis Obispo, Santa Barbara, andVentura	Cismontane woodland; Coastal scrub; Pinyon and juniper woodland; Valley and foothill grassland	March-June	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Pallid manzanita *Arctostaphylos pallida*	T/E/1B.1	Alameda and Contra Costa Counties	Broadleaf upland forest, chaparral, cismontane woodland, closed-cone coniferous forest, coastal scrub. Sometimes gravelly and sandy soils	December-March	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Panoche navarretia *Navarretia panochensis*	-/-/1B.3	Fresno and San Benito Counties	Chenopod scrub and Valley and foothill grassland	April-August	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Panoche pepper-grass *Lepidium jaredii* ssp. *album*	-/-/1B.2	Fresno, Merced, and San Benito Counties	Valley and foothill grassland (clay, steep slopes, sometimes alkaline)	February-June	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Pappose tarplant *Centromadia parryi* ssp. *parryi*	-/-/1B.2	Butte, Colusa, Glenn, Lake, Napa, San Mateo, Solano, Sonoma, and Yolo Counties	Chaparral, coastal prairie, marshes and swamps (coastal salt), meadows and seeps, valley and foothill grassland (vernally mesic); often in alkaline soils.	May-November	Suitable habitat occurs within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Palmate-bracted bird's-beak *Chloropyron palmatum*	E/E/1B.1	Found in Glenn and Colusa Counties and within the Central Valley.	Alkali meadow, alkali scrub, valley and grasslands.	May-October	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Peruvian dodder *Cuscuta obtusiflora* var. *glandulosa*	-/-/2B.2	Los Angeles, Merced, Sacramento, San Bernadino, Sonoma and Sutter Counties	Marshes and swamps (freshwater)	July-October	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Pincushion navarretia *Navarretia myersii* ssp. *myersii*	-/-/1B.1	Amador, Calaveras, Merced, Placer, and Sacramento Counties.	Vernal pools (often acidic).	May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Pine Hill ceanothus *Ceanothus roderickii*	E/R/1B.1	El Dorado County	Serpentinite or gabbroic soils of chaparral and cismontane woodland	April-June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Pine Hill flannelbush *Fremontodendron decumbens*	E/R/1B.2	El Dorado, Nevada, and Yuba counties	Rocky, Gabbroic or serpentinite soils of chaparral and cismontane woodland	April-July	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Pink creamsacs *Castilleja rubicundula* var. *rubicundula*	-/-/1B.2	Butte, Colusa, Glenn, Lake, Napa, Santa Clara, Shasta, and Yolo Counties	Chaparral (openings), cismontane woodland, meadows and seeps, valley and foothill grassland; serpentine soils	April-June	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Pinnacles buckwheat *Eriogonum nortonii*	-/-/1B.3	Monterey and San Benito Counties	Chaparral and Valley and foothill grassland	April - September	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Point Reyes salty bird's-beak *Chloropyron maritimum* ssp. *palustre*	-/-/1B.2	Alameda, Humboldt, Marin, San Francisco, San Luis Obispo, San Mateo, Santa Clara, and Sonoma Counties	Marshes and swamps (coastal salt)	Jun-Oct	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Prostrate vernal pool navarretia *Navarretia prostrata*	-/-/1B.2	Alameda, Fresno, Los Angeles, Merced, Monterey, Orange, Riverside, San Benito, San Bernardino, San Diego, and San Luis Obispo Counties	Coastal scrub, meadows and seeps, valley and foothill grassland (alkaline), vernal pools; mesic soils	April-July	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Presidio clarkia *Clarkia franciscana*	E/E/1B.1	Known from the Oakland Hills and San Francisco’s Presidio	Serpentine soils in grassland and coastal scrub communities	May-July	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Rayless layia *Layia discoidea*	-/-/1B.1	Fresno and San Benito Counties	Chaparral; Cismontane woodland; Lower montane coniferous forest	May	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Recurved larkspur *Delphinium recurvatum*	-/-/1B.2	Alameda, Butte, Contra Costa, Fresno, Kern, Kings, Madera, Merced, Monterey, San Benito, San Joaquin, San Luis Obispo, Santa Barbara, Solano, Sutter, Tulare, and Yuba Counties	Chenopod scrub, cismontane woodland, valley and foothill grassland; alkaline soils	March-June	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Red Bluff dwarf rush *Juncus leiospermus* var. *leiospermus*	-/-/1B.1	Butte, Placer, Shasta, and Tehama Counties	Chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland, and Vernal pools. Vernally Mesic soils.	March-June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Red Hills soaproot *Chlorogalum grandiflorum*	-/-/1B.2	Amador, Calaveras, El Dorado, Placer, and Tuolumne Counties	Gabbroic or serpentine area within chaparral, cismontane woodland, and lower montane coniferous forest	May-June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Red Hills vervain *Verbena californica*	T/T/1B.1	Tuolumne County	Foothill Woodland, Valley Grassland, wetland-riparian	May-September	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area or Buyer Service Area. Transfers would not impact suitable habitat for this species
Robbins' nemacladus *Nemacladus secundiflorus* var. *robbinsii*	-/-/1B.2	Los Angeles, Monterey, San Benito, San Luis Obispo, Santa Barbara, and Ventura Counties	Chaparral; Valley and foothill grassland	April-June	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Robust spineflower *Chorizanthe robusta* var. *robusta*	E/-/1B.1	Santa Cruz and northern Monterey counties	Restricted to sandy soils of coastal and near coastal areas.	April-July	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Rock sanicle *Chlorogalum grandiflorum*	-/R/1B.2	Contra Costa and Santa Clara Counties	Rocky, scree, talus, broad-leafed upland forest, chaparral, and valley and foothill grassland	April-May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Round-headed collinsia *Collinsia corymbosa*	-/-/1B.2	Humboldt, Marin, Mendocino, San Francisco, San Mateo, and Santa Clara Counties	Coastal dunes	April-June	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Sacramento Orcutt grass *Orcuttia viscida*	E,X/E/1B.1	Valley grasslands and freshwater wetlands.	Vernal pools.	May-June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Saline clover *Trifolium hydrophilum*	-/-/1B.2	Alameda, Contra Costa, Lake, Mendocino, Monterey, Napa, Sacramento, San Benito, San Joaquin, San Luis Obispo, San Mateo, Santa Clara, Santa Cruz, Solano, Sonoma, and Yolo Counties	Marshes and swamps, valley and foothill grassland (mesic, alkaline), vernal pools	April-June	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
San Benito evening-primrose *Camissonia benitensis*	-/-/1B.1	Fresno, Monterey, and San Benito Counties	Chaparral; Cismontane woodland; Valley and foothill grassland	April-June	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
San Benito fritillary *Fritillaria viridea*	-/-/1B.2	Fresno, Monterey, and San Benito Counties	Chaparral; Cismontane woodland	March-May	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
San Benito evening-primrose *Camissonia benitensis*	-/-/1B.1	Fresno, Monterey, and San Benito Counties	Chaparral; Cismontane woodland; Valley and foothill grassland	April-June	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
