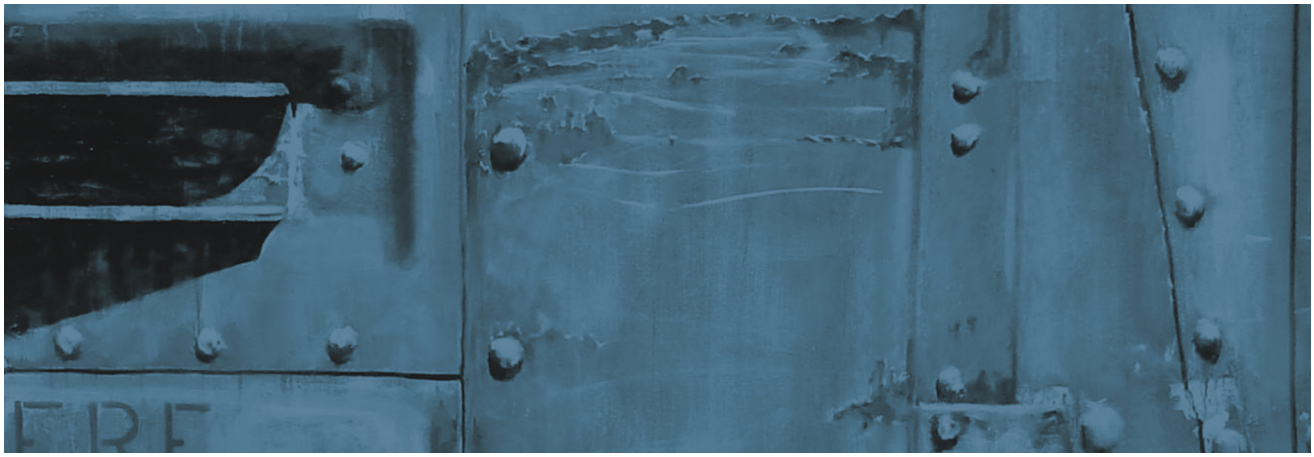

Proctor Willows Master Plan

Preliminary Stormwater Report

February, 2019

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Consulting
Engineers

Preliminary Stormwater Report

February, 2019

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Appendices

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1. Introduction

The Proctor Willows Master Plan is a proposed residential development to include up to 400 units of townhomes and apartments with associated roadways, trails, utilities, and open and recreation space. The project is located at the southwest corner of the intersection of Northeast 124th Street and Willows Road, in Redmond, Washington. The site is currently undeveloped, and is comprised of two parcels totaling approximately 15.6 acres (Figure 1-1). This report is intended to support the preliminary stormwater facility design and mitigation for the proposed development. A more detailed report will be submitted with Site Plan Entitlement (SPE) and a final report will be submitted with Coordinated Civil Review (CCR).

