



1155 CANYON BOULEVARD, SUITE 110, BOULDER, CO 80302
OFFICE: 303-449-2834 FAX: 720-535-4921
SOMACHLAW.COM

RECEIVED

Apr 10, 2026

DEPARTMENT OF
WATER RESOURCES

April 10, 2026

Sent via email to:

Mathew Weaver, Director
Idaho Department of Water Resources
322 E. Front Street, Suite 648
Boise, ID 83702
mathew.weaver@idwr.idaho.gov

Re: Cities' Motion to Consider Information When Determining Surface Water
Coalition's Irrigated Acres Under Methodology Step 1, CM-DC-2010-001

Director Weaver:

On behalf of the City of Pocatello, City of Idaho Falls, and the Coalition of Cities¹ (collectively, the "Cities"), we submit for filing the attached *Cities' Motion to Consider Information When Determining Surface Water Coalition's Irrigated Acres Under Methodology Step 1* ("Motion"), to which a technical memorandum prepared by the Cities' consultant, Spronk Water Engineers, Inc. ("SWE"), is attached. The memorandum describes SWE's review and refinement of the irrigated area shapefile that was recently submitted by the Twin Falls Canal Company ("TFCC").

By way of background, we expect the Idaho Department of Water Resources ("Department") is currently preparing a so-called *Steps 1-3 Order* and will issue it within 14 days after issuance of the Heise Gage Joint Forecast. See *Sixth Final Order Regarding Methodology for Determining Material Injury to Reasonable In-season Demand and Reasonable Carryover* at 42 (Jul. 19, 2023) ("*Sixth Methodology Order*"). Each year, the Department determines how many irrigated acres it will use for each Surface Water Coalition ("SWC") member—when making material injury determinations over the course of the irrigation season—in the *Steps 1-3 Orders*. See, e.g., *Final Order Regarding April 2025 Forecast Supply (Methodology Steps 1-3)* at 2 (Apr. 16, 2025).

We submit this *Motion* to assist the Department with its "ongoing obligation to use the best available science and information" when determining material injury to the SWC members' water rights in 2026. See *Sixth Methodology Order* at 2, 36. We ask that the Department consider the Cities' information as it prepares the 2026 *Steps 1-3 Order* and use

¹ The Coalition of Cities is composed of the Cities of Bliss, Burley, Carey, Declo, Dietrich, Gooding, Hazelton, Heyburn, Jerome, Paul, Richfield, Rupert, Shoshone, and Wendell.

Director Weaver

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irrigated acreage numbers that accurately reflect the acreage being irrigated by SWC members in 2026, particularly TFCC and American Falls Reservoir District No. 2 ("AFRD#2). If inaccurate irrigated acreage numbers are used, the Department will not meet the "clear and convincing evidence" standard "applicable to determinations of material injury." *A&B Irrigation v. Spackman (In re A&B Irrigation Dist.)*, 155 Idaho 640, 655 (2013); *Final Order Establishing 2025 Reasonable Carryover (Methodology Step 9)* at 4-5 (Nov. 21, 2025).

Step 1 of the Methodology requires the Department to determine irrigated acreage each year. The Department starts by reviewing the electronic shape files submitted by SWC members and modifies them as needed. See *Sixth Methodology Order* at 41-42. Step 1 does not preclude the Cities from submitting their own information, nor does it preclude the Department from considering the same when making irrigated acreage determinations. In fact, the Department has encouraged the Cities to submit updated information:

The Director emphasizes that this denial does not prevent the ground water users from presenting updated scientific information or data to the Director in the future. For example, if the ground water users prepare a new analysis of hardened acres within the boundary of a SWC member, this would be new information the Director may consider in the future.

Order Denying Request for Hearing and Motion Authorizing Discovery at 2 n.1 (Aug. 23, 2023).

Additionally, because AFRD#2's response letter was not timely submitted, the *Motion* also requests that the Department adhere to procedures in the *Sixth Methodology Order* by disregarding AFRD#2's letter and determining AFRD#2's irrigated acres "based upon past cropping patterns and current satellite and/or aerial imagery.... [and being] cautious about recognizing acres as being irrigated if there is uncertainty about whether the acres are or will be irrigated during the upcoming irrigation season." *Sixth Methodology Order* at 41.

In sum, we submit this *Motion* and attached information and respectfully request that the Department consider it in a meaningful manner before issuing the *Final Order Regarding April 2026 Forecast Supply (Methodology Steps 1-3)*. Thank you in advance for your attention to this important matter.

Director Weaver

Re: Cities' Motion to Consider Information When Determining Surface Water Coalition's
Irrigated Acres Under Methodology Step 1, CM-DC-2010-001

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Sincerely,

**SOMACH SIMMONS &
DUNN, P.C**

/s/ Sarah A. Klahn

Sarah A. Klahn
Maximilian C. Bricker
*Attorneys for City of
Pocatello*

**MCHUGH BROMLEY,
P.L.L.C**

/s/ Chris Bromley

Chris M. Bromley
Candice M. McHugh
*Attorneys for Coalition of
Cities*

**HOLDEN KIDWELL
HAHN & CRAPO, P.L.L.C.**

/s/ Rob Harris

Robert L. Harris
*Attorney for City of
Idaho Falls*

Attachment

cc: SWC Delivery Call Service List
SAK/mcb

Sarah A. Klahn, ISB # 7928
Maximilian C. Bricker, ISB # 12283
SOMACH SIMMONS & DUNN, P.C.
1155 Canyon St., Ste. 110
Boulder, CO 80302
sklahn@somachlaw.com
mbricker@somachlaw.com

Attorneys for the City of Pocatello

Robert L. Harris, ISB # 7018
HOLDEN, KIDWELL,
HAHN & CRAPO, PLLC
P.O. Box 50130
1000 Riverwalk Dr., Ste. 200
Idaho Falls, ID 83405
rharris@holdenlegal.com

Attorneys for the City of Idaho Falls

Candice M. McHugh, ISB # 5908
Chris M. Bromley, ISB # 6530
MCHUGH BROMLEY, PLLC
Attorneys at Law
P.O. Box 107
Boise, ID 83701
cmchugh@mchughbromley.com
cbromley@mchughbromley.com

*Attorneys for Cities of Bliss, Burley, Carey,
Declo, Dietrich, Gooding, Hazelton,
Heyburn, Jerome, Paul, Richfield, Rupert,
Shoshone, and Wendell*

**BEFORE THE DEPARTMENT OF WATER RESOURCES
OF THE STATE OF IDAHO**

IN THE MATTER OF DISTRIBUTION OF
WATER TO VARIOUS WATER RIGHTS
HELD BY OR FOR THE BENEFIT OF
A&B IRRIGATION DISTRICT,
AMERICAN FALLS RESERVOIR
DISTRICT #2, BURLEY IRRIGATION
DISTRICT, MILNER IRRIGATION
DISTRICT, MINIDOKA IRRIGATION
DISTRICT, NORTH SIDE CANAL
COMPANY, AND TWIN FALLS CANAL
COMPANY

Docket No. CM-DC-2010-001

**CITIES' MOTION TO CONSIDER
INFORMATION WHEN DETERMINING
SURFACE WATER COALITION'S
IRRIGATED ACRES UNDER
METHODOLOGY STEP 1**

COME NOW the City of Pocatello, City of Idaho Falls, and the Coalition of Cities¹
(collectively, the "Cities"), by and through their undersigned counsel, pursuant to Rule 220 of
the Rules of Procedure of the Idaho Department of Water Resources ("Department"), and hereby

¹ The Coalition of Cities is composed of the Cities of Bliss, Burley, Carey, Declo, Dietrich, Gooding, Hazelton, Heyburn, Jerome, Paul, Richfield, Rupert, Shoshone, and Wendell.

move the Department, when making irrigated acreage determinations under Step 1 of the Methodology, to consider the information contained in the technical memorandum prepared by the Cities' consultants, Spronk Water Engineers, Inc., which is attached hereto as Exhibit A.

Additionally, because the response letter of American Falls Reservoir District No. 2 ("AFRD#2") was not timely submitted, the Cities request that the Department disregard the letter and determine AFRD#2's irrigated acreage in accordance with the procedures set forth in the Methodology. *See Sixth Final Order Regarding Methodology for Determining Material Injury to Reasonable In-season Demand and Reasonable Carryover* at 41-42 (Jul. 19, 2023).

RESPECTFULLY SUBMITTED this 10th day of April, 2026.

SOMACH SIMMONS & DUNN, P.C.



Sarah A. Klahn
Maximilian C. Bricker
Attorneys for the City of Pocatello

HOLDEN, KIDWELL, HAHN & CRAPO, PLLC

/s/ Robert Harris
Robert L. Harris
Attorney for the City of Idaho Falls

MCHUGH BROMLEY, PLLC

/s/ Chris Bromley
Chris M. Bromley
Candice M. McHugh
Attorneys for the Cities of Bliss, Burley, Carey, Declo, Dietrich, Gooding, Hazelton, Heyburn, Jerome, Paul, Richfield, Rupert, Shoshone, and Wendell

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on this 10th day of April, 2026, the foregoing document was served via electronic mail to the following:

Idaho Dept. of Water Res.
file@idwr.idaho.gov
garrick.baxter@idwr.idaho.gov
mathew.weaver@idwr.idaho.gov
Kayleen.richter@idwr.idaho.gov
Sarah.tschohl@idwr.idaho.gov

John K. Simpson
IdaH20, PLLC
4354 N. Hackberry Way
Boise, ID 83702-1667
jks@idahowaters.com

Travis L. Thompson
Abigail Bitzenburg
PARSONS BEHLE &
LATIMER P.O. Box 63
Twin Falls, ID 83303-0063
tthompson@parsonsbehle.com
abitzenburg@parsonsbehle.com

Norman M. Semanko
Garrett M. Kitamura
PARSONS BEHLE &
LATIMER 800 W. Main Street,
Ste. 1300 Boise, ID 83702
nsemanko@parsonsbehle.com
gkitamura@parsonsbehle.com

Thomas J. Budge
RACINE OLSON
P.O. Box 1391
Pocatello, ID 83204-1391
tj@racineolson.com

Skyler C. Johns
Nathan M. Olsen
Steven L. Taggart
Olsen Taggart PLLC
P.O. Box 3005
Idaho Falls, ID 83403
sjohns@olsentaggart.com
nolsen@olsentaggart.com
staggart@olsentaggart.com

Matt Howard
US Bureau of Reclamation
1150 N. Curtis Road
Boise, ID 83706-1234
mhoward@usbr.gov

Robert E. Williams
WILLIAMS, MESERVY, & LOTHSPEICH,
LLP
P.O. Box 168
Jerome, ID 83338
rewilliams@wmlattys.com

Rich Diehl
City of Pocatello
P.O. Box 4169
Pocatello, ID 83205
rdiehl@pocatello.us

Candice McHugh
Chris Bromley
MCHUGH BROMLEY, PLLC
P.O. Box 107
Boise, ID 83701
cbromley@mchughbromley.com
cmchugh@mchughbromley.com

David W. Gehlert
Natural Resources Section Environment and
Natural Resources Division U.S. Department
of Justice
999 18th St., South Terrace, Ste. 370
Denver, CO 80202
david.gehlert@usdoj.gov

Robert L. Harris
HOLDEN, KIDWELL, HAHN & CRAPO,
PLLC
P.O. Box 50130
Idaho Falls, ID 83405
rharris@holdenlegal.com

Courtesy Copy to:
Craig Chandler
IDWR- Eastern Region
900 N. Skyline Drive, Ste. A
Idaho Falls, ID 83402
Craig.chandler@idwr.idaho.gov

Corey Skinner
IDWR- Southern Region
1341 Fillmore St., Ste. 200
Twin Falls, ID 83301-3033
Corey.skinner@idwr.idaho.gov

Dylan Anderson
Dylan Anderson Law PLLC
P.O. Box 35
Rexburg, ID 83440
dylan@dylanandersonlaw.com

Zachary H. Jones
City Attorney, City of Idaho Falls
P.O. Box 50220
Idaho Falls, ID 83405
zjones@idahofalls.gov

William A. Parsons
Parsons, Loveland, Shirley, & Lindstrom,
LLP
P.O. Box 910
Burley, ID 83318
wparsons@pmt.org
wparsons@magicvalley.law

Andrew J. Waldera
SAWTOOTH LAW OFFICES, PLLC
1101 W. River Street, Ste 110
Boise, ID 83702
andy@sawtoothlaw.com



Sarah Klahn (ISB # 12283)

EXHIBIT A

Technical Memorandum



Memorandum

TO: Sarah Klahn, Esq. and Maximillian Bricker, Esq. (Attorneys for City of Pocatello)
Robert Harris, Esq. (Attorney for City of Idaho Falls)
Candice McHugh, Esq. and Chris Bromley, Esq. (Attorneys for Coalition of Cities)

FROM: Sprink Water Engineers, Inc.; Gregory Sullivan, P.E., and Heidi Netter, P.H.

