This presentation premiered at WaterSmart Innovations

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Evaluating Water Use Trends of Thornton's Water Saving Champions

Water Smart Innovations Conference
October 6-8, 2010

Laura Wing, City of Thornton, Colorado
Laura.Wing@cityofthornton.net

Ian Hanou, AMEC Earth and Environmental
Ian.Hanou@amec.com

City of Thornton

amec

AMEC Earth & Environmental, Inc.

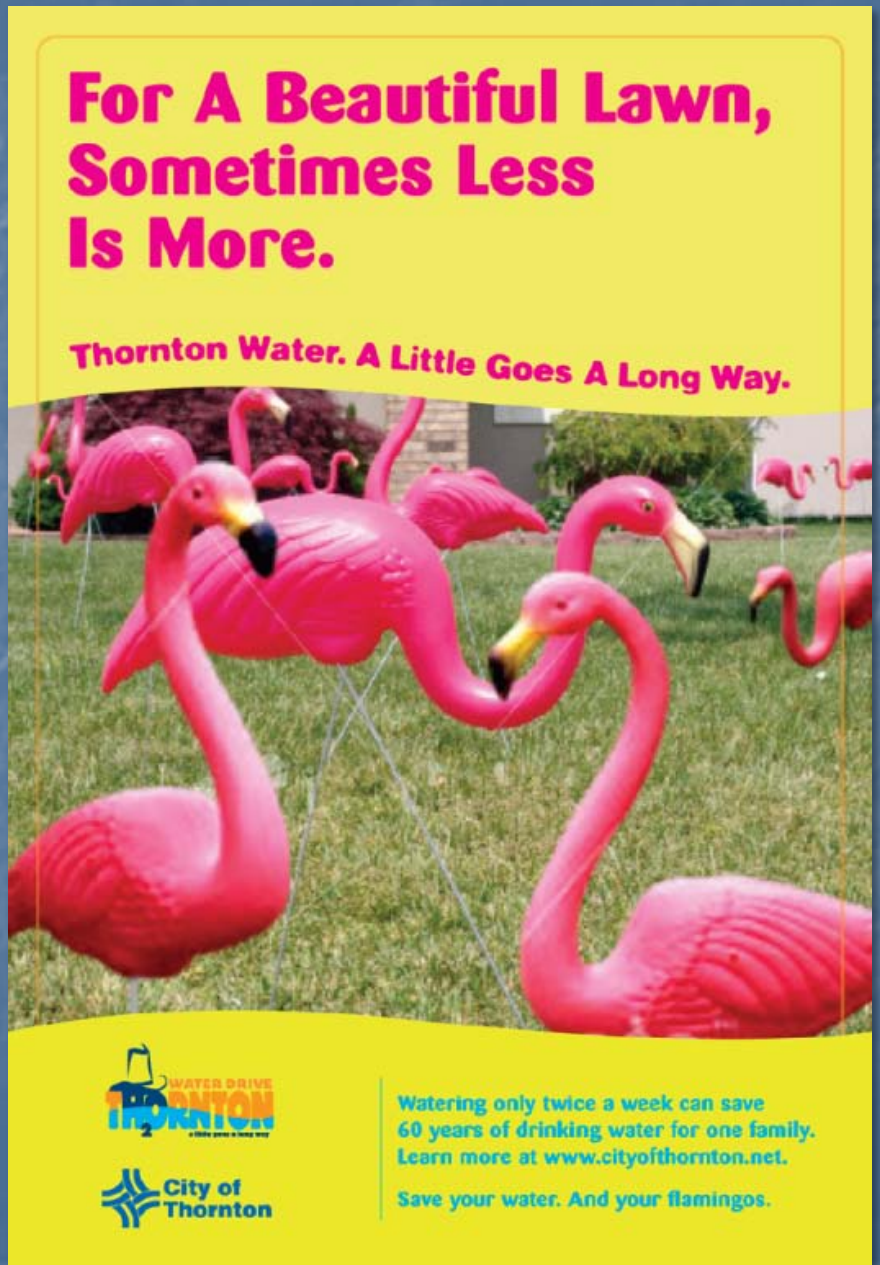
The Thornton Water Drive

- Social Marketing Campaign launched in 2007
- Objectives:
  - Increase awareness about the need to conserve
  - Increase **voluntary** water conservation behaviors
  - Market water efficiency incentive programs

Target Audience

- Adult residents in the Thornton water service area - 2007
  - Population 135,000
  - 34,000 residential accounts
  - 92 gallons per capita per day (gpcd)

