City of Olympia

Meeting Agenda

City Council

City Hall
601 4th Avenue E
Olympia, WA 98501

Information: 360.753.8447

Tuesday, March 4, 2014 **7:00 PM** **Council Chambers**

1. ROLL CALL

1.A ANNOUNCEMENTS

1.B APPROVAL OF AGENDA

2. SPECIAL RECOGNITION

2.A 14-0200 Recognition of Olympia's Nominee for the AWC Center for Quality Communities Scholarship

Attachments: Nomination Letter

3. PUBLIC COMMUNICATION

(Estimated Time: 0-30 Minutes) (Sign Up Sheets are Provided in the Foyer)
During this portion of the meeting, citizens may address the Council regarding only items related to City business, including items on the Agenda, except on agenda items for which the City Council either held a Public Hearing in the last 45 days, or will hold a Public Hearing within 45 days. Individual testimony is limited to three minutes or less. In order to hear as many people as possible during the 30-minutes set aside for Public Communication, the Council will refrain from commenting on individual testimony until all public comment has been taken. The City Council will allow for additional testimony to be taken at the end of the meeting for those who signed up at the beginning of the meeting and did not get an opportunity to speak during the allotted 30-minutes.

COUNCIL RESPONSE TO PUBLIC COMMUNICATION (Optional)

4. CONSENT CALENDAR

(Items of a Routine Nature)

4.A 14-0201 Approval of January 10 and January 11, 2014 City Council Annual Retreat Minutes

Attachments: Minutes

4.B 14-0189 Approval of Interlocal Agreement with Thurston County and Fire District #3 Concerning Boulevard Road / I-5 Area Annexation

Attachments: Interlocal Agreement
Exhibit A Legal Description
Exhibit A Sketch

SECOND READINGS - None

FIRST READINGS

4.C 14-0199 Approval of Appropriations Ordinance in the Amount of $142,200 for the Artesian Commons Fleet Parking Construction

Attachments: Appropriations Ordinance

5. PUBLIC HEARING - None

6. OTHER BUSINESS

6.A 14-0114 Approval of a Resolution Regarding Climate Change

Attachments: Resolution

Greenhouse Gas Inventory Report

6.B 14-0178 Approval of Interlocal Agreement with Port of Olympia for West Bay Environmental Restoration Assessment

Attachments: Interlocal

7. CONTINUED PUBLIC COMMUNICATION

(If needed for those who signed up earlier and did not get an opportunity to speak during the allotted 30 minutes)

8. REPORTS AND REFERRALS

8.A COUNCIL INTERGOVERNMENTAL/COMMITTEE REPORTS AND REFERRALS

8.B CITY MANAGER'S REPORT AND REFERRALS

9. ADJOURNMENT

The City of Olympia is committed to the non-discriminatory treatment of all persons in employment and the delivery of services and resources. If you require accommodation for your attendance at the City Council meeting, please contact the Council's Secretary at 360.753-8244 at least 48 hours in advance of the meeting. For hearing impaired, please contact us by dialing the Washington State Relay Service at 7-1-1 or 1.800.833.6384.

City of Olympia

City Hall
601 4th Avenue E.
Olympia, WA 98501
360-753-8447

City Council

Recognition of Olympia's Nominee for the AWC Center for Quality Communities Scholarship

Agenda Date: 3/4/2014
Agenda Number: 2.A
File Number: 14-0200

File Type: recognition **Version:** 1 **Status:** Recognition

..Title
Recognition of Olympia's Nominee for the AWC Center for Quality Communities Scholarship

..Recommended Action
Committee Recommendation:
Not referred to a committee.

City Manager Recommendation:
Recognize Katie Gubbe, who is nominated by GRuB (Garden Raised Bounty).

..Report
Issue:
The AWC scholarship deadline is March 14, 2014.

Staff Contact:
Cathie Butler, Communications Manager, 360.753.8361

Presenter(s):
Blue Peetz, Olympia High School and GRuB
Katie Gubbe, Nominee

Background and Analysis:
AWC Center for Quality Communities promotes municipal leadership development and civic engagement. The Center supports senior high school students who are actively engaged with their community and/or city government and want to pursue post-secondary education. Four $1,250 scholarships will be awarded to high school students who plan to pursue a post-secondary degree in fall 2014.

Again, this year, the City Council agreed to nominate a high school senior who is active in the GRuB organization.

The nominee, Katie Gubbe, is a senior at Olympia High School and is a graduate of the OHS GRuB program. She is applying to attend The Evergreen State College. Her goal is to begin college next fall and to focus on a degree in Sustainable Agriculture.

Agenda Date: 3/4/2014
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File Number: 14-0200

2/13/14

Dear Friends at the AWC,

My name is Blue Peetz and I am a teacher with Olympia High School. What follows is a letter of recommendation for Katie Gubbe – one of the most stellar people I have ever had the pleasure to work with as both a teacher and direct supervisor. I hope you will consider her for a scholarship from your organization. She is without question deserving.

I first began working with Katie in the summer of 2012. She was a participant in an employment training program developed by the non-profit organization GRuB and the New Market Vocational Skills Center. I served as program coordinator and supervisor. Katie worked alongside a crew of students on a small organic farm. Her primary responsibility was the maintenance and harvesting of fresh produce for the greater community. In doing this work, Katie always stood out. Her professionalism was an incredible asset and her passion for the work inspired others to do their best as well. She is a strong communicator, incredibly compassionate, and works well with people from diverse backgrounds. She also demonstrated an incredible work ethic – typically the first one in the field to work and the last one to leave.

Because of her performance and dedication, Katie was brought into our academic year program with a select, small team of students. Katie earned credits in Biology, American Studies, and Horticulture while helping lead work in the community that makes good food more accessible for all people. As part of the program, Katie gained experience in public speaking, educating children on local foods, and farm planning. One of her strongest accomplishments was testifying to the Washington State Senate Education Committee in support of efforts to expand GRuB-like programs to more regions in our state. Her vulnerability and courage were inspiring to all in attendance. In the end, $105,000 in state funds was made available to expand programs in Olympia and Auburn. She has that kind of effect.

In the summer of 2013, I hired Katie on again to serve as a Peer Crew Leader on a new farm growing produce for the Olympia School District cafeterias. Katie effectively mentored new students, lead farm and team-building activities, and provided strong customer service for our neighborhood market stand. Again, Katie's dedication, work ethic, and emphasis on positive relationship building with everyone she worked with were true strengths.

I could say that Katie is a future leader in our world, but that wouldn't do her justice. She already is a leader in our community, she already is someone you can count on to complete tasks at high levels, and she already is someone that will make any business she works for better. She is a complete package and if I can gather funding for a job program this coming spring, I would hire her back without hesitation.

Sincerely,

Blue Peetz
Teacher – Olympia High School

City of Olympia

City Hall
601 4th Avenue E
Olympia, WA 98501

Information: 360.753.8447

Meeting Minutes - Draft
City Council

Saturday, January 11, 2014 **8:30 AM** **Fire Station #4 - 3525 Stoll Road**

Council Annual Retreat

1. ROLL CALL

Present: 7 - Mayor Stephen H. Buxbaum, Mayor Pro Tem Nathaniel Jones, Councilmember Jim Cooper, Councilmember Julie Hankins, Councilmember Steve Langer, Councilmember Jeannine Roe and Councilmember Cheryl Selby

OTHERS IN ATTENDANCE

City Manager Steve Hall
Assistant City Manager Jay Burney
Communications Manager Cathie Butler
Facilitator Kendra Dahlen
Facilitator Faith Trimble (Saturday only)

The following Department Directors were in attendance for portions of the retreat:
City Attorney Tom Morrill
Administrative Services Director Jane Kirkemo
Parks, Arts and Recreation Director Paul Simmons
Public Works Director Rich Hoey
Community Planning and Development Director Keith Stahley
Community Planning and Development Deputy Director Leonard Bauer
Police Chief Ronnie Roberts
Fire Chief Larry Dibble

2. BUSINESS ITEMS

14-0041 Annual City Council Retreat

The Council met on Friday, January 10, from 11:30 a.m. to 5:00 p.m., and on Saturday, January 11, from 8:30 a.m. to 4:15 p.m.

FRIDAY, JANUARY 10

Councilmembers reviewed the 2013 highlights, including:
- Shoreline Master Plan
- The Washington Center

- LED Lighting
- Public Safety Ballot Measure
- Isthmus Purchase
- Interjurisdictional work
- Community renewal momentum and potential impacts
- Countywide coordination of homeless services
- Health and human services coordination
- Downtown project accomplishments
- New parking meters
- Budget 365 process
- Planning Commission
- Comprehensive Plan process
- Council teamwork

The Council then discussed and agreed to the following appointments:

Alliance for a Healthy South Sound
Delegate: Andy Haub, Staff
Alternate: Julie Hankins

Animal Services
Delegate: Jeannine Roe
Alternate: Cheryl Selby

Capitol Lake Adaptive Management Committee
Delegate: Stephen Buxbaum
Alternate: Steve Langer

Communications Board (TCCOM911)
Delegate: Julie Hankins
Alternate: Cheryl Selby

Economic Development Council
Delegate: Stephen Buxbaum
Alternate: Jim Cooper

EMSS (Medic I)
Delegate: Steve Langer
Alternate: Jim Cooper

Health & Human Services Review Council
Delegate: Jeannine Roe
Alternate: Jim Cooper

Intercity Transit Authority Board
Delegate: Nathaniel Jones
Alternate: Jeannine Roe

Law & Justice Council
Delegate: Cheryl Selby
Alternate: Steve Langer

LEOFF Disability Board
Delegates: Jim Cooper and Jeannine Roe

LOTT Board of Directors
Delegate: Steve Langer
Alternate: Julie Hankins

Olympic Region Clean Air Authority
Delegate: Jim Cooper
Alternate: None

Regional Transportation Policy Board
Delegate: Cheryl Selby
Alternate: Stephen Buxbaum

Sustainable Thurston Task Force
Delegate: Stephen Buxbaum
Alternate: Cheryl Selby

Thurston Council for Children and Youth (Policy Team)
Delegate: Cheryl Selby
Alternate: Jim Cooper

Thurston County Solid Waste Advisory Committee (SWAC)
Delegate: Ron Jones, Staff
Alternate: Nathaniel Jones

Thurston Regional Planning Council
Delegate: Nathaniel Jones
Alternate: Stephen Buxbaum

Visitors and Convention Bureau
Delegate: Julie Hankins
Alternate: Jeannine Roe

Coalition of Neighborhood Associations
Delegate: Julie Hankins
Alternate: None

Liaison to The Washington Center
Delegate: Jeannine Roe
Alternate: Cheryl Selby

Lodging Tax Advisory Committee
Delegate: Julie Hankins
Alternate: None

Mayors Forum
Delegate: Stephen Buxbaum
Alternate: None

PBIA Liaison Board
Delegate: Jeannine Roe
Alternate: Julie Hankins

Liaisons to Advisory Boards and Commissions
Arts Commission - Jim Cooper
Bicycle and Pedestrian Advisory Committee - Julie Hankins
Design Review Board - Steve Langer
Heritage Commission - Jeannine Roe
Parks and Recreation - Nathaniel Jones
Planning Commission - Steve Langer
Utility Advisory Committee - Cheryl Selby

FINANCE COMMITTEE
Jim Cooper, Chair
Nathaniel Jones
Cheryl Selby

GENERAL GOVERNMENT COMMITTEE
Jeannine Roe, Chair
Jim Cooper
Cheryl Selby

LAND USE AND ENVIRONMENT COMMITTEE
Steve Langer, Chair
Julie Hankins
Jeannine Roe

AD HOC COMMUNITY RENEWAL AREA COMMITTEE
Stephen Buxbaum
Nathaniel Jones
Julie Hankins

Council agreed to move the 2013 priorities forward to 2014. These include:

Adopt a Sustainable Budget
Goals:

- Make our budgetary process transparent, simple, and accessible so that everyone knows how and when to be involved
- Protect and strengthen core services as well as identify strategic investments
- Build and maintain reserves so that we can continue services when times are bad
- Continue to manage our debt level responsibly
Ensure all resources are used responsibly and effectively

Desired Outcome: We have adequate revenues and reserves to support the social, economic, and environmental values of the community.

Champion Downtown Goals
Goals:
- Increase commerce and private investment
- Create a safer, cleaner, and more welcoming downtown for all to enjoy
- Develop partnerships to expand desirable public spaces
- Play a greater role in developing the vision and enhancing the image of downtown
- Develop a Community Renewal Plan

Desired Outcome: More people will want to work, live, shop, and play here, and to increase the revenue base.

Change the Culture of Community Development
Goals:
- Invest in a proactive system that encourages collaboration in formulating and implementing plans
- Engage neighborhoods to plan their own future so that investments reflect community values
- Encourage a staff culture of community involvement and dialogue
- Increase revenue base so that we can provide the enriching services and environmental stewardship that the community values
- Align plans and ordinances so that plans can be implemented

Desired Outcome: We achieve the growth and development as defined by the community in the Comprehensive Plan

Inspire Strong Relationships
Goals:
- Develop stronger and healthier regional partnerships
Enrich public participation so that the community has a role in shaping public policy
- Fully use advisory committees and the Coalition of Neighborhood Associations
- Make homelessness a collaborative, regional priority so that we can establish an effective service system

Desired outcome: We get things done most efficiently, foster trust, stay connected, and move forward together.

Next steps:

- The City Manager will work with Department Directors to identify key strategies and measurable objectives for each priority goal area. He will report back to the Council when this has been done.
- As resources allow, include strategies and related activities in department and advisory board work plans, complete with assignments, budget, and schdule. The City Manager will then report back to the full Council.

The meeting adjourned at 5:00 p.m.

SATURDAY, JANUARY 11

The Council reviewed and discussed the "Ultimate Policy Intent Model - Framework for Decison Making."

Mr. Keith Stahley and Mr. Leonard Bauer reviewed planning projects as they relate to the goal areas.

Mr. Keith Stahley and Ms. Lorelei Juntunen, Senior Planner of ECONorthwest, reviewed economic development of the downtown, including community renewal areas; the action plan, purpose, process, and outcomes; and the next steps. Mr. John Fregonese with Fregonese and Associates joined the discussion via telephone.

The Council then reviewed the 2014 goals and work plan from the Friday discussion. They reviewed issues and approaches for each goal area, action plans, roles and responsibilities, measures, partnerships, and timeframes.

Due to the late hour, the Council agreed to postpone the discussion on communications and "telling our story."

The work session was completed.

3. ADJOURNMENT

The meeting adjourned at 4:15 p.m.

City of Olympia

City Hall
601 4th Avenue E.
Olympia, WA 98501
360-753-8447

City Council

Approval of Interlocal Agreement with Thurston County and Fire District #3 Concerning Boulevard Road / I-5 Area Annexation

Agenda Date: 3/4/2014
Agenda Number: 4.B
File Number: 14-0189

File Type: decision **Version:** 2 **Status:** Consent Calendar

..Title
Approval of Interlocal Agreement with Thurston County and Fire District #3 Concerning Boulevard Road / I-5 Area Annexation

..Recommended Action
Committee Recommendation:
Not referred to a Committee.

City Manager Recommendation:
Move approve and authorize the Mayor to sign the Interlocal Agreement with Thurston County and Fire District #3 Concerning Boulevard Road / I-5 Area Annexation.

..Report
Issue:
The City has initiated a proposal to annex an unincorporated County island using an annexation method under RCW 35A14.480 known as “Annexation of Territory Served by Fire Districts - Interlocal Agreement Process.” This annexation method authorizes the City, County and Fire District to effect an annexation by developing an interlocal agreement.

Staff Contact:
Gary Cooper, Project Associate Planner, Department of Community Planning and Development, 360.570.3957.

Presenter(s):
None. Consent Calendar Item.

Background and Analysis:
The City of Olympia, Thurston County and Lacey Fire District 3 have negotiated an agreement that establishes how the UGA island that is the subject of the Interlocal agreement (Exhibit “A” Interlocal Agreement) would transition from the County and Fire District’s jurisdiction to City jurisdiction if the area is annexed in the future.

The proposed agreement was approved for signature by the Thurston County Board of Commissioners on February 18, 2014, and by the Lacey Fire District 3 Board of Commissioners on February 20, 2014. Approval by the Olympia City Council is all that remains to finalize the agreement.

Agenda Date: 3/4/2014
Agenda Number: 4.B
File Number: 14-0189

Approval of this agreement is a pre-requisite to completing an annexation of the area covered under the agreement. However, approval of the agreement does not mean that Council has approved the annexation. Approval of the agreement only establishes how the area will transition to City jurisdiction if and when the area is annexed in the future. If this agreement is approved by Council, a hearing on whether to annex this area is scheduled for March 18, 2014.

Council Direction

The UGA area that is the subject of this agreement is an island within the City of Olympia. Following Council direction, the City has been working toward annexing all 3 County islands. Two islands were annexed in 2013, making the island that is the subject of this proposed agreement the last remaining County island.

Comprehensive Plan and Olympia/Thurston County Joint Plan

Annexation of islands is encouraged under the Olympia/Thurston County Joint Plan's Goals and Policies, including the following:

> GOAL UGM2: Support annexations which create logical boundaries and reasonable service areas with the urban growth area, including annexation of unincorporated islands with the city limits.

Emergency Services

Although the area that is the subject of this inter-local agreement is located in the County, both police and fire emergency services are provided by the City of Olympia through inter-local agreements with Thurston County and Lacey Fire District 3.

Roads

The City of Olympia would assume responsibility for maintenance of roads and streetlights following annexation.

Outstanding Bonds

Properties within the proposed annexation area will be required to pay the existing excess levy for Lacey Fire District 3 until the bond is retired. A requirement to assume existing City of Olympia indebtedness is not addressed in this agreement, but would be decided at the time the annexation proposal is brought to a hearing before the City Council.

Neighborhood/Community Interests:

There are no known concerns from the surrounding neighborhoods or the community at large with respect to the terms of the Interlocal Agreement.

Agenda Date: 3/4/2014
Agenda Number: 4.B
File Number: 14-0189

However, a number of residents and businesses are interested in the annexation itself. Thus far, comments received have been both for and against the annexation. Citizens who have expressed support have cited the desire for City services, including policing of the Woodland Trail. Citizens who have voiced opposition cite the increased costs of living in the City, an expected decline in property values, and the impacts that surrounding future development could have on their residences or businesses.

Staff held a public informational meeting on the annexation on December 18, 2013, and have also mailed informational materials to all affected residents and surrounding neighborhood associations.

Another public informational meeting on the proposed annexation is planned for March 10, 2014 in City Council Chambers.

Options:
Council may either:

1. Approve the proposed Interlocal Agreement. This would enable the proposed annexation to proceed to a public hearing before the City Council, currently scheduled for March 18, 2014.
2. Deny the proposed Interlocal Agreement. This would halt the proposed annexation.

Financial Impact:
The financial impacts of future annexation under the terms of this Interlocal Agreement would be primarily in the redistribution of property taxes from the County and Lacey Fire District 3 to the City of Olympia.
The estimated revenues from property taxes that will accrue to the City of Olympia following annexation is $108,000, based on existing non-exempt assessed property values in the subject area.
Under the terms of the agreement, Lacey Fire District 3 will receive the property tax revenues through 2014.

When recorded return to:
City of Olympia
PO Box 1967
Olympia, WA 98507-1967

INTERLOCAL AGREEMENT AMONG THE CITY OF OLYMPIA, THURSTON COUNTY, AND LACEY FIRE THREE FOR ANNEXATION OF CERTAIN LANDS IN THE OLYMPIA URBAN GROWTH AREA TO THE CITY OF OLYMPIA

I. Agreement

This Interlocal Agreement for Annexation of Certain Lands in the City of Olympia Urban Growth Area to the City of Olympia ("Agreement") is among the City of Olympia ("Olympia"), Thurston County ("County") and Fire Protection District No. 3, Thurston County (Lacey Fire Three, or "District"). Olympia, County and District are each a "Party" and collectively the "Parties to this Agreement. The Parties' agree as follows:

II. Recitals

RCW 35A.14.480 permits annexation by interlocal agreement of a fire district, city and county. The purpose of this Agreement is to address certain issues pertaining to annexation including those identified at RCW 35A.14.480. The area proposed for annexation is shown in Agreement Exhibit A (the "Annexation Area").

III. Definitions

Capitalized terms shall have the meaning set forth in this Agreement. Other terms shall have their ordinary meaning as read in the context of the Agreement.

IV. Scope of Agreement

(A) Transfer of revenues and assets between the fire protection district and the code city.

Due to the small size of the annexation area, no assets (real property, equipment or other personal property) need to be transferred between the Fire District and Olympia.

(B) Consideration and discussion of the impact to the level of service of annexation on the unincorporated area, and an agreement that the impact on the ability of fire protection

and emergency medical services within the incorporated area must not be negatively impacted at least through the budget cycle in which the annexation occurs.

Olympia Fire Department already provides primary fire service to the Annexation Area. There is no expected impact to levels of fire service.

(C) A discussion with fire protection districts regarding the division of assets and its impact to citizens inside and outside the newly annexed area.

The Annexation Area is already primarily served by Olympia Fire Department. Annexation would simply make clear that Olympia is responsible to provide fire service.

(D) Community involvement, including an agreed upon schedule of public meetings in the area or areas proposed for annexation. Public hearing on the ordinance.

Olympia will host at least one public informational meeting on this proposal prior to a final decision by the City Council.

The public meeting will be conducted by Olympia, County and District on March 10, 2014.

Olympia will hold a public hearing on March 18, 2014.

If for some unforeseen reason the dates set forth in this section become unfeasible, the Agreement Administrators set forth in section XI of this agreement are authorized to set new dates.

