B Fiscal Impacts and Community Benefits Analysis

B-1. Transportation Supplemental Study

B-2. Water and Sewer Supplemental Study

B-3. Stormwater Supplemental Study

City of Kirkland NE 85TH SAP Supplemental Study

Fiscal Impacts and Community Benefits Analysis

Final Technical Memo

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Executive Summary

The project vision for the NE 85th Street Station Area Plan describes a thriving walkable urban center with plentiful affordable housing, jobs, sustainable development, and shops and restaurants linked by transit calls for significant population and employment growth. Additional residential and employment options are a substantial community benefit by itself, contributing to City of Kirkland goals for a more inclusive community with housing options and job creation in the Greater Downtown and near transit hubs. To be careful stewards of public resources, City Council has asked if Kirkland can afford the investments necessary to address increased demand on public services, especially schools, parks and open spaces, transportation, and utilities, and avoid a reduction in service for existing residents and businesses.

The short answer is yes, so long as the City employs a variety of strategies to balance the City's overall budget and needs generated by Station Area growth. In fact, much like the rest of Kirkland and many suburban communities, the City will face significant capital investments and demands for services if the area continues to develop under current trends. By embracing the vision of concentrated transit-growth in the Station Area, the City will be able to serve concentrated growth more efficiently and access more tools for investment in public infrastructure and City operations.

Station Area Plan Background

In 2019, the City commissioned the NE 85th Street Station Area Plan to evaluate how to leverage the regional transit investment of Washington State Department of Transportation (WSDOT) and Sound Transit in the planned Inline Bus Rapid Transit (BRT) / Interchange project. The Station Area is a unique location on the eastside and in Kirkland. The new WSDOT / Sound Transit Bus Rapid Transit station at I-405 and NE 85th will connect Kirkland regionally to light rail at Bellevue, Lynnwood, and to SeaTac with frequent bus service every 10-15 minutes. The Opportunities and Challenges Analysis found that the Station Area is significantly underutilized today – with 45% of the area used for surface parking – and has good potential for residential development and a strong location advantage for office development and new jobs.

The project Vision for the Station Area Plan is a thriving walkable urban center with plentiful affordable housing, jobs, sustainable development, and shops and restaurants linked by transit. Compact, transit-oriented growth around the new regional BRT and trail connections are a chance to grow smart, increase access to opportunity, promote the vision in the Comprehensive Plan and Sustainability Master Plan, and benefit the Station Area and Kirkland as a whole. The City's Objective is to leverage the BRT station regional transit investment and to maximize transit-oriented development and create the most:

1. Opportunity and Inclusion,
2. Value for the City,
3. Community Benefits, including affordable housing, and
4. Quality of life.

In fall and winter of 2020, three draft Alternatives were developed for the Draft Supplemental Environmental Impact Statement (DSEIS) for the project. The DSEIS Alternatives studied were based on input from the public, Planning Commission, and City Council, to guide growth around the new bus rapid transit station over the next 20+ years: Alternative 1 – No Action, Alternative 2 – Guiding Transit-

Oriented Growth, and Alternative 3 – Transit-Oriented Hub. Alternative 2, Guiding Transit-Oriented Growth, had the most favorable response and alignment with objectives. Mobility, infrastructure, and inclusion are some of the greatest opportunities and challenges of the Station Area Plan.

The City Council wanted to consider the Draft Alternatives further, and after project scope reassessment, directed a supplemental study. That supplemental study was designed to respond to community and City Council concerns and included a Fiscal Impacts and Community Benefits Study and supplemental transportation analysis items. The supplemental work began in May 2021 to understand the practical implications of options being considered. The results will help shape a preferred direction for the Station Area Plan.

Fiscal Impacts and Community Benefits Study

Today, housing in Kirkland is 50% more expensive than the average of King County and 89% of the jobs in the City are held by people living outside Kirkland. These dynamics are prevalent in the Station Area and result in long commute times and reduced quality of life. Community risk is increased by congested traffic conditions combined with lack of attainable housing that impede the ability of essential workers to get to their jobs in case of emergencies and is increased by contributing to poor air quality that can exacerbate health conditions and crises like COVID-19. If development in line with the current zoning in the Station Area Plan occurs, it will not generate enough revenue to pay for the infrastructure and City services necessary to serve the growth. Similarly, the infrastructure and service improvements in Kirkland's master plans are not fully funded.

The Fiscal Impacts analysis tested if the City could support infrastructure and service needs for future potential growth scenarios, and the Community Benefits analysis looked to maximize affordable housing and access to opportunity, as well as identify tools to help provide needed infrastructure to serve growth. The Study resulted in a recommended Infrastructure Investment Framework and a Community Benefits Policy Framework.

The Public Infrastructure and Services Investment Framework recommends how value for the City can be achieved by sustainable service provision and with fiscal responsibility; as well as how quality of life can be achieved with mobility for all ages and abilities, and access to parks. The Community Benefits Policy Framework recommends how the City can expand opportunity and inclusion with affordable housing and workforce development and by supporting schools and open space; and community benefits realized by greater sustainability, community resilience and health outcomes.

The numbered summary items below correspond to the sections of the full report which follows.

Section 2.0 Growth Analysis: June Alternatives for Study describes how the DSEIS Alternatives were narrowed for purpose of this study, including buildout estimates for next 23 years, and rebalancing the mix and level of growth to better manage transportation impacts. These two Alternatives were based on public, Planning Commission, and Council feedback, and were developed to be compared:

- **June Alternative A: Current Trends** is based on the starting point of DSEIS Alternative 1: No Action. A 'No Action' Alternative showing growth in line with Kirkland's Comprehensive Plan is a requirement of the DSEIS process. For June Alternative A: Current Trends, the growth targets were adjusted upward because growth in the past six years has outpaced the assumptions made in the 2015 Comprehensive Plan. June Alternative A: Current Trends maintains existing zoning heights throughout the district and slightly adjusts the assumed 2044 growth projections to reflect current market trends, showing more jobs, and only slightly more housing than DSEIS Alternative 1.

- **June Alternative B: Transit Connected Growth** is aligned with the overall Station Area Plan growth framework in the Initial Concepts and used DSEIS Alternative 2 as a base while incorporating select elements shown in the commercial corridors of DSEIS Alternative 3. June Alternative B only studies increased allowable heights in areas that provide clear benefits to the community and take advantage of regional transit connections. To that end, several areas where height increases had been proposed as part of DSEIS Alternative 2 and 3 were removed from consideration, including areas that are unlikely to redevelop due to market forces, are limited by development feasibility, or are constrained by other considerations. Alternative B: Transit Connected Growth results in similar household growth numbers as DSEIS Alternative 2, but lower employment numbers than DSEIS Alternative 3, showing more of a jobs-housing balance. The Southwest Quadrant of the Study Area has lower growth numbers, closer to what was proposed for DSEIS Alternative 1.

The table below summarizes the growth assumptions associated with the DSEIS and June Alternatives:

	DSEIS No Action	June Alternative A	June Alternative B	DSEIS Alternative 2	DSEIS Alternative 3
Households	2,782	**2,929**	**8,152**	8,509	10,909
Employment	10,859	**12,317**	**22,751**	28,688	34,988

- **Supplemental Transportation analysis** was completed to support the narrowing of Alternatives and better understand how the mix and level of growth could be adjusted to reduce the impacts modeled in DSEIS Alternative 2. It also included sensitivity testing of any impacts to the I-405/NE 85th interchange, and while the micromodel showed some delays on NE 85th, the increases did not significantly affect the operations of the interchange or the freeway mainline.

Section 3.0 Infrastructure Investment summarizes how planning level studies were conducted to determine a set of representative infrastructure investments needed to maintain service levels in transportation, water and sewer, and stormwater given the employment and household growth assumed for June Alternatives A and B. These studies were produced for development of conceptual cost estimates for fiscal modeling of the Station Area and are not intended to show a preferred plan or final project configurations, which will be developed in later stages of planning and are subject to City Council approval.

Key findings from each infrastructure study include:

- **The City needs to make significant transportation improvements in either Alternative.** In Alternative B, the largest City-funded representative improvements are:
  - Kirkland Way Complete Streets (an improvement which requires rebuilding of the Cross Kirkland Corridor (CKC) bridge and is also assumed under Alternative A).
  - 124th Ave NE Roadway Widening to 5 Lanes, NE 85th St. to NE 90th St. (an improvement also assumed under Alternative A).
  - 90th St Complete Streets Improvements (two projects, both projects are also assumed under Alternative A).

- NE 85th St. Shared Use Trail Improvements, 5th St. to Kirkland Way (an improvement that only takes place in Alternative B).

- Under either scenario outlined above, **additional water and sewer system improvements** will be needed to meet expected growth in the Station Area beyond implementation of the City's existing Capital Improvement Programs (CIPs) as shown in the 2015 Water System Plan (WSP) and 2018 General Sewer Plan (GSP). Additional improvements will be needed in June Alternative B, above and beyond those needed in June Alternative A, to meet projected growth given proposed zoning changes in the Station Area. Additional water and sewer system improvements are identified in these analyses as a representative list of projects that could serve the level of buildout described in June Alternative B:
  - The water system would not be able to meet the rezoned fire flow requirements without additional improvements.
  - The sewer system would not be able to meet the additional flows from the Station Area without additional improvements.
- After determining the potential flooding locations resulting from parcel improvements for basins in the northeast and southeast quadrants of the Study Area for each developed scenario, **stormwater mitigation options** were evaluated to determine their effectiveness at reducing runoff and conveyance capacity issues along the stormwater main line.
  - For either Alternative, development of these portions of the Study Area and any associated increases in impervious surface area will not have any negative downstream impacts due to existing policies and mitigation requirements.
  - Under either Alternative, the only recommended stormwater project within these portions of the Study Area consists of replacing 520 feet of pipe along 120th Ave NE with a smoother pipe material.
  - Although not directly related to the Station Area, outside of the Study Area, the analysis showed an increase in runoff from the upstream residential areas causing potential flooding, that is not exacerbated by potential allowed development represented in either June Alternative A or B.

Section 4.0 Fiscal Impacts Analysis is designed to answer a key question: *With population growth and redevelopment in the Station Area Plan, comparing June Alternatives A and B, can the City afford the investments necessary to address increased demand on public services, especially schools, parks/open spaces, transportation, and utilities, and avoid a reduction in service for existing residents and businesses?*

ECONorthwest developed a revenue model to project associated operating and capital revenues for the City, as well as revenues for key City partners. Operating and capital revenues were calculated based on the changes in the components of the City's tax base resulting from redevelopment in the Study Area. BERK led development of the cost model and calculation of net fiscal impact by comparing City revenues to expenses. Operating cost projections were developed in collaboration with City staff and are based on estimated operational impacts to each of the City's departments. Capital cost projections were

developed in collaboration with City staff as well as the consultants engaged by the City to conduct the planning level studies noted above.

Operating Net Fiscal Impact. On both an annual and cumulative basis, general operating revenues are projected to cover general operating costs under either Alternative during the study period. The table below details cumulative general operating revenues and costs through 2044 for both Alternatives.

Alternative A & B General Operating Revenues and Costs - Cumulative, YOE$

Type	Alt A	Alt B
General Operating Revenues	58.7M	$199.7M
General Operating Costs	-$31.9M	-$117.5M
Total General Operating Surplus/Deficit	**$26.8M**	**$82.2M**

Sources: FCSG, 2020; ECONorthwest, 2021; City of Kirkland, 2021; BERK, 2021.

While operating costs are significantly higher in Alternative B to serve new growth in the Station Area, revenues generated by potential future uses are also significantly higher. Under Alternative B, the City is projected to generate a general operating surplus of around $82.2 million by 2044, around $55.4 million more than the general operating surplus generated in Alternative A.

Costs stemming from functions funded by permit-related revenue sources and utility operating revenue sources are assumed to be covered by those revenue sources based on increased demand for services in the Study Area and not included in the analysis above.

Capital Net Fiscal Impact. Under either Alternative, significant capital needs are anticipated, with the City projected to see large shortfalls in covering capital needs unless other funding strategies are implemented. The table below outlines the projected cumulative surplus/deficit for capital costs and capital revenues through 2044 for both Alternatives. As a note, capital improvements needed in Alternative A are also assumed to be needed in Alternative B as those improvements will be needed to accommodate growth under either scenario.

Alternative A & B Capital Surplus/Deficit Summary – Cumulative, YOE$

Type	June Alt A	June Alt B
Dedicated Capital Revenues	$68.2M	$252.7M
Development-funded Improvements	$33.0M	$84.8M
Total Capital Improvements	-$265.2M	-$455.2M
Capital Surplus/Deficit	**-$164.0M**	**-$117.7M**

Note: Numbers may not add up due to rounding.

Sources: FCSG, 2020; City of Kirkland, 2021, Fehr & Peer's, 2021; RH2, 2021; RKI, 2021; HBB, 2021; ECONorthwest, 2021; BERK, 2021.

While Alternative B is estimated to generate more in total capital improvements than Alternative A, under Alternative B, significantly more dedicated capital revenues are also estimated to be generated, along with more improvements assumed to be funded through development. Compared with Alternative A, this results in a decrease in capital deficit of around $46.3 million (-$117.7 million in Alternative B versus -$164.0 million in Alternative A).

As shown below, in Alternative A, significant shortfalls are projected for transportation, water, sewer, and parks capital improvements. In Alternative B, significant shortfalls are projected for sewer and parks capital improvements.

Alternative A & B Capital Surplus/Deficit by Improvement Type – Cumulative, YOE$

Capital Improvement Type	June Alt A Capital Surplus/Deficit	June Alt B Capital Surplus/Deficit
Fire	$1.1M	$0.6M
Police Fleet and Municipal Facilities	-$0.4M	-$1.7M
Transportation	-$73.4M	$27.2M
Water	-$5.3M	$3.6M
Sewer	-$70.7M	-$53.5M
Stormwater	-$0.5M	-$0.3M
Parks	-$14.8M	-$93.5M
Total Capital Surplus/Deficit	**-$164.0M**	**-$117.7M**

Note: Surplus/Deficit does not include using general government operating surplus to cover gaps. Numbers may not add up due to rounding.

Sources: FCSG, 2020; City of Kirkland, 2021, Fehr & Peer's, 2021; RH2, 2021; RKI, 2021; HBB, 2021; ECONorthwest, 2021; BERK, 2021.

For each type of capital improvement, the City has available strategies that could be pursued to cover capital costs in Alternative.

Summary of Net Fiscal Impact. While it is important to note that restrictions on certain revenue sources exist and, as a result, not all revenues can be applied to certain costs, for contextual purposes, it can be helpful to understand where each Alternative ends up on a total surplus/deficit basis.

The table below details a comparison of both Alternatives on a total surplus/deficit basis. Major takeaways include:

- Under either Alternative, operating revenues are projected to cover operating needs by 2044
- Under either Alternative, significant capital needs are anticipated, with the City projected to see large shortfalls in covering capital needs unless other funding strategies are implemented
- As mentioned, while restrictions on certain revenue sources exist, on a total surplus/deficit basis, under Alternative B, the City's deficit is significantly lower than what is projected under Alternative A.

The City is projected to have a total deficit of around $35.5 million in Alternative B and a total deficit of around $137.2 million in Alternative A.

Alternative A and B Total Surplus/Deficit – Cumulative, YOE$

Surplus/Deficit	Alt A	Alt B
General Operating Surplus/Deficit	$26.8M	$82.2M
Capital Surplus/Deficit	-$164.0M	-$117.7M
Total Surplus/Deficit	**-$137.2M**	**-$35.5M**

Sources: FCSG, 2020; City of Kirkland, 2021, Fehr & Peer's, 2021; RH2, 2021; RKI, 2021; HBB, 2021; ECONorthwest, 2021; BERK, 2021.

Reasons for differences in the fiscal outlook between Alternatives include:

- Generation of a higher operating surplus in Alternative B relative to Alternative A driven by estimated increases in general operating revenues such as sales and property tax revenues
- A smaller capital shortfall in Alternative B relative to Alternative A due to estimated increases in dedicated capital revenues such as impact fees, REET, and capital facility charges as well as an increase in capital improvements funded by development.

It is important to note that the City's CIP looks at project funding for a six-year window and that future projects are shown as unfunded until they are prioritized into the CIP window. Funding strategies will be developed to address any funding gap that exists under current planning assumptions. The Station Area plan could provide additional funding and community benefit tools to help address capital needs as discussed in **Section 6.0**.

Section 5.0 Community Benefits Analysis aims to answer the following questions:

- How can the public receive benefits of growth?
- How can development increase affordable housing, open space, transit/bike/walk connections, and sustainability?

This section studies priority benefits that were chosen based on community feedback, City Council and Planning Commission direction, and initial findings from the DSEIS and 2020 Opportunities and Challenges Report. They include schools, parks and public realm, affordable housing, sustainability, and mobility.

Community Benefits Analysis: Potential Value Capture, described in Section 5.2, is based on a Residual Land Value (RLV) study of the full build-out of allowed development. It studies whether and to what degree the increased development entitlements considered in June Alternatives A and B create potential for value capture to provide additional community benefits. The RLV estimates offer a snapshot of value capture potential for the planned types of growth in the area based on typical development costs, estimated rents for new development, and approximate values of existing property.

The Residual Land Value analysis determined there is greatest potential for value capture for commercial development and increasing value potential in 10+ story development compared with 5-9 story

development. The analysis also found that mid-rise residential is not feasible everywhere in the near term, and additional affordability requirements or other value capture costs may delay development, which could result in less housing production subject to the inclusionary requirements. If the City did want to pursue increasing the existing Inclusionary Zoning requirements for affordable housing, it would be important to monitor how the policy change influences production. For both residential and non-residential development, reducing parking ratios is important for potential value capture. If ratios are not reduced, the potential for value capture is much less. This preliminary analysis shows the most value capture potential in Alternative B, with potential for tens of millions of dollars of additional value capture beyond Alternative A, primarily from non-residential development.

A range of potential Community Benefits Strategies that are relevant to the project and achieving the City's priority benefits are included in Section 5.3 and described below.

- **TIF.** Tax Increment Financing (TIF) is a common tool in other states that was recently authorized by state legislation for the first time in Washington. TIF allows a jurisdiction to capture the future value of public investments and catalyze growth, by designating a geographic area in which public investment is needed and issuing bonds against a likely increase in assessed values catalyzed by those investments. This tool is now available in Washington and is a good opportunity for the Station Area. Improvements that are the best fit for a TIF are ones that are unlikely to happen through typical CIP, critical to make desired development possible, and ideally can provide multiple benefits. This analysis has identified multi-benefit projects, parks, public realm, and mobility as the community benefits that would be the best candidates for a TIF. Based on the assumptions in this study, a preliminary estimate of potential TIF revenues under HB 1189 suggests that TIF may be able to support between $50 to $75 million (2021$ assuming 25 years of revenues discounted at 3.5%) in debt for infrastructure projects.
- **Commercial Linkage Fees.** Linkage fees "link" new development with the increased demand for affordable housing. These fees are typically charged to developers based on a per square foot fee established for specific uses like commercial or retail. Fees as set are based on a nexus study that demonstrates the rationale and relationship between the development and the fee that is charged. The RLV analysis indicates that a Commercial Linkage program for the Station Area has merit and while there are many factors that would influence revenue potential, there may be potential to generate in the range of $10-$50M should all the allowed development capacity for non-residential growth represented in June Alternative B be built within the 23-year planning horizon. The potential for value capture is highly dependent on reduced parking ratios as noted above. The City should consider a workforce development component of a potential linkage program which would allocate a portion of the fees collected toward workforce development programs to help to address the jobs/housing imbalance. More analysis through a nexus study would be required to better evaluate potential policies and establish a linkage program.
- **Density Bonus and Baseline Requirements.** Density bonus programs, also known as incentive zoning programs, allow additional development in exchange for the developer providing community benefits. Under a typical density bonus program, new zoning establishes a base development allowance in each zone. Certain zones are eligible for an additional increase in development up to a maximum development amount. In exchange for this additional development, the developer provides public benefits through fee-in-lieu or direct provision of the amenity. Based on the current

understanding of the City's priorities and objectives, a menu or points-based system is recommended for its ability to accomplish several goals through a single program and provide flexibility for developers to incent participation. Section 5.3.3 provides a potential structure of base requirements and bonus incentives for consideration. A part of this consideration should include potential modifications to existing policies as baseline standards are established.

- **Partnership opportunities** can advance priority community benefits through program alignment or potential co-benefits. Possible topics that should be explored include Shared Use of community facilities and public open space, integrated early education and childcare facilities, workforce development and green infrastructure programs, as well as sustainability, climate action, and health and well-being initiatives.

Section 6.0 Summary of Findings and Recommendations notes that the City must make significant capital investment under June Alternative A if the area develops under current trends. This Alternative does not generate much development contribution to required infrastructure. June Alternative B: Transit-Connected Growth, however, creates an opportunity for the City to efficiently serve concentrated growth and more tools to make investments in public infrastructure and City operations.

To manage Alternative B successfully, the City will have to recognize that a variety of strategies will be required to balance the City's overall budget and Station Area needs.

Based on the results of this analysis, which were all conducted based on existing City policies, the following recommendations are proposed as a framework for realizing fiscally sustainable infrastructure and services provision and the desired community benefits in the Study Area. These include a combination of existing policies and new policy changes that the City should consider as part of developing a preferred Plan Direction for the Station Area.

Potential Infrastructure-specific Financing and Community Benefit Strategies for June Alternative B.

- **Public Infrastructure and Services**
  - **Stormwater.** The City can use stormwater capital fund reserves to fill the $700,000 gap between the available stormwater facility charges and the infrastructure improvement cost in 2035.
  - **Water.** The City can issue a $10 million 20-year bond to cover the cost of the improvement and maintain an annual surplus. A bond of that amount and length is anticipated to result in annual debt payments of $685,000. Projected capital facility charge revenue and 7% of net new water utility revenue from growth in the Station Area are projected to be enough to cover the annual debt payments.
  - **Sewer.** The City can fund sewer improvements with a combination of debt issuance and rate increases. Issuing a $60 million 30-year bond in 2035, resulting in $3.1 million annual debt payments, would cover the cost of needed sewer infrastructure improvements. To make annual debt payments, a rate increase on the overall base would be required, because there is not enough sewer capital facility charges or new sewer rate revenue from the Station Area to cover the payments. Because this investment is also required in Alternative A, where there are less dedicated revenues available to offset costs resulting in a larger City deficit, Alternative A requires a larger rate increase than Alternative B.

- **Community Facilities and Benefits**
  - **Parks.** A mix of strategies will be needed to address parks capital needs, those to consider include:
    - Partially offsetting deficit with a portion of the the $80.0 million remaining in general government operating surplus. This strategy alone will not address parks capital needs.
    - Alternative non-acreage derived LOS guidelines more appropriate for urban centers, such as shifting the standards to geographic equity of park access within walking distance and inclusion of school facilities and non-City parks.
    - Leveraging public assets and partnerships.
    - Identifying Community Park options.
    - Leveraging development requirements and development bonuses which show potential to provide publicly accessible smaller scale open spaces and trail connections including in-building or rooftop urban park amenities.
  - **Affordable housing.** A commercial linkage program is the primary new strategy recommended to maximize affordable housing objectives, which would go beyond the City's existing Inclusionary Zoning requirements for residential development. The Residual Land Value analysis determined that a Commercial Linkage Program has merit, with greatest potential for value capture for commercial development, and increasing value potential in 10+ story development compared with 5-9 story development. Mid-rise residential is not feasible everywhere in the near term, and additional affordability requirements or other value capture costs may delay development, which could result in less housing production subject to the inclusionary requirements. If the City did want to pursue increasing the existing Inclusionary Zoning requirements for affordable housing, it would be important to monitor how the policy change influences production. Supporting workforce development programs may help to address the current jobs/housing imbalance within the Station Area.
  - **Mobility.** Identify and prioritize multi-benefit project opportunities and consider them as part of a TIF strategy, especially right-of-way projects where mobility and infrastructure needs overlap. The City should consider the following baseline or incentive-based changes within the Station Area as described in the Transportation Supplemental Study, Appendix 1: parking ratio reductions, unbundled and paid parking, requirements for large employers or multi-family properties to provide transit pass subsidies, managed parking strategies, Transportation Network Company (TNC) ridesharing programs, bikeshare or micro mobility programs, and shared off-street parking.
  - **Sustainability.** Baseline requirements and density bonuses are the recommended strategies to achieve sustainability features and performance within the Station Area. The City should consider how these goals would fit into a menu-approach and which levels of performance or features are desirable as baseline requirements or as density bonus incentives, and any needed policy adjustments to support this. They should also explore the potential for partnerships around sustainability, climate action, health and well-being initiatives.

- **Schools.** Under either Alternative, the City will need to help the Lake Washington School District solve for additional school population. Initial estimates are that school capacity will need to increase by 153 students under Alternative A and 936 students under Alternative B. In addition, the community as well as Lake Washington School District have articulated an existing and growing need for childcare and early learning and education facilities. Although the fiscal impact analysis did not estimate costs for Lake Washington School District, as they are a separate governmental entity from the City, the analysis did estimate anticipated revenues from school impact fees. It is estimated that there will be $24.6 million in school impact fee revenue available for school capital needs in Alternative B. ECONorthwest estimated that if the LWSD Capital Levy currently scheduled to expire in 2022 were to be extended throughout the life of this study period it could raise as much as $53.9 million in the Station Area. Potential community benefit strategies include:
    - In land-constrained locations like the Study Area, consider requirements or development bonuses for developments to provide space on-site. This can include educational and childcare space integrated into the development (most common for early learning, pre-K and specialized programs like STEM) or by setting aside land for future school development.
    - Consider policy changes to define active frontages or required retail space to include educational, childcare, and community-serving spaces in order to implement a Development Bonus strategy.
    - Explore partnership opportunities to align programs, such as Joint/Shared Use Agreements that broaden access to community-serving facilities.
    - Consider increasing allowed development capacity on existing underutilized public parcels to support future development of new school space.

Recommended Next Steps

- A **Public Infrastructure and Services Investment Framework** will be critical to catalyze transit-connected development and can help support coordination and implementation of various strategies.
    - Identify **baseline requirements** for project-level infrastructure and contributions to the Station Area. Potential for value capture will be related to some policy changes, including reduced parking ratios and unbundling, modifying parks LOS methodologies to move toward geographic equity and inclusion of shared use facilities. **Next step:** Coordinate a comprehensive scan of existing and potential policy changes together with a Density Bonus Program. Base development standards should be calibrated so that all development is held to an acceptable minimum standard of public benefit provision through other strategies like mandatory impact fees and design standards.
    - Use a **TIF District** to finance large, area-wide investments like streetscape improvements, major park, and potentially support additional school capacity and other infrastructure needs. **Next steps:** Conduct a TIF analysis, testing scenarios for TIF boundaries and projected revenues over time including development feasibility, identify target improvements. A Phase 1. TIF Strategy that looks at the TIF area, potential revenue, and eligible projects would cost about $20k and

take about three months. This should be paired project feasibility and conceptual study could range from $40-70k depending on the number and extent of candidate projects. A Phase 2. TIF Implementation Study would create the district itself, and cost about $40k over six to nine months. This will rely on supporting 30% design/engineering of TIF projects, and the costs and timeframe for this work is highly dependent on which projects are selected.

- A **Community Benefits Policy Framework** can then support community benefits provisions through coordination and implementation of various strategies.
  - Establish and confirm **baseline requirements** for affordable housing by maintaining existing inclusionary zoning, and consider sustainability measures, active frontages, and public realm improvements. Base development standards should be calibrated so that all development is held to an acceptable minimum standard of public benefit provision through other strategies like mandatory impact fees and design standards.
  - Identify **partnership opportunities** to advance priority community benefits through program alignment or potential co-benefits. **Next steps:** The project team could create a partnership opportunities inventory and the City could use this as a base to conduct outreach to potential stakeholders on topics including the possibilities of Shared Use of community facilities and open space, integrated early education facilities, workforce development and green infrastructure programs. This work could be documented in the Final Station Area Plan.
  - Develop a **Density Bonus Program** that can capture the value of more density for the community, particularly considering smaller publicly accessible open spaces, on-site educational and community facilities, advanced Transportation Demand Management (TDM) /Mobility measures, and additional sustainability measures. **Next steps:** Conduct a comprehensive scan of existing and potential policies together to establish base/bonus development allowances for zoning and develop a points-based system of benefits. Bonus allowances should be calibrated so they create a sufficient incentive to attract participation from developers. Coordinate with Lake Washington School District regarding a potential incentive program for development to provide integrated educational spaces within projects. Defining base and bonus entitlements could occur within the Form Based Code development during later stages of planning. Either the City or a consultant could complete supplemental work to develop the points-based system that would implement these standards. For a consultant, it may cost about $50k and could take about three months.
  - Implement a mandatory **Commercial Linkage Fee** to address affordable housing and workforce development, leaving room for the density bonus system. This should work in partnership with other affordable housing strategies like the City's existing inclusionary zoning policies and state MFTE program. **Next step:** Complete a nexus study to determine fees and consider workforce development allocation. A nexus study would cost $50-60k and would take from six to nine months, depending on how the City wants to engage with key stakeholders.

1.0 Introduction

1.1 Project Context and Focus of this Supplemental Study

The Northeast 85th St Station Area Plan (SAP) was commissioned to develop a long-term vision and plan to guide development and investment in the Study Area surrounding a future BRT Station at NE 85th St and I-405.

The City's vision for the Station Area is a thriving, new walkable urban center with plentiful affordable housing, jobs, sustainable development, and shops and restaurants linked by transit. Objectives of the 85th Station Area Plan include:

- Leverage the WSDOT/Sound Transit I-405 and NE 85th St Interchange and Inline Stride BRT station regional investment.
- Maximize transit-oriented development and create the most:
  - **Opportunity** for an inclusive, diverse, and welcoming community.
  - **Value** for the City of Kirkland.
  - **Community Benefits** including affordable housing and employment.
  - **Quality of life** for people who live, work, and visit Kirkland.

The SAP project has completed the Vision and Concepts planning phases as well as developing Alternatives up to the Draft Supplemental Environmental Impact Statement (DSEIS) stage. Prior to confirming a Preferred Direction in early 2021, the City Council and Planning Commission requested supplemental information beyond the DSEIS impact analysis to understand the potential community benefits, tradeoffs, and fiscal impacts of different Alternatives. This Supplemental Study is designed to help Council understand the practical implications of the options that are being considered – both the fiscal impacts to the City, and the likely community benefits that could result from new development over the next 23 years as a result of planning changes.

This Supplemental Study is intended to inform the Preferred Plan Direction decision that will become the basis for the Station Area plan, form-based code, and planned action ordinance. This remaining SAP scope, including the Draft and Final Plan, will resume after the Supplemental Study is complete. It is a long-range, planning level study and is not intended to plan for or represent specific, project-level configurations. As this is intended to support an area plan, differences between the assumptions of this long-range study and more near-term individual development and project decisions are expected.

1.2 Structure of this Document

This Supplemental Study is structured as described below and designed to answer the following key questions:

- **Section 2.0 Growth Analysis: June Alternatives for Study** describes the major assumptions underlying this analysis, including planning assumptions and infrastructure investment assumptions.

- *If the City were to implement its vision of the Station Area, how many jobs and housing units would be created?*

- **Section 3.0 Infrastructure Investment** answers the question:
  - *What infrastructure investments would be necessary to support this growth?*
- **Section 4.0 Fiscal Impacts Analysis** presents the projected fiscal impacts of June Alternatives A and B and addresses the impact to City finances:
  - *Can the City afford the investments necessary to address increased demand on public services, especially schools, parks/open spaces, transportation, and utilities, and avoid a reduction in service for existing community members and businesses?*
- **Section 5.0 Community Benefits Analysis** describes the potential for community benefits:
  - *How can the public receive benefits of growth?*
  - *How can development increase affordable housing, open space, transit/bike/walk connections, and sustainability?*
- **Section 6.0 Summary of Findings** and concludes this Supplemental Study by summarizing recommendations.

Note: Figures in this document are presented in year of expenditure dollars (YOE$) – meaning that revenues and costs are adjusted for inflation from present time (2021) to the expected year of collection or expenditure, respectively - unless otherwise noted.

2.0 Growth Analysis: June Alternatives for Study

As the basis of this Supplemental Study, two "June Alternatives" were established based on public comment and community feedback, as well as guidance from the City Council and Planning Commission. These June Alternatives narrow the range of Alternatives studied in the DSEIS by removing DSEIS Alternative 3 from further consideration and adjusting DSEIS Alternatives 1 and 2 for study. These adjusted Alternatives are defined as June Alternative A and June Alternative B:

- **June Alternative A: Current Trends.** June Alternative A: Current Trends (Illustrated in Exhibit 2-1) is based on the starting point of DSEIS Alternative 1: No Action. A 'No Action' Alternative showing growth in line with Kirkland's Comprehensive Plan is a requirement of the State Environmental Policy Act (SEPA) process. For June Alternative A: Current Trends, the growth targets were adjusted upward from DSEIS Alternative 1 because growth in the past six years has outpaced the assumptions in the 2015 Comprehensive Plan.

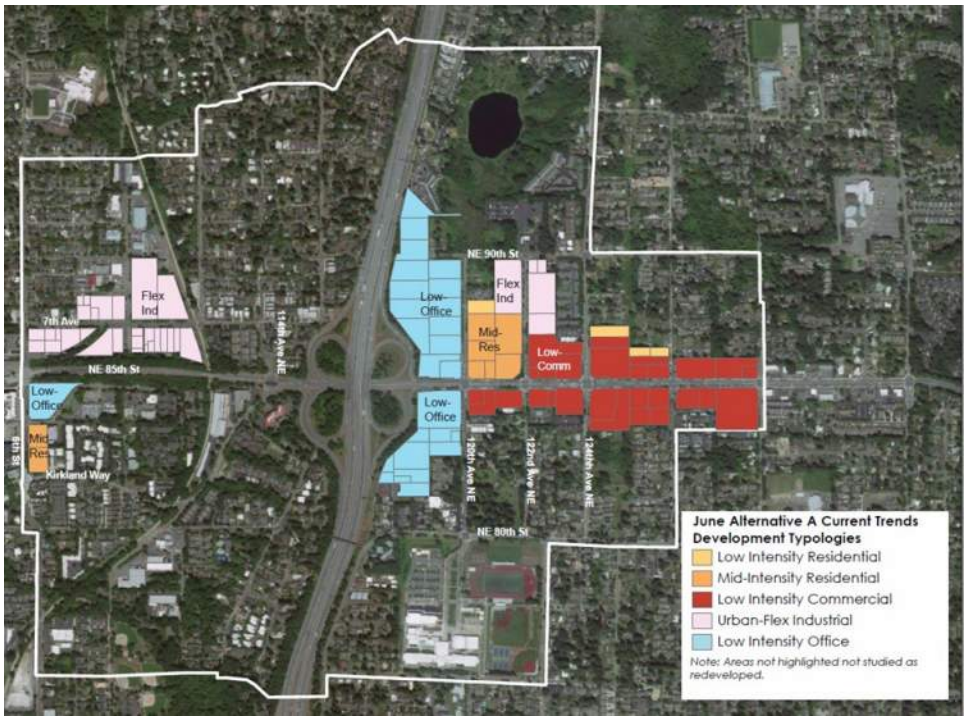
  June Alternative A: Current Trends maintains existing zoning heights throughout the district and slightly adjusts the assumed 2044 growth projections to reflect current market trends, showing more jobs, and only slightly more housing than DSEIS Alternative 1. In June Alternative A: Current Trends, these additional jobs were studied in portions of the Study Area currently zoned for development up to 67' in height in zones RH-1A, RH-2A, and RH-2B. Areas within the district currently zoned for single family or other low density residential area maintained their current zoning.
- **June Alternative B: Transit Connected Growth.** June Alternative B: Transit Connected Growth (Illustrated in Exhibit 2-2) is aligned with the overall Station Area Plan growth framework in the Station Area Initial Concepts (Exhibit 2-3) and incorporates elements shown in the commercial corridors of DSEIS Alternative 3 into the overall land use pattern established in DSEIS Alternative 2. The intent of this strategy is to:
  - Optimize for workforce and affordable housing, in particular the number of units provided through linkage fees and/or inclusionary zoning.
  - Attract new jobs to foster economic activity and meet citywide targets.
  - Balance the distribution of commercial-focused development across the Study Area.
  - Foster an environmentally sound land use pattern that helps achieve the City's sustainability goals.

