Residential Revaluation Summary Report

2021 Mass Appraisal of All Regions for 2022 Property Taxes

Prepared For

Steven J. Drew

Thurston County Assessor

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Certificate of Appraisal

I certify that, to the best of my knowledge and belief:

- The statements of fact contained in this report are true and correct.
- The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are my personal, impartial and unbiased professional analysis, opinions, and conclusions.
- I have no (or the specified) present or prospective interest in the property that is the subject of this report, and I have no (or the specified) personal interest with respect to the parties involved.
- I have performed no (or the specified) services, as an appraiser or in any other capacity, regarding the property that is the subject of this report within the three-year period immediately preceding acceptance of this assignment.
- I have no bias with respect to any property that is the subject of this report or to the parties involved with this assignment.
- My engagement in this assignment was not contingent upon developing or reporting predetermined results.
- My compensation for completing this assignment is not contingent upon the reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value opinion, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this appraisal.
- My analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with *the Uniform Standards of Professional Appraisal Practice 2014-2015 edition with 2016-17 Update letter.*
- I have not personally inspected all of the properties that are the subject of this report. Other appraisers involved in the review of property are listed on the following page.

  No one provided significant analytical assistance to the person(s) signing this certification in the final opinion and conclusions of this report. However, mass appraisal requires a division and specialization of some tasks. I may or may not have been involved in some specific tasks. Although, I did review the conclusions included in this report.

Appraisal Team

Often teams of appraisers complete one or more parts of a mass appraisal. Major contributors to this appraisal project include the following:

Physical Inspection:	
	042 - Senior Appraiser
	057 - Senior Appraiser
	069 - Senior Appraiser
	071 - Senior Appraiser
	072 - Senior Appraiser
	073 - Senior Appraiser
	074 - Senior Appraiser
	075 - Senior Appraiser
	076 - Appraiser Assistant
	077 - Appraiser Assistant
	078 - Appraiser Assistant
Sales Validation:	
	007 - Appraiser Analyst
	035 - Appraiser Analyst
	056 - Appraiser Analyst
	065 - Appraiser Analyst
Land Model Building:	007 - Appraiser Analyst
	035 - Appraiser Analyst
	056 - Appraiser Analyst
	065 - Appraiser Analyst
Final Review:	062 - Chief Deputy

MASS APPRAISAL CONCLUSIONS

Appraisal Date: January 1, 2021

Area Name / Number: County Wide all Regional Summary

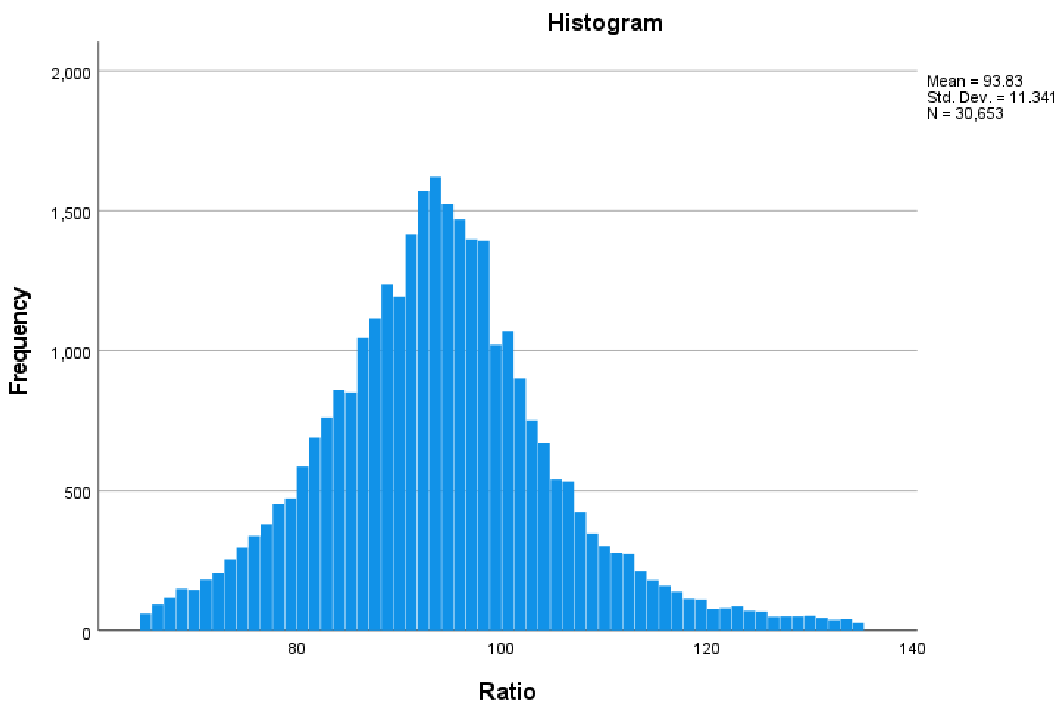
Physical Inspection: Active Inspections of 20,542 parcels in Regions 7,8,11,13
Non-inspected Updates: Non-Inspected Updates 90,777 parcels. Regions 1,2,3,4,5,6,9,15,17

Summary of Regional Sales Ratios

Ratio Statistics for 2021-22 Value / Mkt_Adj_SP							
Group	Mean	Median	Weighted Mean	Average Absolute Deviation	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
01	0.799	0.799	0.791	0.048	1.010	0.060	8.5%
03	0.955	0.974	0.926	0.163	1.031	0.168	21.2%
04	0.943	0.950	0.917	0.197	1.028	0.207	27.1%
05	0.911	0.959	0.914	0.119	0.997	0.124	16.3%
06	0.905	0.923	0.883	0.172	1.025	0.187	27.1%
07	0.912	0.917	0.935	0.159	0.975	0.173	23.8%
08	0.871	0.905	0.857	0.168	1.016	0.185	25.0%
09	0.903	0.903	0.890	0.164	1.015	0.181	24.9%
10	0.945	0.932	0.916	0.182	1.031	0.195	26.8%
11	0.925	0.909	0.894	0.167	1.034	0.184	26.1%
14	0.910	0.907	0.897	0.110	1.014	0.122	16.6%
16	1.000	1.016	0.992	0.145	1.008	0.143	18.4%
17	0.934	0.941	0.901	0.158	1.037	0.168	23.2%
Overall	0.929	0.923	0.905	0.171	1.026	0.186	25.5%

Sales used in Analysis: Sales used in the analysis are validated following the guidelines laid out in the Sales Verification Procedure. Multi-parcel and multi-building sales are generally excluded as not being representative of this market area. Mobile home and condominium sales are analyzed separately for the purpose of appraising these property types. **Listings of the individual sales used in the analysis for any parcel can be found by utilizing the *Parcel Search (A+)* link on the Assessor's website at http://www.co.thurston.wa.us/Assessor/.**

Number of Parcels in the Sales Sample: The population of residential vacant land and standard single-family residences in the county over a 5-year period was approximately 28,117 parcels. Adding sales of manufactured homes and condos brings the final sample to 30,653 total sales. Ratios are represented by properties which have not had a change in use.



Ratio Statistics for MKTTL / Mkt_Adj_SP

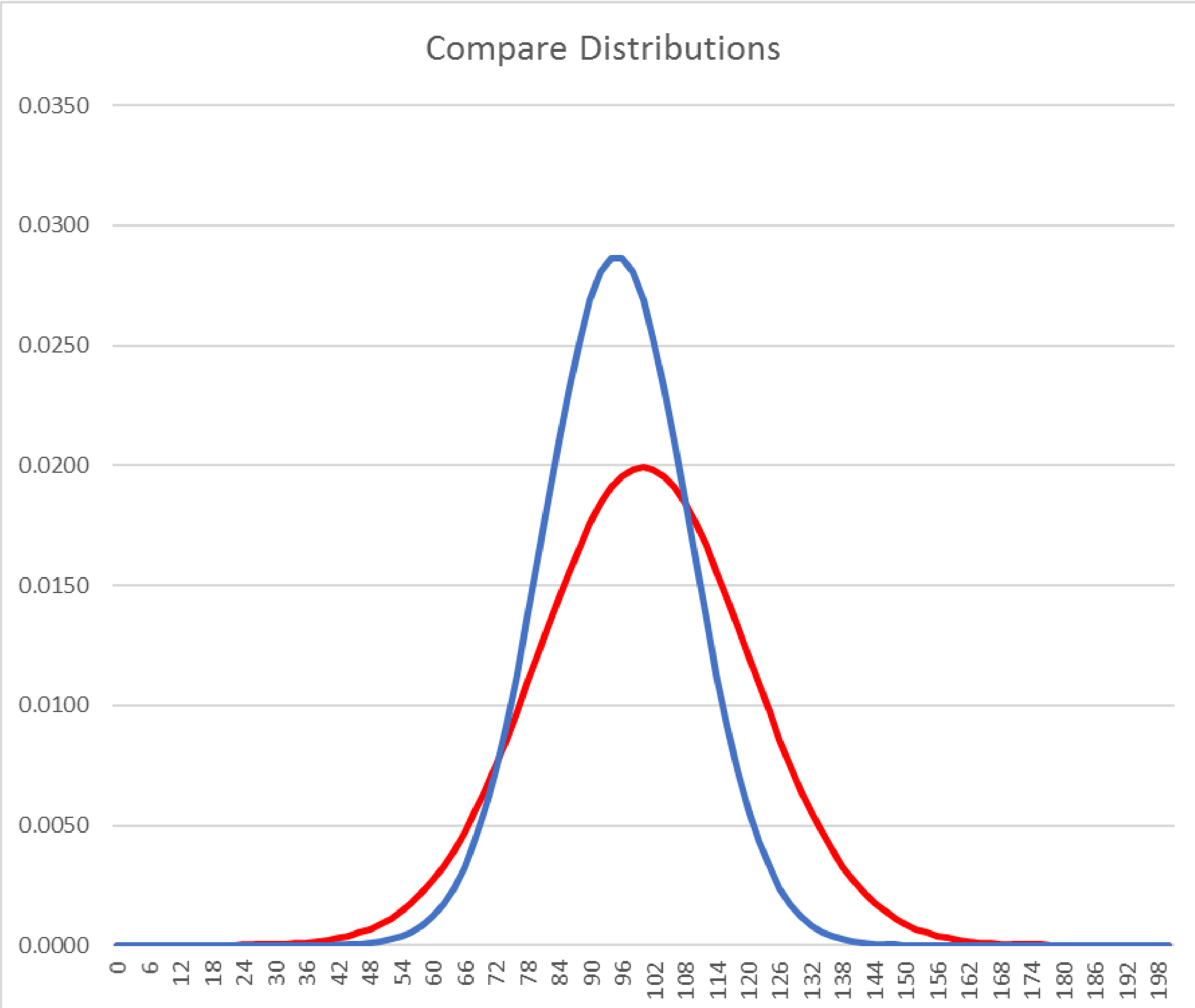
Group	Mean	Median	Weighted Mean	Average Absolute Deviation	Price Related Differential	Coefficient of Dispersion
CNU	.945	.942	.933	.082	1.014	.087
LND	.962	.945	.918	.141	1.048	.150
MNL	1.110	1.110	1.129	.099	.983	.089
MOB	.945	.930	.923	.133	1.023	.142
RES	.937	.936	.937	.082	1.000	.088
Overall	.938	.936	.936	.086	1.002	.092

Conclusion and Recommendation: The assessment department has achieved its constitutional and statutory requirements to appraise, on a mass basis, all residential properties at market value. Additionally, we have met and surpassed the required ratios which represent good quality results per the standards published in the STANDARDS ON RATIO STUDIES 2020 by the International Association of Assessing Officers.

Since the values recommended in this report improve uniformity, assessment level, and equity, we recommend posting them for the 2022 Tax Roll.

Thurston County's Performance Relative to Standards

The table on the previous page indicates the level which are considered professionally a representation of the tolerances for best practices. Thurston County has features of both an urban and suburban county, which would indicate that our Coefficient of Dispersion should be between 15 to 20%, extrapolating that a Gaussian distribution would indicate a standard deviation of 20% at the minimum. The chart below is an example of these standards.



CHECK FOR SALES CHASING

So, how do we know if these ratios are honest and correct? If a jurisdiction engages in such a practice it is called sales chasing. If that occurs, then the validity of their ratios will be false and no conclusion about bias and results can be drawn. There are several methodologies which appraisal practices permit and are outlined in IAAO Standard of Ratio Studies published in 2013. One of the most common methods is to check the average change in value between sold and unsold properties. If adjustments are properly applied between these two groups with near the same mean the distribution should be similar.

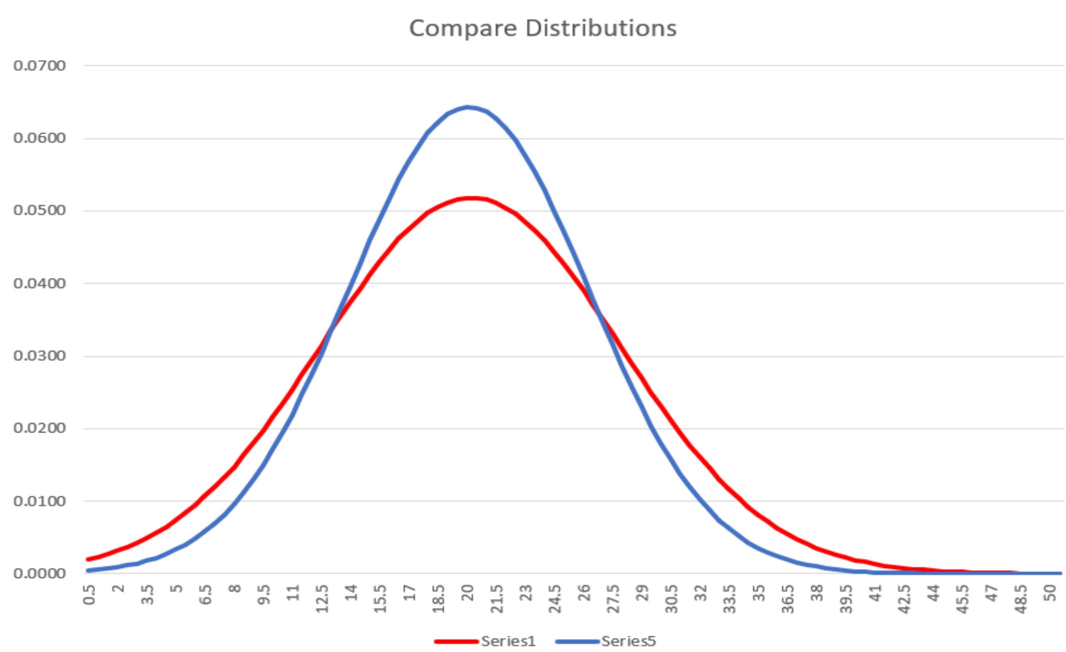
This is accomplished by drawing a RANDOM sample of properties which have sold in the last five years and another RANDOM sample of properties which have not sold (without replacement of the observation). The sample size was about 31,581 for sold properties and 54,508 inventory parcels that have not had a sale in 5 years, no use change or addition.

To strongly quote IAAO Standards on Ratio Studies, page 59:

"Statistical significance in the absence of practical significance may be moot. In large samples, small differences in the magnitude of assessed value changes on sold and unsold parcels can be proven to be statistically significant, yet the actual difference may be slight. Therefore, it is prudent to establish some reasonable tolerance, such as 3 percentage [difference]…before concluding that a meaningful problem exists."

The summary statistics are indicated on the table below and the distributions of these samples are exhibited the following chart.

	Percentage Change in Value	
	Mean	Std. Dev
Inventory	**20.2**	**6.2**
Sales	**20.2**	**7.7**



PREMISE OF THE APPRAISAL

Supporting Documents Used in the Mass Appraisal

"A mass appraisal is the process of valuing a universe of properties as of a given date using standard methodology, employing common data, and allowing for statistical testing."[1]

A mass appraisal for ad valorem taxes is a complicated process involving large amounts of data, gathered and analyzed by teams of appraisers. We do not intend this document to be a self-contained documentation of the mass appraisal but to summarize our methods, data, and to guide the reader to other documents or files, upon which we relied. These documents may include the following:

- Individual property records maintained in a computer database
- Sales ratios and other statistical studies
- Market studies
- Model building documents
- Real estate sales database
- Previous studies and reports filed in our office
- Assessor's manuals for data collection analysis
- Revaluation and sales verification manuals
- Property Tax Advisory Publications by the Washington State Dept. of Revenue
- Title 84 RCW Property Tax Laws (Washington State Law)
- WAC 458 (Washington Administrative Code)
- Guidelines published by the International Association of Assessing Officers (IAAO)

The Appraisal Standards Board of the Appraisal Foundation biennially publishes *the Uniform Standards of Professional Appraisal Practice* (USPAP). This cycle is subject to the 2020-2021 edition and the recent updates for the 2016-2017. These standards are written by appraisers to regulate their profession and are the minimum standards for the conduct of property appraisal in the United States. They cover real, personal, and business property. We rely upon these standards in the development and reporting of our assessed values.

[1] USPAP, Appraisal Standards Board of the Appraisal Foundation, p. 3

CLIENT AND INTENDED USERS

This report was prepared for **Steven J. Drew, Thurston County Assessor**.

The primary intended users are the governing board and levy authority for:

Thurston County
Thurston County Roads
Timberland Regional Library
Medic One
Port of Olympia
PUD 1
State Schools
State Schools 2
Conservation Futures
Tanglewilde Park District
Tumwater Metropolitan Park District
Olympia Metropolitan Park District
North Thurston SD 3
Olympia SD 111
Rainier SD 307
Rochester SD 401
Tenino SD 402
Tumwater SD 33
Yelm SD 2
Centralia SD 401-L
Griffin SD 324
Town of Bucoda
City of Lacey
City of Olympia
City of Rainier
City of Tumwater
City of Tenino
City of Yelm
Fire District 1 Rochester Grand Mound
Fire District 2 Yelm
Fire District 3 Lacey
Fire District 4 Rainier
Fire District 5 Black Lake
Fire District 6 East Olympia
Fire District 8 South Bay
Fire District 9 McLane
Fire District 11 Littlerock
Fire District 12 South Thurston
Fire District 13 Griffin
Fire District 17 Bald Hills
SE Thurston Regional Fire Authority
West Thurston Regional Fire Authority
Cemetery District 1
Cemetery District 2

Other intended users include the County Board of Equalization and the State Board of Tax Appeals.

ASSUMPTIONS AND LIMITING CONDITIONS

The Appraisal Summary Report, of which this statement is a part, is expressly subject to the following conditions:

This revaluation is a mass appraisal assignment resulting in conclusions of market value. No one should rely on this study for any purpose other than administration and distribution of ad valorem taxation. The opinion of value on any parcel may not be applicable for any use other than ad valorem taxation.

That the maps and drawings in this report are included to assist the reader in visualizing the property; however, no responsibility is assumed as to their exactness.

That the legal description, as given, is assumed correct. No survey or search of title of the property has been made for this report, and no responsibility for legal matters is assumed.

The report assumes good merchantable title and any liens or encumbrances that may exist have been disregarded.

The opinions and values shown in the report apply to the subject parcels only. The assessors made no attempt to relate the conclusions of this report to any other revaluations, past, present, or future.

The assumptions governing the use of multiple linear regression analysis have been met unless otherwise stated.

Unless otherwise stated in this report, the existence of hazardous substances, including without limitation asbestos, polychlorinated biphenyl, petroleum leakage, or agricultural chemicals, which may or may not be present on the property, or other environmental conditions, were not called to the attention of nor did the appraiser become aware of such during the appraiser's inspection. The appraiser has no knowledge of the existence of such materials on or in the property unless otherwise stated. The appraiser, however, is not qualified to test such substances or conditions. If the presence of such substances, such as asbestos, urea formaldehyde foam insulation, or other hazardous substances or environmental conditions, may affect the value of the property, the value estimates are predicated on the assumption that there is no such condition on or in the property or in such proximity thereto that it would cause a loss in value. No responsibility is assumed for any such conditions, or for any expertise or engineering knowledge required to discover them.

All properties are considered to be conveyed in fee simple with the full bundle, with the exception of separate leasehold accounts. Exceptions will be noted on their individual records.

Generally, the appraiser does not have the benefit of an interior inspection. As a result, it is assumed that the interior condition mimics the exterior. On those occasions in which an interior inspection is granted, the condition is reflective of the overall property. Those parcels which have had an interior inspection are noted on their individual records.

SPECIAL ASSUMPTIONS, LIMITING AND HYPOTHETICAL CONDITIONS

We assume that none of the subject land or improvement(s) are contaminated or that any contamination would affect the value except as shown in individual property records or otherwise stated.

Unless otherwise noted on the individual property record, we assume that the property is not adversely affected by neighboring properties or other external environmental factors.

We assume that the interior of residences and structures are the same as the exterior visual review.

We assume that the current condition and features of the property are the same as of the date of its last inspection.

It is assumed that the property is at its highest and best use as improved.

Because of budget restraints, we have not inspected all comparable sales. We have inspected the interiors of only a small percentage of the properties.

We believe that our screening process is adequate to capture arm's-length property sales. Some arm's-length transactions do not actually reflect their market value and were not used for either modeling or ratio studies per trimming guidelines of IAAO.

JURISDICTIONAL EXCEPTION

Washington exempts all or a portion of the market value on specific types of property including "open space," agricultural, forest, home improvement, and some low-income housing.

PURPOSE AND INTENDED USE

The intended use of this appraisal is for administration of ad valorem taxation. After certification by the Assessor, these values will be used as the basis for assessment of real estate taxes payable in 2022. We do not intend the values to be used for or relied upon for any other purpose.

This report serves as a record of the revaluation which is subject to review and change by the County Board of Equalization, the Washington State Board of Tax Appeals, and the courts.

TRUE AND FAIR VALUE

The basis of all assessments is the true and fair value of property. True and fair value means market value (Spokane etc. R. Company v. Spokane County, 75 Wash. 72 (1913): Mason County, 62 Wn. 2d (1963); AGO 57-58, No. 1/8/57; AGO 65-66, No. 65, 12/31/65)

The true and fair value of a property in money for property tax valuation purposes is its "market value" or amount of money a buyer willing but not obligated to buy would pay for it to a seller willing but not obligated to sell. In arriving at a determination of such value, the assessing officer can consider only those factors which can within reason be said to affect the price in negotiations between a willing purchaser and a willing seller, and he must consider all of such factors. (AGO 65,66, No. 65, 12/31/65)

DATE OF APPRAISAL

Properties are appraised as of January 1, 2021.

This report was completed as of September 9, 2021

PROPERTY RIGHTS APPRAISED

This appraisal is of the fee simple interest in the real property. The fee simple estate is the absolute ownership unencumbered by any other interest or estate, subject only to the limitations imposed by the governmental powers of taxation, eminent domain, police power, and escheat.[2]

PERSONAL PROPERTY NOT INCLUDED IN THE APPRAISAL

No personal property was included in the value. Fixtures are generally accepted as real property. Business value is intangible personal property and it is not appraised.

MARKET AREA AND PROPERTIES APPRAISED

The subject of this mass appraisal report are residential properties throughout Thurston County. Properties in regions 7, 8, 11 and 13 were physically inspected and their physical features recorded as of the effective date of January 1, 2021. All other properties are assumed to have the same physical features as were noted during their last inspection.

Our property records contain photographs, sketches, legal descriptions and other characteristics of land and buildings on each property.

INSPECTED REGIONS BOUNDARY DESCRIPTION

Physical inspections occurred in Regions 7, 8, 11 and 13.

Region 7 includes eastern Thurston County, south of I-5, northeast of Pacific Highway and west of the Nisqually River, and north of 93rd Ave.

Region 8 includes northwest Thurston County, south of HWY 8 and Hwy 101, west of Black Lake Blvd and north of Rochester.

Region 11 includes Grays Harbor County to the west, Johnson Creek Road to the east, Maytown Road to the north and Lewis County to the south.

Region 13 is countywide and consists of 35 residential condominium neighborhoods that are designed to reflect similar land and building characteristics and neighborhood amenities.

ZONING

Thurston County exercises jurisdiction over land use and community planning. The regulations for use and development can be found in its ordinances. We show property zoning as a land characteristic on our digital maps.

[2] *The Dictionary of Real Estate Appraisal. 3rd Ed.* Appraisal Institute, p.140

HIGHEST AND BEST USE

True and fair value -- Highest and best use. Unless specifically provided otherwise by statute, all property shall be valued on the basis of its highest and best use for assessment purposes. Highest and best use is the most profitable, likely use to which a property can be put. It is the use which will yield the highest return on the owner's investment. Any reasonable use to which the property may be put may be taken into consideration and if it is peculiarly adapted to some particular use, that fact may be taken into consideration. Uses that are within the realm of possibility, but not reasonably probable of occurrence, shall not be considered in valuing property at its highest and best use. [WAC 458-07-30 (3)]

The highest and best use concept is based upon traditional appraisal theory and reflects the attitudes of typical buyers and sellers. The market sets the highest and best use based on the theory of wealth maximization for the owner with consideration given to community goals.

To estimate highest and best use, four elements are considered:

1. Possible use. What uses of the site in question are physically possible?

2. Permissible legal use. What uses of the site are permitted by zoning and deed restrictions?

3. Feasible use. Which possible and permissible uses will produce a net return to the owner of the site?

4. Highest and best use. Among the feasible uses, the use which will produce the highest net return or the highest present worth?

The highest and best use of the land or site if vacant and available for use may be different from the highest and best use of the improved property. This is true when the improvement is not an appropriate use, but it contributes to the total property value.

For the purpose of this appraisal the highest and best use of all vacant and improved property is considered to be single family residential or related to a single-family residential use.

SCOPE OF THE APPRAISAL

Under state law, the assessor receives a copy of each Real Estate Excise Tax Affidavit and is therefore privy to the sale price, date, and description of all real estate sales. Our staff compiles and verifies this data into our sales database as explained in our sales verification procedure.

