



MEMORANDUM

TO: David Nemens, Associate Planner, Community Planning and Development
FROM: Andy Haub, P.E., Engineering and Engineering Supervisor, Public Works *LM for Att*
DATE: September 4, 2012
SUBJECT: Trillium Comprehensive Plan Amendment & Rezone City of Olympia File #11-0152

As requested, City Storm and Surface Water program staff has reviewed testimony regarding the proposed Trillium Comprehensive Plan Amendment provided at the August 20th Olympia Planning Commission public hearing. Our response to the storm and surface water testimony follows.

Summary of Public Hearing Testimony Regarding Stormwater and Flooding

Much of the testimony emphasized potential downstream surface water impacts of the proposed development. Potential impacts could result from increased volumes of stormwater discharging to the Wiggins Road ditch and subsequently to Chamber Ditch upstream of the Wilderness Subdivision. We suggest that the key storm and surface water issues presented at the Commission's public hearing are as follows:

- Potential flooding impacts to downstream properties.
- Stormwater-related water quality impacts to Chambers Creek and downstream water bodies.
- Potential impacts to an adjacent residential well and wetland.

Testimony suggests that increased stormwater volumes released from future development could exacerbate existing flooding and water quality problems. These issues were discussed in detail during the 2006 City of Olympia Chambers Basin moratorium hearings and the resultant 2008 evaluation report (<http://olympiawa.gov/city-utilities/storm-and-surface-water/policies-and-regulations/policies-and-regulations-chambers-basin-moratorium>). Additional detailed discussions and analyses occurred during the Trillium Master Plan and Preliminary Plat processes in 2010.

From our perspective, the recent testimony from the August 20th Planning Commission reinforces concerns and information provided during previous public processes and associated decisions. We have not identified substantial new issues or information.

Written Testimony provided by Thurston County

Written testimony presented to the Olympia Planning Commission by Thurston County Department of Resource Stewardship provides a technical evaluation of the flooding and water quality issues more generally expressed by the community (Thurston County, August 20, 2012). The County refines the broad community issues into five specific concerns:

- Need to update past flooding analysis with new information and standards.

- Existing and future stormwater volumes north and south of Yelm Highway.
- Maintenance of the Chamber Ditch.
- Potential Total Maximum Daily Load requirements for the Deschutes River and its tributaries.
- Implementation of planning recommendations.

In summary, Thurston County recommends updating basin planning work in order to prevent flooding and water quality impacts. In the meantime, the County supports any rezone with reduced impervious surfaces, increased vegetation retention, and reduced stormwater discharges.

City Response to the Written Testimony from Thurston County

The concerns provided by Thurston County on August 20th were also presented by the County during the Hearing Examiner's consideration of the Trillium Master Plan and Preliminary Plat processes in 2010. At that time, Olympia Storm and Surface Water staff provided written testimony responding to County concerns (City of Olympia, July 30, 2010, attached). The Hearing Examiner did not respond to County concerns or City responses in his decision.

Testimony provided by staff to the Hearing Examiner in 2010 remains valid:

- The sizing of the Wiggins Ditch stormwater pipe as presented for the Trillium development relies upon computer modeling approaches consistent with the County's recommendation. The methodology complies with both Olympia and County stormwater requirements.
- The hydrologic analysis of Chamber Ditch flows used contemporary methods as recommended by the County, rather than outdated methods used in the 1995 Chambers Basin Plan. However, the results are similar.
- New rainfall data mentioned by County staff has been available since 2009. As is the case with other developments, the engineering design of Trillium stormwater systems would incorporate the new data and be designed accordingly.
- Groundwater analysis conducted as part of the Chambers moratorium was extensive. During high precipitation events, soils in the Chambers valley become saturated and unable to infiltrate appreciably. The hydrologic modeling does not assume any appreciable infiltration. Therefore results are conservative.
- Simulated Wiggins and Chambers ditch flood flows were found to be greater in the 1995 basin analysis than the 2006 moratorium analysis. Contributing factors include the use of more contemporary modeling procedures as described in the July 30, 2010 submittal to the Hearing Examiner.
- While cumulative effects of development may impact downstream properties, proposed developments are not required to mitigate the entire problem. Olympia and State of Washington stormwater regulations provide the standard for mitigation. Specifically, proposed development in the Chamber and all other areas of Olympia discharging to pipes, streams, and wetland meet this requirement by matching post-development peak flows to pre-development flows. Infrastructure upgrades immediately downstream are also required.

