Low-Impact Development Strategy for Green Cove Basin: A Case Study in Regulatory Protection of Aquatic Habitat in Urbanizing Watersheds

City of Olympia

Thurston County, Washington

City of
OLYMPIA

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Contents

Link to documents by clicking on items below.

Case Study

Attachments

19 – Ordinance 6143 – Amendments to Development Guidelines and Public Works Standards and Olympia Municipal Code for Green Cove Basin (October 2001)
- a – Summary of Ordinance
- b – Complete Text of Ordinance
- c – Table 4.01 – Permitted and Conditional Uses (revision of Ordinance 6140)
- d – Exhibits A-H – Street and Storm Drainage Standards for Green Cove Basin (cross sections and plan views)
- e – Exhibit I – Table 9-1 – Green Cove Basin Minimum Street Standards
- f – Exhibit J – Table 9-2 – Green Cove Basin Street Design Standards

City of Olympia
Low-Impact Development Standards for Green Cove Basin: A Case Study in Regulatory Protection of Aquatic Habitats in Urbanizing Watersheds

ABSTRACT

In October 2001 the City of Olympia, Washington adopted a unique set of mandatory low-impact development regulations within a single watershed for the purpose of preventing further damage to aquatic habitat from urban development.

While other cities – including Olympia's neighbors, Lacey and Tumwater – have adopted voluntary low-impact standards, or standards affecting one aspect of development, Olympia is the first to complete a comprehensive policy revision covering development density, impervious surface coverage, lot size, open space/tree retention, street design, street width, block sizes, parking, sidewalks, and stormwater management requirements. Changes affecting the Green Cove watershed were made concurrently in Olympia's Comprehensive Plan policies, zoning code, development standards and drainage design requirements. Thurston County, responsible for land use regulation in the unincorporated portion of Olympia's growth management area, simultaneously adopted similar policies for its portion of the watershed. To date (one year after adoption), no applications have been filed for development under the new policies.

The policy changes were based on "best available science" determined during a three-year process of research, analysis and peer review. Lessons learned in the process may be useful to other jurisdictions interested in applying differential policies to certain areas for the purpose of environmental protection.

1 – Summary of adopted regulations

2 – Chronology of Events

SETTING THE STAGE

Beginning in 1998, the City of Olympia, Washington undertook to "define the balance between human activities and protecting habitat" in its stream watersheds. Located at the southern tip of Puget Sound, Olympia, the neighboring cities of Lacey and Tumwater, and Thurston County share responsibility for managing a rapidly growing population while maintaining the environmental quality of life which makes the Pacific Northwest one of the nation's most attractive regions.

3 – Vicinity Map – Green Cove Basin

Olympia is part of the South Puget Sound basin, a naturally watery place that was once covered by extensive wetlands and forests and drained by eight major creeks. Over the last 150 years, human settlements have disrupted the complex

hydrological cycle that maintained the natural ecosystem. Wetlands have been filled, forests cut down, land surfaces covered with buildings and pavement, and creeks routed underground. Impacts to aquatic habitat include increases in seasonal high and low flows, loss of critical streamside vegetation, degradation of water quality, and barriers to fish migration and spawning. The result has been a significant decrease in biological diversity and productivity.

In recent years, local land use goals and policies have reflected a growing ecological awareness and increase in scientific understanding. As required by the state's 1980 Growth Management Act, local comprehensive plans have incorporated policies aimed at protecting the environment while accommodating increased population, which is projected to nearly double by 2020. Olympia and other local jurisdictions are increasing densities in urban areas in order to curb sprawl in surrounding rural areas. At the same time, they have attempted a variety of environmental protection strategies, including: drainage regulations and capital improvement products to control flooding, erosion and sedimentation; critical areas ordinances to maintain a protective buffer of riparian vegetation along creeks and around wetlands; tree retention and open space requirements; capital projects to restore and enhance habitat; and water quality programs to enhance and monitor habitats and encourage people to keep pollutants from entering surface and ground water.