Campaign Messages

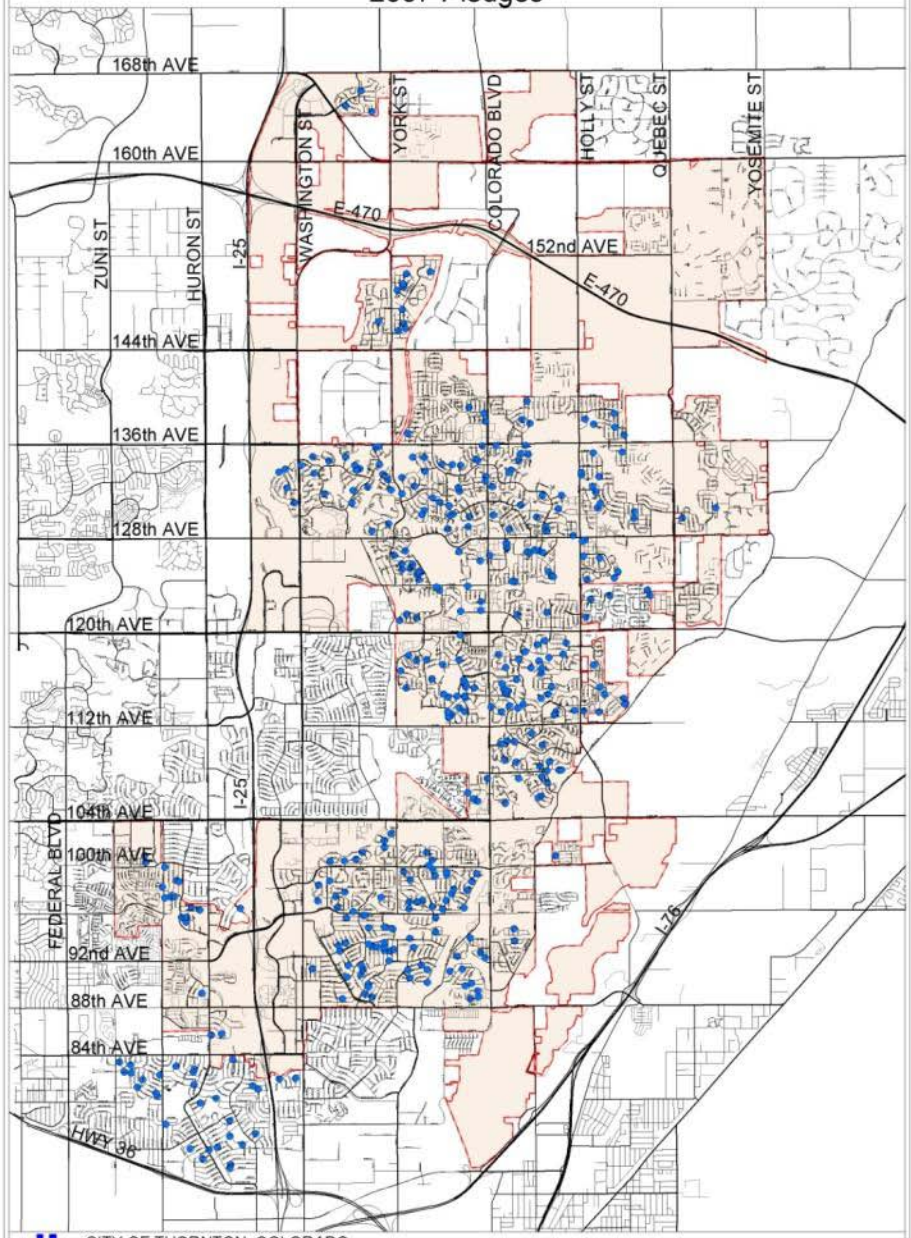


Water Saving Champions

- Pledge to save 10 gallons a day
- Recognition on ThorntonWater.com
- Monthly E-newsletter
- Postcard mailings
- Champion Event
- Yard Signs

Water Saving Champions

2007 Pledges



CITY OF THORNTON, COLORADO
9500 CIVIC CENTER DRIVE
THORNTON, COLORADO 80229-4326
(303) 538-7295
January 27, 2009

1 inch = 2,247 feet

Evaluation of Campaign Effectiveness

- Baseline Telephone Survey
- Annual Evaluation Survey
- Champion Indoor Water Use Analysis
- Champion Outdoor Water Use Analysis

2007 Baseline Survey

- 68% - Lack of commitment
- 18% - Competition for the greenest lawns
- 14% - Lack of awareness
- Reported already practicing techniques
- Motivators:
  - Environment
  - Lower water bills
- Willing to do more to save water