- Maintenance of the Chambers Ditch remains necessary in order to prevent flooding. At a minimum, vegetation and debris management is needed. However, the authority and responsibility for Ditch maintenance lies with the Chambers Ditch District (north of Yelm Highway) and Thurston County (south of Yelm Highway), not the City of Olympia or development proponents. Contrary to County testimony, we understand that the District is not a permittee under the State's NDPES stormwater permit and is therefore not held to various State maintenance standards.
- Requests that we modify Olympia's stormwater regulation to reflect potential future expectations of a State water quality clean-up planning under the Deschutes Total Maximum Daily Load (TMDL) process are not appropriate. The City is involved in the development of the State's plan and like other jurisdictions will implement recommendations when we reach that point. In the mean time, sediments are managed in accordance with the State expectations.
- Olympia has implemented the recommendations of the 2008 moratorium report that fall within our responsibility. Other local jurisdictions may or may not have implemented recommendations applicable to them. In 2008, staff and elected officials of Thurston County and Lacey concurred with the report's recommendations.

While the City does not oppose more planning efforts for the Chambers basin, the Chambers valley and the Trillium site have been studied well beyond the level typical of basin planning work.

Potential Downstream Storm and Surface Flows

Flooding commonly occurs during the period of a storm's peak rainfall and runoff intensity. Olympia requires that stormwater flows leaving new development with poorly draining soils not exceed the calculated peak pre-development (forested) flow from a calculated 50-year storm event (2% probability of occurrence in any given year). Under this management approach, stormwater is stored on the development and slowly released following storms. Downstream peak flows and therefore increased flooding should not occur. Our experience is that these requirements have not generated new flooding problems in Olympia. The approach also keeps non-peak flows below flows associated with channel erosion.

Olympia staff readily acknowledges that the Chambers Ditch/Creek is vulnerable to flooding. They will likely flood again, especially if maintenance is not provided. While we can readily link the probability of future flooding with existing infrastructure deficiencies and lack of maintenance in the Chambers basin, we cannot provide a similar link between potential development at Trillium and downstream flooding. Thurston County is currently evaluating past flooding problems in the Wilderness Subdivision, We can provide that information for the Planning Commission during deliberations.

As discussed at the Planning Commission public hearing, the Trillium site was included in the initial Chambers valley moratorium and subsequently removed. Analysis indicated that the site does not present unique conditions warranting the imposition of extraordinary regulatory action such as a

moratorium or down zone. The site and its potential development do not present conditions appreciably different from other areas of Olympia.

Relationship between Stormwater Flows, Zoning Districts, and Impervious Surface

Replicating pre-development peak flows on a developed site such as Trillium requires providing adequate infiltration and storage of stormwater generated by the site's impervious surfaces. More impervious surfaces require more infiltration and/or storage. Effective stormwater management is a function of impervious surfaces rather than zoning district.

We understand that various residential and neighborhood village zoning districts allow for between 45% (R4 district) and 70% (neighborhood village) impervious surface excluding roadways. Depending upon the type of buildings constructed and its layout on the site, the impervious coverage from R4-8, R6-12, and Neighborhood Village can be similar and potentially overlap. Under certain development scenarios, a lower density district could have impervious surface coverage typical of a higher density district.