However, despite these efforts, aquatic habitat quality and diversity have continued to decline. Olympia Public Works Department storm and surface water staff closely followed research at the University of Washington confirming that the cumulative effects of urbanization may cause irreversible habitat damage (May, et al., 1997). Research on 19 lowland streams in the Puget Sound basin, including three in the City of Olympia, showed that impacts to stream habitat quality and complexity begin to occur at very low development densities – 8% - 12% total impervious area. Physical and biological conditions change most rapidly during the initial phase of urbanization.

4 – Summary of the Scientific Research

Staff realized the implication of this research is that it may not be possible for a diversity of aquatic habitat to flourish in an urban environment. In other words, the City may not be able to achieve policy goals for habitat protection in all basins, particularly those that are the most urbanized.

MAKING THE CASE FOR LOW-IMPACT DEVELOPMENT STANDARDS (1998-99)

In the fall of 1998, storm and surface water utility staff began talking with City Council about the apparent conflict between environmental policy and growth management requirements, which they observed in their own on-the-ground experiences. Realizing the City did not have the tools to completely mitigate environmental effects of increased development, Council authorized staff to explore the options. The State's Growth Management Act (GMA) presented the choice of either changing Comprehensive Plan policies to acknowledge the continued deterioration of aquatic habitats, or changing regulations to better meet Comprehensive Plan goals for environmental protection. Council chose to try to use science to better manage the highest value habitat in the City.

The Public Works Department hired the environmental consulting firm of CH2M-Hill to develop criteria for evaluating the viability of aquatic habitat in Olympia's eight stream watersheds and a range of management goals corresponding to the potential for maintaining or restoring aquatic habitat. Working with a local consultant, Dorothy P. Craig & Associates, staff then refined and expanded this framework, consolidated data on the eight watersheds, and published a preliminary draft report intended to make the case for differential policy based on the potential for preventing habitat decline. The resulting *Aquatic Habitat Evaluation & Management Report* included:

5 – Executive Summary of Report

6 – Aquatic Habitat Evaluation & Management Report

- A summary of research findings.
- Evaluation criteria, data summary for each basin, and grouping of basins as "sensitive," "impacted," or "degraded."
- A range of management goals and expected environmental consequences of each. Optional goals were: (1) protect property; (2) accommodate growth and maintain aesthetic amenities and water quality; (3) accommodate limited growth *and* protect existing habitat; (4) protect existing habitat, aesthetic amenities and water quality; and (5) restore habitat to natural conditions. All these goals were reflected in the Comprehensive Plan, but the study found that "it is not feasible to achieve all these goals in all basins."
- An attempt to quantify management objectives for the three "middle range goals" (2, 3, 4) and an assessment of the relative effectiveness of 15 potential management tools including zoning and critical areas ordinances, development standards,

land acquisition, public involvement, monitoring, and maintenance.

- Differential strategies, with a range of management tools, that might be applied in basins that are already degraded, basins where continued decline is possible, and basins with potential for long-term habitat protection.

The report concluded that "the goal of both accommodating projected growth and protecting habitat is not realistic in the long term." The suggested approach was to adopt different goals and policies based on the habitat potential of a given basin. These goals would guide decisions about development regulations, public expenditures, and landowner incentives, applying these and other management tools where they would likely have the most effect. In general the approach would be to make the goal of preserving habitat primary in those basins where habitat is still intact; for basins where habitat is still intact, but vulnerable to strong development pressure, attempt to protect habitat while accommodating growth, and realize the outcome is uncertain; and to make the goal of accommodating growth primary in basins where habitat is already degraded by urbanization. This approach would be used to design management tools and make investment decisions based on the potential for habitat protection in each basin.

In August 1999, storm and surface water utility staff assembled a team of six scientists, including the primary author of the University of Washington research, and biologists and hydrologists from the public and private sectors who are experienced with urban stream and wetland dynamics. The scientists were asked to critique the report and assess whether the policy suggestions were consistent with the research findings. The team concurred with the report and prepared a written assessment.

