Appendix A

Thomas Harder and Company
Technical Report on
Evaluation of Potential Effects of the Proposed Seawater Desalination Project
(Hydrogeologic Modeling)

Submitted as an Appendix to Attachment A of Irvine Ranch Water District's Comment Letter to Santa Ana Regional Water Quality Control Board Regarding the NPDES Permit Renewal for the Huntington Beach Seawater Desalination Project

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Irvine Ranch
WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

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Executive Summary

This report presents model-predicted groundwater quality impacts to the Irvine Ranch Water District's (IRWD's) Dyer Road Well Field (DRWF) and other municipal and private water producers in southern Orange County due to the Orange County Water District's (OCWD's) potential injection of desalinated (Poseidon Project) seawater into OCWD's Principal Aquifer.

Background

OCWD's proposed Poseidon Project would generate 50 million gallons per day (MGD) of desalinated seawater, which would be injected into the groundwater system via existing and proposed injection wells or delivered directly to meet municipal demand. The concentrations of total dissolved solids (TDS), chloride, and boron of the water to be injected are greater than those of OCWD's existing groundwater replenishment system (GWRS). In order to avoid highly elevated groundwater elevations, the increased injection of the GWRS expansion and Poseidon Project water needs to be offset by an equal amount of groundwater production.

Objective

The objective of this analysis is to evaluate the potential impact Poseidon supplies could have on water quality (i.e., TDS, chloride, and boron concentrations) by comparing different scenarios involving Poseidon supplies to a 'baseline scenario' without Poseidon supplies.

Methodology

Thomas Harder & Company (TH&Co) modified the existing OCWD groundwater flow model to analyze potential groundwater quality impacts to existing wells in the area. A total of four injection scenarios were developed (Scenarios 1 through 4). Scenario 1 is the 'baseline scenario' in which no Poseidon Project water is injected. The other scenarios (Scenarios 2 through 4) are compared to Scenario 1 to evaluate the potential impact Poseidon supplies could have on the quality of IRWD's potable and recycled water supply; the potential impact on other producers and private wells is also assessed.

Results

The predicted impact to the DRWF, other producers, and private wells with respect to TDS, chloride, and boron concentrations in 2070 is shown in **Table ES-1**. The 'a' and 'b' scenarios are associated with different concentrations of TDS, chloride, and boron in the Poseidon water. Specifically, the 'a' scenarios involved TDS, chloride, and boron concentrations of 350, 100, and 1 milligram per liter (mg/L), respectively. The 'b' scenarios involve TDS, chloride, and boron concentrations of 150, 75, and 0.75 mg/L, respectively. Recent data from Poseidon's Carlsbad plant suggests their boron concentration may be on the order of 0.6 mg/L and therefore lower than the 'a' and 'b' scenarios. To bracket this new lower value from above and below, two additional

scenarios (i.e., 'c' and 'd' scenarios) for boron at 0.500 and 0.250 mg/L, respectively, were conducted.

1. For the DRWF, model-predictions show the proposed project serves to reduce TDS and chloride concentrations at the DRWF whereas it serves to significantly increase boron concentrations. *This is based on the proposed project as configured in this analysis, wherein it is assumed the Talbert Injection Barrier (TIB) and South East Talbert Injection Barrier (SETIB) inject solely Poseidon water and no GWRS water.* If GWRS water or a blend of Poseidon water and GWRS water is used at the TIB and SETIB, model-predicted concentrations of all three COCs at the DRWF would be higher than those presented here due to the higher percentage of Poseidon water that would be delivered to the various other injection wells (i.e., the Santa Ana River [SAR], Mid Basin Injection Project [MBIP], Dyer Road, and Campesino Park injection wells). That is, the blended water in the delivery pipeline would contain higher concentrations of TDS, chloride, and boron than that assumed in this analysis.
2. For the other municipal producers, TDS, chloride, and boron concentrations in wells operated by Mesa Verde, Mesa Water District, Newport Beach, and OCWD are predicted to increase due to the proposed injection. Similarly, concentrations of chloride and boron are predicted to increase in Huntington Beach production wells and boron is predicted to increase in Fountain Valley production wells. For the private wells, the most significant predicted increase is associated with chloride in private well SACC-SA-1. As for the previous item in this list, these results are based on the proposed project as configured in this analysis, wherein it is assumed the TIB and SETIB inject solely Poseidon water and no GWRS water.

The calculated boron concentrations in the blended water to be recharged via facilities other than the TIB and SETIB for those scenarios involving Poseidon water (i.e., Scenarios 2 through 4) are as follows:

Boron Concentrations in Blended Water Delivered to non-TIB and non-SETIB Recharge Facilities

Scenario	'a' Poseidon = 1 mg/L	'b' Poseidon = 0.75 mg/L	'c' Poseidon = 0.50 mg/L	'd' Poseidon = 0.25 mg/L
2	0.332	0.305	0.277	0.250
3	0.332	0.305	0.277	0.250
4	0.283	0.272	0.261	0.250

It is noted that boron concentrations are commonly reported by analytical laboratories to the nearest 0.01 mg/L. However, because boron concentrations for the various scenarios differ to a small degree, it was necessary to enter them into the groundwater flow model to the nearest

0.001 mg/L (as shown in the table above) to more clearly demonstrate the differences among the scenarios at the DRWF (see Figures ES-1 through ES-3).

Recommendations

1. With respect to groundwater extraction, the increase in pumping required to offset the GWRS expansion of 30 MGD and the additional 50 MGD associated with the Poseidon project is significant and, for those scenarios involving Poseidon water (i.e., Scenarios 2, 3, and 4), would require a groundwater producer to approach their demand by requiring a Basin Pumping Percentage (BPP) greater than 95%, a value which exceeds the current BPP of 77%. It is recommended to conduct a feasibility analysis of the potential increased pumping (e.g., through use of higher capacity pumps in the existing wells and/or additional extraction wells).
2. With respect to groundwater injection, much of the Poseidon water is used at the existing TIB and proposed SETIB. This results in other existing (Mid Basin) and proposed (Centennial Park, SAR, Dyer Road and Campesino Park) injection wells accommodating a relatively small percentage of the Poseidon water. Therefore, it is recommended to conduct a feasibility analysis of the additional water that would have to be transferred to the Forebay. The analysis should consider the availability of recharge basin storage and aquifer storage during both wet and dry periods.

Comparison of Total Concentrations in 2070 - Summary

Entity	Constituent of Concern	Scenario 0	Scenario 1	Scenario 2a		Scenario 3a		Scenario 4a		Scenario 2b		Scenario 3b		Scenario 4b	
		Total Concentration (mg/L)[1]	Total Concentration (mg/L)	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1
DRWF	TDS	298	236	155	-34%	175	-26%	163	-31%	139	-41%	161	-32%	157	-33%
	Chloride	29	23	22	-6%	23	-1%	19	-18%	20	-14%	21	-9%	18	-21%
	Boron	0.068	0.115	0.258	123%	0.234	103%	0.203	76%	0.237	105%	0.217	88%	0.197	70%
Fountain Valley	TDS	341	338	310	-8%	318	-6%	317	-6%	307	-9%	317	-6%	317	-6%
	Chloride	35	35	33	-5%	33	-5%	33	-6%	33	-6%	33	-6%	33	-6%
	Boron	0.050	0.049	0.083	68%	0.067	37%	0.064	30%	0.078	60%	0.065	33%	0.063	28%
Huntington Beach	TDS	282	284	321	13%	295	4%	295	4%	298	5%	285	0%	285	0%
	Chloride	28	29	39	36%	33	17%	33	17%	36	26%	32	12%	32	12%
	Boron	0.085	0.084	0.164	96%	0.121	45%	0.121	44%	0.135	61%	0.108	29%	0.108	29%
Mesa Verde	TDS	67	78	382	388%	379	385%	377	382%	163	109%	166	113%	165	112%
	Chloride	11	14	109	667%	108	661%	107	656%	82	475%	82	474%	81	471%
	Boron	0.274	0.288	1.089	278%	1.071	271%	1.063	269%	0.817	183%	0.803	178%	0.798	177%
Mesa Water District	TDS	214	208	379	82%	418	101%	417	101%	297	43%	291	40%	291	40%
	Chloride	42	40	98	146%	110	178%	110	177%	87	121%	94	138%	94	137%
	Boron	0.347	0.336	0.845	152%	0.871	160%	0.866	158%	0.666	98%	0.712	112%	0.708	111%
Newport Beach	TDS	59	62	335	442%	161	160%	340	450%	156	152%	339	449%	155	152%
	Chloride	7	7	90	1122%	68	826%	94	1183%	71	870%	94	1181%	71	868%
	Boron	0.244	0.242	0.884	265%	0.933	285%	0.931	284%	0.666	175%	0.702	190%	0.701	189%
OCWD	TDS	50	49	348	608%	348	607%	347	605%	156	218%	154	213%	157	219%
	Chloride	6	6	98	1477%	99	1481%	98	1465%	74	1093%	74	1092%	74	1085%
	Boron	0.251	0.251	0.974	288%	0.980	291%	0.966	285%	0.733	193%	0.736	194%	0.728	190%
Santa Ana	TDS	519	521	488	-6%	487	-7%	497	-5%	497	-5%	497	-5%	496	-5%
	Chloride	73	73	69	-6%	69	-6%	70	-3%	70	-3%	70	-4%	70	-4%
	Boron	0.063	0.063	0.068	8%	0.073	16%	0.071	14%	0.067	7%	0.072	15%	0.071	13%
Tustin	TDS	537	537	540	1%	519	-3%	519	-3%	540	1%	519	-3%	519	-3%
	Chloride	84	84	84	1%	80	-5%	80	-5%	84	1%	80	-5%	80	-5%
	Boron	0.099	0.099	0.099	1%	0.096	-3%	0.096	-3%	0.099	1%	0.096	-3%	0.096	-3%

Comparison of Total Concentrations in 2070 - Summary

Entity	Constituent of Concern	Scenario 0	Scenario 1	Scenario 2a		Scenario 3a		Scenario 4a		Scenario 2b		Scenario 3b		Scenario 4b	
		Total Concentration (mg/L)[1]	Total Concentration (mg/L)	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1
Westminster	TDS	346	346	347	0%	347	0%	347	0%	347	0%	347	0%	347	0%
	Chloride	35	35	35	1%	35	1%	35	0%	35	0%	35	0%	35	0%
	Boron	0.050	0.050	0.050	0%	0.050	0%	0.050	0%	0.050	0%	0.050	0%	0.050	0%
SCSH-SA1-1 (Private)	TDS	283	280	287	2%	288	3%	288	3%	287	2%	288	3%	288	3%
	Chloride	28	28	29	5%	32	15%	32	15%	29	5%	32	15%	32	15%
	Boron	0.134	0.130	0.143	10%	0.179	38%	0.179	38%	0.143	10%	0.179	38%	0.179	38%
MTSN-SA-1 (Private)	TDS	286	284	291	2%	281	-1%	281	-1%	291	2%	281	-1%	281	-1%
	Chloride	29	29	30	4%	31	6%	31	6%	30	4%	31	6%	31	6%
	Boron	0.137	0.134	0.147	10%	0.168	26%	0.168	26%	0.147	10%	0.168	26%	0.168	26%
SAKI-SAJ3-1 (Private)	TDS	325	325	321	-1%	321	-1%	321	-1%	321	-1%	321	-1%	321	-1%
	Chloride	42	42	41	-3%	41	-2%	41	-2%	41	-3%	41	-2%	41	-2%
	Boron	0.141	0.141	0.140	0%	0.148	5%	0.148	5%	0.140	0%	0.148	5%	0.148	5%
SACC-SA-1 (Private)	TDS	332	334	394	18%	368	10%	368	10%	394	18%	368	10%	368	10%
	Chloride	43	44	66	52%	56	28%	56	28%	66	52%	56	28%	56	28%
	Boron	0.359	0.362	0.514	42%	0.475	31%	0.475	31%	0.514	42%	0.475	31%	0.476	31%
NBGC-NB-1 (Private)	TDS	343	344	330	-4%	336	-2%	336	-2%	330	-4%	336	-2%	336	-2%
	Chloride	42	42	40	-6%	41	-3%	41	-3%	40	-6%	41	-3%	41	-3%
	Boron	0.264	0.264	0.274	4%	0.263	0%	0.263	0%	0.274	4%	0.263	0%	0.263	0%

Notes:

Highlighted cells indicate conditions where concentrations have increased by 50% or more when compared to Scenario 1 (Baseline).

[1] mg/L = milligrams per liter.

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Figure ES-1

Flow-Averaged Boron Concentrations at the DRWF Wells
Scenario 2A through 2D

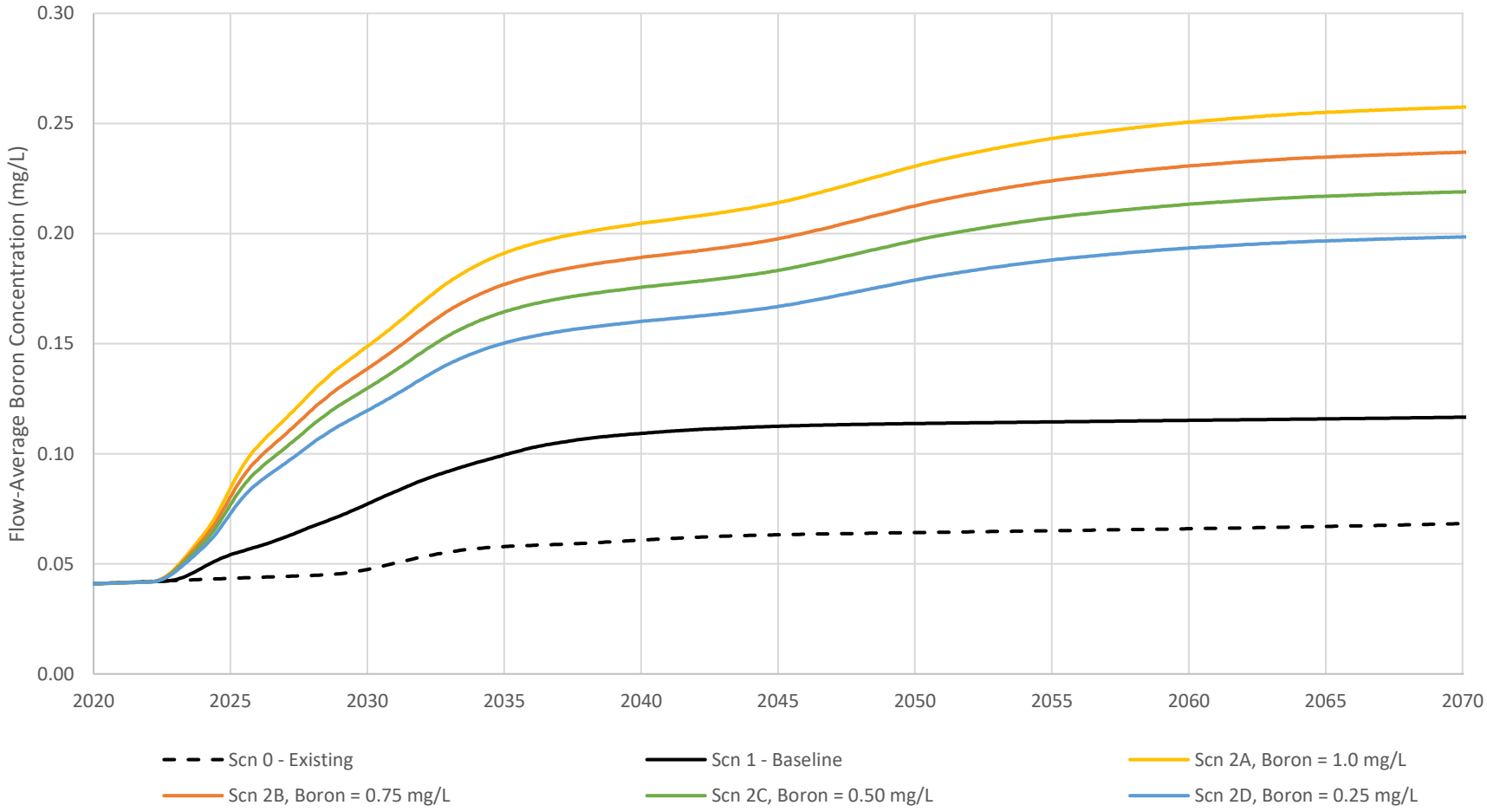

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Figure ES-2

Flow-Averaged Boron Concentrations at the DRWF Wells
Scenario 3A through 3D

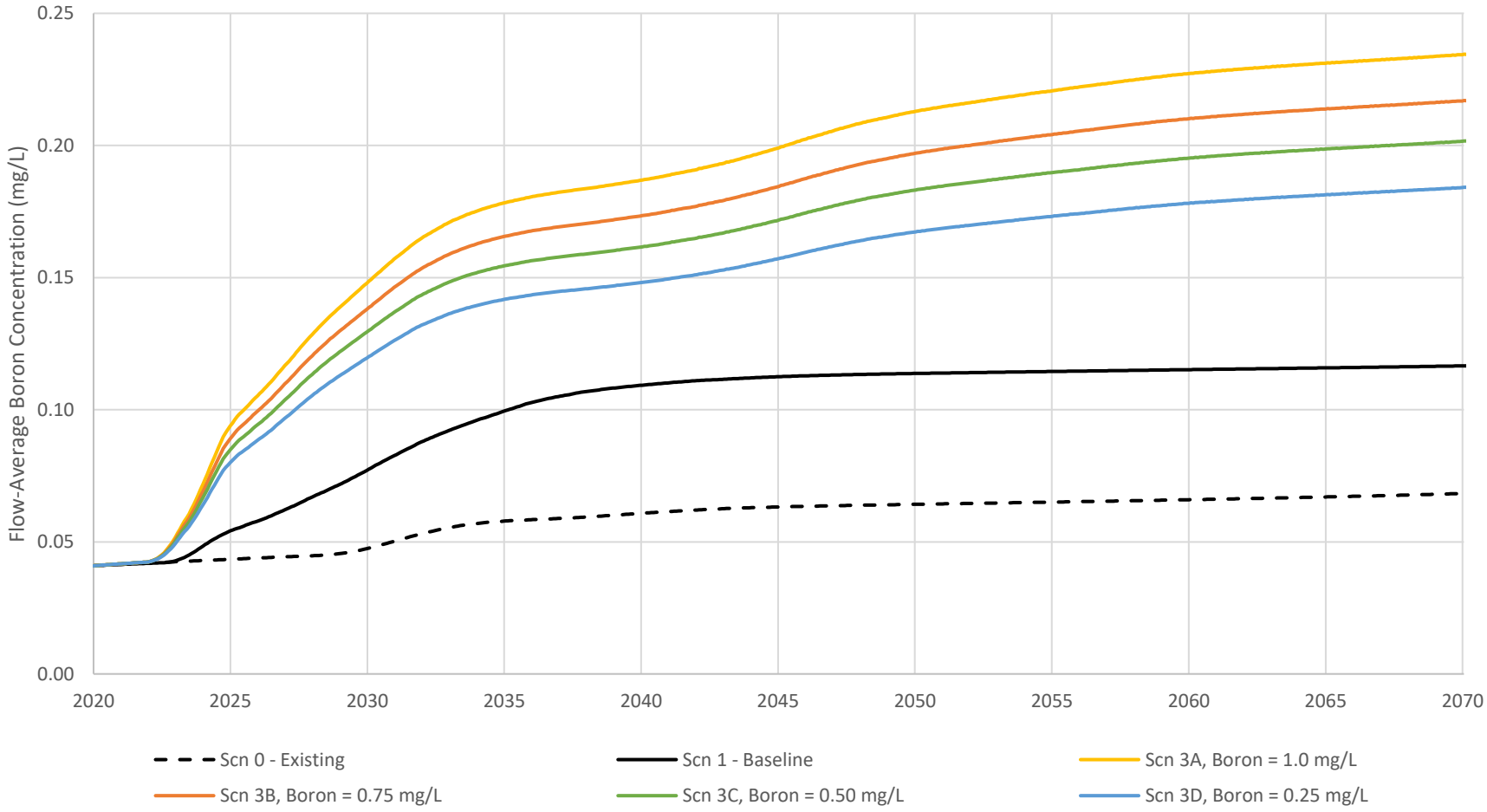

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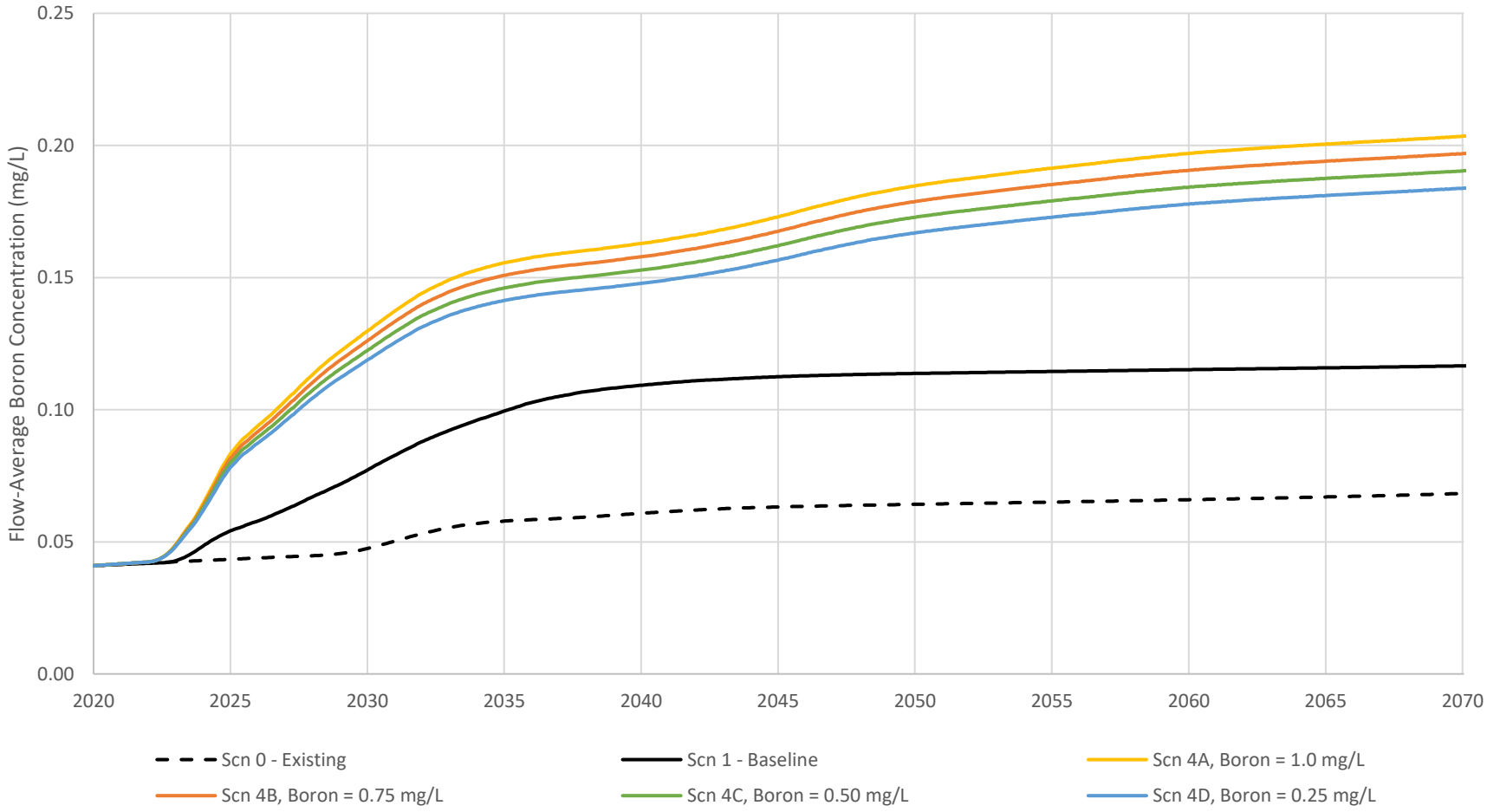
Figure ES-3

Flow-Averaged Boron Concentrations at the DRWF Wells
Scenario 4A through 4D



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1.0 Introduction

This report presents model-predicted groundwater quality impacts to the Orange County Aquifer, Irvine Ranch Water District's (IRWD's) Dyer Road Well Field (DRWF), other water producers, and private wells due to the Orange County Water District's (OCWD's) potential injection of desalinated seawater into the groundwater system via existing and proposed injection wells in Orange County, California. The desalinated seawater would come from the proposed Poseidon Seawater Desalination Plant (Poseidon Project) and used by a combination of aquifer recharge, in-lieu pumping near the coast, and surface water deliveries to South Orange County agencies. The constituents of concern (COCs) in the desalinated seawater evaluated in this draft report are: 1) total dissolved solids (TDS), 2) chloride, and 3) boron. The concentrations of these COCs from the Poseidon Project to be injected into the groundwater system exceed those from OCWD's Groundwater Replenishment System (GWRS) that is currently injecting water into the groundwater system. **Figure 1** presents an outline of the Orange County Groundwater Basin and the domain of the groundwater model used to analyze potential impacts to IRWD. **Figure 2** shows the model domain along with the location of existing and proposed injection wells along with IRWD's Dyer Road well field.

The analysis presented in this report is preliminary, as it is anticipated that the scenarios presented herein will be changed moving forward as OCWD refines its plans for the destination of the desalinated seawater. Once changes to the scenarios and model have been finalized, additional COCs may be evaluated and final results will be provided in a report to be submitted at a later date.

1.1 Groundwater Flow and Solute Transport Model

The most recent evaluation conducted by Thomas Harder & Company (TH&Co) involved the development and calibration of a numerical groundwater flow and solute transport model (GFSTM) for a portion of the Orange County Groundwater Basin (TH&Co, 2018). The GFSTM uses the following public-domain modeling codes:

- MODFLOW-2005 (United States Geologic Survey [USGS]) – this code is used to calculate groundwater elevations in response to hydrogeologic and hydraulic boundaries, and hydraulic boundaries;
- MODPATH (Version 6) (USGS) – this code uses the output from MODFLOW and user-specified porosity to predict groundwater flow pathlines and calculate time-series points along the groundwater flow pathlines; and
- MT3DMS (United States Army Corps of Engineers [USACOE]) – this code uses output from MODFLOW, user-specified porosity, along with user-specified initial, injected, and boundary COC concentrations to predict future COC concentrations.

Details regarding the GFSTM are provided in TH&Co (2018). The list below summarizes the primary features of the GFSTM as used in this analysis.

- The GFSTM is a 1-layer submodel of Orange County Water District's (OCWD's) basin-wide groundwater flow model for the Principal Aquifer and is used as described in TH&Co (2018) without modification, except for incorporation of various injection scenarios specified below, modification of injected COC concentrations in accordance with these scenarios, and interpolation of groundwater elevations and COC concentrations to establish continuous boundary conditions near the perimeter of the model domain.
- The GFSTM is configured as steady-state with respect to groundwater elevations (i.e., it is not configured to vary injection rates and extraction rates over time). As described in TH&Co (2018), this is accomplished by setting constant groundwater elevations near the perimeter of the model domain at average values measured from 2008 through 2015 and model-predicted calibrated values throughout the rest of the model domain in December 2015.
- Initial conditions with respect to COC concentrations are based on the most recent data available at various wells throughout the model area as shown on **Figures 3 through 5**. Fixed concentration boundary cells were collocated with the groundwater boundary wells (including 'control point' wells). Interpolated values obtained through kriging were used to establish the fixed concentrations for the control point wells and non-fixed concentrations throughout the rest of the model domain.
- With respect to solute transport, the GFSTM is steady-state in that the injection concentration is constant over time; however, it is transient in that it simulates concentration changes over time throughout the model area and – especially – at the Dyer Road Wellfield (DRWF) extraction wells.
- The solute transport portion of the GFSTM is configured to provide monthly concentrations at each DRWF extraction well for 50 years (January 2020 through December 2070). Depending on the proximity of a given DRWF extraction well to a concentration boundary condition, the model-predicted concentrations at the given well may or may not stabilize within the 50-year simulation period. That is, model-predicted concentrations at an extraction well located close to a concentration boundary condition are more likely to stabilize than an extraction well located far from a concentration boundary condition.

The GFSTM used for the 2018 analysis was modified for this analysis as follows:

- Model cells aligned between constant head and constant concentration boundary cells were designated as boundary cells using linear interpolation to provide spatially continuous boundaries;
- Unlike the 2018 analysis, well production rates are varied herein for each scenario described below in Section 3 to maintain the water balance; and

- Effective porosity, which was defined using a single value for the 2018 analysis, was defined as a function of hydraulic conductivity to provide an internally consistent model.

2.0 Objective

The objective of this analysis is to use the GFSTM to evaluate the potential impact Poseidon supplies could have on the quality of IRWD's potable and recycled water supply by comparing scenarios with Poseidon supplies to a baseline condition without Poseidon supplies. To this end, the results presented herein have been provided electronically to IRWD's water treatment engineering consulting firm (HDR) for use in HDR's Salt Balance Model (SBM) of IRWD's recycled water system.

3.0 Scenarios

The scenarios to be modeled are summarized in the table below.

		Poseidon Delivery (MGD)				
Scenario	**Description**	**Poseidon Water to OCWD**	**In Lieu Delivery to Coastal Pumpers[a]**	**Poseidon Water to South County**	**Total Poseidon Deliveries**	**GWRS Supplies**
0	Pre-Baseline	0	0	0	0	100
1	Baseline	0	0	0	0	130
2	100% Recharge	50	0	0	50	130
3	Recharge + Coastal In Lieu	39	11	0	50	130
4	Recharge + Coastal In Lieu + South County Delivery	29	11	10	50	130

a) "In lieu" means 'instead of pumping, coastal districts (specifically, Huntington Beach, Newport Beach, and Mesa Consolidated) will take delivery from Poseidon that will be used to decrease their overall pumping'.

The Poseidon deliveries are in the form of injected water for Scenario 2 and a combination of injected water and surface / pipeline deliveries for Scenarios 3 and 4. The injection wells include existing and proposed wells (from north to south) as follows:

- Ball Road Basin (3 injection wells);
- Arctic (1 injection well);
- Campesino Park (3 injection wells);
- Mid-Basin (MBIP) (5 injection wells, this total includes the four Centennial Park wells);
- Dyer Road (8 injection wells);
- Santa Ana River (SAR) (4 injection wells);
- Southeast Talbert Barrier (SETIB) (4 injection wells); and
- Talbert Barrier (TIB) (36 injection wells)[1].

Poseidon water was analyzed at different concentrations (designated by "a" and "b") for scenarios 2 through 4. Water quality concentrations by source are outlined in the table below:

[1] Several of the TIB injection wells are designed with multiple screened intervals. As such, previous reports state the TIB consists of 56 wells. The value of 36 reported here is based on the number of plan-view locations shown in OCWD, 2016 (Concept Report for the Distribution of Desalinated Water for Recharge), January 26th.

Source Water Quality (mg/L)[a]			
Source	**TDS**	**Chloride**	**Boron**
DRWF	257	21	0.17
GWRS	48	6	0.25
Poseidon "a"	350	100	1.00
Poseidon "b"	150	75	0.75

a) mg/L = milligrams per liter

Concentrations at the DRWF are based on the 2008 to 2012 averages for each COC. For the model runs conducted as part of this analysis, these average values are not used as initial conditions. Rather, interpolated values based primarily on 2016 data are used for the initial conditions. GWRS concentrations are based on the 2008 to 2015 averages for each COC. The Poseidon "a" and "b" are based on values reported in the 2015 Water Reliability Term Sheet addendum.

There is a total of seven model runs associated with different concentrations in the delivered water as specified in the table below:

		Concentration of Poseidon Delivery (mg/L)[a]		
Scenario	**Description**	**TDS**	**Chloride**	**Boron**
0	Pre-Baseline	0[b]		
1	Baseline	0[b]		
2a	100% Recharge	350	100	1.00
3a	Recharge + Coastal In Lieu	350	100	1.00
4a	Recharge + Coastal In Lieu + South County Delivery	350	100	1.00
2b	100% Recharge	150	75	0.75
3b	Recharge + Coastal In Lieu	150	75	0.75
4b	Recharge + Coastal In Lieu + South County Delivery	150	75	0.75

a) mg/L = milligrams per liter
b) The pre-baseline and baseline scenarios assume that all water to be delivered to OCWD is from their GWRS.

A summary of the sources of water delivered, along with COC concentrations therein, is provided in Tables 1a and 1b for each scenario. As shown in 'Note 2' of these tables, the difference between

the 'a' and 'b' scenarios is associated with the concentration of the COCs in the Poseidon water presented in the table above.

Well-specific injection and extraction rates and injected concentrations of the COCs used as input to the GFSTM are listed in the following tables:

- **Table 2a**: Scenario 0, Injection Wells
- **Table 2b**: Scenario 0, Extraction Wells
- **Table 3a**: Scenario 1, Injection Wells;
- **Table 3b**: Scenario 1, Extraction Wells;
- **Table 4**: Scenario 2a, Injection Wells;
- **Table 5**: Scenario 3a, Injection Wells;
- **Table 6**: Scenario 4a, Injection Wells;
- **Table 7**: Scenario 2b, Injection Wells;
- **Table 8**: Scenario 3b, Injection Wells;
- **Table 9**: Scenario 4b, Injection Wells;
- **Table 10**: Scenario 2 (2a and 2b), Extraction Wells;
- **Table 11**: Scenario 3 (3a and 3b), Extraction Wells;
- **Table 12**: Scenario 4 (4a and 4b), Extraction Wells.

The information provided in these tables are summarized below.

Scenario 0

- Injected water is from the existing (100 MGD) GWRS only (no Poseidon water is injected);
- 28 MGD is injected using the 36 Talbert Injection Barrier (TIB) wells and 1.6 MGD is injected using one Mid-Basin Injection Project (MBIP) well[2], which is located within the GFSTM domain;
- The total GWRS injection rate is therefore 29.6 MGD;
- The injection rates are uniform – that is, the injection rate for each TIB well is 0.78 MGD (28 MGD / 36 wells = 0.78 MGD per well) whereas it is 1.6 MGD at the MBIP well;
- The GWRS produces 100 MGD – the remaining 70.4 MGD (i.e., 100 MGD – 29.6 MGD = 70.4 MGD) is assumed to be delivered to recharge basins in the OCWD Forebay[3], which is outside (and north of) the GFSTM domain and therefore not modeled; and
- Because there is no blending of waters of different quality (i.e., only GWRS water is injected and no Poseidon water is injected), the concentrations of TDS, chloride, and boron are 48, 6, and 0.25 mg/L, respectively, as tabulated earlier in this section.

[2] The MBIP includes one operating injection well and the four Centennial Park injection wells.
[3] The Forebay recharge basins include Burris Basin, Santiago Basin, Kraemer Basin, Miller Basin, and Miraloma Basin - as well as La Palma Basin, which is currently under construction.

Scenario 1 (Baseline)

- Injected water is from the expanded (130 MGD) GWRS only (no Poseidon water is injected);
- 28 MGD is injected using the 36 Talbert Injection Barrier (TIB) wells and 8 MGD is injected using the 5 Mid-Basin Injection Project (MBIP) wells[4] – all of which are located within the GFSTM domain;
- The total GWRS injection rate is therefore 36 MGD;
- To maintain the water balance, the pumping rates for the extraction wells within the GFSTM domain are uniformly increased from the Scenario 0 values[5] to account for the additional water to be provided under the four new wells in Centennial Park (6.4 MGD)[6] such that they extract an additional 6.4 MGD[7];
- The injection rates are uniform – that is, the injection rate for each TIB well is 0.78 MGD (28 MGD / 36 wells = 0.78 MGD per well) whereas it is 1.6 MGD at each MBIP well (8 MGD / 5 wells = 1.6 MGD per well;
- The GWRS produces 130 MGD – the remaining 94 MGD (i.e., 130 MGD – 36 MGD = 94 MGD) is assumed to be delivered to recharge basins in the OCWD Forebay[8], which is outside (and north of) the GFSTM domain and therefore not modeled; and
- Because there is no blending of waters of different quality (i.e., only GWRS water is injected and no Poseidon water is injected), the concentrations of TDS, chloride, and boron are 48, 6, and 0.25 mg/L, respectively, as tabulated earlier in this section.

Scenario 2 (100% Recharge)

- Injected water is from the expanded (130 MGD) GWRS project and the potential (50 MGD) Poseidon project;
- Injected water is Poseidon water at the TIB and the SETIB and a blend of Poseidon water and GWRS water elsewhere;
- 28 MGD of Poseidon water is injected using the 36 TIB wells (i.e., 0.77 MGD per well) and 6 MGD of Poseidon water is injected using the 4 SETIB wells (i.e., 1.5 MGD per well);
- The remaining 16 MGD of Poseidon water (i.e., 50 MGD – 28 MGD – 6 MGD = 16 MGD) is blended with 130 MGD of GWRS water and this blend is injected at the proposed SAR, Dyer Road, and Campesino Park injection wells at a uniform rate of 1.5 MGD per well and the proposed Centennial Park injection wells at 1.6 MGD per well;

[4] The MBIP includes one operating injection well and the four Centennial Park injection wells.
[5] The Scenario 0 pumping (extraction) values are average values based on those provided by OCWD in their basin-wide groundwater flow model for the time period of July 2008 through December 2015.
[6] 4 wells x 1.6 MGD per well = 6.4 MGD.
[7] 10.3 MGD + 6.4 MGD = 16.7 MGD.
[8] The Forebay recharge basins include Burris Basin, Santiago Basin, Kraemer Basin, Miller Basin, and Miraloma Basin - as well as La Palma Basin, which is currently under construction.

- The balance of this blended water, which totals 115.5 MGD as shown in **Table 1a** and **Table 1b**, is discharged to the Arctic and Ball Road injection wells[9] and the Forebay recharge basins;
- To maintain the water balance, the pumping rates for the extraction wells within the GFSTM domain are uniformly increased such that they extract an additional 34.9 MGD to account for the Poseidon water delivered to the model area;
- Because there is no blending of waters of different quality for the TIB and SETIB (i.e., only Poseidon water is injected), the concentrations of TDS, chloride, and boron 48, 6, and 0.25 mg/L, respectively, as tabulated earlier in this section; and
- At all other locations, the injected water is a blend of Poseidon and GWRS water that is weighted based on 16 MGD of Poseidon water and 130 MGD of GWRS water (i.e., 16/146 Poseidon water and 130/146 GWRS water) and using the concentrations noted for the "a" and "b" scenarios.

Scenario 3 (Recharge and Coastal In Lieu)

- Injected water is from the expanded (130 MGD) GWRS project and the potential (50 MGD) Poseidon project;
- 11 MGD of Poseidon water is delivered as surface water in lieu of pumping to coastal districts;
- Injected water is Poseidon water at the TIB and the SETIB and a blend of Poseidon water and GWRS water elsewhere;
- 20 MGD of Poseidon water is injected using the 36 TIB wells (i.e., 0.56 MGD per well) and 3 MGD of Poseidon water is injected using the 4 SETIB wells (i.e., 0.75 MGD per well)[10];
- The remaining 16 MGD of Poseidon water (i.e., 50 MGD – 11 MGD - 20 MGD – 3 MGD = 16 MGD) is blended with 130 MGD of GWRS water and this blend is injected at the proposed SAR, Dyer Road, and Campesino Park injection wells at a uniform rate of 1.5 MGD per well and at the Centennial Park injection wells at 1.6 MGD per well;
- The balance of this blended water, which totals 115.5 MGD as shown in **Table 1a** and **Table 1b**, is discharged to the Arctic and Ball Road injection wells and the Forebay recharge basins;
- To maintain the water balance, the pumping rates for the extraction wells within the GFSTM domain are uniformly increased such that they extract an additional 34.9 MGD to account for the Poseidon water delivered to the model area;

[9] The Ball Road and Arctic injection wells are outside the GFSTM domain and are therefore not modeled here. Based on discussions between IRWD and OCWD, it was communicated to TH&Co that injection take place at the southernmost injection wells (e.g., the SAR injection wells) and proceed northward (i.e., the Campesino Park wells) as needed for all scenarios.

[10] Based on discussions between IRWD and OCWD, it was communicated to TH&Co that injection at the TIB and SETIB should be reduced under in lieu conditions to provide a more realistic simulation.

- Because there is no blending of waters of different quality for the TIB and SETIB (i.e., only Poseidon water is injected), the concentrations of TDS, chloride, and boron 48, 6, and 0.25 mg/L, respectively, as tabulated earlier in this section; and
- At all other locations, the injected water is a blend of Poseidon and GWRS water that is weighted based on 16 MGD of Poseidon water and 130 MGD of GWRS water (i.e., 16/146 Poseidon water and 130/146 GWRS water).

Scenario 4 (Recharge, Coastal In Lieu, and South County Delivery)

- This scenario is identical to Scenario 3 except 10 MGD of Poseidon water is delivered out of the model area to South County (e.g., Santa Margarita Water District, Moulton Niguel Water District, and El Toro Water District);
- As such, only 6 MGD of Poseidon water (as opposed to the 16 MGD of Poseidon water associated with Scenario 3) remains to be blended with GWRS water and the blend is injected at the proposed SAR, Dyer Road, and Campesino Park injection wells at the same rates as for Scenario 3. The balance of this blended water, which totals 105.5 MGD as shown in **Table 1a** and **Table 1b** (i.e., 10 MGD less than the balance associated with Scenario 3) is discharged to the Arctic and Ball Road injection wells and the Forebay recharge basins;
- In contrast to Scenario 3, at all other locations, the injected water is a blend of Poseidon and GWRS water that is weighted based on 6 MGD of Poseidon water and 130 MGD of GWRS water (i.e., 6/136 Poseidon water and 130/136 GWRS water).

With respect to maintaining the water balance as noted in the summaries above, the user-specified extraction rates for all wells in the GFSTM for all scenarios are shown on **Figures 6 through 16**. It is noted that a) well production rates vary in each scenario to maintain the water balance and b) the increase in pumping for each scenario is equivalent to the increase in recharge. A comparison of total pumping by producer for each scenario is summarized in **Table 13**. This table shows the change in pumping rates relative to Scenario 1.

4.0 Results

The model results are presented in this section in the form of:

1. Groundwater budgets;
2. Groundwater flow pathlines;
3. Concentration versus time graphs for the individual DRWF extraction wells ('individual breakthrough curves');
4. Concentration versus time graphs for the entire DRWF based on flow-averaged concentrations from the individual DRWF extraction wells ('flow-averaged breakthrough curves'); and
5. Color floods showing the distribution of the COCs 50 years into the simulation period (t = 50 years).

4.1 Groundwater Budgets

Groundwater budgets for each scenario were created to summarize the major sources of groundwater inflow and outflow to the model area. As shown on **Table 14**, there is a net inflow of groundwater from the north, south, and east and a net outflow of groundwater to the west. Within the Study Area, the two largest groundwater producers are IRWD and the City of Santa Ana.

4.2 Groundwater Flow Pathlines

Forward particle tracking was used to assess the ultimate destination of injected water injected (i.e., groundwater flow pathlines). The groundwater flow pathlines and time markers for injected water along with model-predicted steady-state groundwater elevations for each scenario are shown on the following figures:

- Figure 17: Scenario 0 (Injection at TIB and one MBIP injection well only);
- Figure 18: Scenario 1 (injection at TIB and all five MBIP injections wells only);
- Figure 19: Scenario 2 (injection at TIB, SETIB, MBIP, SAR, Dyer Road, and the Campesino Park injection wells);
- Figure 20: Scenario 3 (injection at TIB, SETIB, MBIP, SAR, Dyer Road, and the Campesino Park injection wells); and
- Figure 21: Scenario 4 (injection at TIB, SETIB, MBIP, SAR, Dyer Road, And the Campesino Park injection wells).

Because the COCs are considered conservative (non-sorbing and non-reactive), the pathlines and time markers are identical for all COCs. For simplicity, a single particle placed at the center of each injection well is used for these simulations.

Figure 17 shows the following for Scenario 0:

- water injected at MBIP-IW-1 is captured by DRWF extraction well IRWD-17-1;
- travel time from the MBIP to the DRWF extraction well is between 10 and 15 years;
- water injected at the TIB is mostly captured by intervening extraction wells between the TIB and the DRWF extraction wells but some reaches IRWD-7-1 (the southwestern most DRWF extraction well), IRWD-13-1, and IRWD 14-1;
- the travel time from the TIB to IRWD-7-1 and IRWD-14-1 exceeds 80 years; and
- the travel time from the TIB to IRWD-13-1 is between 70 and 80 years.

Figure 18 shows the following for Scenario 1:

- water injected at the MBIP is captured by DRWF extraction wells;
- travel times from the MBIP to the DRWF extraction wells range from greater than 2 years to less than 15 years;
- water injected at the TIB is mostly captured by intervening extraction wells between the TIB and the DRWF extraction wells but some reaches IRWD-7-1 (the southwestern most DRWF extraction well); and
- the travel time from the TIB to IRWD-7-1 exceeds 80 years.

Figure 19 shows the following for Scenario 2:

- water injected at the MBIP, SAR, and Dyer Road injection wells is captured by DRWF extraction wells;
- travel times from the MBIP to the DRWF extraction wells range from greater than 2 years to less than 40 years;
- travel times from the SAR to the DRWF extraction wells range from 5 years to less than 10 years;
- travel times from the Dyer Road injection wells to the DRWF extraction wells range from greater than 5 years to less than 70 years;
- water injected at the Campesino Park injection wells does not reach the DRWF; and
- water injected at the TIB and SETIB is captured by intervening extraction wells between the injection barrier wells and the DRWF extraction wells, and otherwise does not reach the DRWF within 80 years.

Figure 20 shows the following for Scenario 3:

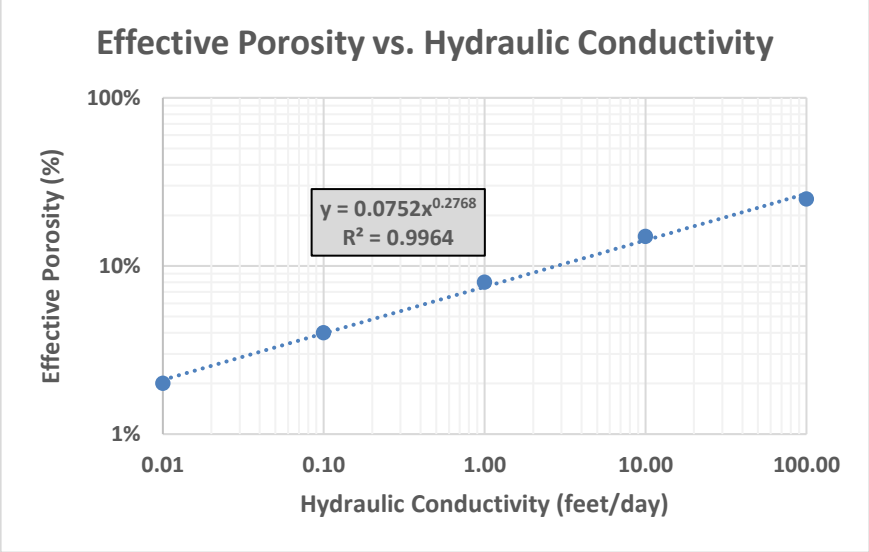
- water injected at the MBIP, SAR, Dyer Road, and one of the three Campesino Park injection wells is captured by DRWF extraction wells (extraction wells south of the easternmost and westernmost Campesino Park injection wells also capture injected water);
- travel times from the MBIP to the DRWF extraction wells range from greater than 2 years to less than 30 years;

- travel times from the SAR to the DRWF extraction wells range from greater than 2 years to less than 5 years;
- travel times from the Dyer Road injection wells to the DRWF extraction wells range from greater than 5 years to less than 60 years;
- travel times from the Campesino Park injection wells to the DRWF extraction wells range from greater than 70 years to less than 80 years;
- water injected at the TIB is mostly captured by intervening extraction wells between the TIB and the DRWF extraction wells but some reaches IRWD-7-1 (the southwestern most DRWF extraction well) and IRWD-13-1;
- travel times from the TIB to IRWD-7-1 range from greater than 50 years to less than 80 years
- travel times from the TIB to IRWD-13-1 are greater than 70 years; and
- water injected at the SETIB is captured by intervening extraction wells between the SETIB and the DRWF extraction wells.

Figure 21 shows the following for Scenario 4:

- water injected at the MBIP, SAR, Dyer Road, and one of the three Campesino Park injection wells is captured by DRWF extraction wells (extraction wells south of the easternmost and westernmost Campesino Park injection wells also capture injected water);
- travel times from the MBIP to the DRWF extraction wells range from greater than 2 years to less than 30 years;
- travel times from the SAR to the DRWF extraction wells range from greater than 2 years to less than 5 years;
- travel times from the Dyer Road injection wells to the DRWF extraction wells range from greater than 5 years to less than 60 years;
- travel times from the Campesino Park injection well to the DRWF extraction wells range from greater than 70 years to less than 80 years.
- water injected at the TIB is mostly captured by intervening extraction wells between the TIB and the DRWF extraction wells but some reaches IRWD-7-1 (the southwestern most DRWF extraction well) and IRWD-13-1;
- travel times from the TIB to IRWD-7-1 are greater than 50 years and less than 80 years;
- travel times from the TIB to IRWD-13-1 are greater than 70 years; and
- water injected at the SETIB is captured by intervening extraction wells between the SETIB and the DRWF extraction wells.

The travel times are based in part on uncertain values of effective porosity that are an assumed function of hydraulic conductivity (the values of which are also uncertain). The assumed function used for this analysis is shown below.



Given the range of hydraulic conductivities in the GFSTM (approximately 1 to 100 feet/day)[11], the effective porosity values range from 0.09 to 0.26 (i.e., 9 to 26%).

The travel times (t_t) in years from the various injection systems to the DRWF extraction wells are summarized in the table below.

System	Scenario 0	Scenario 1	Scenario 2(a,b)	Scenario 3(a,b)	Scenario 4(a,b)
MBIP	$10 < t_t < 15$[a]	$2 < t_t < 15$	$2 < t_t < 40$	$2 < t_t < 30$	$2 < t_t < 30$
TIB	$70 < t_t < 80$[b] $t_t > 80$[c,d]	$t_t > 80$[c]	Not captured	$t_t > 70$[b] $50 < t_t < 80$[c]	$t_t > 70$[b] $50 < t_t < 80$[c]
SETIB	Inactive	Inactive	Not captured	Not captured	Not captured
SAR	Inactive	Inactive	$5 < t_t < 10$	$2 < t_t < 5$	$2 < t_t < 5$
Dyer Road	Inactive	Inactive	$5 < t_t < 70$	$5 < t_t < 60$	$5 < t_t < 60$
Campesino Park	Inactive	Inactive	Not captured	$70 < t_t < 80$	$70 < t_t < 80$

[a] Only one MBIP well is active.
[b] For IRWD-13-1.
[c] For IRWD-7-1.
[d] For IRWD-14-1.

As noted earlier, the model consists of a single layer to simulate the Principal Aquifer. In actuality, the Principal Aquifer consists of several interbedded thinner aquifers and aquitards that have been grouped together for the OCWD groundwater flow model (and, therefore, the GFSTM). These thinner aquifers include (in order of shallowest to deepest) the Beta, Lambda, Omicron, Upper

[11] The OCWD basin model on which the GFSTM is based uses transmissivity for the modeled layer. Therefore, hydraulic conductivity is calculated as the ratio of transmissivity to layer thickness for this analysis.

Rho, Lower Rho, and Main aquifers. The hydraulic conductivity values used in the GFSTM (based on the OCWD model) are thickness-weighted average values. That is, the higher hydraulic conductivity values associated with the thinner aquifers - which control the lateral transport of COCs from the various injection areas to the DWRF – are effectively muted by the single-layer approach. Therefore, the model-predicted travel times reported above are likely overestimates – the actual travel times may be considerably shorter.

4.3 Groundwater Elevations

OCWD has identified three major aquifer systems within the Basin: the Shallow Aquifer, the Principal Aquifer, and the Deep Aquifer. These three major aquifers are separated by regionally extensive confining layers. The Principal Aquifer underlies the Shallow Aquifer and consists of interbedded thinner aquifers and aquitards. Over 90 percent of groundwater production from the Basin occurs from wells that are screened within the Principal Aquifer (OCWD, 2015). A more detailed description of these aquifers is presented in TH&Co, 2018.

Analysis of the groundwater elevations for each scenario shows that groundwater elevations in the Principal Aquifer are not above land surface (i.e. flowing artesian). However, throughout most of the model area, the groundwater elevations are above the top of the confining layer (i.e. artesian). This indicates that the groundwater is artesian, but not flowing artesian.

4.4 Individual and Flow-Averaged Breakthrough Curves

The model-predicted individual breakthrough curves for TDS, chloride, and boron for each of the DRWF extraction wells are shown on the following figures:

- Figure 22a, b, and c: TDS, chloride, and boron for Scenario 0;
- Figure 23a, b, and c: TDS, chloride, and boron for Scenario 1;
- Figure 24a, b, and c: TDS, chloride, and boron for Scenario 2a;
- Figure 25a, b, and c: TDS, chloride, and boron for Scenario 3a;
- Figure 26a, b, and c: TDS, chloride, and boron for Scenario 4a;
- Figure 27a, b, and c: TDS, chloride, and boron for Scenario 2b;
- Figure 28a, b, and c: TDS, chloride, and boron for Scenario 3b; and
- Figure 29a, b, and c: TDS, chloride, and boron for Scenario 4b.

The flow-averaged breakthrough curves for TDS, chloride, and boron for the DRWF extraction wells are also prominently shown on these figures as the thick black line and are based on the following equation (using TDS as an example)[12]:

[12] This equation is also used for chloride and boron.

$$C_{TDS}(t) = \frac{C_{TDS,DRWF-1}(t) \times Q_{DRWF-1} + C_{TDS,DRWF-2}(t) \times Q_{DRWF-2} + \cdots + C_{TDS,DRWF-16}(t) \times Q_{DRWF-16}}{Q_{DRWF-1} + Q_{DRWF-2} + \cdots + Q_{DRWF-16}}$$

where:

$C_{TDS}(t)$ = model-predicted concentration of TDS in the pipeline from the DRWF to the treatment plant at time t;
$C_{TDS,DRWF-1}(t)$ = model-predicted concentration of TDS at the first of the sixteen[13] DRWF extraction wells at time t;
$C_{TDS,DRWF-2}(t)$ = model-predicted concentration of TDS at the second of the sixteen DRWF extraction wells at time t;
$C_{TDS,DRWF-16}(t)$ = model-predicted concentration of TDS at the last of the sixteen DRWF extraction wells at time t;
Q_{DRWF-1} = user-specified extraction rate[14] at the first of the sixteen DRWF extraction wells at time t;
Q_{DRWF-2} = user-specified extraction rate at the second of the sixteen DRWF extraction wells at time t;
$Q_{DRWF-16}$ = user-specified extraction rate at the last of the sixteen DRWF extraction wells at time t.

Note that Q is not a function of time for any extraction or injection wells in the GFSTM. That is, all wells extract or inject water at a constant rate throughout the simulation as noted earlier (and shown on **Figure 8** for the DRWF extraction wells).

The figures generally show that, for some wells, the concentrations stabilize (i.e., concentrations do not change with time as shown as the horizontal portion of the concentration versus time plot). For some wells (e.g., IRWD-3-1, IRWD-5-1, IRWD-6-1), this stabilization is an artifact of the distance of the well to a perimeter constant concentration boundary and the simulation run time. In other cases, the predicted stabilization is more realistically associated with wells located close to one or more injection wells (e.g., IRWD-12-1, IRWD 14-1, IRWD 17-1; all of which are located close to the MBIP and SAR injection wells). Other wells more distant from constant concentration boundary wells or injection wells do not stabilize during the simulation run time but, in theory, would eventually stabilize if the simulation time was extended.

The pathline analysis above reports the travel time from the MBIP to the DRWF extraction wells to be 2 to 15 years in Scenario 1. The midpoint of the sloped portion of the TDS breakthrough curve (**Figure 23a**), which is a common approach taken to quantify travel time, for Scenario 1 for IRWD-12-1 occurs at approximately 5 years. Therefore, the breakthrough curve figures are in reasonable agreement with the pathline figures with respect to travel time.

[13] The DRWF extraction wells in the model are: IRWD-1 through IRWD-7 and IRWD-10 through IRWD-18.
[14] Q is not a function of time for any extraction or injection wells in the GFSTM. That is, all wells extract or inject water at a constant rate throughout the simulation.

Total DRWF COC concentrations in 2070, relative to the baseline (Scenario 1), are summarized in **Table 15**. TDS concentrations for Scenarios 2, 3, and 4 are lower than the baseline. Chloride concentrations are also lower than the baseline but the difference is less notable compared to TDS. Boron concentrations are significantly higher than the baseline (see **Figures 30 through 35).**

The following table summarizes the model-predicted TDS, chloride, and boron concentrations for the flow-averaged DRWF extraction wells at the start and end of each scenario:

Scenario	TDS (mg/L)		Chloride (mg/L)		Boron (mg/L)	
	2020	2070	2020	2070	2020	2070
Scenario 0	294	298	24	29	0.04	0.07
Scenario 1		236		23		0.12
Scenario 2a		155		22		0.25
Scenario 3a		175		23		0.23
Scenario 4a		163		19		0.20
Scenario 2b		139		20		0.25
Scenario 3b		161		21		0.23
Scenario 4b		157		18		0.20

Flow-averaged COC breakthrough curves were also generated for the major producers within the model area (i.e., Fountain Valley, Huntington Beach, Mesa Verde, Mesa Water District, Newport Beach, Orange County Water District, Santa Ana, Tustin, and Westminster) (see **Appendix A**; **Figures A-1 through A-28b**) and five private wells (see **Appendix B**; **Figures B-1 through B-16b**).

Percent increase values relative to Scenario 1 are shown on **Table A-1**. In general, COC concentrations in wells operated by Mesa Verde, Mesa Water District, Newport Beach, and Orange County Water District are predicted to increase due to injection at the Talbert Barrier. Similarly, concentrations of chloride and boron are predicted to increase in Huntington Beach production wells and boron is predicted to increase in Fountain Valley production wells.

Chloride and boron concentrations are predicted to increase in three of the five private wells (SCSH-SA1-1, SACC-SA-1, and MTSN-SA-1). The most significant increases are predicted for SACC-SA-1, in which TDS is also projected to increase.

4.5 Concentration Color Flood Maps

Color flood maps showing the concentrations for the COCs in each scenario 50 years into the simulation (year 2070) are shown on **Figures 36 through Figures 43**. For Scenarios 0 and 1, the comparatively low TDS and chloride GWRS water and comparatively high boron concentration GWRS water is visible at the TIB and MBIP wells. Conversely, for Scenarios 2, 3, and 4, the impact of high TDS, chloride, and boron concentrations is clearly visible surrounding the TIB and SETIB wells. The lower TDS and chloride concentrations brought about by injecting a blend of high concentration Poseidon water with low concentration GWRS water is visible at the remaining injection wells closer to, and north of, the DWRF. Similarly, the higher boron concentrations delivered to these remaining injection wells are also visible.

5.0 Summary and Conclusions

Based on the information and analyses presented herein, the following conclusions have been developed:

- The Poseidon Project would generate 50 MGD of desalinated seawater, which would be injected into the groundwater system via existing and proposed injection wells or delivered directly to meet municipal demand.
- The concentrations of TDS, chloride, and boron of the water to be injected are greater than those of the existing GWRS.
- The increased injection of the GWRS expansion and Poseidon Project needs to be offset by a relatively equal amount of groundwater production to avoid adverse conditions.
- An analysis of groundwater flow pathlines and travel times indicates travel times from the injection wells to the DRWF range from greater than 2 years to greater than 80 years depending on the scenario. Further, baseline conditions (Scenarios 0 and 1) show lower contributions of injected water reaching the DRWF compared to Poseidon Project conditions (Scenarios 2a through 4b).
- Analysis of the groundwater elevations for each scenario shows that the additional groundwater pumping associated with each scenario results in groundwater elevations in the Principal Aquifer below land surface (i.e. they are not flowing artesian).
- From a water quality standpoint, the proposed project serves to reduce TDS and chloride concentrations at the DRWF whereas it serves to significantly increase boron concentrations. This is based on the proposed project as configured in this analysis, wherein it is assumed the TIB and SETIB inject solely Poseidon water and no GWRS water.
- If GWRS water or a blend of Poseidon water and GWRS water is used at the TIB and SETIB, model-predicted concentrations of all three COCs at the DRWF would be higher than those presented here due to the higher percentage of Poseidon water that would be delivered to the various other injection wells (i.e., the SAR, MBIP, Dyer Road, and Campesino Park injection wells). That is, the blended water in the delivery pipeline would contain higher concentrations of TDS, chloride, and boron than that assumed in this analysis.
- The predicted negative impact on the DRWF with respect to boron concentrations is apparent in the breakthrough curve figures (**Figure 32** for the higher concentration "A" scenarios and **Figure 35** for the lower concentration "B" scenarios), the color flood figures (**Figures 38c, 39c, and 40c** for the higher concentration "A" scenarios and **Figures 41c, 42c, and 43c** for the lower concentration "B" scenarios), and the summary table (**Table 15**).
- The boron results are consistent with a Technical Memorandum prepared for OCWD by Trussel Technologies, Inc. (4/13/2016) that "recommended that OCWD pursue resolution

of the issue in three parallel paths: 1) propose a stricter boron standard on the desalter, 2) conduct a study on the impacts of boron and chloride changes on horticulture in the area and 3) conduct a study on long-term projections on of boron levels in the aquifer given increased boron imports".

- The proposed boron injection concentrations for both the higher concentration "A" scenario (1 mg/L) and lower concentration "B" scenario both exceed 0.5 mg/L – the concentration above which injury to citrus trees occurs (Grattan, 2013). The higher concentration "A" scenario value equals both the most recent (August 2019) human health risk-based Notification Level of 1 mg/L (California State Water Resources Control Board, 2019) and the level above which injury is apt to be fairly pronounced (Grattan, 2013).
- The composite flows and COC concentrations to IRWD's Dyer Road well field presented in **Figures 30 through 35** have been provided to HDR for use in a Salt Balance Model in order to estimate the potential impact of changes to Dyer Road well field water quality to IRWD's recycled water quality.

In consideration of the conclusions made for this study, the following recommendations are provided to further study the proposed project scenarios. These recommendations are based on our observations of the assumptions used for the project scenarios.

- With respect to groundwater extraction, the increase in pumping required to offset the GWRS expansion of 30 MGD and the additional 50 MGD associated with the Poseidon project is significant and, for some scenarios, would allow a groundwater producer to approach their demand by requiring a Basin Pumping Percentage of 90% to 95%. It is recommended to conduct a feasibility analysis of the potential increased pumping (e.g., through use of higher capacity pumps in the existing wells and/or additional extraction wells).
- With respect to groundwater injection, much of the Poseidon water is used at the existing Talbert and proposed South East Talbert injection sites. This results in other existing (Mid Basin) and proposed (Centennial Park, SAR, Dyer Road and Campesino Park) injection wells accommodating a relatively small percentage of the Poseidon water. Therefore, it is recommended to conduct a feasibility analysis of the additional water that would have to be transferred to the Forebay. The analysis should consider the availability of recharge basin storage and aquifer storage during both wet and dry periods.
- Recent discussions with OCWD revealed that ten production wells, currently operative in the GFSTM, have recently been removed from service. Based on the locations of these now now-operative wells, it is anticipated that two of these wells (OCWD-D5-1 and MCWD-8-1) would likely cause noticeable changes to the predictions presented herein if removed from the model. Both wells pump at comparatively high rates and capture TIB, SETIB, and high COC concentration water. Therefore, upon removal from the model, it is expected that COC concentrations in the southwestern portion of the DRWF will be

projected to increase. It is recommended that these wells be removed from the GFSTM for any future analyses to not underpredict the impact to the DRWF.

6.0 References

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Tables

Summary of "a" Model Runs

Scenario	System[1]	Delivered Water (MGD)							Flow-averaged Concentration (mg/L)[2]		
		GWRS	GWRS Subtotal	Poseidon	Poseidon Subtotal	GWRS / Poseidon Blend	GWRS / Poseidon Blend Subtotal	Total	TDS	Chloride	Boron
0	TIB	28	100	0	0	0	0	100	48	6	0.25
	MBIP	1.6		0		0			48	6	0.25
	Proposed IWs (model area)	0		0		0			-	-	-
	to the Forebay and northern IWs	70.4		0		0			-	-	-
	Coastal Pumpers	0		0		0			-	-	-
	South County	0		0		0			-	-	-
1	TIB	28	130	0	0	0	0	130	48	6	0.25
	MBIP	8		0		0			48	6	0.25
	Proposed IWs (model area)	0		0		0			-	-	-
	to the Forebay and northern IWs	94		0		0			-	-	-
	Coastal Pumpers	0		0		0			-	-	-
	South County	0		0		0			-	-	-
2a	TIB + SETIB	0	0	34	34	0	146	180	350	100	1.00
	MBIP	0		0		8			81	16	0.33
	Proposed IWs (model area)	0		0		22.5			81	16	0.33
	to the Forebay and northern IWs	0		0		115.5			81	16	0.33
	Coastal Pumpers	0		0		0			-	-	-
	South County	0		0		0			-	-	-
3a	TIB + SETIB	0	0	23	34	0	146	180	350	100	1.00
	MBIP	0		0		8			81	16	0.33
	Proposed IWs (model area)	0		0		22.5			81	16	0.33
	to the Forebay and northern IWs	0		0		115.5			81	16	0.33
	Coastal Pumpers	0		11		0			350	100	1.00
	South County	0		0		0			-	-	-
4a	TIB + SETIB	0	0	23	44	0	136	180	350	100	1.00
	MBIP	0		0		8			61	10	0.28
	Proposed IWs (model area)	0		0		22.5			61	10	0.28
	to the Forebay and northern IWs	0		0		105.5			61	10	0.28
	Coastal Pumpers	0		11		0			350	100	1.00
	South County	0		10		0			350	100	1.00

Note:

[1] "TIB" = Talbert Injection Barrier; "SETIB" = proposed Southeast Talbert Injection Barrier; "MBIP" = existing MBIP well and the four Centennial Park wells; "IWs" = injection wells; model IWs = SAR, Dyer Road, and Campesino Park; northern IWs = Arctic and Ball Road

[2] GWRS and Poseidon concentrations in milligrams per liter are as follows:

GWRS TDS	**48**	Poseidon TDS	**350**
GWRS Chloride	**6**	Poseidon Chloride	**100**
GWRS Boron	**0.25**	Poseidon Boron	**1.00**

Summary of "b" Model Runs

Scenario	System[1]	Delivered Water (MGD)							Flow-averaged Concentration (mg/L)[2]		
		GWRS	GWRS Subtotal	Poseidon	Poseidon Subtotal	GWRS / Poseidon Blend	GWRS / Poseidon Blend Subtotal	Total	TDS	Chloride	Boron
0	TIB	28	100	0	0	0	0	100	48	6	0.25
	MBIP	1.6		0		0			48	6	0.25
	Proposed IWs (model area)	0		0		0			-	-	-
	to the Forebay and northern IWs	70.4		0		0			-	-	-
	Coastal Pumpers	0		0		0			-	-	-
	South County	0		0		0			-	-	-
1	TIB	28	130	0	0	0	0	130	48	6	0.25
	MBIP	8		0		0			48	6	0.25
	Proposed IWs (model area)	0		0		0			-	-	-
	to the Forebay and northern IWs	94		0		0			-	-	-
	Coastal Pumpers	0		0		0			-	-	-
	South County	0		0		0			-	-	-
2b	TIB + SETIB	0	0	34	34	0	146	180	150	75	0.75
	MBIP	0		0		8			59	14	0.30
	Proposed IWs (model area)	0		0		22.5			59	14	0.30
	to the Forebay and northern IWs	0		0		115.5			59	14	0.30
	Coastal Pumpers	0		0		0			-	-	-
	South County	0		0		0			-	-	-
3b	TIB + SETIB	0	0	23	34	0	146	180	150	75	0.75
	MBIP	0		0		8			59	14	0.30
	Proposed IWs (model area)	0		0		22.5			59	14	0.30
	to the Forebay and northern IWs	0		0		115.5			59	14	0.30
	Coastal Pumpers	0		11		0			350	100	1.00
	South County	0		0		0			-	-	-
4b	TIB + SETIB	0	0	23	44	0	136	180	150	75	0.75
	MBIP	0		0		8			53	9	0.27
	Proposed IWs (model area)	0		0		22.5			53	9	0.27
	to the Forebay and northern IWs	0		0		105.5			53	9	0.27
	Coastal Pumpers	0		11		0			150	75	0.75
	South County	0		10		0			150	75	0.75

Note:

[1] "TIB" = Talbert Injection Barrier; "SETIB" = proposed Southeast Talbert Injection Barrier; "MBIP" = existing MBIP well and the four Centennial Park wells; "IWs" = injection wells; model IWs = SAR, Dyer Road, and Campesino Park; northern IWs = Arctic and Ball Road

[2] GWRS and Poseidon concentrations in milligrams per liter are as follows:

GWRS TDS	**48**	Poseidon TDS	**150**
GWRS Chloride	**6**	Poseidon Chloride	**75**
GWRS Boron	**0.25**	Poseidon Boron	**0.75**

Scenario 0 - Injection Well Summary

System	Well	In Model Area	Source	Pumping Rate[1,2]			Modified Pumping Rate[3]		Scenario 0 assumes 100% GWRS water[4] Injection Concentrations (mg/L)		
				MGD	acre-ft/yr	ft^3/d	MGD	ft^3/d	TDS	Chloride	Boron
TIB	I1	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I2	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I3	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I4	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I5	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I6	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I7	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I8	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I9	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I10	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I11	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I12	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I13	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I14	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I15	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I16	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I17	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I18	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I19	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I20	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I21	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I22	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I23	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I24	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I25	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I26C	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I27	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I28	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I29	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I30	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I31	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I32	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I33A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I34A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I35A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I36A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
SETIB	SETIB-IW-1	Yes	OCWD, 2016 - Figure 8	**0**	**0**	**0**	**0**	**0**	-	-	-
SETIB	SETIB-IW-2	Yes	OCWD, 2016 - Figure 8	**0**	**0**	**0**	**0**	**0**	-	-	-
SETIB	SETIB-IW-3	Yes	OCWD, 2016 - Figure 8	**0**	**0**	**0**	**0**	**0**	-	-	-

Scenario 0 - Injection Well Summary

System	Well	In Model Area	Source	Pumping Rate[1,2]			Modified Pumping Rate[3]		Scenario 0 assumes 100% GWRS water[4] Injection Concentrations (mg/L)		
				MGD	acre-ft/yr	ft^3/d	MGD	ft^3/d	TDS	Chloride	Boron
SETIB	SETIB-IW-4	Yes	OCWD, 2016 - Figure 8	**0**	**0**	**0**	**0**	**0**	-	-	-
SAR	SAR-1	Yes	OCWD, 2016 - Figure 10	**0**	**0**	**0**	**0**	**0**	-	-	-
SAR	SAR-2	Yes	OCWD, 2016 - Figure 10	**0**	**0**	**0**	**0**	**0**	-	-	-
SAR	SAR-3	Yes	OCWD, 2016 - Figure 10	**0**	**0**	**0**	**0**	**0**	-	-	-
SAR	SAR-4	Yes	OCWD, 2016 - Figure 10	**0**	**0**	**0**	**0**	**0**	-	-	-
Mid-Basin	MBIP-IW-1	Yes	OCWD, 2016 - Figure 7	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**48**	**6**	**0.25**
Mid-Basin (Centennial Park)	MBIP-IW-2	Yes	Existing condition	**0**	**0**	**0**	**0**	**0**	-	-	-
Mid-Basin (Centennial Park)	MBIP-IW-3	Yes	Existing condition	**0**	**0**	**0**	**0**	**0**	-	-	-
Mid-Basin (Centennial Park)	MBIP-IW-4	Yes	Existing condition	**0**	**0**	**0**	**0**	**0**	-	-	-
Mid-Basin (Centennial Park)	MBIP-IW-5	Yes	Existing condition	**0**	**0**	**0**	**0**	**0**	-	-	-
Dyer Rd. IWs	E1	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Dyer Rd. IWs	E2	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Dyer Rd. IWs	E3	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Dyer Rd. IWs	E4	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Dyer Rd. IWs	E5	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Dyer Rd. IWs	E6	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Dyer Rd. IWs	E7	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Dyer Rd. IWs	E8	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Campesino Park	CP-IW-1	Yes	OCWD, 2016 - Figure 12	**0**	**0**	**0**	**0**	**0**	-	-	-
Campesino Park	CP-IW-2	Yes	OCWD, 2016 - Figure 12	**0**	**0**	**0**	**0**	**0**	-	-	-
Campesino Park	CP-IW-3	Yes	OCWD, 2016 - Figure 12	**0**	**0**	**0**	**0**	**0**	-	-	-
Arctic	A-IW-1	No	OCWD, 2016 - Figure 13	**0**	**0**	**0**	**0**	**0**	-	-	-
Ball Road IWs	B1	No	OCWD, 2016 - Figure 14	**0**	**0**	**0**	**0**	**0**	-	-	-
Ball Road IWs	B2	No	OCWD, 2016 - Figure 14	**0**	**0**	**0**	**0**	**0**	-	-	-
Ball Road IWs	B3	No	OCWD, 2016 - Figure 14	**0**	**0**	**0**	**0**	**0**	-	-	-
			TOTALS (entire basin) =>	**29.6**	**33,181**	**3,957,219**	**29.6**	**3,957,219**			
			TOTALS (model area) =>	**29.6**	**33,181**	**3,957,219**	**29.6**	**3,957,219**			

Notes:

[1] TIB injects 28 MGD of GWRS water under Scenario 0.

28	MGD	original OCWD estimate
36	wells	number of TIB wells
0.78	**MGD/well**	**calculation**

0.3	<== Ratio of TH&Co model area extraction to total OCWD basin extraction
0	<== Proposed increase of GWRS
0.0	<== Share of proposed GWRS expansion that will go into TH&Co model area
0.0	<== Additional MBIP wells (the 4 Centennial Park IWs)
0.0	**<== Additional required extraction**

[2] Single existing MBIP IW injects 1.6 MGD of GWRS water under Scenario 0.

1.6	MGD	original OCWD estimate
1	wells	number of MBIP/Centennial Park wells
1.60	**MGD/well**	**calculation**

[3] The pre-baseline scenario assumes 100 MGD of GWRS is being recharged. The injection wells assumed under this scenario can inject 29.6 (~30) MGD. The remaining 70 MGD (100 MGD - 30 MGD = 70 MGD) is assumed to be recharged to existing recharge basins (Burris, Santiago, Kraemer, Miller, and Miraloma) as well as La Palma Basin, which is currently under construction (OCWD, 2016, page 24). These recharge basins are outside (north of) the model boundary and are therefore not simulated/considered in our analysis.

[4] From 2015 Term Sheet addendum.

Scenario 0 - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD
Huntington Beach	A1-HB-1	-16,154	**-0.1**	**-16,154**	**-0.1**
Santa Ana	DICE-SA2-1	0	**0.0**	**0**	**0.0**
Westminster	ESWA-4-1	-27,208	**-0.2**	**-27,208**	**-0.2**
Fountain Valley	FV-10-1	-214,690	**-1.6**	**-214,690**	**-1.6**
Fountain Valley	FV-11-1	-180,820	**-1.4**	**-180,820**	**-1.4**
Fountain Valley	FV-12-1	-73,954	**-0.6**	**-73,954**	**-0.6**
Fountain Valley	FV-4-1	-4,054	**0.0**	**-4,054**	**0.0**
Fountain Valley	FV-6-1	-128,370	**-1.0**	**-128,370**	**-1.0**
Fountain Valley	FV-8-1	-101,480	**-0.8**	**-101,480**	**-0.8**
Fountain Valley	FV-9-1	-94,179	**-0.7**	**-94,179**	**-0.7**
Huntington Beach	GOOD-HB-1	-6,855	**-0.1**	**-6,855**	**-0.1**
Huntington Beach	HB-10-1	-383,450	**-2.9**	**-383,450**	**-2.9**
Huntington Beach	HB-5-1	-452,150	**-3.4**	**-452,150**	**-3.4**
Huntington Beach	HB-9-1	-135,170	**-1.0**	**-135,170**	**-1.0**
IRWD	IRWD-10-1	-448,590	**-3.4**	**-448,590**	**-3.4**
IRWD	IRWD-1-1	-142,070	**-1.1**	**-142,070**	**-1.1**
IRWD	IRWD-11-1	-118,480	**-0.9**	**-118,480**	**-0.9**
IRWD	IRWD-12-1	-213,210	**-1.6**	**-213,210**	**-1.6**
IRWD	IRWD-13-1	-102,870	**-0.8**	**-102,870**	**-0.8**
IRWD	IRWD-14-1	-201,860	**-1.5**	**-201,860**	**-1.5**
IRWD	IRWD-15-1	-459,810	**-3.4**	**-459,810**	**-3.4**
IRWD	IRWD-16-1	-125,520	**-0.9**	**-125,520**	**-0.9**
IRWD	IRWD-17-1	-372,450	**-2.8**	**-372,450**	**-2.8**
IRWD	IRWD-18-1	-168,960	**-1.3**	**-168,960**	**-1.3**
IRWD	IRWD-2-1	-176,150	**-1.3**	**-176,150**	**-1.3**
IRWD	IRWD-3-1	-1,257	**0.0**	**-1,257**	**0.0**
IRWD	IRWD-4-1	-229,280	**-1.7**	**-229,280**	**-1.7**
IRWD	IRWD-5-1	-161,120	**-1.2**	**-161,120**	**-1.2**
IRWD	IRWD-6-1	-153,020	**-1.1**	**-153,020**	**-1.1**
IRWD	IRWD-7-1	-82,888	**-0.6**	**-82,888**	**-0.6**
Mesa Water District	MCWD-11-1	-135,150	**-1.0**	**-135,150**	**-1.0**
Mesa Water District	MCWD-1B-1	-353,370	**-2.6**	**-353,370**	**-2.6**
Mesa Water District	MCWD-3B-1	-229,860	**-1.7**	**-229,860**	**-1.7**
Mesa Water District	MCWD-4-1	-256	**0.0**	**-256**	**0.0**
Mesa Water District	MCWD-5-1	-293,840	**-2.2**	**-293,840**	**-2.2**
Mesa Water District	MCWD-6-1	-333,830	**-2.5**	**-333,830**	**-2.5**
Mesa Water District	MCWD-7-1	-201,070	**-1.5**	**-201,070**	**-1.5**
Mesa Water District	MCWD-8-1	-21,595	**-0.2**	**-21,595**	**-0.2**
Mesa Water District	MCWD-9-1	-212,250	**-1.6**	**-212,250**	**-1.6**
Private	MTSN-SA-1	-452	**0.0**	**-452**	**0.0**

Scenario 0 - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD
Mesa Verde	MVCC-COSD1-1	-13,326	**-0.1**	**-13,326**	**-0.1**
Mesa Verde	MVCC-COSD2-1	-21,883	**-0.2**	**-21,883**	**-0.2**
Mesa Verde	MVCC-COSD3-1	-2,672	**0.0**	**-2,672**	**0.0**
Newport Beach	NB-DOLD-1	-322,700	**-2.4**	**-322,700**	**-2.4**
Newport Beach	NB-DOLS-1	-269,580	**-2.0**	**-269,580**	**-2.0**
Private	NBGC-NB-1	-15,354	**-0.1**	**-15,354**	**-0.1**
Newport Beach	NB-TAMD-1	-421,610	**-3.2**	**-421,610**	**-3.2**
Newport Beach	NB-TAMS-1	-253,890	**-1.9**	**-253,890**	**-1.9**
Newport Beach	NDW-1-1	-4,631	**0.0**	**-4,631**	**0.0**
Santa Ana	OCCD-SA1-1	-632	**0.0**	**-632**	**0.0**
OCWD	OCWD-D1-1	-19,676	**-0.1**	**-19,676**	**-0.1**
OCWD	OCWD-D3-1	-36,227	**-0.3**	**-36,227**	**-0.3**
OCWD	OCWD-D4-1	-12,517	**-0.1**	**-12,517**	**-0.1**
OCWD	OCWD-D5-1	-13,035	**-0.1**	**-13,035**	**-0.1**
Santa Ana	SA-16-1	-51,726	**-0.4**	**-51,726**	**-0.4**
Santa Ana	SA-18-1	-137,020	**-1.0**	**-137,020**	**-1.0**
Santa Ana	SA-20-1	-165,030	**-1.2**	**-165,030**	**-1.2**
Santa Ana	SA-21-1	-164,990	**-1.2**	**-164,990**	**-1.2**
Santa Ana	SA-24-1	-96,058	**-0.7**	**-96,058**	**-0.7**
Santa Ana	SA-26-1	-65,427	**-0.5**	**-65,427**	**-0.5**
Santa Ana	SA-29-1	-167,970	**-1.3**	**-167,970**	**-1.3**
Santa Ana	SA-30-1	-169,370	**-1.3**	**-169,370**	**-1.3**
Santa Ana	SA-31-1	-279,320	**-2.1**	**-279,320**	**-2.1**
Santa Ana	SA-33-1	-201,630	**-1.5**	**-201,630**	**-1.5**
Santa Ana	SA-34-1	-42,432	**-0.3**	**-42,432**	**-0.3**
Santa Ana	SA-35-1	-253,680	**-1.9**	**-253,680**	**-1.9**
Santa Ana	SA-36-1	-314,850	**-2.4**	**-314,850**	**-2.4**
Santa Ana	SA-37-1	-230,370	**-1.7**	**-230,370**	**-1.7**
Santa Ana	SA-39-1	-323,470	**-2.4**	**-323,470**	**-2.4**
Santa Ana	SA-40-1	-141,770	**-1.1**	**-141,770**	**-1.1**
Santa Ana	SA-41-1	-234,170	**-1.8**	**-234,170**	**-1.8**
Private	SACC-SA-1	-33,336	**-0.2**	**-33,336**	**-0.2**
Fountain Valley	SAKI-FV-1	0	**0.0**	**0**	**0.0**
Private	SAKI-SAJ3-1	-2,862	**0.0**	**-2,862**	**0.0**
Private	SCSH-SA1-1	-1,509	**0.0**	**-1,509**	**0.0**
Westminster	SMID-D5-1	-9,435	**-0.1**	**-9,435**	**-0.1**
Tustin	T-COLU-1	-106,510	**-0.8**	**-106,510**	**-0.8**
Tustin	T-MS3-1	-15,714	**-0.1**	**-15,714**	**-0.1**
Tustin	T-MS4-1	-41,510	**-0.3**	**-41,510**	**-0.3**
Tustin	T-PAS-1	-341,240	**-2.6**	**-341,240**	**-2.6**

Scenario 0 - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD
Tustin	T-PROS-1	-75,186	**-0.6**	**-75,186**	**-0.6**
Tustin	T-TUST-1	-62,245	**-0.5**	**-62,245**	**-0.5**
Tustin	T-VNBG-1	-205,480	**-1.5**	**-205,480**	**-1.5**
Tustin	T-WALN-1	-67,380	**-0.5**	**-67,380**	**-0.5**
Tustin	T-YORB-1	-5,660	**0.0**	**-5,660**	**0.0**
Santa Ana	W-1887-1	-458	**0.0**	**-458**	**0.0**
Westminster	WHEM-WW-1	-37,510	**-0.3**	**-37,510**	**-0.3**
Westminster	WM-107A-1	-152,780	**-1.1**	**-152,780**	**-1.1**
Westminster	WM-1-1	-14,872	**-0.1**	**-14,872**	**-0.1**
Westminster	WM-3-1	-66,764	**-0.5**	**-66,764**	**-0.5**
Westminster	WM-4-1	-119,960	**-0.9**	**-119,960**	**-0.9**
Westminster	WM-6-1	-55,680	**-0.4**	**-55,680**	**-0.4**
Westminster	WM-RES1-1	-153,210	**-1.1**	**-153,210**	**-1.1**
Extraction (totals) =>		**-12,774,059**	**-95.5**	**-12,774,059**	**-95.5**
Additional Required Extraction (totals) =>		**0**	**0.0**	**N/A**	**N/A**
Modeled Extraction (totals) =>		**-12,774,059**	**-95.5**	**N/A**	**N/A**

Note:

[1] Positive values represent injection, and negative values represent extraction. All wells located in Principal Aquifer.

Scenario 1 - Injection Well Summary

System	Well	In Model Area	Source	Pumping Rate[1,2,3]			Modified Pumping Rate[4]		Scenario 1 assumes 100% GWRS water[5] Injection Concentrations (mg/L)		
				MGD	acre-ft/yr	ft^3/d	MGD	ft^3/d	TDS	Chloride	Boron
TIB	I1	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I2	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I3	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I4	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I5	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I6	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I7	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I8	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I9	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I10	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I11	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I12	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I13	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I14	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I15	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I16	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I17	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I18	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I19	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I20	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I21	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I22	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I23	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I24	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I25	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I26C	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I27	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I28	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I29	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I30	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I31	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I32	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I33A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I34A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I35A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
TIB	I36A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**48**	**6**	**0.25**
SETIB	SETIB-IW-1	Yes	OCWD, 2016 - Figure 8	**0**	**0**	**0**	**0**	**0**	-	-	-
SETIB	SETIB-IW-2	Yes	OCWD, 2016 - Figure 8	**0**	**0**	**0**	**0**	**0**	-	-	-
SETIB	SETIB-IW-3	Yes	OCWD, 2016 - Figure 8	**0**	**0**	**0**	**0**	**0**	-	-	-

Scenario 1 - Injection Well Summary

System	Well	In Model Area	Source	Pumping Rate[1,2,3]			Modified Pumping Rate[4]		Scenario 1 assumes 100% GWRS water[5] Injection Concentrations (mg/L)		
				MGD	acre-ft/yr	ft^3/d	MGD	ft^3/d	TDS	Chloride	Boron
SETIB	SETIB-IW-4	Yes	OCWD, 2016 - Figure 8	**0**	**0**	**0**	**0**	**0**	-	-	-
SAR	SAR-1	Yes	OCWD, 2016 - Figure 10	**0**	**0**	**0**	**0**	**0**	-	-	-
SAR	SAR-2	Yes	OCWD, 2016 - Figure 10	**0**	**0**	**0**	**0**	**0**	-	-	-
SAR	SAR-3	Yes	OCWD, 2016 - Figure 10	**0**	**0**	**0**	**0**	**0**	-	-	-
SAR	SAR-4	Yes	OCWD, 2016 - Figure 10	**0**	**0**	**0**	**0**	**0**	-	-	-
Mid-Basin	MBIP-IW-1	Yes	OCWD, 2016 - Figure 7	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**48**	**6**	**0.25**
Mid-Basin (Centennial Park)	MBIP-IW-2	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**48**	**6**	**0.25**
Mid-Basin (Centennial Park)	MBIP-IW-3	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**48**	**6**	**0.25**
Mid-Basin (Centennial Park)	MBIP-IW-4	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**48**	**6**	**0.25**
Mid-Basin (Centennial Park)	MBIP-IW-5	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**48**	**6**	**0.25**
Dyer Rd. IWs	E1	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Dyer Rd. IWs	E2	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Dyer Rd. IWs	E3	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Dyer Rd. IWs	E4	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Dyer Rd. IWs	E5	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Dyer Rd. IWs	E6	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Dyer Rd. IWs	E7	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Dyer Rd. IWs	E8	Yes	OCWD, 2016 - Figure 11	**0**	**0**	**0**	**0**	**0**	-	-	-
Campesino Park	CP-IW-1	Yes	OCWD, 2016 - Figure 12	**0**	**0**	**0**	**0**	**0**	-	-	-
Campesino Park	CP-IW-2	Yes	OCWD, 2016 - Figure 12	**0**	**0**	**0**	**0**	**0**	-	-	-
Campesino Park	CP-IW-3	Yes	OCWD, 2016 - Figure 12	**0**	**0**	**0**	**0**	**0**	-	-	-
Arctic	A-IW-1	No	OCWD, 2016 - Figure 13	**0**	**0**	**0**	**0**	**0**	-	-	-
Ball Road IWs	B1	No	OCWD, 2016 - Figure 14	**0**	**0**	**0**	**0**	**0**	-	-	-
Ball Road IWs	B2	No	OCWD, 2016 - Figure 14	**0**	**0**	**0**	**0**	**0**	-	-	-
Ball Road IWs	B3	No	OCWD, 2016 - Figure 14	**0**	**0**	**0**	**0**	**0**	-	-	-
			TOTALS (entire basin) =>	**36.0**	**40,356**	**4,812,834**	**36.0**	**4,812,834**			
			TOTALS (model area) =>	**36.0**	**40,356**	**4,812,834**	**36.0**	**4,812,834**			

Notes:

[1] TIB injects 28 MGD of GWRS water under Scenario 1 (OCWD/IRWD communication, June 14, 2019).

28	MGD	OCWD/IRWD, 6/14/19	0.3 <== Ratio of TH&Co model area extraction to total OCWD basin extraction
36	wells	number of TIB wells	30 <== Proposed increase of GWRS (i.e., 100 MGD to 130 MGD)
0.78	**MGD/well**	**calculation**	10.3 <== Share of proposed GWRS expansion that will go into TH&Co model area
			6.4 <== Additional MBIP wells (the 4 Centennial Park IWs)
			16.7 <== Additional required extraction in model area

[2] MBIP and Centennial Park IWs inject 8 MGD of GWRS water under Scenario 1 (OCWD, 2016, Table 1).

8	MGD	OCWD 2016, Table 1
5	wells	number of MBIP/Centennial Park wells
1.60	**MGD/well**	**calculation**

[3] OCWD 2016 report page 15-16 states that OCWD will assume that TIB injection will only be 15 MGD. They consider this to be a conservative approach to assess the ability to inject the remaining 35 MGD (50 MGD total) at other injection wells throughout the basin. However, from IRWD's perspective, it is more conservative to assume that 28 MGD will be injected at the TIB under this scenario.

[4] The baseline scenario assumes 130 MGD of GWRS will be recharged. The injection wells assumed under this scenario can inject 23 MGD. The remaining 107 MGD (130 MGD - 23 MGD = 107 MGD) is assumed to be recharged to existing recharge basins (Burris, Santiago, Kraemer, Miller, and Miraloma) as well as La Palma Basin, which is currently under construction (OCWD, 2016, page 24). These recharge basins are outside (north of) the model boundary and are therefore not simulated/considered in our analysis.

[5] From 2015 Term Sheet addendum.

Scenario 1 - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD
Huntington Beach	A1-HB-1	-16,154	**-0.1**	**-17,236**	**-0.1**
Santa Ana	DICE-SA2-1	0	**0.0**	**0**	**0.0**
Westminster	ESWA-4-1	-27,208	**-0.2**	**-29,030**	**-0.2**
Fountain Valley	FV-10-1	-214,690	**-1.6**	**-229,070**	**-1.7**
Fountain Valley	FV-11-1	-180,820	**-1.4**	**-192,931**	**-1.4**
Fountain Valley	FV-12-1	-73,954	**-0.6**	**-78,907**	**-0.6**
Fountain Valley	FV-4-1	-4,054	**0.0**	**-4,325**	**0.0**
Fountain Valley	FV-6-1	-128,370	**-1.0**	**-136,968**	**-1.0**
Fountain Valley	FV-8-1	-101,480	**-0.8**	**-108,277**	**-0.8**
Fountain Valley	FV-9-1	-94,179	**-0.7**	**-100,487**	**-0.8**
Huntington Beach	GOOD-HB-1	-6,855	**-0.1**	**-7,314**	**-0.1**
Huntington Beach	HB-10-1	-383,450	**-2.9**	**-409,134**	**-3.1**
Huntington Beach	HB-5-1	-452,150	**-3.4**	**-482,435**	**-3.6**
Huntington Beach	HB-9-1	-135,170	**-1.0**	**-144,224**	**-1.1**
IRWD	IRWD-10-1	-448,590	**-3.4**	**-478,637**	**-3.6**
IRWD	IRWD-1-1	-142,070	**-1.1**	**-151,586**	**-1.1**
IRWD	IRWD-11-1	-118,480	**-0.9**	**-126,416**	**-0.9**
IRWD	IRWD-12-1	-213,210	**-1.6**	**-227,491**	**-1.7**
IRWD	IRWD-13-1	-102,870	**-0.8**	**-109,760**	**-0.8**
IRWD	IRWD-14-1	-201,860	**-1.5**	**-215,381**	**-1.6**
IRWD	IRWD-15-1	-459,810	**-3.4**	**-490,608**	**-3.7**
IRWD	IRWD-16-1	-125,520	**-0.9**	**-133,927**	**-1.0**
IRWD	IRWD-17-1	-372,450	**-2.8**	**-397,397**	**-3.0**
IRWD	IRWD-18-1	-168,960	**-1.3**	**-180,277**	**-1.3**
IRWD	IRWD-2-1	-176,150	**-1.3**	**-187,949**	**-1.4**
IRWD	IRWD-3-1	-1,257	**0.0**	**-1,342**	**0.0**
IRWD	IRWD-4-1	-229,280	**-1.7**	**-244,637**	**-1.8**
IRWD	IRWD-5-1	-161,120	**-1.2**	**-171,912**	**-1.3**
IRWD	IRWD-6-1	-153,020	**-1.1**	**-163,269**	**-1.2**
IRWD	IRWD-7-1	-82,888	**-0.6**	**-88,440**	**-0.7**
Mesa Water District	MCWD-11-1	-135,150	**-1.0**	**-144,202**	**-1.1**
Mesa Water District	MCWD-1B-1	-353,370	**-2.6**	**-377,039**	**-2.8**
Mesa Water District	MCWD-3B-1	-229,860	**-1.7**	**-245,256**	**-1.8**
Mesa Water District	MCWD-4-1	-256	**0.0**	**-273**	**0.0**
Mesa Water District	MCWD-5-1	-293,840	**-2.2**	**-313,522**	**-2.3**
Mesa Water District	MCWD-6-1	-333,830	**-2.5**	**-356,190**	**-2.7**
Mesa Water District	MCWD-7-1	-201,070	**-1.5**	**-214,538**	**-1.6**
Mesa Water District	MCWD-8-1	-21,595	**-0.2**	**-23,041**	**-0.2**
Mesa Water District	MCWD-9-1	-212,250	**-1.6**	**-226,467**	**-1.7**

Scenario 1 - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD
Private	MTSN-SA-1	-452	**0.0**	**-482**	**0.0**
Mesa Verde	MVCC-COSD1-1	-13,326	**-0.1**	**-14,219**	**-0.1**
Mesa Verde	MVCC-COSD2-1	-21,883	**-0.2**	**-23,349**	**-0.2**
Mesa Verde	MVCC-COSD3-1	-2,672	**0.0**	**-2,851**	**0.0**
Newport Beach	NB-DOLD-1	-322,700	**-2.4**	**-344,315**	**-2.6**
Newport Beach	NB-DOLS-1	-269,580	**-2.0**	**-287,637**	**-2.2**
Private	NBGC-NB-1	-15,354	**-0.1**	**-16,382**	**-0.1**
Newport Beach	NB-TAMD-1	-421,610	**-3.2**	**-449,850**	**-3.4**
Newport Beach	NB-TAMS-1	-253,890	**-1.9**	**-270,896**	**-2.0**
Newport Beach	NDW-1-1	-4,631	**0.0**	**-4,942**	**0.0**
Santa Ana	OCCD-SA1-1	-632	**0.0**	**-674**	**0.0**
OCWD	OCWD-D1-1	-19,676	**-0.1**	**-20,993**	**-0.2**
OCWD	OCWD-D3-1	-36,227	**-0.3**	**-38,654**	**-0.3**
OCWD	OCWD-D4-1	-12,517	**-0.1**	**-13,355**	**-0.1**
OCWD	OCWD-D5-1	-13,035	**-0.1**	**-13,908**	**-0.1**
Santa Ana	SA-16-1	-51,726	**-0.4**	**-55,191**	**-0.4**
Santa Ana	SA-18-1	-137,020	**-1.0**	**-146,198**	**-1.1**
Santa Ana	SA-20-1	-165,030	**-1.2**	**-176,084**	**-1.3**
Santa Ana	SA-21-1	-164,990	**-1.2**	**-176,041**	**-1.3**
Santa Ana	SA-24-1	-96,058	**-0.7**	**-102,492**	**-0.8**
Santa Ana	SA-26-1	-65,427	**-0.5**	**-69,809**	**-0.5**
Santa Ana	SA-29-1	-167,970	**-1.3**	**-179,221**	**-1.3**
Santa Ana	SA-30-1	-169,370	**-1.3**	**-180,715**	**-1.4**
Santa Ana	SA-31-1	-279,320	**-2.1**	**-298,029**	**-2.2**
Santa Ana	SA-33-1	-201,630	**-1.5**	**-215,135**	**-1.6**
Santa Ana	SA-34-1	-42,432	**-0.3**	**-45,274**	**-0.3**
Santa Ana	SA-35-1	-253,680	**-1.9**	**-270,672**	**-2.0**
Santa Ana	SA-36-1	-314,850	**-2.4**	**-335,939**	**-2.5**
Santa Ana	SA-37-1	-230,370	**-1.7**	**-245,800**	**-1.8**
Santa Ana	SA-39-1	-323,470	**-2.4**	**-345,136**	**-2.6**
Santa Ana	SA-40-1	-141,770	**-1.1**	**-151,266**	**-1.1**
Santa Ana	SA-41-1	-234,170	**-1.8**	**-249,855**	**-1.9**
Private	SACC-SA-1	-33,336	**-0.2**	**-35,569**	**-0.3**
Fountain Valley	SAKI-FV-1	0	**0.0**	**0**	**0.0**
Private	SAKI-SAJ3-1	-2,862	**0.0**	**-3,053**	**0.0**
Private	SCSH-SA1-1	-1,509	**0.0**	**-1,610**	**0.0**
Westminster	SMID-D5-1	-9,435	**-0.1**	**-10,067**	**-0.1**
Tustin	T-COLU-1	-106,510	**-0.8**	**-113,644**	**-0.9**
Tustin	T-MS3-1	-15,714	**-0.1**	**-16,767**	**-0.1**

Scenario 1 - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD
Tustin	T-MS4-1	-41,510	**-0.3**	**-44,290**	**-0.3**
Tustin	T-PAS-1	-341,240	**-2.6**	**-364,096**	**-2.7**
Tustin	T-PROS-1	-75,186	**-0.6**	**-80,222**	**-0.6**
Tustin	T-TUST-1	-62,245	**-0.5**	**-66,414**	**-0.5**
Tustin	T-VNBG-1	-205,480	**-1.5**	**-219,243**	**-1.6**
Tustin	T-WALN-1	-67,380	**-0.5**	**-71,893**	**-0.5**
Tustin	T-YORB-1	-5,660	**0.0**	**-6,039**	**0.0**
Santa Ana	W-1887-1	-458	**0.0**	**-489**	**0.0**
Westminster	WHEM-WW-1	-37,510	**-0.3**	**-40,022**	**-0.3**
Westminster	WM-107A-1	-152,780	**-1.1**	**-163,013**	**-1.2**
Westminster	WM-1-1	-14,872	**-0.1**	**-15,868**	**-0.1**
Westminster	WM-3-1	-66,764	**-0.5**	**-71,236**	**-0.5**
Westminster	WM-4-1	-119,960	**-0.9**	**-127,995**	**-1.0**
Westminster	WM-6-1	-55,680	**-0.4**	**-59,409**	**-0.4**
Westminster	WM-RES1-1	-153,210	**-1.1**	**-163,472**	**-1.2**
Extraction (totals) =>		**-12,774,059**	**-95.5**	**-13,629,674**	**-101.9**
Additional Required Extraction (totals) =>		**-855,615**	**-6.4**	**N/A**	**N/A**
Modeled Extraction (totals) =>		**-13,629,674**	**-101.9**	**N/A**	**N/A**

Note:

[1] Positive values represent injection, and negative values represent extraction. All well located in Principal Aquifer.

Scenario 2a - Injection Well Summary

System	Well	In Model Area	Source	Pumping Rate[1,2,3]			Modified Pumping Rate		Injection Concentrations (mg/L)[4]		
				MGD	acre-ft/yr	ft^3/d	MGD	ft^3/d	TDS	Chloride	Boron
TIB	I1	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I2	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I3	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I4	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I5	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I6	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I7	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I8	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I9	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I10	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I11	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I12	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I13	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I14	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I15	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I16	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I17	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I18	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I19	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I20	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I21	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I22	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I23	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I24	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I25	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I26C	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I27	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I28	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I29	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I30	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I31	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I32	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I33A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I34A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I35A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
TIB	I36A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**350**	**100**	**1.00**
SETIB	SETIB-IW-1	Yes	OCWD, 2016 - Figure 8	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**350**	**100**	**1.00**
SETIB	SETIB-IW-2	Yes	OCWD, 2016 - Figure 8	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**350**	**100**	**1.00**
SETIB	SETIB-IW-3	Yes	OCWD, 2016 - Figure 8	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**350**	**100**	**1.00**
SETIB	SETIB-IW-4	Yes	OCWD, 2016 - Figure 8	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**350**	**100**	**1.00**
SAR	SAR-1	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
SAR	SAR-2	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
SAR	SAR-3	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
SAR	SAR-4	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Mid-Basin	MBIP-IW-1	Yes	OCWD, 2016 - Figure 7	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**81**	**16**	**0.33**
Mid-Basin (Centennial Park)	MBIP-IW-2	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**81**	**16**	**0.33**

Scenario 2a - Injection Well Summary

System	Well	In Model Area	Source	Pumping Rate[1,2,3]			Modified Pumping Rate		Injection Concentrations (mg/L)[4]		
				MGD	acre-ft/yr	ft^3/d	MGD	ft^3/d	TDS	Chloride	Boron
Mid-Basin (Centennial Park)	MBIP-IW-3	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**81**	**16**	**0.33**
Mid-Basin (Centennial Park)	MBIP-IW-4	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**81**	**16**	**0.33**
Mid-Basin (Centennial Park)	MBIP-IW-5	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**81**	**16**	**0.33**
Dyer Rd. IWs	E1	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Dyer Rd. IWs	E2	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Dyer Rd. IWs	E3	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Dyer Rd. IWs	E4	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Dyer Rd. IWs	E5	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Dyer Rd. IWs	E6	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Dyer Rd. IWs	E7	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Dyer Rd. IWs	E8	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Campesino Park	CP-IW-1	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Campesino Park	CP-IW-2	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Campesino Park	CP-IW-3	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Arctic	A-IW-1	NO	OCWD, 2016 - Figure 13	2.0	**2,242**	**267,380**	0	**0**	**0**	**0**	**0.00**
Ball Road IWs	B1	NO	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0.00**
Ball Road IWs	B2	NO	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0.00**
Ball Road IWs	B3	NO	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0.00**
			INJECTION WELL CAPACITY (entire basin) =>	**71.0**	**79,590**	**9,491,979**	**64.5**				
			INJECTION WELL CAPACITY (model area) =>	**64.5**	**72,304**	**8,622,995**	0.3	<== Ratio of TH&Co model area extraction to total OCWD basin extraction			
			TOTALS (MBIP + Centennial Park) =>	**8.0**	**8,968**	**1,069,519**	30	<== Proposed increase of GWRS (i.e., 100 MGD to 130 MGD)			
							10.3	<== Share of proposed GWRS expansion that will go into TH&Co model area			
							6.4	<== Additional MBIP wells (the 4 Centennial Park IWs)			
							50	<== Additional required extraction for Poseidon			
							50.0	**<== Total additional extraction required for model area (if possible)**			

Notes:

[1] TIB/SETIB injects 34 MGD of GWRS water under Scenario 2 (OCWD/IRWD communication, June 19, 2019).

