Attachment C
City of Bellevue February 3, 2012 Comment Letter for the
Draft NPDES (2013-2018) Western Washington Phase II Municipal Stormwater Permit

City of Bellevue
Development Stormwater Costs Impact Analysis
by HDR Engineering
(Proposed Condition S5.C.4.a, Appendix 1, and the draft 2012 Ecology Stormwater Manual)

The City of Bellevue Utilities Department (City) retained HDR Engineering (HDR) to perform a technical evaluation of the potential cost impacts to developers resulting from implementing the new Low Impact Development (LID) stormwater Best Management Practice (BMP) requirements in the draft National Pollutant Discharge Elimination System (NPDES) Western Washington Phase II Municipal Stormwater Permit (permit). This memorandum provides background information on the City's current surface water engineering standards for new and redevelopment and discusses the methods, assumptions, and results of the cost analysis.

BACKGROUND

The City of Bellevue's 2011 *Surface Water Engineering Standards* (COB 2011 Standards) go beyond the minimum on-site stormwater management requirements of the 2005 *Stormwater Management Manual for Western Washington* (2005 Ecology Manual) to encourage the use of Natural Drainage Practices (NDPs) as an integral part of new and redevelopment planning, design, construction, and maintenance. Projects with new, replaced, or new plus replaced impervious surface area equal to or greater than 2,000 square feet are required to use on-site BMPs that are based on the 2005 Ecology Manual. These required on-site BMPs include roof downspout infiltration, roof downspout dispersion, and concentrated sheet flow dispersion. The COB 2011 Standards additionally encourage the use of NDPs, including bioretention, pervious pavement, rain recycling, vegetated roofs, reverse slope sidewalk, and minimal excavation foundation systems, in addition to (or in some cases, instead of) the required on-site BMPs.

Selection of on-site stormwater management BMPs follows a tiered approach, in which BMPs must be evaluated in a prescribed order within three sequential tiers: Tier 1 – Minimize Runoff Generation, Tier 2 – Retain Runoff On-site, and Tier 3 – Infiltrate or Disperse Runoff Prior to Discharge. Figure 1 illustrates the tiered approach to BMP selection to satisfy Minimum Requirement (MR) #5 (On-site stormwater management) and MR #7 (Flow control).

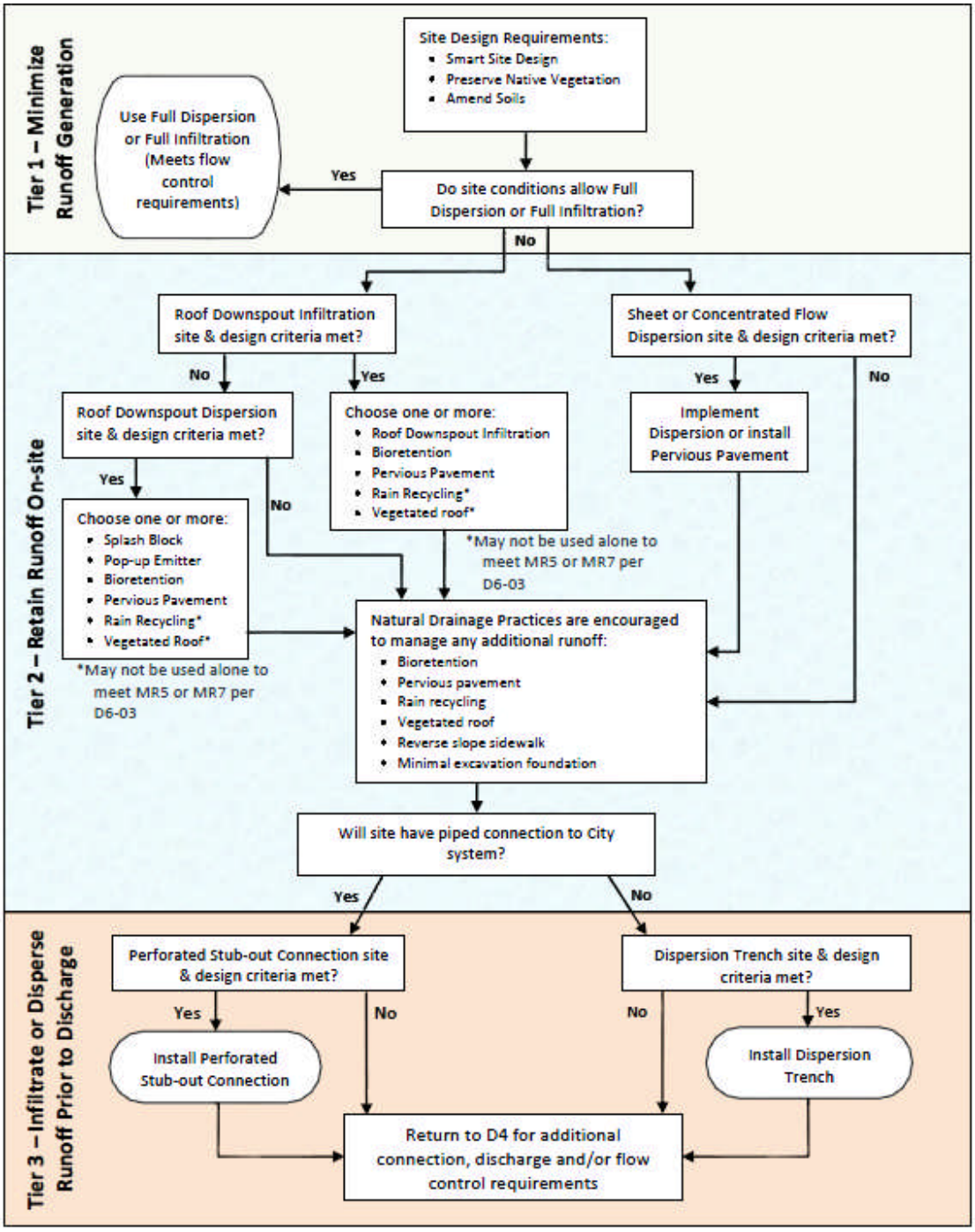


Figure 1 – On-site Stormwater Management Facility Selection for MR 5 and MR7 (from Figure 6.1 of the COB 2011 Standards).

Given this progressive stance on the use of NDPs currently in place through the City's surface water engineering standards, we expect that the potential impacts to developer costs discussed below may actually be lower in Bellevue than in other western Washington Phase II jurisdictions.

COST ANALYSIS

HDR evaluated costs for managing stormwater runoff to meet Minimum Requirements #5 (On-site Stormwater Management), #6 (Runoff Treatment), and #7 (Flow Control) for 10 new and redevelopment projects. The projects include a mix of Single Family Residential (SFR), Multi-family Residential (MFR), Short Plat, Transportation, and Commercial development types.

The remaining text provides a description of the projects evaluated, regulatory and LID feasibility scenarios assessed, and discussion of important assumptions and considerations and results. A copy of a powerpoint presentation presented by HDR to the American Public Works Association – Management and Public Administration Committee (APWA – MPAC) on January 25, 2012 is attached for additional information.

Project Descriptions

The City provided HDR with drainage plans and associated documentation for 2 SFR, 1 MFR, 1 short plat, 1 transportation, and 1 commercial project. These projects (excluding the transportation project, which is currently in design by the City's Transportation Department) were submitted for permit approval in 2010 and 2011. This low number of real projects available for evaluation reflects the depressed economic conditions and the lack of development activity occurring in recent years.

To supplement the cost analysis, HDR developed 4 additional hypothetical projects, including 1 SFR project, 1 transportation project, and 2 commercial projects. Table 1 provides a brief description of the projects evaluated.

Table 1 – Summary of new and redevelopment projects evaluated.

Development Type	Description
SFR	• Fire damage repair (building footprint only) • New home on vacant lot • Hypothetical – SFR redevelopment
MFR	• Addition of 2 new apartment buildings in existing complex
Short Plat	• Plat infrastructure for 4 new SFR homes
Transportation	• NE 15th/16th St (Major Bel-Red new arterial) • Hypothetical – Multi-modal improvements
Commercial	• Replace existing campus residence hall • Hypothetical – Zero lot line • Hypothetical – Big box

Regulatory and LID Feasibility Scenarios

HDR evaluated the following three scenarios relating to regulatory requirements and LID feasibility:

- Current COB Requirements
- Future - Low LID Feasibility
- Future - High LID Feasibility

The Current COB Requirements scenario is based on the actual plans and documentation submitted, when available, or HDR's evaluation of stormwater facilities needed to meet MR #5-7 based on the City's January 2011 *Storm and Surface Water Engineering Standards*. The Future - Low LID Feasibility scenario is based on the draft permit and manual requirements, assuming low permeable soils and high groundwater table beneath the site. The Future - High LID Feasibility scenario is based on the draft permit and manual requirements, assuming highly permeable soils and a seasonal high groundwater depth of at least 10 feet below ground surface.