(E) Revenue sharing, if any.

Except as otherwise set forth in this Agreement, there are no provisions for revenue sharing applicable to this annexation. The Parties agree that the District's 2014 property tax revenues from the Annexation Area are to be paid to District. In the event of mistake or inadvertence, the City shall pay within thirty (30) days to District an amount equivalent to the amount of 2014 property tax revenues not paid to District. Olympia and District shall by separate agreement address Olympia payment to District arising out of Olympia property within District

(F) Debt distribution;

No provisions for debt distribution are applicable to this annexation. Continuation and/or assumption of indebtedness by property owners for existing bonds is addressed in Section IV(M) of this Agreement.

(G) Capital facilities obligations of the code city, county, and fire protection districts.

Olympia will assume responsibility for maintenance of roads and streetlights following annexation.

(H) An overall schedule or plan on the timing of any annexations covered under this agreement.

The Parties intend to complete the annexations before April 30, 2014. However, due to unforeseen circumstances, the annexation may take longer.

(I) A description of which of the annexing code cities' development regulations will apply and be enforced in the area.

Olympia's development regulations shall apply immediately upon the effective date of the annexation ordinance.

(J) Roads and traffic impact mitigation.

Upon annexation, Olympia is responsible for road maintenance in the Annexation Area. If the County holds any SEPA fees, a portion of which applies to projects within the Annexation Area, the County will notify Olympia of such funds.

(K) Surface and storm water management.

Upon annexation, Olympia is responsible for surface and stormwater maintenance in Annexation Area.

(L) Coordination and timing of comprehensive plan and development regulation updates.

Comprehensive plan and development regulation updates will continue to be through the joint planning process between Olympia and County.

(M) Outstanding bonds and special or improvement district assessments;

Property within Annexation Area remains obligated to pay the existing excess levy for District until the bond(s) is/are retired, or as otherwise provided by law.

(N) Annexation procedures.

The method for this annexation is prescribed under RCW 35A.14.480, "Annexation of territory served by fire districts – Interlocal agreement process."

(O) Distribution of debt and revenue sharing for annexation proposals, code enforcement, and inspection services;

Debt and revenue sharing do not apply to this annexation. Upon annexation, Olympia is responsible for code enforcement in the Annexation Area.

(P) Financial and administrative services; and

Upon annexation, Olympia is responsible for any financial and administrative services that may be necessary for the Annexation Area.

(Q) Consultation with other service providers, including water-sewer districts, if applicable.

There are no known water-sewer districts in the Annexation Area.

IV. Entire Agreement

This Agreement sets forth all terms and conditions agreed upon by the Parties and may be amended only in writing.

V. Interpretation and Venue

This Agreement shall be governed by the laws of the State of Washington as to interpretation and performance. The parties hereby agree that venue for enforcement of this Agreement shall be the Superior Court of Thurston County.

VI. Effective Date

This Agreement shall take effect on the date of the last authorizing signature affixed hereto (the "Effective Date").

VII. Term.

This Agreement shall remain in force and effect until its terms are satisfied, but no later than twenty (20) years after the Effective Date.

VIII. General Provisions.

This Agreement does not create a separate legal entity. There shall be no jointly acquired real or personal property.

IX. Joint Board

This Agreement creates no Joint Board and no separate legal entity.

X. Recording

Prior to its entry into force, this Agreement shall be filed with the Thurston County Auditor's Office or posted upon the websites or other electronically retrievable public source as required by RCW 39.34.040.

XI. Agreement Administrators and Notice

Any notice required under this Agreement shall be to the Agreement Administrator designated below at the address listed below and shall become effective three days following the date of deposit in the United States Postal Service.

City of Olympia Agreement Administrator:

City Manager, Steve Hall
Re: Annexation Interlocal
PO Box 1967
Olympia, WA 98507-1967

With a copy to:

Attn: City Attorney
Re: Annexation Interlocal
PO Box 1967
Olympia, WA 98507

Thurston County Agreement Administrator:

County Manager, Cliff Moore
Re: Annexation Interlocal
Thurston County Courthouse, Building One, Room 269
2000 Lakeridge Drive SW
Olympia, WA 98502-1045

Lacey Fire Three Agreement Administrator:

Attn: Steve Brooks, Fire Chief
Re: Annexation Interlocal
1231 Franz St SE
~~Olympia~~, WA 98503-2412
Lacey

CITY OF OLYMPIA

Stephen Buxbaum, Mayor

Date:

Approved as to form:

Darren Nienaber DCA

City Attorney

THURSTON COUNTY

Cliff Moore

Cliff Moore, County Manager

Date: 2/19/14

Approved as to form:

Thurston County Prosecuting Attorney's Office

LACEY FIRE DISTRICT THREE

Steve Brooks, Fire Chief

Date: 2/20/2014

Approved as to form:

Lacey Fire District Three Attorney

Date: January 27, 2014
Project: I-5 Corridor Annexation
Sheet: 1 of 3

EXHIBIT "A"
CITY OF OLYMPIA I-5 CORRIDOR ANNEXATION AREA

I-5 Corridor Annexation Area, situated in the North Half of the Northeast Quarter of Section 24, the East Half of the Southwest Quarter of Section 13, Township 18 North, Range 2 West, Willamette Meridian, the South Half of Section 18, the North Half of Section 19, Township 18 North, Range 1 West, Willamette Meridian, Thurston County, Washington, said Annexation Area is contained and bounded within the following described area:

Commencing at the Section corner common to said Sections 13,24,18, and 19; thence North along the common North-South Section line of said Sections 13 and 18 to the South Right-of-Way of Interstate 5 being the **POINT OF BEGINNING**;

Thence continuing North along said common North-South Section line to the Centerline of Pacific Avenue;

Thence Northwesterly along said centerline to the intersection with the extension of the Easterly boundary line of Fir Grove Business Park BSP, Volume 1, Page 27, Thurston County records;

Thence South along said boundary line to the Southeasterly corner of same;

Thence West along said BSP South line to the East line of Lot 10 of said BSP;

Thence South along said East Lot line to the Southeasterly corner of said Lot 10;

Thence West along the South line of said BSP to the centerline of Boulevard Road;

Thence South along said Boulevard Road centerline to the intersection with the extended North boundary line of Short Plat 03-0206-OL, AFN 3645356, Thurston County records;

Thence East along said Short Plats North boundary line to the Northeasterly corner of same;

Thence South along the Easterly line of said Short Plat to the centerline of 7th Avenue;

Thence East along said 7th Avenue centerline to the intersection with the extended East Right-of-Way of Chambers Street;

Thence South along said Chambers Street Right-of-Way to the Northerly Right-of-Way of Interstate 5;

Thence Southwesterly along said Interstate 5 Right-of-Way to the intersection with the North Right-of-Way of Union Avenue;

Thence West along said North Right-of-Way of Union Avenue extending to the East Right-of-Way of Fairview Street;

Thence South along said East Right-of-Way of Fairview Street to the intersection with the extended South Right-of-Way of 15th Avenue (Dayton Street);

Thence East along said South Right-of-Way of 15th Avenue to the intersection with the extended West Right-of-Way of Boulevard Road;

Thence Northerly along Boulevard Road to the intersection with the North Right-of-Way of 12th Avenue;

Thence East along said North Right-of-Way of 12th Avenue to the intersection with the West boundary of Creekwood PRD, Volume 24, Page 76, AFN 9004190053, Thurston County records;

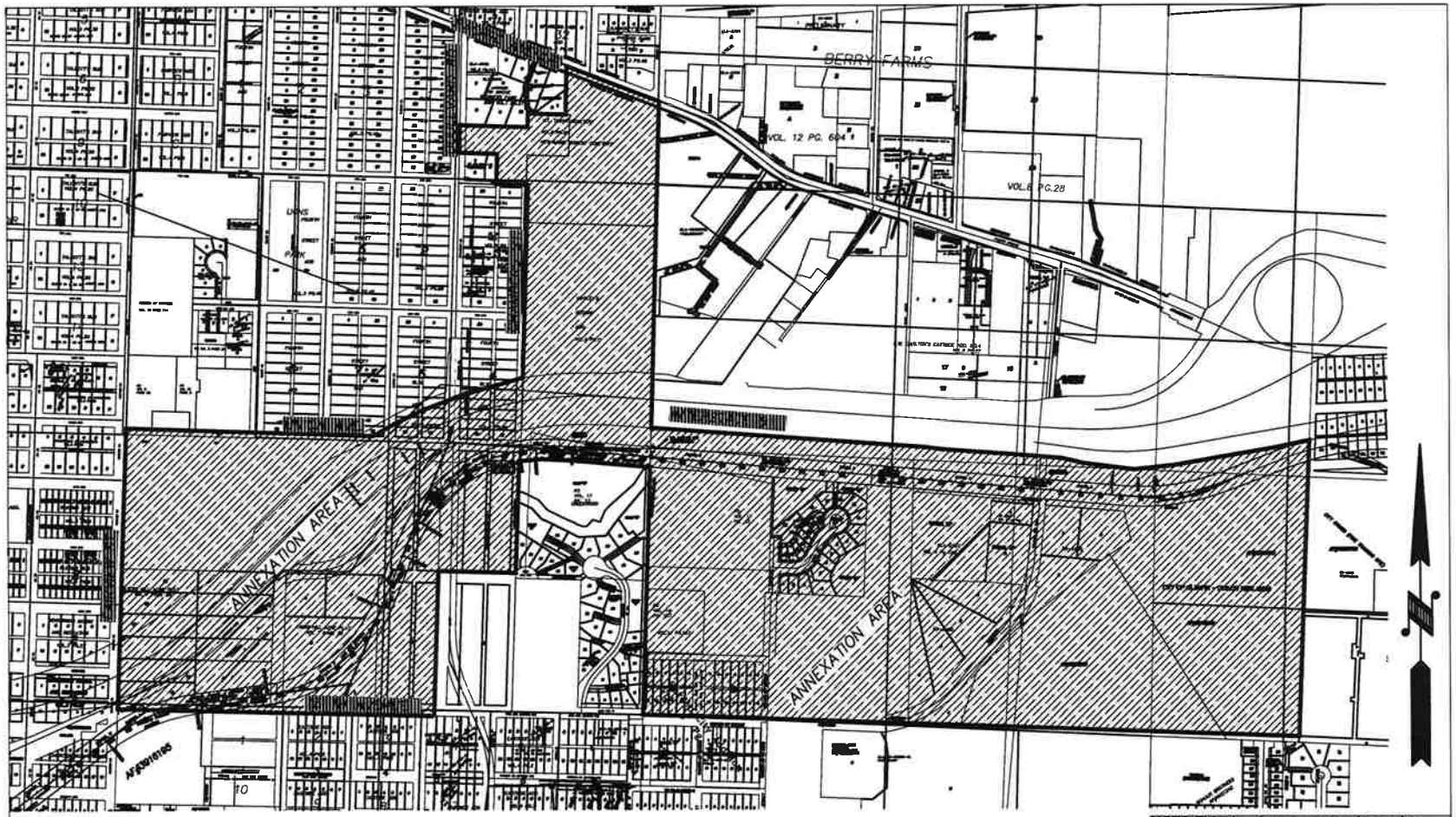
Thence tracing along said Creekwood PRD exterior boundary in a clockwise direction to the intersection with the South line of the North Half of the Northwest Quarter of Section 19;

Thence East along said South line of the North Half of the Northwest Quarter and the South line of the North Half of the Northwest Quarter of the Northeast Quarter to the Southeast corner of the R.J. Smith Donation Land Claim (DLC) No. 42;

Thence North along the East line of said DLC No. 42 and extension thereof to the South Right-of-Way of Interstate 5;

Thence tracing along said South Right-of-Way of Interstate 5 to the **POINT OF BEGINNING.**

Said Annexation Area contains 193 acres more or less.



NOTE: This sketch was prepared to assist with the interpretation of the attached legal description. If conflicts arise between the written legal description and this sketch, the written legal description shall prevail.

	PROJECT NO.	CITY OF OLYMPIA	DRAWING NAME
DRAWN BAM	CP&D Annexation	EXHIBIT "A"	
QC REVIEW LC	DATE	INTERSTATE 5 CORRIDOR	
SCALE 1"=800'	1/2014	ANNEXATION AREA	SHEET 3 OF 3

Date: January 27, 2014
Project: I-5 Corridor Annexation
Sheet: 1 of 3

EXHIBIT "A"
CITY OF OLYMPIA I-5 CORRIDOR ANNEXATION AREA

I-5 Corridor Annexation Area, situated in the North Half of the Northeast Quarter of Section 24, the East Half of the Southwest Quarter of Section 13, Township 18 North, Range 2 West, Willamette Meridian, the South Half of Section 18, the North Half of Section 19, Township 18 North, Range 1 West, Willamette Meridian, Thurston County, Washington, said Annexation Area is contained and bounded within the following described area:

Commencing at the Section corner common to said Sections 13,24,18, and 19; thence North along the common North-South Section line of said Sections 13 and 18 to the South Right-of-Way of Interstate 5 being the **POINT OF BEGINNING**;

Thence continuing North along said common North-South Section line to the Centerline of Pacific Avenue;

Thence Northwesterly along said centerline to the intersection with the extension of the Easterly boundary line of Fir Grove Business Park BSP, Volume 1, Page 27, Thurston County records;

Thence South along said boundary line to the Southeasterly corner of same;

Thence West along said BSP South line to the East line of Lot 10 of said BSP;

Thence South along said East Lot line to the Southeasterly corner of said Lot 10;

Thence West along the South line of said BSP to the centerline of Boulevard Road;

Thence South along said Boulevard Road centerline to the intersection with the extended North boundary line of Short Plat 03-0206-OL, AFN 3645356, Thurston County records;

Thence East along said Short Plats North boundary line to the Northeasterly corner of same;

Thence South along the Easterly line of said Short Plat to the centerline of 7th Avenue;

Thence East along said 7th Avenue centerline to the intersection with the extended East Right-of-Way of Chambers Street;

Thence South along said Chambers Street Right-of-Way to the Northerly Right-of-Way of Interstate 5;

Thence Southwesterly along said Interstate 5 Right-of-Way to the intersection with the North Right-of-Way of Union Avenue;

Thence West along said North Right-of-Way of Union Avenue extending to the East Right-of-Way of Fairview Street;

Thence South along said East Right-of-Way of Fairview Street to the intersection with the extended South Right-of-Way of 15th Avenue (Dayton Street);

Thence East along said South Right-of-Way of 15th Avenue to the intersection with the extended West Right-of-Way of Boulevard Road;

Thence Northerly along Boulevard Road to the intersection with the North Right-of-Way of 12th Avenue;

Thence East along said North Right-of-Way of 12th Avenue to the intersection with the West boundary of Creekwood PRD, Volume 24, Page 76, AFN 9004190053, Thurston County records;

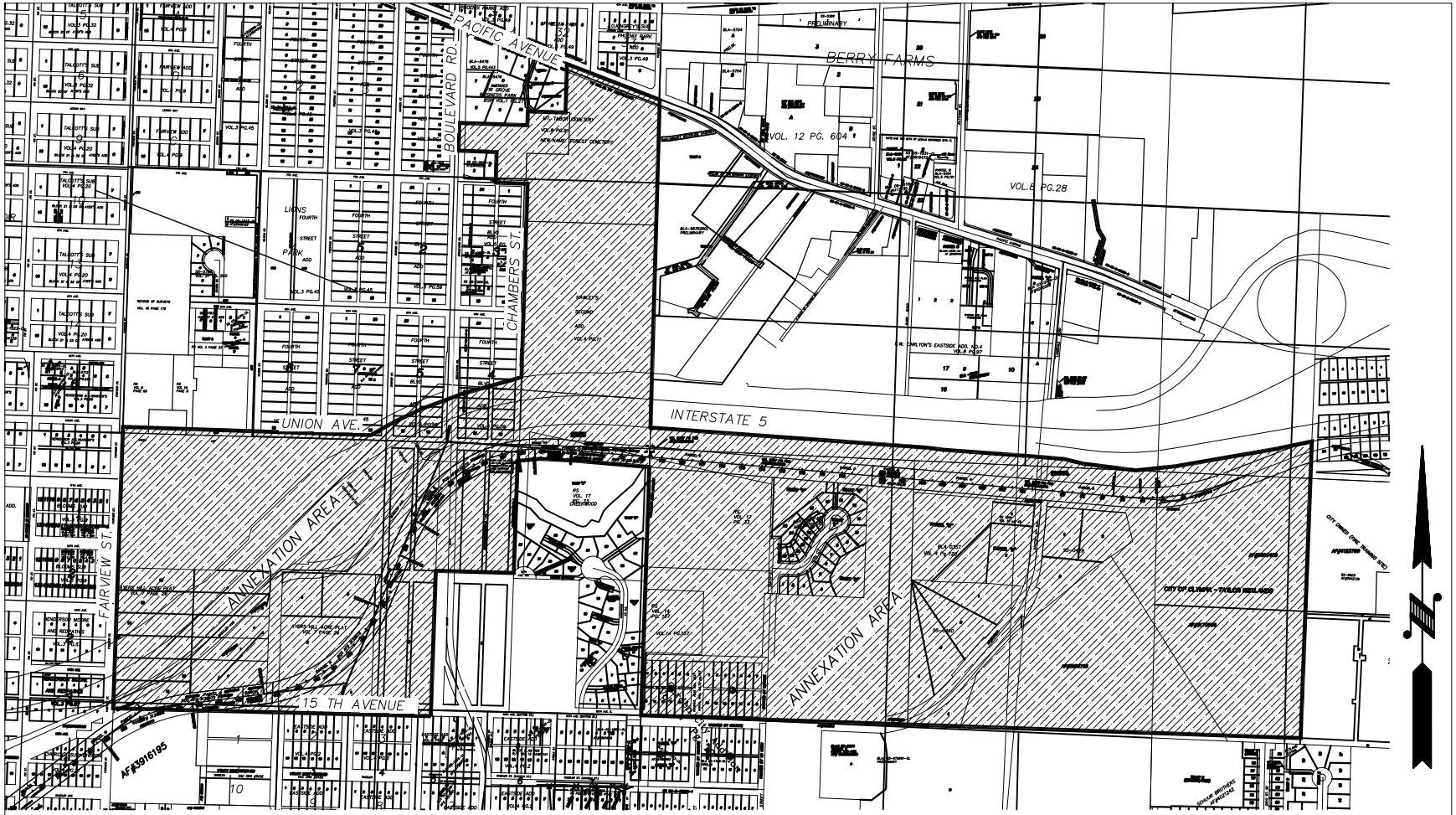
Thence tracing along said Creekwood PRD exterior boundary in a clockwise direction to the intersection with the South line of the North Half of the Northwest Quarter of Section 19;

Thence East along said South line of the North Half of the Northwest Quarter and the South line of the North Half of the Northwest Quarter of the Northeast Quarter to the Southeast corner of the R.J. Smith Donation Land Claim (DLC) No. 42;

Thence North along the East line of said DLC No. 42 and extension thereof to the South Right-of-Way of Interstate 5;

Thence tracing along said South Right-of-Way of Interstate 5 to the **POINT OF BEGINNING.**

Said Annexation Area contains 193 acres more or less.



NOTE: This sketch was prepared to assist with the interpretation of the attached legal description. If conflicts arise between the written legal description and this sketch, the written legal description shall prevail.

	PROJECT NO.	CITY OF OLYMPIA	DRAWING NAME
DRAWN BAM	CP&D Annexation	EXHIBIT "A" INTERSTATE 5 CORRIDOR ANNEXATION AREA	
QC REVIEW LC	DATE		SHEET 3 OF 3
SCALE 1"=800'	1/2014		

City of Olympia

City Hall
601 4th Avenue E.
Olympia, WA 98501
360-753-8447

City Council

Approval of Appropriations Ordinance in the Amount of $142,200 for the Artesian Commons Fleet Parking Construction

Agenda Date: 3/4/2014
Agenda Number: 4.C
File Number: 14-0199

File Type: ordinance **Version:** 1 **Status:** Consent Calendar

..Title
Approval of Appropriations Ordinance in the Amount of $142,200 for the Artesian Commons Fleet Parking Construction

..Recommended Action
Committee Recommendation:
Not referred to a committee.

City Manager Recommendation:
Move to approve the attached appropriation ordinance in the amount of $142,200 for the construction of fleet parking as part of the Artesian Commons project.

..Report
Issue:
Appropriation of funds for the addition of charging stations and fencing for fleet parking as part of the Artesian Commons construction project.

Staff Contact:
Jay Burney, Assistant City Manager, 360.753.8740

Presenter(s):
N/A

Background and Analysis:
The Artesian lot was purchased as part of the New City Hall construction project with the intent to both preserve and protect the Artesian well on the site and provide parking for City fleet and other related City parking needs. A portion of the balance of funds in the New City Hall construction fund were set aside for improvements to the Artesian lot to protect our fleet and add electric vehicle charging stations.

A component of the Artesian Commons construction project is the addition of charging stations and fencing to provide infrastructure for future electric fleet vehicles and protection of the fleet vehicles at this location. The bids for this project were opened on February 4, 2014 and the cost for the fleet parking improvements and some additional contingency came in at $142,200, within the budget set aside for this work. The attached appropriation ordinance transfers funds from the New City Hall construction fund to the Artesian Commons project fund to complete the fleet parking improvements as part of the project.

Agenda Date: 3/4/2014
Agenda Number: 4.C
File Number: 14-0199

Neighborhood/Community Interests (if known):
N/A

Options:

1. Move to approve the attached appropriation ordinance in the amount of $142,200 for the construction of fleet parking as part of the Artesian Commons construction project.
2. Do not approve the attached appropriations ordinance and provide guidance to staff on next steps.