28	MGD	OCWD/IRWD, 6/19/19; since SETIB is assumed at 1.5 MGD per well for this scenario, the total apportioned to the TIB is 28 MGD (34 MGD - 6 MGD = 28 MGD).
36	wells	number of TIB wells
0.78	**MGD/well**	**calculation**

[2] Injection rates at new IWs = 1.5 MGD according to IRWD 5/6/19 email and OCWD 2016 report (except the latter says A-IW-1 will inject at 2 MGD). MBIP and Centennial Park wells inject at 1.6 MGD/well (i.e., 8 MGD/5 wells) as shown in Note 2 of Scenario 1.

[3] OCWD 2016 report page 15-16 states that OCWD will assume that TIB injection will only be 15 MGD. They consider this to be a conservative approach to assess the ability to inject the remaining 35 MGD (50 MGD total) at other injection wells throughout the basin. However, from IRWD's perspective, it is more conservative to assume that 34 MGD will be injected at the TIB/SETIB under this scenario.

[4] TIB/SETIB assumed to inject 34 MGD of Poseidon water; therefore, the injection wells will inject a blend based on 16 MGD Poseidon water and 130 MGD GWRS water as shown below. Any excess GWRS water that the TIB/SETIB, MBIP, and new injection wells don't inject, will be piped to OCWD's recharge basins in the Forebay. This water is not accounted for in the model.

50	MGD	Poseidon water	**350**	**mg/L**	**Poseidon TDS**	**81**	**mg/L**	**blended TDS to MBIP and new IWs**
34	**MGD**	**Poseidon water to TIB and SETIB**	**100**	**mg/L**	**Poseidon chloride**	**16**	**mg/L**	**blended chloride to MBIP and new IWs**
16	**MGD**	**Poseidon water to MBIP and new injection wells**	**1.00**	**mg/L**	**Poseidon boron**	**0.33**	**mg/L**	**blended boron to MBIP and new IWs**
			48	**mg/L**	**GWRS TDS**			
130	MGD	GWRS water	**6**	**mg/L**	**GWRS chloride**			
180	**MGD**	**Poseidon + GWRS**	**0.25**	**mg/L**	**GWRS boron**			

Scenario 3a - Injection Well Summary

System	Well	In Model Area	Source	Pumping Rate[1,2]			Modified Pumping Rate		Injection Concentrations (mg/L)[3]		
				MGD	acre-ft/yr	ft^3/d	MGD	ft^3/d	TDS	Chloride	Boron
TIB	I1	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I2	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I3	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I4	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I5	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I6	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I7	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I8	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I9	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I10	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I11	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I12	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I13	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I14	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I15	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I16	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I17	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I18	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I19	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I20	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I21	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I22	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I23	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I24	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I25	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I26C	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I27	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I28	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I29	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I30	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I31	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I32	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I33A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I34A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I35A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I36A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
SETIB	SETIB-IW-1	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**350**	**100**	**1.00**
SETIB	SETIB-IW-2	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**350**	**100**	**1.00**
SETIB	SETIB-IW-3	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**350**	**100**	**1.00**
SETIB	SETIB-IW-4	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**350**	**100**	**1.00**
SAR	SAR-1	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
SAR	SAR-2	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
SAR	SAR-3	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
SAR	SAR-4	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Mid-Basin	MBIP-IW-1	Yes	OCWD, 2016 - Figure 7	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**81**	**16**	**0.33**
Mid-Basin (Centennial Park)	MBIP-IW-2	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**81**	**16**	**0.33**
Mid-Basin (Centennial Park)	MBIP-IW-3	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**81**	**16**	**0.33**
Mid-Basin (Centennial Park)	MBIP-IW-4	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**81**	**16**	**0.33**
Mid-Basin (Centennial Park)	MBIP-IW-5	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**81**	**16**	**0.33**

Scenario 3a - Injection Well Summary

System	Well	In Model Area	Source	Pumping Rate[1,2]			Modified Pumping Rate		Injection Concentrations (mg/L)[3]		
				MGD	acre-ft/yr	ft^3/d	MGD	ft^3/d	TDS	Chloride	Boron
Dyer Rd. IWs	E1	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Dyer Rd. IWs	E2	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Dyer Rd. IWs	E3	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Dyer Rd. IWs	E4	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Dyer Rd. IWs	E5	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Dyer Rd. IWs	E6	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Dyer Rd. IWs	E7	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Dyer Rd. IWs	E8	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Campesino Park	CP-IW-1	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Campesino Park	CP-IW-2	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Campesino Park	CP-IW-3	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**81**	**16**	**0.33**
Arctic	A-IW-1	No	OCWD, 2016 - Figure 13	2.0	**2,242**	**267,380**	0	**0**	**0**	**0**	**0.00**
Ball Road IWs	B1	No	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0.00**
Ball Road IWs	B2	No	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0.00**
Ball Road IWs	B3	No	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0.00**
	INJECTION WELL CAPACITY (entire basin) =>			**60.0**	**67,259**	**8,021,390**	**53.5**				
	INJECTION WELL CAPACITY (model area) =>			**53.5**	**59,973**	**7,152,406**	0.3	<== Ratio of TH&Co model area extraction to total OCWD basin extraction			
							30	<== Proposed increase of GWRS (i.e., 100 MGD to 130 MGD)			
							10.3	<== Share of proposed GWRS expansion that will go into TH&Co model area			
							6.4	<== Additional MBIP wells (the 4 Centennial Park IWs)			
							50	<== Additional required extraction for Poseidon			
							50.0	**<== Total additional extraction required for model area (if possible)**			
							11	<== Additional required extraction for in lieu delivery of Poseidon water ('effective recharge')			
							64.5	**<== Additional required extraction for this scenario in the model area**			

Notes:

[1] TIB injects 10 MGD of Poseidon water under Scenario 3 (IRWD, May 14 call; based on OCWD information that, when OCWD does in lieu pumping, they can only get 11,000 acre-ft/yr [~10 MGD] into the TIB).
However, based on 6/19/19 call with IRWD, this is a conservative estimate used by OCWD to size their facilities and likely assumes 100% in lieu whereas the in lieu considered here is considerably less than 100%.
Therefore, it is assumed for this scenario that the TIB/SETIB can inject 23 MGD (i.e., 11 MGD less than the 34 MGD assumed for Scenario 2) under in lieu conditions and the SETIB can inject 0.75 MGD per well under in lieu conditions.

20	MGD	Reduced TIB injection under in lieu pumping conditions
36	wells	number of TIB wells
0.56	**MGD/well**	**calculation**

[2] Injection rates at new IWs = 1.5 MGD according to IRWD 5/6/19 email and OCWD 2016 report (except the latter says A-IW-1 will inject at 2 MGD). MBIP and Centennial Park wells inject at 1.6 MGD/well (i.e., 8 MGD/5 wells) as shown in Note 2 of Scenario 1.

[3] TIB/SETIB assumed to inject 23 MGD of Poseidon water; therefore, the injection wells will inject a blend based on 16 MGD Poseidon water and 130 MGD GWRS water as shown below. Any excess GWRS water that the TIB/SETIB, MBIP, and new injection wells don't inject, will be piped to OCWD's recharge basins in the Forebay. This water is not accounted for in the model.

39	**MGD**	**Poseidon water (11 of the 50 MGD will go to coastal pumpers under in lieu scenarios)**	**350**	**mg/L**	**Poseidon TDS**	**81**	**mg/L**	**blended TDS to MBIP and new IWs**
			100	**mg/L**	**Poseidon chloride**	**16**	**mg/L**	**blended chloride to MBIP and new IWs**
23	**MGD**	**Poseidon water to TIB and SETIB under in lieu conditions**	**1.0**	**mg/L**	**Poseidon boron**	**0.33**	**mg/L**	**blended boron to MBIP and new IWs**
			48	**mg/L**	**GWRS TDS**			
16	**MGD**	**Poseidon water to MBIP and new injection wells**	**6**	**mg/L**	**GWRS chloride**			
			0.25	**mg/L**	**GWRS boron**			
130	MGD	GWRS water						
169	**MGD**	**Poseidon + GWRS**						

Scenario 4a - Injection Well Summary

System	Well	In Model Area	Source	Pumping Rate[1,2]			Modified Pumping Rate[3]		Injection Concentrations (mg/L)[4]		
				MGD	acre-ft/yr	ft^3/d	MGD	ft^3/d	TDS	Chloride	Boron
TIB	I1	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I2	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I3	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I4	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I5	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I6	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I7	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I8	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I9	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I10	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I11	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I12	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I13	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I14	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I15	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I16	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I17	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I18	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I19	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I20	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I21	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I22	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I23	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I24	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I25	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I26C	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I27	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I28	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I29	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I30	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I31	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I32	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I33A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I34A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I35A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
TIB	I36A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**350**	**100**	**1.00**
SETIB	SETIB-IW-1	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**350**	**100**	**1.00**
SETIB	SETIB-IW-2	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**350**	**100**	**1.00**
SETIB	SETIB-IW-3	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**350**	**100**	**1.00**
SETIB	SETIB-IW-4	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**350**	**100**	**1.00**
SAR	SAR-1	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**61**	**10**	**0.28**
SAR	SAR-2	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**61**	**10**	**0.28**
SAR	SAR-3	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**61**	**10**	**0.28**
SAR	SAR-4	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**61**	**10**	**0.28**
Mid-Basin	MBIP-IW-1	Yes	OCWD, 2016 - Figure 7	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**61**	**10**	**0.28**
Mid-Basin (Centennial Park)	MBIP-IW-2	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**61**	**10**	**0.28**
Mid-Basin (Centennial Park)	MBIP-IW-3	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**61**	**10**	**0.28**
Mid-Basin (Centennial Park)	MBIP-IW-4	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**61**	**10**	**0.28**
Mid-Basin (Centennial Park)	MBIP-IW-5	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**61**	**10**	**0.28**

Scenario 4a - Injection Well Summary

System	Well	In Model Area	Source	Pumping Rate[1,2] MGD	Pumping Rate[1,2] acre-ft/yr	Pumping Rate[1,2] ft³/d	Modified Pumping Rate[3] MGD	Modified Pumping Rate[3] ft³/d	Injection Concentrations (mg/L)[4] TDS	Injection Concentrations (mg/L)[4] Chloride	Injection Concentrations (mg/L)[4] Boron
Dyer Rd. IWs	E1	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**61**	**10**	**0.28**
Dyer Rd. IWs	E2	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**61**	**10**	**0.28**
Dyer Rd. IWs	E3	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**61**	**10**	**0.28**
Dyer Rd. IWs	E4	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**61**	**10**	**0.28**
Dyer Rd. IWs	E5	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**61**	**10**	**0.28**
Dyer Rd. IWs	E6	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**61**	**10**	**0.28**
Dyer Rd. IWs	E7	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**61**	**10**	**0.28**
Dyer Rd. IWs	E8	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**61**	**10**	**0.28**
Campesino Park	CP-IW-1	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**61**	**10**	**0.28**
Campesino Park	CP-IW-2	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**61**	**10**	**0.28**
Campesino Park	CP-IW-3	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**61**	**10**	**0.28**
Arctic	A-IW-1	No	OCWD, 2016 - Figure 13	2.0	**2,242**	**267,380**	0	**0**	**0**	**0**	**0**
Ball Road IWs	B1	No	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0**
Ball Road IWs	B2	No	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0**
Ball Road IWs	B3	No	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0**
			INJECTION WELL CAPACITY (entire basin) =>	**60.0**	**67,259**	**8,021,390**	**53.5**				
			INJECTION WELL CAPACITY (model area) =>	**53.5**	**59,973**	**7,152,406**	0.3	<== Ratio of TH&Co model area extraction to total OCWD basin extraction			
							30	<== Proposed increase of GWRS (i.e., 100 MGD to 130 MGD)			
							10.3	<== Share of proposed GWRS expansion that will go into TH&Co model area			
							6.4	<== Additional MBIP wells (the 4 Centennial Park IWs)			
							40	<== Additional required extraction for Poseidon (10 of the 50 MGD goes to South County)			
							40.0	**<== Total additional extraction required for model area (if possible)**			
							11	<== Additional required extraction for in lieu delivery of Poseidon water ('effective recharge')			
							64.5	**<== Additional required extraction for this scenario in the model area**			

Notes:

[1] TIB injects 10 MGD of Poseidon water under Scenario 3 (IRWD, May 14 call; based on OCWD information that, when OCWD does in lieu pumping, they can only get 11,000 acre-ft/yr [~10 MGD] into the TIB).
However, based on 6/19/19 call with IRWD, this is a conservative estimate used by OCWD to size their facilities and likely assumes 100% in lieu whereas the in lieu considered here is considerably less than 100%.
Therefore, it is assumed for this scenario that the TIB/SETIB can inject 23 MGD (i.e., 11 MGD less than the 34 MGD assumed for Scenario 2) under in lieu conditions and the SETIB can inject 0.75 MGD per well under in lieu conditions.

20	MGD	Reduced TIB injection under in lieu pumping conditions
36	wells	number of TIB wells
0.56	**MGD/well**	**calculation**

[2] Injection rates at new IWs = 1.5 MGD according to IRWD 5/6/19 email and OCWD 2016 report (except the latter says A-IW-1 will inject at 2 MGD). MBIP and Centennial Park wells inject at 1.6 MGD/well (i.e., 8 MGD/5 wells) as shown in Note 2 of Scenario 1.

[3] TIB/SETIB assumed to inject 23 MGD of Poseidon water; therefore, the injection wells will inject a blend based on 6 MGD Poseidon water and 130 MGD GWRS water as shown below. Any excess GWRS water that the TIB/SETIB, MBIP, and new injection wells don't inject, will be piped to OCWD's recharge basins in the Forebay. This water is not accounted for in the model.

29	**MGD**	**Poseidon water (21 of the 50 MGD will go to coastal pumpers and South County)**	**350**	**mg/L**	**Poseidon TDS**	**61**	**mg/L**	**blended TDS to MBIP and new IWs**
			100	**mg/L**	**Poseidon chloride**	**10**	**mg/L**	**blended chloride to MBIP and new IWs**
23	**MGD**	**Poseidon water to TIB and SETIB under in lieu conditions**	**1.00**	**mg/L**	**Poseidon boron**	**0.28**	**mg/L**	**blended boron to MBIP and new IWs**
			48	**mg/L**	**GWRS TDS**			
6	**MGD**	**Poseidon water to MBIP and new injection wells**	**6**	**mg/L**	**GWRS chloride**			
			0.25	**mg/L**	**GWRS boron**			
130	MGD	GWRS water						
159	**MGD**	**Poseidon + GWRS**						

Scenario 2b - Injection Well Summary

System	Well	In Model Area	Source	Pumping Rate[1,2,3]			Modified Pumping Rate		Injection Concentrations (mg/L)[4]		
				MGD	acre-ft/yr	ft^3/d	MGD	ft^3/d	TDS	Chloride	Boron
TIB	I1	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I2	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I3	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I4	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I5	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I6	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I7	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I8	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I9	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I10	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I11	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I12	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I13	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I14	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I15	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I16	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I17	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I18	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I19	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I20	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I21	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I22	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I23	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I24	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I25	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I26C	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I27	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I28	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I29	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I30	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I31	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I32	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I33A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I34A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I35A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
TIB	I36A	Yes	OCWD, 2016 - Figure 9	**0.78**	**872**	**103,981**	**0.78**	**103,981**	**150**	**75**	**0.75**
SETIB	SETIB-IW-1	Yes	OCWD, 2016 - Figure 8	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**150**	**75**	**0.75**
SETIB	SETIB-IW-2	Yes	OCWD, 2016 - Figure 8	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**150**	**75**	**0.75**
SETIB	SETIB-IW-3	Yes	OCWD, 2016 - Figure 8	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**150**	**75**	**0.75**
SETIB	SETIB-IW-4	Yes	OCWD, 2016 - Figure 8	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**150**	**75**	**0.75**
SAR	SAR-1	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
SAR	SAR-2	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
SAR	SAR-3	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
SAR	SAR-4	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Mid-Basin	MBIP-IW-1	Yes	OCWD, 2016 - Figure 7	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**59**	**14**	**0.30**

Scenario 2b - Injection Well Summary

System	Well	In Model Area	Source	Pumping Rate[1,2,3]			Modified Pumping Rate		Injection Concentrations (mg/L)[4]		
				MGD	acre-ft/yr	ft^3/d	MGD	ft^3/d	TDS	Chloride	Boron
Mid-Basin (Centennial Park)	MBIP-IW-2	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**59**	**14**	**0.30**
Mid-Basin (Centennial Park)	MBIP-IW-3	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**59**	**14**	**0.30**
Mid-Basin (Centennial Park)	MBIP-IW-4	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**59**	**14**	**0.30**
Mid-Basin (Centennial Park)	MBIP-IW-5	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**59**	**14**	**0.30**
Dyer Rd. IWs	E1	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Dyer Rd. IWs	E2	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Dyer Rd. IWs	E3	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Dyer Rd. IWs	E4	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Dyer Rd. IWs	E5	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Dyer Rd. IWs	E6	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Dyer Rd. IWs	E7	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Dyer Rd. IWs	E8	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Campesino Park	CP-IW-1	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Campesino Park	CP-IW-2	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Campesino Park	CP-IW-3	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Arctic	A-IW-1	No	OCWD, 2016 - Figure 13	2.0	**2,242**	**267,380**	0	**0**	**0**	**0**	**0.00**
Ball Road IWs	B1	No	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0.00**
Ball Road IWs	B2	No	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0.00**
Ball Road IWs	B3	No	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0.00**
			INJECTION WELL CAPACITY (entire basin) =>	**71.0**	**79,590**	**9,491,979**	**64.5**				
			INJECTION WELL CAPACITY (model area) =>	**64.5**	**72,304**	**8,622,995**	0.3	<== Ratio of TH&Co model area extraction to total OCWD basin extraction			
			TOTALS (MBIP + Centennial Park) =>	**8.0**	**8,968**	**1,069,519**	30	<== Proposed increase of GWRS (i.e., 100 MGD to 130 MGD)			
							10.3	<== Share of proposed GWRS expansion that will go into TH&Co model area			
							6.4	<== Additional MBIP wells (the 4 Centennial Park IWs)			
							50	<== Additional required extraction for Poseidon			
							50.0	**<== Total additional extraction required for model area (if possible)**			

Notes:

[1] TIB/SETIB injects 34 MGD of GWRS water under Scenario 2 (OCWD/IRWD communication, June 19, 2019).

28	MGD	OCWD/IRWD, 6/19/19; since SETIB is assumed at 1.5 MGD per well for this scenario, the total apportioned to the TIB is 28 MGD (34 MGD - 6 MGD = 28 MGD).
36	wells	number of TIB wells
0.78	**MGD/well**	**calculation**

[2] Injection rates at new IWs = 1.5 MGD according to IRWD 5/6/19 email and OCWD 2016 report (except the latter says A-IW-1 will inject at 2 MGD). MBIP and Centennial Park wells inject at 1.6 MGD/well (i.e., 8 MGD/5 wells) as shown in Note 2 of Scenario 1.

[3] OCWD 2016 report page 15-16 states that OCWD will assume that TIB injection will only be 15 MGD. They consider this to be a conservative approach to assess the ability to inject the remaining 35 MGD (50 MGD total) at other injection wells throughout the basin. However, from IRWD's perspective, it is more conservative to assume that 34 MGD will be injected at the TIB/SETIB under this scenario.

[4] TIB/SETIB assumed to inject 34 MGD of Poseidon water; therefore, the injection wells will inject a blend based on 16 MGD Poseidon water and 130 MGD GWRS water as shown below. Any excess GWRS water that the TIB/SETIB, MBIP, and new injection wells don't inject, will be piped to OCWD's recharge basins in the Forebay. This water is not accounted for in the model.

50	MGD	Poseidon water	**150**	**mg/L**	**Poseidon TDS**	**59**	**mg/L**	**blended TDS to MBIP and new IWs**
34	**MGD**	**Poseidon water to TIB and SETIB**	**75**	**mg/L**	**Poseidon chloride**	**14**	**mg/L**	**blended chloride to MBIP and new IWs**
16	**MGD**	**Poseidon water to MBIP and new injection wells**	**0.75**	**mg/L**	**Poseidon boron**	**0.30**	**mg/L**	**blended boron to MBIP and new IWs**
			48	**mg/L**	**GWRS TDS**			
130	MGD	GWRS water	**6**	**mg/L**	**GWRS chloride**			
180	**MGD**	**Poseidon + GWRS**	**0.25**	**mg/L**	**GWRS boron**			

Scenario 3b - Injection Well Summary

System	Well	In Model Area	Source	Pumping Rate[1,2]			Modified Pumping Rate		Injection Concentrations (mg/L)[3]		
				MGD	acre-ft/yr	ft^3/d	MGD	ft^3/d	TDS	Chloride	Boron
TIB	I1	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I2	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I3	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I4	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I5	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I6	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I7	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I8	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I9	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I10	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I11	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I12	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I13	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I14	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I15	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I16	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I17	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I18	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I19	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I20	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I21	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I22	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I23	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I24	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I25	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I26C	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I27	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I28	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I29	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I30	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I31	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I32	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I33A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I34A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I35A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I36A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
SETIB	SETIB-IW-1	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**150**	**75**	**0.75**
SETIB	SETIB-IW-2	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**150**	**75**	**0.75**
SETIB	SETIB-IW-3	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**150**	**75**	**0.75**
SETIB	SETIB-IW-4	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**150**	**75**	**0.75**
SAR	SAR-1	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
SAR	SAR-2	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
SAR	SAR-3	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
SAR	SAR-4	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Mid-Basin	MBIP-IW-1	Yes	OCWD, 2016 - Figure 7	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**59**	**14**	**0.30**
Mid-Basin (Centennial Park)	MBIP-IW-2	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**59**	**14**	**0.30**
Mid-Basin (Centennial Park)	MBIP-IW-3	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**59**	**14**	**0.30**
Mid-Basin (Centennial Park)	MBIP-IW-4	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**59**	**14**	**0.30**

Scenario 3b - Injection Well Summary

System	Well	In Model Area	Source	Pumping Rate[1,2]			Modified Pumping Rate		Injection Concentrations (mg/L)[3]		
				MGD	acre-ft/yr	ft³/d	MGD	ft³/d	TDS	Chloride	Boron
Mid-Basin (Centennial Park)	MBIP-IW-5	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**59**	**14**	**0.30**
Dyer Rd. IWs	E1	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Dyer Rd. IWs	E2	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Dyer Rd. IWs	E3	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Dyer Rd. IWs	E4	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Dyer Rd. IWs	E5	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Dyer Rd. IWs	E6	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Dyer Rd. IWs	E7	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Dyer Rd. IWs	E8	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Campesino Park	CP-IW-1	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Campesino Park	CP-IW-2	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Campesino Park	CP-IW-3	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**59**	**14**	**0.30**
Arctic	A-IW-1	No	OCWD, 2016 - Figure 13	2.0	**2,242**	**267,380**	0	**0**	**0**	**0**	**0.00**
Ball Road IWs	B1	No	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0.00**
Ball Road IWs	B2	No	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0.00**
Ball Road IWs	B3	No	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0.00**
			INJECTION WELL CAPACITY (entire basin) =>	**60.0**	**67,259**	**8,021,390**	**53.5**				
			INJECTION WELL CAPACITY (model area) =>	**53.5**	**59,973**	**7,152,406**	0.3	<== Ratio of TH&Co model area extraction to total OCWD basin extraction			
							30	<== Proposed increase of GWRS (i.e., 100 MGD to 130 MGD)			
							10.3	<== Share of proposed GWRS expansion that will go into TH&Co model area			
							6.4	<== Additional MBIP wells (the 4 Centennial Park IWs)			
							50	<== Additional required extraction for Poseidon			
							50.0	**<== Total additional extraction required for model area (if possible)**			
							11	<== Additional required extraction for in lieu delivery of Poseidon water ('effective recharge')			
							64.5	**<== Additional required extraction for this scenario in the model area**			

Notes:

[1] TIB injects 10 MGD of Poseidon water under Scenario 3 (IRWD, May 14 call; based on OCWD information that, when OCWD does in lieu pumping, they can only get 11,000 acre-ft/yr [~10 MGD] into the TIB).
However, based on 6/19/19 call with IRWD, this is a conservative estimate used by OCWD to size their facilities and likely assumes 100% in lieu whereas the in lieu considered here is considerably less than 100%.
Therefore, it is assumed for this scenario that the TIB/SETIB can inject 23 MGD (i.e., 11 MGD less than the 34 MGD assumed for Scenario 2) under in lieu conditions and the SETIB can inject 0.75 MGD per well under in lieu conditions.

20	MGD	Reduced TIB injection under in lieu pumping conditions
36	wells	number of TIB wells
0.56	**MGD/well**	**calculation**

[2] Injection rates at new IWs = 1.5 MGD according to IRWD 5/6/19 email and OCWD 2016 report (except the latter says A-IW-1 will inject at 2 MGD). MBIP and Centennial Park wells inject at 1.6 MGD/well (i.e., 8 MGD/5 wells) as shown in Note 2 of Scenario 1.

[3] TIB/SETIB assumed to inject 23 MGD of Poseidon water; therefore, the injection wells will inject a blend based on 16 MGD Poseidon water and 130 MGD GWRS water as shown below. Any excess GWRS water that the TIB/SETIB, MBIP, and new injection wells don't inject, will be piped to OCWD's recharge basins in the Forebay. This water is not accounted for in the model.

39	**MGD**	**Poseidon water (11 of the 50 MGD will go to coastal pumpers under in lieu scenarios)**	**150**	**mg/L**	**Poseidon TDS**	**59**	**mg/L**	**blended TDS to MBIP and new IWs**
			75	**mg/L**	**Poseidon chloride**	**14**	**mg/L**	**blended chloride to MBIP and new IWs**
23	**MGD**	**Poseidon water to TIB and SETIB under in lieu conditions**	**0.75**	**mg/L**	**Poseidon boron**	**0.30**	**mg/L**	**blended boron to MBIP and new IWs**
			48	**mg/L**	**GWRS TDS**			
16	**MGD**	**Poseidon water to MBIP and new injection wells**	**6**	**mg/L**	**GWRS chloride**			
			0.25	**mg/L**	**GWRS boron**			
130	MGD	GWRS water						
169	**MGD**	**Poseidon + GWRS**						

Scenario 4b - Injection Well Summary

				Pumping Rate[1,2]			Modified Pumping Rate[3]		Injection Concentrations (mg/L)[4]		
System	Well	In Model Area	Source	MGD	acre-ft/yr	ft^3/d	MGD	ft^3/d	TDS	Chloride	Boron
TIB	I1	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I2	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I3	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I4	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I5	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I6	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I7	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I8	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I9	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I10	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I11	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I12	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I13	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I14	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I15	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I16	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I17	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I18	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I19	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I20	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I21	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I22	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I23	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I24	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I25	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I26C	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I27	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I28	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I29	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I30	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I31	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I32	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I33A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I34A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I35A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
TIB	I36A	Yes	OCWD, 2016 - Figure 9	**0.56**	**623**	**74,272**	**0.56**	**74,272**	**150**	**75**	**0.75**
SETIB	SETIB-IW-1	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**150**	**75**	**0.75**
SETIB	SETIB-IW-2	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**150**	**75**	**0.75**
SETIB	SETIB-IW-3	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**150**	**75**	**0.75**
SETIB	SETIB-IW-4	Yes	OCWD, 2016 - Figure 8	**0.75**	**841**	**100,267**	**0.75**	**100,267**	**150**	**75**	**0.75**
SAR	SAR-1	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**53**	**9**	**0.27**
SAR	SAR-2	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**53**	**9**	**0.27**
SAR	SAR-3	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**53**	**9**	**0.27**
SAR	SAR-4	Yes	OCWD, 2016 - Figure 10	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**53**	**9**	**0.27**
Mid-Basin	MBIP-IW-1	Yes	OCWD, 2016 - Figure 7	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**53**	**9**	**0.27**
Mid-Basin (Centennial Park)	MBIP-IW-2	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**53**	**9**	**0.27**
Mid-Basin (Centennial Park)	MBIP-IW-3	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**53**	**9**	**0.27**
Mid-Basin (Centennial Park)	MBIP-IW-4	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**53**	**9**	**0.27**

Scenario 4b - Injection Well Summary

System	Well	In Model Area	Source	Pumping Rate[1,2] MGD	Pumping Rate[1,2] acre-ft/yr	Pumping Rate[1,2] ft³/d	Modified Pumping Rate[3] MGD	Modified Pumping Rate[3] ft³/d	Injection Concentrations (mg/L)[4] TDS	Chloride	Boron
Mid-Basin (Centennial Park)	MBIP-IW-5	Yes	TH&Co 2017 report	**1.60**	**1,794**	**213,904**	**1.60**	**213,904**	**53**	**9**	**0.27**
Dyer Rd. IWs	E1	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**53**	**9**	**0.27**
Dyer Rd. IWs	E2	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**53**	**9**	**0.27**
Dyer Rd. IWs	E3	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**53**	**9**	**0.27**
Dyer Rd. IWs	E4	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**53**	**9**	**0.27**
Dyer Rd. IWs	E5	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**53**	**9**	**0.27**
Dyer Rd. IWs	E6	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**53**	**9**	**0.27**
Dyer Rd. IWs	E7	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**53**	**9**	**0.27**
Dyer Rd. IWs	E8	Yes	OCWD, 2016 - Figure 11	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**53**	**9**	**0.27**
Campesino Park	CP-IW-1	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**53**	**9**	**0.27**
Campesino Park	CP-IW-2	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**53**	**9**	**0.27**
Campesino Park	CP-IW-3	Yes	OCWD, 2016 - Figure 12	1.5	**1,681**	**200,535**	**1.50**	**200,535**	**53**	**9**	**0.27**
Arctic	A-IW-1	No	OCWD, 2016 - Figure 13	2.0	**2,242**	**267,380**	0	**0**	**0**	**0**	**0**
Ball Road IWs	B1	No	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0**
Ball Road IWs	B2	No	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0**
Ball Road IWs	B3	No	OCWD, 2016 - Figure 14	1.5	**1,681**	**200,535**	0	**0**	**0**	**0**	**0**
			INJECTION WELL CAPACITY (entire basin) =>	**60.0**	**67,259**	**8,021,390**	**53.5**				
			INJECTION WELL CAPACITY (model area) =>	**53.5**	**59,973**	**7,152,406**	0.3	<== Ratio of TH&Co model area extraction to total OCWD basin extraction			
							30	<== Proposed increase of GWRS (i.e., 100 MGD to 130 MGD)			
							10.3	<== Share of proposed GWRS expansion that will go into TH&Co model area			
							6.4	<== Additional MBIP wells (the 4 Centennial Park IWs)			
							40	<== Additional required extraction for Poseidon (10 of the 50 MGD goes to South County)			
							40.0	**<== Total additional extraction required for model area (if possible)**			
							11	<== Additional required extraction for in lieu delivery of Poseidon water ('effective recharge')			
							64.5	**<== Additional required extraction for this scenario in the model area**			

Notes:

[1] TIB injects 10 MGD of Poseidon water under Scenario 3 (IRWD, May 14 call; based on OCWD information that, when OCWD does in lieu pumping, they can only get 11,000 acre-ft/yr [~10 MGD] into the TIB).
However, based on 6/19/19 call with IRWD, this is a conservative estimate used by OCWD to size their facilities and likely assumes 100% in lieu whereas the in lieu considered here is considerably less than 100%.
Therefore, it is assumed for this scenario that the TIB/SETIB can inject 23 MGD (i.e., 11 MGD less than the 34 MGD assumed for Scenario 2) under in lieu conditions and the SETIB can inject 0.75 MGD per well under in lieu conditions.

20	MGD	Reduced TIB injection under in lieu pumping conditions
36	wells	number of TIB wells
0.56	**MGD/well**	**calculation**

[2] Injection rates at new IWs = 1.5 MGD according to IRWD 5/6/19 email and OCWD 2016 report (except the latter says A-IW-1 will inject at 2 MGD). MBIP and Centennial Park wells inject at 1.6 MGD/well (i.e., 8 MGD/5 wells) as shown in Note 2 of Scenario 1.

[3] TIB/SETIB assumed to inject 23 MGD of Poseidon water; therefore, the injection wells will inject a blend based on 6 MGD Poseidon water and 130 MGD GWRS water as shown below. Any excess GWRS water that the TIB/SETIB, MBIP, and new injection wells don't inject, will be piped to OCWD's recharge basins in the Forebay. This water is not accounted for in the model.

29	**MGD**	**Poseidon water (21 of the 50 MGD will go to coastal pumpers and South County)**	**150**	**mg/L**	**Poseidon TDS**	**53**	**mg/L**	**blended TDS to MBIP and new IWs**
			75	**mg/L**	**Poseidon chloride**	**9**	**mg/L**	**blended chloride to MBIP and new IWs**
23	**MGD**	**Poseidon water to TIB and SETIB under in lieu conditions**	**0.75**	**mg/L**	**Poseidon boron**	**0.27**	**mg/L**	**blended boron to MBIP and new IWs**
			48	**mg/L**	**GWRS TDS**			
6	**MGD**	**Poseidon water to MBIP and new injection wells**	**6**	**mg/L**	**GWRS chloride**			
			0.25	**mg/L**	**GWRS boron**			
130	MGD	GWRS water						
159	**MGD**	**Poseidon + GWRS**						

Scenarios 2a and 2b - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD
Huntington Beach	A1-HB-1	-16,154	**-0.1**	**-22,054**	**-0.2**
Santa Ana	DICE-SA2-1	0	**0.0**	**0**	**0.0**
Westminster	ESWA-4-1	-27,208	**-0.2**	**-37,146**	**-0.3**
Fountain Valley	FV-10-1	-214,690	**-1.6**	**-293,106**	**-2.2**
Fountain Valley	FV-11-1	-180,820	**-1.4**	**-246,865**	**-1.8**
Fountain Valley	FV-12-1	-73,954	**-0.6**	**-100,966**	**-0.8**
Fountain Valley	FV-4-1	-4,054	**0.0**	**-5,534**	**0.0**
Fountain Valley	FV-6-1	-128,370	**-1.0**	**-175,258**	**-1.3**
Fountain Valley	FV-8-1	-101,480	**-0.8**	**-138,546**	**-1.0**
Fountain Valley	FV-9-1	-94,179	**-0.7**	**-128,578**	**-1.0**
Huntington Beach	GOOD-HB-1	-6,855	**-0.1**	**-9,359**	**-0.1**
Huntington Beach	HB-10-1	-383,450	**-2.9**	**-523,507**	**-3.9**
Huntington Beach	HB-5-1	-452,150	**-3.4**	**-617,300**	**-4.6**
Huntington Beach	HB-9-1	-135,170	**-1.0**	**-184,541**	**-1.4**
IRWD	IRWD-10-1	-448,590	**-3.4**	**-612,439**	**-4.6**
IRWD	IRWD-1-1	-142,070	**-1.1**	**-193,962**	**-1.5**
IRWD	IRWD-11-1	-118,480	**-0.9**	**-161,755**	**-1.2**
IRWD	IRWD-12-1	-213,210	**-1.6**	**-291,086**	**-2.2**
IRWD	IRWD-13-1	-102,870	**-0.8**	**-140,444**	**-1.1**
IRWD	IRWD-14-1	-201,860	**-1.5**	**-275,590**	**-2.1**
IRWD	IRWD-15-1	-459,810	**-3.4**	**-627,757**	**-4.7**
IRWD	IRWD-16-1	-125,520	**-0.9**	**-171,367**	**-1.3**
IRWD	IRWD-17-1	-372,450	**-2.8**	**-508,489**	**-3.8**
IRWD	IRWD-18-1	-168,960	**-1.3**	**-230,673**	**-1.7**
IRWD	IRWD-2-1	-176,150	**-1.3**	**-240,489**	**-1.8**
IRWD	IRWD-3-1	-1,257	**0.0**	**-1,717**	**0.0**
IRWD	IRWD-4-1	-229,280	**-1.7**	**-313,025**	**-2.3**
IRWD	IRWD-5-1	-161,120	**-1.2**	**-219,970**	**-1.6**
IRWD	IRWD-6-1	-153,020	**-1.1**	**-208,911**	**-1.6**
IRWD	IRWD-7-1	-82,888	**-0.6**	**-113,163**	**-0.8**
Mesa Water District	MCWD-11-1	-135,150	**-1.0**	**-184,514**	**-1.4**
Mesa Water District	MCWD-1B-1	-353,370	**-2.6**	**-482,440**	**-3.6**
Mesa Water District	MCWD-3B-1	-229,860	**-1.7**	**-313,817**	**-2.3**
Mesa Water District	MCWD-4-1	-256	**0.0**	**-350**	**0.0**
Mesa Water District	MCWD-5-1	-293,840	**-2.2**	**-401,166**	**-3.0**
Mesa Water District	MCWD-6-1	-333,830	**-2.5**	**-455,763**	**-3.4**
Mesa Water District	MCWD-7-1	-201,070	**-1.5**	**-274,512**	**-2.1**
Mesa Water District	MCWD-8-1	-21,595	**-0.2**	**-29,483**	**-0.2**
Mesa Water District	MCWD-9-1	-212,250	**-1.6**	**-289,775**	**-2.2**

Scenarios 2a and 2b - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD
Private	MTSN-SA-1	-452	**0.0**	**-617**	**0.0**
Mesa Verde	MVCC-COSD1-1	-13,326	**-0.1**	**-18,193**	**-0.1**
Mesa Verde	MVCC-COSD2-1	-21,883	**-0.2**	**-29,876**	**-0.2**
Mesa Verde	MVCC-COSD3-1	-2,672	**0.0**	**-3,648**	**0.0**
Newport Beach	NB-DOLD-1	-322,700	**-2.4**	**-440,567**	**-3.3**
Newport Beach	NB-DOLS-1	-269,580	**-2.0**	**-368,045**	**-2.8**
Private	NBGC-NB-1	-15,354	**-0.1**	**-20,962**	**-0.2**
Newport Beach	NB-TAMD-1	-421,610	**-3.2**	**-575,605**	**-4.3**
Newport Beach	NB-TAMS-1	-253,890	**-1.9**	**-346,624**	**-2.6**
Newport Beach	NDW-1-1	-4,631	**0.0**	**-6,323**	**0.0**
Santa Ana	OCCD-SA1-1	-632	**0.0**	**-863**	**0.0**
OCWD	OCWD-D1-1	-19,676	**-0.1**	**-26,862**	**-0.2**
OCWD	OCWD-D3-1	-36,227	**-0.3**	**-49,459**	**-0.4**
OCWD	OCWD-D4-1	-12,517	**-0.1**	**-17,089**	**-0.1**
OCWD	OCWD-D5-1	-13,035	**-0.1**	**-17,796**	**-0.1**
Santa Ana	SA-16-1	-51,726	**-0.4**	**-70,619**	**-0.5**
Santa Ana	SA-18-1	-137,020	**-1.0**	**-187,067**	**-1.4**
Santa Ana	SA-20-1	-165,030	**-1.2**	**-225,308**	**-1.7**
Santa Ana	SA-21-1	-164,990	**-1.2**	**-225,253**	**-1.7**
Santa Ana	SA-24-1	-96,058	**-0.7**	**-131,144**	**-1.0**
Santa Ana	SA-26-1	-65,427	**-0.5**	**-89,324**	**-0.7**
Santa Ana	SA-29-1	-167,970	**-1.3**	**-229,322**	**-1.7**
Santa Ana	SA-30-1	-169,370	**-1.3**	**-231,233**	**-1.7**
Santa Ana	SA-31-1	-279,320	**-2.1**	**-381,343**	**-2.9**
Santa Ana	SA-33-1	-201,630	**-1.5**	**-275,276**	**-2.1**
Santa Ana	SA-34-1	-42,432	**-0.3**	**-57,930**	**-0.4**
Santa Ana	SA-35-1	-253,680	**-1.9**	**-346,338**	**-2.6**
Santa Ana	SA-36-1	-314,850	**-2.4**	**-429,850**	**-3.2**
Santa Ana	SA-37-1	-230,370	**-1.7**	**-314,514**	**-2.4**
Santa Ana	SA-39-1	-323,470	**-2.4**	**-441,619**	**-3.3**
Santa Ana	SA-40-1	-141,770	**-1.1**	**-193,552**	**-1.4**
Santa Ana	SA-41-1	-234,170	**-1.8**	**-319,702**	**-2.4**
Private	SACC-SA-1	-33,336	**-0.2**	**-45,512**	**-0.3**
Fountain Valley	SAKI-FV-1	0	**0.0**	**0**	**0.0**
Private	SAKI-SAJ3-1	-2,862	**0.0**	**-3,907**	**0.0**
Private	SCSH-SA1-1	-1,509	**0.0**	**-2,060**	**0.0**
Westminster	SMID-D5-1	-9,435	**-0.1**	**-12,881**	**-0.1**
Tustin	T-COLU-1	-106,510	**-0.8**	**-145,413**	**-1.1**
Tustin	T-MS3-1	-15,714	**-0.1**	**-21,454**	**-0.2**

Scenarios 2a and 2b - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD
Tustin	T-MS4-1	-41,510	**-0.3**	**-56,672**	**-0.4**
Tustin	T-PAS-1	-341,240	**-2.6**	**-465,879**	**-3.5**
Tustin	T-PROS-1	-75,186	**-0.6**	**-102,648**	**-0.8**
Tustin	T-TUST-1	-62,245	**-0.5**	**-84,980**	**-0.6**
Tustin	T-VNBG-1	-205,480	**-1.5**	**-280,532**	**-2.1**
Tustin	T-WALN-1	-67,380	**-0.5**	**-91,991**	**-0.7**
Tustin	T-YORB-1	-5,660	**0.0**	**-7,727**	**-0.1**
Santa Ana	W-1887-1	-458	**0.0**	**-626**	**0.0**
Westminster	WHEM-WW-1	-37,510	**-0.3**	**-51,211**	**-0.4**
Westminster	WM-107A-1	-152,780	**-1.1**	**-208,583**	**-1.6**
Westminster	WM-1-1	-14,872	**-0.1**	**-20,304**	**-0.2**
Westminster	WM-3-1	-66,764	**-0.5**	**-91,150**	**-0.7**
Westminster	WM-4-1	-119,960	**-0.9**	**-163,776**	**-1.2**
Westminster	WM-6-1	-55,680	**-0.4**	**-76,017**	**-0.6**
Westminster	WM-RES1-1	-153,210	**-1.1**	**-209,171**	**-1.6**
Extraction (totals) =>		**-12,774,059**	**-95.5**	**-17,439,835**	**-130.4**
Additional Required Extraction (totals) =>		**-4,665,775**	**-34.9**	**N/A**	**N/A**
Modeled Extraction (totals) =>		**-17,439,835**	**-130.4**	**N/A**	**N/A**

Note:

[1] Positive values represent injection, and negative values represent
All wells located in Principal Aquifer.

Scenarios 3a and 3b - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjustment #1 Adjusted Modeled Pumping Rate[1]		Adjustment #2 Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD	ft^3/day	MGD
Huntington Beach	A1-HB-1	-16,154	**-0.1**	**-8,393**	**-0.1**	**-8,393**	**-0.1**
Santa Ana	DICE-SA2-1	0	**0.0**	**0**	**0.0**	**0**	**0.0**
Westminster	ESWA-4-1	-27,208	**-0.2**	**-37,146**	**-0.3**	**-46,268**	**-0.3**
Fountain Valley	FV-10-1	-214,690	**-1.6**	**-293,106**	**-2.2**	**-365,090**	**-2.7**
Fountain Valley	FV-11-1	-180,820	**-1.4**	**-246,865**	**-1.8**	**-307,492**	**-2.3**
Fountain Valley	FV-12-1	-73,954	**-0.6**	**-100,966**	**-0.8**	**-125,762**	**-0.9**
Fountain Valley	FV-4-1	-4,054	**0.0**	**-5,534**	**0.0**	**-6,894**	**-0.1**
Fountain Valley	FV-6-1	-128,370	**-1.0**	**-175,258**	**-1.3**	**-218,299**	**-1.6**
Fountain Valley	FV-8-1	-101,480	**-0.8**	**-138,546**	**-1.0**	**-172,571**	**-1.3**
Fountain Valley	FV-9-1	-94,179	**-0.7**	**-128,578**	**-1.0**	**-160,155**	**-1.2**
Huntington Beach	GOOD-HB-1	-6,855	**-0.1**	**-3,561**	**0.0**	**-3,561**	**0.0**
Huntington Beach	HB-10-1	-383,450	**-2.9**	**-199,220**	**-1.5**	**-199,220**	**-1.5**
Huntington Beach	HB-5-1	-452,150	**-3.4**	**-234,913**	**-1.8**	**-234,913**	**-1.8**
Huntington Beach	HB-9-1	-135,170	**-1.0**	**-70,227**	**-0.5**	**-70,227**	**-0.5**
IRWD	IRWD-10-1	-448,590	**-3.4**	**-612,439**	**-4.6**	**-762,846**	**-5.7**
IRWD	IRWD-1-1	-142,070	**-1.1**	**-193,962**	**-1.5**	**-241,596**	**-1.8**
IRWD	IRWD-11-1	-118,480	**-0.9**	**-161,755**	**-1.2**	**-201,480**	**-1.5**
IRWD	IRWD-12-1	-213,210	**-1.6**	**-291,086**	**-2.2**	**-362,573**	**-2.7**
IRWD	IRWD-13-1	-102,870	**-0.8**	**-140,444**	**-1.1**	**-174,935**	**-1.3**
IRWD	IRWD-14-1	-201,860	**-1.5**	**-275,590**	**-2.1**	**-343,272**	**-2.6**
IRWD	IRWD-15-1	-459,810	**-3.4**	**-627,757**	**-4.7**	**-781,927**	**-5.8**
IRWD	IRWD-16-1	-125,520	**-0.9**	**-171,367**	**-1.3**	**-213,452**	**-1.6**
IRWD	IRWD-17-1	-372,450	**-2.8**	**-508,489**	**-3.8**	**-633,367**	**-4.7**
IRWD	IRWD-18-1	-168,960	**-1.3**	**-230,673**	**-1.7**	**-287,324**	**-2.1**
IRWD	IRWD-2-1	-176,150	**-1.3**	**-240,489**	**-1.8**	**-299,551**	**-2.2**
IRWD	IRWD-3-1	-1,257	**0.0**	**-1,717**	**0.0**	**-2,138**	**0.0**
IRWD	IRWD-4-1	-229,280	**-1.7**	**-313,025**	**-2.3**	**-389,900**	**-2.9**
IRWD	IRWD-5-1	-161,120	**-1.2**	**-219,970**	**-1.6**	**-273,991**	**-2.0**

Scenarios 3a and 3b - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjustment #1 Adjusted Modeled Pumping Rate[1]		Adjustment #2 Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD	ft^3/day	MGD
IRWD	IRWD-6-1	-153,020	**-1.1**	**-208,911**	**-1.6**	**-260,217**	**-1.9**
IRWD	IRWD-7-1	-82,888	**-0.6**	**-113,163**	**-0.8**	**-140,955**	**-1.1**
Mesa Water District	MCWD-11-1	-135,150	**-1.0**	**-98,922**	**-0.7**	**-98,922**	**-0.7**
Mesa Water District	MCWD-1B-1	-353,370	**-2.6**	**-258,648**	**-1.9**	**-258,648**	**-1.9**
Mesa Water District	MCWD-3B-1	-229,860	**-1.7**	**-168,245**	**-1.3**	**-168,245**	**-1.3**
Mesa Water District	MCWD-4-1	-256	**0.0**	**-188**	**0.0**	**-188**	**0.0**
Mesa Water District	MCWD-5-1	-293,840	**-2.2**	**-215,075**	**-1.6**	**-215,075**	**-1.6**
Mesa Water District	MCWD-6-1	-333,830	**-2.5**	**-244,345**	**-1.8**	**-244,345**	**-1.8**
Mesa Water District	MCWD-7-1	-201,070	**-1.5**	**-147,172**	**-1.1**	**-147,172**	**-1.1**
Mesa Water District	MCWD-8-1	-21,595	**-0.2**	**-15,806**	**-0.1**	**-15,806**	**-0.1**
Mesa Water District	MCWD-9-1	-212,250	**-1.6**	**-155,356**	**-1.2**	**-155,356**	**-1.2**
Private	MTSN-SA-1	-452	**0.0**	**-617**	**0.0**	**-769**	**0.0**
Mesa Verde	MVCC-COSD1-1	-13,326	**-0.1**	**-18,193**	**-0.1**	**-22,661**	**-0.2**
Mesa Verde	MVCC-COSD2-1	-21,883	**-0.2**	**-29,876**	**-0.2**	**-37,213**	**-0.3**
Mesa Verde	MVCC-COSD3-1	-2,672	**0.0**	**-3,648**	**0.0**	**-4,544**	**0.0**
Newport Beach	NB-DOLD-1	-322,700	**-2.4**	**-201,167**	**-1.5**	**-201,167**	**-1.5**
Newport Beach	NB-DOLS-1	-269,580	**-2.0**	**-168,052**	**-1.3**	**-168,052**	**-1.3**
Private	NBGC-NB-1	-15,354	**-0.1**	**-9,571**	**-0.1**	**-9,571**	**-0.1**
Newport Beach	NB-TAMD-1	-421,610	**-3.2**	**-262,826**	**-2.0**	**-262,826**	**-2.0**
Newport Beach	NB-TAMS-1	-253,890	**-1.9**	**-158,271**	**-1.2**	**-158,271**	**-1.2**
Newport Beach	NDW-1-1	-4,631	**0.0**	**-2,887**	**0.0**	**-2,887**	**0.0**
Santa Ana	OCCD-SA1-1	-632	**0.0**	**-863**	**0.0**	**-1,075**	**0.0**
OCWD	OCWD-D1-1	-19,676	**-0.1**	**-26,862**	**-0.2**	**-33,459**	**-0.3**
OCWD	OCWD-D3-1	-36,227	**-0.3**	**-49,459**	**-0.4**	**-61,606**	**-0.5**
OCWD	OCWD-D4-1	-12,517	**-0.1**	**-17,089**	**-0.1**	**-21,286**	**-0.2**
OCWD	OCWD-D5-1	-13,035	**-0.1**	**-17,796**	**-0.1**	**-22,167**	**-0.2**
Santa Ana	SA-16-1	-51,726	**-0.4**	**-70,619**	**-0.5**	**-87,962**	**-0.7**
Santa Ana	SA-18-1	-137,020	**-1.0**	**-187,067**	**-1.4**	**-233,008**	**-1.7**

Scenarios 3a and 3b - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjustment #1 Adjusted Modeled Pumping Rate[1]		Adjustment #2 Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD	ft^3/day	MGD
Santa Ana	SA-20-1	-165,030	**-1.2**	**-225,308**	**-1.7**	**-280,641**	**-2.1**
Santa Ana	SA-21-1	-164,990	**-1.2**	**-225,253**	**-1.7**	**-280,573**	**-2.1**
Santa Ana	SA-24-1	-96,058	**-0.7**	**-131,144**	**-1.0**	**-163,351**	**-1.2**
Santa Ana	SA-26-1	-65,427	**-0.5**	**-89,324**	**-0.7**	**-111,261**	**-0.8**
Santa Ana	SA-29-1	-167,970	**-1.3**	**-229,322**	**-1.7**	**-285,640**	**-2.1**
Santa Ana	SA-30-1	-169,370	**-1.3**	**-231,233**	**-1.7**	**-288,021**	**-2.2**
Santa Ana	SA-31-1	-279,320	**-2.1**	**-381,343**	**-2.9**	**-474,996**	**-3.6**
Santa Ana	SA-33-1	-201,630	**-1.5**	**-275,276**	**-2.1**	**-342,880**	**-2.6**
Santa Ana	SA-34-1	-42,432	**-0.3**	**-57,930**	**-0.4**	**-72,157**	**-0.5**
Santa Ana	SA-35-1	-253,680	**-1.9**	**-346,338**	**-2.6**	**-431,394**	**-3.2**
Santa Ana	SA-36-1	-314,850	**-2.4**	**-429,850**	**-3.2**	**-535,416**	**-4.0**
Santa Ana	SA-37-1	-230,370	**-1.7**	**-314,514**	**-2.4**	**-391,754**	**-2.9**
Santa Ana	SA-39-1	-323,470	**-2.4**	**-441,619**	**-3.3**	**-550,075**	**-4.1**
Santa Ana	SA-40-1	-141,770	**-1.1**	**-193,552**	**-1.4**	**-241,086**	**-1.8**
Santa Ana	SA-41-1	-234,170	**-1.8**	**-319,702**	**-2.4**	**-398,216**	**-3.0**
Private	SACC-SA-1	-33,336	**-0.2**	**-45,512**	**-0.3**	**-56,689**	**-0.4**
Fountain Valley	SAKI-FV-1	0	**0.0**	**0**	**0.0**	**0**	**0.0**
Private	SAKI-SAJ3-1	-2,862	**0.0**	**-3,907**	**0.0**	**-4,867**	**0.0**
Private	SCSH-SA1-1	-1,509	**0.0**	**-2,060**	**0.0**	**-2,566**	**0.0**
Westminster	SMID-D5-1	-9,435	**-0.1**	**-12,881**	**-0.1**	**-16,045**	**-0.1**
Tustin	T-COLU-1	-106,510	**-0.8**	**-145,413**	**-1.1**	**-181,125**	**-1.4**
Tustin	T-MS3-1	-15,714	**-0.1**	**-21,454**	**-0.2**	**-26,722**	**-0.2**
Tustin	T-MS4-1	-41,510	**-0.3**	**-56,672**	**-0.4**	**-70,590**	**-0.5**
Tustin	T-PAS-1	-341,240	**-2.6**	**-465,879**	**-3.5**	**-580,293**	**-4.3**
Tustin	T-PROS-1	-75,186	**-0.6**	**-102,648**	**-0.8**	**-127,857**	**-1.0**
Tustin	T-TUST-1	-62,245	**-0.5**	**-84,980**	**-0.6**	**-105,850**	**-0.8**
Tustin	T-VNBG-1	-205,480	**-1.5**	**-280,532**	**-2.1**	**-349,428**	**-2.6**
Tustin	T-WALN-1	-67,380	**-0.5**	**-91,991**	**-0.7**	**-114,583**	**-0.9**

Scenarios 3a and 3b - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjustment #1 Adjusted Modeled Pumping Rate[1]		Adjustment #2 Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD	ft^3/day	MGD
Tustin	T-YORB-1	-5,660	**0.0**	**-7,727**	**-0.1**	**-9,625**	**-0.1**
Santa Ana	W-1887-1	-458	**0.0**	**-626**	**0.0**	**-779**	**0.0**
Westminster	WHEM-WW-1	-37,510	**-0.3**	**-51,211**	**-0.4**	**-63,787**	**-0.5**
Westminster	WM-107A-1	-152,780	**-1.1**	**-208,583**	**-1.6**	**-259,809**	**-1.9**
Westminster	WM-1-1	-14,872	**-0.1**	**-20,304**	**-0.2**	**-25,290**	**-0.2**
Westminster	WM-3-1	-66,764	**-0.5**	**-91,150**	**-0.7**	**-113,535**	**-0.8**
Westminster	WM-4-1	-119,960	**-0.9**	**-163,776**	**-1.2**	**-203,997**	**-1.5**
Westminster	WM-6-1	-55,680	**-0.4**	**-76,017**	**-0.6**	**-94,686**	**-0.7**
Westminster	WM-RES1-1	-153,210	**-1.1**	**-209,171**	**-1.6**	**-260,540**	**-1.9**
Extraction (totals) =>		**-12,774,059**	**-95.5**	**-14,515,975**	**-108.6**	**-17,436,775**	**-130.4**
Additional Required Extraction (totals) =>		**-4,665,775**	**-34.9**	**N/A**	**N/A**	**N/A**	**N/A**
Modeled Extraction (totals) =>		**-17,439,835**	**-130.4**	**N/A**	**N/A**	**N/A**	**N/A**

Modeled Extraction (Huntington Beach [HB], Newport Beach [NB], and Mesa Consolidated [MC]) =>	**-2,610,389**	**-19.5**
Modeled Extraction (other pumpers, after accounting for HB, NB, and MC) =>	**-11,905,586**	**-89.1**
Required Modeled Extraction (other pumpers) =>	**-14,829,445**	**-110.9**
Required Modeled Extraction Multiplier (other pumpers) =>	**1.25**	**1.25**

Note:

[1] Positive values represent injection, and negative values represent extraction.
All wells located in Principal Aquifer.

Scenarios 4a and 4b - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjustment #1 Adjusted Modeled Pumping Rate[1]		Adjustment #2 Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD	ft^3/day	MGD
Huntington Beach	A1-HB-1	-16,154	**-0.1**	**-8,393**	**-0.1**	**-8,393**	**-0.1**
Santa Ana	DICE-SA2-1	0	**0.0**	**0**	**0.0**	**0**	**0.0**
Westminster	ESWA-4-1	-27,208	**-0.2**	**-37,146**	**-0.3**	**-46,268**	**-0.3**
Fountain Valley	FV-10-1	-214,690	**-1.6**	**-293,106**	**-2.2**	**-365,090**	**-2.7**
Fountain Valley	FV-11-1	-180,820	**-1.4**	**-246,865**	**-1.8**	**-307,492**	**-2.3**
Fountain Valley	FV-12-1	-73,954	**-0.6**	**-100,966**	**-0.8**	**-125,762**	**-0.9**
Fountain Valley	FV-4-1	-4,054	**0.0**	**-5,534**	**0.0**	**-6,894**	**-0.1**
Fountain Valley	FV-6-1	-128,370	**-1.0**	**-175,258**	**-1.3**	**-218,299**	**-1.6**
Fountain Valley	FV-8-1	-101,480	**-0.8**	**-138,546**	**-1.0**	**-172,571**	**-1.3**
Fountain Valley	FV-9-1	-94,179	**-0.7**	**-128,578**	**-1.0**	**-160,155**	**-1.2**
Huntington Beach	GOOD-HB-1	-6,855	**-0.1**	**-3,561**	**0.0**	**-3,561**	**0.0**
Huntington Beach	HB-10-1	-383,450	**-2.9**	**-199,220**	**-1.5**	**-199,220**	**-1.5**
Huntington Beach	HB-5-1	-452,150	**-3.4**	**-234,913**	**-1.8**	**-234,913**	**-1.8**
Huntington Beach	HB-9-1	-135,170	**-1.0**	**-70,227**	**-0.5**	**-70,227**	**-0.5**
IRWD	IRWD-10-1	-448,590	**-3.4**	**-612,439**	**-4.6**	**-762,846**	**-5.7**
IRWD	IRWD-1-1	-142,070	**-1.1**	**-193,962**	**-1.5**	**-241,596**	**-1.8**
IRWD	IRWD-11-1	-118,480	**-0.9**	**-161,755**	**-1.2**	**-201,480**	**-1.5**
IRWD	IRWD-12-1	-213,210	**-1.6**	**-291,086**	**-2.2**	**-362,573**	**-2.7**
IRWD	IRWD-13-1	-102,870	**-0.8**	**-140,444**	**-1.1**	**-174,935**	**-1.3**
IRWD	IRWD-14-1	-201,860	**-1.5**	**-275,590**	**-2.1**	**-343,272**	**-2.6**
IRWD	IRWD-15-1	-459,810	**-3.4**	**-627,757**	**-4.7**	**-781,927**	**-5.8**
IRWD	IRWD-16-1	-125,520	**-0.9**	**-171,367**	**-1.3**	**-213,452**	**-1.6**
IRWD	IRWD-17-1	-372,450	**-2.8**	**-508,489**	**-3.8**	**-633,367**	**-4.7**
IRWD	IRWD-18-1	-168,960	**-1.3**	**-230,673**	**-1.7**	**-287,324**	**-2.1**
IRWD	IRWD-2-1	-176,150	**-1.3**	**-240,489**	**-1.8**	**-299,551**	**-2.2**
IRWD	IRWD-3-1	-1,257	**0.0**	**-1,717**	**0.0**	**-2,138**	**0.0**
IRWD	IRWD-4-1	-229,280	**-1.7**	**-313,025**	**-2.3**	**-389,900**	**-2.9**
IRWD	IRWD-5-1	-161,120	**-1.2**	**-219,970**	**-1.6**	**-273,991**	**-2.0**
IRWD	IRWD-6-1	-153,020	**-1.1**	**-208,911**	**-1.6**	**-260,217**	**-1.9**

Scenarios 4a and 4b - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjustment #1 Adjusted Modeled Pumping Rate[1]		Adjustment #2 Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD	ft^3/day	MGD
IRWD	IRWD-7-1	-82,888	**-0.6**	**-113,163**	**-0.8**	**-140,955**	**-1.1**
Mesa Water District	MCWD-11-1	-135,150	**-1.0**	**-98,922**	**-0.7**	**-98,922**	**-0.7**
Mesa Water District	MCWD-1B-1	-353,370	**-2.6**	**-258,648**	**-1.9**	**-258,648**	**-1.9**
Mesa Water District	MCWD-3B-1	-229,860	**-1.7**	**-168,245**	**-1.3**	**-168,245**	**-1.3**
Mesa Water District	MCWD-4-1	-256	**0.0**	**-188**	**0.0**	**-188**	**0.0**
Mesa Water District	MCWD-5-1	-293,840	**-2.2**	**-215,075**	**-1.6**	**-215,075**	**-1.6**
Mesa Water District	MCWD-6-1	-333,830	**-2.5**	**-244,345**	**-1.8**	**-244,345**	**-1.8**
Mesa Water District	MCWD-7-1	-201,070	**-1.5**	**-147,172**	**-1.1**	**-147,172**	**-1.1**
Mesa Water District	MCWD-8-1	-21,595	**-0.2**	**-15,806**	**-0.1**	**-15,806**	**-0.1**
Mesa Water District	MCWD-9-1	-212,250	**-1.6**	**-155,356**	**-1.2**	**-155,356**	**-1.2**
Private	MTSN-SA-1	-452	**0.0**	**-617**	**0.0**	**-769**	**0.0**
Mesa Verde	MVCC-COSD1-1	-13,326	**-0.1**	**-18,193**	**-0.1**	**-22,661**	**-0.2**
Mesa Verde	MVCC-COSD2-1	-21,883	**-0.2**	**-29,876**	**-0.2**	**-37,213**	**-0.3**
Mesa Verde	MVCC-COSD3-1	-2,672	**0.0**	**-3,648**	**0.0**	**-4,544**	**0.0**
Newport Beach	NB-DOLD-1	-322,700	**-2.4**	**-201,167**	**-1.5**	**-201,167**	**-1.5**
Newport Beach	NB-DOLS-1	-269,580	**-2.0**	**-168,052**	**-1.3**	**-168,052**	**-1.3**
Private	NBGC-NB-1	-15,354	**-0.1**	**-9,571**	**-0.1**	**-9,571**	**-0.1**
Newport Beach	NB-TAMD-1	-421,610	**-3.2**	**-262,826**	**-2.0**	**-262,826**	**-2.0**
Newport Beach	NB-TAMS-1	-253,890	**-1.9**	**-158,271**	**-1.2**	**-158,271**	**-1.2**
Newport Beach	NDW-1-1	-4,631	**0.0**	**-2,887**	**0.0**	**-2,887**	**0.0**
Santa Ana	OCCD-SA1-1	-632	**0.0**	**-863**	**0.0**	**-1,075**	**0.0**
OCWD	OCWD-D1-1	-19,676	**-0.1**	**-26,862**	**-0.2**	**-33,459**	**-0.3**
OCWD	OCWD-D3-1	-36,227	**-0.3**	**-49,459**	**-0.4**	**-61,606**	**-0.5**
OCWD	OCWD-D4-1	-12,517	**-0.1**	**-17,089**	**-0.1**	**-21,286**	**-0.2**
OCWD	OCWD-D5-1	-13,035	**-0.1**	**-17,796**	**-0.1**	**-22,167**	**-0.2**
Santa Ana	SA-16-1	-51,726	**-0.4**	**-70,619**	**-0.5**	**-87,962**	**-0.7**
Santa Ana	SA-18-1	-137,020	**-1.0**	**-187,067**	**-1.4**	**-233,008**	**-1.7**
Santa Ana	SA-20-1	-165,030	**-1.2**	**-225,308**	**-1.7**	**-280,641**	**-2.1**
Santa Ana	SA-21-1	-164,990	**-1.2**	**-225,253**	**-1.7**	**-280,573**	**-2.1**

Scenarios 4a and 4b - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjustment #1 Adjusted Modeled Pumping Rate[1]		Adjustment #2 Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD	ft^3/day	MGD
Santa Ana	SA-24-1	-96,058	**-0.7**	**-131,144**	**-1.0**	**-163,351**	**-1.2**
Santa Ana	SA-26-1	-65,427	**-0.5**	**-89,324**	**-0.7**	**-111,261**	**-0.8**
Santa Ana	SA-29-1	-167,970	**-1.3**	**-229,322**	**-1.7**	**-285,640**	**-2.1**
Santa Ana	SA-30-1	-169,370	**-1.3**	**-231,233**	**-1.7**	**-288,021**	**-2.2**
Santa Ana	SA-31-1	-279,320	**-2.1**	**-381,343**	**-2.9**	**-474,996**	**-3.6**
Santa Ana	SA-33-1	-201,630	**-1.5**	**-275,276**	**-2.1**	**-342,880**	**-2.6**
Santa Ana	SA-34-1	-42,432	**-0.3**	**-57,930**	**-0.4**	**-72,157**	**-0.5**
Santa Ana	SA-35-1	-253,680	**-1.9**	**-346,338**	**-2.6**	**-431,394**	**-3.2**
Santa Ana	SA-36-1	-314,850	**-2.4**	**-429,850**	**-3.2**	**-535,416**	**-4.0**
Santa Ana	SA-37-1	-230,370	**-1.7**	**-314,514**	**-2.4**	**-391,754**	**-2.9**
Santa Ana	SA-39-1	-323,470	**-2.4**	**-441,619**	**-3.3**	**-550,075**	**-4.1**
Santa Ana	SA-40-1	-141,770	**-1.1**	**-193,552**	**-1.4**	**-241,086**	**-1.8**
Santa Ana	SA-41-1	-234,170	**-1.8**	**-319,702**	**-2.4**	**-398,216**	**-3.0**
Private	SACC-SA-1	-33,336	**-0.2**	**-45,512**	**-0.3**	**-56,689**	**-0.4**
Fountain Valley	SAKI-FV-1	0	**0.0**	**0**	**0.0**	**0**	**0.0**
Private	SAKI-SAJ3-1	-2,862	**0.0**	**-3,907**	**0.0**	**-4,867**	**0.0**
Private	SCSH-SA1-1	-1,509	**0.0**	**-2,060**	**0.0**	**-2,566**	**0.0**
Westminster	SMID-D5-1	-9,435	**-0.1**	**-12,881**	**-0.1**	**-16,045**	**-0.1**
Tustin	T-COLU-1	-106,510	**-0.8**	**-145,413**	**-1.1**	**-181,125**	**-1.4**
Tustin	T-MS3-1	-15,714	**-0.1**	**-21,454**	**-0.2**	**-26,722**	**-0.2**
Tustin	T-MS4-1	-41,510	**-0.3**	**-56,672**	**-0.4**	**-70,590**	**-0.5**
Tustin	T-PAS-1	-341,240	**-2.6**	**-465,879**	**-3.5**	**-580,293**	**-4.3**
Tustin	T-PROS-1	-75,186	**-0.6**	**-102,648**	**-0.8**	**-127,857**	**-1.0**
Tustin	T-TUST-1	-62,245	**-0.5**	**-84,980**	**-0.6**	**-105,850**	**-0.8**
Tustin	T-VNBG-1	-205,480	**-1.5**	**-280,532**	**-2.1**	**-349,428**	**-2.6**
Tustin	T-WALN-1	-67,380	**-0.5**	**-91,991**	**-0.7**	**-114,583**	**-0.9**
Tustin	T-YORB-1	-5,660	**0.0**	**-7,727**	**-0.1**	**-9,625**	**-0.1**
Santa Ana	W-1887-1	-458	**0.0**	**-626**	**0.0**	**-779**	**0.0**
Westminster	WHEM-WW-1	-37,510	**-0.3**	**-51,211**	**-0.4**	**-63,787**	**-0.5**

Scenarios 4a and 4b - Extraction Well Summary

System	Model Well Name	Modeled Pumping Rate[1]		Adjustment #1 Adjusted Modeled Pumping Rate[1]		Adjustment #2 Adjusted Modeled Pumping Rate[1]	
		ft^3/day	MGD	ft^3/day	MGD	ft^3/day	MGD
Westminster	WM-107A-1	-152,780	**-1.1**	**-208,583**	**-1.6**	**-259,809**	**-1.9**
Westminster	WM-1-1	-14,872	**-0.1**	**-20,304**	**-0.2**	**-25,290**	**-0.2**
Westminster	WM-3-1	-66,764	**-0.5**	**-91,150**	**-0.7**	**-113,535**	**-0.8**
Westminster	WM-4-1	-119,960	**-0.9**	**-163,776**	**-1.2**	**-203,997**	**-1.5**
Westminster	WM-6-1	-55,680	**-0.4**	**-76,017**	**-0.6**	**-94,686**	**-0.7**
Westminster	WM-RES1-1	-153,210	**-1.1**	**-209,171**	**-1.6**	**-260,540**	**-1.9**
Extraction (totals) =>		**-12,774,059**	**-95.5**	**-14,515,975**	**-108.6**	**-17,436,775**	**-130.4**
Additional Required Extraction (totals) =>		**-4,665,775**	**-34.9**	**N/A**	**N/A**	**N/A**	**N/A**
Modeled Extraction (totals) =>		**-17,439,835**	**-130.4**	**N/A**	**N/A**	**N/A**	**N/A**

Modeled Extraction (Huntington Beach [HB], Newport Beach [NB], and Mesa Consolidated [MC]) =>	**-2,610,389**	**-19.5**
Modeled Extraction (other pumpers, after accounting for HB, NB, and MC) =>	**-11,905,586**	**-89.1**
Required Modeled Extraction (other pumpers) =>	**-14,829,445**	**-110.9**
Required Modeled Extraction Multiplier (other pumpers) =>	**1.25**	**1.25**

Note:

[1] Positive values represent injection, and negative values represent extraction.
All wells located in Principal Aquifer.

Total Extraction Well Pumping Rates[1]

System	Scenario 0			Scenario 1			Scenario 2a/2b				Scenario 3a/3b				Scenario 4a/4b			
	Total Pumping (gpm)	Total Pumping (MGD)	Total Pumping (af/yr)	Total Pumping (gpm)	Total Pumping (MGD)	Total Pumping (af/yr)	Total Pumping (gpm)	Total Pumping (MGD)	Total Pumping (af/yr)	Increase Relative to Scenario 1 (MGD)	Total Pumping (gpm)	Total Pumping (MGD)	Total Pumping (af/yr)	Increase Relative to Scenario 1 (MGD)	Total Pumping (gpm)	Total Pumping (MGD)	Total Pumping (af/yr)	Increase Relative to Scenario 1
Fountain Valley	4,140	6.0	6,683	4,417	6.4	7,130	5,652	8.1	9,124	1.8	7,040	10.1	11,364	3.8	7,040	10.1	11,364	3.8
Huntington Beach	5,159	7.4	8,327	5,504	7.9	8,885	7,043	10.1	11,369	2.2	2,680	3.9	4,326	-4.1	2,680	3.9	4,326	-4.1
IRWD	16,390	23.6	26,458	17,488	25.2	28,230	22,377	32.2	36,122	7.0	27,873	40.1	44,993	15.0	27,873	40.1	44,993	15.0
Mesa Verde	197	0.3	317	210	0.3	339	268	0.4	433	0.1	334	0.5	540	0.2	334	0.5	540	0.2
Mesa Consolidated	9,246	13.3	14,925	9,865	14.2	15,925	12,623	18.2	20,377	4.0	6,768	9.7	10,925	-4.5	6,768	9.7	10,925	-4.5
Newport Beach	6,608	9.5	10,667	7,051	10.2	11,382	9,022	13.0	14,563	2.8	4,123	5.9	6,655	-4.2	4,123	5.9	6,655	-4.2
OCWD	423	0.6	683	451	0.6	728	577	0.8	932	0.2	719	1.0	1,161	0.4	719	1.0	1,161	0.4
Santa Ana	15,779	22.7	25,471	16,836	24.2	27,177	21,542	31.0	34,774	6.8	26,833	38.6	43,314	14.4	26,833	38.6	43,314	14.4
Tustin	4,780	6.9	7,717	5,101	7.3	8,234	6,526	9.4	10,535	2.1	8,129	11.7	13,123	4.4	8,129	11.7	13,123	4.4
Westminster	3,309	4.8	5,341	3,530	5.1	5,699	4,517	6.5	7,292	1.4	5,627	8.1	9,083	3.0	5,627	8.1	9,083	3.0
Private	278	0.4	448	296	0.4	478	379	0.5	612	0.1	387	0.6	624	0.1	387	0.6	624	0.1
Total	66,309	95.5	107,037	70,750	101.9	114,206	90,528	130.4	146,133	28.4	90,512	130.3	146,107	28.3	90,512	130.3	146,107	28.3

Note:

[1] Within the TH&Co model area only.

Talbert Model Groundwater Budgets

Scenario	Inflows (acre-ft/yr)						Outflows (acre-ft/yr)																Change in Storage (acre-ft)	Percentage of Total Budget
	Injection	Boundary Underflow In					Pumping												Boundary Underflow Out					
	OCWD	North	South	East	West	Total	IRWD	Santa Ana	Mesa Water District	Newport Beach	Huntington Beach	Tustin	Fountain Valley	Westminster	OCWD	Mesa Verde	Private	Total	North	South	East	West	Total	
0	33,181	84,463	6,980	33,063	12,136	169,822	26,458	25,471	14,925	10,667	8,327	7,717	6,683	5,341	683	317	448	107,037	21,908	2,668	9,954	29,434	171,000	-1,178	0.69%
1	40,356	83,772	6,975	33,432	12,202	176,737	28,230	27,177	15,925	11,382	8,885	8,234	7,130	5,699	728	339	478	114,206	22,038	2,669	9,944	29,130	177,987	-1,250	0.70%
2a, 2b	72,304	81,321	5,753	34,755	12,783	206,916	36,122	34,774	20,377	14,563	11,369	10,535	9,124	7,292	932	433	612	146,133	22,373	2,807	10,122	27,068	208,503	-1,587	0.76%
3a, 3b	59,973	89,666	6,749	37,810	12,697	206,895	44,993	43,314	10,925	6,655	4,326	13,123	11,364	9,083	1,161	540	624	146,107	20,838	2,202	9,539	30,207	208,893	-1,998	0.96%
4a, 4b	59,973	89,666	6,749	37,810	12,697	206,895	44,993	43,314	10,925	6,655	4,326	13,123	11,364	9,083	1,161	540	624	146,107	20,838	2,202	9,539	30,207	208,893	-1,998	0.96%

Total Dyer Road Well Field Concentrations in 2070

	Scenario 0	Scenario 1	Scenario 2a		Scenario 3a		Scenario 4a		Scenario 2b		Scenario 3b		Scenario 4b	
Constituent of Concern	Total DRWF Concentration (mg/L)[1]	Total DRWF Concentration (mg/L)	Total DRWF Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total DRWF Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total DRWF Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total DRWF Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total DRWF Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total DRWF Concentration (mg/L)	Percent Increase Relative to Scenario 1
TDS	298	236	155	-34%	175	-26%	163	-31%	139	-41%	161	-32%	157	-33%
Chloride	29	23	22	-6%	23	-1%	19	-18%	20	-14%	21	-9%	18	-21%
Boron	0.07	0.12	0.26	123%	0.23	103%	0.20	76%	0.24	105%	0.22	88%	0.20	70%

Note:

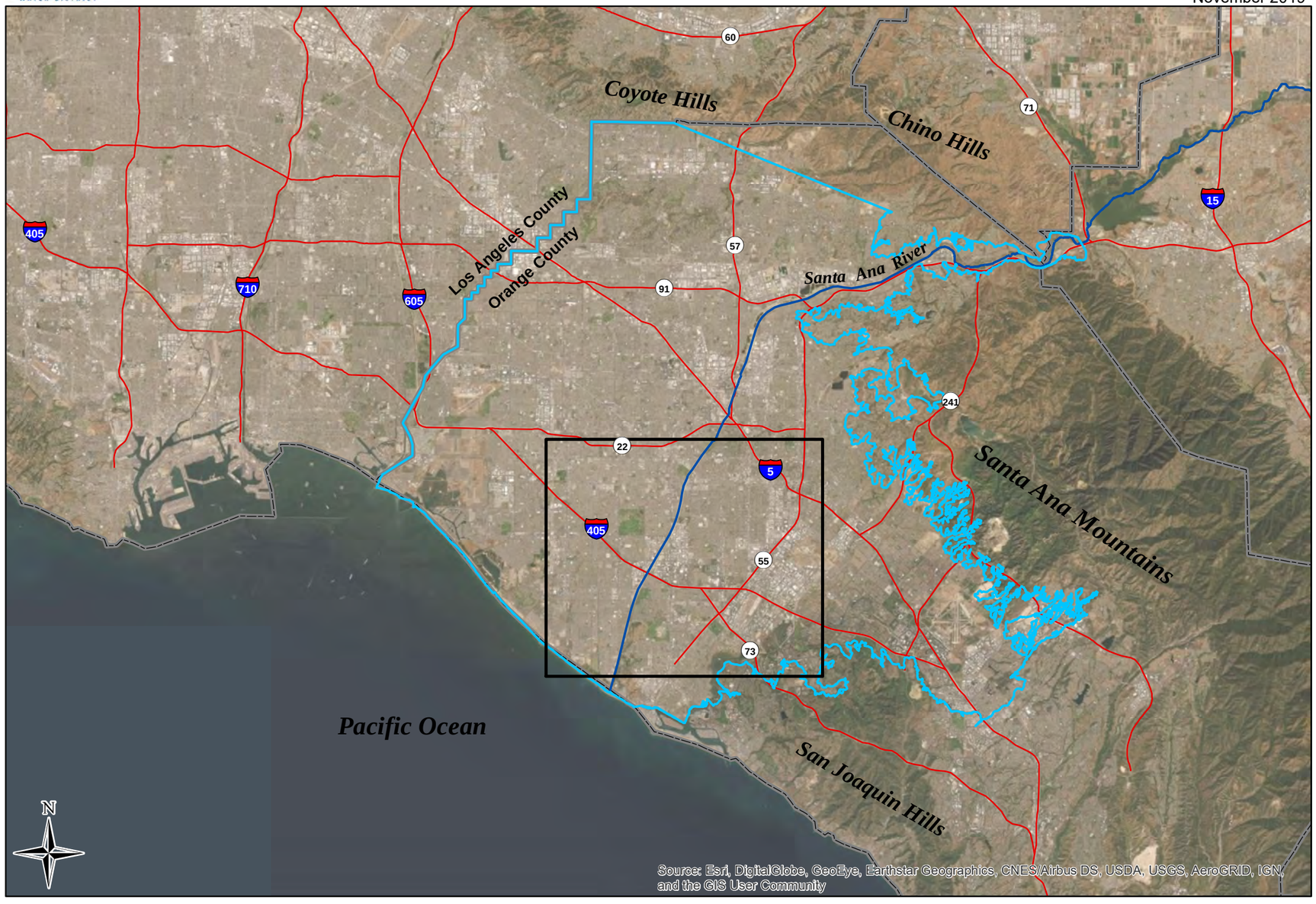
[1] mg/L = Milligrams per Liter.

Figures

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



Map Features

- Model Domain
- Coastal Plain of Orange County Groundwater Basin
- County Boundary
- Santa Ana River
- Freeway

0 2 4 8 Miles

NAD 83 State Plane Zone 6

Regional Map

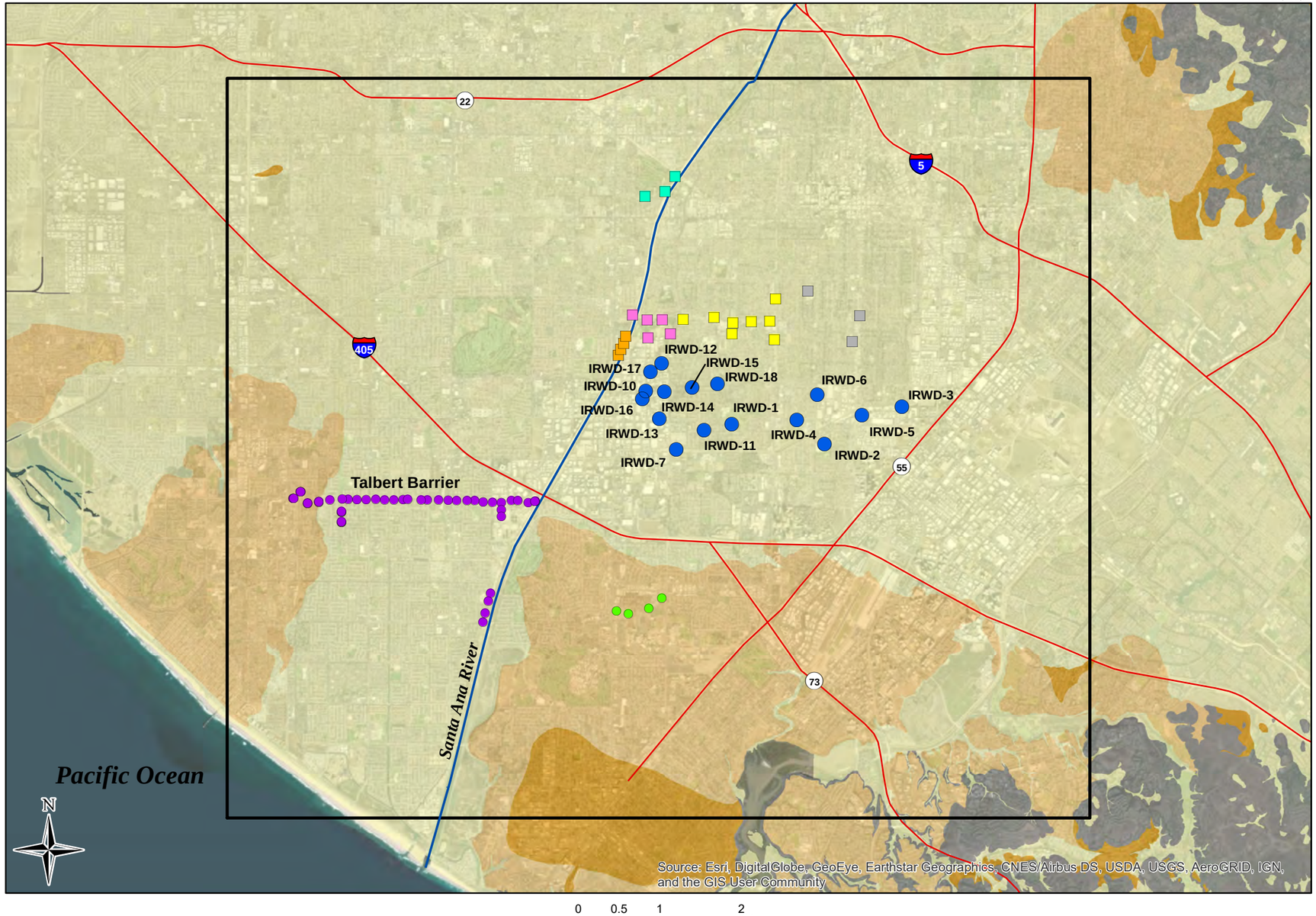
Thomas Harder & Co. Groundwater Consulting

Figure 1

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



NAD 83 State Plane Zone 6

Map Features

- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- Model Domain
- Santa Ana River
- Freeway
- Alluvial Deposits
- Old Alluvial Deposits
- Very Old Alluvial Deposits
- Bedrock

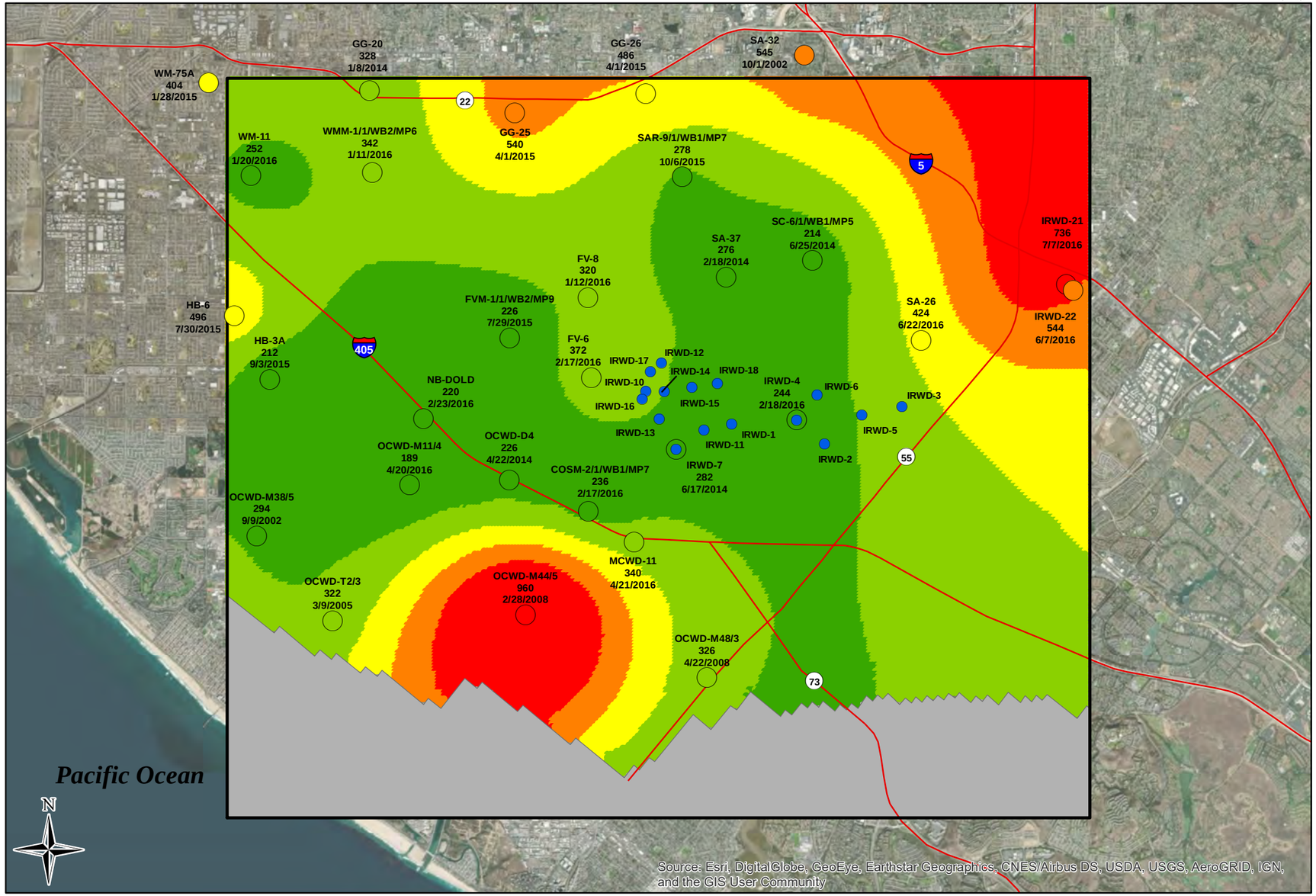
Thomas Harder & Co.
Groundwater Consulting

Study Area

Figure 2

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Basemap Source: esri.com

Map Features

Most Recent Total Dissolved Solids Concentration (mg/L)

- < 300
- 300 - 400
- 400 - 500
- 500 - 600
- > 600

Model Initial Condition (Total Dissolved Solids) (mg/L)

- < 300
- 300 - 400
- 400 - 500
- 500 - 600
- > 600

- Dyer Road Well Field Well
- No Flow Zone
- Model Domain
- Freeway

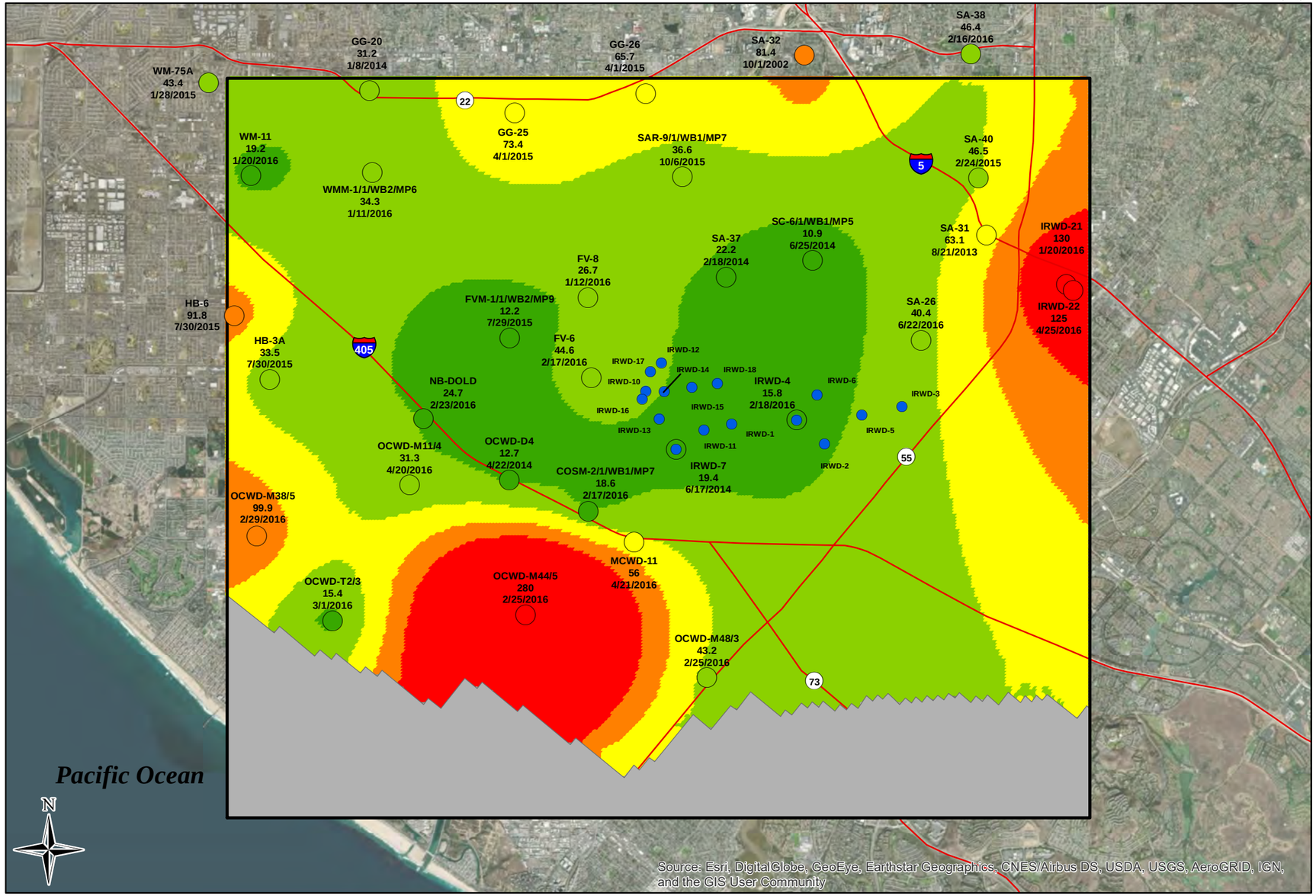
Total Dissolved Solids - Model Initial Condition

Figure 3

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Basemap Source: esri.com

Map Features

Most Recent Chloride Concentration (mg/L)

- < 25
- 25 - 50
- 50 - 75
- 75 - 100
- > 100

Model Initial Condition (Chloride) (mg/L)

- < 25
- 25 - 50
- 50 - 75
- 75 - 100
- > 100
- Dyer Road Well Field Well
- No Flow Zone
- Model Domain
- Freeway

Thomas Harder & Co. Groundwater Consulting

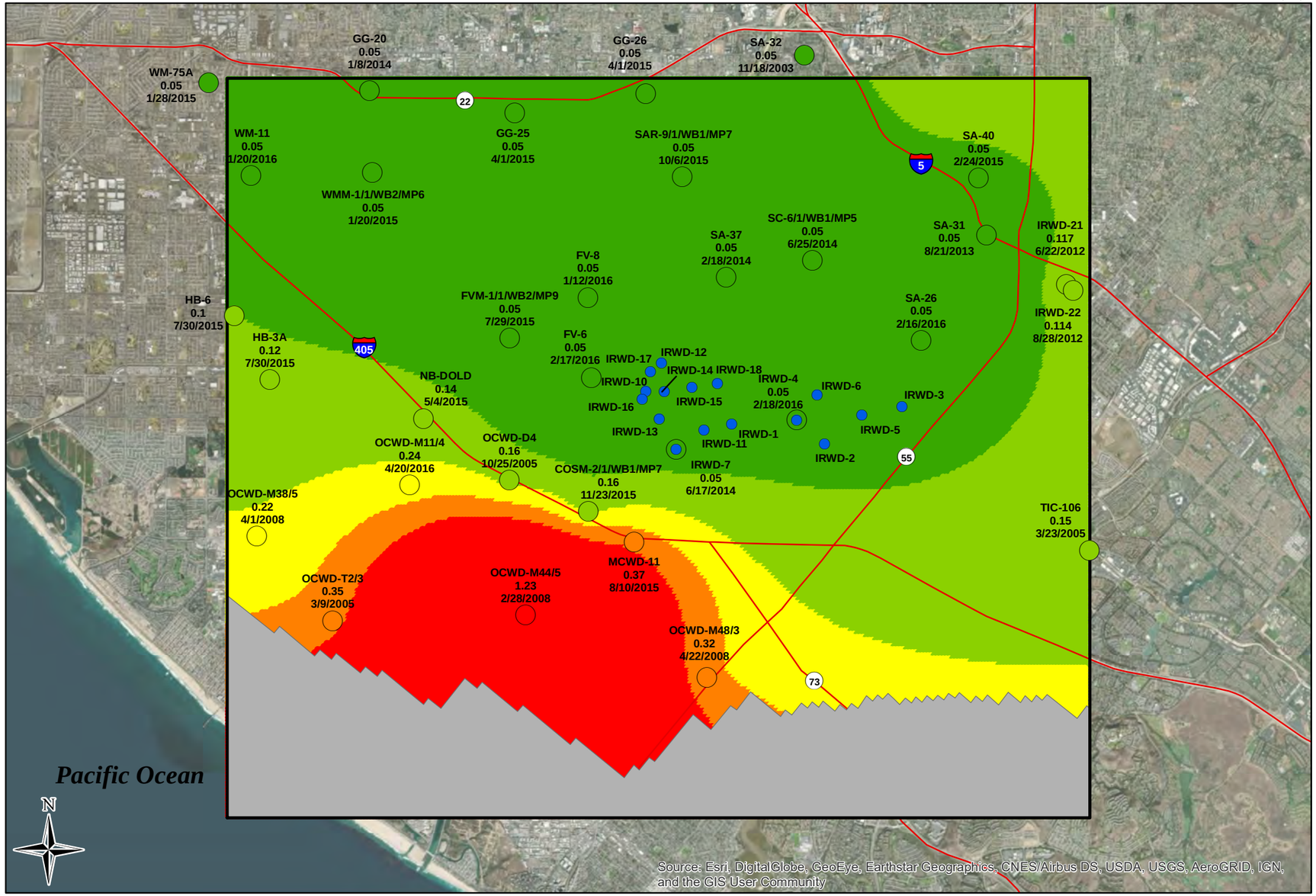
Chloride - Model Initial Condition

Figure 4

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Basemap Source: esri.com

Map Features

Most Recent BoronConcentration (mg/L)

- Below Dection Limit of 0.10 (Assumed to be 0.05)
- 0.10 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- > 0.40

Model Initial Condition (Boron) (mg/L)

- < 0.10
- 0.10 - 0.20
- 0.20 - 0.30
- 0.30 - 0.40
- > 0.40
- Dyer Road Well Field Well
- No Flow Zone
- Model Domain
- Freeway

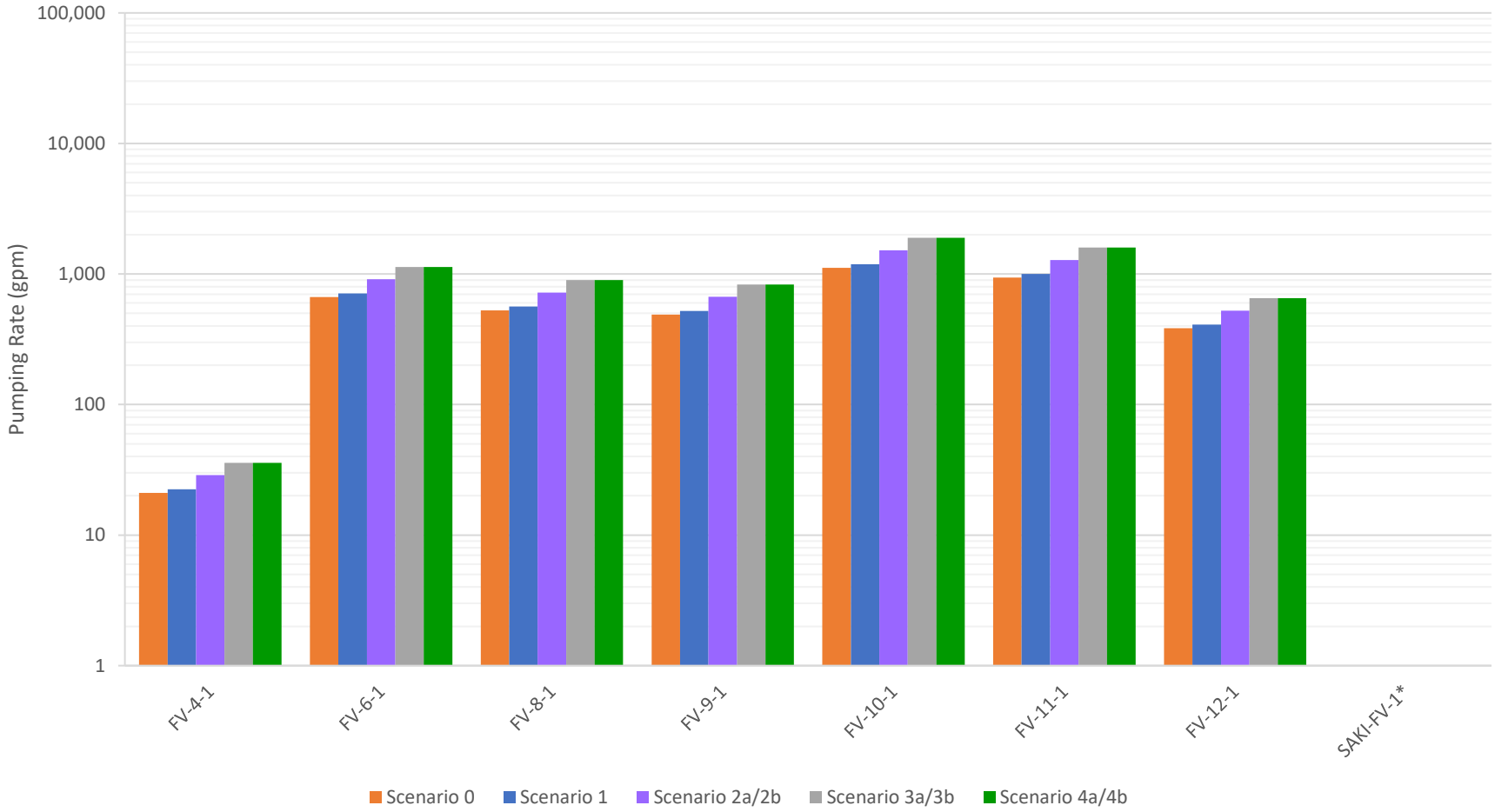
Thomas Harder & Co. Groundwater Consulting

Boron - Model Initial Condition

Figure 5

Figure 6

Fountain Valley Extraction Well Pumping Rates



Note: Wells with an asterisk do not pump in any scenario.