San Benito onion *Allium howellii* var. *sanbenitense*	-/-/1B.3	Fresno, Monterey, and San Benito Counties	Chaparral; Valley and foothill grassland	April-May	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
San Benito pentachaeta *Pentachaeta exilis* ssp. *aeolica*	-/-/1B.2	Monterey, San Benito and Santa Clara Counties	Cismontane woodland; Valley and foothill grassland	March-May	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
San Francisco Bay spineflower *Chorizanthe cuspidata* var. *cuspidata*	-/-/1B.2	Alameda, Marin, San Francisco, San Mateo, and Sonoma Counties	Coastal bluff scrub; Coastal dunes; Coastal prairie; Coastal scrub	Apr-August	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
San Francisco collinsia *Collinsia multicolor*	-/-/1B.2	Marin, Monterey, San Francisco, San Mateo, Santa Clara, and Santa Cruz Counties	Closed-cone coniferous forest; Coastal scrub	February-May	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
San Francisco popcornflower *Plagiobothrys diffusus*	-/E/1B.1	Alameda, San Benito, San Francisco, San Mateo, and Santa Cruz Counties	Coastal prairie; Valley and foothill grassland	March-June	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
San Joaquin spearscale *Extriplex joaquinana*	-/-/1B.2	Western Central Valley and valleys of adjacent foothills.	Alkali grasslands, and alkali scrub.	April-September	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
San Joaquin Valley Orcutt grass *Orcuttia inaequalis*	T/E/1B.1	Fresno, Madera, Merced, Solano, Stanislaus, and Tulare Counties	Vernal pools	April-September	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
San Joaquin Valley wooly-threads *Monolopia congdonii*	E/-/1B.2	Fresno, Kern, Kings, San Benito, San Luis Obispo and Santa Barbara counties.	Grasslands of the hills and plateaus west of the San Joaquin Valley. Associated with the valley salt brush scrub habitat in the valley floor.	February-May	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
San Mateo thornmint *Acanthomintha obovate* ssp. *duttonii*	E/E/1B.1	San Mateo County	Serpentine soil in chaparral and valley foothill grassland.	April-July	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
San Mateo woolly sunflower *Eriophyllum latilobum*	E/E/1B.1	San Mateo County	Occurs in moist shady locations on sparsely wooded or steep grassy slopes	May-June	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Sanford's arrowhead *Sagittaria sanfordii*	-/-/1B.2	Central Valley.	Freshwater marshes, shallow streams, and ditches.	May-August	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Santa Clara Valley dudleya *Dudleya setchellii*	E/-/1B.1	Occurs in the Coyote Valley area of Santa Clara County.	rocky outcrops in serpentine grasslands	April-October	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Santa Cruz tarplant *Holocarpha macradenia*	T/E/1B.1	Alameda, Contra Costa, Marin, Monterey, and Santa Cruz Counties	Coastal prairie, coastal scrub, valley and foothill grassland; Often in clay soils and sometimes sandy soils	June-October	Occurs within the Buyer Service Area in Contra Costa County. Not previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Santa Cruz clover *Trifolium buckwestiorum*	-/-/1B.1	Mendocino, Monterey, San Mateo, Santa Clara, Santa Cruz, and Sonoma Counties	Broadleaf upland forest; Cismontane woodland; Coastal prairie	Apr-Oct	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Santa Cruz Mountains beardtongue *Penstemon rattanii* var. *kleei*	-/-/1B.2	Santa Clara and Santa Cruz Counties	Chaparral; Lower montane coniferous forest; North Coast coniferous forest	(Mar)May-Jun	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Santa Cruz Mountains pussypaws *Calyptridium parryi* var. *hesseae*	-/-/1B.1	Monterey, Santa Clara, and Santa Cruz Counties	Chaparral; Cismontane woodland	May-Aug	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Santa Lucia dwarf rush *Juncus luciensis*	-/-/1B.2	Lassen, Modoc, Monterey, Napa, Nevada, Placer, Plumas, Riverside, San Benito, San Diego, San Luis Obispo, Santa Barbara, and Shasta Counties	Chaparral; Great Basin scrub; Lower montane coniferous forest; Meadows and seeps; Vernal pools	April-July	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Scadden Flat checkerbloom *Sidalcea stipularis*	-/E/1B.1	Nevada County	Marshes and swamps (montane freshwater)	July-August	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Scott's Valley polygonum *Polygonum hickmanii*	E/E/1B.1	Restricted to Scotts Valley, Santa Cruz County	Occurs in isolated patches of shallow soil on outcrops in coastal prairie habitat.	May-August	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Scott's Valley spineflower *Chorizanthe robusta* var. *hattwegii*	E/-/1B.1	Santa Cruz County	Sandy or gravelly soil in maritime chaparral, cismontane woodland openings, coastal dunes and coastal scrub.	April-July	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Sharsmith's harebell *Ravenella sharsmithiae*	-/-/1B.2	Santa Clara and Stanislaus Counties	Chaparral (rocky, serpentinite)	April-June	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Sharsmith's onion *Allium sharsmithiae*	-/-/1B.3	Alameda, Santa Clara and Stanislaus Counties	Chaparral; Cismontane woodland	March-May	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Sheldon's sedge *Carex sheldonii*	-/-/2B.2	Lassen, Modoc, Placer, and Plumas Counties	Lower montane coniferous forest (mesic), marshes and swamps (freshwater), and riparian scrub	May-August	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Shining navarretia *Navarretia nigelliformis* ssp. *radians*	-/-/1B.2	Alameda, Contra Costa, Fresno, Merced, Monterey, San Benito, San Joaquin, and San Luis Obispo Counties.	Cismontane woodland, valley and foothill grassland, and vernal pools 200 - 1000m asl. Known from grassland, and may not necessarily occur in vernal pools.	April - July	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Showy golden madia *Madia radiata*	-/-/1B.1	Contra Costa, Fresno, Kern, Kings, Monterey, San Benito, San Joaquin, San Luis Obispo, Santa Barbara, and Stanislaus Counties	Cismontane woodland and valley and foothill grassland	March-May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Showy Indian clover *Trifolium amoenum*	E/-/1B.1	Marin County	Grassland habitats	April-June	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Sierra arching sedge *Carex cyrtostachya*	-/-/1B.2	Butte, El Dorado, and Yuba Counties	Lower montane coniferous forest (mesic), marshes and swamps, meadows and seeps, riparian forest (margins)	May-August	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Sierra blue grass *Poa sierrae*	-/-/1B.3	Butte, El Dorado, Nevada, Placer, Plumas, Shasta, and Sierra Counties	Lower montane coniferous forest (Openings)	April-July	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Silky cryptantha *Cryptantha crinita*	-/-/1B.2	Glenn, Shasta, and Tehama counties	Gravelly streambeds of cismontane woodland, lower montane coniferous forest, riparian forest, riparian woodland, and valley and foothill grassland	April-May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Slender Orcutt grass *Orcuttia tenuis*	T/E/1B.1	Northern Sacramento Valley, Pit River Valley; isolated populations in Lake and Sacramento Counties	Vernal pools.	May-July	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Slough thistle *Cirsium crassicaule*	-/-/1B.1	Kern, Kings, and San Joaquin Counties	Chenopod scrub, marshes and swamps (sloughs), riparian scrub	May-August	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Smooth lessingia *Lessingia micradenia* var. *glabrata*	-/-/1B.2	Santa Clara County	Chaparral; Cismontane woodland and valley and foothill grassland	April-November	
