APPENDIX 6: CHAPTER 6 APPENDICES

6A: Thurston Highlands Grading, Drainage, and Utilities Technical Engineering Report, 2008

3.19 Utilities

3.19.1 Water Service

This section summarizes technical engineering reports prepared for the City of Yelm by Parametrix (October 2007), and for Thurston Highlands, L.L.C. by KPFF Consulting Engineers (2008). The Parametrix report reviewed City-wide water system infrastructure, with projections of what would be required to extend service to include the Thurston Highlands Master Planned Community. The KPFF report developed projections of water demand, service requirements, potential impacts and mitigation measures specific to Thurston Highlands.

AFFECTED ENVIRONMENT

The City's existing water system infrastructure, including supply wells, storage facilities, and distribution pipelines, is shown on Figure 3.19.1-1. Existing water system facilities, described in the *Water System Hydraulic Analysis* (Parametrix, October 2007), are as follows:

- Water Supply – Three wells supply water to the City's existing water system. Wells 1 and 2 are located near the intersection of 2nd and Washington Streets. Well 3A is located on the south side of Middle Road near Fort Stevens Elementary School. The supply capacities of Wells 1, 2, and 3A are 1,200 gallons per minute (gpm), 1,200 gpm, and 500 gpm; respectively. Wells 1 and 2 were upgraded in 2006 to these 1,200 gpm capacities. Well 3A is an emergency source operated, if needed, under a restricted operational permit (Parametrix, October 2007). Additional information regarding the status of the City's water supply is provided in Draft EIS Section 3.3.3, Public and Private Water Systems.

- Water Storage – The City's storage facilities include three steel tank reservoirs. The City is currently utilizing two of the tanks. One tank, the Public Works tank, connects to the water system by a 12-inch main, and is located in the central part of the City just north of downtown. The Baker Hill tank connects to the water system by two 10-inch mains and is located on the south central edge of the system. Each of these two tanks has an approximate 500,000-gallon capacity and maximum water elevation of 477 feet. The downtown tank was removed from service when the Public Works tank was constructed. This tank has a capacity of 50,000 gallons (Parametrix, October 2007).

- Water Distribution – The City's distribution system consists primarily of polyvinyl chloride (PVC) and asbestos concrete pipes ranging in size from 4-inches to 12-inches in diameter. According to the *2002 City of Yelm Water System Plan*[1]*,* the structural condition of the asbestos cement pipe is satisfactory, but interior surfaces have collected deposits. Therefore, the hydraulic model used increased roughness coefficients. A majority of the asbestos concrete pipes are located in the downtown area. The perimeter of the distribution system primarily consists of PVC pipes (Parametrix, October 2007).

The City of Yelm average water demand in 2007 was approximately 730,400 gallons per day (gpd) with a population of 4,565 (Parametrix, October 2007). There is no water system infrastructure on the Thurston Highlands site at the present time. The closest water main is a 20-inch polyethylene line located under Tahoma Boulevard as it crosses Thompson Creek and terminates in Tahoma Terra, approximately 1,000 feet from the northeast corner of Thurston Highlands. This 20-inch line has an effective operating inner diameter of slightly more than 16-inches. A 16-inch extension of this line to the Thurston Highlands property limits has been

designed as part of the Tahoma Boulevard plans through Tahoma Terra. This 16-inch line is scheduled to be constructed during the summer of 2008 (KPFF 2008).

As part of the existing Tahoma Terra Development just east of Thurston Highlands, infrastructure improvements are currently being designed and constructed that would mitigate some of the impacts of the proposed Thurston Highlands development. Water system improvements specifically under construction or in design include:

- 16-inch water main line extension within Tahoma Terra to the east boundary of Thurston Highlands.
- 10-inch main between 105th Avenue and Longmire Street (across Tahoma Valley Golf and Country Club), currently designed and scheduled for construction in early 2008.
- Pump Station in Tahoma Terra Phase 2 (west side of Thompson Creek), sized to serve all needs of Tahoma Terra and, potentially, some development within Thurston Highlands.

POTENTIAL IMPACTS DURING CONSTRUCTION

Full Build-Out Conceptual Land Use Alternatives

Construction of a new or expanded water distribution system would be required throughout the Thurston Highlands Master Planned Community, and would be constructed within public rights-of-way or easements located under, or adjacent to public streets. Construction activities related to installation of the distribution mains may include temporary disruptions in service to some customers; noise and dust during the construction phase; and construction-related traffic to deliver pipe and other needed materials to the sites.

Impacts to the existing mainline/distribution system should be minimal as a pressurized system would not be affected by the location of the water source. Blow-off devices, air release valves and other appurtenances should not require modification. Connections to existing wells and reservoirs that would no longer be needed would require modifications to properly take those systems off-line. The City's *Water System Plan* update will fully analyze the technical details required to expand the water distribution system to serve Thurston Highlands and maintain existing service levels at lower elevations within the City's system.

Phase 1 Development Concept

A new booster station, reservoir, almost one mile of 16-inch water main and associated appurtenances would be needed to serve Phase 1 conceptual development.

No Action Alternative

The City's water system would not be extended to or through the Thurston Highlands site under the No Action Alternative. The City's *Water System Plan* update would, however, likely address a similar level of development on this site, given that both existing zoning and the City's *Comprehensive Land Use Plan* designation for the property are Master Planned Community.

Insert Figure 3.19.1-1. Water System Map

Full Build-Out Conceptual Land Use Alternatives

The Thurston Highlands project is anticipated to generate an average daily water supply demand of at least 1.61 million gallons per day (gpd) exclusive of fire flow demand. Sources of information, assumptions and standards used to estimate the water usage requirements of the Master Planned Community are described in the *Thurston Highlands Grading, Drainage and Utilities Technical Engineering Report* (KPFF Consulting Engineers 2008). The average daily demand (ADD) for the three conceptual land use alternatives differs by less than 7 percent. The Traditional Development Alternative would generate the highest water demand, with an ADD of approximately 1.72 million gallons per day. This does not include fire flow demand, which would be stored in reservoirs. The comparative water supply requirements of the three conceptual land use alternatives is described below. A detailed breakdown of water system requirements for the various land use components in each alternative is provided in the *Technical Engineering Report*.

Preferred Alternative. The average daily water demand for the Preferred Alternative would be approximately 1.664 million gallons per day (MGD), with a fire flow demand of approximately 960,000 gallons for 4 hours. The single largest water usage group would be the single-family residences, with an average daily demand (ADD) of approximately 0.92 MGD. This value is based on 3,000 single-family residences with an average household population of 2.91. Overall water demand for residential usage, to serve single-family detached homes, duplexes and multi-family units would be approximately 1.318 MGD.

Traditional Development Alternative. The average daily water demand based on the Traditional Development Alternative would be approximately 1.737 million gallons per day (MGD), with a fire flow demand of 960,000 gallons for 4 hours. Similar to the Preferred Alternative, the single largest water usage group would be the single-family residences, with average daily demand (ADD) of approximately 1.223 MGD. This value is based on 4,000 single-family residences with an average household population of 2.91. Overall water demand for residential usage, to serve single-family detached homes, duplexes and multi-family units, would be approximately 1.455 MGD.

Urban Village Alternative. The average daily water demand of the Urban Village Alternative would be approximately 1.613 million gallons per day (MGD), with a fire flow demand of 960,000 gallons for 4 hours. The single largest water usage group would be commercial development of approximately 1,500,000 square feet (total of retail and office buildings). This group would exert an average daily water demand of 0.345 MGD. Similar to the other conceptual land use alternatives, fire flow demand based on 4,000 gpm for the duration of 4 hours would equate to a total of 960,000 gallons.

The existing City of Yelm water system would require infrastructure improvements either within Thurston Highlands, or elsewhere within the City's existing system in order to serve the proposed Master Planned Community (Parametrix, October 2007).

Maintenance requirements and costs to the City would be expected to increase with expansion of water system facilities. Land for reservoirs and pump station locations would be required within the development.

Phase 1 Development Concept

No improvements to the City's existing water system would be required to serve the conceptual Phase 1 development of Thurston Highlands, comprising approximately 1,008 dwelling units; however, it would be necessary to expand the water system into Thurston Highlands and update the City of Yelm *Water System Plan* to identify planned infrastructure within Thurston Highlands. A reservoir located on Thurston Highlands property at an approximate elevation of 480 feet would be needed to supply the maximum daily demand, if this option is identified in the City's *Water System Plan* update (Parametrix, October 2007).

No Action Alternative

There are no water system requirements or demand to serve the undeveloped condition of the Thurston Highlands site at the present time. Similarly, if the site were to temporarily remain undeveloped with the No Action Alternative, there would be no water system demand in the near future.

MITIGATION MEASURES

Incorporated Plan Features. As new water system infrastructure is constructed within Thurston Highlands and extending to Thurston Highlands, operational impacts to the City may be mitigated as older aging facilities such as wells and reservoirs may no longer be needed, and could be taken off-line. The present City of Yelm water distribution system would still exist and would require maintenance. Thurston Highlands is higher in elevation than many parts of Yelm currently served by the City water system, so a new system located in the Highlands would rely largely on gravity to pressurize the system, not requiring as many booster pumps, making the system more efficient, economically feasible, and reliable.

It is typical that as developments occur within local communities, including Yelm, developers are responsible for the initial capital investment costs of infrastructure improvements to mitigate their impacts as a condition of project approval. These requirements are not limited to the new infrastructure needed within the development, but include modifications to existing infrastructure as well. It is anticipated that an agreement of this nature will be created between the City and Thurston Highlands, L.L.C. as new water system infrastructure is needed to serve the Master Planned Community.

Increased operating and maintenance costs accrued by the City would be recovered by utility rates paid by actual users. As outlined in the *Fiscal Analysis of Development Alternatives* (Property Counselors, April 2008), utility charges (for all utilities, not just water) are expected to range from approximately $2,500 per unit for single-family homes, $2,000/unit for multi-plexes, and $1,600/unit for apartments/condominiums. Rates for retail commercial and office uses can be assumed to be approximately $2.50 per square-foot.

Applicable Regulations. All proposed water system improvements would be designed and constructed in compliance with applicable local and State regulations, including:

- City of Yelm Municipal Code
- Washington State Department of Health
- Southeast Thurston Fire and Emergency Medical Services.