2008 Evaluation Survey

- 66% saw messages (n=527)
- 86% thought messages encouraged the community to save
- Self reported (not prompted) water saving techniques:
  - 46% - Reduced lawn watering
  - 19% - Wash full loads
  - 18% - Turn water off when brushing teeth
  - 12% - Take showers in 5 minute or less

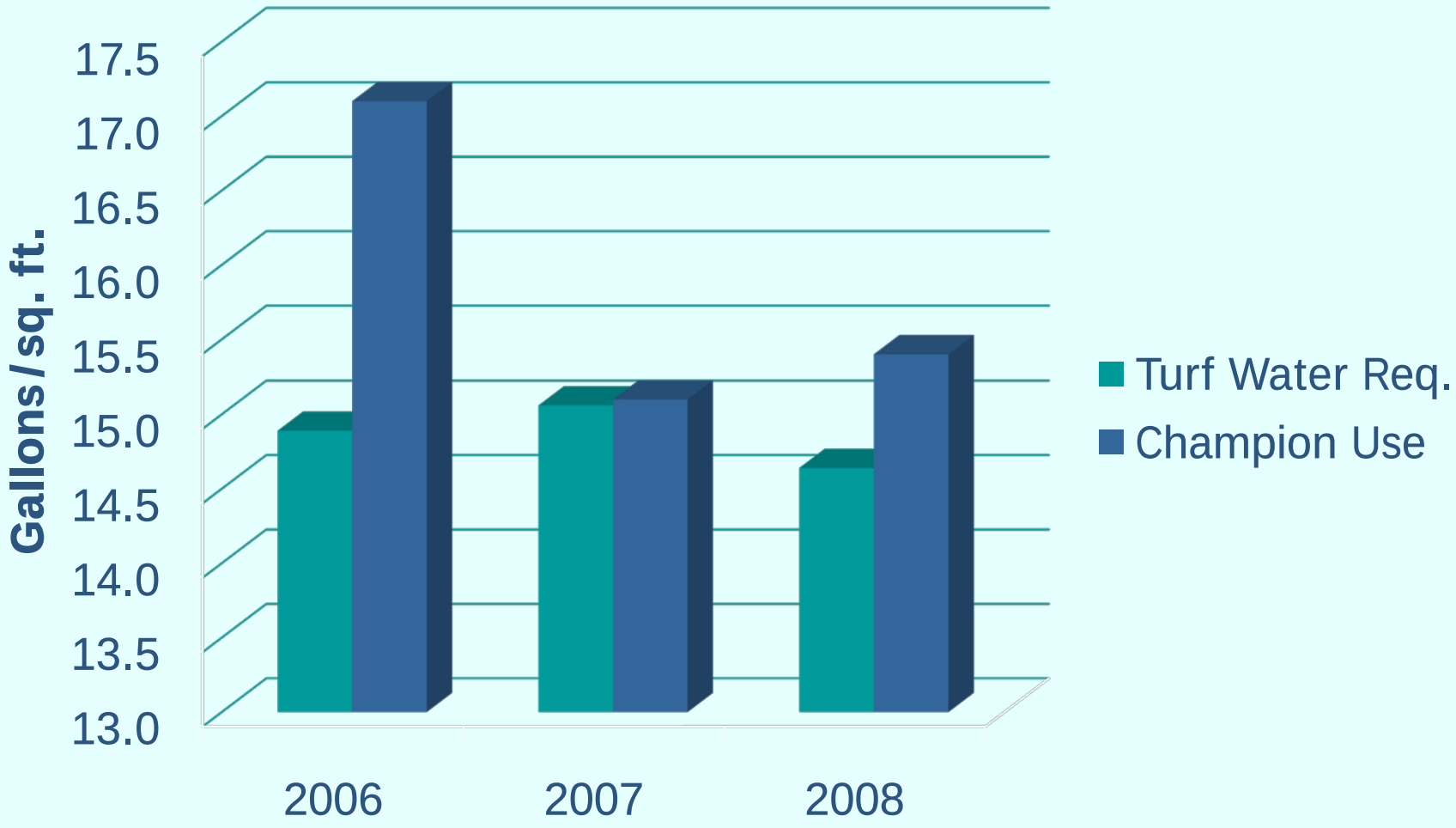
Champion Indoor Water Use

- 312 Champion accounts analyzed
- 64% reduced indoor use after pledging
- 500 gallons per month less than the single family residential average
  - Champions - 4,500 gallons/month
  - Single Family - 5,000 gallons/month