Figure 7

Huntington Beach Extraction Well Pumping Rates

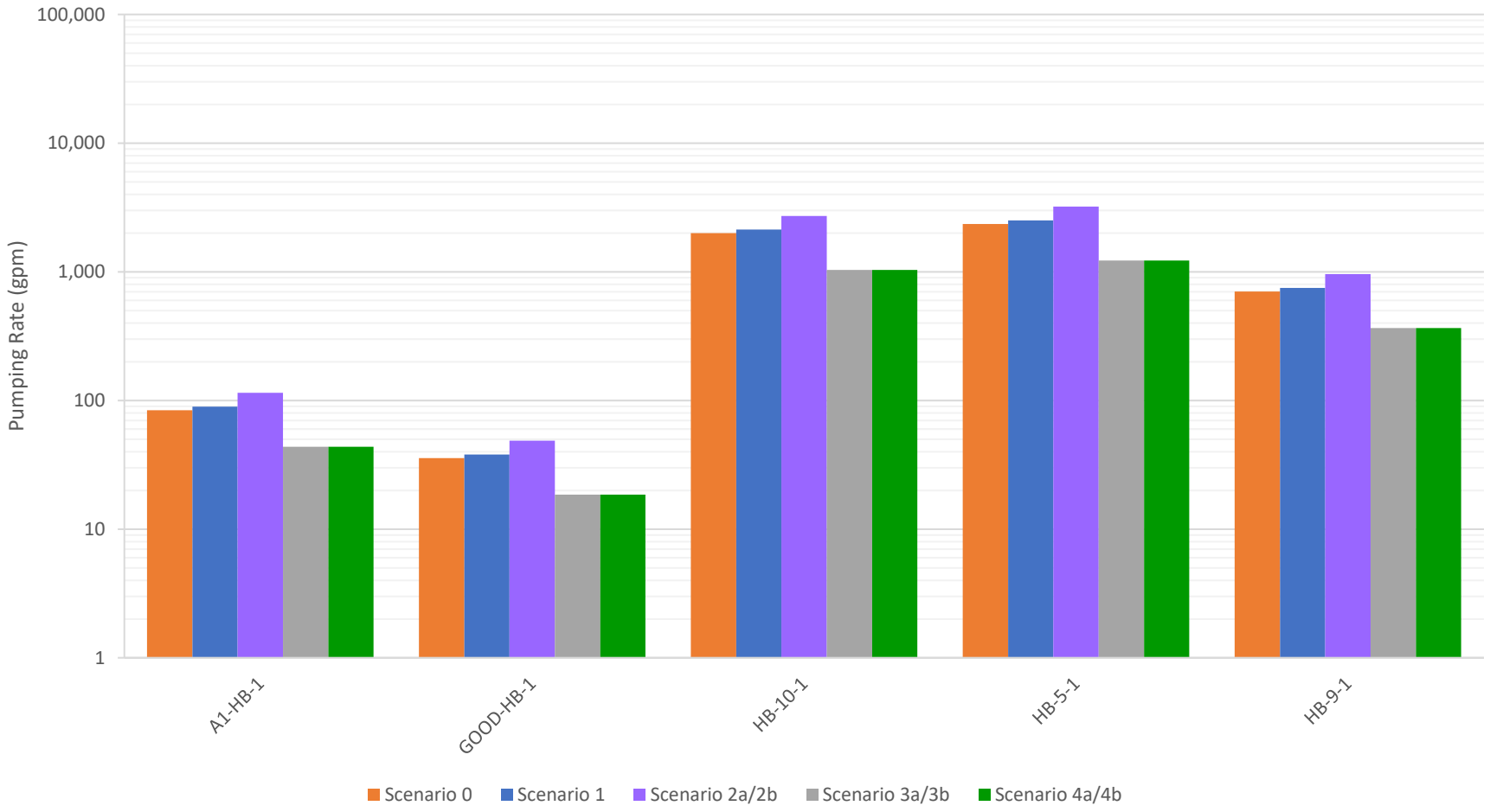


Figure 8

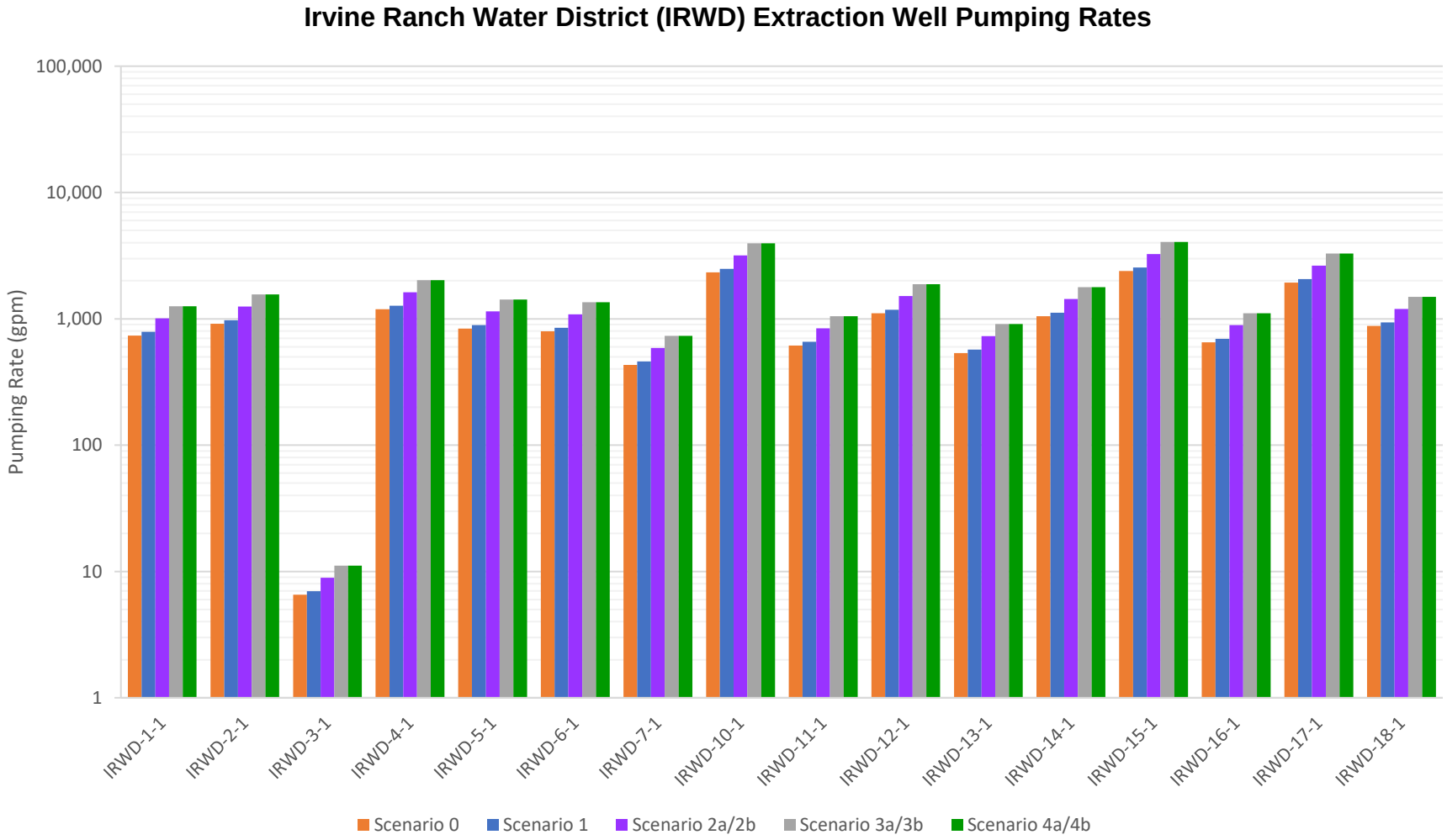

Irvine Ranch Water District (IRWD) Extraction Well Pumping Rates
Pumping Rate (gpm)
100,000
10,000
1,000
100
10
1
IRWD-1-1
IRWD-2-1
IRWD-3-1
IRWD-4-1
IRWD-5-1
IRWD-6-1
IRWD-7-1
IRWD-10-1
IRWD-11-1
IRWD-12-1
IRWD-13-1
IRWD-14-1
IRWD-15-1
IRWD-16-1
IRWD-17-1
IRWD-18-1
Scenario 0
Scenario 1
Scenario 2a/2b
Scenario 3a/3b
Scenario 4a/4b

Figure 9

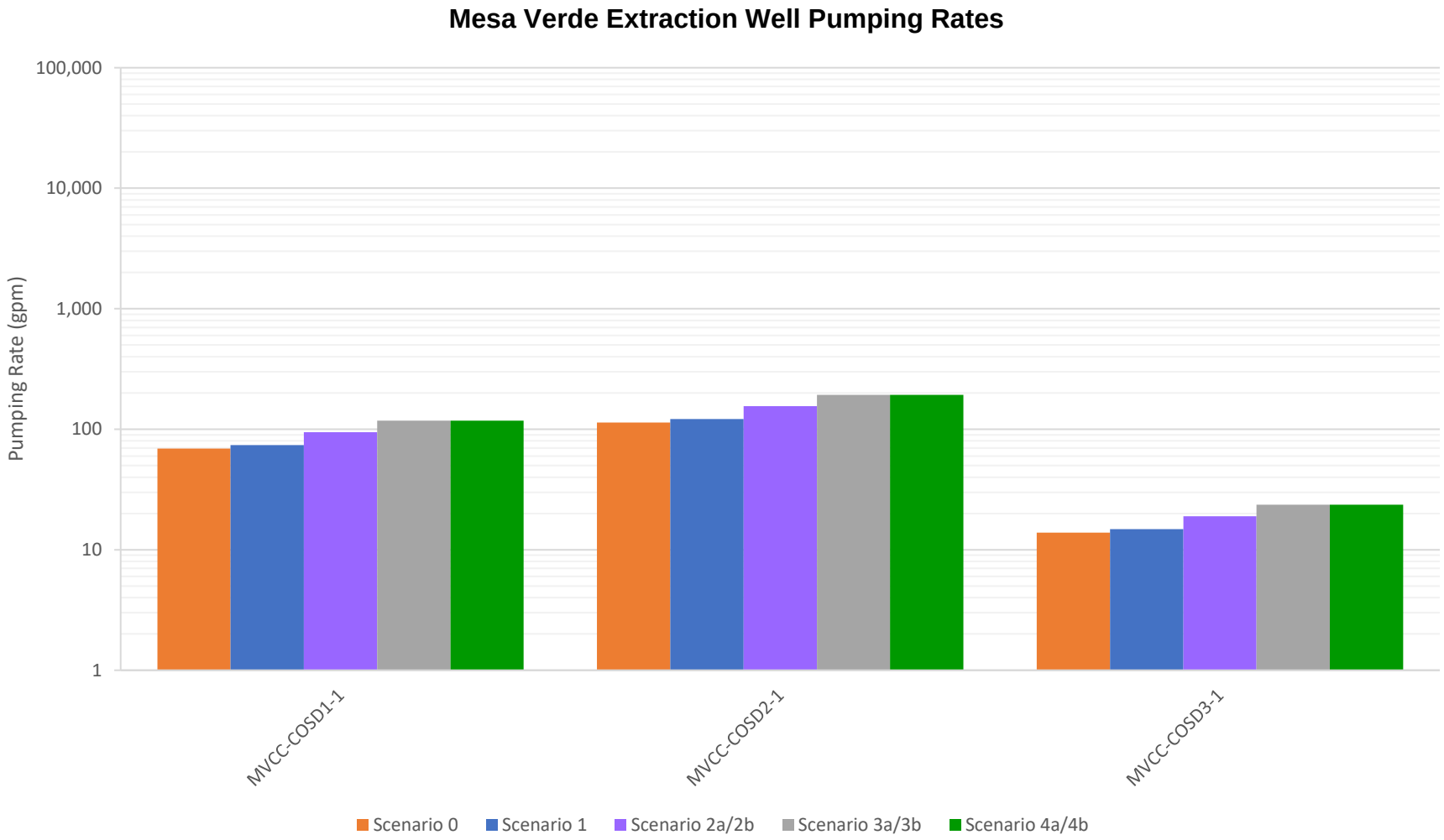
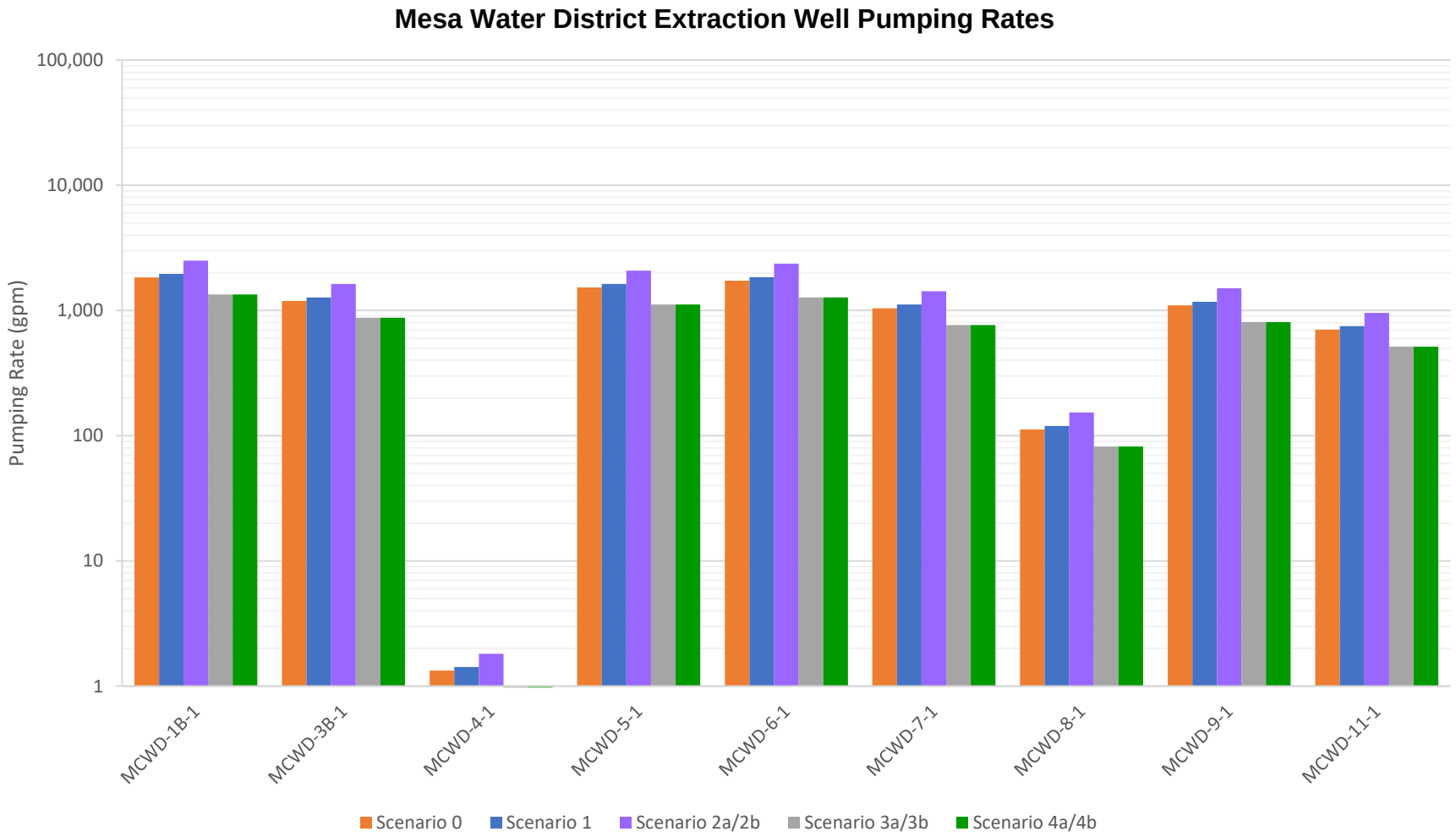

Mesa Verde Extraction Well Pumping Rates
Pumping Rate (gpm)
100,000
10,000
1,000
100
10
1
MVCC-COSD1-1
MVCC-COSD2-1
MVCC-COSD3-1
Scenario 0
Scenario 1
Scenario 2a/2b
Scenario 3a/3b
Scenario 4a/4b

Figure 10



Note: MCWD-4-1 pumps 1 gpm in Scenario 3a/3b and Scenario 4a/4b.

Figure 11

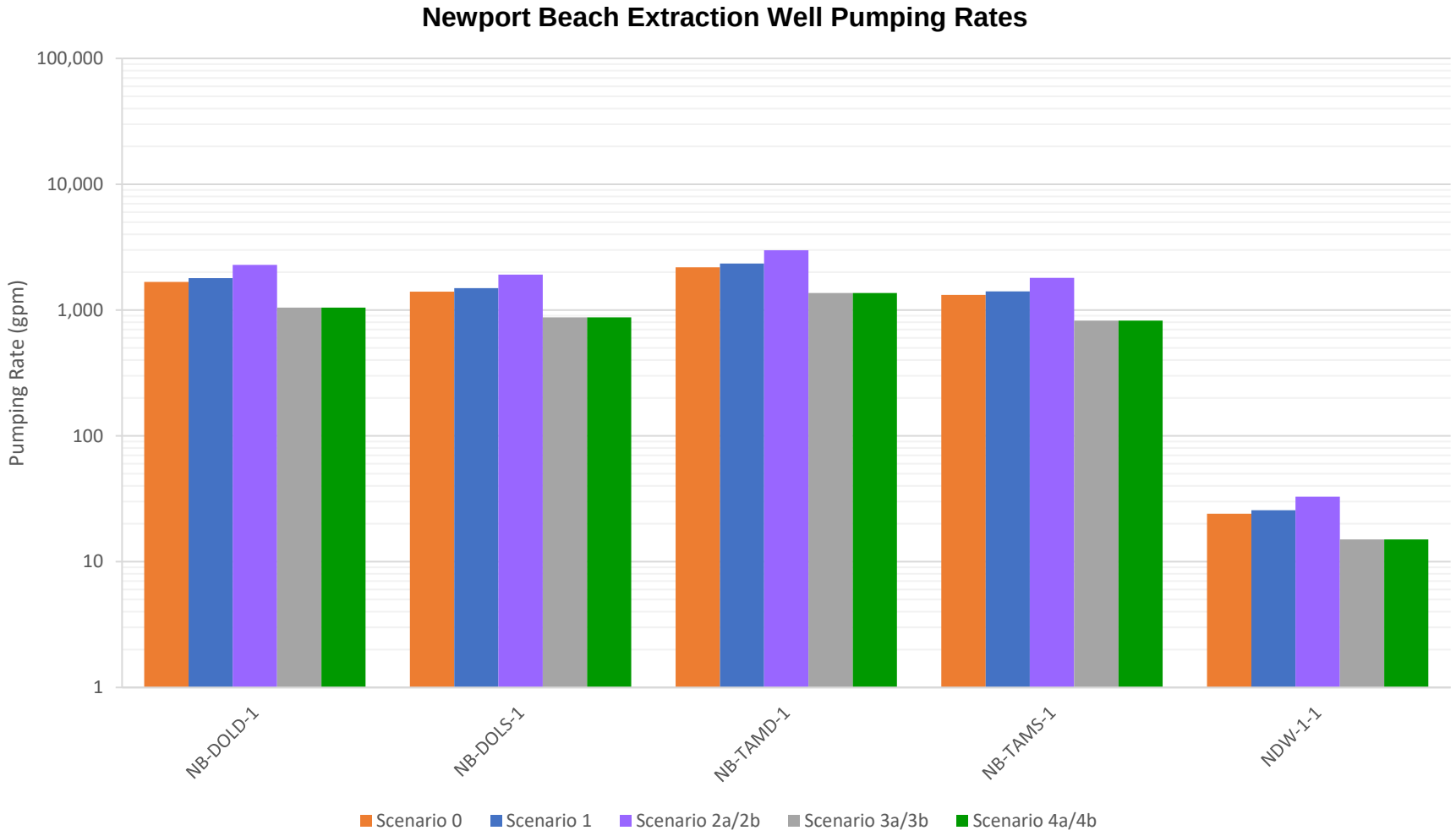

Newport Beach Extraction Well Pumping Rates
Pumping Rate (gpm)
100,000
10,000
1,000
100
10
1
NB-DOLD-1
NB-DOLS-1
NB-TAMD-1
NB-TAMS-1
NDW-1-1
Scenario 0
Scenario 1
Scenario 2a/2b
Scenario 3a/3b
Scenario 4a/4b

Figure 12

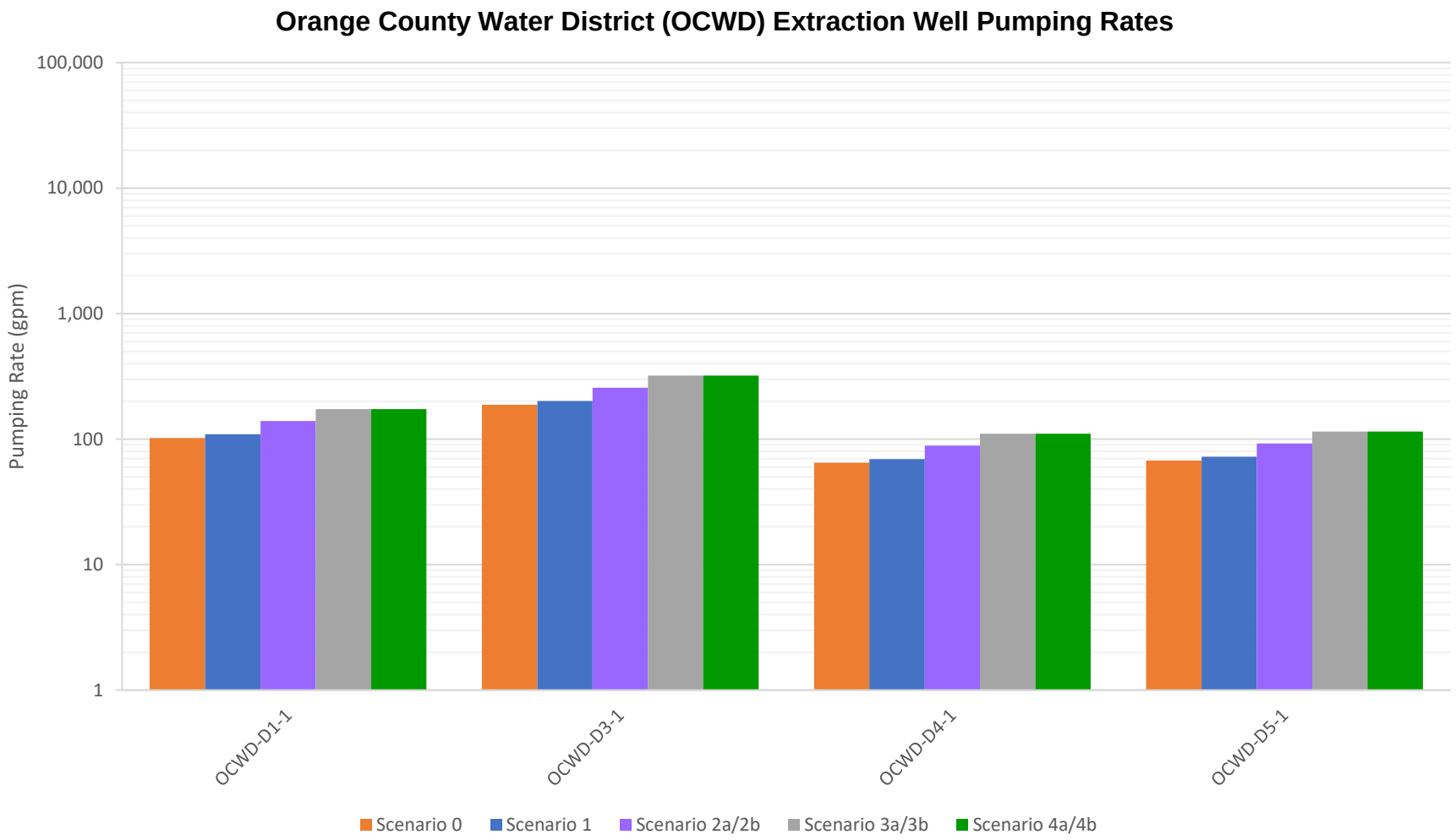
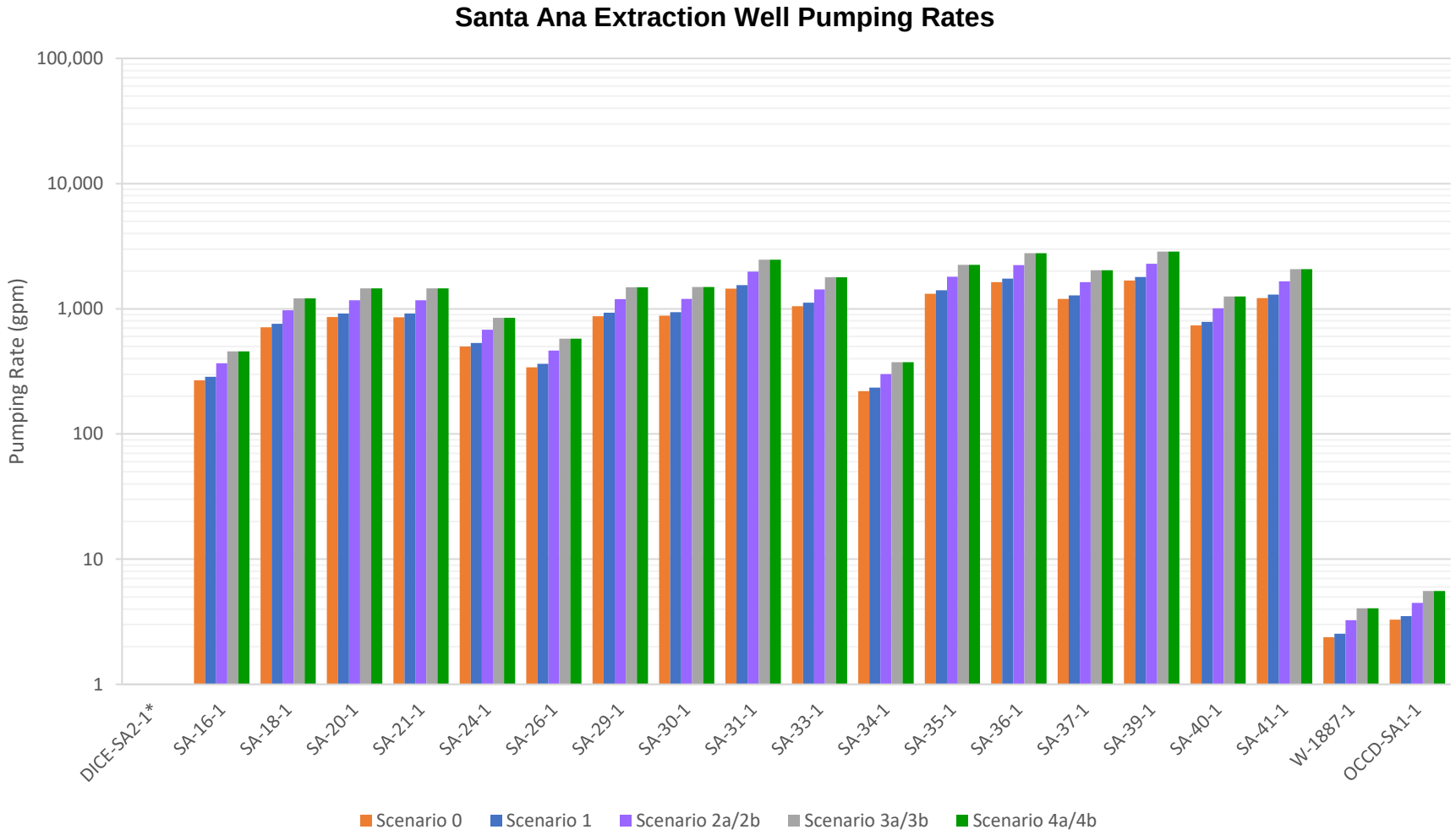

Orange County Water District (OCWD) Extraction Well Pumping Rates
Pumping Rate (gpm)
100,000
10,000
1,000
100
10
1
OCWD-D1-1
OCWD-D3-1
OCWD-D4-1
OCWD-D5-1
Scenario 0
Scenario 1
Scenario 2a/2b
Scenario 3a/3b
Scenario 4a/4b

Figure 13



Note: Wells with an asterisk do not pump in any scenario.

Figure 14

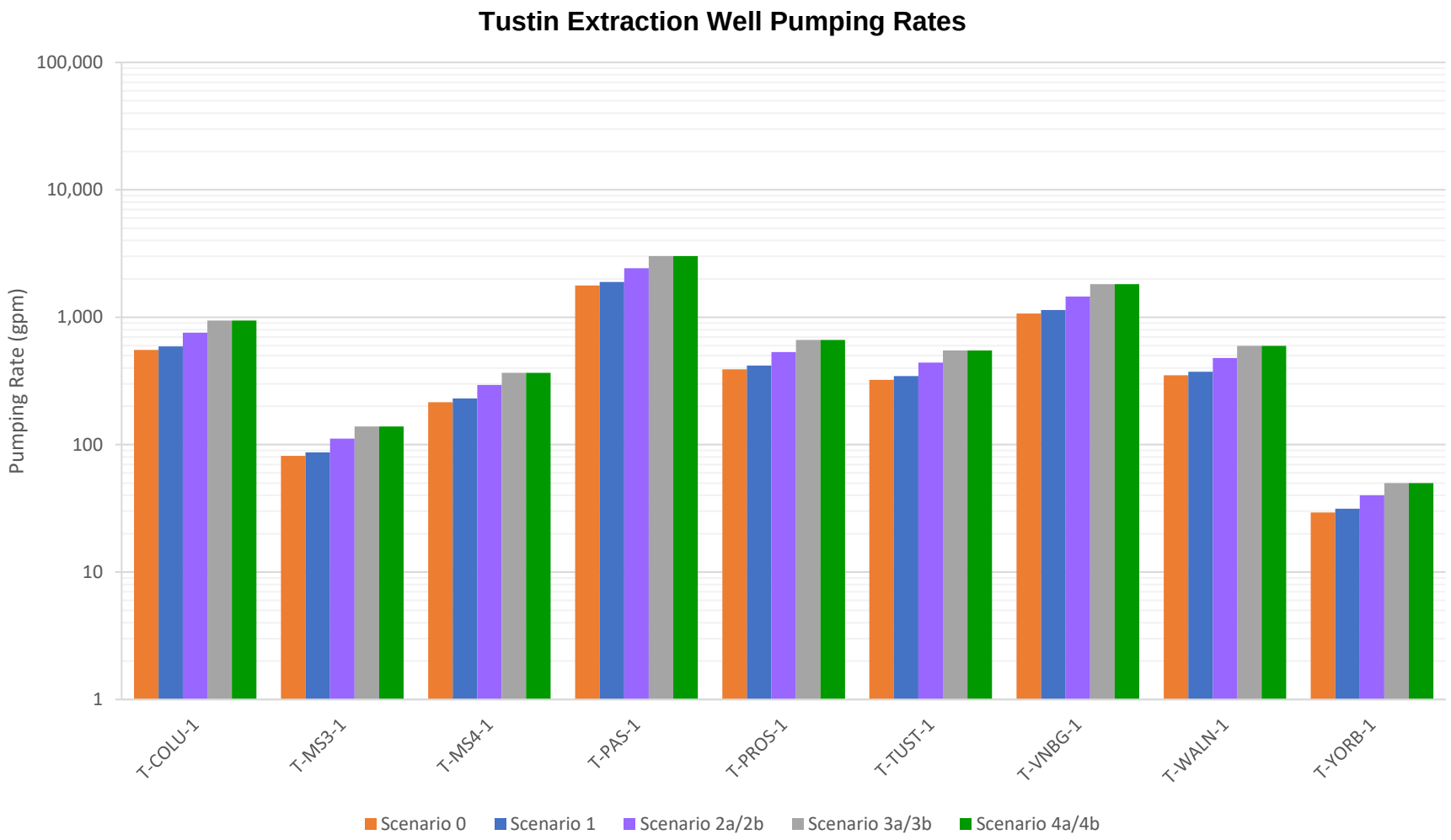

Tustin Extraction Well Pumping Rates
Pumping Rate (gpm)
100,000
10,000
1,000
100
10
1
T-COLU-1
T-MS3-1
T-MS4-1
T-PAS-1
T-PROS-1
T-TUST-1
T-VNBG-1
T-WALN-1
T-YORB-1
Scenario 0
Scenario 1
Scenario 2a/2b
Scenario 3a/3b
Scenario 4a/4b

Figure 15

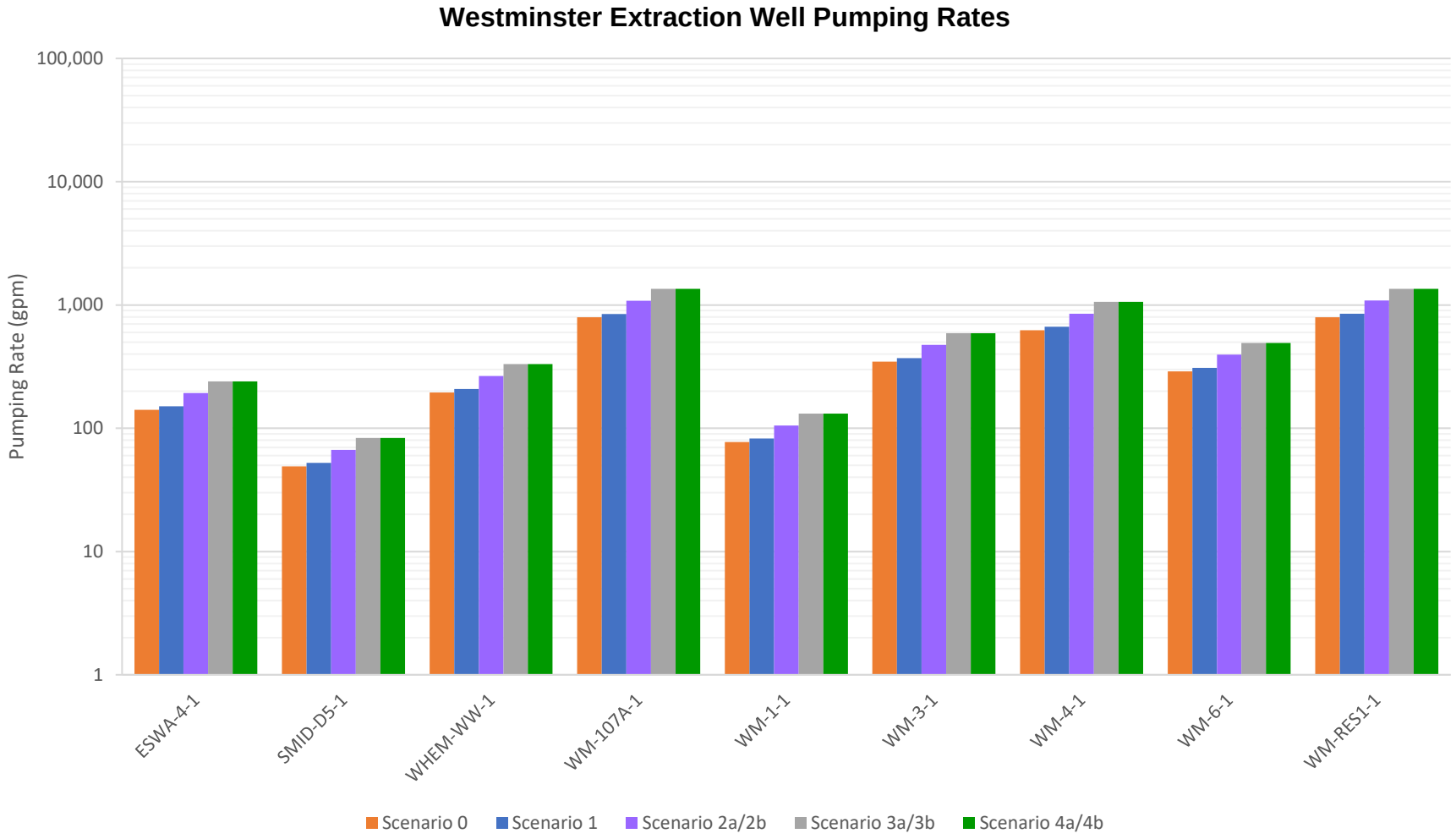
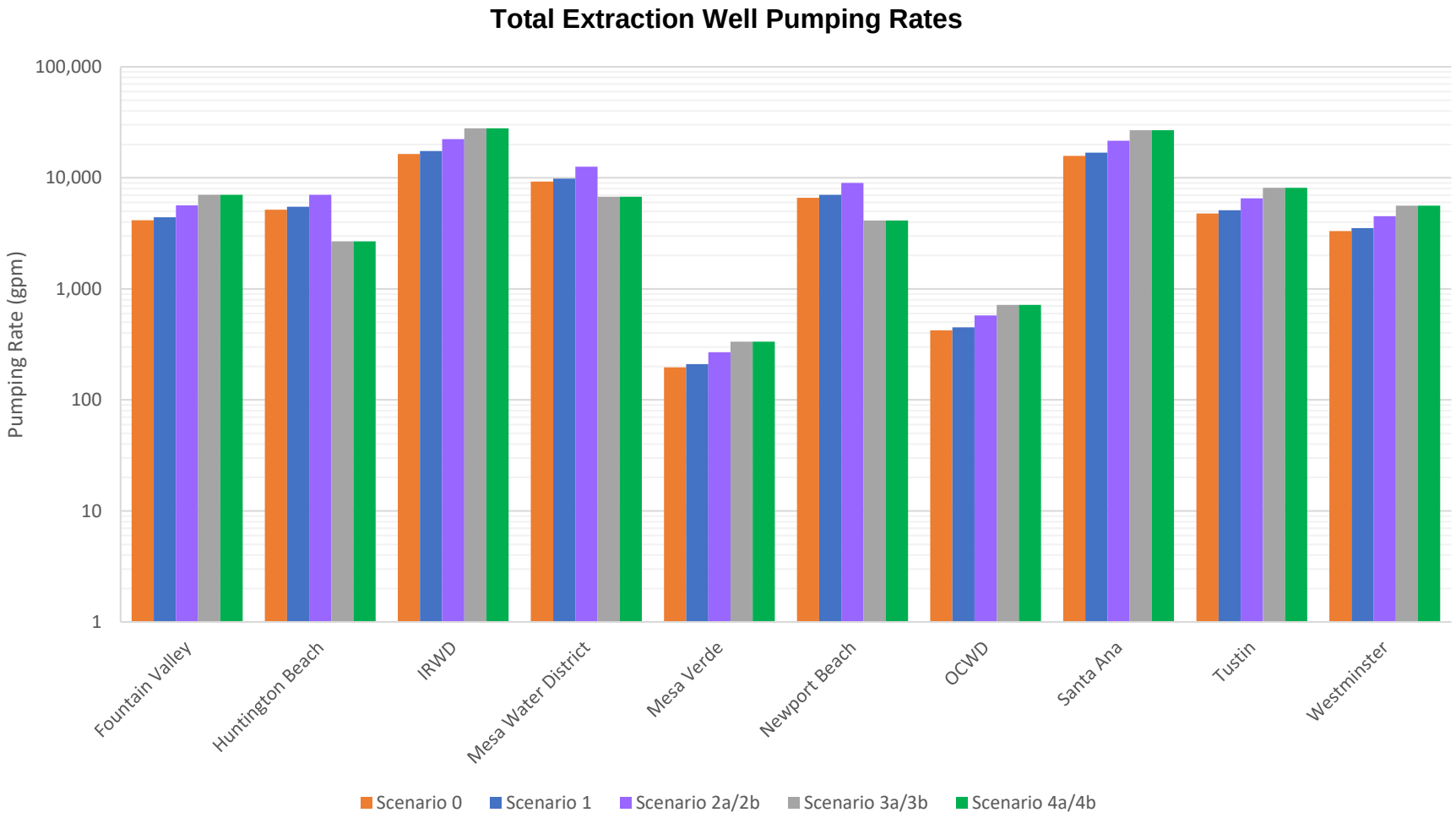

Westminster Extraction Well Pumping Rates
Pumping Rate (gpm)
100,000
10,000
1,000
100
10
1
ESWA-4-1
SMID-D5-1
WHEM-WW-1
WM-107A-1
WM-1-1
WM-3-1
WM-4-1
WM-6-1
WM-RES1-1
Scenario 0
Scenario 1
Scenario 2a/2b
Scenario 3a/3b
Scenario 4a/4b

Figure 16

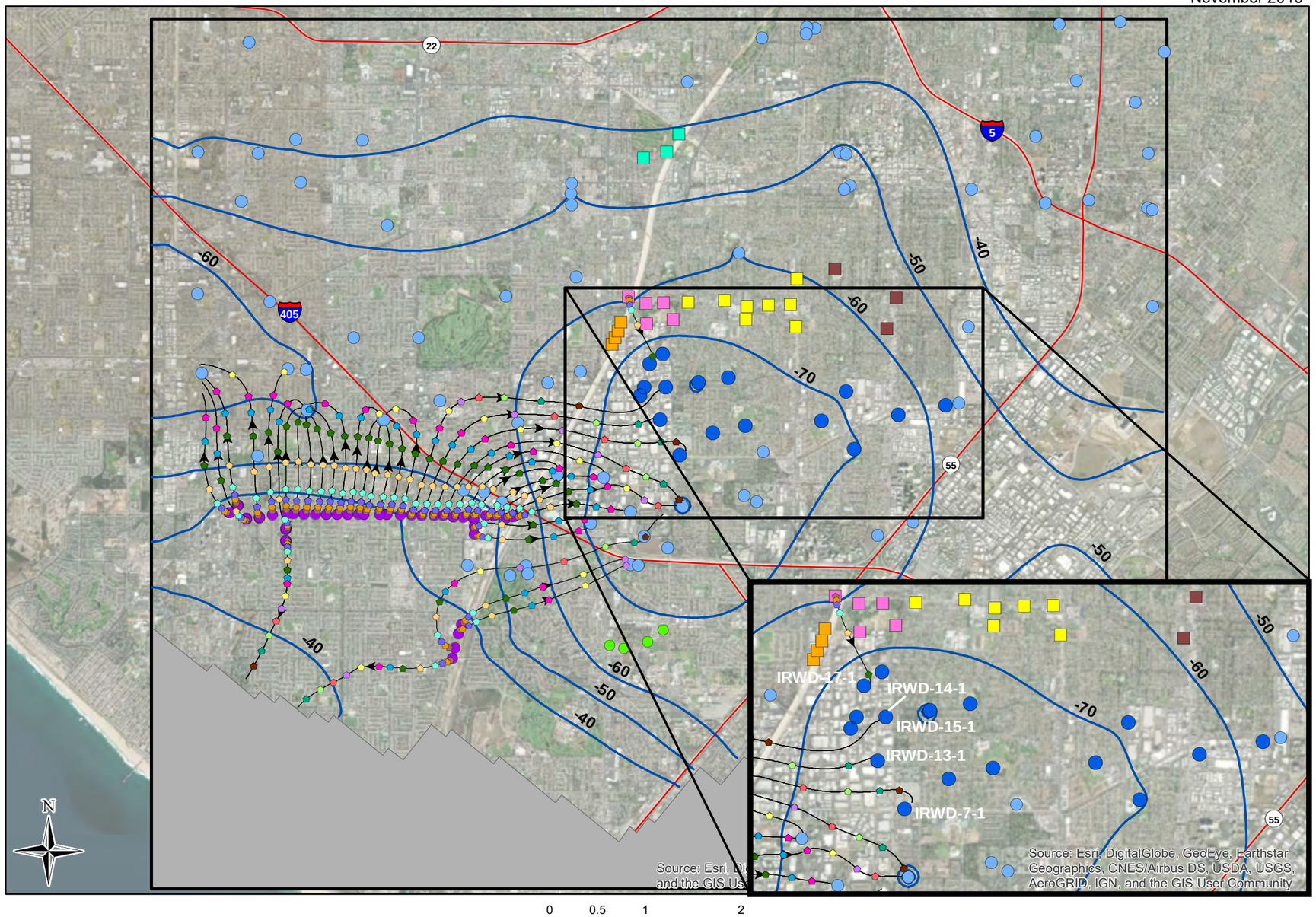


Note: These extraction pumping rates are within the TH&Co model area only.

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



NAD 83 State Plane Zone 6

Map Features

- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- Other Production Well

Model-Predicted Tracking Time

- 3 Months
- 6 Months
- 1 Year
- 2 Years
- 5 Years
- 10 Years
- 15 Years
- 20 Years
- 30 Years
- 40 Years
- 50 Years
- 60 Years
- 70 Years
- 80 Years

- Groundwater Contour (ft)
- Model-Predicted Injection Water Pathline
- Freeway

Thomas Harder & Co. Groundwater Consulting

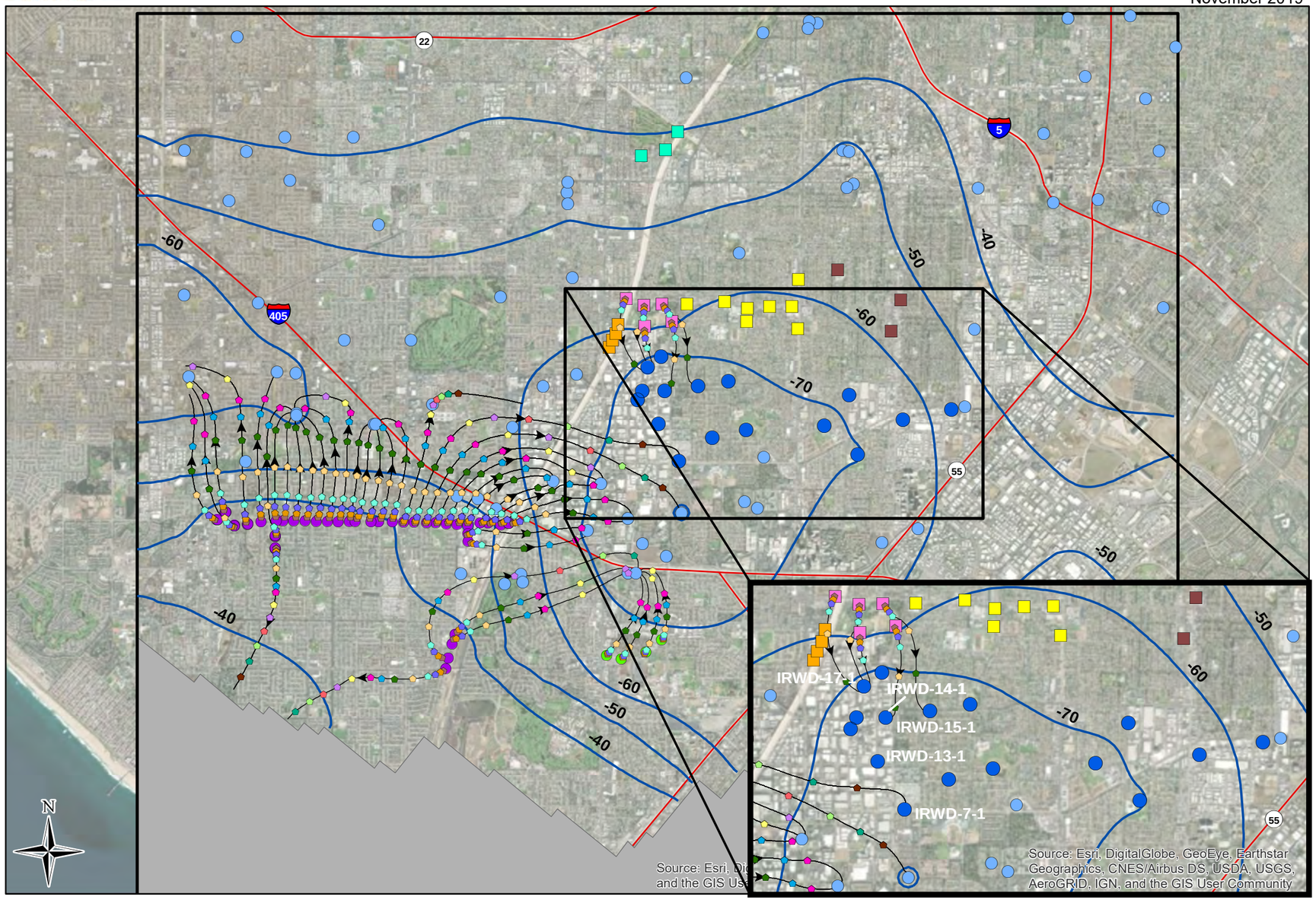
Model-Predicted Injection Water Pathlines - Scenario 0

Figure 17

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



NAD 83 State Plane Zone 6

Map Features

- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- Other Production Well

Model-Predicted Tracking Time

- 3 Months
- 6 Months
- 1 Year
- 2 Years
- 5 Years
- 10 Years
- 15 Years
- 20 Years
- 30 Years
- 40 Years
- 50 Years
- 60 Years
- 70 Years
- 80 Years

- Groundwater Contour (ft)
- Model-Predicted Injection Water Pathline
- Freeway

Thomas Harder & Co. Groundwater Consulting

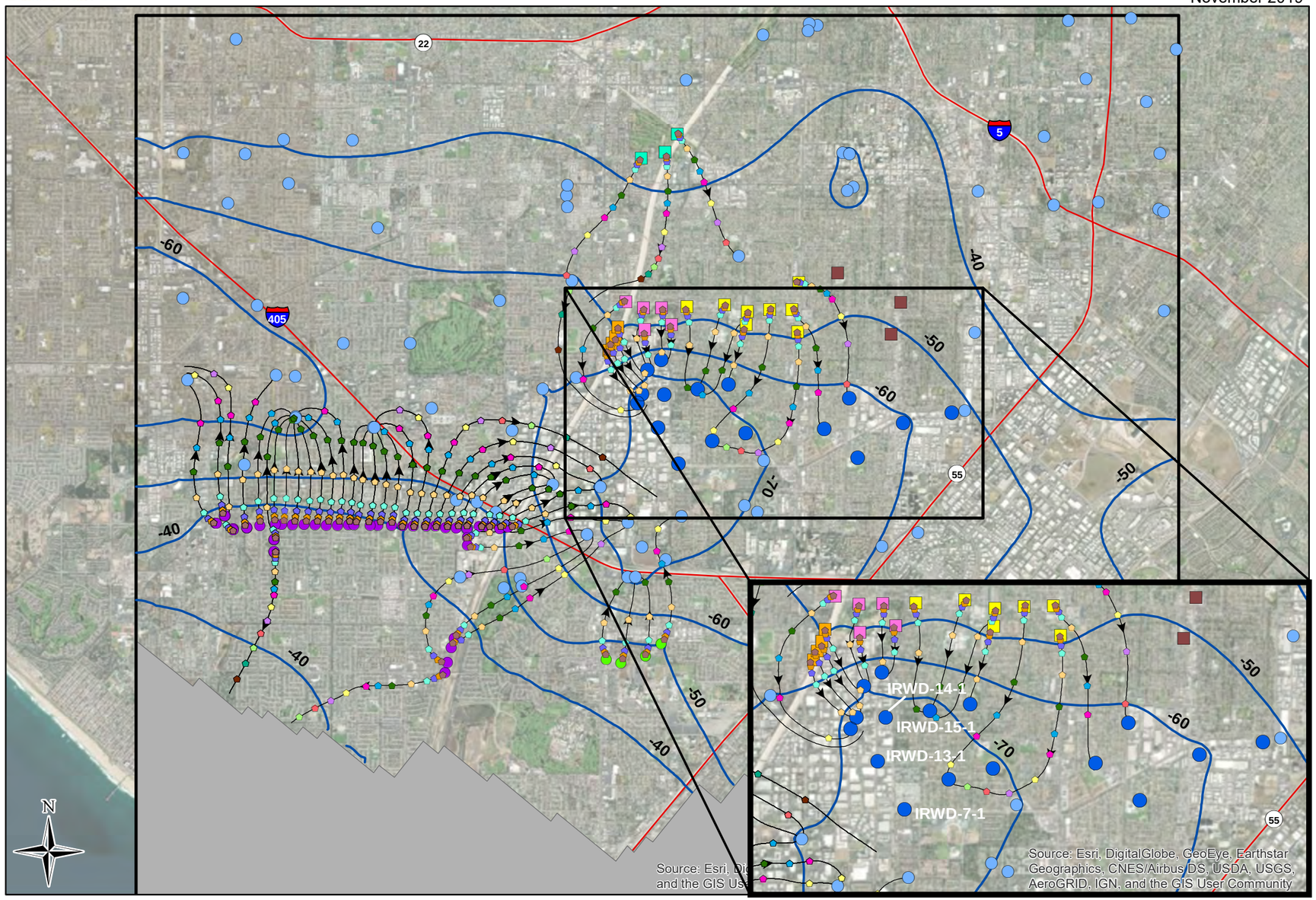
Model-Predicted Injection Water Pathlines - Scenario 1

Figure 18

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



NAD 83 State Plane Zone 6

Map Features

- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- Other Production Well

Model-Predicted Tracking Time

- 3 Months
- 6 Months
- 1 Year
- 2 Years
- 5 Years
- 10 Years
- 15 Years
- 20 Years
- 30 Years
- 40 Years
- 50 Years
- 60 Years
- 70 Years
- 80 Years

- Groundwater Contour (ft)
- Model-Predicted Injection Water Pathline
- Freeway

Thomas Harder & Co. Groundwater Consulting

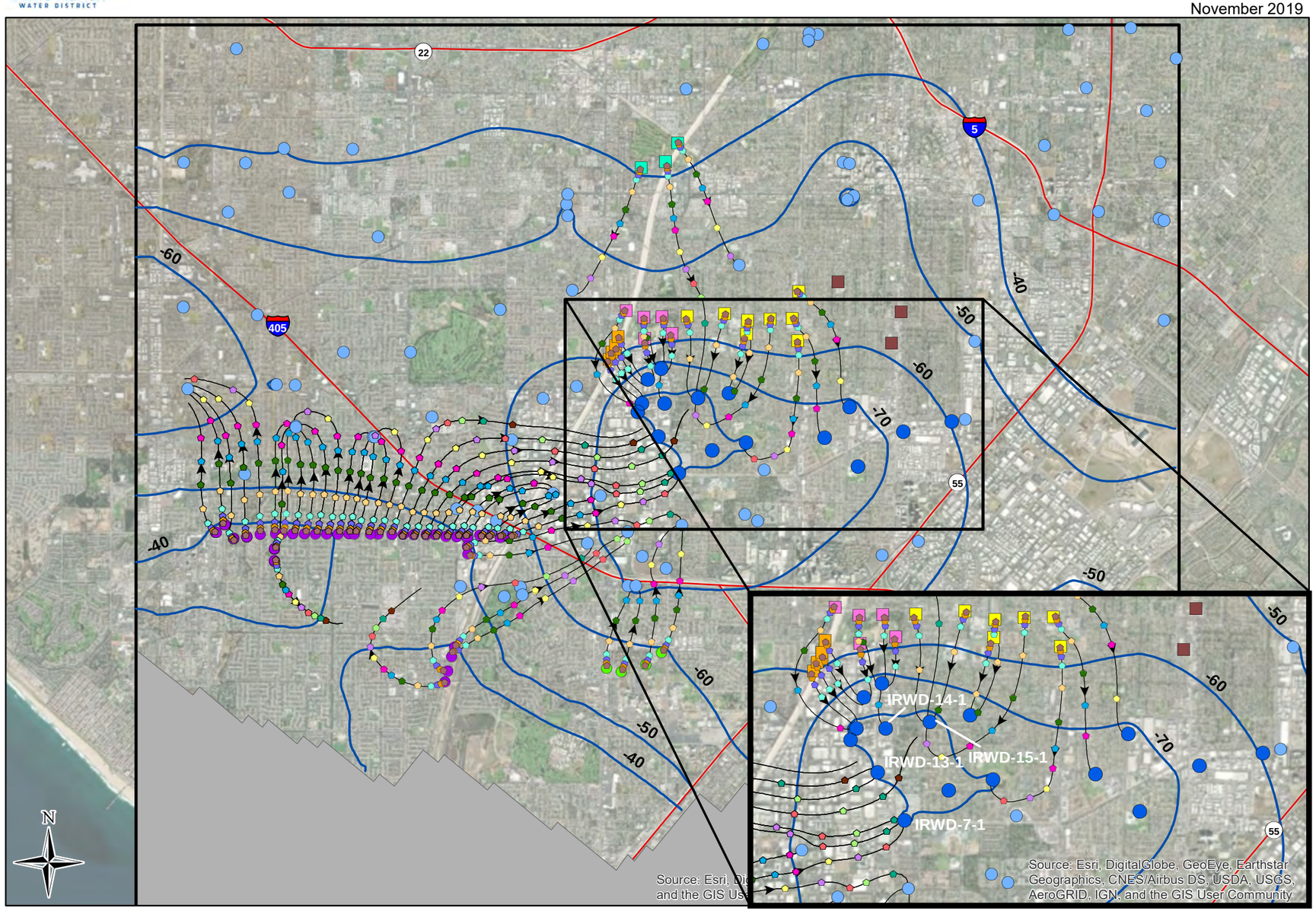
Model-Predicted Injection Water Pathlines - Scenarios 2a and 2b

Figure 19

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



NAD 83 State Plane Zone 6

Map Features

- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- Other Production Well

Model-Predicted Tracking Time

- 3 Months
- 6 Months
- 1 Year
- 2 Years
- 5 Years
- 10 Years
- 15 Years
- 20 Years
- 30 Years
- 40 Years
- 50 Years
- 60 Years
- 70 Years
- 80 Years
- Groundwater Contour (ft)
- Model-Predicted Injection Water Pathline
- Freeway

Thomas Harder & Co. Groundwater Consulting

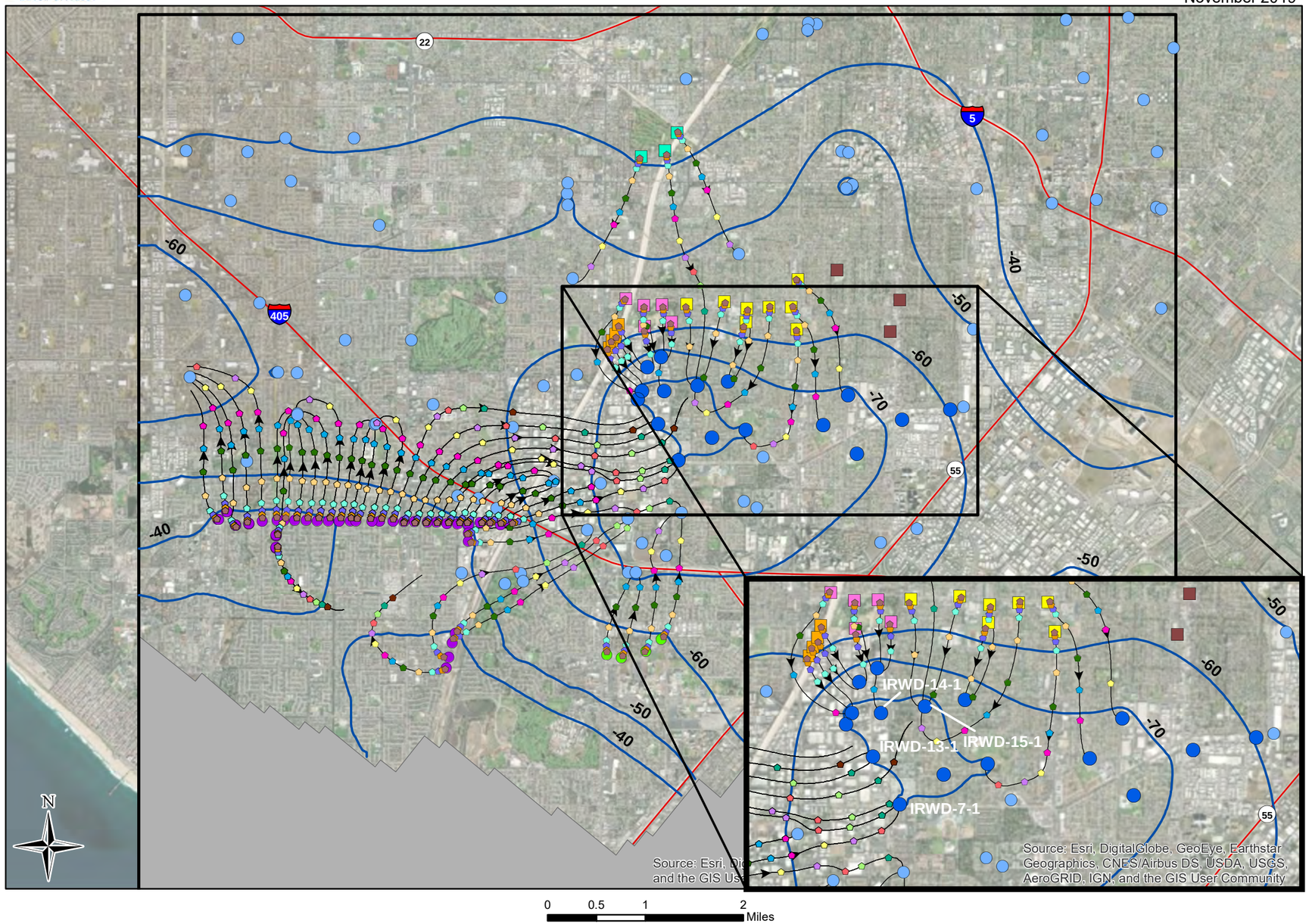
Model-Predicted Injection Water Pathlines - Scenarios 3a and 3b

Figure 20

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



Map Features

- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- Other Production Well

Model-Predicted Tracking Time

- 3 Months
- 6 Months
- 1 Year
- 2 Years
- 5 Years
- 10 Years
- 15 Years
- 20 Years
- 30 Years
- 40 Years
- 50 Years
- 60 Years
- 70 Years
- 80 Years

- Groundwater Contour (ft)
- Model-Predicted Injection Water Pathline
- Freeway

Thomas Harder & Co. Groundwater Consulting

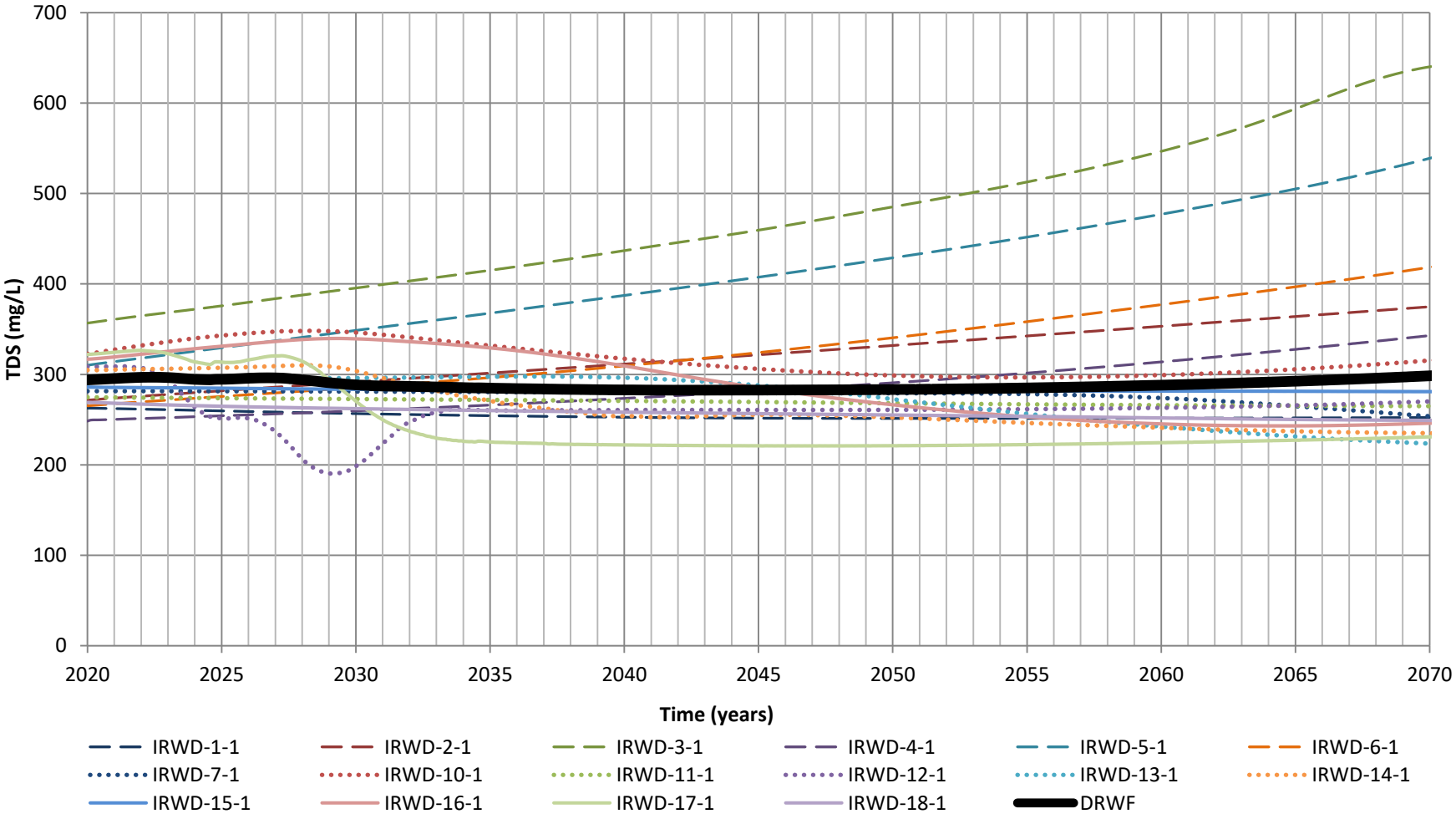
Model-Predicted Injection Water Pathlines - Scenarios 4a and 4b

Figure 21

Irvine Ranch Water District
Evaluation of Potential Effects of the
Proposed Seawater Desalination Project

Figure 22a

Model-Predicted TDS Concentrations versus Time at the Dyer Road Well Field - Scenario 0



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Groundwater Consulting

November 2019

Figure 22b

Model-Predicted Chloride Concentrations versus Time at the Dyer Road Well Field - Scenario 0

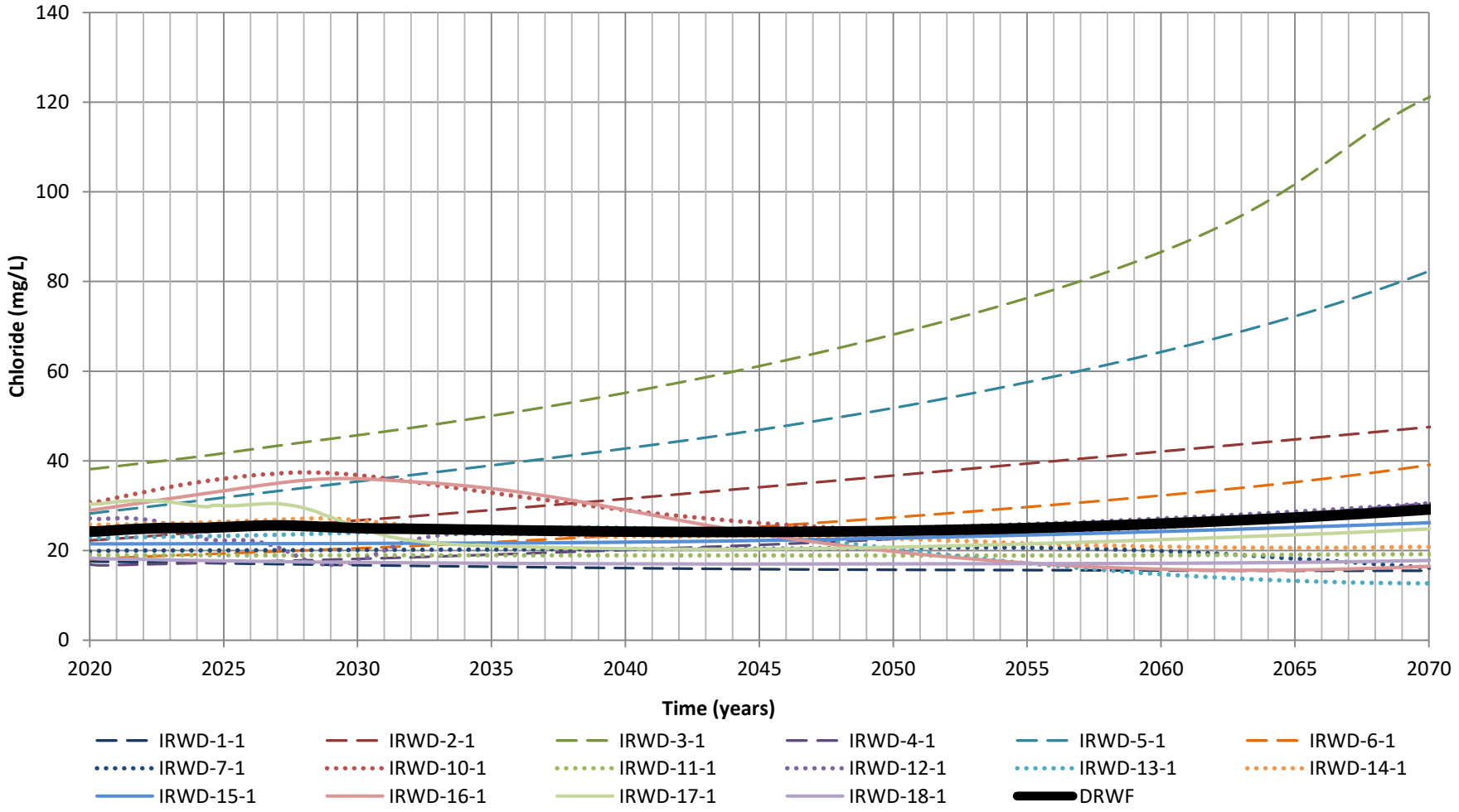
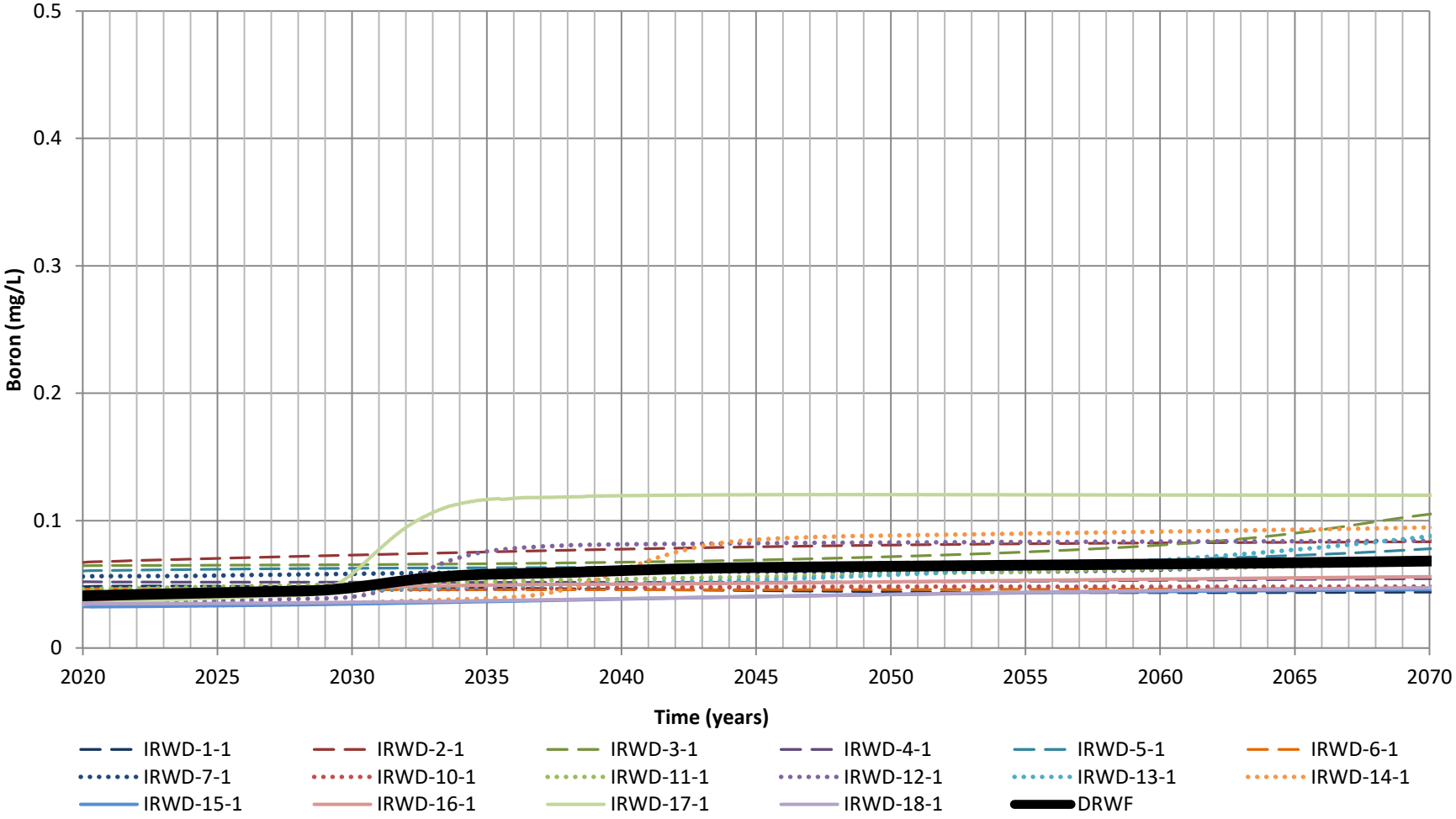


Figure 22c

Model-Predicted Boron Concentrations versus Time at the Dyer Road Well Field - Scenario 0



Irvine Ranch Water District
Evaluation of Potential Effects of the
Proposed Seawater Desalination Project

Figure 23a

Model-Predicted TDS Concentrations versus Time at the Dyer Road Well Field - Scenario 1

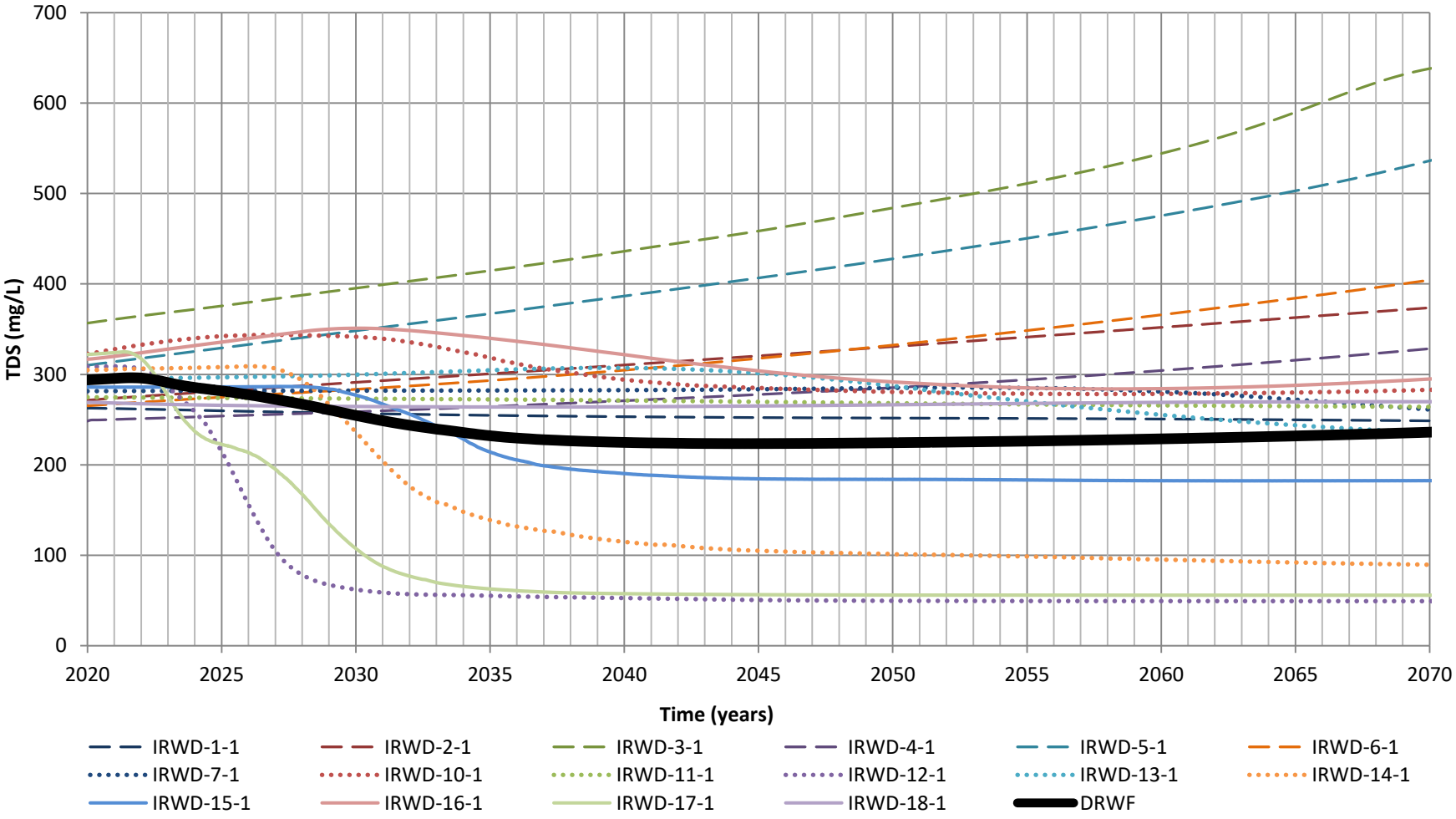


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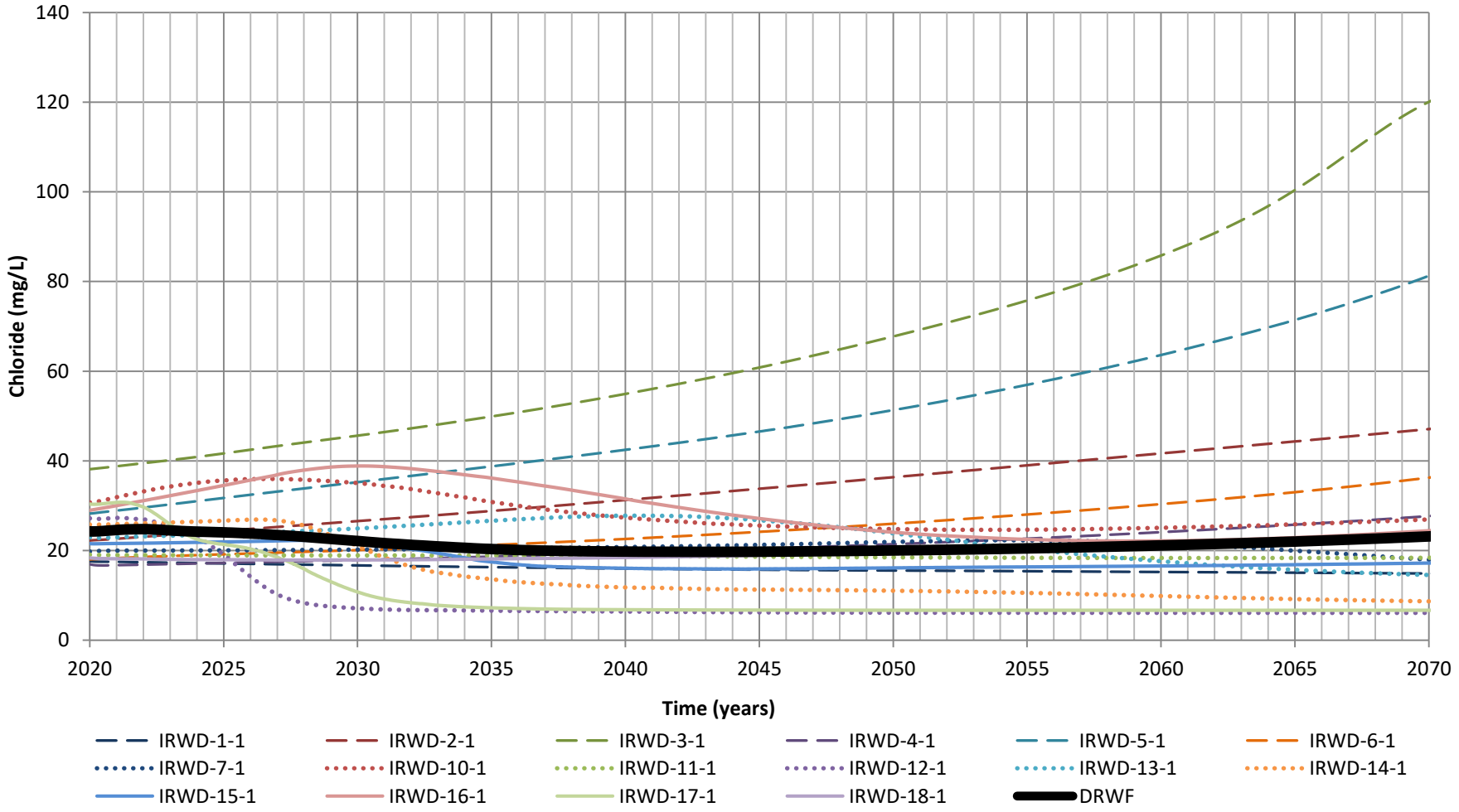
Figure 23b

Model-Predicted Chloride Concentrations versus Time at the Dyer Road Well Field - Scenario 1



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Irvine Ranch Water District
Evaluation of Potential Effects of the
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Figure 23c

Model-Predicted Boron Concentrations versus Time at the Dyer Road Well Field - Scenario 1

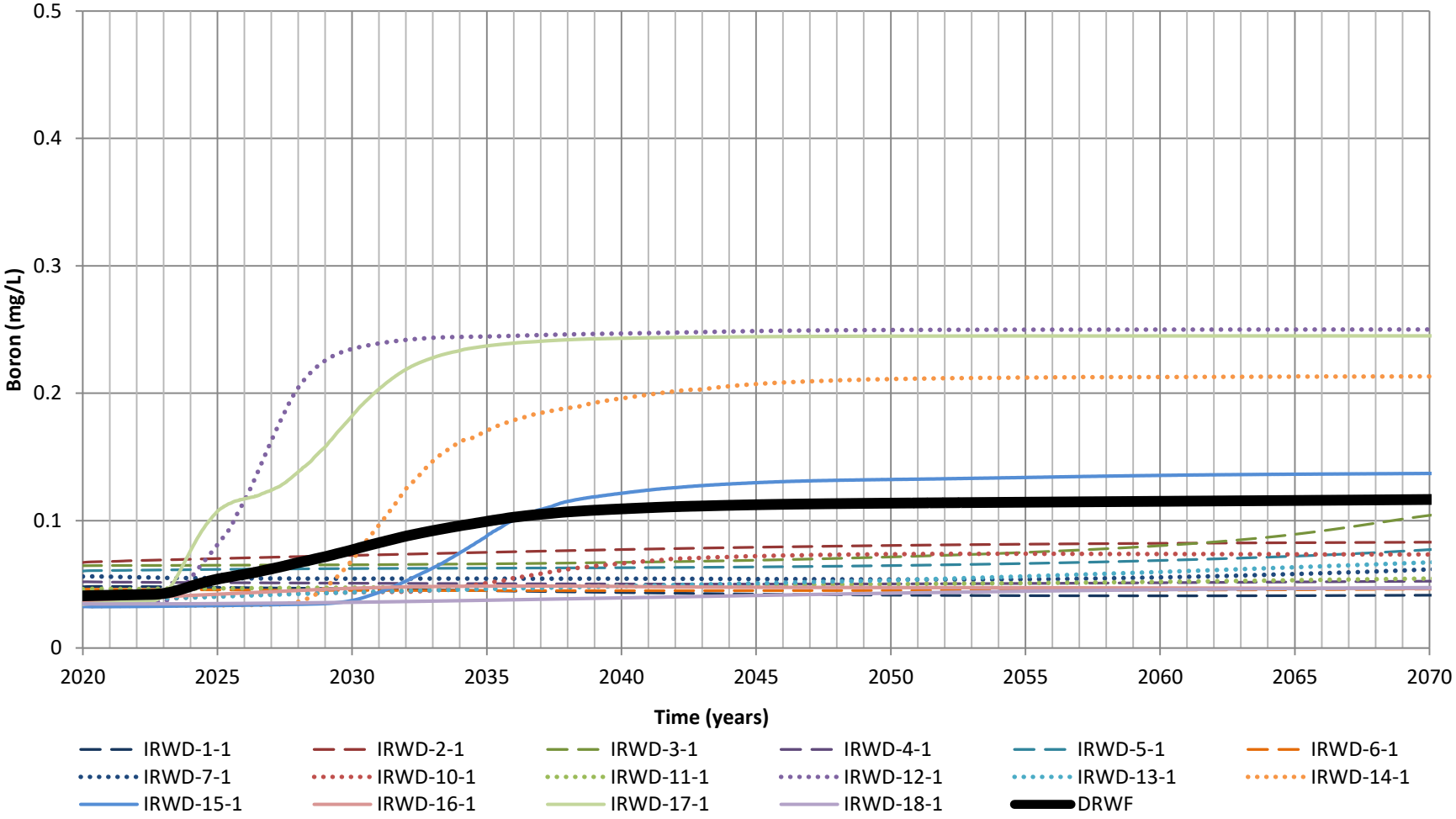

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Figure 24a

Model-Predicted TDS Concentrations versus Time at the Dyer Road Well Field - Scenario 2a

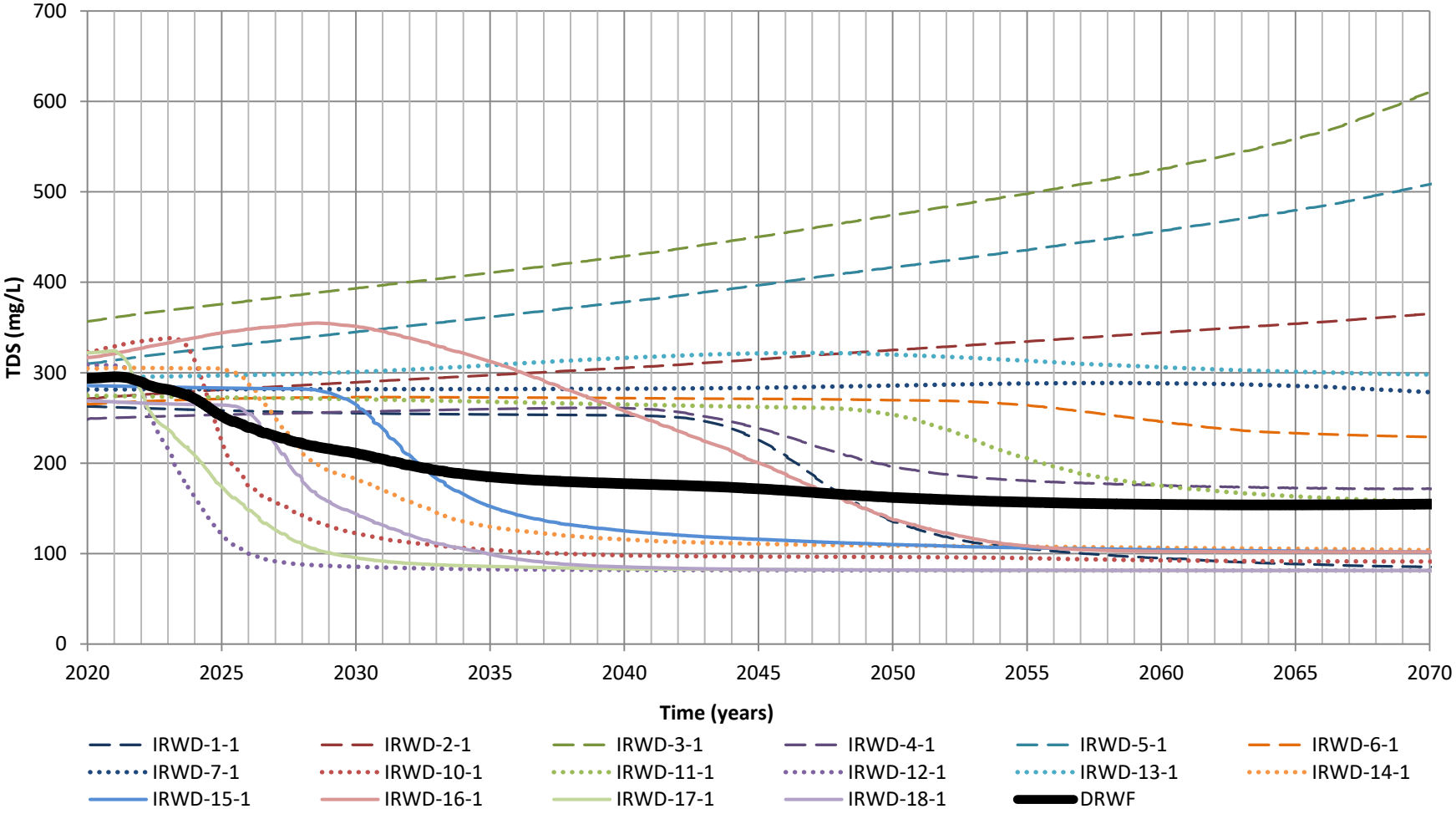
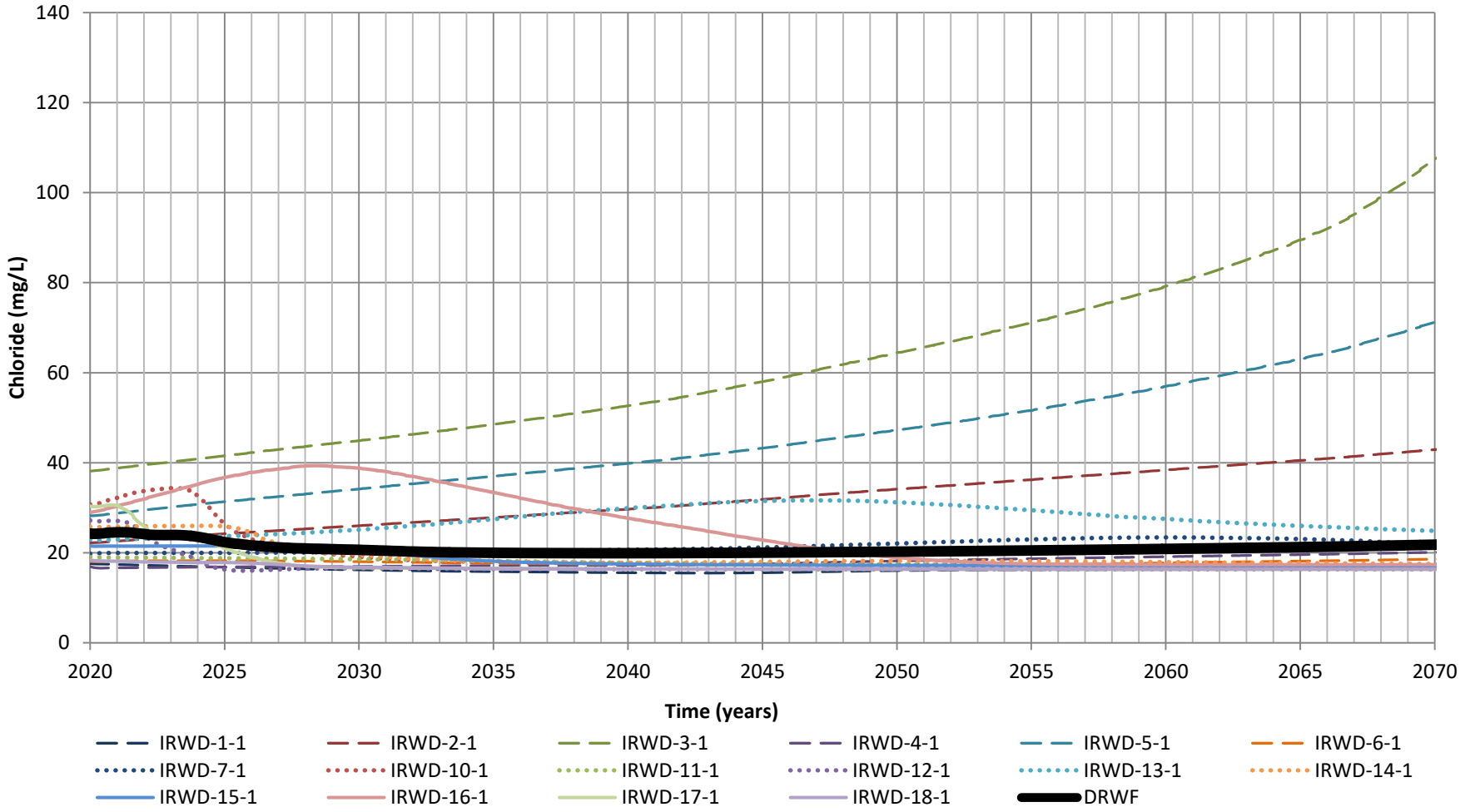


Figure 24b

Model-Predicted Chloride Concentrations versus Time at the Dyer Road Well Field - Scenario 2a



Irvine Ranch Water District
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Figure 24c

Model-Predicted Boron Concentrations versus Time at the Dyer Road Well Field - Scenario 2a

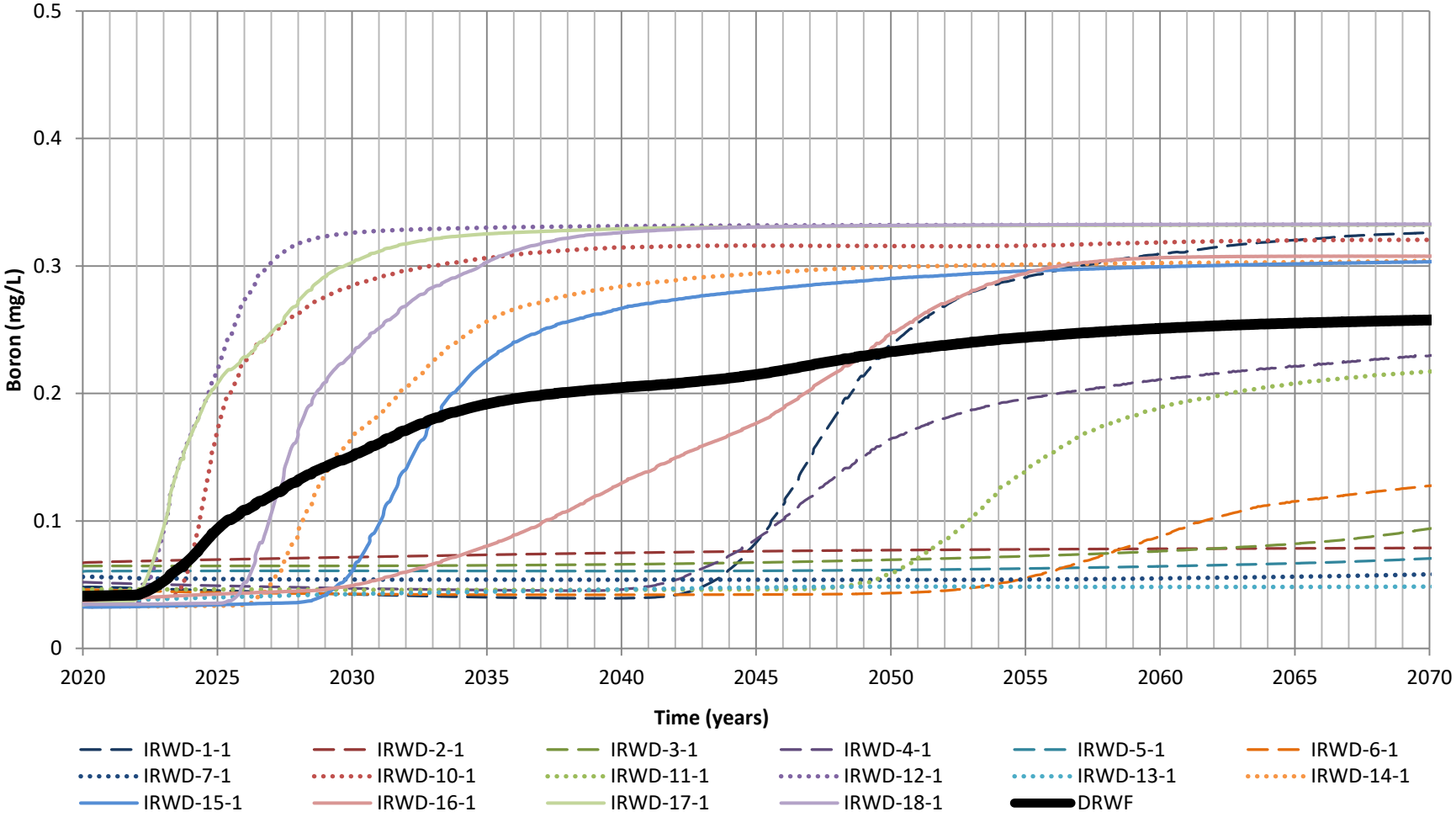

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Figure 25a

Model-Predicted TDS Concentrations versus Time at the Dyer Road Well Field - Scenario 3a

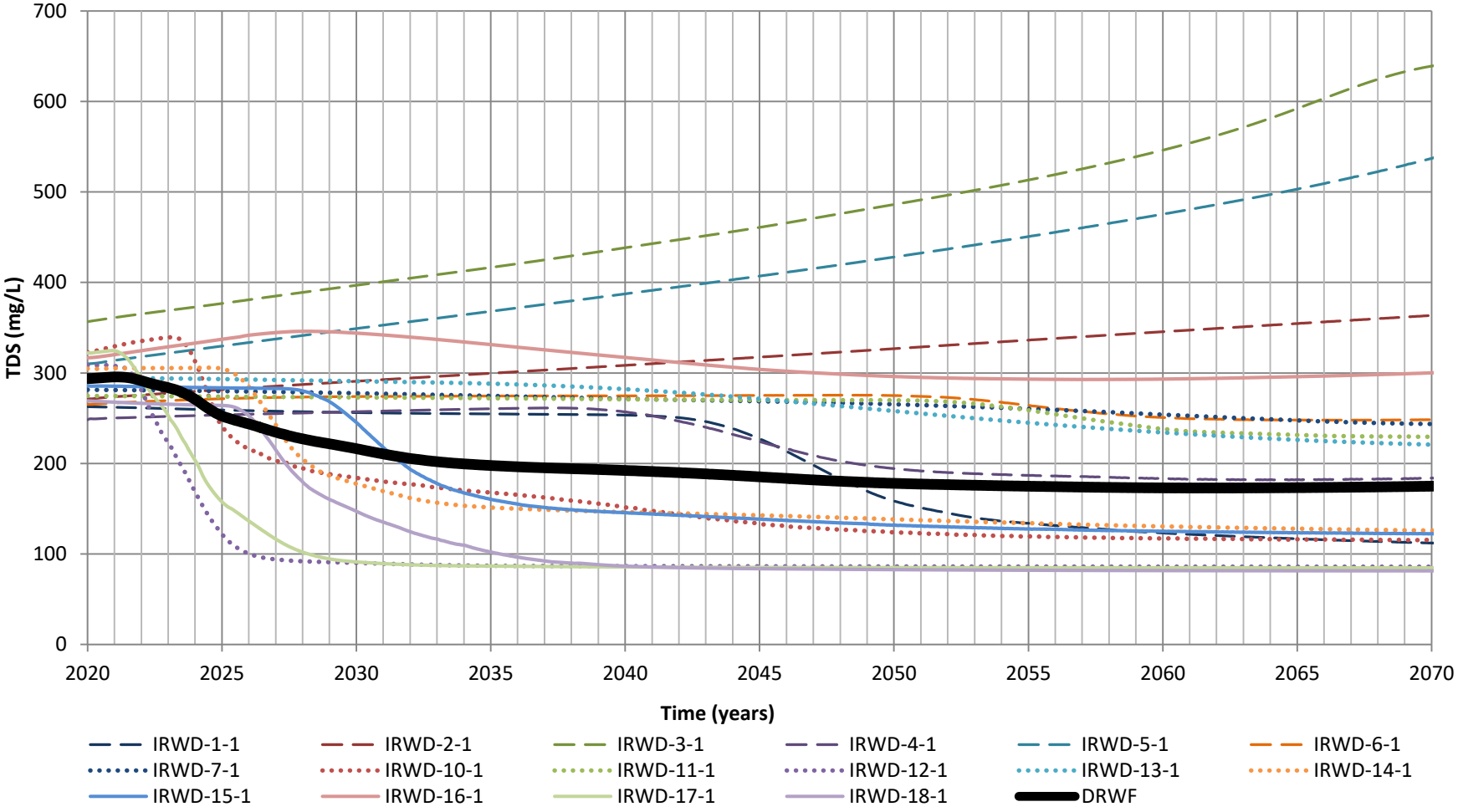


Figure 25b

Model-Predicted Chloride Concentrations versus Time at the Dyer Road Well Field - Scenario 3a

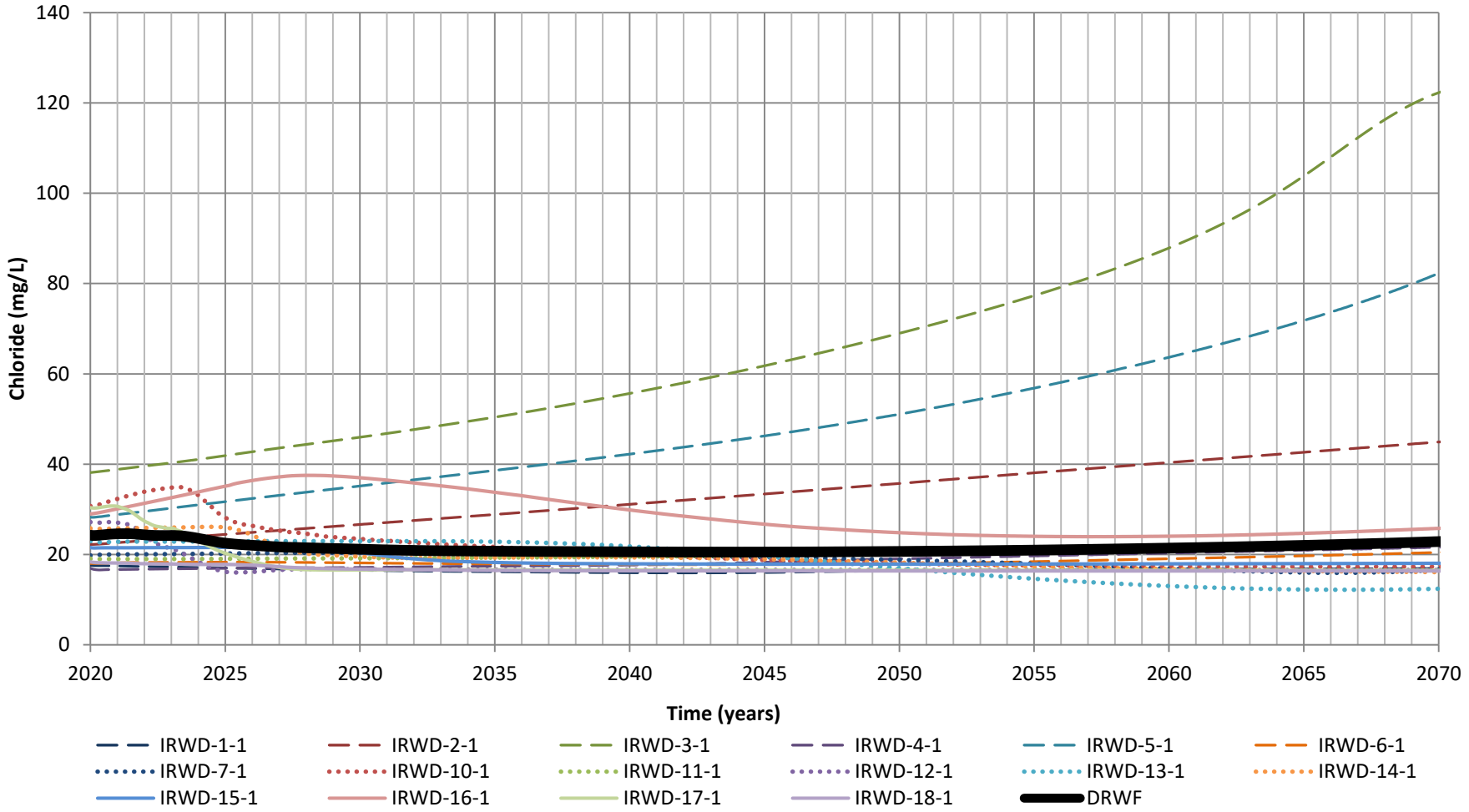


Figure 25c

Model-Predicted Boron Concentrations versus Time at the Dyer Road Well Field - Scenario 3a