In turn, low density zoning such as RLI (residential low impact) district allows similar types of development as the other districts (single family, townhouse, multifamily), but restricts lot coverage to 2,500 square feet. Overall density in the RLI is typically 2-4 units per acre. With small lots, RLI can generate similar impervious coverage as R4-8.

RLI development generates appreciable stormwater in need of onsite management and downstream release. The County agrees and acknowledges in its written testimony (page 6) that even future 2016 State low impact development requirements are unlikely to require volume control. Still, Olympia requires various low impact techniques on all residential developments.

Summary

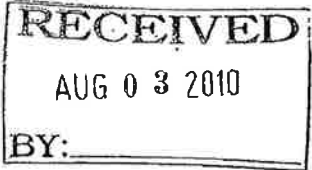
In summary, detailed analysis of the Chambers basin and the Trillium site over the past few years indicate that the site is not unlike other areas of Olympia. Stormwater needs to be managed effectively onsite and downstream systems maintained. Current stormwater and zoning requirements neither exacerbate nor resolve downstream flooding risks.

Stormwater infrastructure is designed to manage runoff from a site's impervious surface regardless of the subtle differences in urban-scale zoning districts. Peak flows are the same. Post-storm event releases of stormwater volumes over a 72-hour time period have not been seen to cause flooding. The proposed rezone would add a 46-acre developed site with contemporary stormwater management to the 2,285 acre Chambers basin which was mostly developed prior to stormwater management requirements.

AH/js

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Attachment



Ex. 116



City of
OLYMPIA

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Fire: 360.753.8348

Police: 360.753.8300

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Public Works: 360.753.8588

July 30, 2010

Mr. Thomas Bjorgen, Hearings Examiner
1235 4th Avenue East, Suite 200
Olympia, WA 98506

Dear Mr. Bjorgen:

**SUBJECT: Supplemental Testimony in Response to Testimony Provided by
Thurston County Water Resources Staff Regarding the Trillium Master Plan
(City File 04-2672) and the Trillium Preliminary Plat (City File 08-0054)**

This letter supplements testimony I provided on June 14, 2010 and is in response to testimony provided by Thurston County Water Resources staff regarding the Trillium development on July 22, 2010.

Background

The Trillium development has made application for land use approvals for a property partially located in the Chambers Basin. Subsequent to a land use approval, more rigorous engineering design and plan preparation will be required prior to issuance of building permits. The Trillium development is vested with the 2005 Olympia Stormwater manual and the 2004 Olympia Engineering Design and Development Standards.

Runoff from a portion (approximately 46 acres) of the proposed Trillium development will discharge partially to an upland wetland adjacent to 37th Avenue with the remainder flowing to Chambers Ditch via a proposed stormwater pipe to be installed along the Wiggins Road alignment. The Chambers Ditch receives flows from several sources including Chambers Lake, the City of Olympia, the City of Lacey, and Thurston County. In all, the Chambers ditch/stream receives flow from approximately 2,285 acres before it joins with the south fork of Chambers Creek. Areas within the City of Olympia that contribute flow to the Chambers Ditch are sparsely developed. Areas contributing flow to the Chambers Ditch from adjacent jurisdictions have been substantially more developed.

In 2006, in response to concerns about potential flooding associated with development, the City of Olympia imposed a moratorium on new development applications. To analyze the situation, the City developed the Chambers Basin Moratorium Evaluation Report dated March 2008 (enclosed for reference). The report provided an evaluation of groundwater and stormwater problems within the

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basin including Chambers Ditch flooding and maintenance issues and the preliminary design for the Wiggins Road stormwater conveyance. The report was the basis for rezoning a portion of the Chambers Basin. Development of that report involved public outreach, a public hearing, and communication with Thurston County and City of Lacey water resources staff, Washington State Department of Fish and Wildlife (Fish and Wildlife) staff and the Chambers Drainage Ditch representatives. In May 2007, with Thurston County water resources staff providing the introduction, City of Olympia staff briefed the Thurston County Commissioners on the draft Chambers Basin Moratorium Evaluation Report. Recommendations made in the draft report did not change substantively when the report was finalized. The Chambers Basin Moratorium Evaluation Report was reviewed by Thurston County staff without comment or appeal prior to its finalization. Both the draft and final versions of the report are available on the City of Olympia website.