Financial Impact:
The $142,200 in funding for this project is being appropriated from the remaining fund balance from the construction of the New City Hall, which had been anticipated.

Ordinance No.

AN ORDINANCE OF THE CITY OF OLYMPIA, WASHINGTON, RELATING TO THE 2014 BUDGET, AND APPROPRIATING $142,200 FOR THE ARTESIAN COURT DEVELOPMENT. FUNDING IS TO BE PROVIDED BY A TRANSFER FROM THE CITY HALL CONSTRUCTION FUND TO THE CAPITAL IMPROVEMENT FUND.

WHEREAS there is a need for additional funding for the Artesian Commons construction projects; and

WHEREAS the lot was acquired to both protect and preserve the Artesian Well and provide parking for City Hall and its associated uses; and

WHEREAS construction of a fleet parking area is included in the scope of the Artesian Commons construction project; and

WHEREAS it was intended that City Hall construction funds would be used for the purposes of constructing fleet parking;

NOW, THEREFORE, THE OLYMPIA CITY COUNCIL ORDAINS AS FOLLOWS:

Section 1. That the following appropriations are hereby made:

CAPITAL IMPROVEMENT FUND (317)

Resources:	Transfer in, from City Hall Construction Fund	$142,200
	TOTAL RESOURCES	**$142,200**
Appropriations:	Artesian Court Development	$142,200
	TOTAL APPROPRIATIONS	**$142,200**

_____

MAYOR

ATTEST:

_____

CITY CLERK

APPROVED AS TO FORM:

ASSISTANT CITY ATTORNEY

PASSED:

APPROVED:

PUBLISHED:

City of Olympia

City Hall
601 4th Avenue E.
Olympia, WA 98501
360-753-8447

City Council

Approval of a Resolution Regarding Climate Change

Agenda Date: 3/4/2014
Agenda Number: 6.A
File Number: 14-0114

File Type: resolution **Version:** 1 **Status:** Other Business

..Title
Approval of a Resolution Regarding Climate Change

..Recommended Action
Committee Recommendation:
The Land Use and Environment Committee reviewed the proposed Resolution at its January 22, 2014, and unanimously recommended City Council adoption.

City Manager Recommendation:
Move to approve the attached Resolution, as recommended by the Land Use and Environment Committee.

..Report
Issue:
Whether to adopt a climate change resolution prepared by the Thurston Climate Action Team (TCAT).

Staff Contact:
Rich Hoey, P.E., Director, Public Works Department, 360.753.8495

Presenter(s):
Rich Hoey, P.E., Director, Public Works Department, 360.753.8495
Representatives of the TCAT Board will be present and available for questions.

Background and Analysis:
The Thurston Climate Action Team (TCAT) is a local non-profit dedicated to creating a healthy and sustainable future for Thurston County by encouraging, coordinating and taking action on climate change. TCAT's priority areas include:

1. Energy efficiency,
2. Transportation, and
3. Developing a community greenhouse gas inventory and climate action plan for Thurston County.

On November 21, 2013, Tom Crawford, TCAT Board Member, presented TCAT's community greenhouse gas inventory for Thurston County to the Land Use and Environment Committee (see attached). The inventory establishes a 2010 baseline for regional greenhouse gas emissions based on data received from Puget Sound Energy, Thurston Regional Planning Council, Thurston County, LOTT and others. The inventory indicates that the two primary sources of greenhouse gas emissions in Thurston County are the built environment (building heating, cooling and lighting) and

Agenda Date: 3/4/2014
Agenda Number: 6.A
File Number: 14-0114

transportation (vehicle emissions). Lesser sources of greenhouse gases include solid waste, wastewater and agricultural activities. Mr. Crawford presented data broken down by jurisdiction, including City of Olympia.
TCAT requested that the City of Olympia formally adopt a resolution accepting the greenhouse gas inventory and express a desire to collaborate with other regional municipalities on policies and actions to reduce greenhouse gas emissions (see attached).
Staff will present highlights of the TCAT greenhouse gas inventory, as well as a summary of the many actions the City has taken to reduce greenhouse gas emissions associated with its municipal operations.

Neighborhood/Community Interests (if known):
TCAT is a local non-profit expressing the interests of its members. The City has not received public comment on the inventory prepared by TCAT. As part of the Imagine Olympia process, the City received many comments from residents about climate change and greenhouse gas reduction.

Options:

1. Adopt the climate change resolution.

2. Accept the inventory completed by TCAT and work on reducing emissions without need for a formal resolution.

3. Do not pursue a resolution at this time.

Financial Impact:
None at this time.

RESOLUTION NO. _____

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF OLYMPIA, WASHINGTON, REGARDING THE COMMUNITY GREENHOUSE GAS INVENTORY COMPLETED BY THURSTON CLIMATE ACTION TEAM, AND STRATEGIES FOR REDUCING GREENHOUSE GASES.

WHEREAS, climate change is a critical concern for Olympia residents, and greenhouse gases resulting from community activities contribute to the negative immediate and long term effects of climate change; and

WHEREAS, the City of Olympia recognizes climate change as a critical issue, and has taken steps to reduce greenhouse gas emissions from city operations; and

WHEREAS, in order to determine strategies and policies that will most effectively reduce greenhouse gas emissions resulting from community activities, it is important to have an inventory of current emissions; and

WHEREAS, the Thurston Climate Action Team has completed a comprehensive greenhouse gas emissions inventory for Thurston County which includes the emissions occurring within the boundaries of the City of Olympia; and

WHEREAS, effective strategies for reducing greenhouse gas emissions within the City of Olympia will rely on strong collaboration with other municipalities within Thurston County;

NOW, THEREFORE, THE OLYMPIA CITY COUNCIL DOES HEREBY RESOLVE AS FOLLOWS:

Section 1. The City of Olympia accepts the greenhouse gas inventory completed by Thurston Climate Action Team, and wishes to collaborate with other municipalities within Thurston County to develop and implement policies and actions for reducing its community greenhouse gas emissions.

Section 2. Effective Date. This Resolution shall become effective immediately upon adoption and signature as provided by law.

PASSED BY THE OLYMPIA CITY COUNCIL this _____day of _____ 2014.

_____
STEPHEN H. BUXBAUM, MAYOR

ATTEST:

_____
CITY CLERK

APPROVED AS TO FORM:

_____
CITY ATTORNEY

Greenhouse Gas Inventory Report for Calendar Year 2010

Thurston County, Washington

August 2013

Version 1.4, Revised December 26, 2013

Presented by the Thurston Climate Action Team

Table of Contents

Author Information and Acknowledgements

This report was developed as a result of Thurston Climate Action Team's (TCAT's) Greenhouse Gas (GHG) Inventory project. Tom Crawford, TCAT board member and treasurer, led the effort on behalf of TCAT, and recruited Robert Coleman, at the time a student in The Evergreen State College's Master in Environmental Studies (MES) program, to serve as intern for the project.

Tom Crawford is one of the founders of TCAT, and has served on TCAT's board since 2009. He holds a bachelor's degree in philosophy from Gonzaga University, and a Master's in Education (M. Ed.) from Eastern Washington University. Tom's background includes work with local and state governments nationwide to improve processes and automated systems, and with Native American communities throughout the Pacific Northwest on community development and educational projects. Tom is a member of the International Society of Sustainability Professionals.

Robert (Bobby) Coleman holds a bachelor's degree in English from Michigan State University, and a Master of Environmental Studies degree from The Evergreen State College. Bobby also currently serves as the Resource Conservation Coordinator at The Evergreen State College. As intern for TCAT's Greenhouse Gas Inventory Project, Bobby gathered data, developed a set of calculation spreadsheets based on ICLEI's U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions, and wrote the initial draft report for the project.

Thurston Climate Action Team's board was instrumental in making this project a reality by defining the greenhouse gas inventory project as a priority for the organization, and providing valuable guidance throughout the effort. Current TCAT board members are:

- Graeme Sackrison, Former Mayor of Lacey, TCAT Board Chair
- Jessica Jensen, Jessica Jensen Law, TCAT Secretary and Board Counsel
- Tom Crawford, President, Praxis Northwest, LLC, TCAT Treasurer
- Geoffrey Glass, Director of Facility and Technology Services, Providence St. Peter Hospital, TCAT Board Member

Thurston Climate Action Team is very grateful for the broad support and assistance we received from many jurisdictions and organizations throughout the county, to help us gather and understand the information contained in this report. We extend special thanks to Thurston County Commissioners, and city council members from Olympia, Lacey and Tumwater, for discussing with us our proposal for completing this work, and for their support and encouragement. Members of TCAT's Energy Advisory Committee were especially helpful in providing guidance on the approach to this effort. The following individuals are members of this committee:

- Cynthia Pratt, City Council Member, City of Lacey
- Randy Bachtell, Instructor, New Market Skills Center
- David Schaffert, Director, Olympia Thurston County Chamber of Commerce
- Christine Winslow, City Council Member, City of Rainier
- Gary Carlson, City of Yelm

- Angela White, Manager, Olympia Master Builders
- Cathy Wolfe, Commissioner, Thurston County
- Lisa Dennis-Perez, LOTT Clean Water Alliance
- Rich Hoey, Director of Public Works, City of Olympia
- Marylin Ball-Brown, CEO, Generations Credit Union
- Scott Morgan, Sustainability Manager, The Evergreen State College
- Ronnie Kemp, City of Tenino
- Dennis Bloom, Intercity Transit
- Tom Oliva, Council Member, City of Tumwater
- Lon Wyrick, Executive Director, Thurston Regional Planning Council
- Teri Bevelaqua, Realtor, RE/Max Realty, and Thurston County Association of REALTORS
- George Barner, Commissioner, Port of Olympia
- Casey Cochrane, Government and Community Relations Manager, Puget Sound Energy

We are grateful to the following individual staff members of area governmental and business organizations for their specific contributions of data and reaction to draft results:

- Paul Replogle, Facilities Manager, Thurston County
- Joshua Cummings, Sustainability Specialist, Thurston County
- Kathy Larson, Major Accounts Manager, Puget Sound Energy
- Farra Vargas, Efficiency Outreach Manager, Puget Sound Energy
- Martha Henderson, Director, Master of Environmental Studies Program, The Evergreen State College
- Gail Wootan, Assistant Director, Master of Environmental Studies Program, The Evergreen State College
- Rick Walk, Community Development Director, City of Lacey
- Rich Hoey, Director of Public Works, City of Olympia
- Keith Stahley, Director of Community Planning and Development, City of Olympia
- Todd Stamm, Planning Manager, City of Olympia
- Mike Matlock, Community Development Director, City of Tumwater
- Thera Black, Senior Planner, Thurston Regional Planning Council
- Veena Tabbut, Senior Planner, Thurston Regional Planning Council
- Kathy McCormick, Senior Planner, Thurston Regional Planning Council
- Bharath Paladugu, Transportation Modeler, Thurston Regional Planning Council
- Susan Mitchell, Public Disclosure, Washington Department of Licensing
- Geoffrey Glass, Director of Facility and Technology Services, Providence St. Peter Hospital
- Keith Edgerton, Sustainability Coordinator, Providence St. Peter Hospital
- Alex Smith, Director of Environmental Programs, Port of Olympia
- Heidi Behrends Cerniwey, formerly Public Affairs Management Analyst, City of Lacey (now with City of Tumwater)

- Karla Fowler, Community and Environmental Planning Director, LOTT Clean Water Alliance
- Laurie Pierce, Operations and Facilities Manager, LOTT Clean Water Alliance
- Jessica Brandt, Environmental and Sustainability Manager, InterCity Transit
- Peter Guttchen, Food to Flowers Program Coordinator, Thurston County Public Works

We want to express special gratitude to John Druelinger, former Sustainability Specialist with Thurston County, who shared with us the results and methodology for his draft GHG inventory model for the 2009 calendar year. The information sources and approach he used both guided and inspired us as we began this effort.

Executive Summary

Global and local concern over the growing climate crisis has led the Thurston Climate Action Team (TCAT) to conduct a community based greenhouse gas (GHG) inventory as a foundation for regional climate action planning. Using a community GHG inventory protocol developed by ICLEI USA, TCAT gathered data for the 2010 calendar year from a variety of sources. Energy usage data was provided by Puget Sound Energy, vehicle miles traveled (VMT) data by the Thurston Regional Planning Council, solid waste data by Thurston County, and wastewater data by the LOTT Clean Water Alliance. Results in each of these sectors was obtained for Thurston County as a whole, and for each of the incorporated cities within the county. TCAT then calculated annual GHG emissions for 2010 using conversion formulas contained in ICLEI documentation for its protocol.

Total GHG emissions for the county as a whole, for each incorporated city, and for the unincorporated portions of the county, are presented in Table 1 below.

Table 1: Summary of GHG emissions by Jurisdiction, 2010, in metric tons of carbon dioxide equivalent (MTCDE)

Jurisdiction	**Total GHG Emissions**	**Per Person GHG Emissions**
Thurston County	2,761,800	10.95
Unincorporated Thurston County	1,443,200	10.68
Bucoda	2,047	3.64
Lacey	392,141	9.25
Olympia	564,607	12.15
Rainier	8,734	4.87
Tenino	12,852	7.58
Tumwater	288,540	16.61
Yelm	49,679	7.25

TCAT recommends that these results be presented to elected officials at the county and city levels. These officials, along with other community and business representatives, would use them to set GHG reduction goals, taking into consideration statewide goals established by the legislature, along with the findings and recommendations of the Inter-governmental Panel on Climate Change (IPCC). It is also recommended that a climate action plan be developed and implemented, along with an annual refresh of this inventory. It is proposed that these efforts include broad participation, with the guidance of a steering committee and segment-specific work groups.

Introduction

Over the last thirty-five years, there has been growing concern among scientists about increases in the level of heat-trapping gases in the earth's atmosphere, and related rising of the average temperature on the earth's surface. These changes are generally known as "the greenhouse effect". There is now near-universal consensus among scientists that human activity—including industrialization, deforestation, fossil fuel based transportation, energy production and consumption, and changing land use patterns-- is responsible for these changes.

The resulting change in the climate is producing a chain reaction of effects—including rising sea levels, drought, extreme weather events (for example, tornados, hurricanes, floods), loss of glaciers and snow pack, and loss of land and sea ice. Expected effects for the Puget Sound region and for Thurston County include:

- Sea level rise
- Wetter winters
- Drier summers
- Increased disease
- Loss of salmon
- Food supply disruption
- Energy disruption
- Problems with drinking water availability

Scientists have indicated that a safe level of atmospheric greenhouse gases is 350 parts per million (ppm); recent reports indicate levels have reached 400 ppm. This is very alarming, and represents a call to action for all communities across the globe.

Our local communities are responding. Thurston County commissioners, as well as many of the city councils within the county, have over the past ten years established goals and programs for reducing greenhouse gas emissions from their facilities and internal operations. In addition, a variety of activist and volunteer groups have engaged in educational and advocacy programs to reduce GHG emissions in the community while building local resiliency.

One such group is Thurston Climate Action Team. It was founded in 2007 by a group of citizens concerned about the potential impact of global warming and wishing to promote local action to reduce Thurston County communities' carbon footprint. TCAT's founding members include county commissioners and city council members, citizen activists, representatives of key planning entities in the county, business people, the primary energy utility for the county, and the educational community. One of its most significant accomplishments has been collaborating with the local economic development council to obtain funding for and operate a community-wide energy efficiency program.

In 2012, TCAT identified three priority areas for its work:

1. Energy efficiency and distributed generation,
2. Transportation, and

3. A community greenhouse gas inventory for Thurston County.

In order to pursue area number three, in the spring and summer of 2012 TCAT discussed a greenhouse gas inventory project with elected representatives and staff from several local jurisdictions, as well as with its Energy Advisory Committee. TCAT also recruited an intern from The Evergreen State College's Master in Environmental Studies program. Robert Coleman was selected to serve as intern. Throughout the fall and winter of 2012 – 2013, energy usage, transportation, and other data were gathered for use in calculating GHG emissions.

The scope of this study encompasses all activities which produce greenhouse gases throughout the county. It includes all cities as well as unincorporated areas. It is not limited to government operations, but includes emissions produced by all homes, businesses and other entities which exist within the boundaries of the county.

TCAT sees this effort as a first step to setting GHG reduction goals, and setting strategies and projects to achieve those goals. In order to provide a check on progress and to allow correction and redesign of strategies that are not actually helping achieve established goals, it is intended that this inventory be updated annually.

Approach

This section contains three sub-sections: Methodology Chosen, Data Gathering, and Estimate Calculation.

Methodology Chosen

Nationally, the first greenhouse gas (GHG) inventories were completed for companies and other organizations. So initial methodologies developed for conducting this work focused on the needs of those groups. However, communities contribute to greenhouse gas emissions in significantly different ways than do organizations. So when selecting a GHG inventory methodology for this study, it was important to consider these differences. As we started this work, we learned that ICLEI had recently published the U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions (i.e., Community Protocol). Because it seemed appropriate to the needs of our communities, and because some local governments in Thurston County have held or currently hold membership in ICLEI, this protocol was selected as the primary guide for estimating community-wide greenhouse gas emissions within the geopolitical boundary of Thurston County Washington.

The Community Protocol is a national standard developed by ICLEI-USA (International Council for Local Environmental Initiatives), now known as Local Governments for Sustainability USA, to inspire and guide U.S. local governments to account for and report on greenhouse gas emissions associated with the communities they represent. The development of the Community Protocol was funded by Pacific Gas and Electric Company, the State of Oregon Department of Environmental Quality, and through a National Science Foundation grant from the Research Coordination Network led by Dr. Anu Ramaswami at University of Colorado Denver. The Community Protocol was vetted by industry experts working in local, state, and federal governments, as well as universities, non-governmental organizations, and private corporations across the United States and Canada. By addressing six internationally recognized greenhouse gases regulated under the Kyoto Protocol (Carbon Dioxide (CO2), Methane (CH4), Nitrous Oxide (N2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur hexafluoride (SF6)) across five basic emission types (built environment, transportation and other mobile sources, solid waste, water and wastewater, and agriculture), the protocol can be used to estimate the quantity of GHG emissions associated with community sources and activities during a chosen analysis year.

Data Gathering

The quantity of greenhouse gases emitted for each of the five basic emission types were estimated for 2010 based on the best available data. Electricity and natural gas consumption data from Puget Sound Energy were used to calculate emissions associated with the built

environment. The Energy Information Administration's (EIA) State Energy Data System (SEDS) was also used to estimate the use of various fuels and their associated emissions in residential units that do not use natural gas from Puget Sound Energy. Thurston County Solid Waste provided aggregate waste sent to the landfill to calculate emissions associated with solid waste. The United States Department of Agriculture's Agricultural Census of 2007 was used to estimate commercial livestock populations in the county and their associated emissions. Lacey, Olympia, Tumwater, Thurston (LOTT) Clean Water Alliance provided wastewater treatment process and digester gas data for estimates related to wastewater treatment. Data were not available for wastewater processing in other communities within the county. Thurston Regional Planning Council's travel demand model and the Highway Performance Monitoring System (HPMS) database were used to calculate emissions related to on-road vehicles operating within the county. VMT data included trips from outside the jurisdictional boundaries to inside the boundaries, from inside to outside, and from inside to inside. Unincorporated Thurston County included rural Thurston County, city Urban Growth Areas, Grand Mound, and the Nisqually and Chehalis Reservations. Population data for 2010 was obtained from Thurston Regional Planning Council's Profile 2012.

Data for this inventory were gathered during the months of January and February of 2013, in partnership with Thurston County and the Thurston Regional Planning Council.

Estimate Calculation

Metric Tons of Carbon Dioxide Equivalents (MTCDE) were calculated either directly with an equation supplied by the Community Protocol or by converting individual estimates for each of the three greenhouse gases into Carbon Dioxide equivalents using 100 year Global Warming Potential (Table 2), and summing the three together.

$$MTCDE = [(mt\ CO_2 \times GWP_{CO_2}) + (mt\ CH_4 \times GWP_{CH_4}) + (mt\ N_2O\ \times GWP_{N_2O})]$$

Table 2: One-hundred year Global Warming Potentials (GWP) for greenhouse gases. Carbon Dioxide (CO_2) has a GWP of 1 since it is the baseline unit to which all other greenhouse gases are compared.

Greenhouse Gas	**100 year GWP**
Carbon Dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous Oxide (N_2O)	310

The Community Protocol provides equations (Table 3) that allowed us to use community-based variables for input (Table 4) in order to calculate individual greenhouse gas values or MTCDE for a given emission source or activity. Equations referenced in Table 3 are taken from the source-specific appendices to the Community Protocol; the referenced Appendix is identified for each section of the table. Each equation is in turn described in greater detail in the Appendix, Emission Calculation Details, Figure 11 through Figure 23. Table 4 contains county-wide input values used to calculate emission estimates for the various emission sources and activities. Input values for each city jurisdiction and for the unincorporated sections of the county can be found in the source spreadsheets for these jurisdictions.

Additional details on how these inputs were used to calculate emissions, including specific formulas used, are contained in the Appendix, Emission Calculation Details.