DATE: April 10, 2026

RE: Preliminary Review and Refinement of 2026 TFCC Irrigated Area Shapefile

Introduction

Step 1 of the Surface Water Coalition (“SWC”) Methodology Order requires each SWC member to submit an electronic shapefile to the Idaho Department of Water Resources (“IDWR”) by April 1 of each year that delineates its total anticipated irrigated area for the upcoming year.¹ Alternatively, SWC members may confirm in writing that the anticipated irrigated area will not vary by more than five percent from the area delineated in the most recently submitted shapefile.

On April 1, 2026, IDWR posted the new irrigated area shapefile submitted by the Twin Falls Canal Company (“TFCC”) for use in the SWC Methodology (“2026 TFCC Shapefile”). Sprink Water Engineers, Inc. (“SWE”) received a corrected working version of this file from IDWR on April 3, 2026. TFCC claimed the shapefile showed a total irrigated area of **194,100 acres** within an overall footprint totaling 207,374 acres. SWE reviewed the 2026 TFCC Shapefile and corrected numerous non-irrigated areas that were misclassified by TFCC as irrigated resulting in a revised total irrigated area of **186,371 acres** within an overall footprint totaling 207,058 acres.

This memorandum includes a summary of the original 2026 TFCC Shapefile submitted by the TFCC, comments on that shapefile, and a summary of SWE’s preliminary effort to correct numerous misclassifications in the shapefile.

¹ On July 19, 2023, the Idaho Department of Water Resources (“Department”) issued its Sixth Final Order Regarding Methodology for Determining Material Injury to Reasonable In-Season Demand and Reasonable Carryover (“Methodology Order”). The Methodology Order established nine steps for determining material injury to members of the Surface Water Coalition (“SWC”).

Summary of 2026 TFCC Irrigated Area Shapefile

The 2026 TFCC Shapefile contains 8,570 polygons. Approximately 5,000 irrigated acres designated as served by TFCC were newly added in 2026. These acres were not identified as served by TFCC in the 2024 and 2025 TFCC shapefiles. TFCC reported that the 2026 TFCC Shapefile was prepared using aerial imagery from 2023.² A comparison of TFCC's 2025 and 2026 shapefiles is provided in **Figure 1**. The footprint of the 2025 TFCC Shapefile is shaded in yellow, and the newly designated polygons added in the 2026 TFCC Shapefile are shaded in red.

TFCC assigned a "percentage" attribute to each polygon to represent the portion of the polygon that is irrigated by TFCC water. A percentage of 100% represents "irrigated" or "irrigable" polygons, a percentage of 0% represents "non-irrigated" polygons, and any percentage between 0% and 100% represents "semi-irrigated" polygons. **Table 1** and **Figure 2** show the 2026 TFCC Shapefile classifications and irrigated acreage.

Table 1
Summary of the 2026 TFCC Shapefile
(acres)

Classification	TFCC	
	Total	Irrigated
Non-irrigated	10,731	0
Semi-Irrigated	6,864	4,321
Irrigated	189,779	189,779
Total	207,374	194,100
Corrected ³	207,204	193,930

Comments on 2026 TFCC Irrigated Area Shapefile

SWE prepared the following comments and deficiencies regarding the 2026 TFCC Shapefile for IDWR's consideration.

- Many of the shapefile polygons in the 2026 TFCC Shapefile have been redrawn by TFCC based on comparison to the TFCC 2025 Shapefile.

² 2026 Conjunctive Administration (Step I Methodology Order) letter dated March 27, 2026, accompanying the submittal of the 2026 TFCC Shapefile.

³ 2026 TFCC analysis was corrected by SWE for an apparent error in GIS-calculated acres associated with four polygons (171 acre reduction).

- There remain overlapping polygons and polygons that extend outside of the TFCC service area boundary
 - Some, but not all, roads, parking lots, lands irrigated by cities, and other areas have been removed.
- In addition to the farmsteads described above, many of the polygons designed as 100% irrigated inappropriately include other non-irrigated areas, such as roads, canals, laterals, parking lots, vacant lots, streams, etc., that should be delineated and designated as non-irrigated. Examples of these are provided in **Attachment 1** (FID numbers referenced in the attachment are the “Feature ID” attribute for each polygon in the 2026 TFCC Shapefile).
- The 2026 TFCC Shapefile includes approximately 4,200 farmsteads, dairies, and rural subdivisions (“Farmsteads”), totaling approximately 8,000 acres as part of larger agricultural polygons that are designated as 100% irrigated.
 - These Farmsteads should be carved out of the larger agricultural polygon and designated either as non-irrigated if the lawn/garden area is irrigated by a well or as semi-irrigated if the lawn/garden area is irrigated by TFCC water. If semi-irrigated, the irrigated area within the Farmstead boundary should be quantified.
- An implicit assumption in the TFCC shapefile is that all agricultural polygons designated as 100% irrigated will be irrigated in 2026. Preliminary review of these lands shows several polygons with unimproved/undeveloped lands, such as shrublands. TFCC should be required to demonstrate that these lands will be developed for irrigation water use during 2026. Some of these polygons were previously designated as irrigated in prior years but still have not been developed based on preliminary review of 2025 aerial imagery.
- In 2025, the City of Twin Falls provided SWE with a shapefile of subdivisions with pressurized irrigation (“PI”) systems and stated that these areas receive TFCC water, while all other areas within the City service area receive City water. The 2026 TFCC Shapefile includes several subdivisions allegedly served by TFCC water that are not included in the City’s PI system shapefile. This mismatch should be investigated. In addition, it should be confirmed that the residential areas in and around the Cities of Buhl, Castleford, Filer, Kimberly, Hansen, and Murtaugh are actually served by TFCC water rather than City groundwater.
- The 2026 TFCC Shapefile includes approximately 12,500 acres that are designated as groundwater irrigation places of use depicted as the cross-hatched areas in **Figure 3**.

It should be verified that TFCC water is used on these groundwater place of use acres, and how much groundwater is used. Several of the groundwater rights associated with the places of use have no mention of TFCC water, and two of the groundwater rights indicate they are part of the Southwest Irrigation District and Milner Irrigation District.

Preliminary Refinement of 2026 TFCC Shapefile

SWE performed the following preliminary review and refinement of the 2026 TFCC Shapefile to correct some of the deficiencies outlined above.

- Polygon cleanup:
 - Remove overlapping polygons and areas outside of the TFCC boundary and recalculate the acreage in GIS.
 - Revised total footprint = 207,058 acres.
- Refine delineation of non-irrigated and semi-irrigated polygons:
 - Export the non-irrigated and semi-irrigated polygons from SWE's prior analysis of the 2025 TFCC Shapefile (see **Attachment 2**) that overlap the 2026 TFCC Shapefile.
 - SWE superimposed the semi-irrigated and non-irrigated polygons from SWE's 2025 analysis on to the 2026 TFCC Shapefile.
 - Cut additional non-irrigated and semi-irrigated polygons from the TFCC 2026 Shapefile using 2023 aerial imagery.
- Refined polygon classification results (non-irrigated, semi-irrigated, and irrigated):
 - Non-Irrigated polygons (11,294 acres)
 - Includes polygons listed as 0% irrigated per TFCC, and other non-irrigated polygons identified by SWE.
 - Includes undeveloped lands, areas served by the city's canals, roads, etc. For this preliminary analysis, SWE used TFCC's determination of the polygons that are served by city water. As mentioned above, SWE has not yet confirmed which areas are served by cities versus those served by TFCC.

- Semi-Irrigated polygons (14,837 acres)
 - Includes polygons classified as greater than 0% and less than 100% irrigated per TFCC's classification, and other semi-irrigated polygons identified by SWE.
 - SWE performed an NDVI analysis on each semi-irrigated polygon to compute the percent irrigated attribute (see **Attachment 3**). The NDVI threshold was set conservatively low to avoid classifying irrigated or potentially irrigated lands within the semi-irrigated polygons as non-irrigated acres.
- Irrigated polygons (180,928 acres)
 - Includes the remaining polygons or portions thereof designated as 100% irrigated by TFCC.
 - For this preliminary analysis, SWE used TFCC's determination that these parcels or portions thereof are 100% irrigated or irrigable. SWE will investigate these determinations as time allows.

Figure 4 shows the results of SWE's preliminary classification of the 2026 TFCC Shapefile. **Table 2** below provides a side-by-side comparison of the total and irrigated acres in the 2026 TFCC Shapefile with the corresponding results from SWE's preliminary refinement of the shapefile.

Table 2
Comparison of 2026 TFCC Shapefile with SWE's Preliminary Refinement
(acres)

Classification	TFCC		SWE		Difference (SWE – TFCC)	
	Total	Irrigated	Total	Irrigated	Total	Irrigated
Non-irrigated	10,731	0	11,294	0	562	0
Semi-Irrigated	6,864	4,321	14,837	7,726	7,972	3,405
Irrigated	189,779	189,779	180,928	180,928	(8,851)	(8,851)
Total	207,374	194,100	207,058	188,654	317	(5,446)
Corrected ⁴	207,204	193,930				

SWE's clean-up of the 2026 TFCC Shapefile resulted in a slightly reduced footprint of 207,058 acres. SWE identified an additional 7,972 acres of semi-irrigated polygons and an additional 562 acres of non-irrigated polygons.

⁴ 2026 TFCC analysis was corrected by SWE for an apparent error in GIS-calculated acres associated with four polygons (171 acre reduction).

The process of carving out Farmsteads from the TFCC designated Irrigated Parcels resulted in shifting 7,972 gross acres from “Irrigated” to “Semi-Irrigated.” SWE’s NDVI analysis of these gross acres shows that 4,184 acres are irrigated, and the remaining 3,788 acres represent driveways, buildings, and other non-irrigated lands within the polygons.

For the polygons where the TFCC and SWE classifications overlap (6,864 acres), TFCC identified 4,321 irrigated acres using its sampling procedure and SWE identified 3,539 irrigated acres using its NDVI process, a difference of 782 acres.

Most of the 8,851 acre difference between the TFCC and SWE polygons classified as “Irrigated” (100% irrigated) results from SWE’s shifting of 7,972 acres from “Irrigated” to “Semi-Irrigated.” The remaining difference of 879 acres represents SWE designation of all or portions of TFCC Irrigated polygons as “Non-Irrigated” (562 acres), removal of overlapping polygons and lands outside of the TFCC service area (146 acres), and the 171 acre correction to the sum of the polygon acres in the 2026 TFCC Shapefile.

SWE’s preliminary refinement of the 2026 TFCC Shapefile resulted in a total of 188,654 irrigated acres, a reduction of 5,446 acres from the 194,100 acres reported by TFCC for 2026.