Soft salty bird's-beak *Chloropyron molle* ssp. *molle*	E/R/1B.2	Contra Costa, Marin, Napa, Sacramento, Solano, and Sonoma counties	Marshes and swamps	June-November	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Solano Grass *Tuctoria mucronata*	E/E/1B.1	Solano and Yolo counties	Freshwater Wetlands, Valley Grassland, wetland-riparian	April-August	Suitable habitat could occur within the area of analysis and this species has been previously documented near Putah Creek just outside of the Seller Service Area. Transfers would not impact suitable habitat for this species.
Spicate calycadenia *Calycadenia spicata*	-/-/1B.3	Amador, Butte, Calaveras, El Dorado, Fresno, Kern, Nevada, Placer, Sacramento, San Joaquin, Stanislaus, Tulare, Tuolumne, and Yuba Counties	Cismontane woodland, Valley and foothill grassland. Often with adobe, clay, disturbed areas, gravelly and rocky areas.	May-September	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Spiny-sepaled button-celery *Eryngium spinosepalum*	-/-/1B.2	Calaveras, Contra Costa, Fresno, Kern, Madera, Mariposa, Merced, San Luis Obispo, Stanislaus, Tulare, and Tuolumne Counties	Valley and foothill grassland and vernal pools	April-June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Stanislaus monkeyflower *Erythranthe marmorata*	-/-/1B.1	Amador, Calaveras, Fresno, Stanislaus, and Tuolumne Counties	Cismontane woodland and lower montane coniferous forest	March-May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Stebbins' morning-glory *Calystegia stebbinsii*	E/E/1B.1	El Dorado and Nevada counties	Gabbroic and serpentinite soils of chaparral and cismontane woodland	April-June	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Stebbins' phacelia *Phacelia stebbinsii*	-/-/1B.2	El Dorado, Nevada, and Placer Counties	Cismontane woodland, lower montane coniferous forest, and meadows and seeps	May-July	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Subtle orache *Atriplex subtilis*	-/-/1B.2	Butte, Fresno, Kern, Kings, Madera, Merced, Stanislaus, and Tulare Counties	Valley and foothill grassland, Alkaline soils	April-October	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Succulent owl's-clover *Castilleja campestris* var. *succulenta*	T/E/1B.2	Fresno, Madera, Mariposa, Merced, San Joaquin, and Stanislaus Counties	Vernal pools (often acidic)	March-May	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Suisun Marsh aster *Symphyotrichum lentum*	-/-/1B.2	Contra Costa, Napa, Sacramento, San Joaquin, Solano, and Yolo Counties	Marshes and swamps (brackish, freshwater)	April-November	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Sulphur Creek brodiaea *Brodiaea matsonii*	-/-/1B.1	Shasta County	Cismontane woodland (streambanks), Meadows and seeps; rocky soils	May-June	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Talus fritillary *Fritillaria falcata*	-/-/1B.2	Alameda, Monterey, San Benito, Santa Clara, and Stanislaus Counties	Chaparral; Cismontane woodland; Lower montane coniferous forest	March-May	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Tiburon buckwheat *Eriogonum luteolum* var. *caninum*	-/-/1B.2	Alameda and Marin Counties	Chaparral; Cismontane woodland; Coastal prairie; Valley and foothill grassland	May-September	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Tiburon jewelflower *Streptanthus glandulosus* ssp. *niger*	E/E/1B.1	Marin County	Shallow serpentine soils on gentle to moderate southwestern facing slopes.	May-June	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Tiburon mariposa lily *Calochortus tiburonensis*	T/T/1B.1	Marin County	Serpentine-derived soil atop this outcrop in grasslands from 0-200 meters (0-656 feet).	March-June	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Tiburon paintbrush *Castilleja affinis* ssp. *neglecta*	E/E/1B.2	Marin, Santa Clara and Napa counties.	Valley grassland	April-June	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Toren's grimmia *Grimmia torenii*	-/-/1B.3	Contra Costa, Lake, Mendocino, Monterey, San Mateo, and Santa Cruz Counties	Chaparral, Cismontane woodland, Lower montane coniferous forest; Carbonate, rocky and volcanic soils.	n/a	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Van Zuuk's morning-glory *Calystegia vanzuukiae*	-/-/1B.3	El Dorado and Placer Counties	Chaparral, Cismontane woodland; gabbroic and serpentine soils	May-August	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Veiny monardella *Monardella venosa*	-/-/1B.1	Butte, Sutter, Tuolumne, and Yuba Counties	Cismontane woodland, Valley and foothill grassland; clay soils.	May-July	Suitable habitat could occur within the area of analysis although this species has not been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species
Vernal pool smallscale *Atriplex persistens*	-/-/1B.2	Colusa, Madera, Merced, Solano, Stanislaus, and Tulare counties	Vernal pools	June, August, September, October	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Water star-grass *Heteranthera dubia*	-/-/2B.2	Butte, Colusa, Marin, Modoc, San Francisco, San Mateo, Shasta, and Sutter Counties	Marshes and swamps (alkaline, still, slow-moving water), Alkaline soils. Requires a pH of 7 or higher, usually in slightly eutrophic waters.	Jul-Oct	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Watershield *Brasenia schreberi*	-/-/2B.3	Butte, Calaveras, El Dorado, Fresno, Glenn, Lake, Lassen, Mendocino, Merced, Nevada, Plumas, Sacramento, San Joaquin, Shasta, Sierra, Siskiyou, Sonoma, Sutter, Tehama, Trinity, Tulare, and Tuolumne Counties	Marshes and swamps (freshwater)	Jun-Sep	None. Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Western Heermann's buckwheat *Eriogonum heermannii* var. *occidentale*	-/-/1B.2	Fresno, Monterey, and San Benito Counties	Cismontane woodland (openings)	July-October	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
Western leatherwood *Dirca occidentalis*	-/-/1B.2	Alameda, Contra Costa, Marin, San Mateo, Santa Clara, and Sonoma Counties	Broad leafed upland forest, closed-cone coniferous forest; chaparral; cismontane woodland; North Coast coniferous forest; Riparian forest; Riparian woodland	January-April	Suitable habitat could occur within the Buyer Service Area. Transfers would not impact suitable habitat for this species.
White bark pine *Pinus albicaulis*	T/-/-	Alpine, Madera, Placer, Trinity, El Dorado, Mariposa, Plumas, Tulare, Fresno, Modoc, Shasta, Tuolumne, Inyo, Mono, Siskiyou, Lassen, Nevada, and Tehama counties	Subalpine forest	July-August	Suitable habitat could occur within the area of analysis in the Seller Service Area. Transfers would not impact suitable habitat for this species.
White-rayed pentachaeta *Pentachaeta bellidiflora*	E/E/1B.1	Found in San Mateo County west of Redwood City at a single population in a location.	Grasslands with serpentine soil.	March-May	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.