Table 3: Emissions sources and related estimation method used to calculate greenhouse gas emission based on the U.S. Protocol for Community-wide Greenhouse Gas Emission Inventories

Emission Source	Equations Used
Built Environment (BE) Emission Activities and Sources, from Appendix C.	
Emissions from stationary combustion of natural gas in residential, commercial, and industrial units	BE.1.1, Equations BE.1.1.1, BE.1.1.2, BE.1.1.4, BE.1.1.6
Emissions from stationary combustion of fuel oil, propane/LPG, and wood in residential units	BE.1.2, BE.1.1
Emissions from use of electricity in residential, commercial, and industrial units	BE.2.1, Equation BE.2.2
Emissions from electricity transmission and distribution losses	BE.4.1, Equation BE.4.1.1
Upstream emissions from energy use	BE.5.1, Equation BE.5.1.1; BE.5.2A
Solid Waste Emission Activities and Sources, from Appendix E.	
Methane emissions from community-generated waste sent to landfills	SW.4.1
Process emissions associated with landfilling	SW.5
Collection and transportation emissions	SW.6
Agricultural Livestock Emission Activities and Sources, from Appendix G	
Methane emissions from enteric fermentation	A.1
Wastewater and Water Emission Activities and Sources, from Appendix F	
Stationary methane emissions from combustion of digester gas	WW.1.a
Stationary nitrous oxide emissions from combustion of digester gas	WW.2.a

Stationary carbon dioxide emissions from digester gas combustion	WW.3
Process carbon dioxide emissions from the use of fossil-fuel-derived methanol for biological nitrogen removal	WW.9
Transportation and Other Mobile Emission Activities, from Appendix D	
Emissions from passenger vehicles	TR.1.B, Equations TR.1.B.2, TR.1.B.3
Emissions from freight and service trucks	TR.2.A, Equations TR.2.A.1, TR.2.A.2

Table 4: List of user input descriptions, values, and related emission source/activity for Thurston County.

Input Description	Input Value	Emission Source/Activity
Built Environment		
Use of electricity in residential units	1,266,273,211 (kWh)	Consumption of electricity, Transmission and distribution losses, Upstream emissions from electricity use
Use of electricity in commercial units	920,512,299 (kWh)	Consumption of electricity, Transmission and distribution losses, Upstream emissions from electricity use
Use of electricity in industrial units	136,413,709 (kWh)	Consumption of electricity, Transmission and distribution losses, Upstream emissions from electricity use
Use of electricity in street lighting	4,419,884 (kWh)	Consumption of electricity, Transmission and distribution losses, Upstream emissions from electricity use
Use of natural gas in residential units	31,268,416 (therms)	Onsite combustion of fuel, Upstream emissions from fuel use
Use of fuel oil in residential units	248,428* (MMBtu)	Onsite combustion of fuel, Upstream emissions from fuel use
Use of propane/LPG in residential units	26,169* (MMBtu)	Onsite combustion of fuel, Upstream emissions from fuel use
Use of wood in residential units	125,965* (MMBtu)	Onsite combustion of fuel, Upstream emissions from fuel use
Use of natural gas in commercial units	15,994,387	Onsite combustion of fuel, Upstream emissions from fuel

Input Description	Input Value	Emission Source/Activity
	(therms)	use
Use of natural gas in industrial units	4,007,881 (therms)	Onsite combustion of fuel, Upstream emissions from fuel use
Transportation and Other Mobile Units		
Vehicle Miles Traveled estimate	2,341,013,000	Use of fuel in passenger cars
Vehicle Miles Traveled estimate	2,341,013,000	Use of fuel in heavy-duty freight vehicles
Solid Waste		
Tons of waste sent to landfill	165,191 tons	Methane emissions from community-generated waste sent to landfills
Tons of waste sent to landfill	165,191 tons	Process emissions associated with landfilling
Tons of waste sent to landfill	165,191 tons	Collection and transportation emissions
Agricultural Livestock		
Quantity of beef cows	5,165 individuals	Methane emissions from enteric fermentation and manure, direct and indirect nitrous oxide emissions from manure
Quantity of dairy cows	5,451 individuals	Methane emissions from enteric fermentation and manure, direct and indirect nitrous oxide emissions from manure
Quantity of swine	777 individuals	Methane emissions from enteric fermentation and manure, direct and indirect nitrous oxide emissions from manure

Input Description	Input Value	Emission Source/Activity
Quantity of sheep	1,838 individuals	Methane emissions from enteric fermentation and manure, direct and indirect nitrous oxide emissions from manure
Wastewater Treatment		
Digester annual average daily Biogas	138,369 ft^3	LOTT digester emissions
Fraction of CH4 in biogas	70%	LOTT digester emissions
Annual methanol consumption	31,029 gallons	LOTT emissions from methanol use in biological treatment of wastewater

*Values are obtained by scaling-down consumption estimates from the Energy Information Administration's (EIA) State Energy Database System (SEDS)

Results (by Jurisdiction)

Greenhouse gas emissions were calculated for Thurston County as a whole, for each incorporated city within the county, and for the unincorporated portion of Thurston County. Incorporated cities for which greenhouse gas emissions were calculated include: Olympia, Lacey, Tumwater, Yelm, Tenino, Bucoda and Rainier. Those results are presented in each of the sections below. All results are presented as metric tons of carbon dioxide equivalent (MTCDE).

Figure 1 depicts the geography of Thurston County, including the boundaries of the various communities and urban growth areas contained within the county, as of 2010. (Grand Mound and Rochester data was not collected for this study, because they are not incorporated and hence energy usage data was not available from Puget Sound Energy for those communities.)

This map can also be found at the following web site:
http://www.trpc.org/data/Documents/Profile%202010/Map02-CityLimits_UGAs11x17.pdf

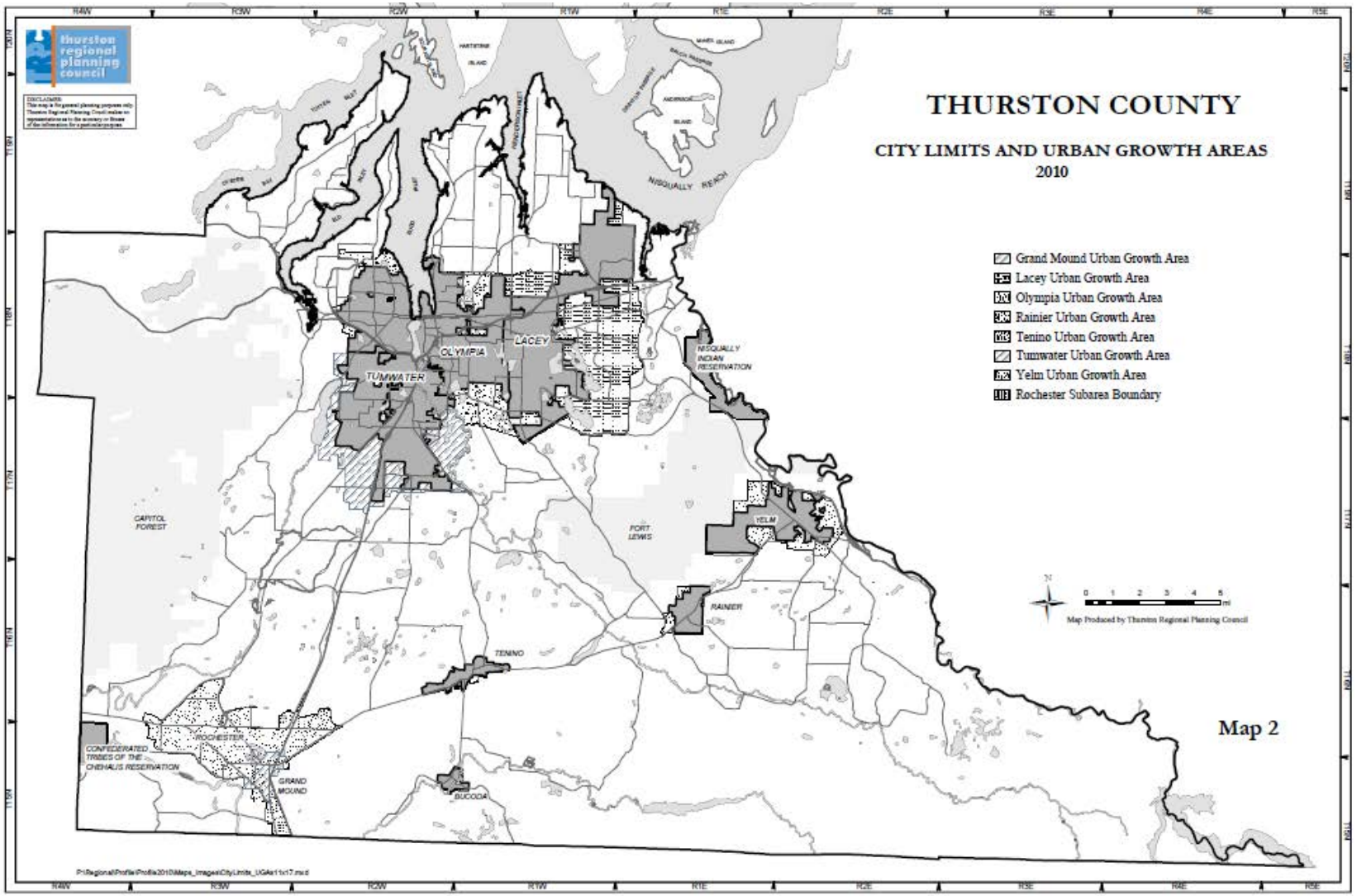


Figure 1: Thurston County Boundaries, City Limits, and Urban Growth Areas

Thurston County

Thurston County is located at the southern end of Puget Sound. As of the 2010 census, its population was 252,264. The county seat is Olympia, which is also the state capital and the county's largest city. According to the U.S. Census Bureau, the county has a total area of 774 square miles, of which 727 square miles is land and 47 square miles (6.03%) is water.

In calendar year 2010, greenhouse gas emissions in all of Thurston County, and from all sources and activities, totaled roughly 2.76 million metric tons of carbon dioxide equivalents (Table 5, Figure 2). This included emissions from the built environment; passenger, heavy-duty, and public transit vehicles; the generation and disposal of solid waste; the primary wastewater treatment facility in the community; and livestock production. The emissions for each of these sources are listed in Table 5 (below) and depicted in Figure 2.

Table 5: County-wide emission source types, quantities, and percentage of total emissions. Values in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source Type	**MTCDE ***	**%**
Built Environment	1,444,406	52%
On-road Vehicles	1,230,054	45%
Solid Waste	54,166	2%
Livestock	21,289	1%
Wastewater Treatment	11,884	0%
Total	2,761,800	100%
Per Capita Emissions	10.95	

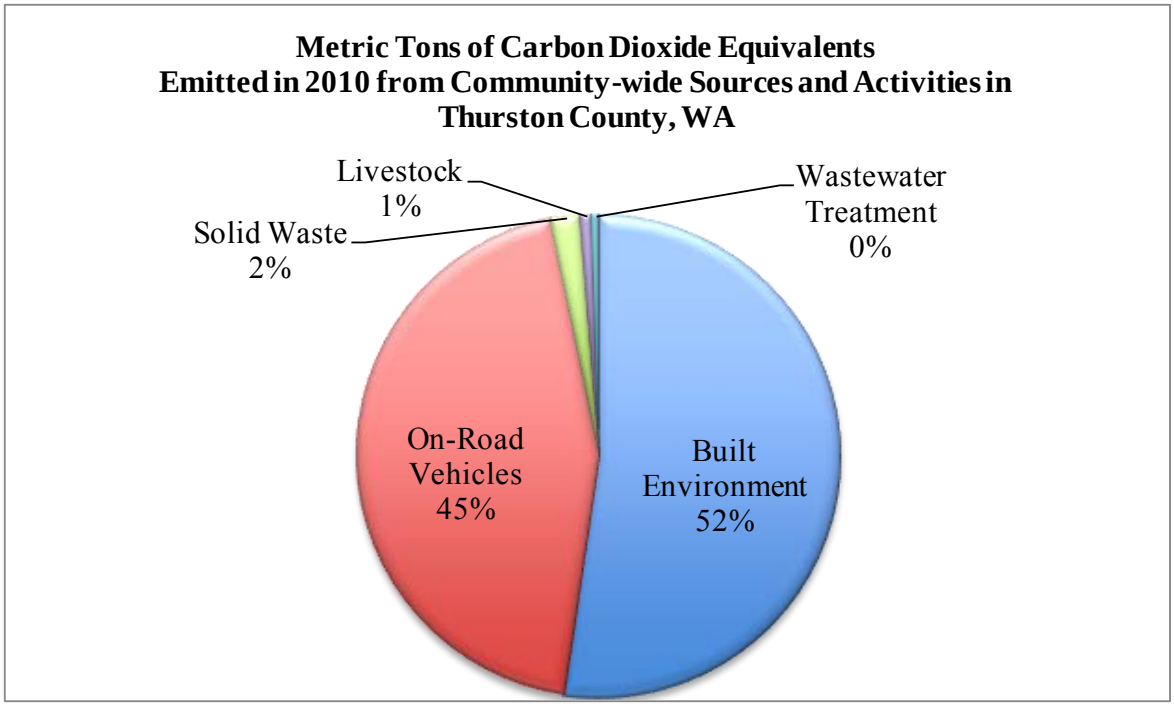


Figure 2: Distribution of county-wide emissions by source.

Built Environment Emissions

Emissions resulting from the use of fuel and electricity in the built environment account for the largest portion of emissions in the county (Figure 2). The use of electricity accounts for 60% of built environment emissions, while the use of fuel, primarily natural gas, accounts for roughly 20% (Table 6). Upstream emissions involved in the generation of the electricity consumed by the community account for approximately 10% of built environment emissions. Emissions from electricity transmission and distribution losses and upstream emissions associated with the production and distribution of natural gas account for 5% and 4% of the built environment total, respectively. The residential sector accounts for the most built environment emissions, followed by commercial and industrial sectors respectively (Figure 3). Street lighting ("lighting") accounts for a very small portion of emissions within the built environment.

Table 6: County-wide built environment emission source quantities and percentages. Values in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emissions Source	**MTCDE**	**%**
Use of Electricity	869,353	60%
Use of Fuel	293,597	20%
Upstream Electricity Use	145,476	10%
Transmission and Distribution Losses	71,373	5%
Upstream Fuel Use	64,606	4%
Total	1,444,406	100%

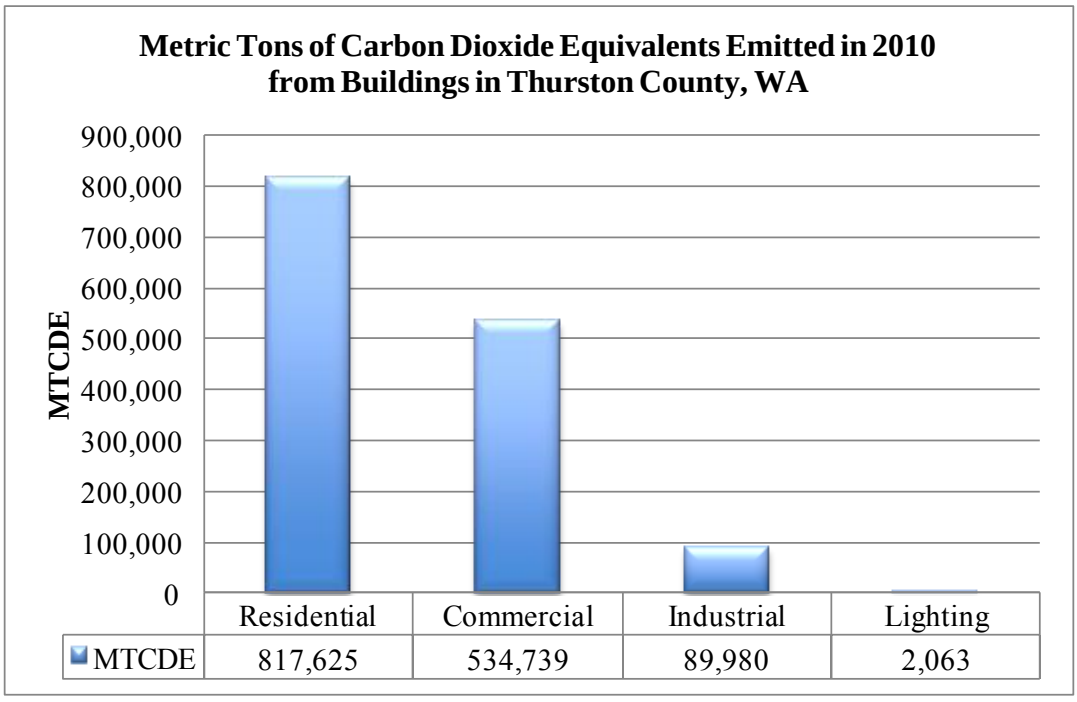


Figure 3: County-wide built environment emissions by structure type. Values in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

On-road Vehicle Emissions

On-road vehicle emissions account for approximately 44% of total emissions in Thurston County, WA in 2010 (Table 7). Emissions resulting from on-road vehicles operating within the county boundary were larger in passenger vehicles (962,361 MTCDE) than in heavy-duty freight vehicles (258,697 MTCDE). Public transit emissions were the smallest source (8,996 MTCDE). Passenger vehicles account for 78% of emissions from on-road transport, while heavy-duty freight vehicles account for 21% of on-road transportation emissions, and public transit accounts for approximately 1% of on-road transportation emissions.

Table 7: County-wide on-road vehicle emission source quantities and percentages. Values in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Passenger vehicles	962,361	78%
Heavy Duty Freight vehicles	258,697	21%
Public Transit (Gasoline)	1,842	<1%
Public Transit (Diesel)	7,154	<1%
Total	1,230,054	100%

Solid Waste Emissions

Methane emissions from the community-generated waste that is deposited in a landfill account for 86% of Thurston County's solid waste emissions (Table 8). Emissions associated with the decomposition of this material, and with the equipment used in processing this material, account for 5% of emissions. Rail and truck emissions, separate from on-road vehicle emissions, associated with transporting waste from the Thurston County Waste and Recovery Center to the Roosevelt Regional Landfill in Roosevelt, WA (4,625 MTCDE) make up the remaining 9% of solid waste emissions.

Table 8. County-wide solid waste emission source quantities and percentages. Values in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	MTCDE	%
Methane emissions	46,831	86%
Transportation emissions	4,625	9%
Process emissions	2,710	5%
Total	54,166	100%

Wastewater Treatment Emissions

Emissions from the operation of the primary wastewater treatment facility within the county (Lacey Olympia Tumwater Thurston (LOTT) Clean Water Alliance Budd Inlet Treatment Plant) were comprised of emissions from burning methane gas from the onsite digesters, and emissions resulting from the use of methanol to biologically treat waste (Table 9) The onsite burning of captured methane gas (digester emissions) produced 99% of emissions, and approximately 1% of emissions were a result of methanol use in the biological treatment of waste.

Table 9. County-wide wastewater emission source quantities and percentages from LOTT Clean Water Alliance Budd Inlet Treatment Plant. Values in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	MTCDE	%
Digester Emissions	11,759	99%
Methanol Emissions	124	1%
Total	11,883	100%

Livestock Emissions

Methane emissions resulting from domesticated animal production within the county boundary were divided among beef cows, dairy cows, sheep, and swine (Table 10). Beef cows accounted for 51% of emissions from domesticated animal production, 48% were from dairy cows, 1% from sheep, and less than 1% from swine.

Table 10: County-wide livestock emission source quantities and percentage. Values in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Beef Cows	10,760	51%
Dairy Cows	10,196	48%
Sheep	309	1%
Swine	24	<1%
Total	21,289	100%

Unincorporated Thurston County

In calendar year 2010 sources and activities producing greenhouse gas emissions in unincorporated Thurston County emitted roughly 1,443,200 metric tons of carbon dioxide equivalents (MTCDEs) (Table 11), including emissions from the built environment, passenger and heavy-duty vehicles, the generation and disposal of solid waste, and livestock production. The built environment generated approximately 606,664 MTCDE (42%), on-road passenger and heavy-duty vehicles produced approximately 786,233 MTCDE (54%), the generation and disposal of solid waste by the community emitted approximately 29,014 MTCDE (2%), and livestock produced roughly 21,289 MTCDE (1%).

Table 11: Unincorporated county emission source types quantities, and percentage of total emissions. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source Type	**MTCDE**	**%**
Built Environment	606,664	42%
On-Road Vehicles	786,233	54%
Solid Waste	29,014	2%
Livestock	21,289	1%
Total	1,443,200	100%
Per Capita Emissions	10.68	

Built Environment Emissions

The use of electricity accounts for 64% of built environment emissions in unincorporated Thurston County, while the use of fuel, primarily natural gas, accounts for roughly 16% (Table 12). Upstream emissions involved in the generation of the electricity consumed by the community account for approximately 11% of built environment emissions. Emissions from electricity transmission and distribution losses and upstream emissions associated with the production and distribution of natural gas account for 5% and 3% of the built environment total, respectively. The commercial sector accounts for the most built environment emissions, followed by the residential sector (Figure 4).