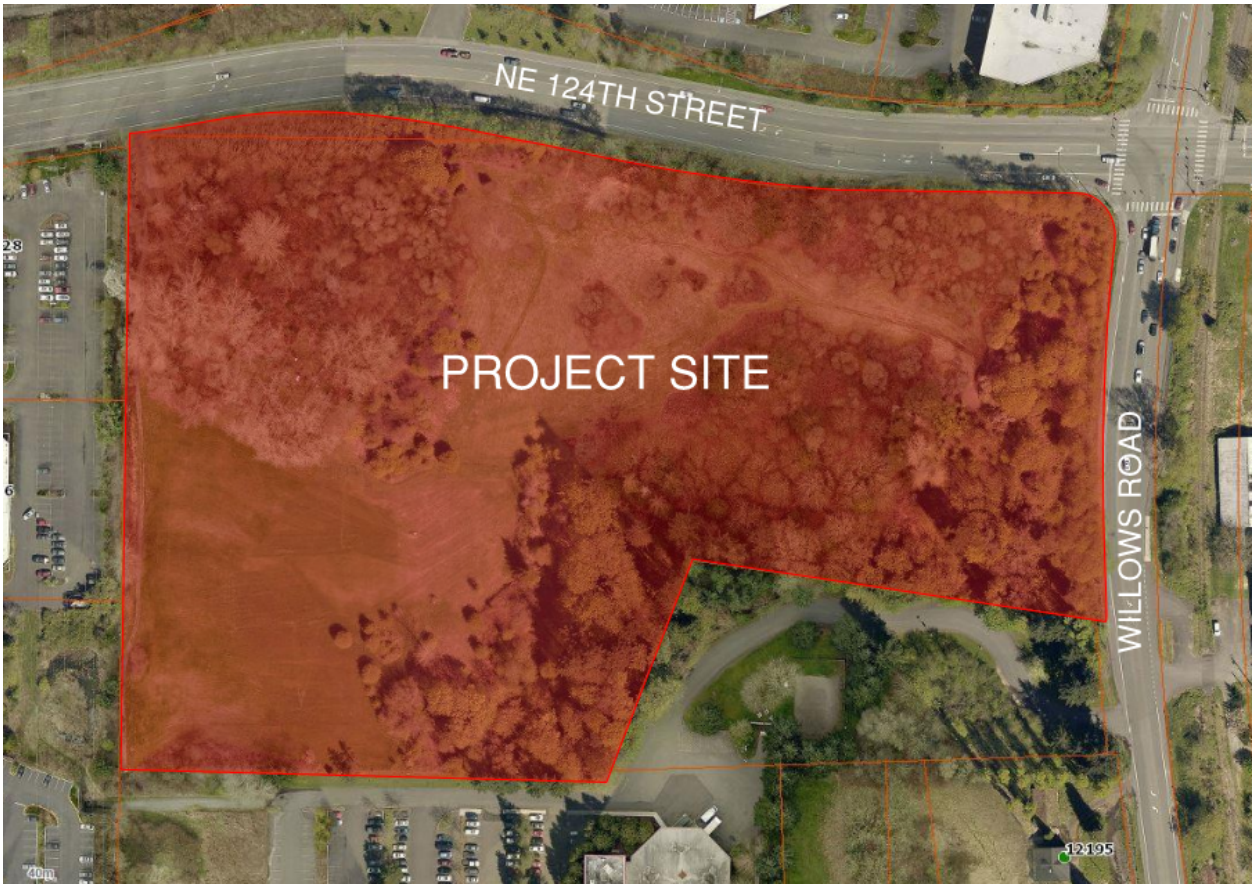

Figure 1-1: Site Map (King County Imap)

2. Existing Drainage

The site is currently undeveloped, pasture and second growth forest. The site generally slopes from west to east, with approximately 85 feet of elevation change across the site. Slopes vary from typically 5 to 15 percent across the majority of the site. A forested ravine in the southeast corner of the site includes slopes of up to 90%. There are also steeper slopes and retaining walls along the NE 124th and Willows Road frontages associated with the grading and construction of those roadways.

Stormwater runoff typically infiltrates on-site or sheet flows off of the site or into the ravine and drainage course in the southeast portion of the site. The drainage course discharges to a roadside ditch on the west side of Willows Road which drains under Willows Road by 12-inch culvert near the southeast corner of the site. See exhibit in Appendix A.

3. Conditions and Requirements Summary

Proposed development shall be in accordance with the 2017 Redmond Stormwater Technical Notebook (RSTN).

MINIMUM REQUIREMENT #1: PREPARATION OF STORMWATER SITE PLANS

This report has been prepared consistent with the Master Plan application requirements. A more detailed report will be submitted with SPE, and a final report and plans meeting all requirements of the RSTN will be submitted with construction documents.

MINIMUM REQUIREMENT #2: CONSTRUCTION STORMWATER POLLUTION PREVENTION

The proposed project includes more than 2,000 square feet of new plus replaced impervious surfaces, and therefore, a preliminary Stormwater Pollution Prevention Plan (SWPPP) will be prepared in accordance with the RSTN as part of SPE and a final SWPPP will be provided with CCR. The project also proposes more than 1 acre of land disturbance, so a Notice of Intent will be filed and an NPDES permit obtained from Ecology prior to start of construction.

MINIMUM REQUIREMENT #3: SOURCE CONTROL OF POLLUTION

Source control BMP's will be identified in the Stormwater Reports submitted with SPE and CCR.

MINIMUM REQUIREMENT #4: PRESERVATION OF NATURAL DRAINAGE SYSTEMS AND OUTFALLS

The project will retain approximately 30 percent of the site as protected open space, including the drainage course and associated wetland areas in the southeastern portion of the site. Mitigated on-site stormwater runoff will be discharged to the Willows Road right-of-way as in the existing condition. Stormwater runoff collected by the site cannot be safely re-dispersed on the steep slopes along the forested ravine. Stormwater runoff from NE 124th Street improvements will be mitigated and discharged within the right-of-way as in the existing condition.