Common Name Scientific Name	Special Status* (F/S/CNPS)	Distribution	Habitat Association	Blooming Period	Potential for Impact
Woodland woollythreads *Monolopia gracilens*	-/-/1B.2	Alameda, Contra Costa, Monterey, San Benito, San Luis Obispo, San Mateo, Santa Clara, and Santa Cruz Counties	Broad-leafed upland forest (openings), chaparral (openings), cismontane woodland, north Coast coniferous forest (openings), valley and foothill grassland and serpentine habitat.	February-July	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Woolly rose-mallow *Hibiscus lasiocarpos* var. *occidentalis*	-/-/1B.2	Butte, Colusa, Contra Costa, Glenn, Sacramento, San Joaquin, Solano, Sutter, and Yolo Counties	Marshes and swamps (freshwater). Often in riprap on sides of levees.	June-September	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Wright's trichocoronis *Trichocoronis wrightii* var. *wrightii*	-/-/2B.1	Colusa, Merced, Riverside, San Joaquin, and Sutter Counties	Alkaline habitat, meadows and seeps, marshes and swamps, riparian forest, and vernal pools	May-September	Suitable habitat could occur within the area of analysis and this species has been previously documented within the Seller Service Area. Transfers would not impact suitable habitat for this species.
Yadon's piperia *Piperia yadonii*	E/-/1B.1	Monterey County	Monterey pine forest	May-August	Suitable habitat could occur within the area of analysis in the Buyer Service Area. Transfers would not impact suitable habitat for this species.