Response to Pat Allen's Testimony

Pat Allen's comments regarding the sizing of the Wiggins Ditch stormwater pipe are technically correct. However, he appears to have reviewed only the conceptual design provided in the Chambers Basin Moratorium Evaluation Report and not the design performed by Barghausen Consulting Engineers in 2008 for land use approval for the Trillium development (refer to Section 4.6 of Attachment M). The Trillium development is vested with the 2005 Olympia Stormwater Manual. The conceptual design of the Wiggins stormwater pipe provided in the Chambers Basin Moratorium Evaluation Report was performed to evaluate the feasibility and cost of installing a pipe to reduce flooding of the Wiggins Ditch and convey runoff from upland development on the western side of Wiggins Road. Barghausen used a single-event Santa Barbara Urban Hydrograph (SBUH) methodology to design the Wiggins Road stormwater pipe. As Mr. Allen indicates, single event models are generally more conservative than the Western Washington Hydrology Model (WWHM) methodology. This is because the SBUH methodology overestimates peak flows. Use of the SBUH methodology for the design of stormwater conveyances complies with both Olympia's and Thurston County's current drainage manuals. Compared to the conceptual design provided in the Chambers Basin Moratorium Evaluation Report, the Barghausen design for the Wiggins Ditch resulted in a larger diameter stormwater pipe throughout.

In regards to the analysis of flooding in the Chambers Ditch, in 2006 the City of Olympia did run a simulation of Chambers Ditch in an unmaintained condition using a the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center's River Analysis System (HEC-RAS) computer program (see enclosed Table 1). The HEC-RAS program superseded the USACE's HEC-2 program used for the 1995 analysis and applies improved and more modern computational procedures that were not available when HEC-2 was developed. The City's 2006 HEC-RAS simulation was based on the Hydraulic Simulation Program Fortran (HSPF) data and future (developed) 100-year flow rates used for the 1995 HEC-2 analysis. The results of the 2006 HEC-RAS analysis corresponded closely with the results of the 1995 HEC-2 analysis. See below for additional information regarding the basis for the HEC-RAS analysis.

Mr. Allen's testimony suggests that more recent rainfall data should be used to evaluate flooding. Integration of recent precipitation data in modeling would likely be more conservative. However,

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the most recent precipitation data was only made publically available this year through integration in the Washington State Department of Ecology's WWHM. Prior to this year, WWHM precipitation data available to the public extended only through September 1999. The precipitation data recently made available extends only through September 2008 and does not include the referenced 2009 storm event.

Mr. Allen suggests that groundwater data should be integrated into the hydrologic flooding model. The HEC-RAS model can accommodate groundwater interflow and approximate hydraulic conductivities may be calculated based on the groundwater monitoring performed in 2007. However, under flood conditions, given the soil types within the Chambers Valley, flows to the Chambers Ditch will be driven by surface water runoff and not groundwater interflow.

As identified by Mr. Allen, the existing conditions flow rates identified for the Wiggins Ditch in the 1995 HSPF/HEC-2 analysis do not match the pre-development flow rates predicted in the preliminary design done for the Chambers Basin Moratorium Evaluation Report. Only the results and not the basis (soil type, acreages, etc) of the HSPF modeling performed for the 1995 analysis are available so an evaluation of the disparity is not possible. However, the projected runoff flow rates for the developed conditions using the HSPF modeling in 1995 were greater than those derived more recently using the WWHM. The higher developed flow rates used for the 1995 analysis are a result of applying Ecology's 1994 Drainage Manual flow control requirements. Subsequent versions of Ecology's Drainage Manual have significantly improved the flow control requirements for development. As a result, runoff flows and durations of flows (above one-half of the 2-year storm event) for properties developed within the City of Olympia will be less than those from the existing conditions. Because a significant portion of the basin being analyzed is already developed and outside of Olympia's jurisdiction, it is unknown what stormwater requirements were enforced at the time of development. For this reason, it is my understanding that the decision was made to use the more conservative 1995 flow data for developed conditions in the Chambers Ditch HEC-RAS analysis performed in 2006.