Qualifications and Limitations of SWE’s Preliminary Refinement

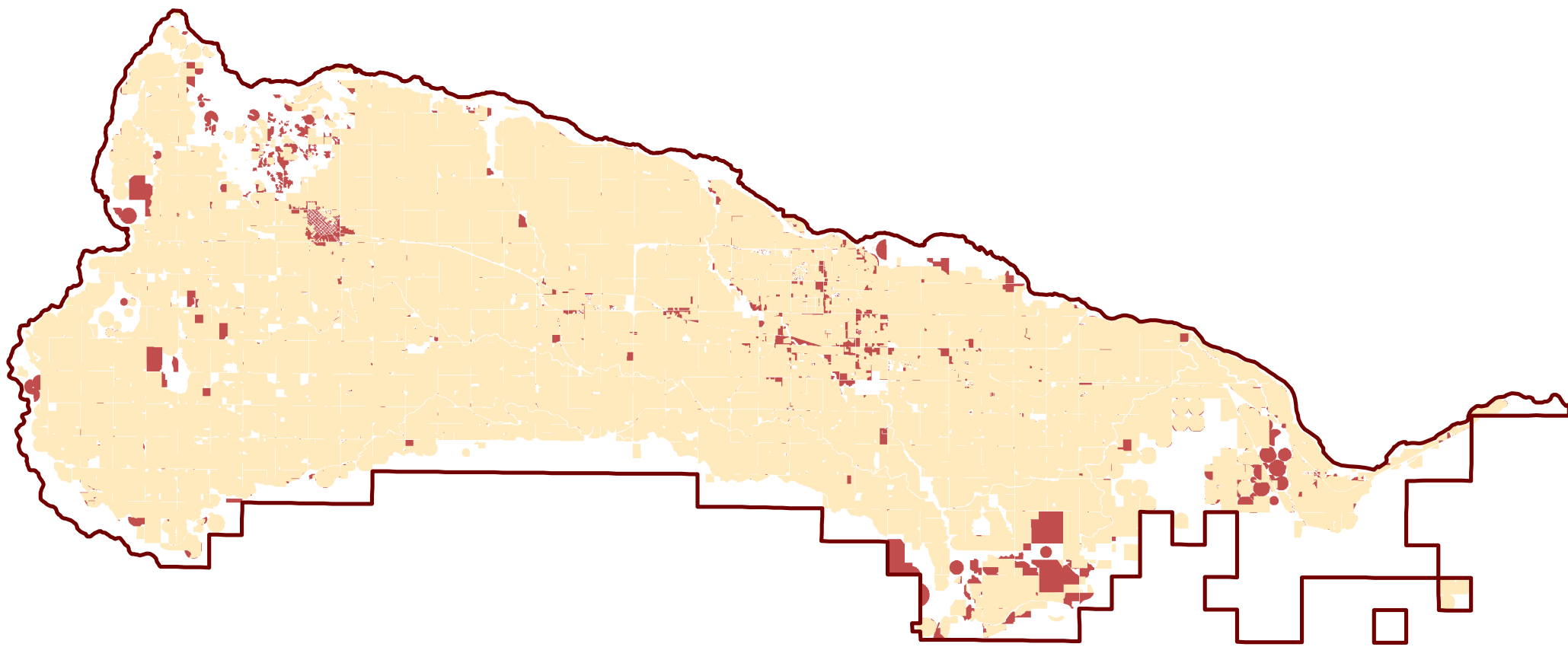
- The approximately 5,000 irrigated acres added to the TFCC shapefile in 2026 have not been independently verified and thoroughly reviewed for possible classification as semi-irrigated or non-irrigated acres.
- The analysis does not account for typically fallowed acreage.
- There may be additional non-irrigated and semi-irrigated areas that need to be reclassified from the current irrigated designation.
- All polygons reportedly served by TFCC should be verified to confirm they are in fact supplied by TFCC and not by groundwater or other sources. In particular, the new polygons added in 2026 and the lands within municipal boundaries should be verified.

Shapefile Download Link

SWE’s preliminary refinement of the 2026 TFCC Shapefile can be downloaded at:

https://spronk.sharepoint.com/:f:/g/IgA_f_JRA0RQSbKefla_U71IAT-uFGVOrdWHlzoIK19tcJY?e=v90Pmm

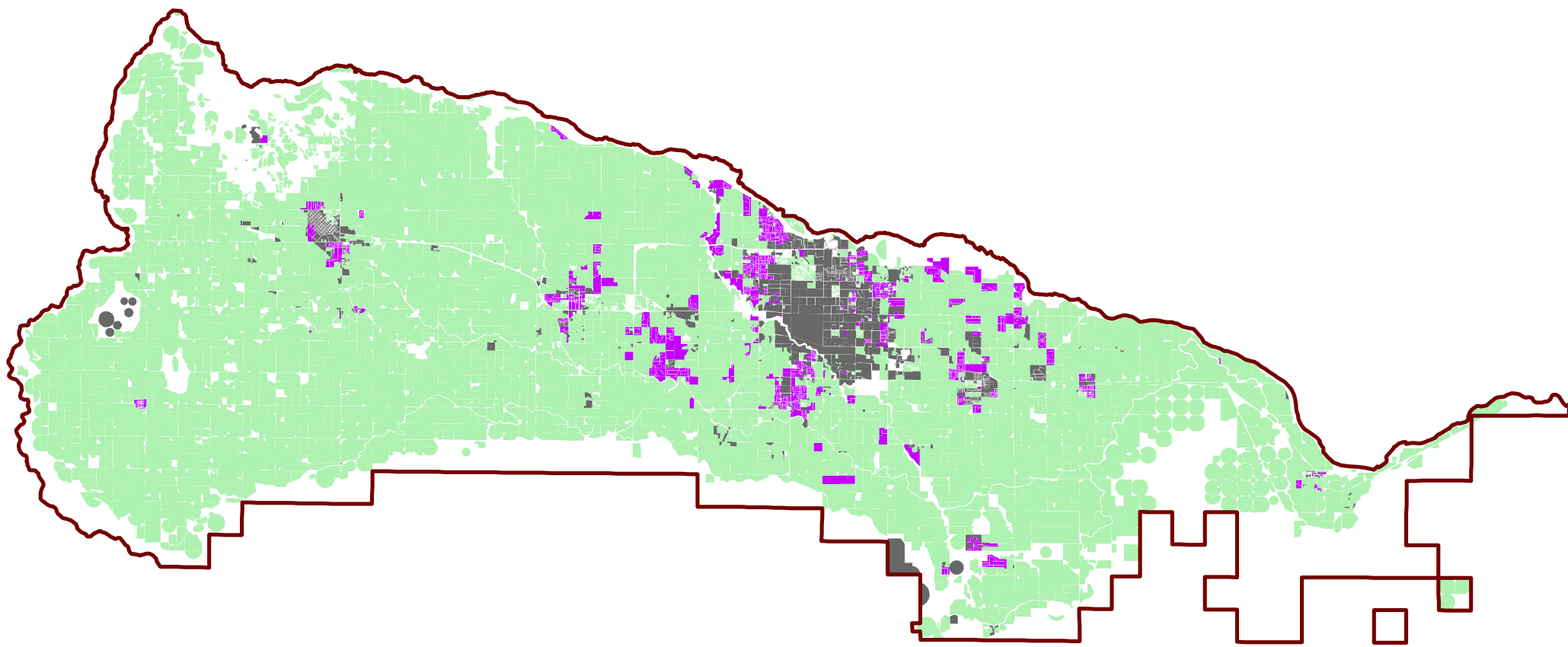
Figures



Source: IDWR shapefiles for boundaries.
TFCC Irrigated lands shapefiles from TFCC.

Figure 1
Comparison of 2025 TFCC Shapefile and
2026 TFCC Shapefile

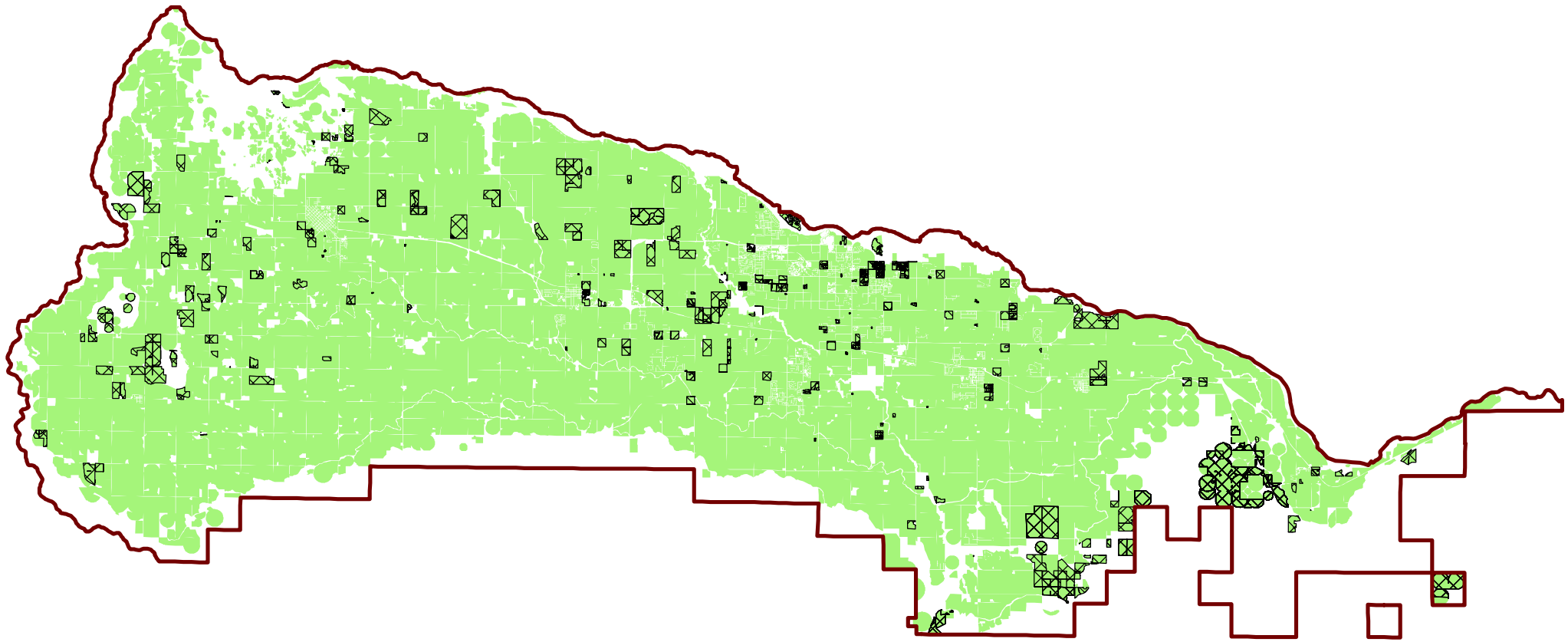
-  TFCC Service Area
-  TFCC 2025 Shapefile
-  TFCC 2026 Shapefile New Polygons



Source: IDWR shapefiles for boundaries.
TFCC Irrigated lands shapefiles from TFCC.