Assumptions and Important Considerations

Following is a summary of assumptions made and important considerations regarding the methods and results of this study:

- The goal of the analysis was to estimate the change in costs related to construction of stormwater management facilities. Certain items, such as paving and landscaping, were included in the base costs when necessary to allow for an "apples-to-apples" comparison between scenarios.
- Costs are intended to represent "book-ends" based on assumptions and professional judgment.
- Vegetated roofs were assumed to cover 75 percent of the roof area for the hypothetical commercial zero-lot line and big box projects.
- A 6-inch-thick treatment liner with media meeting the soil suitability criteria was assumed to be required beneath pervious pavement facilities with tributary Pollution-Generating Hard Surface (PGHS) areas.
- Small-scale Pilot Infiltration Testing (PIT) for non-SFR projects was assumed to cost approximately $5,000 per test. For SFR projects, it was assumed that the homeowner would observe groundwater conditions over the wet season and may additionally conduct limited infiltration testing on their own. It was assumed, however, that no formal geotechnical engineering evaluation would be required for SFR projects that trigger MR #1-5 only.
- The time delay to monitor groundwater during the wet season is an added project cost, but is not accounted for in this evaluation.
- Increased time and cost associated with additional pre-design and inspection is not included.
- Actual cost impacts will depend on local policies and Codes and site suitability for LID.

Results

The results of this evaluation indicate that future development costs may be expected to vary significantly depending primarily on 1) site suitability for LID and 2) local requirements for LID implementation. For MFR, Short Plat, Transportation, and Commercial projects, costs could potentially decrease significantly assuming that LID is highly feasible and that downstream detention and water quality treatment facilities are reduced or eliminated as a result of extensive use of LID BMPs. On the other hand, costs would increase significantly for these same development projects if site suitability for LID is marginal or poor, but the developer is required nonetheless to conduct geotechnical evaluation and construct LID BMPs without significantly reducing the size of required downstream detention and water quality treatment facilities.

For SFR projects, the estimated change in stormwater facility costs is not expected to change substantially as compared to the other development types, regardless of site suitability and local requirements for LID. This is due to the fact that the projects evaluated were subject to MR #1-5 only no geotechnical evaluation was assumed to be needed.

As discussed above, the time and cost of delays associated with additional pre-design, groundwater monitoring, and inspection are important considerations, but are not included in these results. The cost impacts presented below may actually be relatively low compared to potential cost impacts in other western Washington Phase II jurisdictions, where natural drainage practices are not currently encouraged in the surface and stormwater engineering standards.

Table 2 – Summary of results.

Development Type	N (#)	Maximum Cost Increase [$, (%)]	Maximum Cost Decrease [$, (%)]
SFR	3	$1,276 (5%)	-$100 (-1%)
MFR	1	$78,320 (21%)	-$218,760 (-58%)
Short Plat	1	$38,220 (20%)	-$87,230 (-45%)
Transportation	2	$187,660 (106%)	N/A
Commercial	3	$1.1M (248%)	$23,570 (17%)

Notes:
N Number of projects evaluated.
N/A Not applicable.

Draft Municipal Stormwater Permits

Presentation to APWA-MPAC Committee

January 25, 2012; Revised February 1, 2012

By Robin Kirschbaum, PE, LEED
HDR Engineering

Presentation Overview

- **Background on NPDES Municipal Stormwater Permit Program**
- **Highlight key proposed changes**
  - **Draft permit (focus on LID)**
  - **Draft manual**
- **Cost Impact Evaluation by City of Bellevue**
- **Next Steps - What You Can Do To Prepare**
- **Discussion**

NPDES Municipal Stormwater Permit

BACKGROUND

Background

- **NPDES permit implements**
  - Federal Clean Water Act (CWA)
  - US EPA Agency Rules
  - Washington State Water Pollution Control Act (RCW 90.48)
- **Ecology delegated authority in WA (RCW 90.48)**
- **Congress phased in requirements based on population**

Background

- **Phase I Permit**
  - City/County MS4s with ≥ 100,000 as of 1990 Census
  - Snohomish, King, Pierce, and Clark counties (unincorp.), Seattle, Tacoma
  - Issued Jul 1995, reissued Feb 2007, mod Jun 2009
  - To be reissued Jul 2012
- **Phase II Eastern and Western WA Permits**
  - City/County MS4s with ≥ 1,000 based on federally-defined urban areas and ≥ 10,000 based on Ecology review
  - Issued Jan 2007, mod Jun 2009
  - To be reissued Jul 2012

Draft 2012 Permit and Manual

KEY CHANGES

Formal Ecology Workshops

- http://www.ecy.wa.gov/programs/wq/stormwater/municipal/2012draftMUNIcom.html

- **Poulsbo**
  January 30, 2012
  Poulsbo City Hall
  Draft Permit Workshop – 9 to 11:30 am
  Draft Manual Workshop – 12:30pm to 4:30pm

- **Mt Vernon**
  January 31, 2012
  Skagit County Commissioners Hearing Room
  Draft Permit Workshop – 9 to 11:30 am
  Draft Manual Workshop – 12:30pm to 4:30pm

Key Changes in Permit

New LID Requirements

- **Objectives**
  - Incorporate LID principles and BMPs
  - LID becomes standard procedure
- **Goal – Minimize:**
  - Native vegetation loss
  - Impervious surface
  - Stormwater runoff

Key Changes in Permit

LID Principles

Available Guidance

- Integrating LID into Local Codes: A Guidebook for Local Governments (Draft Final 2011)
- LID Technical Guidance Manual for Puget Sound (Draft 2012)

Review and update Codes, Rules, Standards, & Ordinances

- Engineering & Street Standards
- Clearing & Grading Ordinance & Standards
- Parking Requirements
- Individual Zoning District Bulk & Dimensional Regulations
- Subdivision Standards
- Landscaping & Tree Standards
- Shoreline regulations
- Critical area regulations

Key Changes in Permit

LID Principles

- **Adopt new site and subdivision stormwater codes**
  - Phase I: December 31, 2014
  - Phase II: December 31, 2015
- **Revise Development-related Codes, Rules, and Standards**
  - Phase I: December 31, 2014
  - Phase II: December 31, 2016

Key Changes in Permit

LID BMPs

- **All projects with > 2,000 SF hard surface**
- **More geotech. evaluation typ. required**
- **“Large” and “small” project requirements**
- **Options**
  - **Prescriptive LID BMP lists**
  - **LID performance standard**

New LID BMP Requirements

- **Small Projects (MR #1-5)**
  - **Briefly defined as**
    - 2,000 SF to 5,000 SF hard surface

      OR
    - 7,000 SF disturbance
  - **Requirement**
    - Option 1 - Use prescriptive Mandatory List #1 *OR*
    - Option 2 – Demonstrate LID Performance Standard
      - Requires engineer to run model and design BMPs
      - Bioretention required instead of rain gardens
      - Typ. requires high infiltration rates

Mandatory List #1

Lawn and landscaped areas
- BMP T5.13

Roofs
- Full dispersion (BMP T5.30)
- D/S infiltration
- Rain gardens
- D/S dispersion (BMP T5.10)

Other hard surfaces
- Full dispersion (BMP T5.30)
- Permeable pavement
- Rain gardens
- Sheet flow dispersion (BMP T5.12) or Concentrated flow dispersion (BMP %t.11)

New LID BMP Requirements

- **Large Projects (MR #1-9)**
  - **Briefly defined as**
    - 5,000 SF or more of hard surface <u>OR</u>
    - Converts ¾ acre or more of vegetation
  - **Requirement**
    - Inside UGA or outside UGA on parcel < 5 acres
      - Option 1 – Use LID performance standard and BMP T5.13 *<u>OR</u>*
      - Option 2 – Use Mandatory List #2
    - Outside UGA on parcel > 5 acres
      - LID performance standard and BMP T5.13

<u>Mandatory List #2</u>

Same as Mandatory List #2 except:

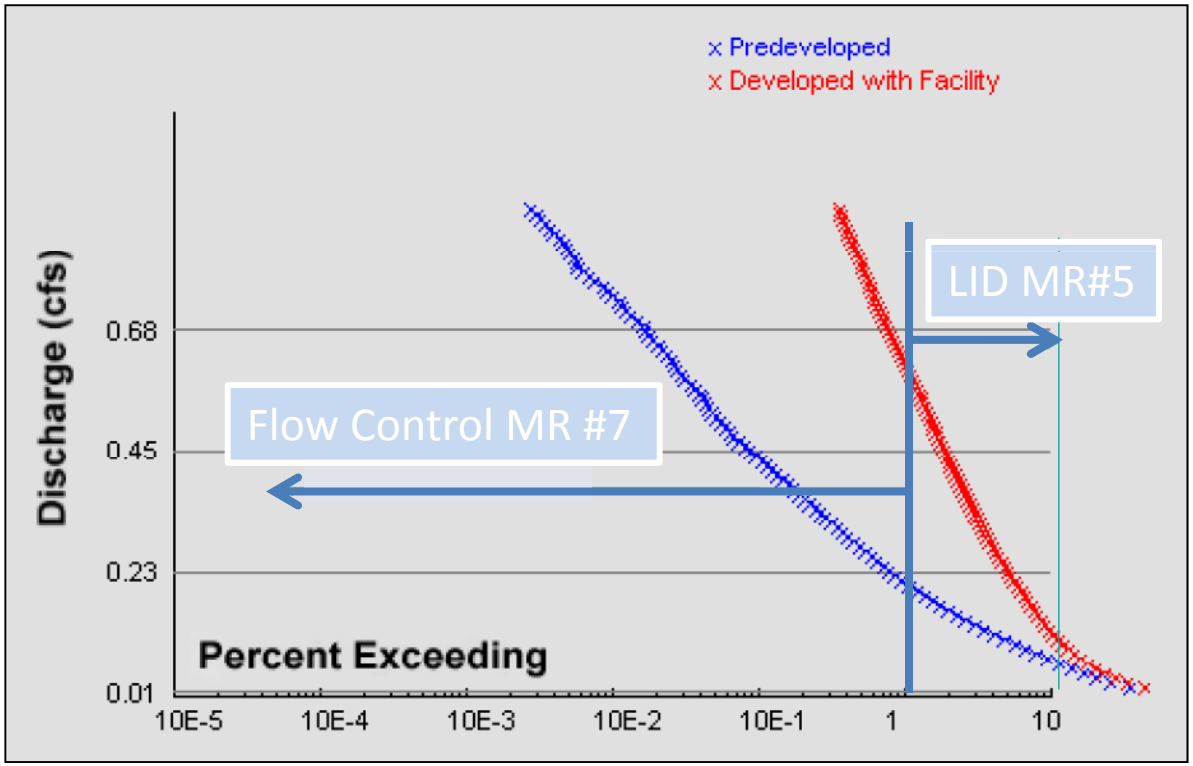
- **Bioretention instead of rain gardens**

Commercial buildings, last roof option

- ***Vegetated roofs or impervious roof to permeable pavement**

LID Performance Standard

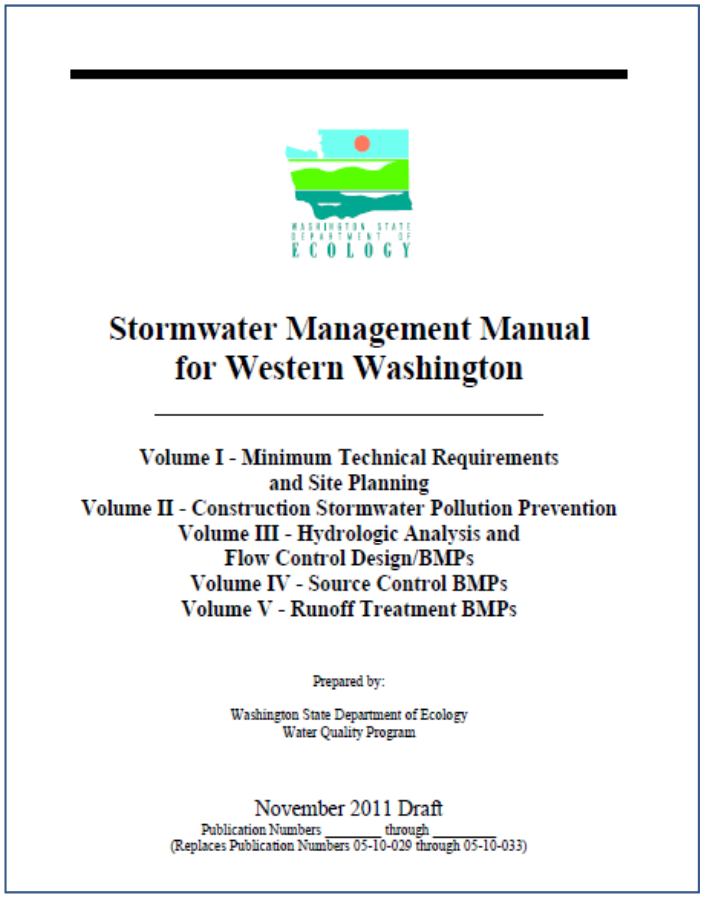
Match 8% 2-yr to 50% 2-yr pre-developed durations



Source: Ecology Presentation on Municipal Stormwater General Permits West. Washington LID Preliminary Draft Requirements, May 26, 2011. Downloaded 12/10/12 from http://www.ecy.wa.gov/programs/wq/stormwater/municipal/LID/LIDppMay2011.pdf

Key Changes in Manual

- **Guides permit implementation**
- **Changes consistent w/ App. 1**
  - New LID requirements
  - New and revised construction BMPs
  - Revised wetlands guidelines
  - Revised infiltration rate guidelines
  - Revised modeling guidelines
  - Revised design guidelines



WASHINGTON STATE DEPARTMENT OF ECOLOGY

Stormwater Management Manual for Western Washington

Volume I - Minimum Technical Requirements and Site Planning
Volume II - Construction Stormwater Pollution Prevention
Volume III - Hydrologic Analysis and Flow Control Design/BMPs
Volume IV - Source Control BMPs
Volume V - Runoff Treatment BMPs

Prepared by:

Washington State Department of Ecology
Water Quality Program

November 2011 Draft
Publication Numbers _____ through _____
(Replaces Publication Numbers 05-10-029 through 05-10-033)

City of Bellevue

COST IMPACT ANALYSIS

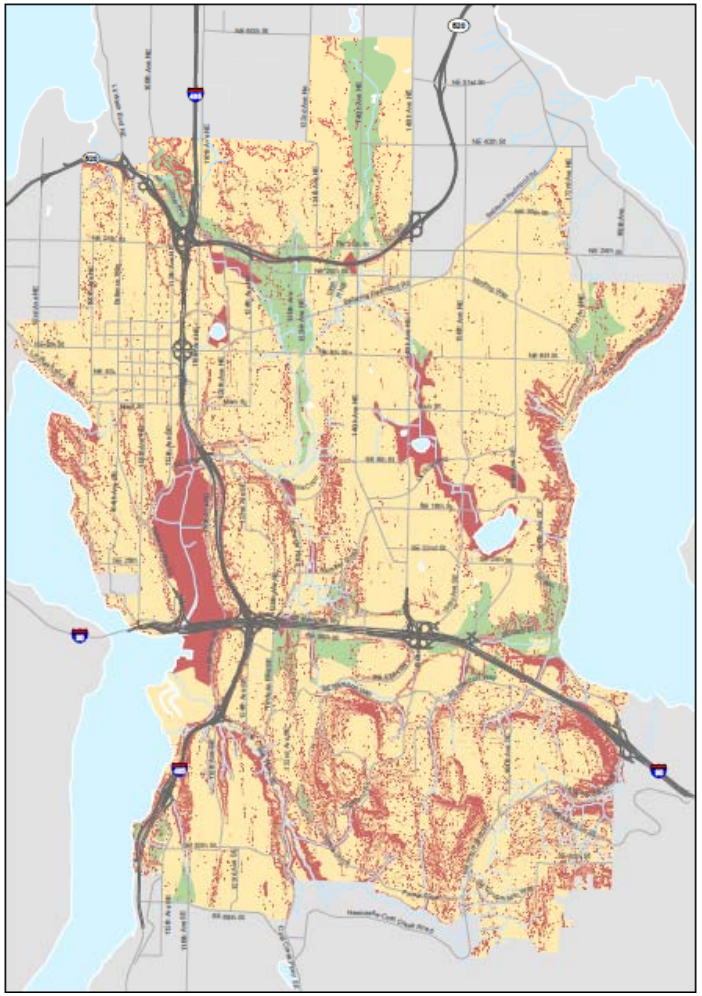
Summary of Projects Evaluated

Development Type	Description
SFR (single family residential)	• Fire damage repair (building footprint only) • New home on vacant lot • Hypothetical – SFR redevelopment
MFR (multi-family residential)	• Addition of 2 new apartment buildings in existing complex
Short Plat	• Plat infrastructure for 4 new SFR homes
Transportation	• NE 15th/16th St (Major Bel-Red new arterial) • Hypothetical – Multi-modal improvements
Commercial	• Replace existing campus residence hall • Hypothetical – Zero lot line • Hypothetical – Big box