Mr. Allen raised the concern that under Ecology's 1994 Drainage Manual, the 1995 analysis would have assumed that new development on outwash soils would provide 100% infiltration. As stated previously, we are unable to verify that this was the case. However, as indicated in the Chambers Basin Moratorium Evaluation Report, soils within the area of concern are predominately till and outwash soils are very limited.

Mr. Allen indicates that the cumulative effects of development discharging to the Chambers Ditch will likely impact downstream wetlands at Yelm Highway and on the Zahn property. This issue was addressed in the Chambers Basin Moratorium Evaluation Report. Potentially, the Trillium developers could be asked to perform hydroperiod analyses to determine the effects of the Trillium development on the downstream wetlands, but the developers should not be burdened with evaluating the cumulative effects of development throughout the basin. The developers are required to address only their proportionate share of the impacts. Substantial portions of the basin have already been developed and remedies for this issue will require a cooperative effort between

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Thurston County and the Cities of Olympia and Lacey working with the State Department of Fish and Wildlife.

Response to Nadine Ramero's Testimony

Nadine Ramero's testimony provides data of great interest to the City of Olympia's Stormwater Utility. Olympia has advocated and financially contributed to updating Ecology's WWHM to integrate the most recent precipitation data for Thurston County. That update was accomplished earlier this year. Data currently available for download from Ecology's WWHM website includes watershed data management files providing 15-minute time step data up through September 2008 for 12 new rain gauges within Thurston County.

I do not question the precipitation data presented. I do question the trend line analysis presented based on limited, selected precipitation data. An attempt to replicate the trend line particularly for the recalculated data resulted in an R2 value (coefficient of determination) of 0.52, which varies significantly from the value presented in the testimony. The recalculated data result in a trend line of lower slope than depicted on the diagram submitted by the County. The recalculated data better represents actual precipitation events than the daily precipitation data which arbitrarily truncates storm events at midnight. This issue is only mentioned because the testimony suggests that on an approximate 3-year cycle we can expect to experience incrementally larger storm events. The data, even as selected, does not clearly support that suggestion, but does indicate we have recently experienced more frequent extreme storm events. Moreover, Ms. Romero admitted the small sample size rendered the data unreliable for purposes of determining a trend but rather serves as an area to watch with interest.

The Trillium development is vested with the 2005 Olympia Stormwater Manual and the precipitation data available for modeling at that time. As I understand it, the intent of vestment in the regulations is to avoid making developers chase a moving target. The WWHM analyses completed by Bargausen in 2008 applied the precipitation data available at the time, which was one-hour time step data collected from October 1955 through September 1999.

Response to Jim Bachmeier's Testimony

In regards to Jim Bachmeier's testimony regarding maintenance of the Chamber's Ditch. The importance of maintenance of the Chambers Ditch is undeniable. The issue of maintenance of the Chambers Ditch was addressed in the Chambers Basin Moratorium Evaluation Report. My understanding is that with the exception of culverts where roadways cross the ditch, the Chambers Ditch District is the jurisdiction with the authority and responsibility to operate and maintain the Chambers Ditch north of Yelm Highway. I assume that, if needed, the Chambers Ditch District has the authority to expand its service area to include any or all areas contributing flows to the ditch and levy fees necessary to perform its maintenance responsibilities. I also assume the City of Olympia has no authority to direct the Chambers Ditch District in its operations.