Figure 2
TFCC Classifications
2026 TFCC Shapefile

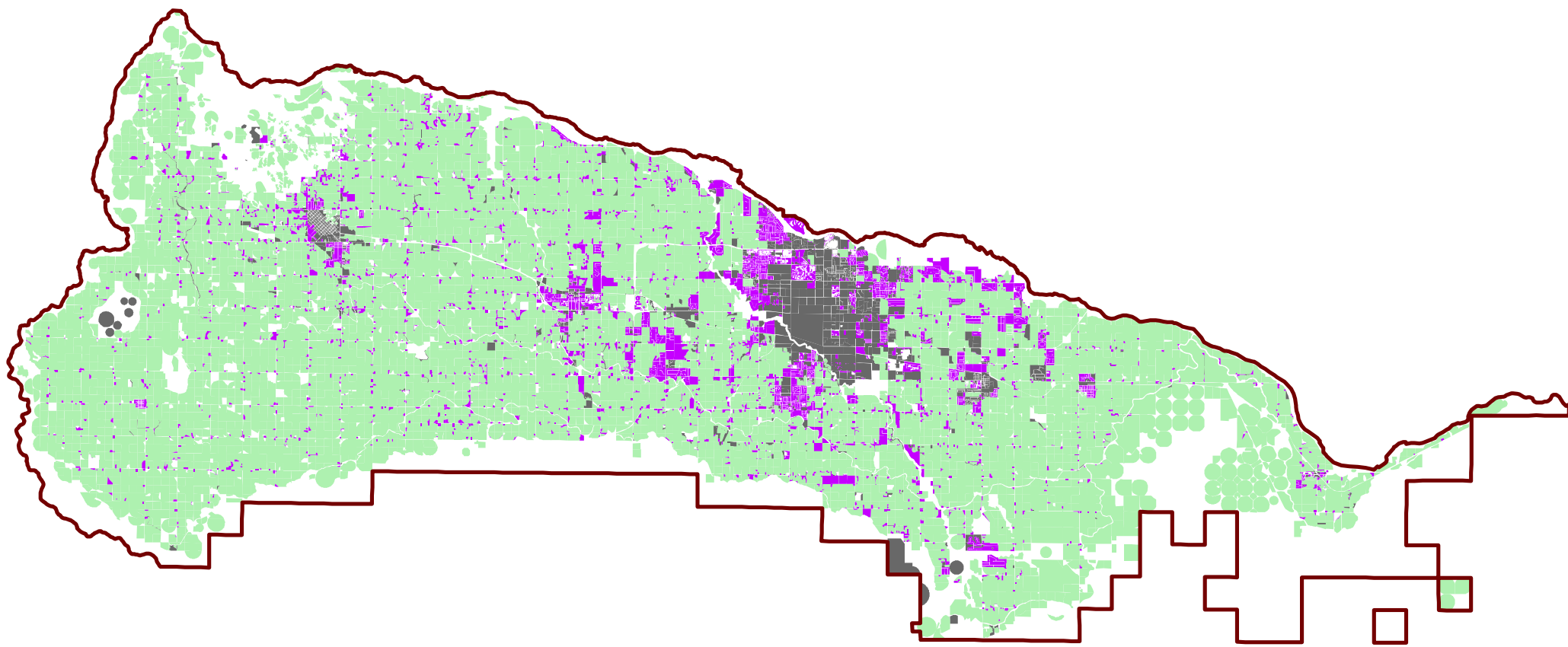
-  TFCC Service Area Boundary
- TFCC 2026 Shapefile**
- TFCC Classification**
-  irrigated
-  non-irrigated
-  semi-irrigated



Source: IDWR shapefiles for boundaries.
TFCC Irrigated lands shapefiles from TFCC.

Figure 3
Groundwater Irrigation Right Places of Use Within
2026 TFCC Shapefile

 TFCC Service Area Boundary
 2026 TFCC Shapefile
 GW Irrigation Right Place of Use



Source: IDWR shapefiles for boundaries.
TFCC Irrigated lands shapefiles from TFCC.

Figure 4
SWE Preliminary Reclassification
2026 TFCC Shapefile

 TFCC Service Area Boundary
TFCC 2026 Shapefile
SWE Classification
 irrigated
 non-irrigated
 semi-irrigated

Attachments

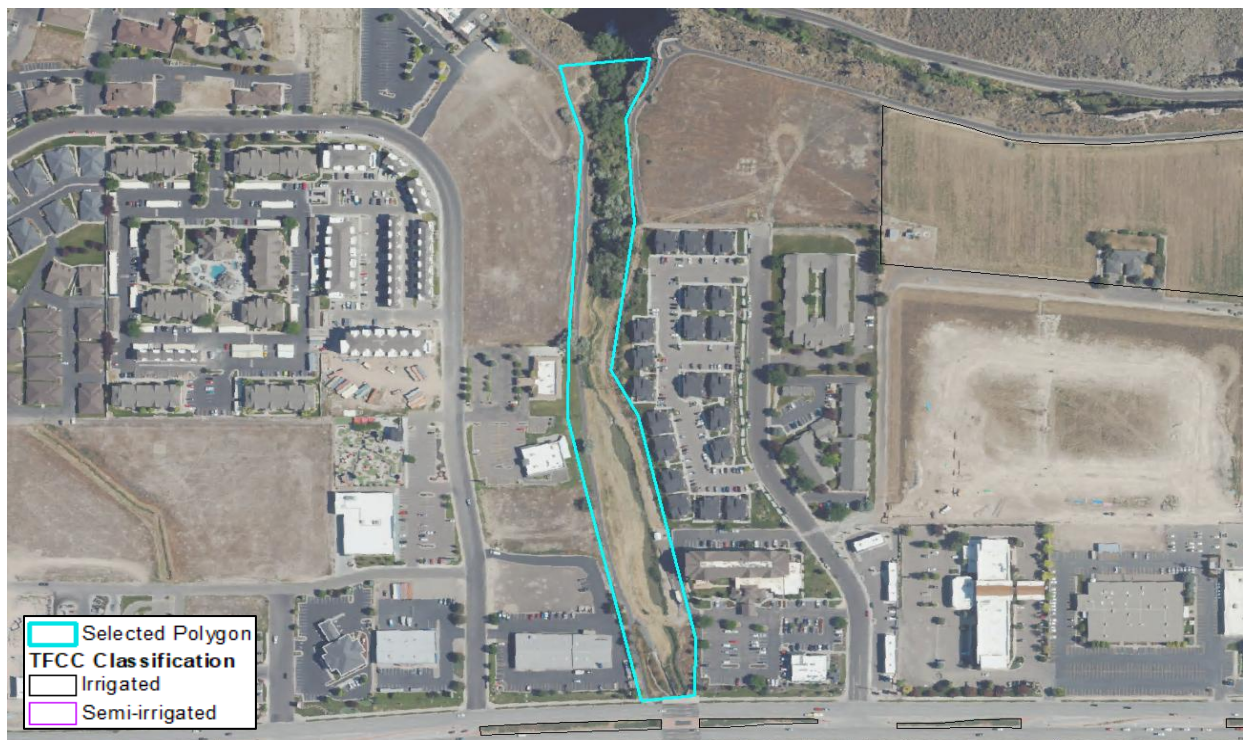
Attachment 1 - TFCC Misclassification Examples

Example 1 (FID 6141)



Hardened acres misclassified as 100% irrigated.

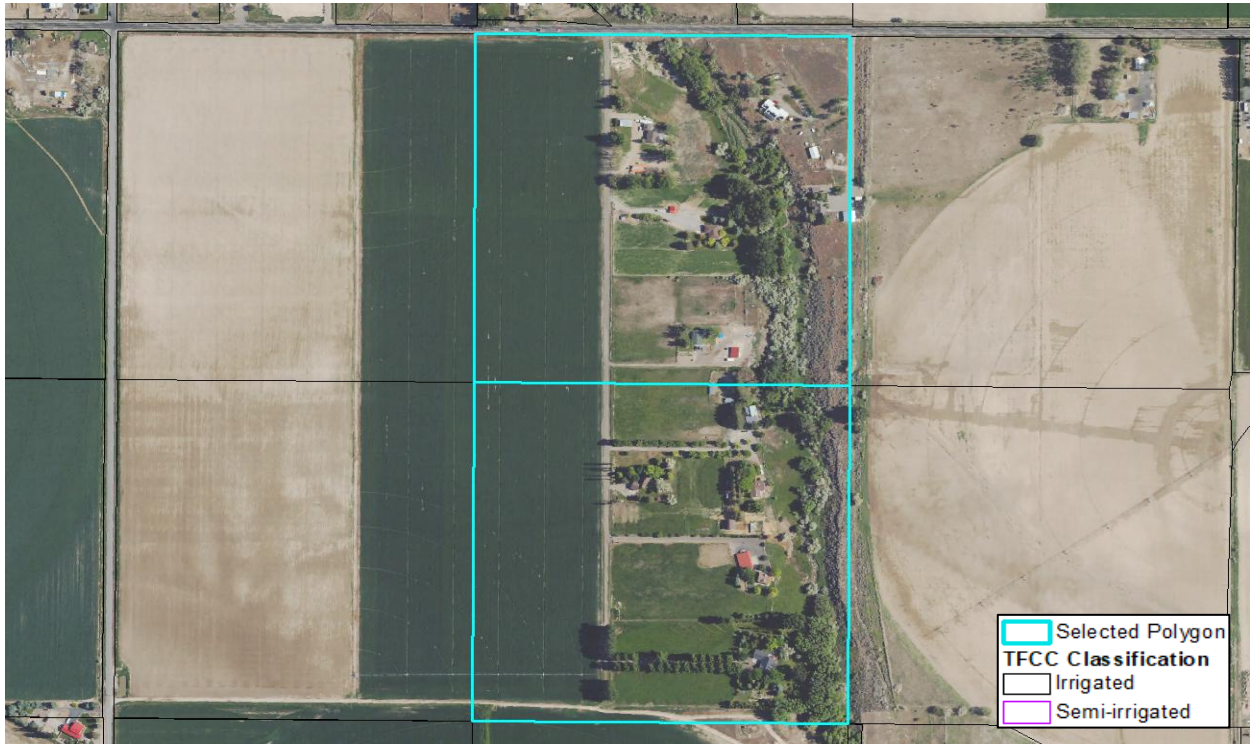
Example 2 (FID 5296)



Non-irrigated wasteway misclassified as 100% irrigated.

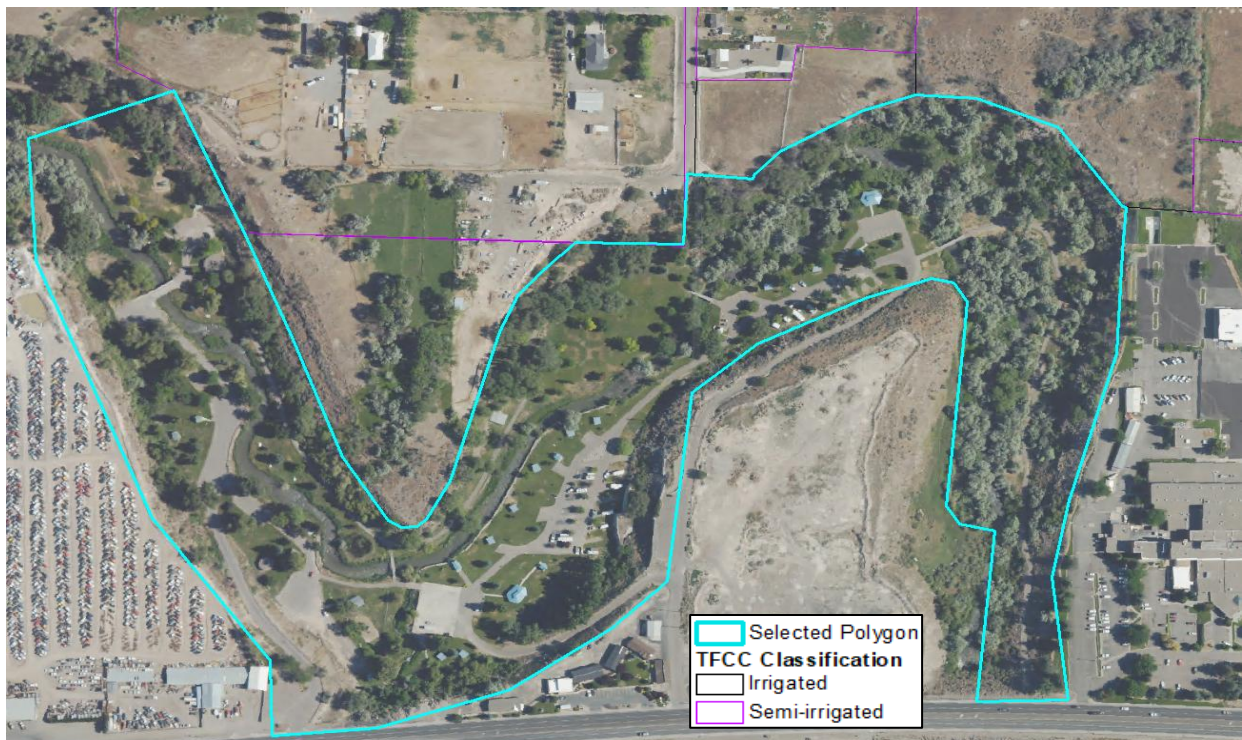
Attachment 1 - TFCC Misclassification Examples

Example 3 (FID 1130 and FID 1133)



Farmsteads, roads, and canal misclassified as 100% irrigated.