7 – Science Team Meeting Summary

8 – Sample Council Update

Throughout the study process, Council members and others had been kept informed through periodic "Council Updates." Following a staff briefing, based on the draft report and science team findings, City Council decided to narrow the scope of the project to the 2,600-acre Green Cove Creek watershed on the west side of Olympia. This watershed had been identified as "sensitive," since it has a relatively low impervious surface coverage (10% current, 24% potential build out), good forest cover (64%), extensive and intact wetlands, and good riparian and in-stream conditions, with good water quality, that support coho and chum salmon. A substantial portion of the basin (38%) is within the City limits and its growth management area. A joint meeting of City Council members and County Commissioners was held in January 2000. They agreed there was no time to waste and began work on developing a set of

interim development standards for Green Cove Creek watershed.

9 – Ordinance 5993 – Interim Standards

10 – Newsletter –Interim Standards

Interim standards were unanimously adopted by the City Council (February 8, 2000) and County Commissioners (May 9, 2000), following a brief period of public involvement that included notification of all property owners in the watershed and a public hearing. Public opinion was mixed more or less equally between pro and con. The interim standards, in place for one year, were as follows:

- **Zoning density.** Maximum density was limited to four housing units/acre within City limits.
- **Stormwater management standards.** New developments had to have "post-development" stormwater runoff releases (peak and average) that matched "pre-development" releases. This very rigorous standard required developments to maximize forest evapotranspiration and soil infiltration while minimizing impervious surface coverage.
- **Seasonal grading restrictions.** Site clearing and grading was allowed only between May 1 and October 1. This restriction to dry season activity was to protect water quality and help preserve soil infiltration capacity.
- **Tree protection.** Tree retention requirements were increased from 30 trees per acre to 60 trees per acre of buildable land on the development site. Protected tree areas were expected to increase from about 4-7% to 8-14% of the site.

FURTHER ANALYSIS (2000-2001)

While no developments were approved under the interim standards, their adoption gave staff time to develop science-based, long-term recommendations. The key to this phase was determining what could feasibly be adopted within the one-year time frame. Building consensus became essential.

City planners and engineers worked together in a day-long exercise, analyzing how improved environmental protection could be accomplished in new subdivisions in Green Cove Basin. They generated tangible ideas and concluded that relatively simple changes in existing regulations were available. The potential changes could have significant implications for development, but could be easily defined and implemented.

Storm and surface water utility staff searched regionally and nationally for comprehensive examples of science-based low-impact development techniques that could be mimicked. They

also asked planners, engineers and biologists for examples of successful low-impact developments. Pieces of the puzzle had been tried elsewhere. For example, several cities had adopted voluntary forest retention standards or narrow lanes. A few developments had been designed with features like swales or clustered housing with large sections of intact forest. They found no municipal jurisdictions that had put together all the habitat protection pieces that were identified in the scientific research. Environmental outcomes of the piecemeal approaches remained highly uncertain.

Given the lack of available models, staff realized they would have to craft a science-based approach, knowing that low-impact developments would be challenging to accomplish in small-lot subdivisions typical of development in Olympia. Since this was a new approach, they asked a local watershed biological consultant, Caldwell & Associates, to evaluate the appropriateness of developing basin biological goals and parameters to guide development regulations. Staff also realized that to be credible, they would need to base the new standards on actual site conditions in the watershed, and to enlist consultants familiar with local site design and development practices. In February 2000, Olympia staff and a local development consultant (SCA Consultants) looked at actual development proposals in the Green Cove basin and brainstormed changes that would meet aquatic habitat protection and other goals:

11 – Biological Goals Evaluation

- Maintain natural hydrologic conditions
- Maintain a minimum of 60% natural vegetation
- Meet current development density requirements
- Minimize the number of variances or regulatory changes
- Minimize impervious surfaces
- Maintain urban level for emergency vehicle access
- Produce a marketable development
- Maximize single family homes