  June Alternative B: Transit Connected Growth responds to the public comment heard during the DSEIS comment period and the May 26, 2021 Council Listening Session. Although a wide range of comments were shared, many participants reiterated a desire to maintain existing residential character, and concerns regarding the maximum allowable zoning heights proposed in DSEIS Alternative 3.
- June Alternative B: Transit Connected Growth only studies increased allowable heights in areas that provide clear benefits to the community and take advantage of regional transit connections. To that

end, several areas where height increases had been proposed as part of DSEIS Alternative 2 and 3 have been removed from consideration in June Alternative B: Transit Connected Growth. These include areas that are unlikely to redevelop due to market forces, are limited by development feasibility, or are constrained by other factors. June Alternative B: Transit Connected Growth results in similar household growth numbers as DSEIS Alternative 2, but lower employment numbers, showing more of a jobs-housing balance. The Southwest Quadrant of the Study Area has lower growth numbers, closer to what was proposed for DSEIS Alternative 1. Transportation analysis, presented in Section 2.2 of this report, describes analysis that was completed to support the narrowing of Alternatives and better understand how the mix and level of growth could be adjusted to reduce the impacts modeled in DSEIS Alternative 2.

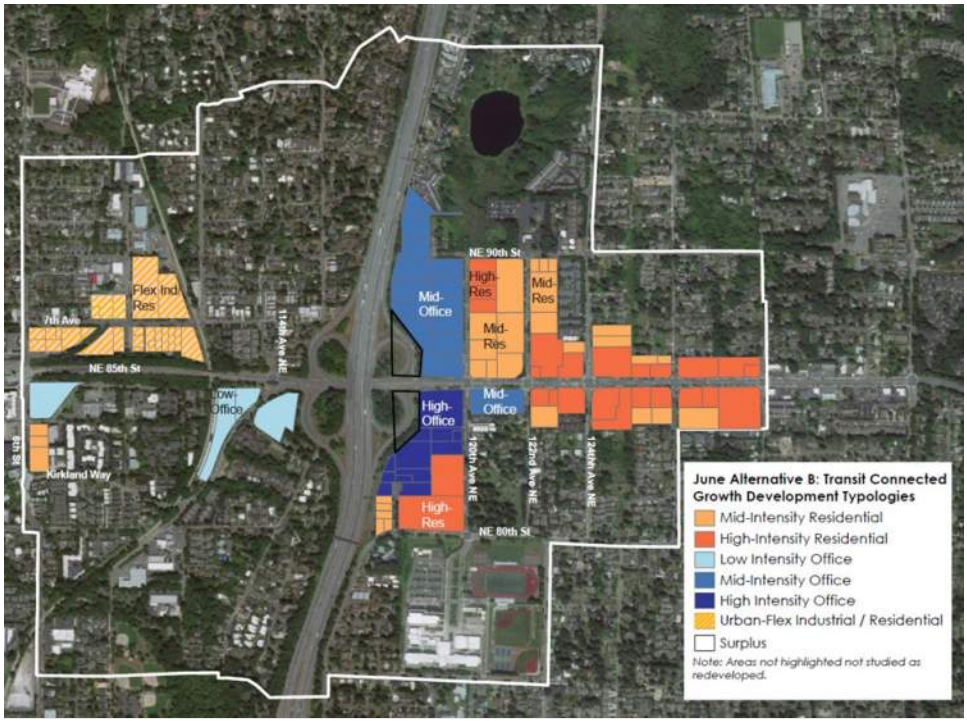
- In alignment with the Station Area Initial Concepts Growth Framework, June Alternative B includes a few areas of greater capacity for change as compared to existing conditions. These are focused around the BRT node and the Cross-Kirkland Corridor, including two areas in Rose Hill nearest to the future BRT station: the mid-rise office designation in the northeast quadrant and the high-intensity office designation in the southeast quadrant; and the flex industrial – residential capacity in the Norkirk LIT area in the northwest quadrant. Because of this greater capacity for change, these areas receive greater study in some sections of this report regarding fiscal impacts and potential for community benefits. Throughout this report, these areas will be referred to as SE Commercial Area or Lee Johnson Site, NE Commercial Area or Costco Site, and Norkirk Area, respectively. In some appendices and references where the terminology Lee Johnson Site and Costco Site may appear, it is important to note that, in all cases, the analysis reflects a hypothetical assumption of the total allowed development in the June Alternatives and is not meant to presuppose decision- making by private landowners or the actions of the market. References to the current ownership have been included to assist the reader in identifying the locations that were evaluated.

Exhibit 2-1. June Alternative A: Current Trends – Development Typologies



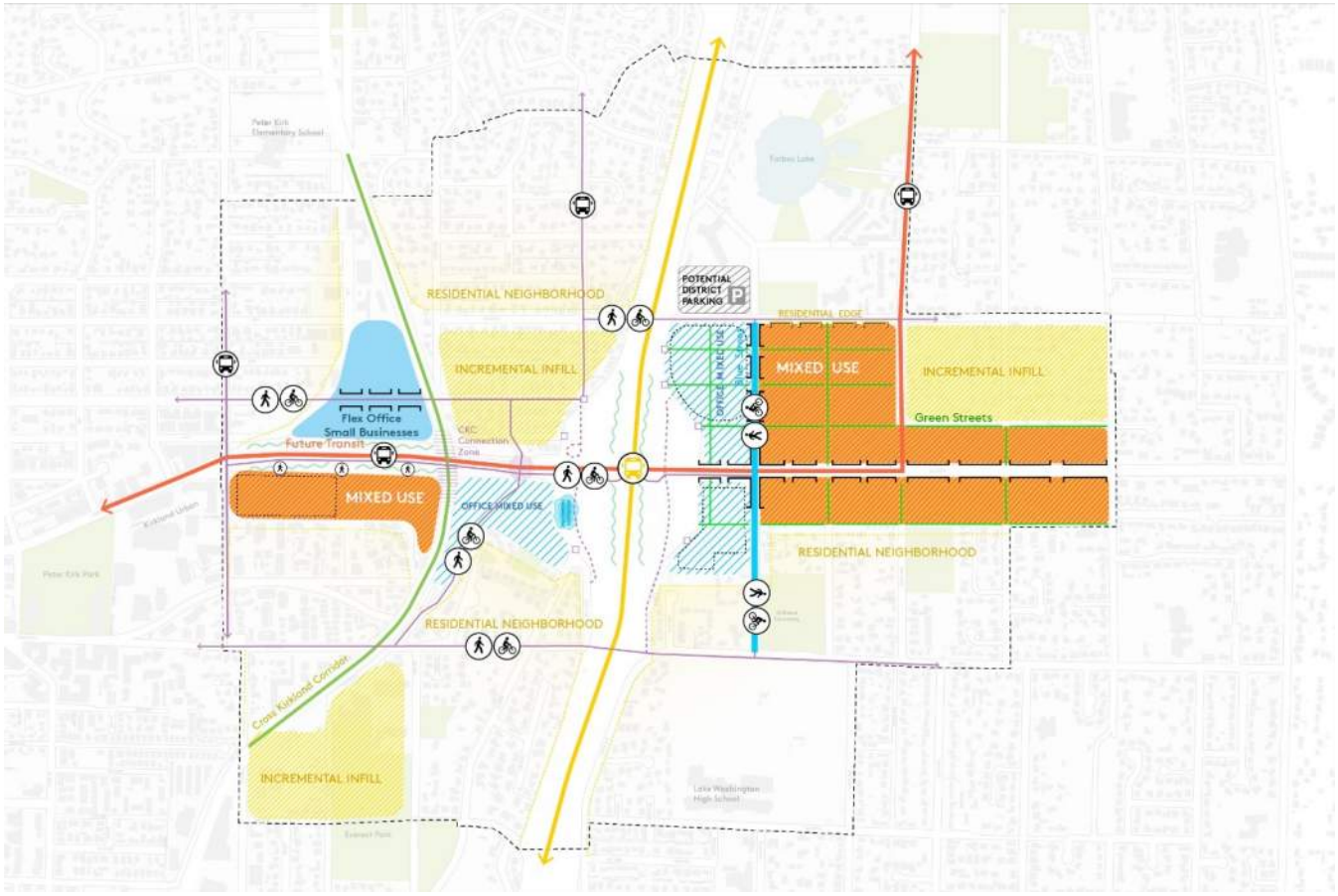
Sources: Mithun, BERK, 2021.

Exhibit 2-2. June Alternative B: Transit Connected Growth- Development Typologies



Sources: Mithun, BERK, 2021.

Exhibit 2-3. Station Area Initial Concepts



Source: Mithun, 2020.

2.1 Summary of Employment and Residential Capacity in June Alternatives

As shown in Exhibit 2-5, either June Alternatives represents significant growth of employment and population in the Station Area. This capacity for additional jobs and housing is a substantial community benefit by itself, contributing to City of Kirkland goals for job creation in the Greater Downtown and near transit hubs, and housing options.

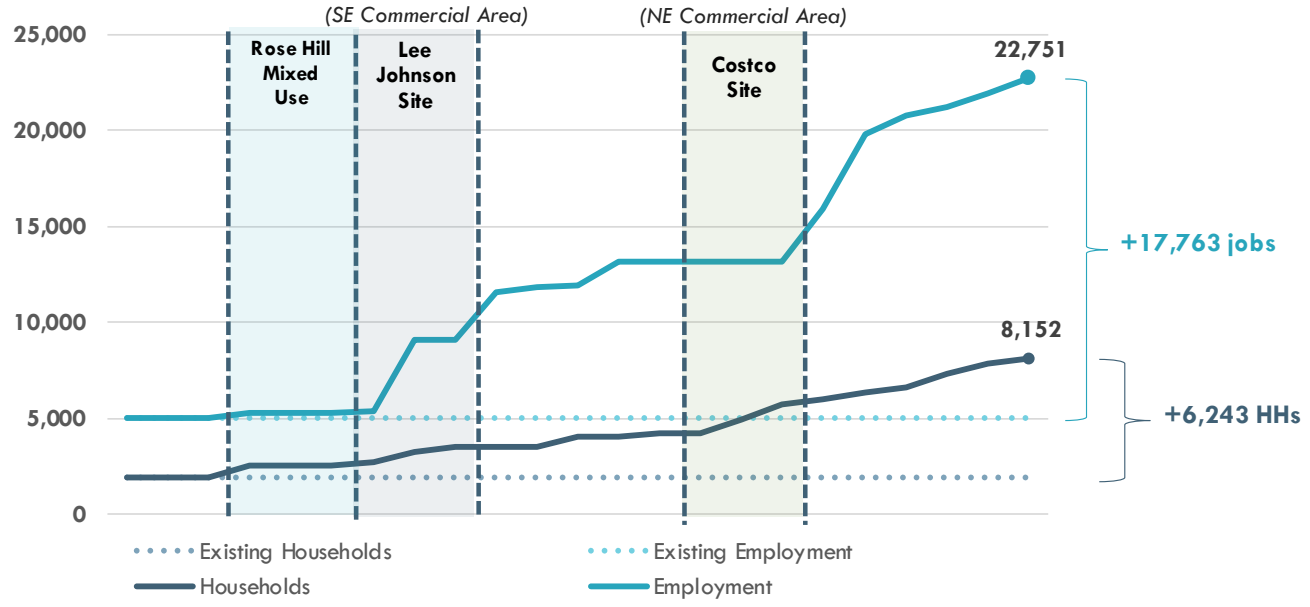
Exhibit 2-4. Employment and Household Totals Assumed in June Alternatives and DSEIS.

	DSEIS No Action	June Alternative A	June Alternative B	DSEIS Alternative 2	DSEIS Alternative 3
Households	2,782	**2,929**	**8,152**	8,509	10,909
Employment	10,859	**12,317**	**22,751**	28,688	34,988

Sources: Mithun, ECONorthwest, BERK, 2021.

Exhibit 2-5 illustrates this growth over time for Alternative B that was utilized for the fiscal analysis. Assumptions about parcel- and quadrant-level development phasing are hypothetical and not meant to presuppose decision-making by private landowners or the actions of the market. A phased development scenario was developed by City and consultant staff as a necessary input for fiscal impact modeling and consideration of potential community benefits. The actual timing of redevelopment projects is likely to differ somewhat from what was modeled.

Exhibit 2-5. Employment and Residential Growth in June Alternative B.



Note: Assumptions about parcel- and quadrant-level development phasing are hypothetical and not meant to presuppose decision-making by private landowners or the actions of the market.

Sources: City of Kirkland, Mithun, ECONorthwest, BERK, 2021.

2.2 Summary of Transportation Analysis of June Alternatives

The City engaged Fehr & Peers to provide supplemental information to support this study, including travel demand modeling and forecasting to better understand implications of the growth in June Alternatives A and B. The **Supplemental Transportation Memo, Appendix 1,** is available for review here. The Bellevue-Kirkland-Redmond (BKR) travel demand model was used as an analytic basis. Prior to the modeling process, MXD+, a trip generation tool that accounts for the variation in land use type and density, provided estimates of new vehicle trips for future Alternatives. The results, shown in Exhibit 2-6, estimated mode share of single occupancy vehicles (SOV), carpool, and transit for each quadrant under each Alternative, which were used to calibrate the BKR model. Additional adjustments were made to the BKR model for adequate distribution of trips, especially for the high intensity commercial area in the southeast quadrant of June Alternative B.

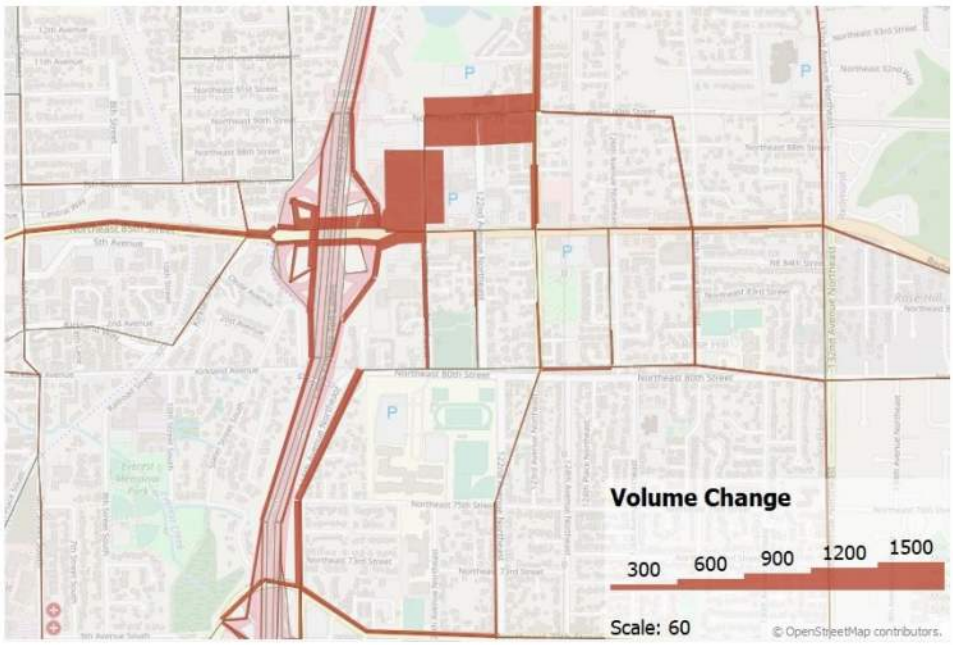
Exhibit 2-6. PM Peak Hour Vehicle Trip Generation using MXD+/BKR Model Mode Share Estimates

Quadrants	2035 DSEIS Alt. 1	2044 June Alt. A	2044 June Alt. B	2044 DSEIS Alt. 2
NW	930	930	1,280	1,000
NE	3,850	4,480	4,920	10,110
SW	1,910	1,850	2,360	2,190
SE	3,630	3,880	7,580	4,300
Total	**10,320**	**11,140**	**16,140**	**17,600**
Mode Share Estimates (SOV/Carpool/Transit)	70%/23%/7%	70%/22%/8%	71%/21%/8%	72%/21%/7%

Source: Fehr & Peers, 2021

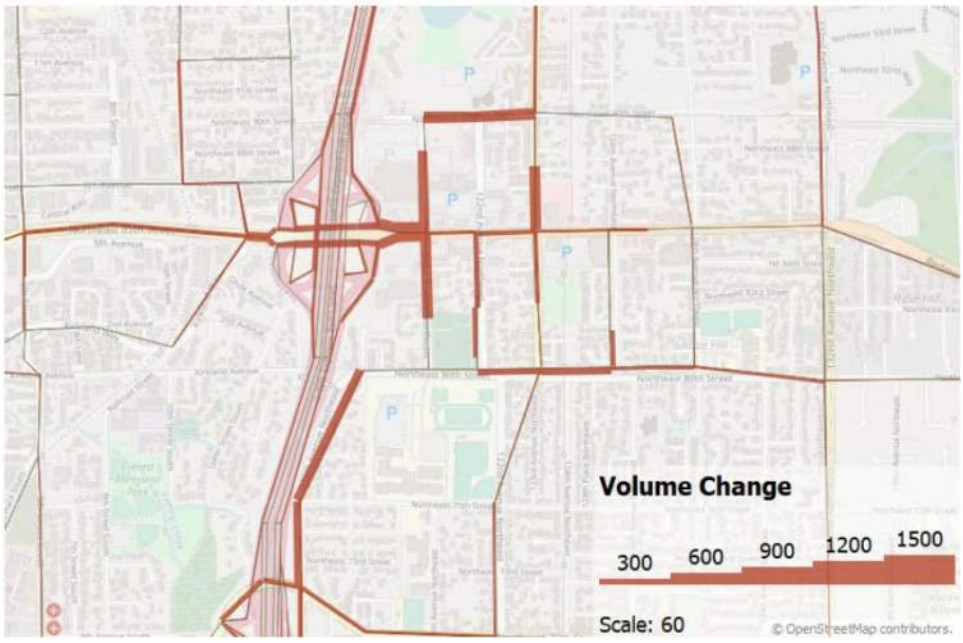
Consistent with land use trends, June Alternative A includes modest growth in vehicle trips in the NE and SE quadrants. The total vehicle trips generated by June Alternative B and DSEIS Alternative 2 are similar; however, there is a substantial shift in which quadrants are likely to receive the most potential land use growth (from NE to SE). Exhibit 2-7 and Exhibit 2-8 show the modeled increase in roadway volumes. June Alternative B features a more even distribution of trips than DSEIS Alternative 2.

Exhibit 2-7. Traffic Volume Increase (2035 No Action vs. 2044 Alternative 2)



Source: Fehr and Peers, 2021.

Exhibit 2-8. Traffic Volume Increase (2035 No Action vs. 2044 Alternative B)



Source: Fehr and Peers, 2021.

Traffic volume forecasts from the refined versions of the BKR model were then used to evaluate traffic operations at eight intersections in the Station Area. Each of the intersections were analyzed for their operational performance under existing (2019) conditions, as well as three future year (2044) Alternatives, both June Alternatives A and B, and DSEIS as well as Alternative 2 were modeled for the

year 2044. Intersection performance is described based on Level of Service (LOS) is a standard measure used to describe traffic operations from the driver's perspective. LOS is defined by intersection delay in seconds and ranges from LOS A with no congestion and little delay to LOS F with substantial congestion and delay. Traffic operations were analyzed using the Synchro 10 software package and Highway Capacity Manual (HCM) 6th Edition methodology.

Findings

The results are summarized in Exhibit 2-9, below. Key findings were used as a basis of understanding implications of the mix, type, and location of growth in June Alternatives A and B.

- All study intersections are currently operating within the City's or WSDOT's standards.
- Under June Alternative A, which represents current growth trends continuing through 2044, the following intersections would fail to meet adopted LOS standards:
  - NE 90th Street & 124th Avenue NE: this intersection would operate at LOS F due to land use growth anticipated in the NE quadrant and the lack of streets connecting north of NE 90th Street.
  - NE 85th Street & 6th Street: this intersection will operate at LOS F under all future year Alternatives due to planned modifications to better accommodate transit, walking, and biking modes.
- Alternative B considered two transportation scenarios for the southeast quadrant, with allowed development at 250 feet maximum height:
  - The first assumes only one general access driveway to the SE Commercial Area site via NE 83rd Street to a signalized intersection with 120th Avenue NE.
  - The second scenario considers the same access as above, plus an additional south access to the site along 118th Avenue NE, which would connect to 80th Street NE with a newly signalized intersection.
  - The reconfiguration of land use growth in June Alternative B would substantially improve intersection operations relative to DSEIS Alternative 2. However, the land use growth envisioned by this Alternative would increase vehicle trips on the roadway network (compared to existing conditions or Alternative A/No Action scenario) such that the following intersections would not meet adopted LOS standards under Alternative B:
    - NE 85th Street & 6th Street: this intersection will operate at LOS under all future year Alternatives due to planned modifications to better accommodate transit, walking, and biking modes. Moreover, additional growth throughout the SAP would result in higher delays than are anticipated for Alternative A.
    - NE 85th Street & 120th Avenue NE: this intersection could not meet City standards without mitigation, as this is the main access point for growth in the SE quadrant.
    - NE 90th Street & 124th Avenue NE: this intersection could not meet City standards without mitigation, as this is the main access point for growth in the NE quadrant.

- NE 83rd Avenue & 120th Avenue NE: under the scenario in which this intersection serves as the only general access to the SE Commercial Area, it will require signalization (as assumed) as well as additional lanes.
- NE 80th Street & 120th Avenue NE: under the scenario in which only one general access is provided to the SE Commercial Area along NE 83rd Avenue, increased traffic through this intersection would result in LOS F delays without mitigation.
- 80th Street & 118th Avenue NE: similarly, under a single access point scenario to the SE Commercial Area, this intersection would also be impacted by additional traffic along 80th Street, although it is unclear whether a signal would be warranted to address the side street delay.

- A sensitivity test was conducted to determine whether the additional land use growth allowed under the 85th Station Area Plan would affect the operations at the redesigned interchange. The operations at the I-405/NE 85th St interchange were evaluated using the microsimulation traffic models developed by WSDOT for their interchange study. Two scenarios were tested, including 2044 June Alternative B and June Alternative B with transportation demand management (TDM) implementation, which resulted in 500 less peak hour trips in the network. As shown in Exhibit 2-10, the Station Area Plan will result in slightly higher delays and queuing along NE 85th St in the future than estimated by WSDOT in their interchange analysis. However, the increases do not significantly affect the operations of the interchange or the freeway mainline.
- Representative project investments to mitigate Level of Service impacts are identified in the next section of this report.

Exhibit 2-9. LOS Results for Evaluated Alternatives (without mitigation)

ID	Intersection	LOS Standard	Peak Hour	2019 Existing	2044 June Alt. B	2044 June Alt. B 1: 2 Driveways	2044 June Alt. B 2: 1 Driveway	2044 DSEIS Alt. 2
1	NE 90th Street & 124th Avenue NE	D	PM	C / 21	**F / 83**	**F / 158**	**F / 158**	**F / 380**
2	NE 85th Street & 6th Street	E	PM	D / 41	**F/109^**	**F / 145^**	**F / 145^**	**F / 138^**
3	NE 85th Street & 120th Avenue NE	D	AM PM	C / 22 C / 21	C / 24 D / 39	**F/ 114** **F/ 113**	**F/ 114** **F/ 113**	**F / 572** **F / 616**
4	NE 85th Street & 124th Avenue NE	D	AM PM	C / 29 D / 35	C / 33 D / 41	D / 39 D / 45	D / 39 D / 45	D / 35 **E / 59**
5	NE 83rd Street & 120th Avenue NE	D	PM	B / 11	B / 13	B / 18*	B / 20**	A / 8*
6	NE 80th Street & 118th Avenue NE	D	PM	B / 15	C / 20	A / 8**	**F / 94**	A / 6**
7	NE 80th Street & 120th Avenue NE	E	PM	B / 11	B / 14	B / 13	**F / 222**	B / 20
8	NE 70th Street & 116th Avenue NE	E	PM	C / 28	D / 35	E / 75	E / 75	E / 67

Source: Fehr & Peers.
Notes:
^ Intersection reconfiguration with transit queue jump and dedicated WBR turn pocket
* Signalized without any geometric improvements
**Signalized with EBL, SBR turn pockets

Exhibit 2-10. LOS and Average Control Delay

Intersection	Control	2045 WSDOT	2044 June Alt. B	2044 June Alt. B w/ TDM
6th St / NE 85th St	Signal	E / 68 sec	F / 128 sec	D / 52 sec
Kirkland Way / NE 85th St	Roundabout	C / 18 sec	F / 75 sec	E / 37 sec
120th Ave NE / NE 85th St	Signal	D / 39 sec	D / 54 sec	D / 52 sec
122nd Ave NE / NE 85th St	Signal	C / 28 sec	C / 33 sec	C / 27 sec
124th Ave NE / NE 85th St	Signal	F / 93 sec	F / 94 sec	E / 63 sec

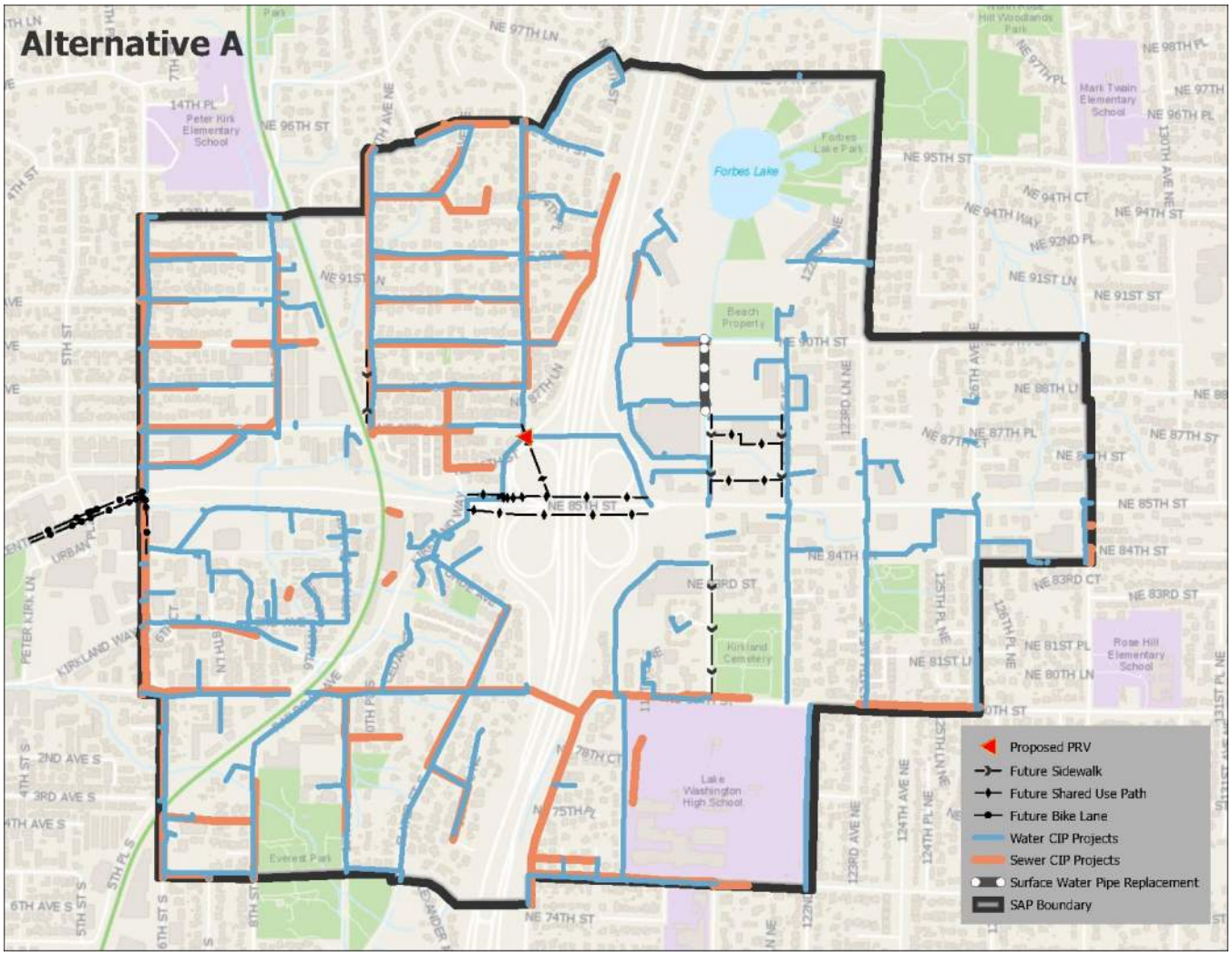
Source: Fehr and Peers, 2021.

3.0 Infrastructure Investment Methodology

Planning level studies were conducted to determine a set of representative infrastructure investments needed to maintain service levels in transportation, water and sewer, and stormwater given the employment and household growth assumed for June Alternatives A and B. These studies were produced for development of conceptual cost estimates for fiscal modeling of the Station Area and are not intended to show a preferred plan or final project configurations, which will be developed in later stages of planning and are subject to City Council approval.

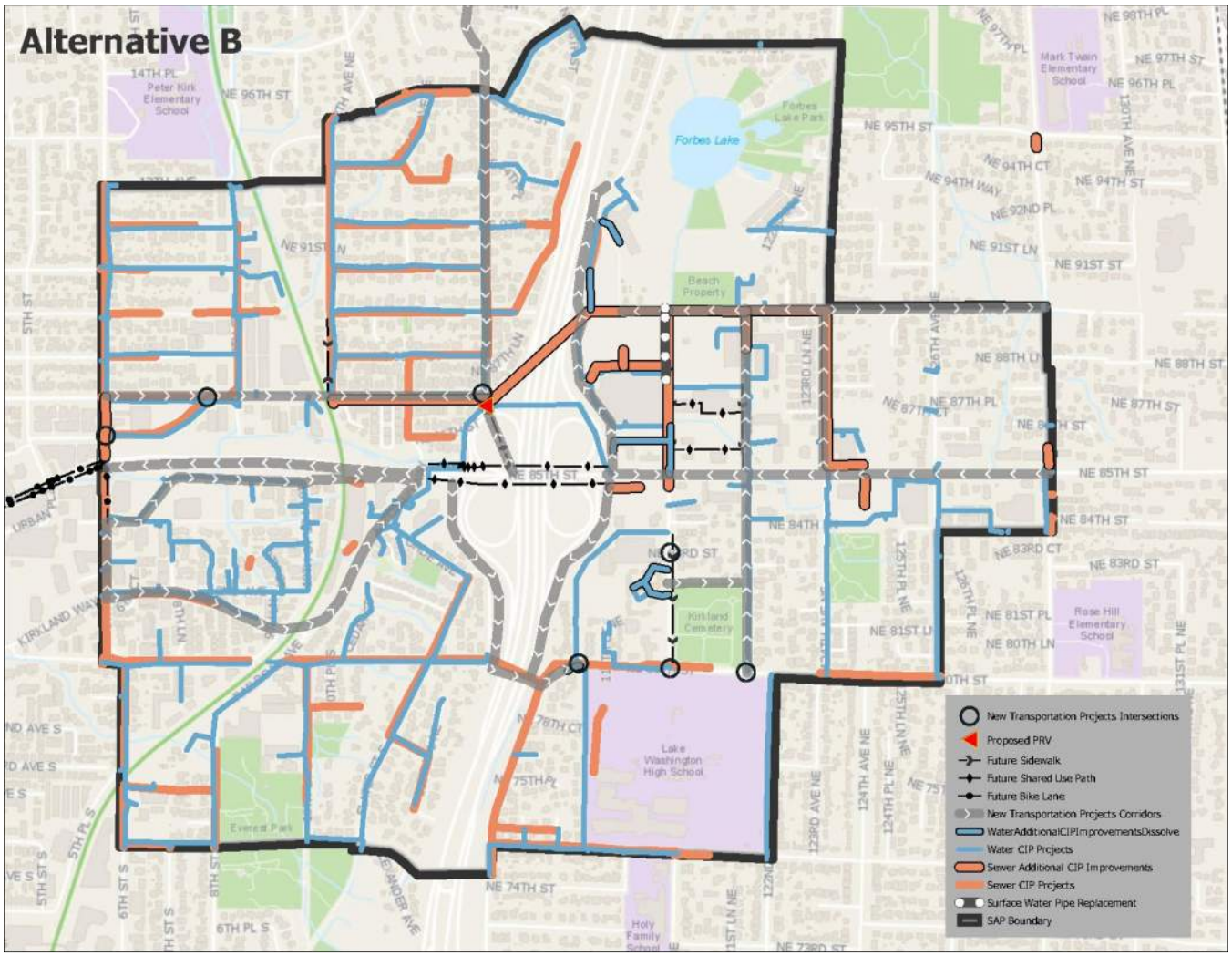
A map of representative infrastructure projects for June Alternative A is shown in Exhibit 3-1 and Exhibit 3-2 shows June Alternative B.

Exhibit 3-1. June Alternative A – Representative Infrastructure Investments



Source: City of Kirkland, 2021.

Exhibit 3-2. June Alternative B – Representative Infrastructure Investments



Source: City of Kirkland, 2021.

3.1 Transportation

In addition to the supplemental transportation analysis for the June Alternatives described in Section 2.2 of this report, the City engaged Fehr & Peers to identify a potential package of representative investment strategies to support full implementation of June Alternatives A and B. The **Supplemental Transportation Memo, Appendix 1**, is available for review here. This section outlines these improvements identified for the purposes of modeling the fiscal impacts associated with each June Alternative. The project team was charged with identifying necessary infrastructure and supportive policies to achieve the following transportation objectives:

- Preserve the functionality of NE 85th Street, while enhancing and expanding its role as an urban, multimodal street.
- Incorporate transportation improvements that preserve community character, including minimizing significant changes such as road widening in areas outside of those intended for proposed growth.
- Accommodate transit effectively along NE 85th Street and other streets in the Study Area.
- Establish a low-stress priority bike and pedestrian network that serves the full Study Area.