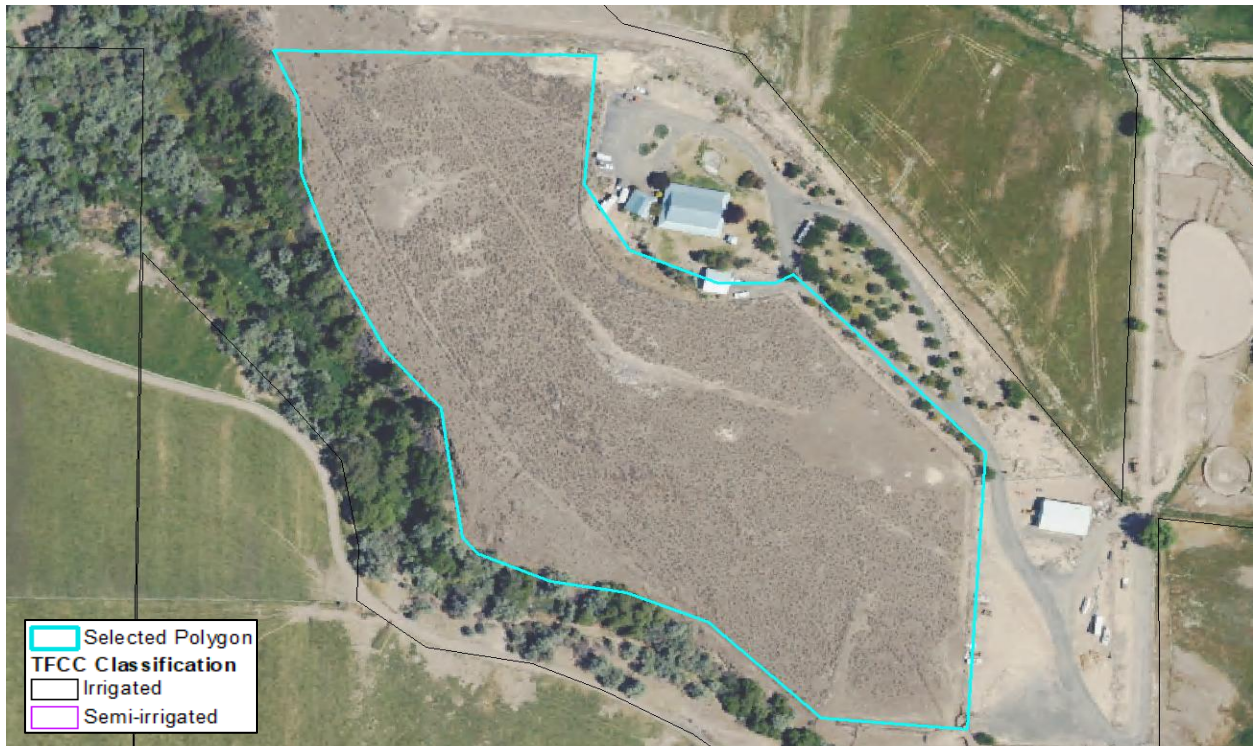
Example 4 (FID 4910)



Stream, park, and riparian area misclassified as 100% irrigated.

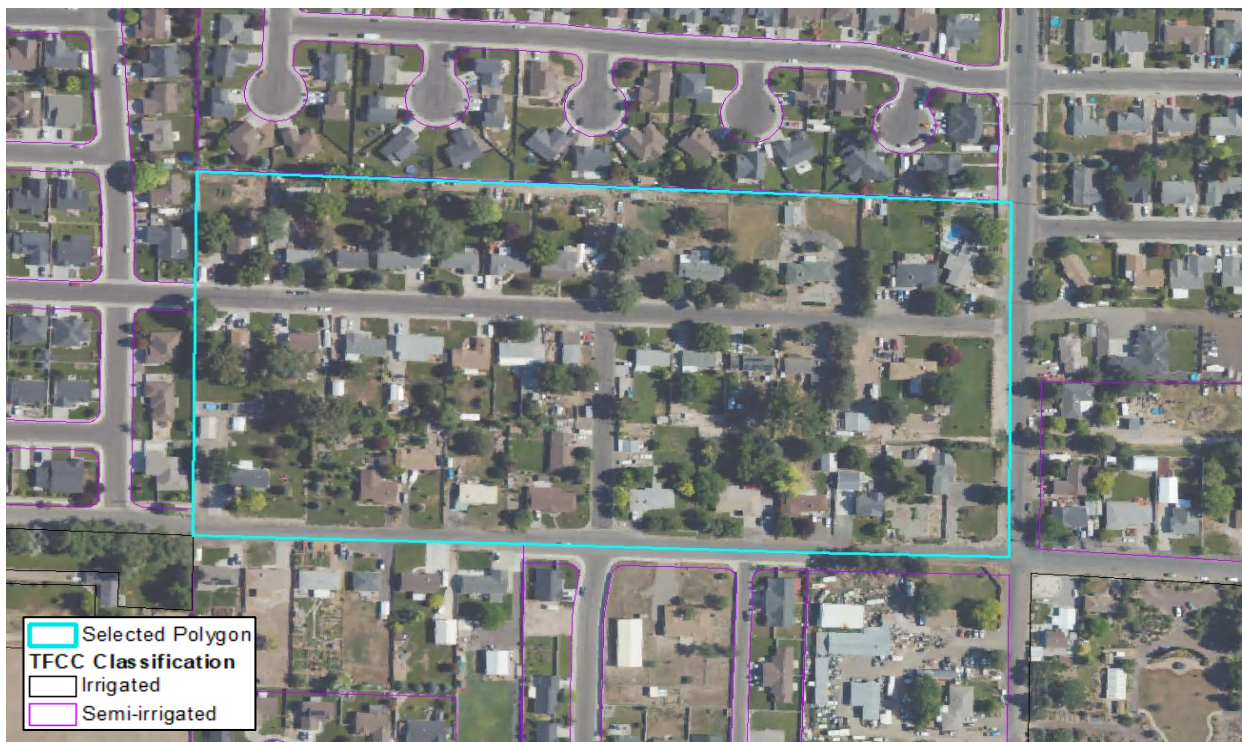
Attachment 1 - TFCC Misclassification Examples

Example 5 (FID 4905)



Shrubland misclassified as 100% irrigated.

Example 6 (FID 4232)



Semi-irrigated polygon without roads cut out with the same irrigated percentage (50%) as the surrounding semi-irrigated polygons with roads cut out.

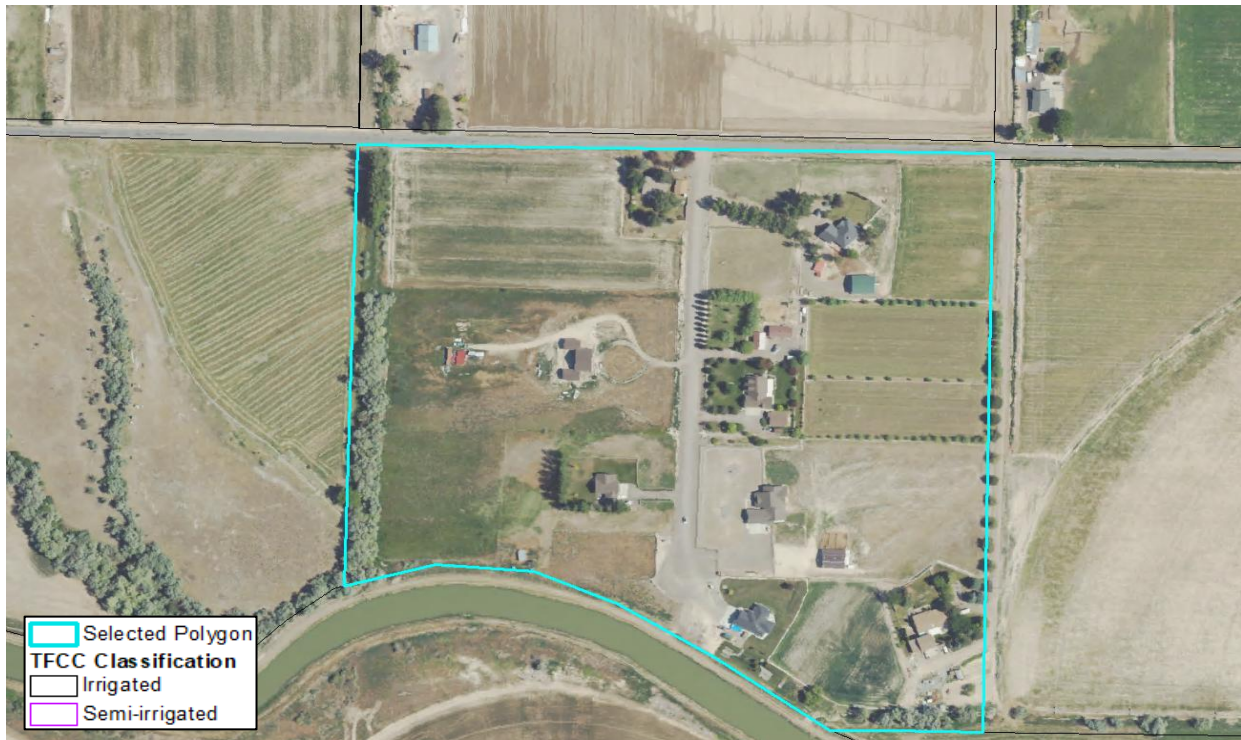
Attachment 1 - TFCC Misclassification Examples

Example 7 (FID 688)



Ponds, canal, and other non-irrigated land misclassified as 100% irrigated.

Example 8 (FID 1857)



Multiple Farmsteads misclassified as 100% irrigated.

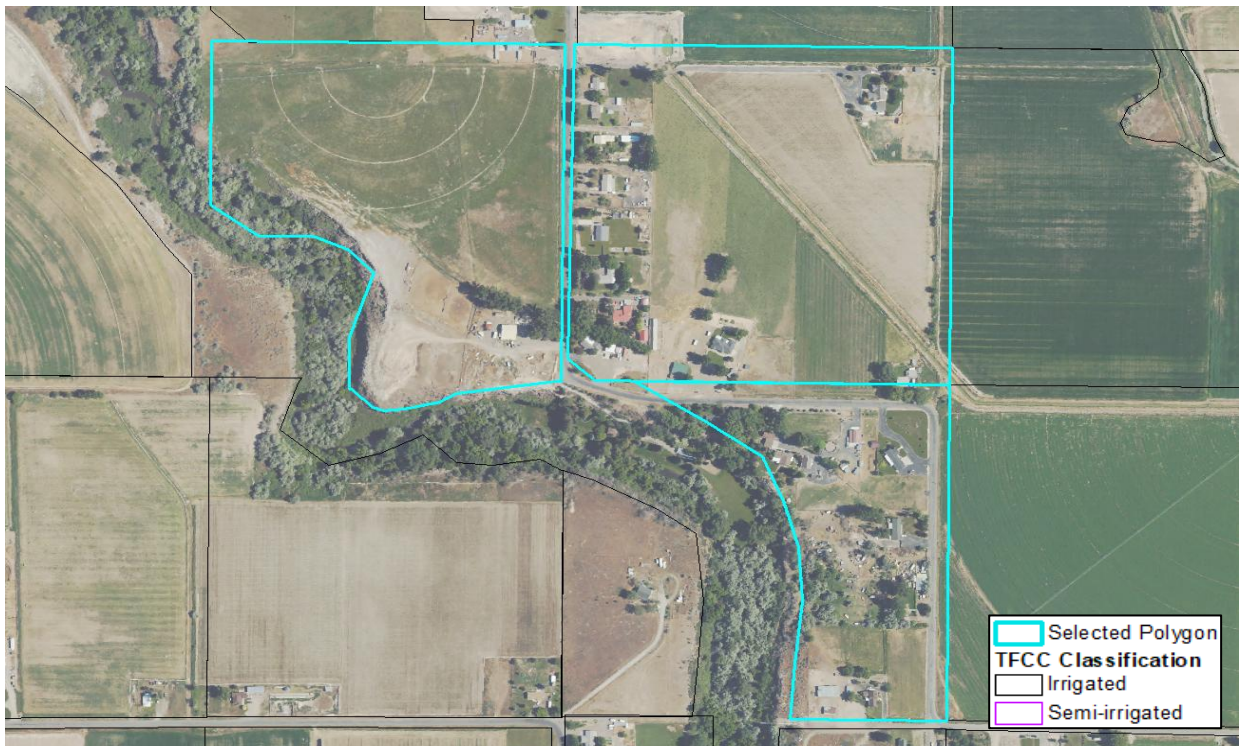
Attachment 1 - TFCC Misclassification Examples

Example 9 (FID 3003, FID 3014, and FID 4358)



Ponds, canal, and other non-irrigated land misclassified as 100% irrigated.