Champion Outdoor Water Use

- Estimated irrigated square footage for Champion accounts (Irrigable Area Analysis)
- Utility billing database join by account number
- Outdoor water use in gallons per sq. ft.
  - 278 accounts
  - May – September
  - 2006 pre-pledge
  - 2007 pledge year
  - 2008 post-pledge

Champion Outdoor Use vs. Turf Water Requirement (ET)



Champion Outdoor Water Use Trends

2007 compared to 2006

- 66% of Champion accounts showed lower usage
  - 25% reduction
- Average of all Champions
  - 12% reduction
  - 2 gallons/sq. ft. savings

Champion Outdoor Water Use Trends

2008 compared to 2006

- 62% of Champion accounts showed lower usage
  - 27% reduction
- Average of all Champions
  - 10% reduction
  - 1.7 gallon/sq. ft. savings


THORNTON
THANK YOU
WATER SAVING
CHAMPIONS
City of Houston

Irrigable Area Analysis
Objectives

- Development of irrigable landscape data at a parcel level within the Service Area
- Information will be used support the estimation of water use and irrigation demands throughout the community
- Characterize high and low irrigable areas
- Assess irrigable acres with metered data
- Compatible GIS deliverables that Thornton can directly use

Deliverables

- August 2009, 1-foot, color-infrared orthorectified imagery
- Updated parcels database containing square footage and percent of land cover classes
  - Shifted and non-shifted parcels, extended parcels, and public right-of-way boundaries
- Land cover data
  - Polygon data of high irrigated, low irrigated, non-irrigated vegetation, total irrigated area and tree canopy
- GIS land cover layers above with the polygons split by parcel and public right-of-way
- GIS model for calculating land cover square footage
- Report
- PowerPoint presentation
- LiDAR-derived digital surface model (DSM)

Methodology

AMEC analyzed the multispectral imagery using a technique known as geographic object-based image analysis (GEOBIA) to develop a 4-class land cover dataset that included...

1) High irrigated
2) Low irrigated
3) Non-irrigated vegetation
4) Trees

The automated classification from the GEOBIA process was then refined with a manual quality assurance/quality control process to finalize the land cover

Land Cover Classifications

- High: 20” or more of supplemental irrigation during each annual growing season
- Low: 5-20” of supplemental irrigation during each annual growing season
- Non: vegetated areas with very low greenness, generally not irrigated
- Trees: roughly 75-100 square foot minimum mapping unit, 90% accuracy