MINIMUM REQUIREMENT #5: ON-SITE STORMWATER MANAGEMENT

Infiltration and dispersion of stormwater runoff are infeasible given site topography and soils. Roof runoff will be routed to bioretention areas, or to perforated stubouts if infeasibility criteria for bioretention are met. Runoff from other hard surfaces will be routed to bioretention systems unless RSTN infeasibility criteria are met. Specific on-site BMP's, sizing, and locations will be identified during SPE.

MINIMUM REQUIREMENT #6: RUNOFF TREATMENT

On-site runoff will be treated to enhanced water quality standards as required for multi-family projects in the City of Redmond. Treatment will occur through a treatment train with proprietary filter cartridges in a vault preceding the combined detention and wet vault proposed on site. Enhanced water quality treatment is intended to remove 80% of TSS along with a >30% reduction of dissolved copper and >60% reduction in dissolved zinc.

Off-site runoff in the frontage roads is required to be treated to basic water quality standards which is 80% TSS removal. This will be accomplished through proprietary filter cartridges in the right-of-way.

Refer to Section 6 for more information regarding water quality treatment.

MINIMUM REQUIREMENT #7: FLOW CONTROL

The development is required to match flow durations for the existing forested condition. This requirement applies for half of the 2-year recurrence interval storm duration up to the 50-year recurrence interval storm duration using a continuous runoff model.

The project proposes collection and conveyance of on-site stormwater runoff to a combined detention and wet vault on site before discharge to the municipal drainage system. Due to topography, the Willows Road frontage improvements will be modeled as bypass in the on-site vault sizing.

Flow control BMP's for stormwater runoff from NE 124th Street improvements in the City of Kirkland right-of-way will be determined in coordination with City of Kirkland public works. Mitigation will occur within the right-of-way.

Refer to Section 5 for additional information regarding flow control design.

MINIMUM REQUIREMENT #8: WETLANDS PROTECTION

A class 4 stream and category 4 wetlands have been delineated by the project biologist in the southeast portion of the site in the forested ravine. The proposed project will maintain the required buffers from these areas with proposed buffer averaging. A category 4 wetland near the west edge of the site is proposed to be filled and mitigated consistent with COR and State and Federal requirements.

Requisite Willows Road frontage improvements will also result in stream and wetland impacts near the southeast corner of the site. The project will work with COR engineers and biologists to minimize the impacts, and provide mitigation as required.

MINIMUM REQUIREMENT #9: BASIN/WATERSHED PLANNING

The project site is located within the Sammamish River Watershed. Watersheds in the City of Redmond are managed under the City of Redmond Citywide Watershed Management Plan. There are several goals for Sammamish River watershed, which are outlined in this plan; however, there are no special requirements based on the basin planning. Water quality and flow control requirements are met as described above.

MINIMUM REQUIREMENT #10: OPERATION AND MAINTENANCE

The stormwater conveyance facilities will be privately maintained. Stormwater flow control and water quality treatment facilities will be publicly maintained. Operation and maintenance measures for stormwater infrastructure will be provided with CCR.

4. Off-Site Analysis

UPSTREAM DRAINAGE AREA

Stormwater runoff from upstream properties to the west is substantially intercepted and diverted to existing stormwater mitigation facilities with piped outfall which bypasses the project site (Figure 4-1). Stormwater mitigation facilities on the adjacent Physio development site to the south outfall to a culvert at the head of the on-site forested ravine.

DOWNSTREAM ANALYSIS

Existing stormwater runoff infiltrates onsite or travels as sheet flow easterly offsite to the Willows Road roadside ditch or to the on-site drainage course in the southeast corner of the site. The on-site drainage course and the roadside ditch flow south to a culvert crossing under Willows Road and discharging to a stream channel flowing northeasterly to the Sammamish River (Figure 4-1).

A full one-quarter mile visual inspection and an analysis will be provided with the preliminary stormwater report at SPE

DOWNSTREAM DRAINAGE COMPLAINTS

Drainage complaints will be researched and documented with the preliminary stormwater report submitted for SPE.