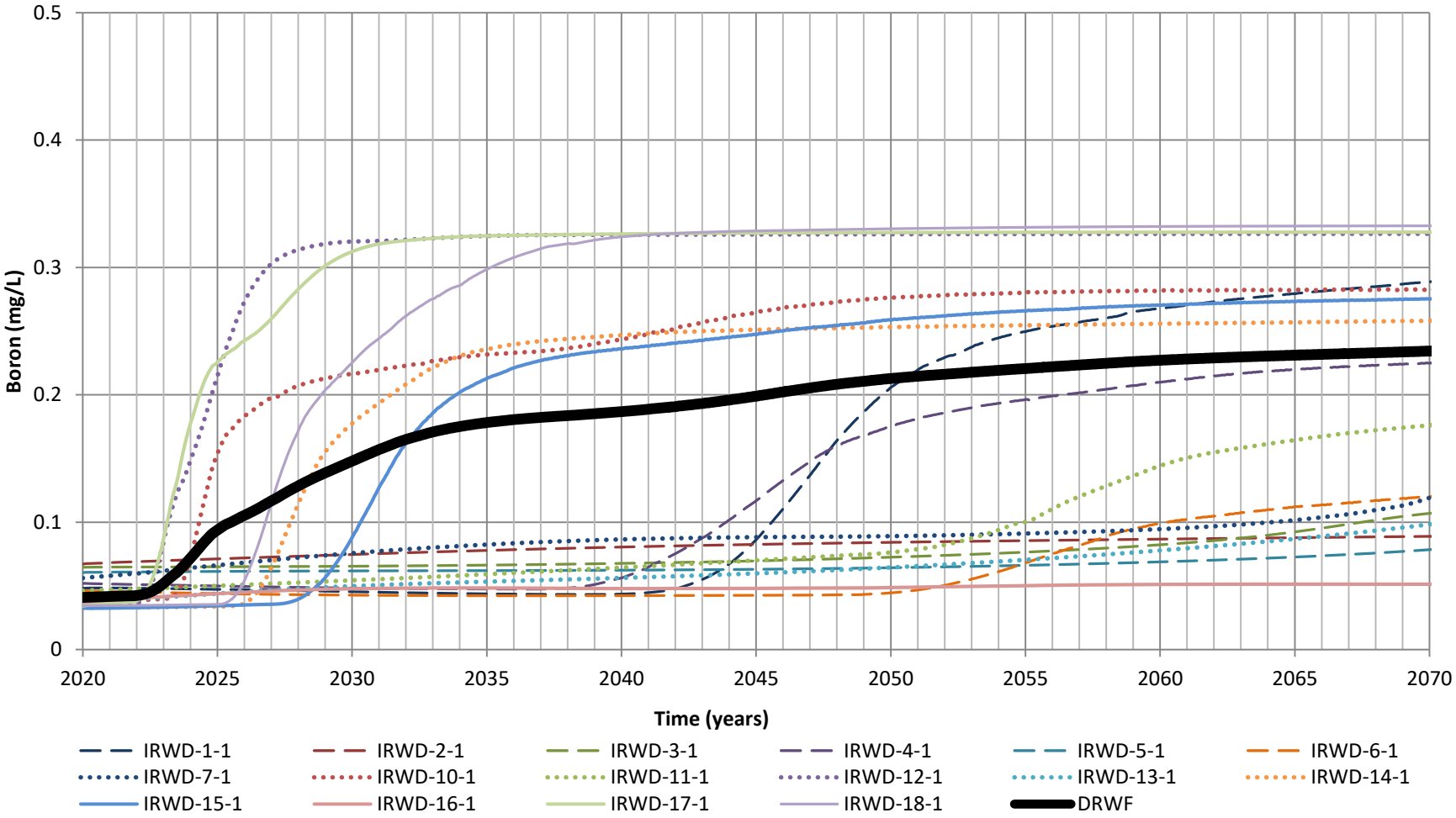


Figure 26a

Model-Predicted TDS Concentrations versus Time at the Dyer Road Well Field - Scenario 4a

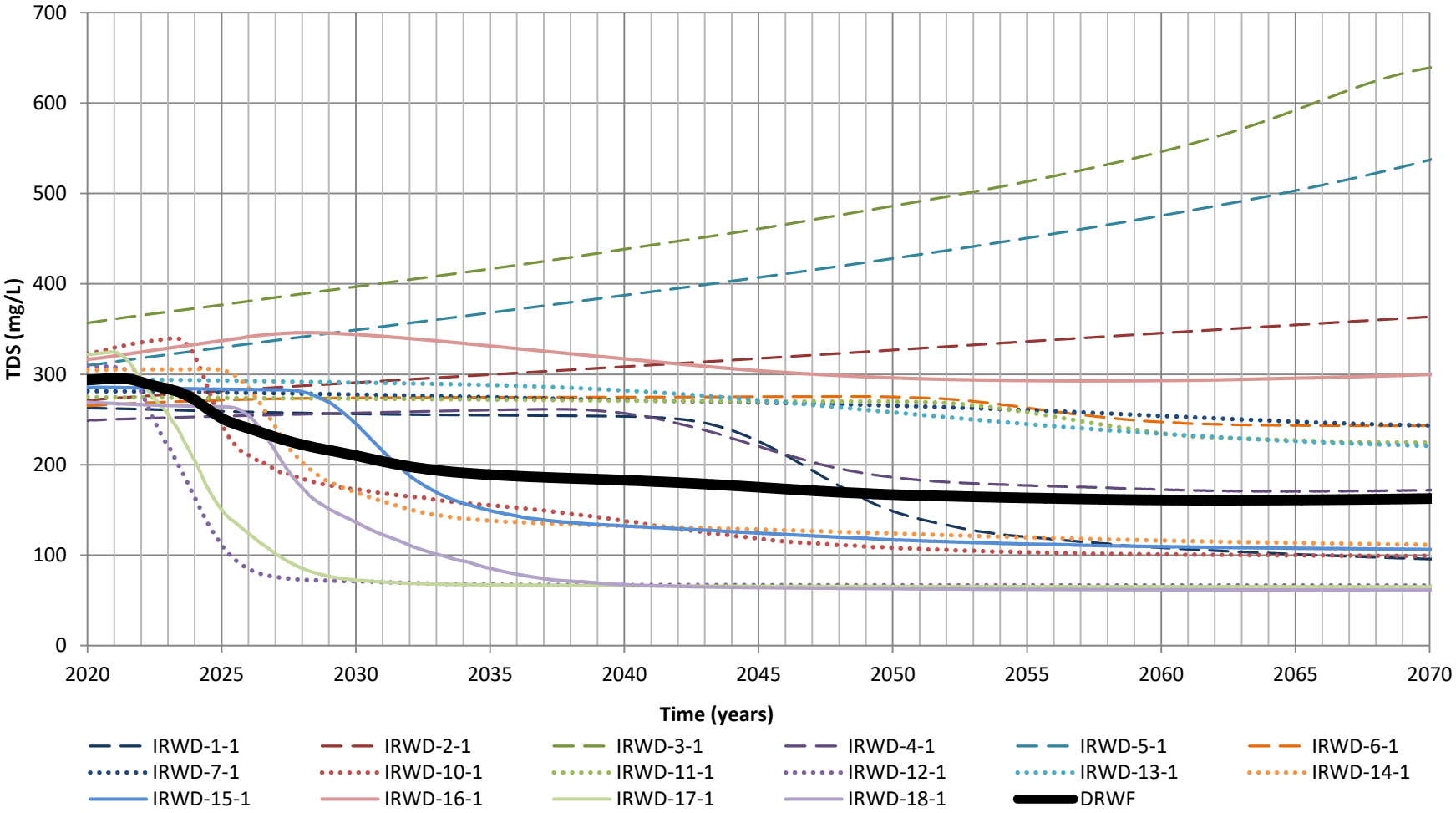


Figure 26b

Model-Predicted Chloride Concentrations versus Time at the Dyer Road Well Field - Scenario 4a

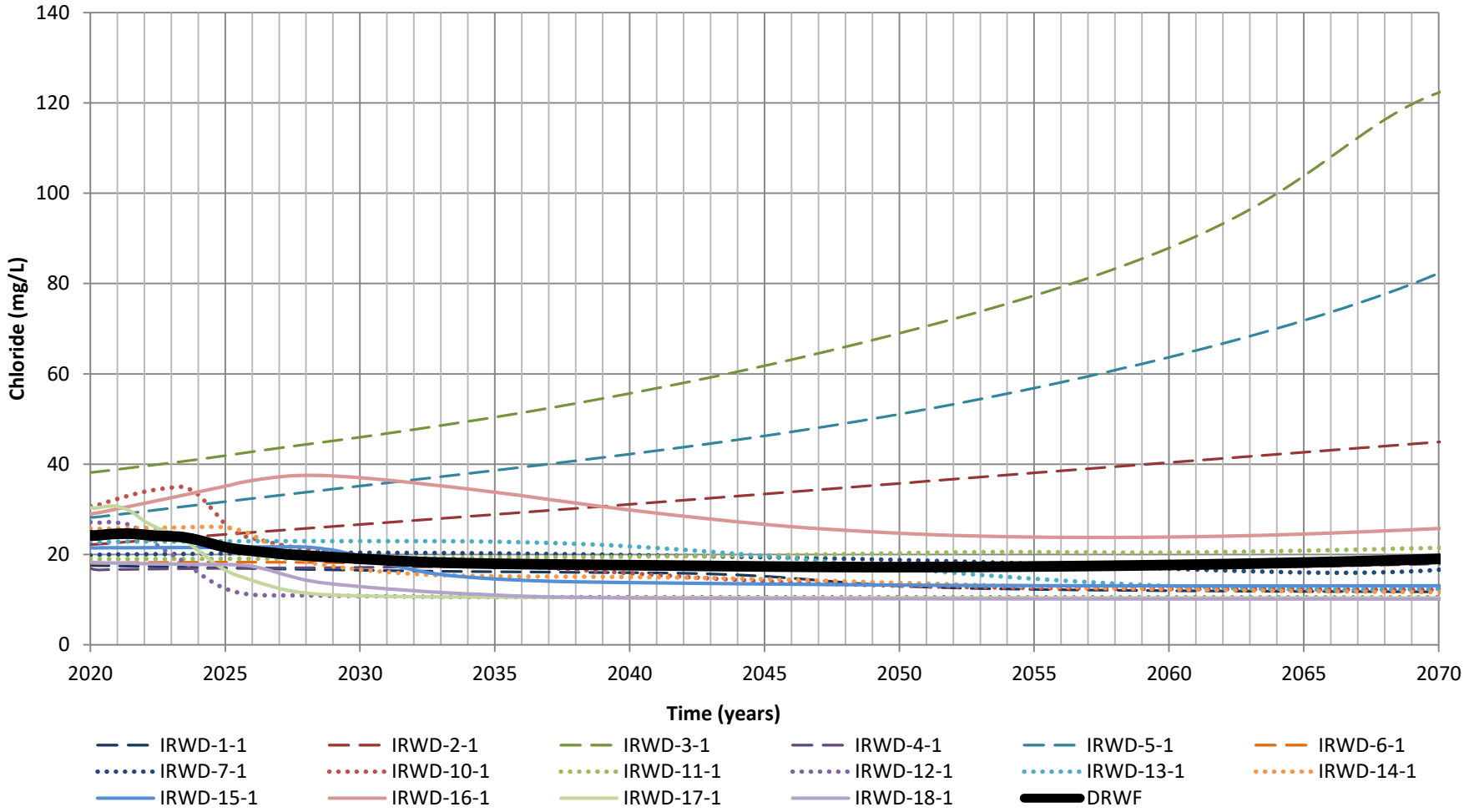


Figure 26c

Model-Predicted Boron Concentrations versus Time at the Dyer Road Well Field - Scenario 4a

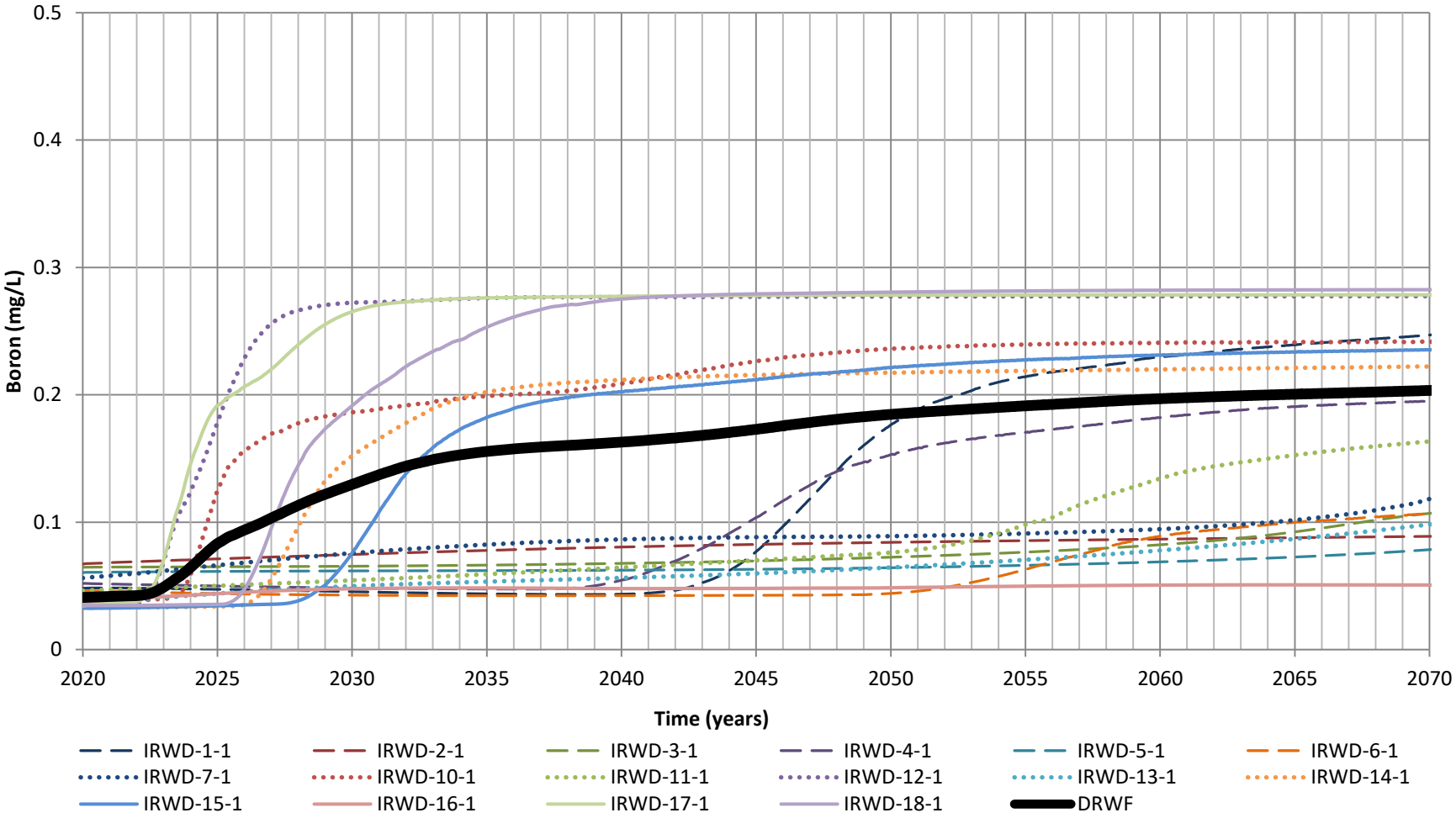


Figure 27a

Model-Predicted TDS Concentrations versus Time at the Dyer Road Well Field - Scenario 2b

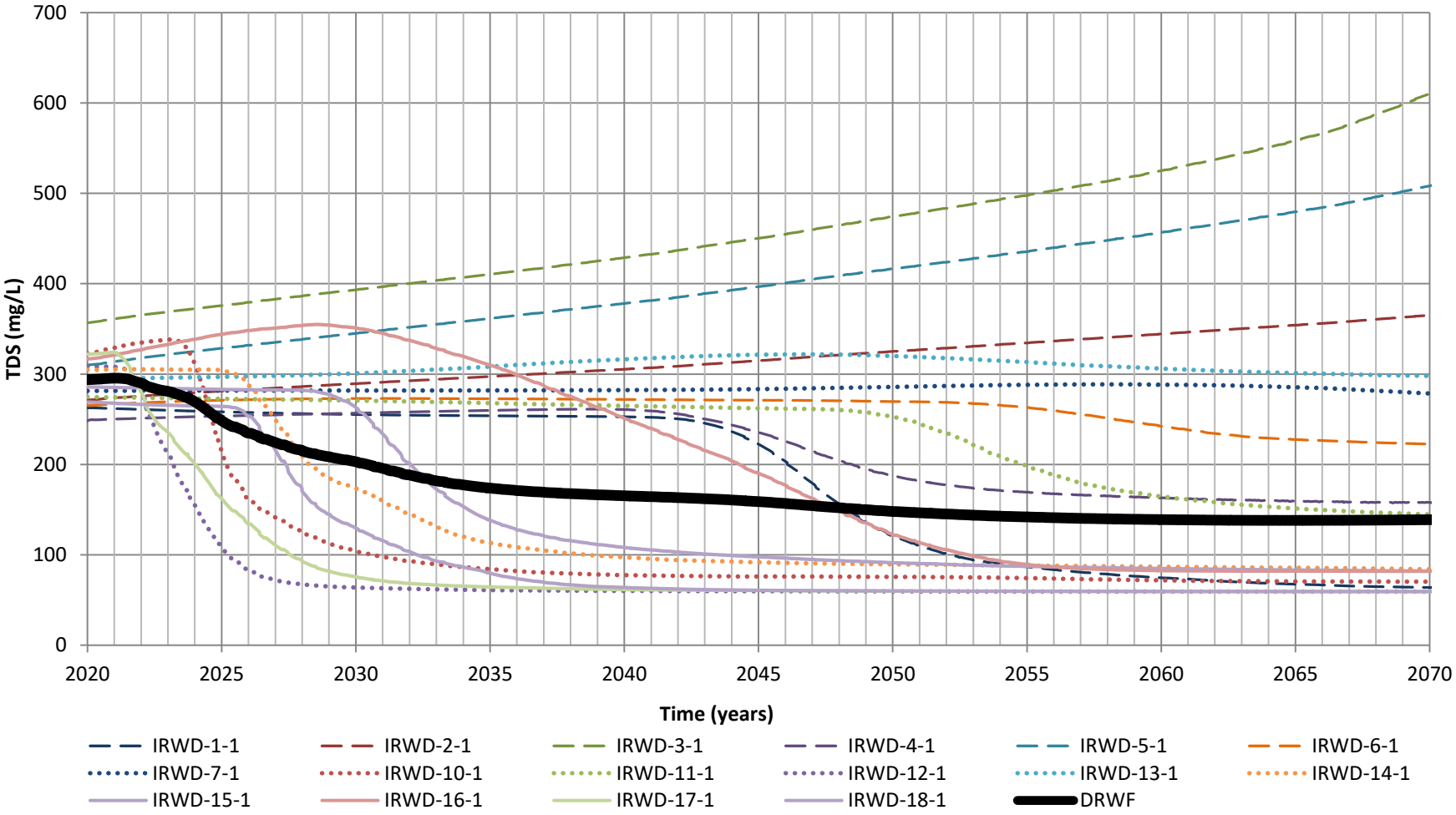


Figure 27b

Model-Predicted Chloride Concentrations versus Time at the Dyer Road Well Field - Scenario 2b

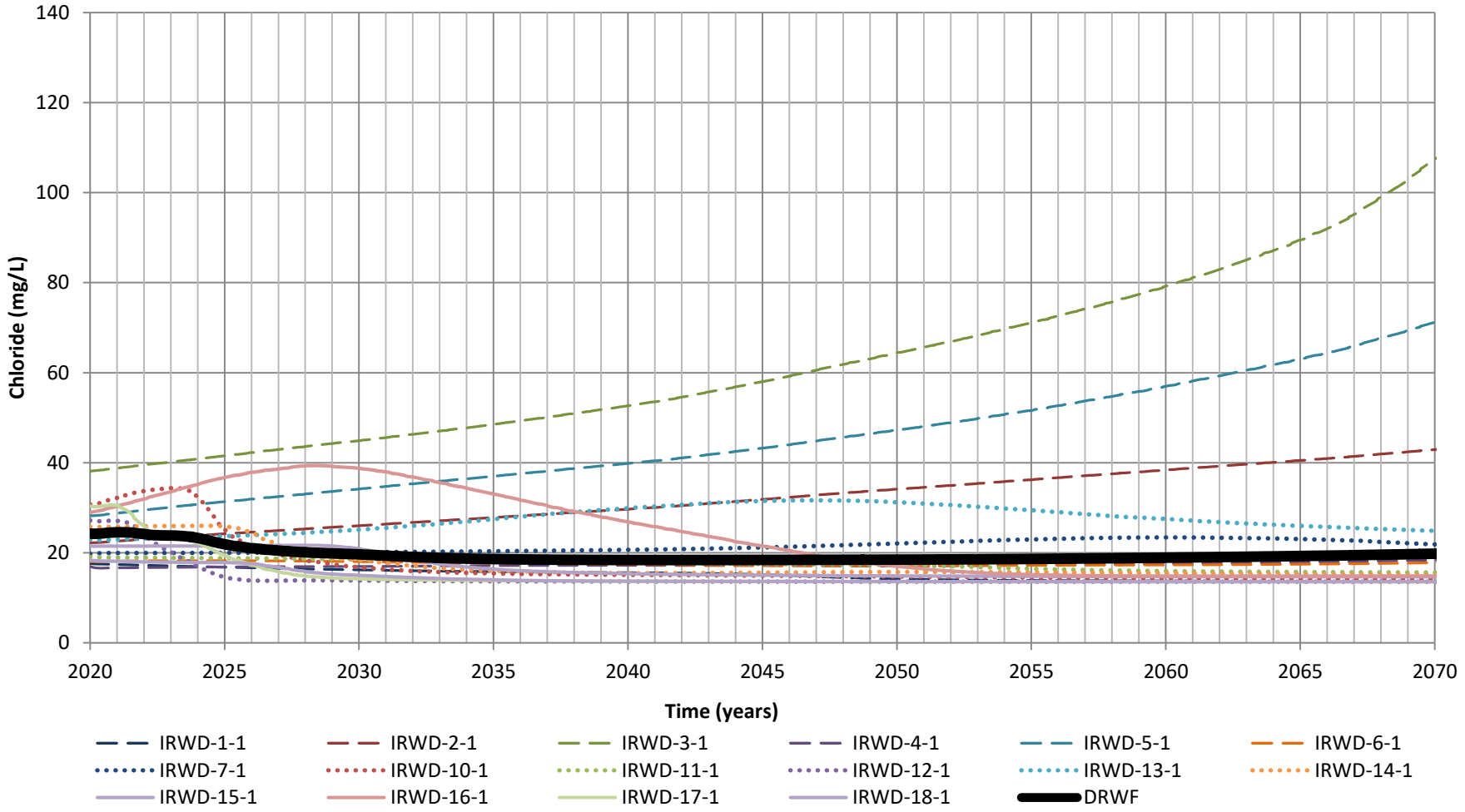


Figure 27c

Model-Predicted Boron Concentrations versus Time at the Dyer Road Well Field - Scenario 2b

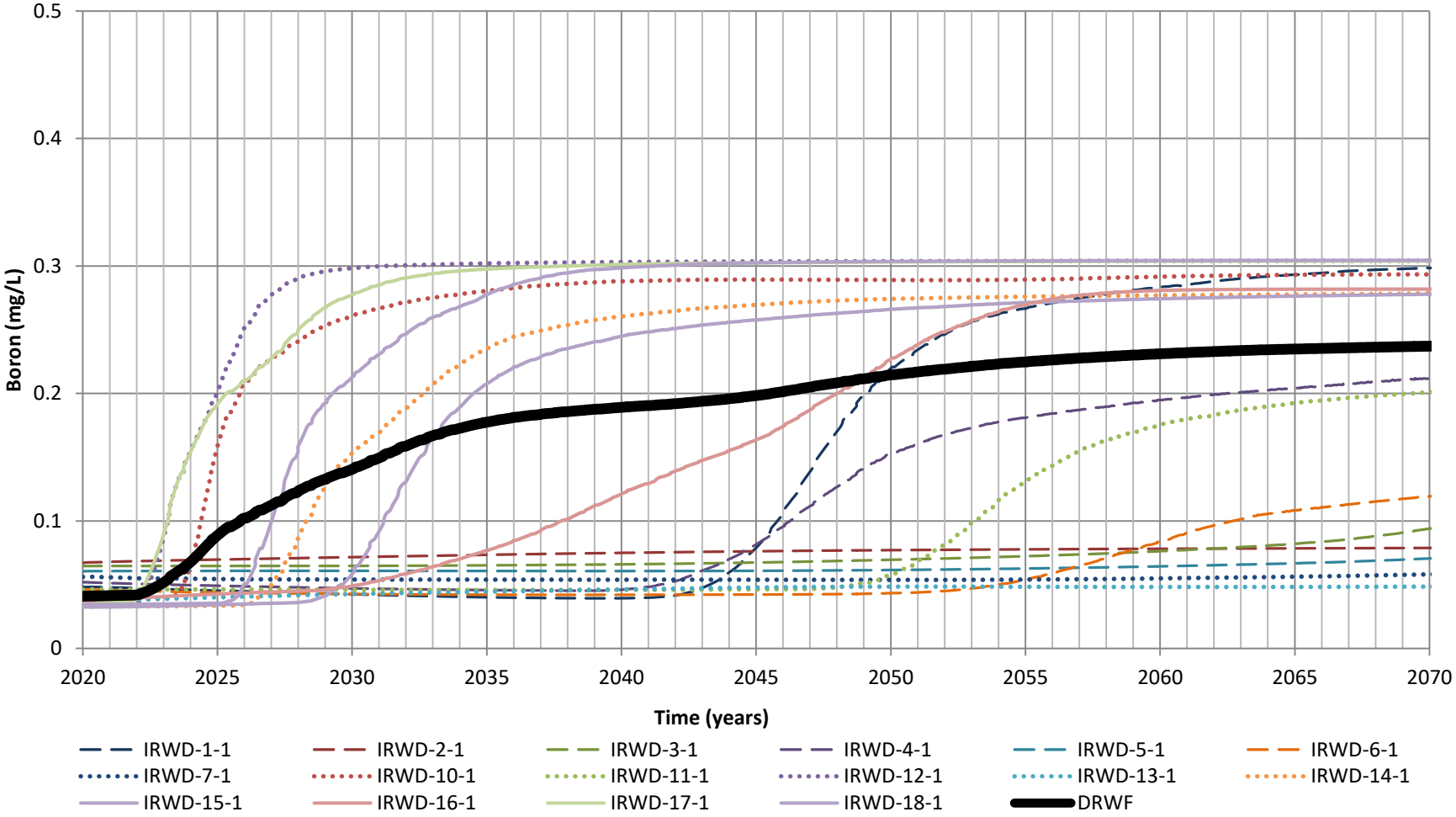


Figure 28a

Model-Predicted TDS Concentrations versus Time at the Dyer Road Well Field - Scenario 3b

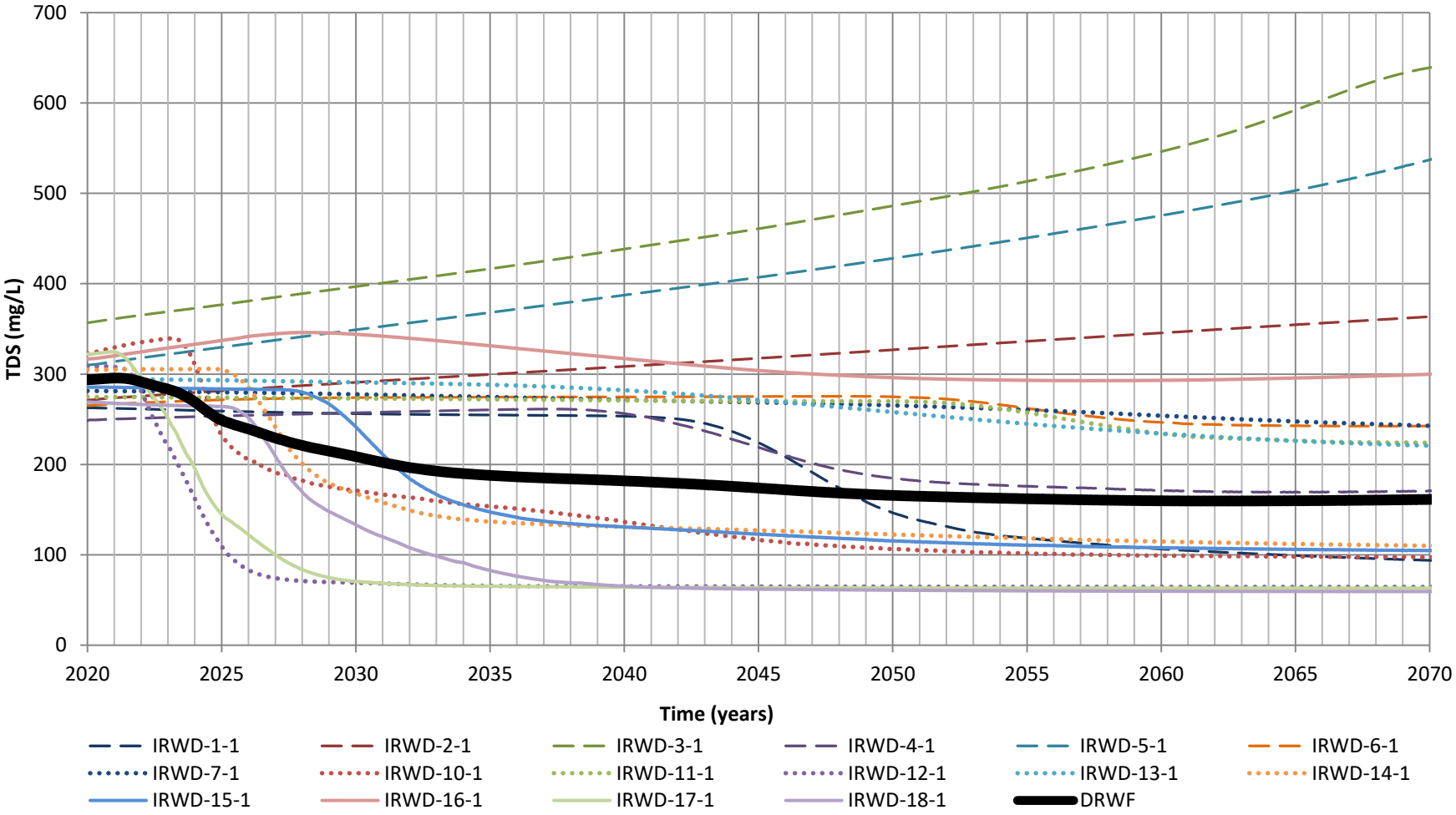


Figure 28b

Model-Predicted Chloride Concentrations versus Time at the Dyer Road Well Field - Scenario 3b

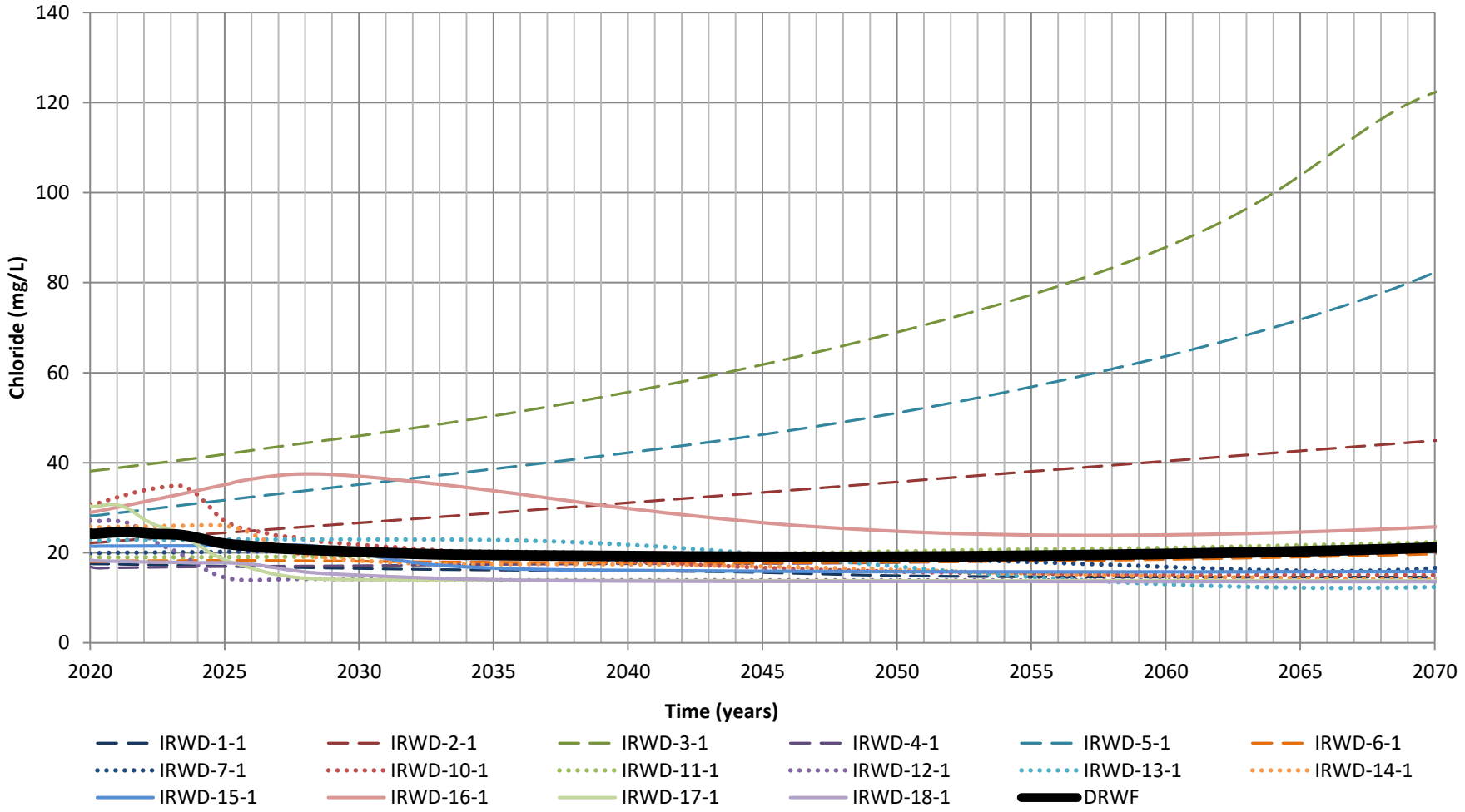


Figure 28c

Model-Predicted Boron Concentrations versus Time at the Dyer Road Well Field - Scenario 3b

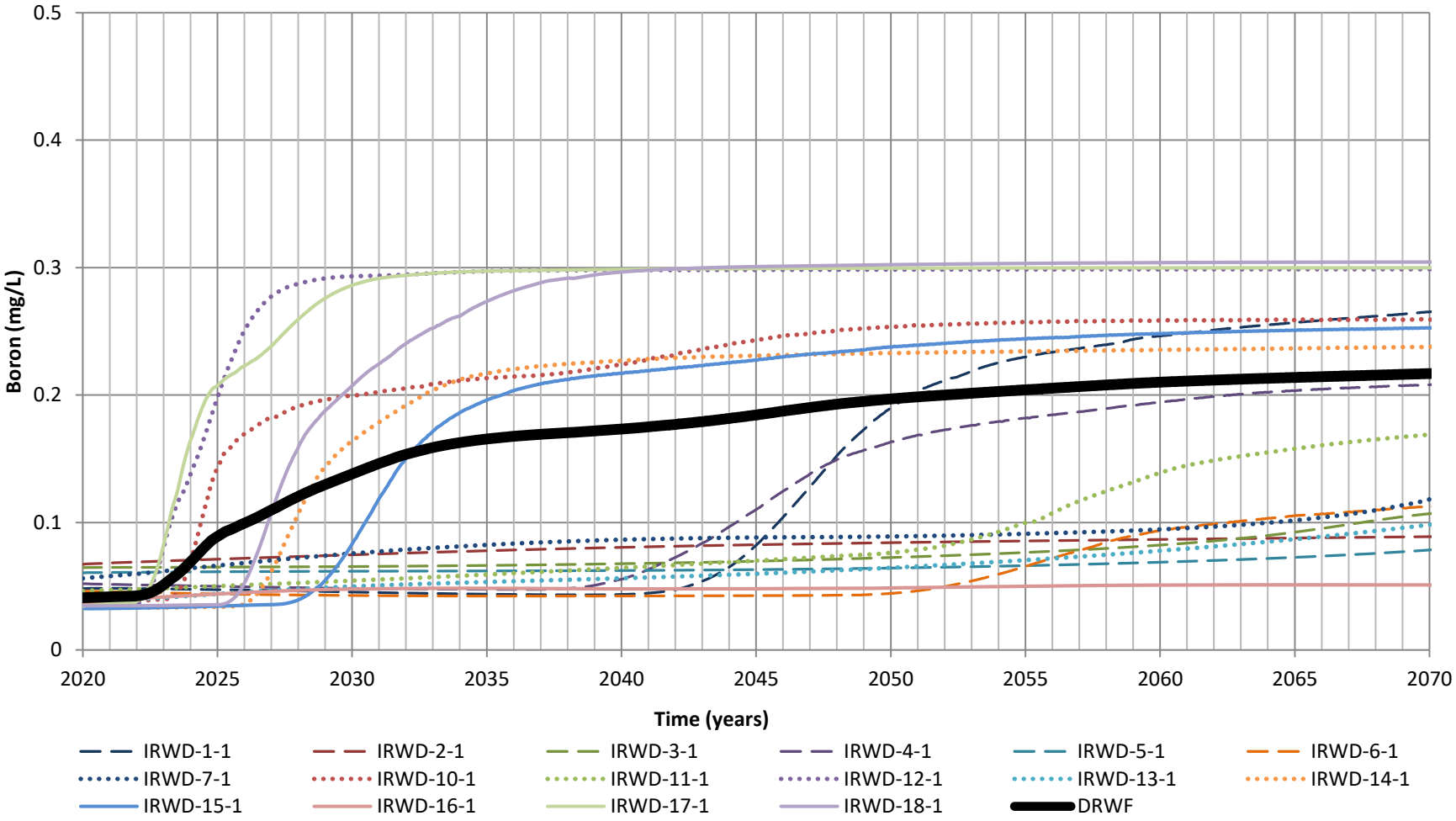


Figure 29a

Model-Predicted TDS Concentrations versus Time at the Dyer Road Well Field - Scenario 4b

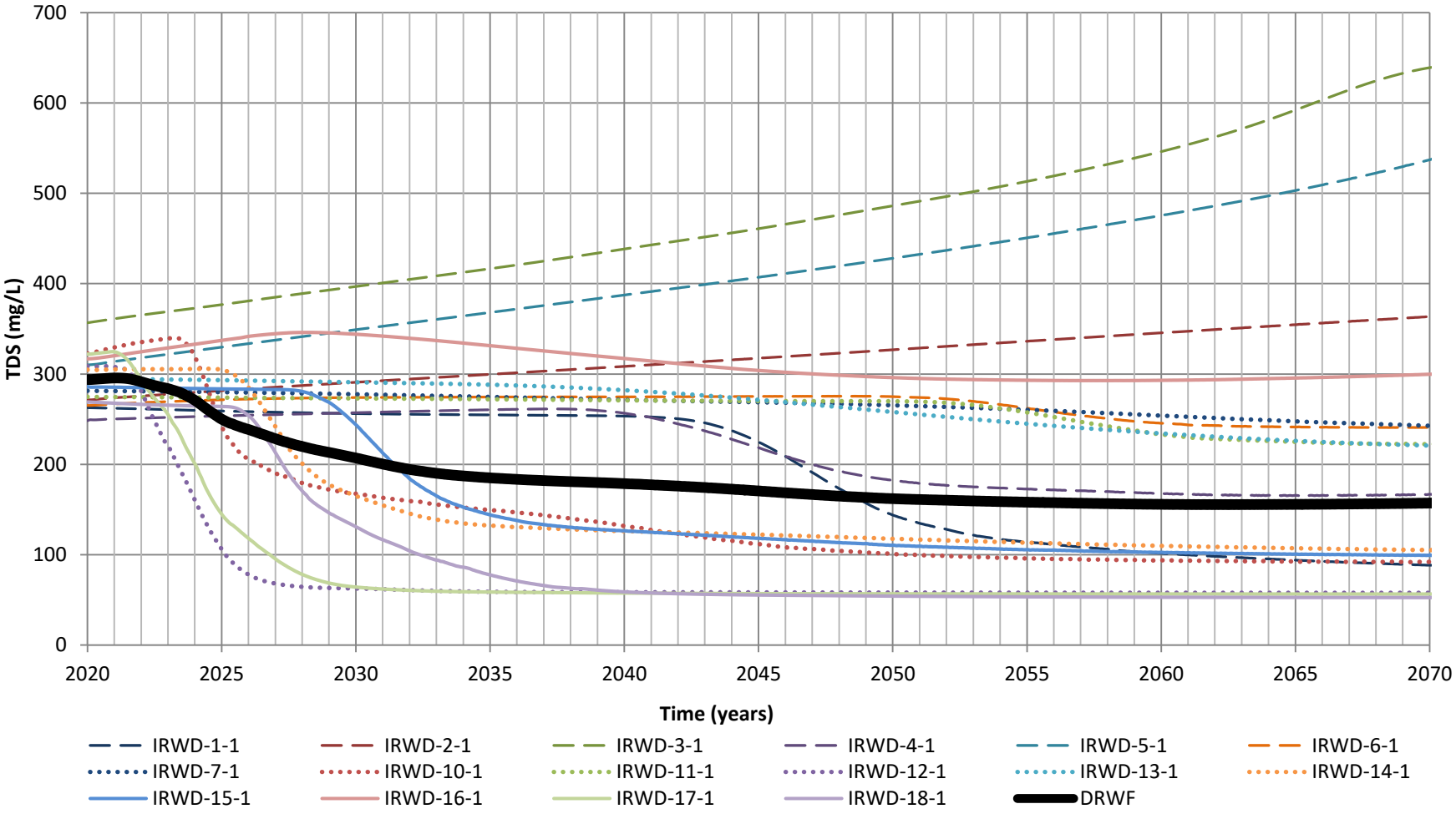


Figure 29b

Model-Predicted Chloride Concentrations versus Time at the Dyer Road Well Field - Scenario 4b

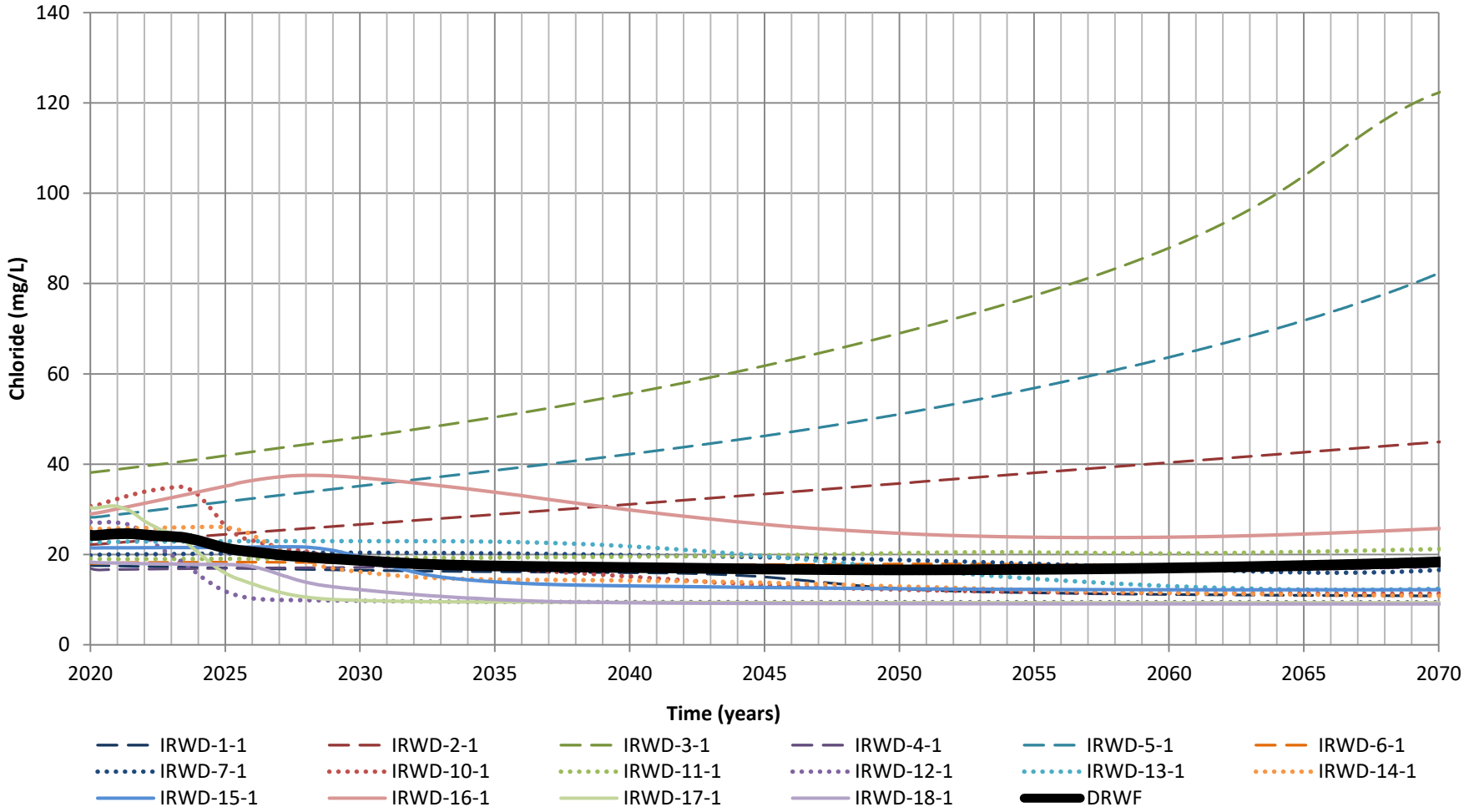


Figure 29c

Model-Predicted Boron Concentrations versus Time at the Dyer Road Well Field - Scenario 4b

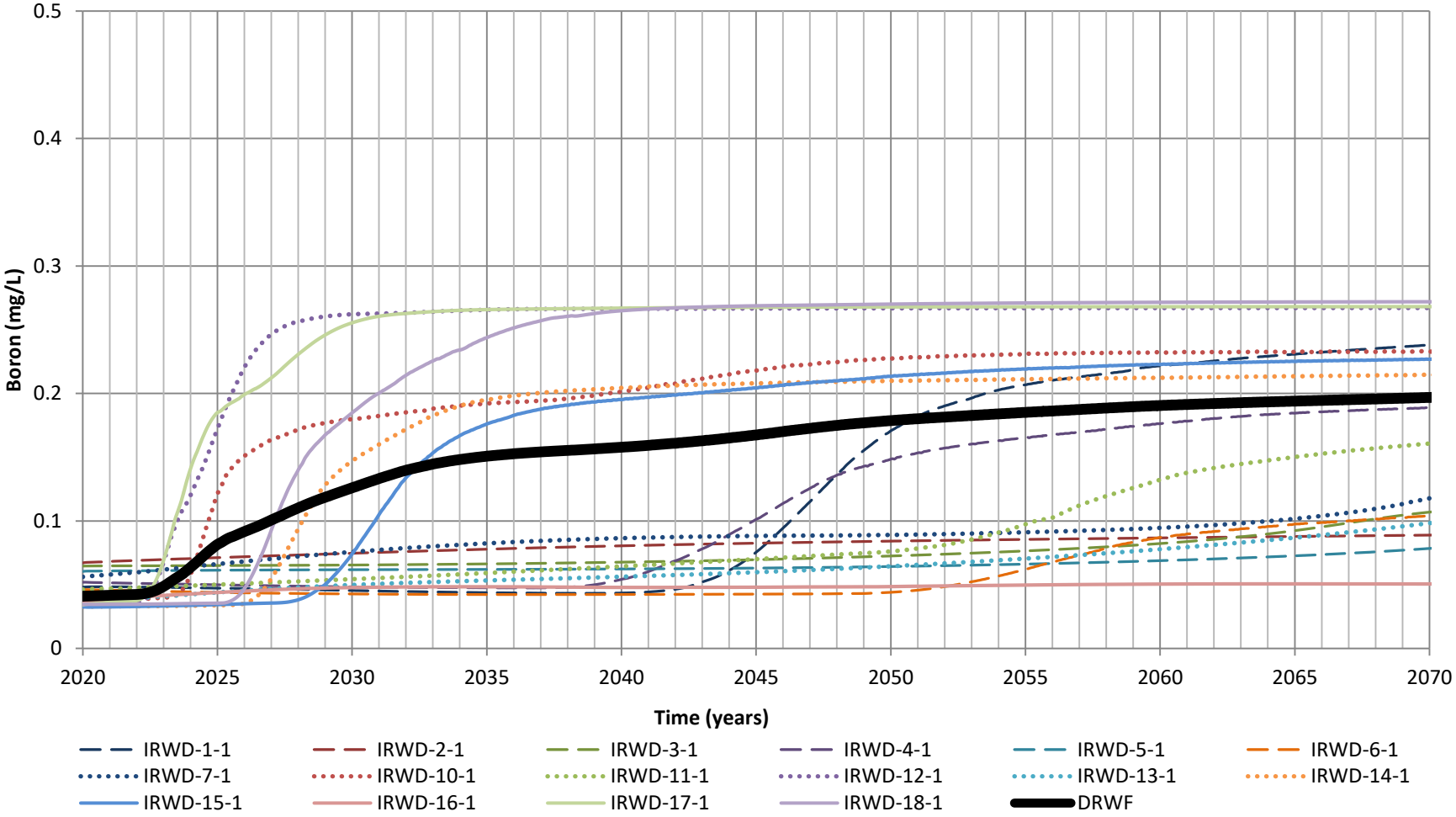


Figure 30

Model-Predicted Net Water Quality at the Dyer Road Well Field - Scenario 'A' TDS Concentrations

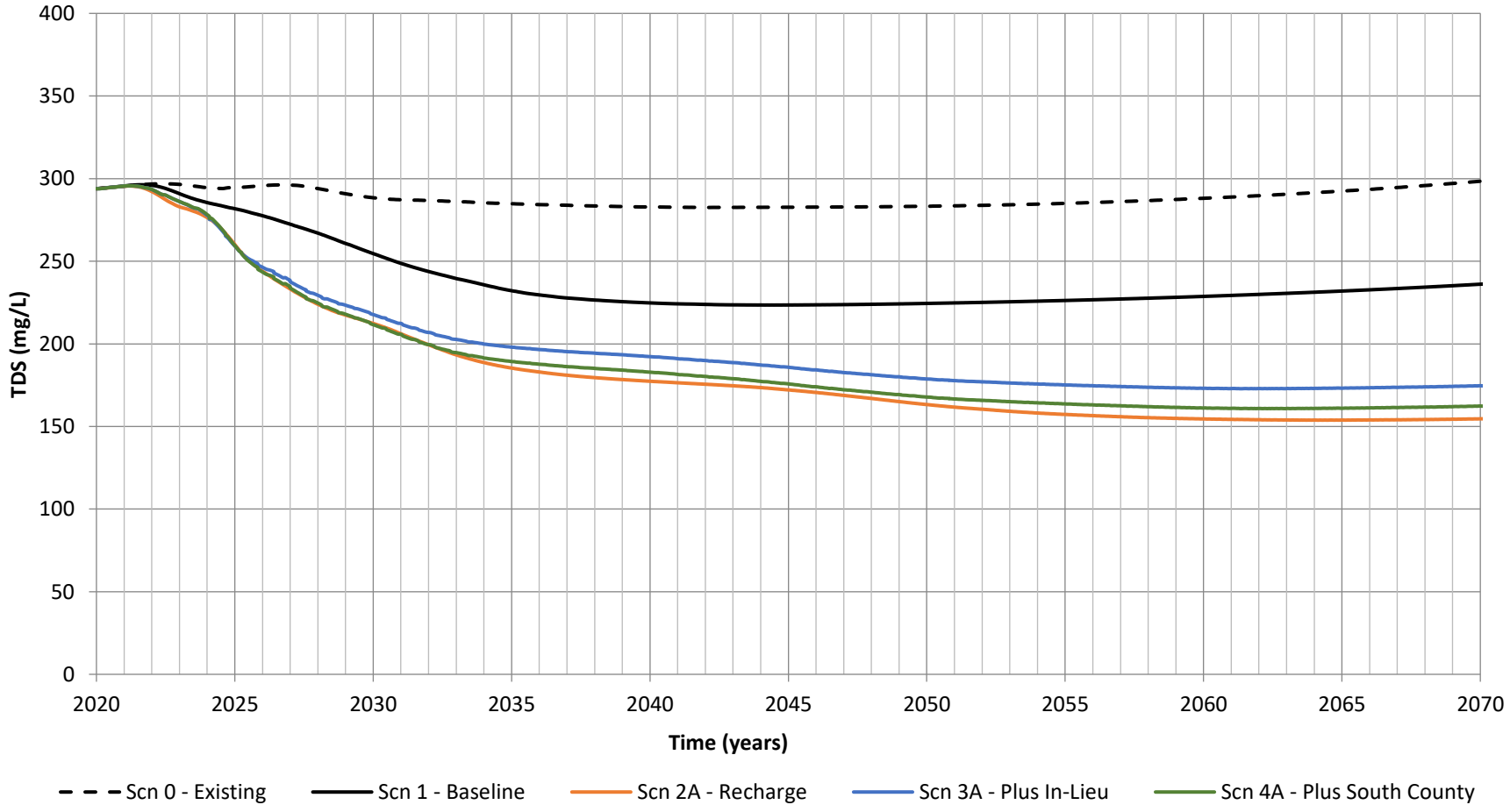


Figure 31

Model-Predicted Net Water Quality at the Dyer Road Well Field - Scenario 'A' Chloride Concentrations

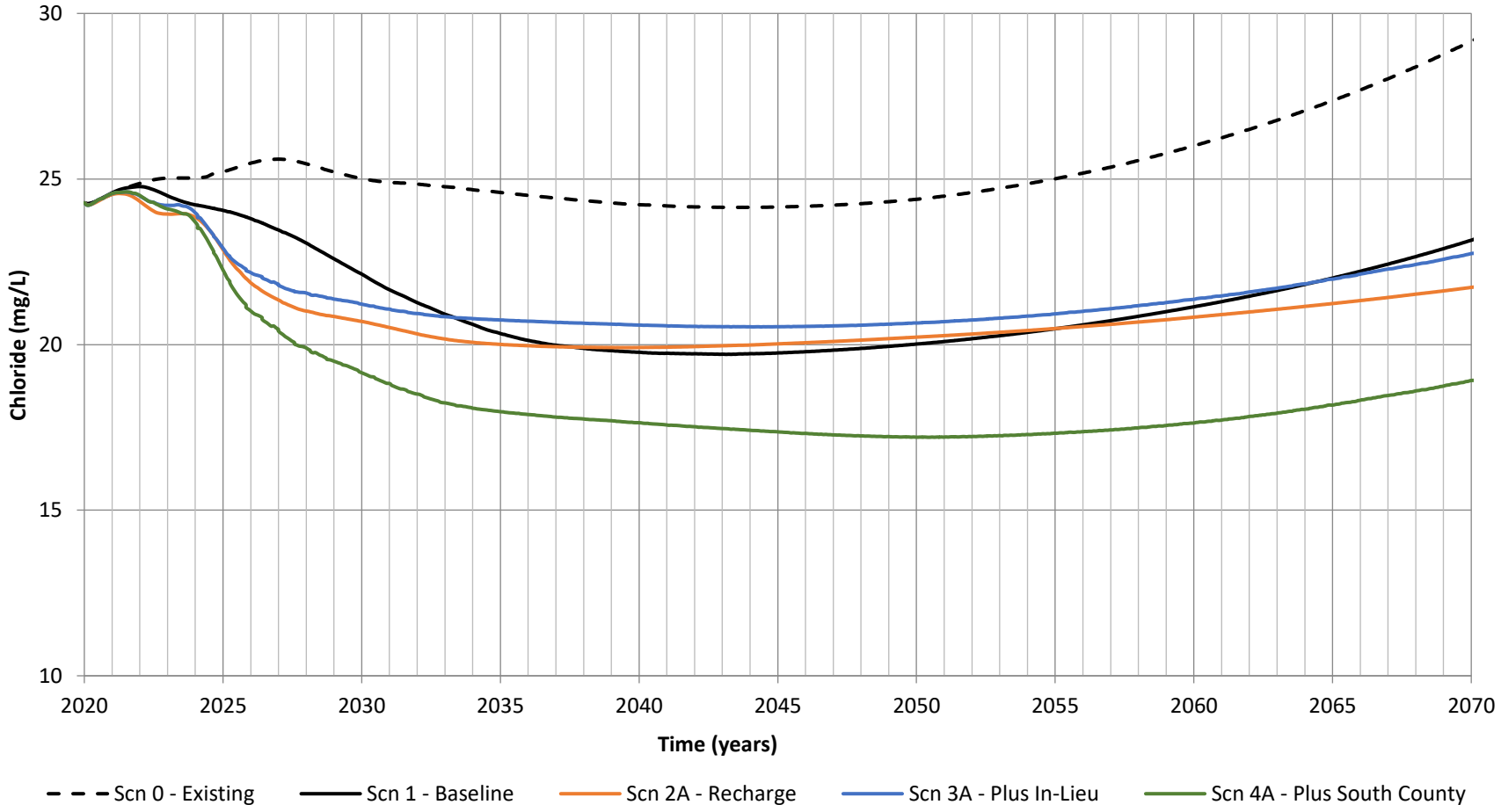


Figure 32

Model-Predicted Net Water Quality at the Dyer Road Well Field - Scenario 'A' Boron Concentrations

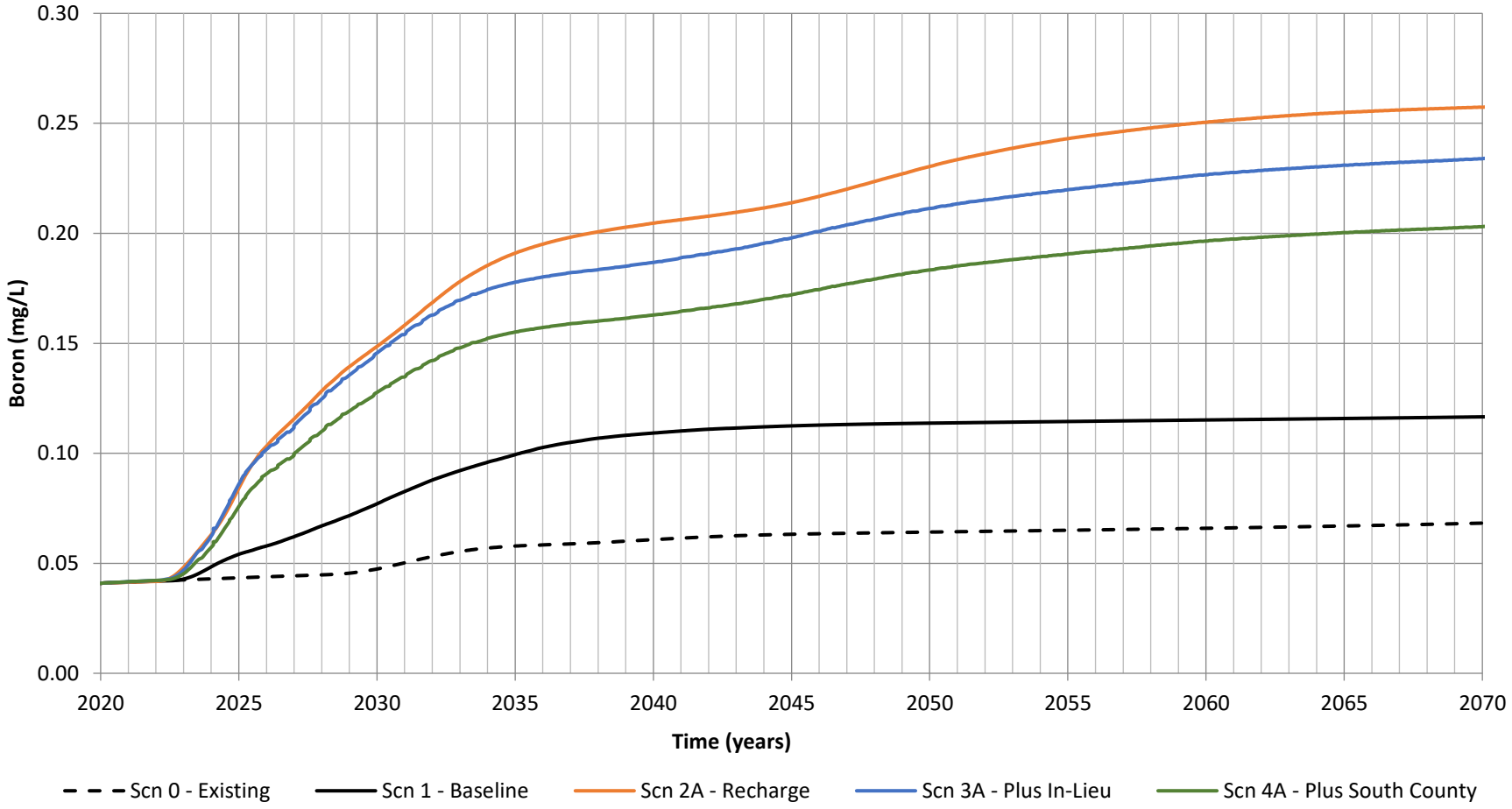


Figure 33

Model-Predicted Net Water Quality at the Dyer Road Well Field - Scenario 'B' TDS Concentrations

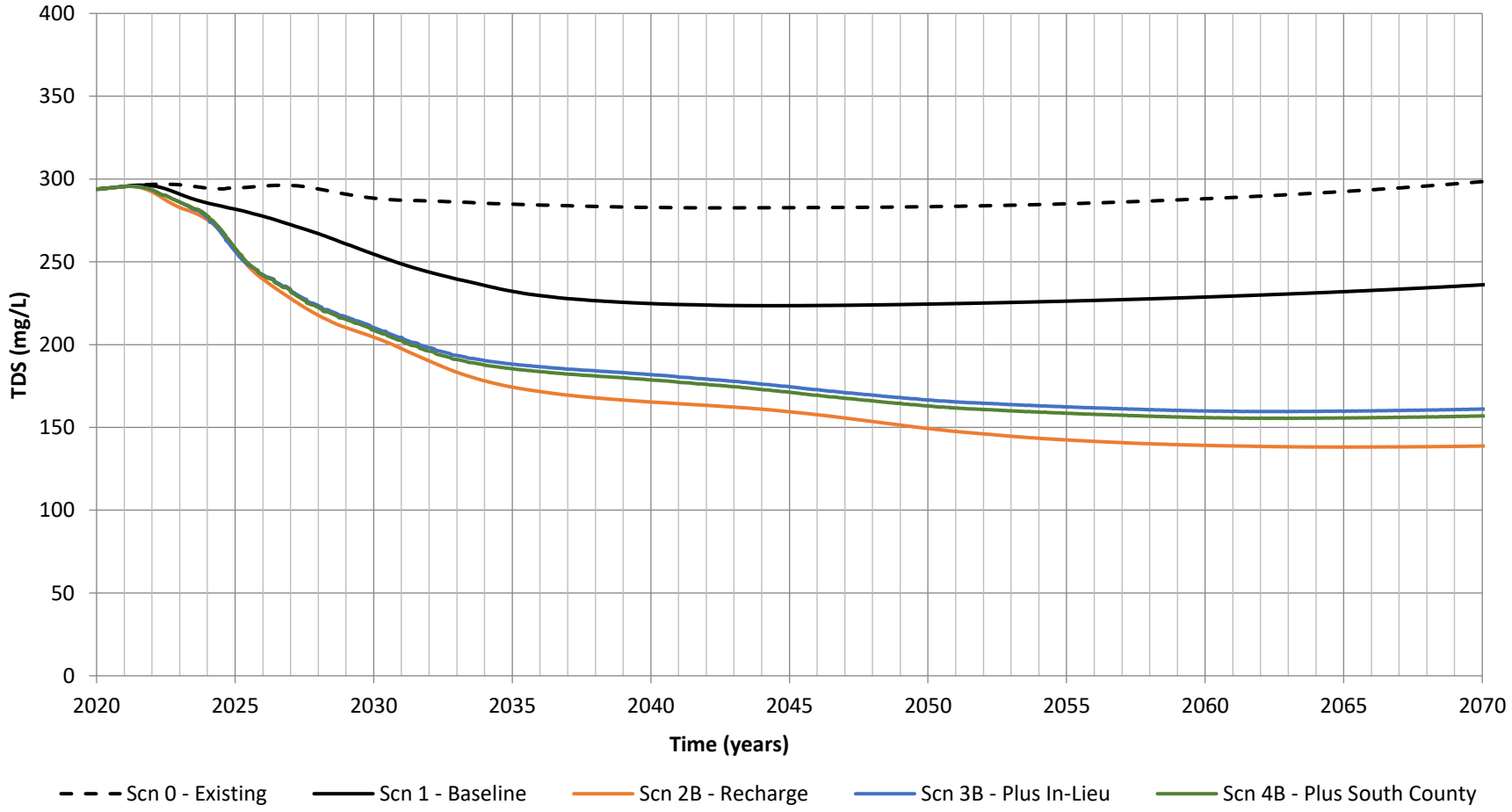


Figure 34

Model-Predicted Net Water Quality at the Dyer Road Well Field - Scenario 'B' Chloride Concentrations

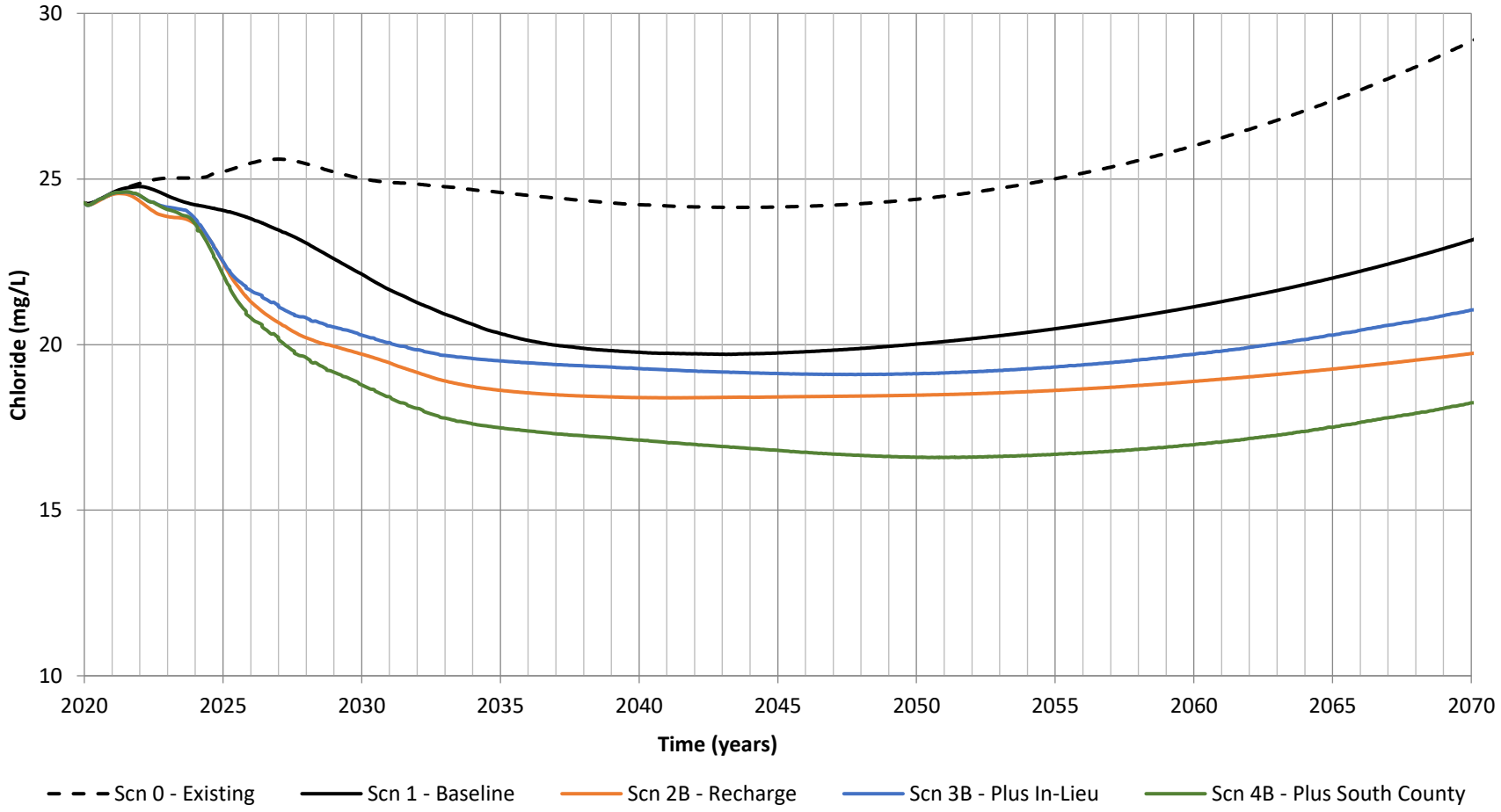
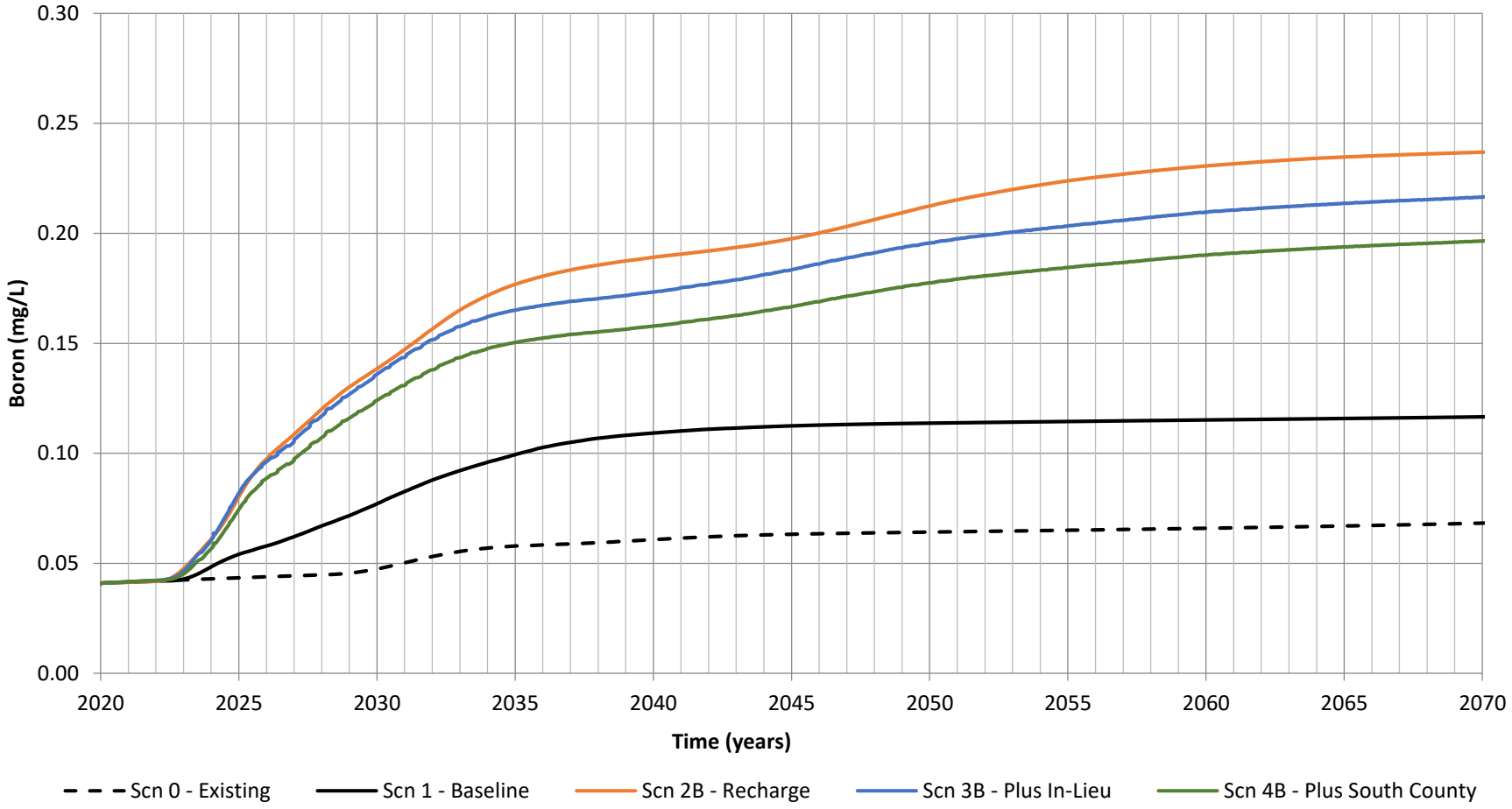


Figure 35

Model-Predicted Net Water Quality at the Dyer Road Well Field - Scenario 'B' Boron Concentrations



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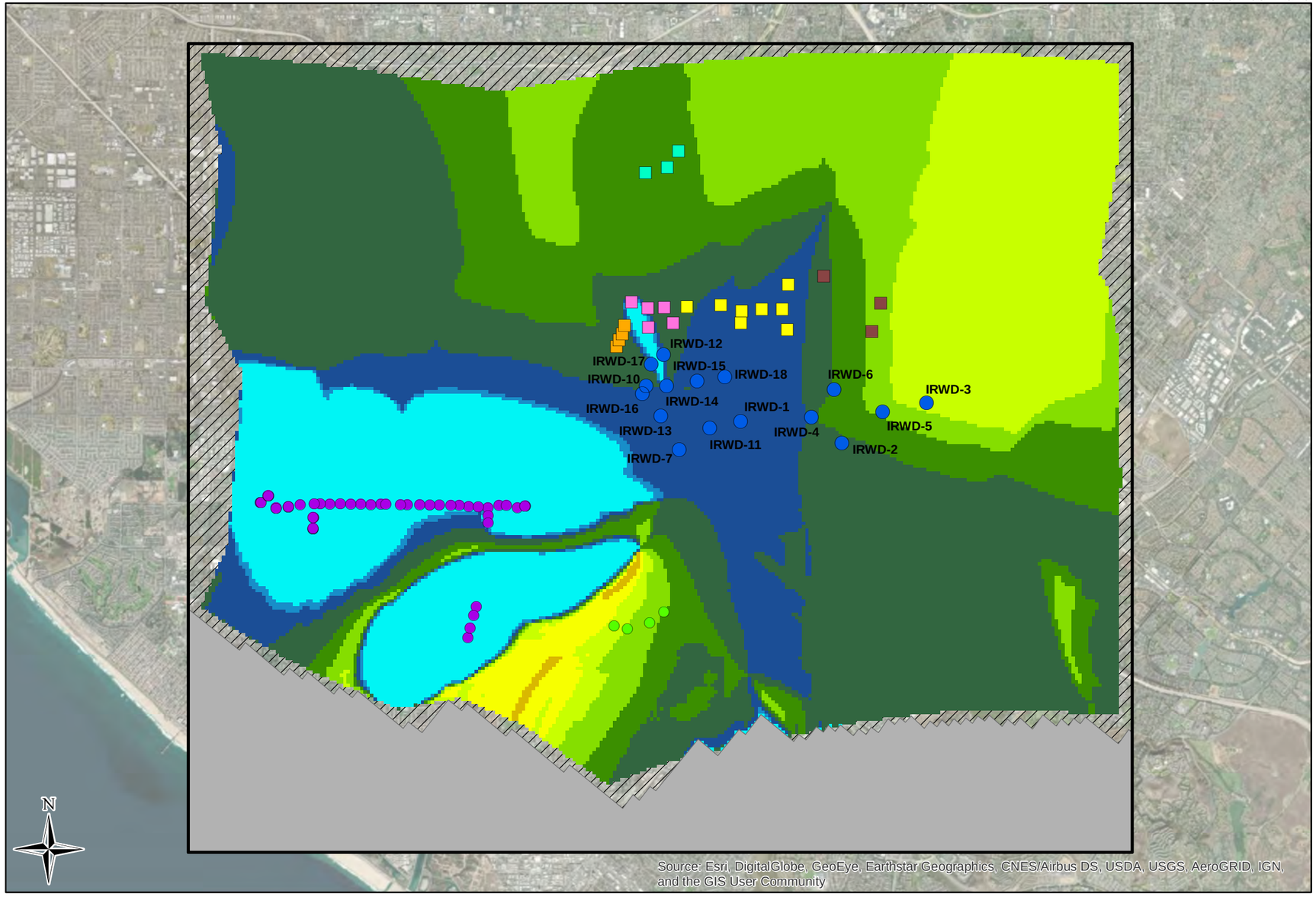

NAD 83 State Plane Zone 6

Map Features

TDS Concentration (mg/L)

- 0 to 100
- 100 to 200
- 200 to 300
- 300 to 400
- 400 to 500
- 500 to 600
- 600 to 700
- 700 to 800
- 800 to 900
- 900 to 1,000
- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

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Model-Predicted TDS Concentrations in 2070 Scenario 0

Figure 36a

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

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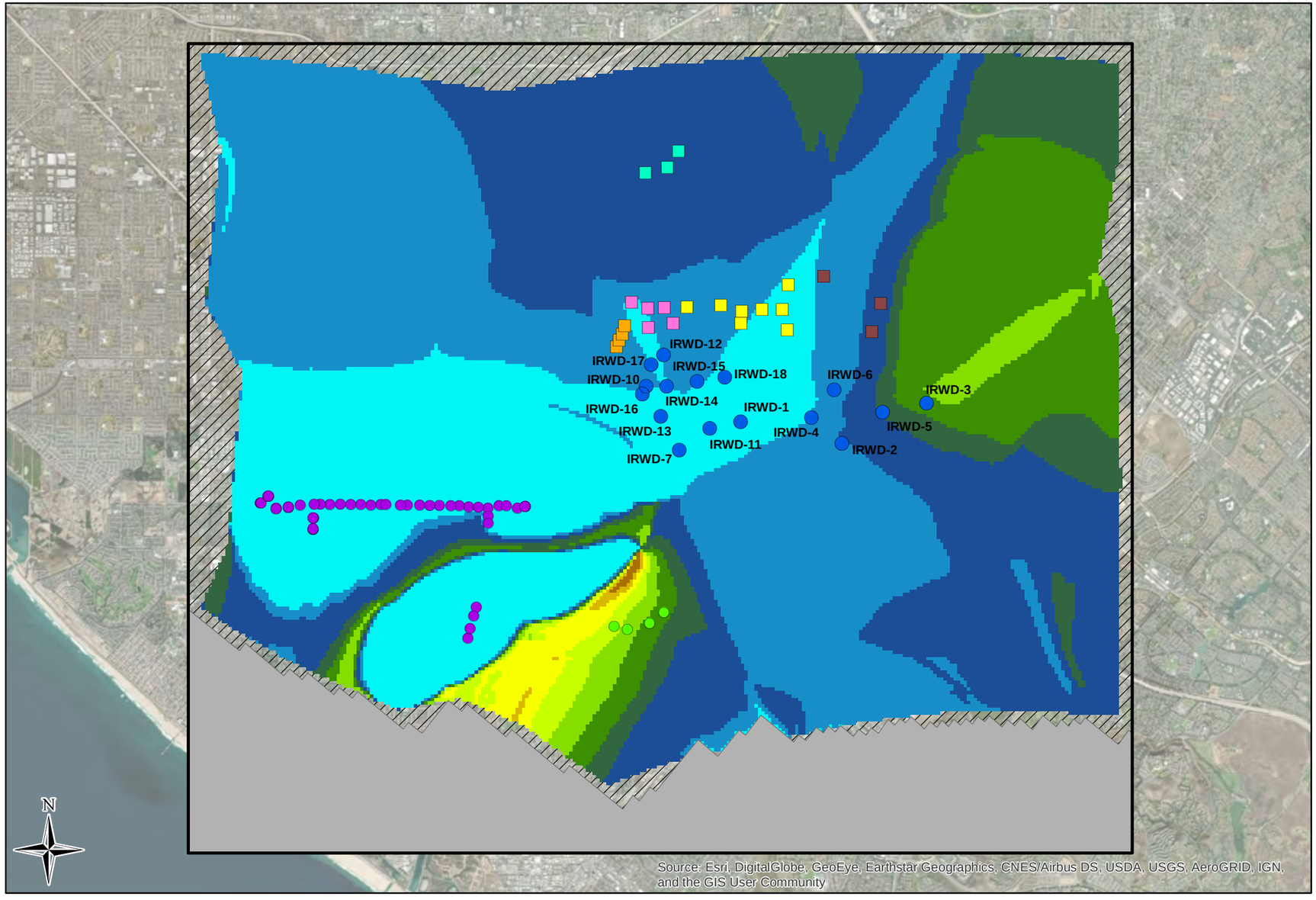

0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

Chloride Concentration (mg/L)
- 0 to 25
- 25 to 50
- 50 to 75
- 75 to 100
- 100 to 125
- 125 to 150
- 150 to 175
- 175 to 200
- 200 to 225
- 225 to 250

- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

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Model-Predicted Chloride Concentrations in 2070 Scenario 0

Figure 36b

Irvine Ranch WATER DISTRICT

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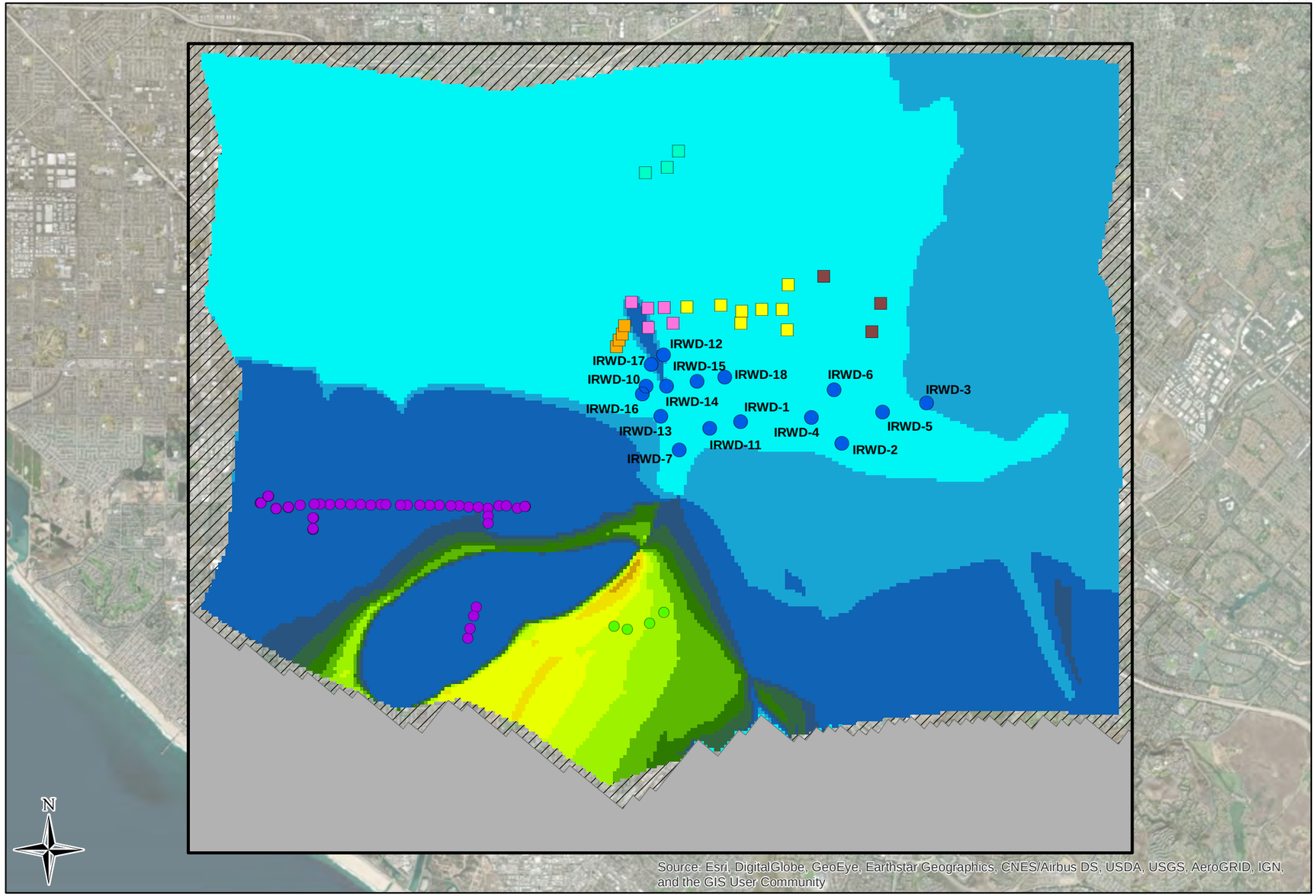
Evaluation of Potential Effects of the Proposed Seawater Desalination Project



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

Boron Concentration (mg/L)
- 0 to 0.1
- 0.1 to 0.2
- 0.2 to 0.3
- 0.3 to 0.4
- 0.4 to 0.5
- 0.5 to 0.6
- 0.6 to 0.7
- 0.7 to 0.8
- 0.8 to 0.9
- 0.9 to 1.0
- 1.0 to 1.1
- 1.1 to 1.2
- 1.2 to 1.3

Campesino Injection Well
Mid-Basin Injection Well
Dyer Road Well Field Injection Well
Dyer Road Well Field Injection Well (Standby)
SAR Injection Well
Talbert Injection Well
Southeast Talbert Injection Well
Dyer Road Well Field Extraction Well
No Flow Zone
Active Model Domain Outside of Boundary Conditions
Model Domain

Model-Predicted Boron Concentrations in 2070 Scenario 0

Figure 36c

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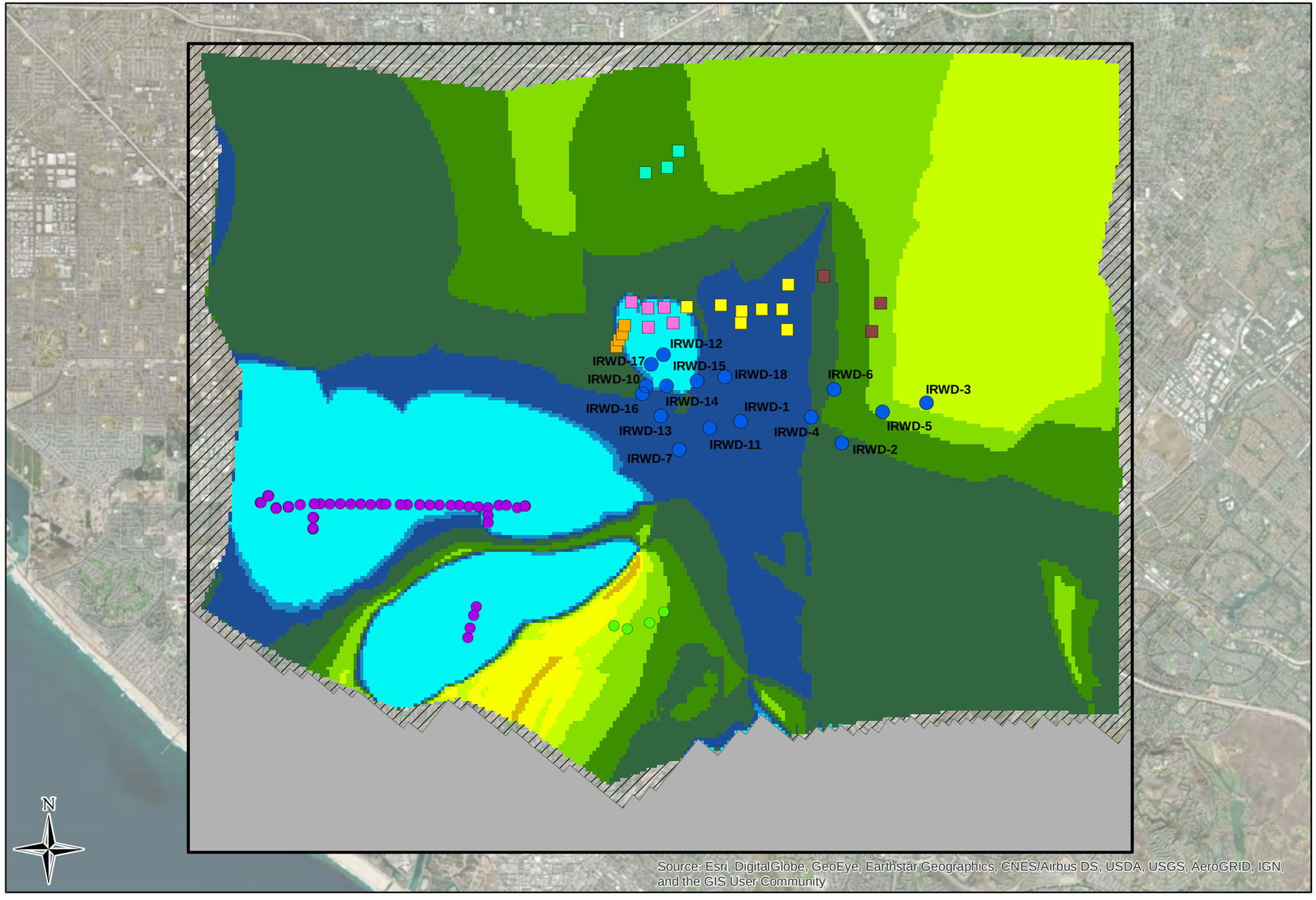
Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



NAD 83 State Plane Zone 6

Map Features

TDS Concentration (mg/L)
- 0 to 100
- 100 to 200
- 200 to 300
- 300 to 400
- 400 to 500
- 500 to 600
- 600 to 700
- 700 to 800
- 800 to 900
- 900 to 1,000
- Campesino Injection Well
- Mid-Basin Injection Well
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- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

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Model-Predicted TDS Concentrations in 2070 Scenario 1

Figure 37a

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

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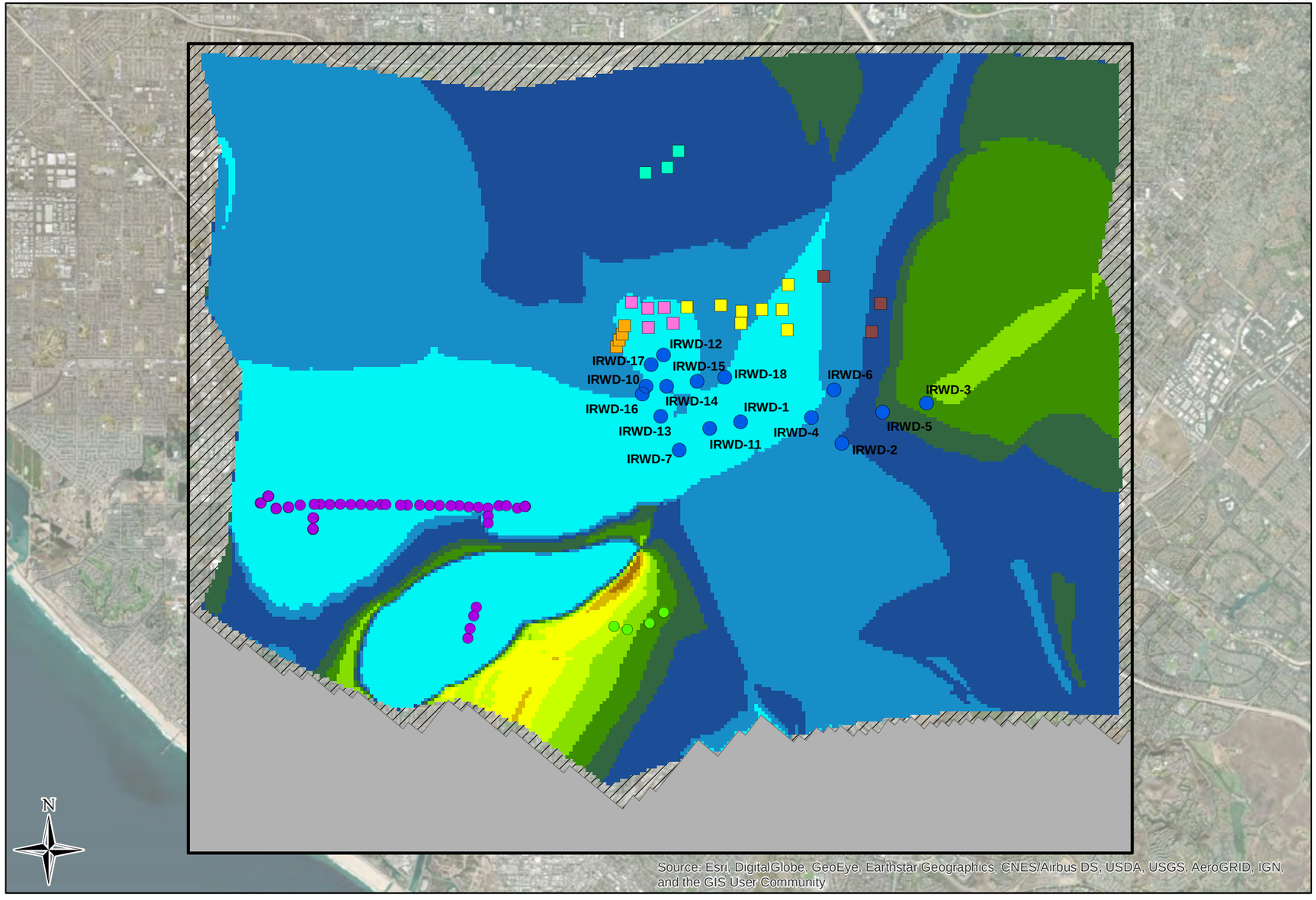

0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

Chloride Concentration (mg/L)

- 0 to 25
- 25 to 50
- 50 to 75
- 75 to 100
- 100 to 125
- 125 to 150
- 150 to 175
- 175 to 200
- 200 to 225
- 225 to 250
- Campesino Injection Well
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- Dyer Road Well Field Injection Well (Standby)
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- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

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Model-Predicted Chloride Concentrations in 2070 Scenario 1

Figure 37b

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

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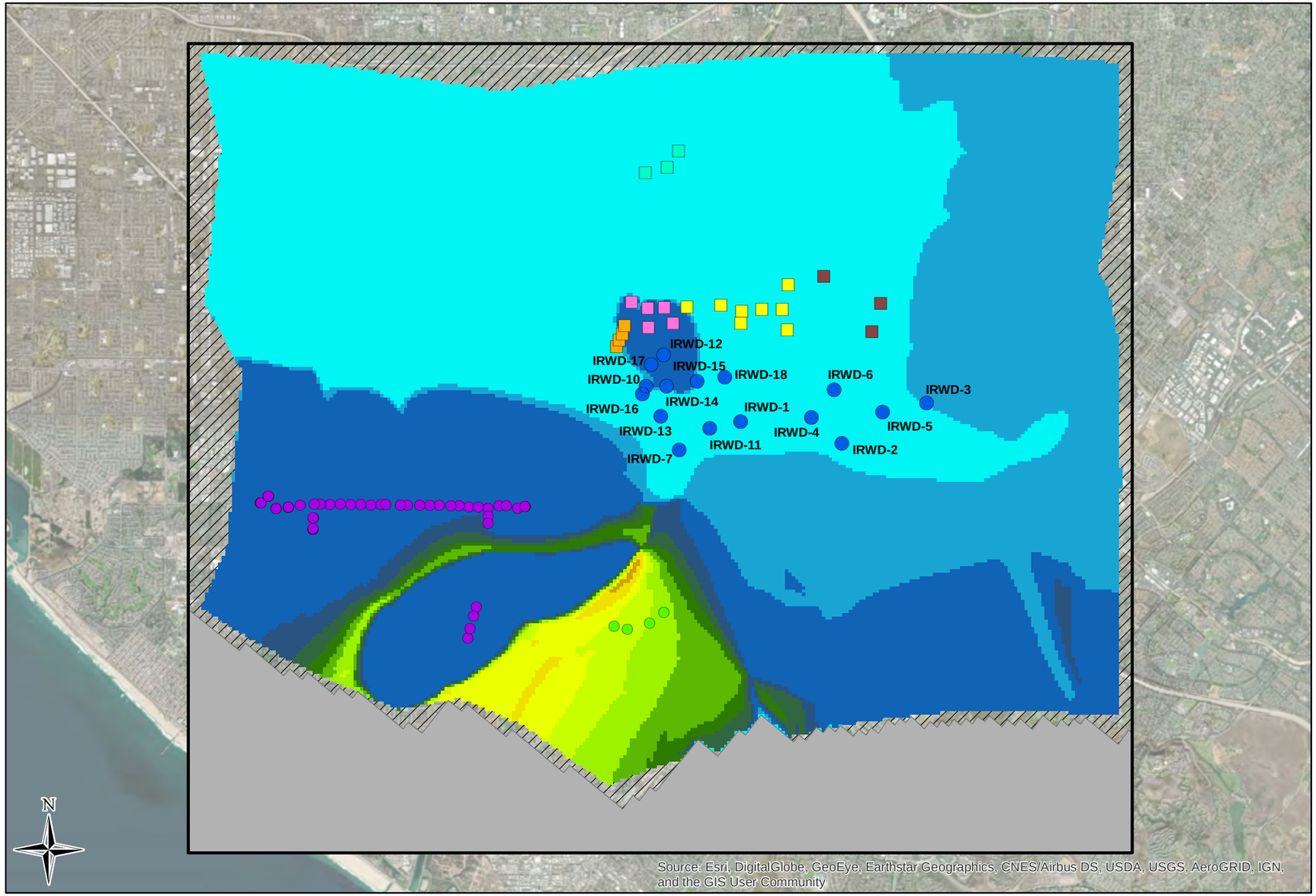

0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

Boron Concentration (mg/L)

- 0 to 0.1
- 0.1 to 0.2
- 0.2 to 0.3
- 0.3 to 0.4
- 0.4 to 0.5
- 0.5 to 0.6
- 0.6 to 0.7
- 0.7 to 0.8
- 0.8 to 0.9
- 0.9 to 1.0
- 1.0 to 1.1
- 1.1 to 1.2
- 1.2 to 1.3
- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

Model-Predicted Boron Concentrations in 2070 Scenario 1

Figure 37c

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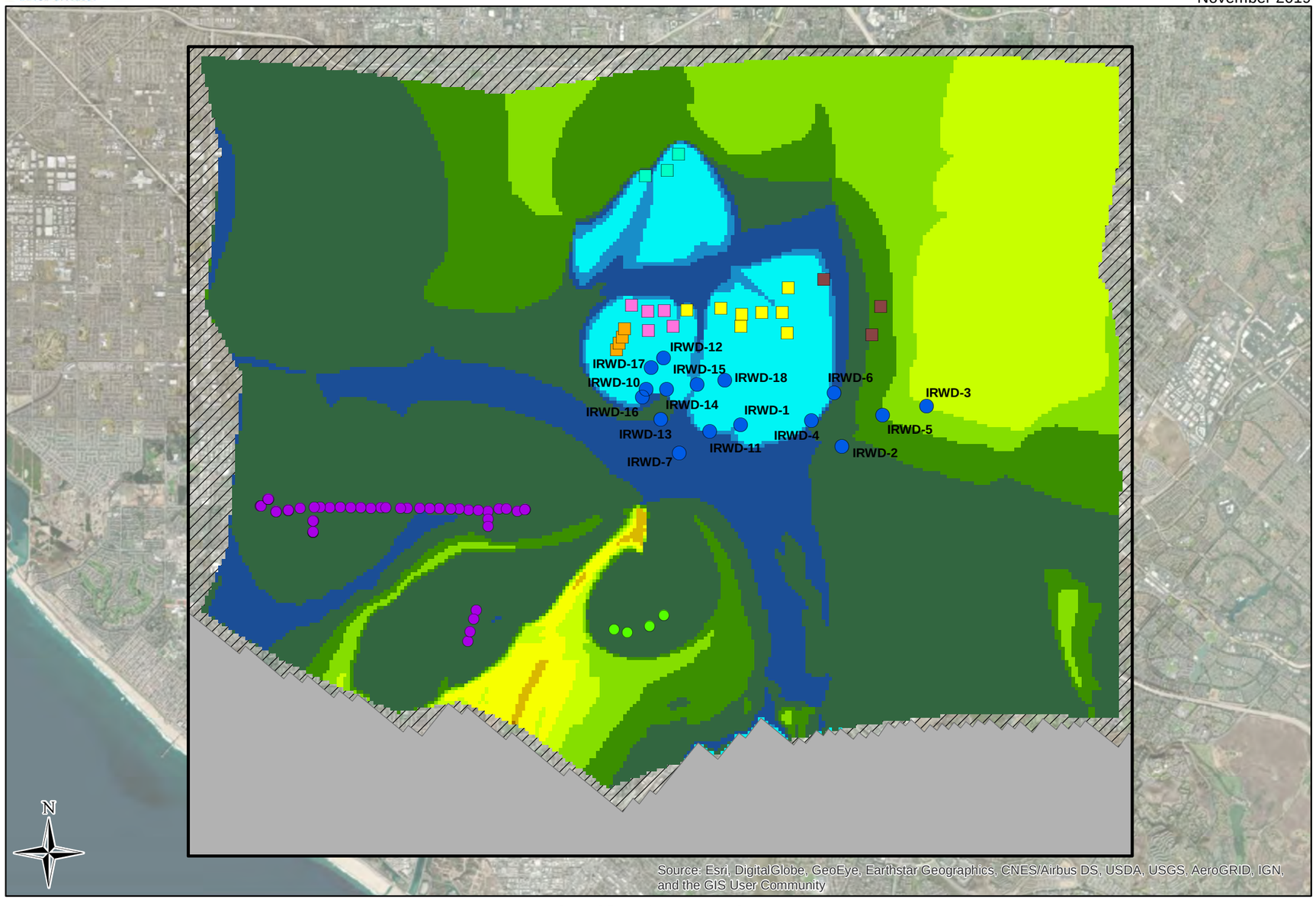

0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

TDS Concentration (mg/L)
- 0 to 100
- 100 to 200
- 200 to 300
- 300 to 400
- 400 to 500
- 500 to 600
- 600 to 700
- 700 to 800
- 800 to 900
- 900 to 1,000
- Campesino Injection Well
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- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

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Model-Predicted TDS Concentrations in 2070 Scenario 2a