Actual domestic water service requirements will be determined at the time of specific land use applications, based on population projections, fixture counts, and fire flow requirements. The fire flow requirements will be based on number of hydrants, building types and sprinkler usage. Water meters will be installed at each building, or at another connection point using water and pipe/meter sizes to be determined on the basis of domestic flow volumes and fire flow needs.

Other Possible Mitigation Measures. The City would notify existing customers in advance of potential temporary disruptions to service during new water main construction.

Proposed development could incorporate low-flow faucets, toilets and other similar fixtures to minimize domestic water supply requirements.

Measures such as rainwater harvesting (i.e., collecting and storing rainwater for beneficial use, such as irrigation and fire flow demands), and drought-tolerant landscaping could reduce water requirements for irrigation. Although rainwater harvesting may not be economical on a large scale, it is a measure that could be implemented on case-by-case basis. It is worth noting the rainwater harvesting may trigger water rights issues that would need to be considered in the overall needs of not just this project, but City needs as a whole.

As described in Draft EIS Section 2.1, it is the intent of the Thurston Highlands Master Planned Community to implement Low Impact Development Standards. Such standards could conceivably reduce water use within the development as a result of the following:

- Small lots with smaller yards would minimize the need for irrigation.
- Utilization of reclaimed water for some applications could reduce domestic water demands (see Draft EIS Section 3.19.3).
- Use of latest technology within homes for plumbing fixtures, such as toilets, faucets, washing machines, and dish washers that use less water.

Consideration should be given to storing reclaimed water for fire flow in some areas of the development, as further described in Draft EIS Section 3.19.3. Such facilities could be located on higher ground for gravity flow, or close to buildings with booster pumps, to attain necessary pressures. It would be necessary to store reclaimed water in separate reservoirs, clearly distinguished from potable domestic drinking water. Fire flow estimates are nearly 960,000 gallons for any of the conceptual land use alternatives, which is a significant volume of water that could be supplied by means other than domestic drinking water. If implemented, this measure would require coordination with Southeast Thurston Fire/EMS to confirm that reuse water would not adversely affect their vehicle fleet, or pose a health concern for fire fighters. Such alternatives may have regulatory constraints or may be economically infeasible at the present time; however, technologies may change over time in a direction that may make this option worth considering**.**

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

No significant unavoidable adverse impacts to the City's water service system have been identified. The construction of new infrastructure should be paid for by developers of the projects that generate the increased demand (including Thurston Highlands), or collected through new connection fees within these projects; therefore, there should not be a significant unavoidable adverse economic impact to existing City water system customers.

3.19.2 Sewage Collection, Treatment and Reuse/Discharge

This section summarizes technical engineering reports prepared for the City of Yelm by Parametrix, and for Thurston Highlands, L.L.C. by KPFF Consulting Engineers. The Parametrix *Wastewater Technical Report* (September 2007) analyzes the City's existing sewage collection, treatment and reuse/discharge system, and evaluates several alternatives and sub-alternatives as feasible strategies for collection, treatment and reuse/discharge of additional wastewater loads that will be generated from development of the Thurston Highlands Master Planned Community and other growth anticipated within the City's Urban Growth Area. Two of these alternatives were evaluated in detail, selected as best able to meet the City's goals and objectives for producing Class A reclaimed water and minimizing additional surface water discharges. City decision makers had not yet selected a preferred alternative for expanding the City's wastewater collection system at the time of this writing. The KPFF *Grading, Drainage and Utilities Technical Engineering Report* (2008) identifies Thurston Highlands wastewater system use projections based on typical population estimates for the area, and evaluates project-specific impacts and mitigation measures.

AFFECTED ENVIRONMENT

The City's existing wastewater collection, treatment, and reuse/discharge system is owned, operated and maintained by the City, and consists of a STEP collection system, an advanced wastewater treatment plant (WWTP) for production of reclaimed water, and a reclaimed water distribution system. The wastewater system is designed and operated to meet criteria set by the Washington Department of Ecology (Ecology) and specified in a National Pollutant Discharge Elimination System (NPDES) permit for these facilities. Components of this system are summarized below from the *Yelm Wastewater Technical Report* (Parametrix, September 2007). A more detailed description of this system is provided in that document.

Collection System. The STEP collection system pipelines are generally located in public rights-of-way and serve most, but not all, buildings within the City limits.

Treatment Plant. The City's existing WWTP generates Class A (the highest quality) reclaimed water using several treatment steps including sequencing batch reactors, sand filters, and chlorine disinfection. Reclaimed water may be reused in non-potable applications, such as irrigation, groundwater recharge, surface water augmentation, and/or various industrial and commercial applications. The existing WWTP has the capacity to treat and reuse/discharge 1.05 mgd of reclaimed water meeting Class A standards.

Reclaimed Water Distribution. Reclaimed water produced at the City's WWTP is pumped from the plant site to various points of application throughout the City, including constructed wetlands at Cochrane Park, followed by infiltration basins and, during the summer months, several irrigation/landscaping applications. Surface water discharge is necessary during periods when demand for reclaimed water is low or when Class A reclaimed standards are not met. During these periods, the treated effluent is discharged through an outfall located in the Centralia Power Canal. Direct discharge to the Nisqually River can also occur through an emergency outfall, but only when discharge to the Power Canal must be avoided due to low flow conditions or maintenance activities in the canal.

POTENTIAL IMPACTS DURING CONSTRUCTION

The Thurston Highlands site has no existing sewage collection or treatment infrastructure.

The nearest infrastructure to the site is an 8-inch Septic Tank Effluent Pump (STEP) main located in Tahoma Terra as part of Phase I, Divisions 1 and 2 of that development, near the northeast boundary of Thurston Highlands. The size of this pipeline is not adequate to convey projected wastewater flows from Master Planned Community development on the Thurston Highlands site. Additional infrastructure was constructed in Tahoma Boulevard through Tahoma Terra Phase II during Summer 2007.

Construction of a new STEP collection system and/or gravity sewer mains would be required throughout the Thurston Highlands Master Planned Community. Either conveyance system would be constructed within public rights-of-way or easements located under, or adjacent to public streets. The proposal is to construct the wastewater collection system infrastructure as Tahoma Boulevard and local access streets are extended through Thurston Highlands, with final paving to follow the completion of utilities. Construction activities related to installation of the collection and conveyance mains may include temporary disruptions in service to some customers; noise and dust during the construction phase; and construction-related traffic to deliver pipe and other materials to the sites.

The WWTP is sized and currently permitted to treat 1.05 million gallons per day of wastewater. Construction would be required to upgrade the facility with sufficient capacity to serve the Thurston Highlands Master Planned Community. For the gravity collection alternative, new headworks facilities would need to be added to process solids conveyed to the WWTP. Alternatively, a second smaller (satellite) WWTP could be constructed within Thurston Highlands, if considered by the City to be an economically feasible component of their system. Under either scenario, WWTP construction or expansion would result in construction-related traffic for transport of material to/from the site; noise and dust associated with earthwork activities and the operation of equipment on the site.

Construction of a gravity collection system (if selected by the City as the preferred alternative) would likely have a longer duration than construction of a STEP collection system, because gravity sewers and interceptors are typically installed deeper than STEP pipelines. Deeper pipelines require longer excavation and backfill periods, and also are more likely to encounter difficult construction conditions such as high groundwater or rock. Furthermore, the gravity collection system would require construction of dual pipelines (wider construction width) between the main pump station and the WWTP. Each gravity collection system pump station would require more time to construct. Individual STEP system septic tanks and pumps would be constructed concurrently with each residence or commercial service connection.

No Action Alternative

There would be no wastewater system construction associated with the Thurston Highlands site in the near-term if the No Action Alternative were selected.

Potential Developed-Condition Impacts

The *Yelm Wastewater Technical Report* (Parametrix, September 2007) developed wastewater flow and loading projections based upon the projected build-out population (12,548) of the Thurston Highlands Preferred Alternative. The per capita loading projections are inclusive of residential, commercial, and public facility land uses. The loading projections were used to evaluate the necessary capacity improvements for future wastewater conveyance, treatment and reuse/discharge facilities. Chapter 2 of the Parametrix report presents the methodology, including data, assumptions, and design criteria, used to develop the loading projections.

Full Build-Out Conceptual Land Use Alternatives

Similar to the water supply requirements of the Master Planned Community described previously in Draft EIS Section 3.19-1, the projected wastewater volume that would be generated by the three conceptual land use alternatives would differ by less than 10 percent (see Table 3.19.2-1). The design wastewater flow used for this proposal is 70 gallons per capita per day (gpcd) (Parametrix, September 2007).

Table 3.19.2-1. Projected wastewater volumes associated with the Thurston Highlands conceptual land use alternatives.

Alternative	Residents		Commercial		Schools		Other Public Facilities	Total Estimate
	Number	Flow (in gpd)	Floor Area (in sf)	Flow (in pgd)	Number of Students	Flow (in gpd)	Flow (in gpd)	(in gpd)
Preferred	12,551	922,470	960,000	154,560	2,661	32,025	55,450	1,164,505
Traditional	13,862	1,018,810	630,000	101,430	2,958	38,325	57,300	1,215,865
Urban Vill.	10,999	808,455	1,500,000	241,500	2,067	25,725	53,765	1,129,445

The Urban Village Alternative (highest density) would possibly require less infrastructure in the ground given that more vertical development would cover a smaller footprint of land. However, impacts to the overall City system downstream of the site would be comparable to the other alternatives.

The City's wastewater system was designed to serve growth within Yelm and its UGA, but does not presently have sufficient capacity to handle the projected wastewater loading that would be generated by the Thurston Highlands Master Planned Community. Additional hydraulic, organic, and solids loading generated by Thurston Highlands would exceed the design capacity of the City's existing wastewater treatment facilities. Furthermore, the STEP conveyance system between the City's WWTP and Thurston Highlands is not adequately sized to serve the proposed Master Planned Community. A system upgrade will be required to serve additional development within the southwest area of the City's UGA.