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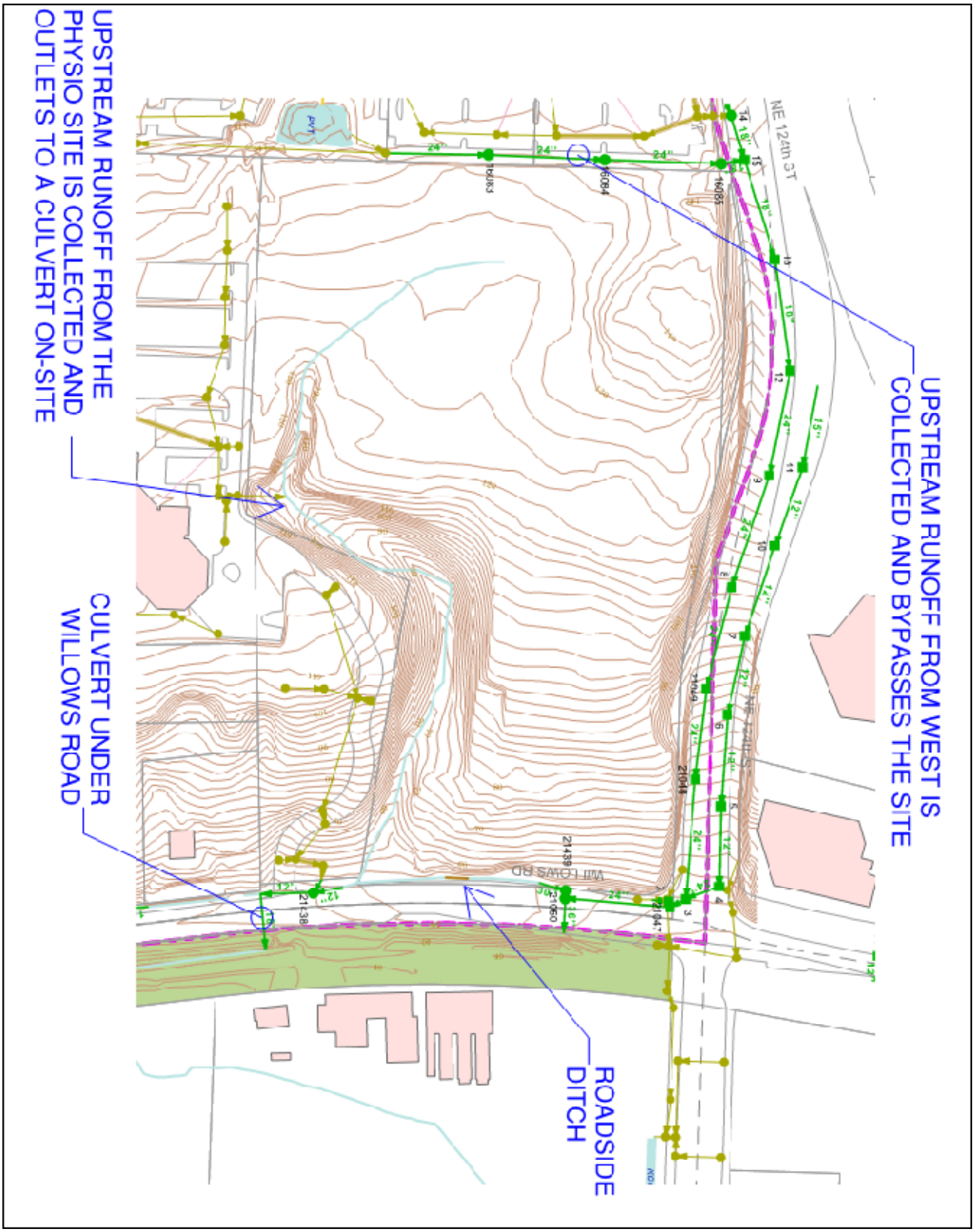


Figure 4-1: Off-site Drainage

5. LID Site Assessment

The proposed project will implement low impact development (LID) in accordance with the 2012 Department of Ecology (DOE) Storm Water Management Manual, amended in December 2014. The following is an evaluation of the List #2 best management practice (BMP) categories, as required by the DOE (Figure 5-1). Geotechnical analysis and Critical Area Study reports were submitted separately from this report.