Table 12: Unincorporated county built environment emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emissions Source	**MTCDE**	**%**
Use of Fuel	100,075	16%
Use of Electricity	388,609	64%
Upstream Fuel Use	21,046	3%
Upstream Electricity Use	65,029	11%
Transmission and Distribution Losses	31,905	5%
TOTAL	606,664	100%

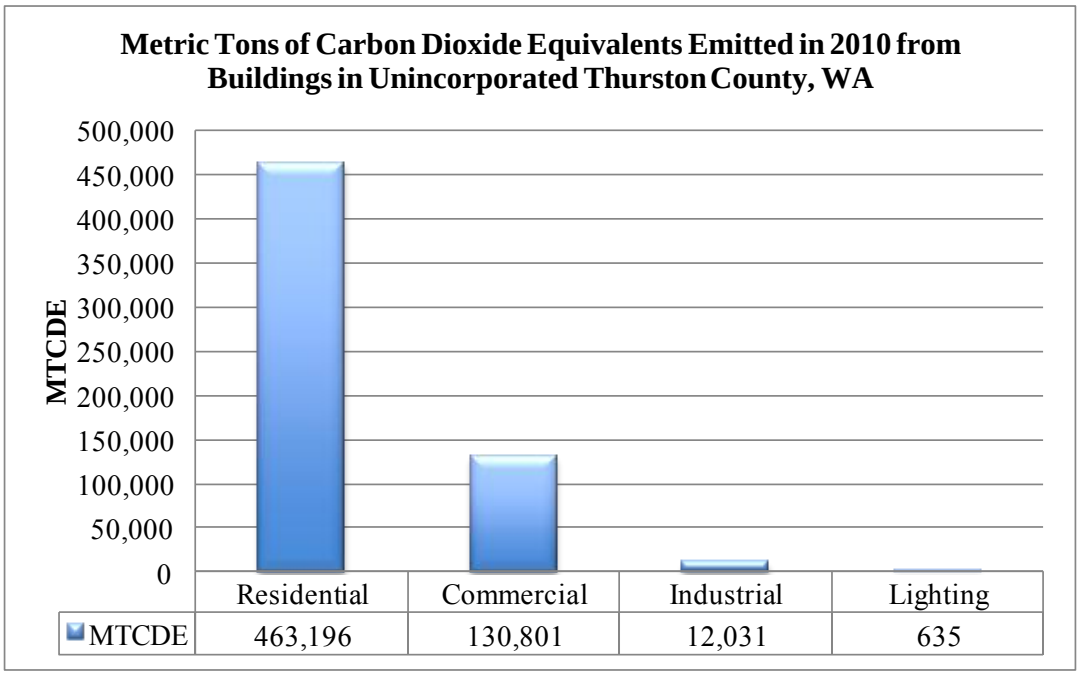


Figure 4: Unincorporated county built environment emissions by structure type. Values in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

On-road Vehicle Emissions

On-road vehicle emissions account for approximately 54% of total emissions in unincorporated Thurston County in 2010, and are the largest single source of emissions in the region (Table 11). Emissions resulting from on road vehicles operating within the county boundary were larger in passenger vehicles (619,659 MTCDE) than in heavy-duty freight vehicles (166,574 MTCDE). Passenger vehicles account for 79% of emissions from on-road transport, while heavy-duty freight vehicles account for 21% of on-road transportation emissions. (Table 13)

Table 13: Unincorporated county on-road vehicle emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Passenger vehicles	619,659	79%
Heavy Duty Freight vehicles	166,574	21%
Total	786,233	100%

Solid Waste Emissions

Community-generated waste that is landfilled accounts for 86% of solid waste emissions in unincorporated Thurston County (Table 14). Emissions associated with the landfilling process (i.e., decomposition) and equipment account for 5% of emissions (Table 14). Rail and truck emissions, separate from on-road vehicle emissions, from transporting waste from the Thurston County Waste and Recovery Center to the Roosevelt Regional Landfill in Roosevelt, WA makeup the remaining 9% of solid waste emissions.

Table 14: Unincorporated county solid waste emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Methane emissions	25,085	86%
Transportation emissions	2,478	9%
Process emissions	1,451	5%
Total	29,014	100%

Livestock Emissions

Methane emissions resulting from enteric fermentation of livestock within the county-boundary were divided among beef cows, dairy cows, sheep, and swine (Table 15). Beef cows accounted for 51% of emissions from livestock production, 48% from dairy cows, 1% from sheep, and less than 1% from swine.

Table 15: Unincorporated county livestock emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Beef Cows	10,760	51%
Dairy Cows	10,196	48%
Sheep	309	1%
Swine	24	<1%
Total	21,289	100%

Bucoda

Bucoda is located in the southern portion of Thurston County, about 17 miles south of Olympia, along Old Highway 99. With a 2010 population of 550, it covers only 0.4 square miles.

In calendar year 2010 sources and activities producing greenhouse gas emissions in Bucoda emitted roughly 2,047 metric tons of carbon dioxide equivalents (MTCDEs) (Table 16), including emissions from the built environment, passenger, and heavy-duty vehicles, and the generation and disposal of solid waste. The built environment generated approximately 1,636 MTCDE (80%), on-road passenger and heavy-duty vehicles produced approximately 290 MTCDE (14%), and the generation and disposal of solid waste by the community emitted approximately 121 MTCDE (6%). Per capita emissions for 2010 in Bucoda were estimated at 3.64 MTCDE.

Table 16: Bucoda emission source types quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source Type	**MTCDE**	**%**
Built Environment	1,636	80%
On-Road Vehicles	290	14%
Solid Waste	121	6%
Total	2,047	100%
Per Capita Emissions	3.64	

Built Environment Emissions

Emissions resulting from the use of fuel and electricity in the built environment account for the largest portion of emissions in Bucoda. The residential sector accounts for the most built environment emissions. The use of electricity accounts for 78% of built environment emissions, while the use of fuel, accounts for 3% (Table 17). Upstream emissions involved in the generation of the electricity consumed by the community account for approximately 13% of built environment emissions. Emissions from electricity transmission and distribution losses account for 6% of built environment emissions.

Table 17: Bucoda built environment emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emissions Source	**MTCDE**	**%**
Use of Electricity	1,272	78%
Upstream Electricity Use	213	13%
Transmission and Distribution Losses	104	6%
Use of Fuel	47	3%
Total	6,288	100%

On-road Vehicle Emissions

On-road vehicle emissions account for approximately 14% of total emissions in Bucoda in 2010, and passenger vehicles are the second largest single-source of emissions city-wide (**Table 18**). Emissions resulting from on road vehicles operating within the county boundary were larger in passenger vehicles (229 MTCDE) than in heavy-duty freight vehicles (61 MTCDE). Passenger vehicles accounted for 79% of emissions from on-road transport, while heavy-duty freight vehicles account for 21% of on-road transportation emissions.

Table 18: Bucoda on-road vehicle emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Passenger vehicles	229	79%
Heavy Duty Freight vehicles	61	21%
Total	290	100%

Solid Waste Emissions

Methane emissions from the community-generated waste that is landfilled account for 86% of Bucoda's solid waste emissions (Table 19). Emissions associated with the landfilling process (i.e., decomposition) and equipment account for 5% of emissions. Rail and truck emissions, separate from on-road vehicle emissions, from transporting waste from the Thurston County

Waste and Recovery Center to the Roosevelt Regional Landfill in Roosevelt, WA makeup the remaining 9% of solid waste emissions.

Table 19: Bucoda solid waste emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Methane emissions	333	86%
Transportation emissions	33	9%
Process emissions	19	5%
Total	385	100%

Lacey

Lacey is located in the northern part of Thurston County, bordering Olympia to the west. Lacey population in 2010 was 42,393. The city has a total area of 16.51 square miles (42.76 km2), of which, 16.06 square miles is land and 0.45 square miles is water.

In calendar year 2010 sources and activities producing greenhouse gas emissions in Lacey, WA emitted roughly 392,141 metric tons of carbon dioxide equivalents (MTCDEs) (Table 20). This included emissions from the built environment, passenger, heavy-duty, and public transit vehicles, the generation and disposal of solid waste, and the primary wastewater treatment facility in the community. The built environment generated approximately 240,697 MTCDE (60%), on-road passenger and freight vehicles produced approximately 137,599 MTCDE (35%), the generation and disposal of solid waste by the community emitted approximately 9,103 MTCDE (2%), and emissions related to the primary wastewater treatment facility within the county serving Lacey total approximately 4,742 MTCDE (1%). Per capita emissions for Lacey were 9.25 MTCDE.

Table 20: Lacey emission source type quantities, and percentage of total emissions. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source Type	**MTCDE**	**%**
Built Environment	240,697	61%
On-Road Vehicles	137,599	35%
Wastewater Treatment	4,742	1%
Solid Waste	9,103	2%
Total	392,141	100%
Per Capita Emissions	9.25	

Unique among the jurisdictions included in this inventory, Lacey conducted a community wide greenhouse gas inventory for calendar year 2005. At that time, Lacey had a population of 33,705 and its emissions were 345,202 metric tons of carbon dioxide equivalent. This represents a 14% increase in overall community GHG emissions between 2005 and 2010, significantly lower than its 26% growth in population. With per capita emissions for 2005 at 10.24, these figures point to a 10% reduction in Lacey's per capita emissions during that five year period.

The numbers reported in Lacey's 2005 greenhouse gas inventory may have used slightly different calculations; for example, they may not have included upstream electricity and fuel use as part of the built environment calculations. For a more accurate picture of Lacey's GHG

emissions trends, these calculations should be examined in greater detail, and any necessary adjustments made to ensure an accurate comparison between 2005 and 2010 emissions.

Built Environment Emissions

Emissions resulting from the use of fuel and electricity in the built environment account for the largest portion of emissions in the city of Lacey (Table 20). The residential sector accounts for the most built environment emissions, followed by the commercial and then industrial sectors respectively (Figure 5). The use of electricity accounts for 55% of built environment emissions, while the use of fuel, primarily natural gas, accounts for roughly 25% (Table 21). Upstream emissions involved in the generation of the electricity consumed by the community account for approximately 9% of built environment emissions. Emissions from electricity transmission and distribution losses and upstream emissions associated with the production and distribution of natural gas account for 5% and 6% of the built environment total, respectively.

Table 21: Lacey built environment emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emissions Source	**MTCDE**	**%**
Use of Electricity	133,586	55%
Use of Fuel	60,329	25%
Upstream Electricity Use	22,354	9%
Upstream Fuel Use	13,461	6%
Transmission and Distribution Losses	10,967	5%
Total	240,697	100%

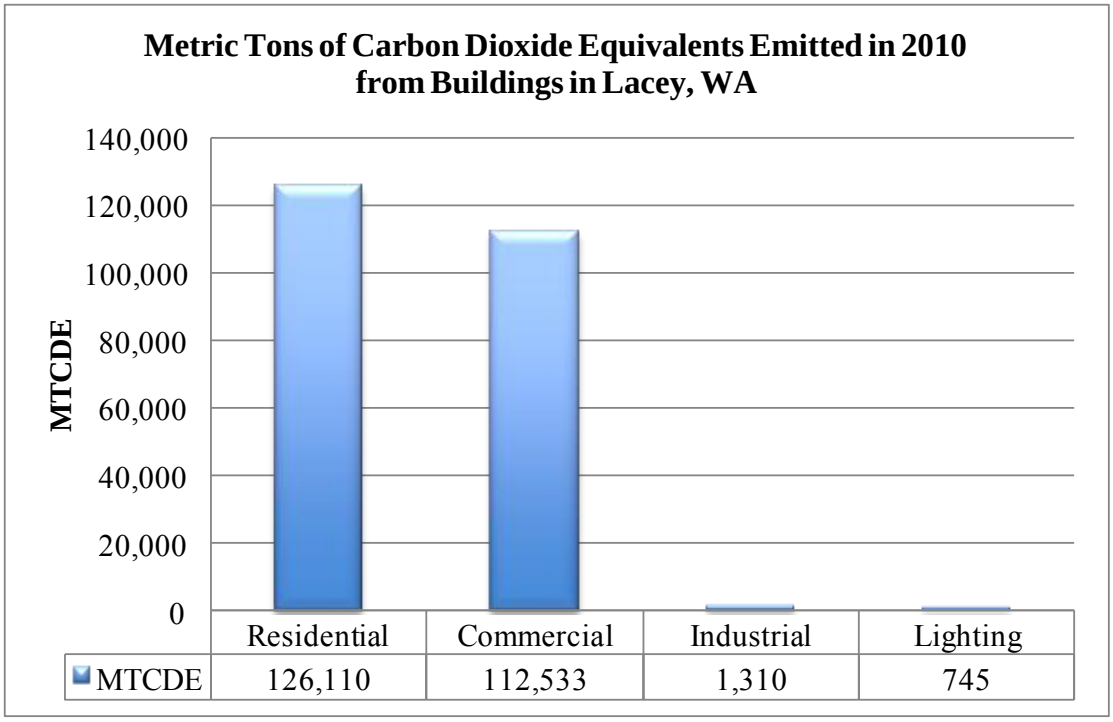


Figure 5: Lacey built environment emissions by structure type. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

On-road Vehicle Emissions

On-road vehicle emissions accounted for approximately 35% of Lacey's total emissions in 2010, and passenger vehicles are the largest single source of on-road vehicle emissions city-wide (Table 22). Passenger vehicles account for 77% of emissions from on-road transport, while heavy-duty freight vehicles account for 21% of on-road transportation emissions, and public transit accounts for approximately 2% of on-road transportation emissions.

Table 22: Lacey on-road vehicle emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Passenger vehicles	105,617	77%
Heavy Duty Freight vehicles	28,391	21%
Public Transit	3,590	2%

Total	137,599	100%

Solid Waste Emissions

Methane emissions from the community-generated waste that is landfilled account for 86% of Lacey's solid waste emissions (7,870 MTCDE) (Table 23). Emissions associated with the landfilling process (i.e., decomposition) and equipment account for 5% of emissions, or 455 MTCDE. Rail and truck emissions, separate from on-road vehicle emissions, from transporting waste from the Thurston County Waste and Recovery Center to the Roosevelt Regional Landfill in Roosevelt, WA (777 MTCDE) makeup the remaining 9% of solid waste emissions (Table 19).

Table 23: Lacey solid waste emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Methane emissions	7,870	86%
Transportation emissions	777	9%
Process emissions	455	5%
Total	9,103	100%

Wastewater Treatment Emissions

Lacey's emissions from the onsite burning of captured methane gas (digester emissions) amounted to 4,692 MTCDE (99%), and approximately 50 MTCDE emissions (1%) were a result of methanol use in the biological treatment of waste (Table 24).

Table 24: Lacey's wastewater emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Digester Emissions	4,692	99%

Methanol Emissions	50	1%
Total	4,742	100%

Olympia

Olympia is the capital of Washington State and the county seat of Thurston County. The population was 46,478 at the 2010 census. Situated in the northern end of Thurston County, the city borders Lacey to the east, and Tumwater to the south. The city has a total area of 19.68 square miles, of which, 17.82 sq mi is land and 1.86 sq mi is water.

In calendar year 2010, greenhouse gas emissions in Olympia from all sources and activities, totaled roughly 564,607 metric tons of carbon dioxide equivalents (MTCDEs) (Table 25). This included emissions from the built environment (365,941 MTCDE); passenger, heavy-duty, and public transit vehicles (183,487 MTCDE); the generation and disposal of solid waste (9,980 MTCDE); and the primary wastewater treatment facility in the community (5,199 MTCDE). The emissions and percentages for each of these sources are listed in Table 25 (below). Per capita emissions for Olympia were 12.15 MTCDE.

Table 25: Olympia emission source types, quantities, and percentage of total emissions. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source Type	MTCDE	%
Built Environment	365,941	65%
On-Road Vehicles	183,487	32%
Solid Waste	9,980	2%
Wastewater Treatment	5,199	1%
Total	564,607	100%
Per Capita Emissions	12.15	

Built Environment Emissions

Emissions resulting from the use of fuel and electricity in the built environment account for the largest portion of emissions in Olympia. The commercial sector accounts for the most built environment emissions, followed by residential and industrial sectors respectively (Figure 6). Street lighting ("lighting") accounts for a very small portion of emissions within the built environment. The use of electricity accounts for 57% of built environment emissions, while the use of fuel, primarily natural gas, accounts for roughly 24% (Table 26). Upstream emissions involved in the generation of the electricity consumed by the community account for approximately 5% of built environment emissions. Emissions from electricity transmission and

distribution losses and upstream emissions associated with the production and distribution of natural gas account for 9% and 5% of the built environment total, respectively.

Table 26: Olympia built environment emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source Type	**MTCDE**	**%**
Use of Electricity	207,575	57%
Use of Fuel	86,906	24%
Upstream Electricity Use	34,735	9%
Upstream Fuel Use	19,683	5%
Transmission and Distribution Losses	17,042	5%
TOTAL	365,941	100%

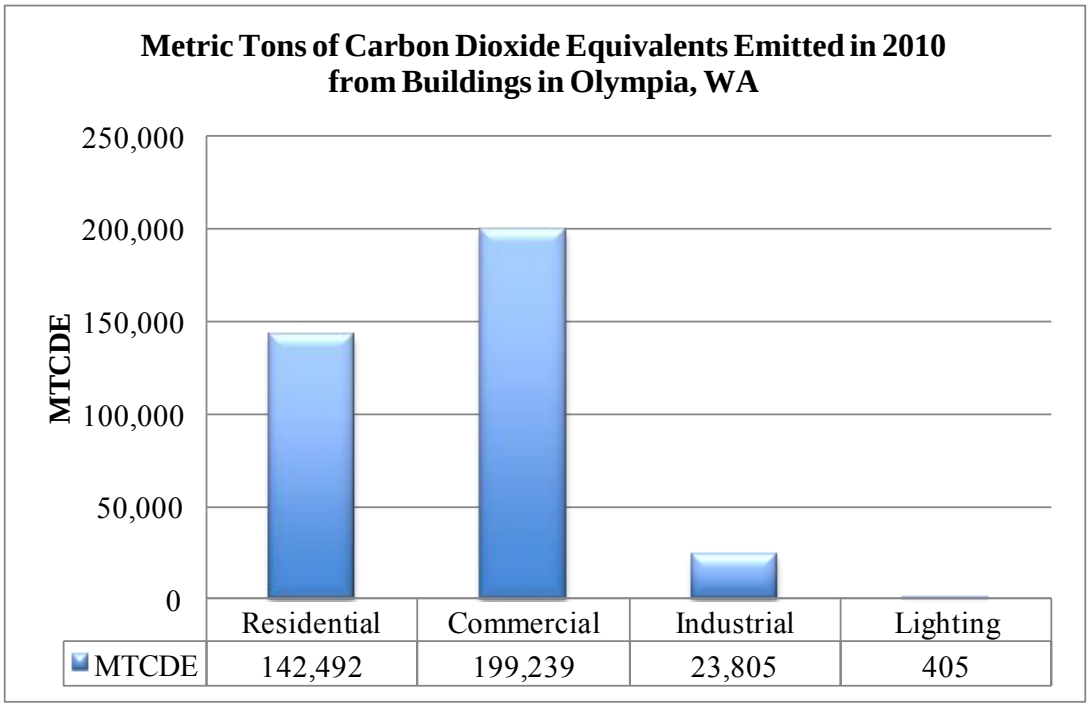


Figure 6: Olympia built environment emissions by structure type. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

On-road Vehicle Emissions

On-road vehicle emissions accounted for approximately 32% of Olympia's total emissions in 2010 (Table 25). Emissions resulting from on-road vehicles operating within the city boundary were larger in passenger vehicles (141,511 MTCDE) than in heavy-duty freight vehicles (38,040 MTCDE). Public transit emissions were the smallest source (3,936 MTCDE). Passenger vehicles account for 71% of emissions from on-road transport, while heavy-duty freight vehicles account for 21% of on-road transportation emissions, and public transit accounts for approximately 2% of on-road transportation emissions (Table 27).

Table 27: Olympia on-road vehicle emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Passenger vehicles	141,511	77%
Heavy Duty vehicles	38,040	21%
Public Transit	3,936	2%
TOTAL	183,487	100%

Solid Waste Emissions

Methane emissions from the community-generated waste that is deposited in a landfill account for 86% of Olympia's solid waste emissions (8,629 MTCDE) (Table 28). Emissions associated with the decomposition of this material, and with the equipment used in processing this material, account for 5% of emissions, or 499 MTCDE. Rail and truck emissions, separate from on-road vehicle emissions, associated with transporting waste from the Thurston County Waste and Recovery Center to the Roosevelt Regional Landfill in Roosevelt, WA (852 MTCDE) make up the remaining 9% of Olympia's solid waste emissions.

Table 28: Olympia solid waste emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Methane emissions	8,629	86%
Transportation emissions	852	9%
Process emissions	499	5%
Total	9,980	100%

Wastewater Treatment Emissions

Onsite burning of captured methane gas (digester emissions) account for 99% of its emissions (5,145 MTCDE), and approximately 1% of emissions (54 MTCDE) were a result of methanol use in the biological treatment of waste (Table 29).

Table 29: Olympia wastewater emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Digester Emissions	5,145	99%
Methanol Emissions	54	1%
Total	5,199	100%

Rainier

Rainier is located in the southeast portion of Thurston County, about 5.5 miles southwest of Yelm along highway 507. The city has a total area of 1.73 square miles, all of it land. In terms of land cover, 18% (179 acres) of the city is urban, 27% (267 acres) is forested, and 55% (540 acres) is covered with non-forest vegetation and soils. As of 2010, there were 1,794 people, 656 households, and 484 families residing in the city

In calendar year 2010 sources and activities producing greenhouse gas emissions in Rainier emitted roughly 8,734 metric tons of carbon dioxide equivalents (MTCDEs) (Table 30), including emissions from the built environment, passenger, and heavy-duty vehicles, and the generation and disposal of solid waste. The built environment generated approximately 6,288 MTCDE (72%), on-road passenger and heavy-duty vehicles produced approximately 2,060 MTCDE (24%), and the generation and disposal of solid waste by the community emitted approximately 385 MTCDE (4%). Per capita emissions for Rainier were 4.87 MTCDE.

Table 30: Rainier emission source type quantities and percentage of total emissions. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source Type	**MTCDE**	**%**
Built Environment	6,288	72%
On-Road Vehicles	2,060	24%
Solid Waste	385	4%
Total	8,734	100%
Per Capita Emissions	4.87	

Built Environment Emissions

Emissions resulting from the use of fuel and electricity in the built environment account for the largest portion of emissions in Rainier (Table 30). The residential sector accounts for the most built environment emissions (Figure 7). The use of electricity accounts for 63% of built environment emissions, while the use of fuel, primarily natural gas, accounts for 18% (Table 31). Upstream emissions involved in the generation of the electricity consumed by the community account for approximately 10% of built environment emissions. Emissions from electricity transmission and distribution losses and upstream emissions associated with the production and distribution of natural gas account for 5% and 4% of the built environment total, respectively.