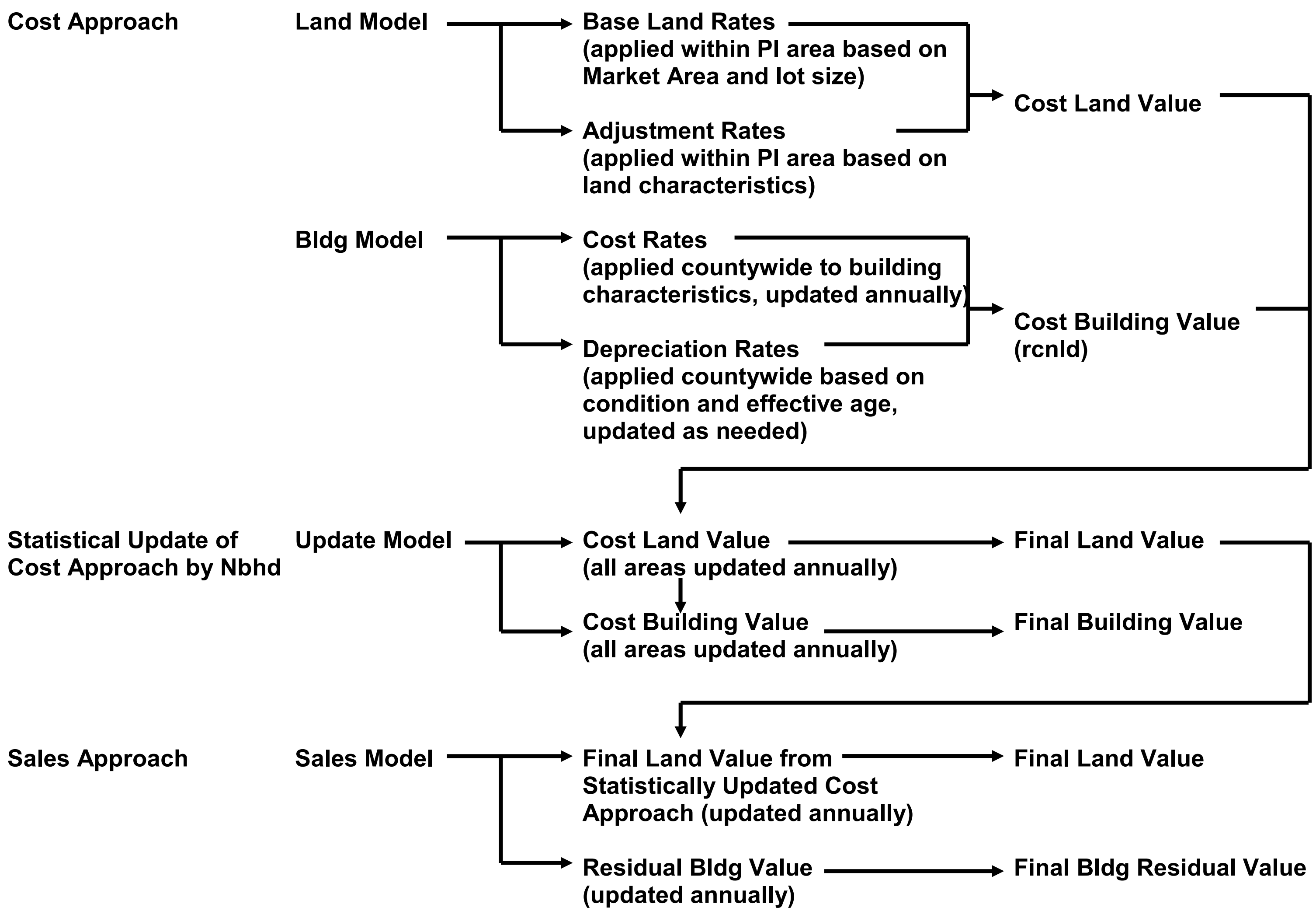
Thurston County is on a six-year revaluation cycle. Every property is revalued annually. At least once each six years, each property is inspected, and its data refreshed. The assessor collects property characteristic data as discussed in our Residential Data Standards Manual. Other than new construction, physical inspections were done in regions 7, 8, 11 and 13 and occurred starting in August of 2020 through the second quarter of 2021. All neighborhood and regional maps are included and begin on page 54 of this report.

The appraisal considers the cost approach to value with sales used to calibrate the model to a specific neighborhood. Neighborhood adjustments are widely used to adjust for time and location and are a normal and standard part of the cost approach to value. The Marshall Swift cost manual provides what they call current cost multipliers and local area multipliers to adjust for time and location. Because this is a national valuation service, we fine tune their cost rates even further to consider differences between neighborhoods and local market trends. Whether we make these adjustments to the raw land and cost rates or to the preliminary cost values, does not impact the mathematical calculation and does not affect the final result. It is more convenient to apply the time and location adjustments to the preliminary cost values, because it makes the statistical updating of values from year to year much easier.

A market model (strict sales approach) has not been developed for 2021 assessment year due to time and budget limitations. The use of an income approach was not considered to be applicable because homes in this area are not typically purchased for their income potential.

The flow chart on the next page describes the land model developed as part of the mass appraisal process and how it is used in the sales adjusted cost approach. The page following the flow chart begins to discuss the model in more detail.

Residential Valuation Process



COST APPROACH

Land Model Specification

- **A logarithmic model format is used in the development of base land rates and adjustment rates.**
- **Land Model Format:**

$LV = b_0 \times SQFT^{b1} \times LINVIEW^{b2} \times b_3^{LI3} \times b_4^{LI4} \times b_5^{LI5} \times \ldots$

All variables are scaled and continuous. Variables with actual scalar values were converted to logarithms.

Land Model Calibration

- **Multiplicative model calibrated using linear MRA**
- **Logarithms are used to convert a multiplicative equation to form.**

Standard Multiplicative form: $SP = a * SQFT^{b} * c^{NBHD} * \ldots$
Log Linear form: $LN(SP) = LN(a) + (b * LN(SQFT)) + (LN(c) * NBHD) + \ldots$

- **Logarithmic equations have the same form as a standard linear equation:**

Linear equation: $Y = a + (b * X) + (c * Z)$

- **We can then calibrate using standard multiple regression analysis.**
- **The calibrated model is then converted back to its Standard Multiplicative form by applying the anti-log function.**

$EXP[LN(SP)] = EXP[LN(a) + (b * LN(SQFT))]$

Due to the limited number of sales available, 5 years of data was utilized. Two models were developed. Most of the properties in the county are based on square footage and acreages. With the exception of salt waterfront properties, a model was developed utilizing the sale price of vacant land as the dependent variable. The major independent variables (as measured by the beta coefficient) were the square foot of land, region, time and other site-specific variables. 60 candidate variables were presented to the urban model and a forced regression was utilized, with 56 variables being statistically significant. There were 639 observations available, dated from January 1, 2016 to March 25, 2021. 67 candidate variables were presented to the suburban model, utilizing a backward regression, with 26 variables being statistically significant. There were 685 observations available, dated from January 1, 2016 to March 25. 2021.

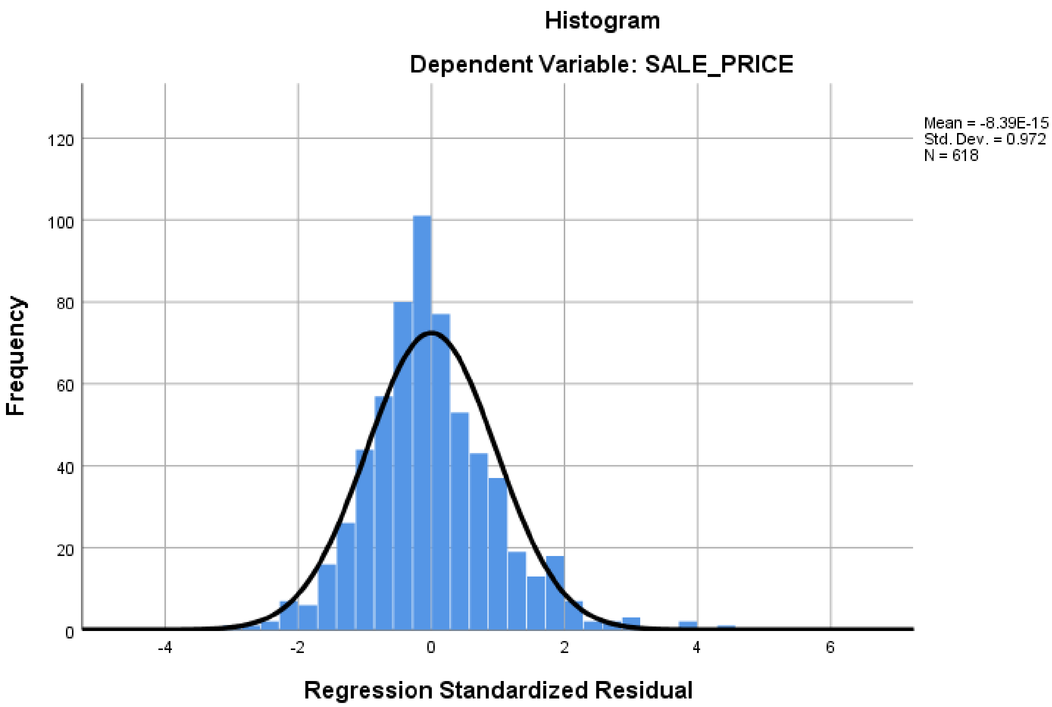
For salt waterfront properties a forced regression model was utilized using 38 variables. The dependent variable was sale price, with the major independent variable being the natural log of the front footage as well as other control variables for region, market conditions (time) and site influences. The sales observations were a combination of vacant land sales, as well as model extracted land values of sold improved properties utilizing regression. There was a total of 382 observations, dated from January 2, 2016 to April 19, 2021.

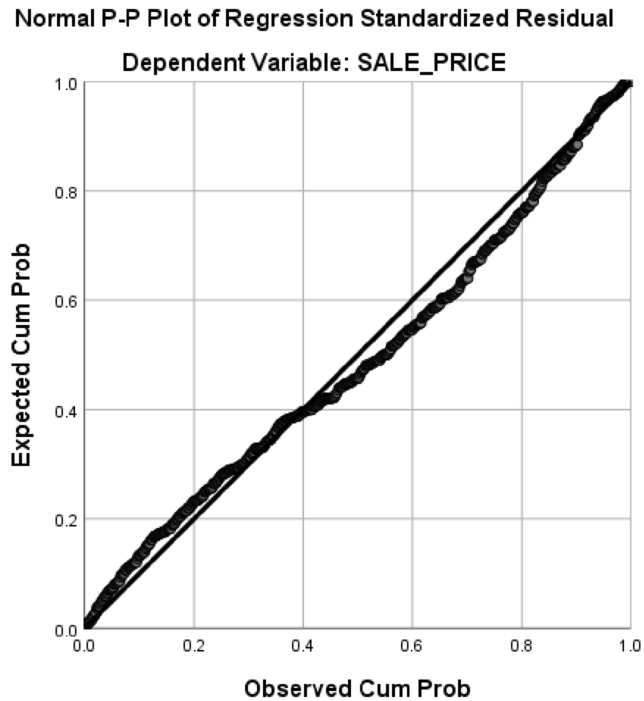
Each region was controlled for by using a variable for that region, time, and other control variables. The model at this point has been maximized at the regional level. However, stochastic errors have not yet been controlled for at the neighborhood level. An analysis of the residuals at the neighborhood will maximize the predictability of values as well as minimize any stochastic errors.

Multiple Regression Analysis Assumptions

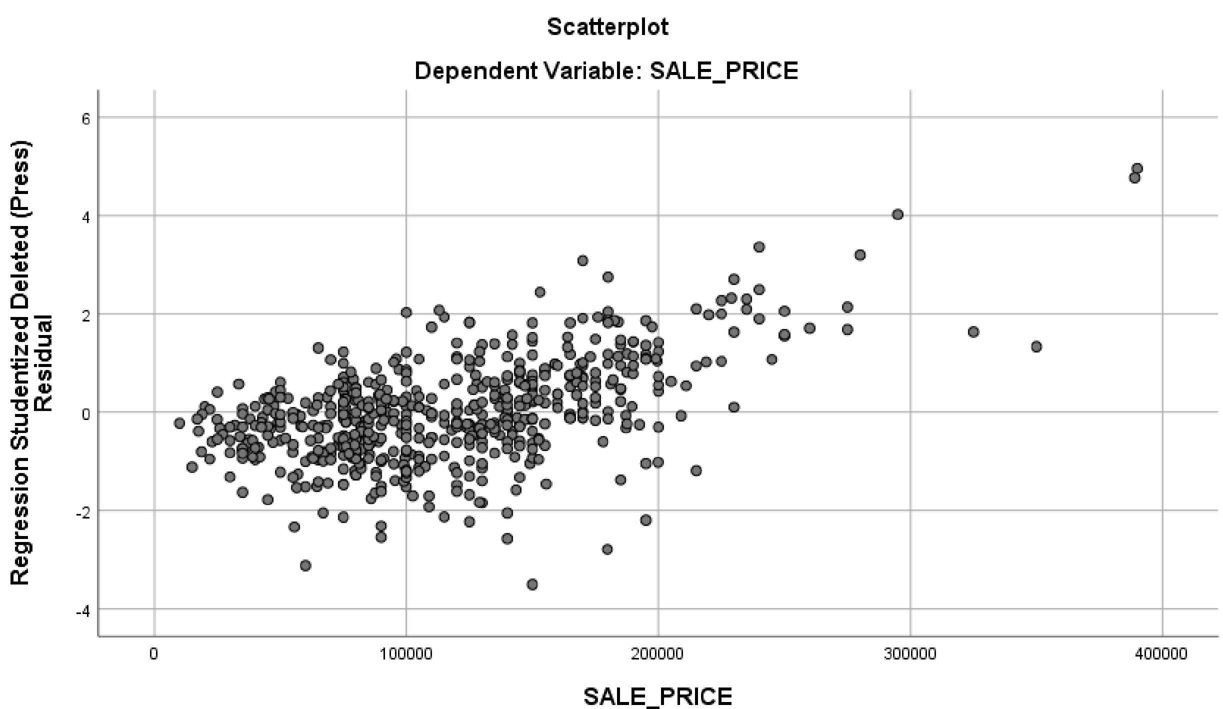
Multiple regression analysis is based on several assumptions regarding the data going into the model and the output from the calibration process. These assumptions are validated to determine the accuracy of the model and identify any limitations that may exist. Checks were conducted for specification errors, multicollinearity, autocorrelation (time), and heteroscedasticity. A detailed discussion of the MRA assumptions is included in the Appendix.

Square Footage Model Normal Distribution of the Residual Errors



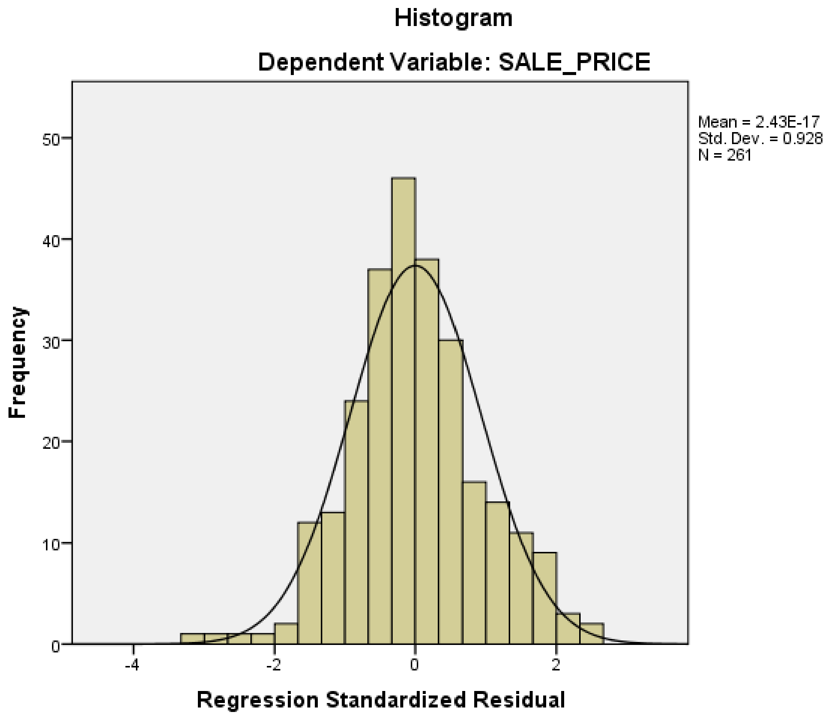


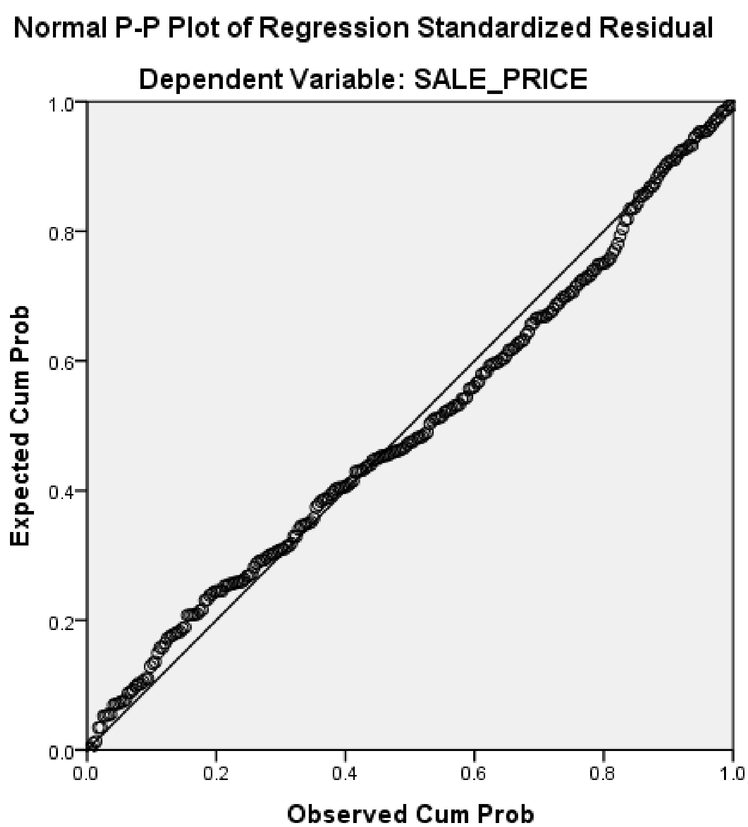
Scatterplot of Residual to Price as check for systemic bias



- The plot indicates that there is no systemic bias with respect to predicted value.

Front Footage Model Normal Distribution of the Residual Errors





Example of Land Square Feet Table Base Area Region 5

	SQUARE FOOT TABLE					
	Site Square Feet	Value	Base / Sq Ft	Act Price / Sq Ft	Size Factor	Value Factor
	2,500	31,425	6.89	**12.57**	0.200	1.825
	5,000	62,857	6.89	**12.57**	0.400	1.825
	7,500	70,607	6.89	**9.41**	0.600	1.367
	10,000	78,357	6.89	**7.84**	0.800	1.137
BASE	**12,500**	86,107	**6.89**	**6.89**	**1.000**	**1.000**
	15,000	93,857	6.89	**6.26**	1.200	0.908
	17,500	101,607	6.89	**5.81**	1.400	0.843
	20,000	109,357	6.89	**5.47**	1.600	0.794
	22,500	117,107	6.89	**5.20**	1.800	0.756
	25,000	124,857	6.89	**4.99**	2.000	0.725
	27,500	126,006	6.89	**4.58**	2.200	0.665
	30,000	127,155	6.89	**4.24**	2.400	0.615
	32,500	128,304	6.89	**3.95**	2.600	0.573
	35,000	129,453	6.89	**3.70**	2.800	0.537
	37,500	130,602	6.89	**3.48**	3.000	0.506
	40,000	131,751	6.89	**3.29**	3.200	0.478
	42,500	132,900	6.89	**3.13**	3.400	0.454
	45,000	134,049	6.89	**2.98**	3.600	0.432
	47,500	134,577	6.89	**2.83**	3.800	0.411
	50,000	135,105	6.89	**2.70**	4.000	0.392
	52,500	135,633	6.89	**2.58**	4.200	0.375
	55,000	136,161	6.89	**2.48**	4.400	0.359
	57,500	136,689	6.89	**2.38**	4.600	0.345
	60,000	137,217	6.89	**2.29**	4.800	0.332
	62,500	137,745	6.89	**2.20**	5.000	0.320
	65,000	138,273	6.89	**2.13**	5.200	0.309
	67,500	138,801	6.89	**2.06**	5.400	0.299
	70,000	139,329	6.89	**1.99**	5.600	0.289
	72,500	139,857	6.89	**1.93**	5.800	0.280
	75,000	140,385	6.89	**1.87**	6.000	0.272
	77,500	140,913	6.89	**1.82**	6.200	0.264
	80,000	141,441	6.89	**1.77**	6.400	0.257
	82,500	141,969	6.89	**1.72**	6.600	0.250
	85,000	142,497	6.89	**1.68**	6.800	0.243
	87,500	143,238	6.89	**1.64**	7.000	0.238

Example of Acreage Table Base Region 5

	ACRES						
	Acres	Site Square Feet	Value	Base / Acre	Act Price / Acre	Size Factor	Value Factor
	1	43,560	134,046	33,616	**134,046**	0.200	3.988
	2	87,120	143,238	33,616	**71,619**	0.400	2.131
	3	130,680	152,427	33,616	**50,809**	0.600	1.511
	4	174,240	160,708	33,616	**40,177**	0.800	1.195
BASE	**5**	**217,800**	168,080	**33,616**	**33,616**	**1.000**	**1.000**
	6	261,360	175,452	33,616	**29,242**	1.200	0.870
	7	304,920	182,824	33,616	**26,118**	1.400	0.777
	8	348,480	190,196	33,616	**23,775**	1.600	0.707
	9	392,040	197,568	33,616	**21,952**	1.800	0.653
	10	435,600	204,940	33,616	**20,494**	2.000	0.610
	11	479,160	212,312	33,616	**19,301**	2.200	0.574
	12	522,720	219,684	33,616	**18,307**	2.400	0.545
	13	566,280	227,056	33,616	**17,466**	2.600	0.520
	14	609,840	234,428	33,616	**16,745**	2.800	0.498
	15	653,400	241,800	33,616	**16,120**	3.000	0.480
	16	696,960	249,172	33,616	**15,573**	3.200	0.463
	17	740,520	256,544	33,616	**15,091**	3.400	0.449
	18	784,080	263,916	33,616	**14,662**	3.600	0.436
	19	827,640	271,288	33,616	**14,278**	3.800	0.425
	20	871,200	278,660	33,616	**13,933**	4.000	0.414
	40	1,742,400	426,100	33,616	**10,653**	8.000	0.317
	60	2,613,600	441,033	33,616	**7,351**	12.000	0.219
	80	3,484,800	508,091	33,616	**6,351**	16.000	0.189
	100	4,356,000	567,050	33,616	**5,670**	20.000	0.169
	200	8,712,000	797,495	33,616	**3,987**	40.000	0.119
	400	17,424,000	1,121,591	33,616	**2,804**	80.000	0.083

Example of Land Influences

MEAN LAND ADJUSTMENT FACTORS

Flood Area	**20% Wetland**	**40% Wetland**	**60% Wetland**	**80% Wetland**	**100% Wetland**
.50	.93	.86	.79	.60	.30
Limited View	**Good View**	**V Good View**	**Excellent View**	**Fair Nbhd Appeal**	**Good Nbhd Appeal**
1.10	1.15	1.35	1.50	.90	1.15
Restrictions	**Shape**	**Steep**	**Unbuildable**	**Unusable**	**No Electric Service**
.50*	.85*	.85*	.30	.05*	.489**
Located on Golf Course	**Lake Front Avg**	**Lake Below Avg**	**No Road**	**No Site Improvements**	**Prelim Plat**
1.30	2.50	1.30*	.80*	.50*	2.70*

The above are the conversion of the unbiased parameters. Although generally applied, specific features of an individual may result in deviations for these parameters. Items with single asterisks are more commonly adjusted to the parcel with appraiser judgement. Double asterisks may alternatively use lump a sum adjustment for the cost to cure. Some parcels may have a cascading effect of multiple influences, and potentially could be over adjusted if the two influence intersect in their impact on the parcel. Although checks for multicollinearity were conducted in building a model, some parcels may require individualized adjustments.

Example of Saltwater Front Foot & Depth Tables

STEAMBOAT

	Front Feet	FF Value	Base Rate	FF Rate Group
	50	4	2,206	3525
	75	5	2,206	3525
	100	5	2,206	3525
BASE>>>>>	150	5	2,206	3525
	200	6	2,206	3525
	250	6	2,206	3525
	300	6	2,206	3525
	350	6	2,206	3525
	400	0	2,206	3525

	Lot Depth	FF Value	Base Rate	Depth Adj Group
	100	5	2,206	2530
	200	5	2,206	2530
BASE>>>>>	350	5	2,206	2530
	500	5	2,206	2530
	650	5	2,206	2530
	800	5	2,206	2530
	950	5	2,206	2530
	1100	0	2,206	2530

SALT WATER SPECIFIC INFLUENCES

Mean Influence	Description
.83	No Access
.91	Moderate Access
1.00	Superior Access
.90	Salt High
.95	Salt Medium
$5000	Rec1st class
$5000	Rec2nd class
.67	No View
.80	Limited View
.92	Good View
Base (no adj)	Very Good View
1.10	Excellent View
1.25	Good Quality NBHD
Variable	Restrictions
Variable	Lagoon

Building Cost Specification

Model Format for RCNLD:

$BV = [(c_1 X Q_1) + (c_2 X Q_2) + (c_3 X Q_3) + . . .] X$ Pct. Good
Where: Building Components = $Q_1, Q_2, Q_3 . . .$
Costs per unit = $c_1, c_2, c_3 . . .$

2021 COST TABLE CALIBRATION

Introduction

Thurston County uses construction cost data from Marshall & Swift as the basis for our cost approach. While these rates include local area and current cost multipliers to produce a cost estimate that is more tailored to our market area, they do not produce the level of accuracy that is needed in the appraisal process. One way to calibrate the cost tables to the local market is to use actual construction costs obtained from local builders to compare to the replacement cost new calculated from the Marshall & Swift rates. Another alternative is to use sales of new construction to measure the actual cost new to compare to the RCN calculated from our Marshal & Swift cost tables. For residential property new construction was used to calculate a calibration factor. For commercial structures and detached structures there were no actual sales of new construction. For these structure types builder cost estimates were obtained and used to determine cost table calibration factor.