As described in the *Yelm Wastewater Technical Report* (Parametrix, September 2007), constructing a gravity collection and conveyance system within Thurston Highlands would result in different overall impacts (specifically at the wastewater treatment plant) to the system compared to a decision to instead construct a STEP collection and conveyance system. The comparative short-term and long-term advantages and disadvantages of the two types of systems under consideration are described in more detail in the *Yelm Wastewater Technical Report* (Parametrix, September 2007).

Phase 1 Development Concept

Using the same design wastewater flow factor (70 gallons per capita per day) for the estimated resident population of the Phase 1 development concept (approximately 2,527 persons), the Thurston Highlands wastewater volume generated by approximately the year 2015 would be about 175,000 to 180,000 gpd.

A need for improvements to the City's sewage collection system between the treatment plant and Tahoma Terra has been identified to serve full build-out of Tahoma Terra, adjoining Thurston Highlands along its northeastern boundary. When these improvements are made, the City's system will be capable of serving Thurston Highlands Phase 1 with extension of the existing system into the first conceptual development area of the Master Planned Community.

The City's existing wastewater treatment plant has available capacity to serve Phase 1, depending on the type of collection system selected by the City. If the City chooses to extend a STEP collection system into and throughout the Thurston Highlands Master Planned Community, there would be no significant impact to the existing wastewater collection, treatment and reuse/discharge system. If, on the other hand, a gravity sewer collection system is selected, the treatment plant would require modification to add headworks to process unseparated sewage conveyed to the plant in a gravity-flow pipelines.

No Action Alternative

If no development were to occur on the Thurston Highlands site, there would be no requirement for extension of the City's wastewater collection system to serve this property, and no need to increase the capacity of the treatment plant and reuse/discharge system. Existing City of Yelm wastewater collection, treatment and reuse/discharge facilities have sufficient capacity to serve other anticipated growth within the incorporated area and UGA through the year 2030 (Parametrix, September 2007).

Mitigation Measures

Mitigation measures for the wastewater collection, treatment, and reuse/discharge requirements of any of the three Thurston Highlands conceptual land use alternatives would be roughly the same, given the similar size of development and resulting impacts. The type of collection and conveyance system (not yet selected) would influence mitigation requirements.

Incorporated Plan Features. Thurston Highlands, L.L.C. is coordinating with the developers of adjacent properties to size wastewater collection mains that terminate at the site boundary to handle expected flows that would be generated by the Master Planned Community. Collection and conveyance lines within Thurston Highlands would be constructed within City rights-of-way or easements. Collection, treatment, and reuse/discharge options will be considered by City decision makers during adoption of an updated *Comprehensive Sewer Plan*, and during the Thurston Highlands Master Site Plan approval process.

Applicable Regulations. The Thurston Highlands Master Planned Community would comply with applicable wastewater collection, treatment, and reuse/discharge criteria set forth by the City of Yelm in their *Comprehensive Sewer Plan*, and all other applicable regulations and permit conditions. The City will be updating its *Comprehensive Sewer Plan* in 2008 to address infrastructure requirements to serve anticipated growth in the Highlands and elsewhere within the City's UGA.

Other Possible Mitigation Measures. Over the course of the 10- to 30-year development of the Thurston Highlands Master Planned Community, and with the extension of fiber optics throughout the project, it is possible that new technology (e.g., some form of telemetry system) could be implemented to monitor the function of STEP system components, if this option is selected by City decision makers.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

It would be necessary to upgrade and expand the City's wastewater collection, treatment, and reuse/discharge system in the future to serve the full build-out condition of the Thurston Highlands Master Planned Community as well as other anticipated growth within the City of Yelm Urban Growth Area. The construction of new infrastructure should be paid for by developers of the projects that generate the increased demand (including Thurston Highlands), or collected through new connection fees within these projects; therefore, there should be not a significant unavoidable adverse economic impact to existing City sewer system customers.

3.19.3 Reclaimed Water

AFFECTED ENVIRONMENT

Reclaimed water is wastewater that has been treated to a higher standard so that it can be put to beneficial use, such as irrigation, fire suppression, or augmentation of groundwater and surface water resources. The City's existing wastewater treatment plant (WWTP) generates Class A (the highest quality) reclaimed water using several treatment steps including sequencing batch reactors, sand filters, and chlorine disinfection. The existing WWTP has the capacity to treat and reuse/discharge 1.05 million gallons per day (mgd) of reclaimed water meeting Class A standards.

Reclaimed water generated at the WWTP is used within the City year around at Cochrane Park, and in some irrigation/landscaping applications during the summer months. Reclaimed water is conveyed from the WWTP to the various use sites via dedicated pipelines often called "purple pipe" based upon regulations that require color coding to signify its use. Reclaimed water distribution lines have been installed in Tahoma Terra northeast of Thurston Highlands. Main lines have been adequately sized for continuation into the proposed Master Planned Community.

A more detailed description of the City's existing reclaimed water system, including permitting and capacity, is provided in the *Yelm Wastewater Technical Report* prepared (Parametrix, September 2007)

POTENTIAL IMPACTS DURING CONSTRUCTION

Full Build-Out Conceptual Land Use Alternatives

Construction-related impacts would be very minimal, as "purple pipe" for the conveyance of reclaimed water would be constructed within road rights-of-way or other public easements, concurrent with the construction of other underground utilities. Improvements to the City's WWTP would occur as part of any upgrade associated with upsizing the facility beyond current allowable capacity. Interruptions to service could occur to the existing system as new pipe is connected to the existing pipe main. However, such interruptions would be minimal, if any. Many construction-related impacts associated with installation of a conveyance system for reclaimed water would be similar to construction impacts associated with the sewer system previously described in Draft EIS Section 3.19.2.

No Action Alternative

A reclaimed water conveyance system would not be extended to and through the Thurston Highlands site in the near-term if the No Action Alternative were selected.

POTENTIAL DEVELOPED-CONDITION IMPACTS

The proposal includes installing reclaimed water distribution pipelines throughout all phases of the Thurston Highlands Master Planned Community. The decision to utilize reclaimed water in the area in the near-term or future will be determined by the City of Yelm based on economical and operational feasibility. As part of a City-wide mitigation plan for the consumptive use of water, the Thurston Highlands site is being evaluated as a possible location for the

infiltration of reclaimed water to recharge the regional aquifer. Environmental review of the potential effects of this action is provided in Draft EIS Section 3.3.

Full Build-Out Conceptual Land Use Alternatives

Any of the three conceptual land use alternatives would have similar impacts in terms of the quantity of reclaimed water that would be generated, and opportunities for reuse.

No Action Alternative

There would be no generation of reclaimed water associated with the undeveloped site if the No Action Alternative were selected. It is possible that some areas of the property could still be considered by the City for infiltration of reclaimed water to recharge the deep groundwater aquifer.

MITIGATION MEASURES

Incorporated Plan Features. Reclaimed water distribution lines will be installed throughout Thurston Highlands for the purpose of maximum flexibility of reclaimed water use when deemed appropriate by the City of Yelm. Uses could include many of the same applications that occur in the City at the present time, including wetland recharge and landscape irrigation. Additionally, reclaimed water could be used to irrigate the proposed Regional Sports Complex year around, pending favorable soil conditions present after final site grading.

Applicable Regulations. Washington State regulations, as adopted by the City of Yelm, that apply to reclaimed water production and conveyance include Chapter 90.46 Revised Code of Washington (RCW), and the State *Water Reclamation and Reuse Standards* (Ecology and DOH 1997). Reclaimed water standards require specific treatment and disinfection procedures beyond those of most conventional wastewater treatment facilities. The standards also require automated alarms, redundancy of treatment units, emergency storage, stringent operator training requirements, and public notification of reclaimed water use. A detailed description of reclaimed water standards and design requirements is presented in the *Yelm Wastewater Technical Report* (Parametrix, September 2007).

Other Possible Mitigation Measures. Groundwater infiltration and/or groundwater storage is a possible mitigation measure for the additional Class A reclaimed water that would be generated by the City's wastewater treatment process as a result of the Thurston Highlands development. Class A reclaimed water is infiltrated back into groundwater within the City of Yelm at the present time, helping to recharge aquifers used for domestic water needs. Thurston Highlands will have large areas of land that may be favorable for infiltration. The potential cumulative effects of stormwater infiltration and Class A reclaimed water infiltration on the Thurston Highlands site are described in Draft EIS Section 3.3.

Reclaimed water has been used successfully in other portions of the country and the world in areas with high water demand. Technology is rapidly changing and advancing in this field. As technology continues to advance in this area, the City of Yelm could consider the possibility of using reclaimed water for applications such as the following:

- Irrigation for the Tahoma Valley Golf Course, or other parks/open spaces
- Street cleaning
- Dust control on construction projects

- Stream flow augmentation
- Fire flow storage to reduce the demand for domestic water for this purpose.

Other potential uses may become more viable with technological advances in the future.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

No significant unavoidable adverse impacts would be anticipated associated with installing a distribution system throughout the Thurston Highlands Master Planned Community for the conveyance of reclaimed water.

Preliminary analysis of the added effect of infiltrating approximately 1.5 million gallons per day (mgd)[1] of reclaimed water within Thurston Highlands indicates potential water level rises and prolonged flow within Thompson Creek that could have adverse effects during the wet season (Brown and Caldwell 2008; see Draft EIS Section 3.3). Given this conclusion, the City would direct all or some portion of reclaimed water for infiltration to another site or sites for all or some portion of the year, in order to avoid exacerbating flooding within the Thompson Creek basin. Therefore, no significant unavoidable adverse impacts would be anticipated associated with reclaimed water infiltration within Thurston Highlands.

[1] The quantity 1.5 mgd of reclaimed water to be infiltrated is an estimate for planning purposes based on projections of the quantity of wastewater to be generated for treatment, reuse and/or discharge as a result of full build-out within Thurston Highlands and the City's Urban Growth Area. See Draft EIS Section 3.3.3 for additional information on this subject.

3.19.4 Stormwater Management

This section describes alternatives for the stormwater management approach for the Thurston Highlands Master Planned Community, as summarized from the *Grading, Drainage and Utilities Technical Engineering Report* (KPFF Consulting Engineers 2008). Characteristics of the Thompson Creek receiving system are reported in the Water Resources section of this Draft EIS (Section 3.3). Geology, soils and topographic relief that also influence storm drainage characteristics are described in the Earth section of this Draft EIS (Section 3.1), and wetlands are described in Section 3.4.