Table 31: Rainier built environment emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emissions Source	**MTCDE**	**%**
Use of Electricity	3,962	63%
Use of Fuel	1,110	18%
Upstream Electricity Use	663	11%
Transmission and Distribution Losses	325	5%
Upstream Fuel Use	228	4%
Total	6,288	100%

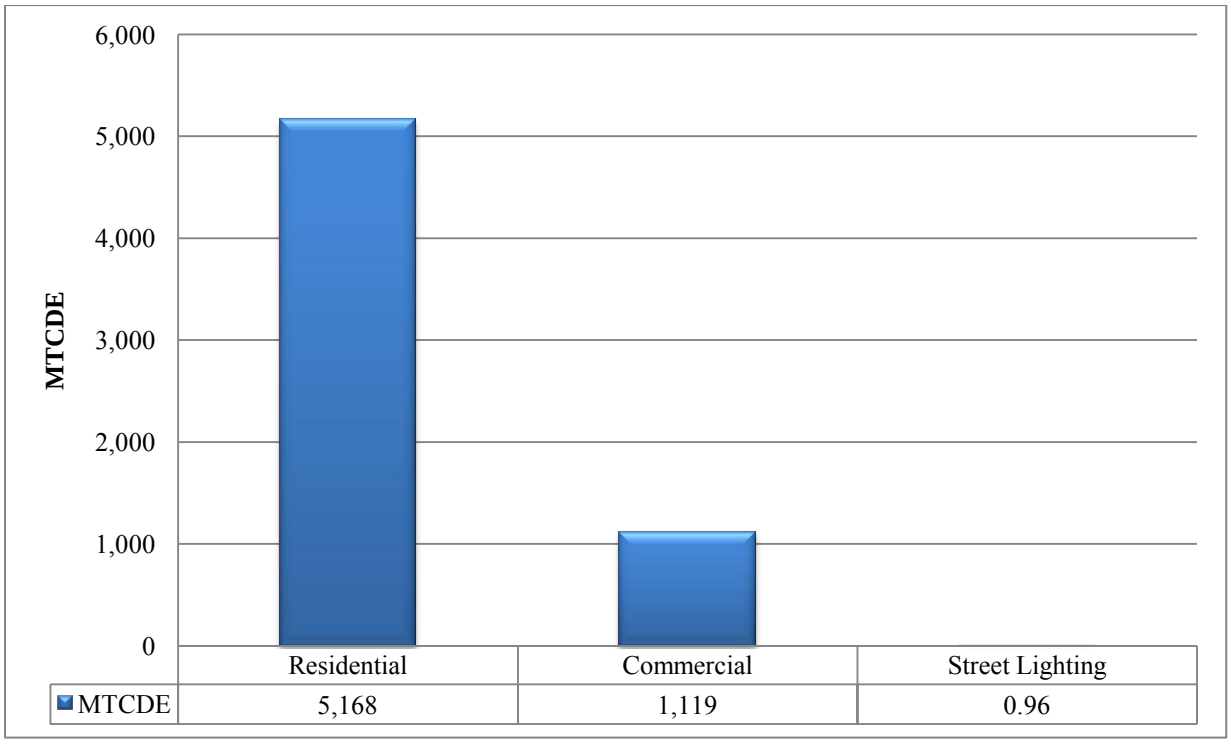


Figure 7: Rainier built environment emissions by structure type. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

On-road Vehicle Emissions

On-road vehicle emissions accounted for approximately 24% of total emissions in Rainier in 2010, and passenger vehicles were the second largest single-source of emissions city-wide

(Table 32). Emissions resulting from on road vehicles operating within the county boundary were larger in passenger vehicles (1,624 MTCDE) than in heavy-duty freight vehicles (436 MTCDE). Passenger vehicles account for 79% of emissions from on-road transport, while heavy-duty freight vehicles account for 21% of on-road transportation emissions.

Table 32: Rainier on-road vehicle emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Passenger vehicles	1,624	79%
Heavy Duty Freight vehicles	436	21%
Total	2,060	100%

Solid Waste Emissions

Methane emissions from the community-generated waste that is landfilled account for 86% of Rainier's solid waste emissions (Table 33). Emissions associated with the landfilling process (i.e., decomposition) and equipment account for 5% of emissions. Rail and truck emissions, separate from on-road vehicle emissions, from transporting waste from the Thurston County Waste and Recovery Center to the Roosevelt Regional Landfill in Roosevelt, WA makeup the remaining 9% of solid waste emissions.

Table 33: Rainier solid waste emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Methane emissions	333	86%
Transportation emissions	33	9%
Process emissions	19	5%
Total	385	100%

Tenino

Tenino is located in the south central portion of Thurston County, about 14 miles south of Olympia along Old Highway 99. In 2010, there were 1,695 people, 691 households, and 440 families residing in Tenino. The city has a total area of 1.44 square miles, all of it land.

In calendar year 2010 sources and activities producing greenhouse gas emissions in Tenino, WA emitted roughly 12,852 metric tons of carbon dioxide equivalents (MTCDEs) (Table 34), including emissions from the built environment, passenger, and heavy-duty vehicles, and the generation and disposal of solid waste. The built environment generated approximately 8,143 MTCDE (63%), on-road passenger and heavy-duty vehicles produced approximately 4,345 MTCDE (34%), and the generation and disposal of solid waste by the community emitted approximately 364 MTCDE (3%). Per capita emissions for Tenino were 7.58 MTCDE.

Table 34: Tenino emission source types quantities, and percentage of total emissions. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source Type	**MTCDE**	**%**
Built Environment	8,143	63%
On-Road Vehicles	4,345	34%
Solid Waste	364	3%
Total	12,852	100%
Per Capita Emissions	7.58	

Built Environment Emissions

Emissions resulting from the use of fuel and electricity in the built environment account for the largest portion of emissions in Tenino (Table 35). The residential sector accounts for the most built environment emissions (Figure 8). The use of electricity accounts for 79% of built environment emissions, while the use of fuel, primarily natural gas, accounts for 2%. Upstream emissions involved in the generation of the electricity consumed by the community account for approximately 13% of built environment emissions. Emissions from electricity transmission and distribution losses account for 6% of the built environment total.

Table 35: Tenino built environment emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emissions Source	**MTCDE**	**%**
Use of Electricity	6,404	79%
Upstream Electricity Use	1,072	13%
Transmission and Distribution Losses	526	6%
Use of Fuel	142	2%
Total	8,143	100%

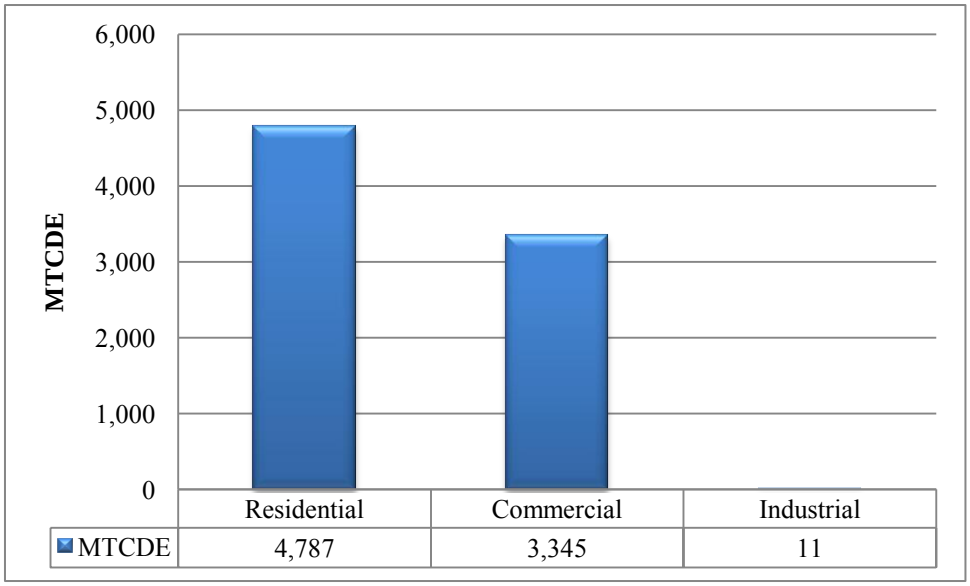


Figure 8: Tenino built environment emissions by structure type. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

On-road Vehicle Emissions

On-road vehicle emissions account for approximately 34% of total emissions in Tenino in 2010, and passenger vehicles are the second largest single-source of emissions city-wide (Table 36). Emissions resulting from on road vehicles operating within the city boundary were larger in passenger vehicles (3,424 MTCDE) than in heavy-duty freight vehicles (921 MTCDE). Passenger vehicles account for 79% of Tenino emissions from on-road transport, while heavy-duty freight vehicles account for 21% of on-road transportation emissions.

Table 36: Tenino on-road vehicle emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	MTCDE	%
Passenger vehicles	3,424	79%
Heavy Duty Freight vehicles	921	21%
Total	2,060	100%

Solid Waste Emissions

Methane emissions from Tenino's community-generated waste that is landfilled account for 86% of its solid waste emissions (Table 37). Emissions associated with the landfilling process (i.e., decomposition) and equipment account for 5% of emissions. Rail and truck emissions, separate from on-road vehicle emissions, from transporting waste from the Thurston County Waste and Recovery Center to the Roosevelt Regional Landfill in Roosevelt, WA makeup the remaining 9% of solid waste emissions.

Table 37: Tenino solid waste emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	MTCDE	%
Methane emissions	315	86%
Process emissions	18	5%
Transportation emissions	31	9%
Total	364	100%

Tumwater

Tumwater shares its northern border with Olympia, and is in the northern portion of Thurston County. The population was 17,371 at the 2010 census. The city has a total area of 14.49 square miles, of which, 14.32 square miles is land and 0.17 square miles is water.

In calendar year 2010 sources and activities producing greenhouse gas emissions in Tumwater emitted roughly 288,540 metric tons of carbon dioxide equivalents (MTCDEs) (Table 38), including emissions from the built environment, passenger, heavy-duty, and public transit vehicles, the generation and disposal of solid waste, and the primary wastewater treatment facility in the community. The built environment generated approximately 177,016 MTCDE (61%), on-road passenger and freight vehicles produced approximately 105,851 MTCDE (36%), the generation and disposal of solid waste by the community emitted approximately 3,730 MTCDE (1%), and emissions related to the primary wastewater treatment facility within the county serving Tumwater total approximately 1,943 MTCDE (1%).

Table 38: Tumwater emission source type quantities, and percentage of total emissions. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source Type	**MTCDE**	**%**
Built Environment	177,016	61%
On-Road Vehicles	105,851	37%
Solid Waste	3,730	1%
Wastewater Treatment	1,943	1%
Total	288,540	100%
Per Capita Emissions	16.61	

Built Environment Emissions

Emissions resulting from the use of fuel and electricity in the built environment account for the largest portion of emissions in Tumwater (Table 39). The commercial sector accounts for the most built environment emissions (Figure 9). The use of electricity accounts for 61% of built environment emissions, while the use of fuel, primarily natural gas, accounts for roughly 19%. Upstream emissions involved in the generation of the electricity consumed by the community account for approximately 10% of built environment emissions. Emissions from electricity transmission and distribution losses and upstream emissions associated with the production and distribution of natural gas account for 5% and 4% of the built environment total, respectively.

Table 39: Tumwater built environment emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emissions Source	**MTCDE**	**%**
Use of Electricity	107,915	61%
Use of Fuel	34,376	19%
Upstream Electricity Use	18,058	10%
Transmission and Distribution Losses	8,860	5%
Upstream Fuel Use	7,807	4%
Total	177,016	100%

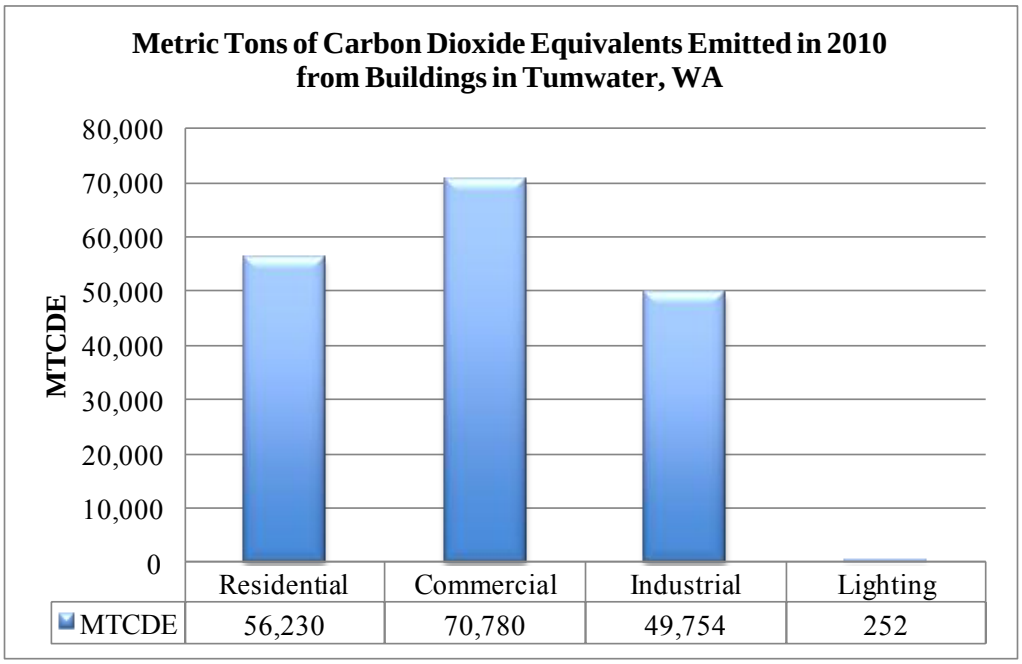


Figure 9: Tumwater built environment emissions by structure type. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

On-road Vehicle Emissions

On-road vehicle emissions accounted for approximately 36% of Tumwater's total emissions in 2010, and passenger vehicles are the largest single source of emissions city-wide (Table 40).

Passenger vehicles account for 78% of Tumwater's emissions from on-road transport, while heavy-duty freight vehicles account for 21%, and public transit accounts for approximately 1%.

Table 40: Tumwater on-road vehicle emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	MTCDE	%
Passenger vehicles	82,266	78%
Heavy Duty Freight vehicles	22,114	21%
Public Transit	1,471	1%
Total	105,851	100%

Solid Waste Emissions

Methane emissions from the community-generated waste that is landfilled account for 86% of Tumwater's solid waste emissions (Table 41). Emissions associated with the landfilling process (i.e., decomposition) and equipment account for 5% of emissions. Rail and truck emissions, separate from on-road vehicle emissions, from transporting waste from the Thurston County Waste and Recovery Center to the Roosevelt Regional Landfill in Roosevelt, WA (319 MTCDE) make up the remaining 9% of solid waste emissions.

Table 41: Tumwater solid waste emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	MTCDE	%
Methane emissions	3,225	86%
Transportation emissions	319	9%
Process emissions	187	5%
Total	3,731	100%

Wastewater Treatment Emissions

Emissions from the operation of the primary wastewater treatment facility within the county (Lacey, Olympia, Tumwater, Thurston (LOTT)) Clean Water Alliance Budd Inlet Treatment Plant) were comprised of process emissions, emissions from burning methane gas from the

onsite digesters, and emissions resulting from the use of methanol to biologically treat waste. Wastewater treatment related process emissions account for 62% of Tumwater's share of emissions at the primary wastewater treatment plant, 37% of emissions were from the onsite burning of captured methane gas, and approximately 1% of emissions were a result of methanol use in the biological treatment of waste (Table 42).

Table 42: Tumwater wastewater treatment emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	**MTCDE**	**%**
Digester Emissions	1,923	99%
Methanol Emissions	20	1%
Total	9,143	100%

Yelm

Yelm is in the eastern part of Thurston County, and is located about 20 miles southeast of Olympia. The city has a total area of 5.69 square miles, of which 5.68 square miles is land and 0.01 square miles is water. In 2010, there were 6,848 people, 2,299 households, and 1,712 families residing in the city.

In calendar year 2010 sources and activities producing greenhouse gas emissions in Yelm emitted roughly 46,679 metric tons of carbon dioxide equivalents (MTCDEs) (Table 43), including emissions from the built environment, passenger and heavy-duty vehicles, and the generation and disposal of solid waste. The built environment generated approximately 38,020 MTCDE (77%), on-road passenger and heavy-duty vehicles produced approximately 10,189 MTCDE (21%), and the generation and disposal of solid waste by the community emitted approximately 1,470 MTCDE (3%). Per capita emissions are estimated at approximately 7.25 MTCDE.

Table 43: Yelm emission source types quantities, and percentage of total emissions. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source Type	**MTCDE**	**%**
Built Environment	38,020	77%
On-Road Vehicles	10,189	21%
Solid Waste	1,470	3%
Total	49,679	100%
Per Capita Emissions	7.25	

Built Environment Emissions

Emissions resulting from the use of fuel and electricity in the built environment account for the largest portion of emissions in Yelm (Table 44). The residential sector accounts for the most built environment emissions, followed by the commercial and then industrial sectors respectively (Figure 10). The use of electricity accounts for 53% of built environment emissions (Table 44), while the use of fuel, primarily natural gas, accounts for roughly 28%, Upstream emissions involved in the generation of the electricity consumed by the community account for approximately 9% of built environment emissions. Emissions from electricity transmission and distribution losses and upstream emissions associated with the production and distribution of natural gas account for 4% and 6% of the built environment total, respectively.

Table 44: Yelm built environment emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emissions Source	**MTCDE**	**%**
Use of Electricity	20,030	53%
Use of Fuel	10,613	28%
Upstream Electricity Use	3,352	9%
Upstream Fuel Use	2,381	6%
Transmission and Distribution Losses	1,644	4%
Total	38,020	100%

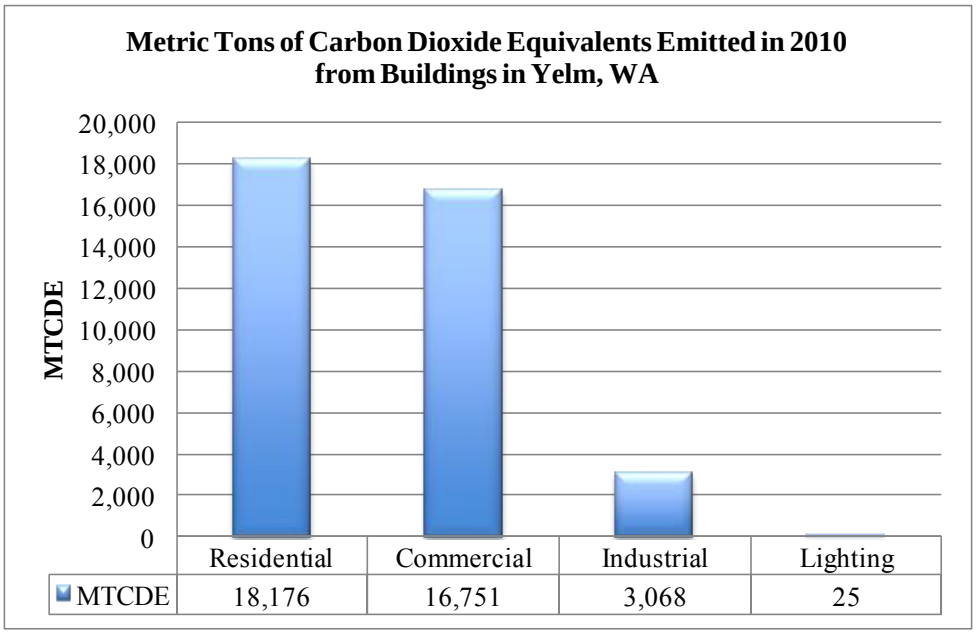


Figure 10: Yelm built environment emissions by structure type. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

On-road Vehicle Emissions

On-road vehicle emissions accounted for approximately 20% of Yelm's total emissions in 2010, and passenger vehicles were one of the largest single sources of emissions city-wide (Table 45). Emissions resulting from on road vehicles operating within the county boundary were larger in passenger vehicles (8,030 MTCDE) than in heavy-duty freight vehicles (2,159 MTCDE).

Passenger vehicles account for 79% of Yelm's emissions from on-road transport, while heavy-duty freight vehicles account for 21% of on-road transportation emissions.

Table 45: Yelm on-road vehicle emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	MTCDE	%
Passenger vehicles	8,030	79%
Heavy Duty Freight vehicles	2,159	21%
Total	10,189	100%

Solid Waste Emissions

Methane emissions from the community-generated waste that is landfilled account for 86% of Yelm's solid waste emissions (Table 46). Emissions associated with the landfilling process (i.e., decomposition) and equipment account for 5% of emissions. Rail and truck emissions, separate from on-road vehicle emissions, from transporting waste from the Thurston County Waste and Recovery Center to the Roosevelt Regional Landfill in Roosevelt, WA makeup the remaining 9% of solid waste emissions.

Table 46: Yelm solid waste emission source quantities and percentages. Values are in Metric Tons of Carbon Dioxide Equivalents (MTCDE).

Emission Source	MTCDE	%
Methane emissions	1,271	86%
Transportation emissions	126	9%
Process emissions	74	5%
Total	1,471	100%

Implications

In this section, implications of this study for setting goals, designing strategies and programs, and monitoring results are discussed.