The comfort of facilities for people walking and biking is measured quantitatively using a metric called "level of traffic stress." This metric describes conditions on a scale of 1-4, with level 1 representing conditions that are comfortable for people of all ages and all abilities and level 4 representing conditions that are stressful for almost everyone, see Exhibit 3-3.

Exhibit 3-3. Level of Traffic Stress Concept

Under City staff direction, the Fehr & Peers team used travel modeling and traffic operations analysis, described in Section 2.2 Summary of Transportation Analysis of June Alternatives, to determine representative improvements including:

- Roadway geometric and operational changes.
- Implementation of a robust transportation demand management strategy.
- Transit access and speed and reliability considerations.
- System improvements to improve conditions for walking and biking.

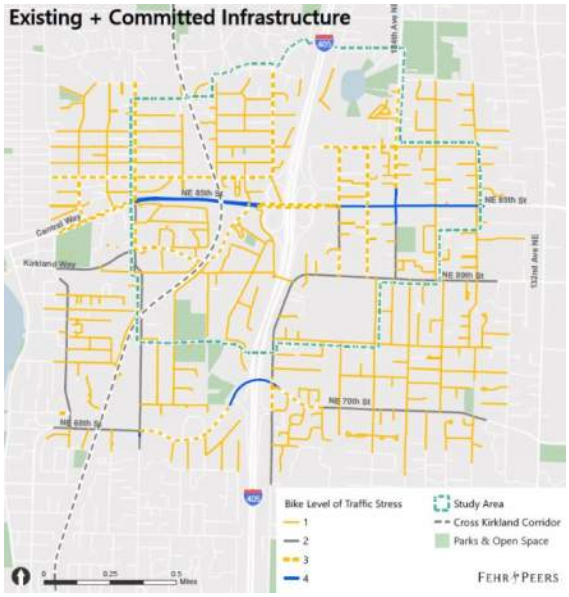
Findings

- The City needs to make significant transportation improvements in either Alternative. In Alternative B, the largest City-funded representative improvements are:
  - Kirkland Way Complete Streets (an improvement which requires rebuilding of the Cross Kirkland Corridor bridge and is also assumed under Alternative A).
  - 124th Ave NE Roadway Widening to 5 Lanes, NE 85th St. to NE 90th St. (an improvement also assumed under Alternative A).
  - 90th St Complete Streets Improvements (two projects, both projects are also assumed under Alternative A).
  - NE 85th St. Shared Use Trail Improvements, 5th St. to Kirkland Way (an improvement that only takes place in Alternative B).
- This effort identifies a suite of transportation demand management (TDM) strategies that could be implemented by the City or required of developers over time within the SAP. Implementation of these strategies would not only help reduce driving, which in turn lessens traffic congestion and greenhouse gas impacts, but fundamentally align with the City's values and vision for the Station Area. TDM strategies identified include measures related to parking management, transit subsidies, and commute trip reduction programs, like Kirkland's Green Trips. Collectively, recommended strategies are estimated to reduce driving by 9% to 38%, with 13% serving as an estimate based on typical planning applications. It is recommended that these strategies be implemented as part of **Alternative B**. Implementation of TDM strategies would require investments by the City in several forms, including:
  - City staff time to develop code revisions and manage compliance, for example requiring developers to provide a transit subsidy to tenants.
  - Creation of new staff positions to implement and operate new programs, for example on street parking policing and management and off-street parking program implementation.
  - Capital investments, for example micro mobility charging stations.

These costs, both for initial start-up and ongoing program management, should be considered within the financial evaluation of the plan.

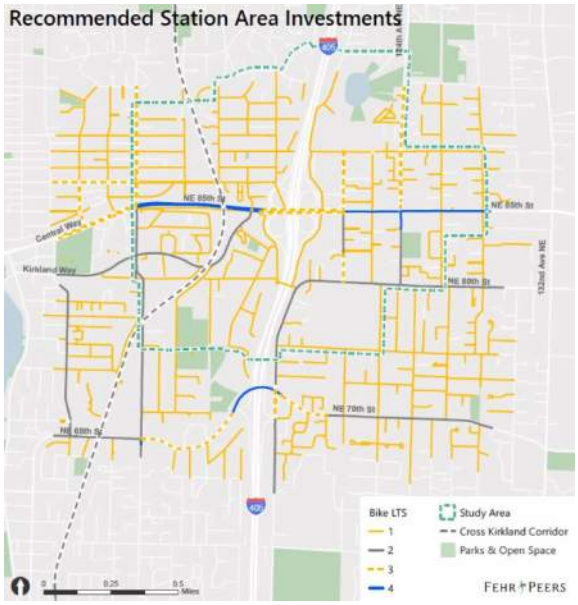
- Analysis of the comfort of facilities for people walking and biking in the Study Area with existing and committed transportation investments and how that could change with recommended investments for the SAP is illustrated below in Exhibit 3-4 and Exhibit 3-5.
- Analysis of how far people can comfortably walk or bike within 5, 10, and 15-minutes of the proposed station with existing and committed transportation investments and how that could change with recommended investments for the SAP is illustrated below in Exhibit 3-6 and Exhibit 3-7.

Exhibit 3-4. Alt A Bike Level of Stress Network



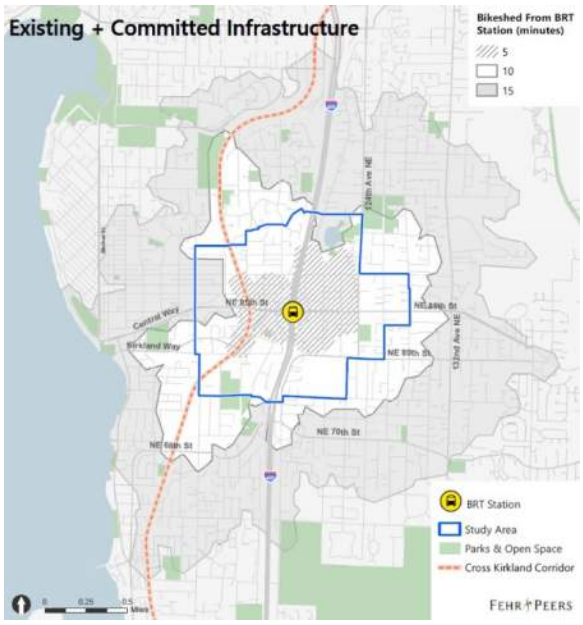
Source: Fehr and Peers, 2021.

Exhibit 3-5. Alt B Bike Level of Stress Network



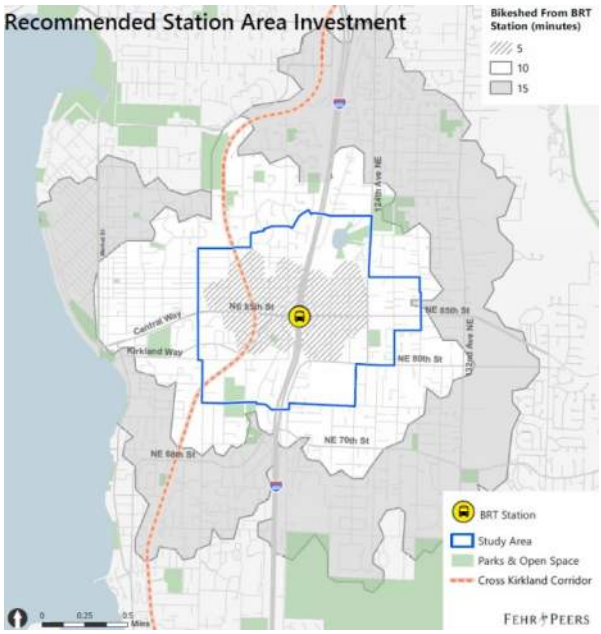
Source: Fehr and Peers, 2021.

Exhibit 3-6. Alt A Potential Bikeshed from BRT Station



Source: Fehr and Peers, 2021.

Exhibit 3-7. Alt B Potential Bikeshed from BRT Station



Source: Fehr and Peers, 2021.

Fehr and Peers considered three primary elements to understand potential change to transit conditions under the different land use alternatives: passenger loads, speed and reliability, and access-to-transit. Analysis of the future year action Alternatives, including DSEIS Alternative 2 as a point of comparison, on the transit passenger loads in the Study Area utilized the 2042 Sound Transit (ST) Model and bus crowding threshold guidance from King County (KC) Metro. A higher transit load factor indicates more crowded conditions. It should be noted that KC Metro's bus crowding thresholds do not guarantee a seat for every rider on the bus. The thresholds account for an acceptable number of both seated and standing riders. Generally, passenger load factors should not exceed 1.25 for routes that run less than every 10 minutes, and should not exceed 1.5 for routes that run every 10 minutes or better.

Exhibit 3-8 indicates that all the reviewed action Alternatives further impact the I-405 BRT due to the new PM peak hour transit trips: transit ridership growth for these Alternatives exceeds 15%. To address the projected overcrowding of buses along the impacted routes, some riders may slightly shift their commute time to avoid the peak period or access their destination via different routes. Transit agencies also regularly monitor the passenger load factor and adjust scheduling to best accommodate ridership demand. An expanded safe bicycle network to additional areas within the city and region would also help alleviate transit overcrowding by providing alternatives to riding transit. While transit lane options including recommendations in the KTIP were reviewed, they were removed for further consideration because the transit lanes would provide limited speed and reliability benefits for the substantial cost while potentially constraining pedestrian access and limiting bus station location options.

Exhibit 3-8. Impacted Transit Ridership

Action Alternative	New PM Peak Hour Transit Trips in Station Area	Routes With Passenger Load Factors Above the Threshold	New PM Peak Hour Riders per Route	Passenger Load Factor^	Transit Ridership Growth
Alternative A	372	I-405 BRT North	11	1.16	15%
Alternative B	603	I-405 BRT North	18	1.25	24%
Alternative 2	669	Route 250	38	1.06	285%
		I-405 BRT North	20	1.28	26%

Source: Fehr & Peers, 2021
Notes:
^ Passenger load factor is a ratio of anticipated ridership compared to KC Metro's crowding threshold.

Transportation costs and resources are addressed further in:

- Section 4.5.1 Capital Revenues.
- Section 4.5.2 Capital Costs.
- Section 4.5.3 Capital Net Fiscal Impact (page 4-25): A comparison of City-funded transportation infrastructure costs and revenues.

3.2 Water and Sewer

The City contracted with RH2 to determine water and sewer system improvements required above and beyond the City's existing Capital Improvement Programs (CIPs) to support the SAP development (June Alternative B). The **Supplemental Water and Sewer Memo, Appendix 2,** is available for review here.

The RH2 team worked under City staff direction to determine representative water and sewer system improvements needed to support the following scenarios for development in the Station Area.

- Growth based on 2035 Comp Plan including the Rose Hill Mixed Use sites, which City staff has indicated is comparable to June Alternative A.
- June Alternative B.

All identified improvements were classified and phased based on the following.

- Those required to be constructed in conjunction with the Bus Rapid Transit (BRT) station.
- Those required to be constructed to support each of the service areas analyzed as part of the Fiscal Impacts analysis (SE Commercial Area, NE Commercial Area, and NE, NW, SE, SW quadrants).

Findings

Under either scenario outlined above, additional water and sewer system improvements will be needed to meet expected growth in the Station Area beyond implementation of the City's existing CIPs as shown in the 2015 Water System Plan (WSP) and 2018 General Sewer Plan (GSP). This analysis was designed to update the existing CIPs in the 2015 WSP/2018 GSP based on updated expected growth projections, such as development of the Rose Hill Mixed Use sites, in the Station Area (i.e., June Alternative A). It is important to note that the City's CIP looks at project funding for a six-year window and that future projects are shown as unfunded until they are prioritized in the CIP window.

Additional improvements will be needed in June Alternative B, above and beyond those needed in June Alternative A, to meet projected growth given proposed zoning changes in the Station Area. Additional water and sewer system improvements are identified in these analyses as a representative list of projects that could serve the level of buildout described in June Alternative B:

- The water system would not be able to meet the rezoned fire flow requirements without additional improvements.
- The sewer system would not be able to meet the additional flows from the Station Area without additional improvements.

Notable water and sewer improvements needed include a water main under I-405 as required by WSDOT due to construction of the BRT station (needed in either June Alternative A or June Alternative B) as well as a sewer capacity project that crosses under I-405 to connect the King County transmission line under Cross Kirkland Corridor (needed in June Alternative B).

Water and sewer costs and resources are addressed further in:

- Section 4.5.1 Capital Revenues.
- Section 4.5.2 Capital Costs.
- Section 4.5.3 Capital Net Fiscal Impact (page 4-25 for water and page 4-27 for sewer): A comparison of City-funded water/sewer infrastructure costs and revenues.

3.3 Stormwater

The City engaged Robin Kirschbaum, Incorporated (RKI) to evaluate stormwater infrastructure needs associated with the SAP. The **Supplemental Stormwater Memo, Appendix 3,** is available for review here. A high-level analysis was performed to determine potential flooding and conveyance capacity impacts to the stormwater main line along 120th Ave NE with various redevelopment scenarios. The study was limited to potential parcel-based improvements and did not address rights-of-way. It was determined that conditions in the June Alternatives would not have substantial impacts to the conveyance systems in basins in the western quadrants and eastern edge including portions of the northeast quadrant of the Station Area. Therefore, it did not analyze these areas. The three scenarios analyzed included:

1. A baseline condition with existing land cover.
2. A full 23-year build out condition which evaluated development in line with current zoning standards. City staff has indicated this scenario is comparable to June Alternative A.
3. A full 23-year built out June Alternative B condition which evaluated development in line with the Station Area Plan vision. This standard would allow an increase in lot coverage on certain parcels, therefore increasing impervious surface.

After determining the potential flooding locations for each developed scenario, stormwater mitigation options were evaluated to determine their effectiveness at reducing runoff along the stormwater main line. Mitigation options that were applied included stormwater conveyance system improvements (larger pipe diameters, or change in pipe material), and incorporation of detention facilities (vaults). In addition, "blue/green" streets (a combination of rain gardens and vault-type structures) were modeled as an additional conveyance mitigation option for parcel-improvement conditions under June Alternative B levels of growth.

Findings

1. **For either Alternative, development of the Study Area and any associated increases in impervious surface area will not have any negative downstream impacts.** This is due to current stormwater mitigation requirements that will require these parcels to install large detention systems (such as tanks and vaults) to reduce the flow off their development and help existing flooding issues, mitigating to forested conditions.
2. **Under either Alternative, the only recommended stormwater project within the Study Area consists of replacing 520 feet of pipe along 120th Ave NE with a smoother pipe material.** This will increase capacity through the stormwater main line, helping in all scenarios.
3. **Evaluation of Green/Blue Street stormwater infrastructure modeled within the Study Area showed it was not effective as an additive mitigation strategy for the capacity of the stormwater system in either Alternative, and was not recommended as modeled in the representative stormwater investment list.** This is because much of the potential flooding within parcels is resolved with the on-site stormwater mitigation from redevelopment. These strategies were not evaluated for their potential relative to mitigating right-of-way stormwater or existing flooding conditions or for park or open space community benefit, given the high cost of construction and maintenance of the improvements as modeled. Other types of green streets or stormwater expression, that were not included in the study and may have lower maintenance costs, could continue to be considered as urban design features with water quality treatment benefits.

4. **Although not directly related to the Station Area vision, the analysis showed that outside of the Study Area, an increase in runoff from the upstream residential areas causing potential flooding.** The growth associated with June Alternatives A and B did not have any impact on or contribution to this potential upstream residential area flooding. Residential parcels are smaller in size and tend to be under the mitigation requirement and therefore are exempt from the requirement to construct large stormwater facilities. This issue will need to be addressed in context of future development outside the Station Area.
5. **Recommended next steps** include considering re-evaluation of the conveyance standards to acknowledge climate change projections that indicate an 18-22% higher storm intensity in the 2030's to provide for more resilient design and developing a groundwater management policy to preserve system capacity.

Overall, this analysis shows that development and any associated land use code changes under each Alternative within the Study Area will not negatively impact existing stormwater conveyance through the stormwater main line on 120th Ave NE between NE 85th St and NE 90th St. Redevelopment in this area should reduce stormwater runoff with the implementation of required onsite stormwater control facilities.

Stormwater infrastructure costs and resources are addressed further in:

- Section 4.5.1 Capital Revenues.
- Section 4.5.2 Capital Costs.
- Section 4.5.3 Capital Net Fiscal Impact (page 4-28): A comparison of City-funded stormwater infrastructure costs and revenues.

4.0 Fiscal Impacts Analysis

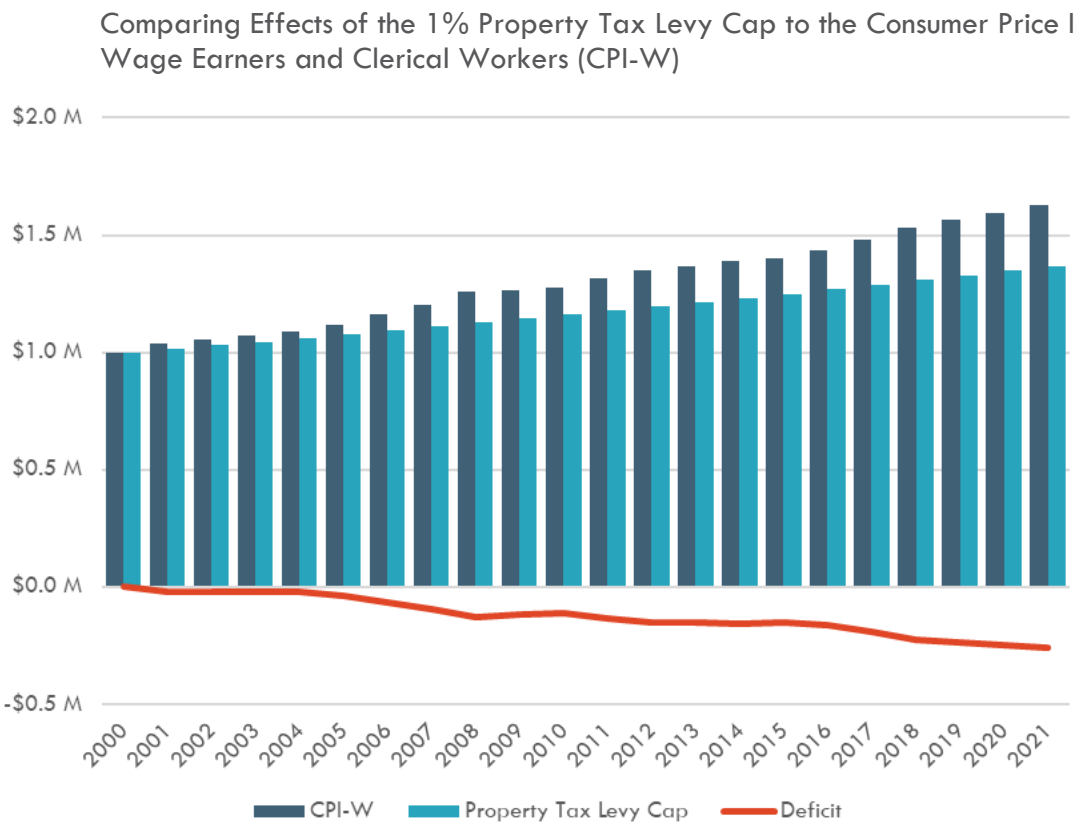
4.1 Fiscal Analysis: Purpose and Context

The fiscal analysis is designed to answer a key question: *With population growth and redevelopment in the Station Area Plan, comparing June Alternatives A and B, can the City afford the investments necessary to address increased demand on public services, especially schools, parks/open spaces, transportation, and utilities, and avoid a reduction in service for existing residents and businesses?*

Fiscal Context

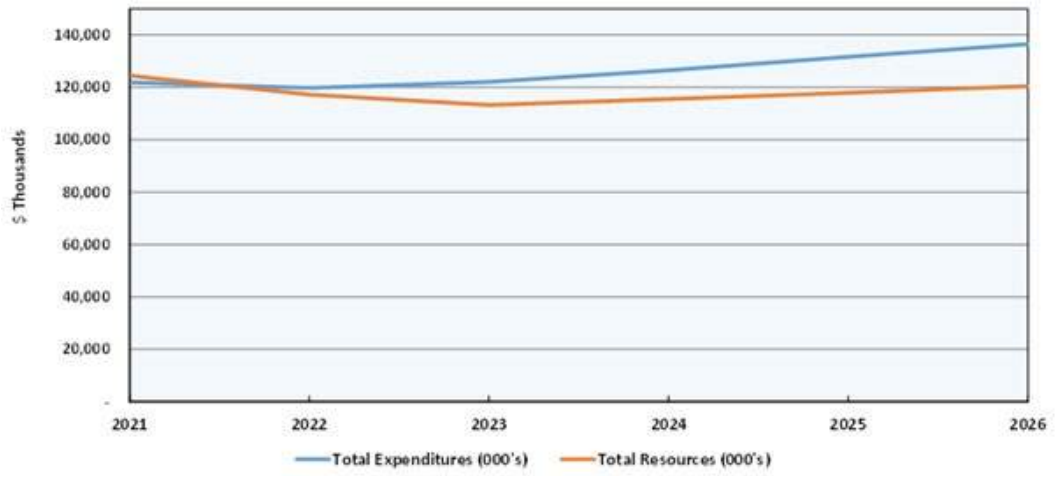
- **The Washington tax code, specifically a cap on property tax increases, creates a structural gap between operating costs and revenues in the absence of growth.** This is illustrated for a prototypical Washington city in Exhibit 4-1. This structural imbalance exists for Kirkland, as shown in Exhibit 4-2, and the Council takes specific actions each biennium to balance the budget and fund service levels. Growth-related revenues are significant, particularly for Alternative B, but, given the structural challenges noted here, it is expected that operational fiscal sustainability challenges will resurface over time as inflation outpaces capped property tax revenues.
- **The Station Area Plan is not an opportunity to catch up on existing service deficits.** Like most cities, Kirkland aspires to higher levels of service than it is often able to attain, and certain City services are currently below desired levels. Similarly, the City would like to invest in capital facilities, such as a pool or recreation center, to serve the population. As noted in the key question above, the Station Area Plan does not represent an opportunity to bridge current deficits. The focus of this fiscal analysis is on determining whether *existing* levels of service can be sustained.
- **Planning level studies were conducted to determine a set of representative infrastructure investments needed to maintain service levels in transportation, water and sewer, and stormwater with the June Alternatives A and B.** These studies were produced for development of conceptual cost estimates for fiscal modeling of the Station Area and are not intended to show a preferred plan or final project configurations, which will be developed in later stages of planning and are subject to City Council approval.

Exhibit 4-1. Fiscal Projections for a Prototypical Washington City



Source: BERK, 2021.

Exhibit 4-2. Kirkland General Fund Forecast, 2021-2026



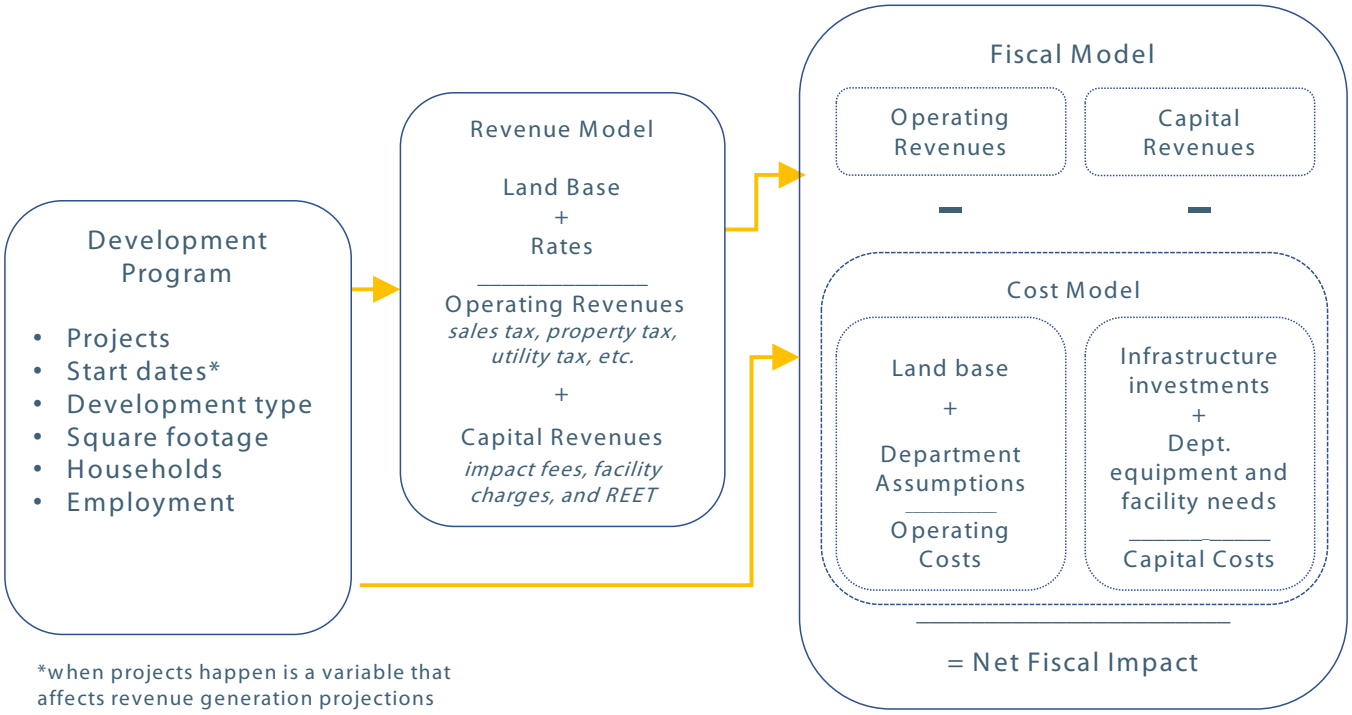
Note: Reflects 2021-2022 Revised Budget

Source: City of Kirkland, 2021.

4.1.1 Fiscal Model Structure and Use

Exhibit 4-3 illustrates the functioning of the revenue and cost models used to analyze the net fiscal impacts to the City of June Alternatives A and B. ECONorthwest developed a revenue model to project associated operating and capital revenues for the City, as well as revenues for key City partners. BERK led development of the cost model and calculation of net fiscal impact by comparing City revenues to expenses. BERK relied on the infrastructure investment analysis discussed in Section 3.0 for costs associated with transportation, water, sewer, and stormwater infrastructure.

Exhibit 4-3. Fiscal Model Structure



Source: BERK, 2021.

Development Assumptions

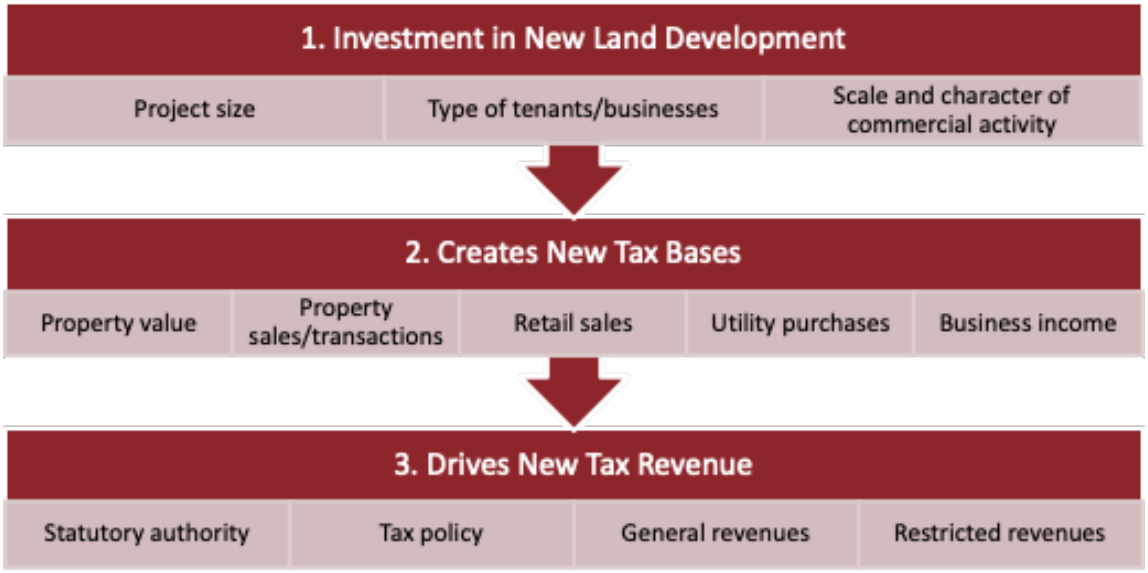
The development assumptions that drive revenue and cost projections are consistent with June Alternatives A and B established for further evaluation in June 2021. They use the same control totals and spatial allocation of growth to the Traffic Analysis Zone (TAZ) level as other analyses. From there, development was assigned to parcels using development prototypes that reflect realistic building forms and densities consistent with each Alternative's future land use assumptions. Parcel-level development assumptions were aggregated into "Projects" – clusters of adjacent parcels (all within the same TAZ and same physical block) with the same development assumptions. Development was spread through the planning period based on timing for known development projects and generalized market conditions for residential, office, and flex/industrial development.

4.2 Revenue Analysis Methodology

4.2.1 General Assumptions

Washington State tax policy has conditions that allow governments that grow their tax bases to collect additional revenues. This relationship creates a mutually reinforcing benefit of housing and commercial development with additional tax revenues. As shown in Exhibit 4-4, new land development represents a direct financial investment in land preparation and building structures. Those structures are then occupied by residential and business uses that increase the lands' productive economic capacity. That economic value generates taxable bases at the land, business operation, and transaction level, represented in land value, retail sales, business income, etc. State tax policy allows government jurisdictions to tax these bases to fund needed public services and infrastructure.

Exhibit 4-4. Land Development and Tax Revenue Generation



Source: ECONorthwest, 2021.

The application of tax policy on these tax bases determines the amount of local tax revenue generated by the land development and the businesses and residential uses that occupy the developed land.

The tax impact analyses focus on the core tax revenues that support the delivery of general City services as well as a select number of capital restricted revenues used to fund infrastructure. The analysis above assesses the tax revenue of the proposed Alternative development in Kirkland based on assumptions about the timing, scale, and quality of construction. This analysis looks at an approximate baseline for the revenue impact of redevelopment acknowledging the uncertainty inherent in the broader economy and development. The three main determinants of fiscal impact are explained below.

- **Scale and Mix of Development.** The fiscal impact is likely to change as developers contemplate differing types and amounts of land development. Effectively, changes to these assumptions impact how much economic activity will take place in the area.
- **Quality of Development.** Baseline assumptions around development quality are drawn from reliable data calibrated to the Kirkland marketplace.

- **Timing of Development.** The timing of construction, absorption, and occupancy of development can either accelerate or delay the onset of tax revenues. Delay reduces the tax revenues from construction and operations in the area by pushing out the impacts into the future, resulting in decreasing years of benefits.

Conceptually, tax revenues are differentiated into three categories:

- **One-time Revenues.** These General Fund revenues are tied to the construction of housing and commercial products. Specifically, they include the retail sales tax on construction (materials and labor). They also include the one-time nature of permit and permit review fees (these revenues are assumed to support the cost of permitting activities and are not available for other purposes).
- **Recurring Revenues.** These General Fund revenues are derived from the occupancy of residential and commercial structures by residents, businesses, and employees. Specific revenues include the property tax, retail sales tax, and utility taxes.
- **Non-General Fund Capital Restricted Revenues.** These revenues are statutorily restricted to fund capital expenses. Specific revenues include the real estate excise tax, impact fees, and capital facility charges.

Baseline Comparisons

The revenue analysis seeks to identify the incremental "new" revenue within the study area for each alternative. The analysis must then create an estimate for how much tax and fee revenue in generated within the study area today and how those revenues may grow in the future assuming no changes in land development. With this "baseline" understanding, it is possible to analyze the impact of the growth in the alternatives by doing two things as a project site is redeveloped: 1) the existing stream of tax revenues will cease to accrue to the city, and 2) a new stream of revenues will begin accruing to the city tied to the new construction and occupation of the building.

4.2.2 Operating Revenues

The following description of tax revenues is included for reference of the estimated taxes. Tax revenues are calculated based on the changes in the components of the City's tax base resulting from redevelopment in the Study Area. Elements of growth that influence revenues include the timing, scale, and quality of development understood as part of the Alternative specification.

The following operating revenues are estimated as part of the analyses:

- **Property Tax.** The property tax impact is only the degree that new construction assessed value raises the add-on value to the City levy capacity above the 1% limit. Redevelopment of the site would be taxed at the City's regular levy rate. Only the regular levy is considered in this analysis (i.e., not including the 2020 Fire & EMS Levy Lid Lift)). The 2021 expense levy is $0.9937 per $1,000 of taxable assessed value. The analysis lets the levy rate grow and recede with growth in new construction, assessed value, and levy collections. This tax is modeled by estimating the amount of new construction and assessed value is within both the study area and city in order to estimate the property tax rate in any given year. With this information it is possible to estimate how much new assessed valuation and property taxes are generated within the study area under a given alternative.

- **Sales Tax.** Of the 10.2% sales tax currently collected in the City on general retail purchases, a 1% "local" share of the tax accrues to local jurisdictions. The City receives 85% of the 1% local tax and King County gets 15%. This tax is levied on businesses in the area, and also on construction activity and some transactions related to housing and business, such as certain online purchases and the delivery of personal and commercial goods. The current rate accruing to the City is 0.85%. The sales tax relies on estimates of new construction value and consumer taxable retail sales spending.
  - The City also levies a 0.1% Public Safety sales tax. The revenue must be shared with the County for this tax (the City receives 85% of this increment as well with the County receiving 15%).
  - The City also receives a population pro rata share of 90% of the city allocation of King County's 0.1% criminal justice sales tax. Increase in the criminal justice tax is modeled on net increases in population due to development.
  - In the 2019 legislative session, the state approved a local revenue sharing program for local governments by providing a 0.0146% local sales and use tax credited against the state sales tax for housing investments. The city's rate is 0.0073% due to the county also using this tax. This tax is not estimated at this time.
- **Business License Tax.** The City collects an annual business license tax. The fee is a base rate plus a "per employee fee." Kirkland does not impose a Business and Occupation (B&O) tax on gross receipts. The license tax is calculated by estimating the amount of employment by industry sector within occupied buildings and applying the appropriate tax rate.
- **Utility Taxes.** The City imposes utility taxes on gross purchases of electricity, water, wastewater, solid waste, telephones, cable, and natural gas. Current tax rates are used for this analysis. A generalized utility expenditure productivity factor (on a per person and employee basis) was used to generate estimates of utility purchases.
  - Water: 13.38%
  - Wastewater: 10.5%
  - Electric: 6%
  - Natural Gas: 6%
  - Solid Waste: 10.5%
  - Cable/Internet: 6%
  - Telephone/Mobile: 6%
  - Stormwater: 7.5%
- **State Shared Revenues.** The City receives several State-shared revenues. The principal sources treated in the analysis are the Motor Vehicle Fuel Tax, Liquor Excise Tax, and Liquor Board Profits. These revenues are primarily disbursed on a formula weighted toward population. Increase in the criminal justice tax is modeled on net increases in population due to development.