Figure 38a

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

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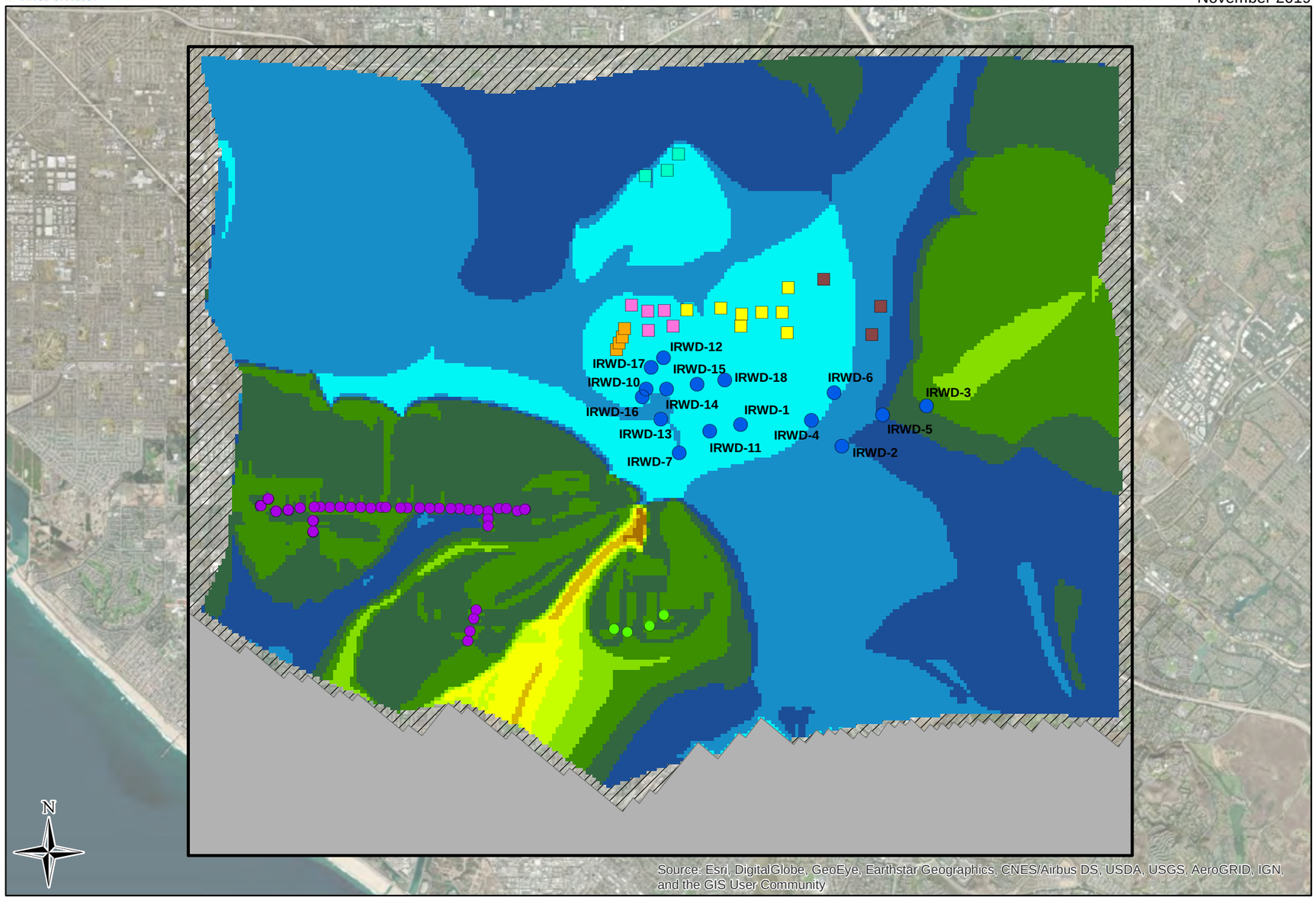

0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

Chloride Concentration (mg/L)
- 0 to 25
- 25 to 50
- 50 to 75
- 75 to 100
- 100 to 125
- 125 to 150
- 150 to 175
- 175 to 200
- 200 to 225
- 225 to 250
- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

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Model-Predicted Chloride Concentrations in 2070 Scenario 2a

Figure 38b

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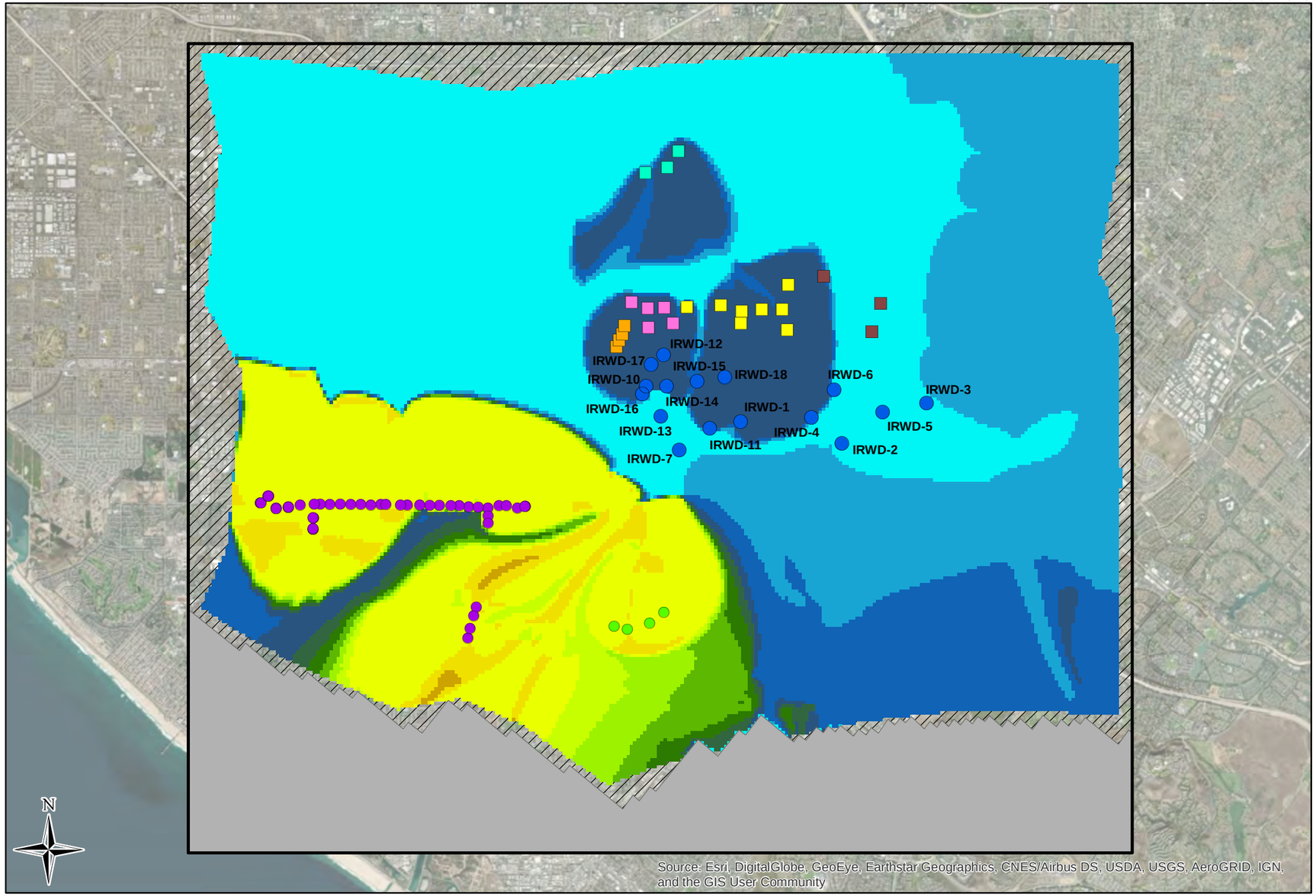
Evaluation of Potential Effects of the Proposed Seawater Desalination Project



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

Boron Concentration (mg/L)
- 0 to 0.1
- 0.1 to 0.2
- 0.2 to 0.3
- 0.3 to 0.4
- 0.4 to 0.5
- 0.5 to 0.6
- 0.6 to 0.7
- 0.7 to 0.8
- 0.8 to 0.9
- 0.9 to 1.0
- 1.0 to 1.1
- 1.1 to 1.2
- 1.2 to 1.3

Campesino Injection Well
Mid-Basin Injection Well
Dyer Road Well Field Injection Well
Dyer Road Well Field Injection Well (Standby)
SAR Injection Well
Talbert Injection Well
Southeast Talbert Injection Well
Dyer Road Well Field Extraction Well
No Flow Zone
Active Model Domain Outside of Boundary Conditions
Model Domain

Model-Predicted Boron Concentrations in 2070 Scenario 2a

Figure 38c

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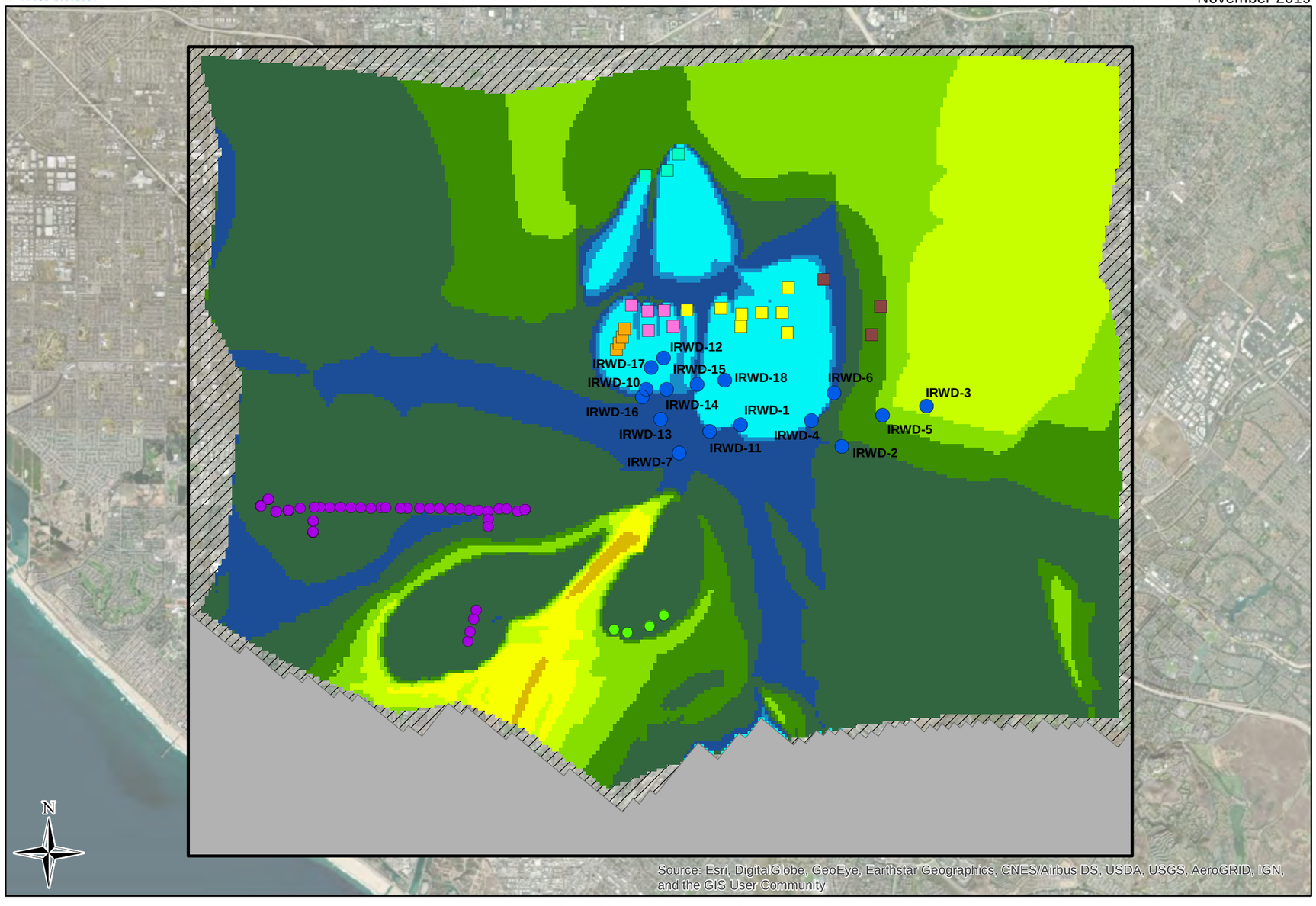
Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

TDS Concentration (mg/L)
- 0 to 100
- 100 to 200
- 200 to 300
- 300 to 400
- 400 to 500
- 500 to 600
- 600 to 700
- 700 to 800
- 800 to 900
- 900 to 1,000
- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

Thomas Harder & Co. Groundwater Consulting

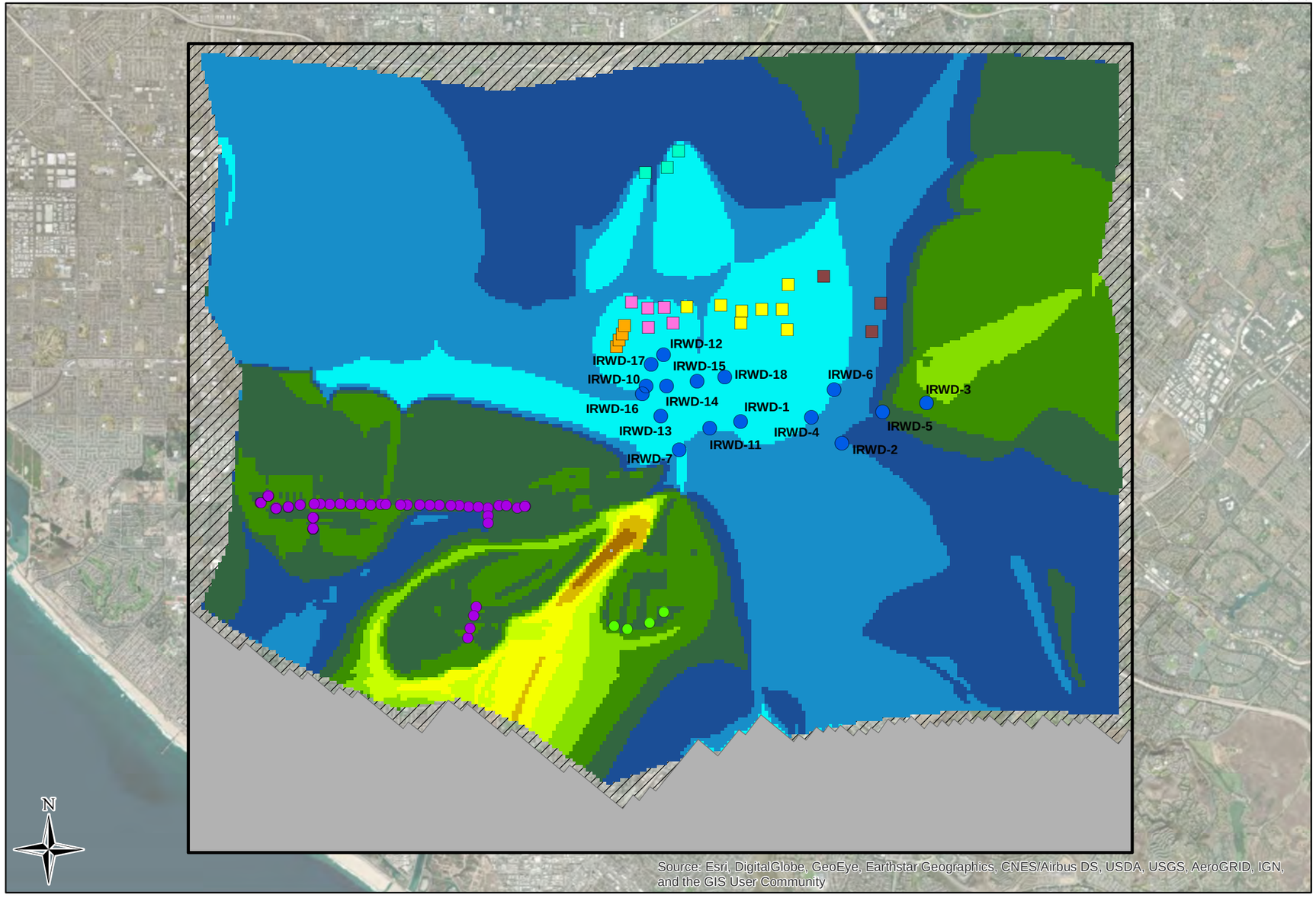
Model-Predicted TDS Concentrations in 2070 Scenario 3a

Figure 39a

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



NAD 83 State Plane Zone 6

Map Features

Chloride Concentration (mg/L)
- 0 to 25
- 25 to 50
- 50 to 75
- 75 to 100
- 100 to 125
- 125 to 150
- 150 to 175
- 175 to 200
- 200 to 225
- 225 to 250
- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

Thomas Harder & Co. Groundwater Consulting

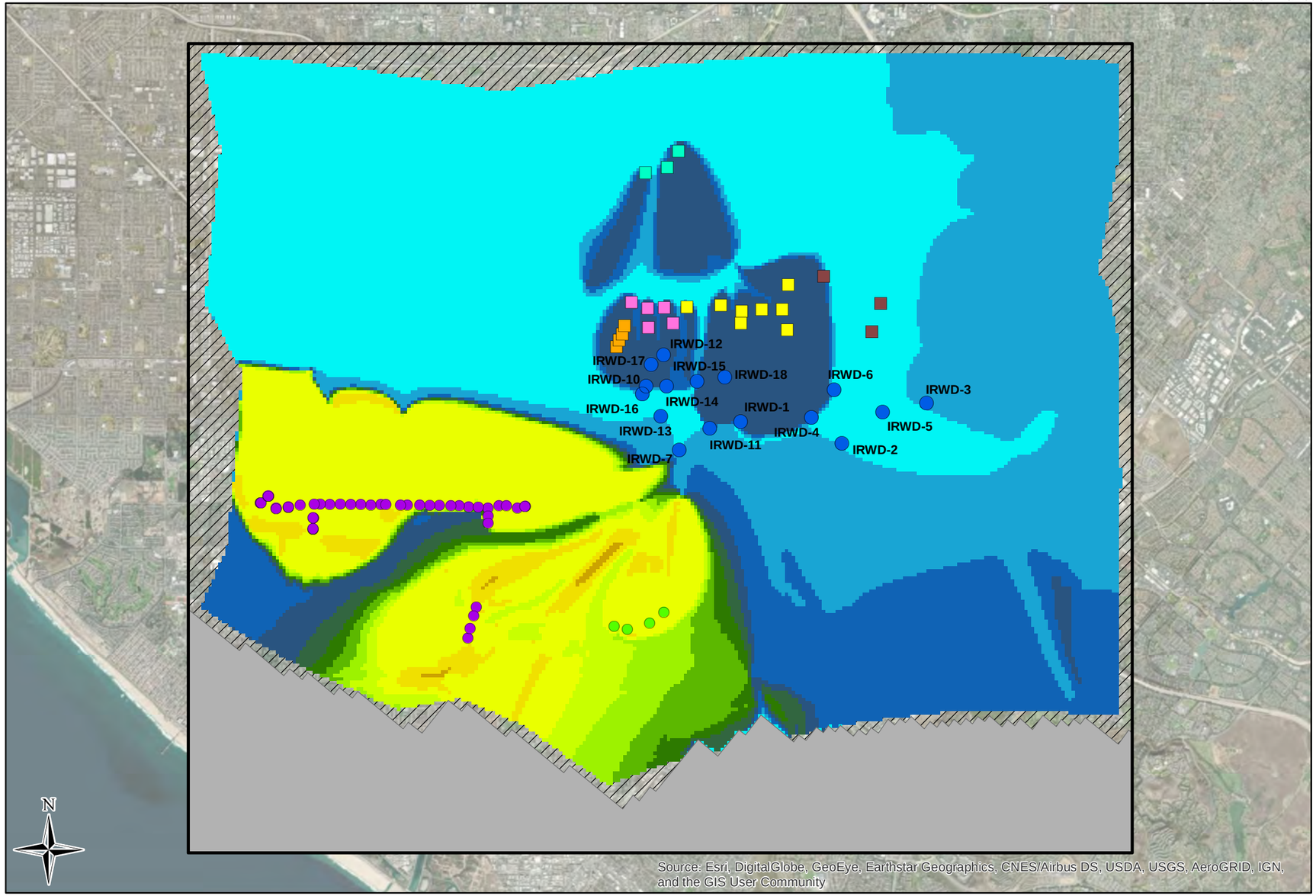
Model-Predicted Chloride Concentrations in 2070 Scenario 3a

Figure 39b

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

Boron Concentration (mg/L)

- 0 to 0.1
- 0.1 to 0.2
- 0.2 t o 0.3
- 0.3 to 0.4
- 0.4 to 0.5
- 0.5 to 0.6
- 0.6 to 0.7
- 0.7 to 0.8
- 0.8 to 0.9
- 0.9 to 1.0
- 1.0 to 1.1
- 1.1 to 1.2
- 1.2 to 1.3
- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

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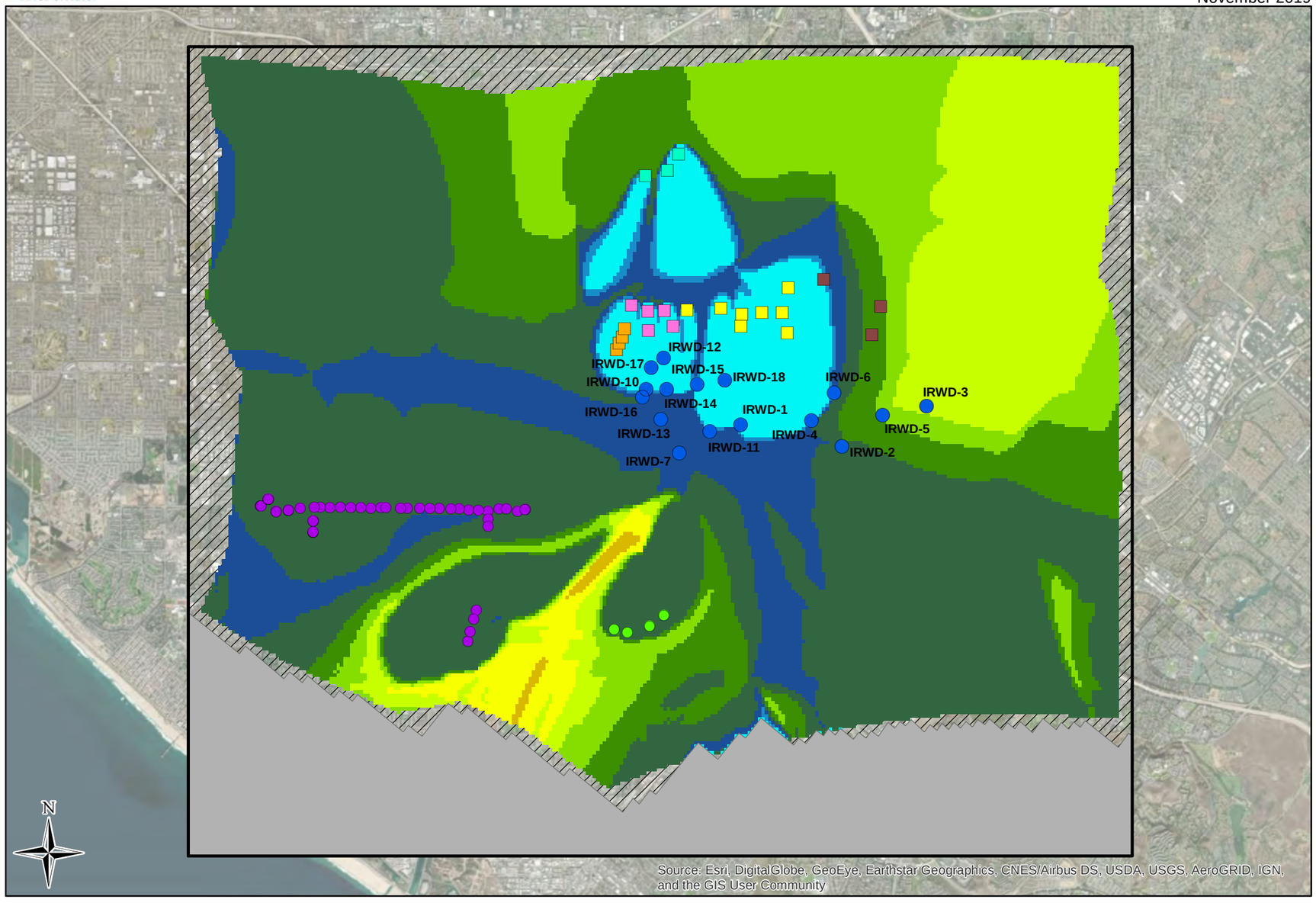
Model-Predicted Boron Concentrations in 2070 Scenario 3a

Figure 39c

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

TDS Concentration (mg/L)
- 0 to 100
- 100 to 200
- 200 to 300
- 300 to 400
- 400 to 500
- 500 to 600
- 600 to 700
- 700 to 800
- 800 to 900
- 900 to 1,000
- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

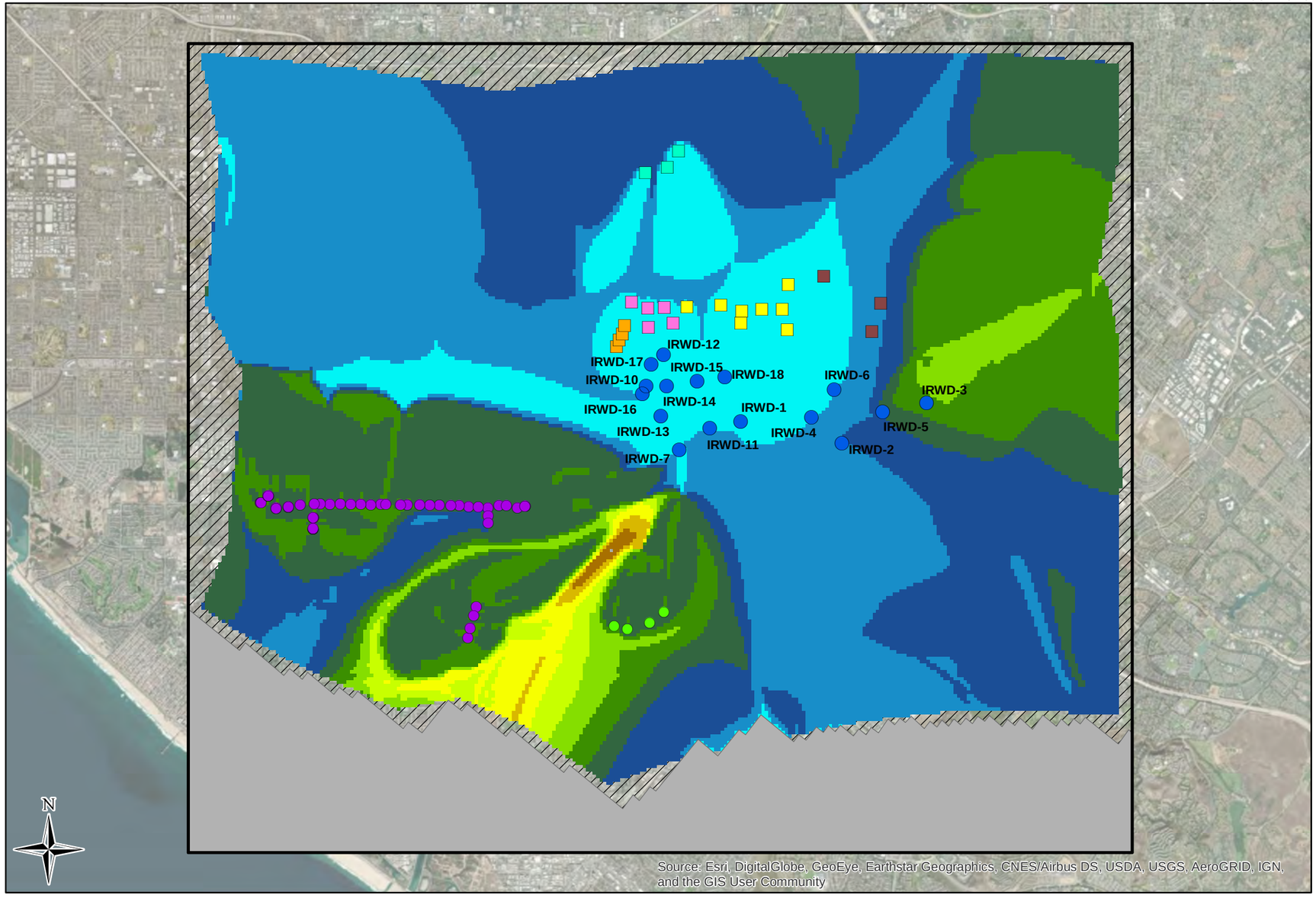
Model-Predicted TDS Concentrations in 2070 Scenario 4a

Figure 40a

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



NAD 83 State Plane Zone 6

Map Features

Chloride Concentration (mg/L)
- 0 to 25
- 25 to 50
- 50 to 75
- 75 to 100
- 100 to 125
- 125 to 150
- 150 to 175
- 175 to 200
- 200 to 225
- 225 to 250
- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

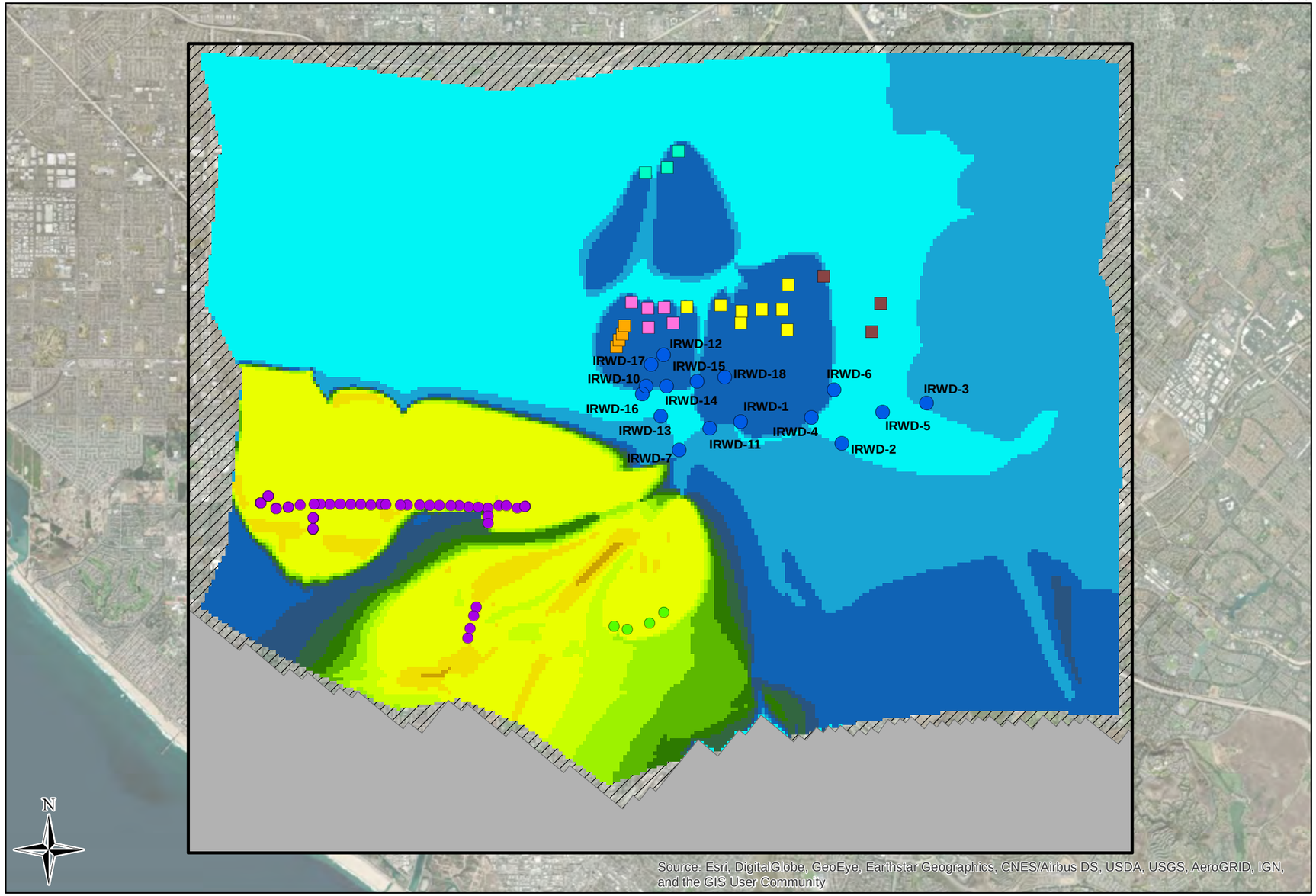
Thomas Harder & Co. Groundwater Consulting

Model-Predicted Chloride Concentrations in 2070 Scenario 4a

Figure 40b

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

Boron Concentration (mg/L)
- 0 to 0.1
- 0.1 to 0.2
- 0.2 to 0.3
- 0.3 to 0.4
- 0.4 to 0.5
- 0.5 to 0.6
- 0.6 to 0.7
- 0.7 to 0.8
- 0.8 to 0.9
- 0.9 to 1.0
- 1.0 to 1.1
- 1.1 to 1.2
- 1.2 to 1.3

Campesino Injection Well
Mid-Basin Injection Well
Dyer Road Well Field Injection Well
Dyer Road Well Field Injection Well (Standby)
SAR Injection Well
Talbert Injection Well
Southeast Talbert Injection Well
Dyer Road Well Field Extraction Well
No Flow Zone
Active Model Domain Outside of Boundary Conditions
Model Domain

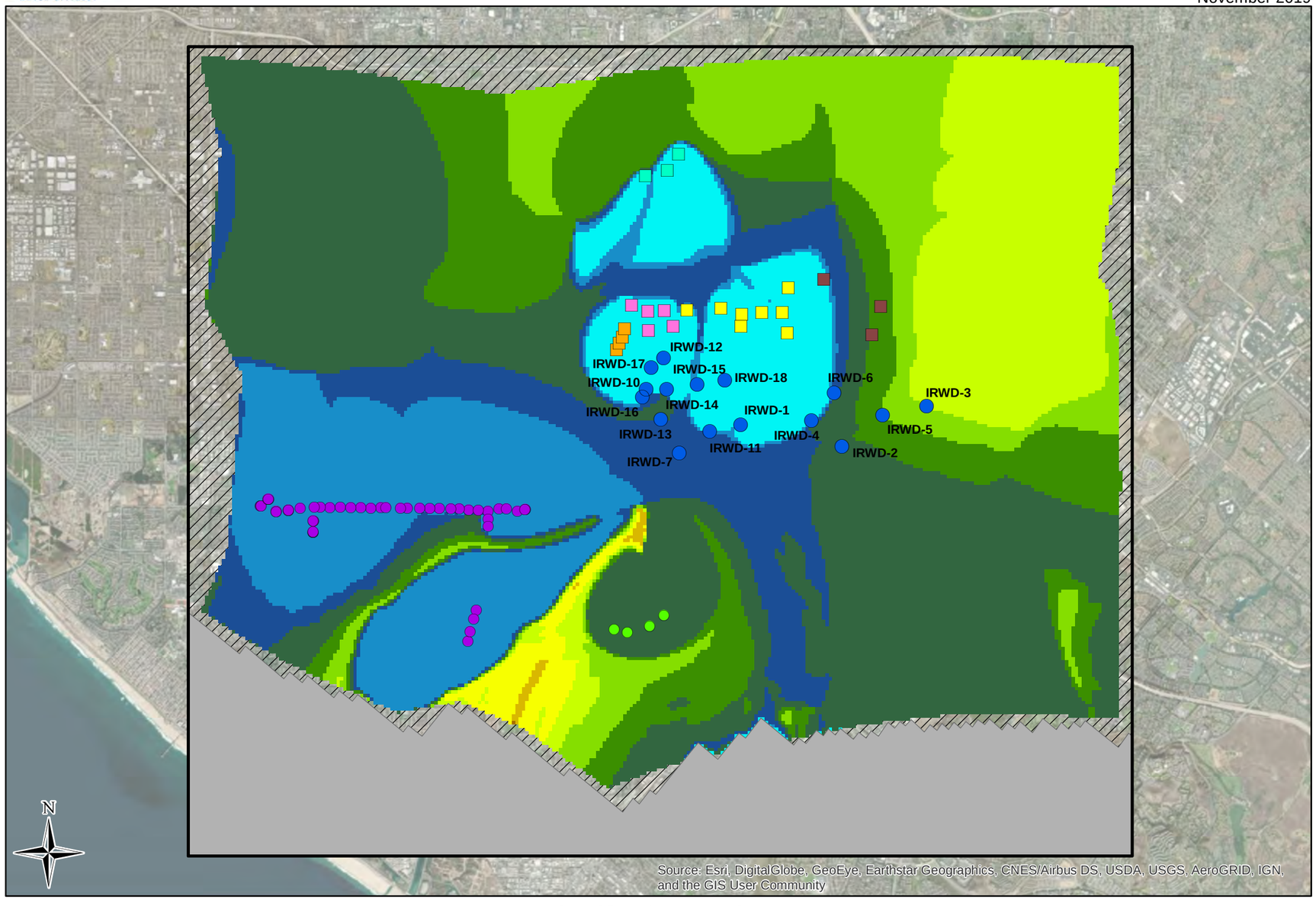
Model-Predicted Boron Concentrations in 2070 Scenario 4a

Figure 40c

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

TDS Concentration (mg/L)
- 0 to 100
- 100 to 200
- 200 to 300
- 300 to 400
- 400 to 500
- 500 to 600
- 600 to 700
- 700 to 800
- 800 to 900
- 900 to 1,000
- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

Thomas Harder & Co. Groundwater Consulting

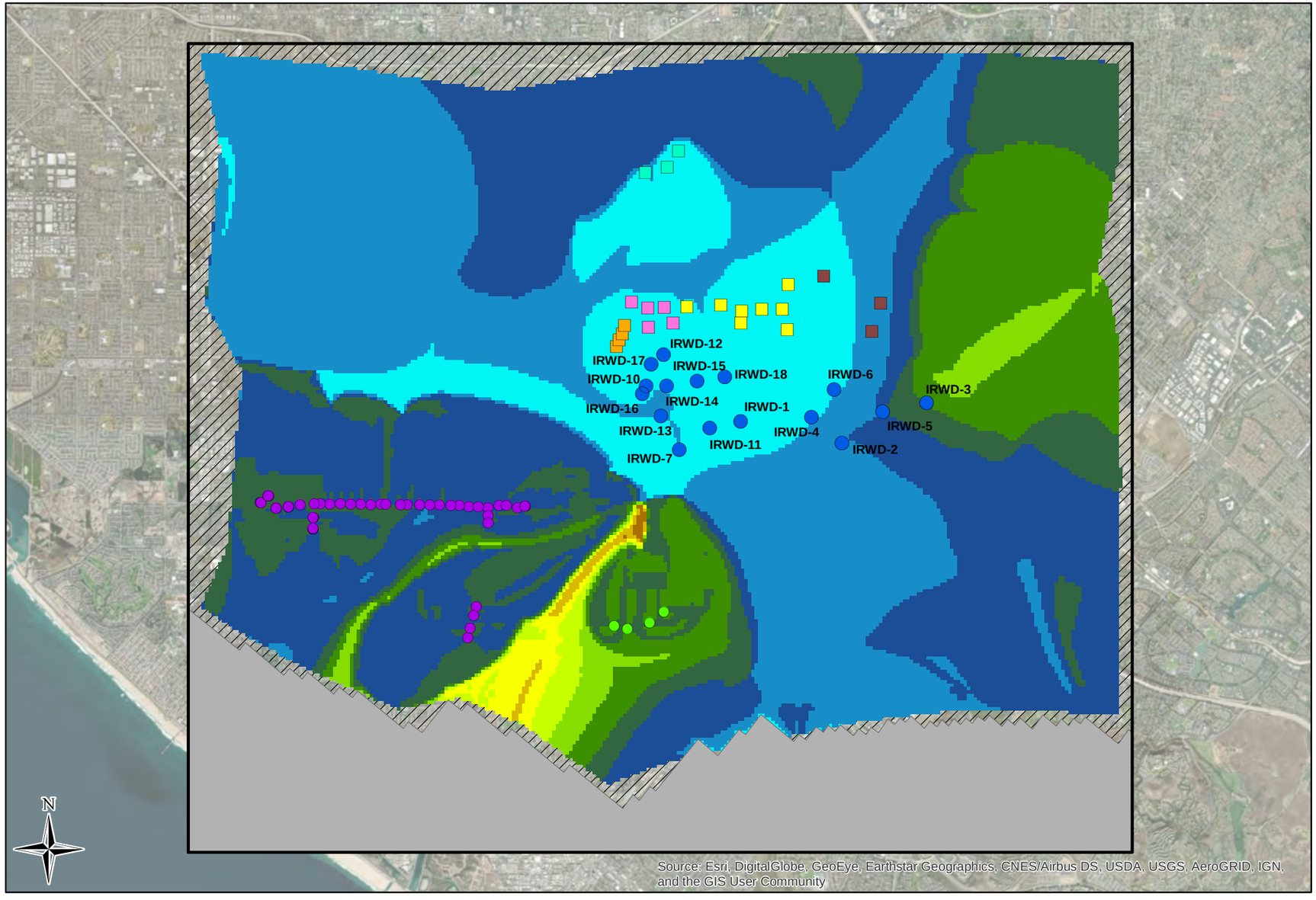
Model-Predicted TDS Concentrations in 2070 Scenario 2b

Figure 41a

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

Chloride Concentration (mg/L)

- 0 to 25
- 25 to 50
- 50 to 75
- 75 to 100
- 100 to 125
- 125 to 150
- 150 to 175
- 175 to 200
- 200 to 225
- 225 to 250
- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

Thomas Harder & Co. Groundwater Consulting

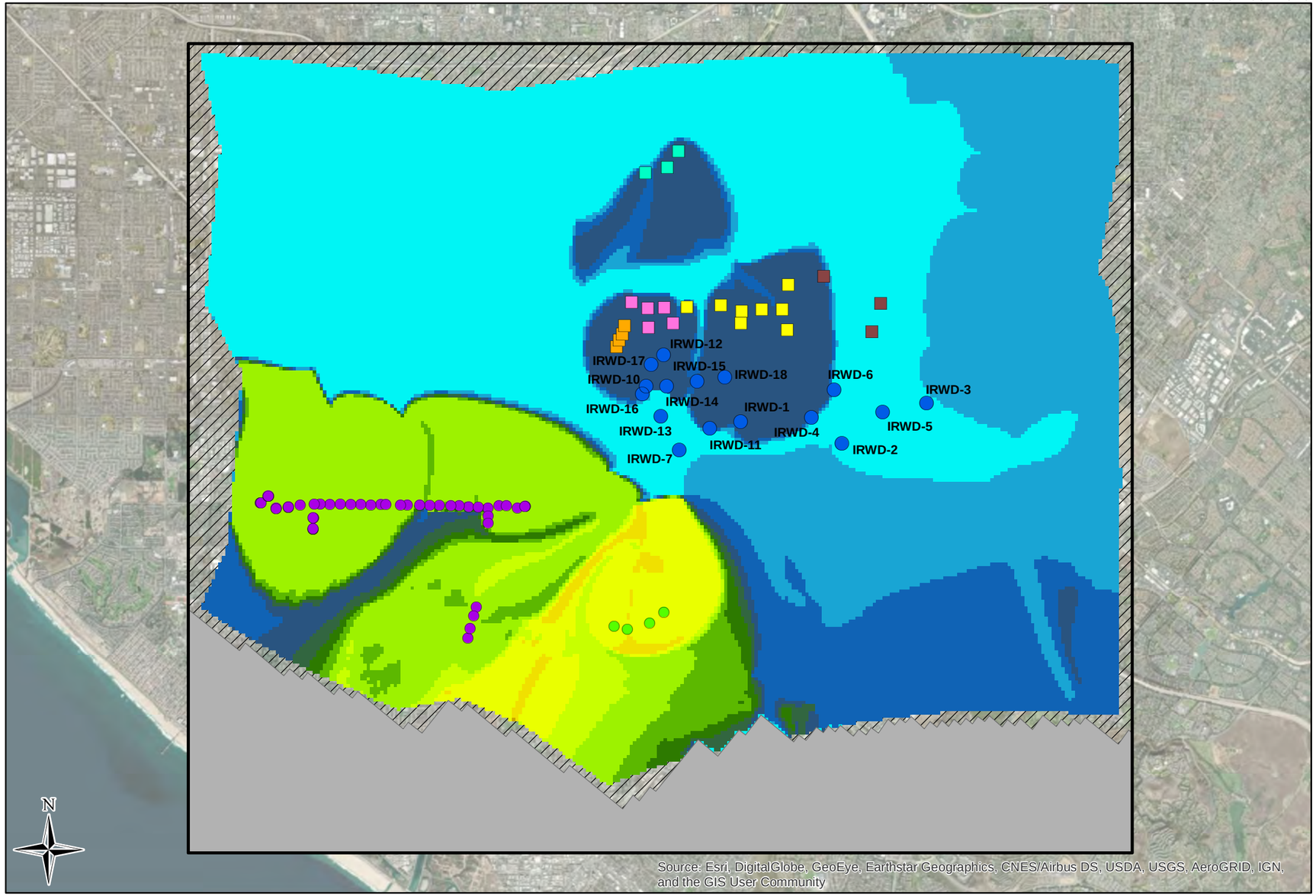
Model-Predicted Chloride Concentrations in 2070 Scenario 2b

Figure 41b

Irvine Ranch WATER DISTRICT

November 2019

Evaluation of Potential Effects of the Proposed Seawater Desalination Project



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

Boron Concentration (mg/L)
- 0 to 0.1
- 0.1 to 0.2
- 0.2 to 0.3
- 0.3 to 0.4
- 0.4 to 0.5
- 0.5 to .06
- 0.6 to 0.7
- 0.7 to 0.8
- 0.8 to 0.9
- 0.9 to 1.0
- 1.0 to 1.1
- 1.1 to 1.2
- 1.2 to 1.3

Campesino Injection Well
Mid-Basin Injection Well
Dyer Road Well Field Injection Well
Dyer Road Well Field Injection Well (Standby)
SAR Injection Well
Talbert Injection Well
Southeast Talbert Injection Well
Dyer Road Well Field Extraction Well
No Flow Zone
Active Model Domain Outside of Boundary Conditions
Model Domain

Thomas Harder & Co. Groundwater Consulting

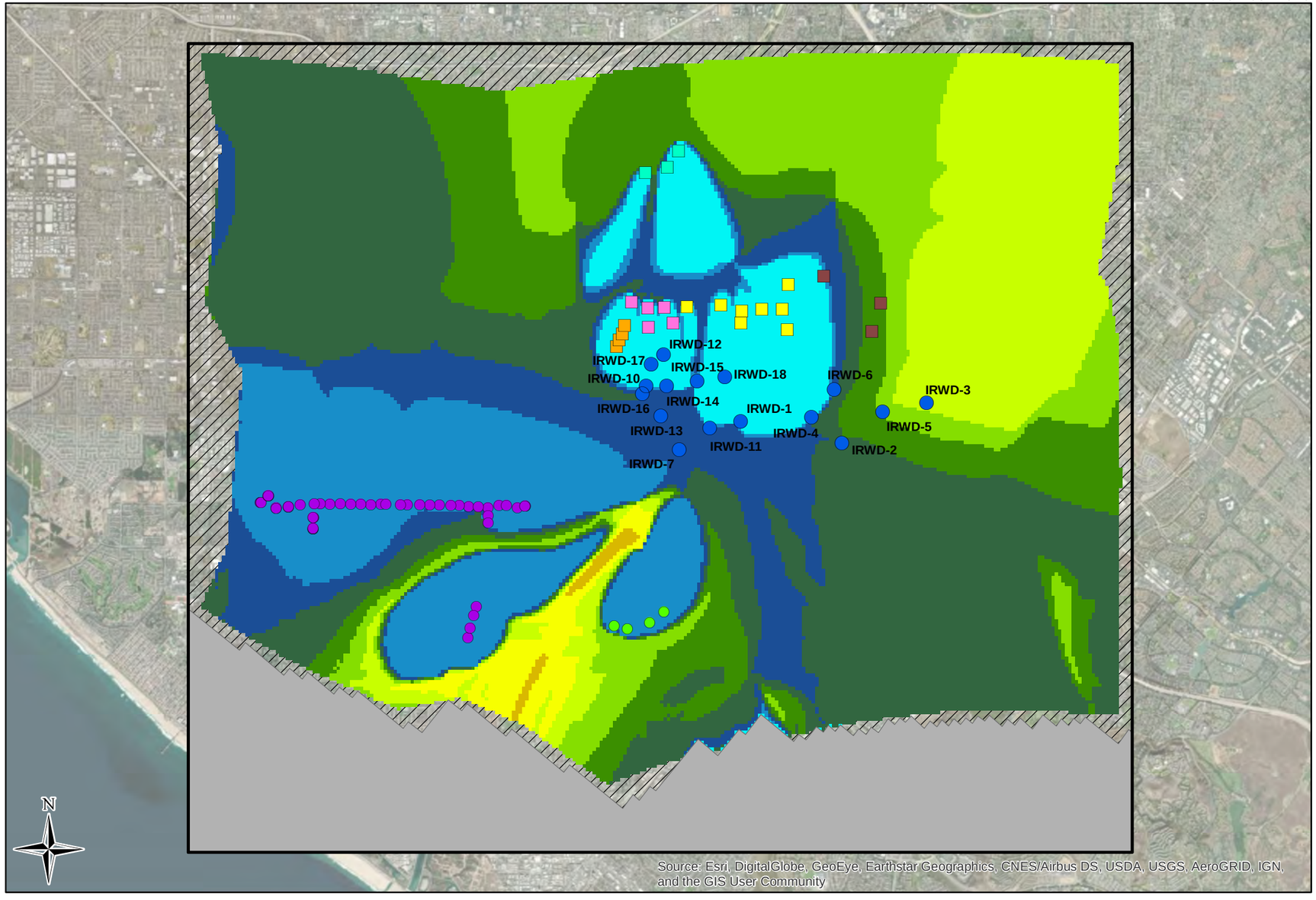
Model-Predicted Boron Concentrations in 2070 Scenario 2b

Figure 41c

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

TDS Concentration (mg/L)
- 0 to 100
- 100 to 200
- 200 to 300
- 300 to 400
- 400 to 500
- 500 to 600
- 600 to 700
- 700 to 800
- 800 to 900
- 900 to 1,000
- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

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Model-Predicted TDS Concentrations in 2070 Scenario 3b

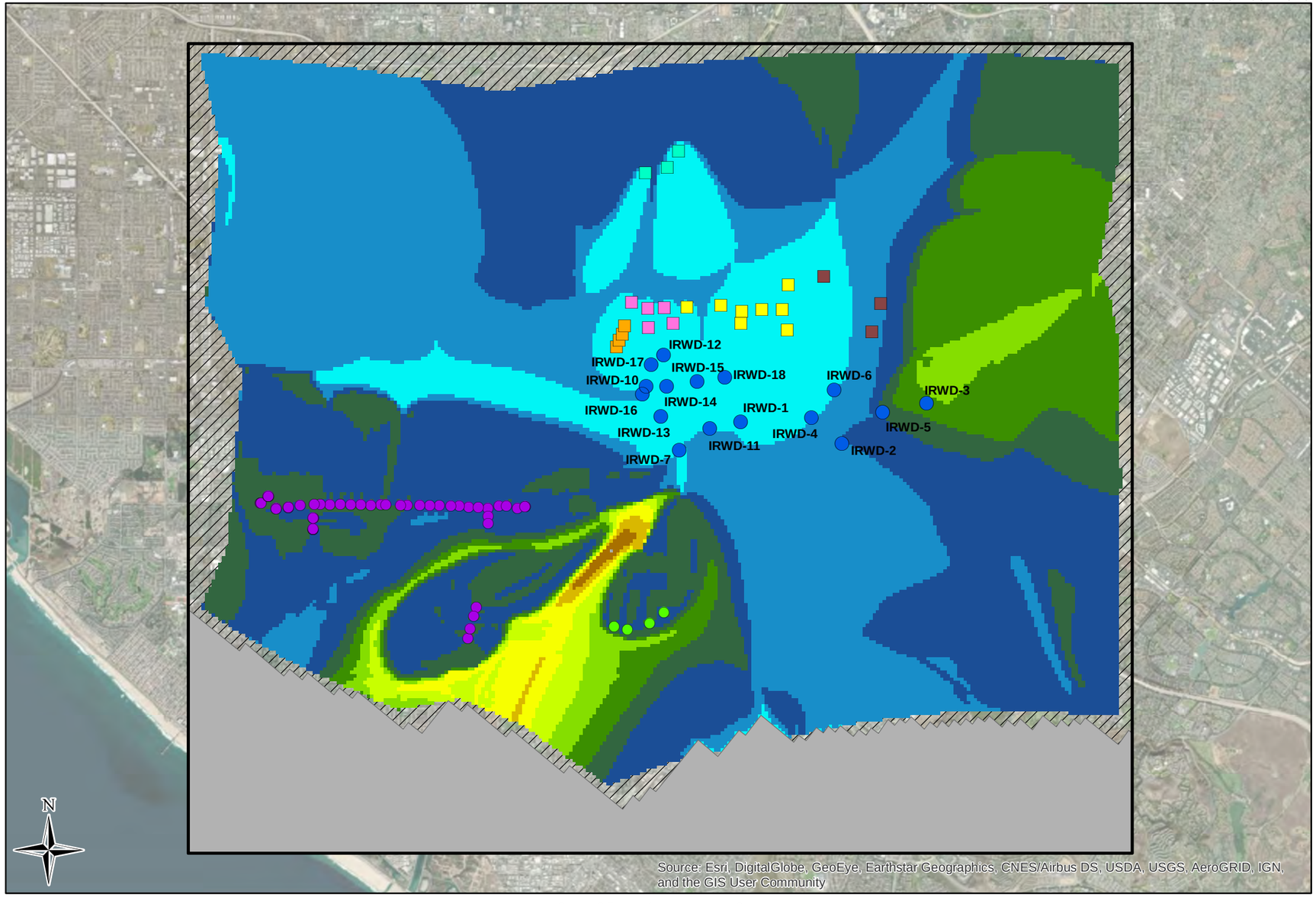
Figure 42a

Thomas Harder & Co. Groundwater Consulting

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



NAD 83 State Plane Zone 6

Map Features

Chloride Concentration (mg/L)

- 0 to 25
- 25 to 50
- 50 to 75
- 75 to 100
- 100 to 125
- 125 to 150
- 150 to 175
- 175 to 200
- 200 to 225
- 225 to 250
- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

Thomas Harder & Co. Groundwater Consulting

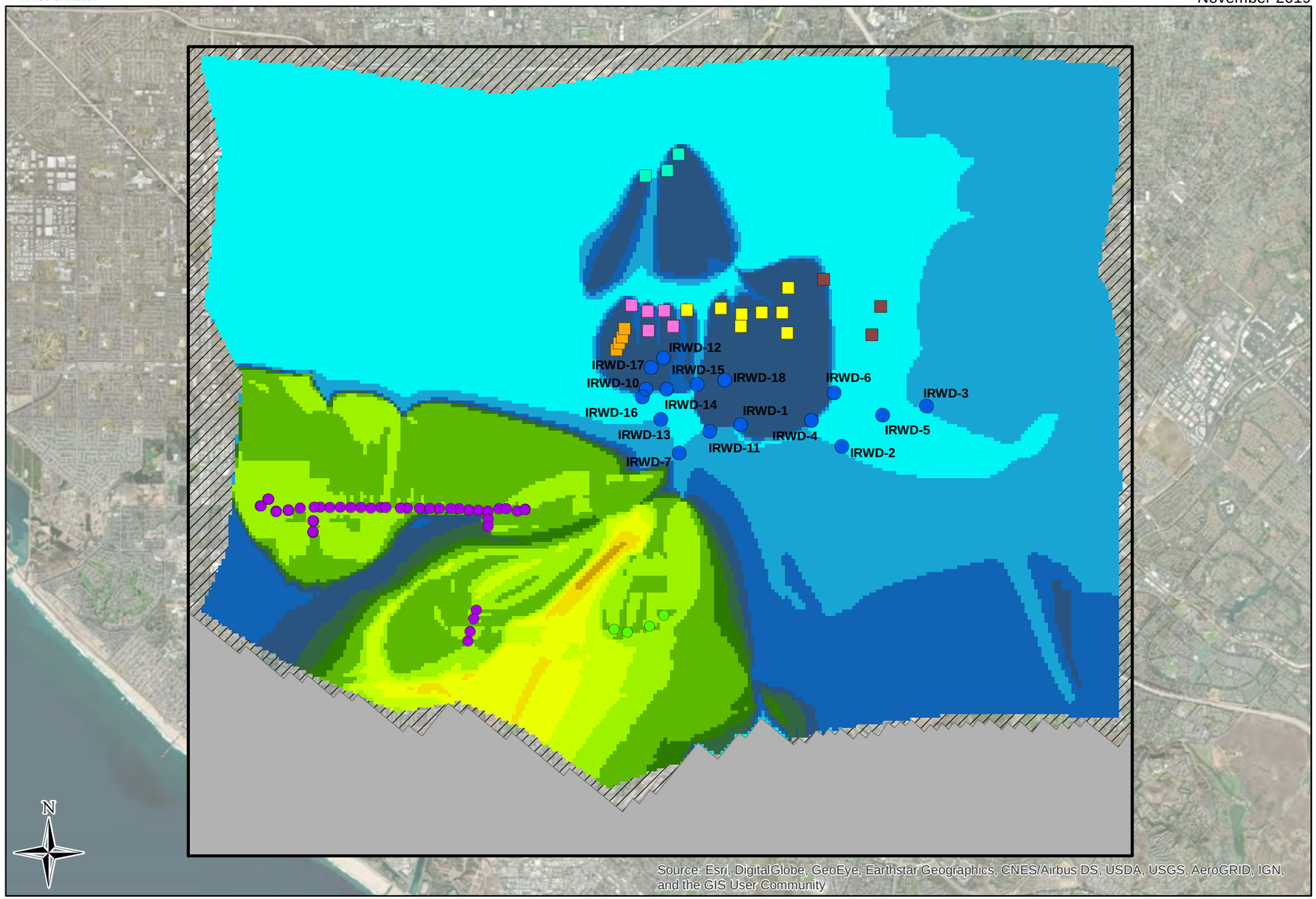
Model-Predicted Chloride Concentrations in 2070 Scenario 3b

Figure 42b

Irvine Ranch WATER DISTRICT

November 2019

Evaluation of Potential Effects of the Proposed Seawater Desalination Project



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

Boron Concentration (mg/L)
- 0 to 0.1
- 0.1 to 0.2
- 0.2 to 0.3
- 0.3 to 0.4
- 0.4 to 0.5
- 0.5 to 0.6
- 0.6 to 0.7
- 0.7 to 0.8
- 0.8 to 0.9
- 0.9 to 1.0
- 1.0 to 1.1
- 1.1 to 1.2
- 1.2 to 1.3

Campesino Injection Well
Mid-Basin Injection Well
Dyer Road Well Field Injection Well
Dyer Road Well Field Injection Well (Standby)
SAR Injection Well
Talbert Injection Well
Southeast Talbert Injection Well
Dyer Road Well Field Extraction Well
No Flow Zone
Active Model Domain Outside of Boundary Conditions
Model Domain

Model-Predicted Boron Concentrations in 2070 Scenario 3b

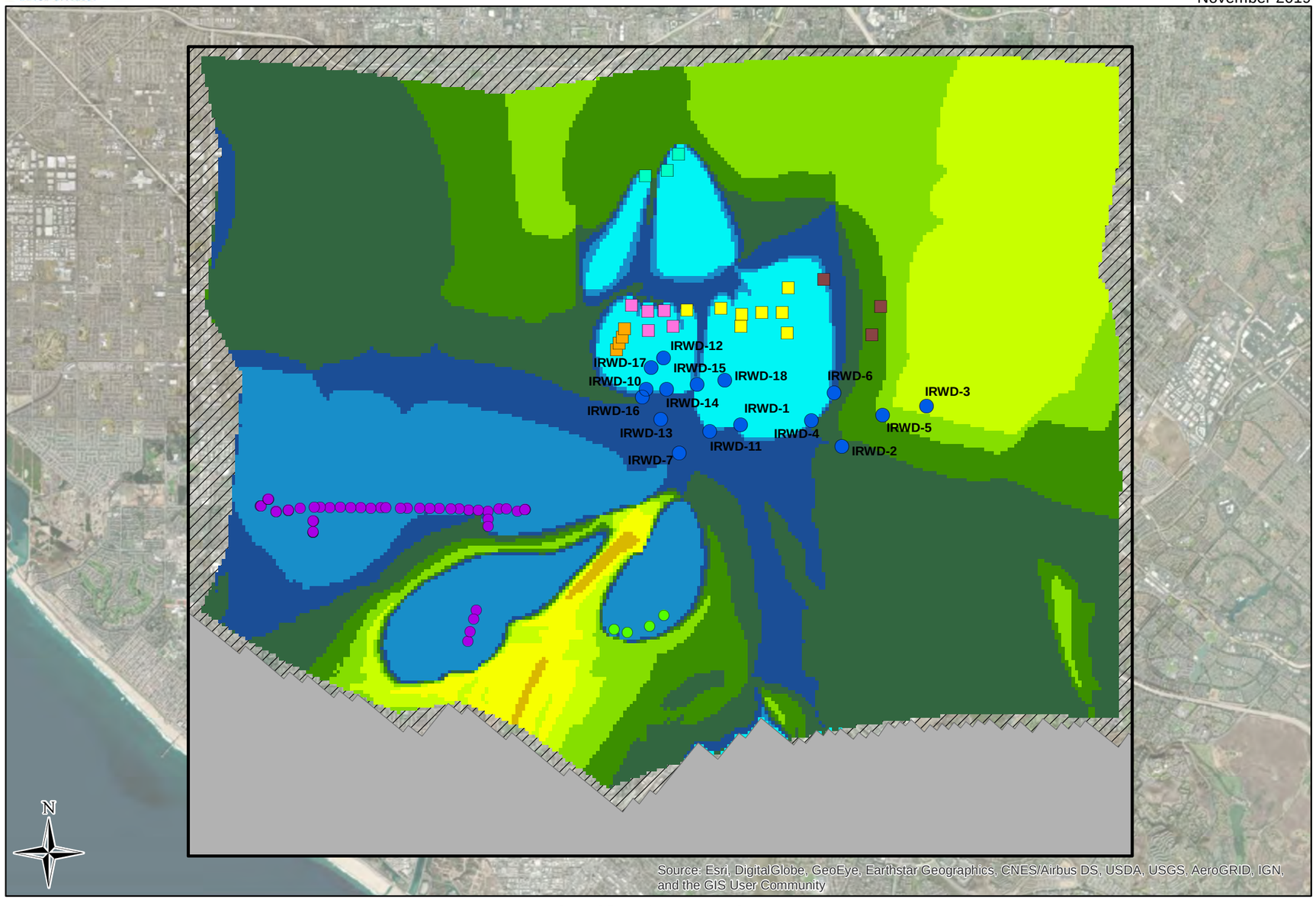
Figure 42c

Thomas Harder & Co. Groundwater Consulting

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

TDS Concentration (mg/L)
- 0 to 100
- 100 to 200
- 200 to 300
- 300 to 400
- 400 to 500
- 500 to 600
- 600 to 700
- 700 to 800
- 800 to 900
- 900 to 1,000
- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

Thomas Harder & Co. Groundwater Consulting

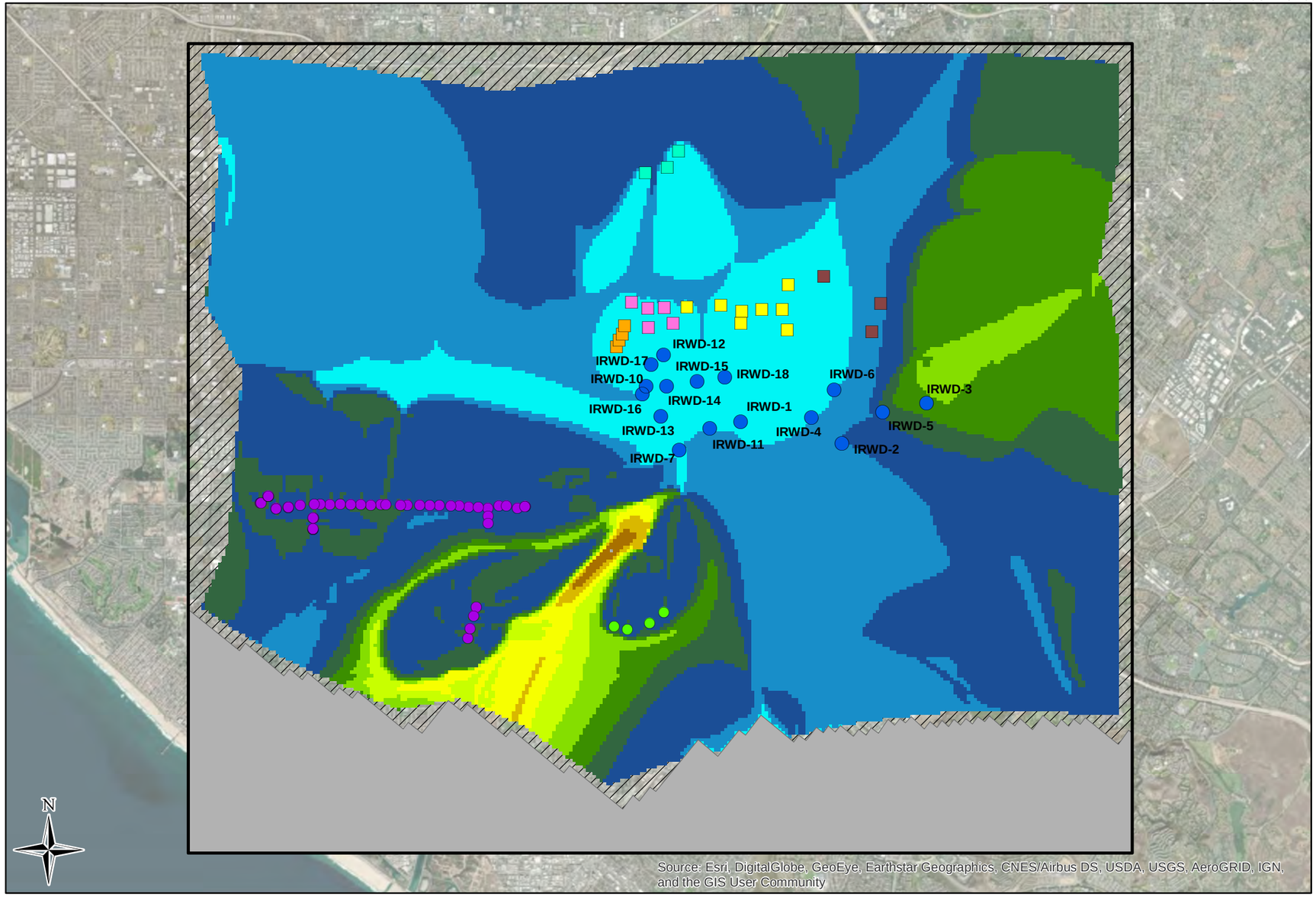
Model-Predicted TDS Concentrations in 2070 Scenario 4b

Figure 43a

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



NAD 83 State Plane Zone 6

Map Features

Chloride Concentration (mg/L)

- 0 to 25
- 25 to 50
- 50 to 75
- 75 to 100
- 100 to 125
- 125 to 150
- 150 to 175
- 175 to 200
- 200 to 225
- 225 to 250
- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

Thomas Harder & Co. Groundwater Consulting

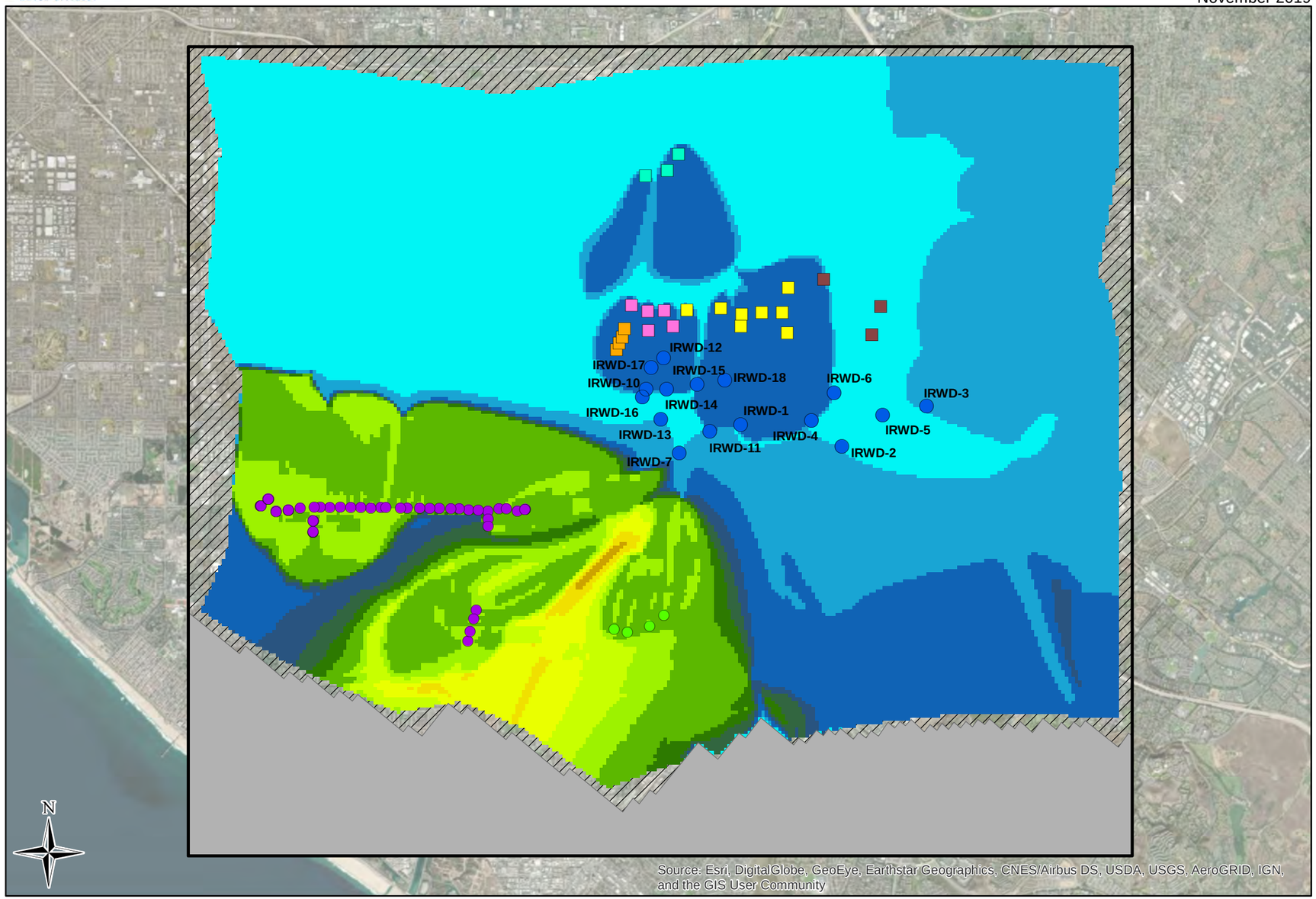
Model-Predicted Chloride Concentrations in 2070 Scenario 4b

Figure 43b

Irvine Ranch WATER DISTRICT

November 2019

Evaluation of Potential Effects of the Proposed Seawater Desalination Project



NAD 83 State Plane Zone 6

Map Features

Boron Concentration (mg/L)

- 0 to 0.1
- 0.1 to 0.2
- 0.2 to 0.3
- 0.3 to 0.4
- 0.4 to 0.5
- 0.5 to 0.6
- 0.6 to 0.7
- 0.7 to 0.8
- 0.8 to 0.9
- 0.9 to 1.0
- 1.0 to 1.1
- 1.1 to 1.2
- 1.2 to 1.3
- Campesino Injection Well
- Mid-Basin Injection Well
- Dyer Road Well Field Injection Well
- Dyer Road Well Field Injection Well (Standby)
- SAR Injection Well
- Talbert Injection Well
- Southeast Talbert Injection Well
- Dyer Road Well Field Extraction Well
- No Flow Zone
- Active Model Domain Outside of Boundary Conditions
- Model Domain

Thomas Harder & Co. Groundwater Consulting

Model-Predicted Boron Concentrations in 2070 Scenario 4b

Figure 43c

Appendices

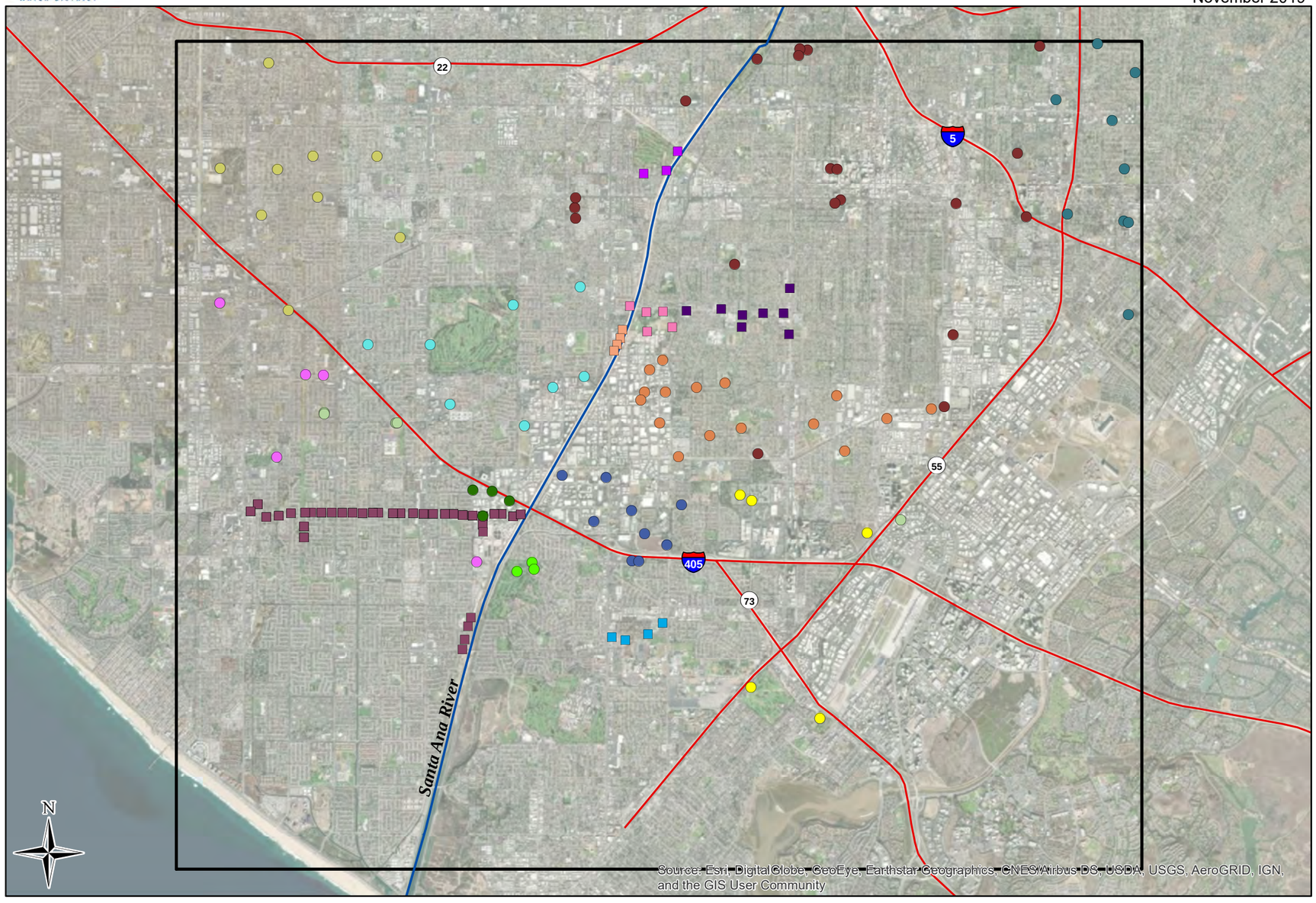
Appendix A

Model-Predicted Net Water Quality by Entity

Irvine Ranch WATER DISTRICT

Evaluation of Potential Effects of the Proposed Seawater Desalination Project

November 2019



0 0.5 1 2 Miles

NAD 83 State Plane Zone 6

Map Features

Production Wells
- Fountain Valley
- Huntington Beach
- IRWD
- Mesa Verde
- Mesa Water District
- Newport Beach
- OCWD
- Private
- Santa Ana
- Tustin
- Westminster

Injection Wells
- Campesino Park
- Dyer Road
- Mid-Basin
- Santa Ana River
- South East Talbert
- Talbert

Model Domain

Santa Ana River

Freeway

Production Well Locations

Appendix A
Figure A-1

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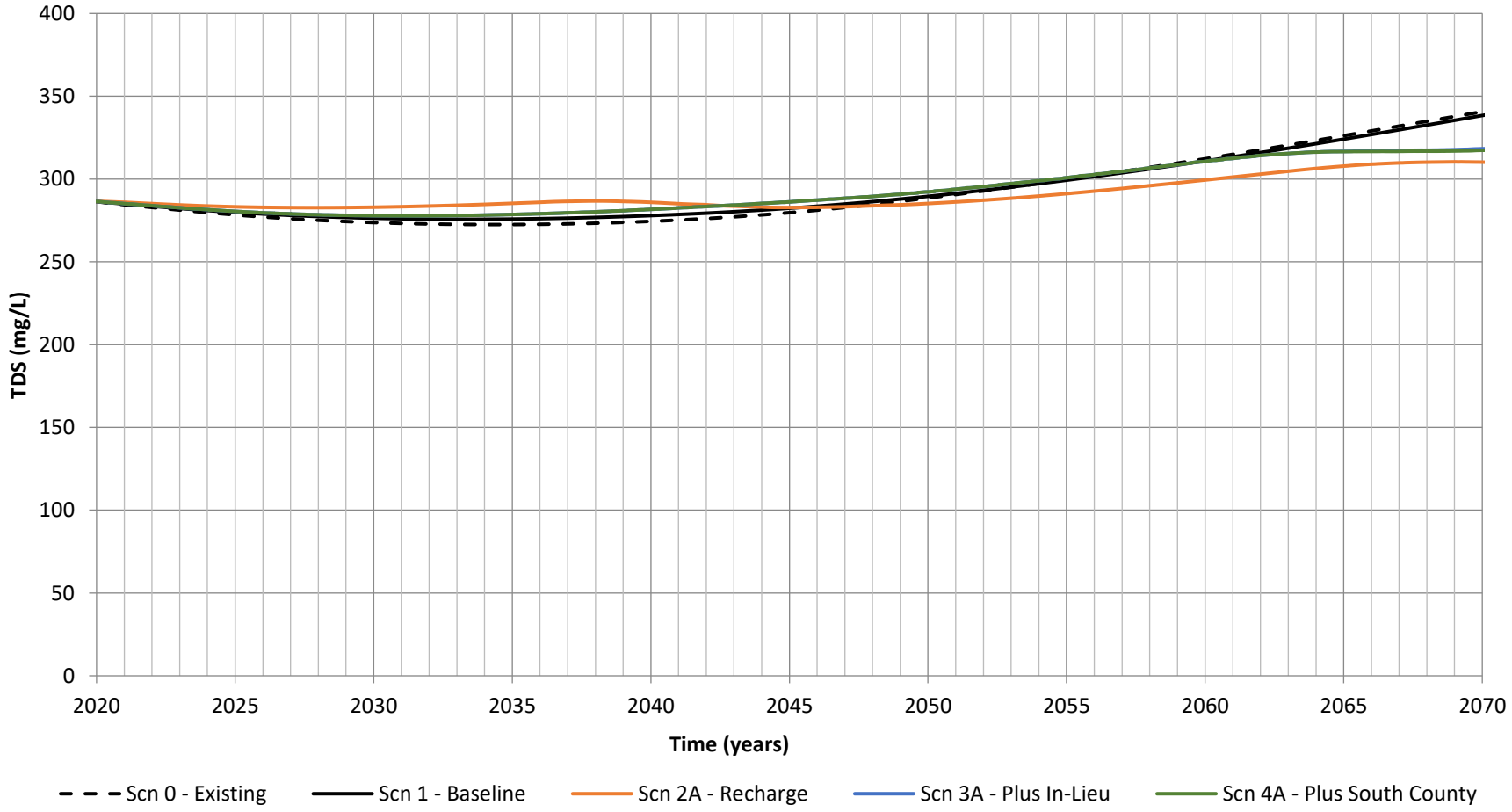
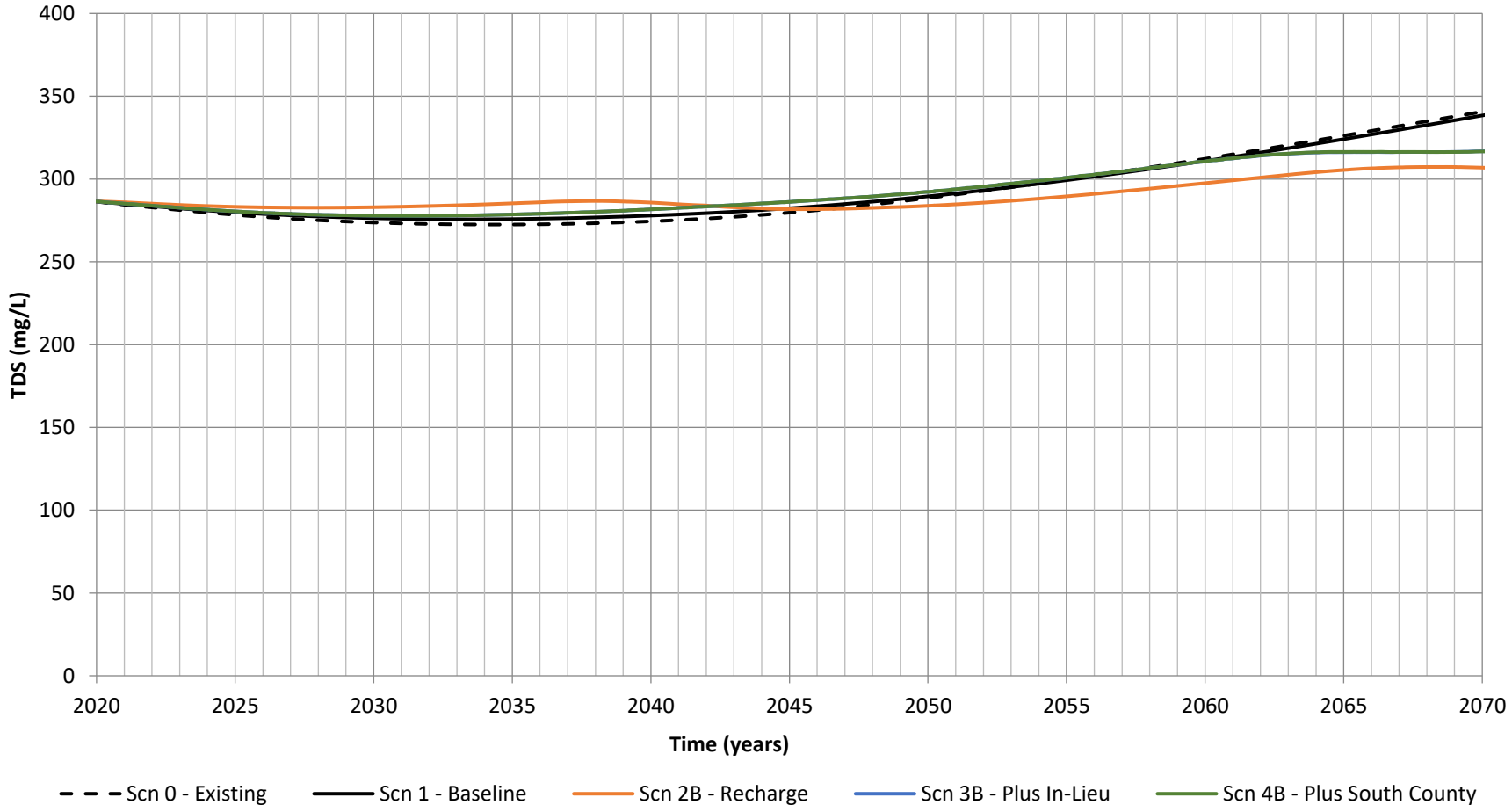
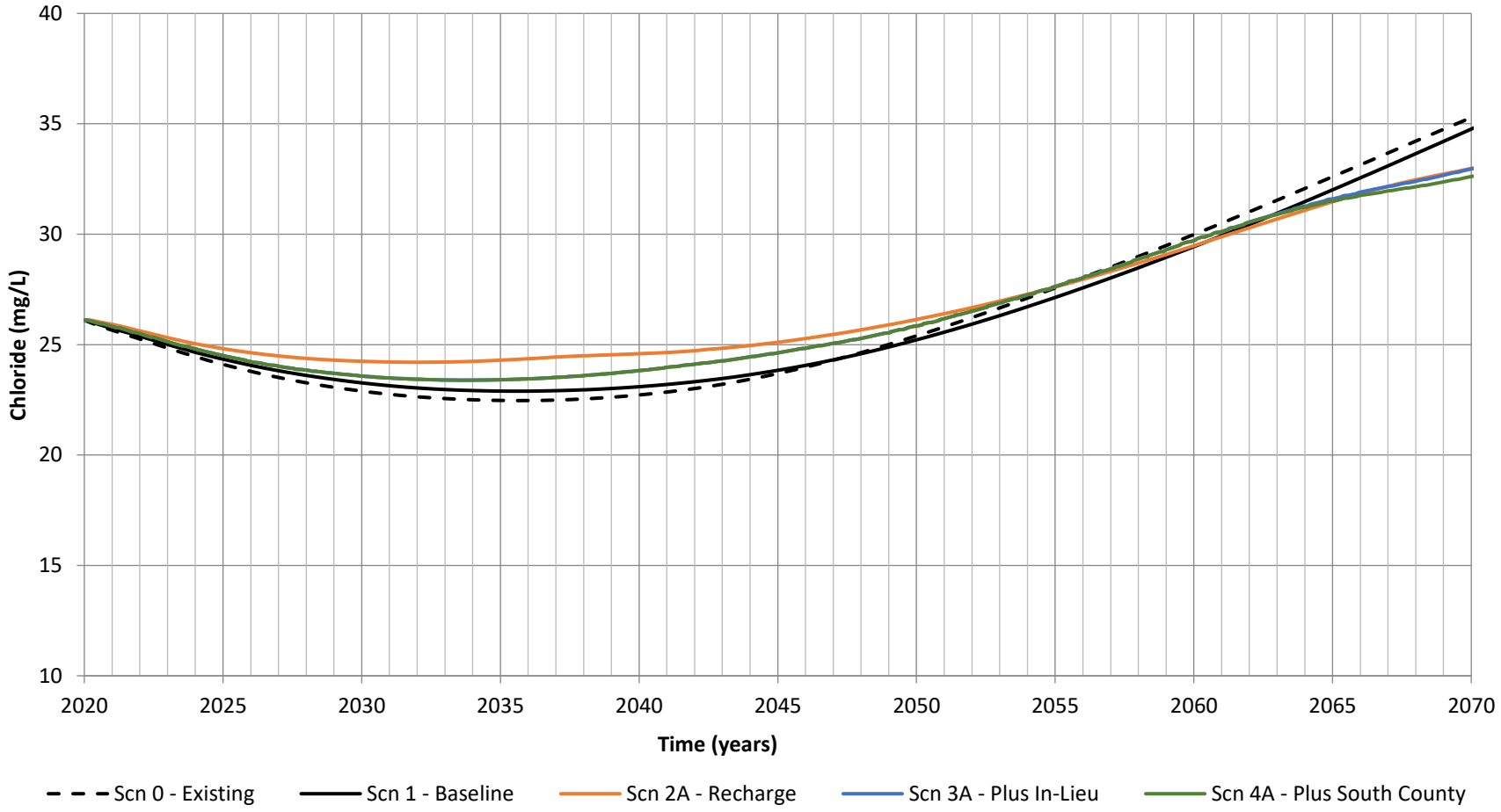
Model-Predicted Net Water Quality at the Fountain Valley Wells - Scenario 'A' TDS Concentrations



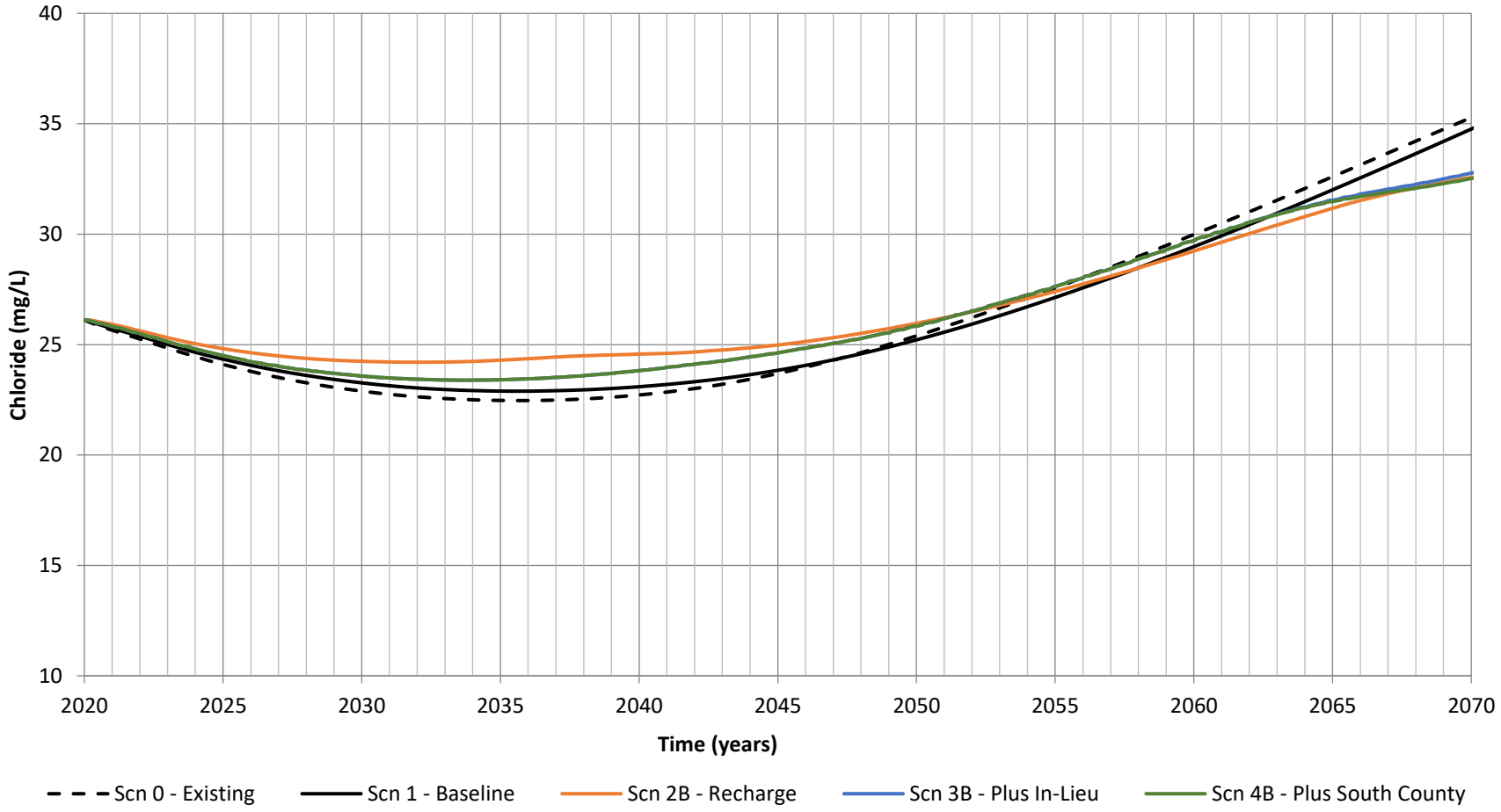
Model-Predicted Net Water Quality at the Fountain Valley Wells - Scenario 'B' TDS Concentrations



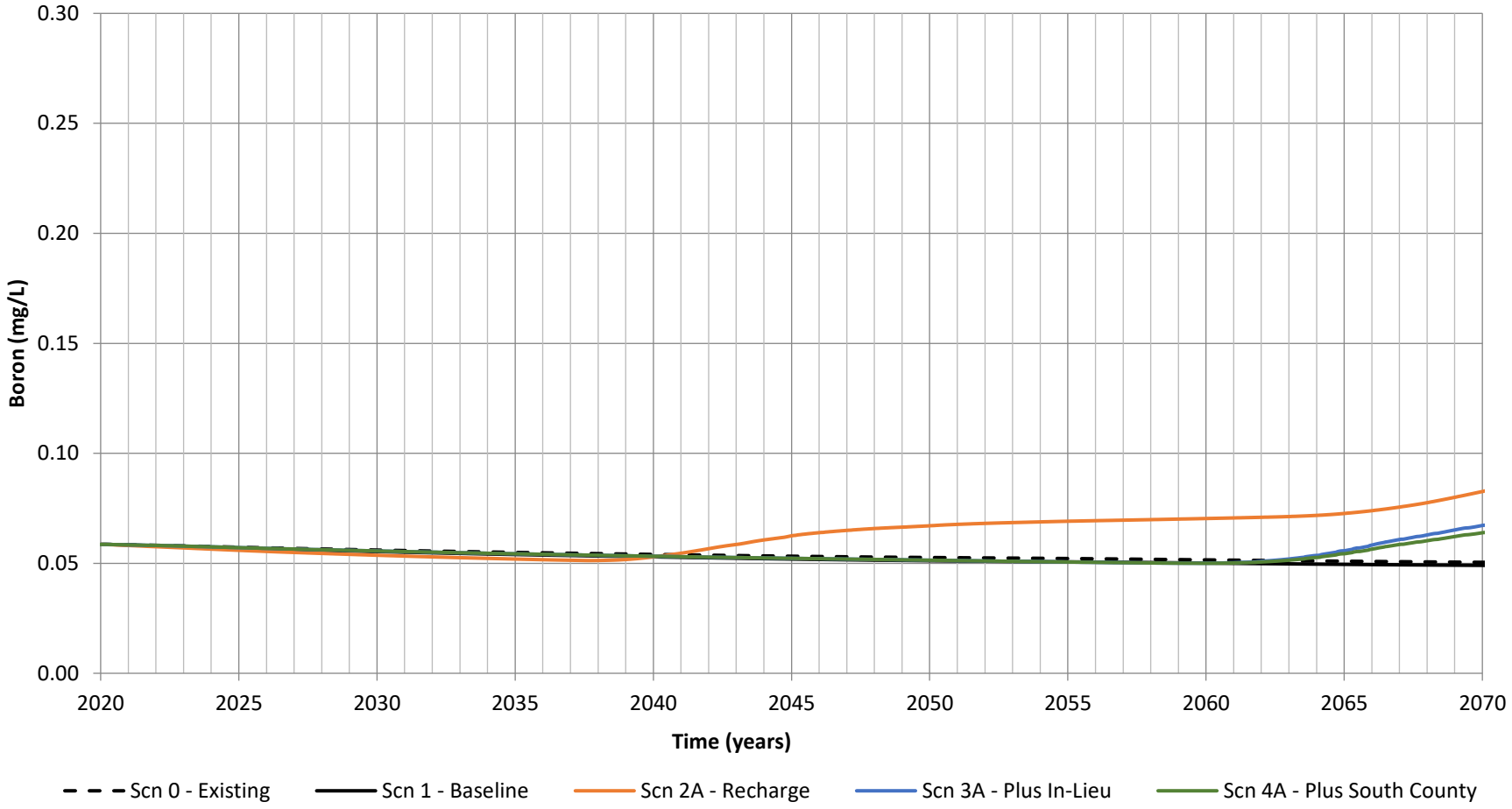
Model-Predicted Net Water Quality at the Fountain Valley Wells - Scenario 'A' Chloride Concentrations



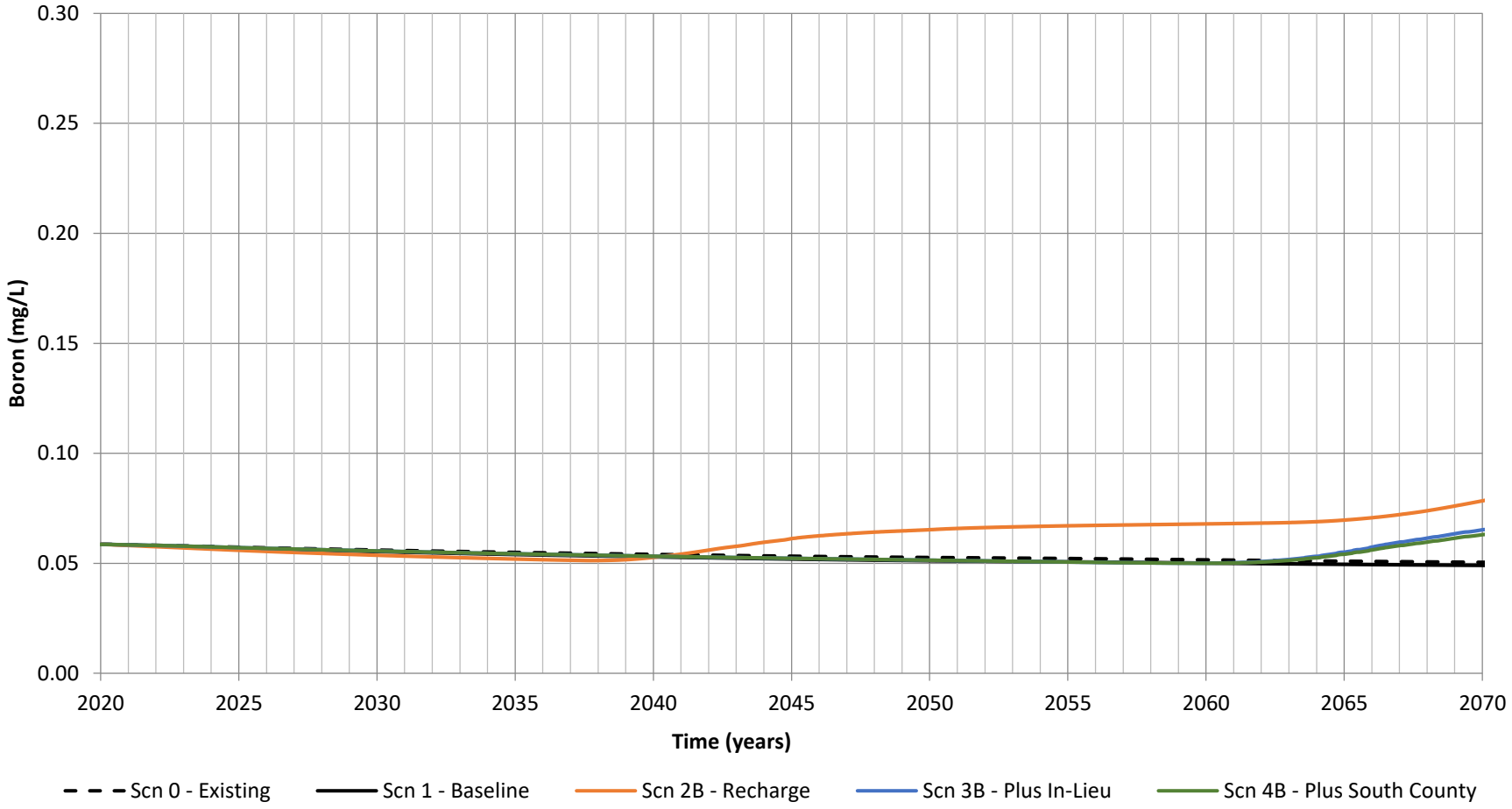
Model-Predicted Net Water Quality at the Fountain Valley Wells - Scenario 'B' Chloride Concentrations



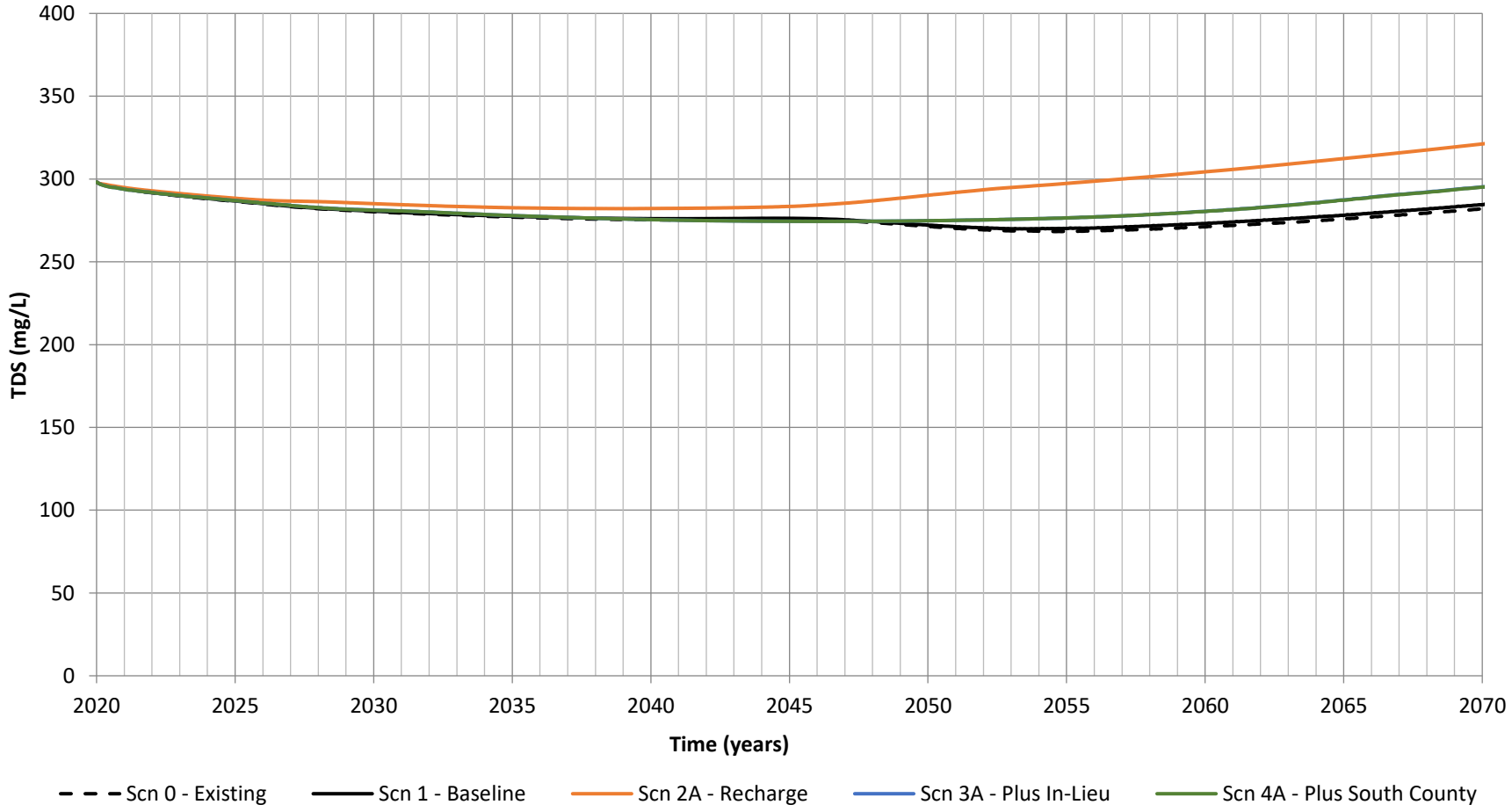
Model-Predicted Net Water Quality at the Fountain Valley Wells - Scenario 'A' Boron Concentrations