Because economic, social and political dynamics of the communities within Thurston County are highly interdependent, TCAT recommends that goals, strategies and programs be defined collaboratively among the county, city councils, and related agencies which serve the region. Other agencies and organizations with specific contributions to setting goals, strategies and programs include Thurston Regional Planning Council, school districts and other educational institutions, LOTT, Puget Sound Energy, and the Port of Olympia.

Setting Goals

When considering GHG reduction goals for Thurston County, it is helpful first to consider how Thurston County's current emissions compare with those of Northwest states and communities, and with emissions nation-wide. Secondly, Thurston County goals should take into account Washington State's legally-established GHG reduction goals, codified in RCW 70.235.020, and with goals set for other Northwest communities. Finally, we should consider the assessments of the Intergovernmental Panel on Climate Change (IPCC) and other international scientific bodies for GHG reduction targets.

Northwest GHG Emissions and Goals

Because each city and local jurisdiction has different population and area it includes, comparison among jurisdictions must take this into account. The easiest way of comparing GHGs among jurisdictions is on a per person basis. Table 47 compares Thurston County per person GHG emissions for 2010 with those of Washington State as a whole, other western states (Oregon and California), the U.S., King County, Washington, and Eugene, Oregon.

Table 47. Per Person GHG emission comparisons

Jurisdiction	Per Person GHG (MTCDE)	Data source
Thurston County	11.0	This study.
Washington	14.1	Washington Department of Ecology, Washington State Greenhouse Gas Emissions Inventory, 1990-2010.
Oregon	10	US-EPA CO2 Emissions from Fossil Fuel Combustion.
California	10	US-EPA CO2 Emissions from Fossil Fuel Combustion.
United States	22	US-EPA CO2 Emissions from Fossil Fuel Combustion.
Eugene, OR	8.6	City of Eugene Community Greenhouse Gas Emissions Inventory (2007)
King County, WA	8.6	Erickson, P. & Chandler, C. (2012). Greenhouse gas tracking framework for King County: 2010 update.

Since the GHG emission figures for Washington, Oregon, California, and the Unites States do not include sources other than fossil fuel combustion (for example, solid waste), slight adjustments may be necessary to bring them into line with the calculations included in this study.

We recommend that, as part of the goal setting and climate action planning process, GHG emission data on additional communities comparable to the communities in Thurston County should be further investigated.

Other communities within the Pacific Northwest have set GHG reduction goals. As listed in the ICLEI USA Annual Report for 2010, Table 48 presents a sample of GHG reduction goals for Northwest cities and counties.

Table 48: GHG Emission Reduction Goals for Northwest Cities

City	First GHG reduction target	Second GHG reduction target	Third GHG reduction target
Blaine County, ID	25% below 2007 levels by 2025	50% below 2007 levels by 2045	
Eugene, OR	50% reduction by 2030		
Portland, OR	10% below 1990 levels by 2010	40% below 1990 levels by 2030	80% below 1990 levels by 2050
Bellevue, WA	7% below 1990 levels by 2012		
Bellingham, WA	7% below 2000 levels by 2012	28% below 2000 levels by 2020	
Kirkland, WA	10% below 2005 levels by 2012	20% below 2005 levels by 2020	80% below 2005 levels by 2050
Olympia, WA	50% below 2005 levels by 2020	70% below 2005 levels by 2035	80% below 2005 levels by 2050
Seattle, WA	7% below 1990 levels by 2012	30% below 1990 levels by 2024	80% below 1990 levels by 2050
Skagit County, WA	10% below 2000 levels by 2015	20% below 2000 levels by 2020	80% below 2000 levels by 2050
Snohomish County, WA	20% below 2000 levels by 2020		
Spokane, WA	30% below 2005 levels by 2030		
Tacoma, WA	15% below 1990 levels by 2012	40% below 1990 levels by 2020	80% below 1990 levels by 2050
Whatcom County, WA	7% below 1990 levels by 2012		

Washington State Goals

The Washington Legislature has established GHG emission reduction goals for the state as a whole. Codified in RCW 70.235.020, those goals are:

- By 2020, reduce overall emissions of greenhouse gases in the state to 1990 levels;
- By 2035, reduce overall emissions of greenhouse gases in the state to twenty-five percent below 1990 levels;
- By 2050, the state will do its part to reach global climate stabilization levels by reducing overall emissions to fifty percent below 1990 levels, or seventy percent below the state's expected emissions that year.

Per person emissions can also be useful in understanding the implications of various targets for emission reductions. For example, Table 49 uses the RCW targets identified above, along with population projections for Thurston County provided by TRPC, to estimate per person emissions and emission reductions required to meet those targets. Washington State GHG emissions are taken from the Department of Ecology's Washington State Greenhouse Gas Emissions Inventory, 1990-2010.

If these estimates are correct, there has already been a significant reduction in per person GHG emissions (5.43 MTCDE) between 1990 and 2010. By comparison, the reductions required per person to meet 2020 and 2035 targets are modest (2.04 and 3.60 respectively).

We recommend that these estimates and the assumptions they are based on be further examined and refined as part of the goal setting process.

Table 49: Washington and Thurston County emissions for Washington RCW targets

	1990	**2010**	**2020**	**2035**
Statewide population	4,866,692	6,724,540	7,414,437	8,494,122
Statewide GHG MTCDE	88,400,000	96,100,000	88,400,000	66,300,000
Statewide average GHG tons / person	18.16	14.29	11.92	7.81
Thurston Co Population	161,238	252,264	295,900	370,600
Thurston Co Average GHG MTCDE / person	15.76	10.95	8.59	5.14
Thurston Co GHG MTCDE	2,540,511	2,761,800	2,540,511	1,905,383
Per person emissions differences from prev period:		-4.81	-2.36	-3.44

Data sources and calculations for Table 49 are as follows:

- Washington State GHG emissions figure is taken from Department of Ecology, Washington State Greenhouse Gas Emissions Inventory, 1990-2010, December 2012.
- Washington state population figure for 1990 is taken from US Census Bureau, Population Change and Distribution, April 2001. State population for 2010 is taken from US Census Bureau, 2010 Demographic Profile. State population projections for 2020 and 2035 are taken from the Washington Office of Financial Management, November 2012 Population Forecast, http://www.ofm.wa.gov/pop/stfc/stfc2012/stfc_2012.pdf
- Thurston County GHG emissions for 1990 were estimated by multiplying statewide emissions by the ratio of 2010 Thurston County emissions to 2010 statewide emissions. That is, Thurston County's portion of statewide GHG emissions was assumed to the same in 1990 and in 2010.
- Thurston County population figures were provided by the Thurston Regional Planning Council.

IPCC Assessment

The Intergovernmental Panel on Climate Change (IPCC) is the primary scientific body established internationally to monitor changes in greenhouse gas accumulations, emissions, and their effects on global climate. The IPCC has assessed the level at which greenhouse gases should be stabilized in the atmosphere to prevent a crisis to human civilization, and the global reductions required in GHG emissions in order to achieve that level. Their assessments should also be considered in setting GHG reduction goals for Thurston County.

The IPCC assessments were summarized in a 2008 study by Dr. Joseph Romm, former Acting Assistant Secretary of the U.S. Department of Energy, author and climate expert. (See "The United States Needs a Tougher Greenhouse Gas Emissions Reduction Target for 2020," Center for American Progress.) IPCC assessments suggest GHG reduction targets for developed countries of 25% to 40% below 1990 levels by 2020, and 80% to 95% below 1990 levels by 2050. Table 50 applies the low end of the range for these targets, to Washington State and Thurston County GHG emissions. Since OFM and TRPC population projections do not include figures for 2050, average per person emissions and differences from the previous period could not be calculated for that year.

Table 50: Washington and Thurston County emissions for IPCC Targets

	1990	**2010**	**2020**	**2050**
Statewide population	4,866,692	6,724,540	7,414,437	??
Statewide GHG MTCDE	88,400,000	96,100,000	66,300,000	17,680,000
Statewide average GHG tons / person	18.16	14.29	8.94	??
Thurston Co Population	161,238	252,264	295,900	??
Thurston Co GHG MTCDE	2,540,511	2,761,800	1,905,383	508,102
Thurston Co Average GHG MTCDE / person	15.76	10.95	6.44	??
Per person emissions differences from prev period		-4.81	-4.51	
Per person percentage reductions		-31%	-41%	

Designing Strategies and Programs

Strategies for reducing Thurston County's GHG emissions can be defined based on an analysis of the numbers contained in this inventory. Since the largest emissions are associated with energy usage in the built environment (both residential and commercial) and transportation, it follows that strategies and programs should focus first on those segments.

We recommend placing these emission numbers in context of other trends and dynamics within Thurston County communities. This can be done by posing and researching follow up questions about the county's GHG emissions. Some sample questions are listed in Table 51.

Table 51: Sample questions for exploring community context of GHG emissions

1. What is the ratio of passenger car VMT attributable to commute and non-commute trips?
2. What drives the difference in per-capita GHG emissions between rural (south county) and urban (north county) communities?
3. What economic incentives and disincentives have greatest influence on GHG emissions related to specific activities (e.g., transportation, built environment energy usage, solid waste disposal)?
4. What needs are residents addressing when they drive (e.g., shopping, entertainment, socializing, working)? How might some of these needs be met in other ways, to reduce emissions?
5. What industries and companies are responsible for the majority of heavy duty freight traffic in Thurston County? What efficiencies or transportation alternatives might be explored to help them reduce their emissions while meeting their transportation needs?

To take one example, Question 2 in Table 51 asks, "What drives the difference in per-capita GHG emissions between rural (south county) and urban (north county) communities?" Another number that varies by city size is the amount of emissions due to commercial building energy usage. This might suggest that a useful strategy for reducing emissions in north county communities is reducing energy usage in commercial buildings. This theory deserve further exploration, both statistically and by talking with knowledgeable commercial property owners, to determine whether this strategy is likely to produce hoped for results.

We suggest that strategies and programs be defined for each of the major segments and activities that produce the most significant GHG emissions. These segments include:

- Residential built environment
- Commercial built environment

- Passenger vehicle transportation
- Public transportation (for example., service provided by Intercity Transit)
- Commercial transportation
- Wastewater
- Solid waste
- Energy generation and delivery (for example, solar, smart grid)

In addition, in order to ensure broad public engagement in implementing strategies in the above areas, as well as solid and consistent financial support, strategies and programs will be needed in the following areas:

- Public engagement
- Program finance

Following this approach to defining strategies, we recommend that a working group for each segment be commissioned to help define strategies, and to lead and coordinate GHG reduction projects and activities for that segment. Following this approach, it will be critical that there be significant coordination among these working groups. Therefore, we recommend formation of a steering committee composed of representatives of local jurisdictions and stakeholder groups to achieve this coordination. In addition, we recommend staffing the coordination effort adequately, to help track the progress in each segment, handle logistics and meeting management, and to ensure those working on strategies and programs receive needed support and guidance.

Monitoring Results

The effectiveness of adopted strategies and programs must be checked frequently against actual GHG emissions. This will allow Thurston County leaders and residences to know whether their efforts to reduce emissions are actually making a difference, and to adopt new strategies if they are not. The time frames in which results must be achieved are relatively short; 2013 to 2020, for example, is only seven years. If there were a delay of five years between reports, there would not be sufficient time to make adjustments and reach the selected target.

For this reason, we recommend that a community-based GHG inventory be prepared for Thurston County annually. As these inventories are completed, refinements and improvements to the methodology will likely be identified. As improvements in methodology and analysis are adopted, it will be important to document these changes and to adjust results for previous inventories, as needed, to ensure comparable numbers from one year to the next.

We recommend assigning local jurisdiction staff (including county, city and TRPC staff) to complete specific tasks in this annual effort. In addition, we recommend defining and funding new staff time to coordinate this annual GHG inventory, either within one of the local government organizations or in a separate organization.

Recommended Next Steps

Based on activities described in the previous section, we recommend the following steps be taken over the next six months:

1. Present this report to Thurston Regional Planning Commission, the Sustainable Thurston Task Force, and individual city councils and tribal councils. Request necessary funding to define strategies, and coordinate actions among jurisdictions.
2. Define climate action targets and recommended strategies which include all communities within the county boundaries. This should be completed by the end of calendar year 2013, and cover:
    - GHG reduction goals and targets;
    - strategies, programs and projects for reaching the targets;
    - mechanisms for broad participation (including but not limited to work groups and a steering committee);
    - assignment of individual targets, strategies and projects to owners (e.g., chairs of work groups);
    - public engagement
    - staffing; and
    - funding.
3. Establish work groups and other mechanisms for completing strategies and projects defined above.
4. Complete the GHG Inventory for 2011.

Appendices

Glossary

A comprehensive glossary of climate change terms can be found on the US Environmental Protection Agency's web site, at the following address:

http://www.epa.gov/climatechange/glossary.html

Emission Calculation Details

Emission sources and activities associated with the built environment include the consumption of electricity, electricity transmission and distribution losses, onsite combustion of fuel, and upstream emissions from electricity and fuel usage. For each jurisdiction, aggregate values for the consumption of electricity in residential, commercial, industrial, and street lighting units were used to calculate emissions associated with the generation of the electrical energy consumed (Figure 11) as well as transmission and distribution losses (Figure 12) and upstream emissions resulting from the use of electricity (Figure 13). Aggregate values for the consumption of fuel in residential, commercial, and industrial units were used to calculate associated emissions (Figure 14) and upstream emissions resulting from the use of fuel (Figure 15).

Equation BE.2.2 Calculating Electricity GHG Emissions Using Separate CO_2, N_2O, and CH_4 Emission Factors

Annual CO_2e emissions (metric tons/year) =

$$\frac{electricity}{2204.6} \times \begin{pmatrix} CO_2\ emission\ factor \\ +21 \times CH_4\ emission\ factor \\ +310 \times N_2O\ emission\ factor \end{pmatrix}$$

Where:

- electricity is the community's annual electricity use in MWh from Step 1,
- the CO_2 emission factor is the individual CO_2 emission factor from Step 2 (lb/MWh),
- the CH_4 emission factor is from Step 2 (lb/MWh),
- the N_2O emission factor is from Step 2 (lb/MWh),
- Use the CH_4 global warming potential[11] (GWP) to convert from pounds of CH_4 to CO_2e
- Use the N_2O global warming potential[12] (GWP) to convert from pounds of N_2O to CO_2e, and
- 2204.6 is the conversion factor to convert from pounds to metric tons.

Figure 11: Method for estimating individual GHG emissions from the use of electricity. Retrieved from "U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions," Developed by ICLEI Local Governments for Sustainability – USA, 2012.

Equation BE.4.1.1 Calculating Electricity GHG Emissions Using a CO_2e Emission Factor

Annual CO_2e emissions (metric tons/year) =

$$\frac{\textit{Community electricity use} \times \textit{grid loss factor} \times \textit{CO}_2\textit{e emission factor}}{2204.6}$$

Where:

- Electricity is the community's annual electricity use in MWh from Step 1,
- the CO_2e emission factor is the combined carbon dioxide *equivalents* emission factor from Step 2 in lbs/MWh,
- the grid loss factor is from Step 3, and
- 2204.6 is the conversion factor to convert from pounds to metric tons.

Figure 12: Method for estimating GHG emissions resulting from transmission and distribution losses. Retrieved from "U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions," Developed by ICLEI Local Governments for Sustainability – USA, 2012.

***Equation BE.5.2.A* - Upstream emissions associated with electricity used within a community.**		
Total upstream emissions= (Total Electricity Use x Regional Upstream Emissions Factor Conversion Factor) Where: Description		
Annual CO_2e	= Total annual CO_2e emitted by upstream activities ($mtCO_2e$)	User Input
Total Electricity Use	= Total annual electricity used in a community including transmission and distribution losses	User Input
EF_{region}	= Regionally appropriate upstream emissions factor from Table B.18	User Input
Conversion Factor	= Conversion from kg to metric ton (mt/kg)	10^{-3}

Figure 13: Method for estimating upstream GHG emissions associated with electricity used within a community. Retrieved from "U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions," Developed by ICLEI Local Governments for Sustainability – USA, 2012.

Equation BE.1.1.1	Calculating CO_2 Emissions From Stationary Combustion (gallons)
Fuel A CO_2 Emissions (metric tons) = Fuel Used (gallons) × Emission Factor (kg CO_2/gallon) ÷ 1,000 (kg/metric ton)	
Fuel B CO_2 Emissions (metric tons) = Fuel Used (gallons) × Emission Factor (kg CO_2/gallon) ÷ 1,000 (kg/metric ton)	
Total CO_2 Emissions (metric tons) = CO_2 from Fuel A (metric tons) + CO_2 from Fuel B (metric tons)	
Note that Equation BE.1.1.1 expresses fuel use in gallons. If fuel use is expressed in different units (such as short tons, cubic feet, MMBtu, etc.), replace "gallons" in the equation with the appropriate unit of measure. Be sure that your units of measure for fuel use are the same as those in your emission factor.	

Equation BE.1.1.2	Calculating CH_4 Emissions From Stationary Combustion (MMBtu)
Fuel/Sector A CH_4 Emissions (metric tons) = Fuel Use (MMBtu) × Emission Factor (kg CH_4/MMBtu) ÷ 1,000 (kg/metric ton)	
Fuel/Sector B CH_4 Emissions (metric tons) = Fuel Use (MMBtu) × Emission Factor (kg CH_4/MMBtu) ÷ 1,000 (kg/metric ton)	
Total CH_4 Emissions (metric tons) = CH_4 from Type A (metric tons) + CH_4 from Type B (metric tons)	

Equation BE.1.1.4	Calculating N_2O Emissions From Stationary Combustion (MMBtu)
Fuel/Sector A N_2O Emissions (metric tons) = Fuel Use (MMBtu) × Emission Factor (kg N_2O/MMBtu) ÷ 1,000 (kg/metric ton)	
Fuel/Sector B N_2O Emissions (metric tons) = Fuel Use (MMBtu) × Emission Factor (kg N_2O/MMBtu) ÷ 1,000 (kg/metric ton)	
Total N_2O Emissions (metric tons) = N_2O from Type A (metric tons)+ N_2O from Type B (metric tons)	

Figure 14: Method for estimating emissions from on-site combustion of fuels in residential, commercial, and industrial units. Retrieved from "U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions," Developed by ICLEI Local Governments for Sustainability – USA, 2012.

Equation BE.5.1.1 **Upstream emissions associated with stationary fuel use within a community. Note: this is for primary fuels only and also applies to primary fuels combusted outside of the community for generating electricity used by the community.**		
Annual CO_2e *emissions* $= \Sigma(\text{Total Fuel Use}_{\text{Fuel Type}} \times \text{Conversion Factor} \times \text{Upstream EF}) \times 10^{-3}$ Where:		
Description		Value
Annual CO_2e	= Total annual CO_2e emitted by upstream activities ($mtCO_2e$)	Result
Total Fuel $\text{Use}_{\text{Fuel Type}}$	= Total annual fuel of each type used in a community and sector	User Input
Conversion Factor	= Conversion factor to obtain the same units of fuel used in Table B.13	User Input
Upstream EF	= Fuel specific upstream emissions factor from Table B.13	User Input
10^{-3}	= Conversion from kg to metric ton (mt/kg)	10^{-3}

Figure 15: Method for estimating upstream emissions associated with on-site fuel use in residential, commercial, and industrial units. Retrieved from "U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions," Developed by ICLEI Local Governments for Sustainability – USA, 2012.

Emissions activities and sources associated with on-road transportation and other mobile units include the use of fuel in on-road passenger and freight vehicles, as well as the use of fuel in public transit vehicles. For each jurisdiction, on-road passenger and freight vehicle emissions were calculated by using the formula:

$$\sum \left(\frac{VMT \times \%_{vehicle\ type}}{Average\ MPG_{vehicle\ type}} \times Emission\ Factor_{fuel\ type}\right)$$

Emissions from public transit vehicles were obtained from InterCity Transit's 2010 greenhouse gas emissions inventory.

Emission sources and activities associated with the generation and disposal of solid waste include methane emissions from community-generated waste sent to landfills (Figure 16), process emissions associated with landfilling waste (Figure 17), and rail transportation emissions (Figure 18). In order to estimate emissions for each jurisdiction within Thurston County, each emission source was multiplied by the percentage of total Thurston County population for that jurisdiction.

Equation SW.4.1 Methane Emissions

$$CH_4\ Emissions\ = GWP_{CH4} * (1-\ CE) * (1-OX) * M * \sum_i P_i\ * EF_i$$

Where:

Term	Description	Value
CH_4 emissions	= Community generated waste emissions from waste M ($mtCO_2e$)	Result
GWP_{CH4}	= CH_4 global warming potential	
M	= Total mass of waste entering landfill (wet short ton)	User Input
P_i	= Mass fraction of waste component i	User Input
EF_i	= Emission factor for material i ($mtCH_4$/wet short ton)	Table SW.5
CE	= Default LFG Collection Efficiency	No Collection, 0 Collection, 0.75
OX	= Oxidation rate	0.10

Source: As developed by ICLEI staff and Solid Waste Technical Advisory Committee. Emissions factors from U.S. EPA Municipal Solid Waste Publication (2008) available at http://www.epa.gov/epawaste/nonhaz/municipal/pubs/msw2008data.pdf

Figure 16: Method for estimating methane emissions from community-generated waste sent to landfills. Retrieved from "U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions," Developed by ICLEI Local Governments for Sustainability – USA, 2012.