4.2.3 Capital Revenues

The following capital revenues are estimated as part of the analyses:

- **Real Estate Excise Tax (REET).** REET revenues are placed in the capital restricted funds and are used by the City to finance capital projects. This analysis assumes that all market-rate developments would be sold upon completion with some share of structures entering the resale market in subsequent years. The rate of valuation turnover is assumed to be 9.61%, the rate or turnover ranges from about 7% in years when price growth is low and up to 11% in years when price growth is high). The City currently uses both 0.25% REET rates (REET 1 and REET 2 total to a rate of 0.5%).
- **Impact Fees.** The City levies transportation, parks, and fire impact fees calculated on units of development and square footage of development (depending on the type of impact fee). The City also collects a school impact fee on behalf of the Lake Washington School District. Impact fees are estimated by applying the appropriate rate on the type of development specified in the respective alternative. Impact Fees were assumed to grow at a rate of 2.90%, derived from a 10-year average of the Engineering News-Record's Construction Cost Index and consistent with the inflation rate used for the cost of City infrastructure projects upon which these revenues are based. The inclusion of future capital improvements to the Capital Facilities Plan could lead to additional fee increases.
- **Capital Facility Charges.** The City also collects a capital facility charge for its water utility, sewer utility, and stormwater utility. Facility charges are estimated by applying the appropriate rate on the type of development specified in the respective alternative. Like Impact Fees, Capital Facility Charges were assumed to grow at the 10-year average of the Engineering News-Record's Construction Cost Index and consistent with the inflation rate used for the cost of utility infrastructure projects upon which these revenues are based.

4.3 Cost Analysis Methodology

4.3.1 Operating Costs

Operating cost projections were developed in collaboration with City staff and are based on estimated operational impacts to each of the City's departments. City departments are bucketed into the following five departmental categories: Fire, Police, Parks and Community Services, Public Works, and Internal Services. Internal Services includes the City's Finance and Administration, Human Resources, Information Technology, City Manager's Office, City Attorney's Office, and Municipal Court departmental functions.

As a note, growth in the Study Area is also assumed to impact Planning and Building operations; however, this analysis assumes that operating activities funded by permit-related revenues (i.e., Planning and Building) as well as by utility operating revenues (i.e., certain functions of Public Works) are covered by those respective revenue sources based on increased demand for services. As such, the methodology covered below focuses on operating costs funded by general operating revenue sources (e.g., property taxes, sales taxes, utility taxes, etc.), which are defined as "general operating costs."

General operating costs for each departmental category are broken out into labor costs, such as salaries and benefits, and non-labor costs, such as supplies, IT operating charges, fleet operating charges (excepting Fire and Police whose fleet needs are projected separately), facility operating charges, etc.

Inflation assumptions are based on City staff input and consistent with the City's long-term growth assumptions for budgeting and financial forecasting where possible. Salaries are assumed to grow at 2.26% annually while benefits are assumed to grow at 6.10% annually, consistent with the City's assumptions around labor cost budgeting. Non-labor costs are assumed to grow in line with the average annual growth rate (2.14%) of the Seattle-Tacoma-Bellevue Consumer Price Index: All Urban Wage Earners and Clerical Workers.

In the following sections, general operating cost assumptions and methodology are outlined for each of the five departmental categories.

Fire

Drivers

Operating cost projections for Fire are based on the projections of additional annual fire incidents from growth in the study area. The projection methodology for new annual incidents is driven by applying estimated increases in square footage of various land uses in the study area, such as commercial, office & industrial, or estimated increases in single-family or multifamily dwelling units in the study area to incident generation rates derived from the City's 2020 Fire Impact Fee Update.[1]

Labor and Non-Labor Needs and Costs

Fire labor needs are based on assumptions developed by Fire Department staff given the projected number of annual incidents under each Alternative. Under Alternative B, Fire staff projected a need for five additional firefighters and one additional fire inspector based on the volume of annual projected incidents and annual major developments (multifamily, mixed use, or other non-residential buildings) added in the area. Fire staff estimated that firefighter staffing would need to be added to Station 26 when the volume of annual incidents in the Study Area increased above 500 per year. Additionally, it was estimated that an additional fire inspector would need to be added when 5 new major development buildings would complete construction. Labor and non-labor costs are based on 2021 budgeted firefighter and fire inspector salaries/benefits and average 2015-2021 Fire non-labor costs in 2021$ per Fire staff FTE, respectively. Additional one-time non-labor costs for training and equipment are based on estimates from City staff.

Under Alternative A, Fire staff estimated that the Department's current and projected future staffing capacity would be able to handle the additional generated annual incidents in the Study Area and no additional operational costs would be needed.

Police

Drivers

Operating cost projections for Police are driven by a variety of assumptions, primarily either in projected increases in annual calls for service or projected increases in total equivalent population. Projected

[1] https://www.kirklandwa.gov/files/sharedassets/public/city-council/agenda-documents/2021/april-6-2021/9a_business.pdf

increases in annual calls for service are based on the average ratio of annual Citywide calls per service to the City's total equivalent population from 2015 to 2019.

Labor and Non-Labor Needs and Costs

Police labor and non-labor needs and costs are projected for the following Department functions:

- *Patrol Division* – Labor and non-labor needs for the Patrol Division are based on applying the average ratio of Patrol staff to annual calls for service from 2015 to 2019 to projected increases in annual calls for service. Patrol labor and non-labor costs are based on average 2021 budgeted patrol officer salaries/benefits and average 2015-2021Police non-labor costs in 2021$ per police staff FTE, respectively.
- *Traffic Division* – Labor and non-labor needs for the Traffic Division are determined by applying the average ratio of Traffic staff to total equivalent population from 2015 to 2020 to projected increases in total equivalent population. Traffic labor and non-labor costs are based on average 2021 budgeted traffic officer salaries/benefits and average 2015-2021 Police non-labor costs in 2021$ per Police staff FTE, respectively.
- *Professional Standards Division* – Labor and non-labor needs for the Professional Standards Division are determined by applying the average ratio of Professional Standards staff to Patrol staff from 2015 to 2020 to projected increases in Patrol staff. Professional Standards labor and non-labor costs are based on average 2021 budgeted Professional Standards salaries/benefits and average 2015-2021 Police non-labor costs in 2021$ per Police staff FTE, respectively.
- *Administration Staff* – Labor and non-labor needs for Administration staff are determined by applying the average ratio of Administration staff to Patrol staff from 2015 to 2020, which was subsequently adjusted downwards by 50% based on feedback from Police staff, to projected increases in Patrol staff. Administration labor and non-labor costs are based on average 2021 budgeted Administration staff salaries/benefits and average 2015-2021 Police non-labor costs in 2021$ per Police staff FTE, respectively.

BERK also explored the need for additional Corrections staff and City staff indicated that there is enough existing capacity to meet needs under either Alternative.

Parks and Community Services

Drivers

Operating cost projections for Parks and Community Services are primarily driven by projected increases in total population in the Study Area. This approach assumes that the City will maintain existing staffing levels on a per capita basis. It should be noted that this approach does not specifically project the portion of increased Parks and Community Services staffing needed to service potential new park facilities or amenities in the Study Area. Projected Parks and Community Services staffing through this method could be deployed to both service existing Citywide park facilities or amenities that would see increased usage due to growth as well as any potential new park facilities or amenities in the Study Area.

Labor and Non-Labor Needs and Costs

Parks labor needs are determined by applying the average ratio of Parks and Community Services FTEs to Citywide population from 2015 to 2020 to projected increases in total population under either Alternative. Labor costs are based on average 2021 budgeted Parks and Community Services staff salaries/benefits.

Parks non-labor costs are determined by applying average 2015-2020 Parks non-labor spending in 2021$ per City resident towards projected increases in total population. As a note, Human Service grant amounts are increased as part of this calculation.

Public Works

Drivers

Operating cost projections for Public Works are driven by a variety of assumptions, primarily around increases in annual major development projects and specific assumptions derived from Public Works staff input.

Labor and Non-Labor Needs and Costs

Labor and non-labor costs assumptions are driven by a variety of factors depending on the type of function:

- *Fleet Management* – As a note, fleet management costs are captured for each departmental category through non-labor cost assumptions, or, in the case of Fire and Police through capital cost assumptions. For Public Works, BERK projected fleet management staffing needs to understand the City's need for additional municipal facilities. Labor needs for fleet management are determined by applying the 2021 budgeted ratio of fleet technicians to City vehicles toward the number of vehicles estimated to be added by each department.
- *Streets and Public Grounds* – BERK explored the need for additional streets and public grounds staffing; however, based on Public Works staff input, developments in the Station Area are not estimated to increase need for staffing under either Alternative.
- *Development Engineering, Permit Review, Inspection* – Labor needs for this function are determined by applying the ratio of the increase in development engineering, permit review, and inspection staffing between 2016 to 2018 to the change in new building permits issued for major developments between 2016-2018 towards expected annual growth in major development projects under either Alternative. Labor costs and non-labor costs are based on the average 2021 budgeted salaries and benefits for development engineering, permit review, and inspection staff as well as average 2015-2021 Public Works non-labor costs in 2021$ per Public Works staff FTE, respectively.
- *Water and Sewer Maintenance* – BERK explored the need for additional water and sewer maintenance staffing; however, based on Public Works staff input, developments in the Station Area are not estimated to increase need for staffing under either Alternative.
- *Stormwater Inspection and Maintenance* – Labor needs for stormwater inspection are determined by applying a Public Works staff assumption of needing 1 new Stormwater Inspector for every 200 new major developments to expected growth in major development projects under either Alternative. Labor costs and non-labor costs are based on the average 2021 budgeted salaries and benefits for

Stormwater staff as well as average 2015-2021 Public Works non-labor costs in 2021$ per Public Works staff FTE, respectively.

- *Transportation Maintenance* – Labor needs for additional transportation maintenance are assumed to primarily be driven by need for additional signal technicians. Based on Public Works staff input, the need for additional signal technicians is assumed to increase at a rate of 1 new technician for every 20 new signals under each Alternative. Additionally, under Alternative B, Public Works staff indicated the need for 0.5 FTE of signal technicians for maintaining supporting infrastructure such as rectangular rapid-flashing beacons (RRFBs) and streetlights. Labor costs and non-labor costs for additional signal technicians are based on the average 2021 budgeted salaries and benefits for an Electronics Technician III as well as average 2015-2021 Public Works non-labor costs in 2021$ per Public Works staff FTE, respectively.
- *Transportation Demand Management* – Based on Public Works staff input, labor needs for an additional Transportation Program Coordinator are assumed in Alternative B. Labor costs and non-labor costs for an additional Transportation Program Coordinator are based on the average 2021 budgeted salary and benefits for a Transportation Program Coordinator as well as average 2015-2021 Public Works non-labor costs in 2021$ per Public Works staff FTE, respectively. The Transportation Program Coordinator position is assumed to be added in Alternative B in 2029, when the first transportation projects are assumed to begin construction.

Internal Services

Drivers

Operating cost projections for Internal Services are driven by increases in staffing in other non-Internal Services City departments, namely Fire, Police, Parks, Planning and Building, and Public Works.

Labor and Non-Labor Needs and Costs

Labor and non-labor costs assumptions are driven by a variety of factors depending on the type of function:

- *Human Resources* – Labor needs for Human Resources staffing are determined by applying the 2021 ratio of Human Resources FTEs to all non-Internal Services FTEs towards the estimated number of non-Internal Services FTEs added under each Alternative. Labor costs and non-labor costs are based on the average of 2021 budgeted salaries and benefits for Human Resources staff as well as average 2015-2021 Human Resources non-labor costs in 2021$ per Human Resources staff FTE, respectively.
- *Finance and Administration* – Labor needs for Finance and Administration staffing are determined by applying the 2021 ratio of Finance FTEs to all non-Internal Services FTEs towards the estimated number of non-Internal Services FTEs added under each Alternative. Labor costs and non-labor costs are based on the average of 2021 budgeted salaries and benefits for Finance staff as well as average 2015-2021 Finance and Administration non-labor costs in 2021$ per Finance staff FTE, respectively.
- *City Manager's Office (CMO)* – Labor needs for CMO staffing are determined by applying the 2021 ratio of CMO FTEs (excluding Facilities staff) to all non-Internal Services FTEs towards the estimated number of non-Internal Services FTEs added based on redevelopment under each

Alternative. Labor costs and non-labor costs are based on the average of 2021 budgeted salaries and benefits for CMO staff as well as average 2015-2021 CMO non-labor costs in 2021$ per CMO staff FTE, respectively. As a note, the CMO calculation for non-labor costs includes a factor for increased needs for the City's community responder program.

- *City Attorney's Office (CAO)* – Labor needs for CAO staffing are determined by applying the 2021 ratio of CAO FTEs to all non-Internal Services FTEs towards the estimated number of non-Internal Services FTEs added based on redevelopment under each Alternative. Labor costs and non-labor costs are based on the average of 2021 budgeted salaries and benefits for CAO staff as well as average 2015-2021 CAO non-labor costs in 2021$ per CAO staff FTE, respectively.
- *Municipal Court* – Labor needs for Municipal Court staffing are determined by applying the 2021 ratio of Judicial Support and Probation Officer FTEs to Kirkland's total equivalent population towards the estimated increase in total equivalent population in the Study Area based on redevelopment under each Alternative. Labor costs and non-labor costs are based on the average of 2021 budgeted salaries and benefits for Judicial Support and Probation Officer FTEs as well as average 2015-2021 Municipal Court non-labor costs in 2021$ per Municipal Court staff FTE, respectively.
- *Prosecutors* – As the City contracts for prosecutors, needs for increased prosecutor services (which are assumed to be Internal Services non-labor costs from the City perspective) are determined by applying the ratio of the City's 2021 budgeted contract to the City's Municipal Court FTEs towards the additional Municipal Court FTEs to be added under each Alternative.
- *Public Defenders* – As the City also contracts for public defenders, needs for increased public defender services (which are assumed to be Internal Services non-labor costs from the City perspective) are determined by applying the ratio of the City's 2021 budgeted contract to the City's Municipal Court FTEs towards the additional Municipal Court FTEs to be added under each Alternative.
- *Information Technology* – Like fleet management costs in Public Works, IT costs are captured at the department level through non-labor cost assumptions. However, BERK projected IT staffing needs to understand the City's need for additional municipal facilities. FTE needs for IT are determined by applying the 2021 ratio of IT FTEs to all non-Internal Services FTEs towards the estimated number of non-Internal Services FTEs added under each Alternative.
- *Facilities* – Like IT costs, Facilities costs are captured at the department level through non-labor costs assumptions. However, BERK estimated Facilities staffing needs to understand the City's need for additional facilities. FTE needs for Facilities are determined by applying the 2021 ratio of Facilities FTEs to all non-Internal Services FTEs towards the estimated number of non-Internal Services FTEs added under each Alternative.

4.3.2 Capital Costs

Capital cost projections were developed in collaboration with City staff as well as Fehr and Peers for transportation improvements, RH2 for water and sewer improvements, and Robin Kirschbaum, Inc. (RKI) for stormwater improvements. For our analysis, capital costs are broken out into the following

departmental or use categories: Fire, Police, Parks and Community Services, Internal Services, Public Works – Water, Public Works – Sewer, Public Works – Stormwater, and Public Works – Transportation.

Inflation assumptions are based on City staff input and consistent with the City's growth assumptions for budgeting and financial forecasting where possible. Costs for vehicles and equipment are assumed to grow at a rate of 3% annually, consistent with the City's assumptions around fleet budgeting. Infrastructure costs (i.e., water, sewer, stormwater, and transportation improvements) along with Internal Services facility renovation costs and Parks capital costs are assumed to grow at a rate of 2.90%, derived from a 10-year average of the Engineering News-Record's Construction Cost Index.

In the following sections, capital cost assumptions and methodology are outlined for each of the eight capital cost categories.

Fire

Fire capital costs are based on estimated vehicles and equipment needed to support increased Fire operating needs in the Study Area developed by Fire staff. Fire staff indicated that current Fire facilities are sufficient to service expected growth in the Study Area under either Alternative and there was no expected need under either Alternative for new or expanded Fire facilities.

Under Alternative B, Fire staff indicated the need for an additional aid car and the need to convert an existing engine truck into a ladder truck in Station 26. The need for these vehicles was assumed to start when increased firefighter staffing would be needed in Station 26, as outlined above. Costs for the aid car are derived from the average 2021 replacement value of Fire aid cars in the City's fleet. Costs for the engine truck to ladder truck conversion are derived by taking the difference of the 2021 replacement value of engine truck F617 in the City's fleet and estimates of the acquisition cost of a new ladder truck provided by City staff.

Under Alternative A, Fire staff indicated there are no capital costs needed to service growth in the Study Area.

Police

Police capital costs are based on estimated vehicles and equipment needed to support increased Police operating needs in the Study Area. Police staff indicated that current Police facilities are sufficient to service expected growth in the Study Area under either Alternative and there was no expected need under either Alternative for new or expanded Police facilities.

Under either Alternative, vehicle and equipment needs are based on type of operating function (i.e., Patrol, Traffic, Professional Standards, etc.) and estimated by applying the average 2021 ratio of vehicles per each function's FTEs toward the projected increase in each respective function's staffing. Under Alternative B, based on Police staff input, the need for Professional Standards vehicles was manually adjusted to be 1 Professional Standards vehicle.

Equipment needs are estimated to follow the same ratio as vehicle needs. Vehicle costs are estimated by using the average 2021 replacement value of vehicles for each respective function and assumed to follow the average replacement schedule of vehicles for each function. Equipment costs for outfitting Police vehicles (radios, laptop, firearms, etc.) are based on assumptions from City staff.

Parks and Community Services

Parks capital costs are based on estimated park facilities and acreage needed to be added within the City to comply with the City's adopted Level of Service (LOS) guidelines. Since the City's LOS guidelines are for the entire City, the approach to estimating park capital costs focused on capturing the Study Area's incremental share of facilities and acres that need to be added Citywide.

Exhibit 4-5 details all facility or acreage-based City Parks LOS guidelines and the estimated unit cost for each facility or acreage type.

Exhibit 4-5. Park LOS Guideline and Estimated Facility/Acre Costs, 2021$

Facility/Acre Type	LOS Guidelines	Estimated Cost per Facility/Acre
Tennis Courts	1/3,000 pop.	$0.1 M
Baseball Fields	1/5,000 pop.	$1.9 M
Softball Fields	1/10,000 pop.	$1.4 M
Soccer/Football/Lacrosse Fields	1/7,500 pop.	$2.7 M
Skate Parks	1/40,000 pop.	$1.4 M
Indoor Pools	1/40,000 pop.	$72.0 M
Community Park Acres	2.25/1,000 pop.	$2.3 M
Neighborhood Park Acres	1.5/1,000 pop.	$2.3 M

Sources: HBB, 2021; City of Kirkland, 2021; BERK, 2021.

Unit cost estimates for Tennis Courts, Baseball Fields, Softball Fields, Soccer/Football/Lacrosse Fields, and Skate Parks are based on development prototype costs from HBB Landscape Architecture, which were developed as estimates for King County-based parks development projects and include design/engineering fees, financing costs, and contingency funds. Unit cost estimates for Indoor Pools are based on assumptions from City staff. Unit cost estimates for Community and Neighborhood Parks Acres are based on an average of 2020 assessed values per acre within the Study Area.

Internal Services

Internal Services capital costs are based on the costs of renovating City Hall to accommodate additional staff in the building. Renovation needs are based on the number of City Hall-based staff that would be added under each Alternative. Renovation costs are based on a per-employee estimate of renovation costs supplied by City staff ($18,000 per employee).

Public Works – Transportation, Water/Sewer, and Stormwater

See Section 3.0 for infrastructure costing methodology.

4.4 Operating Revenues and Costs

4.4.1 Operating Revenues

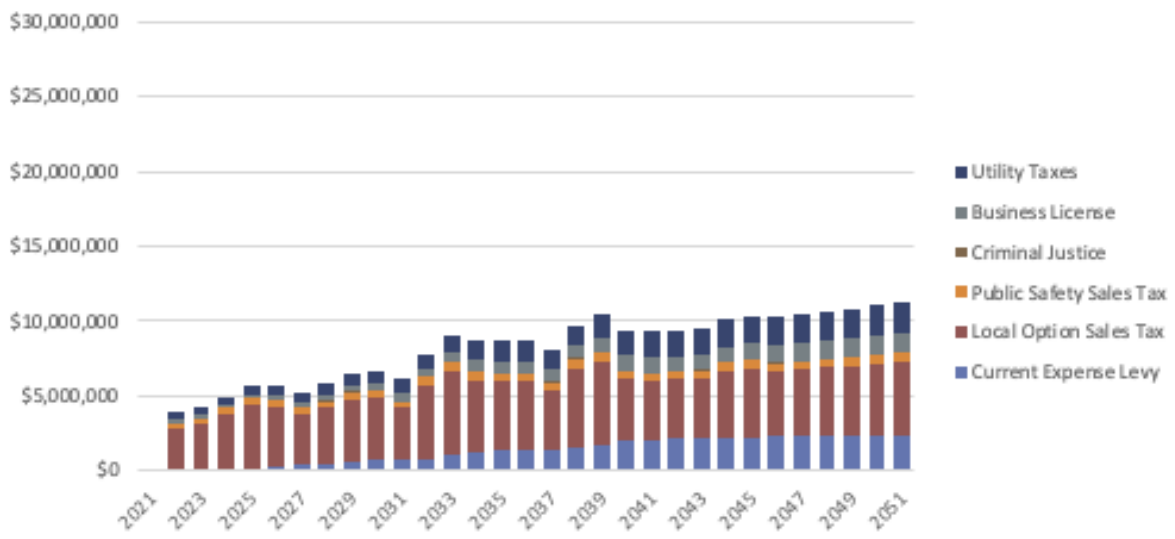
In this section, projected operating revenues from current and potential future uses are outlined for each Alternative. General operating revenues include the City's current expense levy (property tax), sales taxes, and utility taxes among other sources and are assumed to be available to fund the City's general government operating functions. General operating revenues fluctuate year-over-year depending on the amount of development happening and subsequently when buildings are occupied. Overall revenues may fall year-over-year depending on the tax contributions of the existing use relative to what use supersedes it from redevelopment.

As a note, the City also collects permit-related revenues such as plan check fees, design review fees, and building permit fees, which are dedicated to funding planning operating functions in the City's Planning and Building department. For the fiscal impacts analysis, these revenues are assumed to cover projected planning operating costs in the Study Area and are not included in the projections shown below. As growth and development occur in the Study Area, the City should monitor the associated permit-related revenues and planning costs collected and incurred, respectively, to assess whether the current fee structure needs to be addressed if revenues and costs are not aligned.

Alternative A Operating Revenues

Exhibit 4-6 summarizes the operating revenues from current and potential future uses in Alternative A. At buildout of Alternative A, operating revenues stabilize at about $10 million dollars per year.

Exhibit 4-6. Alternative A General Operating Revenues, YOE$

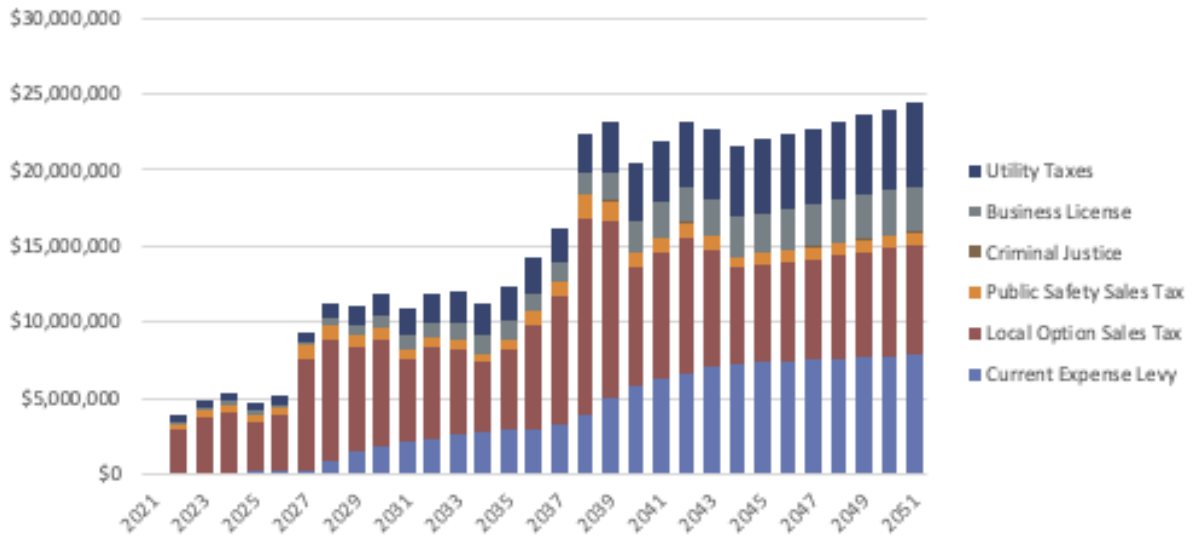


Sources: City of Kirkland, 2021; ECONorthwest, 2021.

Alternative B Operating Revenues

Exhibit 4-7 summarizes the operating revenues from current and potential future uses in Alternative B. At buildout of Alternative B, operating revenues stabilize at about $21 million dollars per year.

Exhibit 4-7. Alternative B General Operating Revenues, YOE$



Sources: City of Kirkland, 2021; ECONorthwest, 2021.

4.4.2 Operating Costs

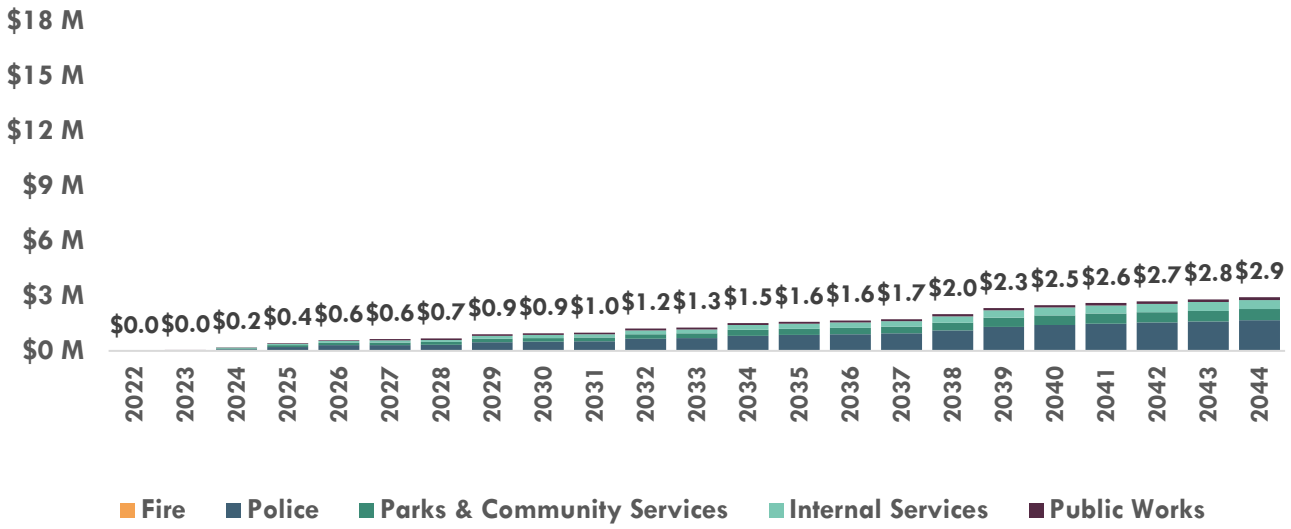
In this section, projected operating costs from growth in the Station Area are outlined for each Alternative. Operating costs are summarized by departmental category. As mentioned previously, departmental categories include Fire, Police, Parks and Community Services, Public Works, and Internal Services.

As a reminder, this analysis again assumes that operating activities funded by permit-related revenues (i.e., Planning and Building) as well as by utility operating revenues (i.e., certain functions of Public Works) are covered by those respective revenue sources based on increased demand for services in the Study Area. As such, the analysis covered below focuses on operating costs funded by general operating revenue sources (i.e., property taxes, sales taxes, utility taxes, etc.), which are defined as "general operating costs."

Alternative A Operating Costs

Exhibit 4-8 details general operating costs under Alternative A by departmental category. The largest drivers of operating costs are from Police, followed by Parks and Community Services, and Internal Services.

Exhibit 4-8. Alternative A General Operating Costs by Departmental Category, YOE$

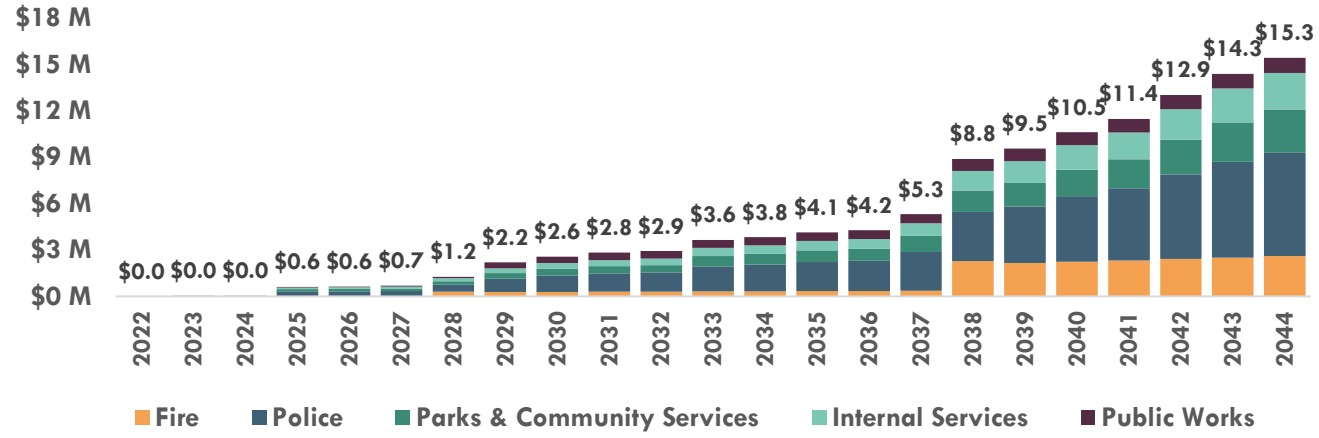


Sources: City of Kirkland, 2021; FCSG, 2020; BERK, 2021.

Alternative B Operating Costs

Exhibit 4-9 details general operating costs under Alternative B by departmental category. The largest drivers of operating costs are from Police, followed by Fire, Parks and Community Services, and Internal Services.

Exhibit 4-9. Alternative B General Operating Costs by Departmental Category, YOE$



Sources: FCSG, 2020; City of Kirkland, 2021; BERK, 2021.

4.4.3 Operating Net Fiscal Impact

On both an annual and a cumulative basis, general operating revenues are projected to cover general operating costs under either Alternative. Exhibit 4-10 details cumulative general operating revenues and costs through 2044 for both Alternatives.

Exhibit 4-10. Alternative A & B General Operating Revenues and Costs - Cumulative, YOE$

Type	Alt A	Alt B
General Operating Revenues	58.7M	$199.7M
General Operating Costs	-$31.9M	-$117.5M
Total General Operating Surplus/Deficit	**$26.8M**	**$82.2M**

Sources: FCSG, 2020; ECONorthwest, 2021; City of Kirkland, 2021; BERK, 2021.

While operating costs are significantly higher in Alternative B to serve new growth in the Station Area, revenues generated by potential future uses are also significantly higher. Under Alternative B, the City is projected to generate a general operating surplus of around $82.2 million by 2044, around $55.4 million more than the general operating surplus generated in Alternative A.

As mentioned above, costs stemming from functions funded by permit-related revenue sources and utility operating revenue sources are assumed to be covered by those revenue sources based on increased demand for services in the Study Area and are not included in the analysis above.

4.5 Capital Revenues and Costs

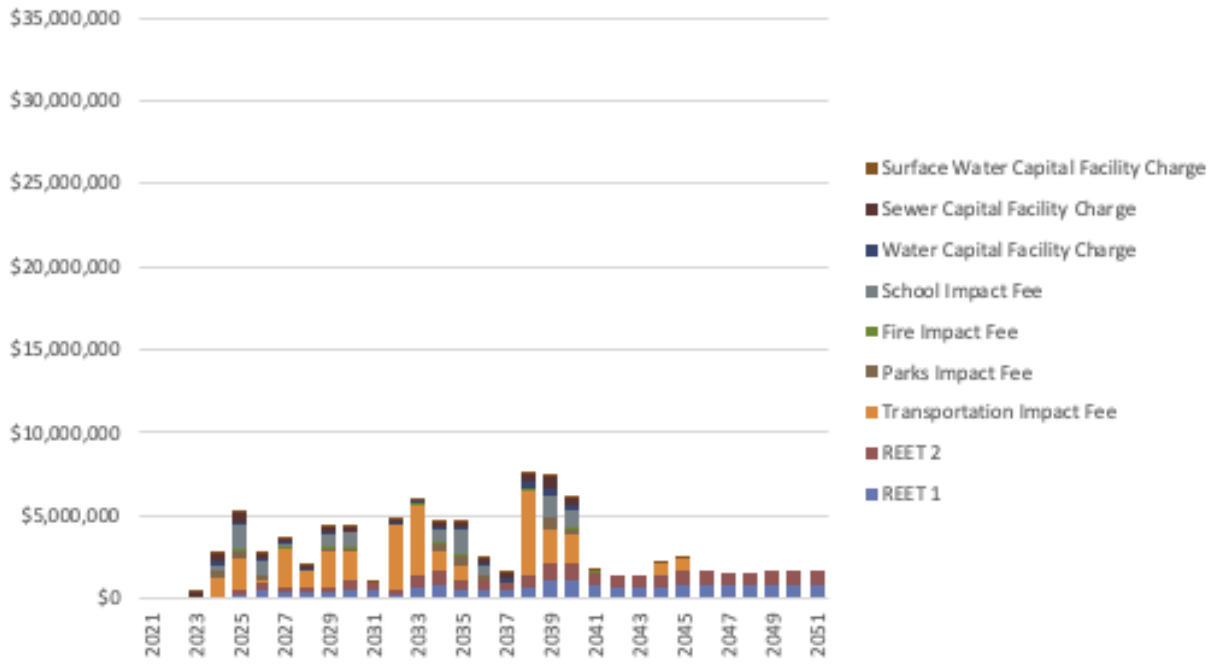
4.5.1 Capital Revenues

The following section details projected capital revenues generated from potential future uses under each Alternative. Capital revenues projected include impact fees for parks, fire, school, and transportation; capital facility charges for water, sewer, and stormwater; and Real Estate Excise Tax (REET). Impact fees and capital facility charges were assumed to grow at a rate of 2.90%, derived from a 10-year average of the Engineering News-Record's Construction Cost Index and consistent with the inflation rate used for the cost of City infrastructure projects upon which these revenues are based. The inclusion of future capital improvements to the Capital Facilities Plan could lead to additional fee increases not assumed within this analysis.