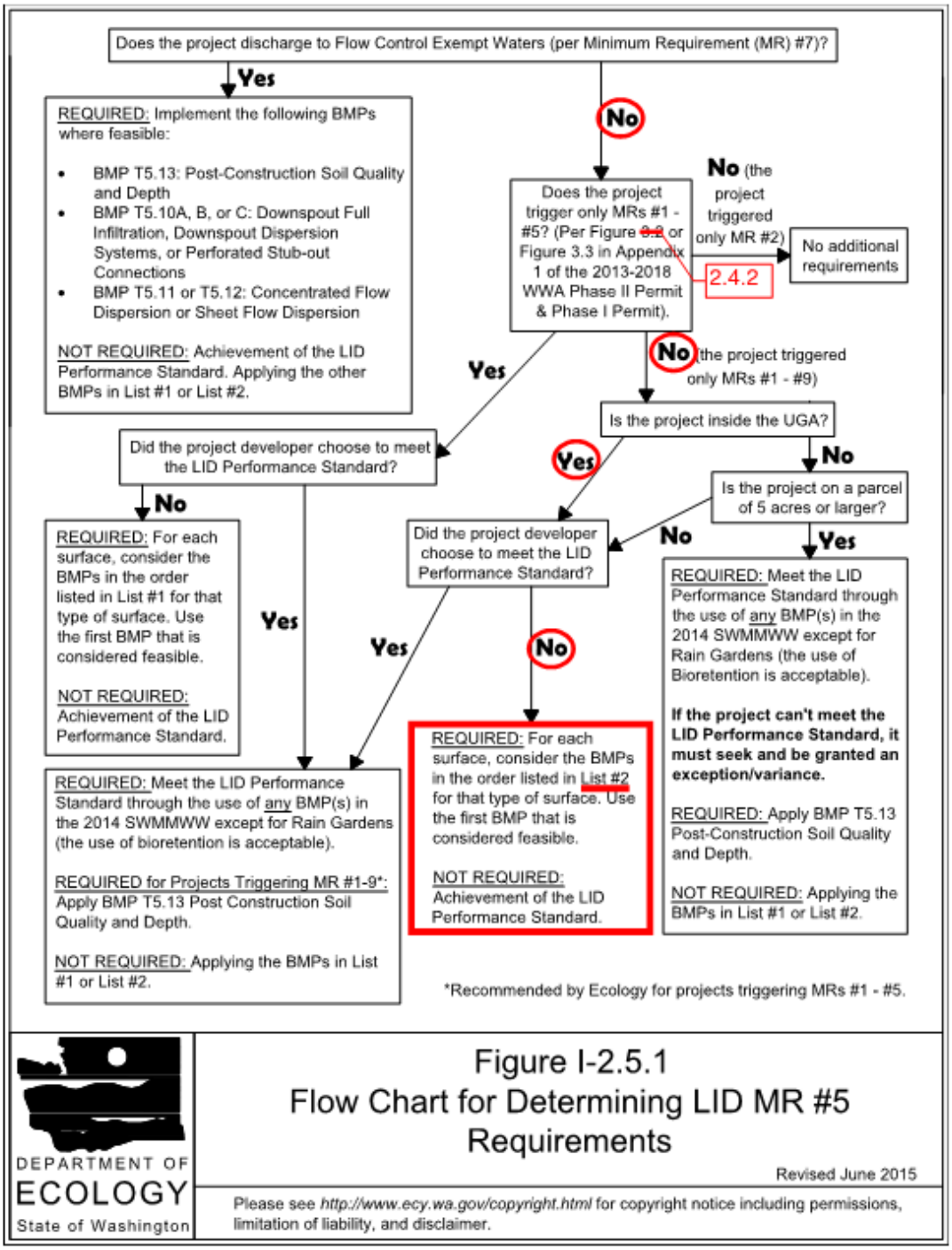


Figure 5-1: DOE Flow Chart for Determining LID MR #5 Requirements

ROOFS

- **FULL DISPERSION OR DOWNSPOUT FULL INFILTRATION:** Full dispersion is not feasible as the project cannot accommodate the required vegetated flow paths. Downspout full infiltration is not feasible as test borings indicate soils consists of glacial outwash deposits and interglacial alluvial soils with low infiltration capacity (refer to Geotechnical Evaluation prepared by Terra Studies dated May 24, 2017). Infiltration facilities placed higher on the site will increase seepage that will daylight in the ravine, be intercept by retaining walls along the northern edge of the site, or in slopes created along the frontage above Willows Road. As a result full infiltration is not a viable option for management of onsite stormwater.