Sources:
US Fish and Wildlife Service IPaC list. Accessed September 2024
California Department of Fish and Wildlife (CDFW) State and Federally Listed Endangered, Threatened, and Rare Plants of California. September 2024.
CDFW California Natural Diversity Database (CNDDB). Rarefind 5. Accessed September 2024.
CNPS Rare Plant Inventory. Accessed September 2024.
Notes:
***Status explanations:**
F=Federal
E=Endangered
T=Threatened
SC= Special Concern
X= critical habitat
S=State

E=Endangered
T=Threatened
R = Rare
CNPS=California Native Plant Society
1A = Presumed extirpated in California and either rare or extinct elsewhere
1B = Rare, threatened, or endangered in California and elsewhere
2 = Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere

Appendix K
Cumulative Projects

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Appendix K Cumulative Projects

This appendix provides a summary of other past, present, and reasonably foreseeable/probable future projects (or actions) as required by the National Environmental Policy Act (NEPA) implementing regulations (32 Code of Federal Regulations, Section 651.16(a) and California Environmental Quality Act Guidelines (Sections 15063(d)(3), 15130, and Appendix G). The reasonably foreseeable/probable future actions considered in the cumulative effects analysis are actions located within the Seller Service Area that have been identified as potentially having an effect on resources that also may be affected by the Proposed Action. No construction projects within the Seller Service Area were analyzed. The following sections present brief descriptions for each of the projects and plans considered for the cumulative analysis.

K.1 Cumulative Projects

K.1.1 Other Potential Water Transfers

The cumulative analysis considers other potential groundwater substitution and reservoir release water transfers that could occur in the 2026-2027 transfer season, including other Central Valley Project (CVP) water transfers, non-CVP water transfers, and additional water transfers. Potential Sellers, including those in the Proposed Action, have indicated interest or have provided water for transfer in the past, including:

- Potential transfers from Sellers evaluated in this EA/IS could participate in transfers with other Buyers, including the Tehama-Colusa Canal Authority (TCCA) in 2026-2027. The transfer quantities evaluated in this EA/IS are the upper limits for Sellers.
- Potential transfers from Sellers in the Feather River Region from entities holding settlement agreements with the California Department of Water Resources (DWR) that could make surface water available for CVP or State Water Project (SWP) contractors. These transfers would be approved and facilitated by DWR.

The cumulative analysis considers other CVP and non-CVP water transfers that could occur in addition to the Proposed Action. For the purpose of this cumulative analysis, methods of making water available for transfer under these other transfers include groundwater substitution and reservoir release. Other methods of making water available for transfer not evaluated in this EA/IS could also include conservation or cropland idling transfers.

Water made available for transfer could be sold to multiple agencies in addition to agencies evaluated in this EA/IS. These agencies include the TCCA, SWP contractors receiving water from the North Bay Aqueduct, and Buyers south of the Sacramento-San Joaquin River Delta (Delta), including Metropolitan Water District of Southern California and other State Water Contractors. The quantity of water transferred in a given year, as evidenced by past dry years depends on a number of factors, including hydrologic conditions and available conveyance capacity. Table K-1 lists the total quantities of transfers (includes in basin transfers and cross Delta transfers) that ranged from zero to 344,000 AF from 2009 through 2024.

Table K-1. Water Transfers (2009 – 2024)

Year	Total Acre-Feet [1]
2009	274,000
2010	303,000
2011	0
2012	190,000
2013	210,000
2014	198,000
2015	344,000
2016	60,000
2017	0
2018	261,000
2019	0
2020	244,000
2021	276,000
2022	136,000
2023	0
2024	0

Source: DWR and Sutter Extension Water District 2024

Note:

[1] Transfer quantities made available from the seller and do not consider carriage losses and streamflow depletion losses. The summarized quantities are the completed transfer during the respective years.

K.1.1.1 State Water Project Transfers

The SWP supports contracts between DWR and 29 public agencies and local water districts. To help compensate for discrepancies in supply and demand, SWP contractors also implement transfers from agencies north of the Delta to SWP contractors south of the Delta. These transfers enable SWP contractors to purchase or reallocate water as needed to address supply variability. Given that these transfers depend on timing, negotiations with rights holders, and SWP capacity, it is not possible to determine the potential volume of transfers that might occur annually. Table K-2 lists past Buyers and Sellers that have participated in SWP water transfers.