Residential Structures

Procedure

All new construction sales were queried for 2016 through 2021 and were adjusted for market conditions as of 1/1/2021. A total of 77 sales of new homes were used in the analysis and dated from March 10, 2017 to March 12, 2020. A residual building cost was calculated by subtracting an estimate of the land value from the sale price. The current appraised value of the land is found after conducting a ratio study of land sales within the last five years with the appraised value.

Sales Analysis

The descriptive table on the next page demonstrates that the supplied cost table rates match our actual construction costs within our local market. This indicates that the Marshall & Swift building cost are good proxies for actual local building cost. The overall computed COD about the median is 11.5%.

Conclusion

The cost index as supplied by Marshall & Swift is representative of our current cost in their present state on an aggregate scale. This market calibrated cost table then provides a starting point for the determination of value at the neighborhood level. Sales are further analyzed to determine final land and building adjustments that take into consideration locational differences between neighborhoods.

COST BASE RATE STATISTICS

	25	50	75
2021	0.892	0.927	0.954

Construction Cost Tables

Marshall Swift cost rates, adjusted to the current year and local area, are used to determine the replacement cost of each residential improvement. Adjustments can also be made for various structure types and for other building components based on locally advertised building costs.

The complete set of rate tables is too lengthy to include here. However, an example of the rates for a 2-Story residence by quality grade is shown below. The complete set of rate tables is stored within the Sigma CAMA System.

STRUCTURE TYPE	SFLA	LOW	FAIR	AVG	GOOD	VGD	EXC	EXCP
BASE-2STY-SS	900	104.98	112.49	126.68	152.74	176.18	237.06	327.15
BASE-2STY-SS	1000	102.61	111.35	125.57	152.16	176.18	237.06	327.15
BASE-2STY-SS	1200	99.06	108.44	122.34	152.16	176.18	237.06	327.15
BASE-2STY-SS	1400	95.96	106.59	119.8	151.33	176.18	237.06	327.15
BASE-2STY-SS	1600	93.43	104.41	117.49	150.26	176.18	237.06	327.15
BASE-2STY-SS	1800	90.76	101.99	115.61	148.38	176.12	237.06	327.15
BASE-2STY-SS	2000	88.78	100.23	113.46	147.5	175.11	236.72	326.67
BASE-2STY-SS	2200	86.73	99.14	111.92	146.21	173.43	236.63	326.55
BASE-2STY-SS	2400	85.41	97.17	110.24	144.6	171.21	235.98	325.66
BASE-2STY-SS	2600	83.25	95.94	108.45	142.74	170.2	234.63	323.79
BASE-2STY-SS	2800	81.85	94.65	107.37	142.29	168.88	232.79	321.25
BASE-2STY-SS	3000	80.44	93.32	106.22	140.1	167.3	232.14	320.35
BASE-2STY-SS	3200	79.21	92.29	105.02	139.36	167.13	231.19	319.03
BASE-2STY-SS	3600	77	90.46	102.96	136.82	164.71	228.52	315.34
BASE-2STY-SS	4000	75.01	88.77	101.11	134.79	161.81	225.1	310.63
BASE-2STY-SS	4400	75.01	88.77	99.41	133.16	160.16	222.74	307.38
BASE-2STY-SS	4800	75.01	88.77	97.87	131.7	158.22	219.98	303.58
BASE-2STY-SS	5400	75.01	88.77	95.83	129.64	155.52	217.67	300.38
BASE-2STY-SS	6000	75.01	88.77	95.83	127.71	152.83	214.85	296.51
BASE-2STY-SS	6200	75.01	88.77	95.83	127.71	152.12	213.99	295.29
BASE-2STY-SS	6400	75.01	88.77	95.83	127.71	151.39	213.3	294.36
BASE-2STY-SS	7000	75.01	88.77	95.83	127.71	151.39	210.86	290.99
BASE-2STY-SS	7600	75.01	88.77	95.83	127.71	151.39	208.88	288.25
BASE-2STY-SS	8000	75.01	88.77	95.83	127.71	151.39	208.67	287.95

Depreciation Analysis

Effective Age

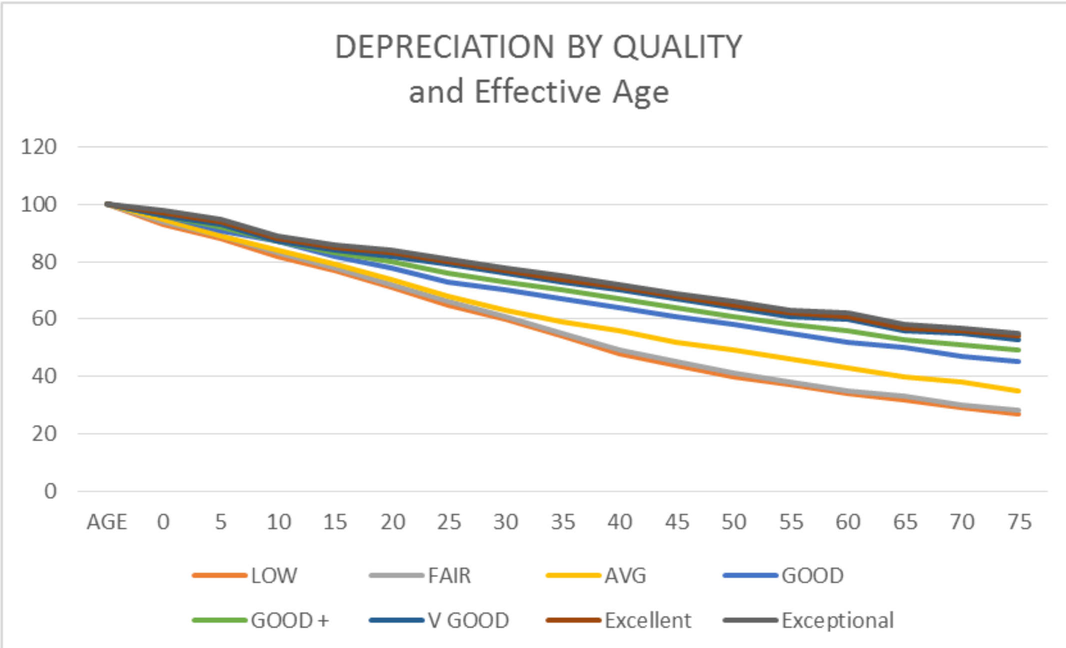
The effective age of a building is largely based on its overall condition. It is a measure of how old a building looks and not how old it actually is. As a result, any type of maintenance, repair, remodel, or renovation will tend to reduce the effective age. The more extensive the maintenance or repair work the more the effective age is reduced. This concept suggests that a very old building can be brought back to almost new condition, thereby reducing the effective age to a level that is typical of much newer construction.

Depreciation Rate Tables

Periodically, the depreciation tables are calibrated using residential sales representing all years of construction. The most recent estimates of the land values are subtracted from the sale prices to determine the residual building values. These values are compared to the replacement cost new to arrive at an estimate of the percent good, which is then correlated with the effective age of the building to produce a set of depreciation tables. An example table for a stick-built house is show below. The depreciation rates are expressed as a percent good.

SELECTED DEPRECIATION PERCENT GOOD BY EFFECTIVE AGE								
AGE	LOW	FAIR	AVG	GOOD	GOOD +	V GOOD	Excellent	Exceptional
0	100	100	100	100	100	100	100	100
5	93	94	95	96	96	96	97	98
10	88	89	89	91	92	93	94	95
15	82	83	84	87	87	87	88	89
20	77	78	79	82	83	84	85	86
25	71	72	74	78	80	82	83	84
30	65	66	68	73	76	79	80	81
35	60	61	63	70	73	76	77	78
40	54	55	59	67	70	73	74	75
45	48	49	56	64	67	70	71	72
50	44	45	52	61	64	67	68	69
55	40	41	49	58	61	64	65	66
60	37	38	46	55	58	61	62	63
65	34	35	43	52	56	60	61	62
70	32	33	40	50	53	56	57	58
75	29	30	38	47	51	55	56	57
80	27	28	35	45	49	53	54	55

The graph below shows the relationship between the percent good by quality and effective age.



Condition

Because many properties are in better or worse condition than what is typical for their age, we need a method to adjust the depreciation rate accordingly. There are two ways to accomplish this. One is to adjust the effective age and the other is to adjust the condition rating to raise or lower the amount of depreciation that is applied.

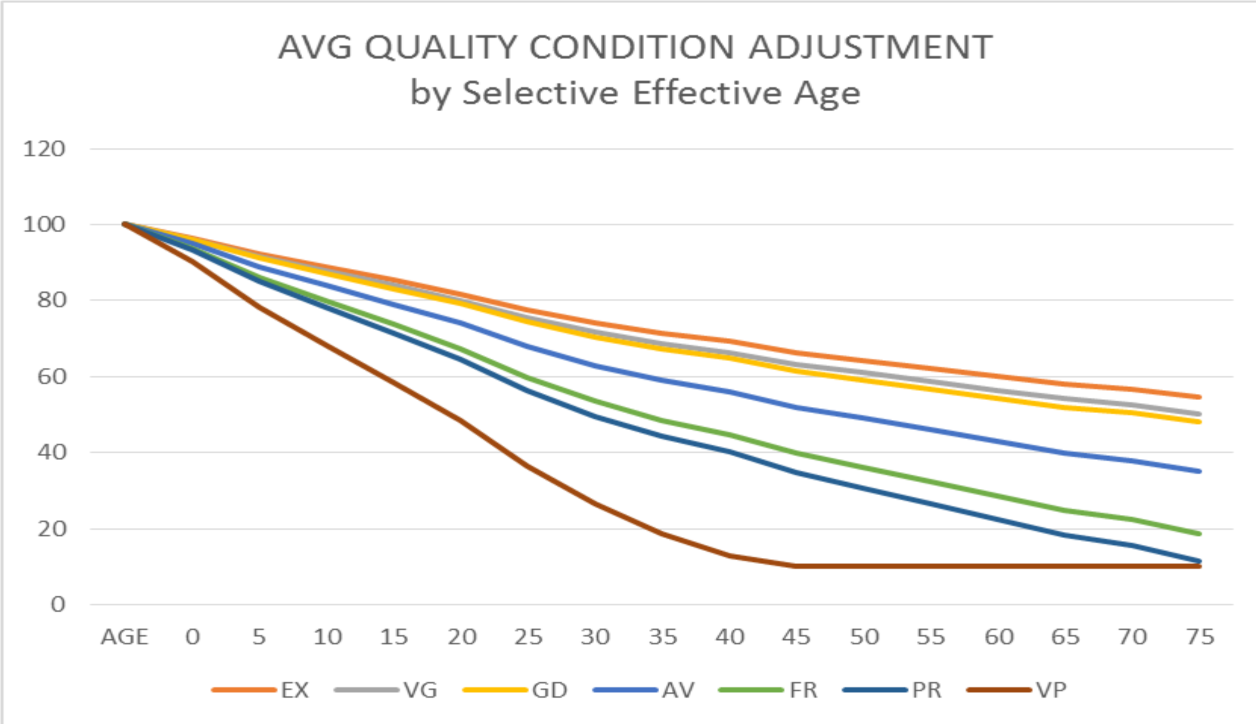
Adjusting the effective age would involve a fairly complex set of instructions and calculations for different situations that may be encountered. Minor remodels, major renovations, and building additions would require different adjustment techniques. Even with these procedures in place, there would be substantial appraiser judgment involved that would open the door for inconsistencies in the way effective age is determined and depreciation is applied.

A better method is to establish guidelines for determining the condition rating to apply to each property. In general, if an improvement to a parcel of land is typical for its age and has received average maintenance, it would be considered in average condition. If the improvement has had less than average maintenance, it will be in less than average condition. If the improvement has received better than average maintenance, it will be in better than average condition.

Generally, the appraiser does not have the benefit of an interior inspection. As a result, it is assumed that the interior inspection is the same as the exterior. On those occasions in which an interior inspection is granted, the condition is reflective of the overall property. Those parcels which have had an interior inspection are noted on their individual records.

The graph on the following page is an example of average quality with the different condition ratings on the percent good curve. It summarizes the relationship between effective age, building condition, and the rate of depreciation. The CAMA system calculates depreciation by the following formula:

Phy-Pct_Good = 100 – (Cond-Factor x (100 - Pct_Gd_Table))


AVG QUALITY CONDITION ADJUSTMENT
by Selective Effective Age
120
100
80
60
40
20
0
AGE
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
EX
VG
GD
AV
FR
PR
VP

Neighborhood Adjustment Model Specification

The equation for the neighborhood adjustment is an additive model.

$V = b_1(LV) + b_2(BV)$ + systemic and random error

- Where:
  b_1 and b_2 are based on a combination of regression analysis and appraiser judgment

1. Systemic errors would be bias introduced by neighborhood influence and their impact can be extracted by residual analysis.
2. Other random sampling errors are a result of market imperfections and difference occur because of consumer taste.

Neighborhood Adjustment Calibration

Initially regression coefficients are developed to apply to both land (b_1) and building (b_2) values within each neighborhood. A preliminary adjustment to the neighborhood land values is determined first by considering only available vacant land sales within the region.

After making the initial adjustment to the land value, the coefficient for the building value (RCNLD) can be determined. This again produces a preliminary adjustment or starting point for determining the final neighborhood building trend. The residuals produced by the regionalized model will indicate a systemic difference between neighborhoods. These residuals become the basis for developing a neighborhood factor. These factors are scalar values, as opposed to qualitative estimates often employed by fee appraisers and can be reintroduced in an MRA model. These factors are analogous to a positivist economist market model, it provides a statistically valid measurable solution based upon observable data. These positivist models are not normative, they do not attempt to answer why. These positivist assumptions and methodology are employed in the cost approach. In this mass appraisal methodology, a group of sales is normalized on a neighborhood level to determine the best factor to meet the statutory requirement and minimize variance.

Specifically, each neighborhood within the region is analyzed to consider its unique characteristics, amenities, and market conditions. This final adjustment to the neighborhood land and building values are largely based on the appraiser's analysis of individual sales ratios guided by the region wide sales analysis. An iterative process of adjusting the initial coefficients is applied to each neighborhood to reach the desired level of assessment, PRD, and COD. The Assessor's target level of assessment for 2021 is 95%. This level was chosen to reflect that the majority of residences are not 'market ready' compared to the properties that sold at 100% of their market value. There were 30,653 sales used to do develop these neighborhood ratios.

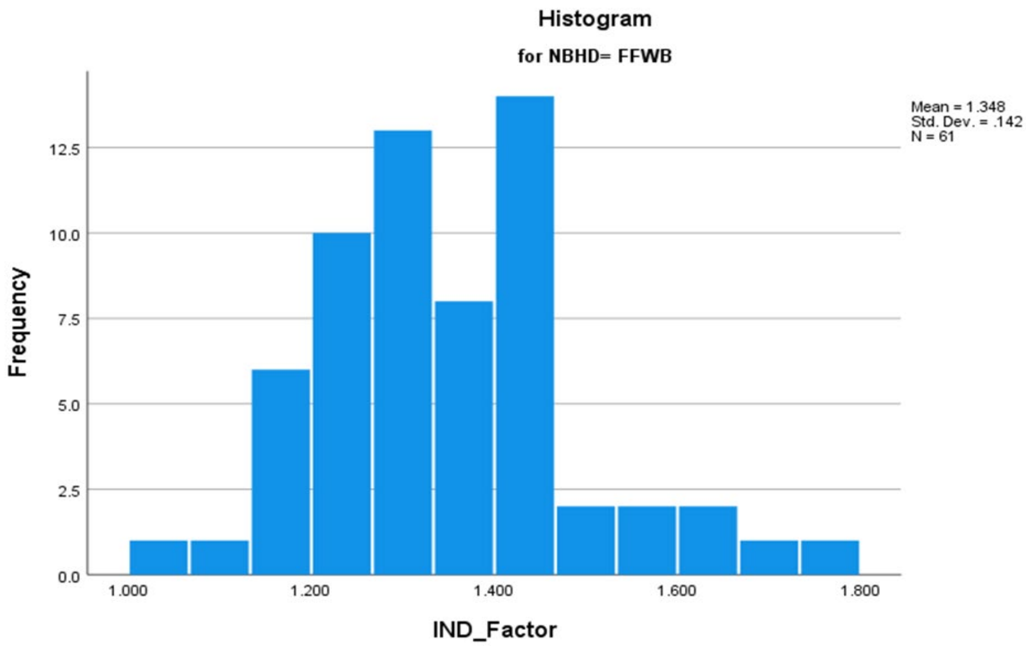
On the following page is an example: neighborhood "FFWB" with the original system cost to adjusted market value and the development of a market location adjustment.

IMPORTANT CONSIDERATION: Why do different types of properties (Single Family, Manufactured Homes, and Condominiums) have different neighborhood factors? The answer is quite simple. They have a different original cost basis. The important goal is to achieve equity and equality as to market value. In other words, the final assessment ratios need to be in compliance with medians between 90 to 110%.

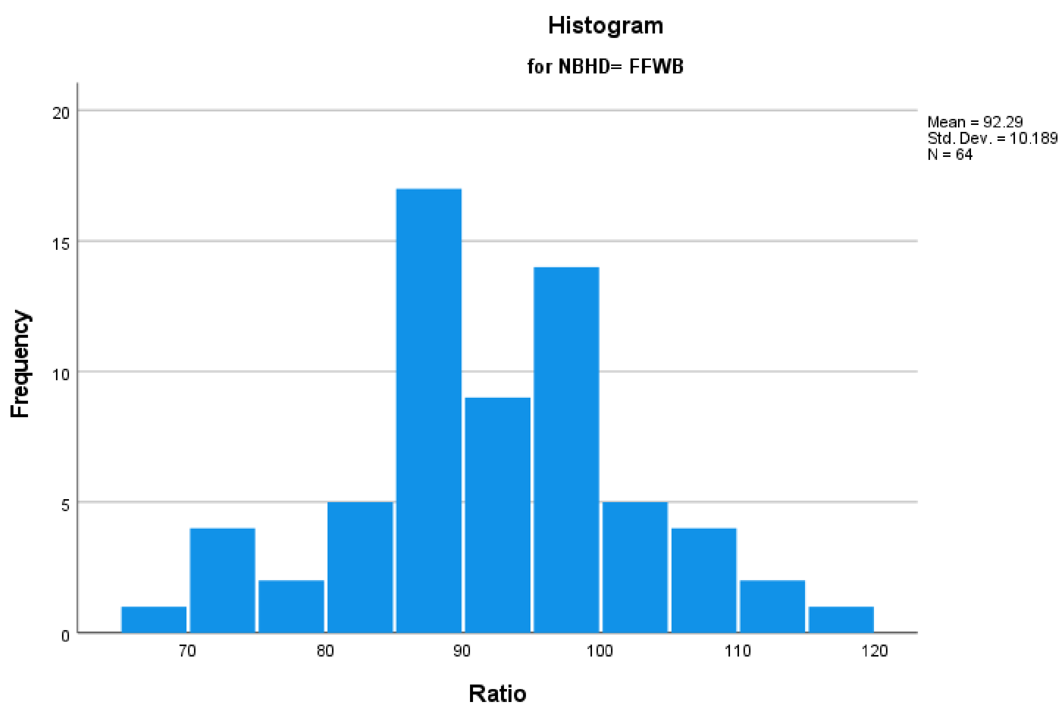
Below is the example neighborhood "FFWB" indicating the raw ratio data distribution, also the post treatment ratio.

EXAMPLE

Distribution of Raw Ratio for FFWB



Distribution of Ratio for FFWB after neighborhood adjustments.



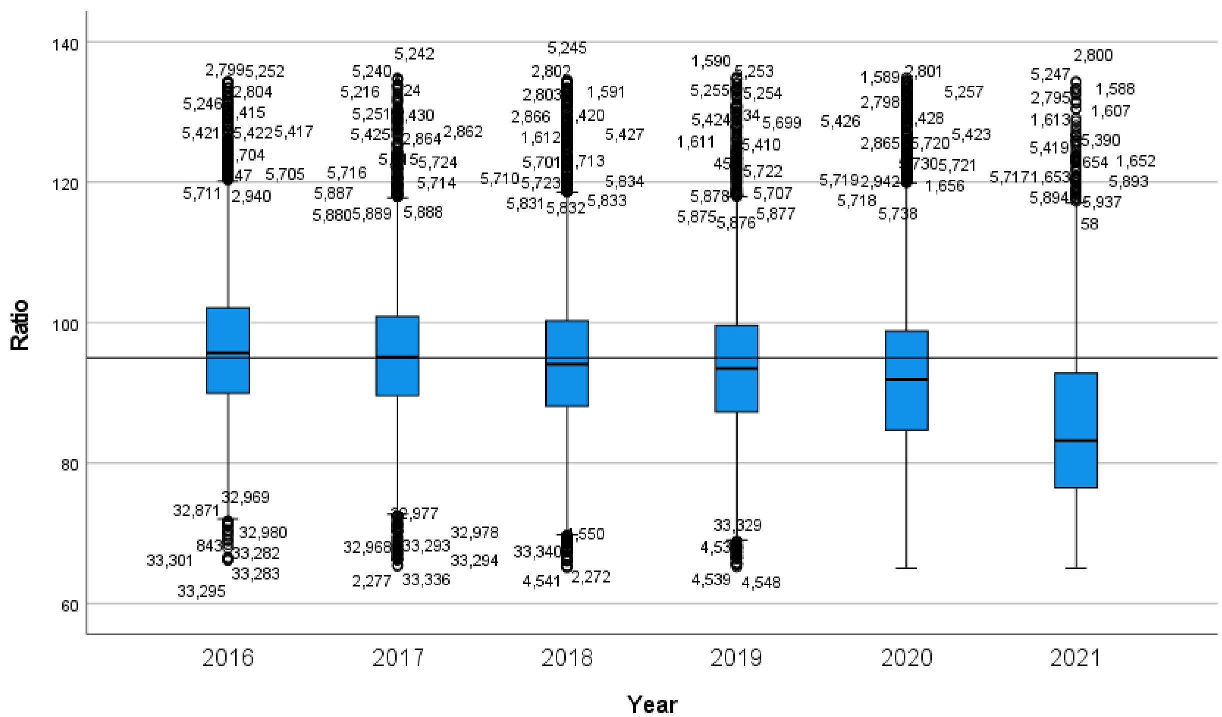
Post Treatment of Residential FFWB

Median	0.933
Coefficient of Dispersion	0.087
Price Related Differential	1.006

Residential Adjustment Model Validation

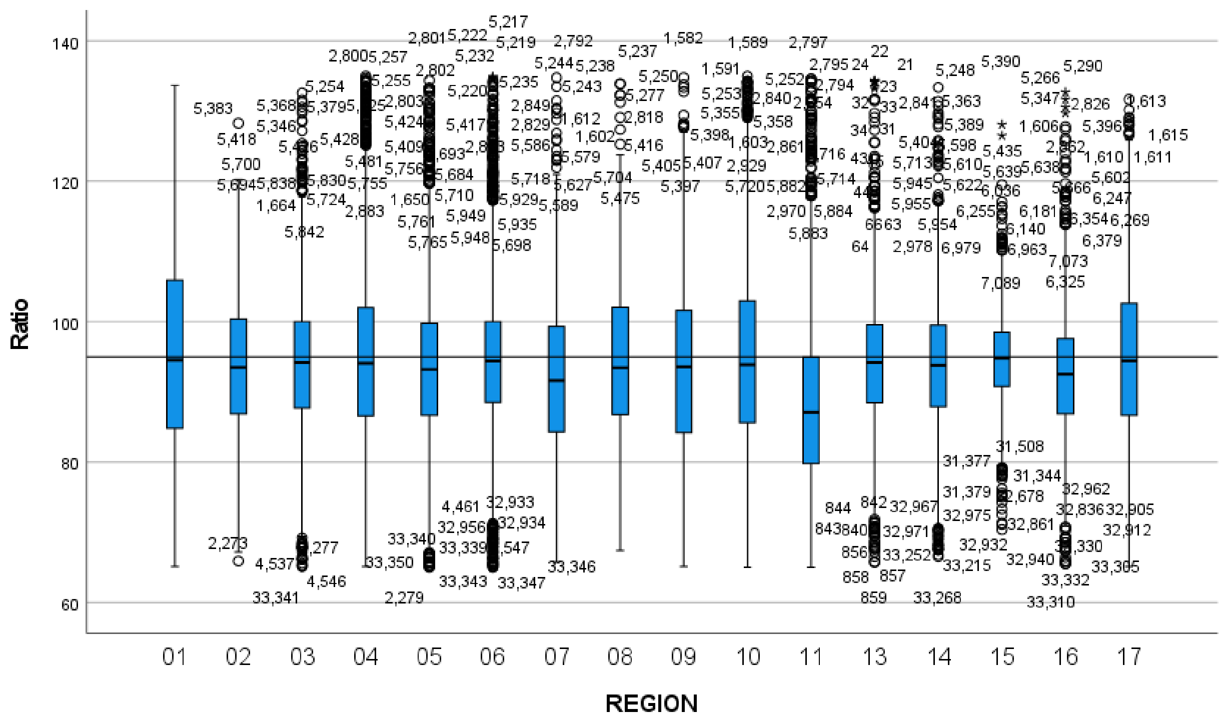
Neighborhood trends were calibrated using 30,653 sales that took place between 1/1/2016 to 3/31/2021. Because multiyear sales are utilized, a check for consistency of that estimate is required. In other words, the mean and median ratios for each year should be in the range of 90 to 110% and be consistent across all years. To achieve this, the comparable sales can be time adjusted to the current year and unbiased estimates achieved. The boxplot below provides graphical verification this has been achieved. For information on time trending of sales, refer to the *Market/Time Adjustment* document in the Appendix.