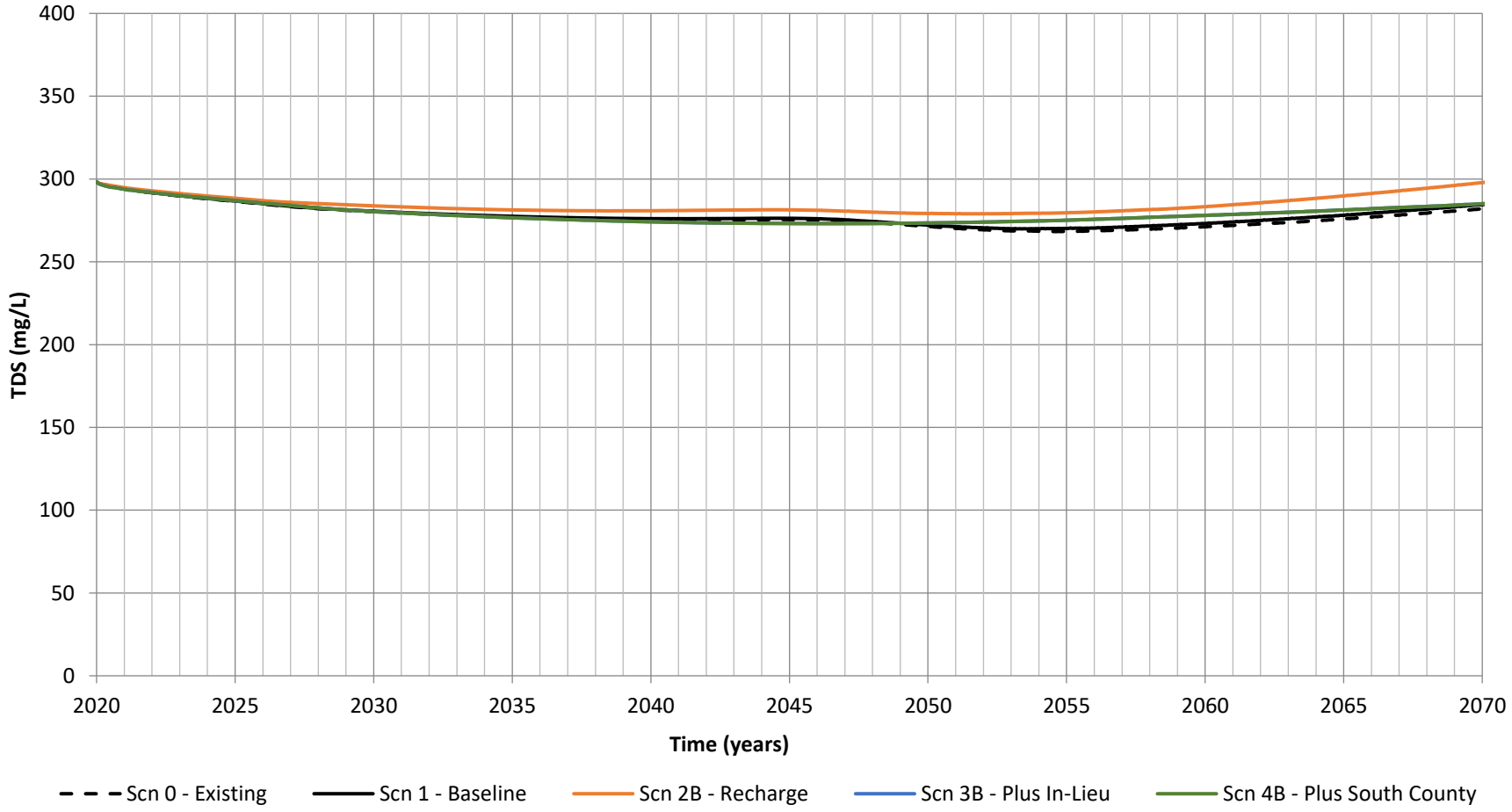
Model-Predicted Net Water Quality at the Fountain Valley Wells - Scenario 'B' Boron Concentrations



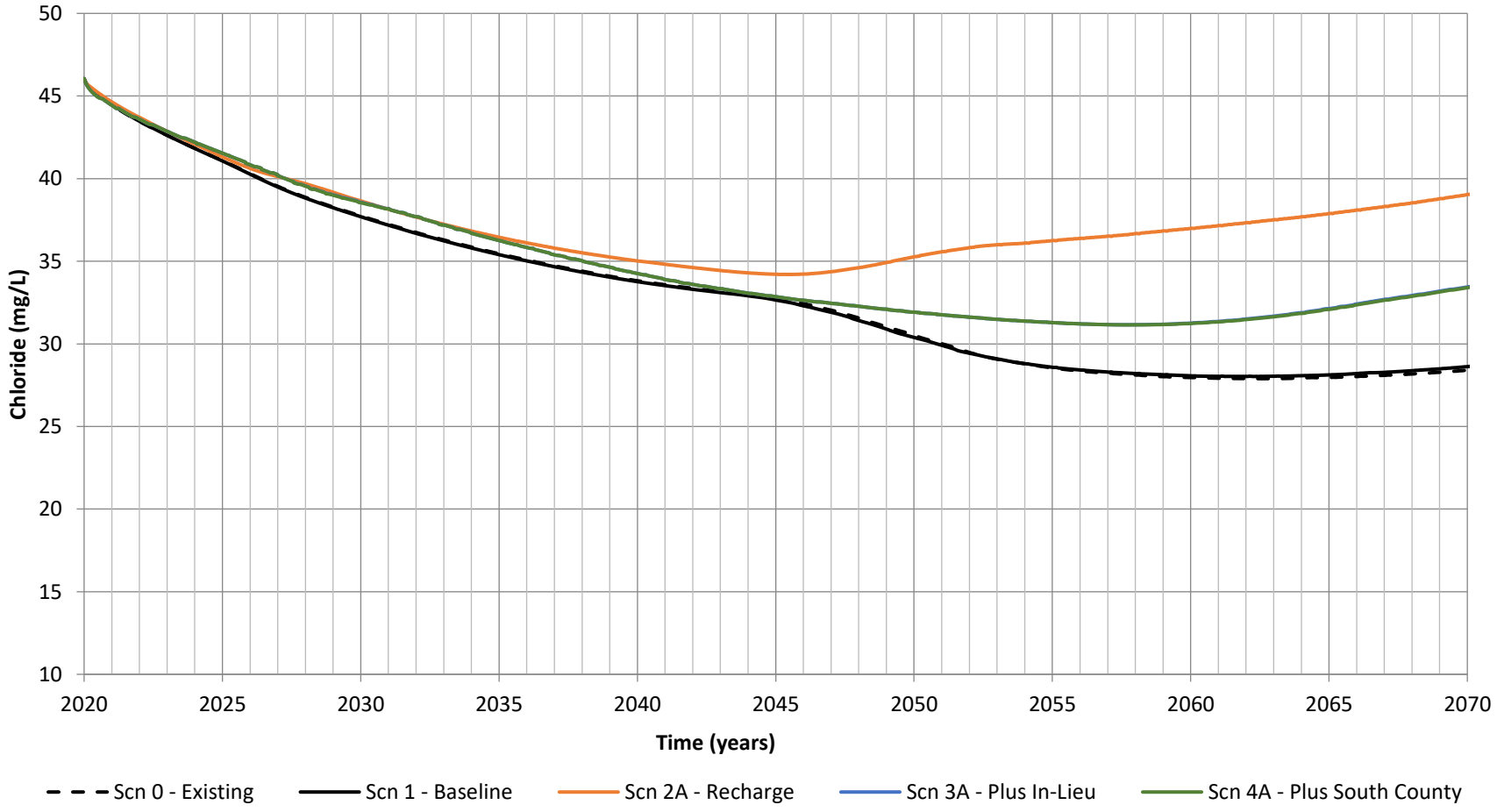
Model-Predicted Net Water Quality at the Huntington Beach Wells - Scenario 'A' TDS Concentrations



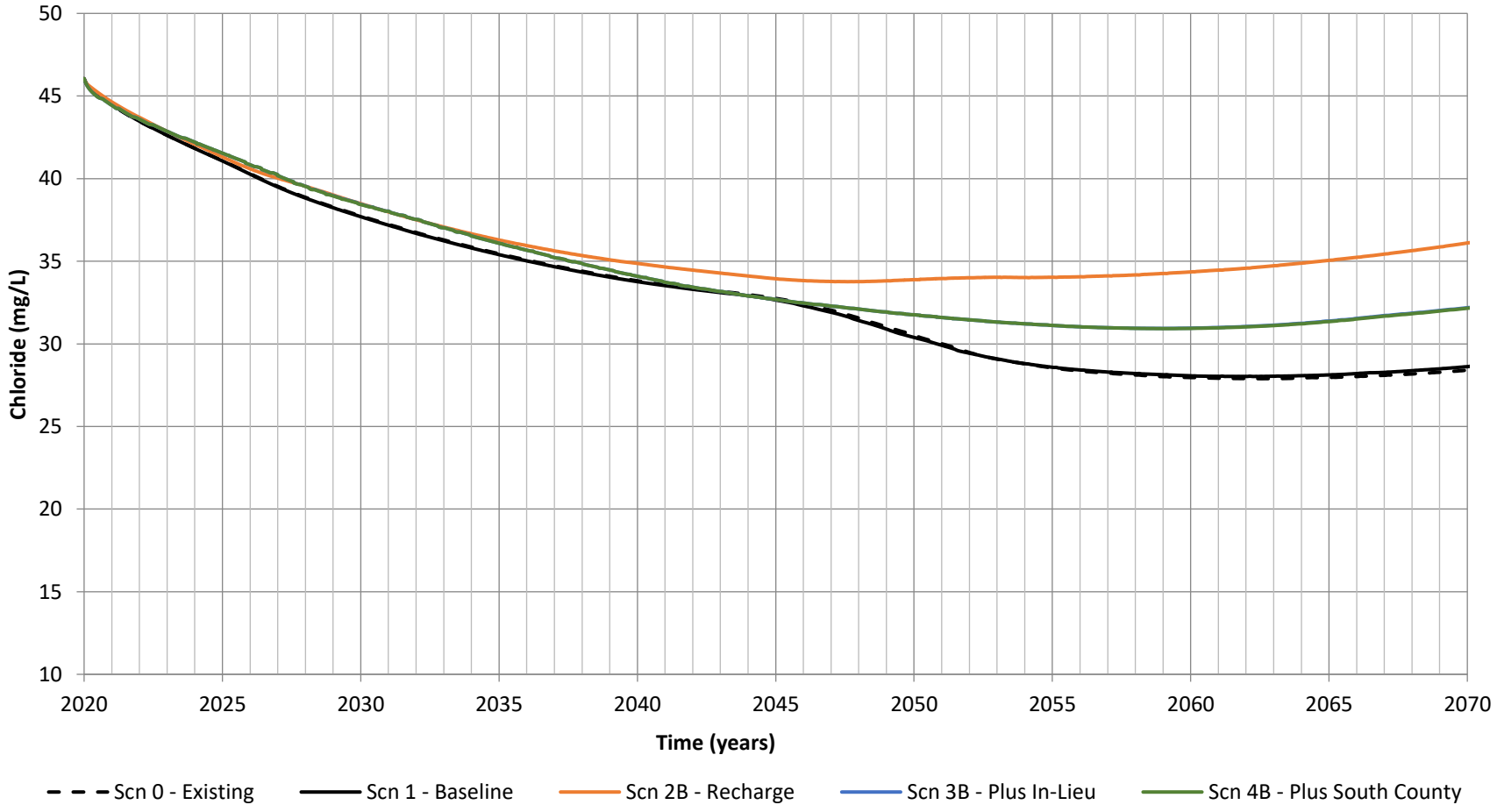
Model-Predicted Net Water Quality at the Huntington Beach Wells - Scenario 'B' TDS Concentrations



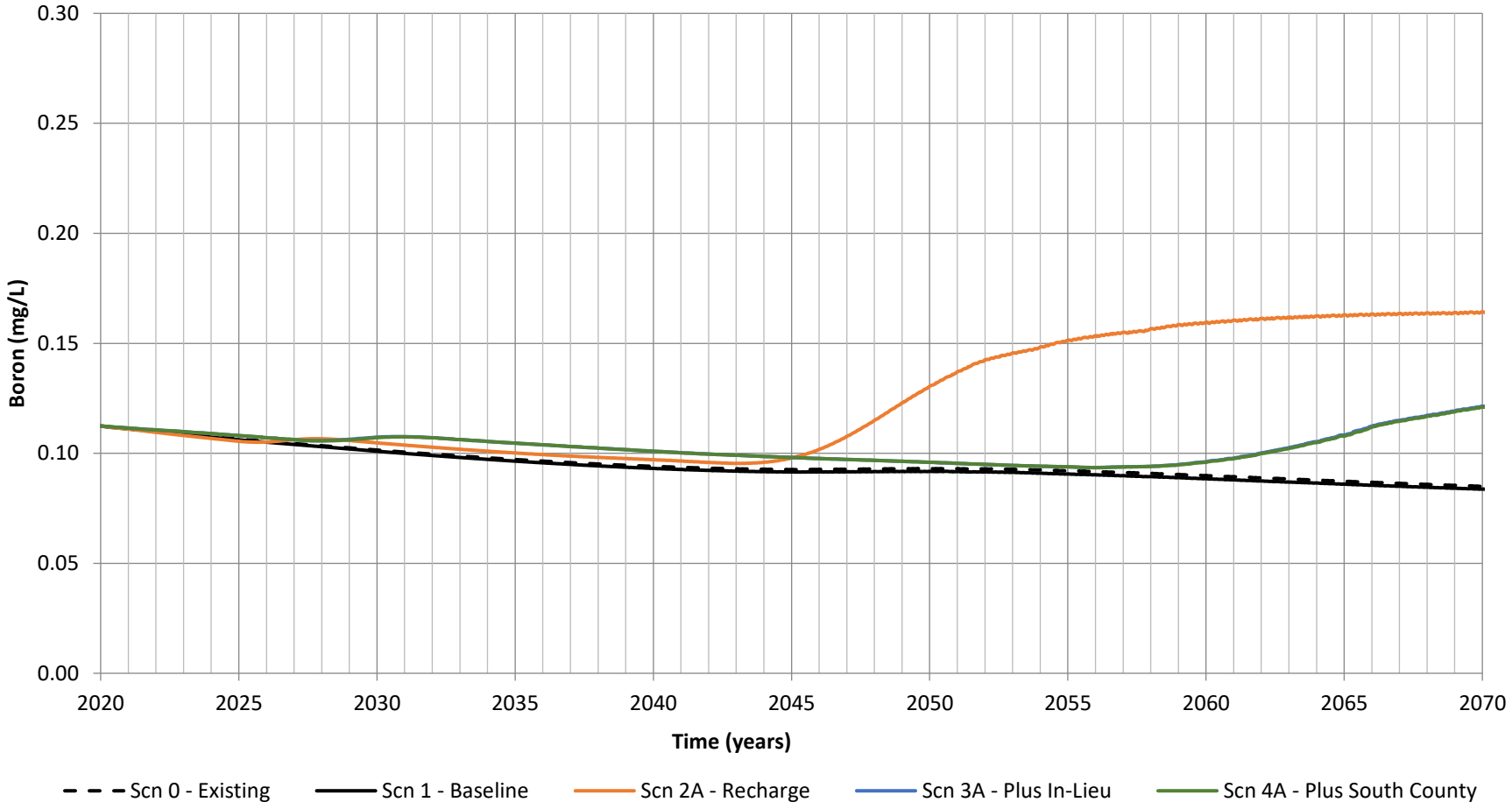
Model-Predicted Net Water Quality at the Huntington Beach Wells - Scenario 'A' Chloride Concentrations



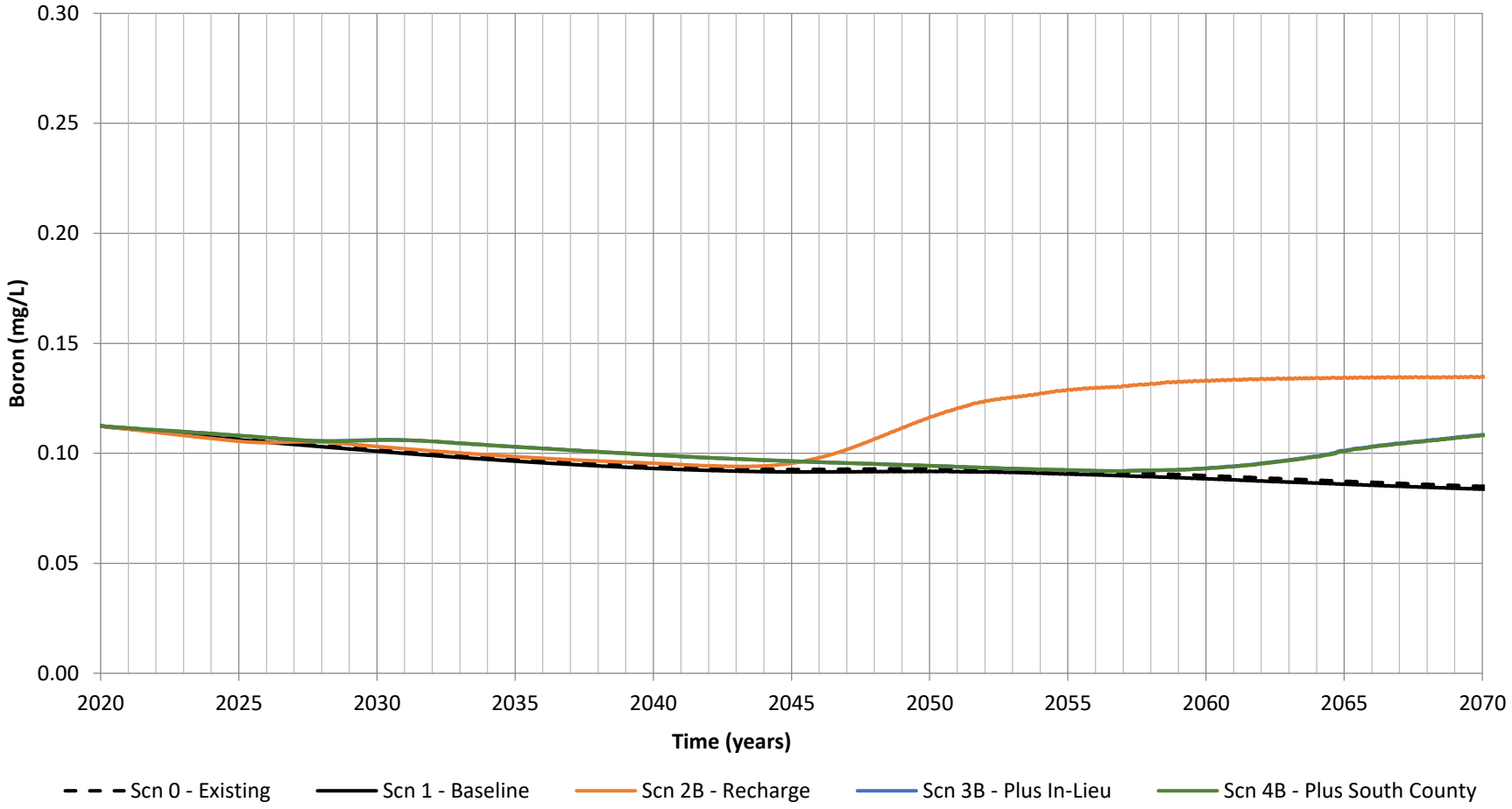
Model-Predicted Net Water Quality at the Huntington Beach Wells - Scenario 'B' Chloride Concentrations



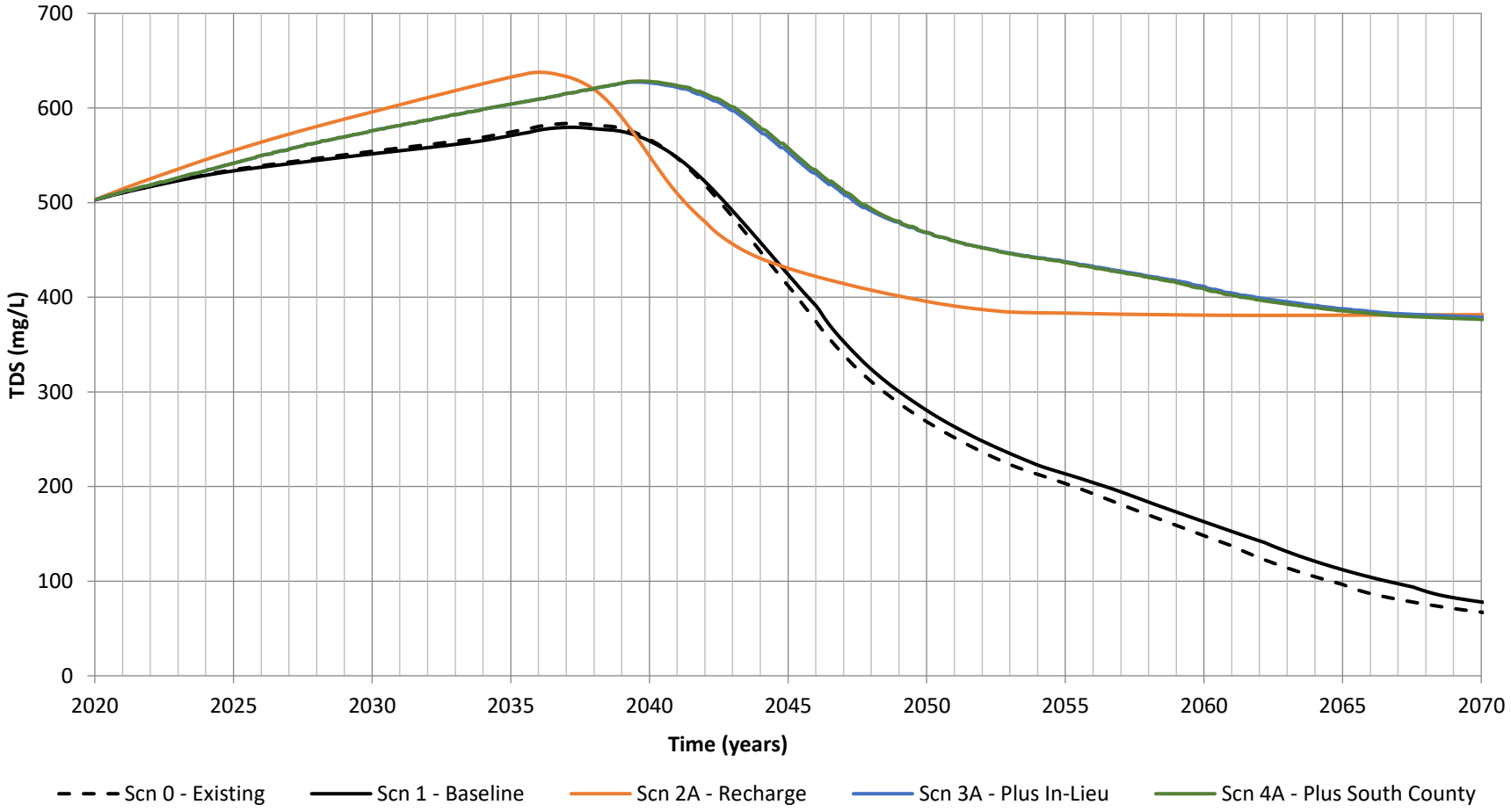
Model-Predicted Net Water Quality at the Huntington Beach Wells - Scenario 'A' Boron Concentrations



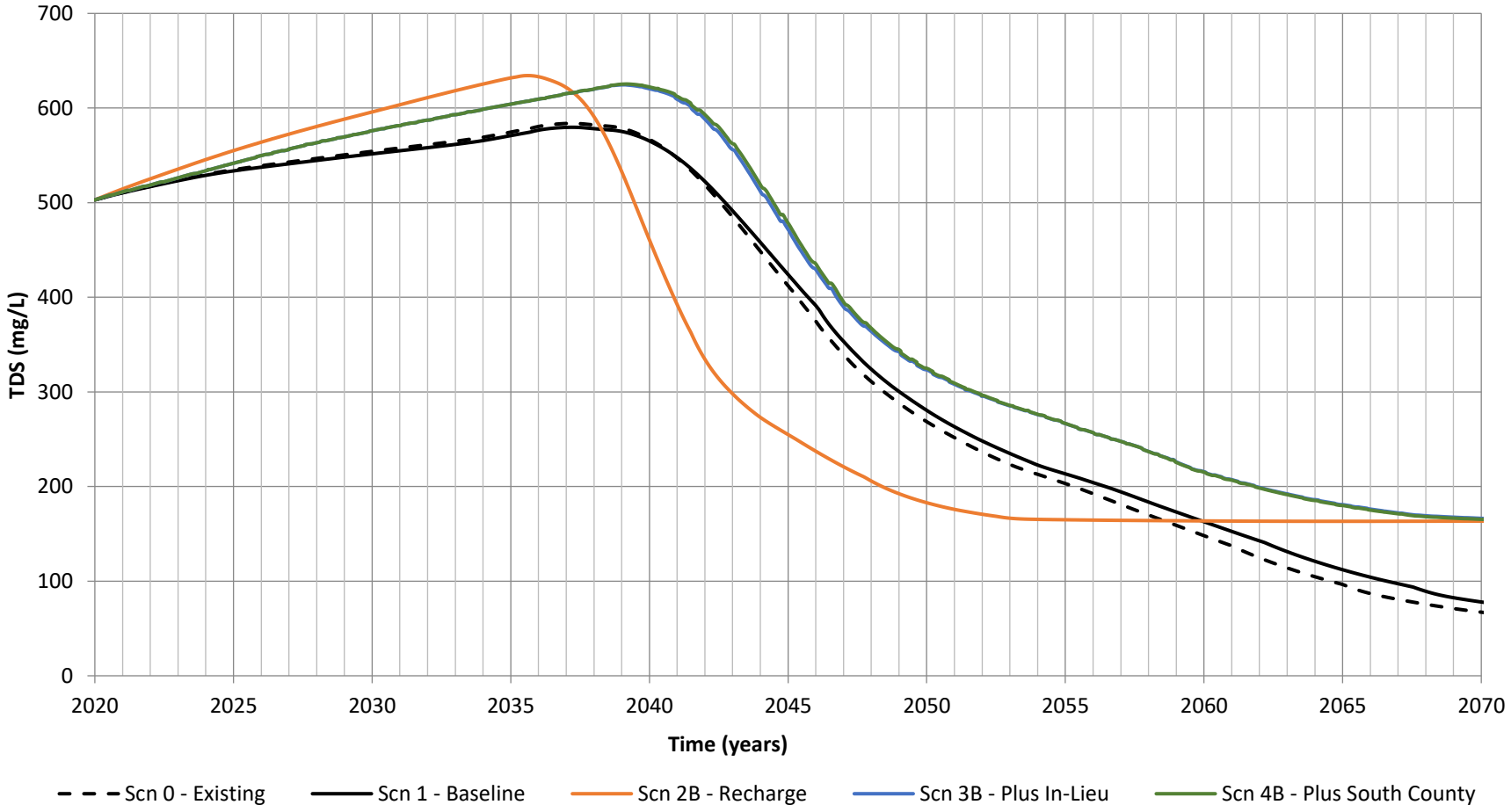
Model-Predicted Net Water Quality at the Huntington Beach Wells - Scenario 'B' Boron Concentrations



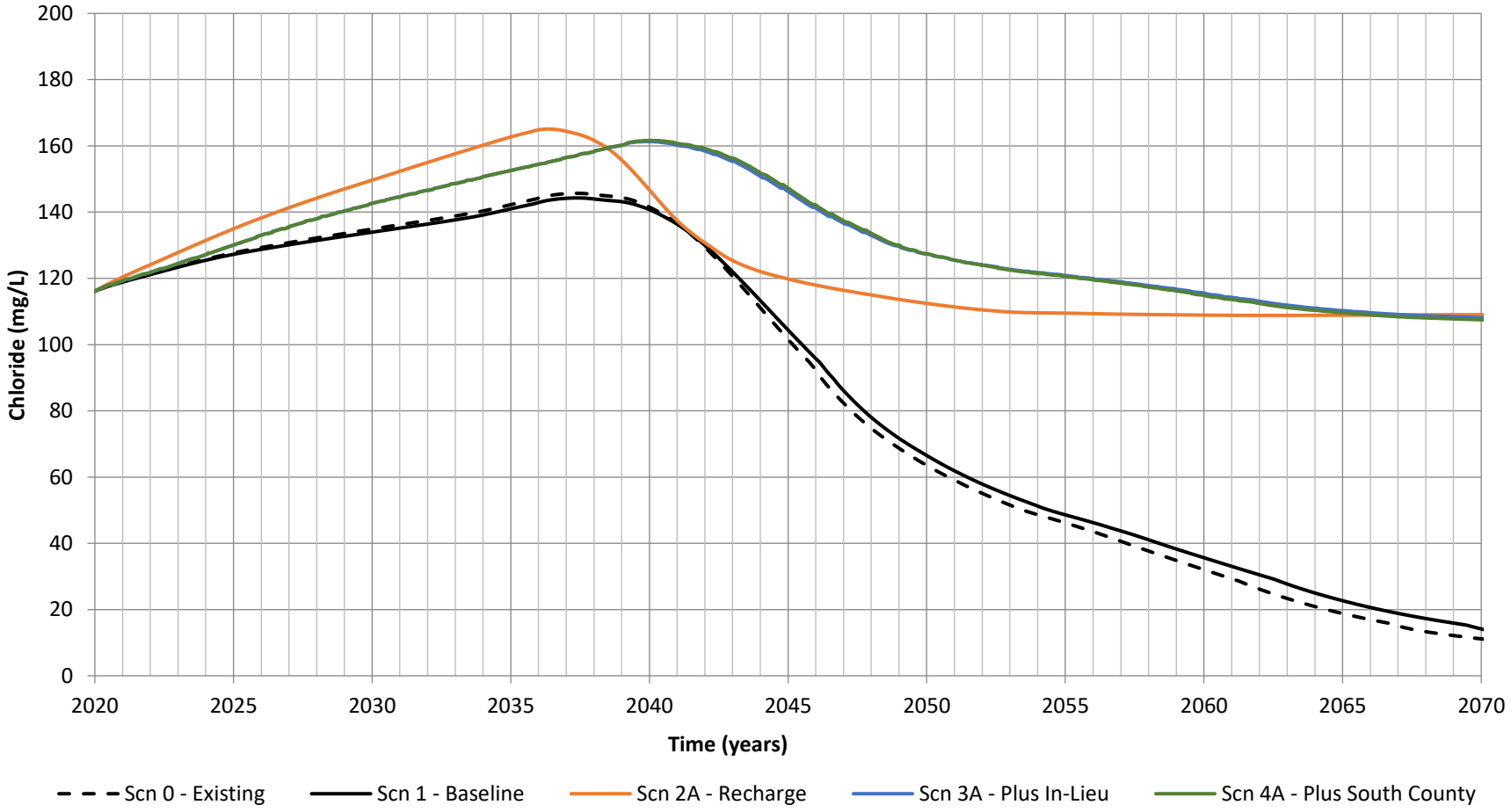
Model-Predicted Net Water Quality at the Mesa Verde Wells - Scenario 'A' TDS Concentrations



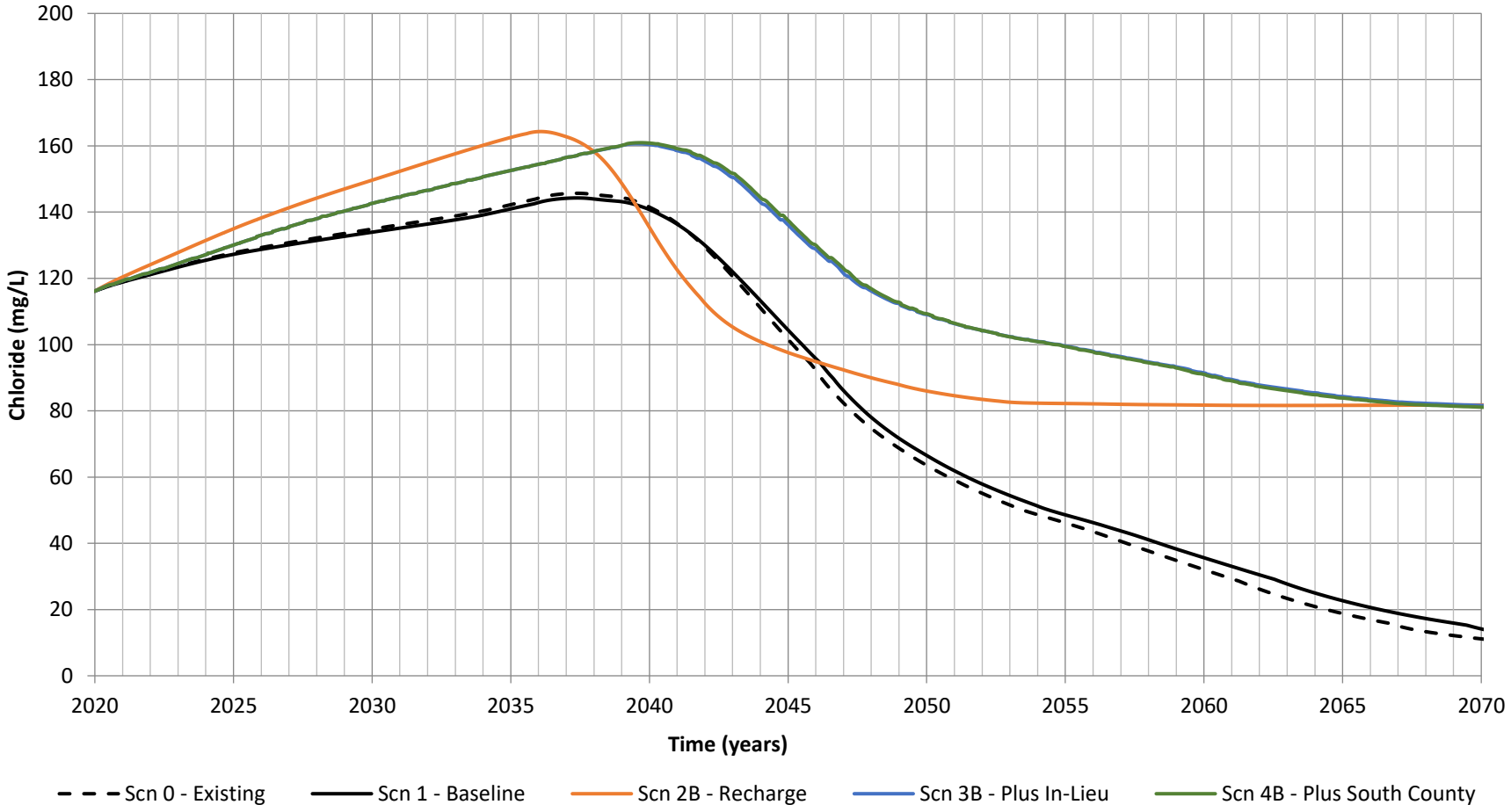
Model-Predicted Net Water Quality at the Mesa Verde Wells - Scenario 'B' TDS Concentrations



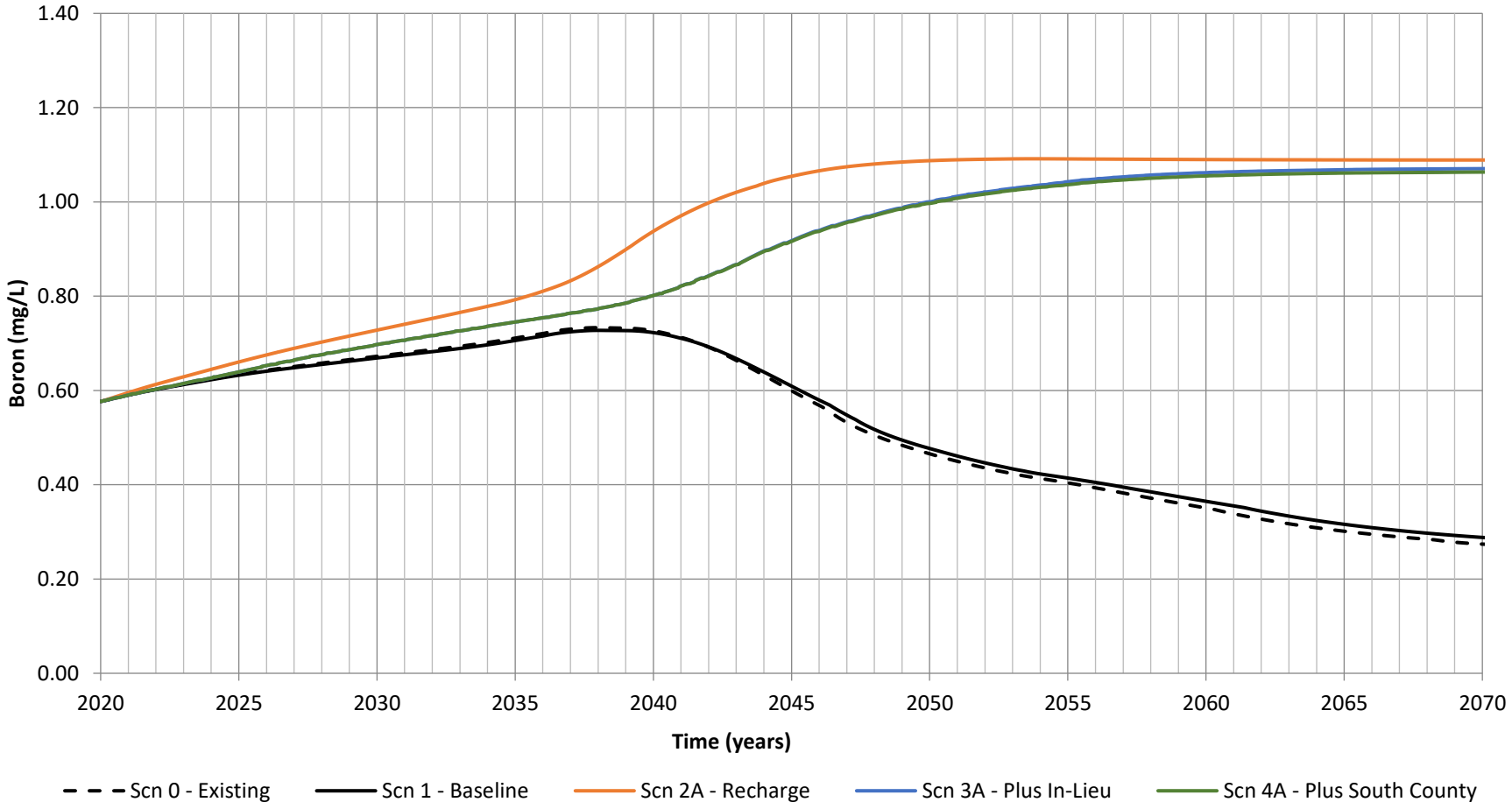
Model-Predicted Net Water Quality at the Mesa Verde Wells - Scenario 'A' Chloride Concentrations



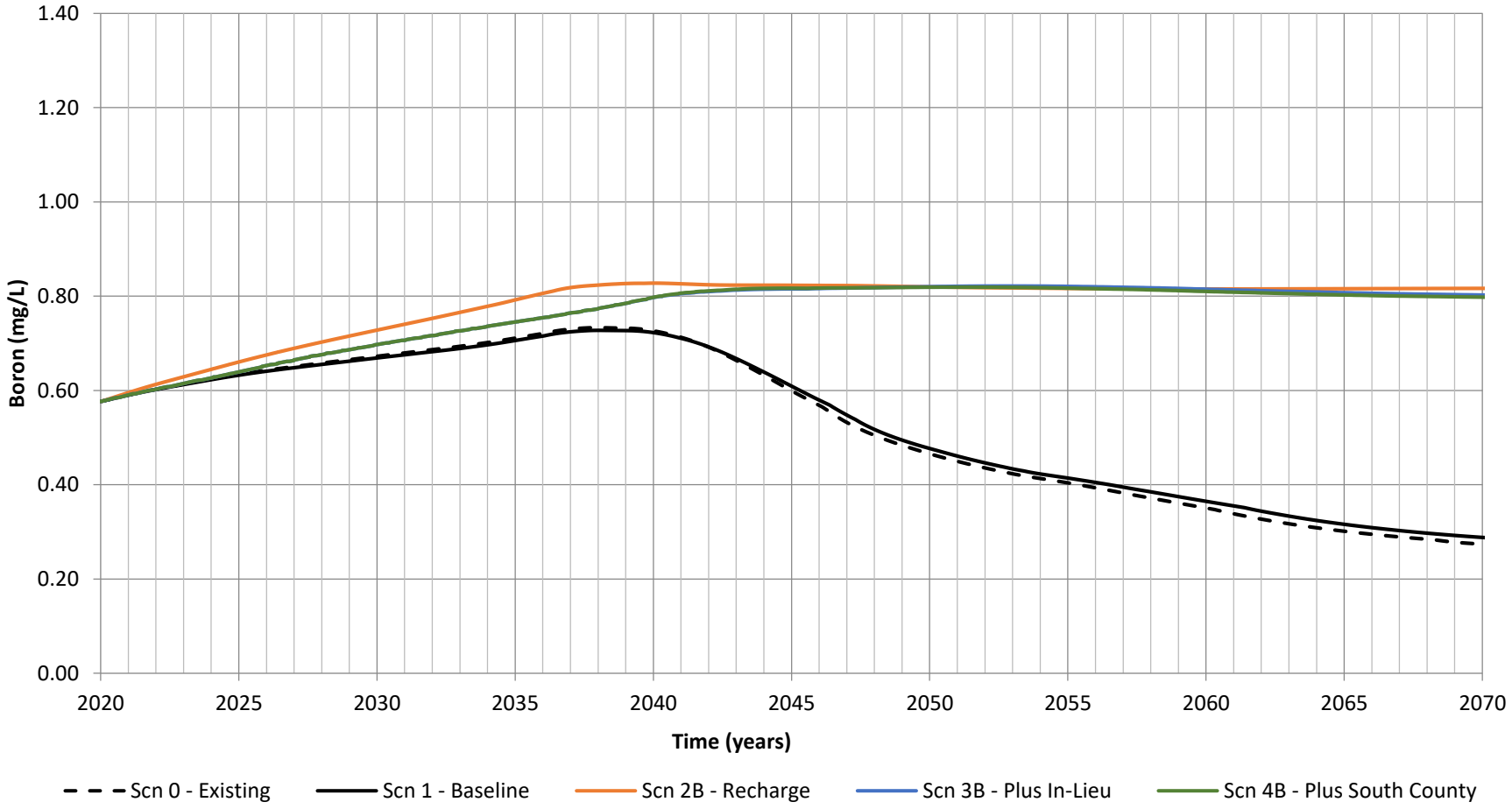
Model-Predicted Net Water Quality at the Mesa Verde Wells - Scenario 'B' Chloride Concentrations



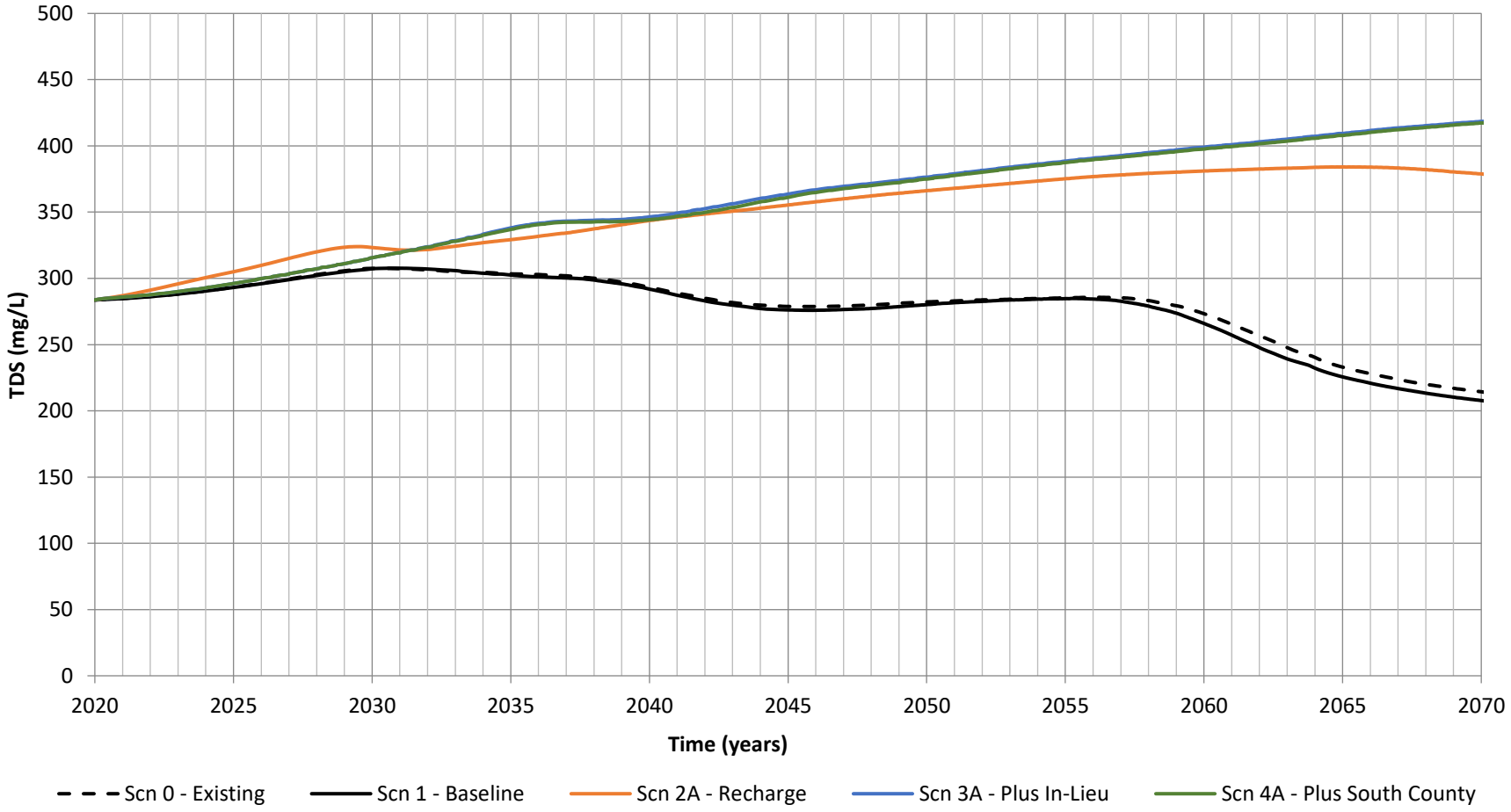
Model-Predicted Net Water Quality at the Mesa Verde Wells - Scenario 'A' Boron Concentrations



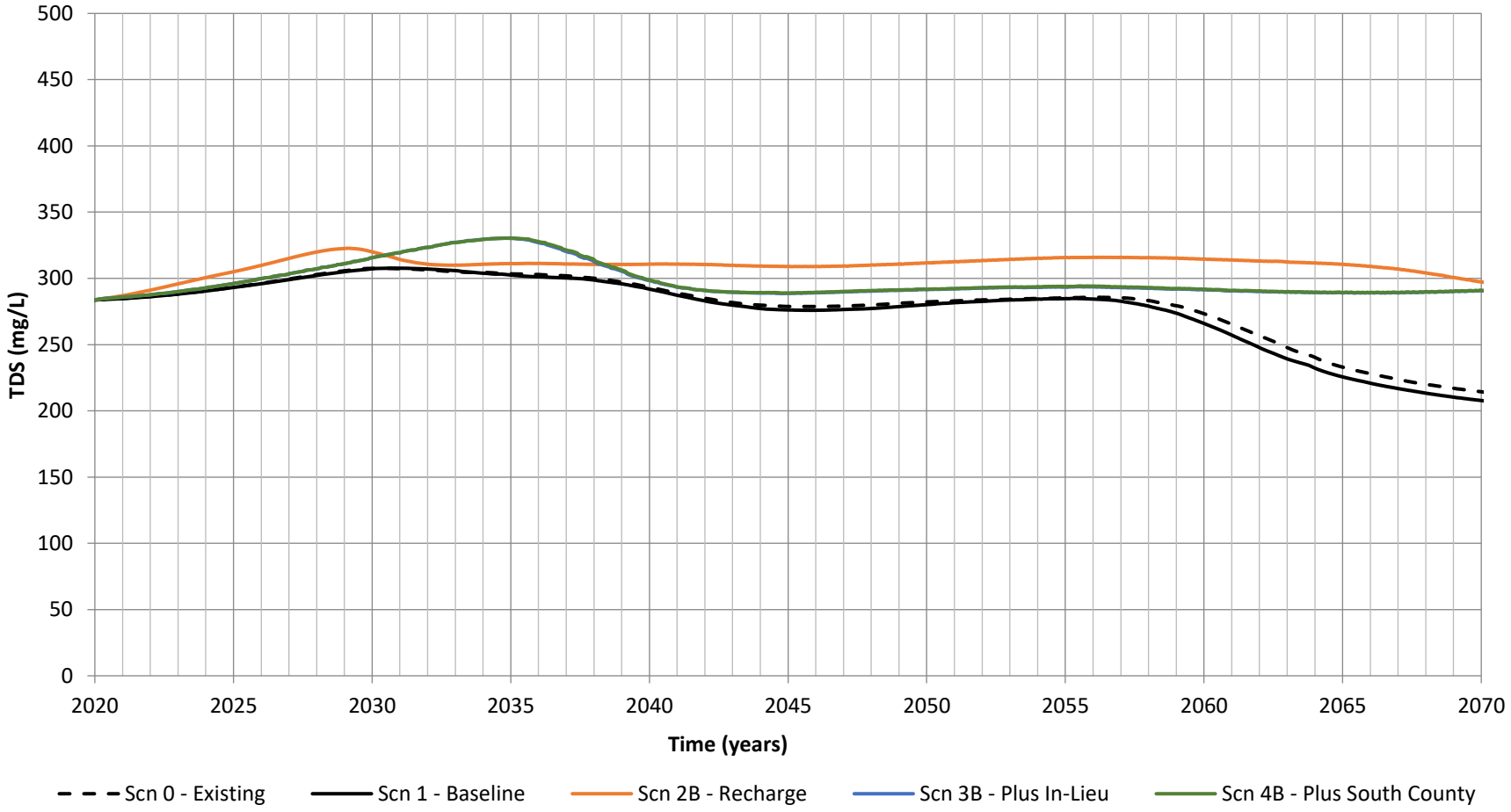
Model-Predicted Net Water Quality at the Mesa Verde Wells - Scenario 'B' Boron Concentrations



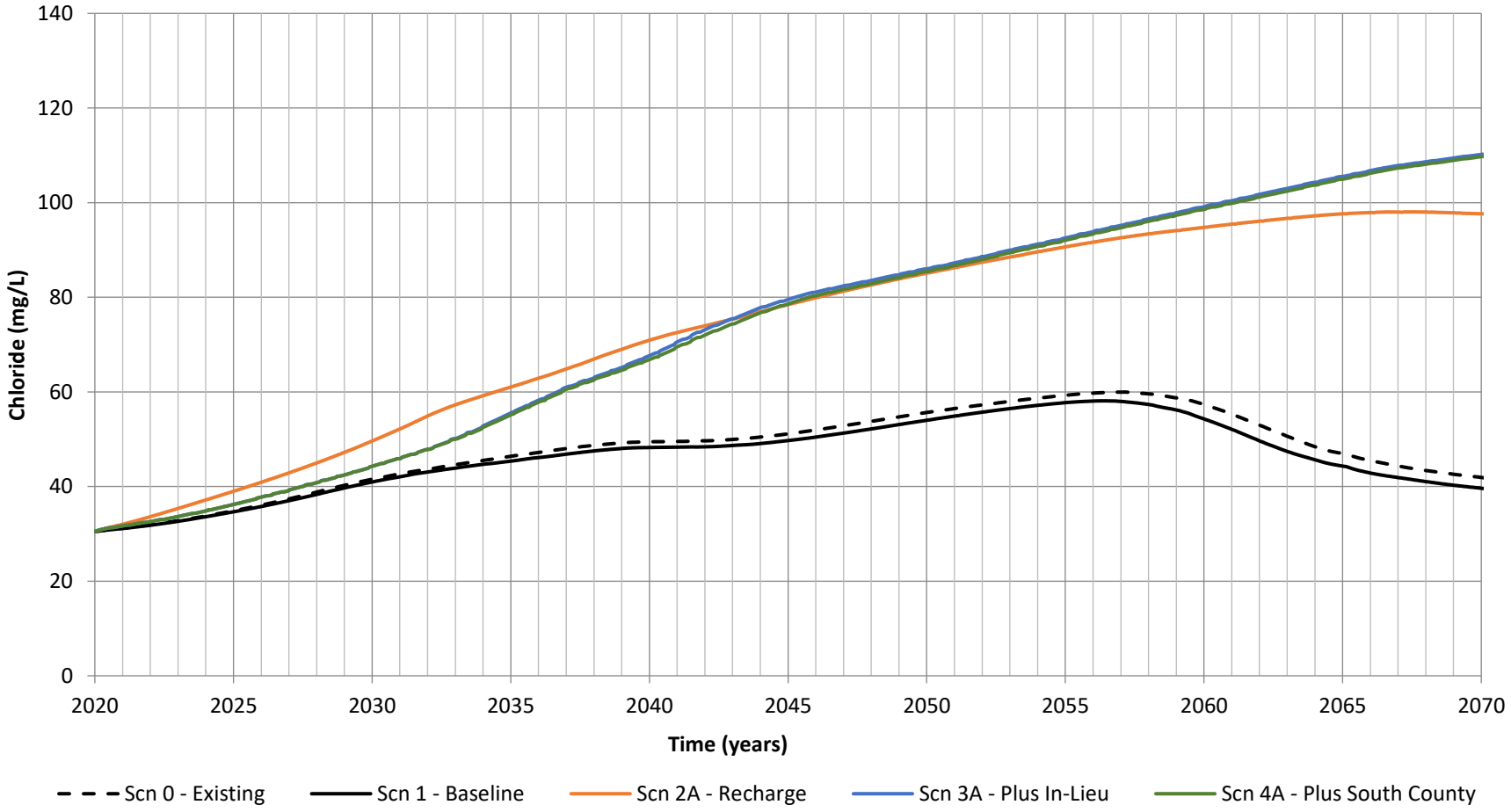
Model-Predicted Net Water Quality at the Mesa Water District Wells - Scenario 'A' TDS Concentrations



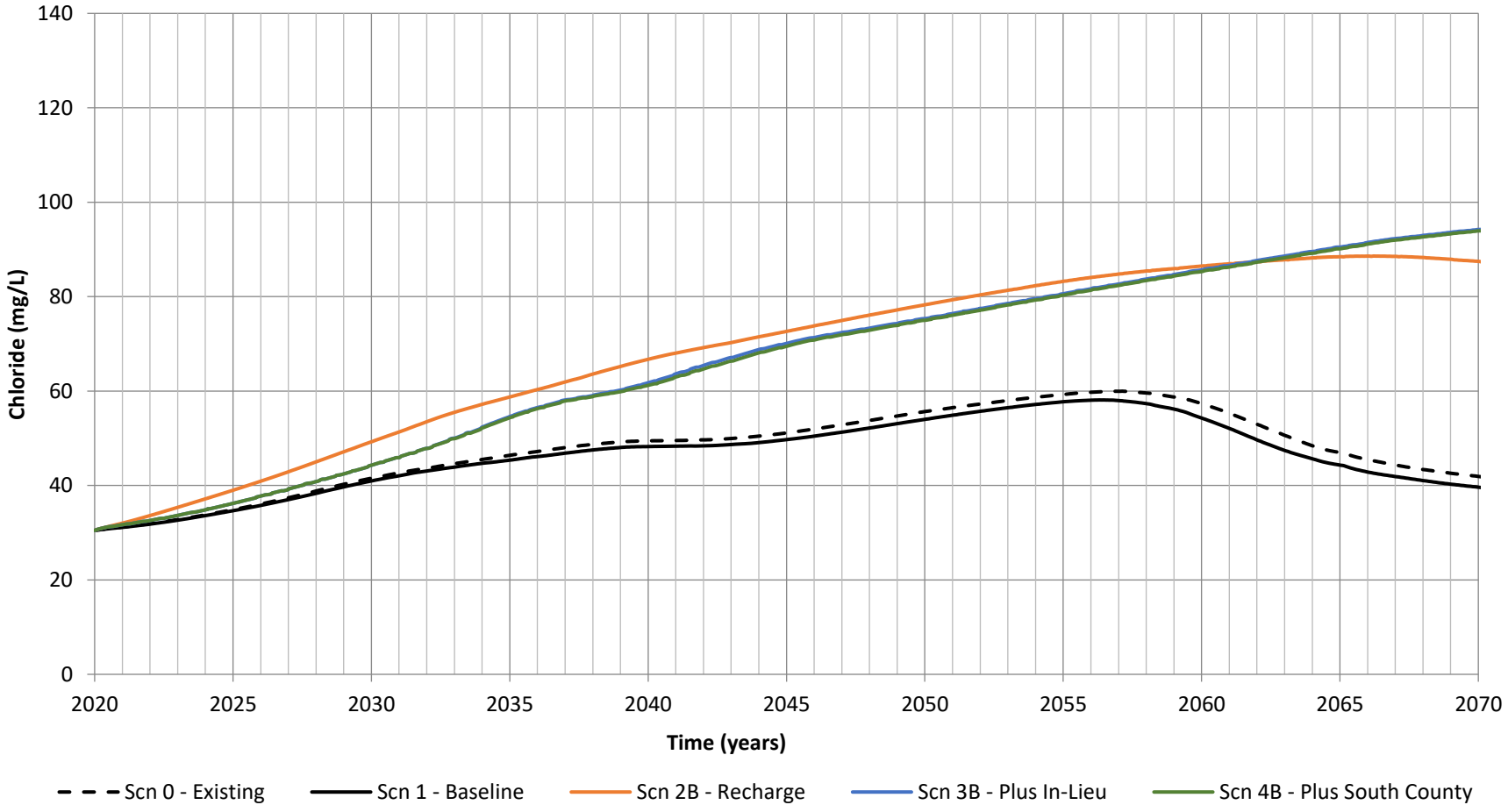
Model-Predicted Net Water Quality at the Mesa Water District Wells - Scenario 'B' TDS Concentrations



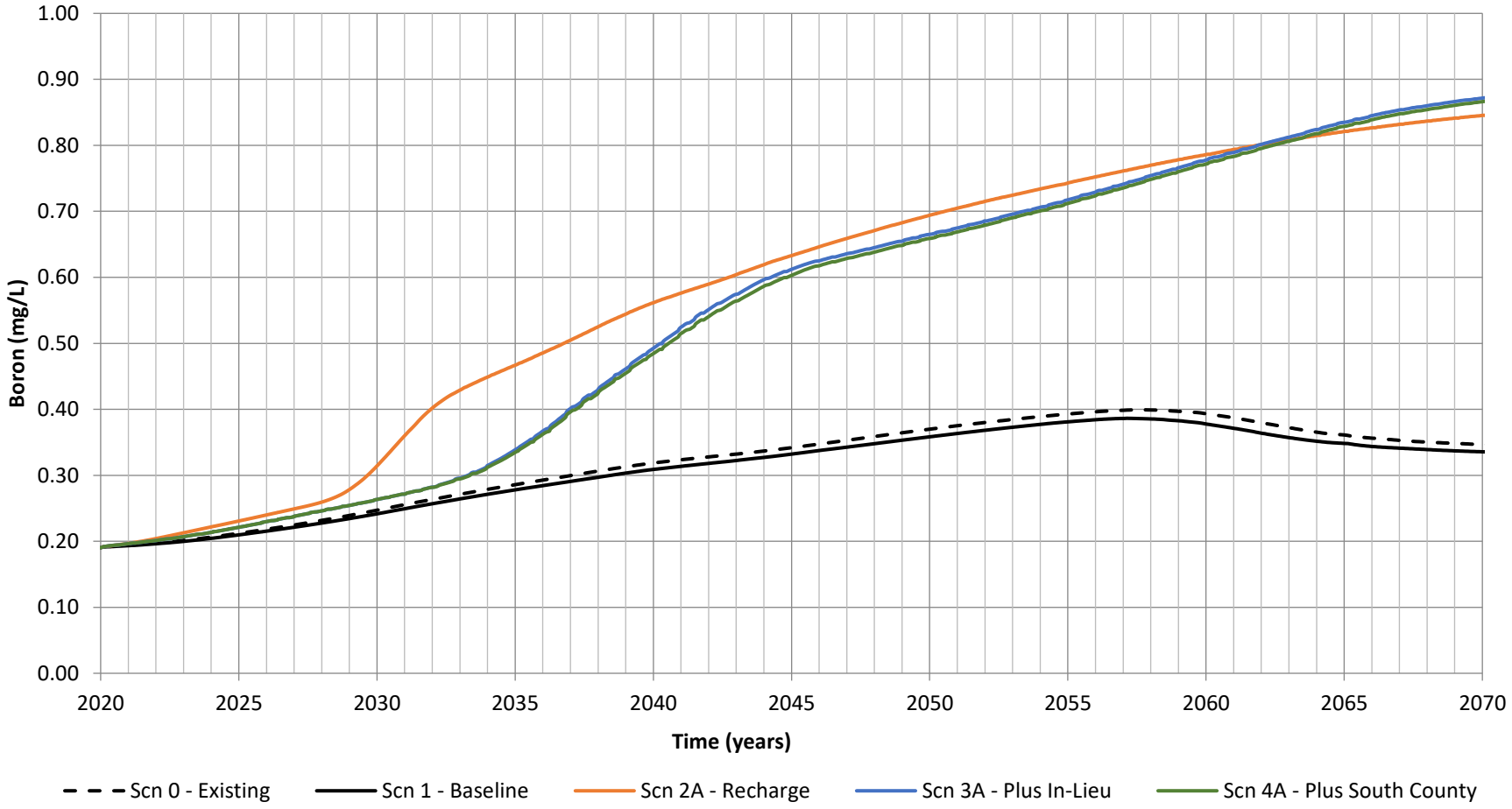
Model-Predicted Net Water Quality at the Mesa Water District Wells - Scenario 'A' Chloride Concentrations



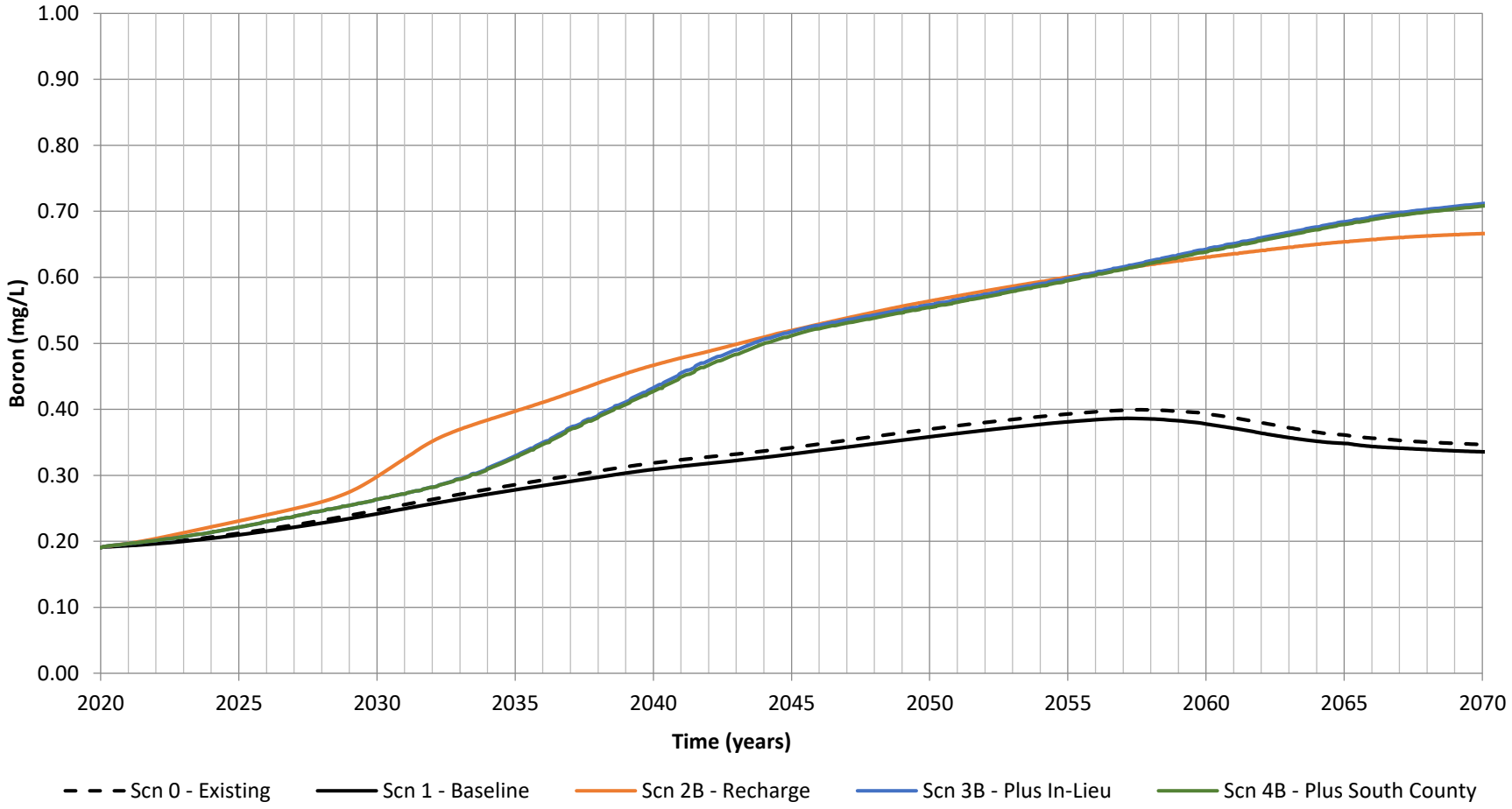
Model-Predicted Net Water Quality at the Mesa Water District Wells - Scenario 'B' Chloride Concentrations



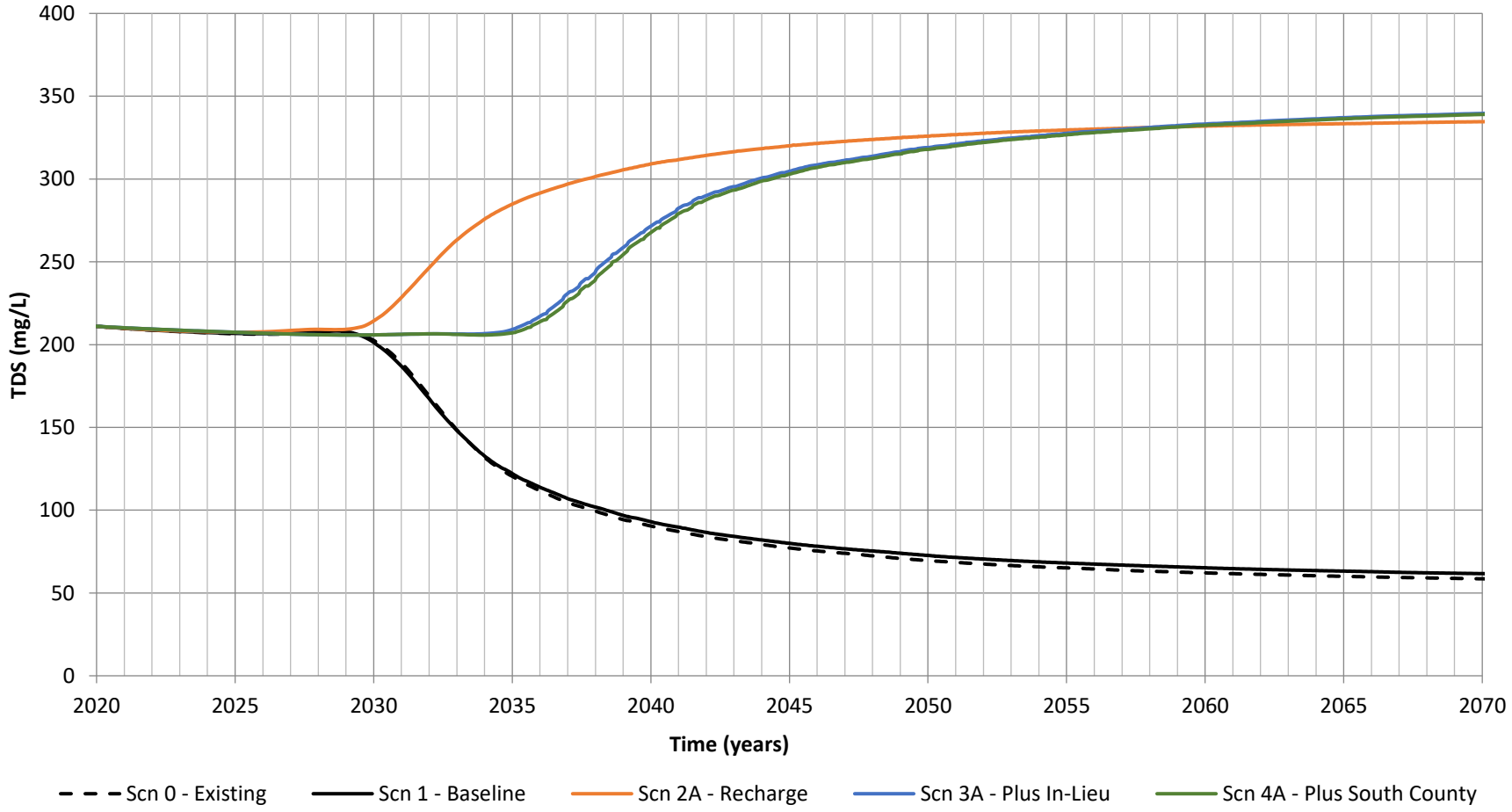
Model-Predicted Net Water Quality at the Mesa Water District Wells - Scenario 'A' Boron Concentrations



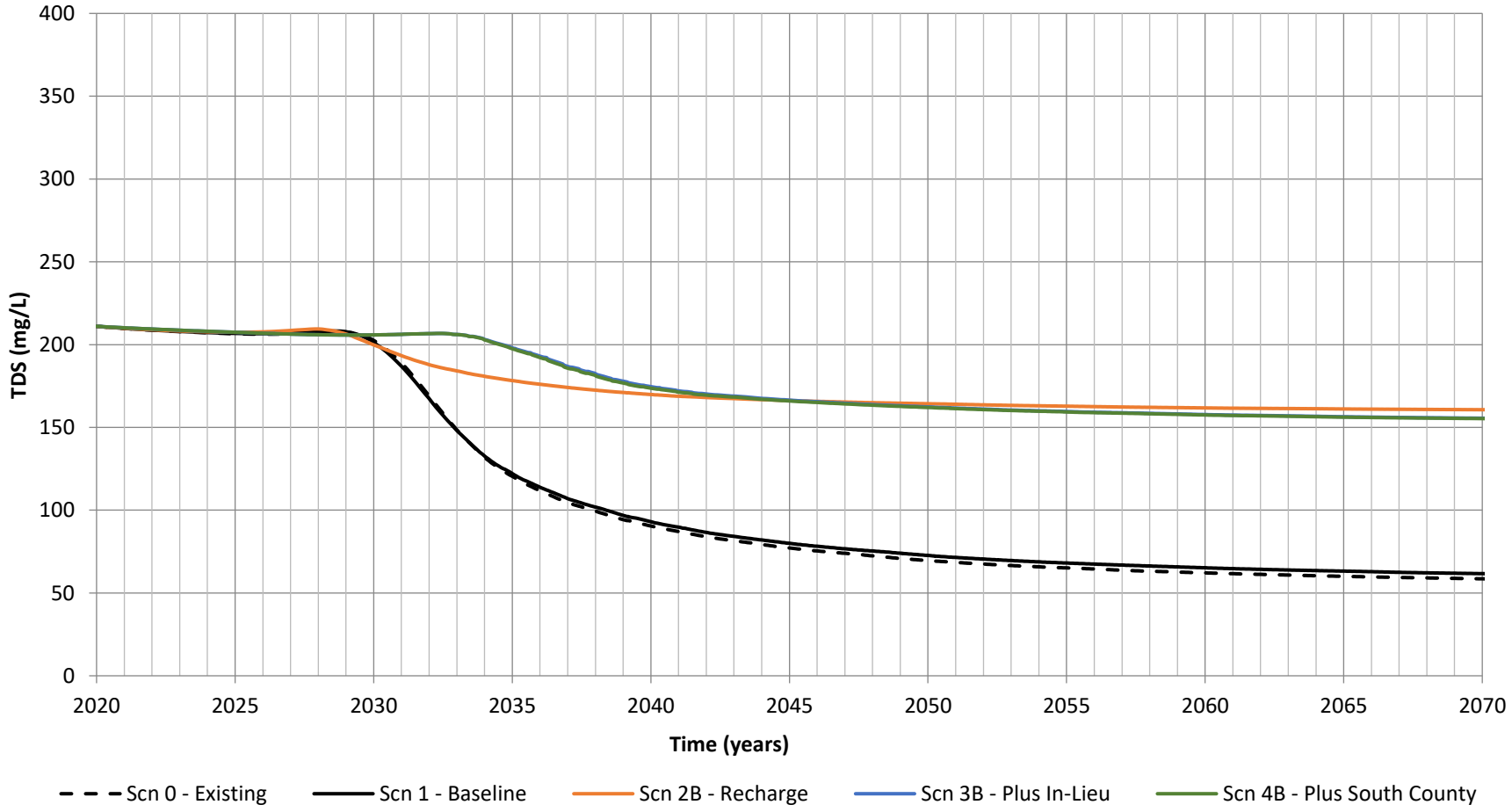
Model-Predicted Net Water Quality at the Mesa Water District Wells - Scenario 'B' Boron Concentrations



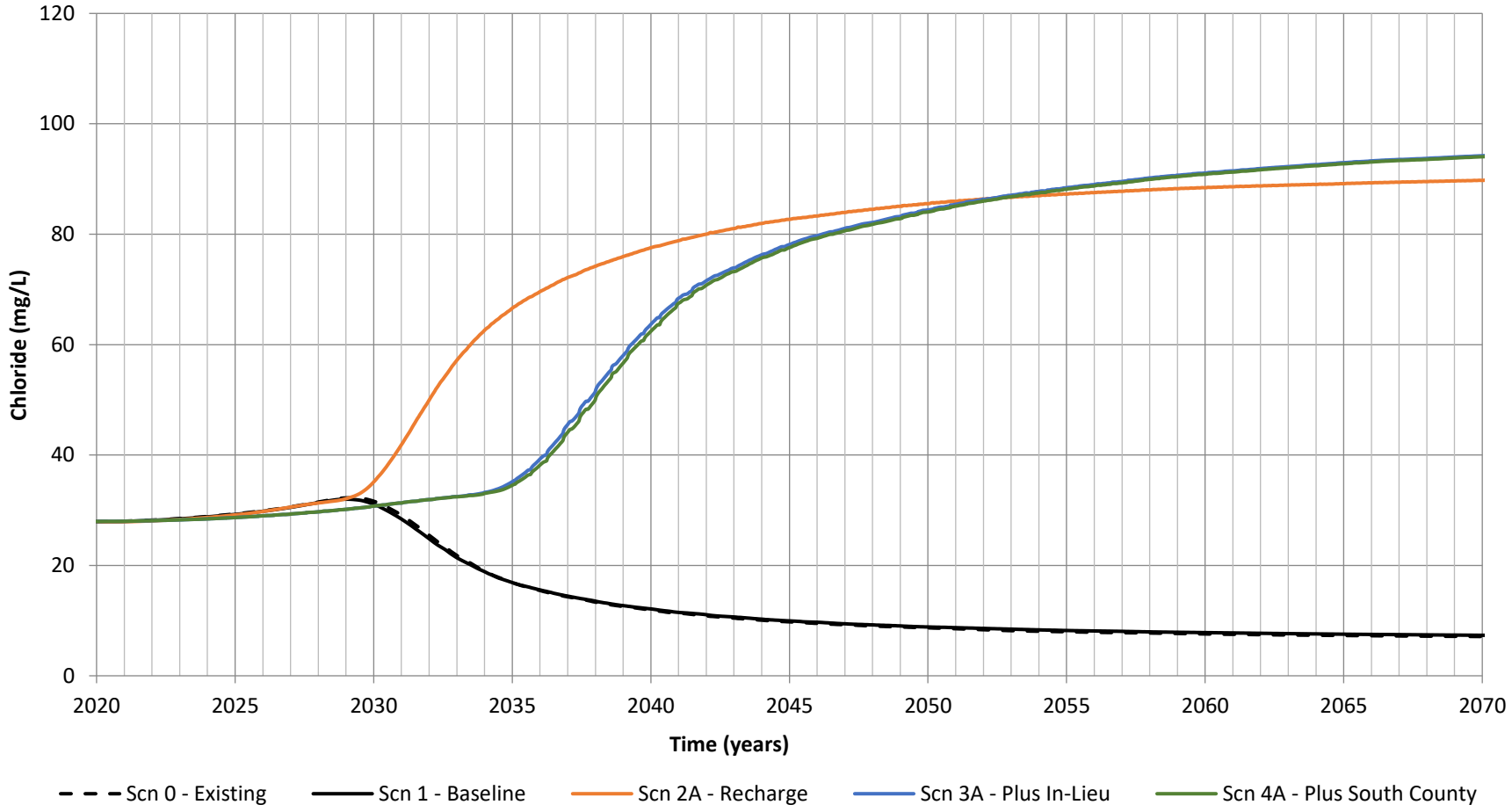
Model-Predicted Net Water Quality at the Newport Beach Wells - Scenario 'A' TDS Concentrations



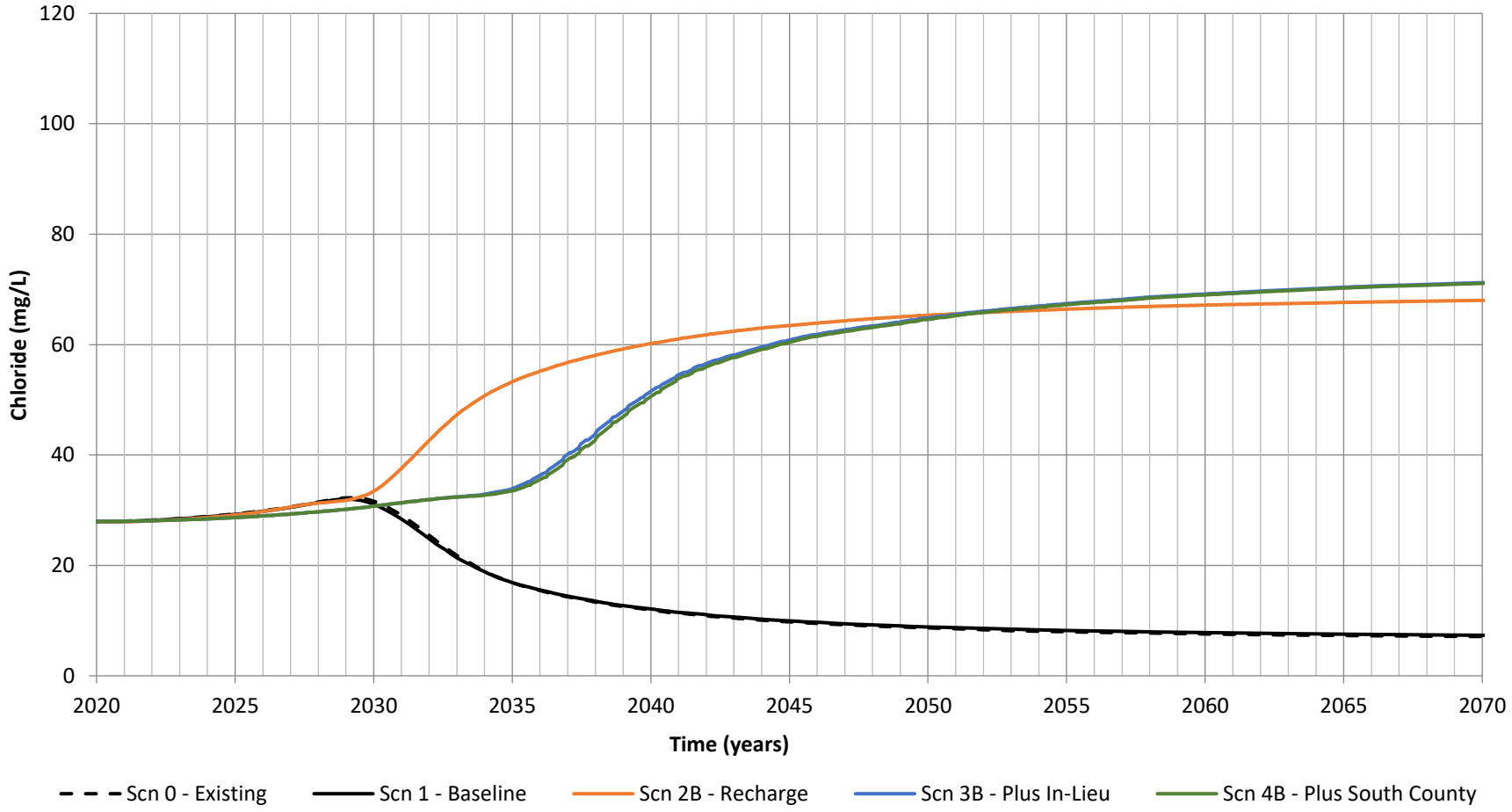
Model-Predicted Net Water Quality at the Newport Beach Wells - Scenario 'B' TDS Concentrations



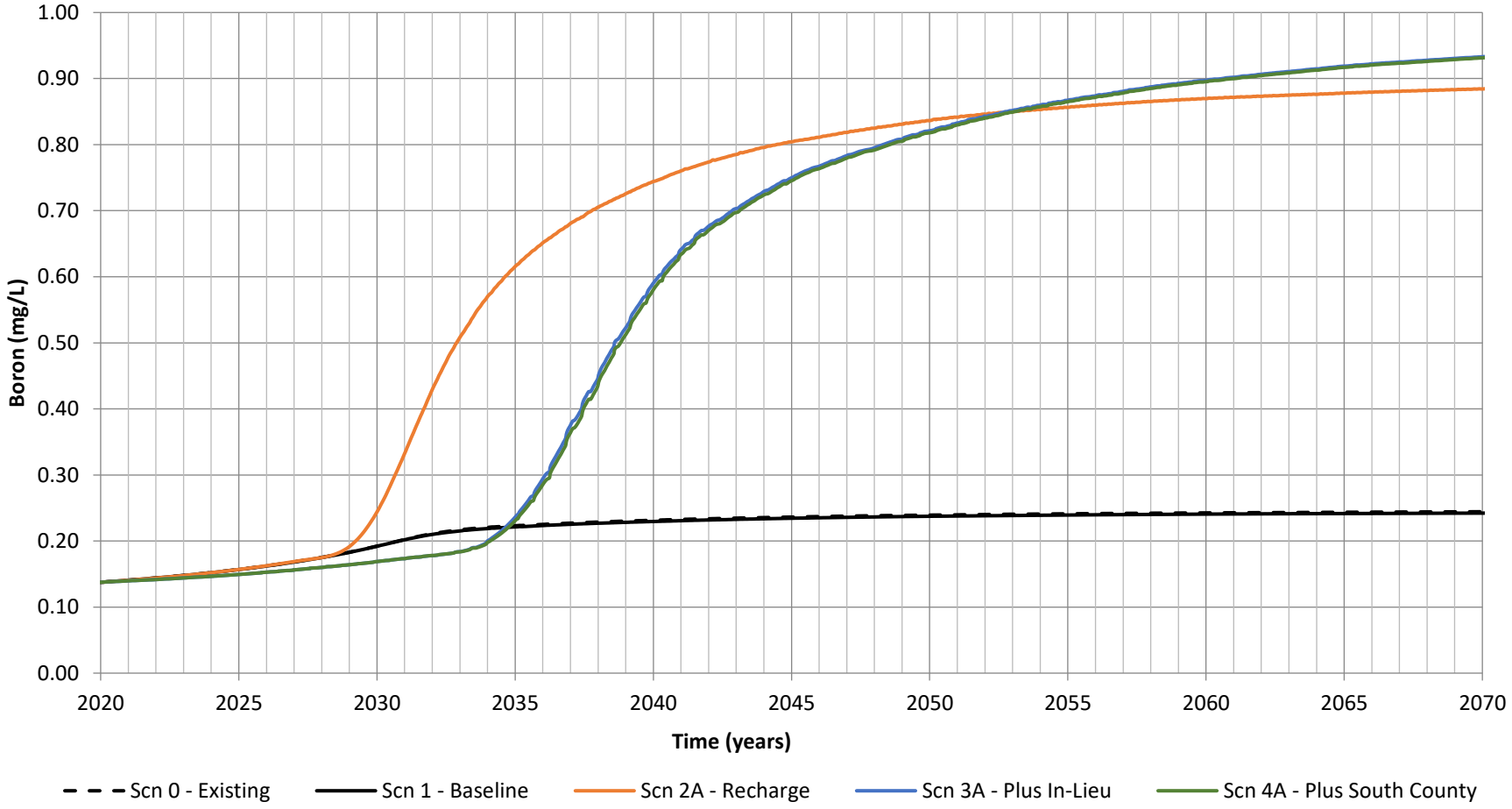
Model-Predicted Net Water Quality at the Newport Beach Wells - Scenario 'A' Chloride Concentrations



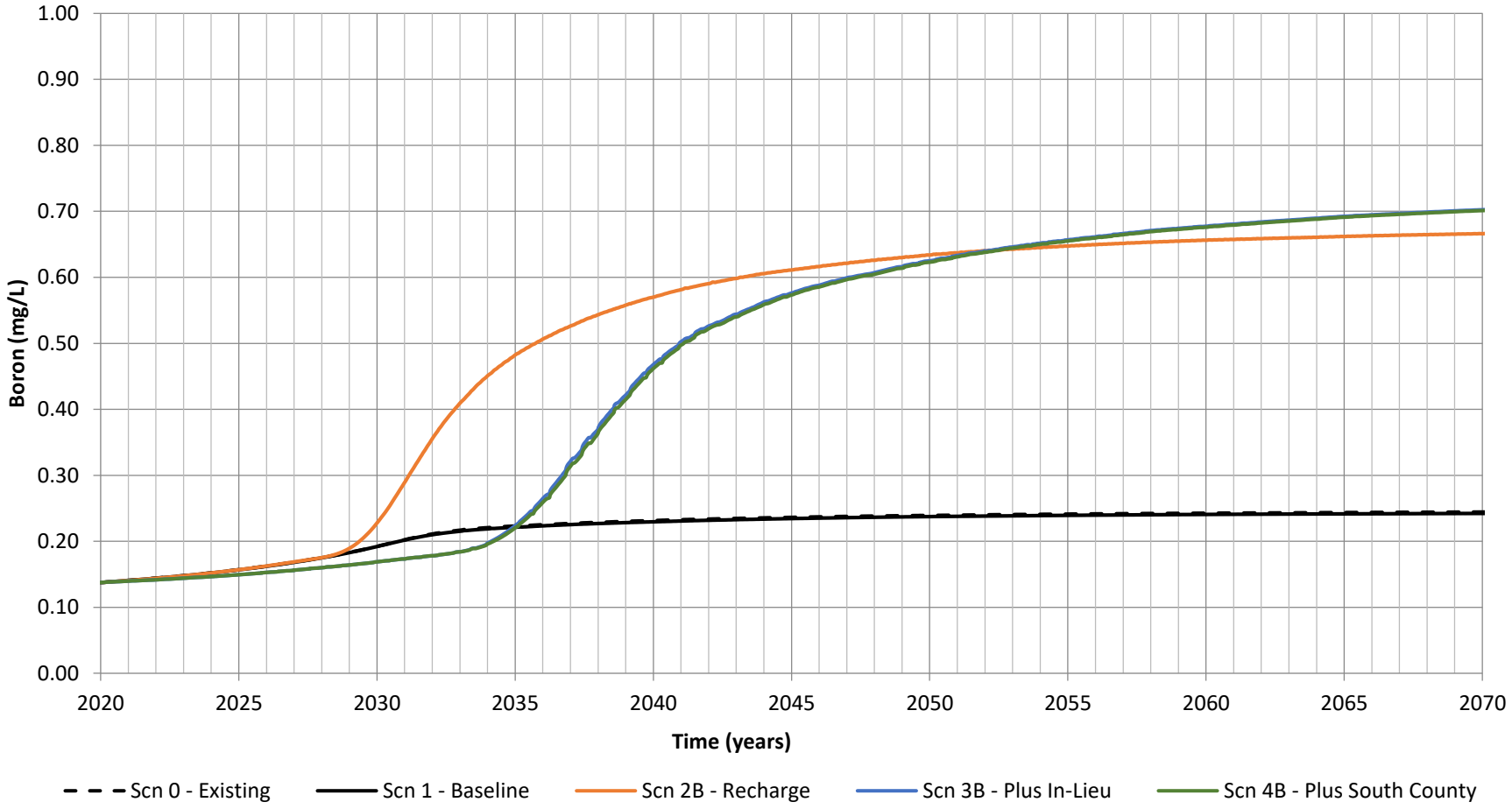
Model-Predicted Net Water Quality at the Newport Beach Wells - Scenario 'B' Chloride Concentrations



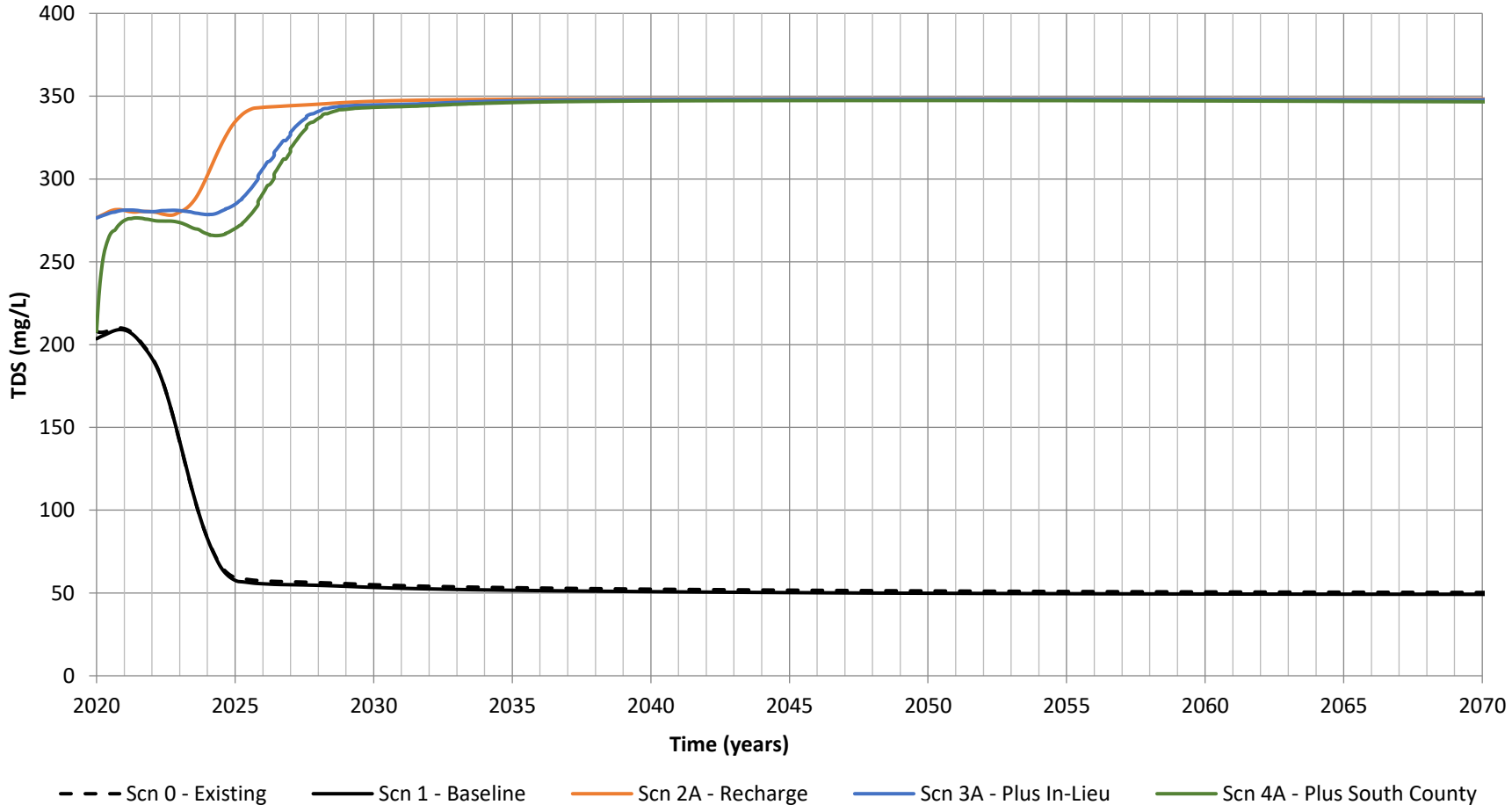
Model-Predicted Net Water Quality at the Newport Beach Wells - Scenario 'A' Boron Concentrations



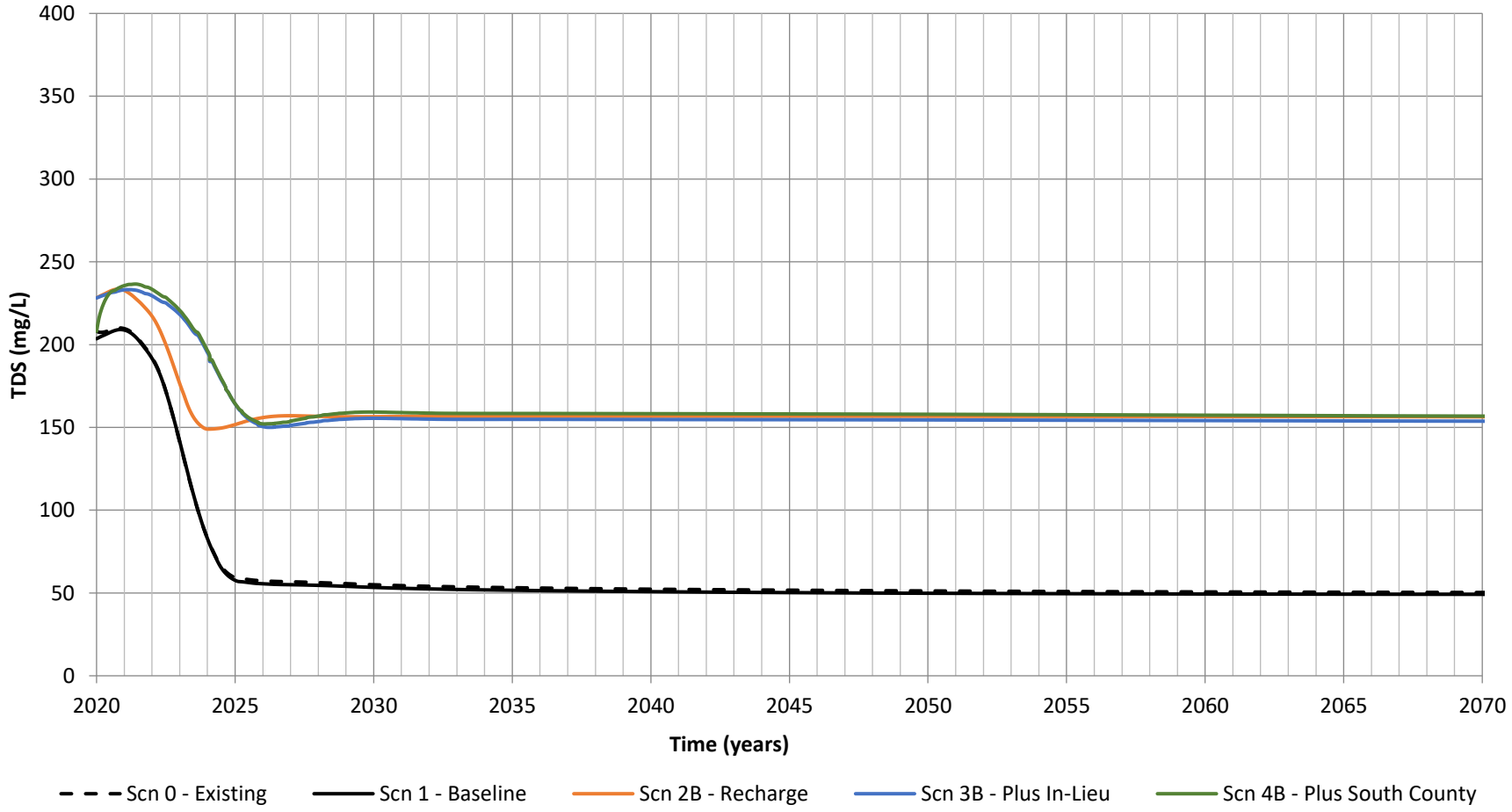
Model-Predicted Net Water Quality at the Newport Beach Wells - Scenario 'B' Boron Concentrations



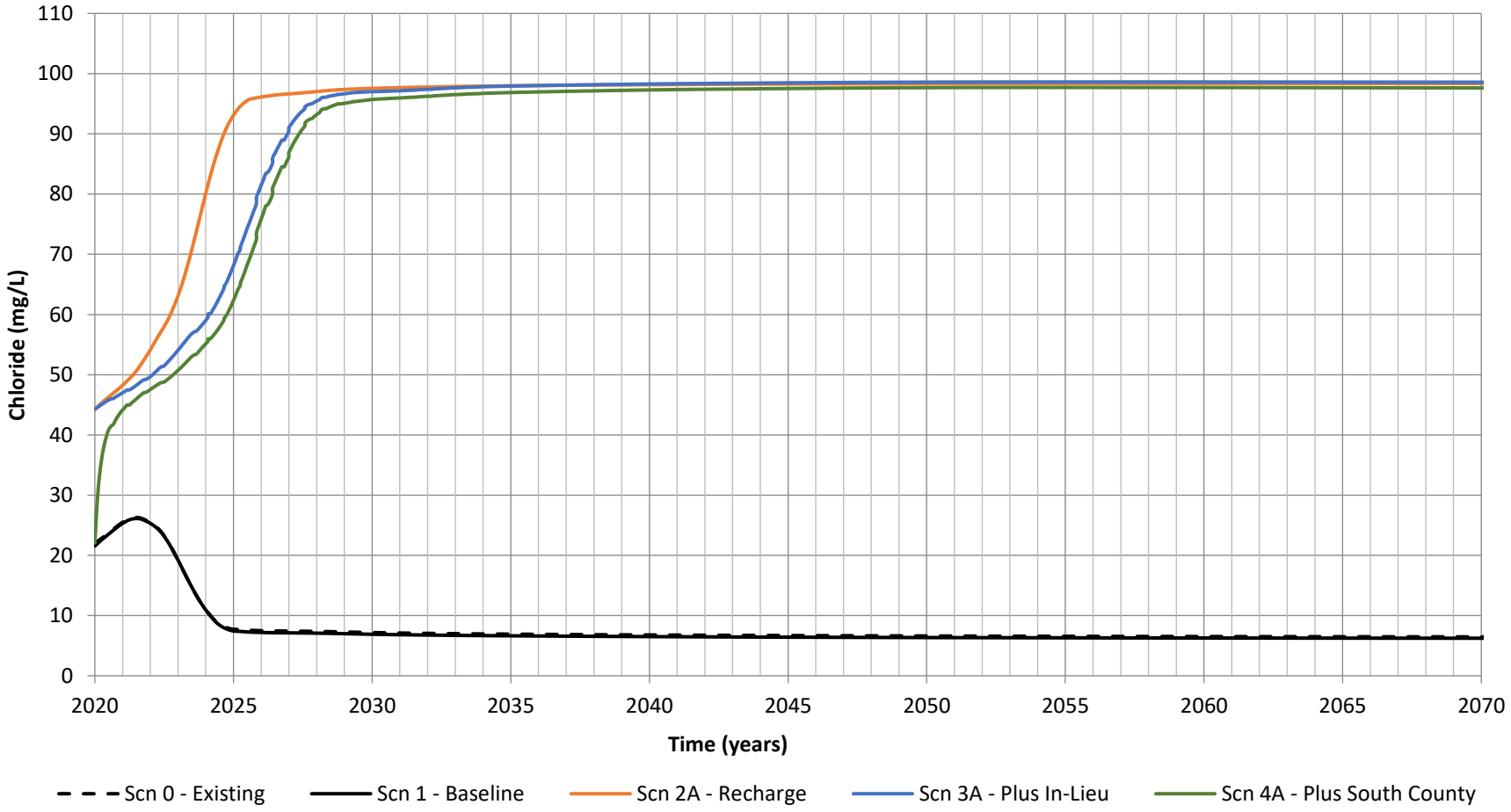
Model-Predicted Net Water Quality at the OCWD Wells - Scenario 'A' TDS Concentrations



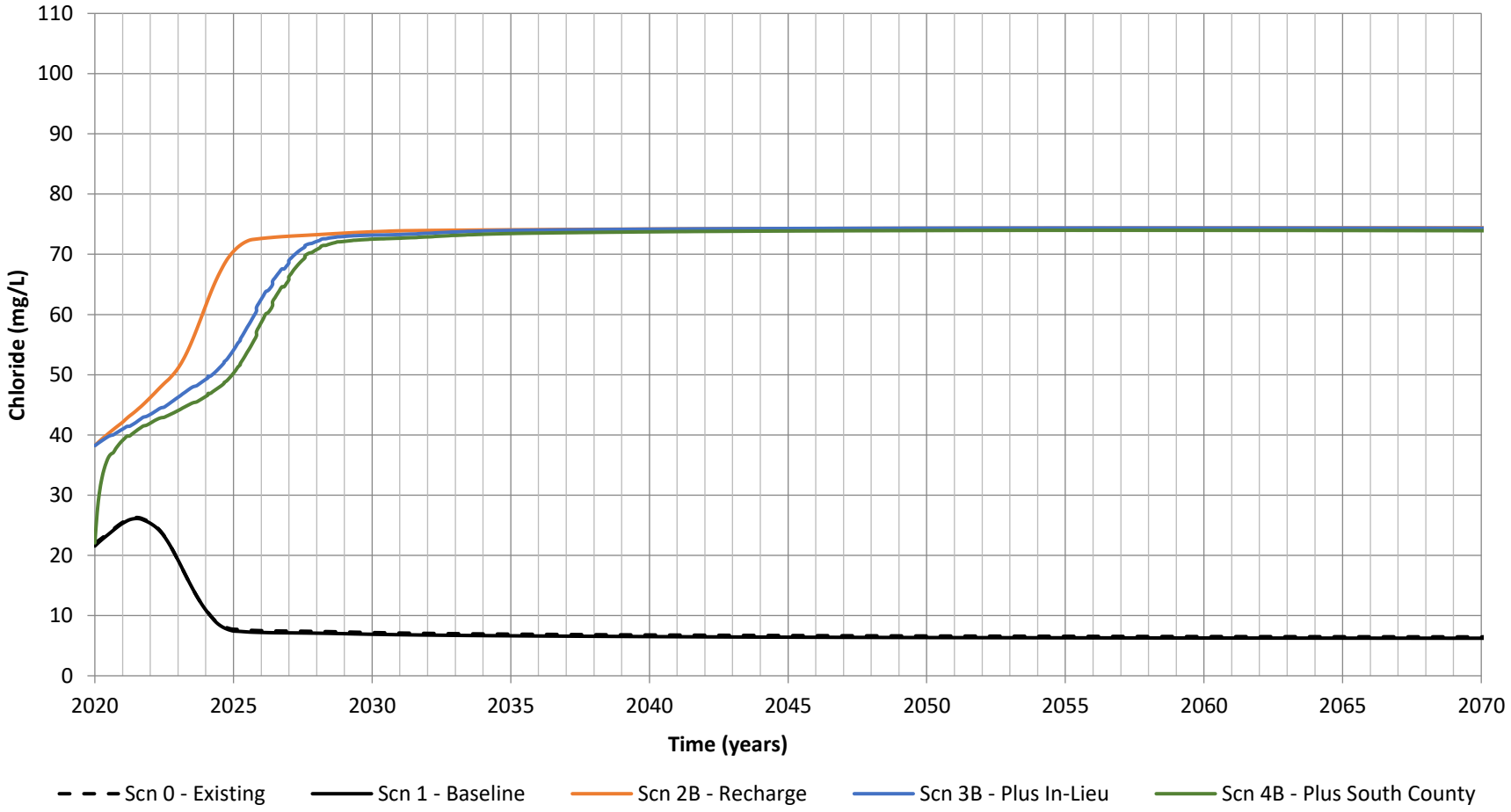
Model-Predicted Net Water Quality at the OCWD Wells - Scenario 'B' TDS Concentrations