Table K-2. Past SWP Water Transfer Sellers and Buyers

SWP Buyers	SWP Sellers
Alameda Water District	Biggs-West Gridley Water District
Antelope Valley-East Kern Water Agency	Butte Water District
Dudley Ridge Water District	Carmichael Water District
Kern County Water Agency	City of Sacramento
Kings County Water District	Cordua Irrigation District
Metropolitan Water District of Southern California	El Dorado Irrigation District
Napa County Flood Control and Water Conservation District	Foresthill Public Utility District
Palmdale Water District	Garden Highway Mutual Water Company
San Gabriel Valley Municipal Water District	Golden State Water Company
Santa Barbara Flood Control & Water Conservation District	Merced Irrigation District
Santa Clarita Valley Water	Plumas Mutual Water Company
Zone 7 Water Agency	Tudor Mutual Water Company
	San Juan Water District
	South Sutter Water District
	Sutter Extension Water District
	Tule Basin Farms
	Richvale Irrigation District
	River Garden Farms
	Western Canal Water District

Source: State Water Resources Control Board (SWRCB) 2024

K.1.2 Healthy Rivers and Landscapes Program

On December 12, 2018, the State Water Resources Control Board (SWRCB) adopted Resolution 2018-0059, approving an update to the Bay-Delta Water Quality Control Plan (Bay-Delta Plan). The agreement included flow and non-flow measures to improve water quality in the Bay-Delta watershed to support viability of native fishes. On March 1, 2019, a coalition of water agencies, agricultural districts, and state and federal agencies, including the Sacramento River Settlement Contractors, entered into the "*Planning Agreement Proposing Project Description and Procedures for the Finalization of the Voluntary Agreements to Update and Implement the Bay-Delta Water Quality Control Plan*" (Planning Agreement). State agencies play a central role managing transfers to support the Delta ecosystem while ensuring water access for various regions. Primary supply purchases occur March through May and are flexible depending on hydrologic conditions.

The flow measures discussed in the Planning Agreement provide instream flows above existing conditions and in a manner that: (a) does not conflict with the requirements of the Sustainable Groundwater Management Act and (b) maintains reliability of water supply for other beneficial uses, including designated wildlife refuges. These flows above existing conditions will be generated through land fallowing, reservoir reoperation and/or demand reduction, and limited use of groundwater substitution. Table K-3 shows the flow contributions from the Sacramento River watershed. Parties have reached an agreement on a term sheet and signed a memorandum of understanding (MOU) in March 2022 (SWRCB 2022). The agreements are now being translated into a legally enforceable framework to be studied by SWRCB (California Natural Resources Agency [CNRA] 2024).

Table K-3. Contribution of Flow to the Healthy Rivers and Landscapes Program in the Sacramento River Watershed

Tributary	Season	Source	Application[2]	Flow Contributions (in TAF)				
				C	D	BN	AN	W
Sacramento	Spring or summer[1]	Land fallowing	Block		100	100	100	
Feather	Spring or summer[1]	Land fallowing	Block		50	50	50	
Yuba	Assume spring likely[1]	Reservoir storage	Block		50	50	50	
American	Spring	Groundwater substitution	Hybrid	10	10			
		Reservoir storage				10	10	
		Reservoir storage and/or groundwater substitution			10			
		Reservoir storage and/or groundwater substitution		20	20			

Notes:
[1] Flow represents an instream target, Blocks can be scheduled within constraints, and Hybrid represents a combination.
[2] Subject to coordination with California Department of Fish and Wildlife (DFW) (Yuba) or fisheries agencies (Sacramento, Feather).
Key: AN = Above Normal Water Year; C = Critical Water Year; D = Dry Water Year; BN = Below Normal Water Year;
TAF = Thousand acre-feet; W = Wet Water Year

K.1.3 Coordinated Operations Agreement

Reclamation and DWR would continue to operate their respective facilities in accordance with the Agreement between the United States and the State of California for Coordinated Operation of the CVP and the SWP executed in 1986 (Coordinated Operations Agreement, hereinafter referred to as COA). The COA defines the project facilities and their water supplies, sets forth procedures for coordinating operations, and identifies formulas for sharing joint responsibilities for meeting Delta standards and other legal uses of water. COA further identifies how unstored flow is shared, sets up a framework for exchange of water and services between the projects, and provides for periodic review of the agreement.

Implementation of the COA principles has evolved since 1986, as changes have occurred to CVP and SWP facilities, operating criteria, and overall physical and regulatory environment. For example, updated water quality and flow standards adopted by the SWRCB, CVPIA, and Endangered Species Act (ESA) responsibilities have affected both CVP and SWP operations. The 1986 COA incorporated the SWRCB Water Right Decision 1485 (D-1485) provisions regarding Delta salinity, outflow, and export restrictions. D-1485 included implementation provisions for the Bay-Delta Water Quality Control Plan (WQCP) that was current at the time but has since been updated with Water Right Decision 1641 (D-1641). COA envisioned and provided a methodology to incorporate future regulatory changes, such as Delta salinity requirements, but did not explicitly envision or address sharing of export restrictions. D-1641 and the 2008 U.S. Fish and Wildlife Service (USFWS) Biological Opinion and 2009 National Marine Fisheries Service (NMFS) Biological Opinion included various export restrictions not explicitly addressed in the 1986 COA. However, the available export capacity as a result of these export restrictions was shared between the CVP and the SWP in absence of a formal update to the COA.

In 2018, Reclamation and DWR amended four key elements of the COA to address changes since the COA was signed: (1) in-basin uses, (2) export restrictions, (3) CVP use of Banks Pumping Plant up to 195,000 acre-feet (AF) per year, and (4) periodic review. The COA sharing percentages for meeting Sacramento Valley in-basin uses now vary from 80 percent responsibility of the United States and 20 percent responsibility of the state of California in wet year types to 60 percent responsibility of the United States and 40 percent responsibility of the state of California in critical year types. In a dry or critical year following two dry or critical years, the United States and state of California will meet to discuss additional changes to the percentage sharing of responsibility to meet in-basin uses. When exports are constrained and the Delta is in balanced conditions, Reclamation may pump up to 65 percent of the allowable total exports with DWR pumping the remaining capacity. In excess conditions, these percentages change to 60/40. The COA defines balanced conditions as periods when it is agreed that releases from upstream reservoirs plus unregulated flow approximately equal the water supply needed to meet Sacramento Valley in-basin uses, plus exports. The COA defines excess conditions as periods when it is agreed that releases from upstream reservoirs plus unregulated flow exceed Sacramento Valley in-basin uses, plus exports.