Ratio by Sale Year



Assessment Uniformity by Region

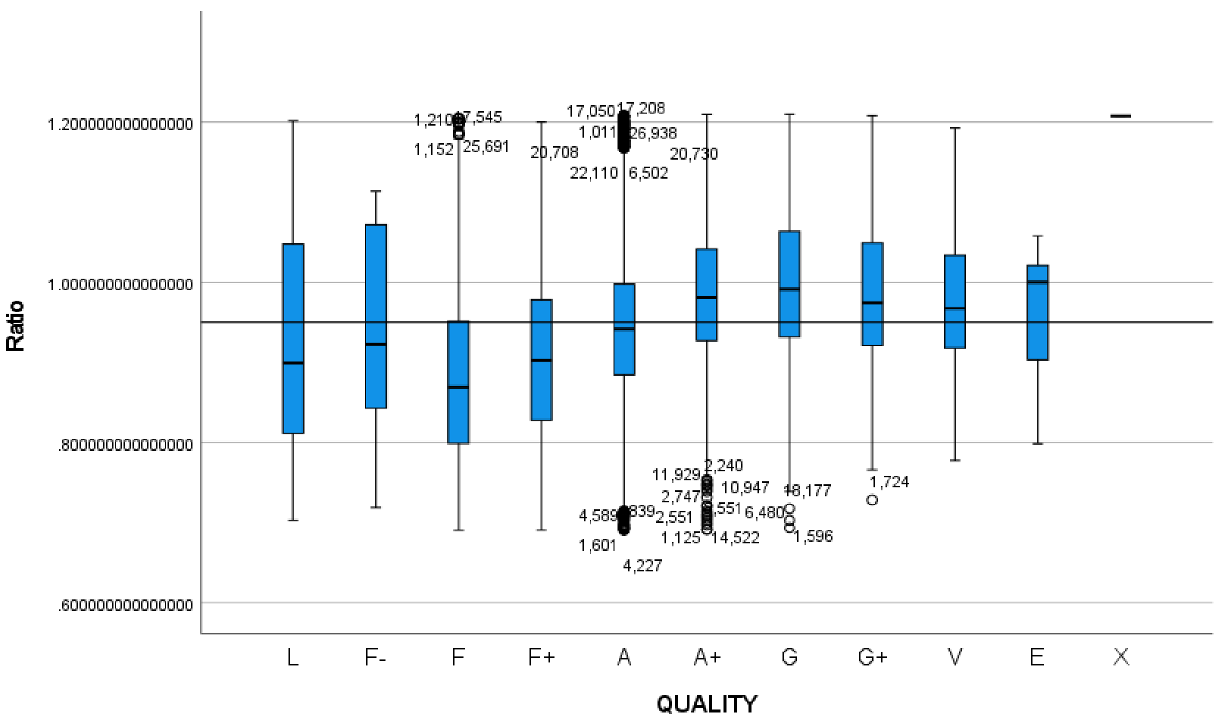
Ratio by Region



Assessment Uniformity by Quality Grade

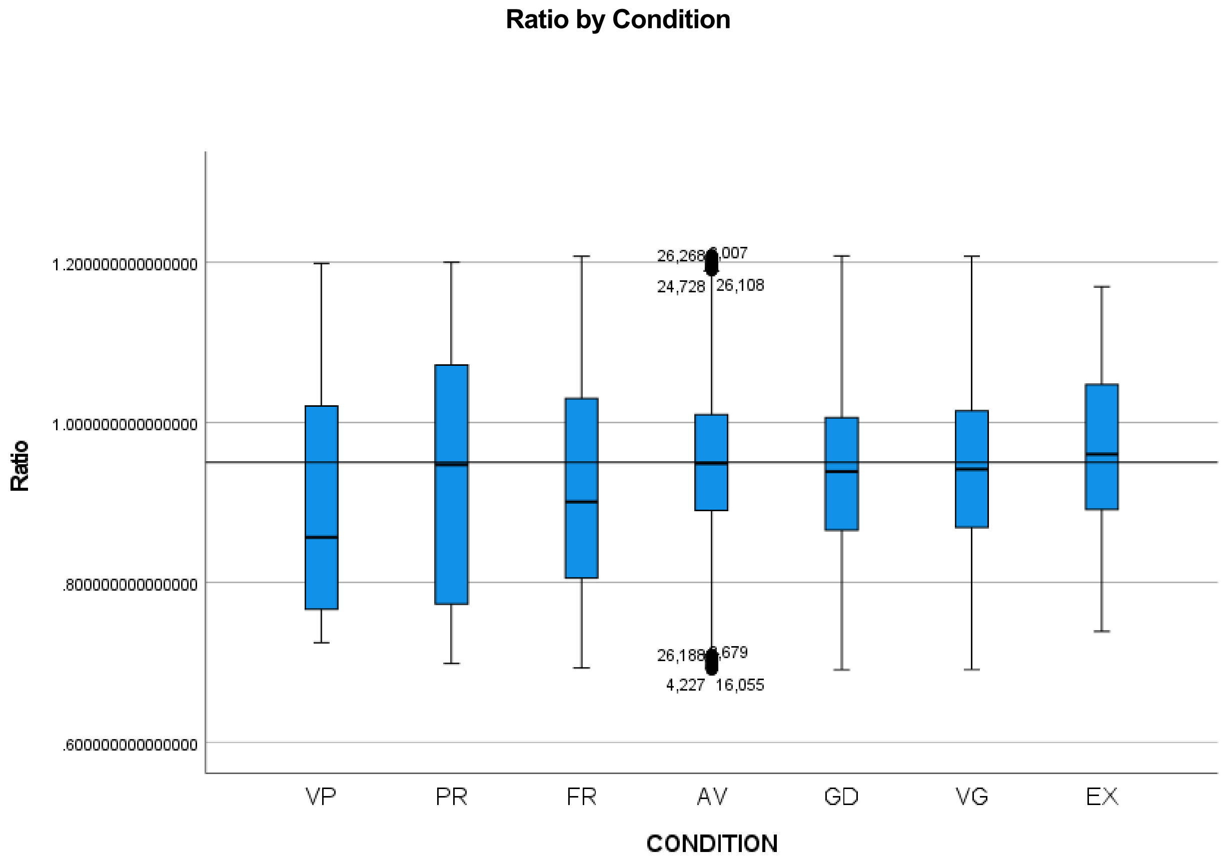
Total square feet of gross living area, quality and size are major value drivers. The median level between quality grades is fairly consistant at about the 94.9% level and the interquartile ranges are fairly consistent. The county is in the process of consolidating and creating better consistency between quality levels. While compliant, continuous improvement is expected. However, the data does indicate a propensity to slightly under value fair quality homes.

Ratio by Quality



Assessment Uniformity by Condition

With respect to condition, there is no indication of systemic bias. The values for VP conditions are slightly lower than the general trend for all other conditions. It may be due to the low value of these properties, so a slight miss will overstate the difference. All other medians are within a tight pattern and hover around 94.9%



RECONCILIATION AND CONCLUSION

Considering the quantity and quality of data and the reliability of the various models as shown in the performance tests above, we have concluded that the Sales Adjusted Cost Approach produces an accurate estimate of market value. There is no evidence of a systemic bias between or within the sample. Also, the median ratio between the commercial subclass and residential subclass is within recommended guidelines by the International Association of Assessing Officers. This would indicate there is no tax shift due to inequality or inequity among property owners.

APPENDIX

Multiple Regression Analysis Assumptions

Complete and Accurate Data:

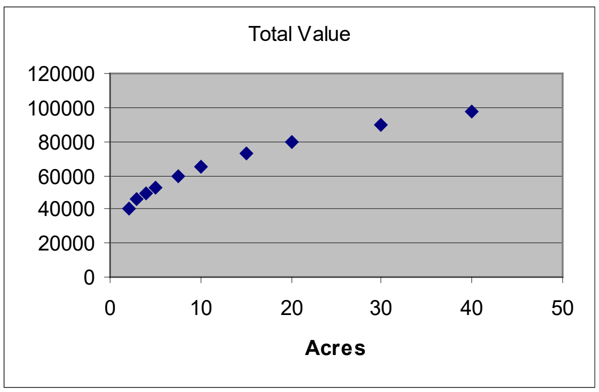
- Data definitions and standards have been developed to ensure our data is as complete and accurate as possible.
- A procedure has been established to ensure sales are properly verified.
- Annual training is conducted to remind appraisers of the standards that have been developed.

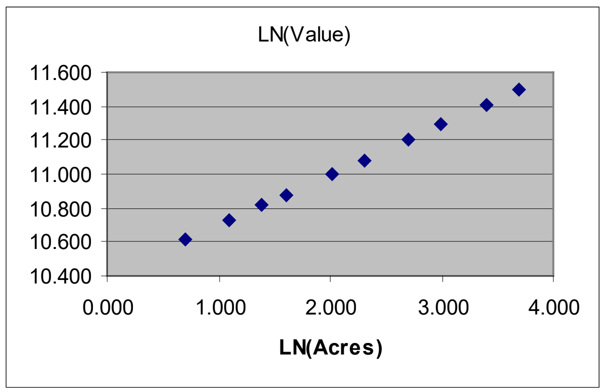
Representativeness:

- It is assumed that the sale sample adequately represents variables in the model.
- Violation of this assumption may affect the accuracy of the model in predicting the value of properties that are under-represented. For example, if there are no sales of "Excellent" view, the model would make no distinction from the typical "Average" view and an "Excellent" view. Using scalar or linearized variables in the model has mitigated this potential problem.

Linearity:

- It is assumed that the marginal contribution of a variable is constant over the range of values for the variable. Each additional unit of size or quantity adds equally to the value.
- The assumption is violated when economies of scale or other non-linear relationships are present.
- Developing a multiplicative land model has helped to create linear relationships between the dependent variable and independent variables.
- For example, using the natural logarithm of the lot size (acres) addresses the decreasing marginal utility of adding additional units of land. See example below.





Additivity:

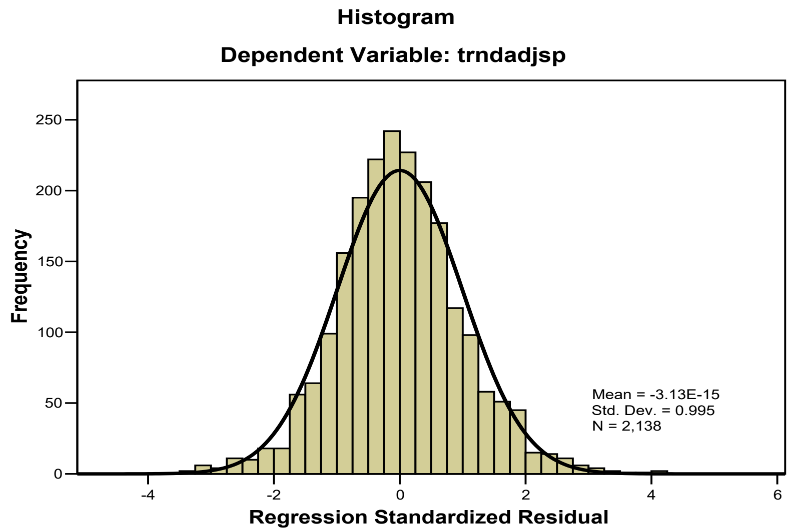
- It is assumed that the marginal contribution of one independent variable is not affected by the changes in other variables.
- The assumption is violated when one impendent variable interacts with another.
- This assumption generally does not hold for land models.
- Land characteristics are often interactive. For example, the adjustment for view may be influenced by the size or topography of the land parcel.
- A multiplicative model helps to address this issue by converting the format to log-linear terms.

No Correlation between Independent Variables:

- It is assumed that there is no correlation between independent variables.
- This assumption is addressed by reviewing the correlation matrix and by either eliminating one of the correlated variables or combining the highly correlated variables.

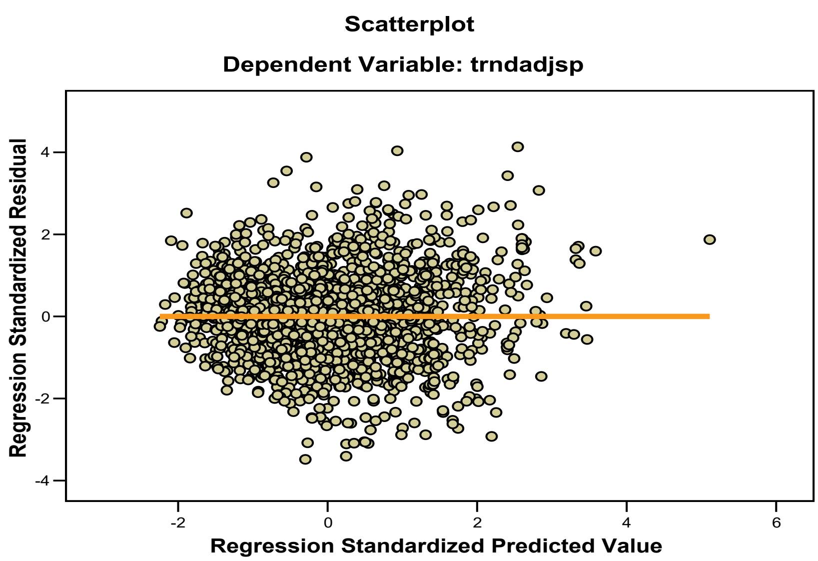
Normal Distribution of Residual Errors:

- Violation of this assumption affects the interpretation of the SEE, COV, and t-statistics.
- With large samples and proper screening of the sales, this assumption is typically not a problem.
- The assumption is verified by examining a histogram of residual errors. See example below.



Constant Variance of the Error Term (homoscedasticity):

- The residual errors should be consistent as prices increase.
- Violation of this assumption implies the residual errors are not evenly distributed (heteroscedasticity).
- As a result the model will chase high priced sales that may not be representative of the market.
- Sales have been properly screened to ensure accuracy of the data, and outliers have been removed to reduce the likelihood of this problem.
- Expressing the sale price (dependent variable) in per square foot or per acre terms has also helped to minimize this potential problem.
- Verified by examining a scatter diagram comparing residual errors to corresponding predicted values. See scatter diagram below as an example. The horizontal line-of-best-fit indicates that the residual errors are evenly distributed among the predicted values.



MARKET / TIME ADJUSTMENT AND MODEL SUMMARIES

For any statistical estimate to be valid, it must be representative of the population. In theory, under ideal circumstances, the sample should be an adequate size and randomized. However, in the real world, convenience samples are utilized. A convenience sample is one where the units that are selected for inclusion in the sample are, in this instance, the best available sales. Although these samples lack randomness, there is no other methodology available but to use actual sales. If the sample is large enough to represent the population value, then estimates can be developed which should reflect true market action.

So how does one increase the sample size? One method would be to expand the area, however, since real estate is highly dependent upon location that methodology would result in failure. The only other option is to extend the time frame (sale date range) in which to select observations. This methodology is quite accurate when properly controlled. The following explains the rational for this decision and the results.

Values in all economic markets change over the course of time. The changes in values can occur as rapidly as second by second as in securities trading, or have slower movement which occurs over months, quarters, or even years as is more typical in real estate. The reader is cautioned to remember that it is not time itself which accounts for the change, but changes in supply and demand factors. These changes can be due to abstract things such as public sentiment and taste, to physical features such as weather conditions and natural aging of a depreciating asset, and to changes in economic conditions, to name just a few.

Real estate prices are subject to many factors and when analyzed in sequence can exhibit predictable patterns. These patterns are generally seasonal and cyclical. For residential properties these values tend to peak in late spring/early summer and bottom out around mid-November to early-February. However, these patterns do not perfectly repeat so there can be differences in the magnitudes in common seasons. Besides the seasonal influences, cyclical influences also occur. These can be due to a sudden exogenous shock, such as the World Trade Center Attack and the beginning of the War on Terror, or more likely due to economic upheavals such as the Great Recession. ***The 2020 Covid-19 lockdown did not slow the residential sales market, actually the market during this time has had unprecidented increases. One of the main reasons for such a steep increase is the supply is low and the demand is very high.***

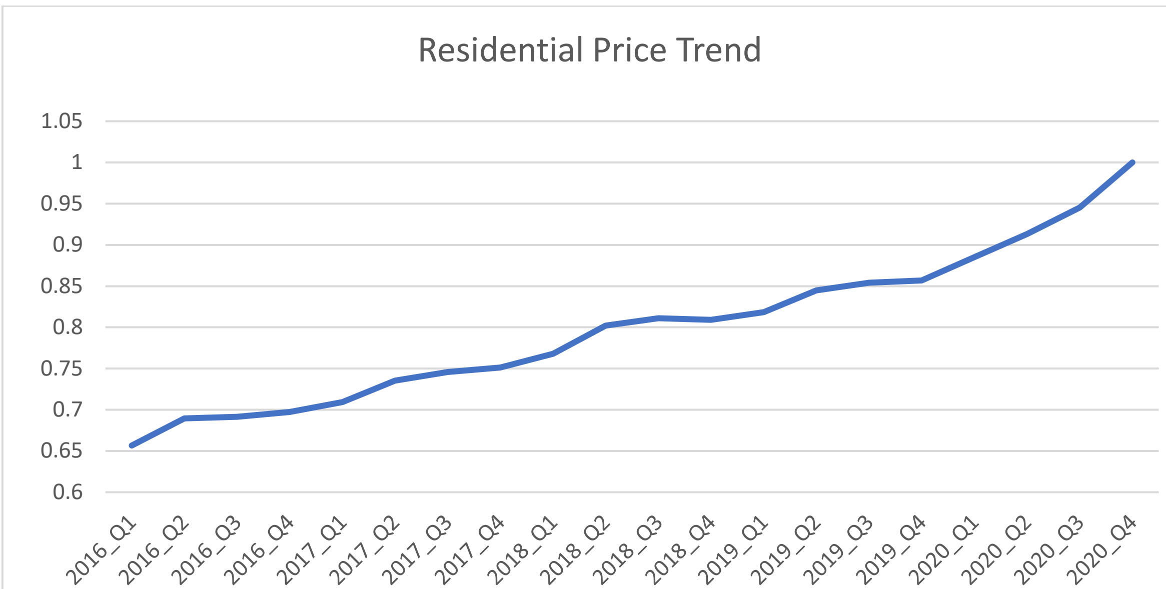
For residential real estate, when other variables are controlled for such as size, quality, condition, age, and site value time patterns can be seen, and their influence determined. This is standardized research methodology that is used in academic, medical, social, and economic studies.

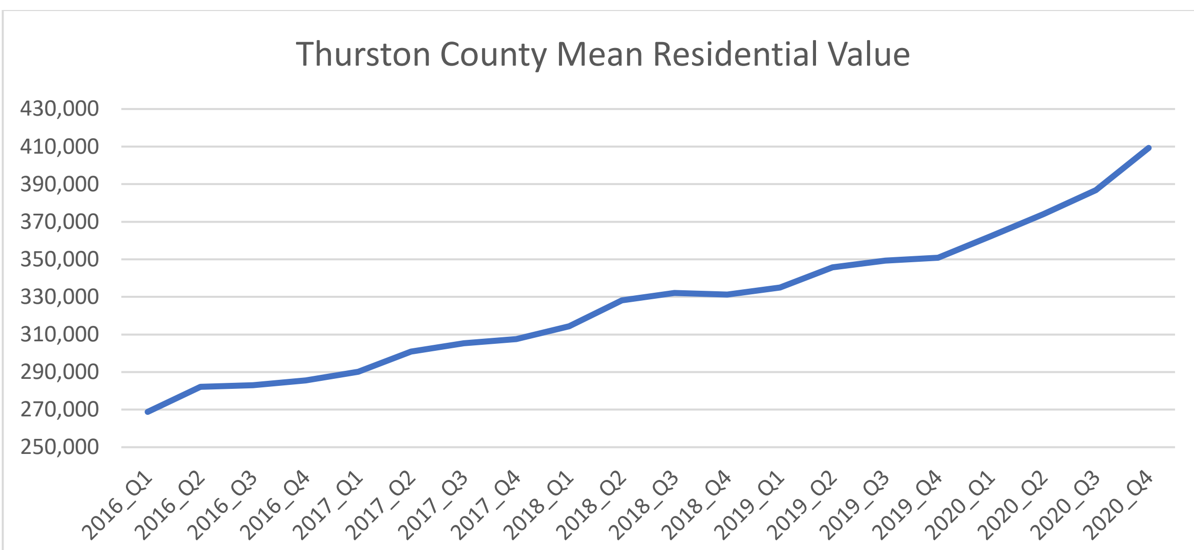
These time variables were determined by using 26,049 observations which occurred from January 2, 2016 to March 7, 2021. A total of 95 variables were presented for backward regression modeling of which 77 were found to be statistically valid. To minimize the impact of a random outlier as well as to create an efficient model, time adjustments were categorized on a quarterly basis.

Thurston County's residential values exhibit a strong pattern. Historic analysis revealed that the residential market exhibits an upward trend over the five-year period. This can be seen graphically below.

Time_Period	Time_Factor
2016_Q1	1.523
2016_Q2	1.450
2016_Q3	1.446
2016_Q4	1.434
2017_Q1	1.410
2017_Q2	1.360
2017_Q3	1.341

2017_Q4	1.331
2018_Q1	1.302
2018_Q2	1.247
2018_Q3	1.233
2018_Q4	1.236
2019_Q1	1.222
2019_Q2	1.184
2019_Q3	1.171
2019_Q4	1.167
2020_Q1	1.130
2020_Q2	1.095
2020_Q3	1.058
2020_Q4	1.000





At this point the reader is wondering, how we know if those numbers are accurate? The proof can be determined by four features. Does the model have predictive ability, do the variables used "explain" the variance in values, is the model structurally correct, and when analyzed in isolation is there an indication of systematic bias?

The predictive ability of a model is determined by utilizing an Analysis of Variance (ANOVA) technique with an F-test. The regression utilized 77 variables with 26,049 observations used. The F-test value was 1,612.9 which is highly significant (t<.000). This would indicate that the model has high predictive ability as a whole.

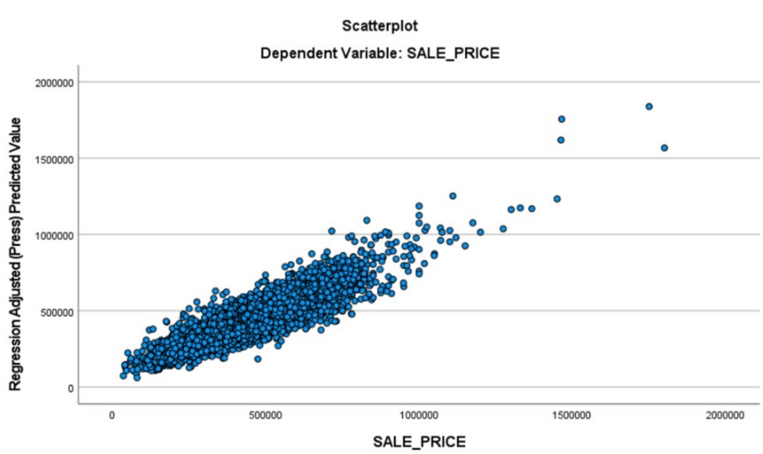
The next step is to determine if the chosen variables (including market/time) explain the dependent variable, in this case its value. This is accomplished by determining the Coefficient of Determination (R^2) and the Adjusted Coefficient of Determination (adj. R^2). The Raw R square results in a value of .859. One way to imagine this is that 86% of the variance is accounted for by the variables, even without specific neighborhood influences considered.

A common concern is the "usefulness" of the number of variables used. In other words, does the increase in the number of variables result in a general improvement of the model? The method to estimate this is by the adjusted R square. In this case the model still renders good results with a value of .858, or effectively, that these chosen variables explain 86% of the variance.

Of utmost importance, is the model correctly structured or is there a systemic bias. The most critical and rudimentary check is whether the model is misspecified. A misspecification results when the coefficients' value is beyond what would be a reasonable estimate or the directionality of the variable is opposite of what is expected by theory and established practice: for example, if the square footage adjustment is a minus $90.00 per square foot, or the value was $34,000 per square foot. Of the 77 variables utilized in the model, none are misspecified.

When two independent variables which affect the dependent variables similarly and to a high degree, it produces another possibility of systematic bias called multicollinearity. For example, total rooms and square feet both refer to size, both are highly correlated to each other and both affect home prices in nearly the same way. If both are introduced into the same model, their parameter values would be incorrect and quite likely would bias all other estimates as well. The most common check to avoid such a result would be to run a correlation matrix between all independent variables and assure that no correlation exceeded +/- 0.60. This was achieved in the model, so there is no indication of multicollinearity.

While we do not need the assumption of homoscedasticity for a model to create unbiased estimators, it is critical to the predictability of the model and the resulting standard error of the estimate. The ideal is to have the errors of the estimate to be consistent along the value range. When this occurs the model exhibits homoscedasticity, when it does not it is said to be heteroscedasticity. When heteroscedasticity is present, as the values move away from the mean, the error rate increases. While there are several tests for this, the easiest review is to plot the estimates for the actual value. We have achieved a homoscedastic distribution if the error is consistent along the value range. This can be seen in the graph below.



Another critical feature of systemic bias is whether there is autocorrelation present in the model. Autocorrelation is a check for time related bias. A common check is the Durbin-Watson Statistic. This value ranges from 0 to 4, with 2 meaning there is no autocorrelation or, if you will, time bias. A value of 0 indicates positive autocorrelation. This is the most common time error when present. It means the directionality of the residual is followed by the same directionally of the previous observation. If either seasonal or cyclical influences were not accounted for in the model the pattern would look serpentine. A value of 4 would indicate negative autocorrelation. This would result in each observation's residual moving in the exact opposite of the previous observed direction. The residuals would exhibit a staccato pattern of rapid up and down movements. The model produced a value of 1.102 meaning there is no time bias that has not been accounted for by the variables.

The results indicate that the model is systematically unbiased, and the time adjustments accurately reflect the market conditions.

Model Summary[t]

					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
19	.927[s]	.859	.858	44051.326	.000	2.578	1	25949	.108	1.102

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
19	Regression	306722106368486.000	98	3129817411923.330	1612.876	.000[t]
	Residual	50356475562432.400	25950	1940519289.496		
	Total	357078581930918.000	26048			

SQUARE FOOT LAND MODEL SUMMARY

This model is a hybrid model with the dependent variable being the the sales price. A backward regression methodology was utilized. Two land models were run, one for urban and one for suburban regions. The independent variables are a combination of size, region, and site influences. 56 variables were statistically significant to predict value for the urban land model and 26 for the suburban land.