12 – Site Plans for Case Study

The two sites chosen for the case study were a 35-acre, flat, forested site with minimal environmental constraints and a 50-acre, hilly site with extensive environmental constraints (steep slopes and wetlands). Both had been proposed for standard subdivisions with relatively small lot (5000-6000 square feet) single-family housing. Based on the goals, SCA developed two alternate site plans, which were presented to the City's site plan review committee and subsequently to the City Council in the fall of 2000. In evaluating the low-impact site plans compared to conventional subdivision design, the most critical issues were development density, forest retention, and street

designs. Ultimately, development density was reduced by about 40%, forest retention increased to 55%, and street related impervious surface decreased by about 25%. Overall, impervious surface coverage was reduced by about 50%.

13 – Case Study Results
a – Report Summary
b – Cost Comparisons
c – Cost Analysis - Summary
d – Other Comparisons

The following March, J.W. Morrissette Associates, Inc., a local development engineering firm, completed a hydrologic analysis and infrastructure design for the low-impact and conventional site plans, and prepared a comparison of land use and unit costs for the two alternatives. A hydrologic consultant, AquaTerra, was hired to develop a computer model capable of evaluating different development scenarios, and the City prepared graphic comparisons of such factors as impervious surface coverage, stormwater pond area, and tree tracts as well as costs.

14 – Summary of Interviews

In May 2001, The Shea Group, another local consultant, conducted interviews with realtors, development engineers, bankers, and developers, asking for feedback on the low-impact site plan. In response, further revisions in the low-impact designs were made, specifically: (1) tree lots were not required in front of homes, but moved to dedicated tree tracts; (2) 25-foot planter strips on streets became optional; (3) minimal street parking was added on alternate sides of street.

15 – Chart Comparing Impacts

Staff then prepared a chart comparing how build out of the watershed under current standards and four alternative zoning scenarios would impact the key watershed quality indices (total impervious area, forest retention, riparian corridor integrity, and in-stream conditions). Comparisons were quantified where possible and otherwise described in relative terms.

16 – Science Team Meeting Summary

The science team was reconvened to discuss the proposed low-impact development standards for Green Cove Basin. Their report confirmed that the proposed subdivision designs were generally consistent the scientific findings and that implementation would have the potential to maintain habitat conditions equivalent to the present. They concurred that Green Cove is a good basin to test the hypothesis that this level of housing density can co-exist with aquatic wetland and riparian resources. They also found that with current methods, environmental benefits represented in the comparative chart could not be quantified more precisely.

ADOPTED POLICY AND REGULATIONS – CITY OF OLYMPIA (2001)

Once the analysis, scientific review, and recommendations were complete, the City and County embarked on a sequential process of adopting changes in Comprehensive Plans, zoning and tree protection ordinances; street, sidewalk, and parking

standards; and drainage design and erosion control standards. The Comprehensive Plan amendment process began earlier and took a year, from September 2000 to September 2001. The Olympia Planning Commission reviewed the entire package – the first time it had considered anything other than Comprehensive Plan revisions. During review of the Comprehensive Plan amendments, the chart comparing impacts with conventional and low-impact design helped convince both City and County Planning Commissions that the approach was viable.

17 – Newsletter

To make the complicated process as transparent as possible, newsletters were mailed every few months to all basin property owners and other stakeholders. Each newsletter explained the context for each policy or regulatory proposal, upcoming meetings or hearings in both jurisdictions, and what would be discussed or decided in each meeting.

In Olympia, the following policy and regulatory changes were adopted in sequence between August 1 and September 15, 2001. All became effective October 1, 2001.