AFFECTED ENVIRONMENT

KPFF Consulting Engineers analyzed the topographic map of the site prepared by Butler Surveying, and delineated ten separate drainage basins (see Figure 3.3-6 in the Water Resources section). The characteristics of these basins are described in Section 3.1 of the *Grading, Drainage and Utilities Technical Engineering Report*. The level of detail of drainage basin boundary delineation is appropriate for preliminary calculations and environmental review. More detailed drainage basin analysis will be performed for construction-level design.

There is no evidence of well-developed surface water runoff from the upland portion of the site to Thompson Creek under existing conditions. Reprod forest cover on the site intercepts a significant amount of precipitation. Water evaporates and transpires from the boughs of trees, minimizing the amount of runoff and infiltration to aquifers. When runoff does occur, it is essentially internal to the site, flowing to wetlands and closed depressions where it infiltrates to shallow groundwater.

POTENTIAL IMPACTS DURING CONSTRUCTION

Full Build-Out Conceptual Land Use Alternatives

Construction stormwater impacts associated with site development would be largely related to the potential for wind and water erosion of disturbed and exposed soils during earthwork activities, and would not differ substantially between the conceptual land use alternatives. During construction, stormwater management measures described in Draft EIS Section 3.1.3 (or more current measures) would be implemented to limit or reduce the potential for sediment-laden water and windblown particles to leave the site.

It is not anticipated that sediment-laden water from exposed soils within Thurston Highlands could enter Thompson Creek directly, as very little of the Thurston Highlands property abuts the creek, nor does the creek pass through the property. Two exceptions to this are the Wetland A and Wetland F complexes that constitute the headwaters of Thompson Creek, and the Wetland H complex in the Phase 1 development area (northeast quadrant of the site). These areas could potentially receive sediment-laden water if proper protective measures are not taken; however, the proposal includes retaining these wetland complexes with minimal development around them and substantial buffers (see Draft EIS Section 3.4).

It is possible that sediment-laden water from newly-graded areas could cross the property line onto adjacent land if proper mitigation measures were not installed. Grading activities (described in Draft EIS Chapter 2, Section 2.7) could alter the size of existing drainage basins. If altered, these basins could exhibit different surface water runoff characteristics by redirecting flows from an existing basin to new location within a different basin. Detailed designs may

purposely redirect runoff from an existing basin with low permeable soils to a different basin with better permeability so that runoff would be retained and infiltrated on-site.

Phase 1 Development Concept

Potential stormwater impacts during construction within the Phase 1 development area would be similar in nature, though less extensive, than those described above for the full build-out alternatives. The Phase 1 development area encompasses approximately 31 percent of the site.

No Action Alternative

There would be no construction-period stormwater impacts if the No Action Alternative were selected.

POTENTIAL DEVELOPED-CONDITION IMPACTS

Full Build-Out Conceptual Land Use Alternatives

Operational impacts associated with stormwater would occur in the form of changes in the function of existing drainage systems as the site is altered over time. Changes to forested areas, meadows, and wetlands that currently detain and treat stormwater runoff would alter stormwater quantity and quality with development of any of the conceptual land use alternatives. Based on approximate typical land cover in the developed condition of each conceptual land use alternative, estimates of impervious cover have been estimated in relation to total site area (see Table 3.19.4-1).

Table 3.19.4-1. Total estimated impervious cover by conceptual land use alternatives.

Conceptual Land Use Alternative	Impervious Cover (in acres)	Percent Impervious Cover
Preferred Alternative	580.9 acres	46.9%
Traditional Development Alternative	586.4 acres	47.3%
Urban Village Alternative	529.5 acres	42.7%
Total Site Area:	1238.6 acres	

Washington Department of Ecology (Ecology) regulations require that developed-condition runoff rates must not exceed pre-developed condition rates ranging from 50 percent of the 2-year peak flow up to the 50-year peak flow. The goal of stormwater quantity control is to protect downstream areas of a drainage basin from erosion and flooding due to increases in the rate and peak frequency of runoff from developed areas. Traditional methods of stormwater quantity control typically include a series of storm drain pipes or surface structures to convey runoff from the project site to large retention/detention ponds or infiltration ponds at the low end of the site drainage basin. While large infiltration basins will most likely not be used as the primary means of stormwater management within the Thurston Highlands Master Planned Community, these types of facilities were used in the *Grading, Drainage and Utilities Technical Engineering Report* (KPFF 2008) analysis to provide general calculations of stormwater detention, infiltration, and water quality treatment facility requirements.

Urban development of the site would introduce pollutants in site runoff in the form of petroleum product residues, heavy metals, biological agents and nutrients (see Table 3.3-4 in Draft EIS Section 3.3.1). These pollutants would have the potential to degrade the quality of water being infiltrated into the ground if not properly treated. The proposal includes designing and constructing water quality treatment facilities in accordance with City of Yelm and Washington Department of Ecology requirements to remove pollutants contained in stormwater runoff. Pollutants of concern include sand, silt, and other suspended solids; petroleum product residues; metals such as copper, lead, and zinc; nutrients, bacteria, viruses, organics, and pesticides. Water quality treatment facilities will be sized based on the 91st percentile 24-hour runoff volume indicated by an approved continuous runoff model such as the Western Washington Hydrology Model (WWHM), version 3. Ecology has developed a step-by-step selection process for stormwater quality treatment facilities that serves as a guide to determine the level of treatment necessary based on land cover and land use prior to infiltration. Due to the diversity of uses within a sustainably-developed Master Planned community, different combinations of methods for runoff treatment may be used in the stormwater management system. Representative types of water quality treatment facilities are described in Section 3.5 of the *Grading, Drainage and Utilities Technical Engineering Report* (KPFF 2008).

Table 3.19.4-2 summarizes calculations of estimated unmitigated stormwater runoff for a 50-year event, estimated required volume of infiltration facilities, and estimated required volume for water quality treatment (i.e., wet pond) facilities for each of the conceptual land use alternatives.

Table 3.19.4-2. Estimated stormwater management parameters and facility requirements (KPFF Consulting Engineers 2008).

Estimated Stormwater Management Parameters and Facilities	Preferred Alternative	Traditional Development	Urban Village Alternative
Unmitigated Stormwater Runoff	290.656 cfs	294.65 cfs	264.591 cfs
Required Volume of Infiltration Facilities	217.541 ac ft	218.845 ac ft	206.988 ac ft
Required Volume of Water Quality Treatment Facilities	93.487 ac ft	93.888 ac ft	87.290 ac ft

Impacts associated with any of the three conceptual land use alternatives would be similar in nature. As shown in Table 3.19.4-2, there would be a difference of only approximately 11 percent in the volume of runoff generated from the full build-out alternatives, less than a 6 percent difference in infiltration volume required, and less than an 8 percent difference in required water quality treatment volume.

The Thurston Highlands Homeowners' Association would own and be responsible for stormwater management facilities within the Master Planned Community after construction is complete and lots are legally platted. The City of Yelm would own and maintain stormwater management facilities that serve public right-of-way.

Each stormwater management facility would need to be periodically observed and maintained to ensure design performance. Because the facilities associated with the proposed development would increase the number of facilities for which City of Yelm staff would be responsible, there would be a need to adjust to the City's observation and maintenance operations to add these responsibilities.

Phase 1 Development Concept

Approximately 24 percent of the Phase 1 development area would be converted to impervious surface − approximately 154 acres of 351 acres, total (personal communication with KPFF Consulting Engineers, April 14, 2008).

Stormwater runoff generated within the Phase 1 development area in the northeastern portion of the site, if infiltrated in this area, has the potential to report to Thompson Creek through inputs to shallow groundwater. Stormwater management system design will rely on recommendations in the Pacific Groundwater Group (2008) *Infiltration Effects Analysis* to minimize impacts to Thompson Creek (see Draft EIS Section 3.3).

No Action Alternative

If the No Action Alternative were selected, existing conditions of surface water runoff, infiltration, and evapotranspiration would continue. No pollutant-generating impervious surfaces would be introduced on the site, and no stormwater quantity or water quality treatment facilities would be required.

MITIGATION MEASURES

Incorporated Plan Features. The City of Yelm and Thurston Highlands, L.L.C. adopted a common definition of "smart growth" and Sustainable Development Principles (September 19, 2006) to guide planning and City review of the Thurston Highlands Master Planned Community (see Draft EIS Appendix A). The Sustainable Development Principles most applicable to stormwater management are the Low Impact Development (LID) technologies. Stormwater management facilities will therefore be developed using criteria from the *Low Impact Development: Technical Guidance Manual for Puget Sound* (Puget Sound Action Team, February 2005), and the requirements of the *Stormwater Management Manual for Western Washington* (SWMWW) (Ecology 2005). The stormwater management techniques of Low Impact Development differ from traditional development in that they are applied at a smaller scale and are designed to more closely mimic pre-development hydrology by managing stormwater closer to its source in small drainage areas, rather than creating large stormwater facilities for entire drainage basins. Techniques that retain natural land cover, minimize impervious surfaces, and maximize infiltration of stormwater would be used to the extent practicable to protect aquifer recharge that currently occurs on the Thurston Highlands site.

The increase in runoff would be mitigated within the design of the stormwater management facilities. Closed depressions on the site may be used as local areas for infiltration. In other areas, the final stormwater management systems may be used during construction activities. In these cases, additional erosion/sedimentation control measures may be required to ensure that the performance of the final system is not degraded.

The potential for incursion of construction activities into wetland areas would be minimized by defining buffers around wetlands. Recommended buffer widths are identified in the *Wetlands Inventory, Wetland Impacts and Mitigation Recommendations* (Coot Company 2008B), and in Draft EIS Section 3.4. These will be clearly marked with high-visibility temporary fencing during construction. In the event that some small, isolated wetlands are proposed for use in the stormwater management system, the Wetland Protection provisions of the Ecology Manual will be followed. These provisions require that discharges to wetlands must maintain the hydrologic

conditions, hydrophytic vegetation, and substrate characteristics necessary to support existing and designated beneficial uses (SWMWW, Volume 1, Section 2.5.8).