Urban Land Model Summary

					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.797[a]	.635	.599	43085.806	.635	17.741	57	581	.000	1.824
ANOVA										
Model		Sum of Squares	df	Mean Square	F	Sig.				
1	Regression	1877251082561.080	57	32934229518.615	17.741	.000[b]				
	Residual	1078560668164.140	581	1856386692.193						
	Total	2955811750725.220	638							

Suburban Model Summary

					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
22	.858[v]	.737	.726	34959.303	-.001	2.309	1	657	.129	1.907
ANOVA										
Model		Sum of Squares	df	Mean Square	F	Sig.				
22	Regression	2249949918154.720	26	86536535313.643	70.807	.000[w]				
	Residual	804176563733.294	658	1222152832.421						
	Total	3054126481888.020	684							

SALT WATERFRONT LAND MODEL SUMMARY

This model uses a forced regression technique with the independent variable being the residual land value. The independent variables are a combination of size, region, site influences and time splines. 38 variables were statistically significant to predict value. The reference group for this single region is for very good view, medium bank, properties.

Saltwater Model Summary										
					Change Statistics					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
1	.947[a]	.897	.886	128775.148	.897	78.598	38	343	.000	2.108
ANOVA										
Model		Sum of Squares	df	Mean Square	F	Sig.				
1	Regression	49528783405885.100	38	1303389036996.980	78.598	.000[b]				
	Residual	5687982282244.990	343	16583038723.746						
	Total	55216765688130.100	381							

NEIGHBORHOOD RATIO STATISTICS

SINGLE FAMILY RESIDENCES & LAND

Group	Mean	Median	Weighted Mean	Average Absolute Deviation	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
03U1	0.951	0.953	0.947	0.080	1.004	0.084	10.8%
06E2	0.921	0.918	0.920	0.113	1.000	0.123	16.3%
06U1	0.905	0.895	0.888	0.146	1.019	0.163	26.8%
06U2	0.915	0.901	0.916	0.129	0.999	0.143	20.9%
07E2	0.879	0.866	0.872	0.089	1.009	0.103	16.7%
08B2	0.911	0.893	0.884	0.116	1.031	0.130	17.5%
08H1	0.984	0.992	0.980	0.074	1.004	0.075	9.6%
08L1	0.943	0.935	0.952	0.094	0.991	0.101	13.4%
08N1	0.900	0.907	0.888	0.155	1.014	0.171	28.0%
09S1	0.968	0.957	0.972	0.108	0.997	0.113	16.3%
09W1	0.970	0.950	0.975	0.103	0.995	0.109	16.5%
09YS	0.854	0.908	0.803	0.199	1.063	0.220	33.0%
10G2	0.884	0.862	0.883	0.093	1.002	0.108	17.1%
10I1	0.930	0.935	0.947	0.118	0.982	0.127	17.5%
10O1	0.993	0.952	0.978	0.123	1.015	0.129	20.3%
10P1	0.907	0.899	0.891	0.077	1.018	0.086	12.4%
10P2	1.035	1.031	0.996	0.132	1.039	0.128	14.9%
11E1	0.883	0.870	0.873	0.109	1.012	0.126	21.6%
11F1	0.852	0.850	0.855	0.093	0.997	0.110	16.2%
11K1	0.889	0.907	0.889	0.058	1.000	0.063	8.9%
11L1	0.984	0.961	0.969	0.130	1.016	0.135	18.2%
11O1	0.961	0.955	0.960	0.075	1.001	0.078	10.6%
11U1	0.942	0.939	0.937	0.079	1.006	0.084	11.5%
11VS	1.017	0.985	0.932	0.188	1.092	0.191	27.1%
11XS	0.940	0.941	0.952	0.148	0.988	0.158	20.6%
12O1	0.951	0.922	0.941	0.073	1.011	0.079	10.9%
12P1	0.956	0.952	0.961	0.082	0.994	0.086	11.4%
12Q1	0.966	0.961	0.971	0.134	0.995	0.140	18.0%
12S2	0.965	0.958	0.962	0.092	1.003	0.096	13.0%
12U1	0.926	0.947	0.945	0.150	0.979	0.158	19.8%
12V3	0.969	0.950	0.976	0.075	0.992	0.079	10.3%
12W2	0.937	0.943	0.942	0.102	0.996	0.108	16.2%
12Z1	0.957	0.953	0.947	0.087	1.011	0.091	14.1%
12ZS	0.866	0.837	0.883	0.138	0.981	0.165	24.9%
13K1	0.965	0.950	0.963	0.123	1.002	0.129	17.9%
13R1	0.943	0.944	0.947	0.076	0.996	0.080	10.5%

Group	Mean	Median	Weighted Mean	Average Absolute Deviation	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
13R2	0.924	0.905	0.931	0.094	0.992	0.103	12.6%
13T1	0.952	0.931	0.944	0.109	1.008	0.117	19.0%
13U1	0.972	0.938	0.960	0.103	1.012	0.109	15.9%
13V1	0.960	0.943	0.980	0.109	0.980	0.116	14.6%
13W1	0.962	0.956	0.964	0.067	0.998	0.070	9.2%
13W3	0.915	0.906	0.906	0.091	1.010	0.100	12.6%
13W4	0.883	0.913	0.926	0.118	0.953	0.129	18.9%
13X1	0.942	0.946	0.937	0.058	1.006	0.061	8.9%
13Y1	0.951	0.948	0.956	0.099	0.995	0.105	12.9%
13YS	0.969	0.957	0.980	0.134	0.989	0.141	18.0%
13Z1	0.960	0.962	0.964	0.146	0.995	0.151	22.4%
13ZS	0.941	0.950	0.943	0.133	0.997	0.140	18.1%
14H1	0.898	0.868	0.867	0.128	1.035	0.148	23.6%
14N1	0.970	0.961	0.952	0.098	1.019	0.102	15.5%
14P1	0.914	0.915	0.912	0.110	1.002	0.121	15.7%
14Q1	0.962	0.949	0.967	0.137	0.994	0.144	19.0%
14S2	0.941	0.938	0.942	0.128	0.999	0.137	17.9%
14T1	0.977	0.954	0.970	0.151	1.008	0.158	20.9%
14U2	0.940	0.931	0.903	0.136	1.041	0.146	21.0%
15K1	0.954	0.937	0.939	0.110	1.016	0.117	18.3%
15R2	0.952	0.941	0.949	0.121	1.003	0.129	17.2%
15S1	0.959	0.966	0.962	0.120	0.996	0.124	16.3%
15T1	0.988	0.961	0.975	0.138	1.014	0.144	18.8%
15T2	0.946	0.932	0.943	0.124	1.003	0.133	17.0%
15U1	0.946	0.940	0.952	0.111	0.993	0.118	15.0%
15U2	0.969	0.964	0.962	0.141	1.007	0.146	21.0%
15X1	0.949	0.938	0.930	0.142	1.021	0.151	23.0%
15XS	0.938	0.942	0.934	0.109	1.005	0.116	16.0%
16B1	0.944	0.902	0.928	0.168	1.017	0.186	24.4%
16F1	0.879	0.874	0.870	0.105	1.010	0.120	19.6%
16P1	0.939	0.939	0.938	0.081	1.000	0.086	11.7%
16Q1	0.959	0.937	0.952	0.102	1.007	0.108	16.6%
16Q2	0.946	0.943	0.945	0.062	1.002	0.066	8.6%
16R1	0.923	0.916	0.924	0.087	0.999	0.095	13.3%
16S1	0.967	0.952	0.961	0.130	1.007	0.137	18.5%
16S2	0.980	0.951	0.969	0.134	1.011	0.141	20.9%
16T1	0.898	0.893	0.906	0.137	0.992	0.153	19.3%
16W1	0.925	0.944	0.926	0.118	0.999	0.125	17.4%
17C1	0.963	0.892	0.912	0.159	1.056	0.178	26.8%
17G1	0.899	0.892	0.896	0.115	1.003	0.129	16.2%

Group	Mean	Median	Weighted Mean	Average Absolute Deviation	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
17L1	0.952	0.936	0.962	0.111	0.990	0.119	18.5%
17N1	0.892	0.886	0.890	0.066	1.002	0.075	10.4%
17Q1	0.949	0.938	0.946	0.065	1.002	0.070	9.8%
17R1	0.922	0.905	0.907	0.139	1.016	0.153	21.5%
17S1	0.925	0.927	0.929	0.073	0.997	0.079	10.1%
17S2	0.914	0.926	0.915	0.074	0.999	0.080	11.0%
17T1	0.911	0.915	0.893	0.122	1.021	0.134	17.7%
17U1	0.946	0.940	0.945	0.099	1.000	0.105	13.7%
17U2	0.963	0.950	0.960	0.087	1.003	0.091	12.9%
17U3	0.945	0.942	0.944	0.055	1.000	0.059	7.3%
17Y1	0.980	0.957	0.980	0.108	0.999	0.113	14.5%
17Z1	0.945	0.938	0.936	0.108	1.010	0.116	15.0%
17ZS	0.946	0.931	0.943	0.101	1.003	0.108	15.3%
18L1	0.926	0.933	0.921	0.118	1.005	0.127	15.7%
18N1	0.949	0.934	0.958	0.107	0.990	0.115	16.5%
18P1	0.945	0.939	0.938	0.069	1.008	0.074	9.4%
18Q1	0.943	0.944	0.942	0.045	1.000	0.048	5.9%
18R1	0.983	0.954	0.978	0.098	1.006	0.102	14.4%
18S1	0.970	0.955	0.966	0.105	1.005	0.110	15.5%
18U2	0.952	0.951	0.952	0.030	1.000	0.032	3.9%
18U3	0.916	0.905	0.916	0.048	1.000	0.053	6.9%
18U4	0.922	0.955	0.914	0.067	1.009	0.070	16.5%
18W1	0.937	0.907	0.931	0.123	1.006	0.136	18.7%
18YS	0.968	0.963	0.942	0.137	1.028	0.142	16.9%
19H1	0.932	0.898	0.924	0.180	1.008	0.200	29.0%
19P1	0.906	0.910	0.907	0.055	0.999	0.060	7.8%
19P2	0.966	0.948	0.963	0.074	1.003	0.078	10.8%
19Q1	0.972	0.949	0.972	0.078	1.000	0.082	11.5%
19Q2	0.977	0.960	0.967	0.088	1.010	0.092	14.5%
19Q3	0.950	0.950	0.947	0.065	1.003	0.069	9.1%
19R2	0.940	0.957	0.949	0.075	0.991	0.078	9.5%
19R3	0.961	0.956	0.957	0.080	1.004	0.084	12.4%
19R4	0.930	0.948	0.911	0.120	1.021	0.126	19.7%
19W1	0.932	0.930	0.939	0.087	0.993	0.094	11.9%
19Z1	0.942	0.938	0.944	0.096	0.998	0.102	13.9%
20P2	0.945	0.951	0.944	0.061	1.001	0.064	8.2%
20P3	0.951	0.966	0.957	0.092	0.993	0.095	11.6%
20Q1	0.930	0.966	0.933	0.121	0.997	0.125	18.1%
20R1	0.956	0.947	0.955	0.066	1.001	0.070	9.1%
20S1	0.952	0.953	0.955	0.084	0.997	0.088	11.2%

Group	Mean	Median	Weighted Mean	Average Absolute Deviation	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
20T1	0.959	0.952	0.958	0.066	1.001	0.070	9.3%
20U1	0.970	0.944	0.958	0.101	1.012	0.107	15.9%
20V1	0.937	0.946	0.937	0.079	1.000	0.084	10.6%
20V2	0.940	0.947	0.948	0.056	0.991	0.059	7.7%
20W1	0.961	0.943	0.970	0.105	0.990	0.111	15.4%
20W2	0.969	0.968	0.972	0.083	0.997	0.086	11.1%
20ZS	0.984	0.950	1.007	0.114	0.977	0.120	16.0%
21H2	1.013	0.971	1.013	0.159	1.000	0.164	23.3%
21O1	0.929	0.933	0.930	0.087	0.999	0.093	12.2%
21Q3	0.944	0.955	0.943	0.057	1.002	0.060	7.3%
21R1	0.958	0.967	0.938	0.129	1.022	0.134	18.2%
21R2	0.964	0.958	0.960	0.069	1.004	0.072	9.6%
21S1	0.946	0.951	0.950	0.070	0.996	0.074	9.4%
21T1	0.951	0.946	0.948	0.077	1.003	0.082	11.4%
21T2	0.962	0.951	0.957	0.079	1.006	0.083	11.1%
21T4	0.944	0.933	0.940	0.093	1.005	0.099	13.5%
22N1	0.901	0.905	0.909	0.097	0.990	0.107	14.6%
22Q1	0.942	0.926	0.935	0.080	1.007	0.086	12.2%
22Q2	0.956	0.950	0.957	0.066	0.999	0.070	10.7%
22T1	0.965	0.955	0.959	0.092	1.006	0.096	13.5%
22T2	0.970	0.958	0.960	0.116	1.011	0.122	16.4%
22T3	0.957	0.948	0.954	0.058	1.003	0.061	8.9%
23T1	0.977	0.910	0.926	0.139	1.055	0.152	23.1%
23T2	0.952	0.944	0.946	0.080	1.006	0.084	10.7%
23U1	0.939	0.933	0.939	0.054	1.000	0.058	7.1%
23W1	0.938	0.933	0.940	0.074	0.998	0.079	11.2%
24I1	0.989	0.956	0.979	0.121	1.009	0.126	17.4%
24P1	0.940	0.933	0.942	0.090	0.998	0.097	15.4%
24Q1	0.942	0.939	0.937	0.092	1.005	0.098	14.3%
24Q2	0.995	0.972	0.996	0.137	1.000	0.141	20.1%
25I1	1.003	0.962	1.015	0.160	0.989	0.167	20.6%
25I2	0.951	0.951	0.952	0.061	0.999	0.064	8.2%
25J1	0.932	0.934	0.913	0.135	1.020	0.145	22.3%
25S1	0.961	0.942	0.980	0.120	0.980	0.128	18.7%
27H1	0.965	0.975	0.955	0.109	1.010	0.112	17.9%
27J1	0.952	0.934	0.921	0.114	1.033	0.122	19.6%
28F1	1.038	0.956	0.962	0.176	1.078	0.184	29.5%
28M1	0.984	0.995	0.978	0.111	1.006	0.112	14.3%
28N1	0.957	0.900	0.915	0.121	1.046	0.135	20.3%
29I1	0.958	0.941	0.939	0.106	1.020	0.113	16.8%

Group	Mean	Median	Weighted Mean	Average Absolute Deviation	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
29K1	0.997	0.973	1.000	0.118	0.997	0.122	15.6%
29M1	1.003	0.986	1.003	0.153	1.001	0.155	20.5%
29M2	0.919	0.912	0.920	0.061	0.999	0.067	9.2%
29N1	0.976	0.966	0.971	0.083	1.005	0.086	11.6%
29N2	0.949	0.954	0.948	0.022	1.001	0.023	3.8%
30G1	0.977	0.944	0.979	0.169	0.998	0.179	22.2%
30G2	0.963	0.958	0.970	0.109	0.992	0.114	14.3%
30N1	0.966	0.962	0.964	0.119	1.001	0.123	16.8%
31K1	0.934	0.915	0.927	0.097	1.007	0.107	17.2%
32E1	0.991	0.931	0.941	0.196	1.053	0.211	26.8%
32I1	0.956	0.933	0.939	0.098	1.019	0.105	15.7%
34F1	1.026	0.962	0.951	0.180	1.079	0.187	28.2%
35E1	0.972	0.956	0.950	0.129	1.024	0.135	19.4%
DGBA	0.952	0.948	0.957	0.066	0.994	0.069	9.8%
DHBA	0.979	0.946	0.975	0.060	1.005	0.063	9.4%
DHBB	0.912	0.913	0.909	0.082	1.003	0.090	12.7%
DHBC	0.965	0.954	0.963	0.058	1.002	0.061	9.8%
DHBD	0.950	0.949	0.951	0.052	0.999	0.055	6.6%
DHBE	0.939	0.941	0.938	0.093	1.000	0.099	13.2%
DHBF	0.963	0.949	0.963	0.050	1.000	0.053	8.0%
DUNA	0.858	0.923	0.867	0.130	0.990	0.141	26.3%
FD1A	0.961	0.950	0.961	0.076	1.000	0.080	10.4%
FD1B	0.953	0.949	0.949	0.053	1.004	0.055	7.2%
FD4A	0.962	0.950	0.961	0.053	1.002	0.056	8.2%
FD4B	0.968	0.957	0.966	0.071	1.001	0.074	10.4%
FDRA	0.949	0.951	0.948	0.051	1.001	0.054	7.0%
FDWA	0.946	0.951	0.944	0.062	1.002	0.065	8.3%
FDWB	0.943	0.944	0.940	0.072	1.003	0.077	9.7%
FFHA	0.952	0.949	0.952	0.039	1.000	0.041	5.2%
FFHB	0.940	0.953	0.944	0.059	0.996	0.062	8.1%
FFKA	0.948	0.943	0.942	0.055	1.006	0.058	7.2%
FFKB	0.953	0.955	0.952	0.052	1.001	0.054	6.6%
FFMA	0.938	0.948	0.944	0.084	0.993	0.089	14.4%
FFWA	0.933	0.941	0.935	0.063	0.997	0.067	8.9%
FFWB	0.942	0.937	0.933	0.085	1.010	0.090	13.2%
FFWC	0.943	0.949	0.943	0.042	0.999	0.045	5.4%
FFXA	0.961	0.943	0.961	0.037	0.999	0.039	7.2%
FFXB	0.955	0.951	0.953	0.048	1.002	0.051	6.4%
HTW1	0.977	0.957	0.976	0.074	1.001	0.078	10.7%
HTW2	0.915	0.908	0.921	0.072	0.993	0.079	9.8%

Group	Mean	Median	Weighted Mean	Average Absolute Deviation	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
HTW3	0.979	0.965	0.983	0.129	0.996	0.134	17.0%
LXQA	0.967	0.956	0.969	0.092	0.999	0.096	12.6%
LXQB	0.947	0.953	0.951	0.059	0.996	0.062	8.5%
LXWA	0.959	0.952	0.958	0.074	1.000	0.077	11.9%
LXWB	0.961	0.954	0.957	0.081	1.004	0.085	11.3%
LXWC	0.933	0.930	0.934	0.060	0.998	0.065	8.6%
LXWD	0.920	0.926	0.923	0.050	0.997	0.054	6.8%
LXWE	0.957	0.954	0.959	0.055	0.998	0.057	7.2%
NDAA	0.949	0.950	0.949	0.050	1.000	0.052	6.7%
NDAB	0.953	0.954	0.951	0.046	1.003	0.048	6.1%
NDFA	0.946	0.949	0.944	0.054	1.003	0.057	7.1%
NDFB	0.955	0.950	0.951	0.048	1.004	0.050	7.5%
NDFC	0.950	0.949	0.949	0.036	1.001	0.038	4.8%
NDUA	0.953	0.952	0.954	0.040	0.998	0.042	5.3%
NDWA	0.954	0.950	0.954	0.045	1.000	0.047	6.6%
NDWB	0.963	0.952	0.964	0.056	0.998	0.058	7.7%
NDWC	0.967	0.956	0.963	0.063	1.004	0.066	8.4%
NDXA	0.950	0.941	0.948	0.053	1.002	0.056	7.4%
OCUA	0.960	0.941	0.955	0.093	1.006	0.098	13.3%
OD1A	0.949	0.940	0.946	0.100	1.003	0.106	14.4%
ODEA	0.951	0.948	0.952	0.049	0.999	0.051	6.4%
ODWA	0.938	0.936	0.942	0.054	0.997	0.057	7.2%
ODXA	0.948	0.935	0.946	0.060	1.002	0.064	8.9%
OFFA	0.946	0.936	0.946	0.064	1.000	0.069	10.2%
OFNA	0.978	0.964	0.977	0.044	1.000	0.046	6.1%
OFUA	0.956	0.953	0.954	0.051	1.002	0.054	6.7%
T14A	0.889	0.922	0.879	0.121	1.011	0.131	17.9%
TDFA	0.942	0.950	0.942	0.039	1.000	0.041	5.5%
TDFB	0.955	0.950	0.954	0.032	1.001	0.034	4.8%
TDKA	0.919	0.933	0.920	0.064	0.999	0.069	8.8%
TDTA	0.932	0.939	0.930	0.065	1.002	0.069	9.1%
TEAA	0.962	0.951	0.961	0.043	1.001	0.045	6.0%
TFFA	0.875	0.913	0.881	0.106	0.994	0.116	15.2%
TFWA	0.958	0.950	0.954	0.056	1.004	0.058	7.7%
TFZA	0.941	0.947	0.936	0.065	1.004	0.068	9.2%
THUA	0.928	0.932	0.925	0.059	1.003	0.063	7.9%
THUB	0.936	0.926	0.934	0.045	1.002	0.048	7.5%
THUC	0.947	0.949	0.945	0.059	1.002	0.062	8.1%
TJ2A	0.959	0.950	0.958	0.021	1.001	0.022	4.1%
Overall	0.946	0.940	0.943	0.090	1.003	0.096	14.1%

CONDOMINIUMS

Group	Mean	Median	Weighted Mean	Average Absolute Deviation	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
CN01	0.942	0.931	0.927	0.079	1.016	0.085	12.6%
CN02	0.906	0.946	0.889	0.080	1.018	0.085	13.6%
CN03	0.904	0.919	0.897	0.079	1.008	0.086	10.1%
CN04	1.007	0.974	0.984	0.117	1.023	0.120	17.0%
CN05	0.973	0.950	0.941	0.113	1.033	0.119	16.5%
CN06	0.950	0.952	0.942	0.067	1.008	0.071	9.8%
CN07	0.945	0.942	0.935	0.072	1.010	0.077	11.2%
CN08	0.900	0.901	0.894	0.069	1.008	0.077	11.6%
CN09	0.965	0.950	0.961	0.046	1.005	0.048	7.9%
CN10	0.905	0.925	0.904	0.047	1.002	0.051	6.7%
CN11	0.961	0.938	0.946	0.090	1.015	0.096	12.6%
CN12	0.945	0.932	0.939	0.061	1.006	0.065	8.3%
CN13	0.892	0.924	0.820	0.131	1.088	0.142	23.2%
CN14	0.892	0.899	0.846	0.174	1.054	0.194	23.7%
CN15	0.961	0.956	0.959	0.035	1.002	0.036	5.2%
CN16	0.986	0.950	0.978	0.048	1.008	0.050	10.1%
CN17	0.889	0.896	0.889	0.006	1.000	0.007	1.5%
CN18	0.889	0.933	0.851	0.117	1.044	0.125	20.9%
CN19	1.002	0.949	0.971	0.115	1.031	0.122	20.9%
CN20	0.938	0.950	0.934	0.044	1.004	0.046	7.2%
CN21	1.000	0.951	0.978	0.122	1.022	0.128	16.8%
CN22	0.957	0.950	0.954	0.059	1.002	0.063	8.9%
CN23	0.948	0.948	0.947	0.028	1.001	0.029	3.6%
CN24	0.945	0.950	0.943	0.061	1.002	0.064	8.3%
CN25	0.972	0.962	0.946	0.129	1.028	0.134	17.6%
CN27	0.870	0.843	0.862	0.077	1.010	0.092	12.2%
CN28	0.967	0.953	0.964	0.045	1.003	0.047	7.0%
CN29	0.992	0.943	0.933	0.152	1.063	0.161	24.6%
CN30	0.936	0.949	0.924	0.082	1.012	0.087	12.5%
CN31	0.979	0.950	0.967	0.083	1.012	0.087	13.6%
CN32	0.950	0.930	0.945	0.063	1.006	0.068	9.2%
CN33	0.976	0.956	0.959	0.091	1.018	0.095	14.6%
CN34	0.953	0.933	0.941	0.095	1.014	0.101	12.6%
CN35	0.963	0.949	0.960	0.046	1.003	0.049	7.3%
Overall	0.945	0.944	0.931	0.089	1.016	0.094	13.9%

CN26 – no valid sales

MANUFACTURED HOMES ON LAND

Group	Mean	Median	Weighted Mean	Average Absolute Deviation	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
01	0.799	0.799	0.791	0.048	1.010	0.060	8.5%
03	0.955	0.974	0.926	0.163	1.031	0.168	21.2%
04	0.943	0.950	0.917	0.197	1.028	0.207	27.1%
05	0.911	0.959	0.914	0.119	0.997	0.124	16.3%
06	0.905	0.923	0.883	0.172	1.025	0.187	27.1%
07	0.912	0.917	0.935	0.159	0.975	0.173	23.8%
08	0.871	0.905	0.857	0.168	1.016	0.185	25.0%
09	0.903	0.903	0.890	0.164	1.015	0.181	24.9%
10	0.945	0.932	0.916	0.182	1.031	0.195	26.8%
11	0.925	0.909	0.894	0.167	1.034	0.184	26.1%
14	0.910	0.907	0.897	0.110	1.014	0.122	16.6%
16	1.000	1.016	0.992	0.145	1.008	0.143	18.4%
17	0.934	0.941	0.901	0.158	1.037	0.168	23.2%
Overall	0.929	0.923	0.905	0.171	1.026	0.186	25.5%