Important Considerations

- Analysis performed for City of Bellevue Council Presentation Jan 3, 2012
- Permit and manual draft and incomplete at time of analysis
- Increased time and cost of additional pre-design, monitoring, and inspection not included
- Goal was to estimate change in costs related to stormwater. Certain items, such as paving and landscaping, were included when necessary to allow for apples-to-apples comparison between scenarios
- Costs provided are “book-ends” based on assumptions and professional judgment
- Cost impacts will depend on jurisdiction’s policies and codes and site suitability for LID

Infiltration Feasibility



- Very few sites where infiltration expected to be feasible
- Geotechnical analysis required

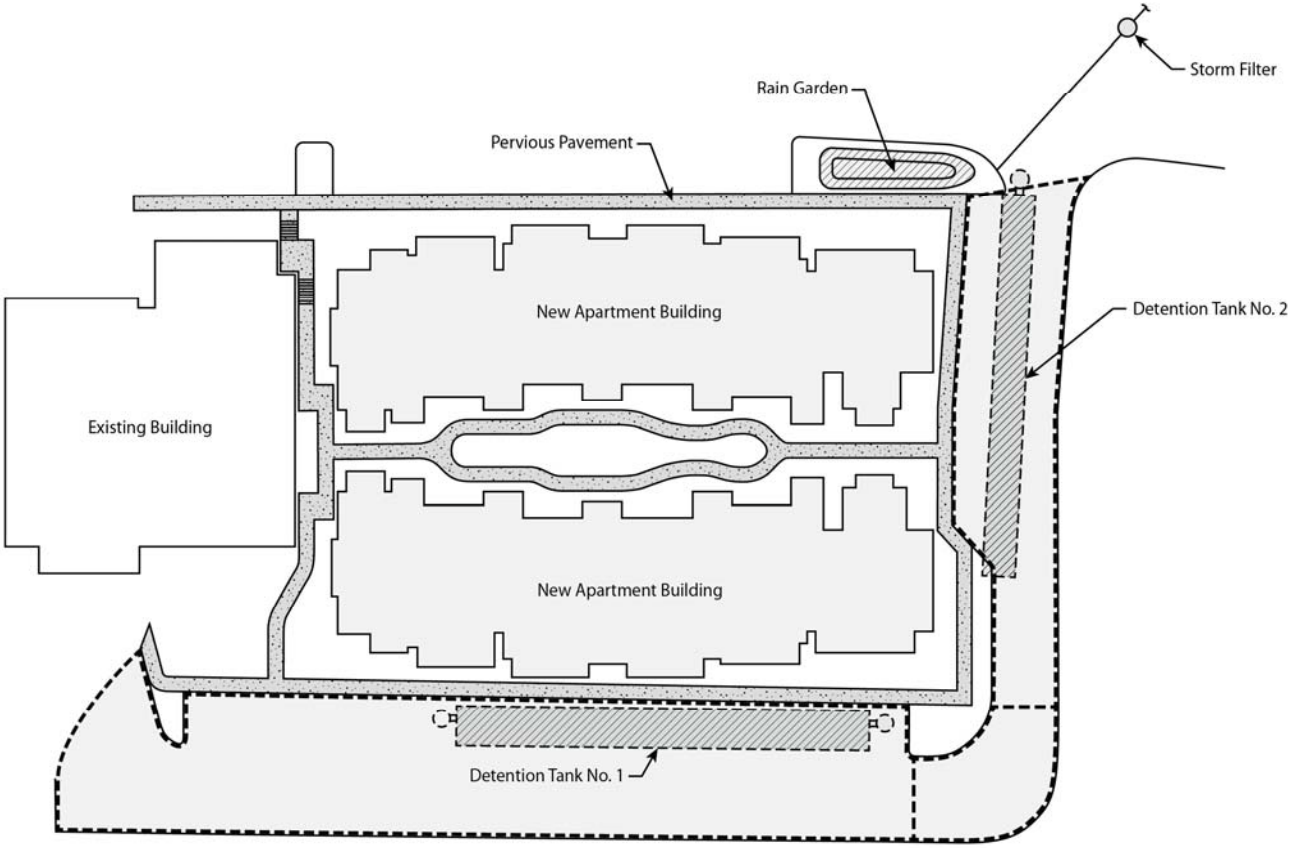
N

Low Impact BMP (Infiltration)

- Likely
- Unlikely
- Not

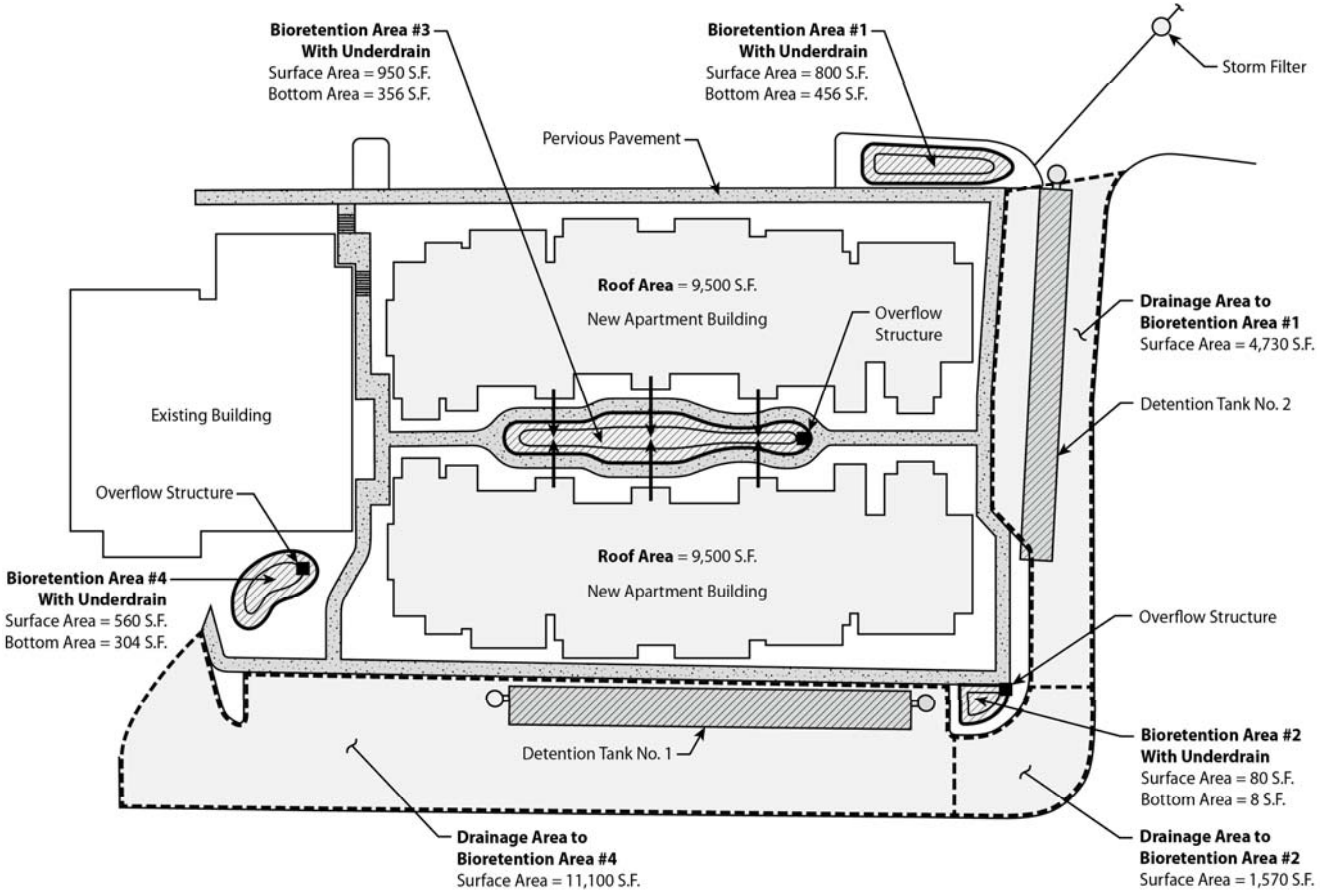
Multi-Family Residential

Plans Submitted Per COB 2011 (NTS)