- **BIORETENTION:** Bioretention swales will be utilized in many of the central courtyard areas (Figure 5-3). These facilities will receive stormwater from adjacent roof tops and will be equipped with overflow connections to the storm mains adjacent the project's internal roads. Additional bioretention usage is limited by required horizontal setbacks to roads and buildings, as well as proximity to steep slopes and wetland areas.

- **DOWNSPOUT DISPERSION SYSTEMS:** Downspout dispersion is not feasible as the required 25-foot vegetated flow path cannot be met.

- **PERFORATED STUB-OUT CONNECTIONS:** Perforated stub-out connections will be used for building connections to the proposed storm main along the project's internal roads.

OTHER HARD SURFACES

- **FULL DISPERSION:** Full dispersion is not feasible as the project cannot accommodate the required vegetated flow paths.

- **PERMEABLE PAVEMENT:** Permeable pavements may be utilized for areas where road grades are ten percent or less and where suitable granular soils are present at the final subgrade elevation. The project proposes to utilize permeable pavement in areas with low vehicular traffic, such as individual building driveways and sidewalks.

- **BIORETENTION:** Bioretention swales will be utilized where feasible adjacent to proposed road and other paved areas. Site topography, proximity to building foundation, and proximity to critical areas make bioretention infeasible in portions of the site.

- **SHEET FLOW DISPERSION OR COCENTRATED FLOW DISPERSION:** Sheet flow dispersion and concentrated flow dispersion are not feasible as the required vegetated flow paths cannot be met.

LAWN AND LANDSCAPED AREAS

- **POST-CONSTRUCTION SOIL QUALITY AND DEPTH:** The existing duff layer and native topsoil will be maintained to the maximum extent practical. In areas requiring grading, the duff layer and topsoil will be removed and stockpiled onsite in a designated controlled area, not adjacent to public resources or critical areas, to be reapplied to other portions of the site. Areas of new fill not covered by impervious surfaces shall have topsoil modified as needed to meet DOE BMP T5.13 requirements.

6. Proposed Drainage Control

Stormwater runoff is anticipated from buildings, roadways, paved areas and open space. Stormwater runoff on-site will be collected and conveyed to a combined stormwater detention and wet vault at the east edge of the site which will outfall to the roadside ditch on the east side of Willows Road. The outfall will be permitted through King County Permitting and Environmental review. The detention volume and controls will be sized using WWHM methodology according to the requirements described in Section 3 of this report. The SPE will include a more detailed report with contributing area breakdowns, vault sizing and controls, and calculations.

Off-site runoff in NE 124th Street will be mitigated within the City of Kirkland right-of-way, and will be reviewed and approved through the City of Kirkland right-of-way permit process.

7. Water Quality Treatment

As previously described, on-site stormwater runoff will be collected and conveyed to a treatment train with a proprietary filter cartridge vault preceding a combined stormwater detention and wet vault at the east edge of the site. The water quality volume will be sized using WWHM methodology according to the requirements described in Section 3 of this report. The SPE will include a more detailed report with contributing area breakdowns, wetvault sizing, and calculations.

Off-site runoff in NE 124th Street will be mitigated within the City of Kirkland right-of-way using proprietary filter cartridges in vaults or manholes, and will be reviewed and approved through the City of Kirkland right-of-way permit process.

8. Conveyance

The proposed conveyance system will be designed to convey the flows anticipated for a 100-year, 24-hour return frequency rainfall event using the WWHM2012 continuous modeling for flow frequencies. Storm pipe size and type, conveyance check calculations, and a backwater analysis will be provided as part of CCR.

9. Temporary Erosion and Sedimentation Control (TESC)

TESC will be installed to prevent transport of sediment-laden runoff from entering adjacent properties and sewer systems. TESC plans, descriptions of how runoff will be treated, and descriptions of the TESC facilities that will be used will be provided as part of CCR.

10. Drainage System Maintenance

An Operation and Maintenance Manual off all the drainage system facilities will be provided as part of the final report as part of CCR.