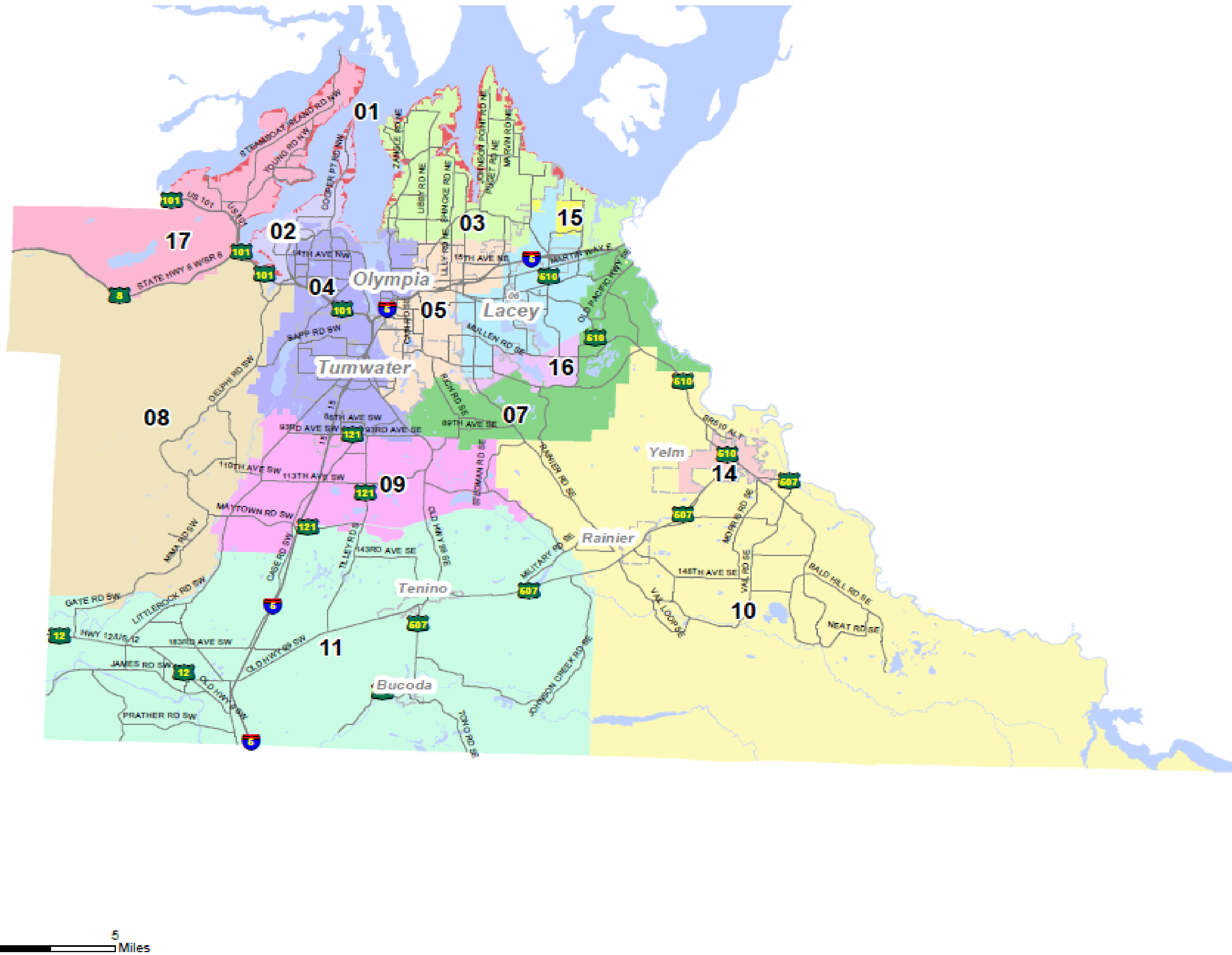
Region 02 – no valid sales

MANUFACTURED HOMES IN PARKS

Group	Mean	Median	Weighted Mean	Average Absolute Deviation	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation Median Centered
MHPR	0.726	0.684	0.575	0.260	1.261	0.380	44.7%
MRAV	0.949	0.916	0.856	0.264	1.109	0.288	37.8%
MRFR	0.891	0.918	0.824	0.243	1.081	0.265	34.3%
MRGD	1.046	0.939	0.926	0.240	1.129	0.255	41.1%
MUAV	0.990	0.938	0.907	0.257	1.091	0.274	35.9%
MUEX	0.983	0.940	0.936	0.158	1.050	0.168	23.6%
MUFR	0.998	0.896	0.870	0.332	1.147	0.371	48.3%
MUGD	1.044	1.034	1.013	0.141	1.031	0.137	18.0%
Overall	0.978	0.937	0.921	0.248	1.061	0.265	35.4%

THURSTON COUNTY

Residential Regions



Region

Region
01
02
03
04
05
06
07
08
09
10
11
14
15
16
17

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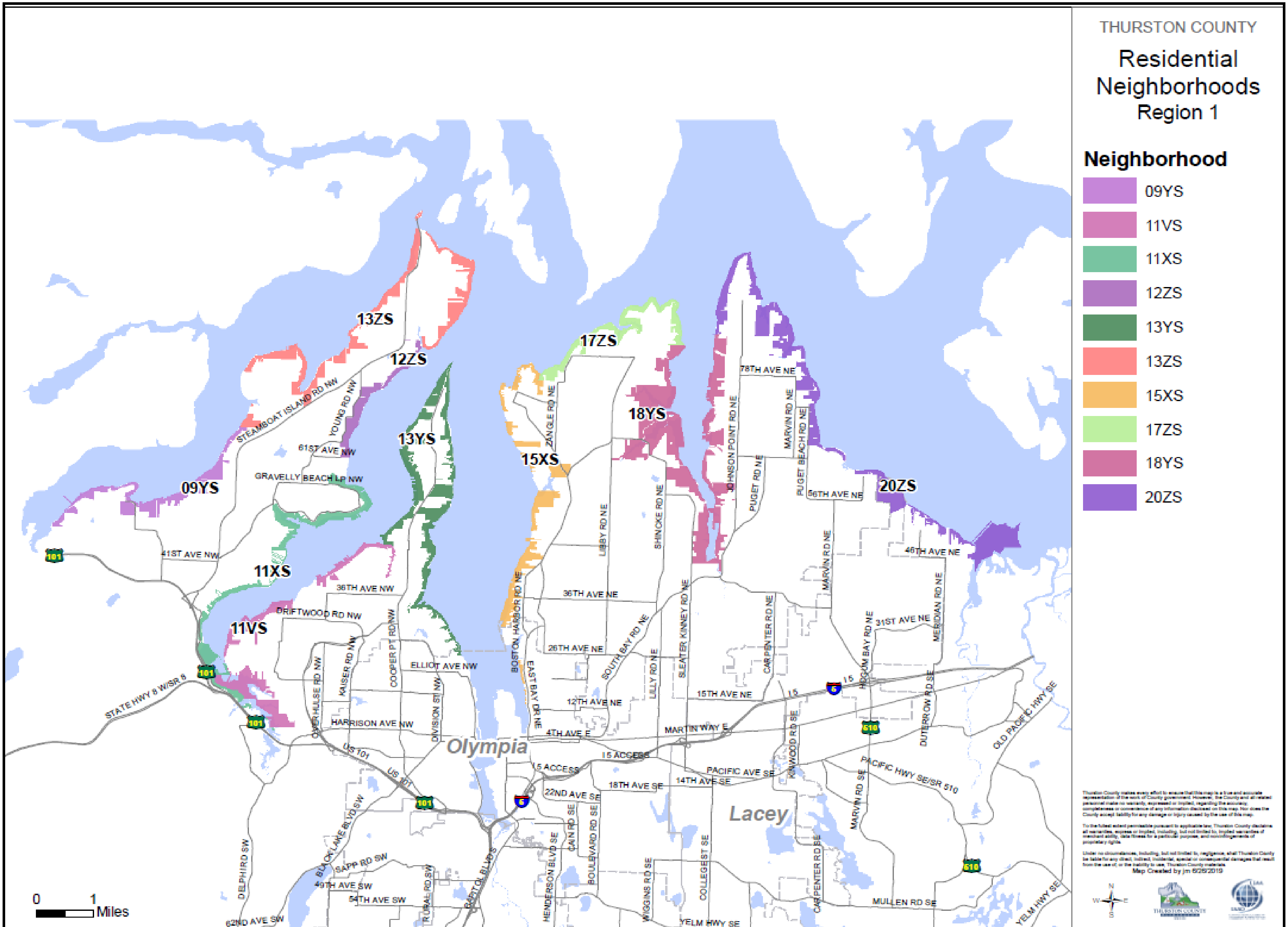
THURSTON COUNTY
Residential Neighborhoods
Region 1
Neighborhood
09YS
11VS
11XS
12ZS
13YS
13ZS
15XS
17ZS
18YS
20ZS
13ZS
12ZS
17ZS
18YS
13YS
15XS
09YS
20ZS
11XS
11VS
Olympia
Lacey
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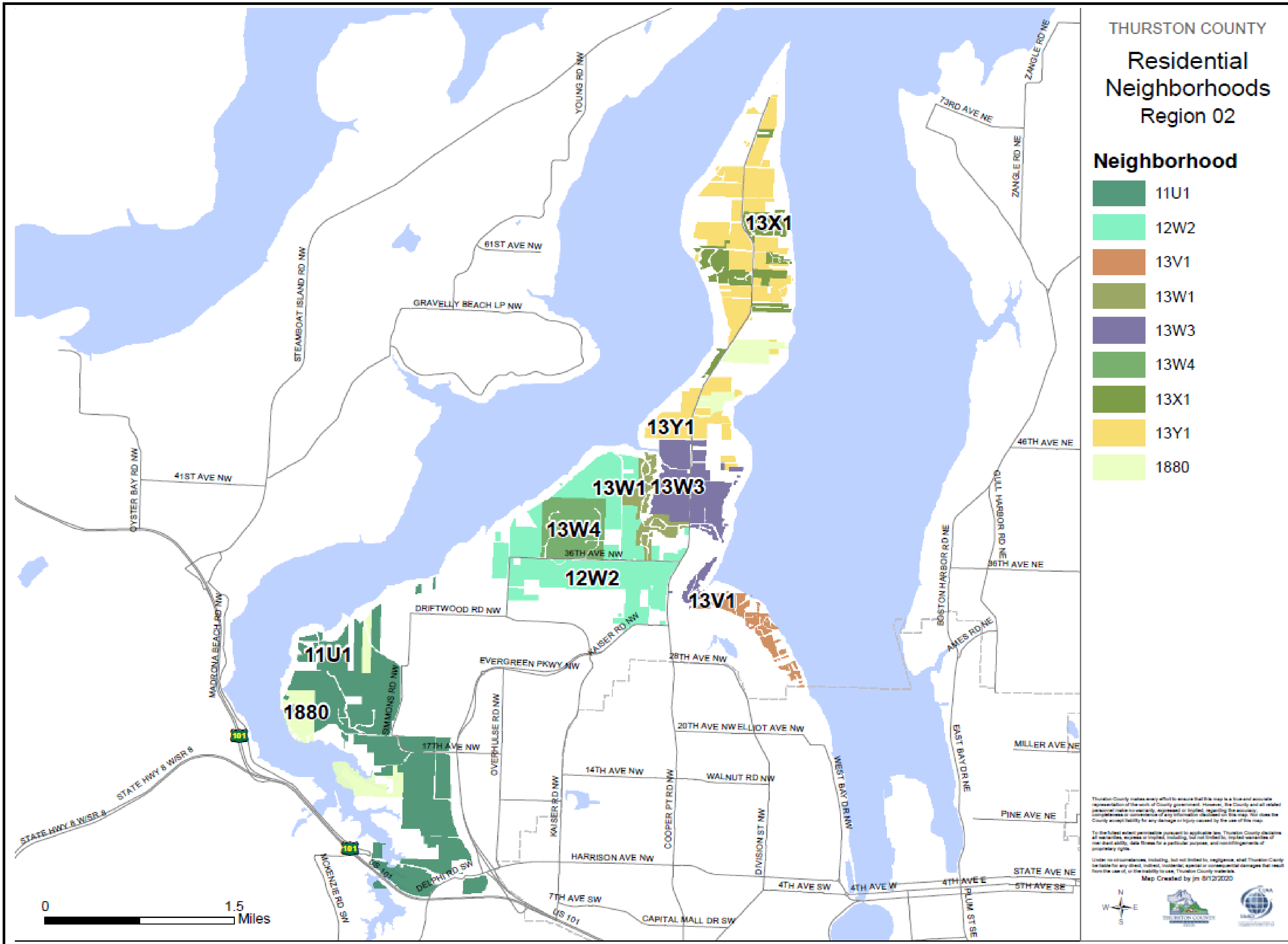
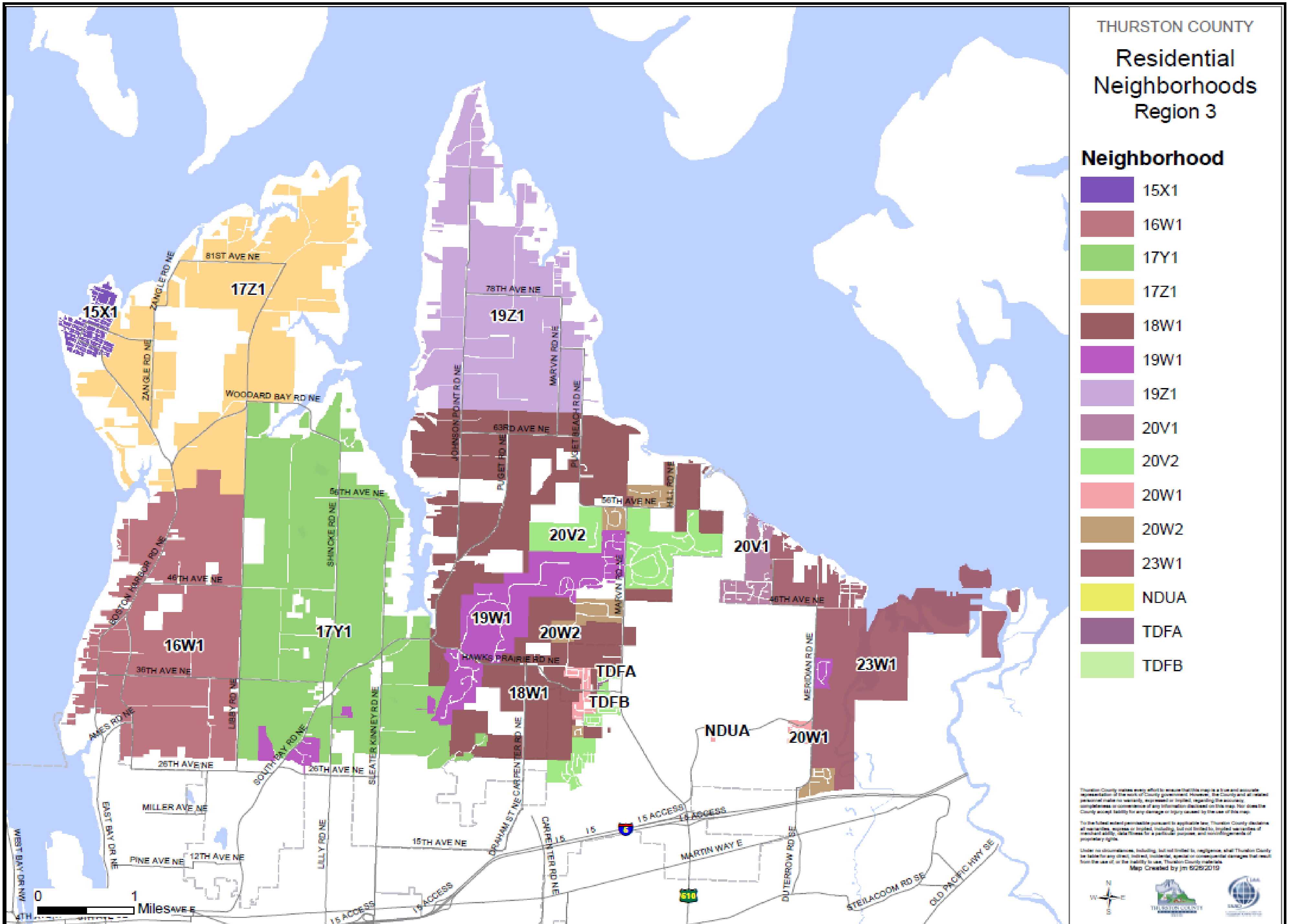
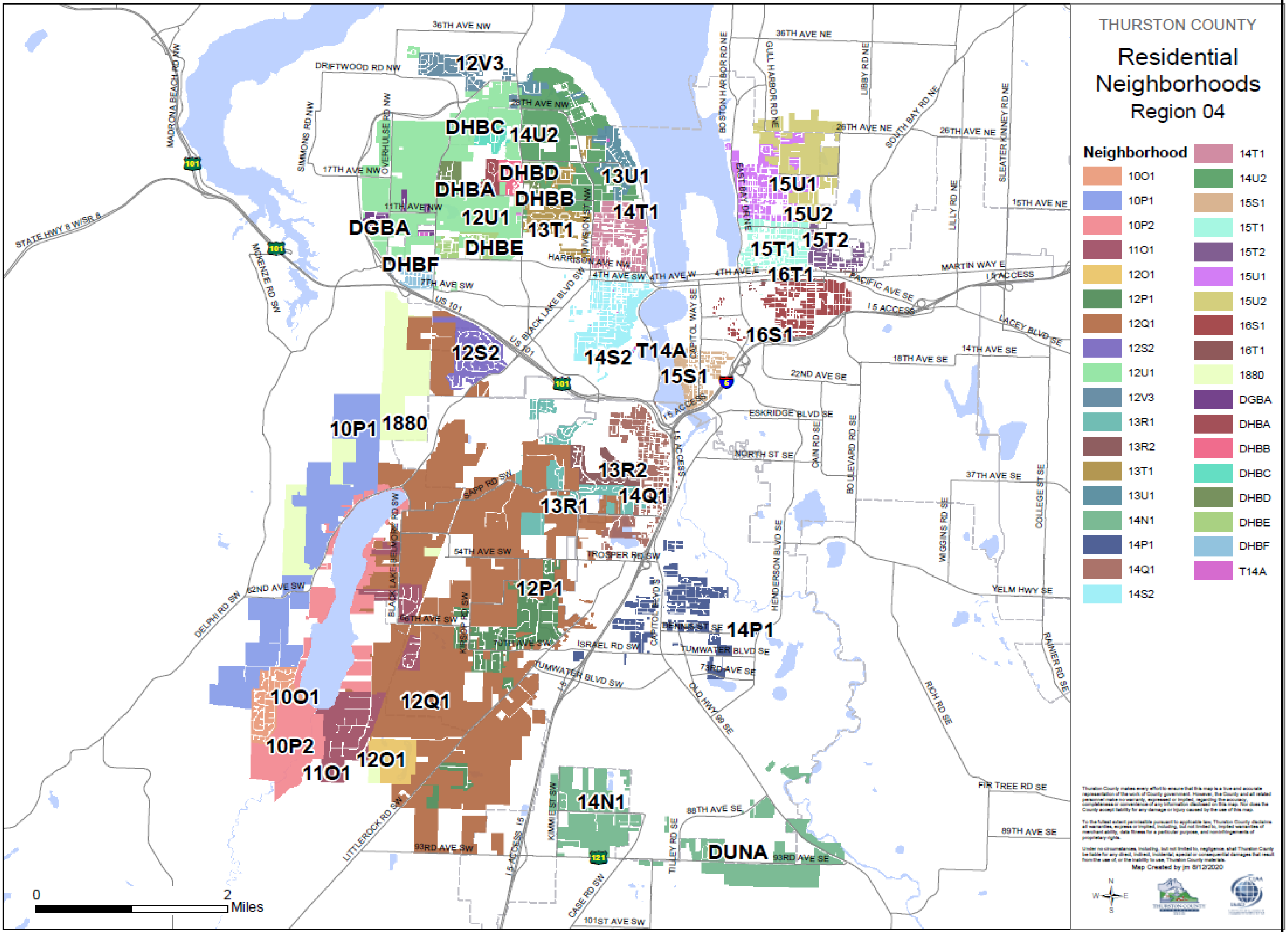
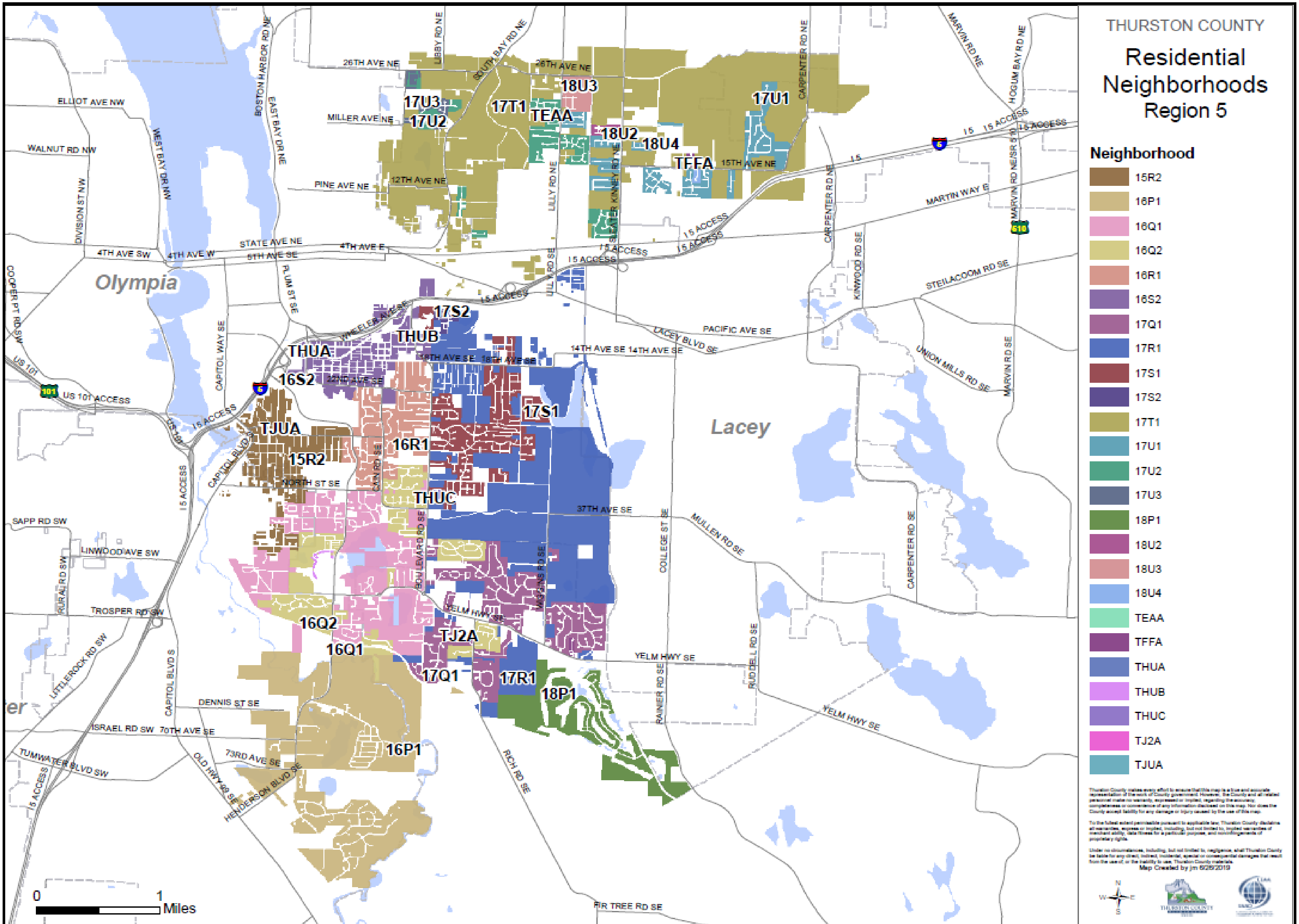

THURSTON COUNTY
Residential Neighborhoods Region 02
Neighborhood
11U1
12W2
13V1
13W1
13W3
13W4
13X1
13Y1
1880
13X1
13Y1
13W1
13W3
13W4
12W2
13V1
11U1
1880
ZANGLE RD NE
73RD AVE NE
YOUNG RD NW
61ST AVE NW
GRAVELLY BEACH LP NW
STEAMBOAT ISLAND RD NW
41ST AVE NW
OYSTER BAY RD NW
46TH AVE NE
GULL HARBOR RD NE
36TH AVE NW
36TH AVE NE
BOSTON HARBOR RD NE
AMES RD NE
DRIFTWOOD RD NW
KAISER RD NW
MADRONA BEACH RD NW
EVERGREEN PKWY NW
28TH AVE NW
SIMMONS RD NW
OVERHULSE RD NW
20TH AVE NW
ELLIOT AVE NW
17TH AVE NW
EAST BAY DR NE
MILLER AVE NE
STATE HWY 8 W/SR 8
14TH AVE NW
WALNUT RD NW
COOPER PT RD NW
WEST BAY DR NW
DIVISION ST NW
PINE AVE NE
HARRISON AVE NW
MCKENZIE RD SW
US 101
DELPHI RD SW
4TH AVE SW
4TH AVE W
4TH AVE E
STATE AVE NE
5TH AVE SE
7TH AVE SW
CAPITAL MALL DR SW
PLUM ST SE
0
1.5
Miles