Equation SW.5 Process Emissions			
$PE_{LF} = M*EFP$			
Where:			
Term	Description	Value (Diesel)	Value (CNG)
PE_{LF}	= Total landfill process emissions ($mtCO_2e$)	Result	Result
M	= Total mass of solid waste that enters the landfill in the inventory year (wet short ton)	User Input	User Input
EFP	= Emissions factor for landfill process emissions (mtCO2e/wet short ton)	0.0164	0.011
Source: U.S. EPA, Waste Reduction Model (WARM), Version 12 and Model Documentation			

Figure 17: Method for estimating process emissions from community-generated waste sent to landfills. Retrieved from "U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions," Developed by ICLEI Local Governments for Sustainability – USA, 2012.

Equation SW.6 Collection and Transportation Emissions			
$CE = M*EFC$ $TE = M*MT*EFT$			
Where:			
Term	Description	Value (Diesel)	Value (CNG)
CE	= Total collection emissions ($mtCO_2e$)	Result	Result
TE	= Total transportation emissions ($mtCO_2e$)	Result	Result
M	= Total mass of solid waste collected and transported in the inventory year (wet short ton)	User Input	User Input
MT	= Miles traveled to disposal site	User Input	User Input
EFC	= Emissions factor for collection emissions ($mtCO_2e$/ wet short ton)	0.020	0.014
EFT	= Emissions factor for transport emissions ($mtCO_2e$/ wet short ton/mile)	0.00014	0.00010

Figure 18: Method for estimating rail transportation emissions from community-generated waste sent to landfills. Retrieved from "U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions," Developed by ICLEI Local Governments for Sustainability – USA, 2012.

Emissions sources and activities associated with domesticated animal production include methane emissions from enteric fermentation. In this inventory, only emissions from enteric fermentation are reported as the availability of data related to manure management practices in Thurston County is not readily available. Beef cows, dairy cows, swine, and sheep populations were included in methane emissions estimates resulting from enteric fermentation (Figure 19). Emissions from livestock production were allocated to unincorporated Thurston County.

Equation A.1
Methane Emissions due to Enteric Fermentation from Domesticated Animal Production

$$CH_4 \text{ Emissions} = \Sigma \text{ (Animal Population x EF x (1/1000) x GWP)}_{\text{animal type}}$$

Where:

		Description	Value
CH_4 Emissions	=	Methane emissions due to enteric fermentation ($MTCO_2e$)	Product of equation A.1
Animal Population	=	Average annual animal population (head)	User input (or as calculated in A.0)
EF	=	Emissions Factor (kg CH_4/head/year)	Varies by animal type, see tables A.1.1 and A.1.2
1/1000	=	Conversion of kg CH_4 to metric tons	1/1000
GWP_{CH4}	=	Global Warming Potential; conversion from metric tons of methane into metric tons of CO_2 equivalents (CO_2e)	GWP^1

Source: US Environmental Protection Agency's *2011 Inventory of US Greenhouse Gas Emissions and Sinks* Annex 3 Section 3.9 Methodology for Estimating CH_4 Emissions from Enteric Fermentation

Figure 19: Method for estimating methane emissions from enteric fermentation. Retrieved from "U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions," Developed by ICLEI Local Governments for Sustainability – USA, 2012.

Emission sources and activities associated with wastewater treatment at the LOTT Clean Water Alliance Budd Inlet Treatment Plant include digester operation (Figure 20, Figure 21, Figure 22), and biological (Figure 23) wastewater treatment processes. In order to estimate emissions for each of the jurisdictions served by LOTT (Lacey, Olympia, Tumwater), each emission source was multiplied by the percentage of the total population served by LOTT. The portions of unincorporated Thurston County served by LOTT were not included in the inventory for unincorporated Thurston County.

***Equation WW.1.a* Emissions from Devices Designed to Combust Digester Gas, with CH_4 Content Known**		
Annual CH_4 emissions = *(Digester Gas $\times fCH_4 \times BTU_{CH4} \times 10^{-6} \times EF_{CH4} \times 365.25 \times 10^{-3}) \times GWP$* Where:		
Description		Value
Annual CH_4 emissions	= Total annual CH_4 emitted by incomplete combustion ($mtCO_2e$)	Result
Digester gas	= Standard cubic feet of digester gas produced per day (std ft^3/day)	User Input
fCH_4	= Fraction of CH_4 in gas	User Input
BTU_{CH4}	= Default BTU content of CH_4, higher heating value (BTU/ft^3)	1028 (nation-wide average)
10^{-6}	= Conversion from BTU to 1 MMBTU	10^{-6}
EF_{CH4}	= CH_4 emission factor (kg CH_4/MMBTU)	3.2 X 10^{-3} kg CH_4 per MMBTU
365.25	= Conversion factor (day/year)	365.25
10^{-3}	= Conversion from kg to mt (mt/kg)	10^{-3}
GWP_{CH_4}	= Global Warming Potential; conversion from mt of CH_4 into mt of CO_2 equivalents	GWP[5]
***Equation WW.1.a* Emissions from Devices Designed to Combust Digester Gas, with CH_4 Content Known**		
Source: In 40 CFR Part 98, Mandatory Reporting of Greenhouse Gases; Final Rule, Table C-2, page 79154 of the Federal Register / Vol. 75, No. 242 / Friday, December 17, 2010 / Rules and Regulations, is referenced an emission factor for digester gas combustion: 3.2 X 10^{-3} kg CH_4 per million BTU. See: http://edocket.access.gpo.gov/2010/pdf/2010-30286.pdf		

Figure 20: Method for estimating methane emissions from devices designed to combust digester gas. Retrieved from "U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions," Developed by ICLEI Local Governments for Sustainability – USA, 2012.

Box WW.2.a	**Example Calculation of N_2O Emissions from the Combustion of Anaerobic Digester Gas when fraction of CH_4 is known**	
A wastewater facility generates 1,000,000 ft^3 per day of digester gas containing 65% CH_4. The BTU content of the digester gas is not available. Based on this scenario the N_2O emissions from the combustion of digester biogas can be calculated as follows		
Description		Value
N_2O emissions	= Total N_2O emitted by combustion ($mtCO_2e$)	Result
Digester gas	= Measured standard cubic feet of digester gas produced per day (std ft^3/ day)	1,000,000
fCH_4	= Fraction of CH_4 in biogas	0.65
BTU_{CH4}	= Default BTU content of CH_4, higher heating value (BTU/ft^3)	1028
10^{-6}	= Conversion from BTU to 1 MMBTU	10^{-6}
EF_{N2O}	= N_2O emission factor (kg N_2O/MMBTU)	6.3 X 10^{-4} kg N_2O per MMBTU
365.25	= Conversion factor (day/year)	365.25
10^{-3}	= Conversion from kg to mt (mt/kg)	10^{-3}
GWP_{N_2O}	= Global Warming Potential; conversion from mt of N_2O into mt of CO_2 equivalents	GWP^9
Sample Calculation:		
Annual N_2O emissions = (1,000,000 x 0.65 x 1028 x 10^{-6} x (6.3 x 10^{-4}) x 365.25 x 10^{-3}) x 310 = 47.7 $mtCO_2e$		

Figure 21: Method for estimating nitrous oxide emissions from the combustion of digester gas. Retrieved from "U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions," Developed by ICLEI Local Governments for Sustainability – USA, 2012.

***Equation WW.3* CO_2 Emissions from Digester gas Combustion**		
*Annual CO_2 emissions = Digester gas * BTU_{CO2} * EF_{CO2} * 365.25 * 10^{-3}*		
Where:		
Description		Value
CO_2 emissions	= Total annual biogenic CO_2 emitted by combustion of biogas ($mtCO_2e$)	Result
Digester gas	= Standard cubic feet of digester gas produced per day (std ft^3/day)	User input
BTU_{CO2}	= BTU content of biogas (MMBTU/scf)	User input or 0.000841
EF_{CO2}	= Emission factor for CO_2 (kg CO_2/ MMBTU)	52.07
365.25	= Conversion factor (day/year)	365.25
10^{-3}	= Conversion factor kg to mt	10^{-3}
Source: Table G.2 of the Local Government Operations Protocol version 1.1 May, 2010		

Figure 22: Method for estimating carbon dioxide emissions from digester gas combustion. Retrieved from "U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions," Developed by ICLEI Local Governments for Sustainability – USA, 2012.

***Equation WW.9* CO2 Emission from Methanol Use**		
*Annual CO_2 emissions = Methanol Load *F *(44.01/32.04) *GWP *365.25*		
Where:		
Description		Value
Annual CO_2 emissions	= Total annual CO_2 emitted ($mtCO_2e$)	Result
Methanol load	= Amount of neat chemical used per day (mt CH_3OH/day)	User Input
F	= Factor to be applied based on WWTP's sludge treatment type: • Raw Solids Disposal 80% • Anaerobic Digestion 90% • Solids Combustion 100%	0.80, 0.90, 1.0
44.01/32.04	= Molecular weight ratio of 44.01 (for CO_2) to 32.04 (for CH_3OH)	1.37
GWP	= Global Warming Potential for CO_2	1
365.25	= Conversion factor from days to year	365.25

Figure 23: Method for estimating carbon dioxide emissions from methanol usage in the biological treatment of wastewater. Retrieved from "U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions," Developed by ICLEI Local Governments for Sustainability – USA, 2012.

City of Olympia

City Hall
601 4th Avenue E.
Olympia, WA 98501
360-753-8447

City Council

Approval of Interlocal Agreement with Port of Olympia for West Bay Environmental Restoration Assessment

Agenda Date: 3/4/2014
Agenda Number: 6.B
File Number: 14-0178

File Type: contract **Version:** 1 **Status:** Other Business

..Title
Approval of Interlocal Agreement with Port of Olympia for West Bay Environmental Restoration Assessment

..Recommended Action
Committee Recommendation:
Not referred to a committee.

City Manager Recommendation:
Move to approve and authorize the Mayor to sign an Interlocal Agreement with the Port of Olympia for the West Bay Environmental Restoration Assessment.

..Report
Issue:
Whether to enter into an Interlocal Agreement with the Port of Olympia for joint development of an Environmental Restoration Assessment for West Bay. The Port Board of Commissioners approved the Interlocal Agreement at its meeting on February 24, 2014.

Staff Contact:
Rich Hoey, P.E., Director, Public Works Department, 360.753.8495
David Hanna, Associate Director, Parks, Arts and Recreation Department, 360.753.8020

Presenter(s):
Rich Hoey, P.E., Director, Public Works Department

Background and Analysis:
Through its work on the Shoreline Master Program, West Bay Park master planning, and other efforts, City staff identified the need for a comprehensive assessment of environmental restoration opportunities along the west shore of West Bay in Olympia. This science-based assessment would support the development of a water quality and habitat restoration strategy for West Bay.

Early on, City staff identified that the Port of Olympia, a key property owner of West Bay shoreline, would be an important partner in the assessment. Port staff agreed that this assessment would be mutually beneficial. In prioritizing potential restoration projects, the assessment would inform capital facilities planning by the City and Port,

as well as other public entities. In addition, the assessment could be used for project mitigation planning by the City, Port and other public or private entities proposing projects along the shoreline of West Bay or elsewhere in Budd Inlet.

Following discussions with the Squaxin Island Tribe, City and Port staff identified three main components needed as part of the West Bay Environmental Restoration Assessment:

1. Shoreline Restoration Assessment
   This includes an assessment of current and potential future ecological functions provided in the nearshore environment of western West Bay. The assessment will focus on the marine shoreline environment from the 4th Avenue Bridge north to the City limits. The assessment will primarily focus on government owned property (City, County, Port, State, Tribal), but may be expanded to include private properties where possible. The assessment will build on the Budd Inlet Landscape Analysis completed by the Squaxin Island Tribe in 2010.

2. Stormwater Basin Analysis
   This analysis includes an evaluation of stormwater treatment in the upland areas draining to West Bay. The analysis will result in a prioritized list of upland stormwater treatment needs, and include a methodology to establish the relative value of upland stormwater retrofits compared to nearshore habitat restoration actions.

3. Lagoon Area Alternatives Analysis
   Building on the Shoreline Restoration Assessment outlined above, a more detailed review of the “Lagoon Area” adjacent to 4th Avenue Bridge will be conducted. The analysis will support the West Bay Park Master Planning efforts and include an analysis of ecological processes and habitats under four alternative configurations:

   - Current lagoon configuration with trail added on existing berm
   - Partial berm removal with new trail added on remaining berm and new overwater sections
   - Complete berm removal with new trail added on an overwater structure
   - Complete berm removal and no overwater trail

   Each alternative will be assessed under current conditions, as well as potential future scenarios of sea level rise and Deschutes River estuary restoration.

The three assessment elements outlined above will be used to produce a recommended progression of priority restoration actions for the West Bay study area.

If the Interlocal Agreement (attached) is approved, the City and Port will move forward within the next few months to retain the services of a consultant(s) to complete the

Agenda Date: 3/4/2014
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West Bay Environmental Restoration Assessment. Staff expects the assessment to be complete in late 2014 or early 2015. The Squaxin Island Tribe has expressed interest in coordinating with the City and the Port on the project.

The Port Board of Commissioners approved the Interlocal Agreement at its meeting on February 24, 2014.

Neighborhood/Community Interests (if known):
There is a high degree of public interest in the redevelopment of the West Bay shoreline, including opportunities for environmental restoration, economic development and improved recreational opportunities.

Options:

1. Approve the Interlocal Agreement.

2. Pursue work on an environmental restoration assessment independent of the Port.

3. Do not pursue the environmental restoration assessment.

Financial Impact:
Under the agreement, the City will pay two-thirds and the Port will pay one-third of the costs for consultant services. Total costs for such services are not to exceed one hundred and fifty thousand dollars ($150,000). The City's share of costs ($100,000) will be split equally between Parks funding and the Storm and Surface Water Utility.

INTERLOCAL AGREEMENT BETWEEN THE CITY OF OLYMPIA AND PORT OF OLYMPIA FOR ENVIRONMENTAL RESTORATION ASSESSMENT OF WEST BAY

INTERLOCAL AGREEMENT

This Interlocal Agreement is entered into by and between the City of Olympia ('City"), a Washington non-charter code city, and the Port of Olympia ("Port"), a Port District formed under RCW Chapter 53.04. The City and Port are referred to herein collectively as the "Parties."

RECITALS

Whereas, RCW 39.34.010 permits local governmental units to make the most efficient use of their powers by enabling them to cooperate with other localities on a basis of mutual advantage and thereby to provide services and facilities in a manner and pursuant to forms of governmental organization that will accord best with geographic, economic, population and other factors influencing the needs and development of local communities; and

Whereas, pursuant to RCW 39.34.080, each party is authorized to contract with any one or more other public agencies to perform any governmental service, activity, or undertaking which each public agency entering into the contract is authorized by law to perform: provided, that such contract shall be authorized by the governing body of each party to the contract and shall set forth its purposes, powers, rights, objectives and responsibilities of the contracting parties; and

Whereas, the Parties desire to work with the Squaxin Island Tribe to assess environmental restoration potential and priorities along the west shore of West Bay in lower Budd Inlet; and

Whereas, the City and the Port each own significant adjoining properties along West Bay that have environmental restoration potential; and

Whereas, the information gathered from this environmental restoration assessment will inform capital facility and project planning by the City, Port and other entities, and support the implementation of a water quality and habitat restoration strategy over time.

NOW, THEREFORE, in consideration of the mutual promises contained herein, the Parties agree as follows:

I. Purpose/Objective

The Parties intend to complete a science based environmental restoration assessment of West Bay that will support the implementation of a water quality and habitat restoration

strategy over time. The assessment will identify and prioritize restoration to inform various planning efforts, including but not limited to: capital facilities planning, project mitigation planning, stormwater infrastructure planning and master planning for a West Bay Park and Trail.

II. Scope of Agreement/Work

The Parties agree to jointly engage the services of one or more consultants to assist the Parties in an environmental restoration assessment of the west shore of West Bay in lower Budd Inlet. Tasks will include, but are not limited to: shoreline habitat and restoration assessment, stormwater basin analysis, lagoon area alternatives analysis and implementation strategy.

A consultant will be chosen through the standard selection process for professional services as required by the laws of the State of Washington. The Parties will jointly develop and issue a Request for Qualifications (RFQ) for the consulting work. A project committee will be formed by the Parties to review RFQs of submitting firms and will make a unified recommendation for selection of the firm. The Parties agree to invite the Squaxin Island Tribe to participate in the consultant selection process. Once a consultant is selected, the project committee shall coordinate with the consultant in the development of a Scope of Work and Professional Services Agreement amenable to each Party as a joint contract. The City Manager is authorized to execute the necessary Professional Services Agreement(s), and the Port Executive Director will seek authorization from the Port Commission to execute the contract(s).

The project committee will be responsible for contract management, consultant communication and dissemination of project information to appropriate staff within their own jurisdiction. The consultant shall coordinate regular meetings with the Parties.

III. Consultant and Legal Cost Sharing

The Parties will divide costs for consulting services. The City will pay two-thirds and the Port will pay one-third of the costs for consultant services. Total costs for such services are not to exceed one hundred and fifty thousand and 00/100 dollars ($150,000).

To the extent feasible, the Parties agree to pursue grants to support the work performed under this agreement. The proceeds of any grants or other donations towards the work performed under this agreement will be deducted from the consulting costs before the cost shares are calculated.

IV. Rights of Ownership – Final Products

All products that result from the work outlined in this agreement will be jointly owned by the Parties.

V. Method of Payment

a. The consultant will invoice each Party separately on a monthly basis.

b. Payment will be made separately by each Party to the consultant upon receipt of an acceptable invoice, after completion of each task agreed upon in the professional services agreement.

VI. Indemnification & Insurance

Each Party agrees to defend, indemnify and hold the other Party, its officers, officials, employees and volunteers harmless from any and all claims, injuries, damages, losses or suits including reasonable attorney fees, arising out of or in connection with the indemnifying Party's performance of this Agreement, including injuries and damages caused by the negligence of the indemnifying Party's officers, officials and employees.

VII. No Separate Legal Entity Created

This Agreement creates no separate legal entity.

VIII. Duration of Agreement

This Agreement shall be effective on the date of its entry into force pursuant to Paragraph XIII below and shall terminate upon completion of the tasks necessary to accomplish the purpose of the agreement, unless sooner terminated by the Parties as provided herein.

IX. Dispute Resolution

a. Step One – Negotiation. In the event of a dispute concerning any matter pertaining to this Agreement, the Parties involved shall attempt to address their differences by informal negotiation. The Party perceiving a dispute or disagreement persisting after informal attempts at resolution shall notify the other Parties in writing of the general nature of the issues. The letter shall be identified as a formal request for negotiation and shall propose a date for representatives of the Parties to meet. The other Parties shall respond in writing within ten (10) business days. The response shall succinctly and directly set out that Party's view of the issues or state that there is no disagreement. The Parties shall accept the date to meet or shall propose an alternate meeting date not more than ten (10) business days later than the date proposed by the Party initiating dispute

resolution. The representatives of the Parties shall meet in an effort to resolve the dispute. If a resolution is reached the resolution shall be memorialized in a memorandum signed by all Parties which shall become an addendum to this Agreement. Each Party will bear the cost of its own attorneys, consultants, and other Step One expenses. Negotiation under this provision shall not exceed 90 days. If a resolution is not reached within 90 days, the Parties shall proceed to mediation.

b. Step Two – Mediation. If the dispute has not been resolved by negotiation within ninety (90) days of the initial letter proposing negotiation, any Party may demand mediation. The mediator shall be chosen by agreement. Each Party will bear the cost of its own attorneys, consultants, and other Step Two expenses. The parties to the mediation will share the cost of the mediator. A successful mediation shall result in a memorandum agreement which shall become an addendum to this Agreement. Mediation under this provision shall not exceed 90 days. If the mediation is not successful within 90 days, the Parties may proceed to litigation.

c. Step Three – Litigation. Unless otherwise agreed by the Parties in writing, Step One and Step Two must be exhausted as a condition precedent to filing of any legal action. A Party may initiate an action without exhausting Steps One or Two if the statute of limitations is about to expire and the Parties cannot reach a tolling agreement, or if either Party determines the public health, safety, or welfare is threatened.

X. Termination of Agreement

This Agreement may be terminated upon mutual agreement of the Parties.

XI. Interpretation and Venue

This Agreement shall be governed by the laws of the State of Washington as to interpretation and performance. The Parties hereby agree that venue for enforcement of any provisions shall be the Superior Court of Thurston County.

XII. Entire Agreement

This Agreement sets forth all terms and conditions agreed upon by the Parties and supercedes any and all prior agreements oral or otherwise with respect to the specific subject matter addressed herein.

XIII. Recording

Prior to its entry into force, this Agreement shall be filed with the Thurston County Auditor's Office or posted upon the Parties' websites as provided by RCW 39.34.040.

XIV. Notice

Any notice required under this Agreement shall be to the party at the address listed below and shall become effective three days following the date of deposit with the United States Postal Service.

CITY OF OLYMPIA:
Attn: Rich Hoey, P.E., Public Works Director
Re: West Bay Environmental Restoration Assessment
PO Box 1967
Olympia, WA 98507-1967

PORT OF OLYMPIA:
Attn: Alex Smith, Environmental Program Director
Re: West Bay Environmental Restoration Assessment
915 Washington Street NE
Olympia WA 98501

This Agreement is hereby entered into between the Parties and shall take effect on the date of the last authorizing signature affixed hereto:

CITY OF OLYMPIA	**PORT OF OLYMPIA**
_____	_____
Stephen H. Buxbaum, Mayor	Ed Galligan, Executive Director
Date:_____	Date:_____
Approved as to form:	Approved as to form:
_____	_____
Tom Morrill, City Attorney	_____, Port General Counsel