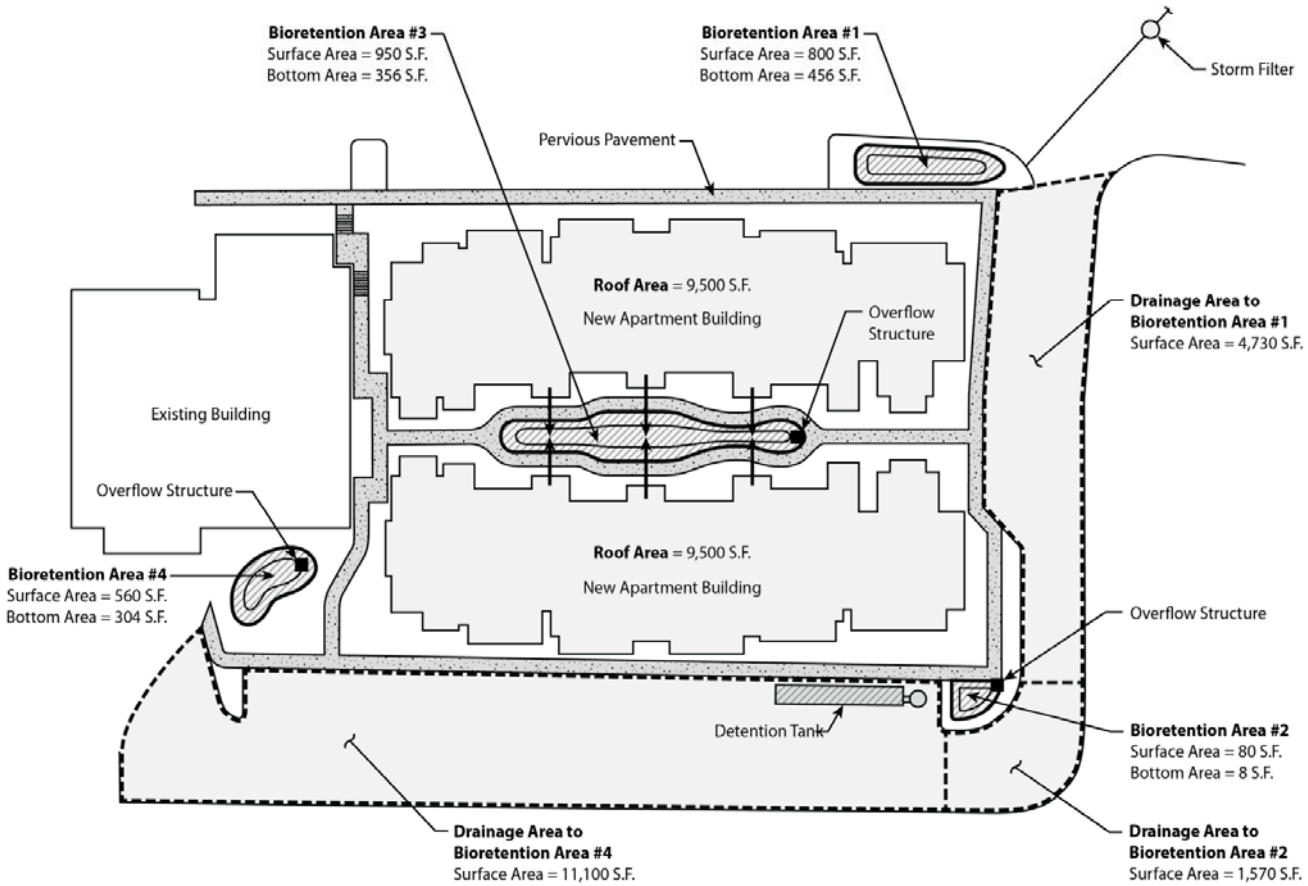
Multi-Family Residential

Low LID Feasibility Scenario (NTS)