11. Bond Quantities and Declaration of Covenant

BOND QUANTITIES

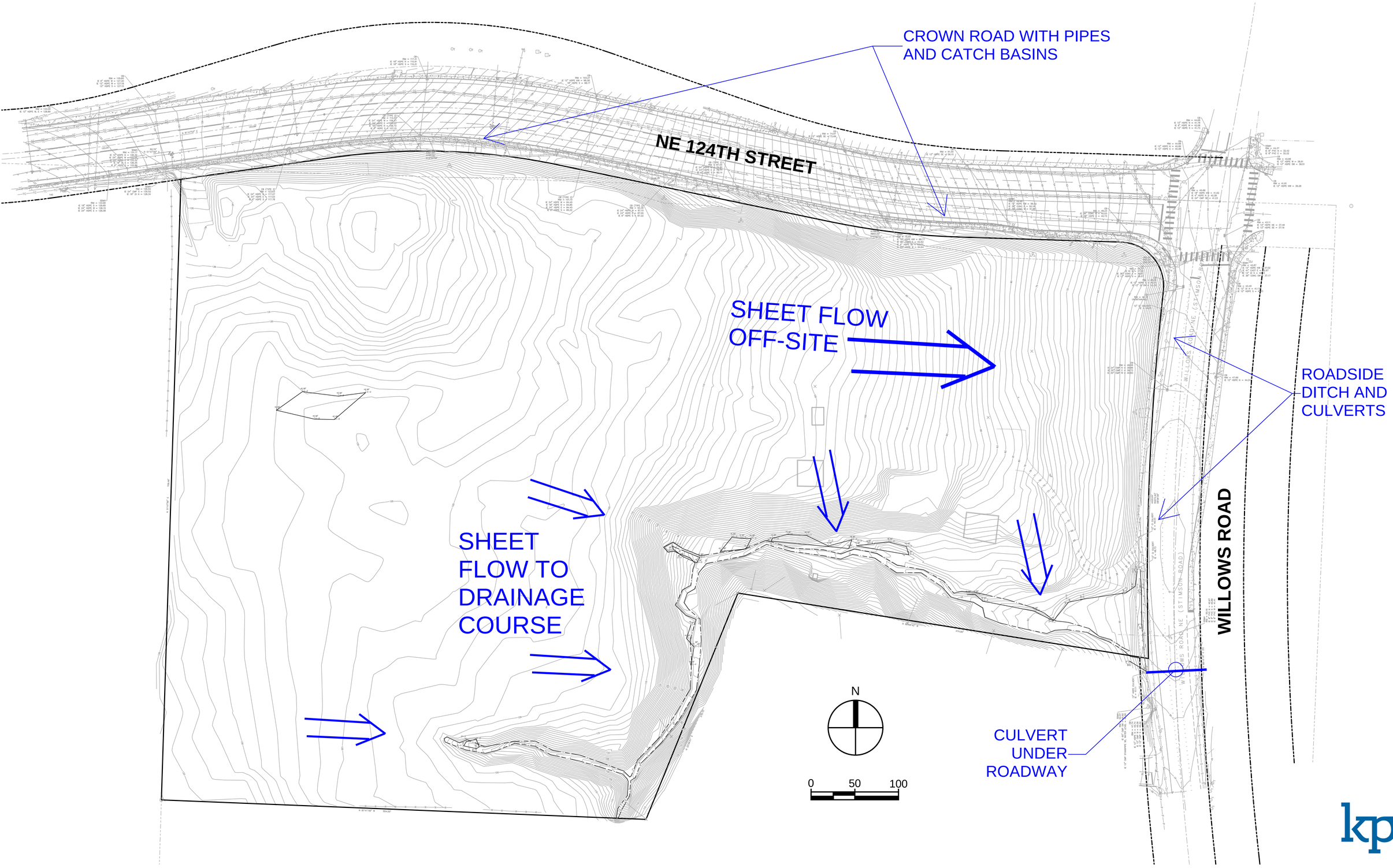
Bond Quantities in accordance to the City of Redmond's bond quantity requirements will be provided prior to construction.

DECLARATION OF COVENANT

Declaration of Covenant will be captured in the CCR's, which will be finalizing prior to recording of final plat.