K.1.4 Lower Yuba River Accord

The Lower Yuba River Accord (Yuba Accord) is a set of three agreements that resolve litigation over in-stream flow requirements on the Lower Yuba River. The three agreements include a Fisheries Agreement, a Water Purchase Agreement, and Conjunctive Use Agreements.

The Fisheries Agreement establishes higher in-stream flow requirements and a flow schedule during specific periods of the year to meet fish needs. The agreement also requires a groundwater substitution program to increase surface flows in the Lower Yuba River and calls for studies of Lower Yuba River fish or fish habitat, monitoring of flows or temperatures and salmon fry studies.

The Water Purchase Agreement establishes conditions when the Yuba County Water Agency would make water available for water supply reliability and fish and wildlife purposes. The agreement separates water purchases into four components with variations in pricing, purpose of use and schedule. For Component 1 Water Supplies, DWR purchased 60,000 AF per year for eight years for fish and wildlife purposes. Components 2, 3, and 4 Water Supplies are also purchased by DWR, but the actual amounts vary depending on hydrologic year types and allocation scenarios.

The Conjunctive Use Agreements require Yuba County Water Agency and eight member districts to implement conjunctive use measures to provide local water supplies in dry years to facilitate storage operations to meet in-stream flow requirements in the Lower Yuba River, as defined in the Fisheries Agreement. The conjunctive use agreements enable Yuba Water's member units and their landowners and well owners to participate in the Yuba Accord's Groundwater Substitution Water Transfer Program.

The Yuba Accord Water Transfer Program includes storage water transfers of up to 200,000 AF per year and groundwater substitution water transfers of up to 90,000 AF per year and up to 180,000 AF in a three-year period (Yuba Water Agency 2024). Water is released from New Bullards Bar Reservoir to support instream flows on the lower Yuba River for fish and wildlife purposes, but that may also subsequently be transferred to Buyers downstream of the Marysville Gage for municipal, industrial, or irrigation use. For cross-Delta water transfers to areas south of the Delta, the Delta must be in balanced water conditions and available conveyance capacity must exist at Banks Pumping Plant or Jones Pumping Plant to convey the transfer water. Under the Yuba Accord, transfer releases can occur throughout the year as part of the releases to the Yuba Accord flow requirements and end-of-September target storage in New Bullards Bar Reservoir. Consistent with the re-operation of the CVP and the SWP, transfer water is only delivered across the Delta in the summer and fall months during the allowed transfer window. The Yuba Water Member Units that are able to participate in the transfer program are Brophy Water District, Browns Valley Irrigation District, Cordua Irrigation District (joined in 2021), Dry Creek Mutual Water Company, Hallwood Irrigation District, Ramirez Water District, South Yuba Water District, and Wheatland Water District (Yuba Water Agency 2024).

Table K-4 lists the historical maximum quantities of transfers, ranging from zero to 180,000 AF, from 2008 to 2022.

Table K-4. Lower Yuba Accord Historical Maximum Transfers (2008-2022)

Year	Sacramento Valley Water Year Hydrologic Classification[1]	Quantity (AF)
2008	Critical	166,086
2009	Dry	180,000
2010	Below normal	141,856
2011	Wet	0
2012	Below normal	81,681
2013	Dry	177,274
2014	Critical	161,647
2015	Critical	89,131
2016	Below normal	60,000
2017	Wet	0
2018	Below normal	92,987
2019	Wet	0
2020	Dry	120,538
2021	Critical	130,090
2022	Critical	77,477

Source: Yuba County Water Agency 2024
Note:
1 Water year hydrologic classification as implemented in SWRCB Water Right Decision 1641.

In September 2024, Yuba Water Agency released a Final Supplemental Environmental Impact Report for the Extension of the Lower Yuba River Accord Water Transfer Program to extend beyond its current expiration date of December 31, 2025. No significant changes to the Water Transfer Program are proposed under the extension.

K.1.5 Central Valley Salinity Alternatives for Long-term Sustainability

The Central Valley Salinity Alternatives for Long-term Sustainability (CV-SALTS) is a collaborative stakeholder driven and managed program to develop sustainable salinity and nitrate management planning for the Central Valley. CV-SALTS developed a Salt and Nitrate Management Plan (SNMP) for the entirety of the Central Valley Regional Water Quality Control Board's jurisdictional area (also referred to as the "Central Valley" or "Region 5"). The Central Valley SNMP builds on a range of water quality management policies and mechanisms already in existence, proposes additional policies and tools needed to provide the Central Valley Water Board with flexibility in addressing legacy and ongoing loading of salt and nitrate in the diverse region, and presents a comprehensive regulatory and programmatic approach for the sustainable management of salt and nitrate (Central Valley Salinity Coalition 2024).

The Central Valley Regional Water Quality Control Board approved amendments to the water quality control plans in October of 2019 (Resolution No. 2019-0057), establishing a prioritized Nitrate Control Program for discharges to groundwater and a phased Salt Control Program for discharges to surface water and groundwater (Central Valley Salinity Coalition 2020). Phase 1 of the Salt Prioritization and Optimization Study will run for 10 to 15 years and define long-term salt management actions, including strategies and projects for reducing and removing salts. Phase 2 will include the design and permitting of the projects identified in Phase 1, with Phase 3 being the construction of those projects (Central Valley Salinity Coalition 2021).