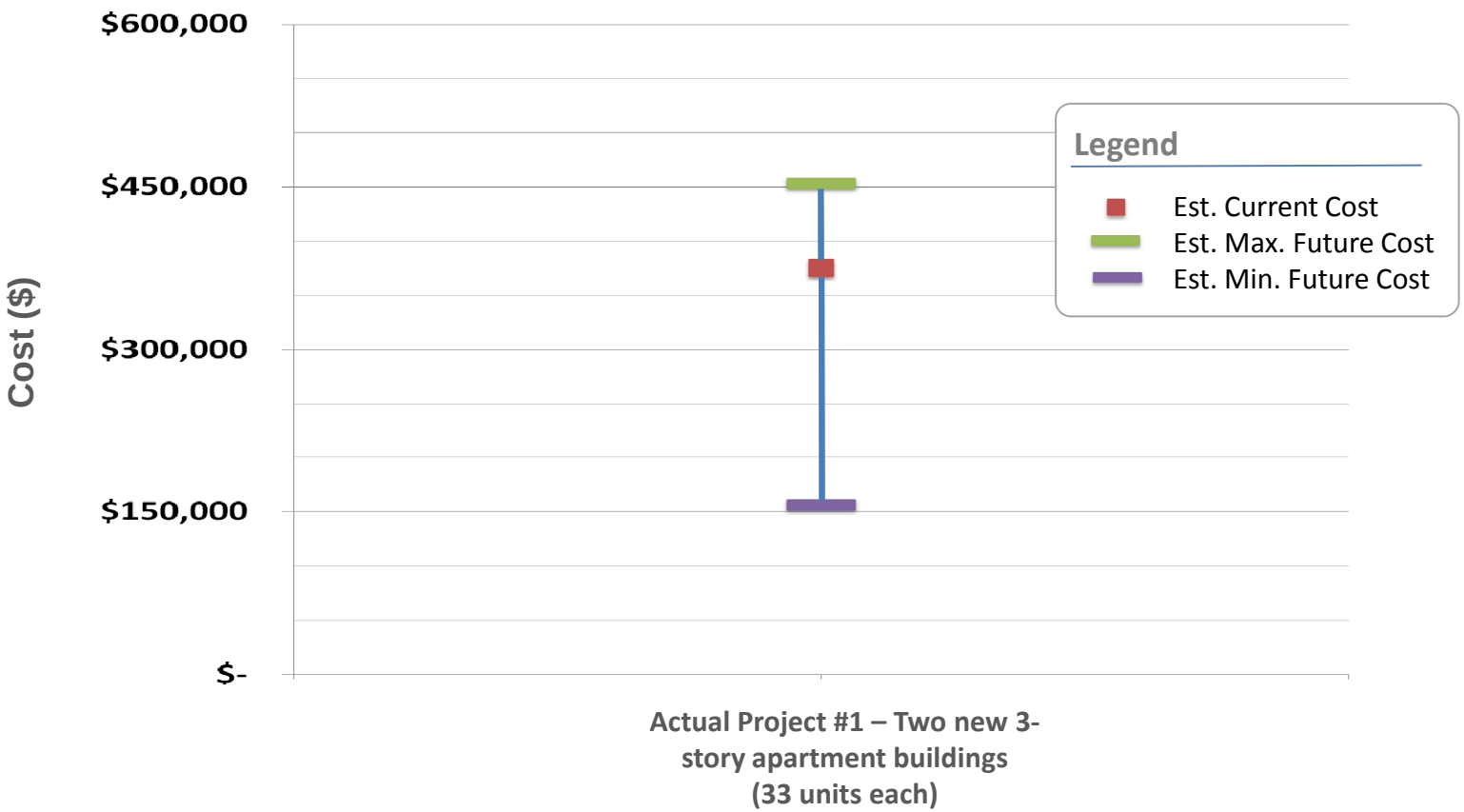


Multi-Family Residential

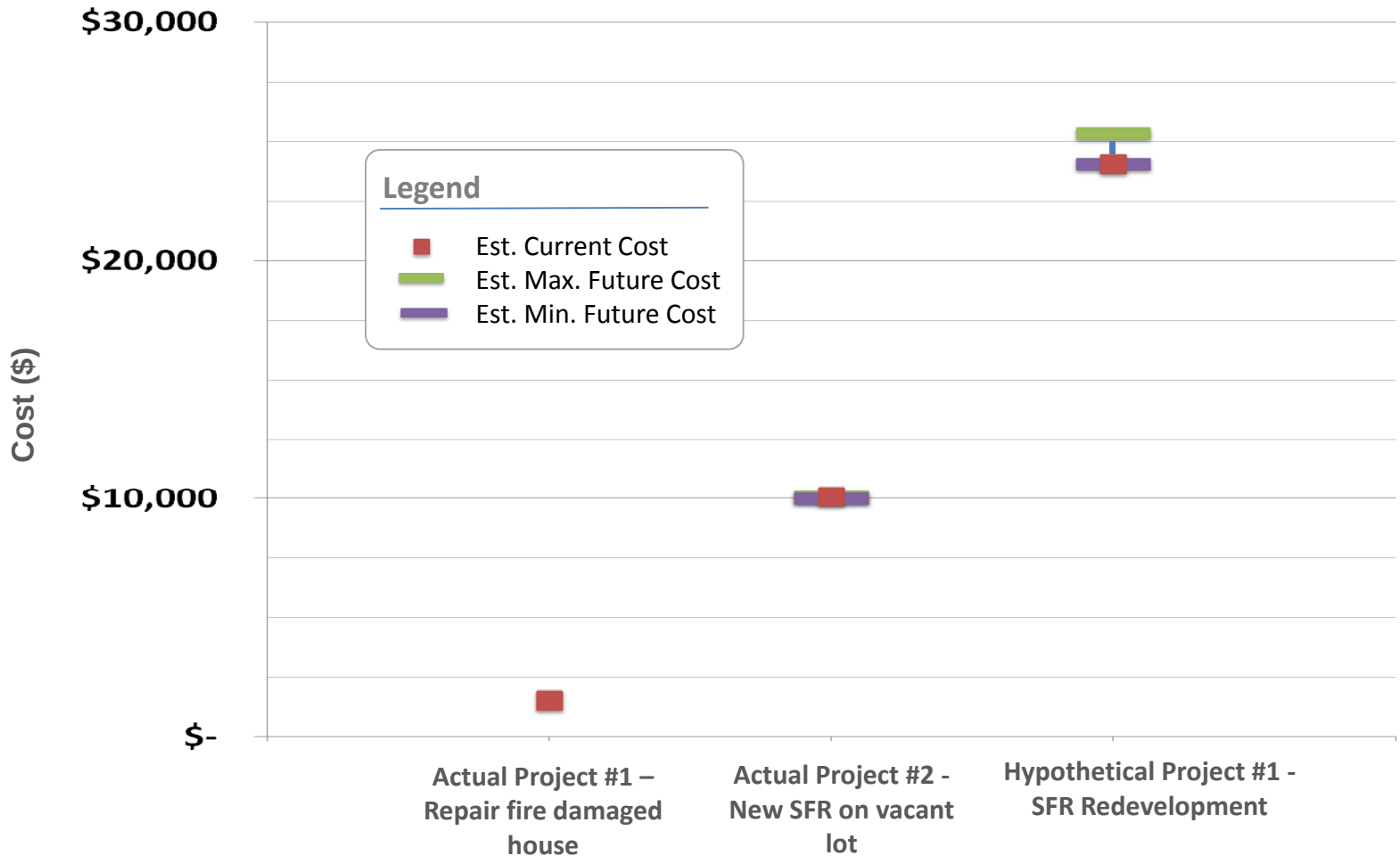
High LID Feasibility Scenario (NTS)



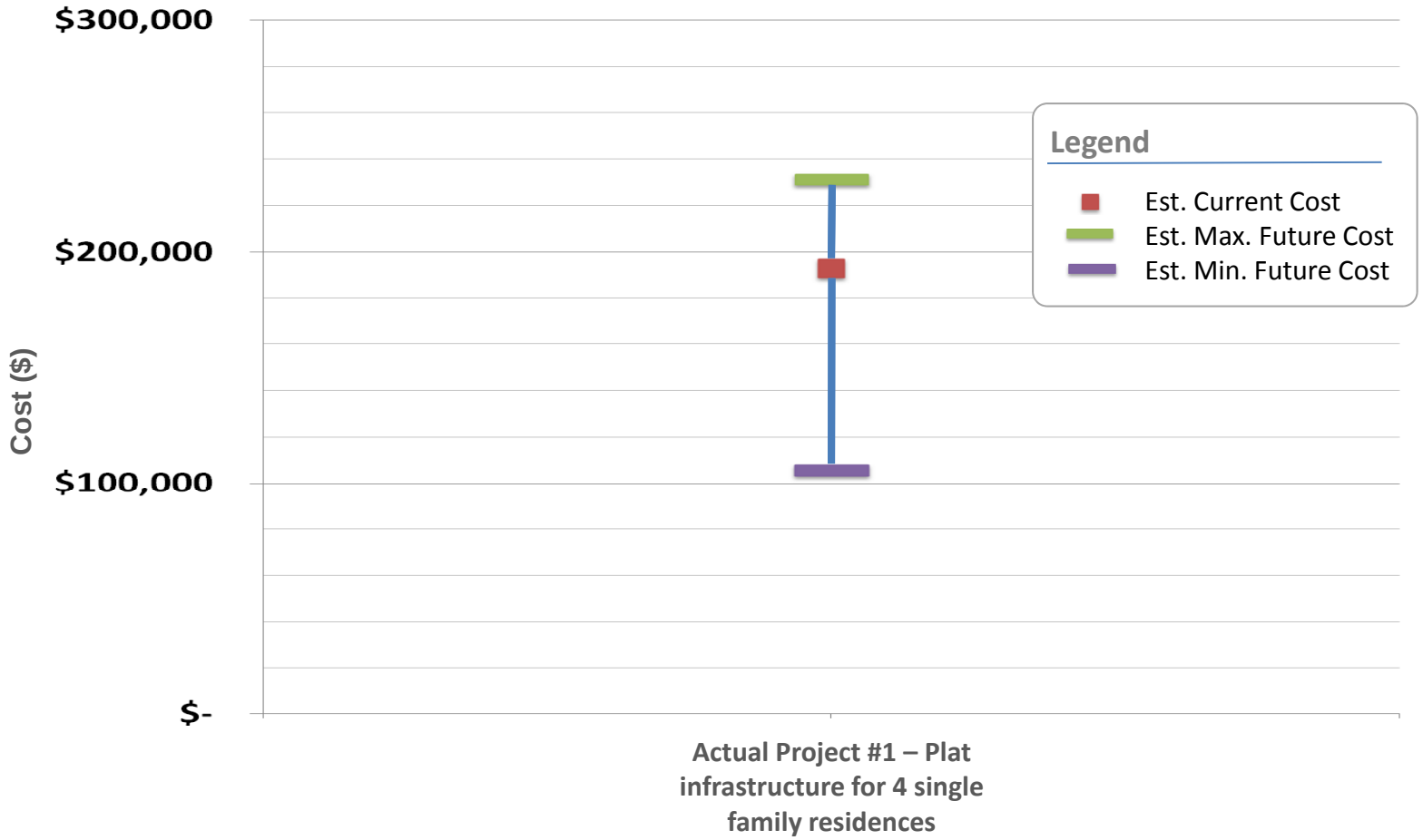
Estimated Current and Potential Future Stormwater Costs – MFR