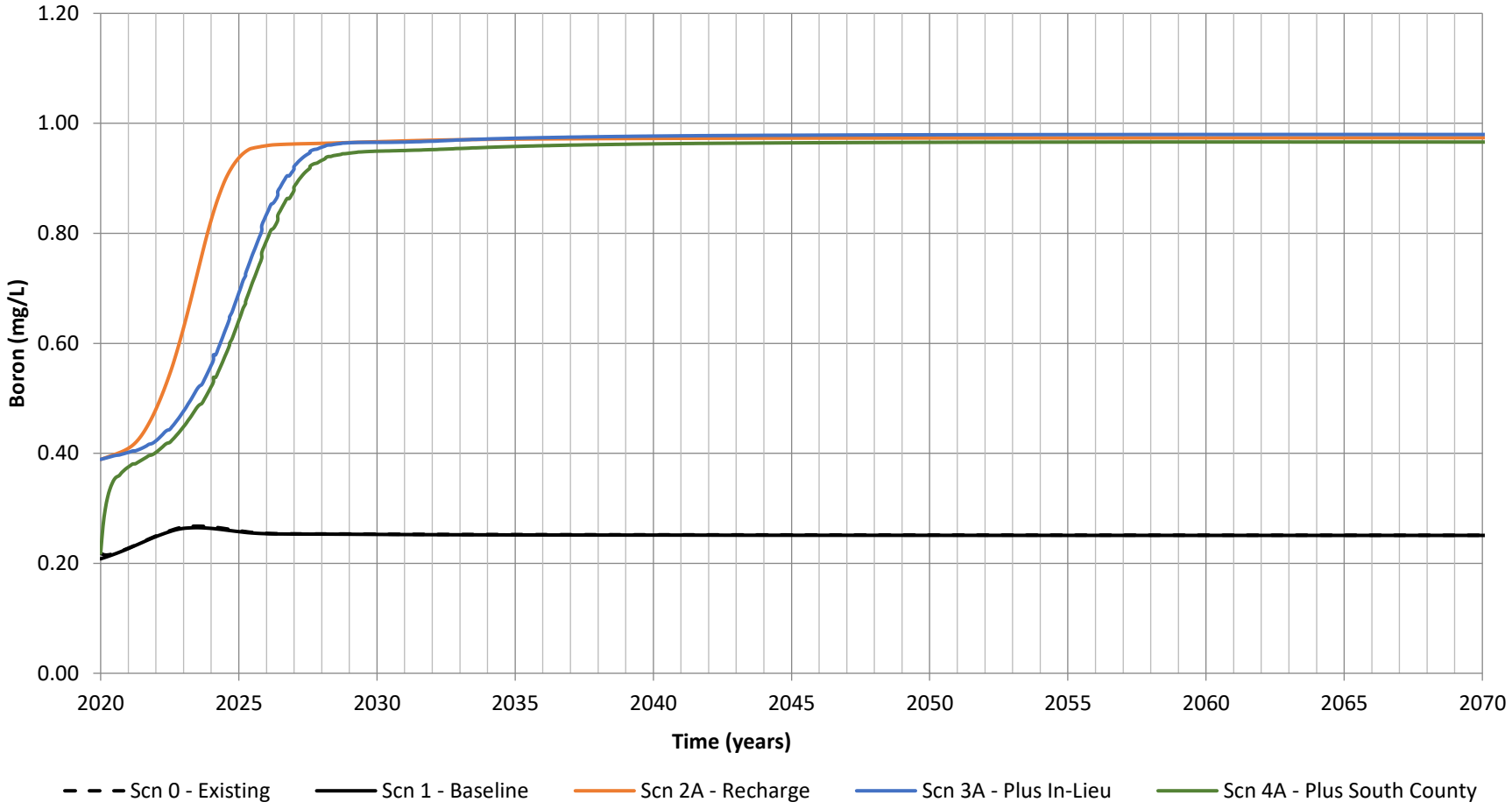
Model-Predicted Net Water Quality at the OCWD Wells - Scenario 'A' Chloride Concentrations



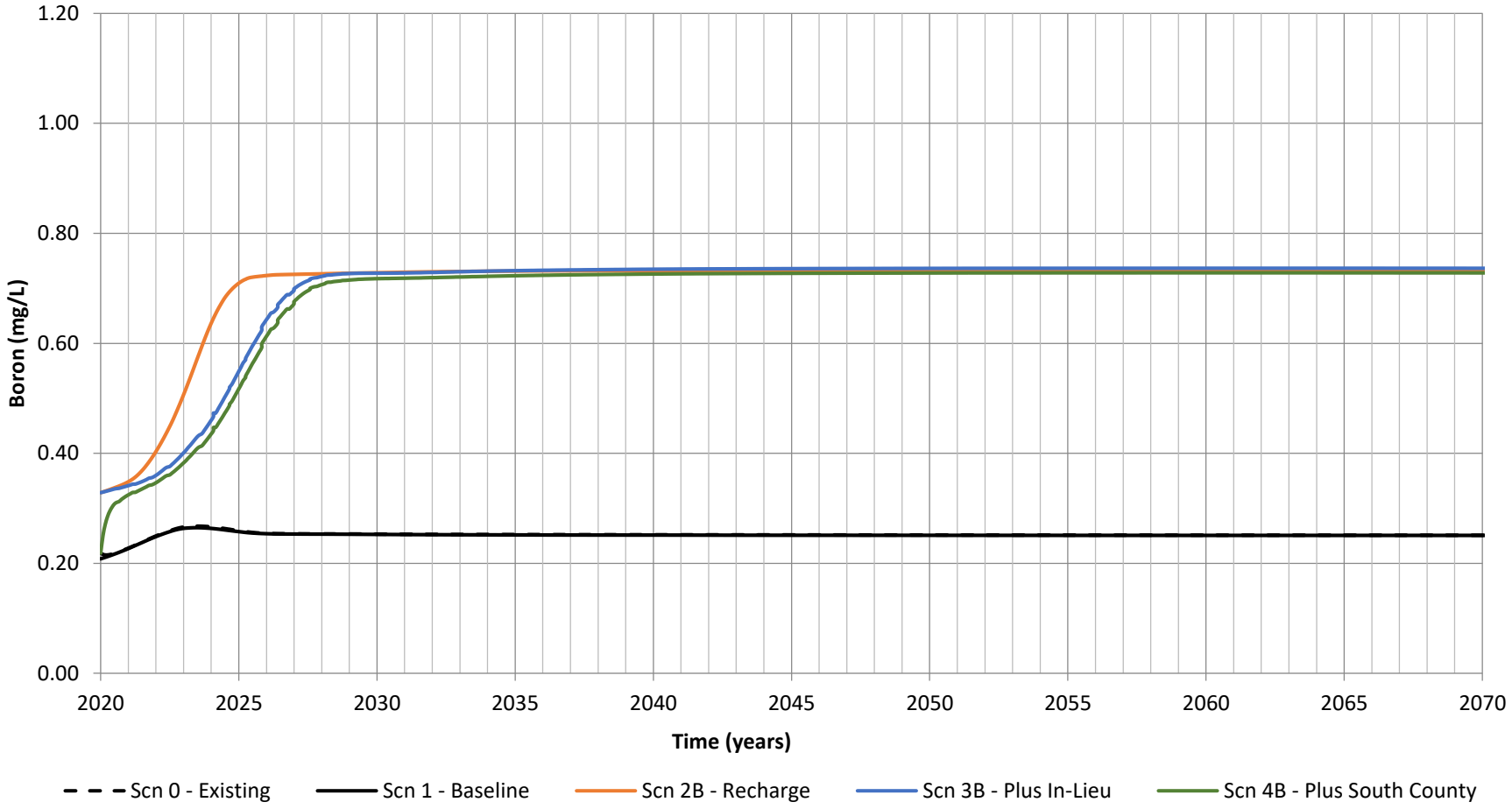
Model-Predicted Net Water Quality at the OCWD Wells - Scenario 'B' Chloride Concentrations



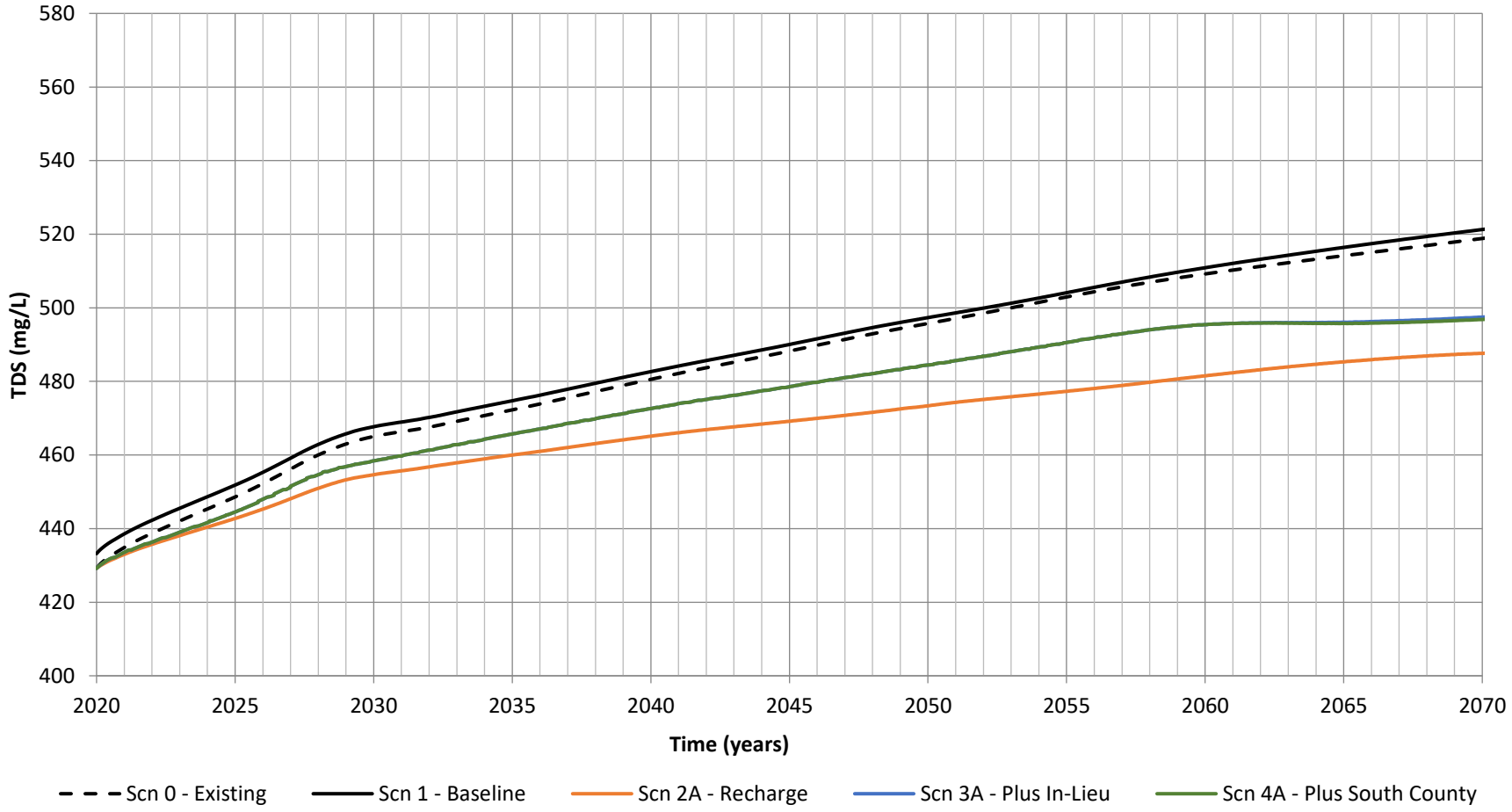
Model-Predicted Net Water Quality at the OCWD Wells - Scenario 'A' Boron Concentrations



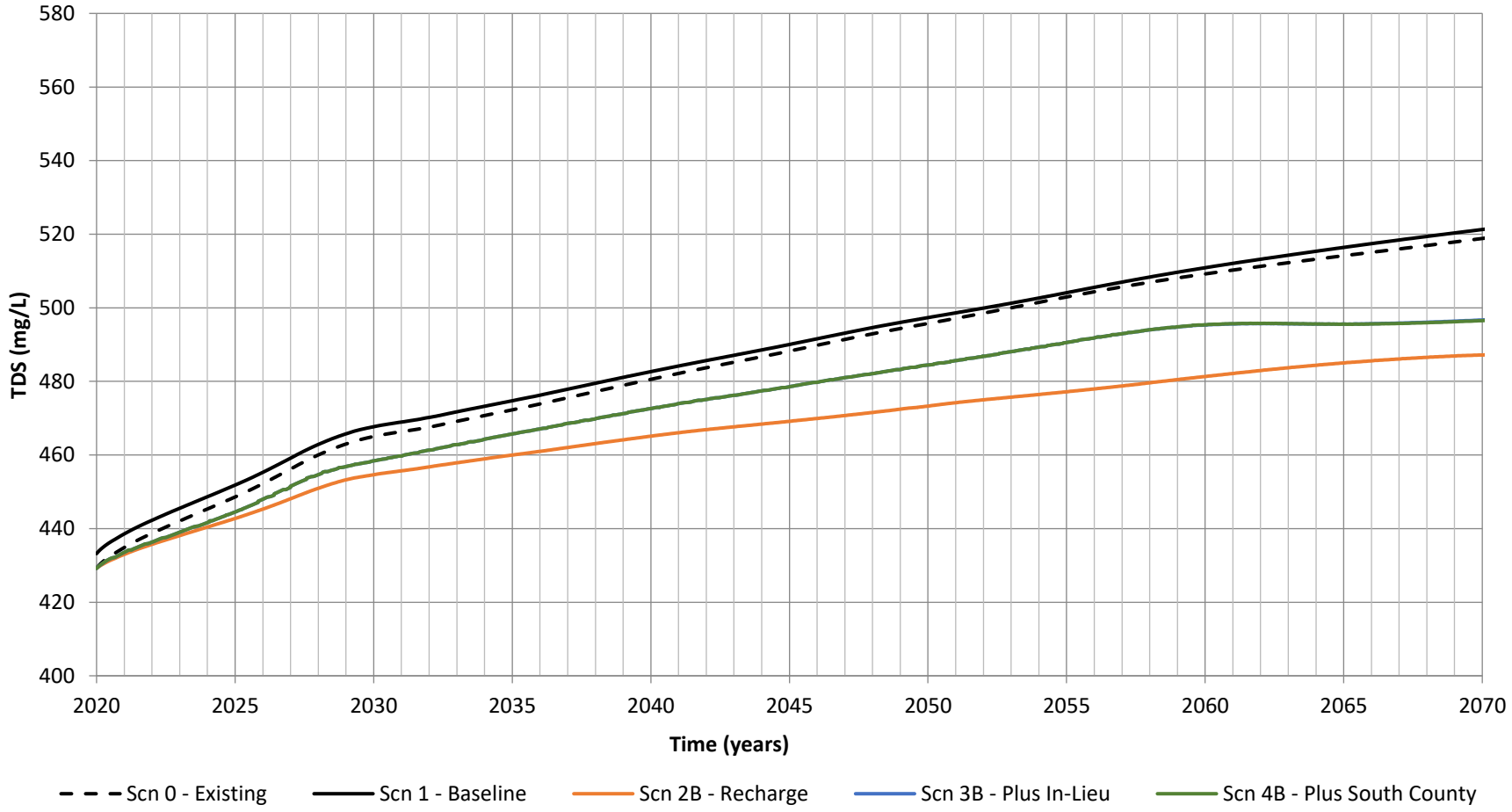
Model-Predicted Net Water Quality at the OCWD Wells - Scenario 'B' Boron Concentrations



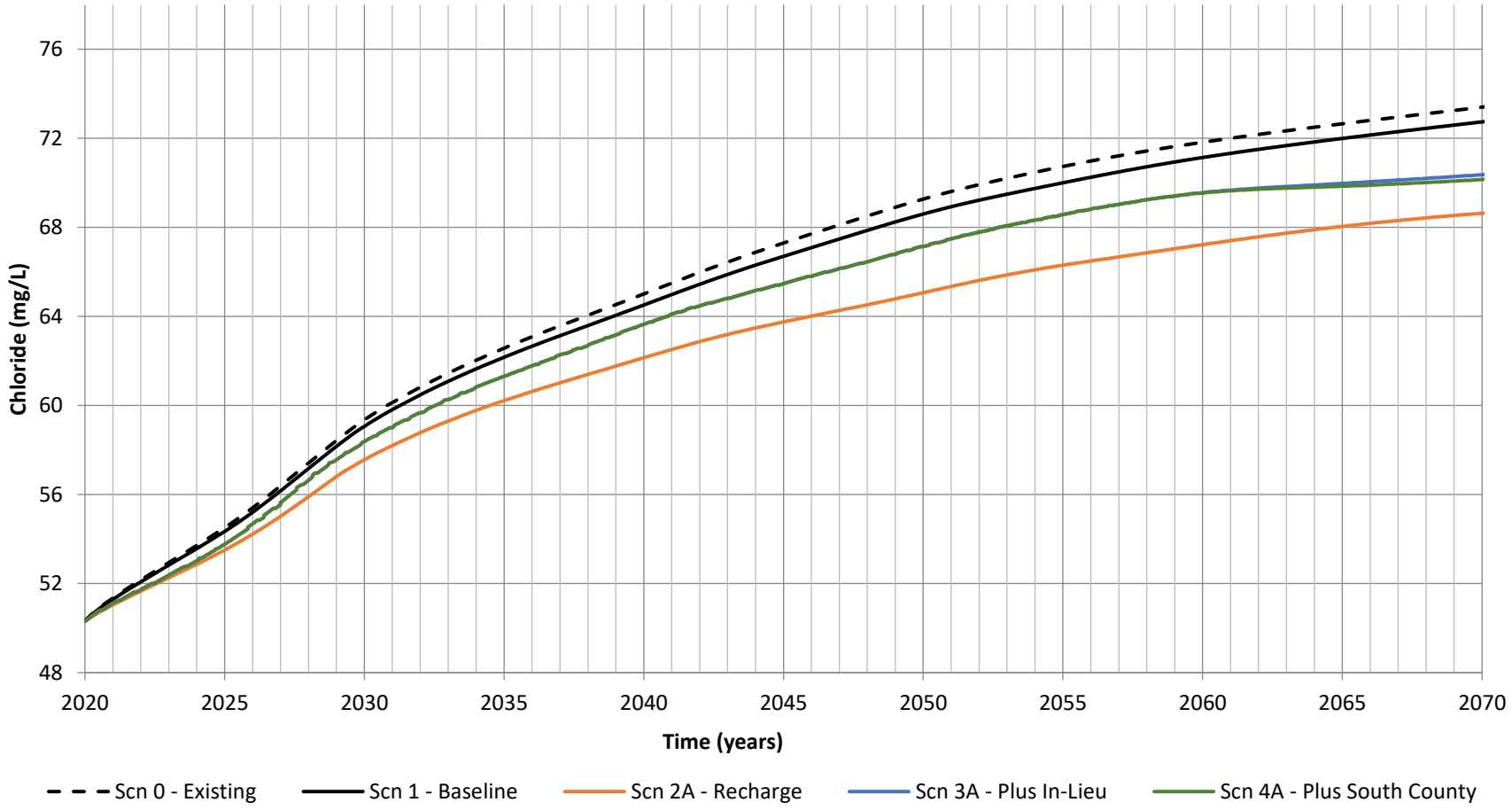
Model-Predicted Net Water Quality at the Santa Ana Wells - Scenario 'A' TDS Concentrations



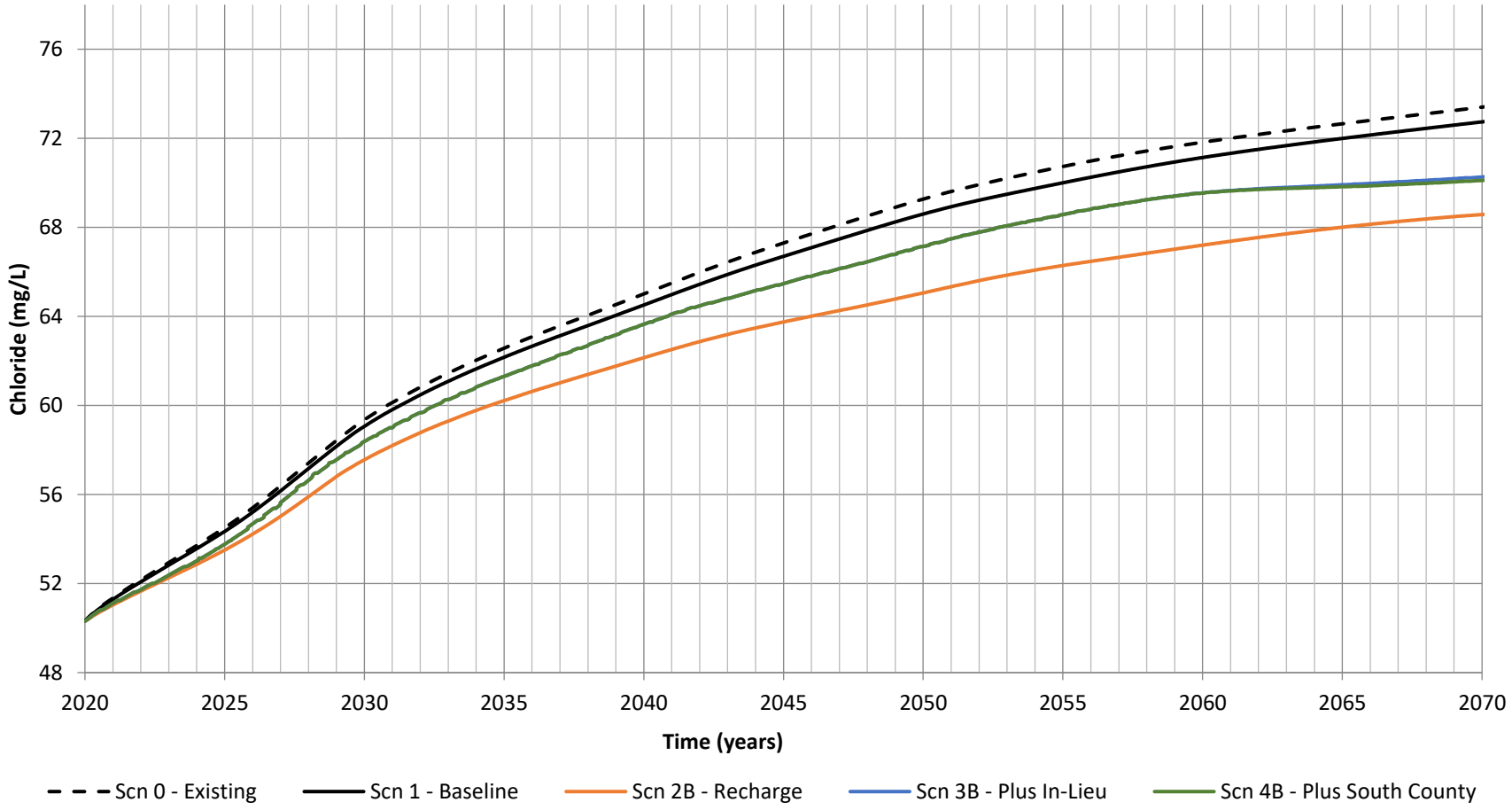
Model-Predicted Net Water Quality at the Santa Ana Wells - Scenario 'B' TDS Concentrations



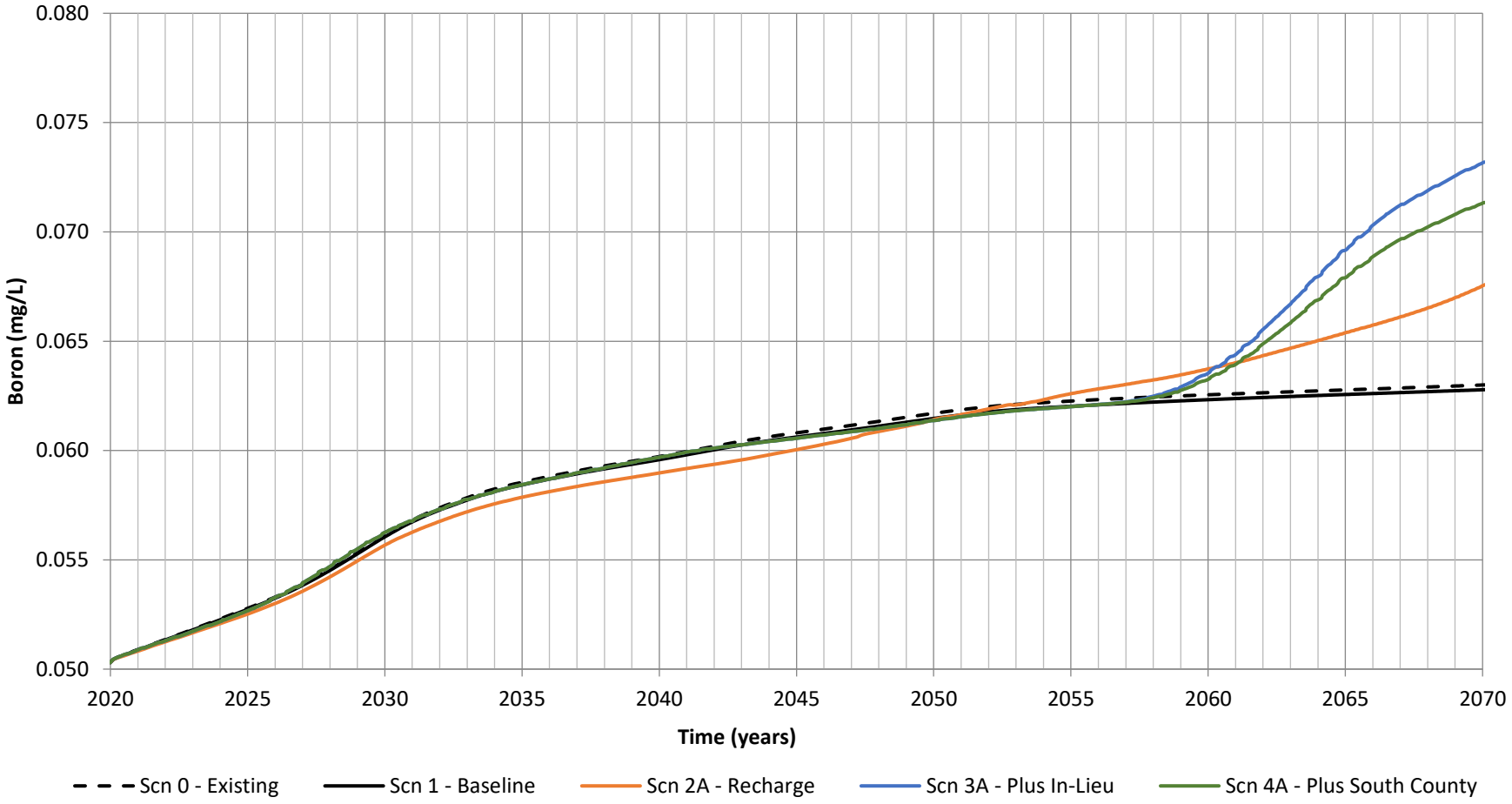
Model-Predicted Net Water Quality at the Santa Ana Wells - Scenario 'A' Chloride Concentrations



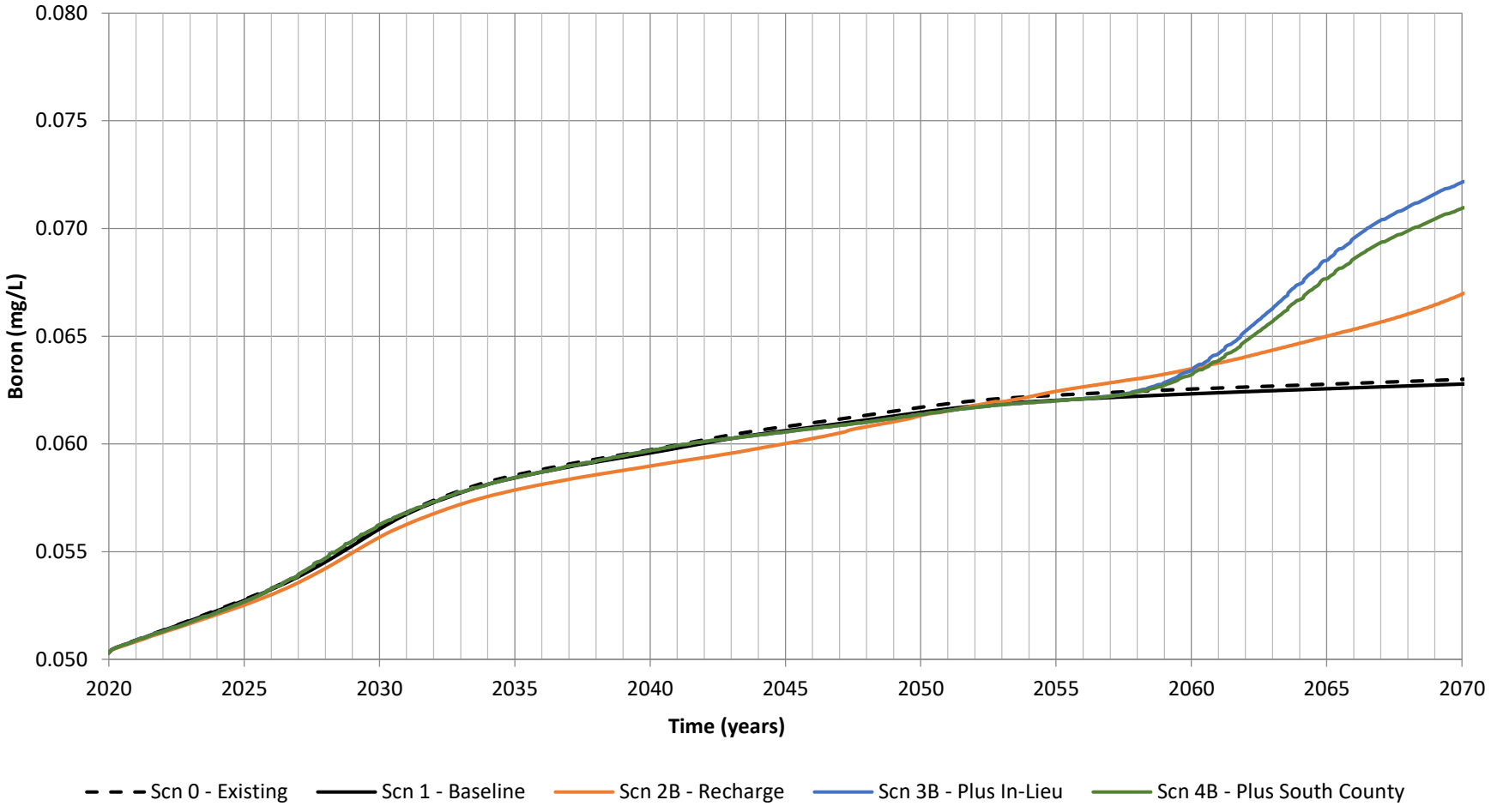
Model-Predicted Net Water Quality at the Santa Ana Wells - Scenario 'B' Chloride Concentrations



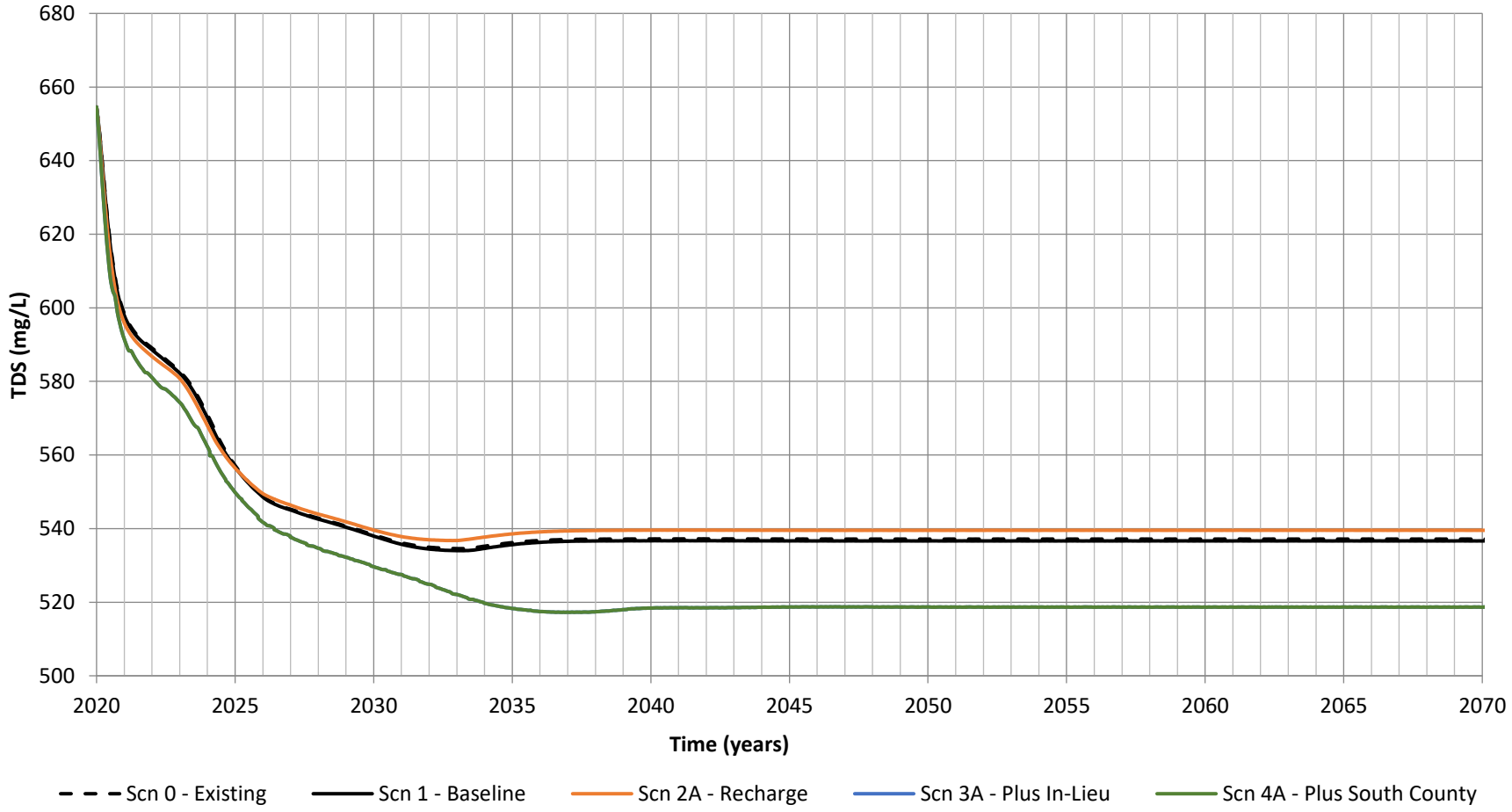
Model-Predicted Net Water Quality at the Santa Ana Wells - Scenario 'A' Boron Concentrations



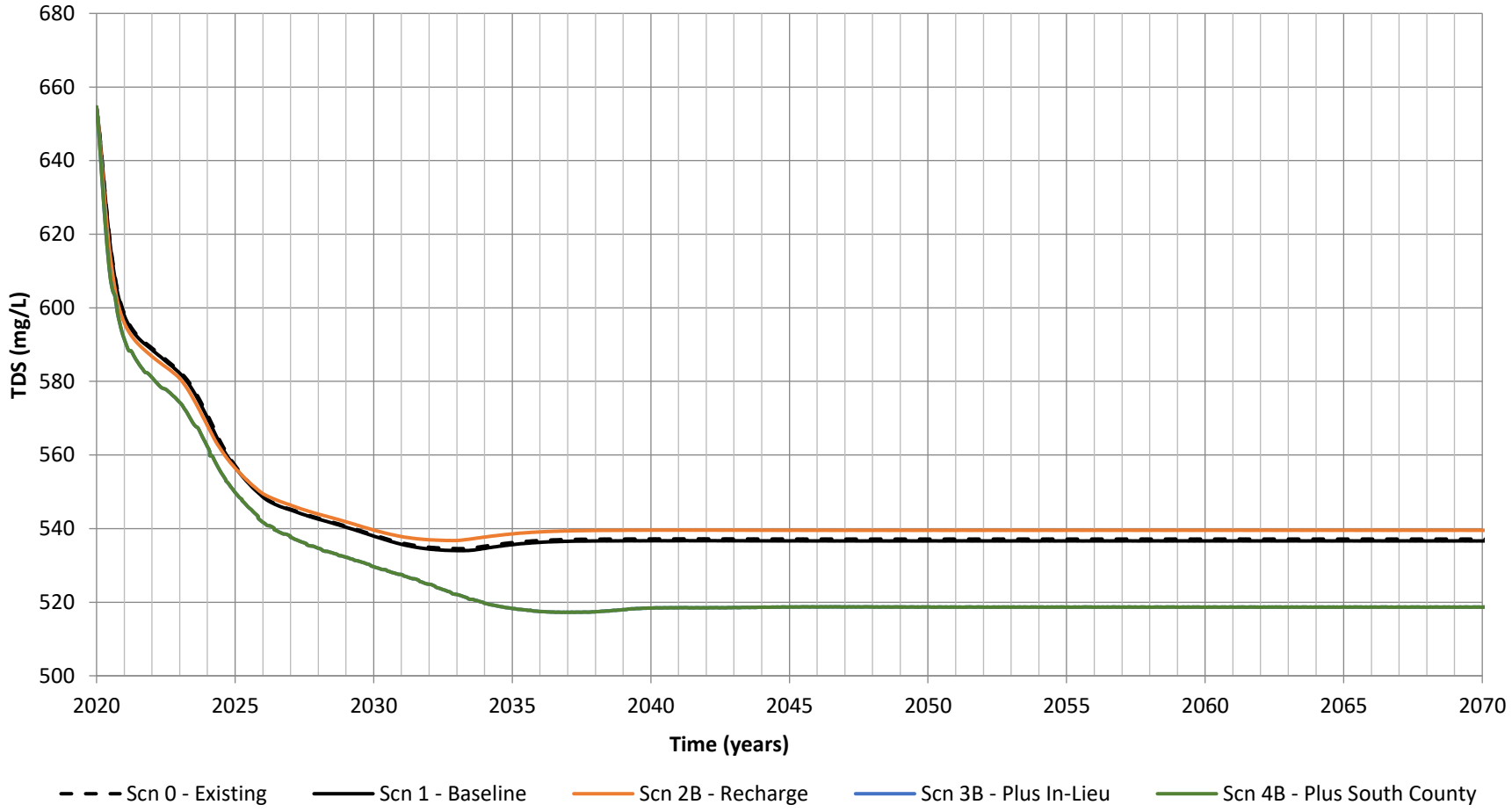
Model-Predicted Net Water Quality at the Santa Ana Wells - Scenario 'B' Boron Concentrations



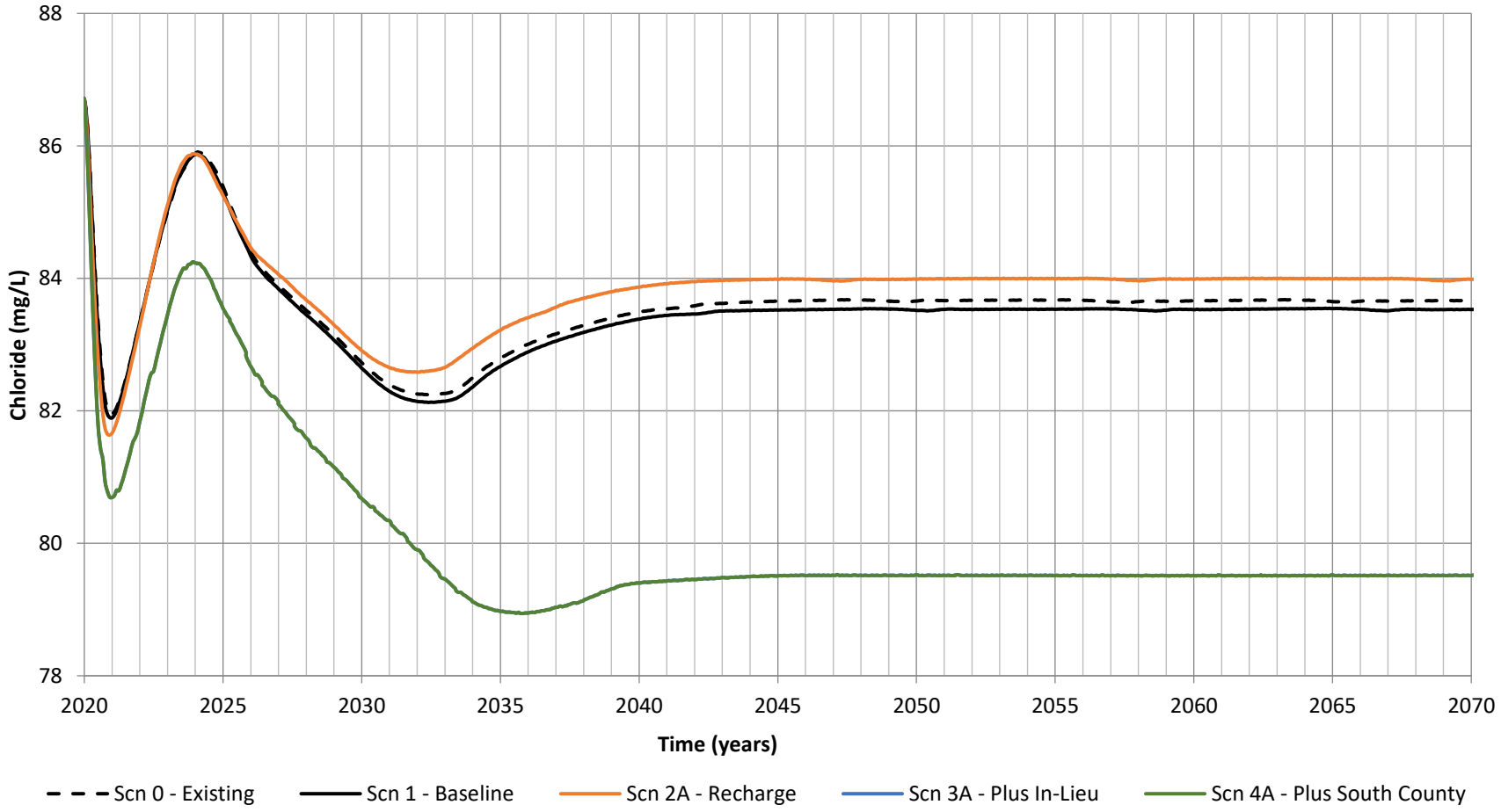
Model-Predicted Net Water Quality at the Tustin Wells - Scenario 'A' TDS Concentrations



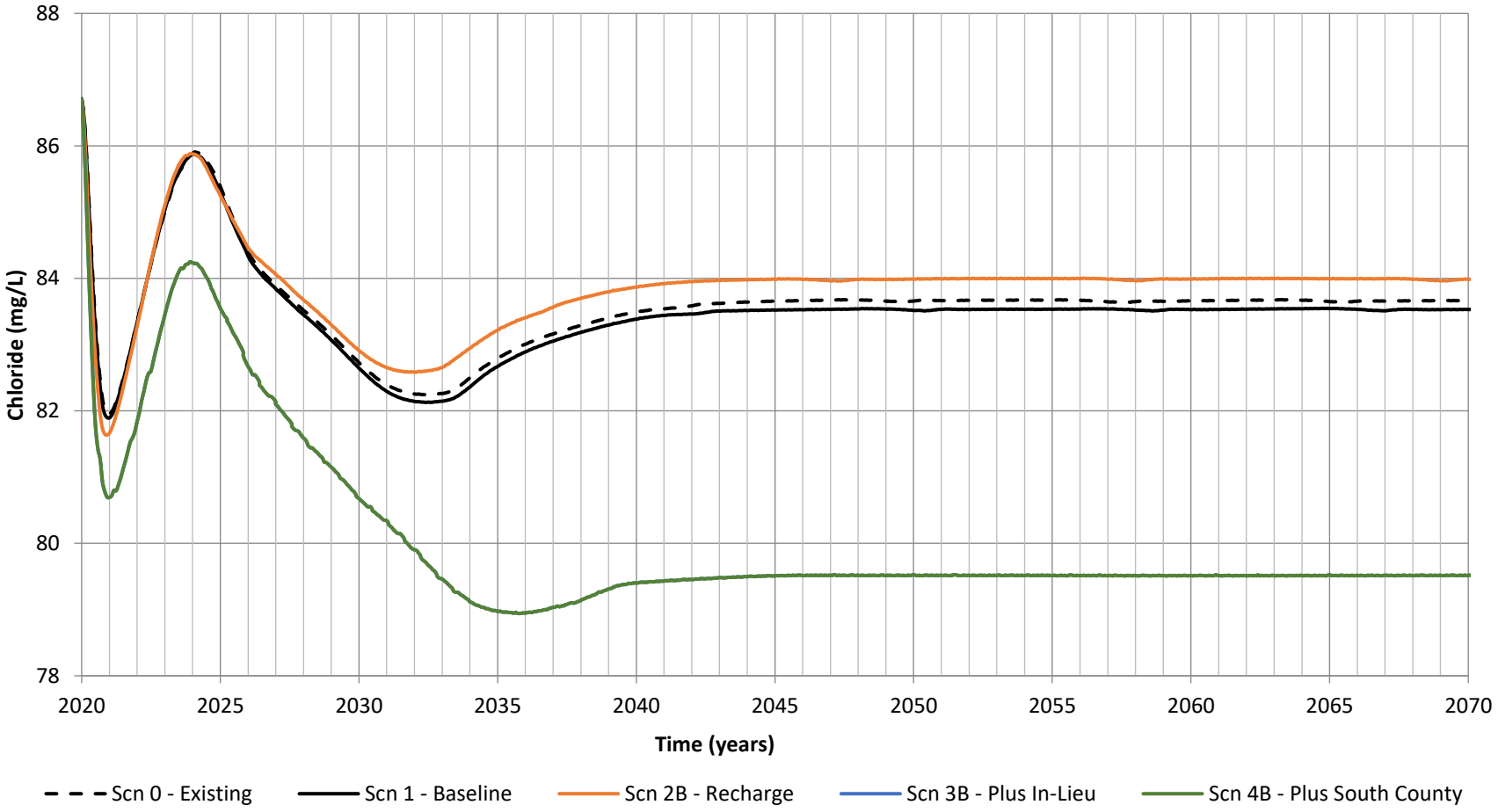
Model-Predicted Net Water Quality at the Tustin Wells - Scenario 'B' TDS Concentrations



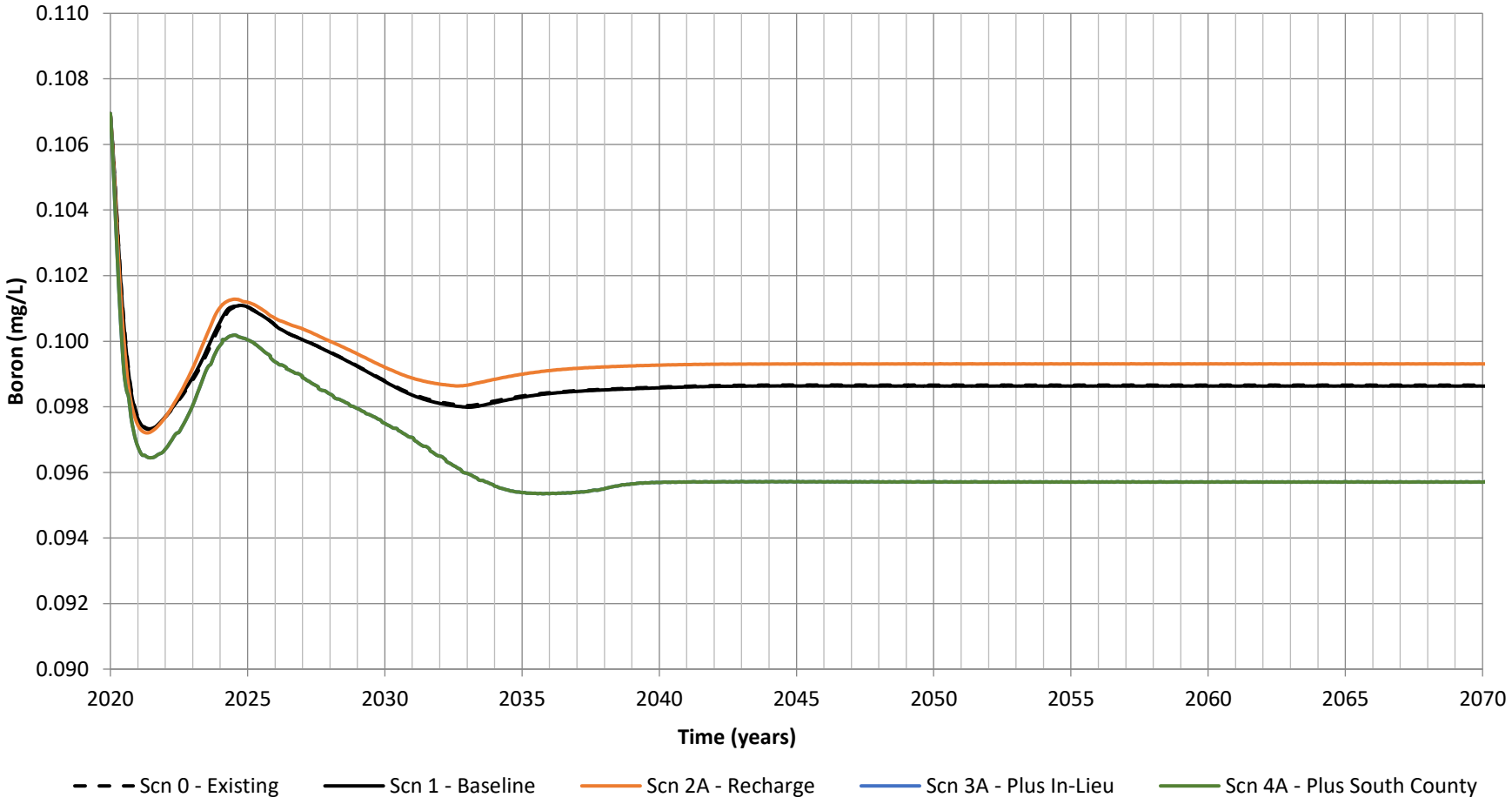
Model-Predicted Net Water Quality at the Tustin Wells - Scenario 'A' Chloride Concentrations



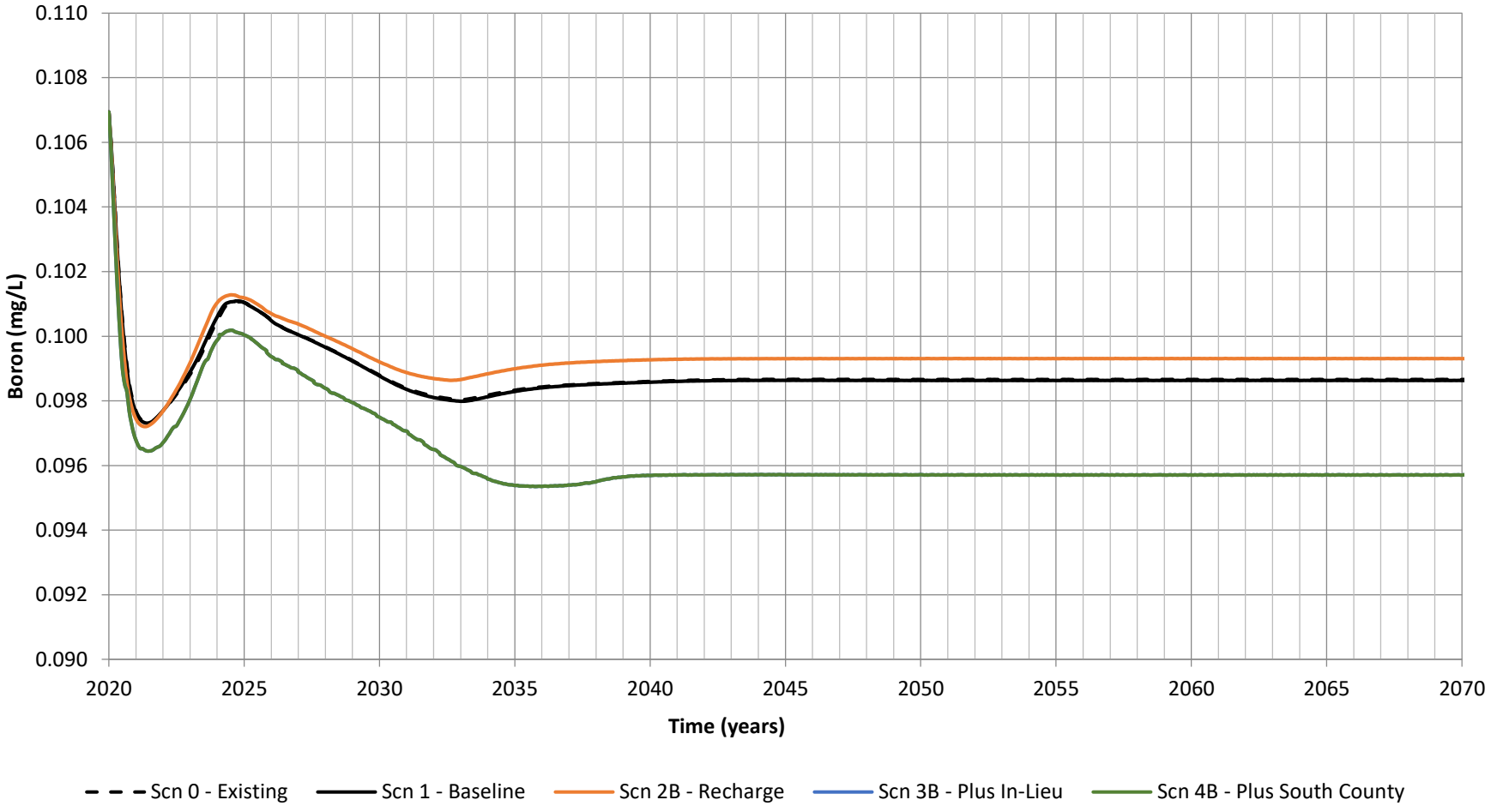
Model-Predicted Net Water Quality at the Tustin Wells - Scenario 'B' Chloride Concentrations



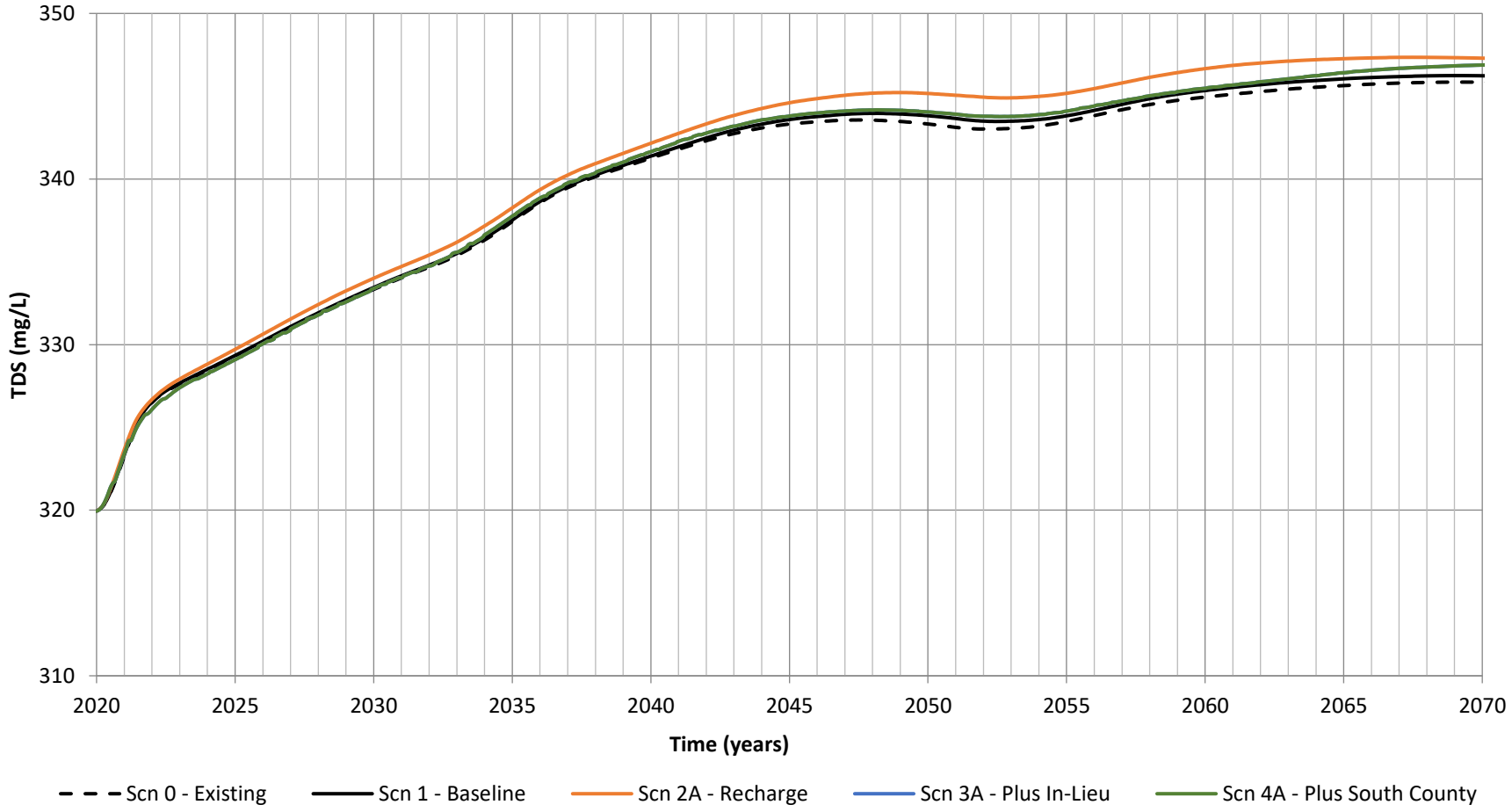
Model-Predicted Net Water Quality at the Tustin Wells - Scenario 'A' Boron Concentrations



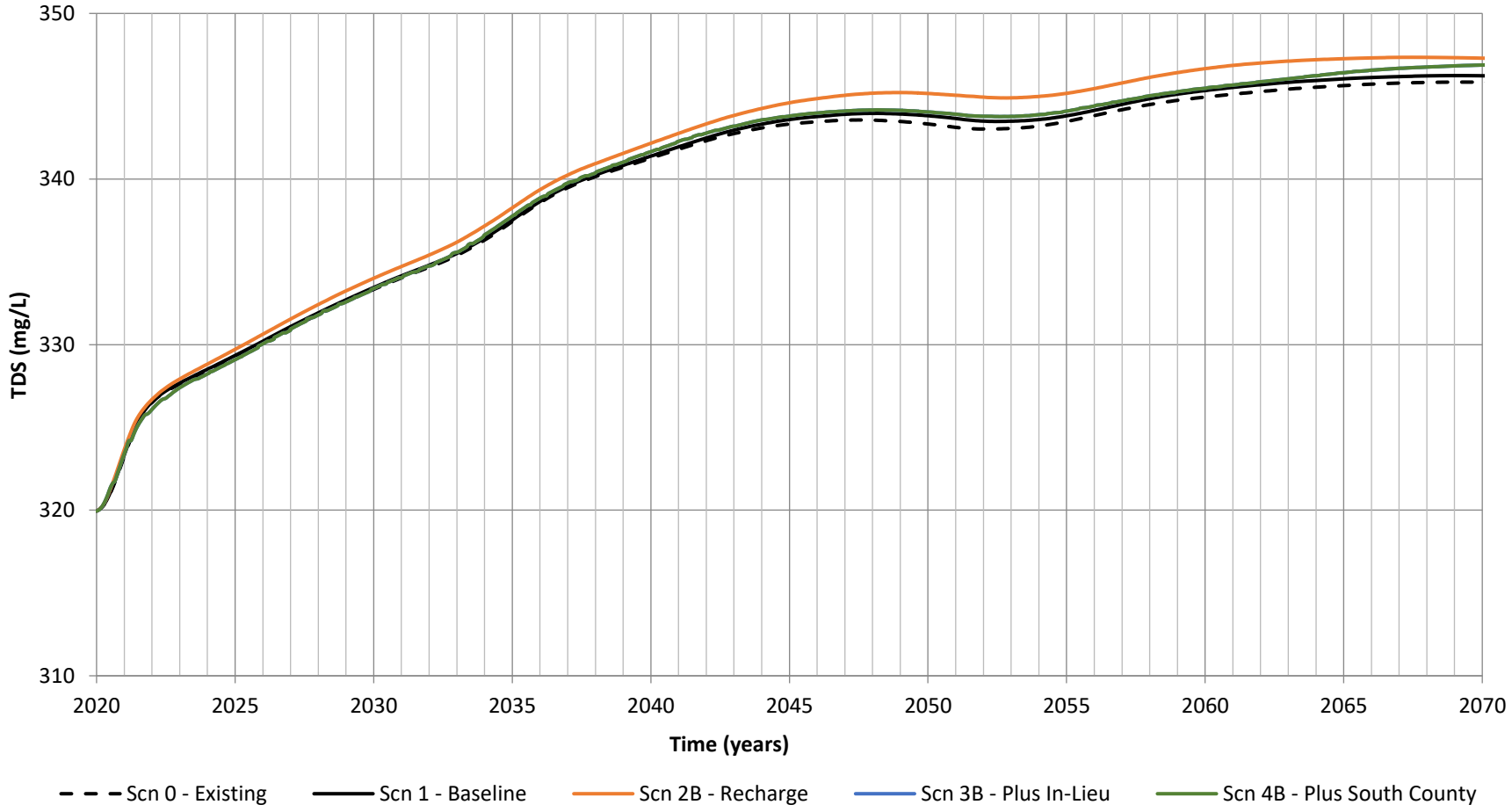
Model-Predicted Net Water Quality at the Tustin Wells - Scenario 'B' Boron Concentrations



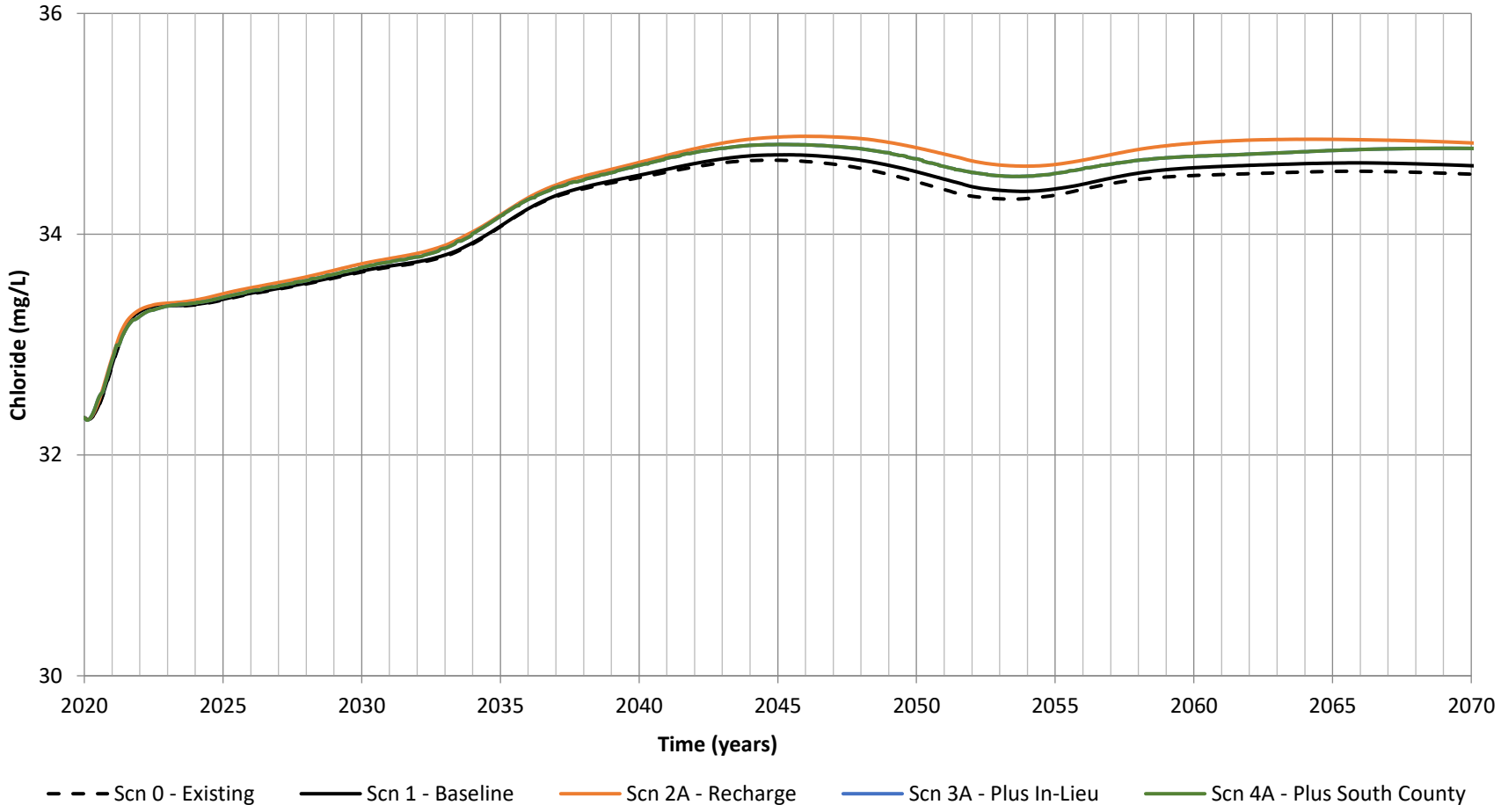
Model-Predicted Net Water Quality at the Westminster Wells - Scenario 'A' TDS Concentrations



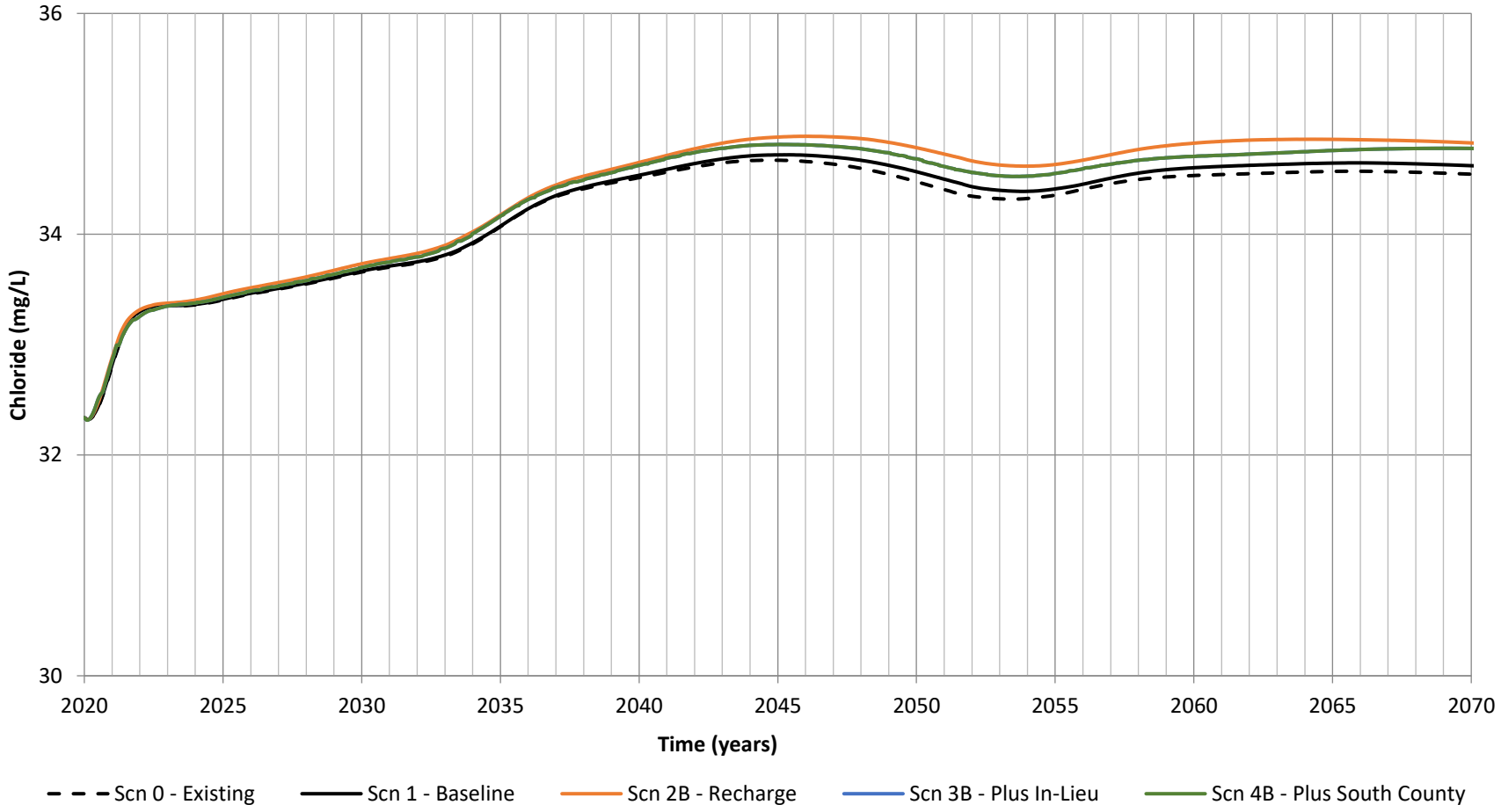
Model-Predicted Net Water Quality at the Westminster Wells - Scenario 'B' TDS Concentrations



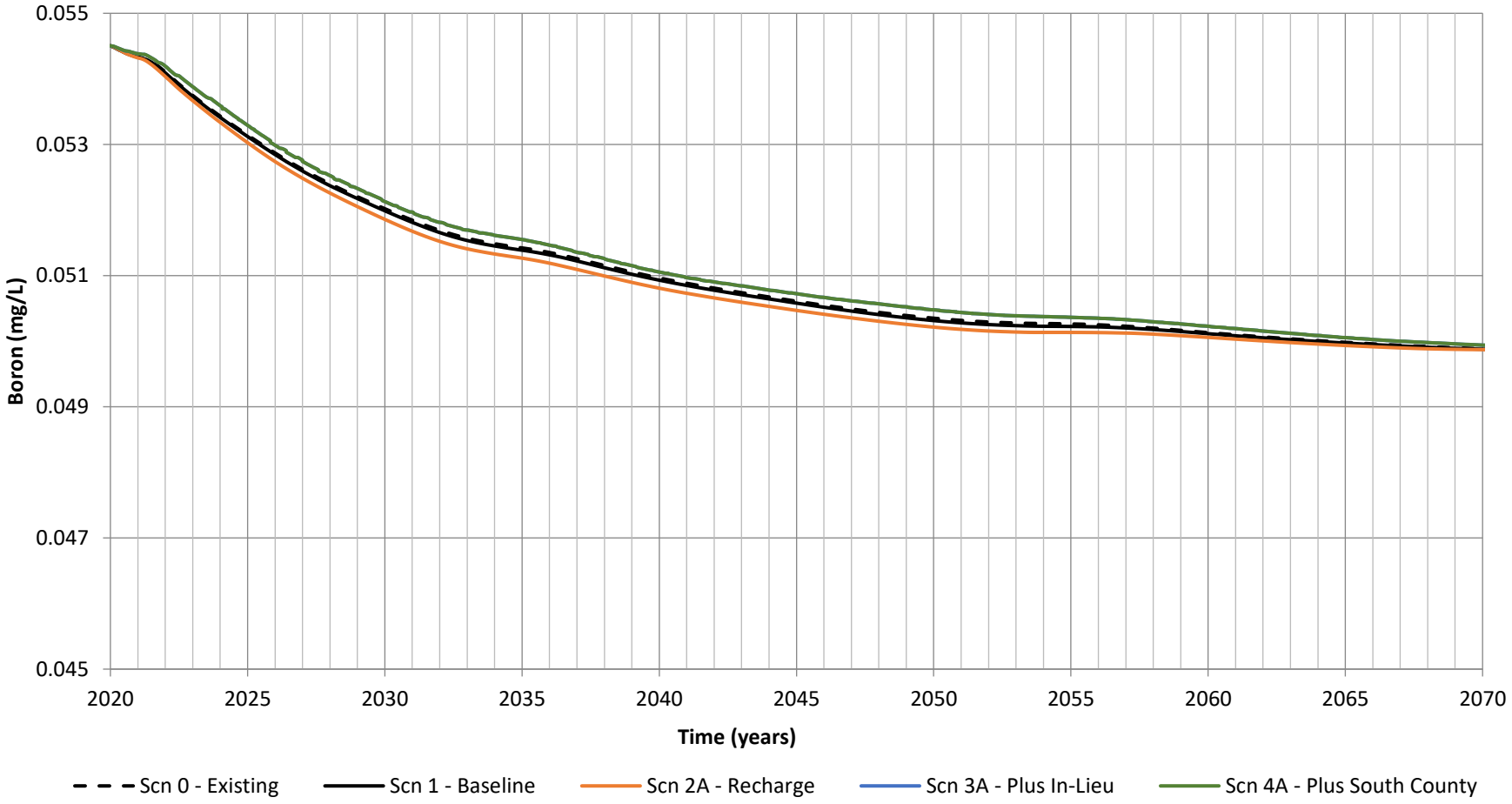
Model-Predicted Net Water Quality at the Westminster Wells - Scenario 'A' Chloride Concentrations



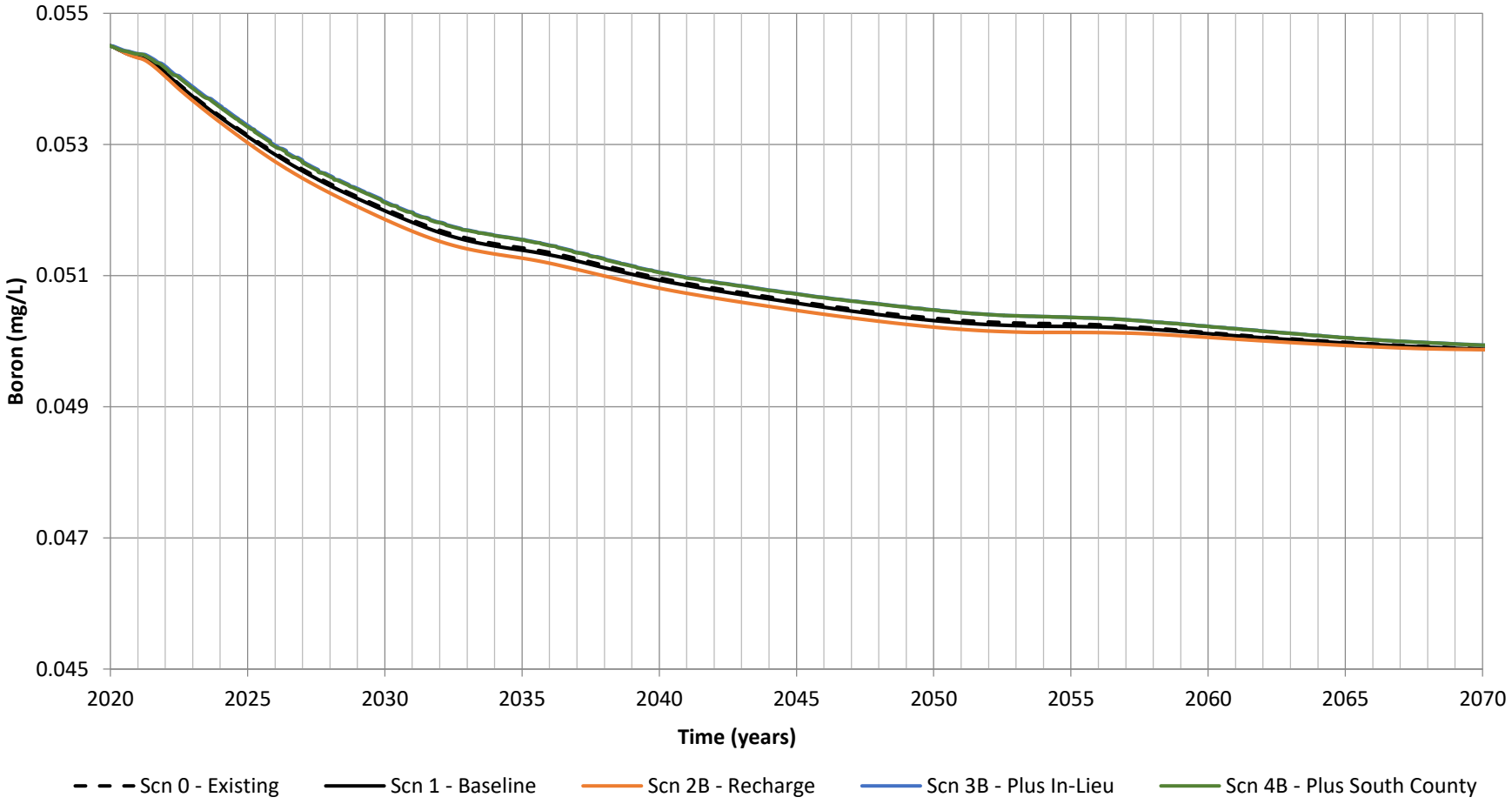
Model-Predicted Net Water Quality at the Westminster Wells - Scenario 'B' Chloride Concentrations



Model-Predicted Net Water Quality at the Westminster Wells - Scenario 'A' Boron Concentrations



Model-Predicted Net Water Quality at the Westminster Wells - Scenario 'B' Boron Concentrations



Comparison of Total Concentrations in 2070 by Entity

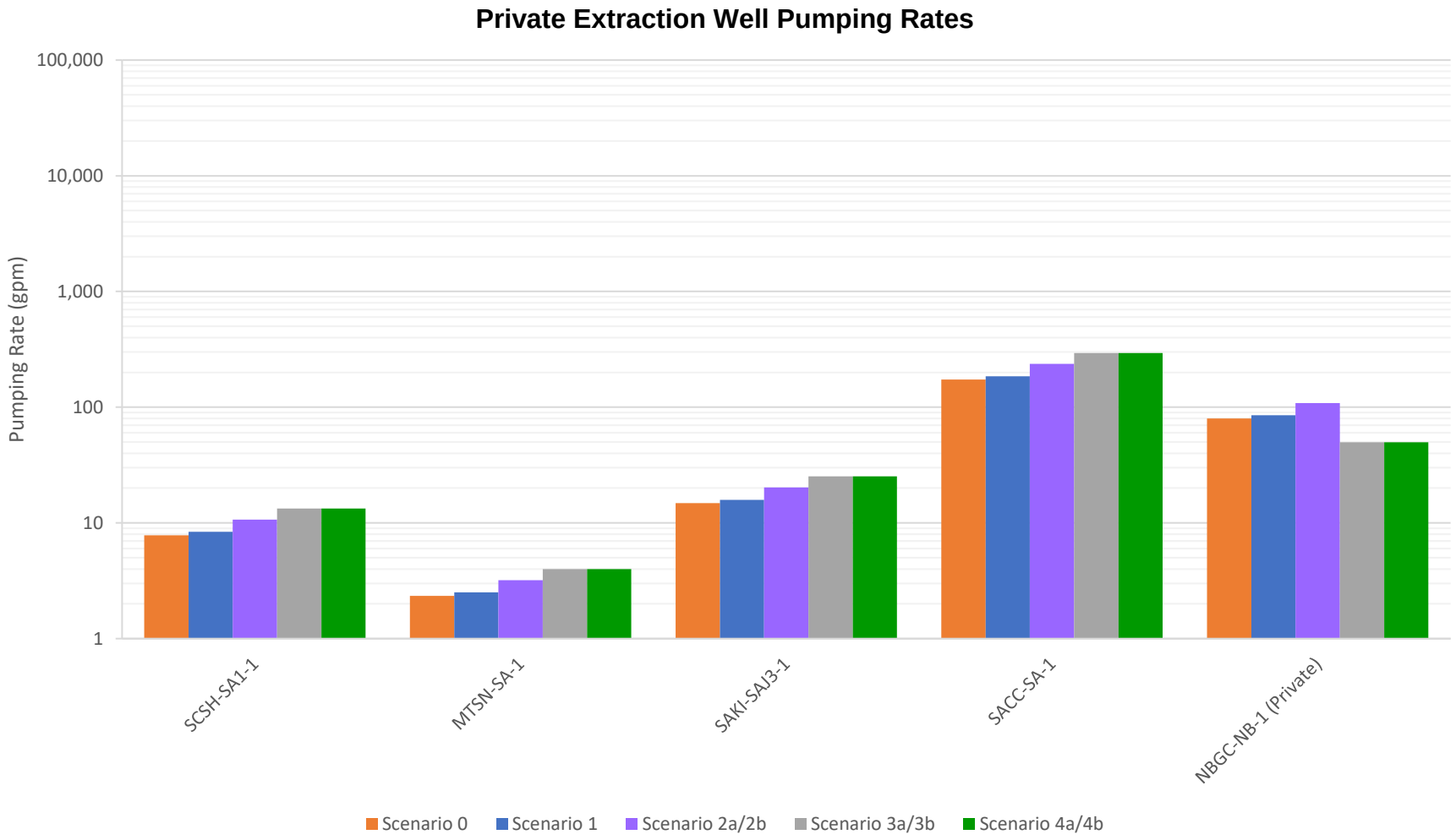
Entity	Constituent of Concern	Scenario 0	Scenario 1	Scenario 2a		Scenario 3a		Scenario 4a		Scenario 2b		Scenario 3b		Scenario 4b	
		Total Concentration (mg/L)[1]	Total Concentration (mg/L)	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1
Fountain Valley	TDS	341	338	310	-8%	318	-6%	317	-6%	307	-9%	317	-6%	317	-6%
	Chloride	35	35	33	-5%	33	-5%	33	-6%	33	-6%	33	-6%	33	-6%
	Boron	0.05	0.05	0.08	68%	0.07	37%	0.06	30%	0.08	60%	0.07	33%	0.06	28%
Huntington Beach	TDS	282	284	321	13%	295	4%	295	4%	298	5%	285	0%	285	0%
	Chloride	28	29	39	36%	33	17%	33	17%	36	26%	32	12%	32	12%
	Boron	0.09	0.08	0.16	96%	0.12	45%	0.12	44%	0.13	61%	0.11	29%	0.11	29%
Mesa Verde	TDS	67	78	382	388%	379	385%	377	382%	163	109%	166	113%	165	112%
	Chloride	11	14	109	667%	108	661%	107	656%	82	475%	82	474%	81	471%
	Boron	0.27	0.29	1.09	278%	1.07	271%	1.06	269%	0.82	183%	0.80	178%	0.80	177%
Mesa Water District	TDS	214	208	379	82%	418	101%	417	101%	297	43%	291	40%	291	40%
	Chloride	42	40	98	146%	110	178%	110	177%	87	121%	94	138%	94	137%
	Boron	0.35	0.34	0.85	152%	0.87	160%	0.87	158%	0.67	98%	0.71	112%	0.71	111%
Newport Beach	TDS	59	62	335	442%	161	160%	340	450%	156	152%	339	449%	155	152%
	Chloride	7	7	90	1122%	68	826%	94	1183%	71	870%	94	1181%	71	868%
	Boron	0.24	0.24	0.88	265%	0.93	285%	0.93	284%	0.67	175%	0.70	190%	0.70	189%
OCWD	TDS	50	49	348	608%	348	607%	347	605%	156	218%	154	213%	157	219%
	Chloride	6	6	98	1477%	99	1481%	98	1465%	74	1093%	74	1092%	74	1085%
	Boron	0.25	0.25	0.97	288%	0.98	291%	0.97	285%	0.73	193%	0.74	194%	0.73	190%
Santa Ana	TDS	519	521	488	-6%	487	-7%	497	-5%	497	-5%	497	-5%	496	-5%
	Chloride	73	73	69	-6%	69	-6%	70	-3%	70	-3%	70	-4%	70	-4%
	Boron	0.06	0.06	0.07	8%	0.07	16%	0.07	14%	0.07	7%	0.07	15%	0.07	13%
Tustin	TDS	537	537	540	1%	519	-3%	519	-3%	540	1%	519	-3%	519	-3%
	Chloride	84	84	84	1%	80	-5%	80	-5%	84	1%	80	-5%	80	-5%
	Boron	0.10	0.10	0.10	1%	0.10	-3%	0.10	-3%	0.10	1%	0.10	-3%	0.10	-3%
Westminster	TDS	346	346	347	0%	347	0%	347	0%	347	0%	347	0%	347	0%
	Chloride	35	35	35	1%	35	1%	35	0%	35	0%	35	0%	35	0%
	Boron	0.05	0.05	0.05	0%	0.05	0%	0.05	0%	0.05	0%	0.05	0%	0.05	0%

Notes:

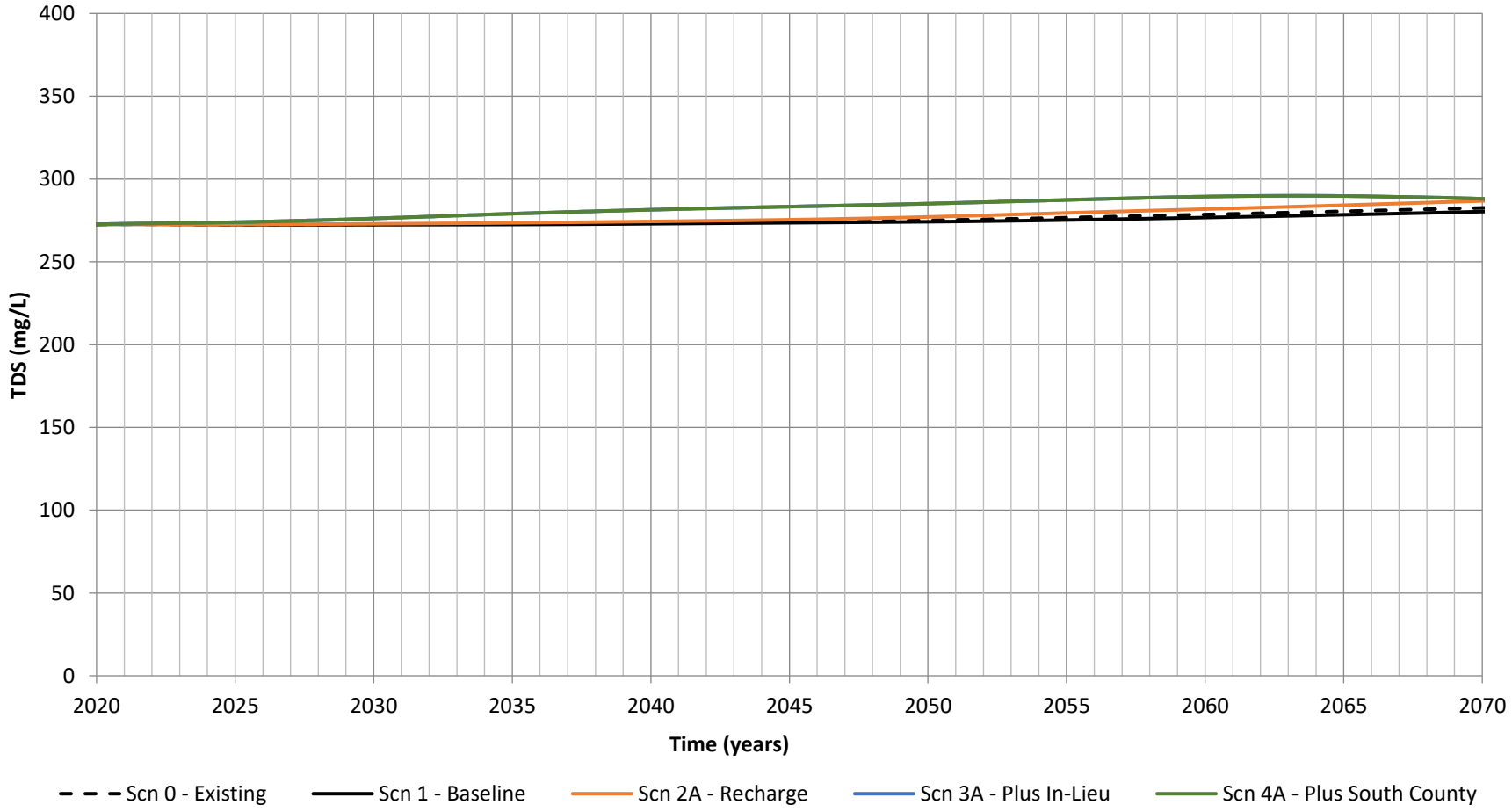
Highlighted cells indicate conditions where concentrations have increased by 50% or more when compared to Scenario 1 (Baseline).