Alternative A Capital Revenues

Exhibit 4-11 summarizes the capital revenues from potential future uses in Alternative A. REET is collected every year after 2023 when redevelopment begins. Impact fees and capital facility charges are collected in years of development activity. The single largest year of fees is in 2039, at approximately $7 million. The general shape of revenues is related to development in the Station Area and roughly follows the shape of development shown in Exhibit 2-5.

Exhibit 4-11. Capital Revenues from Alternative A, YOE$



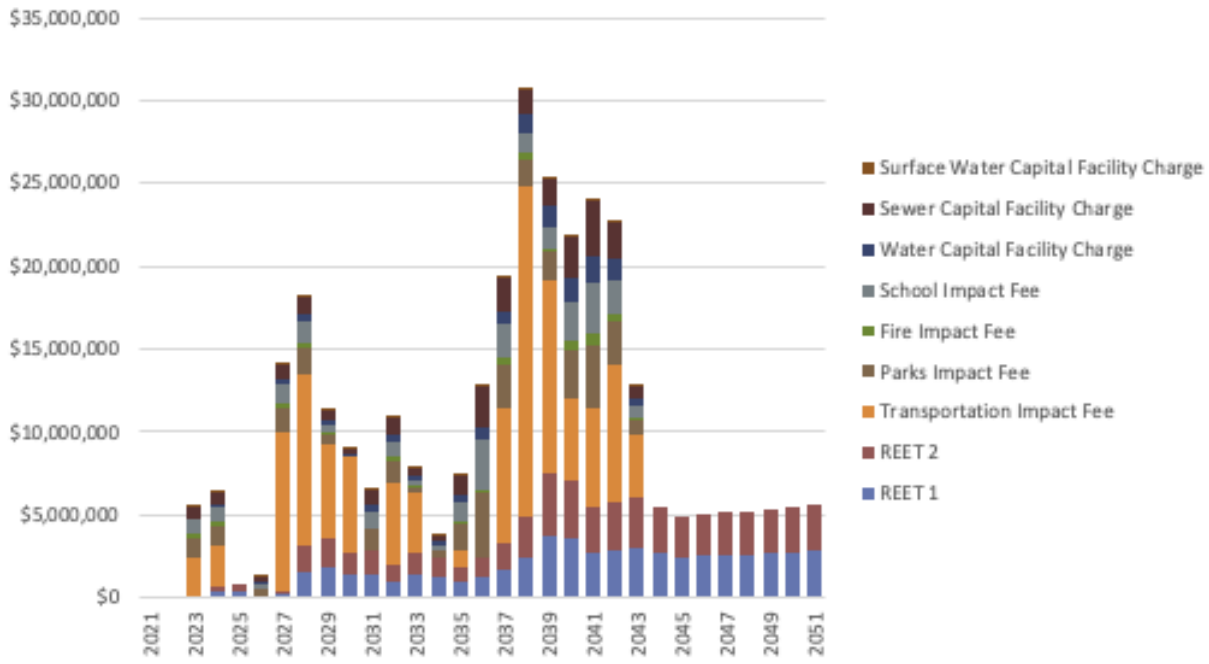
Sources: City of Kirkland, 2021; ECONorthwest, 2021.

Alternative B Capital Revenues

Exhibit 4-12 summarizes the capital restricted revenues from potential future uses in Alternative B.

As with Alternative A, REET is collected every year after 2023 when redevelopment begins, while impact fees and capital facility charges are collected in years of development activity. The single largest year of fees is in 2039, at approximately $25 million, largely driven by anticipated developments at the Costco site and in eastern quadrants of the study area.

Exhibit 4-12. Capital Revenues from Alternative B, YOE$



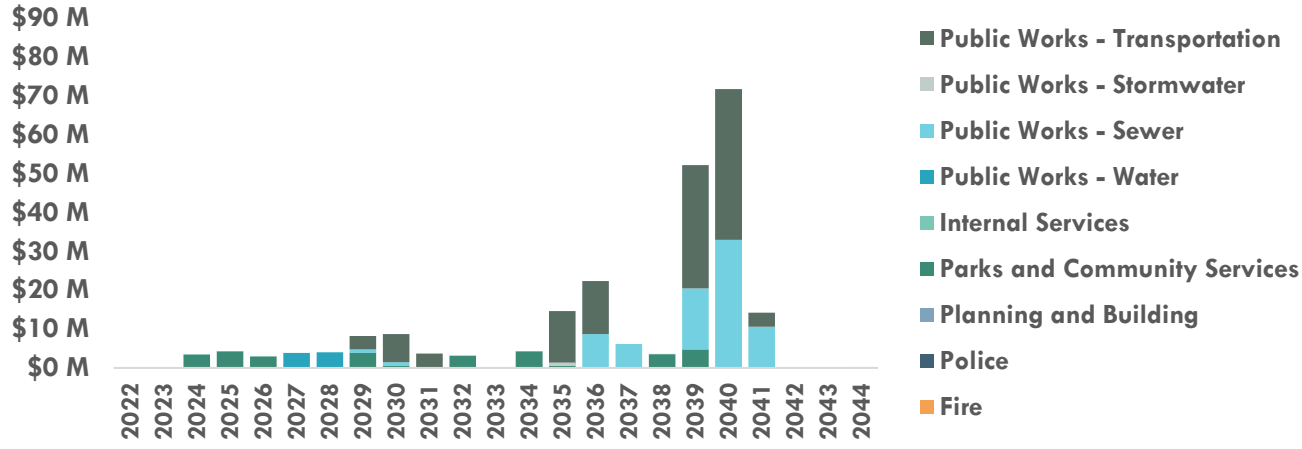
Sources: City of Kirkland, 2021; ECONorthwest, 2021.

4.5.2 Capital Costs

Alternative A Capital Costs

Cumulatively, under Alternative A, the City is projected to need a total of nearly $265 million in capital funds in order to meet the demands of growth in the Study Area, of which nearly $34 million is assumed to be funded by development. The largest drivers of capital costs are sewer improvements, transportation improvements, and parks capital needs.

Exhibit 4-13. Alternative A Capital Costs by Department, YOE$



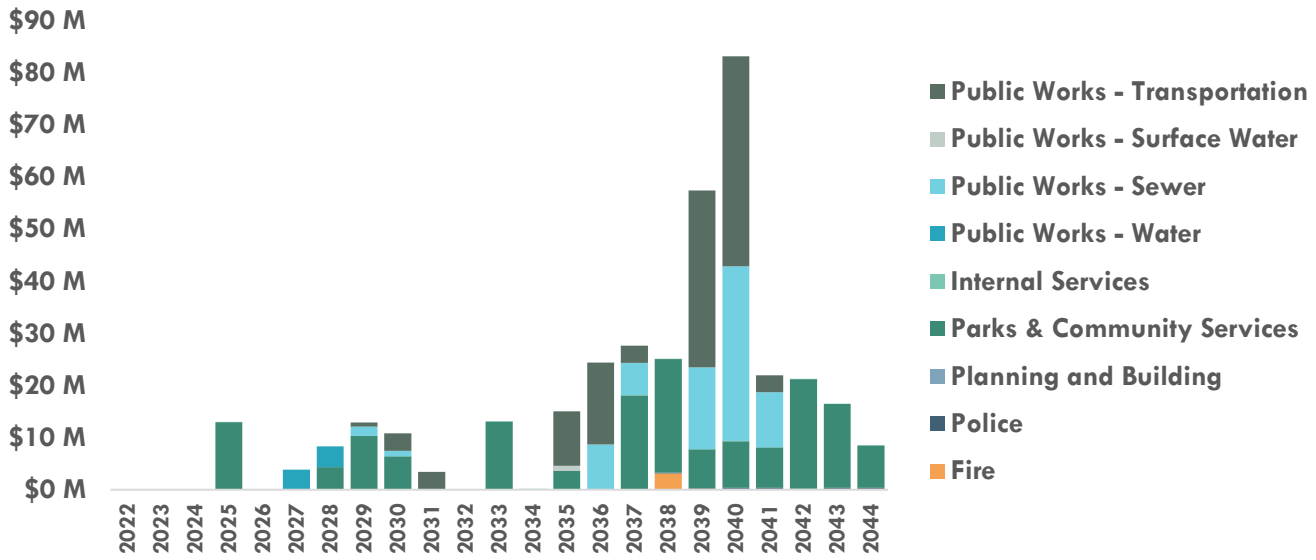
Sources: FCSG, 2020; City of Kirkland, 2021, Fehr & Peers, 2021; RH2, 2021; RKI, 2021; HBB, 2021; BERK, 2021.

Much of the costs from sewer and transportation improvements are projected to occur in 2039 and 2040.

Alternative B Capital Costs

Cumulatively, under Alternative B, the City is projected to need a total of nearly $456 million in capital funds in order to meet the demands of growth in the Study Area, of which around $85 million is assumed to be funded by development. The largest drivers of capital costs are sewer improvements, transportation improvements, and parks capital needs.

Exhibit 4-14. Alternative B Capital Costs by Department, YOE$



Sources: FCSG, 2020; City of Kirkland, 2021, Fehr & Peers, 2021; RH2, 2021; RKI, 2021; HBB, 2021; BERK, 2021.

The largest capital costs are projected to occur in 2039 and 2040 and consist of transportation and sewer improvements. Transportation in particular has a few large projects during this timeframe which include:

- Kirkland Way Complete Streets ($34.8 million, 2039-2040) a primarily non-motorized project that includes replacing the Cross Kirkland Corridor (CKC) bridge.
- 124th Ave NE Roadway Widening to 5 Lanes, NE 85th St. to NE 90th St. ($20.3 million, 2039-2040).
- NE 85th St. Shared Use Trail Improvements, 5th St. to Kirkland Way ($9.8 million, 2039-2040).

Meanwhile, sewer is projected to need 43 different projects in this timeframe which total around $50 million in costs.

4.5.3 Capital Net Fiscal Impact

Summary of Capital Net Fiscal Impact

Under either Alternative, significant capital needs are anticipated, with the City is projected to see large shortfalls in covering capital needs unless other funding strategies are implemented. Exhibit 4-15 outlines the projected cumulative surplus/deficit for capital costs and capital revenues through 2044 for both Alternatives. As a note, capital improvements needed in Alternative A are also assumed to be needed in Alternative B as those improvements will be needed to accommodate growth under both scenarios.

Exhibit 4-15. Alternative A & B Capital Surplus/Deficit Summary – Cumulative, YOE$

Type	June Alt A	June Alt B
Dedicated Capital Revenues	$68.2M	$252.7M
Development Funded Improvements	$33.0M	$84.8M
Total Capital Improvements	-$265.2M	-$455.2M
Capital Surplus/Deficit	**-$164.0M**	**-$117.7M**

Note: Numbers may not add up due to rounding.

Sources: FCSG, 2020; City of Kirkland, 2021, Fehr & Peer's, 2021; RH2, 2021; RKI, 2021; HBB, 2021; ECONorthwest, 2021; BERK, 2021.

While Alternative B is estimated to generate more in total capital improvements than Alternative A, under Alternative B, significantly more dedicated capital revenues are also estimated to be generated along with more improvements assumed to be funded by development. Compared with Alternative A, this results in a decrease in capital deficit of around $46.3 million (-$117.7 million in Alternative B versus -$164.0 million in Alternative A).

As shown in Exhibit 4-16, in Alternative A, significant shortfalls are projected for transportation, water, sewer, and parks capital improvements. In Alternative B, significant shortfalls are projected for sewer and parks capital improvements.

Exhibit 4-16. Alternative A & B Capital Surplus/Deficit by Improvement Type – Cumulative, YOE$

Capital Improvement Type	June Alt A Capital Surplus/Deficit	June Alt B Capital Surplus/Deficit
Fire	$1.1M	$0.6M
Police Fleet and Municipal Facilities	-$0.4M	-$1.7M
Transportation	-$73.4M	$27.2M
Water	-$5.3M	$3.6M
Sewer	-$70.7M	-$53.5M
Stormwater	-$0.5M	-$0.3M
Parks	-$14.8M	-$93.5M
Total Capital Surplus/Deficit	**-$164.0M**	**-$117.7M**

Note: Surplus/Deficit does not include using general government operating surplus to cover gaps. Numbers may not add up due to rounding.

Sources: FCSG, 2020; City of Kirkland, 2021, Fehr & Peers, 2021; RH2, 2021; RKI, 2021; HBB, 2021; ECONorthwest, 2021; BERK, 2021.

For each type of capital improvement, the City has available strategies that could be pursued in order to cover capital costs in either Alternative.

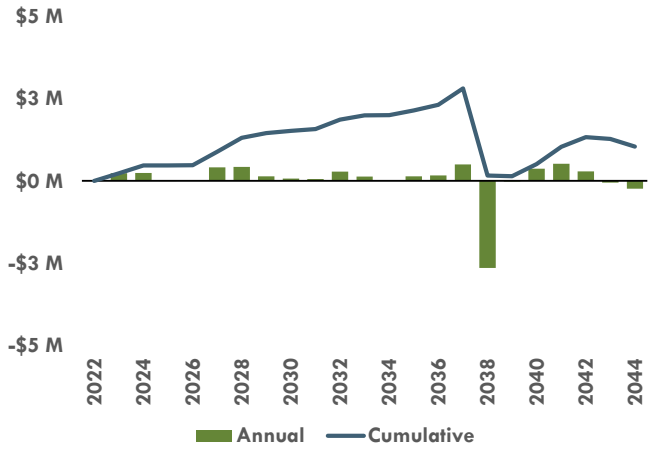
In the following section details the capital surplus or deficit of each type of capital improvement in Alternative B. In cases where there is a deficit, potential funding strategies available to the City to cover costs are included. Additional community benefit strategies may also be relevant and are presented in Section 6.0 .

By Capital Improvement Type (Alternative B)

Fire

There are no anticipated capital costs in Alternative A. In Alternative B, the Fire Department is projected to have $4.5 million in capital costs over the study period, consisting of $3.2 million for an additional ladder truck and aid car in 2038 plus annual replacement costs. Fire capital costs are projected to be covered both by Fire impact fees generated in the Station Area on new development and by using 0.5% of the general government operating surplus ($400,000) to cover annual deficits in 2038 when the new equipment is needed. Exhibit 4-17 shows both an annual and cumulative summary of Fire capital surplus and deficits over the study period and Exhibit 4-18 summarizes the cumulative surplus and deficit for each Alternative.

Exhibit 4-17. Alternative B Fire Fleet Capital Surplus/Deficit – City Portion, YOE$



Note: Annual and Cumulative Surplus/Deficit includes a portion of general government operating surplus to cover gaps.

Sources: City of Kirkland, 2021; ECONorthwest, 2021; BERK 2021.

Exhibit 4-18. Alternative A & B Fire Fleet Cumulative Capital Surplus/Deficit, YOE$

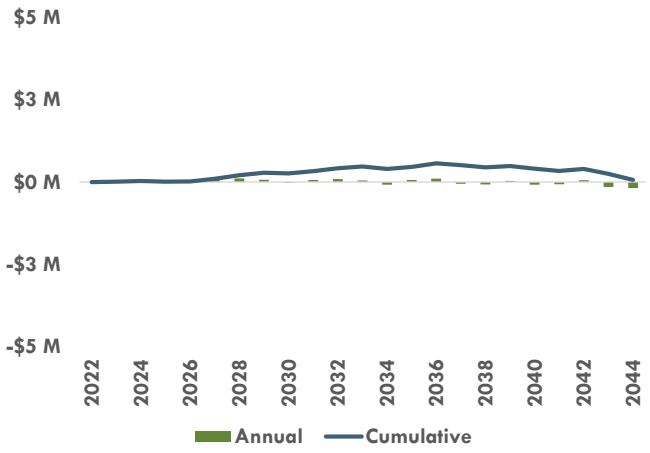
Type	Alt A	Alt B
Fire Impact Fees	$1.1M	$5.1M
0.5% of Operating Surplus	N/A	$0.4M
Total Capital Improvements	N/A	-$4.5M
Surplus/Deficit	**$1.1M**	**$1.0M**

Sources: City of Kirkland, 2021; ECONorthwest, 2021; BERK 2021.

Police Fleet and Municipal Facilities

In Alternative B, there is a cumulative capital need of $1.7 million for Police fleet and municipal facility renovations. The Police Department projects a capital need of $1.3 million to expand their fleet by six vehicles over the study period. While the City overall will need to accommodate an additional 15 FTEs in City Hall at a cost of $400,000, using a renovation cost of $18,000 per FTE. There are no dedicated revenues generated by new development for Police or general City operations, but there is enough general operating surplus available to cover these costs. Exhibit 4-9 shows both the annual and cumulative summary of Police fleet and City facilities capital surplus and deficits over the study period when allocating 2.2% of the general operating surplus ($1.8 million). Exhibit 4-20 summarizes the cumulative surplus and deficit for each Alternative.

Exhibit 4-19. Alternative B Police and Municipal Capital Surplus/Deficit – City Portion, YOE$



Note: Annual and Cumulative Surplus/Deficit includes a portion of general government operating surplus to cover gaps.

Sources: City of Kirkland, 2021; ECONorthwest, 2021; BERK 2021.

Exhibit 4-20. Alternative A & B Police and Municipal Cumulative Capital Surplus/Deficit, YOE$

Type	Alt A	Alt B
2.2% of Operating Surplus	$0.6M	$1.8M
Police Fleet Capital Needs	-$0.3M	-$1.3M
Municipal Facilities Capital Needs	-$0.1M	-$0.4M
Surplus/Deficit	**$0.2M**	**$0.1M**

Sources: City of Kirkland, 2021; ECONorthwest, 2021; BERK 2021.

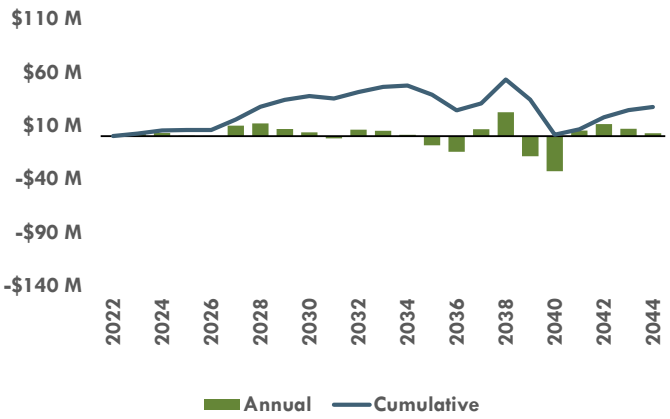
Transportation

The City needs to make significant transportation improvements in either Alternative. In Alternative B, there is an estimated total of $153.4 million in transportation infrastructure improvements needed. Of those, $36.3 million are assumed to be development funded improvements, leaving $117.1 million in city costs. The largest City-funded improvements in Alternative B are:

- Kirkland Way Complete Streets ($34.8 million, 2039-2040, an improvement which requires rebuilding of the CKC bridge and is also assumed under Alternative A).
- 124th Ave NE Roadway Widening to 5 Lanes, NE 85th St. to NE 90th St. ($20.3 million, 2039-2040, an improvement also assumed under Alternative A).
- 90th St Complete Streets Improvements ($19.8 million for two projects, 2035-2036, both projects are also assumed under Alternative A).
- NE 85th St. Shared Use Trail Improvements, 5th St. to Kirkland Way ($9.8 million, 2039-2040, an improvement that only takes place in Alternative B).

The City's capital costs can be covered using the transportation impact fees ($108.8 million) and all the REET 2 ($35.4 million) generated on new development in the Station Area. Exhibit 4-21 shows both an annual and cumulative summary of transportation capital surplus and deficits over the study period and Exhibit 4-22 summarizes the cumulative surplus and deficit for each Alternative.

Exhibit 4-21. Alternative B Transportation Capital Surplus/Deficit – City Portion, YOE$



Sources: City of Kirkland, 2021; ECONorthwest, 2021; BERK 2021.

Exhibit 4-22. Alternative A & B Transportation Cumulative Capital Surplus/Deficit, YOE$

Type	Alt A	Alt B
Transportation Impact Fees	$30.2M	$108.8M
100% of REET 2	$11.9M	$35.4M
Development-funded Improvements	$0.0M	$36.3M
Total Capital Improvements	-$115.4M	-$153.4M
Surplus/Deficit	**-$73.4M**	**$27.2M**

Sources: City of Kirkland, 2021; Fehr & Peers 2021; ECONorthwest, 2021; BERK 2021.

Water

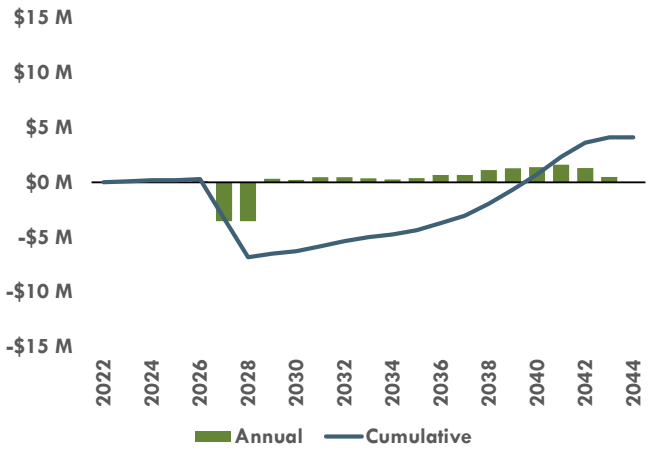
The City needs to relocate the water main under I-405, at a cost of $7.8 million, per WSDOT requirements due to the construction of the BRT in each Alternative.

In Alternative B, the City has a total of $42.1 million identified water improvements, of which $33.7 million are developer-constructed, leaving one City-constructed improvement. By the end of the study period, there will be $11.9 million in water capital facility charges generated, but there will not be enough dedicated revenue available in the early years to cover the construction costs in 2027-2028, as shown in Exhibit 4-23. Exhibit 4-24 summarizes the cumulative surplus and deficit for each Alternative.

Potential financing strategy. The City can issue a $10 million 20-year bond to cover the cost of the improvement and maintain an annual surplus. A bond of that amount and length is anticipated to result in annual debt payments of $685,000. Projected capital facility charge revenue and 7% of net new water utility revenue from growth in the Station Area are projected to be enough to cover the annual debt payments.

In addition, community benefit strategies may also be relevant. Please refer to Section 6.2.1 .

Exhibit 4-23. Alternative B Water Capital Surplus/Deficit – City Portion, YOE$



Sources: City of Kirkland, 2021; RH2, 2021; ECONorthwest, 2021; BERK 2021.

Exhibit 4-24. Alternative A & B Water Cumulative Capital Surplus/Deficit, YOE$

Type	Alt A	Alt B
Stormwater Capital Facility Charges	$3.0M	$11.9M
Development-funded Improvements	$33.0M	$33.7M
Total Capital Improvements	-$41.3M	-$42.1M
Surplus/Deficit	**-$5.3M**	**$3.6M**

Sources: City of Kirkland, 2021; RH2, 2021; ECONorthwest, 2021; BERK 2021.

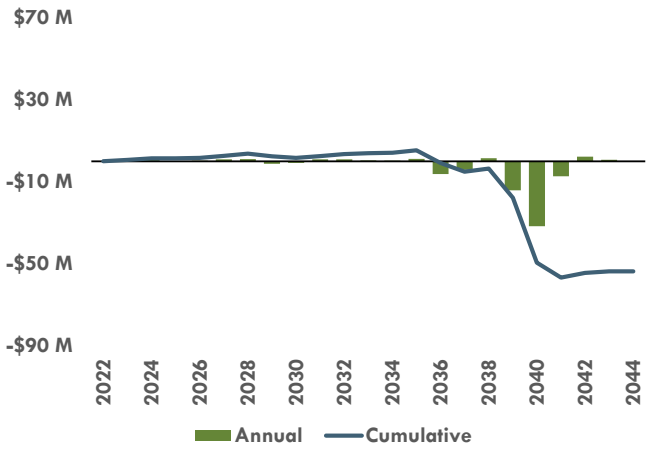
Sewer

The City needs to make significant sewer improvements in either Alternative. In Alternative B, the city has a total of $92.6 million in total identified sewer improvements, of which $14.8 million are anticipated to be funded by development, leaving a total of $77.9 million in City-funded costs. A cumulative total of $24.4 million in sewer capital facility charges are projected to be generated by new development in the Station Area over the study period, but the revenue will not be enough to cover sewer capital costs as shown in Exhibit 4-25. Exhibit 4-26 summarizes the cumulative surplus and deficit for each Alternative.

Potential financing strategy. The City can fund sewer improvements with a combination of debt issuance and rate increases. For example, if development followed the modeled growth, issuing a $60 million 30-year bond in 2035, resulting in $3.1 million annual debt payments, would cover the cost of needed sewer infrastructure improvements. A rate increase on the overall base would be required to make annual debt payments, because there is not enough sewer capital facility charges or new sewer rate revenue from the Station Area to cover the payments. Because this investment is also required in Alternative A, where there are less dedicated revenues available to offset costs resulting in a larger City deficit, Alternative A requires a larger rate increase than Alternative B.

In addition, community benefit strategies may also be relevant. Please refer to Section 6.2.1 .

Exhibit 4-25. Alternative B Sewer Capital Surplus/Deficit – City Portion, YOE$



Sources: City of Kirkland, 2021; RH2, 2021; ECONorthwest, 2021; BERK 2021.

Exhibit 4-26. Alternative A & B Sewer Cumulative Capital Surplus/Deficit, YOE$

Type	Alt A	Alt B
Sewer Capital Facility Charges	$5.5M	$24.4M
Development-funded Improvements	$0.0M	$14.8M
Total Capital Improvements	-$76.3M	-$92.6M
Surplus/Deficit	**-$70.7M**	**-$53.5M**

Sources: City of Kirkland, 2021; RH2, 2021; ECONorthwest, 2021; BERK 2021.

In addition to the identified deficit in Alternative B, there is a large capacity project ($6.9 million) that crosses under I-405 to connect the King County transmission line under the CKC. Based on the input of subject matter experts, this analysis assumes the project will occur early in the study period, since it is needed to serve the higher density in the Station Area and will be completely funded by development. The City will need to closely coordinate this project with the BRT construction, since the project will likely need to be completed at the same time as or before the station. If major redevelopment in the Station Area does not occur before construction of the BRT station, the City may need to construct the sewer capacity project and recover costs through increased connection charges and/or rates. City staff have recommended proceeding with a feasibility study for the project at a cost of $30,000-$35,000.

Stormwater

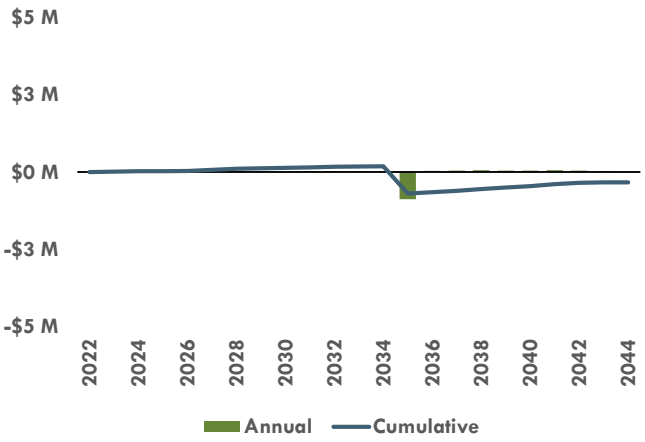
Development of the Study Area under Alternative B will not produce negative stormwater impacts due to current mitigation requirements that will require developed parcels to install large detention systems to reduce the flow off their development and help existing flooding issues. The only proposed stormwater project within the Study Area consists of replacing 520 feet of pipe along 120th Ave NE with a smoother pipe material. This will increase capacity through the stormwater main line, helping in all scenarios.

The estimated cost of the pipe replacement is $0.9 million in the year of construction. Over the study period, stormwater capital facility charges will total $0.6 million, but in the year that the stormwater pipe

replacement is anticipated there will be a gap of $0.7 million that will need to be filled. Exhibit 4-27 shows both the annual and cumulative stormwater capital surplus and deficit over the study period and Exhibit 4-28 summarizes the cumulative surplus and deficit for each Alternative.

Potential funding strategy. The City can use stormwater capital fund reserves to fill the $0.7 million gap between the available stormwater facility charges and the infrastructure improvement cost in 2035.

Exhibit 4-27. Stormwater Capital Surplus/Deficit – City Portion, YOE$



Sources: City of Kirkland, 2021; RKI 2021; ECONorthwest, 2021; BERK 2021.

Exhibit 4-28. Alternative A & B Stormwater Cumulative Capital Surplus/Deficit, YOE$

Type	Alt A	Alt B
Stormwater Capital Facility Charges	$0.4M	$0.6M
Development-funded Improvements	$0.0M	$0.0M
Total Capital Improvements	-$0.9M	-$0.9M
Surplus/Deficit	**-$0.5M**	**-$0.3M**

Note: The annual deficit in 2035 is larger than the cumulative deficit at the end of the study period that is shown in this table. This smaller cumulative deficit is due to additional stormwater capital facility charges collected on development after 2035.

Sources: City of Kirkland, 2021; RKI 2021; ECONorthwest, 2021; BERK 2021.

Parks

In Alternative B, there is a cumulative capital need of $160.0 million for Parks and Community Services. This estimate is based on the City's current target levels of service, some of which are acreage derived. Seventy-six percent of the cumulative park capital needs are comprised of acquisition and development of 15 new acres of neighborhood parks and 22 new acres of community parks, which are likely infeasible in the Station Area.

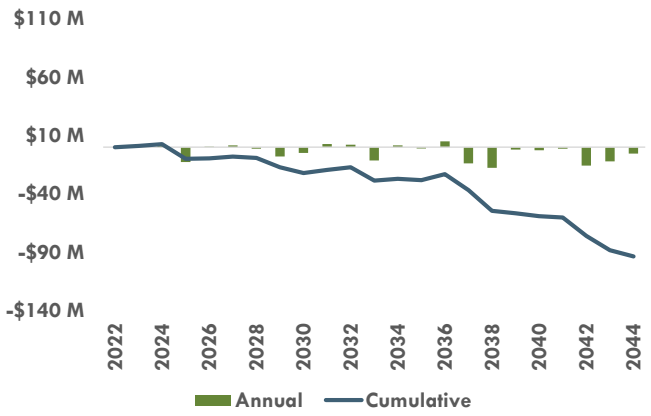
In Alternative B, new development is anticipated to generate $31.0 million in park impact fees over the study period and an additional $35.4 million of REET 1 is available to offset costs. Using these available

funds would leave a cumulative gap of $93.5 million, as shown in Exhibit 4-29. Exhibit 4-30 summarizes the cumulative surplus and deficit for each Alternative.

Potential funding strategy. Consider partially offsetting costs using the $80.0 million remaining in general government operating surplus. This strategy alone will not address parks capital needs.

A policy change to how park Level of Service is defined that moves toward equitable park access within walking distance and away from a per-acre approach would also be well suited for the Station Area and could change the amount of park land needed. In addition, community benefit strategies or multi-benefit infrastructure projects that include open space or trails may also be relevant. Please refer to Section 6.2.1 .

Exhibit 4-29. Alternative B Parks Capital Surplus/Deficit – City Portion, YOE$



Sources: City of Kirkland, 2021; ECONorthwest, 2021; BERK 2021.

Exhibit 4-30. Alternative A & B Parks Cumulative Capital Surplus/Deficit, YOE$

Type	Alt A	Alt B
Parks Impact Fees	$4.1M	$31.0M
100% of REET 1	$11.9M	$35.4M
Total Capital Improvements	-$30.8M	-$160.0M
Surplus/Deficit	**-$14.8M**	**-$93.5M**

Sources: City of Kirkland, 2021; ECONorthwest, 2021; BERK 2021.

4.6 Summary of Net Fiscal Impact

While it is important to note that restrictions on certain revenue sources exist and, as a result, not all revenues can be applied to certain costs, for contextual purposes, it can be helpful to understand where each Alternative ends up on a total surplus/deficit basis.

Exhibit 4-31 details a comparison of both Alternatives on a total surplus/deficit basis. Major takeaways include:

- Under either Alternative, operating revenues are projected to cover operating needs by 2044.
- Under either Alternative, significant capital needs are anticipated, with the City projected to see large shortfalls in covering capital needs unless other funding strategies are implemented.
- As mentioned, while restrictions on certain revenue sources exist, on a total surplus/deficit basis, under Alternative B, the City's deficit is significantly lower than what is projected under Alternative A. The City is projected to have a total deficit of around $35.5 million in Alternative B and a total deficit of around $137.2 million in Alternative A.

Exhibit 4-31. Alternative A and B Total Surplus/Deficit – Cumulative, YOE$

Surplus/Deficit	Alt A	Alt B
General Operating Surplus/Deficit	$26.8M	$82.2M
Capital Surplus/Deficit	-$164.0M	-$117.7M
Total Surplus/Deficit	**-$137.2M**	**-$35.5M**

Sources: FCSG, 2020; City of Kirkland, 2021, Fehr & Peers, 2021; RH2, 2021; RKI, 2021; HBB, 2021; ECONorthwest, 2021; BERK, 2021.

Reasons for differences in the fiscal outlook between Alternatives include:

- Generation of a higher operating surplus in Alternative B relative to Alternative A driven by estimated increases in general operating revenues such as sales and property tax revenues.
- A smaller capital shortfall in Alternative B relative to Alternative A due to estimated increases in dedicated capital revenues such as impact fees, REET, and capital facility charges as well as an increase in capital improvements funded by development.

It is important to note that the City's CIP looks at project funding for a 6-year window and that future projects are shown as unfunded until they are prioritized into the CIP window. Funding strategies will be developed to address any funding gap that exists under current planning assumptions. The Station Area plan could provide additional funding and community benefit tools to help address capital needs as discussed in Section 6.0 .

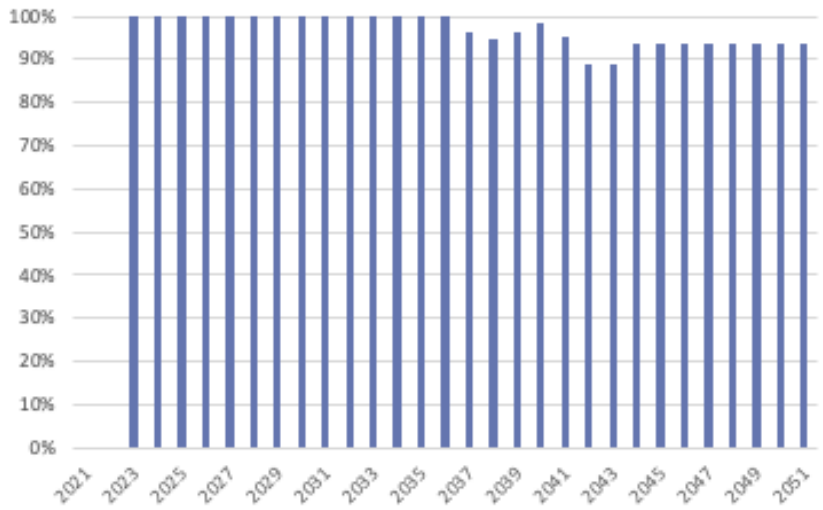
4.7 Sensitivity Analyses

By Geography, Western Quadrants versus East Quadrants

City staff have posed a range of sensitivity analyses. In terms of geographic accounting of the revenues, the following question has been posed: How much do the western quadrants contribute to the revenues or are they mostly generated east of I-405?