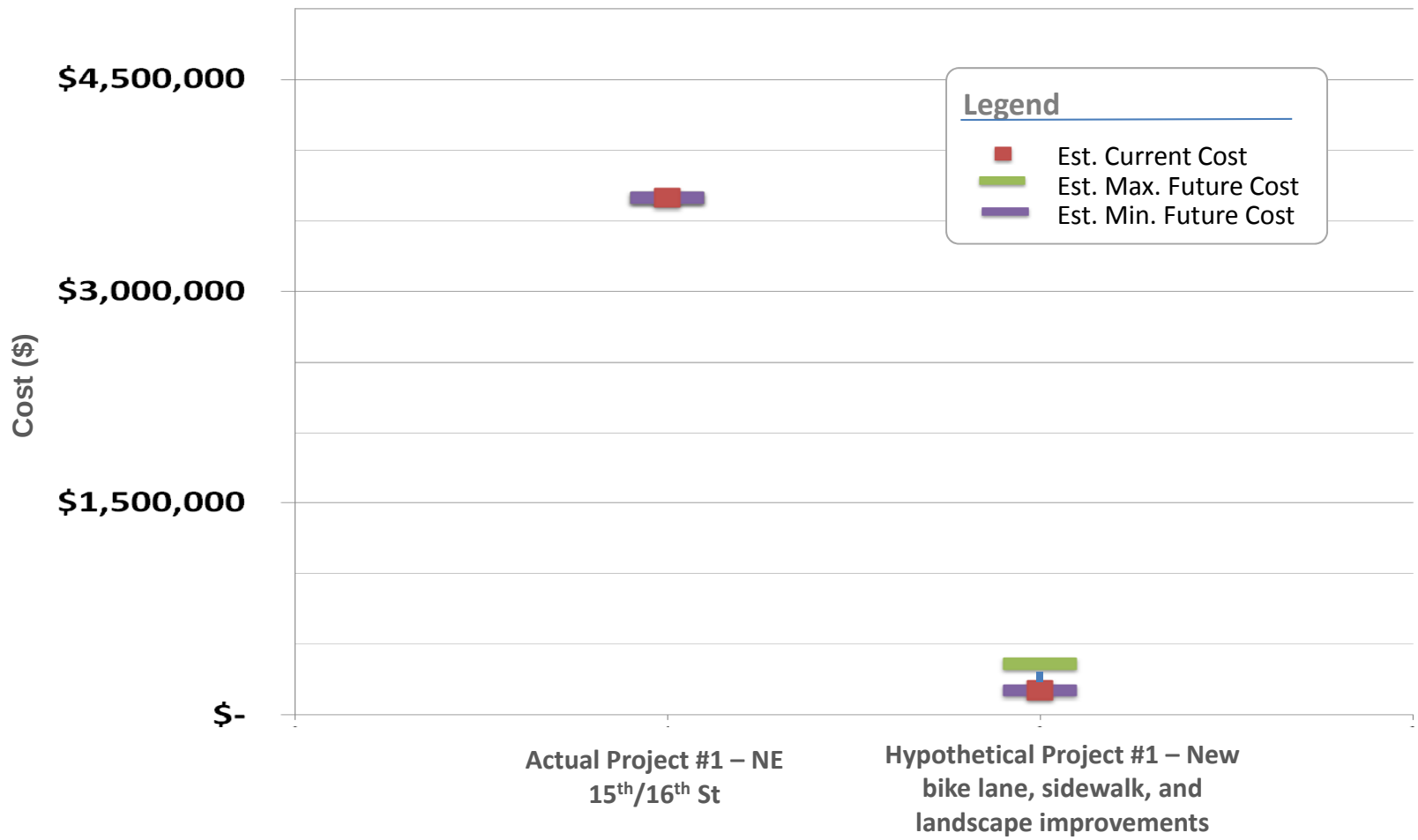
Estimated Current and Potential Future Stormwater Costs – SFR



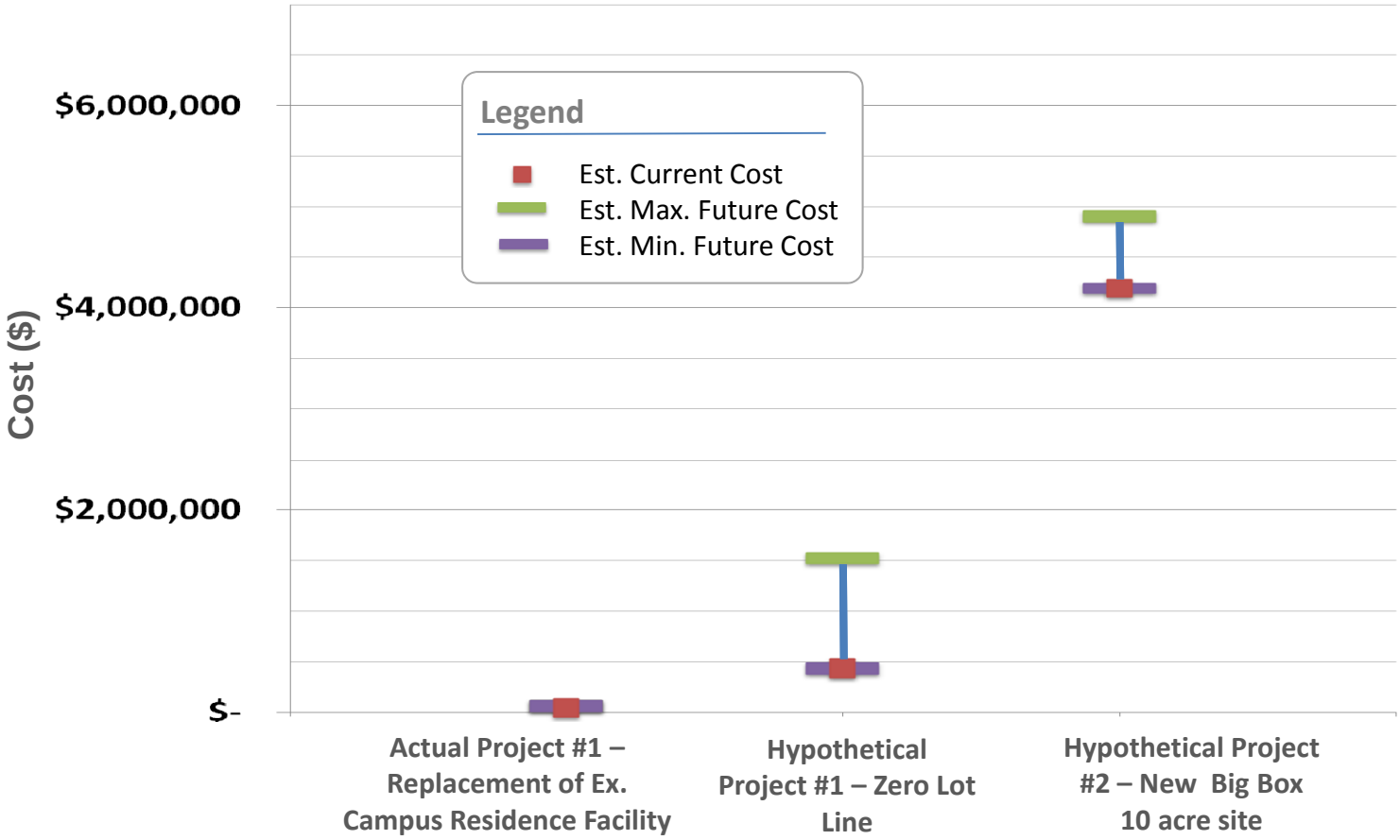
Estimated Current and Potential Future Stormwater Costs – Short Plat



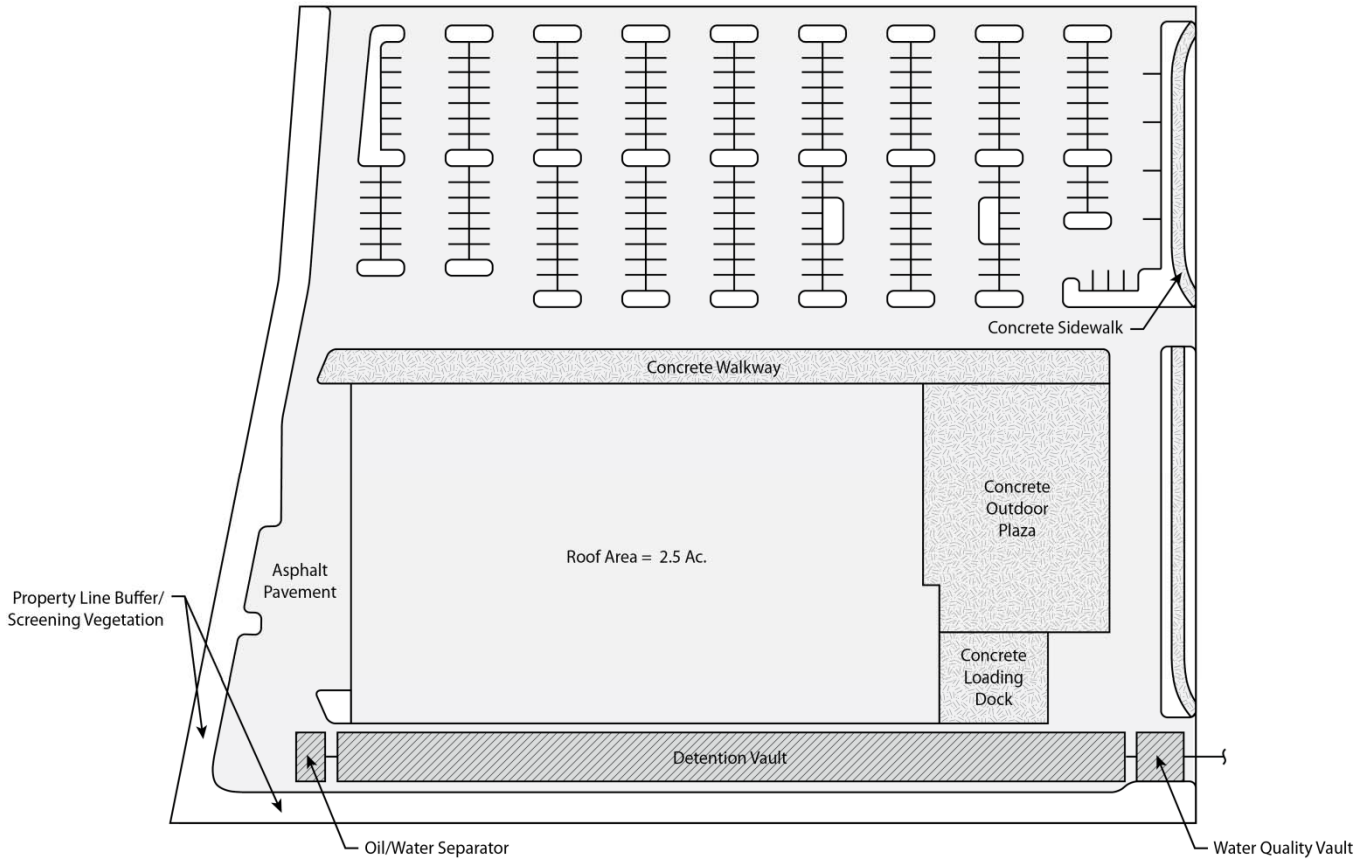
Estimated Current and Potential Future Stormwater Costs – Transportation