Imagery & Classification Results

Color infrared imagery

Tree Canopy

Irrigable Land Cover

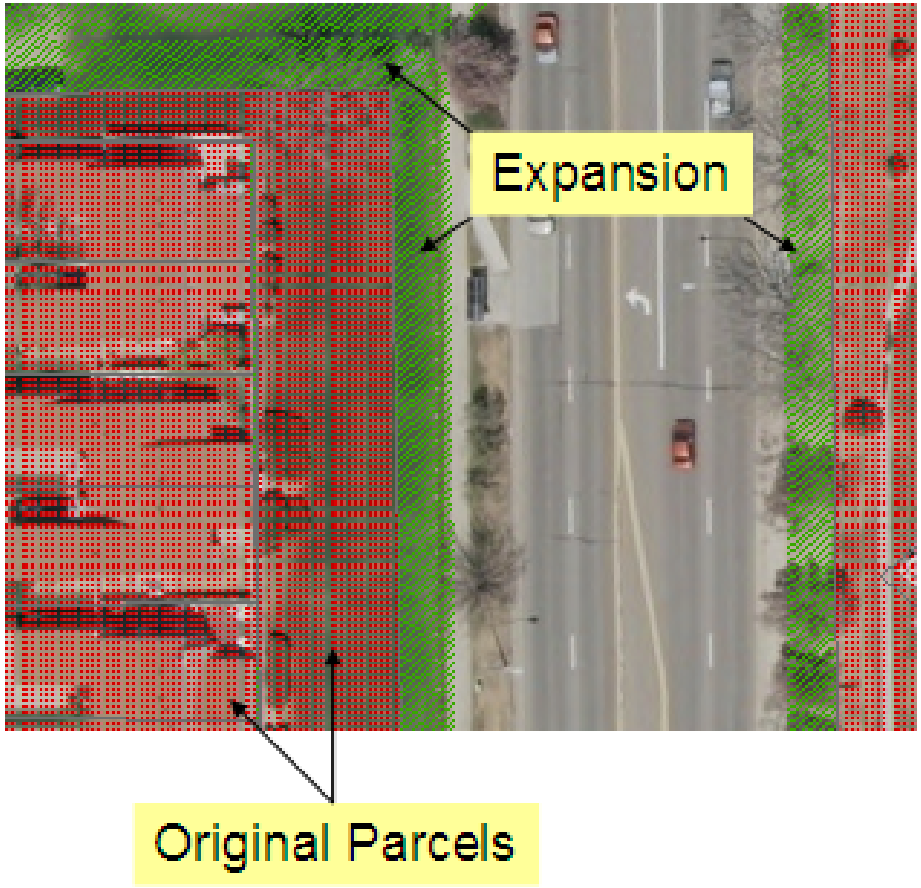
Limitations

- While “greenness” is a strong indicator of outdoor water application it does not necessarily represent specific levels of irrigation
- Other factors include natural precipitation previous to the aerial imagery collection, soils, fertilizer practices, and slope
- Tree canopy treated as “high-irrigated” category for three main reasons:
  - Lack of specific research data on the water requirements for local urban tree species
  - No data was available on the distribution of tree species,
  - Wasn’t cost-effective to identify whether the area under tree canopy is being irrigated or to what level

Parcel Expansion Process

- The Reason: irrigated area extends beyond a parcel edge
- The Need: to capture all irrigated area and accurately tie that to a given parcel
- The Solution: after a thorough review, extend parcels by 15-feet
  - Only applied where necessary
  - Impervious layers were used to remove unneeded area
  - QA/QC performed: expansions were deleted where:
    - They did not contain vegetation, were in backyards or bordered a greenway, or were smaller than 10 square feet

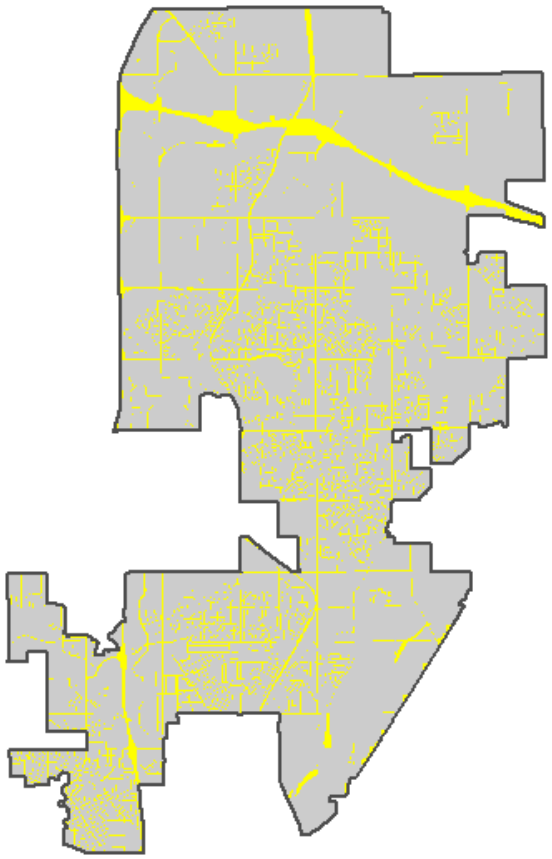
Parcel Expansion Example



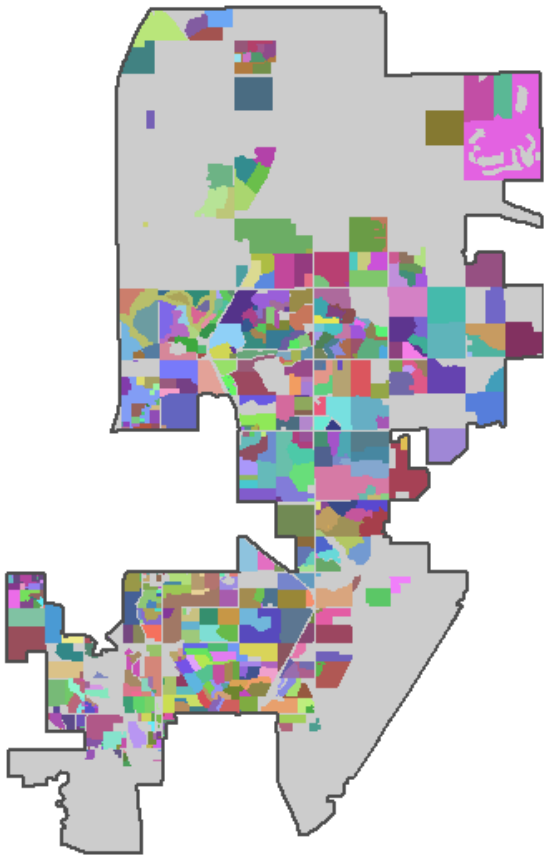
Right-of-Way Irrigable Areas

- What about irrigated areas in the public rights-of-way (ROW)?
  - Defined as irrigated area in public land, maintained by the City of Thornton, not bound by a parcel
  - Not “double-counted” from expanded parcels
  - Delivered by subdivision boundary rather than simply citywide