Applicable Regulations. The *Stormwater Management Manual for Western Washington* (Ecology 2005) will be used for design guidance. Since the project will take a number of years for full build-out, the most current local or State manual for guidance on stormwater design will be followed throughout implementation of the Master Planned Community. SWMWW (Ecology 2005) requires conveyance systems, including sedimentation ponds and traps, to be designed to handle the 25-year, 24-hour storm event under construction conditions. Developed-condition runoff rates must not exceed pre-developed rates ranging from 50 percent of the 2-year peak flow up to 50-year peak flow.

Permits for grading activities will require submission of Erosion and Sediment Control (ESC) and Spill Prevention Control and Cleanup (SPCC) plans. Compliance with these plans will minimize the potential for water quality impacts. Any work within or modifications to wetlands would require permitting by Ecology, and potentially by the U.S. Army Corps of Engineers. In the event that any work is proposed within the Thompson Creek channel (offsite), this work would require Hydraulic Project Approval from the Washington Department of Fish & Wildlife. Permit conditions to mitigate impacts may include a restriction on the period when construction activities can be undertaken, measures necessary to monitor and minimize release of suspended sediments, and restoration requirements at the conclusion of construction.

Other Possible Mitigation Measures

Possible mitigation measures to be considered once ongoing analysis is complete and impacts to Thompson Creek are more defined may include:

Stormwater Pumping. Permeable areas within the Thurston Highlands site that appear to drain to the deeper aquifer and therefore do not contribute to flow to Thompson Creek would be ideal locations for stormwater infiltration facilities. Pumps could be added to the stormwater management system to convey excess runoff to infiltration facilities in areas where there is less direct flow of shallow groundwater to Thompson Creek, and/or located within areas of the site with well-draining soils that would treat and release stormwater to the deeper aquifer. This mitigation option is discussed in more detail in the Water Resources section of this Draft EIS (Section 3.3).

Wetlands. The stormwater design team will work closely with the wetlands biologist to develop a stormwater management system that would minimize hydrologic alterations to high-value wetlands and the headwaters of Thompson Creek. Some onsite wetlands provide little to no habitat value (Coot Company 2008A) or hydrologic value to the larger system (Coot Company 2008B). These small, isolated wetland depressions may be considered for use as stormwater detention/infiltration facilities. Compensatory mitigation for wetlands that may be altered in this manner is described in Section 3.4 of this Draft EIS.

Thompson Creek Improvements, Possible Drainage District Formation. Thompson Creek is an ephemeral stream that is seasonally influenced by the rise in shallow groundwater elevation. In order to address historical seasonal flooding that would likely be exacerbated by development of the Thurston Highlands site and other anticipated projects within the basin, there may be a joint opportunity to improve the conveyance capacity of the creek through formation of a Drainage District or Flood Control District. Improvements could include:

- Widening the channel and/or increasing the overall slope.
- Replacing existing under-sized culverts within the channel with larger, more appropriately-sized culverts.
- Removing obstructions within the creek channel that are not needed, or that otherwise limit conveyance capacity.

A Thompson Creek Watershed Drainage District would have the authority to engage in flood control activities, to investigate, plan, construct, acquire, repair, maintain, and operate improvements, works, projects, and facilities necessary to prevent inundation or flooding from Thompson Creek. The governing board of directors would ultimately be elected by the property owners within the watershed, and would work both on their own and with other local government authorities to manage the District. To the extent that formation of the District or actions to be implemented by the District would require compliance with applicable laws and regulations, including environmental review, these compliance measures would be performed at appropriate times in the schedule for development a Drainage District and constructing needed improvements. Formation of a Drainage District is not an element of the Thurston Highlands proposal. Rather, the applicant has expressed an interest in working with the City and other property owners along the creek to form a district of this nature to improve the current situation for all affected property owners.

Rainwater Harvesting. Measures such as rainwater harvesting (i.e., collecting and storing stormwater for beneficial use, such as irrigation and fire flow), and the use of drought-tolerant landscaping could minimize potable water supply requirements for irrigation. Although rainwater harvesting may not be economical on a large scale, it is a measure that could be considered on case-by-case basis. If in the process of harvesting and applying rainwater drainage basin boundaries were crossed, water rights issues could be triggered that would need to be considered in the overall needs of not just this project, but the City's needs as a whole.

Reduce the Quantity of Stormwater to be Infiltrated. Consideration could be given to increasing evaporation and transpiration by introducing vegetation in site landscaping that requires a lot of water to survive. Certain areas of the site not planned for development could be reserved for growing vegetation of this type to accomplish this goal.

Significant Unavoidable Adverse Impacts

Because applicable regulations require implementing stormwater management measures that would control runoff substantially to pre-developed conditions, no significant unavoidable adverse impacts would be anticipated. Also see Draft EIS Section 3.3 for discussion of stormwater infiltration effects and mitigation options to avoid adverse impacts to Thompson Creek.

3.19.5 Electrical Service

Puget Sound Energy (PSE) and Centralia Utilities are the electrical power service providers in the project area. PSE provided a detailed account of their facilities and abilities to meet the needs of Thurston Highlands in a letter to Grant Beck, City of Yelm Community Development Director in correspondence dated May 3, 2007. Centralia Utilities was also consulted regarding their potential interest and capability to serve the Thurston Highlands Master Planned Community, but they have declined to provide any service. Centralia Utilities will work with the developer to relocate the existing transmission lines that run diagonally across the western portion of the site.

AFFECTED ENVIRONMENT

Electrical power to the Yelm area including the Thurston Highlands property is provided by PSE transmission lines that originate at the Saint Clair Substation and extend to the Yelm Substation located at 16300 Railway Road SE (see Figure 3.19.4-1). An additional transformer may be needed at this substation to serve near-term growth from known development proposals.

All power lines that would serve the Thurston Highlands property are below-grade facilities located within public road rights-of-way, or within adjacent easements. Conduit and electrical line capacity to serve the initial phase(s) of Thurston Highlands development were placed within the Tahoma Boulevard right-of-way as part of the Tahoma Terra development.

The Rainer Substation was rebuilt in 2005 and 2006 to increase the electrical load capacity in the town of Rainer and unincorporated areas northeast of Rainer. The initial load demand from development of the Thurston Highlands Master Planned Community could be reinforced from the Rainier Substation, if needed (personal communication with Amy Tousley, PSE Municipal Liaison Manager, May 3, 2007).

Centralia Utilities has a 77-year-old transmission line with a capacity of 40 megawatts (MW) that crosses the western portion of the Thurston Highlands site in a northeasterly/southwesterly direction. At the time of this writing, only 11 MW are conveyed through the system (personal communication with Rich Baine, Centralia City Light, November 19, 2007). The transmission line is 27 miles in length within a 150-ft wide easement, and originates from the Yelm hydropower facility on the Nisqually River. These facilities provide electrical service the City of Centralia. There is no local service available from this line.

POTENTIAL IMPACTS DURING CONSTRUCTION

The electrical service requirements of the Thurston Highlands Master Planned Community will be coordinated with PSE Engineering and Construction Departments during the preparation of construction documents for the project. The development will continually coordinate with PSE on long-range planning/scheduling needs, but the actual design of facilities will occur as each phase of development submits subdivision applications to the City of Yelm.

It is an element of the Thurston Highlands proposal to relocate the Centralia Utilities overhead transmission line from the existing diagonal easement across the property to the perimeter of the site along the west and north property boundaries adjacent to Fort Lewis. Centralia Utilities has requested that a 100-foot easement be granted for the new location to accommodate future expansion, although they have admitted that they have no current plans to expand the system. As a result, a 50-foot wide easement may be enough to satisfy their needs

for access to and maintenance of the single power line. A 50-ft easement is proposed. Relocation of the Centralia Utilities transmission line will be coordinated with Centralia Utilities Engineering and Construction Departments. The timing of this effort will occur when the first land use application for improvements in the western portion of the Thurston Highlands site would require relocation of this power line. The entire length of the transmission line across the property would be addressed at that time.

PSE will need a utility corridor, as well, for new transmission lines per the *Yelm Area Transmission Plan*. This corridor could either locate new transmission lines within this same easement benefiting Centralia Utilities, or look for alternative routes (cross-country or along County road rights-of-way). Co-locating with Centralia Utilities would be consistent with Growth Management Act policies; however, PSE is prohibited from sharing transmission poles with Centralia Utilities. Therefore, a second system of poles would be necessary, resulting in the need for at least a 100-foot wide easement. PSE's long-range planning anticipates extending overhead transmission lines south from the Saint Clair Substation to a new substation south of SR 507.

Full Build-Out Conceptual Land Use Alternatives

PSE has plans to expand the existing Yelm Substation (by adding a transformer), and construct a third transmission line from the Saint Clair Substation to increase capacity, improve reliability, and to meet the demands of ongoing development within the Yelm area, with or without development of the Thurston Highlands Master Planned Community. The PSE system improvements would require construction to expand the existing footprint of the Yelm Substation (PSE, May 30, 2006).

New transmission lines from the Saint Clair Substation to Yelm would likely follow existing roadway rights-of-way, as PSE has franchise agreements with Thurston County and the City of Yelm. Short-term traffic delays may be expected as the facilities are constructed adjacent to operational roadways within some of the rights-of-way.

Phased extension of the electrical distribution system through the Master Planned Community may or may not coincide with phased development of the project. The developer will maintain close communication with PSE to coordinate the extension of power, in accordance with a mutually-agreeable phasing schedule. Load analyses will be developed at the time of application for specific subdivision approvals. Electrical lines will be located within designated easements with ease of access for inspection and repair. PSE requires a 10-foot frontage easement on private property (personal communication with Bill Foster, Senior Engineer, PSE, April 18, 2008). For ease of construction and to minimize conflicts with other utility services, "bubble" easements may be required to expand the width of the easement at vault locations.

Phase 1 Development Concept

Phase 1 construction impacts would include coordinating the location of underground conduit within the public right-of-way of the Tahoma Boulevard extension and adjoining residential streets to meet the expanded demand of the Thurston Highlands Master Planned Community. Electrical service to all the new residences within Phase 1 would be provided from the PSE system, implementing a site distribution system map (PSE, May 3, 2007).

Insert Figure 3.19.5-1. Location of Existing Electrical Power and Natural Gas Facilities.

No Action Alternative

If the No Action Alternative were selected, PSE would not extend its electrical power supply system into the Thurston Highlands site.