To address this, the general fund operating revenues for the SE and NE Quadrants for Alternative B are estimated as a proportion of total revenues for Alternative B.

Exhibit 4-32. East Quadrants Share of Operating Revenues for Alternative B



Sources: City of Kirkland, 2021; ECONorthwest, 2021.

Exhibit 4-32 demonstrates that the majority of the incremental revenues are generated in the east quadrants. This reflects both the timing (no development in the SW quadrants begin before 2037) and the scale of the development that occurs on the east quadrants.

Infrastructure Costs

Based on geography, anticipated infrastructure costs driven by development in western or eastern quadrants in the study area under Alternative B are outlined in Exhibit 4-33 and described below as follows:

- For water capital improvements, City-funded improvements are largely driven by developments in the eastern quadrants of the study area at around $8.2 million, which represents around 96% of total City-funded water capital improvement costs. This is primarily due to the previously mentioned need for relocating a water main under I-405 per WSDOT requirements ($7.8 million). City-funded water capital improvements in the western quadrants of the study are projected to be around $0.2 million.
- For sewer capital improvements, the majority of City-funded improvements are driven by developments in the western quadrants of the study area at around $60.3 million, which represents around 77% of total City-funded sewer capital improvement costs. The need for total sewer capital

improvements is both larger in western quadrants versus eastern quadrants (at a ratio of around 2:1, respectively) while nearly all development-funded sewer improvements in study area are driven by development in the eastern quadrants.

- For stormwater capital improvements, the only stormwater capital improvement projected to be needed is driven by developments in the eastern quadrants of the study area at $0.9 million. No stormwater capital improvements are driven by developments in the western quadrants of the study area.
- For transportation capital improvements, City-funded improvements are more evenly split between being driven by developments in western versus eastern quadrants of the study area (57% versus 43%, respectively). All development-funded improvements are projected to occur based on developments in eastern quadrants of the study area.

Exhibit 4-33. Alternative B Infrastructure Costs, West vs. East Quadrants of Study Area, YOE$

Capital Improvement Type	West	East
Water		
Development-funded Improvements	$17.3 M	$16.5 M
City-Funded Improvements	**$0.2 M**	**$8.2 M**
Total Capital Improvements	$17.4 M	$24.7 M
Sewer		
Development-funded Improvements	$0.1 M	$14.7 M
City-Funded Improvements	**$60.3 M**	**$17.6 M**
Total Capital Improvements	$60.3 M	$32.3 M
Stormwater		
Development-funded Improvements	$0.0 M	$0.0 M
City-Funded Improvements	**$0.0 M**	**$0.9 M**
Total Capital Improvements	$0.0 M	$0.9 M
Transportation		
Development-funded Improvements	$0.0 M	$36.3 M
City-Funded Improvements	**$66.2 M**	**$50.8 M**
Total Capital Improvements	$66.2 M	$87.2 M

Note: Numbers may not add up due to rounding.

Sources: FCSG, 2020; City of Kirkland, 2021, Fehr & Peers, 2021; RH2, 2021; RKI, 2021; HBB, 2021; ECONorthwest, 2021; BERK, 2021.

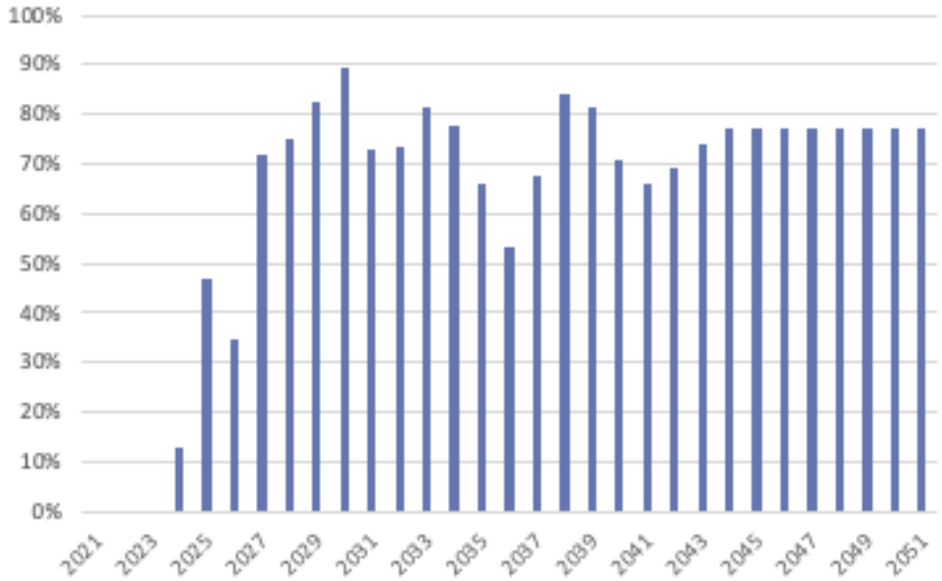
In terms of overall capital costs, it is challenging to do a detailed evaluation of capital needs and resources generated in different areas of the Study Area as many of the projects serve the full area

overall. In general terms, development-funded capital projects and capital-related revenues generated in the eastern quadrants are important to funding improvements in the western quadrants, particularly the multimodal improvements west of the BRT station.

By Commercial versus Residential Development, Eastern Quadrants

A related question to the development occurring on the eastern quadrants is how much does the commercial component account for the total amount of revenue in these quadrants. To address this, the commercial components of the general fund operating revenues for the SE and NE Quadrants for Alternative B are estimated as a proportion of their total revenues.

Exhibit 4-34. Commercial Portion of East Quadrants Share of Operating Revenues



Sources: City of Kirkland, 2021; ECONorthwest, 2021.

Exhibit 4-34 demonstrates that the majority of the incremental revenues are generated by the commercial components of the east quadrants.

Operating Costs

In the eastern quadrants, anticipated impacts to operating costs projections based on if currently projected commercial development in eastern quadrants of the study area were to instead develop as a residential development are outlined in Exhibit 4-35 and described below is as follows:

- Drivers for Police and Parks and Community Services are more strongly tied to residential development than other departmental functions. If commercial properties redevelop as residential, these costs would be expected to increase.
- Internal Services costs are a function of non-Internal Services operating costs and are expected to increase if commercial properties redevelop as residential, but to a lesser degree than Police and Parks and Community Services.
- Drivers for Fire, Planning and Building, and Public Works are less dependent on the distinction between commercial and residential properties and are not anticipated to be significantly impacted

if commercial properties redeveloped as residential. Operating costs are anticipated to be similar for both residential and commercial properties for Fire, Planning and Building, and Public Works costs.

Exhibit 4-35. Operating Cost Comparison, Commercial vs. Residential

Operating Cost Category	If Commercial is developed as Residential, costs would:
Fire	▬
Police	▲ ($$)
Planning and Building	▬
Parks and Community Services	▲ ($$)
Public Works	▬
Internal Services	▲ ($)

Legend

▬ Stay relatively similar

▲ ($) Go up a small amount

▲ ($$) Go up

5.0 Community Benefits Analysis

5.1 Community Benefits Framework

5.1.1 Study Goals and Purpose

Based on the findings of the DSEIS, the Kirkland City Council requested additional information to understand the costs and benefits associated with growth Alternatives for the Study Area. This section focuses on community benefits. In particular, it aims to answer the following questions:

- How can the public receive benefits of growth?
- How can development increase schools, affordable housing, open space, transit/bike/walk connections, and sustainability?

This section is broken into two parts. Section 5.2 reviews how the concept of residual land value analysis was used to study the potential for value capture associated with different scales and types of development in each Alternative. Section 5.3 identifies a series of policy options for capturing the value of development and providing community benefits as defined below.

5.1.2 Analysis Approach and Priority Benefits Studied

The analysis focused on five areas of community benefits to study. These were chosen based on community feedback, City Council and Planning Commission direction, and initial findings from the DSEIS and 2020 Opportunities and Challenges report.

Schools

As identified in the DSEIS, the levels of growth in each Alternative would require additional school capacity. Although school facilities are the responsibility of the Lake Washington School District, this analysis looked at opportunities for the City to help encourage innovative partnerships or other strategies for supporting the need for additional school capacity within the Study Area.

Parks & Public Realm

The City has identified the need for additional parks, open space, and public realm improvements to serve the additional housing and jobs assumed in each growth Alternative. This analysis focuses on strategies for providing new parks through both on-site facilities as part of development and standalone parks and other recreation opportunities.

Affordable Housing

Providing housing choices across a range of housing types, incomes, and needs has been identified as a priority throughout the Station Area planning process. This analysis looked at opportunities to generate funds to support affordable housing beyond the City's existing affordable housing regulations (such as

inclusionary zoning) as well as market-rate housing production, and other ways to address the current jobs/housing imbalance in the Station Area.

Sustainability

This analysis focused on how development can support a range of sustainability objectives, including carbon reduction, increased green infrastructure, and green building. This analysis focused on how development can support a range of sustainability strategies and objectives, including reduction of carbon emissions, increased green infrastructure, and green building.

Mobility

As part of an initial step in this supplemental study, additional transportation modeling was done to better understand the vehicular infrastructure needs for each growth Alternative. This portion of the analysis focused on additional mobility options, including cycling, walking, and transit use. As part of this work, a representative transportation improvements project list was developed to understand fiscal impacts of these improvements. This project list and associated costs and tradeoffs are covered in the Fiscal Impacts Study portion of this memo.

5.2 Understanding Potential for Value Capture to Deliver Community Benefits

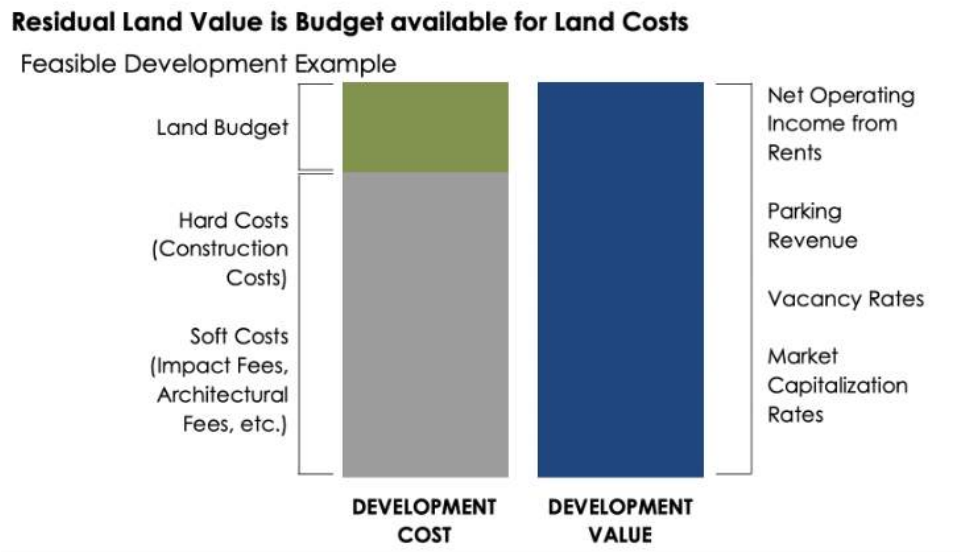
5.2.1 Approach

Certain public investments and regulatory changes can increase development potential and/or the value of existing development in the affected area. State and local governments have a number of mechanisms to "capture" the incremental real estate value created by public investments or regulatory changes to provide community benefits. These mechanisms are often modifications or extensions of existing public funding sources and requirements. They generally either impose fees or requirements to provide public benefits on new development (e.g., impact fees, affordability requirements) or derive revenue from occupancy and use of the completed development (e.g., property taxes, user fees).

Estimating Financial Feasibility of New Development Using Residual Land Value

To understand whether and to what degree the increased development entitlements considered in June Alternatives A and B create potential for value capture to provide additional community benefits, ECONorthwest used pro forma financial analysis to estimate the feasibility of the total allowed new development assumed in each Alternative. The analysis used the same development prototypes (realistic building forms and densities consistent with each Alternative's future land use assumptions) as the fiscal impacts analysis and the level of growth as established in the June Alternatives A and B as described above. The pro forma model estimates residual land value (RLV)—a developer's land budget—as an indicator of development feasibility. RLV reflects how much a developer would be willing to pay for land or a property intended for (re)development after considering the estimated value of the completed new development; typical development costs including demolition, design, construction, and local fees; and the typical investment returns needed to secure financing. This analysis did not include any proposed policy changes and assumed existing city impact fees and policies. This is illustrated in Exhibit 5-1.

Exhibit 5-1. Residual Land Value



Sources: ECONorthwest, 2021.

The RLV estimates offer a snapshot of what development feasibility looks like for the planned types of growth in the area based on typical development costs, estimated rents for new development, and approximate values of existing property. They are not intended to predict outcomes at a site level, for several reasons:

- Although site- and project-specific conditions can influence costs and return expectations, the pro forma model and RLV estimates are intended to reflect typical development conditions, rather than the specific conditions of individual developments. For example, development built for a single specific end-user often has different development feasibility criteria than development built to meet broader market demand for a certain type of space.
- The value of existing property is estimated based on the assessor's tax rolls—a readily available but imperfect predictor of market value.
- The development assumptions also can (and will) change over the planning period, but this analysis offers a point-in-time evaluation of what is financially feasible. In this case, residential and office rents were assumed to increase in the Study Area with the arrival of BRT and other public investments in the area and the increase in demand reflected by nearby recent developments. Thus, the anticipated market conditions for the Study Area are more like those currently found in other nearby urban centers (e.g., Bellevue) than today's rents within existing buildings in the Study Area. Depending on the timing of new development, market conditions may differ from those modeled for this analysis.

A prototype can be considered financially feasible for development if the RLV (the developer's land budget) exceeds the value of the existing property. In this situation, a developer can potentially reach a deal with the property owner if the property comes up for sale. If the RLV is lower than the value of a site, the project would not be financially feasible unless market conditions or investment return expectations change. However, RLV alone does not indicate that a property *will* redevelop, only that it *could* redevelop, if:

- The property owner decides to make the property available for sale and is willing to accept the estimated market value for the property.
- There is sufficient demand from the intended end user(s) of the new development to "absorb" the space as it is developed (this will tend to limit the amount of new construction at any given time).
- There is a developer with interest and ability to develop the type of space that is financially feasible and they face similar costs and financial return expectations as the typical values modeled.
- Other potential uses of the property (e.g., renovation/improvements to the existing building) would not be financially competitive with redevelopment.

Residual Land Value as an Indication of Potential for Community Benefits and Value Capture

If the RLV exceeds the estimated value of the existing property by a sufficient margin, this suggests that the new development may be able to bear the cost of providing additional public benefits and remain financially feasible. As shown in Exhibit 5-2, the remaining RLV after the actual cost of site acquisition is potentially negotiable between the property owner, developer/end user, and the public sector. However, some of this remainder is needed to provide the developer room to negotiate with the property owner to ensure a viable deal is possible. Seeking to "capture" all of this remaining value risks making development infeasible. If project-specific costs and revenues are known with some certainty, the public sector can have greater confidence pushing for greater degrees of value capture. However, because the analysis uses typical costs and market conditions and estimated values for existing property at a Station Area scale, the margin for error relative to a specific individual development is high. Given this, seeking to capture less of the remaining RLV is appropriate so that development remains feasible through fluctuating market conditions, escalating construction costs, or higher-than-expected site acquisition costs.

Exhibit 5-2. Residual Land Value

Sources: ECONorthwest, 2021.

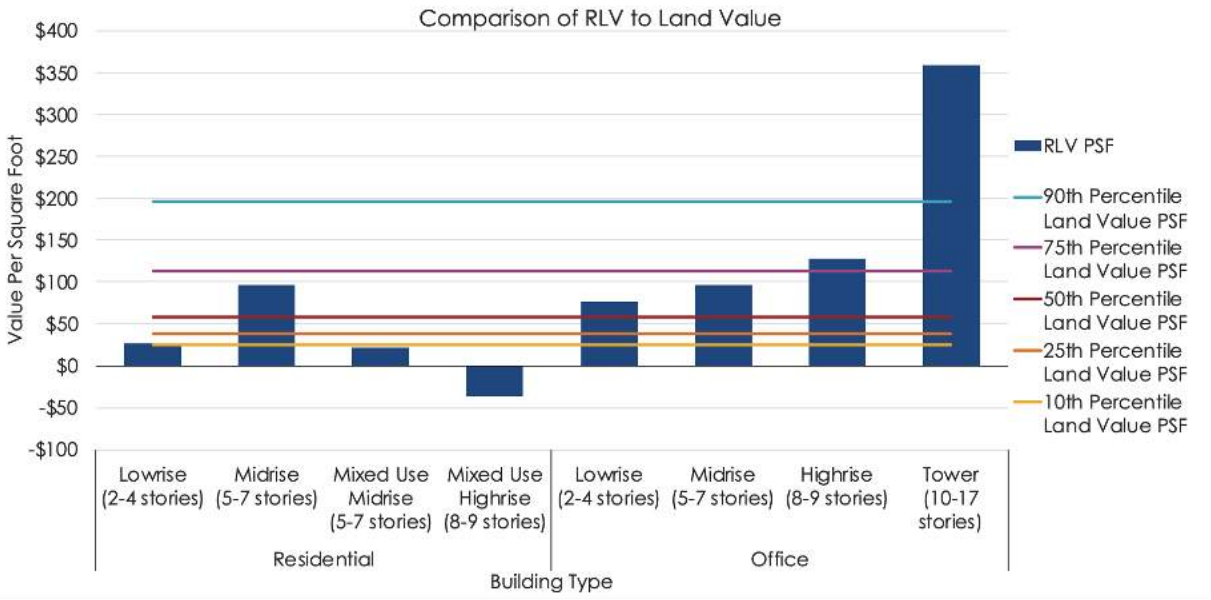
The analysis is intended to provide an indicator of which types and scales of development may be financially feasible enough to offer potential for value capture, not to calculate specific dollar amounts that could be captured from development. It is also beyond the scope of this project to calibrate specific mechanisms for community benefits/value capture.

5.2.2 RLV Alternatives Results

Results

ECONorthwest's analysis showed that RLV varies substantially by land use and scale, as shown in Exhibit 5-3. The dark blue bars indicate the RLV per square foot of land for various scales of residential and office development. The various colored lines indicate percentile thresholds of the value of the existing property in the commercial corridor of the Study Area on a per-square-foot basis.

Exhibit 5-3. Comparison of Residual Land Value to Land Value



Sources: ECONorthwest, 2021.

This shows:

- For residential development, midrise development (5-7 stories) without ground-floor commercial appears to be most feasible.
  - Lowrise development may be feasible in locations with lower land cost (vacant land, or within residential infill areas), but is unlikely to support redevelopment within the commercial corridor.
  - Including ground floor commercial in midrise residential ("Mixed Use Midrise") increases development costs to the point that development is less likely to be feasible.
  - Given the need to change to a different construction type under current building code, highrise residential development (8 or more stories) is not likely to be financially feasible under anticipated market conditions, even if land were free.
- For office development, feasibility increases with scale, so long as there is sufficient demand for high-end office space to support very large developments.
- Office development typically uses different construction types than residential development (steel, concrete, or sometimes mass timber), particularly for midrise development. Projected office rents in this area are high enough that value is projected to exceed costs even with these higher cost construction types.

These differences across land use and building scale are reflected in the approximate aggregate RLV of each Alternative, shown by the dark blue bar in Exhibit 5-4. The yellow bar shows the estimated total value of existing development on the sites identified for possible redevelopment in each Alternative. Where the yellow bar is larger than the blue bar, this means that although individual redevelopment and infill projects may be financially feasible and may have some potential for value capture, there are more sites where redevelopment is not financially feasible in the near-term, even without additional value capture measures. Where the blue bar is larger than the yellow bar, this suggests that there are more potential redevelopments where value capture may be possible near-term, or that those that are feasible have greater value capture potential.

The larger bars for non-residential development in Alternative B (Upper Bookend Alternative) reflect the greater financial feasibility of larger scale office development types. While these aggregate results point to the overall performance of different scales and types of development, it is important to note that they represent an approximate snapshot of the collective value capture potential of the development in each Alternative; they do not forecast development timing or account for project-specific conditions. For that reason, Alternative-level results are best understood as directional and order of magnitude results rather than specific dollar amounts that would be available for value capture.

- This preliminary analysis suggests substantially greater value capture from June Alternative B, with potential for tens of millions of value capture from feasible development, primarily from non-residential development in the northeast and southeast quadrants.
- There is likely to be little potential for value capture in the northwest and southwest quadrants in either June Alternative.
- Residential development is already subject to affordability requirements and is providing community benefits in the form of affordable housing units; while there may be additional potential for value capture, pushing this further could jeopardize feasibility for some residential development, which could result in less housing production subject to the existing inclusionary requirements for affordable housing.

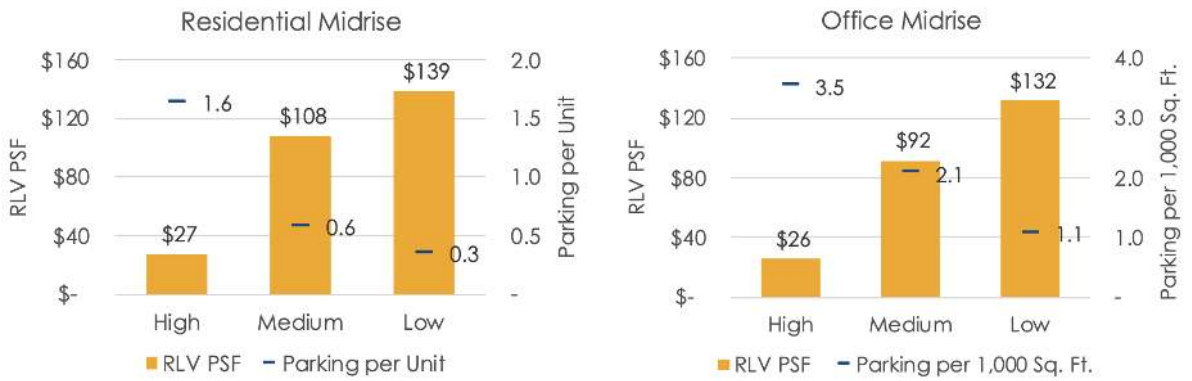
Exhibit 5-4. Summary of Residual Land Value

Sources: ECONorthwest, 2021.

Additional testing showed that RLV is also highly sensitive to parking ratio, as shown in Exhibit 5-5. The prototypes tested for Alternative B assume "Medium" parking ratios, which roughly reflect developers' desired parking ratios in this type of environment. In contrast the "High" parking ratios reflect current zoning. ("Low" parking ratios were tested for comparison but would require district parking strategies and/or changes to travel behavior to make these parking ratios viable in the market.)

- These results show that reducing parking requirements is an important part of creating potential for value capture in the Study Area.

Exhibit 5-5. Residual Land Value Sensitivity to Parking



Sources: ECONorthwest, 2021.

Summary of Key Findings

- Allowing tower-scale office buildings (10 or more stories) in the Study Area could create substantial potential for value capture, if there is sufficient demand to support multiple large-scale office developments.
- Office development in the 5- to 9-story range can also offer substantial potential for value capture, even if to a lesser degree than tower-scale buildings. This type of development could be feasible across much of the commercial portion of the Study Area, but the pace of office development will be limited by regional market demand and Kirkland's ability to absorb new development.
- Where midrise (5- to 7-story) residential development is feasible it may be able to provide some additional community benefits, in addition to the affordability set-asides that are already required. However, some of the areas identified for midrise residential use may not be feasible for redevelopment in the near-term and increasing affordability requirements or adding other costs as a means of value capture could delay redevelopment further on those sites.
- For both residential and non-residential development, reducing required parking ratios is an important aspect of the potential for value capture. Without such a reduction, the potential for value capture will be much less.
- This preliminary analysis shows the most value capture potential in Alternative B, with potential for tens of millions of dollars of additional value capture beyond Alternative A, primarily from non-residential development.

5.3 Community Benefits Strategies

As part of this analysis, a range of possible strategies were studied for their potential to realize benefits to the community from development. Based on this initial scan, the following strategies were identified as tools that could work well together as part of an overall framework for realizing community benefits for Kirkland in support of the Station Area Plan project objectives. The strategies that were identified as relevant to the project to achieve priority benefits identified by the City are described below.

5.3.1 Tax Increment Finance (TIF)

Overview

Tax Increment Financing (TIF) is a common tool in other states that was recently authorized by state legislation for the first time in Washington. TIF allows a jurisdiction to capture the future value of public investments and catalyze growth. In a typical TIF, a city designates a geographic area in which a public investment is needed. The city then freezes assessed values for that area for a finite time period (typically 15-25 years). Based on a project analysis that identifies the likely increase in assessed values in the TIF district after the investment, the city can issue bonds to raise the funds necessary to complete the infrastructure investment. In subsequent years, as increased revenues begin to accrue, the city uses those proceeds to service the debt.

This tool has been common in most states for many years but has not been widely used in Washington State. Recent legislation (ESHB 1189) removes previous limitations on TIF in Washington State. Some of the guidelines from that legislation include that no city can have more than 2 TIF areas at a time, no TIF can exceed a Base AV of $200 million or 20% total Jurisdiction assessed valuation (whichever is less), and the TIF district can last no more than 25 years. In addition, the city must make a finding that the provision of the infrastructure enables development to occur in a way that it would not have happened absent the infrastructure investment (this could include enabling the entire development or aspects of the scale and/or use of a project).

Community Benefit Potential

One of the advantages of a TIF is that it is a flexible tool, as long as the TIF-supported investment is publicly owned and is linked to community improvements and investment. It can be used to help catalyze development by supporting needed infrastructure improvements. This analysis has identified multi-benefit projects, parks, public realm, and mobility as the community benefits that would be the best candidates for a TIF.

Multi-Benefit Projects: Infrastructure projects that combine multiple benefits through improvements should be prioritized as TIF candidates. Some examples include transportation improvements that include linear open spaces or trail connections; or stormwater facilities that also provide parks or open space. A next step to identify such multi-benefit projects is to review the range of representative infrastructure improvements and seek areas of alignment. There may also be potential for other large representative infrastructure projects to be a good fit for a TIF. A review of gaps for such projects is warranted, to identify any further TIF candidates, especially if they are deemed important to catalyze future development.

Parks: While smaller open spaces and neighborhood parks can be provided through a density bonus program (see Section 5.3.3 Density Bonus and Baseline Requirements), larger community-serving parks

could be easier to provide through a TIF. The capital needs analysis indicated that current LOS would require 22 acres of community parks in the Station Area. The TIF could cover site acquisition and development costs. The City should also consider the potential of multi-benefit projects as TIF candidates, such as streetscape improvements inclusive of linear open spaces or trail connections which have been identified as aligned with Parks purpose and need for this area.

Transportation Infrastructure: There are several potential transportation projects that would support future development in line with Station Area Plan goals, including public realm improvements to 120th Ave NE that could be a part of a multi-benefit project, additional bicycle/pedestrian improvements to the interchange, and other road improvements.

Shared Facilities: As a newly enabled tool in Washington State, more study is needed to understand whether shared facilities with other agencies like the LWSD can be funded through a TIF. If possible, partnering with LWSD to address the need for additional school capacity could be a valuable use case, especially if this is a priority topic for the City.

Considerations for 85th SAP

- A TIF is most effective in areas that are most likely to have significant property value increases.
- Given the assessed value guidelines in the TIF legislation, only a subset of Study Area parcels could be included in a TIF. Note that the location of the investment does not have to fall within the TIF district (e.g., a water facility can be constructed outside the TIF district but serve the TIF district parcels). A preliminary review indicates that were all northeast and southeast areas of change indicated in June Alternative B to be included in a TIF district, that boundary would approach or slightly exceed the legislated $200 million assessed value limit.
- Improvements that are the best fit for a TIF are ones that are unlikely to happen through typical CIP, critical to make desired development possible, and ideally can provide multiple benefits.
- TIF districts are financed against projected future value of development, but the city is responsible for servicing the debt even if the projected development does not materialize. It is important to think carefully about how much growth is realistic and set the total TIF value accordingly.
- It is important to note that the incremental City property taxes from new development are reflected in the operating revenues in the fiscal analysis. If TIF is used to bond against those revenues, allowing improvements to be made in advance of the revenues being realized, this would reduce the operating surplus discussed earlier, but would allow infrastructure improvements to be made earlier in the timeframe.
- Based on the assumptions in other sections of this report, a preliminary estimate of potential TIF revenues under HB 1189 suggests that TIF may be able to support between $50 to $75 million (2021$ assuming 25 years of revenues discounted at 3.5%) in debt for infrastructure projects. These figures rely on the speculative plans for the timing, use, and scale of development in certain areas of development east of I-405 in the east quadrants.
- A TIF study would be the next step to determine an appropriate geographic area for a TIF, estimate potential revenue, and narrow specific projects that should be funded through a TIF.

5.3.2 Commercial Linkage Fees

Overview

Linkage fees "link" new development with the increased demand for affordable housing. These fees are typically charged to developers based on a per square foot fee established for specific uses like commercial or retail. Less commonly, linkage fees can be packaged with a Linkage Fee program as well. Fees as set are based on a nexus study that demonstrates the rationale and relationship between the development and the fee that is charged. Linkage fees are used widely throughout the U.S., particularly in communities facing acute housing pressures from rising land values and strong commercial development markets.

Community Benefit Potential

By collecting mandatory fees associated with commercial development, a community can generate the funds necessary to provide more housing options. Funds generated through linkage fees can support a wide range of housing goals, including family-friendly housing, workforce housing, affordable housing, supportive housing. Some examples of linkage fees and their outcomes include:

- **Seattle MHA Program:** This program charges a fee to commercial development and offers a fee-in-lieu option for residential inclusionary zoning requirements. Fees range from $7.64-$35.75 per sq ft for residential and $5.58-$16.17 for commercial depending on zoning and location. A recent report by the Seattle Office of Housing found that MHA has collected $96.1 million over a two-year period from 2019-2020 with contributions from 259 MHA-eligible projects.
- **Boston Commercial Linkage Program:** Boston, MA has one of the oldest and most robust commercial linkage programs in the country. Boston's linkage fee only applies to commercial developments over 100,000 square feet. Another important feature of Boston's program is that it dedicates a small portion of the fee to workforce development as well as affordable housing production.
- **Additional Commercial Linkage Fee Programs:** Linkage fees are common in many Bay Area cities facing housing pressure from commercial development such as San Francisco, Berkeley, San Jose, and Napa. Within the Puget Sound region, Bothell is in the process of developing commercial linkage fees.

Considerations for 85th SAP

- Potential revenue generation from a Commercial Linkage program would be dependent on a range of factors. These factors include the eventual amount and type of development that is built in the Station Area, City policies like required parking ratios, as well as the specific fee rates and policies of the potential Commercial Linkage program itself. Understanding that these factors would influence the total value capture potential, the amount of non-residential growth represented in June Alternative B may have the potential to generate in the range of $10-$50 million should all the allowed development capacity be built within the 23-year planning horizon. More analysis through a nexus study would be required to better evaluate potential policies and establish a linkage program.
- It is important to balance the need for additional housing while maintaining the development feasibility of commercial projects. A nexus study would be the next step to address this consideration

by showing the increase in demand for affordable housing that accompanies new non-residential development. As part of a nexus study, recommendations on fee schedules and policies would be developed.

- Set clear targets for affordable housing production by AMI, bedroom mix, and other parameters. Supporting workforce development programs may help to address the current jobs/housing imbalance within the Station Area. Similar to Boston's program, the City should consider a workforce development component of a potential linkage program which would allocate a portion of the fees collected toward workforce development programs.
- Look for opportunities to incentivize co-location of amenities like community rooms, childcare spaces, and small open spaces as a part of required active frontages or open spaces in Linkage program funded affordable housing development. This can serve to maximize community benefit of public investment, while not reducing the capacity of a particular site to maximize affordable housing provision. The Puget Sound Early Learning Facilities Fund is an example of an aligned program.
- Consider a linkage program as part of a larger housing policy framework that includes the City's current inclusionary zoning policies, MFTE policy, and other tools.

5.3.3 Density Bonus and Baseline Requirements

Overview

Density bonus programs, also known as incentive zoning programs, allow additional development in exchange for the developer providing community benefits. Under a typical density bonus program, new zoning establishes a base development allowance in each zone. Certain zones are eligible for an additional increase in development up to a maximum development amount. In exchange for this additional development, the developer provides public benefits through fee-in-lieu or direct provision of the amenity. In many density bonus programs, developers can select from a menu of benefits to provide on a points-based system, with specific point totals tied to specific development increases. This point-based approach has two benefits. First, it allows communities to accomplish several public benefit goals through a single program. City staff can weigh the value of different benefits to prioritize benefits based on need or value to the community. Second, this points-based approach provides flexibility for developers, which increases the likelihood they will participate in the program.

Community Benefit Potential

One of the advantages of a density bonus program is that it can support a number of different community benefits. This analysis identified parks, schools, and sustainability (including public realm improvements) as the benefits with the greatest potential to be realized through density bonus programs. Examples of the kinds of benefits that could be provided include:

Parks: Developers provide on-site open space or pay a fee into a parks fund. Density bonus programs have shown themselves to be particularly effective for small pocket parks, plazas, roof decks and other open spaces that can be integrated into large developments.

Schools: In land-constrained locations like the Study Area, applicants can provide educational space on-site. This can include childcare or educational space integrated into the development or by setting aside land for future school development.

Sustainability: Sustainability features and performance are one of the most common objectives to be incentivized through density bonus programs. Two approaches include listing specific sustainability features to be provided (green infrastructure, solar arrays, etc.) or identifying third-party sustainability certifications that can serve as demonstration of sustainability benefits (eg: LEED, WELL).

Mobility: Mobility and transportation demand management to support safe connections for people of all ages and abilities is a core value and project objective. A series of transportation demand management (TDM) strategies including policies and programs can be found in the Transportation Supplemental Study Appendix 1. These TDM strategies are recommended to be incorporated into June Alternative B to help manage representative infrastructure needs, improve mobility, and increase potential revenue capture. In reviewing these potential strategies, the City should consider which are appropriate as baseline requirements and which are best suited for development incentives.

Considerations for 85th SAP

- Identify which benefits are the highest priority, and establish a points system that reflects those priorities
- Base development standards should be calibrated so that all development is held to an acceptable minimum standard of public benefit provision through other strategies like mandatory impact fees and design standards. The City should consider modifications to existing policies as they establish baseline standards for the Station Area. This analysis found that topics including park LOS, active frontage definition, parking ratios or other transportation demand management strategies, and mid-block pedestrian connections should be considered.
- Bonus allowances should be calibrated so they create a sufficient incentive to attract participation from developers. Coordinate a comprehensive scan of existing and potential policy changes together with a Density Bonus Program.
- Analysis shows that current Park LOS would necessitate 15 acres of neighborhood parks in the Station Area. While smaller open spaces are a good candidate for base requirements and bonus incentives, the City should also consider shifting their park LOS policy away from per acre standards toward geographic equity of park access within walking distance and inclusion of school facilities and non-city parks in walking distance.
- School development parameters and needs as provided by Lake Washington School District should be considered for inclusion.
- Identify partnership opportunities to advance priority community benefits through program alignment or potential co-benefits. Possible topics that should be explored include Shared Use of community facilities and public open space, integrated early education and childcare facilities, workforce development and green infrastructure programs, as well as sustainability, climate action, and health and well-being initiatives.