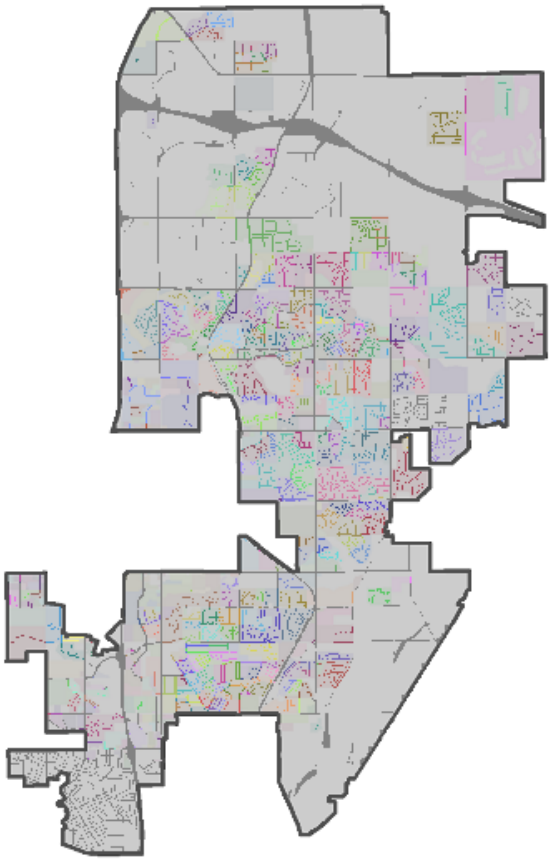
Right-of-Way & Subdivisions



Rights of Way



Subdivisions

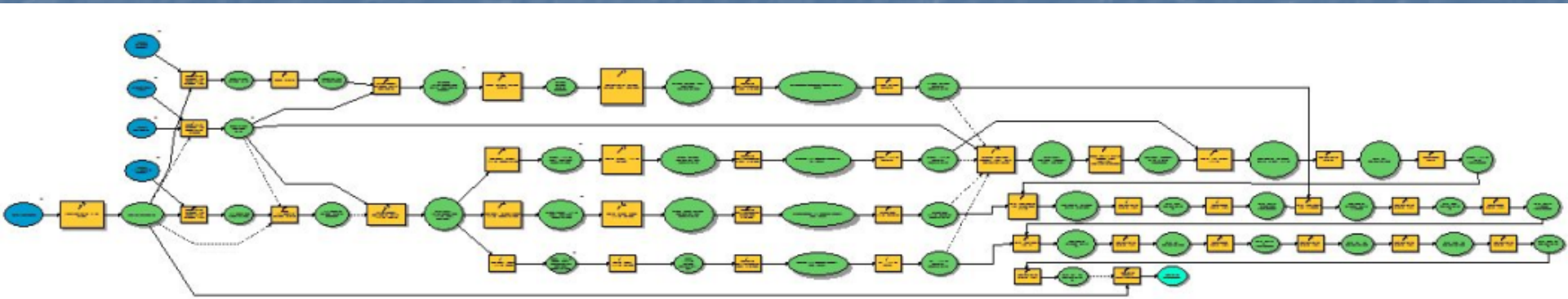


ROW by Subdivision

Developing the Irrigable Areas Database

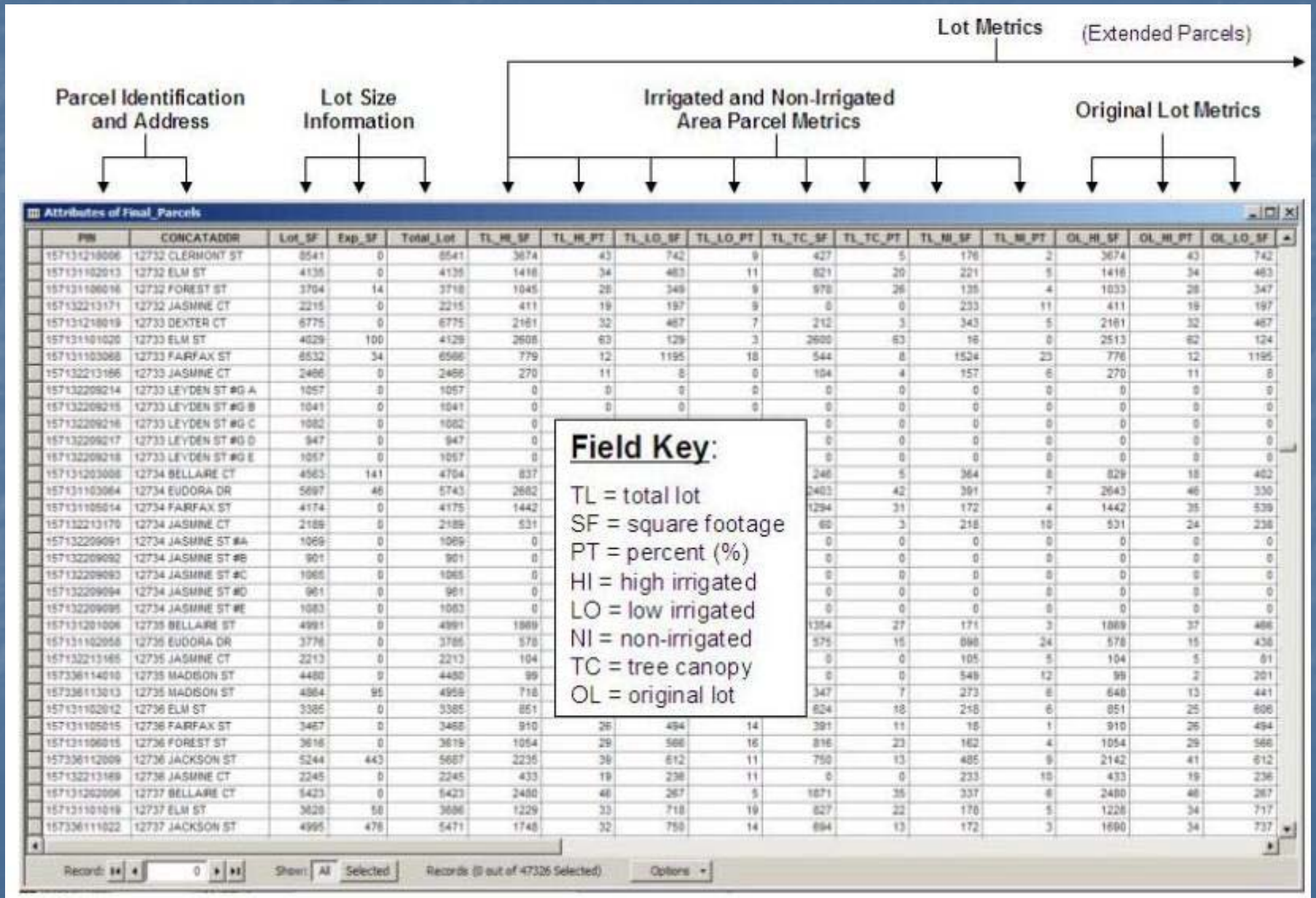
- Create GIS Model and define parcel attributes (fields) to delivery:
  - Parcel number
  - Address
  - Lot Size
  - Irrigable Area Fields (shown on next slides)
- Separate parcel database into Single-Family, Non-Single Family and Right-of-Way
- Also delivered in Access and Excel spreadsheet format

GIS Models



* One of 3 GIS (geoprocessing) models built to calculate land cover square footage per parcel. These models were included in the delivery.