K.1.6 Water Reduction Program Agreement

The Water Reduction Program Agreement is an agreement between the Sacramento River Settlement Contractors Nonprofit Mutual Benefit Corporation, individual Sacramento River Settlement Contractors (SRSC), and Reclamation to forego a larger percentage of their contract supply in specified drought years under two phases (Glenn-Colusa Irrigation District 2024). The SRSC would receive funding from Reclamation to engage in drought-resiliency projects to address potential water loss. The two phases include:

- Phase 1 (2025 to 2035): The SRSC would reduce contract supply by up 500,000 AF during specified drought years.
- Phase 2 (2036 to 2045): The SRSC would reduce contract supply by up to 100,000 AF during specified drought years.

In response to the reduced contract supply, the SRSC are expected to engage in activities in response to water reductions, including cropland idling, cropland shifting, conservation, and the implementation of the drought-resiliency projects (Glenn-Colusa Irrigation District 2024). The project would allow for additional flexibility in Reclamation's management of operation of the CVP during drought conditions.

K.2 References

DWR and State Water Resources Control Board (SWRCB). 2015. Background and Recent History of Water Transfers in California. July 2015. Available at: https://cawaterlibrary.net/wp-content/uploads/2018/03/Background_and_Recent_History_of_Water_Transfers.pdf. [Accessed on August 21, 2024].

———. 2023. Delta Conveyance Project Final EIR. December 2023. Available at: https://www.deltaconveyanceproject.com/planning-processes/california-environmental-quality-act/final-eir/final-eir-document. [Accessed on October 14, 2024].

DWR and Sutter Extension Water District. 2024. Draft Initial Study and Proposed Mitigated Negative Declaration for Sutter Extension Water District 2024 Water Transfer Program. Available at: https://files.ceqanet.opr.ca.gov/295043-1/attachment/N-Lji-b3_TF4aUYhdpCgY0tPZ-2CyROfvpuYhwvYr64OyLlVNoFKM75Z8GDiLP2d7F0mw1bq5G7ORMxL0. [Accessed on August 21, 2024].

California Natural Resources Agency (CNRA). 2024. Voluntary Agreements FAQ. Available at: https://resources.ca.gov/Initiatives/Voluntary-Agreements-Page/VA-FAQ. [Accessed on August 22, 2024].

Central Valley Salinity Coalition. 2020. New Nitrate Control Program: Coming Together to Resolve the Safe Drinking Water Challenge. March. Available at: https://cvsalinity-my.sharepoint.com/:b:/g/personal/cv-salts_cvsalinity_org/EfRCpHeFUDFAuU7ec6XGD7MBRpaufNYAs7nj8xBy5T8WvA?e=3OdGT9. [Accessed on September 24, 2024].

———. 2021. New Salt Control Program for the Central Valley: Coming Together to Resolve the Central Valley's Salinity Program. January. Available at: https://cvsalinity-my.sharepoint.com/:b:/g/personal/cv-salts_cvsalinity_org/EVCrWbmI9SdGllnLZwatyxYBbFaehGnQ2TC-gNixfEG_Vw?e=g7xKPB. [Accessed on September 24, 2024].

———. 2024. CV-SALTS – Managing Salt and Nitrate in the California Central Valley – About Us. Available at: https://www.cvsalinity.org/about/#story. [Accessed on September 24, 2024].

Glenn-Colusa Irrigation District. 2024. Water Reduction Program Agreement Between the Sacramento River Settlement Contractors Nonprofit Mutual Benefit Corporation, Individual Sacramento River Settlement Contractors, and the U.S. Bureau of Reclamation Project Final Environmental Impact Report. December 2024. Available at: https://files.ceqanet.opr.ca.gov/300312-3/attachment/ZA0DFKkmA1Sc-arF-OgnGp1CtdKH5H8sb2ToFlZFnnik7l6CprQu24mkvOJpA6uYaGhqBnuyx3-O1qVE0. [Accessed on January 9, 2025].

State Water Resources Control Board (SWRCB). 2022. Memorandum of Understanding Advancing a Term Sheet for the Voluntary Agreements to Update and Implement the Bay-Delta Water Quality Control Plan, and Other Related Actions. March 29, 2022. Available at: https://resources.ca.gov/-/media/CNRA-Website/Files/NewsRoom/Voluntary-Agreement-Package-March-29-2022.pdf?utm_medium=email&utm_source=govdelivery. [Accessed on August 22, 2024].

———. 2024. Transfers and Temporary Urgency Actions – Orders. Available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/applications/transfers_tu_orders/. [Accessed on October 15, 2024].

United States Department of Interior, Bureau of Reclamation (Reclamation). 2021. Central Valley Project/State Water Project Interim Operations Plan for Water Year 2022. Available at: https://fisheries.legislature.ca.gov/sites/fisheries.legislature.ca.gov/files/4d%20CVP-SWP%20Interim%20Operations%20Plan%20for%20Water%20Year%202022.pdf. [Accessed on August 22, 2024].

Yuba County Water Agency. 2024. Draft Supplemental EIR for the Extension of the Yuba Accord Long-Term Water Transfer Program. Available at: https://www.yubawater.org/DocumentCenter/View/7150/Yuba-Accord-Extension---Draft-SEIR. [Accessed on August 22, 2024].