Scholls Ferry Road Conceptual Design Plan

Technical Memorandum–Stormwater Management Alternatives

Prepared for

Multnomah County
1600 SE 190th Avenue
Portland, OR 97233

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CITATION

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CERTIFICATION

The technical material and data contained in this document were prepared under the supervision and direction of the undersigned, whose seal, as a professional engineer licensed to practice as such, is affixed below.

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1. INTRODUCTION

Parametrix has been asked to provide concept level stormwater management alternatives including considerations of Green Street treatments for Scholls Ferry Road (SFR) between Highway 26 and the Washington/Multnomah County border. Multnomah County currently defers to the City of Portland (COP) stormwater standards for guidance. COP standards require water quality and flow control considerations when impervious areas are increased as is proposed in this study area. In addition to alternative discussions, this memo also discusses stormwater management challenges and issues as we see them in the study area.

1.1 GREEN STREET AND LOW IMPACT DEVELOPMENT APPLICATIONS

The primary mechanisms that make Green Street and Low Impact Development (LID) Best Management Practices (BMPs) effective are their ability to detain, retain, and infiltrate stormwater. The ability to manage stormwater at the site reduces or eliminates the downstream impacts to the infrastructure and the environment. The benefits go beyond mitigation, repair and maintenance cost savings. The ideal conditions for implementing these BMPs include plenty of room, flat terrain, and highly permeable soils. Conditions along the SFR study area are less than ideal for this application. This is not to say that Green Street and LID BMPs cannot be implemented, but to do so in less than ideal conditions increases costs, increases risk of failure, and BMPs will likely be less effective than in ideal conditions. Before proceeding with any roadway or stormwater improvements further geotechnical investigation is recommended. See further discussions in the Soils and Sylvan Creek Basin sections.

2. ISSUES

The issues of concern limiting stormwater management and the use of Green Streets or LID alternatives and options on Scholls Ferry Road are;

1. Steep slopes,
2. Space constraints
3. Poor soil conditions
4. An existing drainage basin (Sylvan Creek) that is currently in a compromised condition.

This area also has a high potential for slide activity and a thorough geotechnical investigation complete with soil stabilization recommendations is necessary. Not included in this study but necessary in the future is the analysis of the basins draining to the existing Scholls Ferry Road stormwater infrastructure and a master plan to determine the adequacy of the existing system to manage the existing and future full build out runoff conditions.

2.1 SLOPES & SPACE CONSTRAINTS (SEE FIGURES)

Roughly two thirds of the roadway corridor being studied can be characterized as having slopes of 6% or greater. A good approximation of this section extends from Highway 26 to near Patton Road (upper reach). As discussed in the previous section, longitudinal slopes of this magnitude are less than ideal for implementing Green Street and LID applications. Additionally, this stretch of roadway is space constrained with limited room to install roadside Best Management Practices (BMPs) requiring excavation or embanking of the existing steep side slopes (see Figure 1 below). The lower one third of the study corridor can be characterized by having wider cross sections and longitudinal slopes in the 1–2% range which are more appropriate for Green Street and LID applications.

Figure 1. Upper Reach

Figure 2. Lower Reach

2.2 SOILS

The soils as seen on the NRCS Soils map attached are not conducive to infiltration, and as described in the Sylvan Creek Basin discussion below, are prone to slide activity. Utilizing infiltration as a component of Green Street BMPs would require amending soils and underlying them with a high flow bypass pipe system and an impermeable liner. Such a

subsurface stormwater management system is not typically associated with pervious pavements presumably because of maintenance/access and prohibitive cost concerns. For this project, we don't recommend pervious pavements as they perform best on soils with infiltration potential and would provide little value in this application.

2.3 SYLVAN CREEK BASIN

Sylvan Creek will be the primary receiving body of water for improvements along SFR, and its basin has a history of sloughing soils, land slides and stream degradation. This area has been subject to numerous studies by Clean Water Services and Washington County. Raleighwood Marsh/Park is the southern portion of this study area drainage basin where there exists a significant grade break. Grade breaks reduce flow velocities, allowing suspended sediment to drop out, and accumulate. Development pressure in the basin and the floods of 1996 have resulted in problematic and chronic stream degradation. The resulting siltation and aggregate deposition are exacerbating local property flooding problems and filling roadway culverts. Currently much of the existing Scholls Ferry Road stormwater infrastructure discharges into the Sylvan Creek basin. These outfalls should be assessed, and any improvements to SFR should be done collaboratively with Washington County and Clean Water Services who have been studying, managing, and attempting to improve the Sylvan Creek drainage system. Because the Sylvan Creek basin has a history of slide activity, a thorough geotechnical analysis should be performed prior to any roadway or stormwater improvements.