Irrigated Area Database



PIN	CONCATADDR	Lot_SF	Exp_SF	Total_Lot	TL_HI_SF	TL_HI_PT	TL_LO_SF	TL_LO_PT	TL_TC_SF	TL_TC_PT	TL_NI_SF	TL_NI_PT	OL_HI_SF	OL_HI_PT	OL_LO_SF
1571312180006	12732 CLERMONT ST	8541	0	8541	3674	43	742	9	427	5	176	2	3674	43	742
1571311102013	12732 ELM ST	4135	0	4135	1416	34	463	11	821	20	221	5	1416	34	463
1571311066016	12732 FOREST ST	3704	14	3718	1045	28	349	9	970	26	135	4	1033	28	347
1571322213171	12732 JASMINE CT	2215	0	2215	411	19	197	9	0	0	233	11	411	19	197
1571312180019	12733 DEXTER CT	6775	0	6775	2161	32	467	7	212	3	343	5	2161	32	467
1571311101020	12733 ELM ST	4029	100	4129	2608	63	129	3	2600	63	16	0	2513	62	124
1571311103068	12733 FAIRFAX ST	8532	34	8566	779	12	1195	18	544	8	1524	23	776	12	1195
1571322213166	12733 JASMINE CT	2466	0	2466	270	11	8	0	104	4	157	6	270	11	8
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1571322209215	12733 LEYDEN ST #G B	1041	0	1041	0	0	0	0	0	0	0	0	0	0	0
1571322209216	12733 LEYDEN ST #G C	1082	0	1082	0				0	0	0	0	0	0	0
1571322209217	12733 LEYDEN ST #G D	947	0	947	0				0	0	0	0	0	0	0
1571322209218	12733 LEYDEN ST #G E	1057	0	1057	0				0	0	0	0	0	0	0
1571312203008	12734 BELLAIRE CT	4563	141	4704	837				246	5	364	8	829	18	402
1571311103064	12734 EUDORA DR	5697	46	5743	2682				2403	42	391	7	2643	46	330
1571311105014	12734 FAIRFAX ST	4174	0	4175	1442				1294	31	172	4	1442	35	539
1571322213170	12734 JASMINE CT	2189	0	2189	531				60	3	218	10	531	24	238
1571322209091	12734 JASMINE ST #A	1069	0	1069	0				0	0	0	0	0	0	0
1571322209092	12734 JASMINE ST #B	901	0	901	0				0	0	0	0	0	0	0
1571322209093	12734 JASMINE ST #C	1065	0	1065	0				0	0	0	0	0	0	0
1571322209094	12734 JASMINE ST #D	961	0	961	0				0	0	0	0	0	0	0
1571322209095	12734 JASMINE ST #E	1083	0	1083	0				0	0	0	0	0	0	0
1571312201006	12735 BELLAIRE ST	4991	0	4991	1869				1354	27	171	3	1869	37	486
1571311102058	12735 EUDORA DR	3776	0	3786	578				575	15	898	24	578	15	438
1571322213165	12735 JASMINE CT	2213	0	2213	104				0	0	105	5	104	5	81
1573361140010	12735 MADISON ST	4480	9	4480	99				0	0	549	12	99	2	201
1573361130013	12735 MADISON ST	4964	95	4959	716				347	7	273	6	648	13	441
1571311102012	12736 ELM ST	3386	0	3386	851				624	18	216	6	851	25	606
1571311105015	12736 FAIRFAX ST	3467	0	3468	910	26	494	14	391	11	16	1	910	26	494
1571311066015	12736 FOREST ST	3616	0	3619	1054	29	566	16	816	23	162	4	1054	29	566
1573361120009	12736 JACKSON ST	5244	443	5687	2235	39	612	11	750	13	485	9	2142	41	612
1571322213169	12736 JASMINE CT	2245	0	2245	433	19	236	11	0	0	233	10	433	19	236
1571312602006	12737 BELLAIRE CT	5423	0	5423	2480	46	267	5	1871	35	337	6	2480	46	267
1571311101019	12737 ELM ST	3628	58	3686	1229	33	718	19	827	22	176	5	1228	34	717
1573361111022	12737 JACKSON ST	4995	476	5471	1748	32	758	14	894	13	172	3	1690	34	737

Record: 0 | Show: All | Selected | Records (0 out of 47326 Selected) | Options

Joining Water Use with the Irrigable Areas Database

- Why: Linking water utility data to the irrigation database will enable Thornton to evaluate the relationships between irrigation and consumption
- How: A ‘spatial join’ ties the two sets of information based on location; a meter that sits within a parcel gets spatially associated with that parcel
- Issues: Information between parcels and meters can be linked in this manner only when there is one meter for each parcel, like with single family homes; other situations will require a special approach
- For single family properties this join has been made as part of the deliverable Irrigable Areas Database; for all other property types the meter information will need to be linked at a later time

Recommendations & Future Considerations

- **Updates to Irrigated Area Database**
- **Parcel GeoAccurizing**
- **Urban Tree Canopy Assessment**
- **Water Budget Rate Structure**
- **Development**
- **Lawn Irrigated Return Flow (LIRF)**
- **Updates to Impervious Surface Layers**

Contact Information

City of Thornton:
Laura Wing, Laura.Wing@cityofthornton.net
www.ThorntonWater.com

AMEC:
Ian Hanou, Ian.Hanou@amec.com