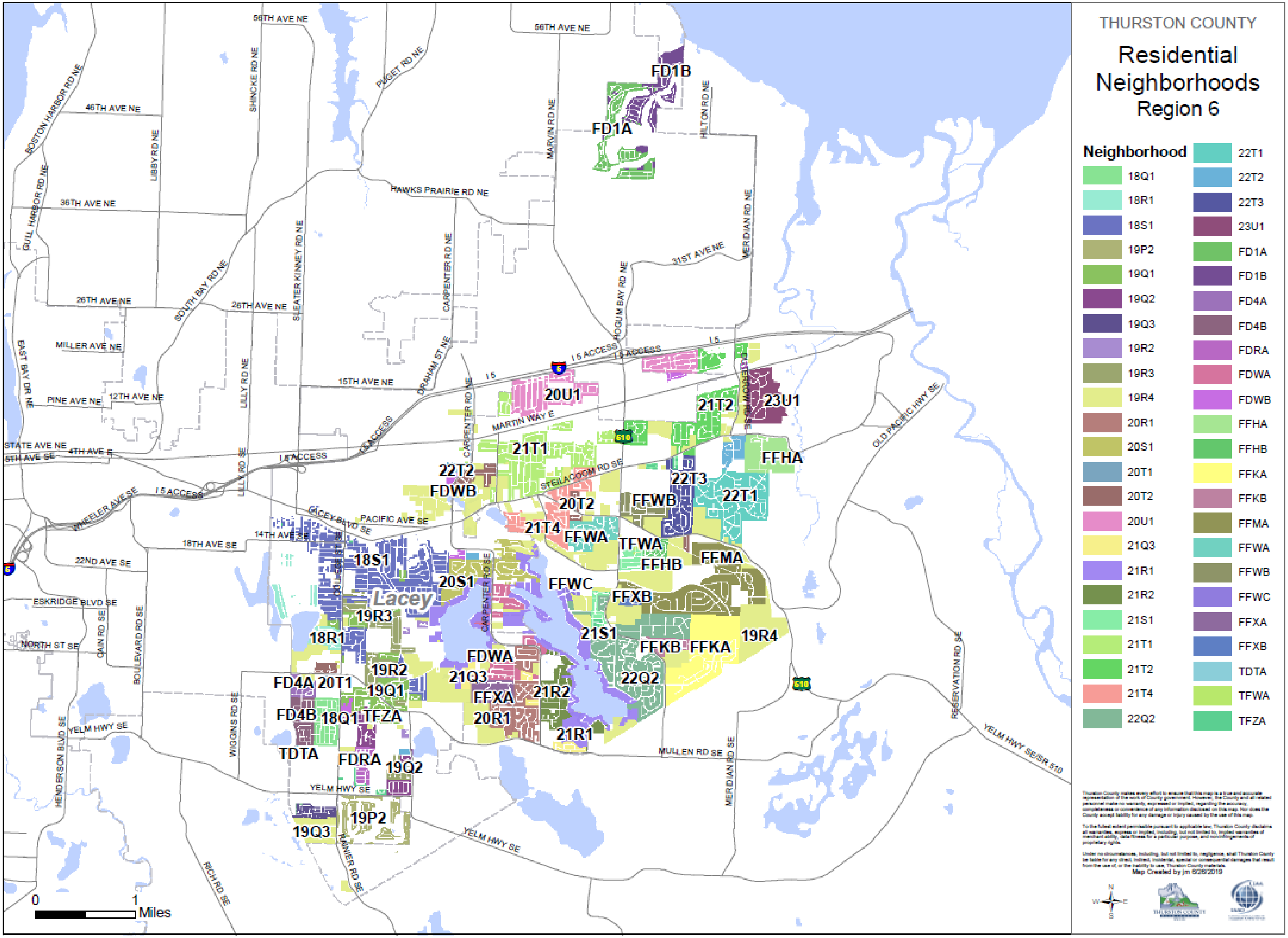


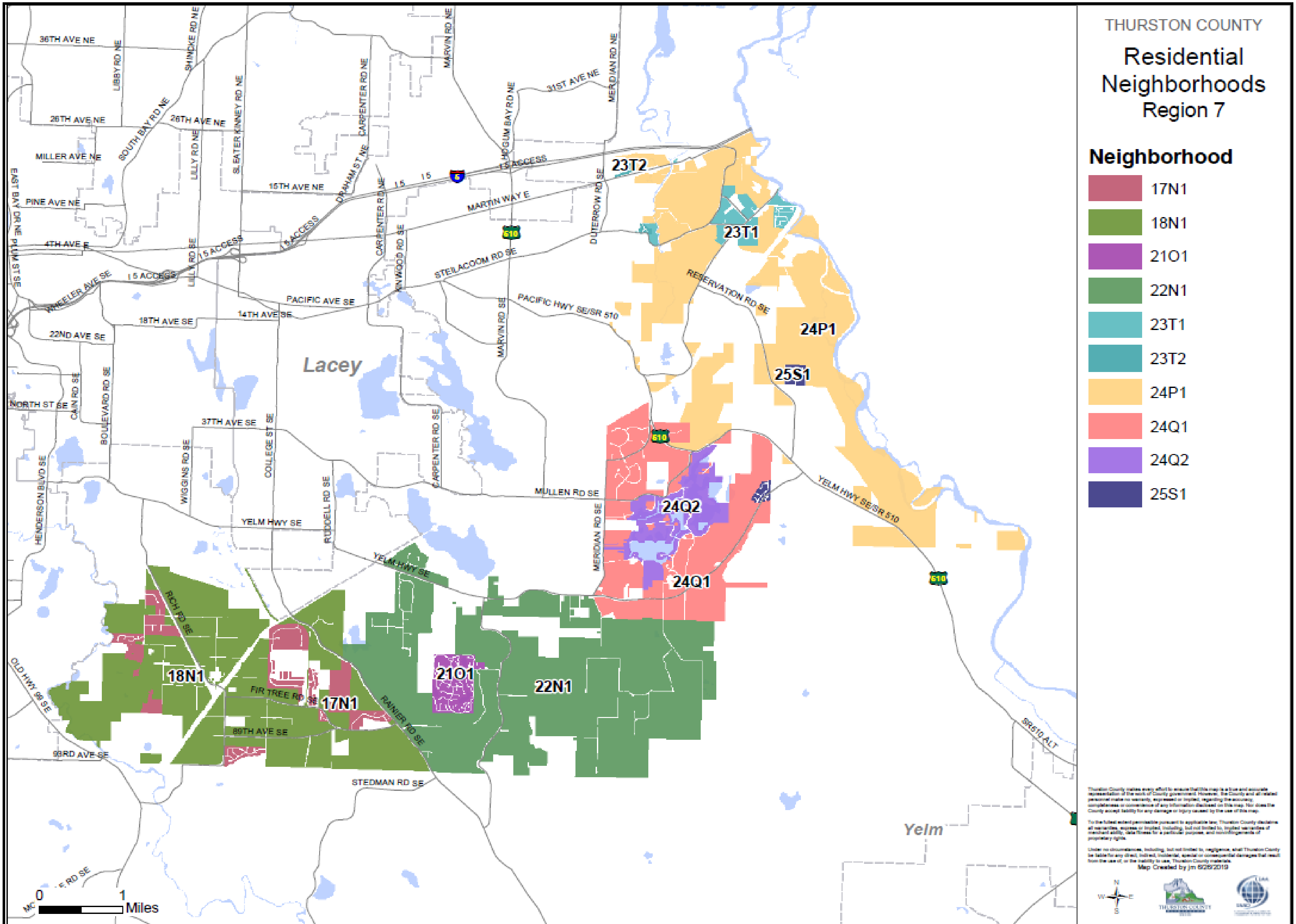
THURSTON COUNTY
Residential Neighborhoods
Region 3
Neighborhood
15X1
16W1
17Y1
17Z1
18W1
19W1
19Z1
20V1
20V2
20W1
20W2
23W1
NDUA
TDFA
TDFB
15X1
17Z1
19Z1
16W1
17Y1
19W1
20V2
20W2
20V1
18W1
TDFA
TDFB
NDUA
20W1
23W1
81ST AVE NE
ZANGLE RD NE
78TH AVE NE
MARVIN RD NE
WOODARD BAY RD NE
JOHNSON POINT RD NE
63RD AVE NE
PUGET RD NE
PUGET BEACH RD NE
56TH AVE NE
SHINCKE RD NE
HILL RD NE
BOSTON HARBOR RD NE
46TH AVE NE
48TH AVE NE
36TH AVE NE
HAWKS PRAIRIE RD NE
MERIDIAN RD NE
LIBBY RD NE
AMES RD NE
SOUTH BAY RD NE
SLEATER KINNEY RD NE
CARPENTER RD NE
26TH AVE NE
MILLER AVE NE
EAST BAY DR NE
15TH AVE NE
GRAHAM ST NE
MARTIN WAY E
PINE AVE NE
12TH AVE NE
LILLY RD NE
DUTERROW RD SE
STEILACOOM RD SE
OLD PACIFIC HWY SE
WEST BAY DR NW
I5 ACCESS
0
1
Miles



THURSTON COUNTY
Residential Neighborhoods Region 04
Neighborhood
10O1
10P1
10P2
11O1
12O1
12P1
12Q1
12S2
12U1
12V3
13R1
13R2
13T1
13U1
14N1
14P1
14Q1
14S2
14T1
14U2
15S1
15T1
15T2
15U1
15U2
16S1
16T1
1880
DGBA
DHBA
DHBB
DHBC
DHBD
DHBE
DHBF
T14A
DUNA
0
2
Miles

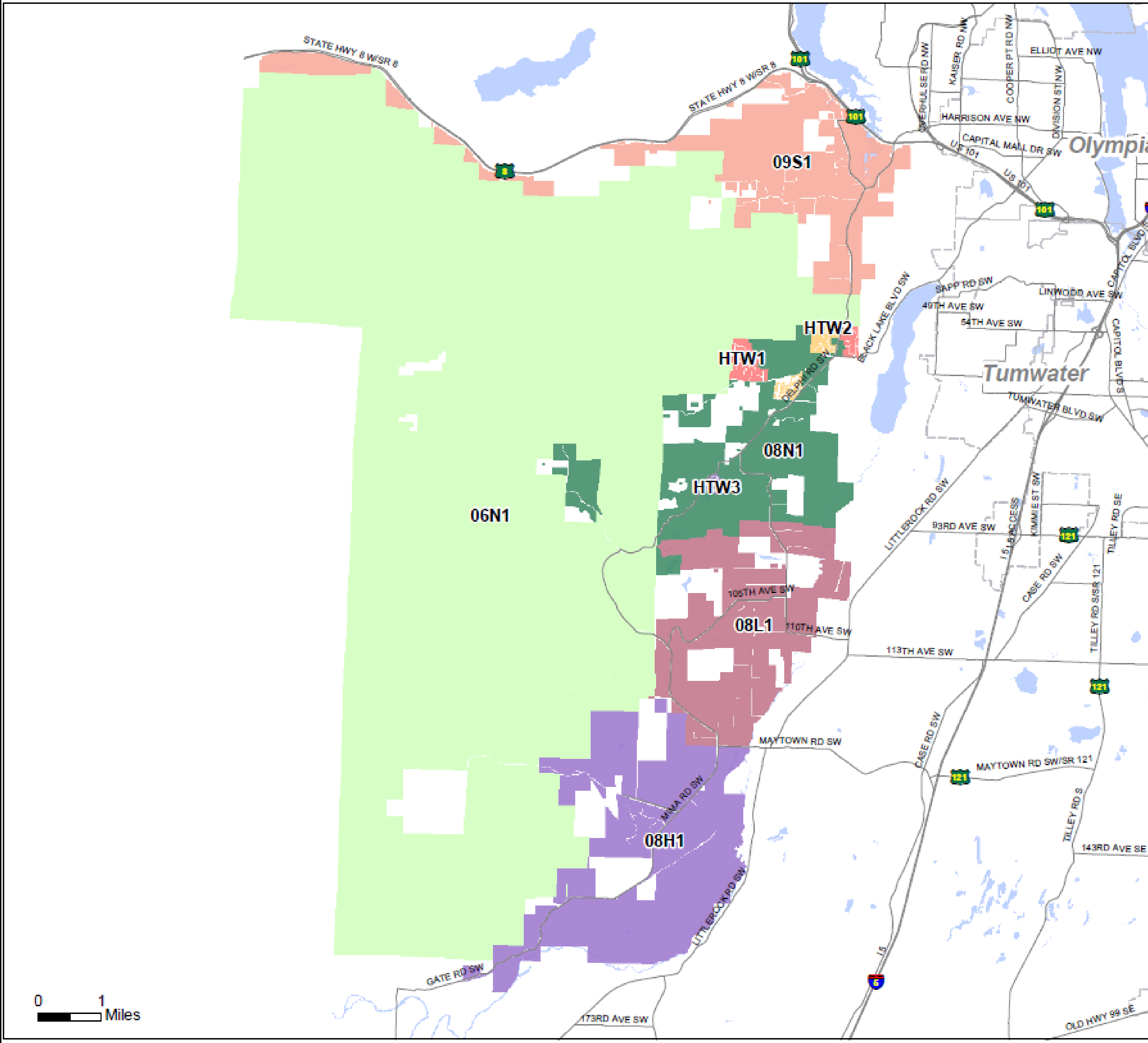

THURSTON COUNTY
Residential Neighborhoods
Region 5
Neighborhood
15R2
16P1
16Q1
16Q2
16R1
16S2
17Q1
17R1
17S1
17S2
17T1
17U1
17U2
17U3
18P1
18U2
18U3
18U4
TEAA
TFFA
THUA
THUB
THUC
TJ2A
TJUA
Olympia
Lacey
0
1
Miles


THURSTON COUNTY
Residential Neighborhoods Region 6
Neighborhood
18Q1
18R1
18S1
19P2
19Q1
19Q2
19Q3
19R2
19R3
19R4
20R1
20S1
20T1
20T2
20U1
21Q3
21R1
21R2
21S1
21T1
21T2
21T4
22Q2
22T1
22T2
22T3
23U1
FD1A
FD1B
FD4A
FD4B
FDRA
FDWA
FDWB
FFHA
FFHB
FFKA
FFKB
FFMA
FFWA
FFWB
FFWC
FFXA
FFXB
TDTA
TFWA
TFZA
Lacey
56TH AVE NE
46TH AVE NE
36TH AVE NE
26TH AVE NE
MILLER AVE NE
15TH AVE NE
PINE AVE NE
12TH AVE NE
STATE AVE NE
4TH AVE E
5TH AVE SE
HAWKS PRAIRIE RD NE
31ST AVE NE
MARTIN WAY E
STEILACOOM RD SE
PACIFIC AVE SE
LACEY BLVD SE
14TH AVE SE
18TH AVE SE
22ND AVE SE
ESKRIDGE BLVD SE
NORTH ST SE
YELM HWY SE
MULLEN RD SE
YELM HWY SE/SR 510
OLD PACIFIC HWY SE
RESERVATION RD SE
MERIDIAN RD SE
MERIDIAN RD NE
HILTON RD NE
MARVIN RD NE
PUGET RD NE
SHINCKE RD NE
LIBBY RD NE
BOSTON HARBOR RD NE
GULL HARBOR RD NE
EAST BAY DR NE
SOUTH BAY RD NE
SLEATER KINNEY RD NE
CARPENTER RD NE
CARPENTER RD SE
GRAHAM ST NE
LILLY RD NE
LILLY RD SE
WHEELER AVE SE
BOULEVARD RD SE
CAIN RD SE
HENDERSON BLVD SE
WIGGINS RD SE
RAINIER RD SE
RICH RD SE
I 5 ACCESS
I 5
0
1
Miles


THURSTON COUNTY
Residential Neighborhoods Region 7
Neighborhood
17N1
18N1
21O1
22N1
23T1
23T2
24P1
24Q1
24Q2
25S1
Lacey
Yelm
23T2
23T1
24P1
25S1
24Q2
24Q1
18N1
17N1
21O1
22N1
36TH AVE NE
26TH AVE NE
MILLER AVE NE
PINE AVE NE
4TH AVE E
15TH AVE NE
31ST AVE NE
MARTIN WAY E
STEILACOOM RD SE
PACIFIC AVE SE
PACIFIC HWY SE/SR 510
RESERVATION RD SE
14TH AVE SE
18TH AVE SE
22ND AVE SE
NORTH ST SE
37TH AVE SE
MULLEN RD SE
YELM HWY SE
YELM HWY SE/SR 510
FIR TREE RD SE
89TH AVE SE
93RD AVE SE
STEDMAN RD SE
RAINIER RD SE
RICH RD SE
OLD HWY 99 SE
SR510 ALT
MERIDIAN RD SE
MARVIN RD SE
CARPENTER RD SE
COLLEGE ST SE
RUDDELL RD SE
WIGGINS RD SE
BOULEVARD RD SE
HENDERSON BLVD SE
0
1
Miles