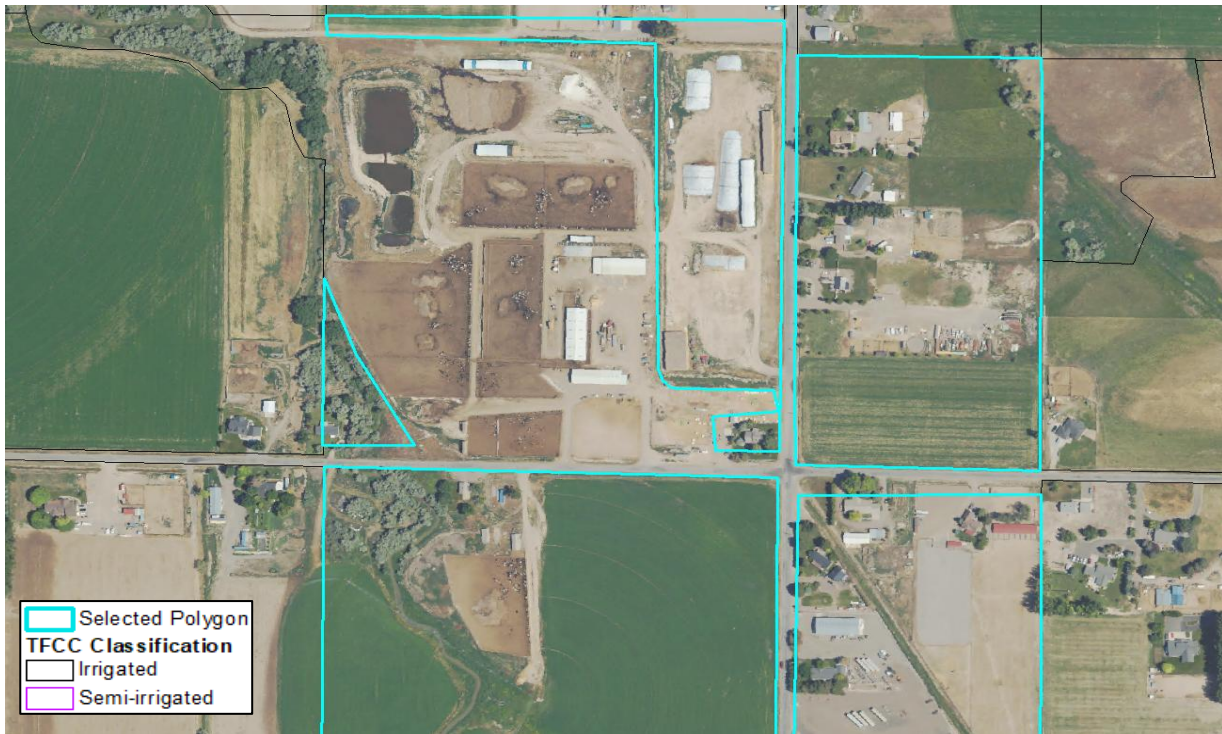
Example 10 (FID 4340, FID 464, and FID 4174)



Farmsteads, roads, canals, etc. misclassified as 100% irrigated

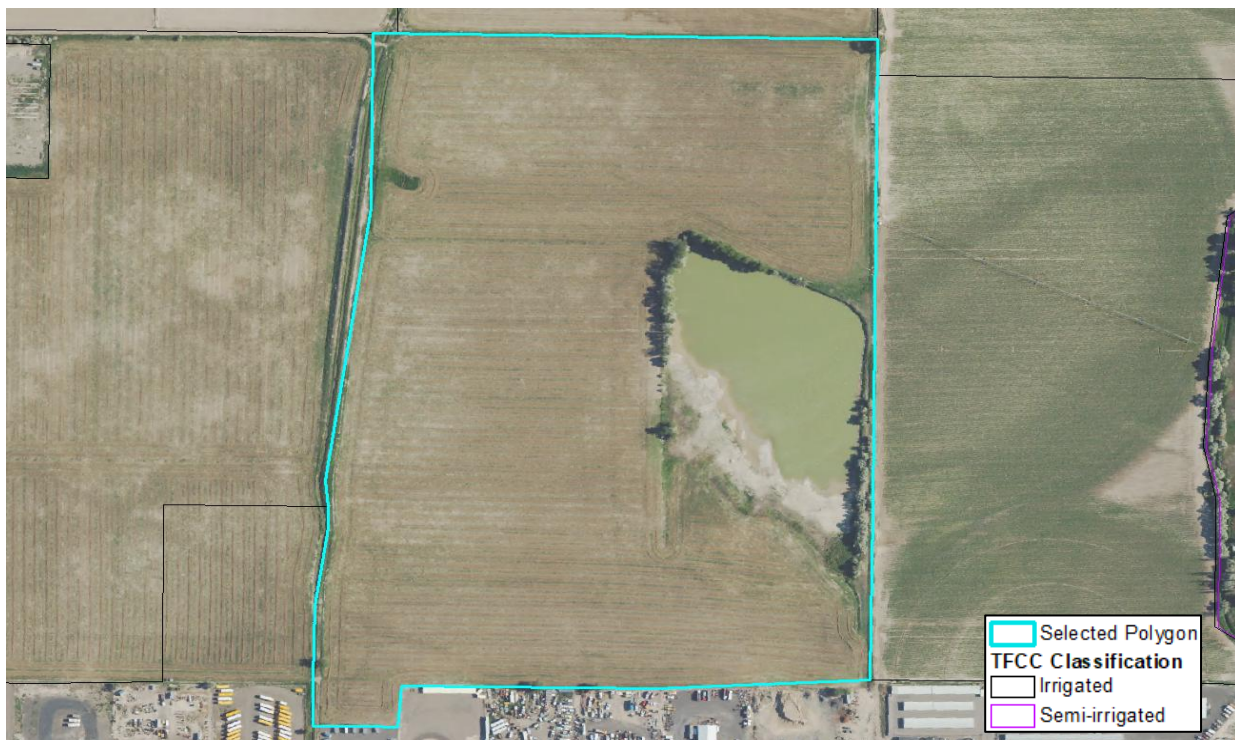
Attachment 1 - TFCC Misclassification Examples

Example 11 (FID 458, FID 454, FID 4397, and FID 460)



Dairy, commercial, other non-irrigated land misclassified as 100% irrigated.

Example 12 (FID 602)



Large pond misclassified as 100% irrigated.

Attachment 1 - TFCC Misclassification Examples

Example 13 (FID 282, FID 283, FID 278 and FID 277)



Undeveloped land and Farmsteads misclassified as 100% irrigated.

Example 14 (FID 4351, FID 4885, and FID 4886)



Undeveloped land and Farmsteads misclassified as 100% irrigated.

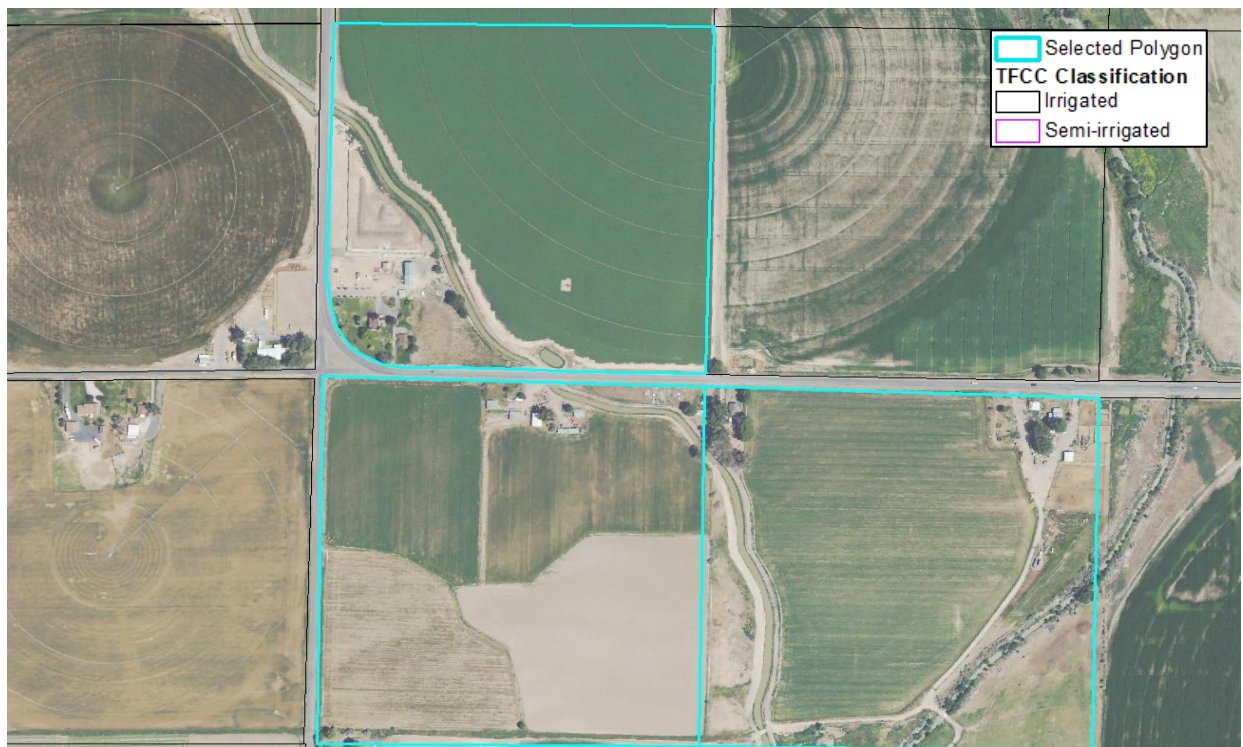
Attachment 1 - TFCC Misclassification Examples

Example 15 (FID 3088, FID 3075, and FID 3089)



Undeveloped land, canal, and Farmsteads misclassified as 100% irrigated.

Example 16 (FID 3056, FID 3091, and FID 3086)



Undeveloped land, canal, and Farmsteads misclassified as 100% irrigated.

Attachment 1 - TFCC Misclassification Examples

Example 17 (FID 143)



Rural subdivision misclassified as 100% irrigated.