Comprehensive Plan Amendments

18 – Ordinance 6140 Comprehensive Plan Amendments
- a – Excerpts
- b – Permitted and Conditional Uses
- c – Residential Development Standards
- d – Zoning Map

By adoption of Ordinance 6140, the City supplemented the Comprehensive Plan's Chapter 1 (Land Use and Urban Design), Chapter 2 (Environment), Chapter 5 (Utilities and Public Facilities), and Chapter 6 (Transportation) with goals and policies that establish Green Cove basin as a unique area, subject to enhanced environmental regulations. Primary goals and policy changes for Green Cove basin included the following:

- Designate Green Cove Creek as a sensitive drainage basin.
- Avoid high-density development where new development would have a significant adverse impact upon the habitat within designated sensitive drainage basins.
- Administer development regulations that protect critical areas and designated sensitive drainage basins.
- Adopt low-impact development regulations within designated sensitive drainage basins that may include stormwater standards, critical area regulations, zoning designations, and other development standards.
- Establish street designs that minimize impacts to the natural environment especially within a designated sensitive drainage basin.

Olympia Municipal Code (OMC)

Ordinance 6140 also supplemented the OMC with requirements for designated sensitive drainage basins, Green Cove basin in particular. The ordinance created a new zoning district and increased tree protection and replacement requirements.

Title 18 Unified Development Code: Article II - Land Use Districts

The new district, Residential Low Impact (RLI), applied to Green Cove basin within Olympia city limits. Parcels along the basin boundary that have at least 50% of their surface area within the basin were included in the district. Traits of the district included:

- Residential densities of two to four units per acre. Duplex, townhouse, and multifamily uses are allowed.
- Lot widths and rear setbacks are reduced and maximum building heights are increased, compared to the other residential districts.
- Maximum impervious surface coverage per lot is limited to 2,500 square feet.
- Several land uses, including duplexes and parking lots, not typically permitted in single-family residential developments, are allowed in the Green Cove basin.

New Chapter 16.54 Tree Protection and Replacement for Green Cove Basin

- A minimum tree density requirement of 220 tree units per acre is required. The requirement will result in approximately 55% tree cover in any given development. Trees within critical areas can be included in the density calculation.

Development Guidelines and Public Works Standards (DGPWS)

Ordinance 6143 created a new chapter in the DGPWS, containing specific standards for engineered features of a new development in Green Cove basin. The Green Cove requirements focus on street designs and stormwater conveyance. Chapter 9 includes the following requirements:

- Residential block perimeters cannot exceed 1,700 feet.
- Driveways and sidewalks can be constructed of porous surfaces with City approval.
- Sidewalks are required on one side of local access streets.

19 – Ordinance 6143 – Development Standards
- a – Summary
- b – Complete Text
- c – Permitted and Conditional Uses (revised)
- d – Street Standards (schematics)
- e – Minimum Street Standards
- f – Street Design Standards

- Sidewalk planter widths can be increased from the required eight feet to an optional 25 feet. The parameters for the optional cross-section, species, and plant stock are provided.
- Additional parking within low-impact developments can be provided by the construction of porous surface lots subject to City approval.
- A rocked infiltration gallery/conveyance system is to be constructed when street slopes are 5% or less. Use of the system on greater slopes requires geotechnical and engineering evaluation.
- Neighborhood collector streets are to be 25 feet wide, with parking provided on alternating sides of the street. Local access streets are to be 18 feet wide, with similar parking arrangements. Additional street and right-of-way design traits are provided.

Drainage Design and Erosion Control Manual

Administrative changes to the City's stormwater management manual resulted in increased stormwater storage requirements and seasonal grading limitations in Green Cove basin. Specific changes included:

- Stormwater discharges shall be controlled by matching developed discharge durations to pre-developed durations, for the range of pre-developed discharge rates from 50% of the two-year peak flow to the 50-year peak flow. The application of the requirement is defined in the *Stormwater Management Manual for Western Washington*, Washington Department of Ecology, August 2001 (Publication 99-11 through 99-15).
- Clearing and grading within the basin is allowed only between May 1 and October 1 of any given year.

ADOPTED POLICY AND REGULATIONS – THURSTON COUNTY (2001)

Thurston County adopted the following policy and regulatory changes over the same time period, affecting new development in the portion of Green Cove Basin that is outside Olympia city limits but within the City's urban growth area (UGA).