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Mr. Bachmeier first recommendation is that the Trillium development and all future developments discharging to the Chambers Ditch be required to waive their protest to annexation to the Chambers Ditch District. This may be a first step to a constructive solution for helping to maintain the Chambers Ditch, but I do not know whether the City has the authority to make the request of a development. I assume the request and appropriate documentation would need to come from the Chambers Ditch District. As part of the land use approval process, the Chambers Ditch District was notified of the proposed Trillium development.

Mr. Bachmeier's second recommendation is that the City of Olympia and the Chambers Ditch District become National Pollution Discharge Elimination System (NPDES) Phase II municipal stormwater permit co-permittees. In his oral testimony, I understood Mr. Bachmeier to suggest that this would extend City's responsibility for maintenance of the ditch to areas outside of the city limits. The request that the land use approval for the Trillium development be conditioned to require the City of Olympia to assume maintenance of the Chambers Ditch outside of the Olympia city limits is surprising. The portions of the Chambers Ditch maintained by the Chambers Ditch District flow through and receive flows from Thurston County and the Cities of Lacey and Olympia. In April 2007, Ditch District commissioners and engineers met with staff from Ecology, Thurston County, and the Cities of Lacey and Olympia to discuss the District's responsibility for NPDES compliance. My understanding is that it was concluded that the Chambers Ditch District would continue to perform maintenance of the ditch and that interlocal agreement should be established between each of the jurisdictions and the Ditch District to establishing the District as a secondary permittee under each jurisdictions respective NPDES Phase II permit. This is documented in the Chambers Basin Moratorium Evaluation Report and is my recommendation. The Washington State Department of Ecology administers NPDES Phase II municipal stormwater permits in compliance with the State Water Pollution Control Law and the Federal Water Pollution Control Act. It is my assumption that the Examiner lacks jurisdiction over and should be reluctant to intervene in the requirements of the NPDES permit program.

If you have any questions or require additional information, please call me at (360) 570-3741, or via e-mail at echriste@ci.olympia.wa.us. Thank you.

Sincerely,



ERIC T. CHRISTENSEN
Water Resources Engineer II
Public Works Water Resources

ETC/hrr

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Enclosures

Chambers Ditch Flood Elevations Comparing HEC2 and HEC RAS Models

HEC2 flood Elevation calculated from Thurston County 1995 HEC2 model of Chambers Ditch
 HEC2 RAS flood Elevations from City of Olympia 2006 model based on 1995 data

Craig Tosomeen

30-Jul-10

Unmaintained Ditch n = 0.08

Station	Ditch Invert	HEC2 100-yr	RAS 100-yr	Typical Gnd Elev	Discharge	Location	Road Elevation
11755	177.5	181.5	181.89	181.8		DS of Yelm Highway	185.5
11945	178.89	182.42	182.95	180.9		US of Yelm Highway	
12825	180.29	184.67	185	186.1		DS of Donnelly Drive	188.5
12945	181.83	185.52	185.45	188		US of Donnelly Drive	
13985	184.51	188.6	188.82	190.4		DS of Wilderness Drive	190
14120	184.74	189.2	188.92	190.4		US of Wilderness Drive	
15115	186.02	191.04	191.09	192.4		DS of Wiggins Road	193.6
15135	186.37	191.11	191.12	193		US of Wiggins Road	
15432	185.93	191.91	191.88	192		DS of Fuller Lane	193
15472	186.11	192.55	192.5	192.7		US of Fuller Lane	
16665	188.28	193.11	193.08	194		1200' US of Fuller Lane	
17620	189.65	194.06	193.7	195.6		DS of 40th Ave	196
17700	189.16	195.08	194.57	196.5		US of 40th Ave	
18360	189.75	195.23	194.79	195.2		665 feet DS of 37th Ave	
19025	190.23	195.36	194.98	195.5		DS of 37th Ave	195.7
19085	190	195.95	195.69	196		US of 37th Ave	
19845	190.04	196	195.75	196		DS of Chelalis Western Trail	197.7