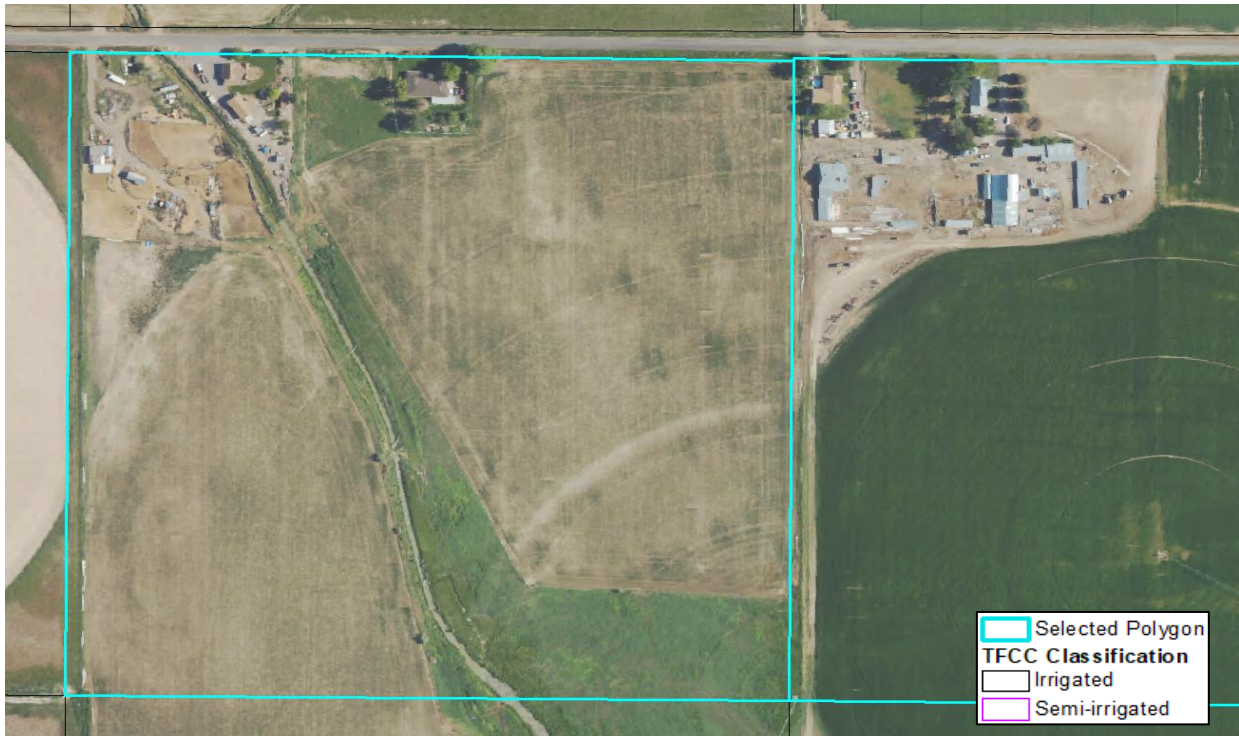
Example 18 (FID 4206)



Commercial land and Farmsteads misclassified as 100% irrigated.

Attachment 1 - TFCC Misclassification Examples

Example 19 (FID 2353 and FID 2354)



Farmsteads and canal misclassified as 100% irrigated.

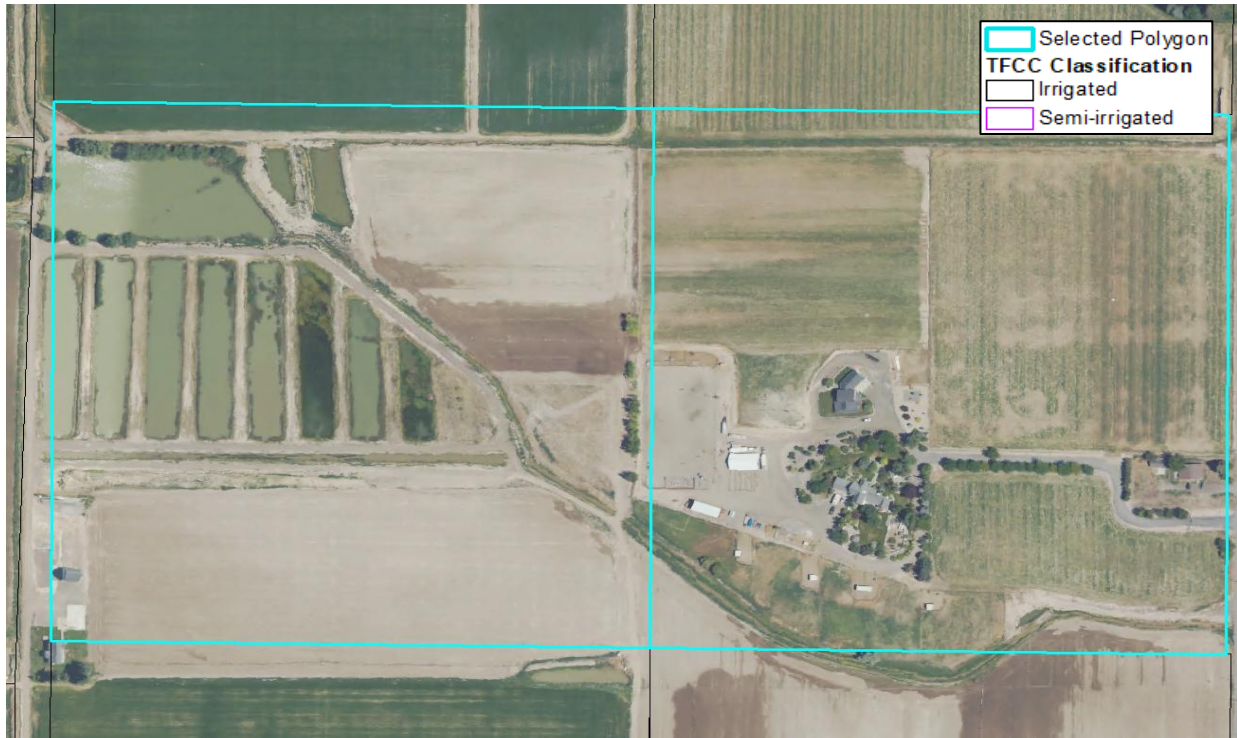
Example 20 (FID 4545)



Commercial land and Farmsteads misclassified as 100% irrigated.

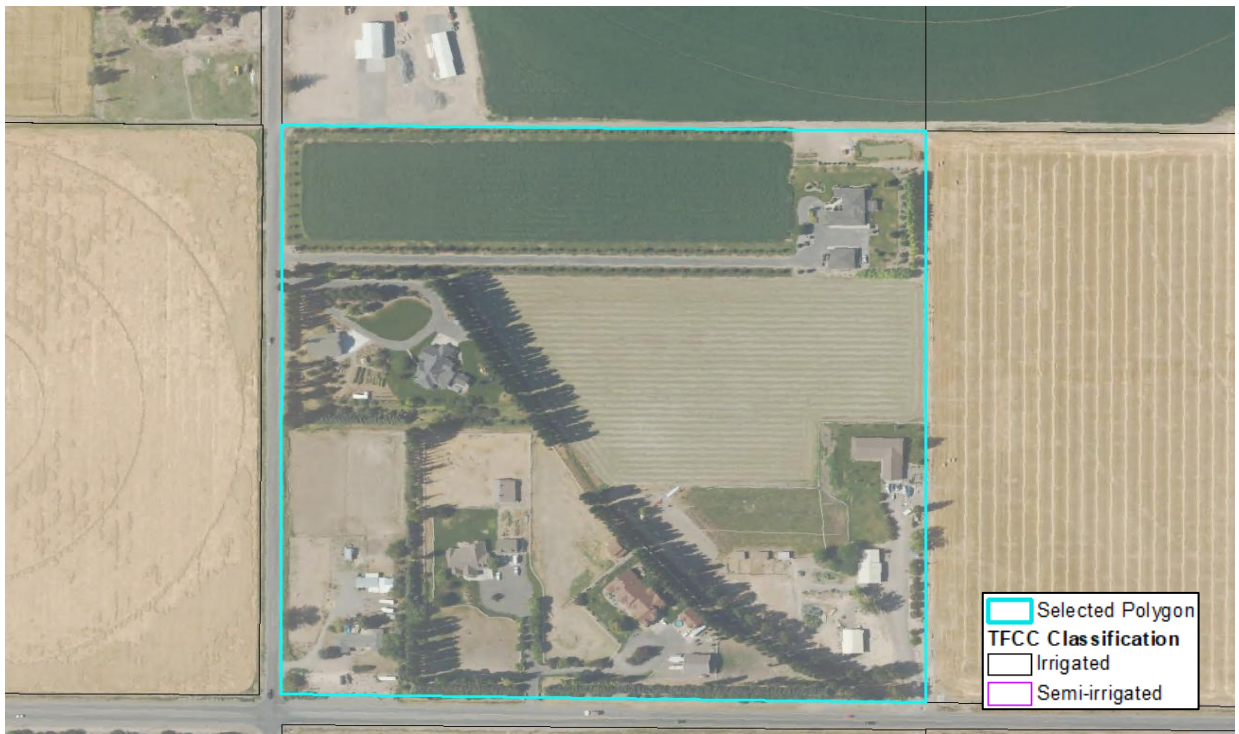
Attachment 1 - TFCC Misclassification Examples

Example 21 (FID 405 and FID 4130)



Example of Farmsteads, ponds, and canal misclassified as 100% irrigated.

Example 22 (FID 306)



Example of Farmsteads misclassified as 100% irrigated.

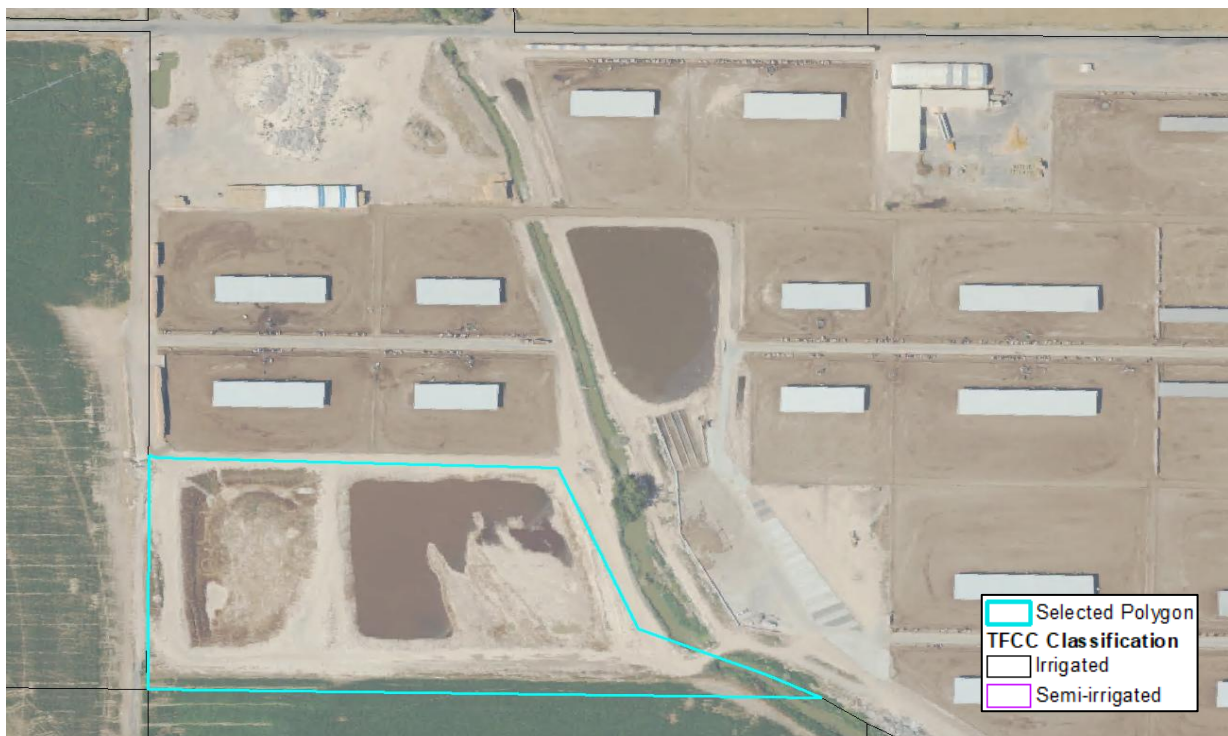
Attachment 1 - TFCC Misclassification Examples

Example 23 (FID 275, FID 274, and FID 272)



Example of parking lot, building and start of subdivision misclassified as 100% irrigated.

Example 24 (FID 75)



Example of waste ponds and roads misclassified as 100% irrigated.