Comprehensive Plan

Comprehensive Plan policies for the urban growth area were amended to create guidance for low-impact development and habitat preservation, and land use designations and zoning in

the Green Cove Creek basin were amended to be consistent with those of Olympia.

Zoning

The County's Olympia Urban Growth Area Zoning Code (TCC 20.23), was amended to be generally consistent with City of Olympia zoning. The urban growth area within Green Cove Creek Drainage Basin was rezoned from predominately 4-8 units per acre to 2-4 units per acre. The exception was a forested area along the creek where density was limited to one unit per five acres, to reduce the overall impervious surface in the basin to levels likely to enable preservation of anadromous fish and to buffer the creek from the impacts of urban density development up slope. The zoning amendments also required that, within the urban growth area, 60% of each site be retained in open space and that existing vegetation in these areas be preserved. The Planning Commission recommendation that this open space requirement be extended to the area of the basin outside the urban growth area will be considered in 2002.

Open space program

The County will also consider in 2002 the Planning Commission recommendation to amend the open space program to extend tax incentive eligibility to small property owners in the entire basin who maintain (or replant) native trees on 60% of their property and/or maintain a suitable buffer along the banks of creeks and wetlands.

LESSONS LEARNED

Since adoption of the new low-impact development regulations in October 2001, no development proposals have been submitted for Green Cove basin (nor in neighboring Tumwater or Lacey under their voluntary low-impact standards). One Olympia developer has completed an initial site design and cost estimate that establishes feasibility, and offered to make the low-impact standards a mandatory condition of his project; however the project is now on hold for other reasons. Following are several lessons from the Olympia experience that may prove helpful for other jurisdictions.

What Works Well

1. **Stick closely with science.** Because the standards were to be mandatory, they had to be legally defensible in terms of property rights, growth management law, and public safety. Several developers challenged City's right to make these restrictions.

2. **Document the need thoroughly.** Olympia staff spent an entire year confirming that a problem existed and making sure City Council and Planning Commission acknowledged the problem and were willing to tackle it, knowing the high value the community places on environmental protection. Elected officials also became convinced that it is appropriate to do things differently in different basins, and that the Comprehensive Plan could be changed based on new information.

3. **Adopt interim measures.** Once the need was established, this step gave the City a full year to make sure the final recommendations were feasible.

4. **Assume a lengthy process.** Storm and surface water utility staff realized time would be needed to develop internal consensus among City planners, engineers, and fire officials. They knew cooperation with County staff and officials would be needed to ensure consistency between the two jurisdictions. Concerns such as public safety and emergency vehicle access took time to resolve.

5. **Bring in outside people.** Respected local experts were consulted throughout the process to lend credibility and ensure feasibility. For example the City used a science peer review team, hired engineering and design consultants, and interviewed local developers and bankers.

6. **Focus on feasible changes to existing requirements.** Early in the process, the City acknowledged that changes necessary to achieve ideal conditions for watershed habitat could not be achieved within the time available. Although the effects on aquatic habitat were uncertain, the City wanted to see what could be accomplished with more environmentally friendly regulations. The agenda remains unfinished; however, the City did what was possible in 2001.

What Could Be Done Better

1. Plan for low-impact development in less developed basins, for example in more rural counties where there has been less development impact.

2. Include developers earlier and more thoroughly. Delaying involvement became a reason for them to criticize later.

3. Communicate clearly with the public. Changing all the policies at once was confusing to both the public and developers, though the mailings during the adoption process helped. It is important to communicate the big picture, the interrelationships among all the policies and standards, and the separate processes for changing different documents.

Lingering Questions

Several questions have not been resolved so far in the Green Cove basin process:

1. Extra costs of non-standard development techniques.
2. Home buyers' willingness to purchase homes in a "low-impact" neighborhood with narrower streets, less parking, smaller home footprints, and regulatory limits to additions that would increase impervious surfaces.
3. Environmental benefits of development restrictions, given the overall pattern of development and previous disruption of natural hydrology.