POTENTIAL DEVELOPED-CONDITION IMPACTS

PSE maintains spreadsheets of projects identified through development applications sent by local permitting jurisdictions, including the City of Yelm. They also implement a *Thurston County Growth Management Act Facilities Plan* through the individual Comprehensive Land Use Plans of municipalities within the County. The County's *Comprehensive Plan: Utilities Element* was last amended in 2004. Based on information received to-date regarding the Thurston Highlands development, PSE has determined that there is capacity to serve this future growth through its transmission and distribution systems in the near future. However, PSE may need to accelerate the timing of some planned transmission and distribution improvements within Thurston County depending on the actual customer growth rate in the area (PSE, May 30, 2006).

Full Build-Out Conceptual Land Use Alternatives

PSE uses types of growth and scale of development to assess project impacts. For a project of the size of Thurston Highlands, with more than 5,000 residential units planned, the type and size of residential units will vary. The impact of a 1,000 square-foot multi-family unit will be much less than a 3,000 square-foot single-family home. PSE uses electrical power estimates for heating, lighting and appliances ranging from 4.97 kilowatt (kW) for 1,000 to 1,500 square-foot multi-family units, to 5.44 kW for 1,000 to 1,500 square-foot duplexes, to 7.80 kW for 3,000 to 3,500 square-foot single-family homes.[2] For planning purposes for a Master Planned Community like Thurston Highlands, PSE uses an average square-footage for the various residential types. All-electric load estimates provided by PSE for each of the conceptual land use alternatives are shown in Table 3.19.5-1. As can be seen from these comparisons, the Traditional Development Alternative would be the least energy-efficient, due to the larger number of single-family homes. The Urban Village Alternative would be the most energy-efficient, even with a significantly larger commercial component, due to the largest number of duplex and multi-family units.

PSE would serve the Thurston Highlands Master Planned Community from the existing Yelm Substation located on Railway Road SE, and from construction of a new distribution substation to be located south of SR 507. Based on the conceptual land use plans reviewed by PSE in May 2006, if the energy requirements of the project were met entirely with electricity, the electrical load demand of the Thurston Highlands Master Planned Community would require about two-thirds of the capacity of a typical substation.

[2] Note that these electrical power estimates are for all-electric service; i.e., they assume no use of natural gas. Since the use of natural gas is proposed, these are highly conservative estimates of the electrical demands of the project.

Table 3.19.5-1. All-electric demand estimates for the Thurston Highlands conceptual land use alternatives (Bill Foster, Senior Engineer, Puget Sound Energy, April 25, 2008).

Land Use Component	Electrical Demand/unit	Preferred Alternative		Traditional Development Alternative		Urban Village Alternative	
Single-Family	7.80 kW/unit	3,000 units	23,400 kW	4,000 units	31,200 kW	1,000 units	7,800 kW
Duplexes	5.44 kW/unit	546 units	3,013 kW	400 units	2,176 kW	1,240 units	6,746 kW
Multi-Family	4.97 kW/unit	1,454 units	7,477 kW	600 units	2,982 kW	2,760 units	13,717 kW
Residential Totals:	*varies*[1]	*5,000 units*	*33,890 kW*	*5,000 units*	*36,358 kW*	*5,000 units*	*28,263 kW*
Retail	0.0077 kW/sf	825,000 sf	6,353 kW	480,000 sf	3,696 kW	850,000 sf	6,545 kW
Office	0.0063 kW/sf	135,000 sf	851 kW	150,000 sf	945 kW	650,000 sf	4,095 kW
Commercial Totals:	*0.0075 kW/sf*	*960,000 sf*	*7,203 kW*	*630,000 sf*	*4,641 kW*	*1,500,000 sf*	*10,640 kW*
Alternative Totals:			**41,093 kW**		**40,999 kW**		**38,903 kW**

[1] The average residential demand per unit factor differs between the alternatives, based on the mix and number of dwelling unit types. The "blended" number is 6.78 kW/unit with the Preferred Alternative, 7.27 kW/unit with Traditional Development, and 5.65 kW/unit with the Urban Village Alternative.

In addition to expanding the existing Yelm Substation, PSE has identified a need for a new distribution substation through their long-range planning process. A specific site has not yet been selected. While PSE plans have tentatively located the proposed substation south of the Thurston Highlands Master Planned Community along SR 507, PSE believes it is also important to include a potential site for a substation, most likely a 25 MVA, within Thurston Highlands (PSE, May 30, 2006). If sited within the development, this substation would include the installation of new overhead 115 KV transmission lines from the new off-site substation to this new onsite substation. All new facilities would be sized in anticipation of full build-out of the Master Planned Community. The actual increase in demand for electrical power would be phased over the projected build-out of planned improvements.

PSE has indicated that it could take 3 to 5 years to acquire property and build a new substation. They are currently (2008) analyzing prime locations to determine an ideal site, and anticipate starting the process to acquire land in 2009, with design to follow in 2010−2011 (personal communication with Bill Foster, Senior Engineer, PSE, April 18, 2008). PSE anticipates having a fully-energized new facility by 2012. This time frame would correspond to the approximate completion of Phase 1 and the initiation of Phase 2 of Thurston Highlands Master Planned Community development.

Phase 1 Development Concept

An all-electric residential load of approximately 6,743 kW was estimated for the Phase 1 development concept using the same electrical demand per unit factors indicated in Table 3.19.5-1 for the full build-out alternatives (personal communication with Bill Foster, Senior Engineer, PSE, April 25, 2008).

PSE has indicated that they would be able to meet the electrical load requirements of the Phase 1 development concept with existing distribution and transmission facilities. This area of the site (northeast corner) would most likely be served from the Yelm Substation. The Rainier Substation could help subsidize load demands, if needed (PSE, May 3, 2007).

No Action Alternative

With the No Action Alternative, there would be no development on the Thurston Highlands site in the near-term; therefore, there would be no requirement to extend electrical service through the property. Other planned improvements within PSE's service area would not be affected by a No Action decision on Thurston Highlands, as the Yelm Substation upgrade and third transmission line extension from the Saint Clair Substation are needed to improve reliability and increase capacity with or without the master planned community (personal communication with Bill Foster, Senior Engineer, PSE, April 18, 2008).

MITIGATION MEASURES

Incorporated Plan Features. The proposal includes serving homes within the development with natural gas to be used for space heating and hot water. Table 3.19.5-2 shows that this would reduce the residential demand for electrical energy by approximately 64 percent with implementation of any of the conceptual land use alternatives. In terms of total electrical demand, the most savings would occur with the Traditional Development Alternative.

Table 3.19.5-2. Electrical demand estimates of the Thurston Highlands conceptual land use alternatives assuming natural gas will be used for space heating and hot water (Bill Foster, Senior Engineer, Puget Sound Energy, April 25, 2008).

Land Use Component	Electrical Demand/unit	Preferred Alternative		Traditional Development Alternative		Urban Village Alternative	
Single-Family	2.80 kW/unit	3,000 units	8,400 kW	4,000 units	11,200 kW	1,000 units	2,800 kW
Duplexes	1.82 kW/unit	546 units	994 kW	400 units	728 kW	1,240 units	2,257 kW
Multi-Family	1.82 kW/unit	1,454 units	2,646 kW	600 units	1,092 kW	2,760 units	5,023 kW
Residential Totals:	*varies*[1]	*5,000 units*	*12,040 kW*	*5,000 units*	*13,020 kW*	*5,000 units*	*10,080 kW*
Retail	0.0077 kW/sf	825,000 sf	6,353 kW	480,000 sf	3,696 kW	850,000 sf	6,545 kW
Office	0.0063 kW/sf	135,000 sf	851 kW	150,000 sf	945 kW	650,000 sf	4,095 kW
Commercial Totals:	*0.0075 kW/sf*	*960,000 sf*	*7,203 kW*	*630,000 sf*	*4,641 kW*	*1,500,000 sf*	*10,640 kW*
Alternative Totals:			**19,243 kW**		**17,661 kW**		**20,720 kW**

[1] The average residential demand per unit factor in the "with gas" scenario differs between the alternatives, based on the mix and number of dwelling units by type. The "blended" number is 3.78 kW/unit with the Preferred Alternative, 2.60 kW/unit with Traditional Development, and 2.01 kW/unit with the Urban Village Alternative.

PSE would construct the electrical distribution system using one of its authorized contractors. The contractor would be required to work with Thurston County and the City of Yelm to provide traffic control measures during work within road rights-of-way adjacent to operational roadways.

Underground conduit facilities are already in-place in Tahoma Boulevard through Tahoma Terra to serve initial phases of the Thurston Highlands Master Planned Community.

Thurston Highlands, L.L.C. proposes to encourage the construction of "built green" homes within the Master Planned Community. Representative energy-efficient characteristics of this type of construction are described in Draft EIS Section 3.6.

Applicable Regulations. Per Yelm City Code, the electrical distribution facilities for the Master Planned Community would be constructed through an underground distribution system, except that PSE's substation facilities and 115 kV transmission lines would be above-ground. If there will be any bridge crossings, PSE would like to coordinate attaching lines to these, or boring beneath (City of Yelm, personal communications with energy and telecommunications service providers, May 23, 2006).

Other Possible Mitigation Measures. Mitigation measures to minimize electrical demand generally consist of using high-efficiency lighting, heating, ventilating, and air conditioning (HVAC) systems. Homeowners, commercial property owners and tenants will be encouraged to utilize energy-efficient practices.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

Construction and occupancy of the proposed Master Planned Community would result in the consumption a significant amount of electrical energy; however, this demand would occur regardless of where within the City of Yelm and/or Thurston County development occurs to provide for projected population growth during the current 20-year planning period. The vast majority of electrical energy conveyed by Puget Sound Energy originates from hydropower, a renewable source. Based on communications with Puget Sound Energy, no significant unavoidable adverse impacts to their electrical supply system would be anticipated with phased development of the Thurston Highlands Master Planned Community.

3.19.6 Natural Gas Service

Puget Sound Energy (PSE) provides natural gas service within the area that includes the Thurston Highlands site, and anticipates customary natural gas service to be constructed throughout the Master Planned Community. Based on information they have reviewed to date, PSE has indicated that there is available capacity within their existing natural gas distribution system and planned improvements to serve future growth.