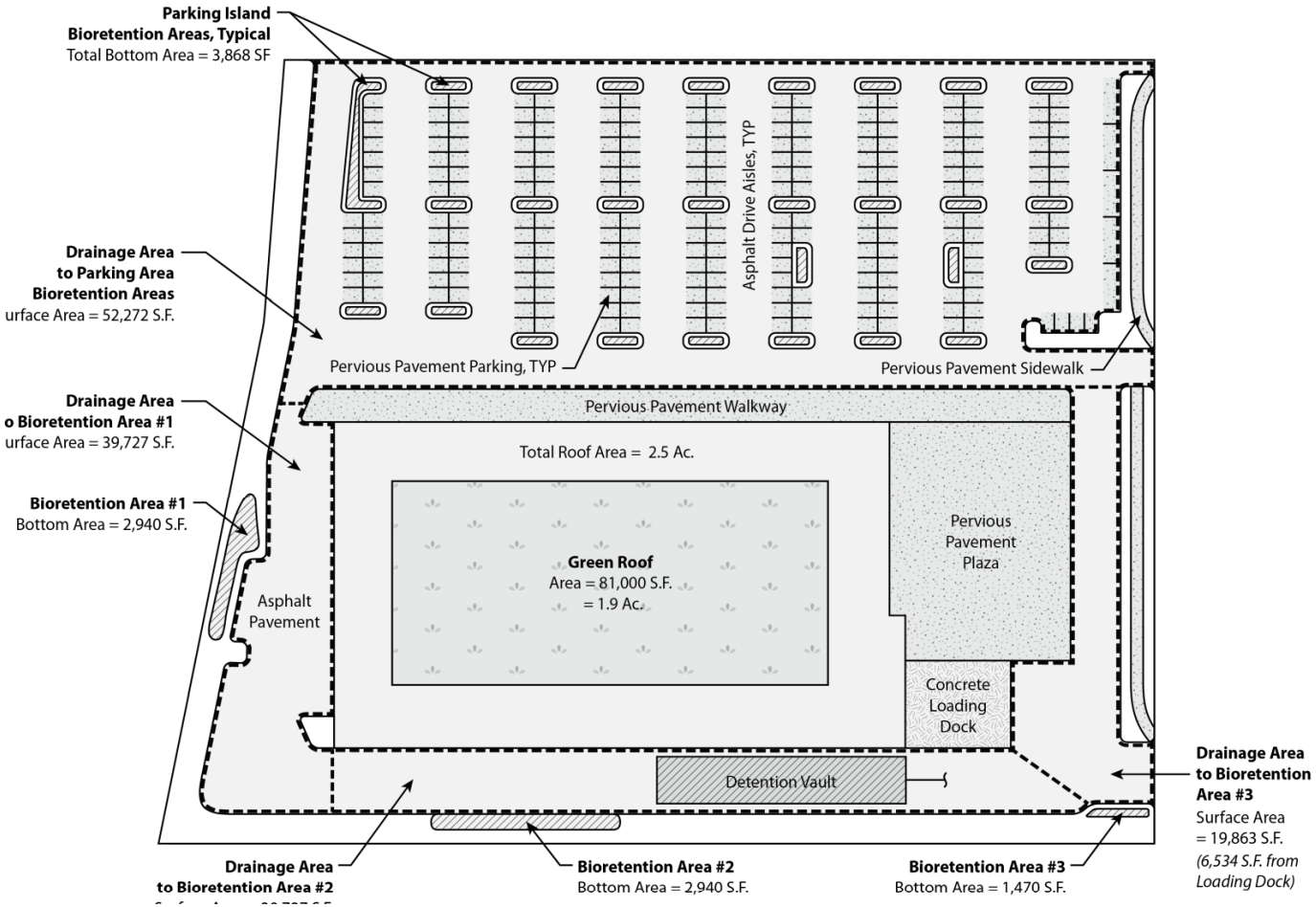
Estimated Current and Potential Future Stormwater Costs – Commercial



Hypothetical Big Box
2011 COB Code – Schematic (NTS)



Hypothetical Big Box
High LID Feasibility – Schematic (NTS)



Summary of Potential Changes in Stormwater Costs

Development Type	N (#)	Max Change [$, (%)]	Min Change [$, (%)]
SFR (single family residential)	3	$1,276 (5%)	-$100 (-1%)
MFR (multi-family residential)	1	$78,320 (21%)	-$218,760 (-58%)
Short Plat	1	$38,220 (20%)	-$87,230 (-45%)
Transportation	2	$187,660 (106%)	N/A
Commercial	3	$1.1M (248%)	$23,570 (17%)

Next Steps

WHAT YOU CAN DO TO PREPARE

What You Can Do To Prepare

- Review draft permit, manual, and reference documents
- Update leadership early on interests that affect your citizens, agency, and development community
- Submit comments to Ecology by 5pm, February 3, 2012
  - Public hearings testimony
  - E-mail to SWPermitCommetns@ecy.wa.gov
  - Mail to:

    Municipal Stormwater Permit Comments
    Water Quality Program
    Washington Department of Ecology
    PO Box 47600
    Olympia, WA 98504-7600
- Option to seek changes to permit in 2012 Legislative Session
- Option to appeal manual and/or permit after issuance
- Consider permit changes underway when updating comp plans, policies, etc.

Additional Resources

- **Formal Public Comment Period Information**
http://www.ecy.wa.gov/programs/wq/stormwater/municipal/2012draftMUNIcom.html

- **Draft Permits and Fact Sheets**
http://www.ecy.wa.gov/programs/wq/stormwater/municipal/2012draftMUNIpermits.html

- **Stormwater Monitoring Work Group**
http://www.ecy.wa.gov/programs/wq/psmonitoring/swworkgroup.html and
http://sites.google.com/site/pugetsoundstormwaterworkgroup/home

- **LID Advisory Process**
http://www.ecy.wa.gov/programs/wq/stormwater/municipal/LIDstandards.html

- **Listening Sessions**
http://198.238.211.77:8004/programs/wq/forms/listeningsessionscomments.html

Additional Resources (Cont.)

- **Preliminary Draft LID & Monitoring Permit Language Review**
http://www.ecy.wa.gov/programs/wq/stormwater/municipal/LIDmonitorCOMMENTS/informalcomments.html

- **Integrating LID into Local Codes: A Guidebook for Local Governments, November 2011 Final Draft**
http://www.psp.wa.gov/LID_GLG.php

- **Rain Garden Handbook for Western Washington Homeowners, June 2007**
http://county.wsu.edu/mason/nrs/water/Documents/Raingarden_handbook.pdf

- **Low Impact Development Technical Guidance Manual for Puget Sound, January 2012 Draft**
http://www.psp.wa.gov/LID_manual.php

- **Public Comment information on Draft Stormwater Management Manual for Western Washington:**
http://www.ecy.wa.gov/programs/wq/stormwater/wwstormwatermanual/2012draft/2012draftSWMMWW.html

DISCUSSION

Photograph by Greg Fulling, HDR

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THANK YOU!