Attachment 2

Summary of Refinement of 2025 TFCC Shapefile

In 2025, SWE performed a detailed and thorough review of the 2025 TFCC Irrigated Area Shapefile (“2025 TFCC Shapefile”) in preparation for technical discussions with TFCC that ultimately did not occur. The results of this classification effort were transferred to the 2026 TFCC Shapefile as described in the main body of the technical memorandum to which this attachment accompanies. This attachment summarizes SWE’s 2025 review and reclassification of the 2025 TFCC Shapefile.

The 2025 TFCC Shapefile is comprised of polygons classified as irrigated, non-irrigated, and semi-irrigated, defined as follows:

- Non-irrigated – Hardened areas such as roads, buildings, and parking lots; and other non-irrigated areas such as canals, ponds, vacant lots, and riparian areas. This also includes lands that are irrigated from city water systems or other sources identified by TFCC. There is no dispute that areas classified as non-irrigated by TFCC surface water should not be included in the TFCC demand analysis under the SWC Methodology.
- Semi-irrigated – A term used by IDWR to refer to developed non-agricultural lands, portions of which are irrigated. This includes residential and commercial developments, farmsteads, parks, and golf courses. The non-irrigated portions of the semi-irrigated parcels should not be included in the TFCC demand analysis.
- Irrigated – Agricultural or unimproved parcels that are irrigated or will be irrigated in the upcoming irrigation season. There is some debate over whether parcels that are not currently irrigated but are capable of being put into irrigation should be included in the TFCC demand analysis.

Polygon Classification

SWE used the 2023 USDA NAIP aerial imagery⁵ (“2023 NAIP Imagery”) to classify each polygon in the 2025 TFCC Shapefile footprint as:

- Irrigated;
- Semi-irrigated; or
- Non-irrigated.

During the classification process, polygons that were comprised of clearly different land use types were split. For example, a polygon that contained a residential subdivision and an agricultural field was split into two polygons, with the subdivision classified as semi-irrigated and the agricultural field classified as irrigated.

Each polygon was visually reviewed and edited to exclude non-irrigated areas, such as major streams, major roads, major canals, large buildings, parking lots, commercial areas, and industrial lots. These non-irrigated areas were cut from the original shapefile and reclassified as non-irrigated. The cutting tool in GIS cuts polygons into two or more parts, where the sum of the area of the parts equals the total area of the original polygon. The visual review and editing process was performed at a consistent visual scale of approximately 1:5,000. The result was that some small non-irrigated and semi-irrigated features (dirt roads, minor laterals, and small homesteads) within the polygons remain classified as irrigated.

- Polygons classified as “Irrigated” were designated as 100% irrigated/irrigable.
- Polygons classified as “Non-Irrigated” were designated as 0% irrigated/irrigable.
- Polygons classified as “Semi-Irrigated” were designated as greater than 0% and less than 100% irrigated/irrigable.

⁵ U.S. Department of Agriculture (“USDA”) National Aerial Photography Program (“NAIP”) 4-band imagery.

Attachment 3

Quantification of Irrigated Area in Semi-Irrigated Polygons 2026 TFCC Shapefile

Analysis of Semi-irrigated Polygons

The polygons classified as semi-irrigated in the 2026 TFCC Shapefile (14,837 acres) contain irrigated vegetation, including turf grass, trees, shrubs, and gardens. SWE performed a remote sensing analysis to distinguish irrigated portions of semi-irrigated parcels from non-irrigated areas (roads, houses, driveways, etc.).

METRIC, SWE used NDVI derived from high-resolution, four-band NAIP Imagery from July 2023 to determine the irrigated area within the semi-irrigated polygons. NDVI is a commonly used index to determine the amount and health of vegetation in agricultural and urban environments. The 2023 NAIP imagery used in the analysis has a pixel size of 0.6 meters x 0.6 meters. The 2023 NAIP imagery was used to be consistent with aerial imagery used by TFCC to delineate the 2026 TFCC Shapefile.

The use of a single image from July 2023 for the NDVI analysis is reasonable and appropriate, since the vegetation being detected (turf grass, trees, shrubs, etc.) grows throughout the summer and has a relatively high NDVI even when not well irrigated.

NDVI

NDVI is computed using the formula:

$$NDVI = (NIR - Red) / (NIR + Red)$$

where:

NIR is the near-infrared reflectance of the pixel, and

Red is the red light reflectance of the pixel.

The NDVI values can range from -1 to +1, with higher values indicating denser and healthier vegetation. The NDVI values are scaled in ArcGIS to values between 0 and 200, where 0 corresponds to -1 and 200 corresponds to +1.

NDVI Analysis Procedure

SWE computed the NDVI value in ArcGIS for each pixel from the four-band 2023 NAIP Imagery. SWE selected 30 random sample training parcels to determine the cutoffs between irrigated and non-irrigated NDVI values based on tabulation of the NDVI values for pixels that were visually assigned as irrigated or non-irrigated pixels. Through an iterative process, the following cutoffs were determined for the NDVI analysis.

NDVI Range (GIS)	Land Use	Classification
0 - 96	Hardened	Non-irrigated
97-110	Hardened or bare ground	Non-irrigated
111-200	Vegetation	Irrigated

The threshold for the irrigated classification was set conservatively low at NDVI values greater than 110. Irrigated lawn grass and trees typically have a much higher NDVI value than 110, with values generally ranging from 130 to 180.

SWE processed the NDVI raster values to compute the irrigated and non-irrigated pixels in each semi-irrigated polygon. **Figure A-1** shows an example semi-irrigated parcel with side-by-side comparisons of (a) the visual image, (b) the NDVI pixels, and (c) the classified pixels.

NDVI Accuracy Assessment

SWE assessed the accuracy of the NDVI analysis using a random sample of 100 polygons. Within each sample polygon, NDVI pixels for each feature were checked for accuracy, including at least two pixels for each land use feature, such as driveways, sidewalks, roads, buildings, trees, etc. The NDVI values of the near 1,000 selected pixels were recorded and compared to the NDVI cutoffs. Using these results, a typical error matrix analysis was employed to evaluate classification performance, with pixels categorized as true positives, true negatives, false positives, or false negatives relative to expected land use conditions. An error was recorded if a selected pixel recorded higher or lower than the expected cutoff. For example, certain green or blue roofs appeared as irrigated (NDVI > 110), and this was noted as a misclassification of non-irrigated areas as irrigated (false positive).

The accuracy assessment results showed a two percent error rate in classifying non-irrigated pixels as irrigated, and no errors in classifying irrigated pixels as non-irrigated.

There are instances in which weedy, unirrigated areas are classified as irrigated. While weedy areas may introduce noise in the data, this tends to overclassify non-irrigated areas as irrigated, resulting in a conservatively high determination of the irrigated area.

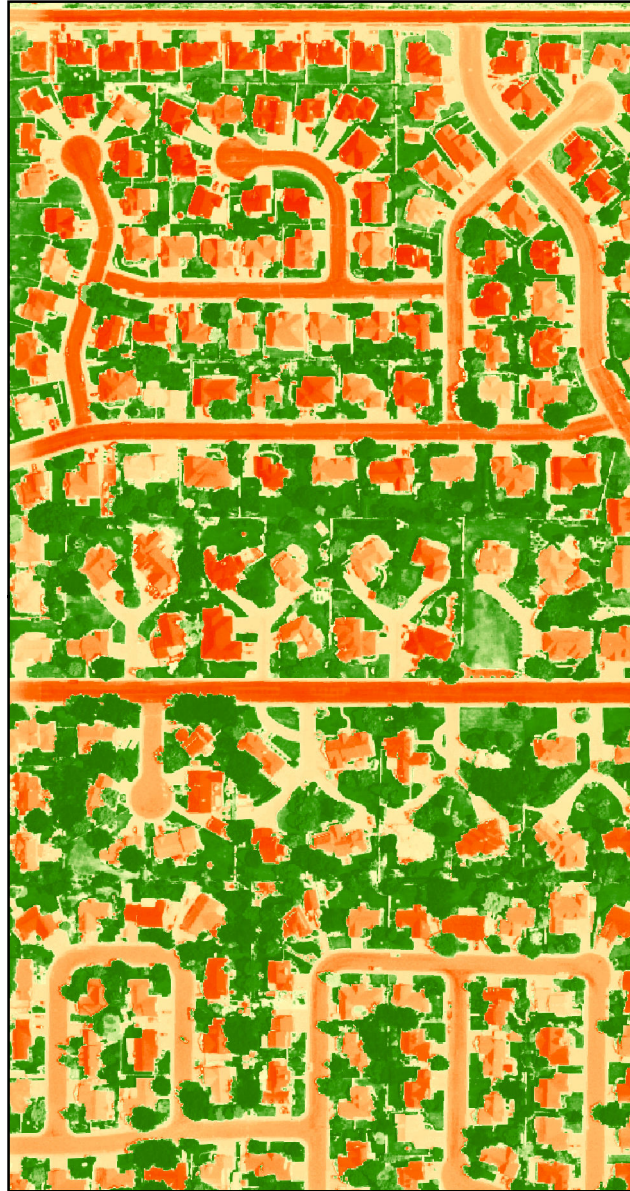
Results

The results of the NDVI analysis of semi-irrigated polygons showed that there were 7,726 irrigated acres out of the 14,837 total acres (52%), and 7,111 non-irrigated acres (48%).

2023 NAIP Imagery



NDVI



Reclassified NDVI

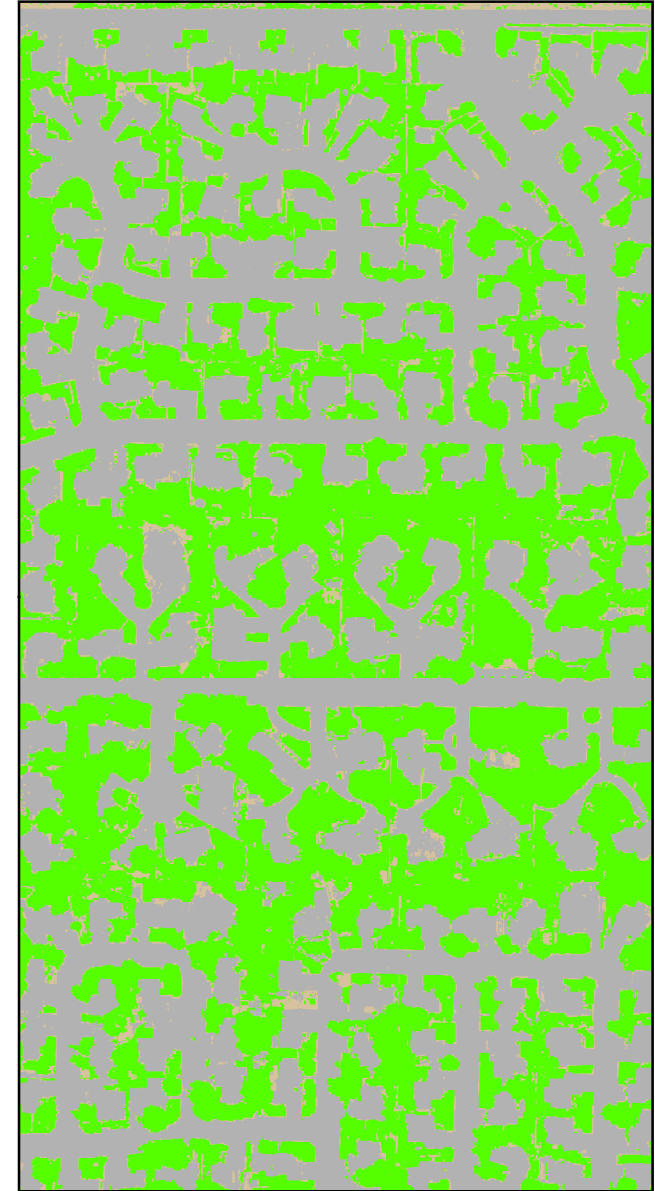


Figure A1
Example of Semi-Irrigated Land
2023 Aerial Photo, NDVI, and Reclassified NDVI

Reclassified NDVI

- Hardened or water
- Hardened or bare ground
- Vegetation