Appendix B

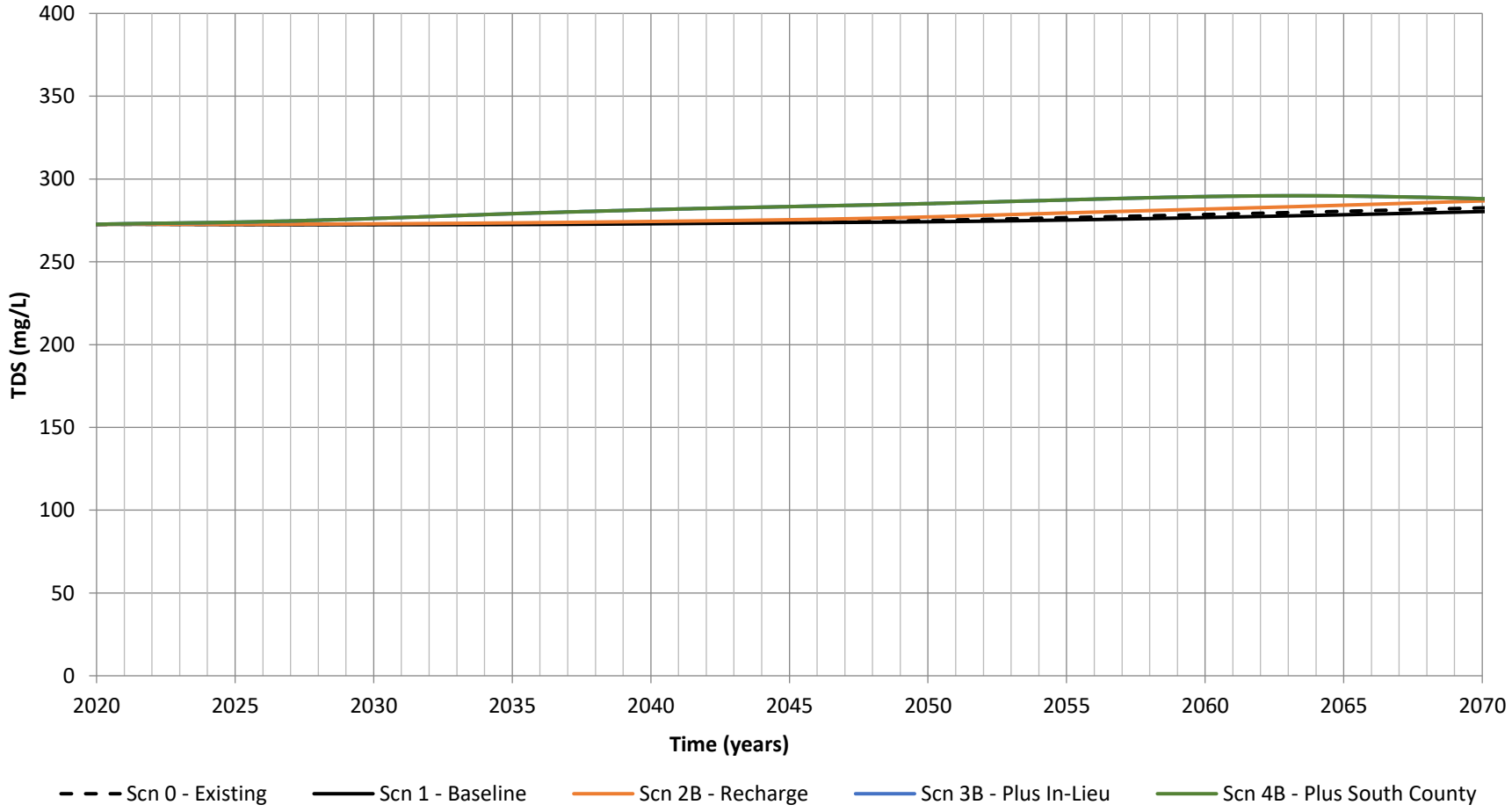
Model-Predicted Net Water Quality – Private Wells


Private Extraction Well Pumping Rates
Pumping Rate (gpm)
100,000
10,000
1,000
100
10
1
SCSH-SA1-1
MTSN-SA-1
SAKI-SAJ3-1
SACC-SA-1
NBGC-NB-1 (Private)
Scenario 0
Scenario 1
Scenario 2a/2b
Scenario 3a/3b
Scenario 4a/4b

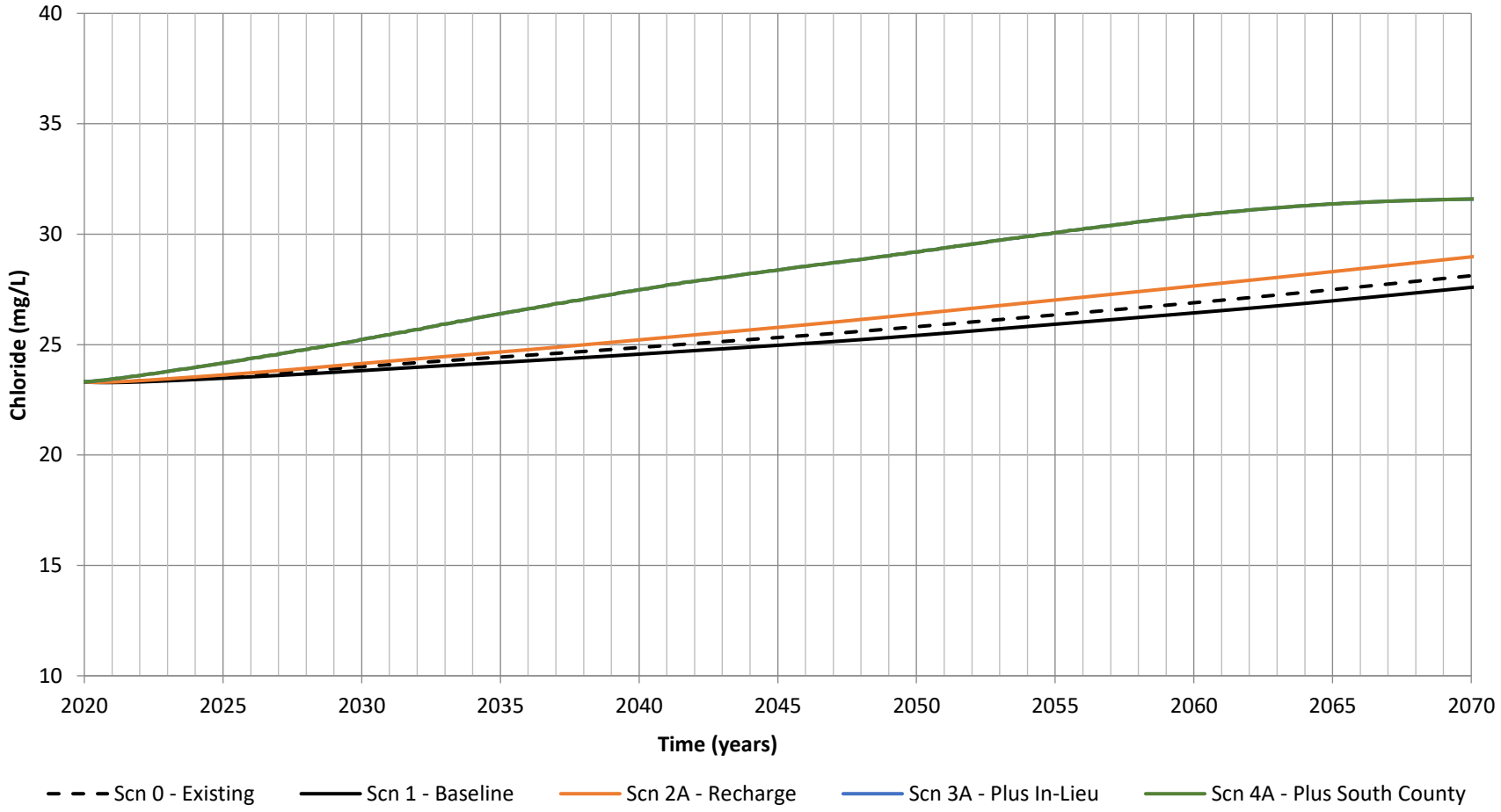
Model-Predicted Net Water Quality at Private Well SCSH-SA1-1 - Scenario 'A' TDS Concentrations



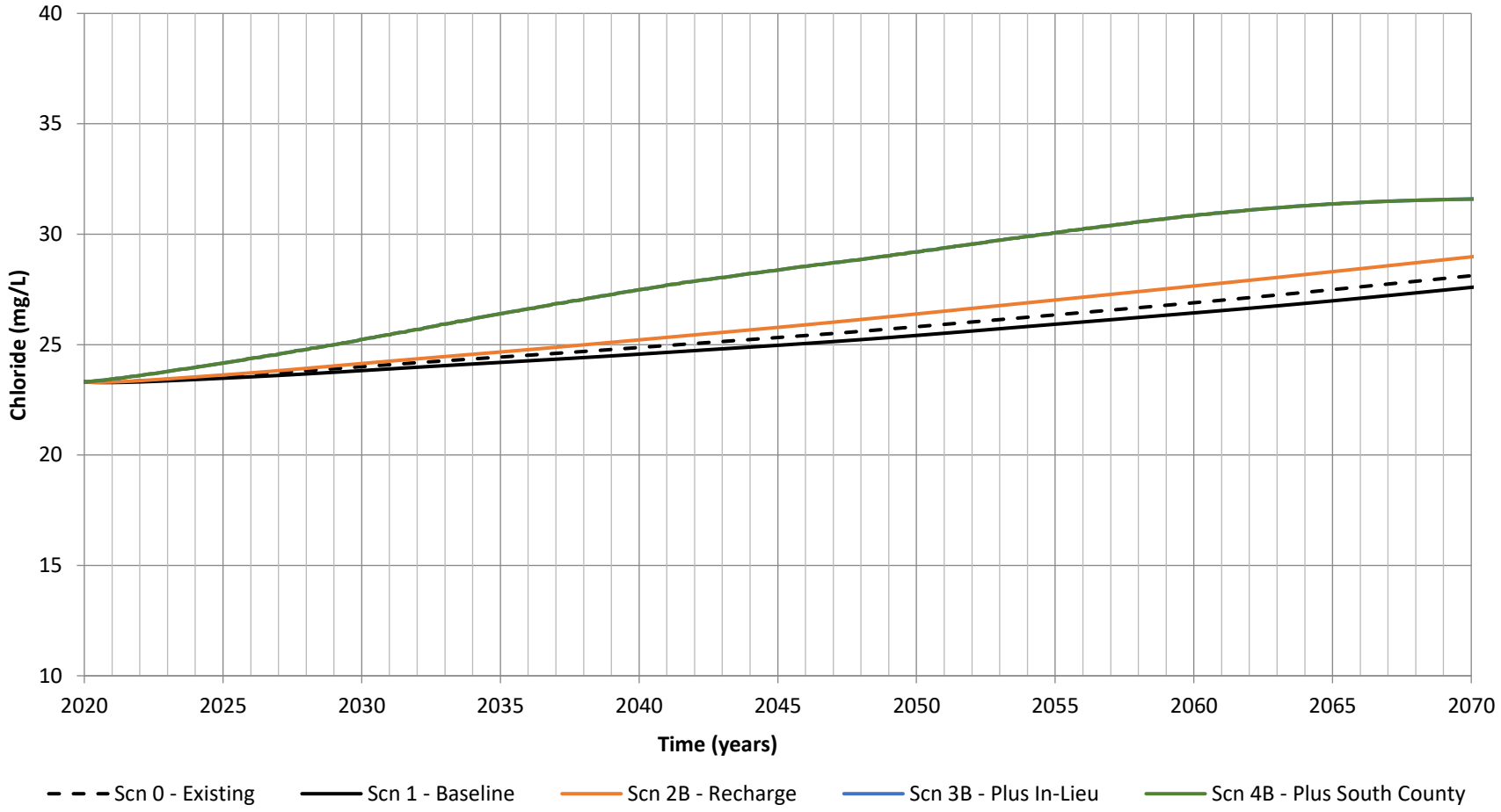
Model-Predicted Net Water Quality at Private Well SCSH-SA1-1 - Scenario 'B' TDS Concentrations



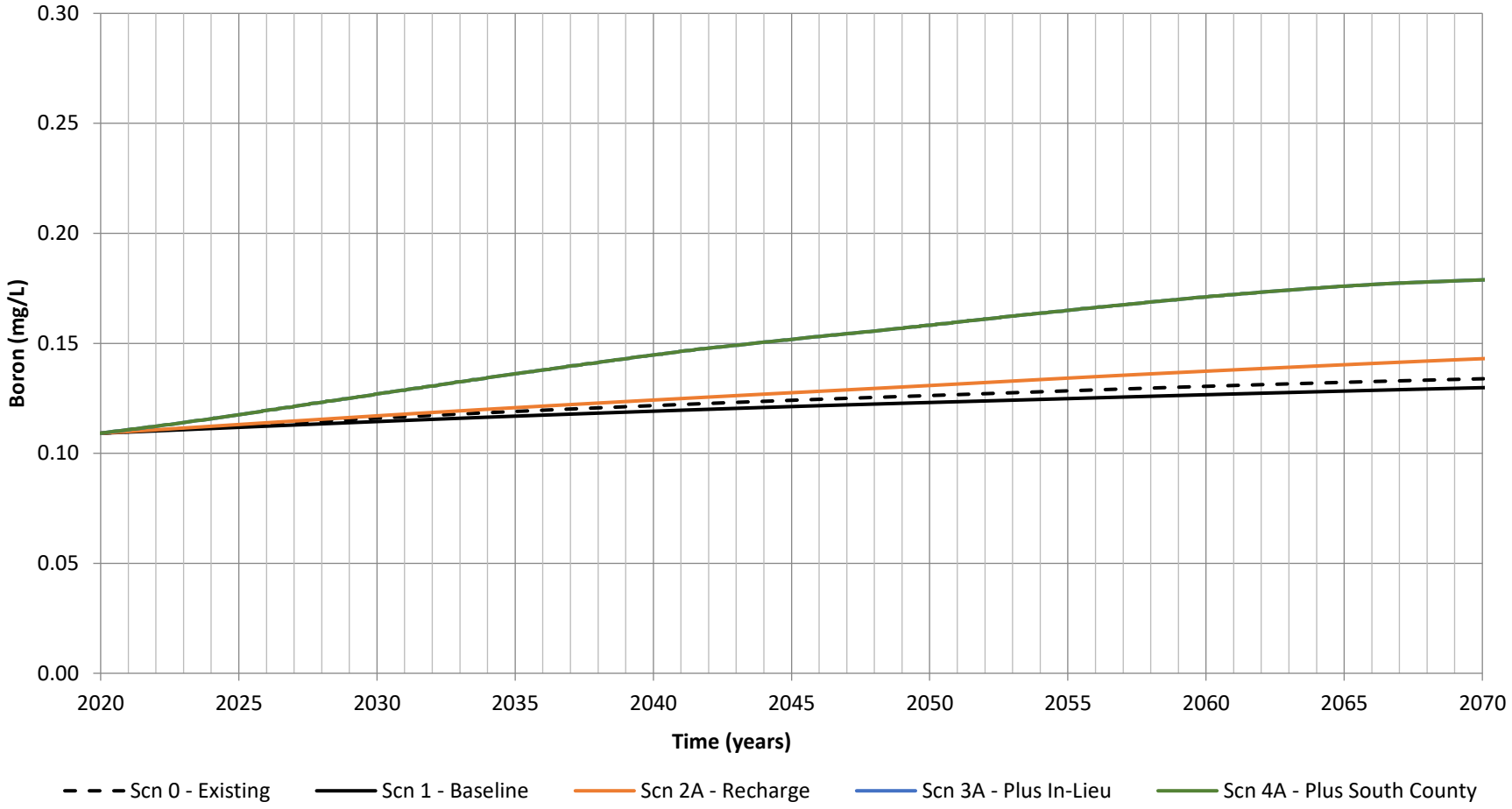
Model-Predicted Net Water Quality at Private Well SCSH-SA1-1 - Scenario 'A' Chloride Concentrations



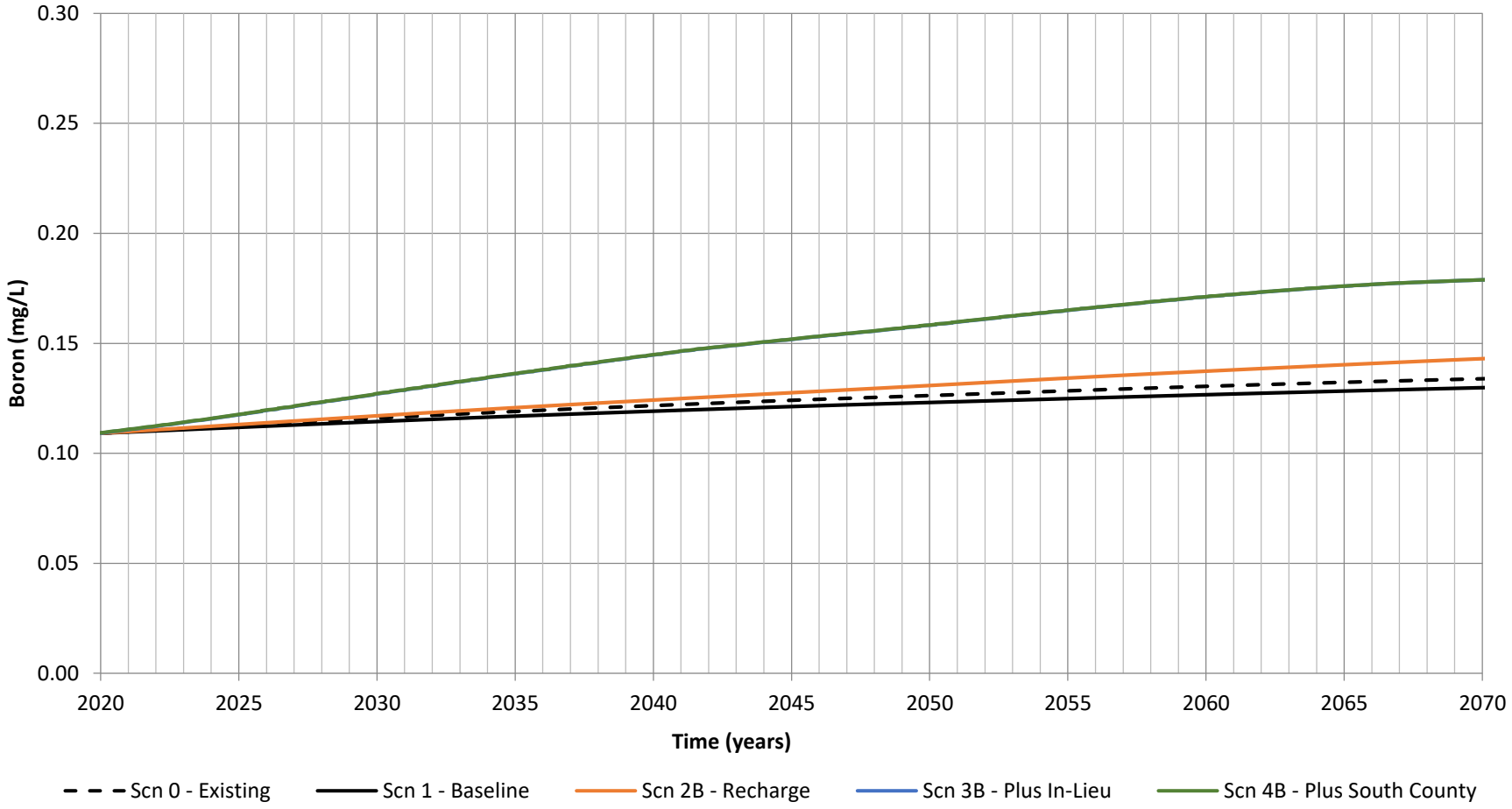
Model-Predicted Net Water Quality at Private Well SCSH-SA1-1 - Scenario 'B' Chloride Concentrations



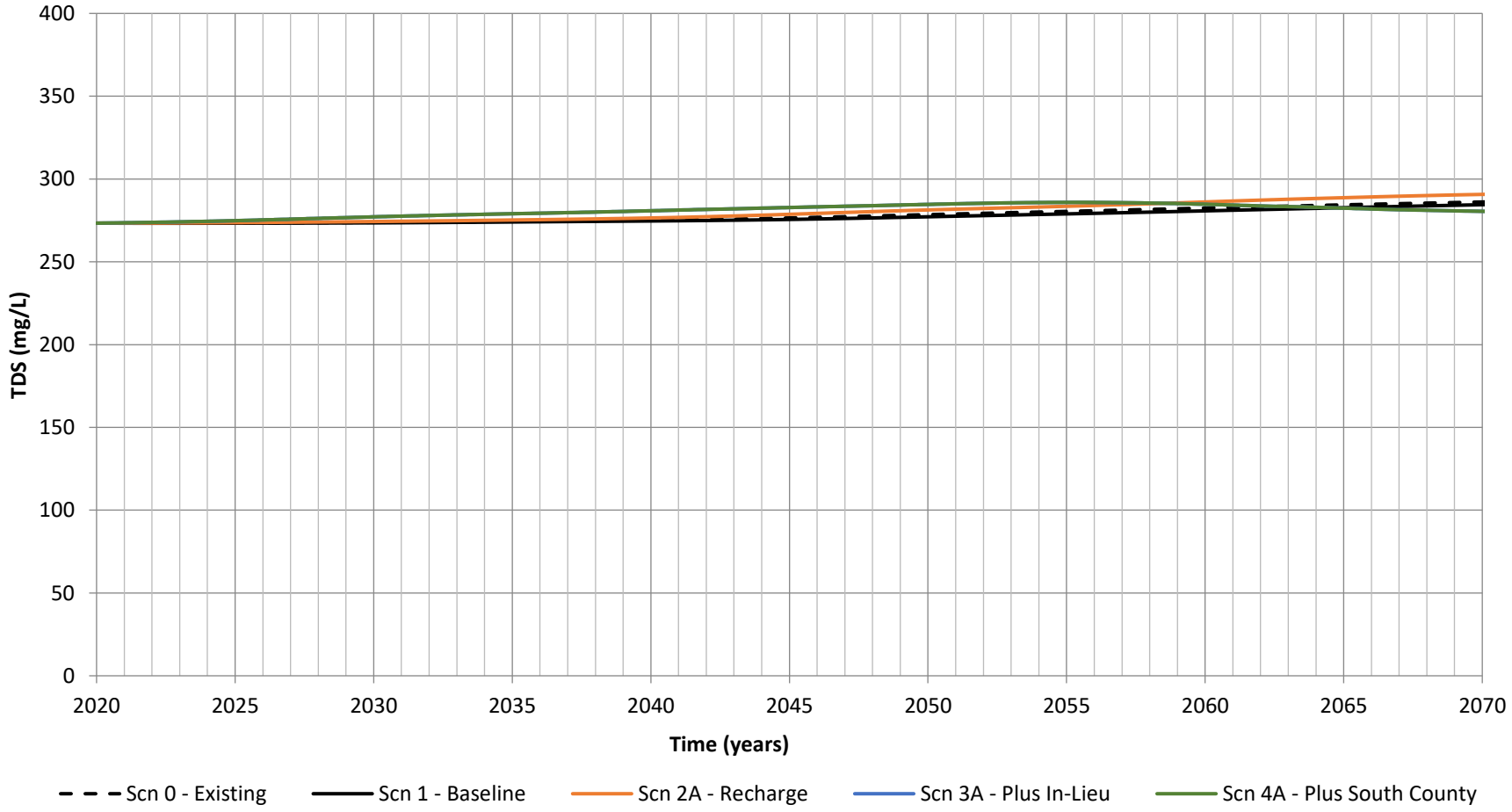
Model-Predicted Net Water Quality at Private Well SCSH-SA1-1 - Scenario 'A' Boron Concentrations



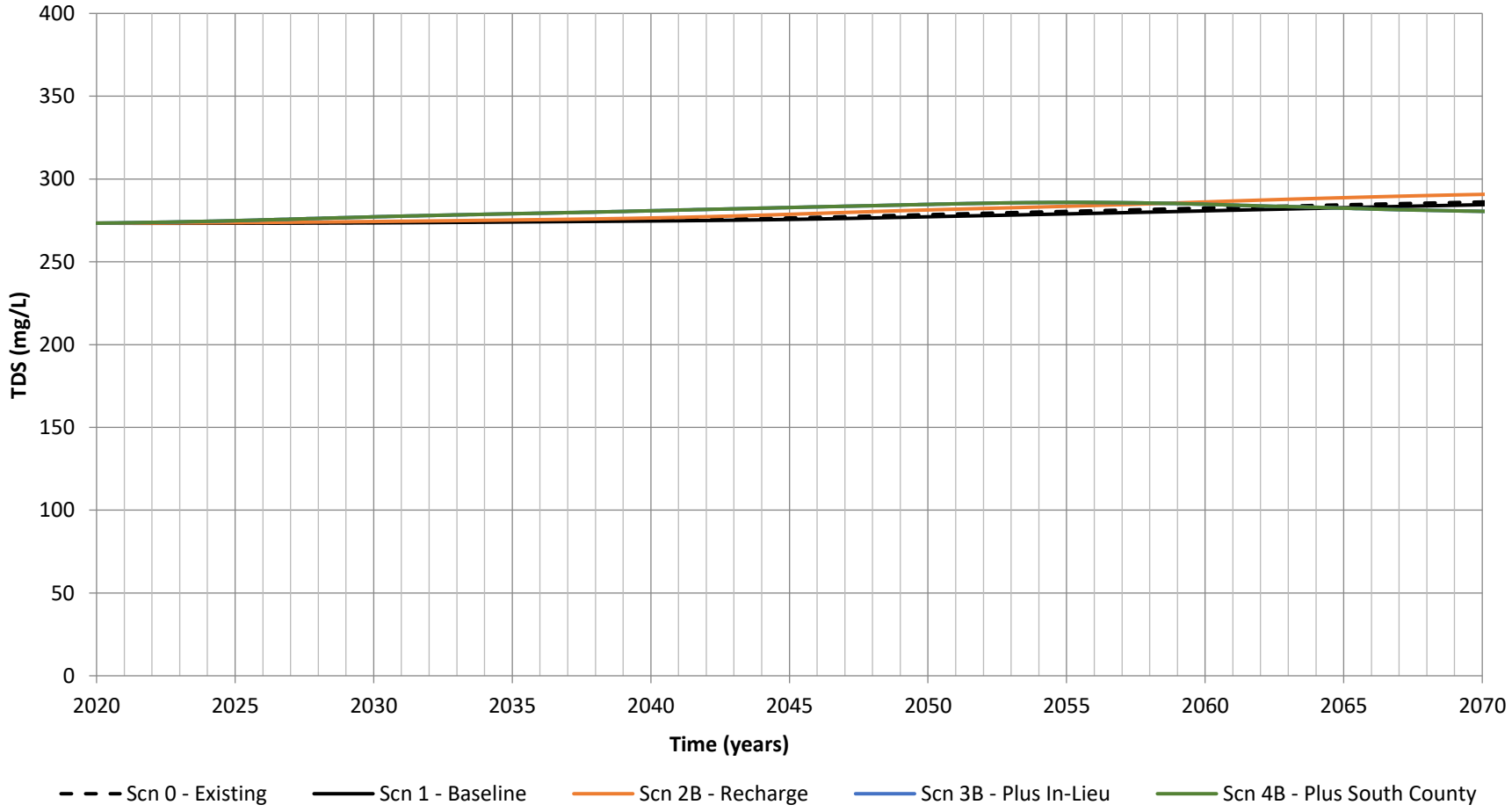
Model-Predicted Net Water Quality at Private Well SCSH-SA1-1 - Scenario 'B' Boron Concentrations



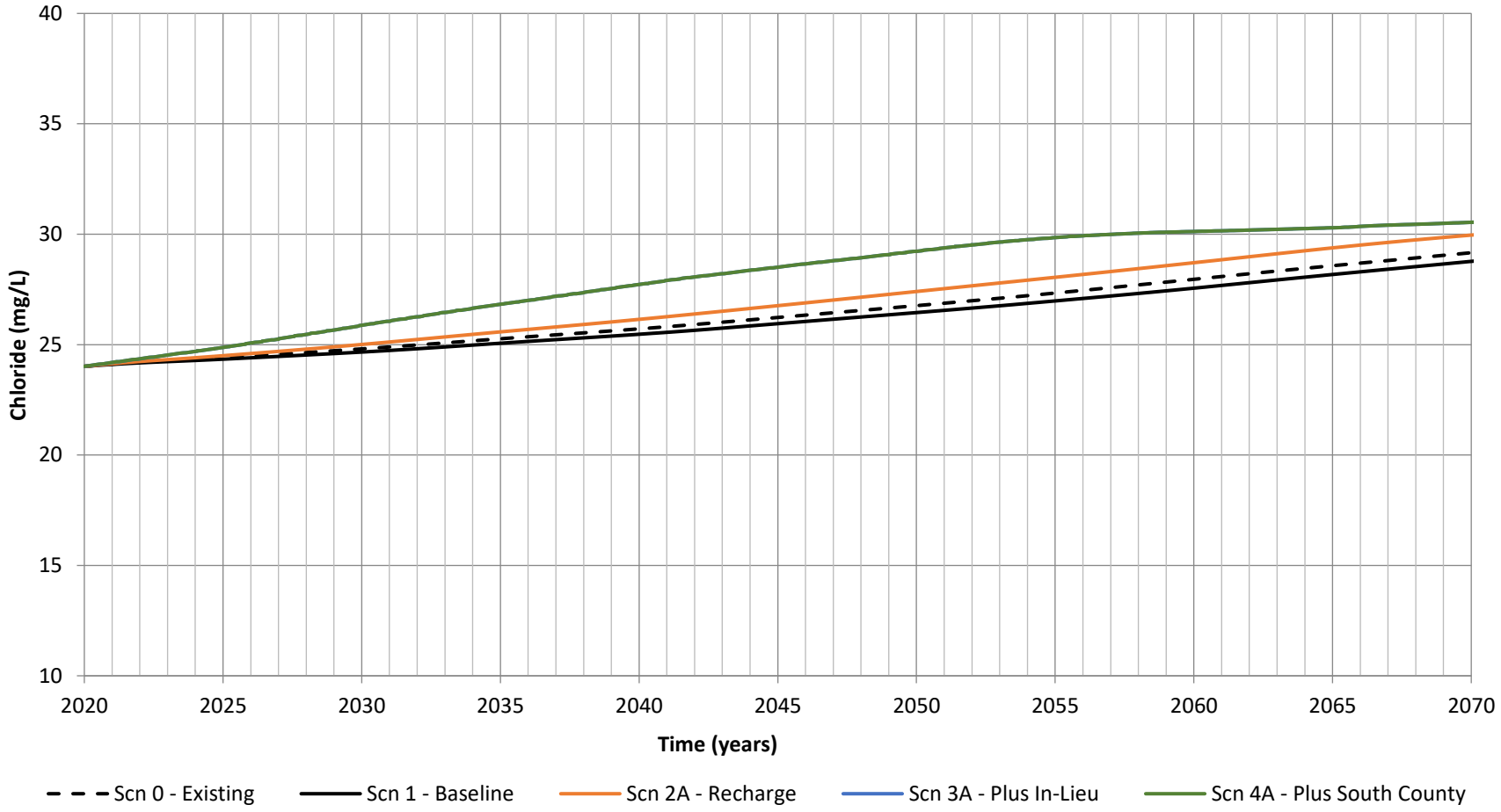
Model-Predicted Net Water Quality at Private Well MTSN-SA-1 - Scenario 'A' TDS Concentrations



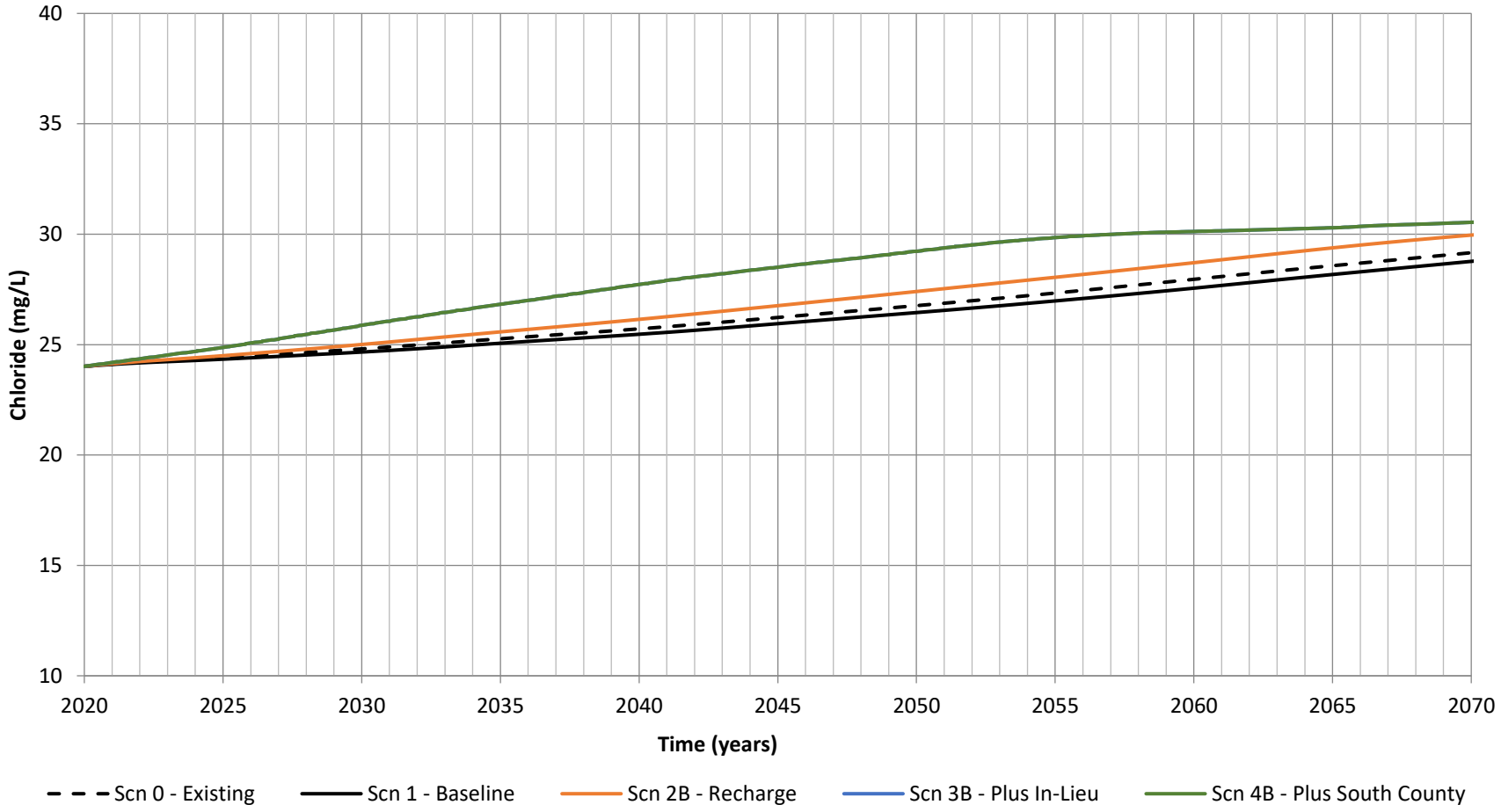
Model-Predicted Net Water Quality at Private Well MTSN-SA-1 - Scenario 'B' TDS Concentrations



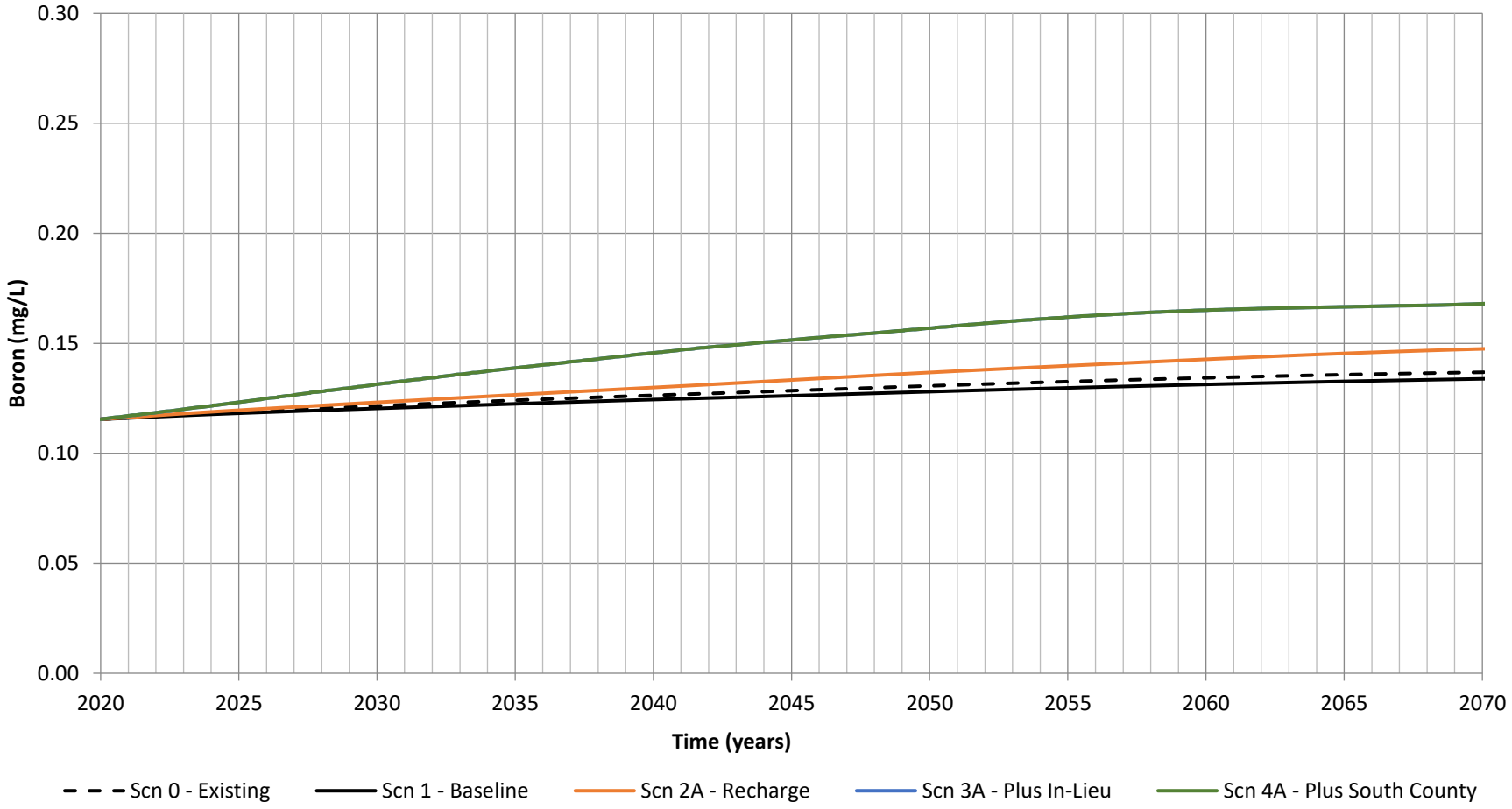
Model-Predicted Net Water Quality at Private Well MTSN-SA-1 - Scenario 'A' Chloride Concentrations



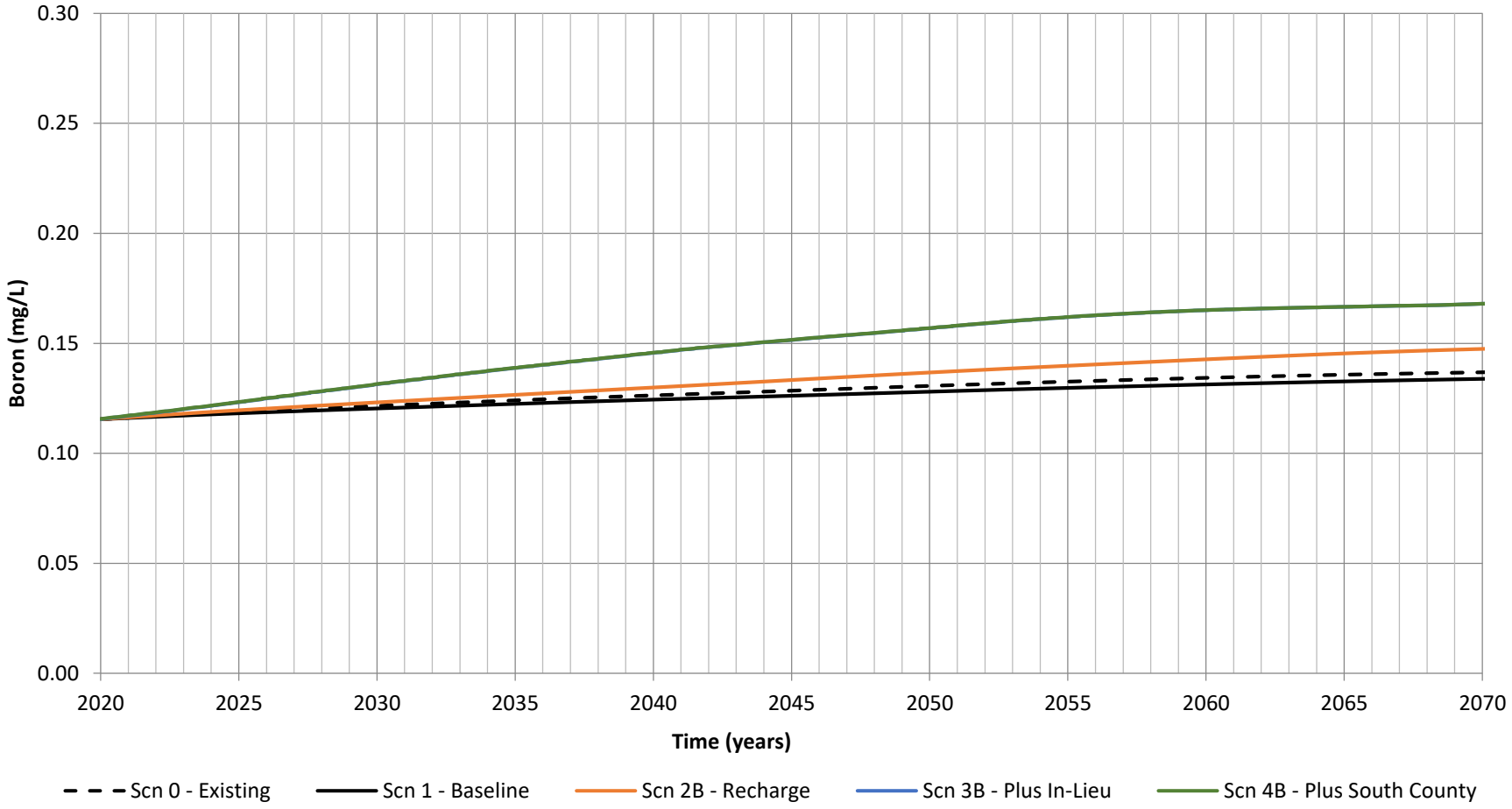
Model-Predicted Net Water Quality at Private Well MTSN-SA-1 - Scenario 'B' Chloride Concentrations



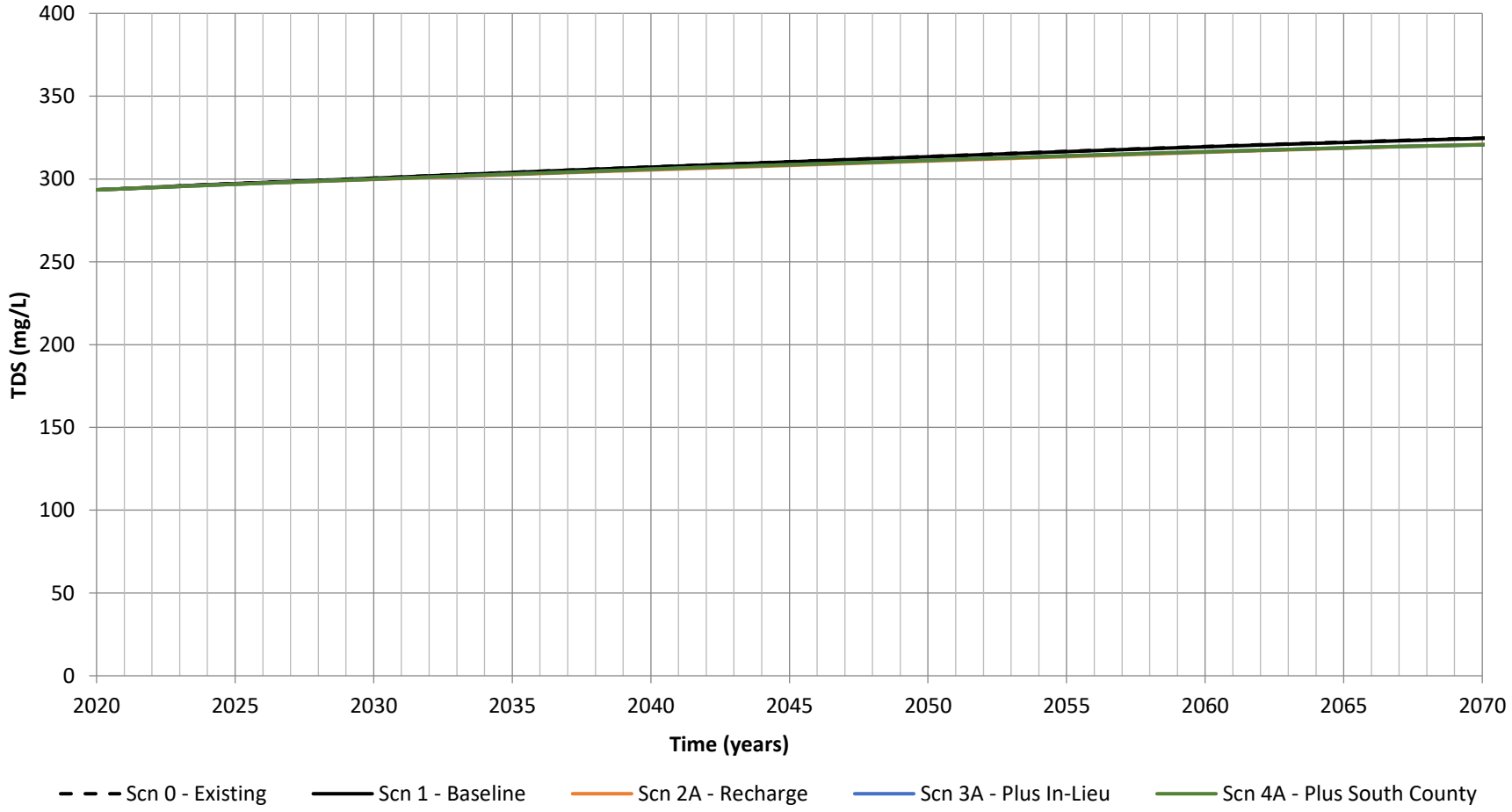
Model-Predicted Net Water Quality at Private Well MTSN-SA-1 - Scenario 'A' Boron Concentrations



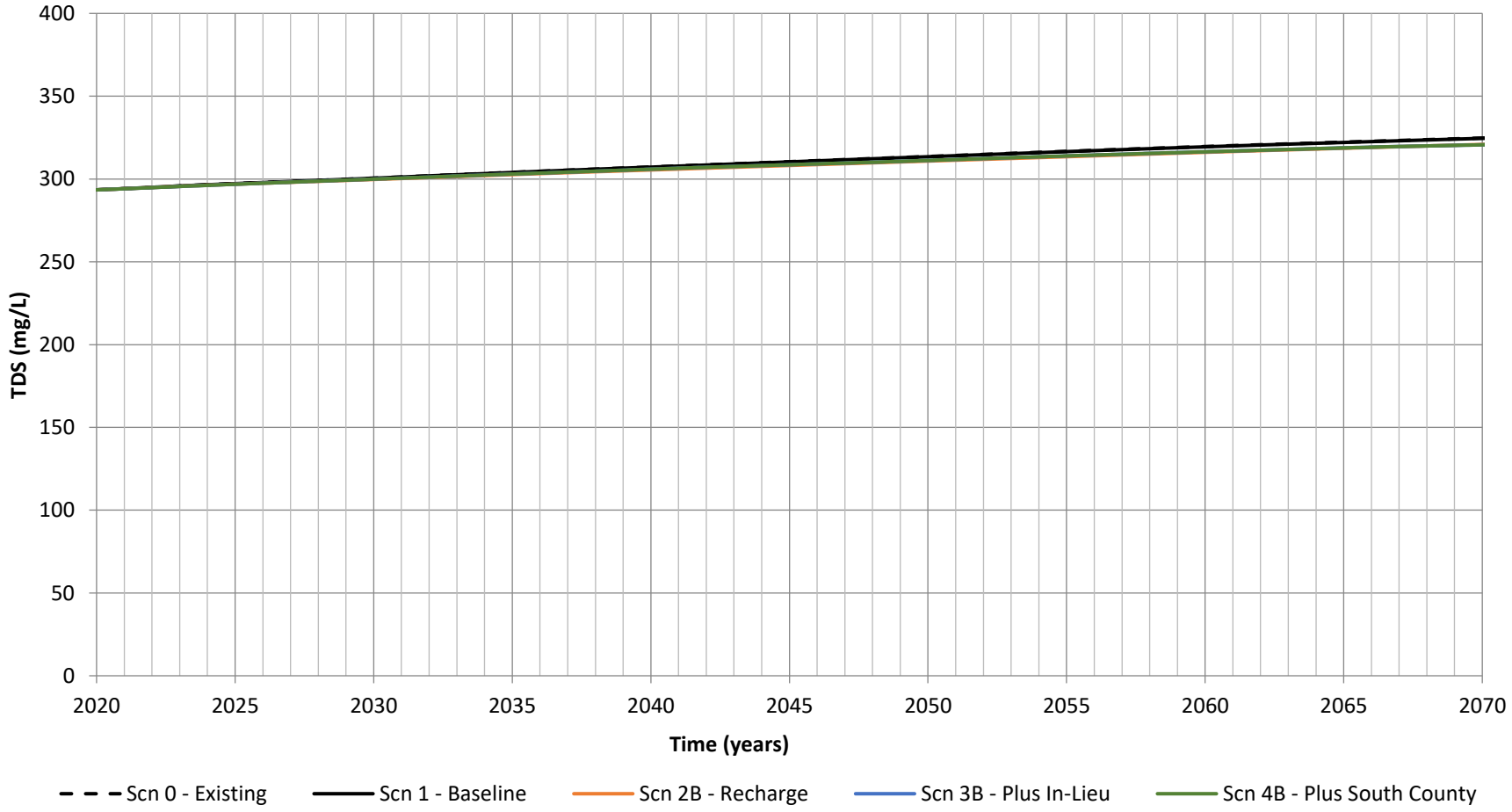
Model-Predicted Net Water Quality at Private Well MTSN-SA-1 - Scenario 'B' Boron Concentrations



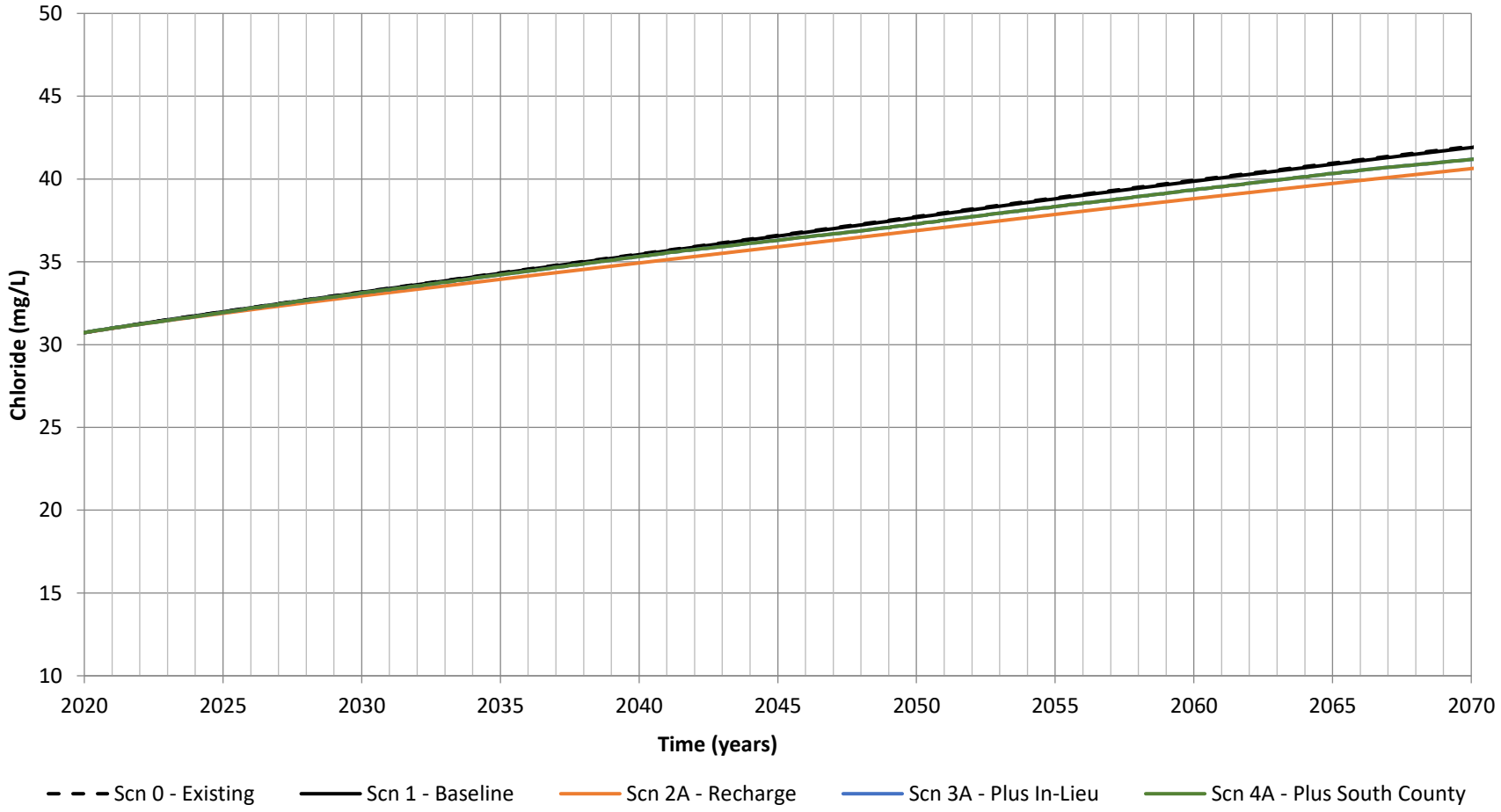
Model-Predicted Net Water Quality at Private Well SAKI-SAJ3-1 - Scenario 'A' TDS Concentrations



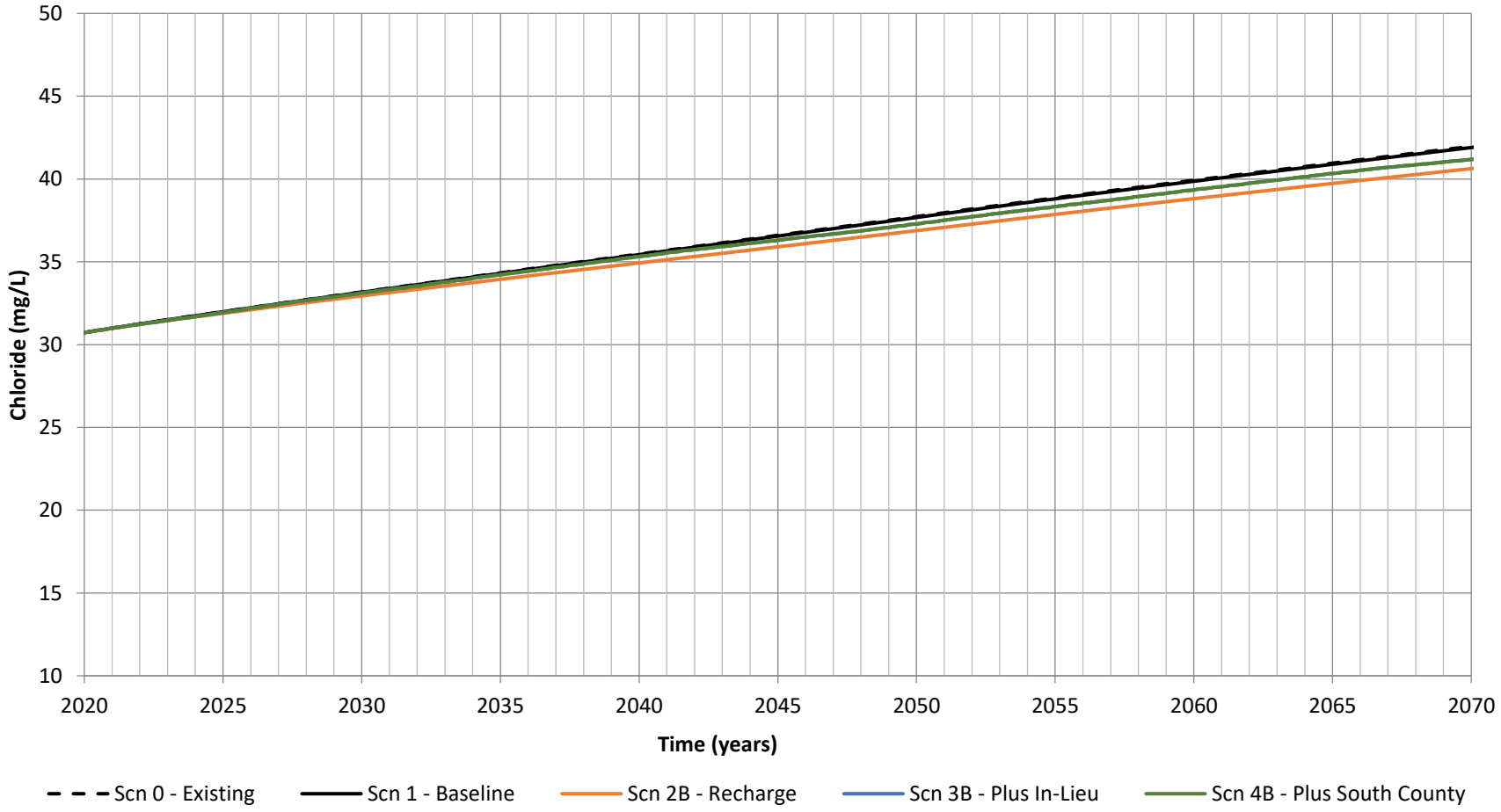
Model-Predicted Net Water Quality at Private Well SAKI-SAJ3-1 - Scenario 'B' TDS Concentrations



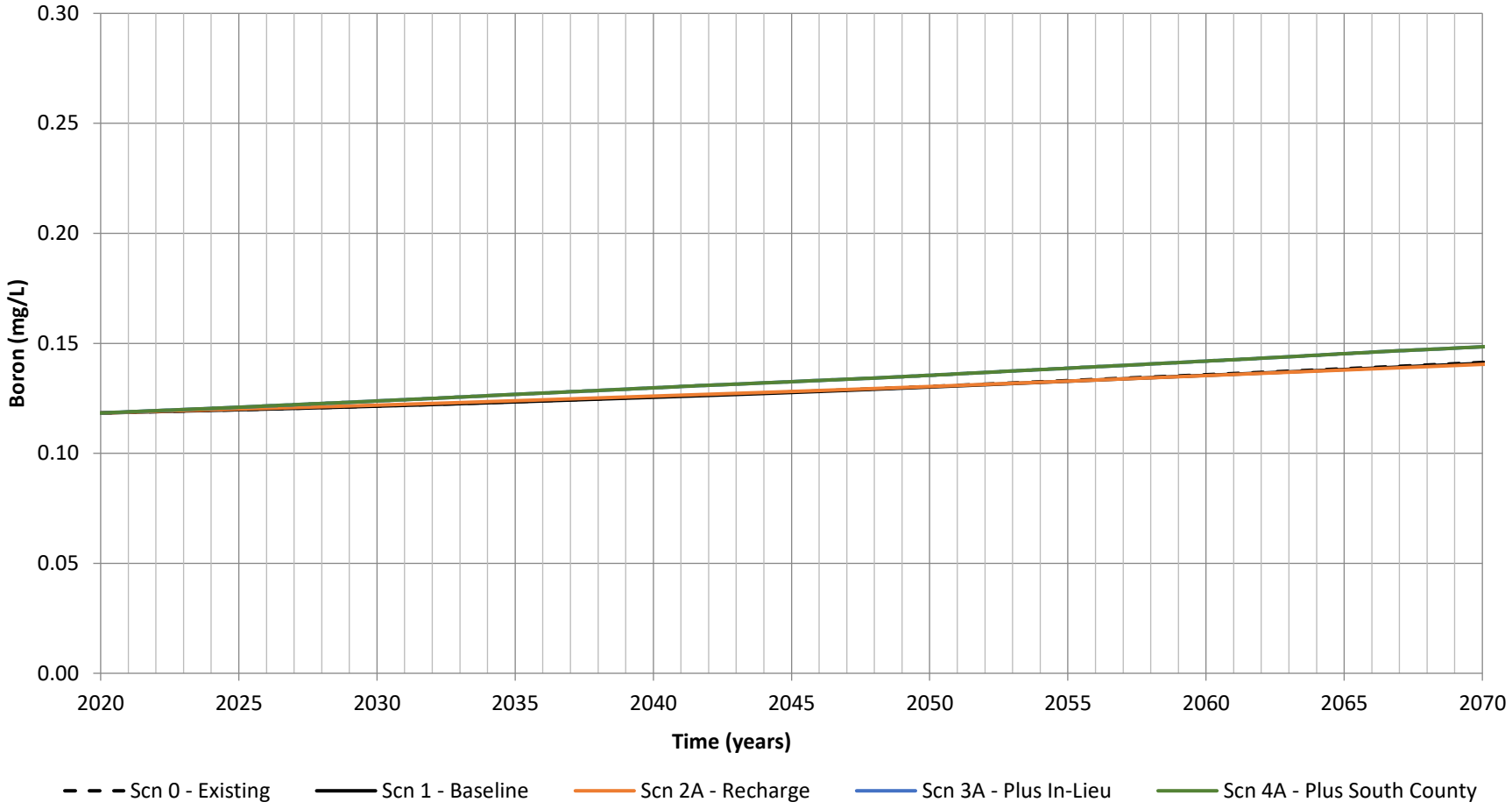
Model-Predicted Net Water Quality at Private Well SAKI-SAJ3-1 - Scenario 'A' Chloride Concentrations



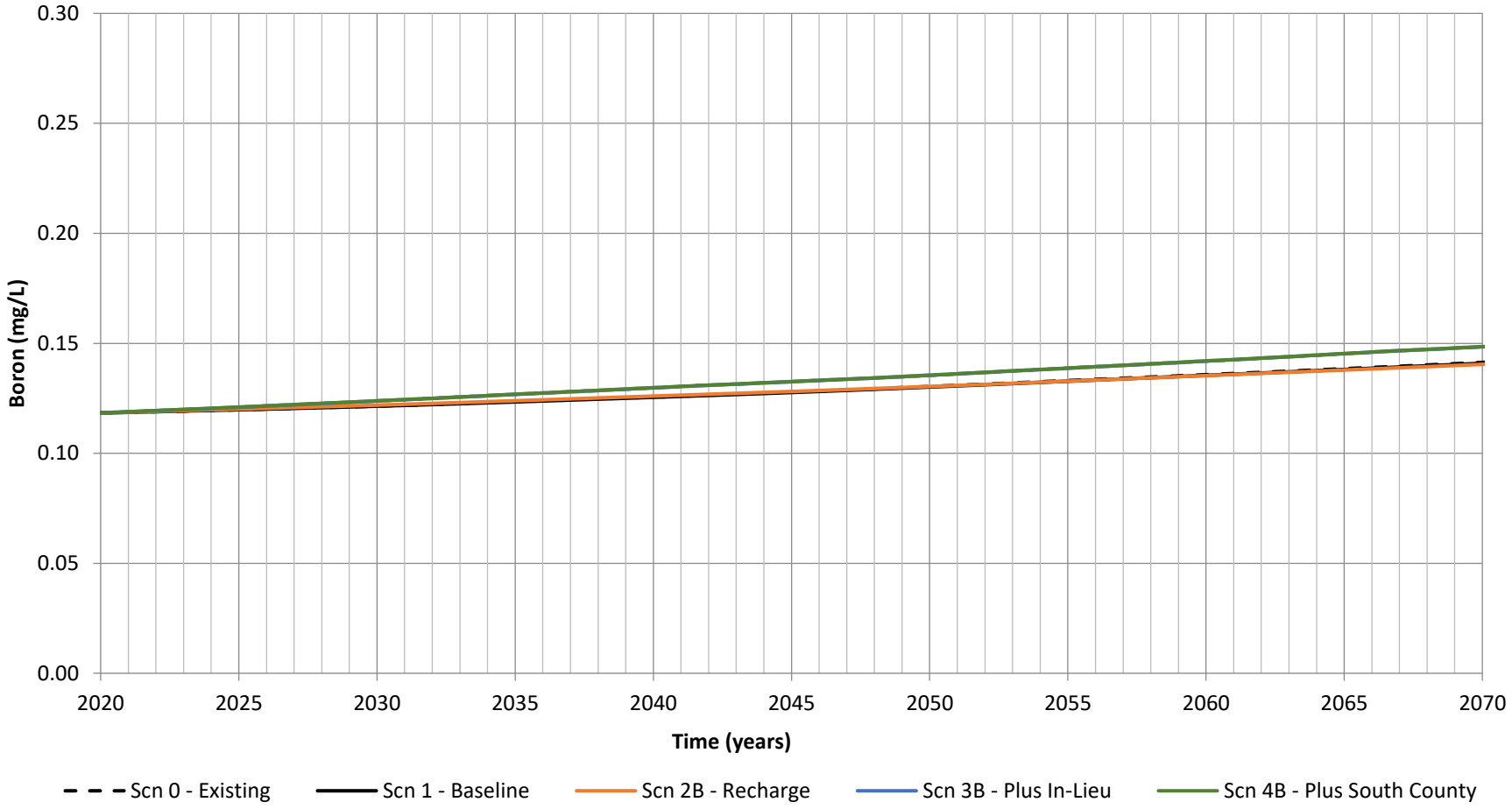
Model-Predicted Net Water Quality at Private Well SAKI-SAJ3-1 - Scenario 'B' Chloride Concentrations



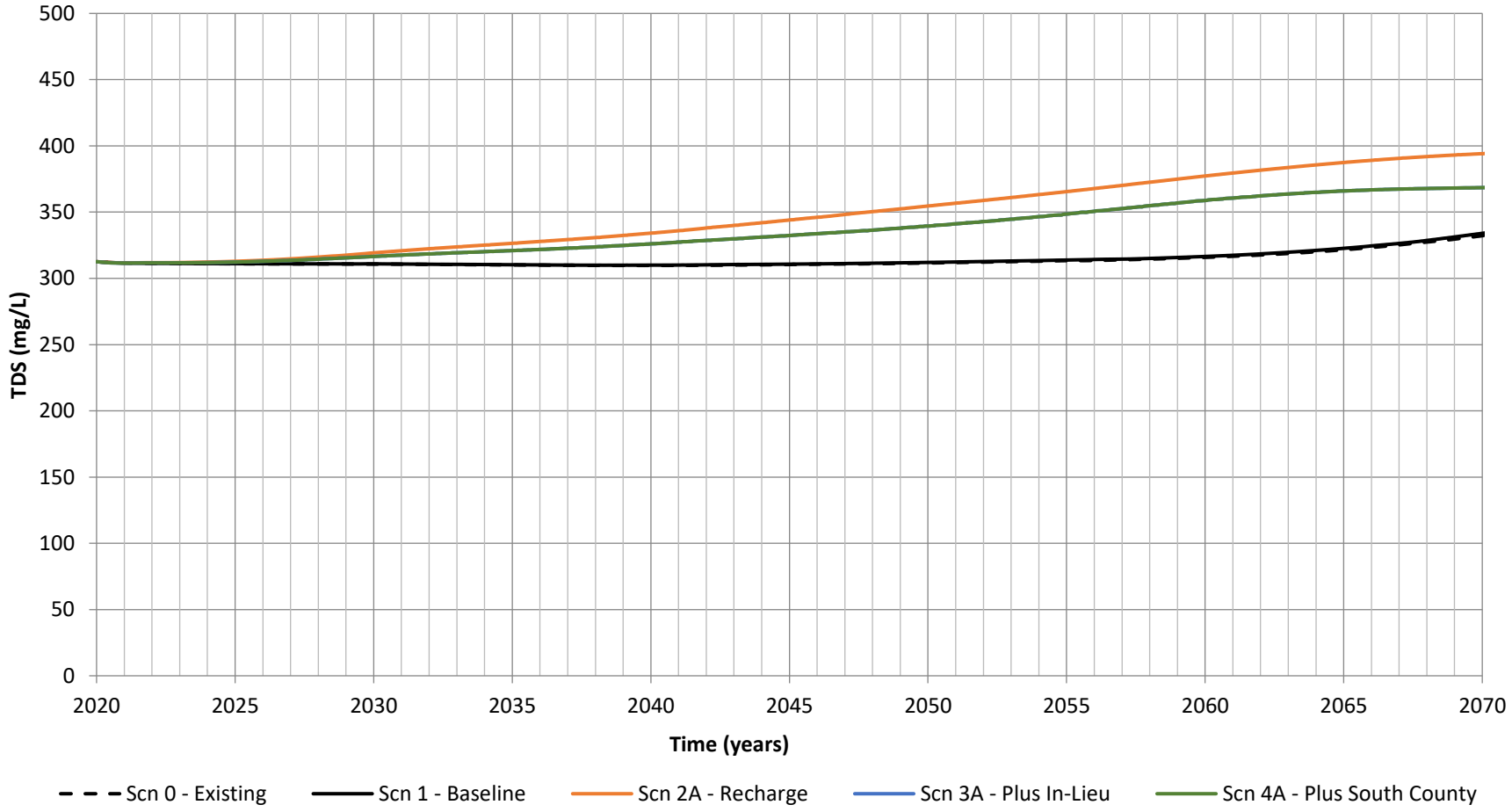
Model-Predicted Net Water Quality at Private Well SAKI-SAJ3-1 - Scenario 'A' Boron Concentrations



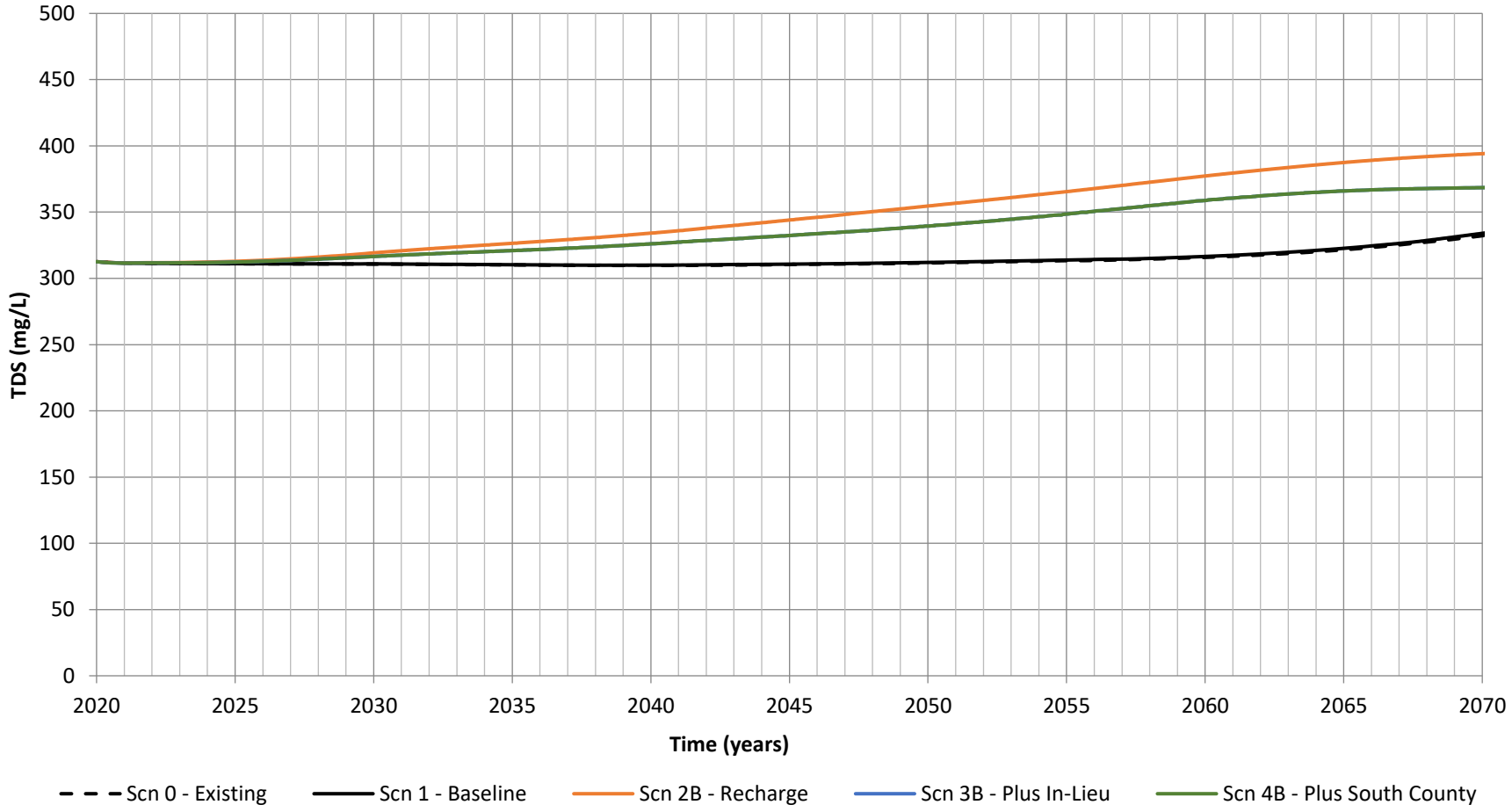
Model-Predicted Net Water Quality at Private Well SAKI-SAJ3-1 - Scenario 'B' Boron Concentrations



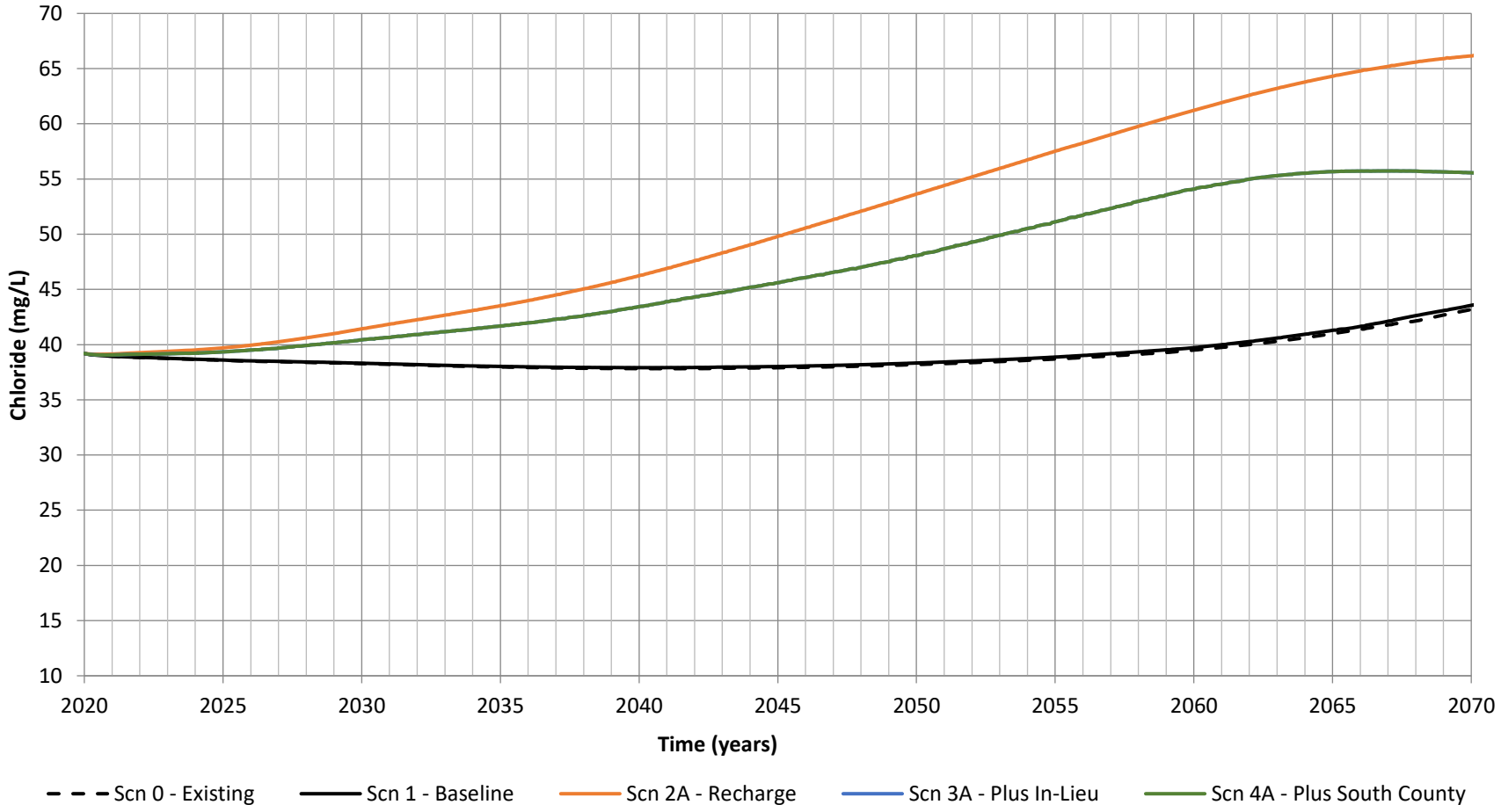
Model-Predicted Net Water Quality at Private Well SACC-SA-1 - Scenario 'A' TDS Concentrations



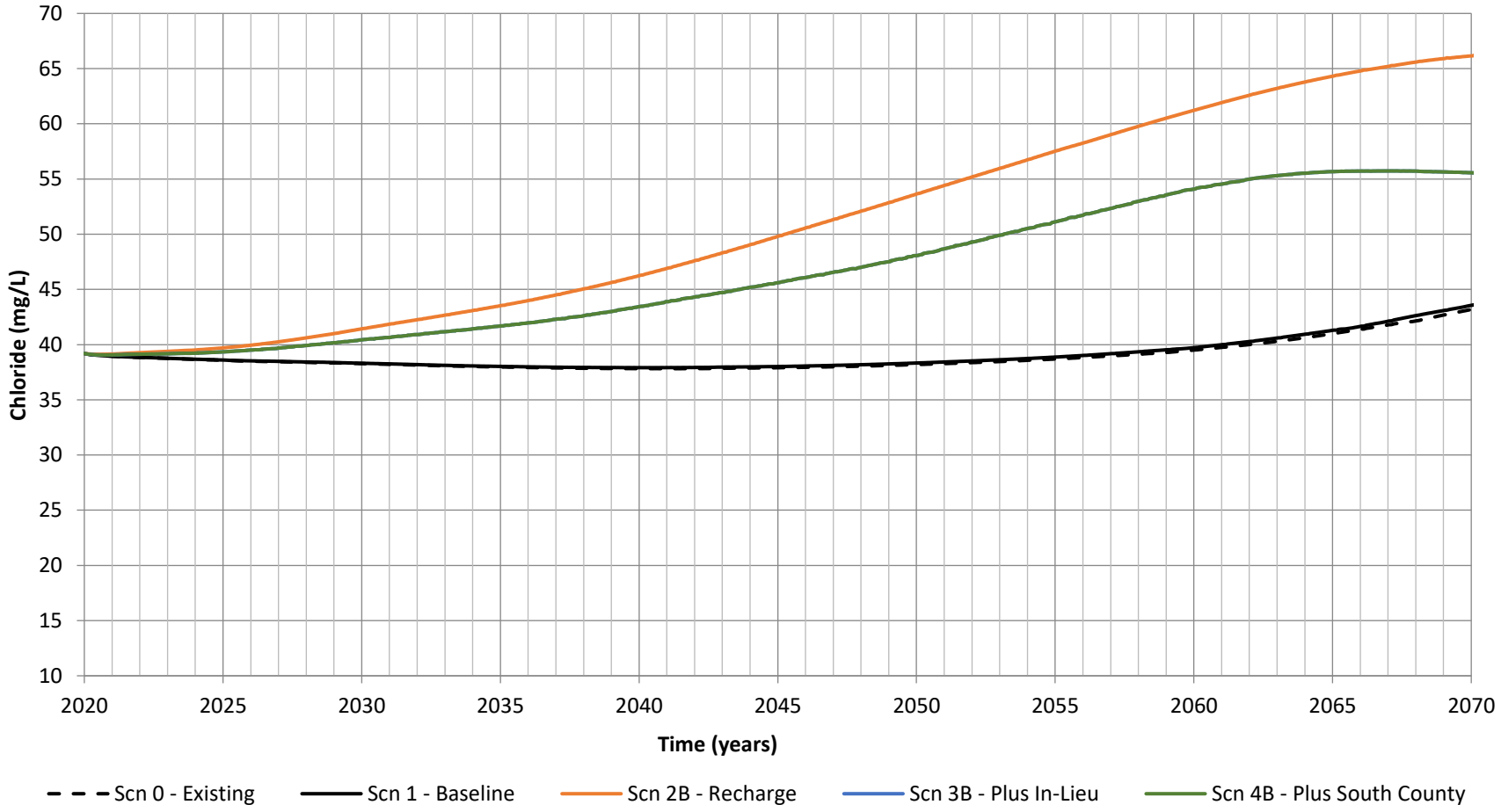
Model-Predicted Net Water Quality at Private Well SACC-SA-1 - Scenario 'B' TDS Concentrations



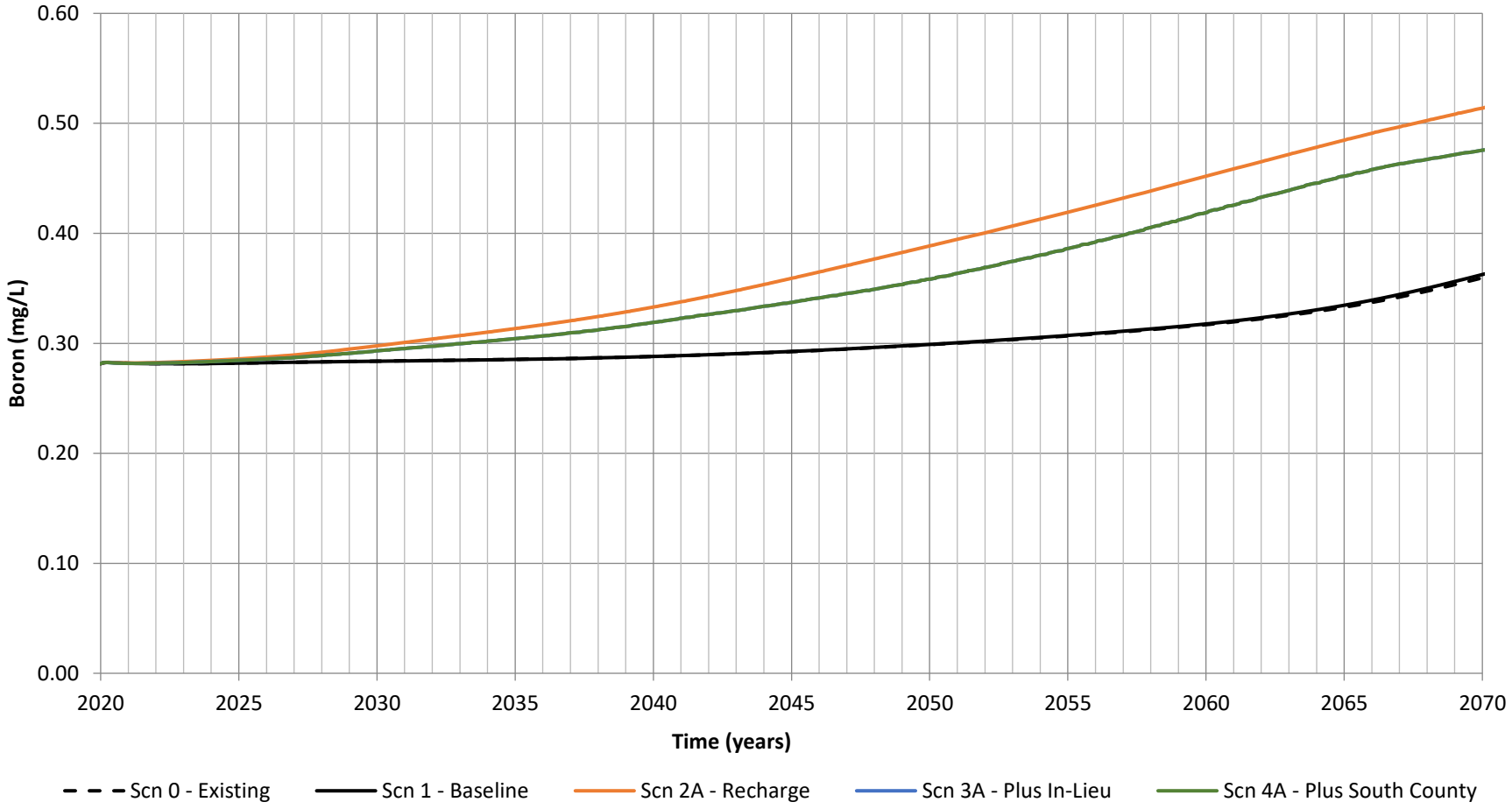
Model-Predicted Net Water Quality at Private Well SACC-SA-1 - Scenario 'A' Chloride Concentrations



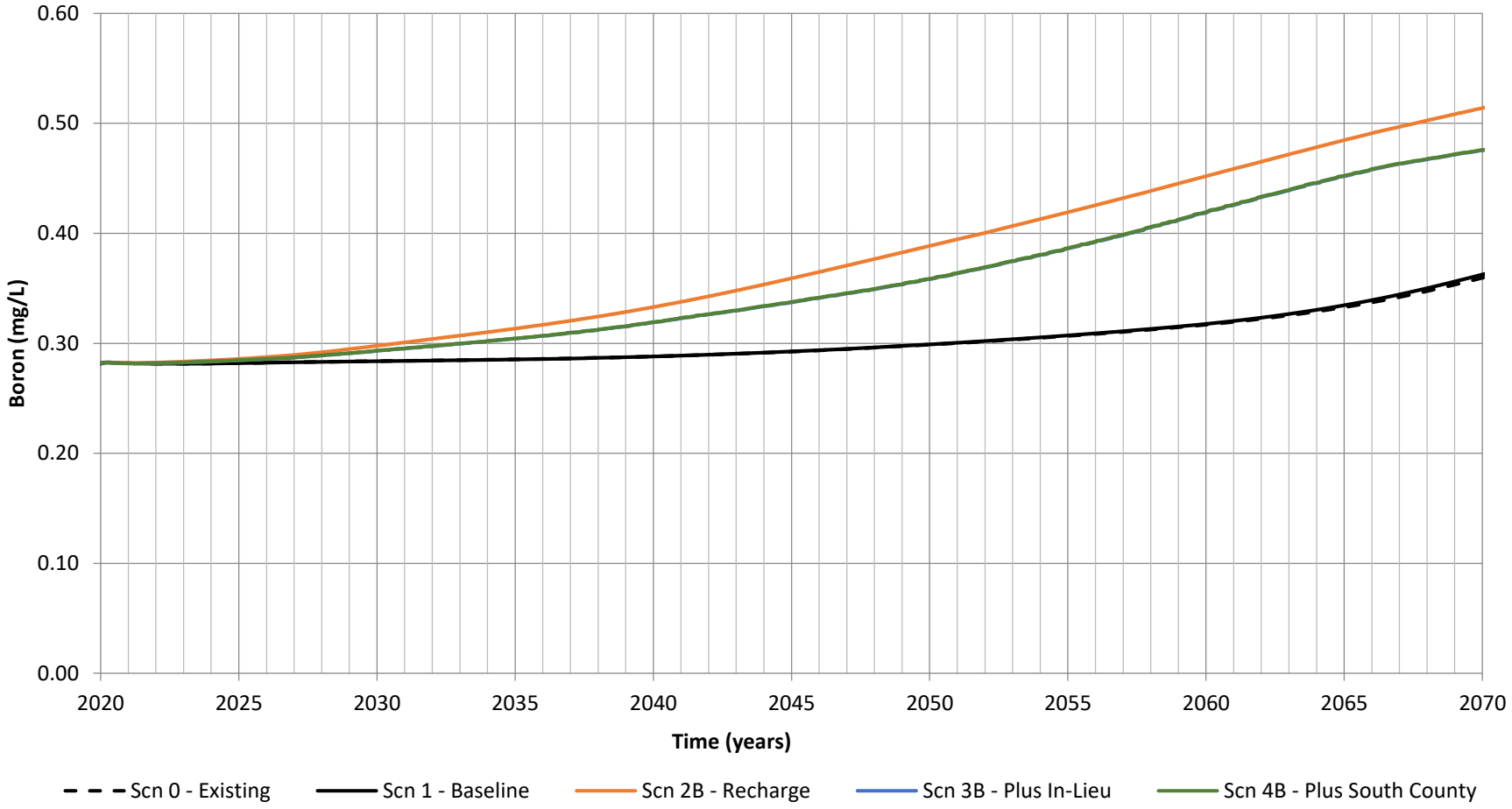
Model-Predicted Net Water Quality at Private Well SACC-SA-1 - Scenario 'B' Chloride Concentrations



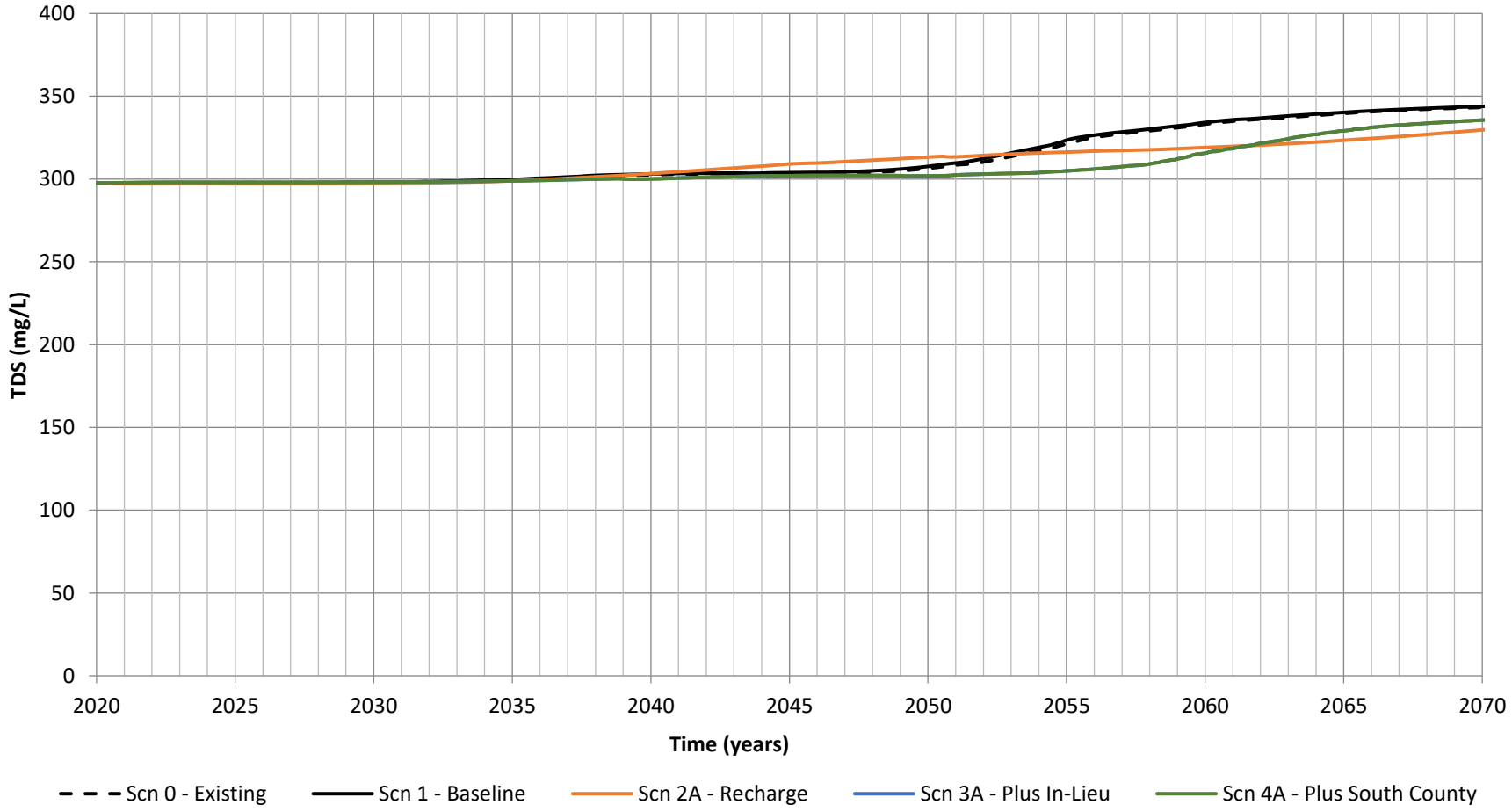
Model-Predicted Net Water Quality at Private Well SACC-SA-1 - Scenario 'A' Boron Concentrations



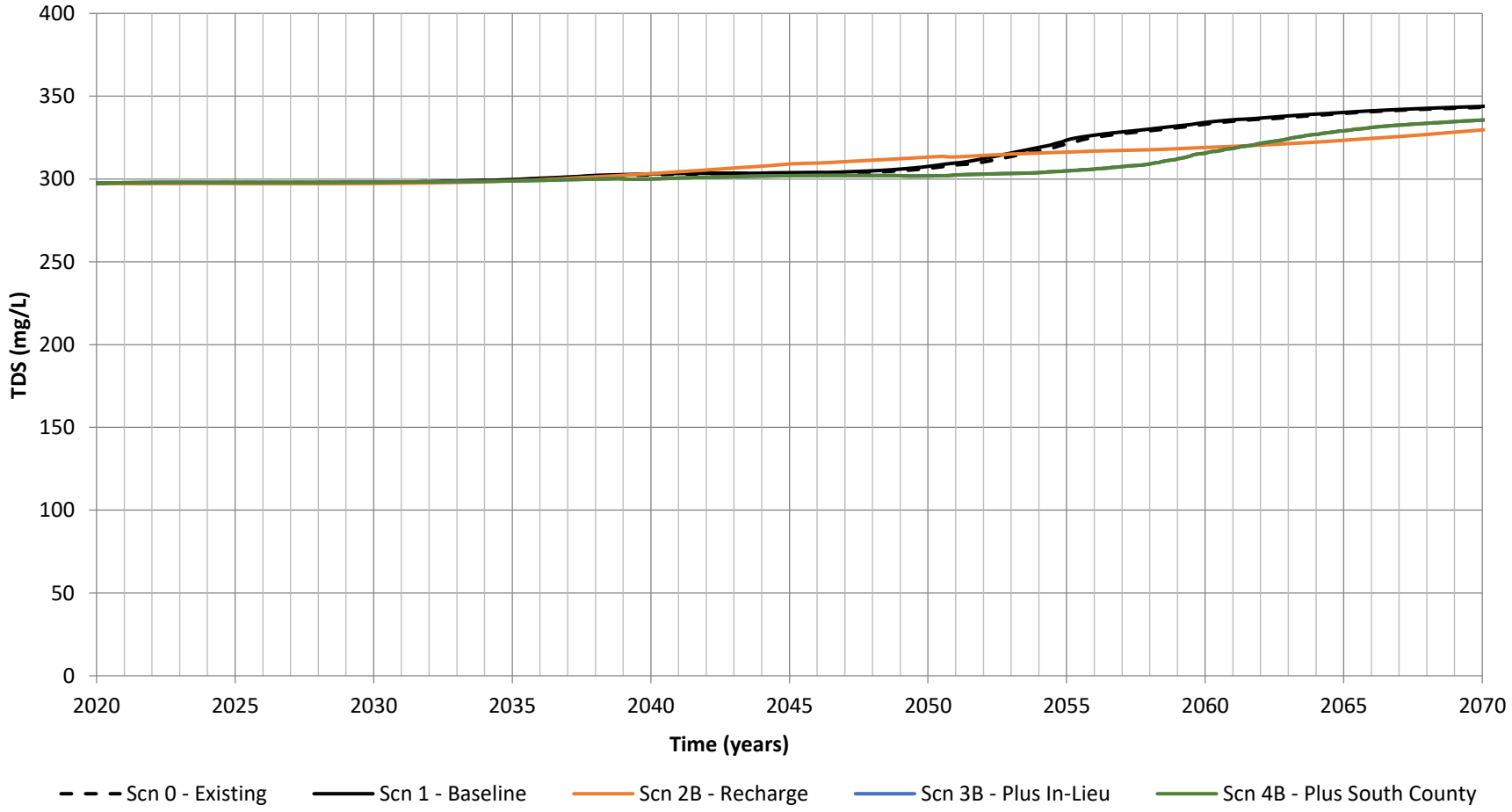
Model-Predicted Net Water Quality at Private Well SACC-SA-1 - Scenario 'B' Boron Concentrations



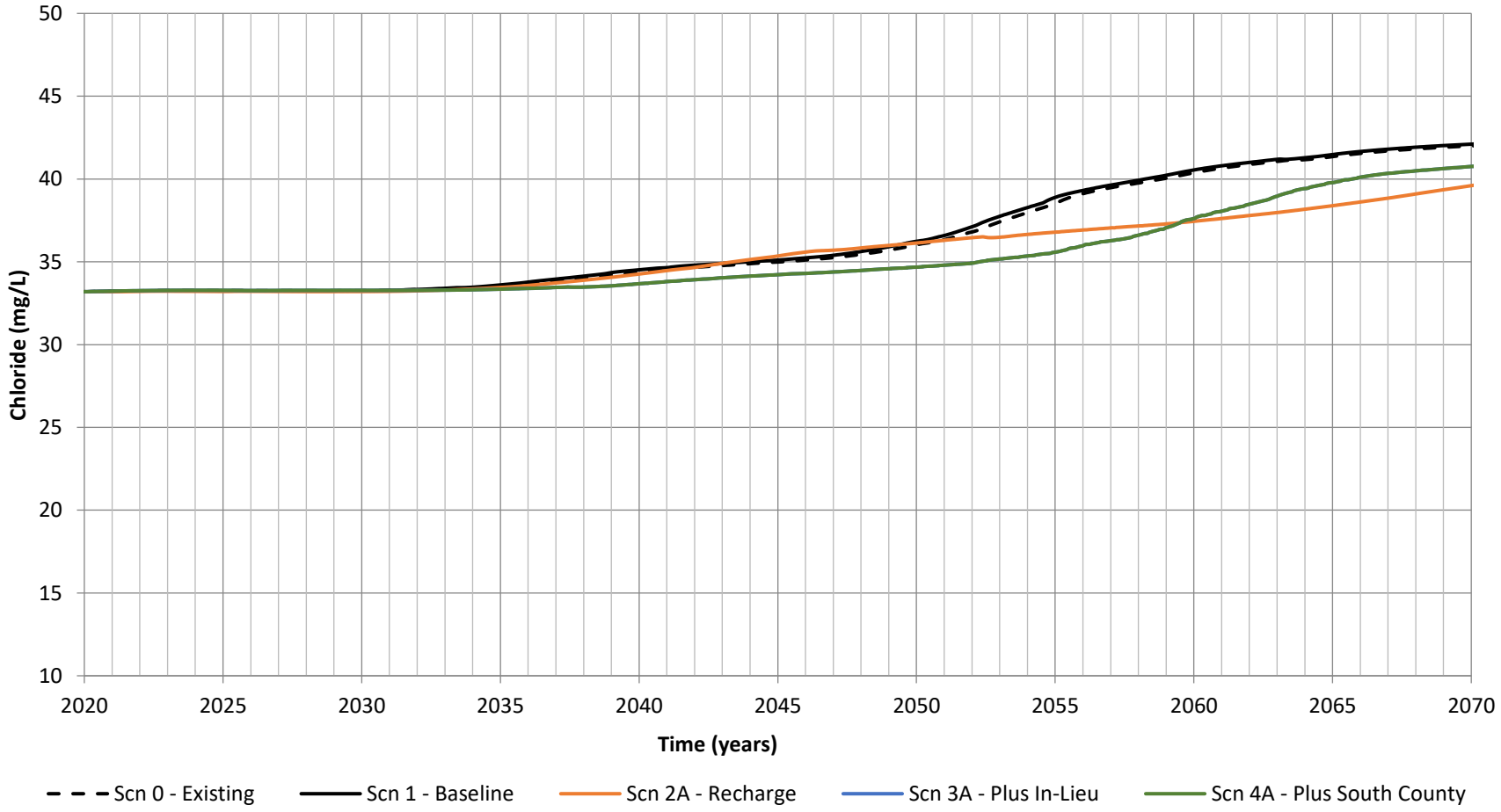
Model-Predicted Net Water Quality at Private Well NBGC-NB-1 - Scenario 'A' TDS Concentrations



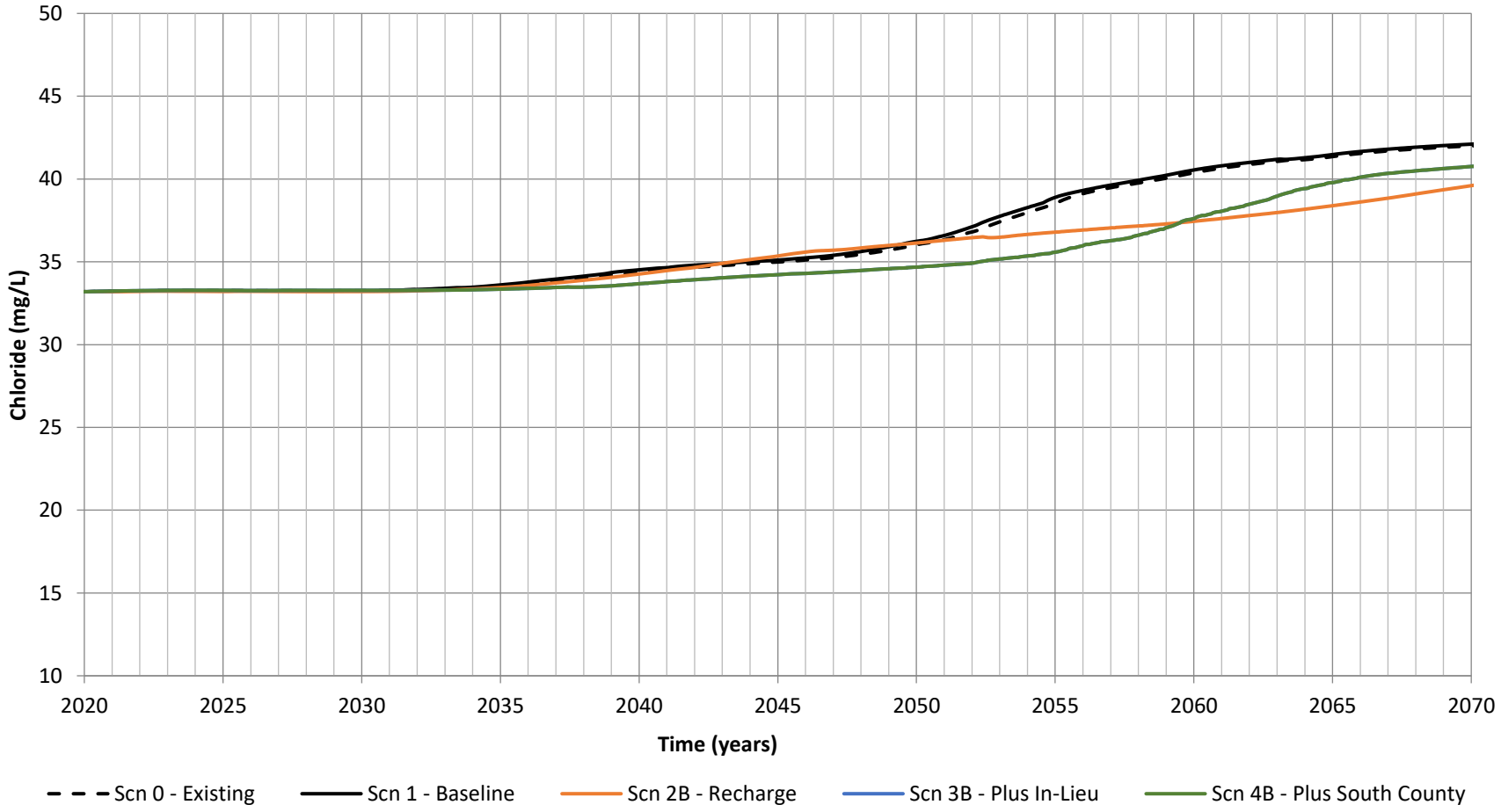
Model-Predicted Net Water Quality at Private Well NBGC-NB-1 - Scenario 'B' TDS Concentrations



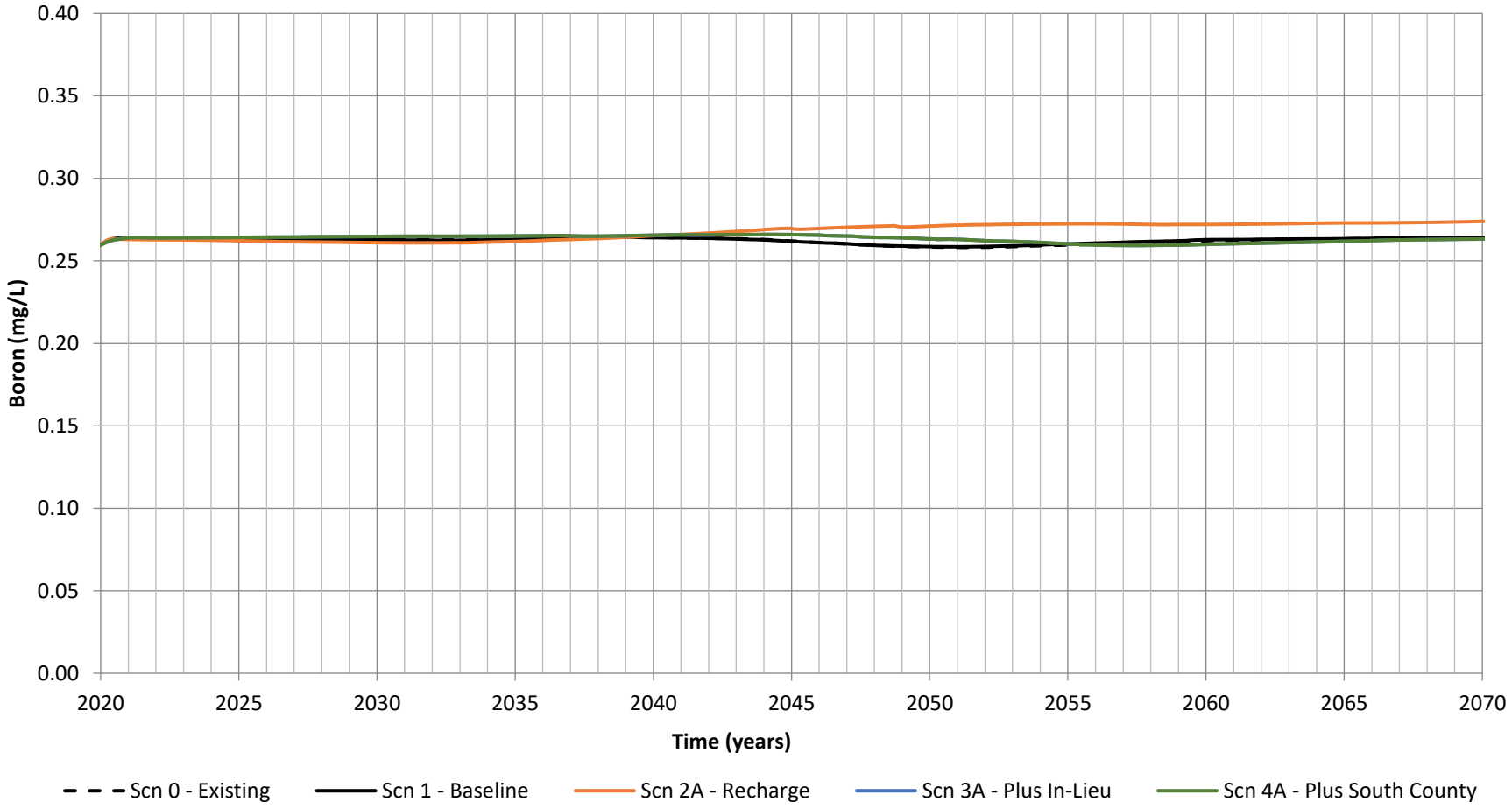
Model-Predicted Net Water Quality at Private Well NBGC-NB-1 - Scenario 'A' Chloride Concentrations



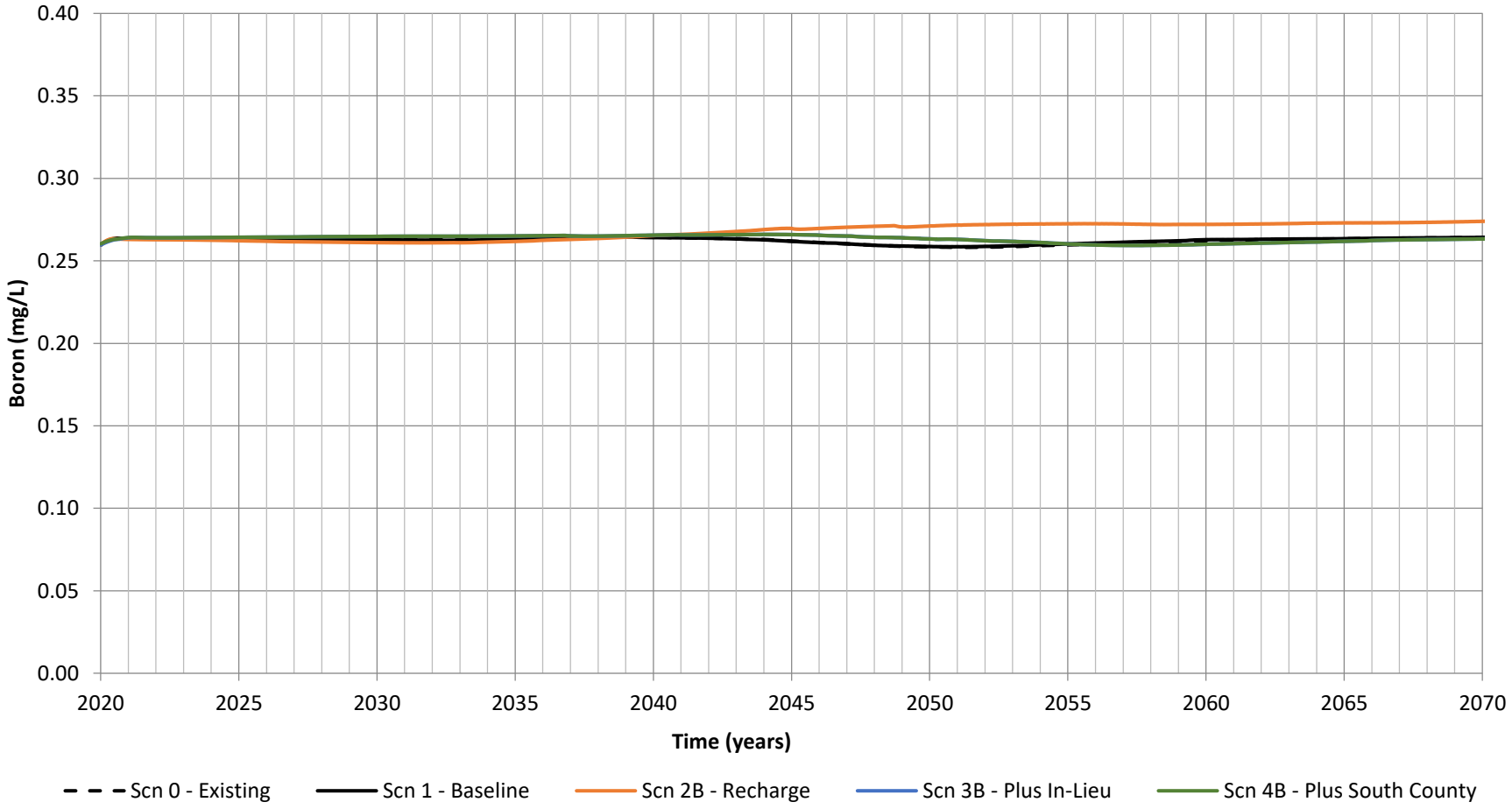
Model-Predicted Net Water Quality at Private Well NBGC-NB-1 - Scenario 'B' Chloride Concentrations



Model-Predicted Net Water Quality at Private Well NBGC-NB-1 - Scenario 'A' Boron Concentrations



Model-Predicted Net Water Quality at Private Well NBGC-NB-1 - Scenario 'B' Boron Concentrations



Comparison of Total Concentrations in 2070 - Private Wells

Entity	Constituent of Concern	Scenario 0	Scenario 1	Scenario 2a		Scenario 3a		Scenario 4a		Scenario 2b		Scenario 3b		Scenario 4b	
		Total Concentration (mg/L)[1]	Total Concentration (mg/L)	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1	Total Concentration (mg/L)	Percent Increase Relative to Scenario 1
SCSH-SA1-1 (Private)	TDS	283	280	287	2%	288	3%	288	3%	287	2%	288	3%	288	3%
	Chloride	28	28	29	5%	32	15%	32	15%	29	5%	32	15%	32	15%
	Boron	0.13	0.13	0.14	10%	0.18	38%	0.18	38%	0.14	10%	0.18	38%	0.18	38%
MTSN-SA-1 (Private)	TDS	286	284	291	2%	281	-1%	281	-1%	291	2%	281	-1%	281	-1%
	Chloride	29	29	30	4%	31	6%	31	6%	30	4%	31	6%	31	6%
	Boron	0.14	0.13	0.15	10%	0.17	26%	0.17	26%	0.15	10%	0.17	26%	0.17	26%
SAKI-SAJ3-1 (Private)	TDS	325	325	321	-1%	321	-1%	321	-1%	321	-1%	321	-1%	321	-1%
	Chloride	42	42	41	-3%	41	-2%	41	-2%	41	-3%	41	-2%	41	-2%
	Boron	0.14	0.14	0.14	0%	0.15	5%	0.15	5%	0.14	0%	0.15	5%	0.15	5%
SACC-SA-1 (Private)	TDS	332	334	394	18%	368	10%	368	10%	394	18%	368	10%	368	10%
	Chloride	43	44	66	52%	56	28%	56	28%	66	52%	56	28%	56	28%
	Boron	0.36	0.36	0.51	42%	0.48	31%	0.48	31%	0.51	42%	0.48	31%	0.48	31%
NBGC-NB-1 (Private)	TDS	343	344	330	-4%	336	-2%	336	-2%	330	-4%	336	-2%	336	-2%
	Chloride	42	42	40	-6%	41	-3%	41	-3%	40	-6%	41	-3%	41	-3%
	Boron	0.26	0.26	0.27	4%	0.26	0%	0.26	0%	0.27	4%	0.26	0%	0.26	0%

Notes:

Highlighted cells indicate conditions where concentrations have increased by 50% or more when compared to Scenario 1 (Baseline).

[1] mg/L = milligrams per liter.