Based on the current understanding of the City's priorities and objectives, the team prepared a potential structure of base requirements and bonus incentives for consideration in Exhibit 5-6.

Exhibit 5-6. Potential Structure of Base Requirements and Bonus Incentives.

Community Benefit	Baseline Examples	Bonus Examples	Notes
Affordable Housing	Existing inclusionary zoning requirements, Commercial linkage	Additional inclusionary units or fees	
Sustainability and Mobility	Existing landscape, stormwater code, and energy code standards; Basic third-party sustainability certifications aligned with market expectations; Basic Transportation Demand Management (TDM) strategies	More ambitious certification with third-party sustainability programs like LEED, Built Green, Passivhaus, Living Building Challenge, or similar; Tree canopy; off-site contributions to Tree canopy or Stream improvements; More ambitious energy code standards; Advanced Transportation Demand Management (TDM) strategies	Example strategies commonly included in green certification programs include energy reduction, green infrastructure, and sustainable materials. Example Transportation Demand Management Strategies include reduced parking provision, shared and paid parking, and provision of transit passes.
Schools & Community Amenities	Existing school impact fees	Provision of on-site educational, childcare, or community space	Requires coordination with LWSD and other aligned Early Education and community service providers
Public Realm	Existing setbacks and landscape standards, mid-block connections for large developments, active frontage on designated corridors	Plazas and other publicly accessible open and gathering places, Additional public realm improvements	Additional public realm improvements can include tree canopy, wider sidewalk areas, and bike/ped connections, as well as improvements to existing City open space to increase utility and accommodate additional users

Sources: Mithun, EcoNorthwest, Fehr and Peers, City of Kirkland, 2021

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6.0 Summary of Findings and Recommendations

6.1 Is the City's Station Area Vision Feasible?

The City must make significant capital investment under June Alternative A if the area develops under current trends. This Alternative does not generate much development project contribution to required infrastructure. June Alternative B: Transit-Connected Growth, however, creates an opportunity for the City to efficiently serve concentrated growth and more tools to make investments in public infrastructure and City operations.

To manage Alternative B successfully, the City will have to:

- Recognize that a variety of strategies will be required to balance the City's overall budget and Station Area needs.
- Take next steps to coordinate and implement Infrastructure and Services Investment strategies, including:
  - Utilize debt financing and potential rate increases to fund **sewer** and **water** infrastructure.
  - Address **parks** LOS and consider alternate delivery methods.
  - Obtain more direction from LWSD on what **school** capacity the District will need to accommodate more students and require that development addresses these needs.
- Take next steps to coordinate and implement Community Benefit strategies, including: TIF/District Financing for site acquisition and development; Baseline Requirements and Development Bonuses for a range of affordable housing, sustainability and mobility, schools and community amenities, and public realm benefits including providing on-site open space, educational or community space; fees-in-lieu; or partnership opportunities including Shared Use Agreements; and address parking policies to maximize potential benefit.

6.2 Recommendations

Based on the results of this analysis, which was conducted using existing City policies, the following recommendations are proposed as a framework for realizing fiscally sustainable infrastructure and services provision and the desired community benefits in the Study Area. These include a combination of existing policies and new policy changes that the City should consider as part of developing a preferred Plan Direction for the Station Area.

6.2.1 Potential Infrastructure-specific Financing and Community Benefit Strategies

Public Infrastructure and Services

In June Alternative B, Capital revenues are expected to cover capital costs for Transportation, Fire, Police Fleet, and municipal facilities [see more in Section 4.5.3 Capital Net Fiscal Impact By Capital Improvement Type (Alternative B)]. Potential strategies to address capital deficits for the remaining City

and other governmental services are described below. These include a blend of financing strategies and opportunities to leverage private investment through requirements and incentives.

Stormwater

Development of the Study Area under Alternative B will not produce negative stormwater impacts due to current mitigation requirements that will require developed parcels to install large detention systems to reduce the flow off their development and help existing flooding issues. The only proposed stormwater project within the Study Area consists of replacing 520 feet of pipe along 120th Ave NE with a smoother pipe material. This will increase capacity through the stormwater main line, helping in all scenarios.

Potential funding strategy. The City can use stormwater capital fund reserves to fill the $700,000 gap between the available stormwater facility charges and the infrastructure improvement cost in 2035.

Water

The City has committed to relocate the water main under I-405 at a cost of $7.8 million (YOE$) per WSDOT requirements due to the construction of the BRT in either Alternative. The remaining water improvements are projected to be built by development at a cost of $24.2 million. Although there is enough dedicated revenue generated cumulatively over the study period to cover the cost of the City-funded improvement, there will not be enough revenue available in the early years to cover the construction costs when they are anticipated to occur in 2027-2028.

Potential financing strategy. The City can issue a $10 million 20-year bond to cover the cost of the improvement and maintain an annual surplus. A bond of that amount and length is anticipated to result in annual debt payments of $685,000. Projected capital facility charge revenue and 7% of net new water utility revenue from growth in the Station Area are projected to be enough to cover the annual debt payments.

Sewer

The City needs to make many significant sewer improvements in either Alternative to support the additional flows from the Station Area. The total cost of the improvements over the study period are estimated to be $92.9 million, of which $14.8 million are anticipated to be funded by development. The remaining $78.1 million will need to be funded by the City. The City is anticipated to generate $24.4 million in sewer capital facility charges on new development in the Station Area that can be used to offset these costs, leaving a cumulative gap of $53.7 million over the study period.

Potential financing strategy. The City can fund sewer improvements with a combination of debt issuance and rate increases. Issuing a $60 million 30-year bond in 2035, resulting in $3.1 million annual debt payments, would cover the cost of needed sewer infrastructure improvements. To make annual debt payments, a rate increase on the overall base would be required, because there is not enough sewer capital facility charges or new sewer rate revenue from the Station Area to cover the payments. Because this investment is also required in Alternative A, where there are less dedicated revenues available to offset costs resulting in a larger City deficit, Alternative A requires a larger rate increase than Alternative B.

Community Facilities and Benefits

Parks

Under current target Levels of Service, some of which are acreage derived, the Parks capital needs under Alternative B are $160.0 million. The majority of those costs, 75.8%, are associated with the acquisition and development of 15 acres of neighborhood parks and 22 acres of community parks, calculated under current LOS guidelines and are likely infeasible in the Station Area. The growth in the Station Area will generate some dedicated revenue that can be used to offset these costs ($31.0 million in parks impact fees and $35.4 million in REET 1) but it will not be enough to cover the costs and will result in a cumulative gap of $93.5 million over the study period.

Potential financing strategy. Consider using a portion of the $80.0 million remaining in general government operating surplus to offset costs. This strategy alone will not address parks capital needs.

Other potential strategies:

- **Policy changes**: Consider alternative non-acreage derived LOS guidelines more appropriate for urban centers, such as shifting the standards to geographic equity of park access within walking distance and inclusion of school facilities and non-City parks.
- **Leverage public assets and partnerships:**
  - Explore the ability of needed and planned infrastructure investments in the **public right-of-way**, including street and utility improvements, to offer **multiple benefits** and contribute to parks and open space. A multi-faceted streetscape improvement can easily incorporate linear parks.
  - **Leverage existing spaces.** Enhance existing neighborhood parks, open space around Forbes Lake, and Cross Kirkland Corridor with needed amenities to increase capacity (expand playgrounds, use vegetation to create intentional spaces for use and division of space).
  - Inventory **existing publicly owned parcels** for potential to support open space objectives. Identify parcels for neighborhood needs to support amenities like playgrounds, picnic areas, walking paths (multiple smaller parcels, parcels that allow for one or two amenities versus several in the same location).
  - Explore **clover leaf space** more for stormwater/natural areas/sustainable landscape areas.
  - **Shared Use** agreements to leverage existing park and recreation spaces for public use. Maintain existing Shared Use agreements and explore expanding these to maximize the use of existing or future community assets.
- **Community Park options:**
  - A series of strategies could support a larger park. This has been identified as one of the top candidate project types for a potential TIF district. In addition, there may be potential for Shared Use agreements to help satisfy Community Park needs.
  - Support complete re-design of Peter Kirk Park, including teen space, senior space, renovation of existing amenities, addition of new amenities.

- Support re-design of community parks to increase capacity for athletics, such as converting grass fields to synthetic or diamond to rectangular, add lights at sports fields and courts, additional amenities.
- Acquisition of Taylor Fields to support addition of amenities as identified in PROS plan (or long-term use given that the site is a closed landfill).

- **Development requirements and development bonuses** show potential to provide smaller scale publicly accessible open spaces and trail connections.
  - In-building or rooftop urban park amenities
  - Linear parks for safe pathways.
  - Pocket parks, including rooftop parks.
  - Dog parks, including rooftop parks.

It should be noted in the next steps that the Station Area would be subject to any voted Parks funding measures to address overall parks system needs.

Affordable Housing

Based on existing Inclusionary Zoning requirements, development of the Study Area under Alternative A will produce minimal new affordable housing units, and Alternative B has the potential to produce between 400 and 1,200 new affordable housing units, if all allowed development is feasible, by the end of the 23-year study period.

Potential community benefit strategy. A commercial linkage program is the primary new strategy recommended to maximize affordable housing objectives, which would go beyond the City's existing Inclusionary Zoning requirements for residential development. The Residual Land Value analysis determined that a Commercial Linkage Program has merit, with greatest potential for value capture for commercial development, and increasing value potential in 10+ story development compared with 5-9 story development. Mid-rise residential is not feasible everywhere in the near term, and additional affordability requirements or other value capture costs may delay development, which could result in less housing production subject to the inclusionary requirements. Parking policies should be reviewed and addressed to maximize potential for benefit. If the City did want to pursue increasing the existing Inclusionary Zoning requirements for affordable housing, it would be important to monitor how the policy change influences production. Finally, due to the existing jobs/housing imbalance in the Study Area, the City should consider allocating a portion of the Linkage Fees toward a workforce development program. As noted in the following section, next steps to pursue this strategy would include further coordination with other policy changes and a nexus study demonstrates the rationale and relationship between the development and the fee that is charged.

Mobility

White not an explicit study topic, the ability for people of all ages and abilities to easily navigate the Station Area will improve community well-being, sustainability, and resilience. It is also directly related to the project's objective to leverage the regional transit investment. Further, making policy and program changes to support transportation demand management (TDM) will facilitate development feasibility and the potential for value capture to be realized for community benefit. Mobility-related policy and program changes can accrue multiple benefits. The City should identify and prioritize multi-benefit

project opportunities and consider them as part of a TIF strategy, especially right-of-way projects where mobility and infrastructure needs overlap. The City should also consider the following baseline or incentive-based transportation demand management (TDM) changes within the Station Area as described in the Transportation Supplemental Study, Appendix 1: parking ratio reductions, unbundled and paid parking, requirements for large employers or multi-family properties to provide transit pass subsidies, managed parking strategies, TNC ridesharing programs, bikeshare or micro mobility programs, and shared off-street parking.

Sustainability

Baseline requirements and density bonuses are the recommended strategies to achieve sustainability features and performance within the Station Area, through third-party green building certifications, energy, landscape, and stormwater standards, as well as tree canopy and stream improvements. The City should consider how these goals would fit into a menu-approach and which levels of performance or features are desirable as baseline requirements or as density bonus incentives, and any needed policy adjustments to support this. They should also explore the potential for partnerships around sustainability, climate action, health and well-being initiatives.

Schools

Under either Alternative, the City will need to help the Lake Washington School District solve for additional school population. Initial estimates are that school capacity will need to increase by 153 students under Alternative A and 936 students under Alternative B. In addition, the community as well as Lake Washington School District have articulated an existing and growing need for childcare and early learning and education facilities.

Although the fiscal impact analysis did not estimate costs for Lake Washington School District, as they are a separate governmental entity from the City, the analysis did estimate anticipated revenues from school impact fees. It is estimated that there will be $24.6 million in school impact fee revenue available for school capital needs in Alternative B. EcoNorthwest estimated that if the LWSD Capital Levy currently scheduled to expire in 2022 were to be extended throughout the life of this study period, it could raise as much as $53.9 million in the Station Area.

Potential community benefit strategies:

- In land-constrained locations like the Study Area, consider requirements or development bonuses for developments to provide space on-site. This can include educational and childcare space integrated into the development (most common for early learning, pre-K and specialized programs like STEM) or by setting aside land for future school development.
- Consider policy changes to define active frontages or required retail space to include educational, childcare, and community-serving spaces in order to implement a Development Bonus strategy.
- Explore partnership opportunities to align programs, such as Joint/Shared Use Agreements that broaden access to community-serving facilities.
- Consider increasing allowed development capacity on existing underutilized public parcels to support future development of new school space.

6.2.2 Recommended Next Steps

A **Public Infrastructure and Services Investment Framework** will be critical to catalyze transit-connected development and can help support coordination and implementation of various strategies.

- Identify **baseline requirements** for project-level infrastructure and contributions to the Station Area. Potential for value capture will be related to some policy changes, including reduced parking ratios and unbundling, modifying parks LOS methodologies to move toward geographic equity and inclusion of shared use facilities. **Next step:** Coordinate a comprehensive scan of existing and potential policy changes together with a Density Bonus Program. Base development standards should be calibrated so that all development is held to an acceptable minimum standard of public benefit provision through other strategies like mandatory impact fees and design standards.
- Use a **TIF District** to finance large, area-wide investments like streetscape improvements, major park, and potentially support additional school capacity and other infrastructure needs. **Next steps:** Conduct a TIF analysis, testing scenarios for TIF boundaries and projected revenues over time including development feasibility, identify target improvements. A Phase 1. TIF Strategy that looks at the TIF area, potential revenue, and eligible projects would cost about $20k and take about three months. This should be paired project feasibility and conceptual study could range from $40-70k depending on the number and extent of candidate projects. A Phase 2. TIF Implementation Study would create the district itself, and cost about $40k over six to nine months. This will rely on supporting 30% design/engineering of TIF projects, and the costs and timeframe for this work is highly dependent on which projects are selected.

A **Community Benefits Policy Framework** can then support community benefits provisions through coordination and implementation of various strategies.

- Establish and confirm **baseline requirements** for affordable housing by maintaining existing inclusionary zoning, and consider sustainability measures, active frontages, and public realm improvements. Base development standards should be calibrated so that all development is held to an acceptable minimum standard of public benefit provision through other strategies like mandatory impact fees and design standards.
- Identify **partnership opportunities** to advance priority community benefits through program alignment or potential co-benefits. **Next steps:** The project team could create a partnership opportunities inventory and the City could use this as a base to conduct outreach to potential stakeholders on topics including the possibilities of Shared Use of community facilities and open space, integrated early education facilities, workforce development and green infrastructure programs. This work could be documented in the Final Station Area Plan.
- Develop a **Density Bonus Program** that can capture the value of more density for the community, particularly considering smaller publicly accessible open spaces, on-site educational and community facilities, transportation demand management (TDM) /Mobility measures, and additional sustainability measures. **Next steps:** Conduct a comprehensive scan of existing and potential policies together to establish base/bonus development allowances for zoning and develop a points-based system of benefits. Bonus allowances should be calibrated so they create a sufficient incentive to attract participation from developers. Coordinate with Lake Washington School District and other

aligned Early Education or Community Service providers regarding a potential incentive program for development to provide integrated educational spaces within projects. Defining base and bonus entitlements could occur within the Form Based Code development during later stages of planning. Either the City or a consultant could complete supplemental work to develop the points-based system that would implement these standards. For a consultant, it may cost about $50k and could take about three months.

- Implement a mandatory **Commercial Linkage Fee** to address affordable housing and workforce development, leaving room for the density bonus system. This should work in partnership with other affordable housing strategies like the City's existing inclusionary zoning policies and state MFTE program. **Next step:** Complete a nexus study to determine fees and consider workforce development allocation. A nexus study would cost $50-60k and would take from six to nine months, depending on how the City wants to engage with key stakeholders.

Appendices

1. Transportation Supplemental Study
2. Water and Sewer Supplemental Study
3. Stormwater Supplemental Study

Representative Infrastructure Studies

(Published October 2021)

Appendix 1. Supplemental Transportation Study

This Study is an Appendix to the **NE 85th Street Station Area Plan project** **Fiscal Impacts and Community Benefits Analysis Study Technical Memo (Technical Memo).** The Station Area Fiscal Impacts and Community Benefits Analysis was scoped to answer this question: If the City were to implement its vision of the Station Area as a thriving, walkable urban center with plentiful affordable housing, jobs, sustainable development, and shops and restaurants linked by transit, can the City afford the investments necessary to address increased demand on public services, especially schools, parks/open spaces, transportation, and utilities, and avoid a reduction in service for existing community members and businesses?

Study Purpose

To support the Technical Memo's assumptions, planning level **Representative Infrastructure Studies** were conducted to determine a set of representative infrastructure investments needed to maintain service levels in transportation, water and sewer, and stormwater, in alignment with the full 23-year buildout scenarios described for the two key development alternatives analyzed in the Technical Memo – June Alternatives A and B. The purpose of the Infrastructure Studies was to inform an understanding of area-wide representative infrastructure and service needs and costs and for incorporation as assumptions in the fiscal analysis. Note that as "representative infrastructure," these identified investments are ones that are likely to be similar in scale and type to those needed to support future Station Area development, but are likely to differ somewhat from the specific infrastructure investments that will ultimately be adopted for the Station Area. Information about the Representative Infrastructure Studies is presented in Section 3 of the Fiscal Impacts and Community Benefits Technical Memo. The Fiscal Impact model assigns all representative infrastructure investments either to development projects or to the City, roughly following City policy. Any assumptions about parcel- and quadrant-level development and phasing included in the studies are hypothetical and not meant to presuppose decision- making by private landowners or the actions of the market. The representative investments identified in the Infrastructure Studies are distinct from and should not be construed as preferred plan recommendations or final project configurations, which will be developed in later stages of planning and are subject to City Council approval.

Key Contacts

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Consultant Project Lead: Mithun

Fiscal Impacts and Community Benefits Supplemental Study Technical Memo

Lead Author: BERK; Contributors: EcoNorthwest, Fehr and Peers, Mithun

Representative Infrastructure Studies

Appendix 1. Supplemental Transportation Study Lead Author: Fehr and Peers

Appendix 2. Supplemental Water and Sewer Study Lead Author: RH2

Appendix 3. Supplemental Stormwater Memo Lead Author: RKI

FEHR PEERS

Memorandum

Date: October 12, 2021

To: Allison Zike, Jeremy McMahan, Joel Pfundt, and Thang Nguyen, City of Kirkland

CC: Erin Christensen Ishizaki, Brad Barnett, and Becca Book, Mithun

From: Kendra Breiland and Team, Fehr & Peers

Subject: Kirkland 85th Station Area Plan – Supplemental Transportation Summary

SE20-0719.01

As part of the Mithun project team, Fehr & Peers is supporting the City of Kirkland in providing supplemental information to understand the community benefits, tradeoffs, and fiscal impacts of different alternatives for the I-405/NE 85th Street Station Area Plan (SAP) from the perspective of transportation. This memo and attached exhibits present the findings of our analysis, spanning the following topics:

- Travel modeling for the two new future year alternatives: June Alternatives A and B
- Traffic operations analysis for June Alternatives A and B within the study area, including interchange operations
- Transit analysis for June Alternatives A and B
- Analysis of the comfort of facilities for people walking and biking in the study area with existing and committed[1] transportation investments and how that could change with recommended investments for the SAP
- Analysis of how far people can comfortably walk or bike within 5, 10, and 15-minutes of the proposed station with existing and committed transportation investments and how that could change with recommended investments for the SAP
- Potential package of investment strategies to support full implementation of June Alternatives A and B:
    - Roadway geometric & operational changes
    - Implementation of a robust transportation demand management strategy
    - Transit access & speed and reliability considerations

[1] Committed projects are transportation infrastructure, such as sidewalks, trails, and bike lanes that are likely to move forward independent of the 85th Street Station Area Plan.

- System improvements to improve conditions for walking and biking

This memo has been revised based on feedback from City staff and the Transportation Commission on the merits of the proposed package of investment strategies in meeting the City's vision for the SAP.

Land Use Discussion

Based on public comment and community feedback, a charrette held with City staff in May, and guidance from the City Council and Planning Commission, two alternatives were developed (known as the June Alternatives). These June Alternatives narrow the range of alternatives studied in the DSEIS in the following ways:

- Remove the level of growth shown in DSEIS Alternative 3 from further consideration
- Use a revised version of DSEIS Alternative 1 as the lower limit of growth to be studied (June Alternative A: Current Trends)
- Use a reduced version of DSEIS Alternative 2 as the upper limit of growth to be studied (June Alternative B: Transit Connected Growth)

These scenarios represent a range of possibilities to be studied for the Station Area, defined by the total potential growth in employment and residential housing units that the City of Kirkland could plan for over the next two decades.

June Alternative A: Current Trends

This alternative maintains existing zoning heights throughout the district and slightly adjusts the assumed 2044 growth projections to reflect current market trends, showing more jobs, and only slightly more housing than DSEIS Alternative 1 (**Exhibit 1**). The additional jobs were studied in portions of the study area currently zoned for more intensive development.

Exhibit 1: June Alternative A "Current Trends" (Growth through 2044)

Quadrant	Households	Employment
NW	515	1,164
NE	1,104	3,918
SW	710	3,787
SE	600	3,449
Totals	**2,929**	**12,317**

Source: Mithun/EcoNW, 2021

June Alternative B: Transit Connected Growth

This alternative is aligned with the overall SAP growth framework in the Initial Concepts and incorporates elements shown in the commercial corridors of DSEIS Alternative 3 into the overall land use pattern established in DSEIS Alternative 2. The intent of this strategy is to:

- Optimize for workforce and affordable housing, in particular the number of units provided through linkage fees and/or inclusionary zoning.
- Attract new jobs to foster economic activity and meet Citywide targets.
- Balance the distribution of commercial-focused development across the study area.
- Foster an environmentally-sound land use pattern that helps achieve the City's sustainability goals.

June Alternative B responds to the public comment heard during the DSEIS comment period and the May 26, 2021 Council Listening Session. Although a wide range of comments were shared, many participants reiterated a desire to maintain existing residential character, and concerns regarding the maximum allowable zoning heights proposed in DSEIS Alternative 3. June Alternative B only studies increased allowable heights in areas that provide clear benefits to the community and take advantage of regional transit connections. To that end, several areas where height increases had been proposed as part of DSEIS Alternative 2 and 3 have been removed from consideration in this alternative. These include areas that are unlikely to redevelop due to market forces, are limited by development feasibility, or are constrained by other considerations.

This alternative results in similar household growth to DSEIS Alternative 2, but lower overall employment, showing a better jobs-housing balance (**Exhibit 2**). The Southwest Quadrant has lower growth numbers, closer to what was proposed for DSEIS Alternative 1.

Exhibit 2: June Alternative B "Transit Connected Growth" (Growth through 2044)

Quadrant	Households	Employment
NW	568	1,561
NE	2,670	8,660
SW	916	3,356
SE	3,998	9,174
Totals	**8,152**	**22,751**

Source: Mithun/EcoNW, 2021

Overall Objectives for Both Alternatives

For both June Alternatives, the project team has been charged with identifying necessary infrastructure and policies that support achieving the following objectives related to transportation:

- Preserve the functionality of NE 85th Street, while enhancing and expanding its role as an urban, multimodal street.
- Incorporate transportation improvements that preserve community character, including minimizing significant changes such as road widening in areas outside of where proposed growth is occurring.
- Accommodate transit effectively along NE 85th Street and other streets in the study area.
- Establish a low-street priority bike and pedestrian network that serves the full study area

The remainder of this memo describes the travel modeling and mobility analysis conducted to identify a transportation system that would achieve these objectives.

Travel Demand Modeling and Forecasting

Fehr & Peers incorporated land use assumptions for future alternatives in the Bellevue-Kirkland-Redmond (BKR) travel demand model to fully capture the resulting impact on traffic operations in the station area. The alternatives considered in the travel modeling include:

- 2035 No Action Alternative from the DSEIS
- 2044 Alternative 2 from the DSEIS
- 2044 June Alternative A (identified by Kirkland City Council in June 2021)
- 2044 June Alternative B (identified by Kirkland City Council in June 2021)

As discussed in the prior section, June Alternative A represents 2044 conditions with similar development patterns to the 2035 No Action Alternative. Similarly, June Alternative B represents 2044 conditions but with greatly increased office employment and housing in the study area relative to the No Action Alternative. June Alternative B represents a refinement to Alternative 2, which was evaluated in the DSEIS.

The BKR travel demand model was used to develop traffic volume forecasts for future alternatives based on the transportation infrastructure envisioned in the 2035 Comprehensive Plan and respective land use forecasts. Prior to the modeling process, MXD+, a trip generation tool that accounts for the variation in land use type and density, provided estimates of new vehicle trips for the future alternatives. **Exhibit 3** shows the net new vehicle trips for each alternative by quadrant of the station area, as well as the single occupancy vehicle (SOV), carpool, and transit mode share estimates in the BKR travel model for each scenario. Of note, while the mode share estimates are relatively similar among future year alternatives (due to consistent assumptions about transit

services and parking charges in the BKR travel model), the number of vehicle and transit trips vary greatly due to the differences in development intensity assumed under each alternative.

Exhibit 3: PM Peak Hour Vehicle Trip Generation using MXD+/BKR Model Mode Share Estimates

Quadrants	2035 No Action	2044 Alternative A	2044 Alternative B	2044 Alternative 2
NW	930	930	1,280	1,000
NE	3,850	4,480	4,920	10,110
SW	1,910	1,850	2,360	2,190
SE	3,630	3,880	7,580	4,300
Total	**10,320**	**11,140**	**16,140**	**17,600**
Mode Share Estimates (SOV/Carpool/Transit)	70%/23%/7%	70%/22%/8%	71%/21%/8%	72%/21%/7%

Source: Fehr & Peers, 2021

Consistent with land use trends, Alternative A includes modest growth in vehicle trips in the NE and SE quadrants. The total vehicle trips generated by Alternative B and Alternative 2 are similar; however, there is a substantial shift in which quadrants the land use growth is located (from NE to SE). These results were used to calibrate the BKR travel demand model to reflect similar growth in trips. Additional adjustments were also made to the BKR travel demand model for adequate distribution of trips, particularly trips accessing the Lee Johnson site. **Exhibits 4 and 5** show the modeled increase in roadway volumes that would occur under Alternative 2 and Alternative B relative to the No Action Alternative. As the exhibits show, Alternative B features a more even distribution of trips than Alternative 2.

Exhibit 4: Traffic Volume Increase (2035 No Action vs. 2044 Alternative 2)

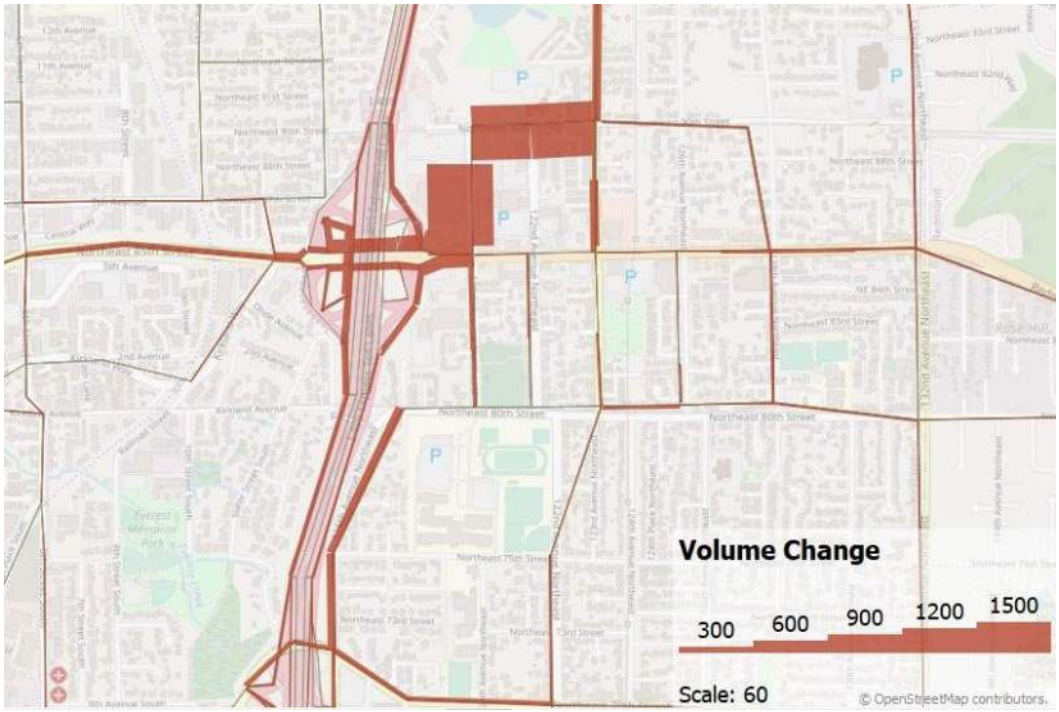
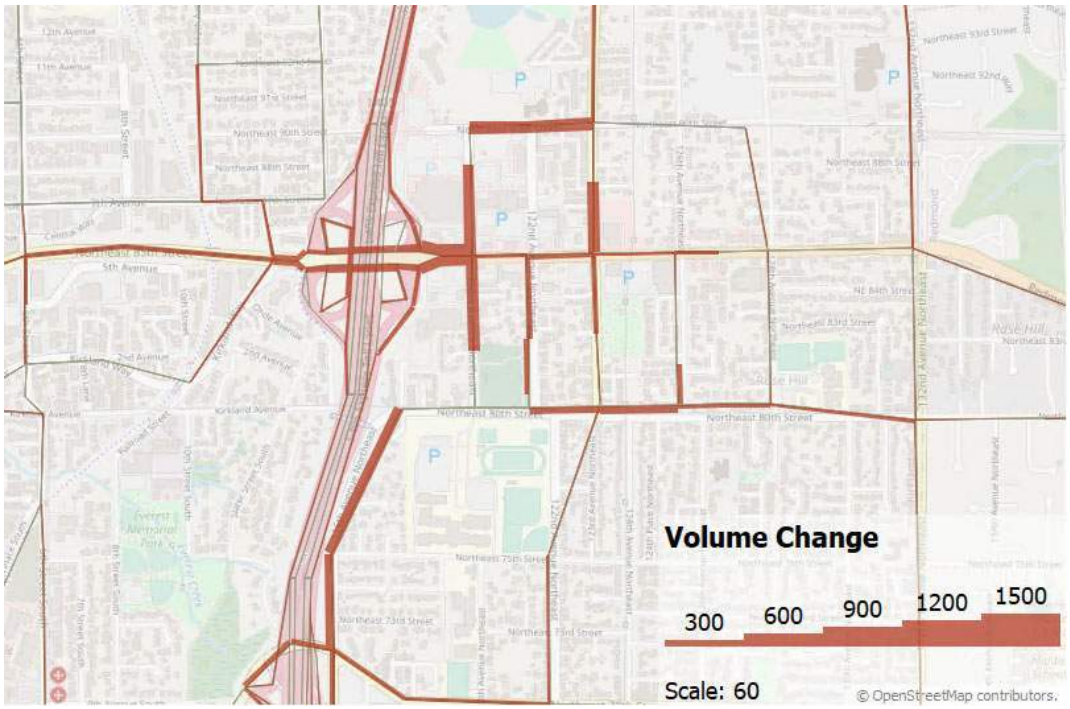


Exhibit 5: Traffic Volume Increase (2035 No Action vs. 2044 Alternative B)



Traffic volume forecasts from the refined versions of the BKR model were then used to evaluate traffic operations at the following intersections (**Exhibit 6a**):

1. NE 90th Street & 124th Avenue NE (Intersection 8 in DSEIS)
2. NE 85th Street & 6th Avenue NE (Intersection 1 in DSEIS)
3. NE 85th Street & 120th Avenue NE (Intersection 6 in DSEIS)
4. NE 85th Street & 124th Avenue NE (Intersection 9 in DSEIS)
5. NE 83rd Street & 120th Avenue NE
6. NE 80th Street & 118th Avenue NE
7. NE 80th Street & 122nd Avenue NE
8. NE 70th Street & 116th Avenue NE

Exhibit 6b shows the original list of intersections evaluated in the DSEIS.