HBH Propane and Ferrellgas, L.P. provide propane service in the Yelm area. Both would entertain the possibility of serving the Thurston Highlands site or various portions of development, if requested (personal communication with Steve Ball, HBH Systems (propane) and Stacy Hogan and Joe Westby, Ferrellgas, L.P.; May 23, 2006).

AFFECTED ENVIRONMENT

As part of PSE's long-range planning program, on-going natural gas improvements have been constructed in the Yelm area to meet existing and future demands. PSE recently completed installation of an 8-inch diameter natural gas main along Longmire Road, to accommodate existing and anticipated growth in the southwestern portion of the City (PSE, May 3, 2006). This gas main presently terminates within the Tahoma Terra development, in the Tahoma Boulevard right-of-way on the west side of Thompson Creek, within one-quarter of a mile of the Thurston Highlands site (see Figure 3.19.5-1).

PSE projects constructed in 2007 improved system capacity as part of the Killian Road, Stevens Road and Main Street public improvement projects. The purpose of these improvements was to address growth anticipated on the Thurston Highlands site and in the overall area by constructing 8-inch mains that are either new, or that replaced smaller 2-inch lines (PSE, May 3, 2007).

PSE rebuilt the Town Border Station in 2007. This is the district regulator that feeds the natural gas intermediate pressure system into Yelm. Design is also underway to rebuild the Yelm Gate Station in the near future. This Station is the district regulator that feeds high-pressure lines that feed the intermediate pressure system.

POTENTIAL IMPACTS DURING CONSTRUCTION

All information regarding natural gas service to the Thurston Highlands Master Planned Community would be coordinated with PSE Engineering and Construction Departments during construction document preparation. The developer would maintain on-going coordination with PSE on long-range planning and scheduling needs. Phased extension of the natural gas system through the Thurston Highlands site may or may not coincide with phased development of the Master Planned Community. Load analyses will be prepared at the time of application for subdivision approvals. Natural gas lines extended through the site would be located within public rights-of-way or within a designated easement, with ease of access for inspection and repair.

It is not anticipated that propane will be used on a large-scale basis. Instead, propane may be requested on a case-by-case basis by actual users within the development. If propane service is utilized for any portion of the development, similar coordination would be required with the liquid propane service provider.

Full Build-Out Conceptual Land Use Alternatives

PSE natural gas facilities and improvements under design and construction at the time of this writing have the capacity to serve all of Thurston Highlands without a need for additional off-site improvements to their systems (PSE, May 3, 2007).

Potential short-term impacts to natural gas service during installation of new distribution lines could occur. The impact of these short-term interruptions would affect small areas that could be controlled by isolation within the transmission system.

Construction impacts associated with propane use would include delivery of large storage tanks to an on-site facility, and separate distribution piping within road rights-of-way or easements to be provided.

Phase 1 Development Concept

Construction requirements to extend natural gas service into the Thurston Highlands Phase 1 development area would include coordinating the location of underground natural gas mains within the public right-of-way of the Tahoma Boulevard extension and connecting residential streets to meet the expanded demand of the development. Natural gas service could be provided to all new buildings by developing a site distribution system map. PSE has stated that they are able to meet the load impacts anticipated in the Phase 1 development concept with existing natural gas distribution system facilities (PSE, May 3, 2007).

No Action Alternative

If the No Action Alternative were selected, there would be no anticipated utility trenching within the boundaries of the Thurston Highlands site to extend the natural gas system onto the property.

Potential Developed-Condition Impacts

The developed condition of any of the three conceptual land use alternatives would result in a similar demand for natural gas service.

Based on information received to-date, PSE has determined that there is capacity in their existing natural gas system to serve future growth associated with the Thurston Highlands Master Planned Community (PSE, May 3, 2007). Based on the customers to be served, PSE anticipates typical natural gas main extensions and services to be constructed throughout the development, fed by an 8-inch loop main. Applications for gas service to commercial uses will be submitted for review. Installation of the gas lines and meters will be coordinated with the contractor during construction. PSE's estimates for residential and commercial natural gas loads are shown below.

Natural Gas Load Demand. An average house (using natural gas for both heat and hot water) uses about 1,000 Therms of natural gas per year; 1 (one) Therm is about 100 cubic feet (CF) of gas; so 1,000 Therms is about 100,000 cubic feet of natural gas per household per year.

For retail and office uses, PSE estimates natural gas load requirements based on the following:

- Retail: 75 ft^3/sqft-year (75 cubic feet per square foot per year)

- Office: 85 ft^3/sqft-year (85 cubic feet per square foot per year).

Operational impacts would include a larger distribution system for PSE to maintain. Infrastructure is already being designed and/or constructed to satisfy the overall demands of area growth, including a Master Planned Community on the Thurston Highlands site.

Operational impacts associated with propane service would require dedication of easements for storage tank locations. Given the history associated with large propane tanks storing large amounts of concentrated propane at one location, the general public could have safety concerns.

Full Build-Out Conceptual Land Use Alternatives

Any of the three conceptual land use alternatives would result in the construction of approximately 5,000 residential units. These would create a demand for approximately 500,000,000 cubic feet or 5,000,000 Therms of natural gas.

Preferred Alternative

Commercial **–** 960,000 square feet (or 73,345,000 cu ft)

- Retail – 825,000 sq ft (61,870,000 cu ft)
- Office – 135,000 sq ft (11,475,000 cu ft)

Traditional Development Alternative

Commercial – 630,000 square feet (or 48,750,000 cu ft)

- Retail – 480,000 sq ft (36,000,000 cu ft)
- Office – 150,000 sq ft (12,750,000 cu ft)

Urban Village Alternative

Commercial – 1,500,000 square feet (or 119,000,000 cu ft)

- Retail – 850,000 sq ft (63,750,000 cu ft)
- Office – 650,000 sq ft (55,250,000 cu ft)

As an alternative energy source, propane could be considered for use in the Thurston Highlands development, instead of or in addition to natural gas. Although this service is not being considered for large-scale distribution, it is possible that propane could be used on a case-by-case basis for various land use applications. Propane service on a large-scale basis would require installing onsite storage tanks (multiples of 30,000 gallon tanks), and underground distribution lines. HBH Systems prefers a mounded above-ground installation, for ease of inspection, 24/7 security monitoring, and minimal optimum aesthetic compatibility. The propane supply would be trucked to onsite storage tanks, if this energy source is developed on the site (City of Yelm, May 23, 2006).

No Action Alternative

If the No Action Alternative were selected, there would be no demand for natural gas service on the Thurston Highlands site in the near-term.

Mitigation Measures

Incorporated Plan Features. PSE would construct the natural gas system within dedicated right-of-way using one of its authorized contractors to perform this work. The contractor would be required to work with Thurston County and the City of Yelm to provide traffic control measures during work within road rights-of-way adjacent to operational roadways.

Applicable Regulations. Design and construction of all proposed natural gas system improvements would be coordinated with PSE Engineering and Construction Departments.

Above-ground propane storage tanks and enclosures (if any) would be designed and constructed by or in coordination with the propane carrier, and in accordance with applicable state and local regulations for safety, access, maintenance and security. Security fencing would be required at each location.

Other Possible Mitigation Measures. Inconveniences during installation of new natural gas distribution lines could be minimized by accomplishing the switchover at a time of low building use (such as evenings or weekends for commercial buildings, or weekdays during business hours for residences).

Measures that could be taken to minimize natural gas demand generally coincide with measures that would increase building envelope insulation and therefore heat loss. Homeowners, commercial property owners and tenants will be encouraged to utilize energy-efficient practices.

If large propane tanks were installed within the development, landscape screening should be required to mitigate aesthetic impacts.

Significant Unavoidable Adverse Impacts

Based on communications with Puget Sound Energy, no significant unavoidable adverse impacts to their natural gas service system would be anticipated with phased development of the Thurston Highlands Master Planned Community.

3.19.7 Telecommunications Service

Fairpoint Communications, Comcast, and Digiteria/Equity provide telecommunications, internet services, and fiber optics within the project area. The information reported below is based on meetings, correspondence, and telephone communications with personnel from each utility (personal communications with Tim Hite, Fairpoint Communications, Senior Engineer, June 4, 2007; Scott Morrison, Comcast, SWPS Outside Plant Construction Engineer, June 4, 2007; and John Petersen, Digiteria, June 20, 2007).

AFFECTED ENVIRONMENT

Fairpoint Communications (Fairpoint) has extended their fiber optic network to an easement site within Tahoma Terra, adjacent to the northeast boundary of Thurston Highlands. Their node at this location is capable of serving 864 customers. Only 30 homes were served from this node as of June 2007. This node has capacity to extend fiber optic service into Thurston Highlands. The existing network has been designed to provide Fairpoint's Triple Play and Business services (personal communication with Tim Hite, Fairpoint Communications, Senior Engineer; June 4, 2007).

Comcast has also extended their service into Tahoma Terra, with capacity to extend into Thurston Highlands. The size and location of facilities vary; however, they coincide horizontally with electrical power locations (personal communication with Scott Morrison, Comcast, SWPS Outside Plant Construction Engineer, June 4, 2007).

Digiteria has also extended their service into Tahoma Terra, and has the capacity to extend into Thurston Highlands. They have a 36-foot square data center building in Tahoma Terra with capacity to serve all of Tahoma Terra and Thurston Highlands. The size and location of other facilities vary. As with Comcast facilities, Digiteria systems coincide horizontally with electrical power locations (personal communication with John Peterson, Digiteria, June 20, 2007).

POTENTIAL IMPACTS DURING CONSTRUCTION

Telecommunications installation will follow the regulated requirements of each provider. Underground installation would follow electrical power installation (using the same trenches), and precede the extension of natural gas. This sequencing will require typical coordination between all underground utility service providers. Because no separate trenching would be required for the installation of telecommunications services, it is unlikely that there would be any distinguishable impacts during construction.

Full Build-Out Conceptual Land Use Alternatives

"Bubble" easements (i.e., wider than standard 10-foot easements) would be requested at vault locations. The requested dimension of the bubble easements is 4 feet x 1-foot setback (Fairpoint Communications, May 26, 2006). Approximately six to eight separate sites (one for approximately every 864 lots) within the Master Planned Community would be required to establish small offices (node locations), approximately 20 feet by 20 feet in area, preferably in an easement adjacent to a roadway. Comcast and Digiteria would also require vaults and service lines in the same trenches as electrical power and within the same "bubble" easements to expand their network service area.