Appendix A

Existing Conditions Site Map


CROWN ROAD WITH PIPES
AND CATCH BASINS
NE 124TH STREET
SHEET FLOW
OFF-SITE
ROADSIDE
DITCH AND
CULVERTS
WILLOWS ROAD
SHEET
FLOW TO
DRAINAGE
COURSE
N
0
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CULVERT
UNDER
ROADWAY

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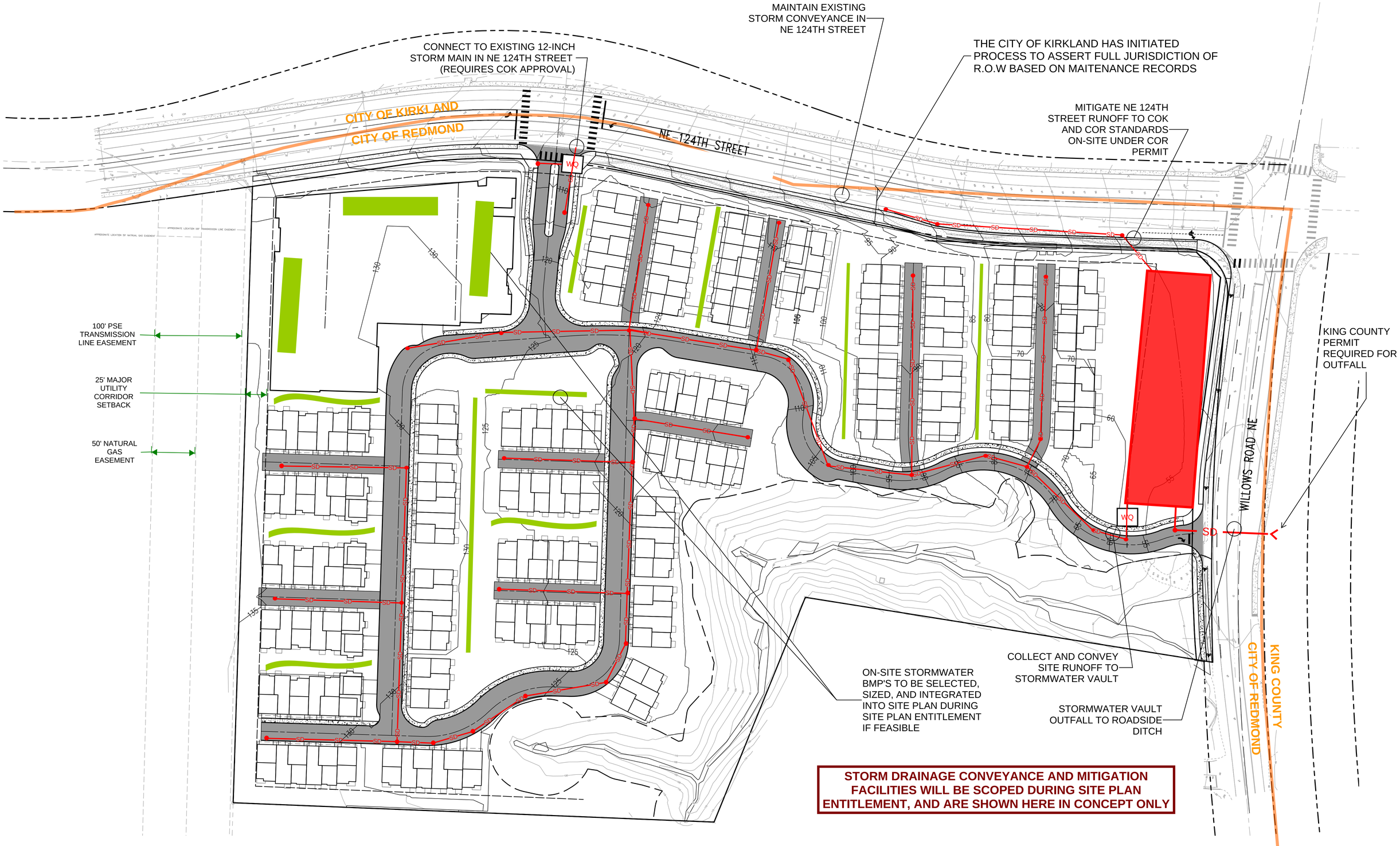
Appendix B

Proposed Conditions Site Plan



STORM DRAINAGE CONVEYANCE AND MITIGATION FACILITIES WILL BE SCOPED DURING SITE PLAN ENTITLEMENT, AND ARE SHOWN HERE IN CONCEPT ONLY