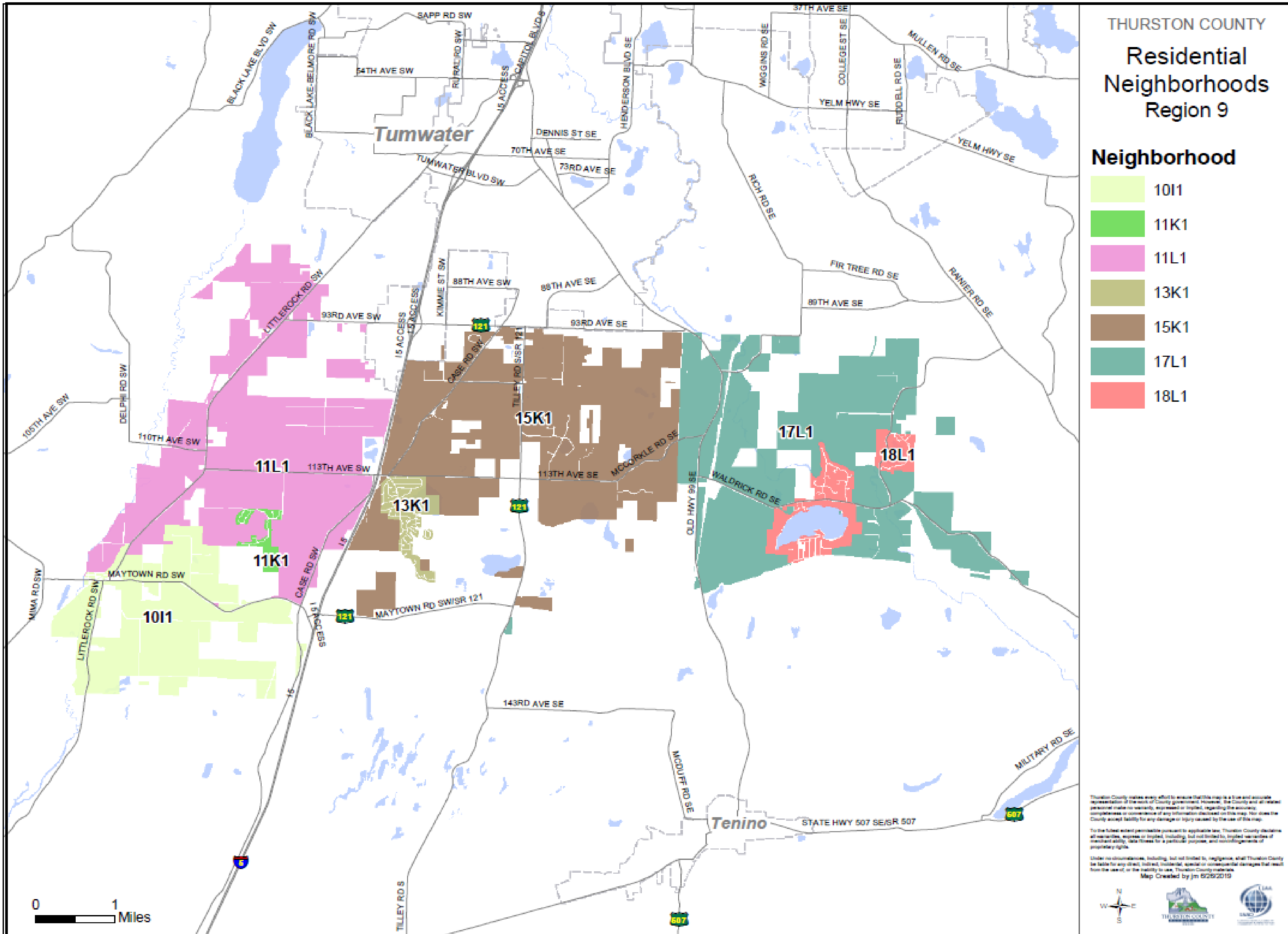
THURSTON COUNTY

Residential Neighborhoods Region 8

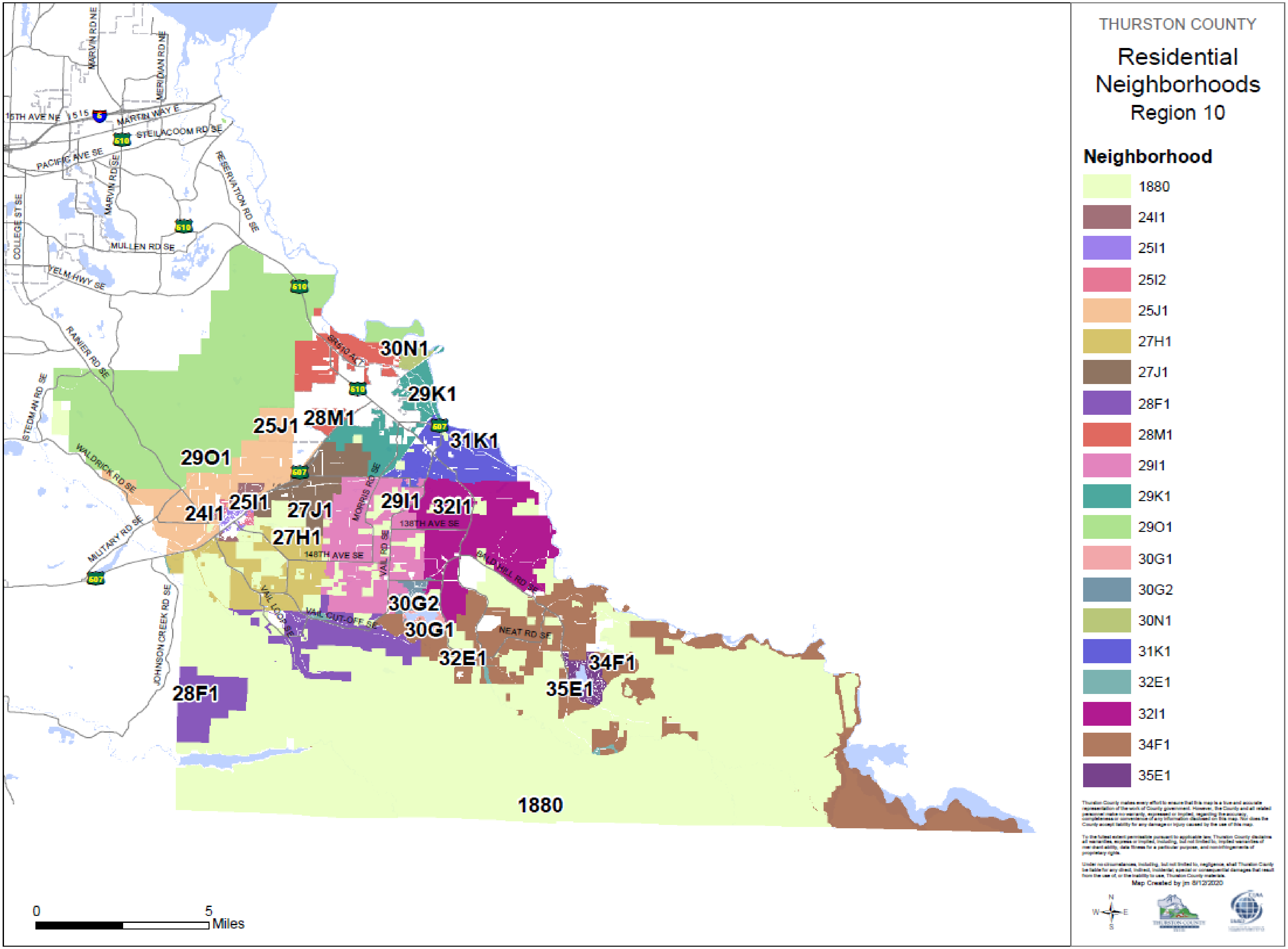


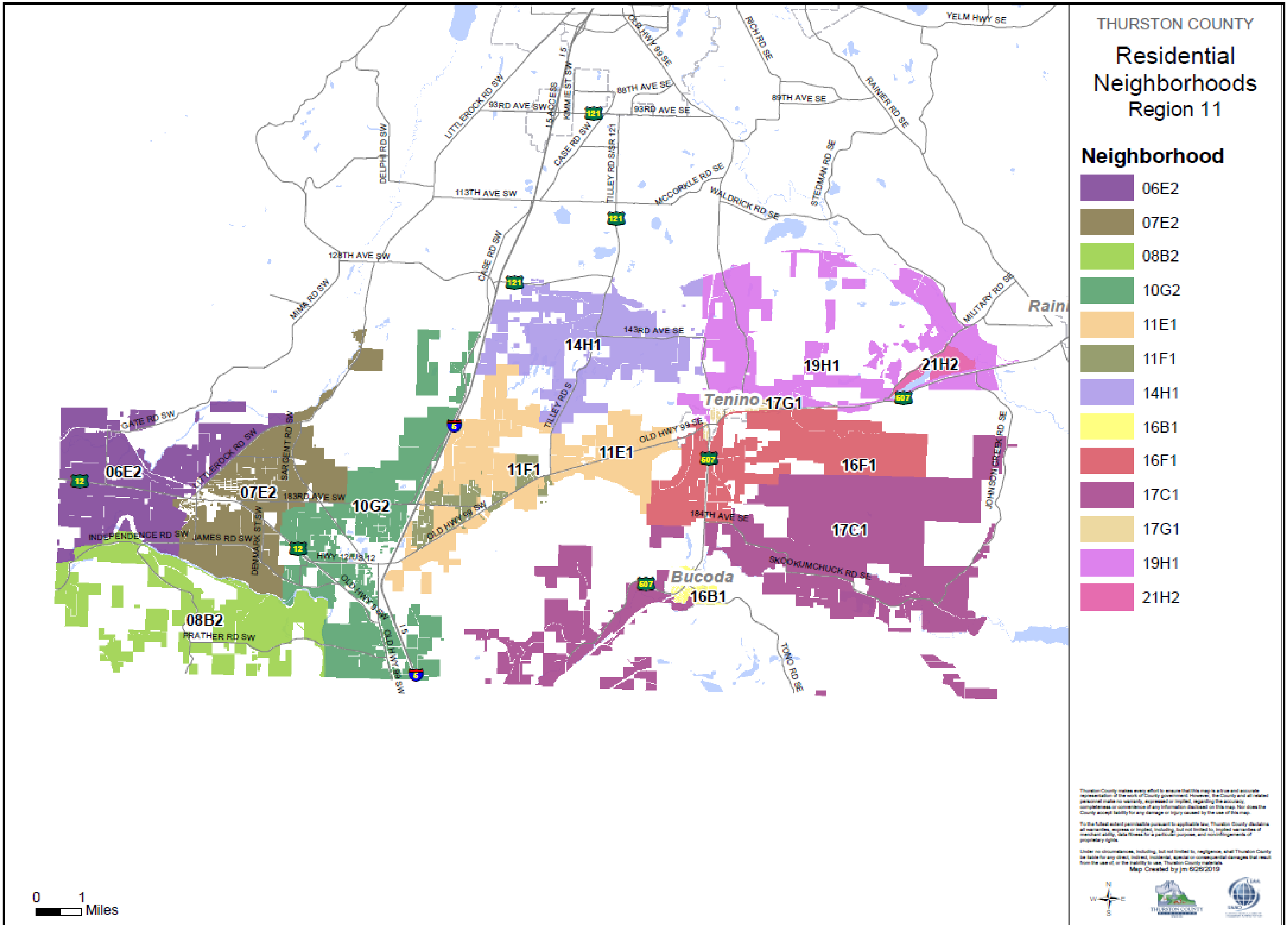
Neighborhood

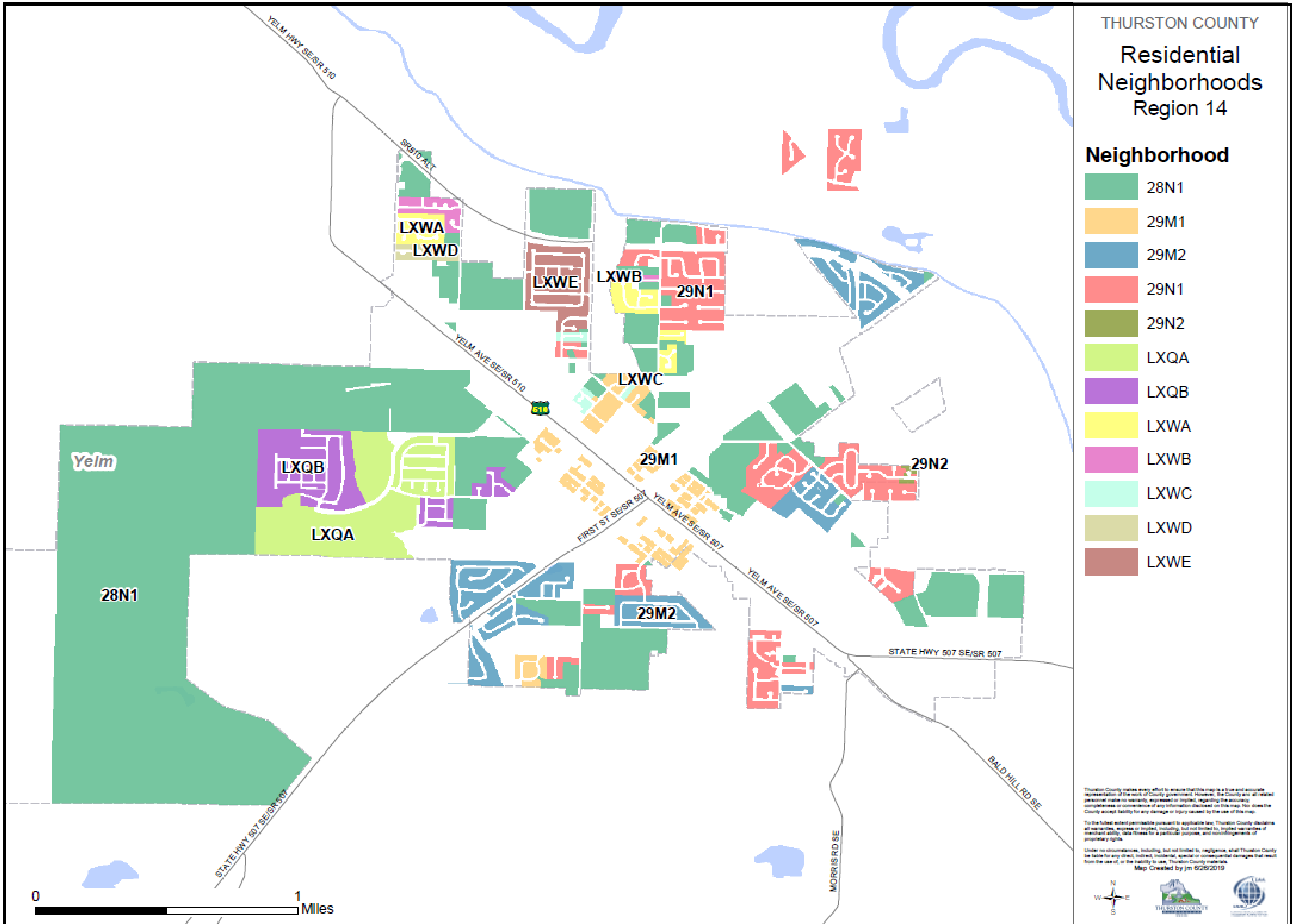
- 06N1
- 08H1
- 08L1
- 08N1
- 09S1
- HTW1
- HTW2
- HTW3



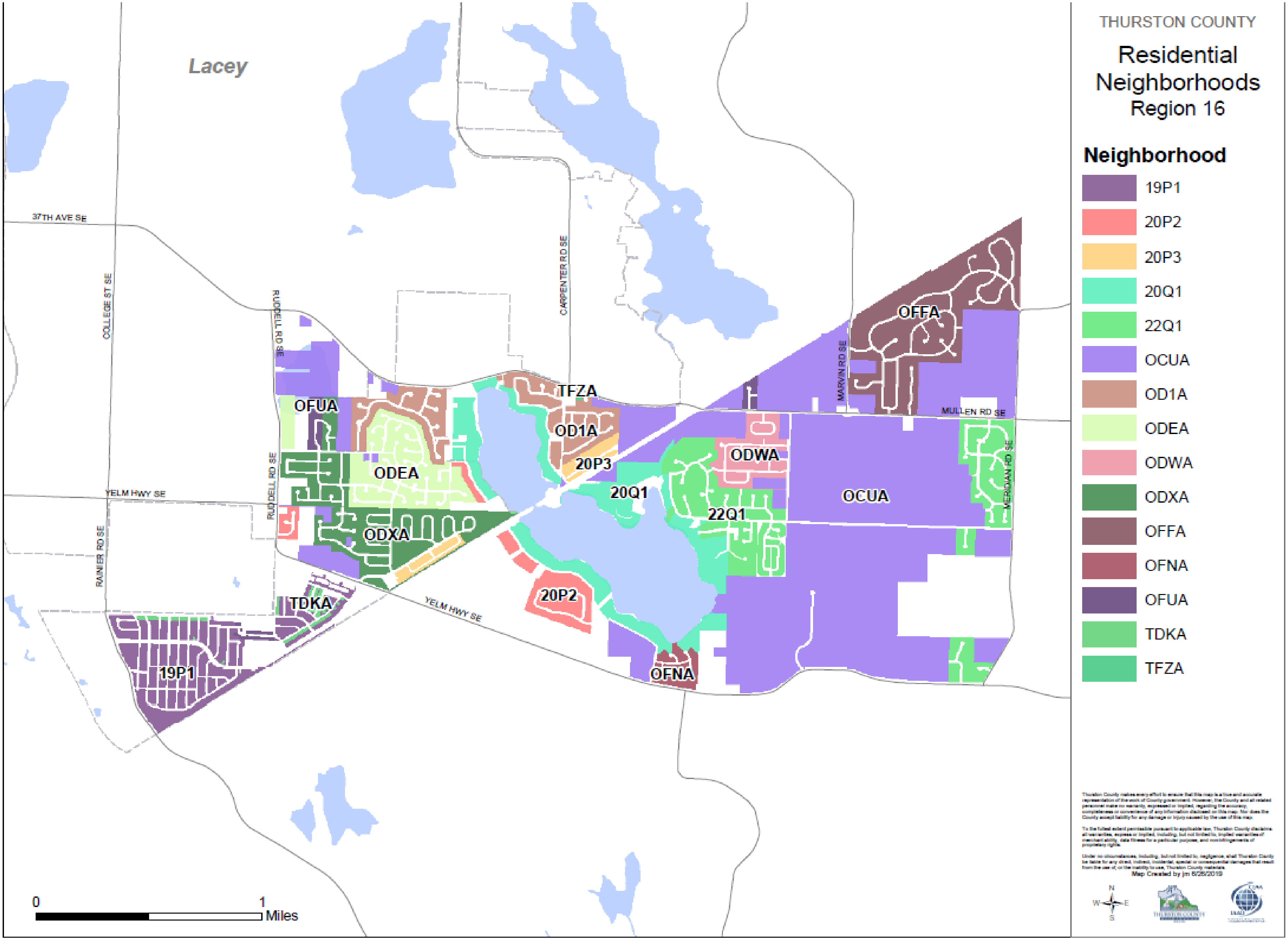
THURSTON COUNTY
Residential Neighborhoods Region 9
Neighborhood
10I1
11K1
11L1
13K1
15K1
17L1
18L1
Tumwater
Tenino
10I1
11K1
11L1
13K1
15K1
17L1
18L1
SAPP RD SW
54TH AVE SW
DENNIS ST SE
70TH AVE SE
73RD AVE SE
TUMWATER BLVD SW
YELM HWY SE
MULLEN RD SE
37TH AVE SE
WIGGINS RD SE
COLLEGE ST SE
RUDDELL RD SE
HENDERSON BLVD SE
CAPITOL BLVD S
BLACK LAKE BLVD SW
BLACK LAKE-BELMORE RD SW
RURAL RD SW
I 5 ACCESS
RICH RD SE
FIR TREE RD SE
89TH AVE SE
RANIER RD SE
88TH AVE SW
88TH AVE SE
93RD AVE SW
93RD AVE SE
KIMMIE ST SW
LITTLEROCK RD SW
105TH AVE SW
DELPHI RD SW
110TH AVE SW
113TH AVE SW
113TH AVE SE
CASE RD SW
TILLEY RD S/SR 121
MCCORKLE RD SE
OLD HWY 99 SE
WALDRICK RD SE
MAYTOWN RD SW
MAYTOWN RD SW/SR 121
MIMA RD SW
143RD AVE SE
MCDUFF RD SE
MILITARY RD SE
STATE HWY 507 SE/SR 507
TILLEY RD S
121
507
5
0
1
Miles
Map Created by jm 6/26/2019


THURSTON COUNTY
Residential Neighborhoods
Region 10
Neighborhood
1880
24I1
25I1
25I2
25J1
27H1
27J1
28F1
28M1
29I1
29K1
29O1
30G1
30G2
30N1
31K1
32E1
32I1
34F1
35E1
30N1
29K1
28M1
25J1
31K1
29O1
25I1
24I1
27J1
29I1
32I1
27H1
30G2
30G1
32E1
34F1
35E1
28F1
1880
MARTIN WAY E
STEILACOOM RD SE
PACIFIC AVE SE
MARVIN RD SE
RESERVATION RD SE
MULLEN RD SE
YELM HWY SE
COLLEGE ST SE
RAINIER RD SE
STEDMAN RD SE
WALDRICK RD SE
MILITARY RD SE
JOHNSON CREEK RD SE
MORRIS RD SE
138TH AVE SE
148TH AVE SE
VAIL RD SE
VAIL LOOP SE
VAIL CUT-OFF SE
BALD HILL RD SE
NEAT RD SE
0
5
Miles


THURSTON COUNTY
Residential Neighborhoods
Region 11
Neighborhood
06E2
07E2
08B2
10G2
11E1
11F1
14H1
16B1
16F1
17C1
17G1
19H1
21H2
Tenino
Bucoda
Raini
YELM HWY SE
RICH RD SE
OLD HWY 99 SE
88TH AVE SE
89TH AVE SE
93RD AVE SE
93RD AVE SW
RAINIER RD SE
LITTLEROCK RD SW
DELPHI RD SW
CASE RD SW
TILLEY RD S/SR 121
MCCORKLE RD SE
WALDRICK RD SE
STEDMAN RD SE
113TH AVE SW
128TH AVE SW
MIMA RD SW
143RD AVE SE
MILITARY RD SE
GATE RD SW
SARGENT RD SW
TILLEY RD S
OLD HWY 99 SW
183RD AVE SW
184TH AVE SE
JOHNSON CREEK RD SE
INDEPENDENCE RD SW
JAMES RD SW
DENMARK ST SW
HWY 12/US 12
OLD HWY 9 SW
SKOOKUMCHUCK RD SE
TONO RD SE
PRATHER RD SW
0 1 Miles
Map Created by jm 6/26/2019

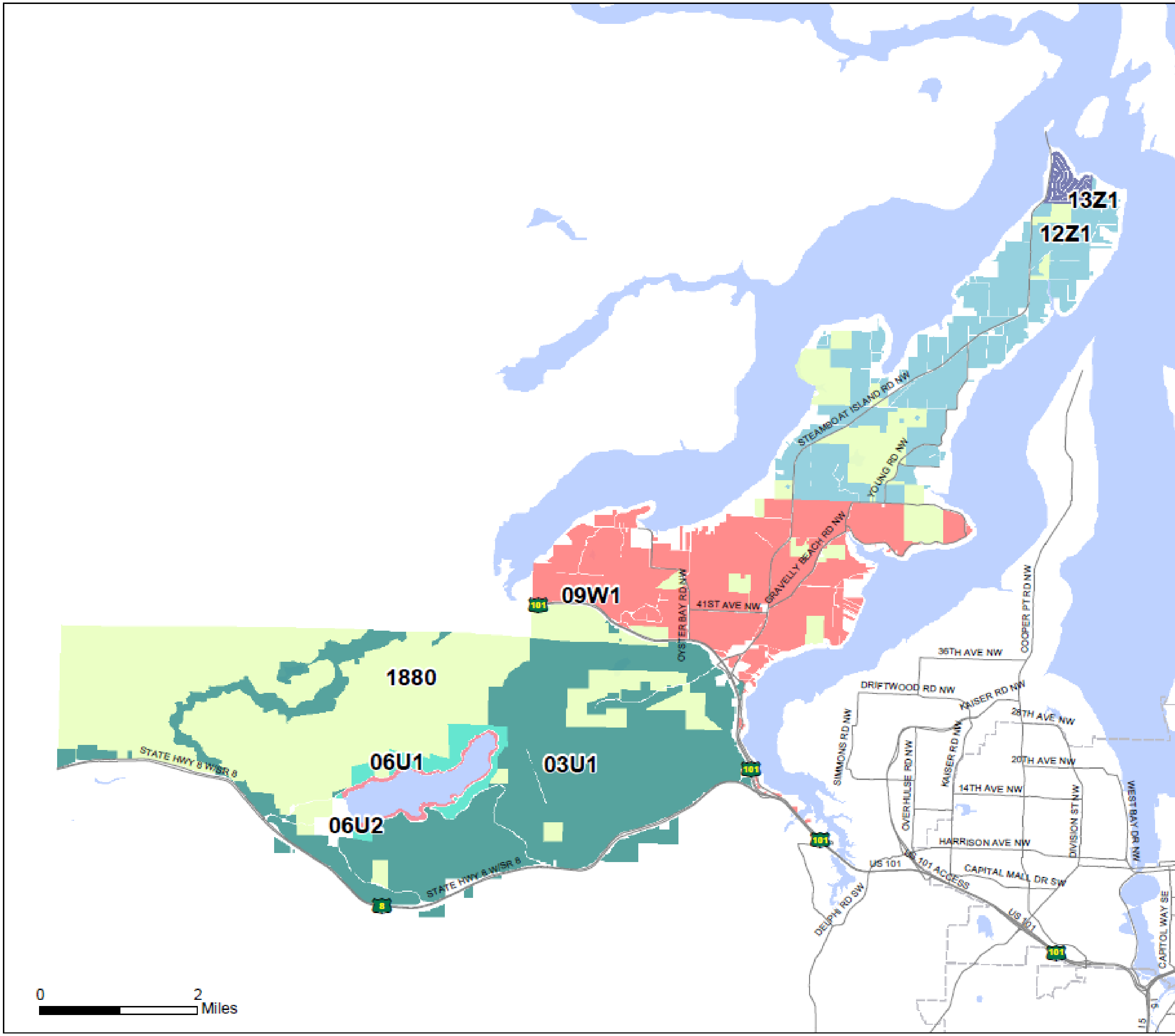

THURSTON COUNTY
Residential Neighborhoods
Region 14
Neighborhood
28N1
29M1
29M2
29N1
29N2
LXQA
LXQB
LXWA
LXWB
LXWC
LXWD
LXWE
Yelm
LXWA
LXWD
LXWE
LXWB
29N1
LXWC
LXQB
LXQA
28N1
29M1
29N2
29M2
YELM HWY SE/SR 510
SR510 ALT
YELM AVE SE/SR 510
510
FIRST ST SE/SR 507
YELM AVE SE/SR 507
STATE HWY 507 SE/SR 507
BALD HILL RD SE
MORRIS RD SE
0
1
Miles
Map Created by jm 6/26/2019


THURSTON COUNTY
Residential Neighborhoods
Region 15
Neighborhood
NDAA
NDAB
NDFA
NDFB
NDFC
NDUA
NDWA
NDWB
NDWC
NDXA
TFZA
HILTON RD NE
46TH AVE NE
MARVIN RD NE
MERIDIAN RD NE
HOGUM BAY RD NE
31ST AVE NE
NDAA
NDAB
NDWC
TFZA
NDFC
NDFA
NDFB
NDWA
NDWB
NDUA
NDXA
0
1
Miles


THURSTON COUNTY
Residential Neighborhoods Region 16
Neighborhood
19P1
20P2
20P3
20Q1
22Q1
OCUA
OD1A
ODEA
ODWA
ODXA
OFFA
OFNA
OFUA
TDKA
TFZA
Lacey
37TH AVE SE
COLLEGE ST SE
RUDDELL RD SE
CARPENTER RD SE
MARVIN RD SE
MULLEN RD SE
MERIDIAN RD SE
YELM HWY SE
RAINIER RD SE
0
1
Miles

THURSTON COUNTY

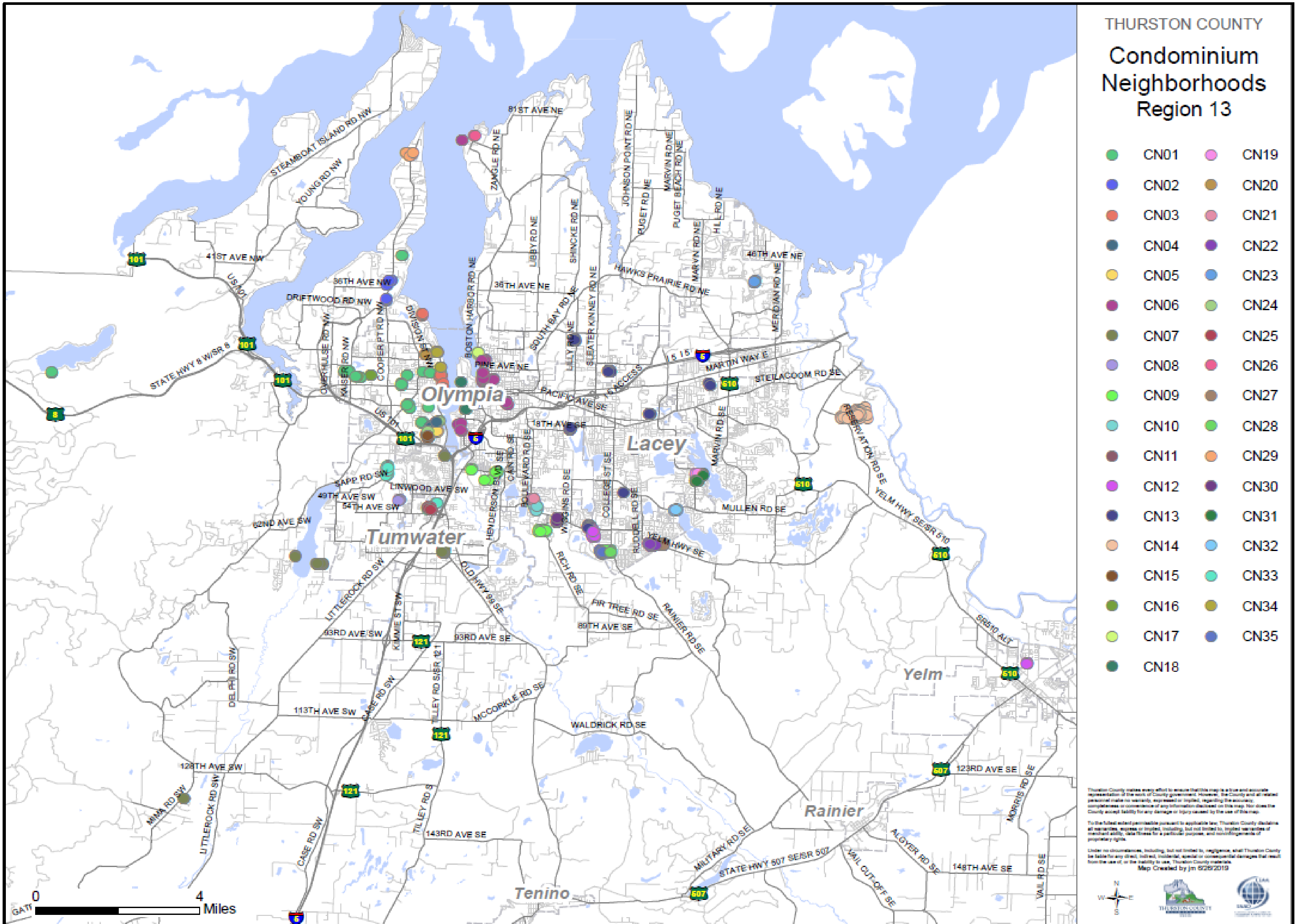
Residential Neighborhoods
Region 17

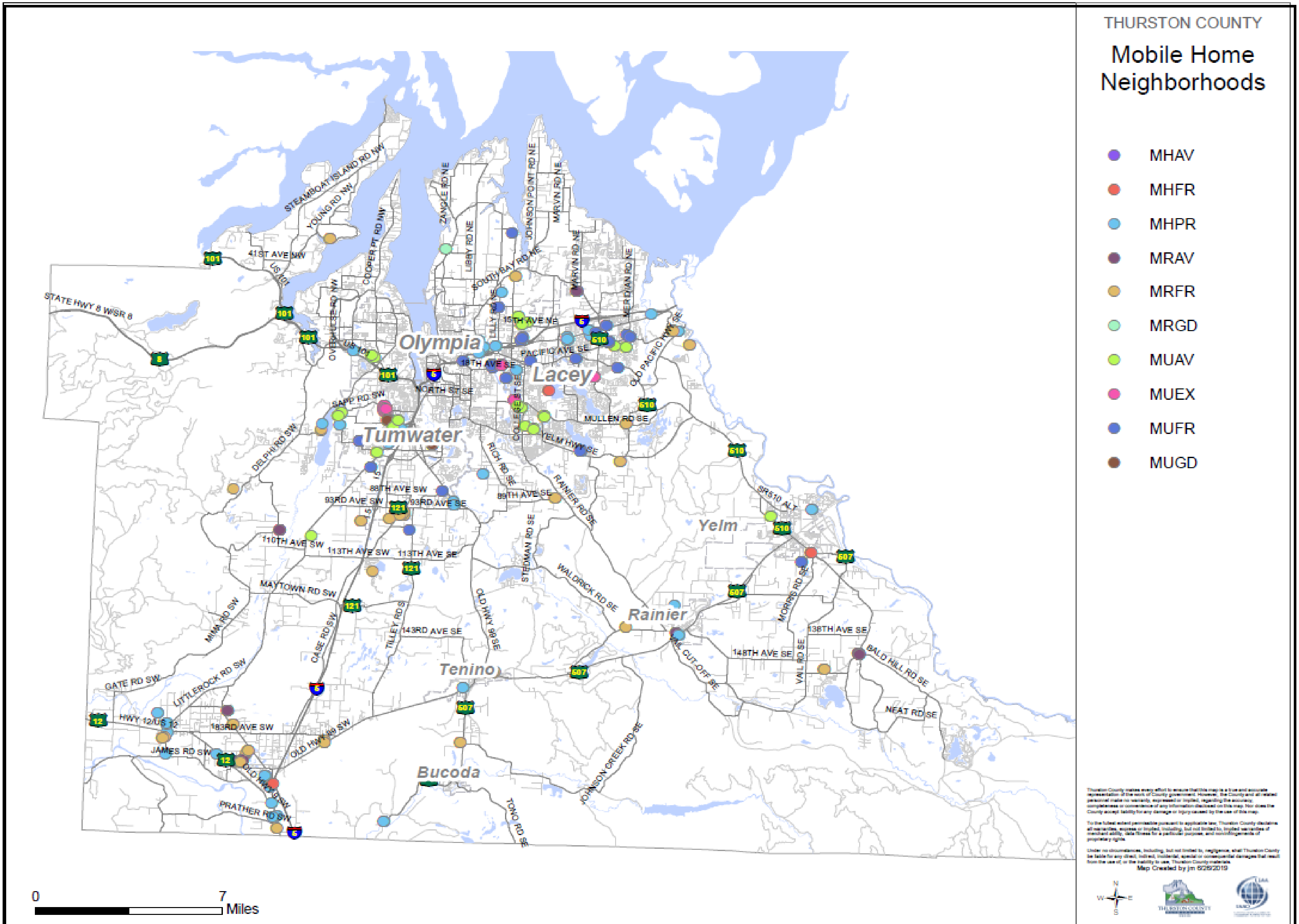


Neighborhood

- 03U1
- 06U1
- 06U2
- 09W1
- 12Z1
- 13Z1
- 1880

Map Created by jm 8/12/2020


THURSTON COUNTY
Condominium Neighborhoods
Region 13
CN01
CN02
CN03
CN04
CN05
CN06
CN07
CN08
CN09
CN10
CN11
CN12
CN13
CN14
CN15
CN16
CN17
CN18
CN19
CN20
CN21
CN22
CN23
CN24
CN25
CN26
CN27
CN28
CN29
CN30
CN31
CN32
CN33
CN34
CN35
Olympia
Lacey
Tumwater
Yelm
Rainier
Tenino
0
4
Miles


THURSTON COUNTY
Mobile Home Neighborhoods
MHAV
MHFR
MHPR
MRAV
MRFR
MRGD
MUAV
MUEX
MUFR
MUGD
Olympia
Lacey
Tumwater
Yelm
Rainier
Tenino
Bucoda
0
7
Miles
Map Created by jm 6/26/2019