Phase 1 Development Concept

The Phase 1 development area is in closest proximity to existing installations of telecommunications services within Tahoma Terra; therefore, no significant construction would be required to extend these services to Phase 1 homes.

No Action Alternative

If the No Action Alternative were selected, there would be no anticipated utility trenching within the boundaries of the Thurston Highlands site to extend underground utilities, including telecommunications services, onto the property.

POTENTIAL DEVELOPED-CONDITION IMPACTS

Full Build-Out Conceptual Land Use Alternatives

Because any of the conceptual land use alternatives would have approximately 5,000 dwelling units, the demand for telecommunications services may not vary significantly between these alternatives, depending on the demand generated by commercial development. The amount and type of retail and professional office space would vary by alternative, based in part on the character of the residential community and market factors unknown at the time of this writing. It is possible that the Urban Village Alternative would exert a somewhat higher demand for telecommunications services, due to the highest projection of commercial development: approximately 1,500,000 sf compared to approximately 960,000 sf with the Preferred Alternative, or approximately 630,000 sf with the Traditional Development Alternative. Based on information received to-date regarding the proposed Thurston Highlands Master Planned Community and alternatives, all three telecommunications providers have indicated that they have networks with capacity to provide service to the development (personal communication with Tim Hite, Fairpoint Communications, Senior Engineer, June 4, 2007; Scott Morrison, Comcast, SWPS Outside Plant Construction Engineer, June 4, 2007; and John Peterson Digiteria, June 20, 2007). The extension of utility infrastructure within the development would be required.

From an operational standpoint, there appear to be no adverse impacts associated with providing telecommunications services to the Master Planned Community, as all service providers have indicated adequate capacity to handle the development needs, and welcome opportunities for expansion.

Phase 1 Development Concept

Each telecommunications service provider indicated available capacity to serve the Phase 1 development concept substantially from existing infrastructure in the adjoining Tahoma Terra development.

No Action Alternative

If the No Action Alternative were selected, there would be no demand for telecommunications services on the Thurston Highlands site in the near-term.

MITIGATION MEASURES

Incorporated Plan Features. At the Conceptual Master Plan level of review, there are no known measures or features proposed to minimize construction impacts associated with the installation or operation of telecommunications services, and none are known to be necessary. All underground utilities would be co-located within road rights-of-way or easements.

Applicable Regulations. All proposed telecommunication system improvements and construction would be coordinated with each provider at the time site development approvals are sought. These systems would be installed in compliance with applicable regulations, with construction sequencing to be coordinated with PSE for use of the same trenches.

Other Possible Mitigation Measures. As no adverse impacts have been identified associated with the construction or operation of telecommunications services within the Thurston Highlands Master Planned Community, there are no other mitigation measures recommended for these services.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

Based on communications with telecommunications service providers, no significant unavoidable adverse impacts would be anticipated with the provisions of these services to the Thurston Highlands Master Planned Community.

3.19.8 Solid Waste Collection Service

Solid waste collection, transport and disposal services are provided to the City of Yelm by Pacific Disposal, a division of LeMay Enterprises. LeMay Enterprises has been under contract to the City for at least 12 years. Until recently, this account was serviced by the company's Tacoma operations. Beginning with the 2007−2008 contract (automatically renewable on a biannual basis), the account is now serviced by the Pacific Disposal division in Lacey, north of the Thurston County Transfer Station, on Hogum Bay Road NE. Personal communication with Mike Holcomb, Operations Manager, Pacific Disposal, is the source of information in this section.

AFFECTED ENVIRONMENT

At the time of this writing, LeMay Enterprises had approximately 50 commercial accounts and 590 residential customers within the incorporated area of the City of Yelm, as well as several thousand within the surrounding area of unincorporated Thurston County. It is their mission to handle all refuse and recycling needs of customers within the County.

Mixed municipal solid waste (MMSW) collected within the County and incorporated areas is transported to the Thurston County Recycling and Transfer Station in Lacey, in the northeast quadrant of the I-5/Marvin Road Interchange. The company collects residential and commercial solid waste, recyclables, yard waste, and construction/demolition/land clearing (CDL) wastes. MMSW is compacted and transported in containers to the Centralia Intermodal Yard, for long-haul transport to the Roosevelt Regional Landfill in Kittitas County, Washington for disposal. Yard waste is loaded into containers and transported to Silver Springs in Thurston County near the town of Rainier. This (2008) is their first full season of operation, converting yard waste and food waste to compost for resale. Mixed loads of CDL are sorted on the pick line at the transfer station. Compostable materials are mixed with yard waste; clean wood may be transported to a building materials reuse center in Olympia, or to a location where it is converted to hog fuel; used concrete is transported to Jones Quarry on Black Lake Boulevard to grind and reuse; and unusable materials are disposed with MMSW.

Pacific Disposal/LeMay Enterprises uses an automated system of solid waste and recyclable materials collection, with a range of container sizes and hydraulic arm lifts. The automated system has increased driver efficiency, and thus the number of customers that can be served per route on collection days. The company has no existing manpower or equipment constraints, and is able to respond quickly to additional demand (personal communication with Mike Holcomb, Operations Manager, Pacific Disposal, April 9, 2008).

No new or additional solid waste or recycling stations are identified in the *Thurston County Solid Waste Management Plan* (2001). Expiration of the Lakeside Industries lease at the Thurston County Recycling and Transfer Station site in 2008 will allow the company to expand into this area to improve the efficiency of the recyclable materials collection and processing area.

POTENTIAL IMPACTS DURING CONSTRUCTION

If requested by the site developer and/or contractor, Pacific Disposal/LeMay Enterprises can provide containers for CDL collection during construction. Land clearing debris, if mixed with demolition waste, would be transported to the Recycling and Transfer Station to be sorted on the pick line. If the contractor is willing to sort materials on-site, Pacific Disposal would provide

separate boxes for this purpose, and credit the account for clean material, thereby reducing overall transport and disposal costs.

No Action Alternative

If the No Action Alternative were selected, there would be no construction-period demand for solid waste collection, transport, and disposal services.

POTENTIAL DEVELOPED-CONDITION IMPACTS

Pacific Disposal learns of new development proposals within their service area through contacts and information they receive during environmental review and permitting, and/or directly through new customer calls requesting service. They often receive calls from new commercial customers to inspect proposed solid waste container storage areas and access for their trucks before these developments are completed.

The company has the capability to respond quickly to add manpower and equipment as new customer calls for service warrant these additions. With the 10 to 30-year projected build-out of Thurston Highlands, this growth is within the range anticipated by the company, and they have no concerns about their ability to meet the gradual increase in demand. The project would require no special or exceptional planning for solid waste collection, transport and disposal services (personal communication with Mike Holcomb, Operations Manager, Pacific Disposal, April 9, 2008).

Full Build-Out Conceptual Land Use Alternatives

Development of the Thurston Highlands Master Planned Community will require that Pacific Disposal/LeMay Enterprises increase their manpower and equipment over time. The quantity of solid waste and recyclables collection from each of the conceptual land use alternatives was estimated by Pacific Disposal as follows (personal communication with Mike Holcomb, Operations Manager, April 30,2008):

Preferred Alternative: 6,500 cubic yards per month
Traditional Development Alternative: 6,100 cubic yards per month
Urban Village Alternative: 7,200 cubic yards per month.

These numbers appear to be influenced by the amount of commercial development anticipated within each conceptual development scenario, rather than the difference in type and mix of dwelling units.

Phase 1 Development Concept

Pacific Disposal did not provide an estimate of the quantity of solid waste and recyclables collection requirements of the Phase 1 development concept. However, since this concept includes approximately 20 percent of total proposed residential development and no commercial component, it is inferred from the solid waste generation estimates for full build-out that Phase 1 may generate approximately 1,000 cubic yards per month of solid waste and recyclables.

No Action Alternative

If the No Action Alternative were selected, and no development were to occur on the property in the near-term, there would be no change from existing conditions, and thus no requirement for solid waste collection, transport and disposal services associated with the Thurston Highlands site.

MITIGATION MEASURES

Incorporated Plan Features. The applicant and/or City would notify Pacific Disposal/LeMay Enterprises at the time each new phase of development is proposed within Thurston Highlands, in order to coordinate services that may be required during construction, and to give the company advance notice of the forthcoming increase in the number of customers to be served.

The clearing and grading proposal includes grinding wood waste and stumps onsite to create woodchips for use in temporary site stabilization and permanent landscaping. Project implementation would also create significant opportunities for the use of compost generated onsite or at Silver Springs − to stabilize disturbed soils, and to mix with topsoil to improve moisture retention properties in areas to be landscaped.

Applicable Regulations. Residential and commercial customers would be required to establish individual accounts for solid waste collection services.

Other Possible Mitigation Measures. The developer and City could encourage contractors to implement waste reduction, sorting and recycling practices for building materials on-site during construction. Contractors could also be asked to minimize the potential presence of hazardous waste on the site through good jobsite housekeeping practices.

The Thurston County Solid Waste Division implements a public information/public awareness program to assist customers with understanding solid waste and recyclables collection and separation procedures. This can be expected to continue in the future, during the build-out and occupancy period of Thurston Highlands, incorporating new practices as technology advances for these services. Recycling procedures need to be as simple and convenient as possible, in order to engage the most customer participation. For example, builders could be encouraged to install recycle bins in kitchens or garages, and install food recycling chutes as an alternative to traditional food garbage disposals.

SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

The Thurston Highlands Master Planned Community and resident population, combined with other growth anticipated within the City of Yelm and its Urban Growth Area, would generate significant additional quantities of solid waste for collection and disposal at the Roosevelt Regional Landfill in Klickitat County, Washington; however, this impact would occur regardless of where growth occurs within Thurston County.

Pacific Disposal/LeMay Enterprises does not anticipate any significant unavoidable adverse impact to their operations as a result of the Thurston Highlands Master Planned Community proposal, due to the gradual rate of growth predicted to occur over 10 to 30 years (personal communication with Mike Holcomb, Operations Manager, Pacific Disposal, April 9, 2008).