3. ALTERNATIVES

3.1 TRADITIONAL CURBED AND PIPED SYSTEM

Traditionally, curb, gutter and sidewalks have been constructed as CIP budgets allow or as required by development conditions of approval. This traditional approach to stormwater collection and management has often proven detrimental to natural systems by either removing the amount of stormwater that a site has historically seen, and or concentrating it into an area that historically hasn't see such inundation. Mitigation for such impacts has traditionally been done by flow quality and quantity and control facilities that were somewhere downstream of the improvements. Stormwater management approach paradigms are shifting more towards managing stormwater at the source by mimicking the exiting or pre-existing site hydrology such as 'Green Street' and LID stormwater management approaches.

In addition to the potential negatives listed above, obviously, traditional curb/gutter and piping infrastructure and stormwater management facilities are relatively expensive to install and maintain compared to alternatives that don't require them.

A potential benefit to a traditional approach to managing stormwater on SFR, is the prospect of a reduction in existing runoff flow currently draining to the stressed Sylvan Creek basin system. See this discussion in the Sylvan Creek Basin Section.

3.2 TRADITIONAL APPROACH WITH GREEN STREETS ADDED

A second alternative would include traditional curb gutter and sidewalk with Green Street BMPs. The Green Street applications could be located behind the curbs, and between the sidewalks. They would be in the form of biofiltration or lined infiltration swales as illustrated in the examples below. To accomplish this, in the steep upper reach of SFR, expanding the road prism would require significant excavation or embankment. As described in the Soils and Sylvan Creek Basin Sections, there is likely increased risks of soil instability if the roadway prism is expanded significantly (build up of downhill shoulders, or cut into uphill side slopes). There would likely also be significant cost increases to further expanding the width of the road prism to accommodate roadside stormwater management facilities.

3.3 MODIFIED EXISTING CONDITION

A third alternative might be to expand the upper reach to the minimum practicable yet still achieve the bike, pedestrian, and lane improvement goals. The stormwater could be allowed to continue to sheet flow off of the roadway in areas where it currently does, and continue to be collected in a curb or piping systems where that infrastructure currently exists**.** A further feasibility analysis of the existing outfalls, receiving system, and collection system would be required to determine if they can handle the additional flows resulting from this expansion. However, this approach would allow minor roadway widening to achieve the multimodal project goals. In the lower reach, it may be feasible to install roadside Green Street applications that achieve water quality treatment and flow control goals for all of SFR in the project area. In the flatter and broader lower reach roadway corridor, stormwater could be collected in water quality treatment swales in sufficient amounts to treat an equivalent area to that of all of the new proposed impervious surfaces.

As mentioned above, roadside bio-swales could be designed to provide stormwater quality treatment and convey high flows. However the higher energies associated with high flows

tend to render these facilities maintenance intensive compared to swales with high flow bypasses. The primary disadvantage of bio-filtration swales from a green streets perspective is that they do little to control flow at the source and instead can behave like traditional conveyance systems that introduce higher flows and energies downstream along with the associated detrimental environmental impacts listed above.

In order to control flow at the source in the lower reach, flow would need to be retained or detained along Scholls Ferry Road to the maximum extent practicable. This could be accomplished utilizing infiltration swales with amended soils over a high flow bypass pipe installed above an impermeable liner. See examples in Figures 3 & 4 below. These could be installed with or without curb and sidewalks.

Figure 3. Roadside Green Street /LID Application Under Construction

Figure 4. Roadside Green Street /LID Application Under Construction

3.4 WATER QUALITY

Multnomah County currently defers to the City of Portland (COP) stormwater standards for guidance. The City of Portland's Stormwater Management Manual outlines required stormwater management for all development. The City's approach is to treat and infiltrate stormwater onsite using vegetated surface facilities *to the maximum extent feasible*[1], before discharging to a surface drainage canal or pipe system with limited capacity. The following is the City's pollution reduction target for water treatment facilities:

- 70 percent removal of total suspended solids (TSS) is required from 90 percent of the average annual runoff.

The above requirement is applicable to projects that develop or redevelop more than 500 square feet of impervious surface.

[1] City of Portland *Stormwater Management Manuel* (2008), pg. 1-9.