Exhibit 6a: Supplemental Study Intersections

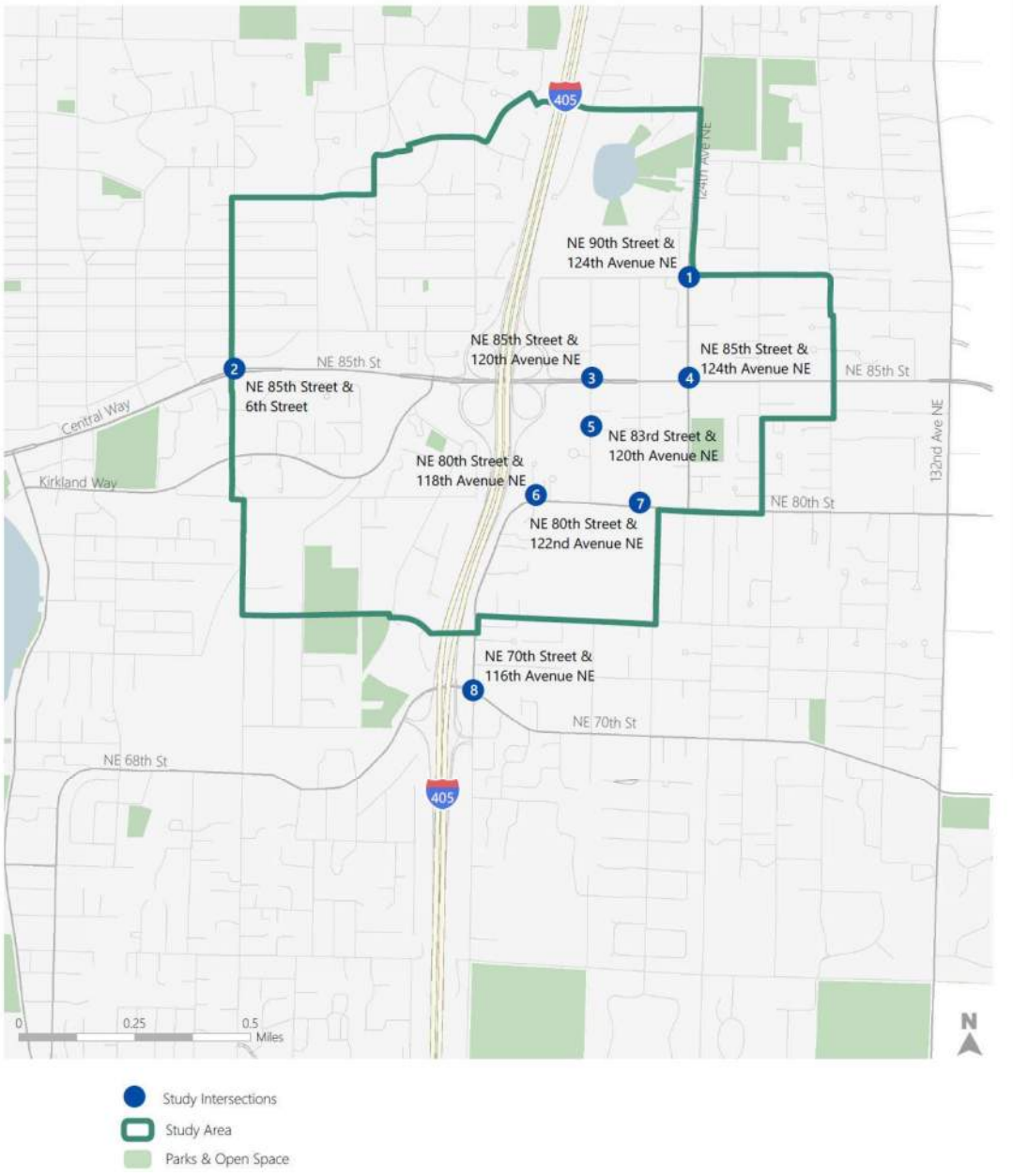
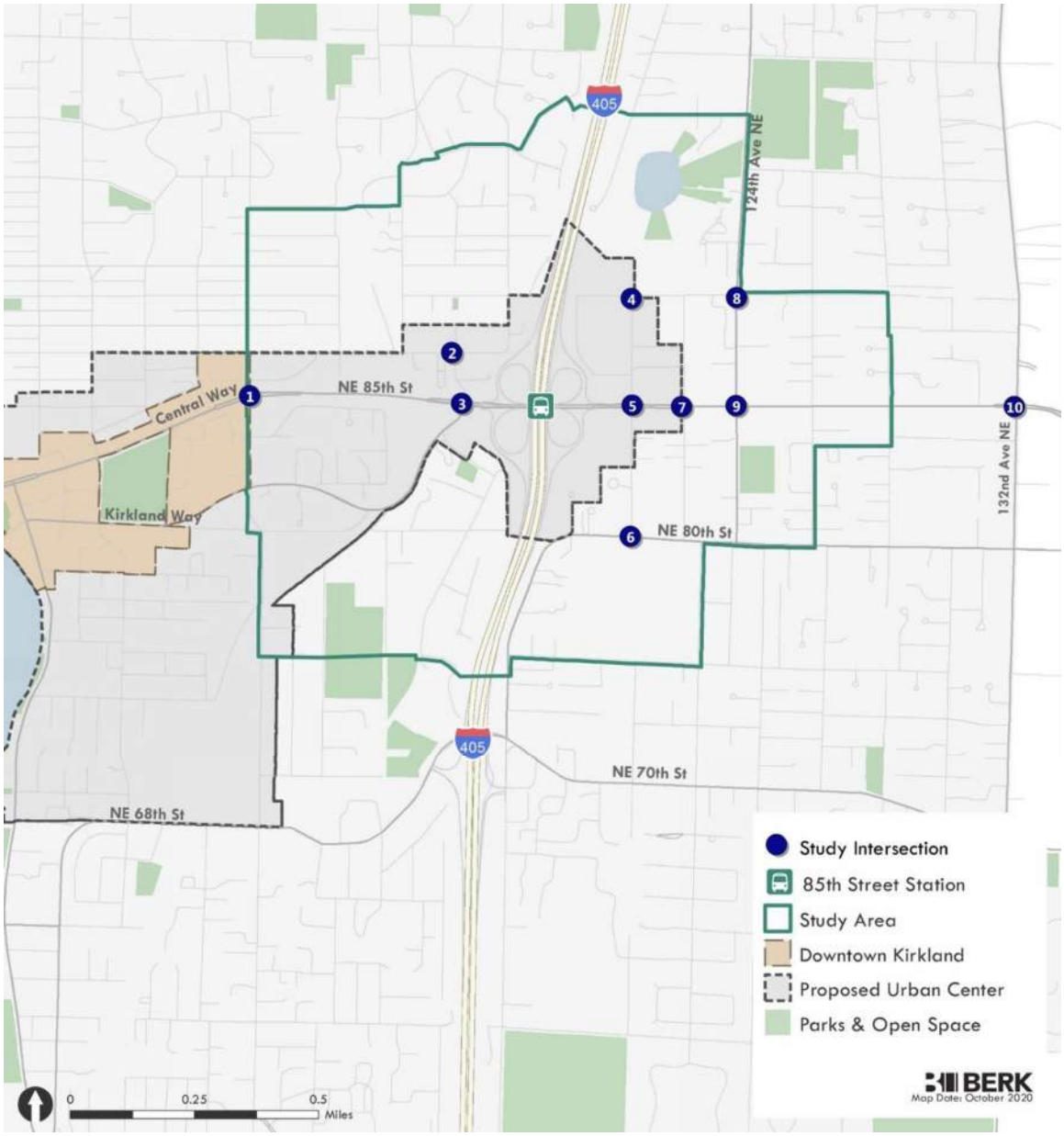


Exhibit 6b: Study Intersections Originally Considered in the DSEIS



Intersection Level of Service

Intersection level of service (LOS) is a concept used to describe traffic operations from the driver's perspective. LOS is defined by intersection delay in seconds and ranges from LOS A with no congestion and little delay to LOS F with substantial congestion and delay. Traffic operations were analyzed using the Synchro 10 software package and Highway Capacity Manual (HCM) 6th Edition methodology. We performed PM peak hour analysis for all intersections shown in **Exhibit 6a**, and AM peak hour analysis was exclusive to two intersections (NE 85th Street & 120th Avenue NE and

NE 85th Street & 124th Avenue NE). The project team modeled the existing (2019) conditions and each of the future alternatives bulleted below.

- 2044 Alternative A
- 2044 Alternative B
- 2044 Alternative 2

The modeled Synchro networks reflect traffic volumes (passenger vehicles, heavy vehicles, and pedestrian and bicycle counts) and roadway network assumptions, including segment and intersection geometry and signal timings that align with each scenario. For signalized and all-way stop controlled intersections, LOS is based on the average delay of all movements. For side street stop-controlled intersections, LOS is based on the movement with the highest delay. **Exhibit 7** summarizes the LOS and delay thresholds specified in the Highway Capacity Manual, which is a standard methodology for measuring intersection performance.

Exhibit 7: LOS and Delay Thresholds for Signalized and Unsignalized Intersections

LOS	Signalized Intersections (Delay in Seconds)	Unsignalized Intersections (Delay in Seconds)
A	≤ 10	≤ 10
B	> 10 to 20	> 10 to 15
C	> 20 to 35	> 15 to 25
D	> 35 to 55	> 25 to 35
E	> 55 to 80	> 35 to 50
F	> 80	> 50

Source: Highway Capacity Manual (Transportation Research Board), 2016.

Findings

Exhibit 8 reports the findings of the intersection analysis conducted by the methodologies described above. Key findings include:

- All study intersections are currently operating within the City's or WSDOT's standards.
- Under Alternative A, which represents current growth trends continuing through 2044, the following intersections would fail to meet adopted LOS standards:
    - **NE 90th Street & 124th Avenue NE:** this intersection would operate at LOS F due to land use growth anticipated in the NE quadrant and the lack of streets connecting north of NE 90th Street.

- **NE 85th Street & 6th Street:** this intersection will operate at LOS F under all future year alternatives due to planned modifications to better accommodate transit, walking, and biking modes.

- Alternative B considered two transportation scenarios for the southeast quadrant, with allowed development at 250 feet maximum height:
  - The first assumes only one general access driveway[2] to the Lee Johnson site via NE 83rd Street to a signalized intersection with 120th Avenue NE;
  - The second scenario considers the same access as above, plus an additional south access to the site along 118th Avenue NE, which connects to 80th Street NE with a newly signalized intersection.
- The reconfiguration of land use growth in Alternative B would substantially improve intersection operations relative to Alternative 2. However, the land use growth envisioned by this alternative would increase vehicle trips on the roadway network (compared to existing conditions or Alternative A/No Action scenario) such that the following intersections would not meet adopted LOS standards under Alternative B:
  - **NE 85th Street & 6th Street:** this intersection will operate at LOS under all future year alternatives due to planned modifications to better accommodate transit, walking, and biking modes. Moreover, additional growth throughout the SAP would result in higher delays than are anticipated for Alternative A.
  - **NE 85th Street & 120th Avenue NE:** this intersection could not meet City standards without mitigation, as this is the main access point for growth in the SE quadrant.
  - **NE 90th Street & 124th Avenue NE:** this intersection could not meet City standards without mitigation, as this is the main access point for growth in the NE quadrant.
  - **NE 83rd Avenue & 120th Avenue NE:** under the scenario in which this intersection serves as the only general access to the Lee Johnson site, it will require signalization (as assumed) as well as additional lanes.
  - **NE 80th Street & 120th Avenue NE:** under the scenario in which only one general access is provided to the Lee Johnson site along NE 83rd Avenue, increased traffic through this intersection would result in LOS F delays without mitigation.
  - **80th Street & 118th Avenue NE**: similarly, under a single access point scenario to the Lee Johnson site, this intersection would also be impacted by additional traffic along 80th Street, although it is unclear whether a signal would be warranted to address the side street delay.

[2] Assumes the Lee Johnson site's direct access to NE 85th Street would be limited to a controlled access point for select trip or vehicle-types.

Exhibit 8: LOS Results for Evaluated Alternatives (Without Mitigation)

ID	Intersection	LOS Standard	Peak Hour	2019 Existing	2044 Alternative A	2044 Alternative B-1: 2 Driveways	2044 Alternative B-2: 1 Driveway	2044 Alternative 2 (DSEIS Results)
1	NE 90th Street & 124th Avenue NE	D	PM	C / 21	**F / 83**	**F / 158**	**F / 158**	**F / 380**
2	NE 85th Street & 6th Street	E	PM	D / 41	**F/109^**	**F / 145^**	**F / 145^**	**F / 138^**
3	NE 85th Street & 120th Avenue NE	D	AM PM	C / 22 C / 21	C / 24 D / 39	**F/ 114** **F/ 113**	**F/ 114** **F/ 113**	**F / 572** **F / 616**
4	NE 85th Street & 124th Avenue NE	D	AM PM	C / 29 D / 35	C / 33 D / 41	D / 39 D / 45	D / 39 D / 45	D / 35 **E / 59**
5	NE 83rd Street & 120th Avenue NE	D	PM	B / 11	B / 13	B / 18*	B / 20**	A / 8*
6	NE 80th Street & 118th Avenue NE	D	PM	B / 15	C / 20	A / 8**	**F / 94**	A / 6**
7	NE 80th Street & 120th Avenue NE	E	PM	B / 11	B / 14	B / 13	**F / 222**	B / 20
8	NE 70th Street & 116th Avenue NE	E	PM	C / 28	D / 35	E / 75	E / 75	E / 67

Source: Fehr & Peers.
Notes:
^ Intersection reconfiguration with transit queue jump and dedicated WBR turn pocket
* Signalized without any geometric improvements
**Signalized with EBL, SBR turn pockets

Proposed Geometric Mitigation Strategies

Exhibit 9 summarizes the results of mitigations tested to address impacted intersections. The following summarizes modifications to the roadway network that would be necessitated by traffic impacts measured for Alternatives A or B.

- **NE 90th Street & 124th Avenue NE:** This intersection is impacted under both Alternatives A and B. Identified mitigation for this intersection includes adding northbound and southbound through lanes and restriping the eastbound through lane to be an eastbound through/left/right lane with east/west split phasing. The additional northbound lane would need to be carried through to north of NE 90th Street. With these improvements in place, the intersection would meet the City's LOS standard under both Alternatives A and B.
- **NE 85th Street & 120th Avenue NE:** Given high delays measured at this intersection under Alternative B during both the AM and PM peak hours, we tested several potential mitigation scenarios to address capacity needs. Based on a site visit, as well as feedback from City staff and the Transportation Commission, two potential geometric mitigation options were identified:
    - Option 1 (See **Exhibit 10a**):
        - Adding an eastbound right turn lane from the I-405 off ramp to 120th Avenue NE to facilitate trips for future intensive development
        - Removal of the western crosswalk of NE 85th Street (since pedestrians would have to cross at least eight vehicle travel lanes with planned widening related to both the interchange and eastbound right turn lane proposed above)
        - Restriping the northbound approach to include a left turn lane and a shared left/through/right turn lane
        - Restriping the southbound approach to include dedicated left, through, and right lanes, with the right turn lane protected by a "pork chop" to create a free movement[3]
        - Revising the signal to provide northbound/southbound split phasing to allow for left turn movements out of either lane from the south approach
    - Option 2 (See **Exhibit 10b**):
        - Restriping the northbound approach to include a left turn lane and a shared left/through/right turn lane
        - Restriping the southbound approach to include dedicated left, through, and right lanes, with the right turn lane protected by a "pork chop."

[3] In designing this improvement it would be important to consider weaving interactions between traffic making the southbound free right and westbound traffic accessing northbound I-405. The viability of installing a pork chop should also be evaluated in final intersection design.

Unlike Option 1, the right turn would not be a free movement since the western crosswalk would remain.
    - Revising the signal to provide northbound/southbound split phasing to allow for left turn movements out of either lane from the south approach
- **NE 83rd Street & 120th Avenue NE:** With the allowed development in the southeast quadrant at a maximum height of 250 feet anticipated under Alternative B, this intersection would need to be signalized. If this intersection serves as the only primary entrance (and a southern entrance via 118th Avenue NE is not provided), this intersection requires additional geometric modification. There are various ways that this intersection could be configured. For the purposes of this modeling, it was assumed that the west leg would include a left-turn pocket, plus a shared left/through/right lane with all other approaches served by one lane. This would require that the northbound left turn lane at the 85th Street intersection be extended to provide a second northbound receiving lane. These improvements are illustrated in **Exhibits 10c**.
- **NE 80th Street & 118th Avenue NE:** Based on delay analysis, this intersection would require mitigation under Alternative B regardless of whether 118th Avenue NE serves as a primary access point. This is due to additional traffic passing through the intersection along 80th Avenue. It should be noted that this intersection is located on a curve and may require additional treatments to ensure safe sight distance. Before constructing a signal, it would also be important to conduct a signal warrant analysis.
- **NE 80th Street & 120th Avenue NE:** If the Lee Johnson site has only one primary entrance (via 83rd Street & 120th Avenue NE), this intersection would require geometric mitigation (a southbound left turn pocket) to maintain the City's LOS standard. This improvement, illustrated in **Exhibit 10d**, could be a standalone improvement, as it would better serve areawide circulation.

No additional geometric modifications have been identified to address impacts at NE 85th Street & 6th Street.

Exhibit 9: LOS Results for Evaluated Alternatives with Geometric Mitigations

ID	Intersection	LOS Standard	Peak Hour	2019 Existing	2044 Alternative A	2044 Alternative B: 2 Driveways	2044 Alternative B: 1 Driveway	2044 Alternative B: 1 Driveway (Mitigated)
1	NE 90th Street & 124th Avenue NE	D	PM	C / 21	**F / 83**	**F / 158**	**F / 158**	D / 52
2	NE 85th Street & 6th Street	E	PM	D / 41	**F/109^**	**F / 145^**	**F / 145^**	**same**
3	NE 85th Street & 120th Avenue NE	D	AM PM	C / 22 C / 21	C / 24 D / 39	**F/ 114** **F/ 113**	**F/ 114** **F/ 113**	**F / 104** **F / 88** **(Mit. Option 1)** **F / 126** **F / 96** **(Mit. Option 2)**
4	NE 85th Street & 124th Avenue NE	D	AM PM	C / 29 D / 35	C / 33 D / 41	D / 39 D / 45	D / 39 D / 45	same
5	NE 83rd Street & 120th Avenue NE	D	PM	B / 11	B / 13	B / 18*	B / 20**	D / 37
6	NE 80th Street & 118th Avenue NE	D	PM	B / 15	C / 20	A / 8***	**F / 94**	A / 5*
7	NE 80th Street & 120th Avenue NE	F	PM	B / 11	B / 14	B / 13	**F / 222**	D / 52
8	NE 70th Street & 116th Avenue NE	E	PM	C / 28	D / 35	E / 75	E / 75	same

Source: Fehr & Peers.
Notes:

* Signalized without any geometric improvements
** Signalized with EBL, NBL, SBR turn pockets
*** Signalized with EBL, SBR turn pockets
^ Intersection reconfiguration with transit queue jump and dedicated WBR turn pocket

Exhibit 10a: Potential Geometric Modifications to NE 85th Street/120th Avenue NE

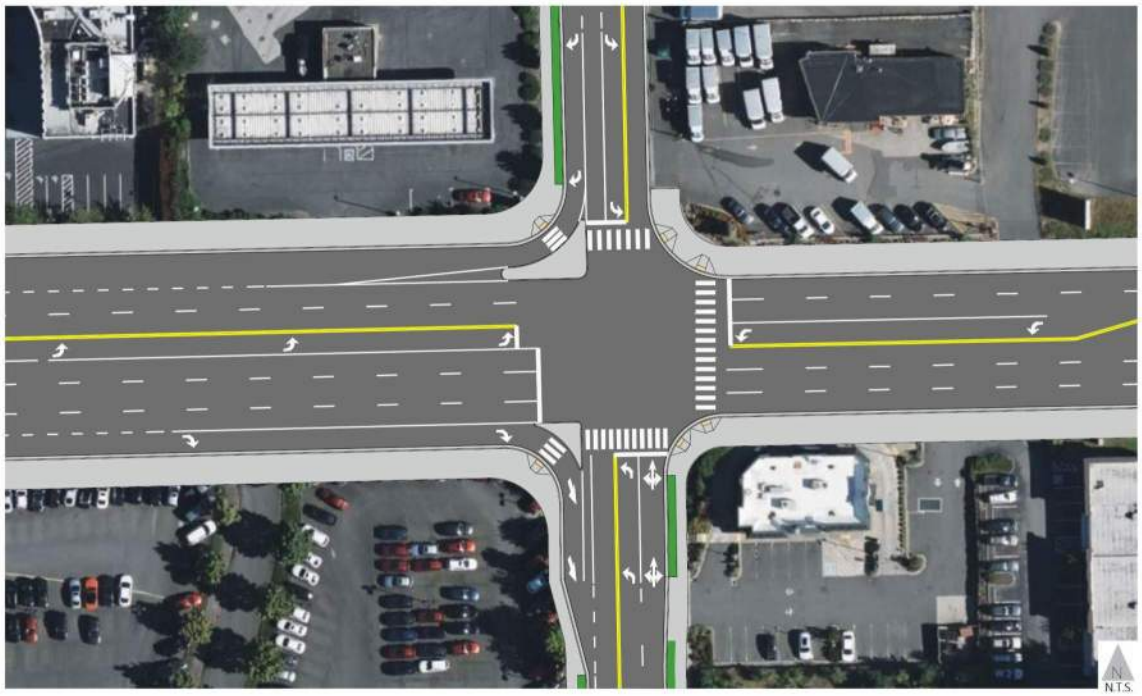


Exhibit 10b: Potential Geometric Modifications to NE 85th Street/120th Avenue NE

Exhibit 10c: Potential Geometric Modifications to NE 83rd Street/120th Avenue NE

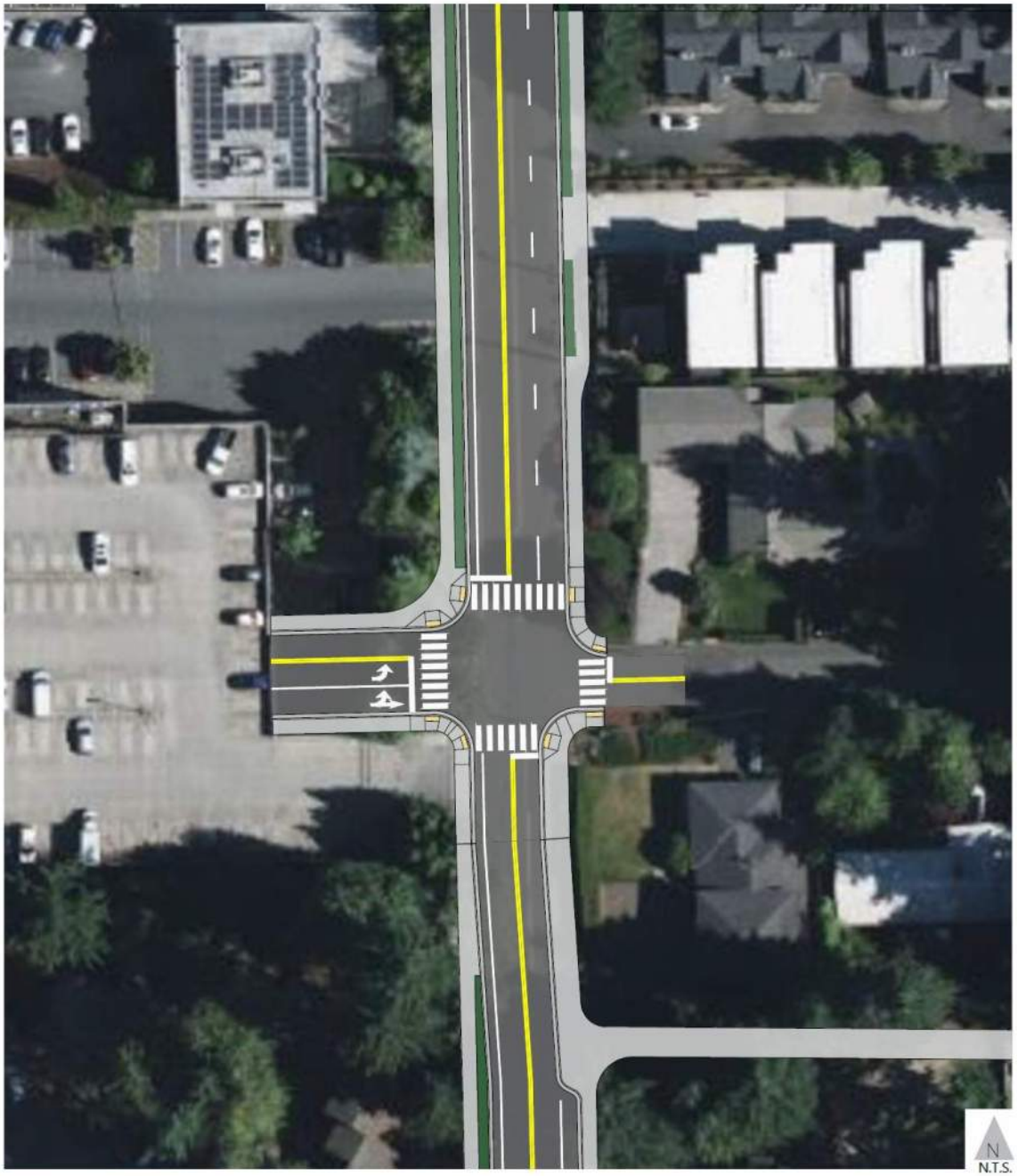
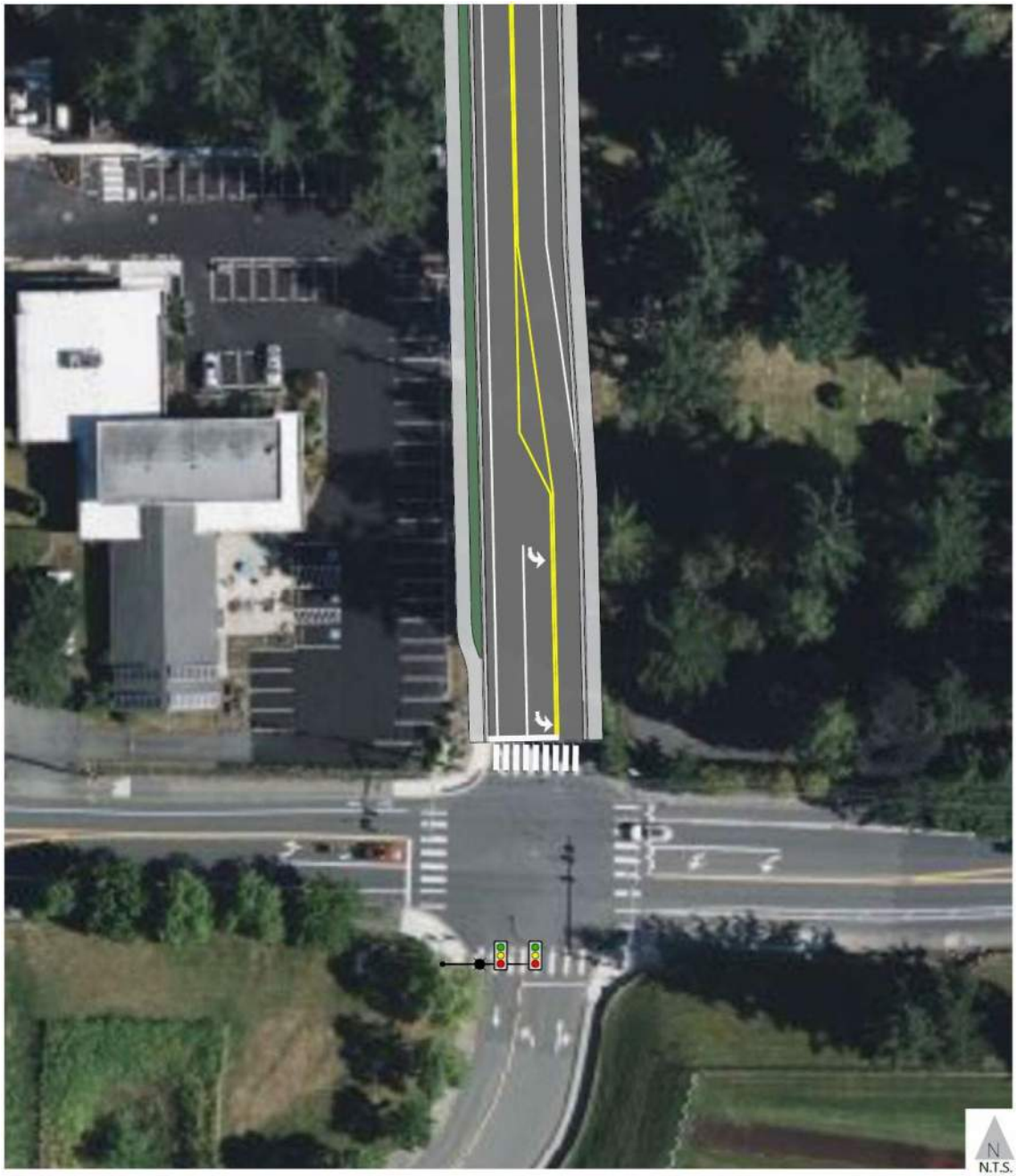


Exhibit 10d: Potential Geometric Modifications to NE 80th Street/120th Avenue NE



NE 85th Street Interchange Analysis

The operations at the I-405/NE 85th Street interchange were evaluated using the microsimulation traffic models developed by WSDOT for their interchange study. This sensitivity test was conducted to determine whether the additional land use growth allowed under the 85th Station Area Plan would affect the operations at the redesigned interchange. The Vissim model provided by WSDOT simulates NE 85th Street between 6th Street and 124th Avenue NE, including the freeway ramps to and from I-405 as well as the BRT station and access points.

Details about our analysis and overall findings are included in **Appendix A**. Overall, the Station Area Plan will result in slightly higher delays and queuing along NE 85th Street in the future than estimated by WSDOT in their interchange analysis. However, the increases do not significantly affect the operations of the interchange or the freeway mainline.

Transportation Demand Management Strategies

The trip generation estimates produced from the BKR model and MXD trip generation tool predict mode share based primarily on land use and demographic information but do not take additional TDM measures into account. This approach provides a conservative estimate of the transportation conditions for each alternative in the absence of robust TDM measures. However, additional mitigation measures could be considered to modify and expand current TDM strategies. These strategies would not only help to reduce driving, which in turn lessens traffic congestion and greenhouse gas impacts, but fundamentally align with the City's values and vision for the station area.

Potential TDM Strategies

A comprehensive set of strategies were considered by City staff to select those that are most likely to be implemented both because they are within the City's control and consistent with the City's vision for the study area; these are listed as Tier 1 strategies below. While these actions are within the City's control, many would require investment of additional City staff time or code revisions to implement. An additional set of strategies, listed below as Tier 2, could also be pursued but would either be led by developers or would require additional partnerships beyond sole City control.

Tier 1 TDM Strategies

- Unbundle parking to separate parking costs from total property cost, allowing buyers or tenants to forgo buying or leasing parking spaces if they do not park a car.
- Revise parking code to reduce the amount of parking new developments must provide or implement parking maximums to further reduce the amount of parking supply in the

Study Area beyond what is assumed under Alternatives 2 and 3. This would limit the number of parking spaces which can be built with new development.

- Implement managed on-street parking strategies (e.g., designate special use zone for activities such as loading/unloading or emergencies, implement time restricted parking, and charge for parking).
- Require new development to charge for parking off-street.
- Implement requirements for robust monitoring and management of parking and the TDM measures in the Study Area to ensure that people are not parking in the surrounding neighborhood to avoid these parking management measures.
- Encourage or require transit pass subsidies from developers/property owners.
- Expand upon Kirkland's Green Trip program to utilize commute marketing programs to advertise different commuting options and encourage walking, biking, transit use, carpooling, vanpooling, or other means of travel.
- Utilize an Emergency Ride Home program to provide a taxi voucher or other way for employees to travel home if an emergency or unexpected late work makes them miss their normal transit, carpool, or bike ride home.
- Accommodate bicyclists by requiring development to provide secure, covered, and convenient bicycle parking at office and residential buildings; showers and lockers at offices; and public repair stations.
- Utilize a Ridematch Program to assist potential carpoolers in finding other individuals with similar travel routes. These may be open or closed systems, but generally a larger population will have more potential matches.

Tier 2 TDM Strategies

- Provide shared off-street parking with new developments.
- Provide private shuttle service or gondola as a first mile/last mile solution to make the 85th Street Station more accessible from Downtown Kirkland, the 6th Street Google campus, Kirkland Urban, and other destinations, and to provide an attractive transportation alternative for locations that are less served by fixed-route transit. Two shuttle routes should be explored – one to Downtown Kirkland and Kirkland Urban using NE 87th Street/7th Avenue and 5th Street, and one that goes to the 6th Street Google Campus and Houghton/Everest Neighborhood Center at 108th Avenue NE & NE 68th Street using the Cross Kirkland Corridor. This could start as a pilot program in partnership with Uber or Lyft to provide subsidized rides to gauge demand for a shuttle. Ultimately, Gondola service routes should be further explored connecting the station area to Downtown Kirkland using the NE 85th Street/Central Way corridor with three stations - the first station would be in the vicinity of the NE 85th Street/I-405 In-line Station and Interchange, the second station could be located in the northeast corner of the 6th Street

and NE 85th Street Intersection and the third station would be in the vicinity of the downtown Kirkland Transit Center.

- Encourage or require transit pass provision programs for residents— King County Metro has a Passport program for multifamily housing that is similar to its employer-based Passport program. The program discounts transit passes purchased in bulk for residences of multifamily properties.
- Partner with Transportation Network Companies (TNCs) such as Uber or Lyft to provide pooled ridesharing options, ideally as a last-mile connection to transit or as an aspect of an Emergency Ride Home program.
- Launch a bikeshare or other micromobility system in Kirkland.

Efficacy of TDM Strategies

Because the Tier 1 strategies are most likely to be implemented, the quantitative efficacy of those strategies was estimated and the resulting trip reductions were incorporated into the traffic operations analysis to understand how the strategies would affect operations at the intersection level. Tier 2 strategies could still be pursued but have not been quantified in terms of their effects on traffic operations because they are more speculative at this time.

To evaluate the potential efficacy of the proposed TDM measures, Fehr & Peers used its TDM+ tool. TDM+ is a tool that allows the user to estimate how a set of TDM strategies will affect vehicle trip generation. The tool uses a realistic, evidence-based assessment of how similar strategies have worked in similar locations. By incorporating nuances such as the urban form and limiting the measures included to those with well-documented research, the TDM+ approach allows for a high level of technical rigor and defensibility when quantifying a program's potential to reduce vehicle trips or vehicle miles.

This quantitative approach emerged from a 2010 partnership with the California Air Pollution Control Officers Association (CAPCOA) to develop a comprehensive set of guidelines for assessing and quantifying reductions in vehicle miles traveled and greenhouse gas emissions associated with more than 50 TDM strategies, both individually and in combination.[4] The CAPCOA report is a resource for local agencies to quantify the benefit, in terms of reduced travel demand, of implementing various TDM strategies. Working with the Bay Area Air Quality Management District, the evaluation methods were validated by comparing the strategies to the San Francisco Bay Area. Fehr & Peers has continued to update TDM+ since the initial CAPCOA report, with the most recent iteration incorporating information from new studies published through 2018.

Exhibit 11 summarizes the range of estimated efficacy for each of the Tier 1 strategies. Combined these strategies have an estimated overall efficacy of 9 to 38 percent, with 13 percent

[4] California Air Pollution Control Officers Association, Quantifying Greenhouse Gas Mitigation Measures. August 2010.

recommended for typical planning applications.[5] In **Exhibit 12**, we apply these strategies to our traffic operations analysis to see the combined efficacy of geometric and TDM strategies in mitigating transportation impacts. As the exhibit shows, TDM serves to reduce delays, although the intersections of NE 85th Street with 6th Street and 120th Avenue NE would have delays exceeding City standards.

[5] Full implementation of Tier 2 strategies could result in vehicle trip reductions that range from 10-40%, with 16% recommended for typical planning applications. It is worthwhile to note that some of the measures in the Tier 2 list, including shared off-street parking and implementation of a gondola, could not be quantified.

Exhibit 11: Tier 1 Transportation Demand Management Strategies

TDM Reduction Summary Report: Kirkland 85th Station Area Plan				
Parking	VMT % Reduction by Land Use			
	Office	Residential	Retail	Other
Increased Off-Street Fees	6% to 11%	6% to 11%	6% to 11%	
Increased On-Street Fees	1% to 5%	1% to 5%	1% to 5%	
Unbundled Parking	–	–	–	
Pay-as-you-Go Parking Rates				
Parking Supply	up to 4%	4% to 4%	up to 4%	
Transit	**Office**	**Residential**	**Retail**	**Other**
Subsidies	up to 2%	–	–	
Transit Frequency				
Transit Coverage				
Private Point-to-Point Shuttles				
Last Mile Shuttle				
Commute Programs	**Office**	**Residential**	**Retail**	**Other**
Commuter Incentives				
Commute Marketing Program	2% to 16%	3% to 21%	up to 3%	
Emergency Ride Home	up to 1%	–	–	
TNC Partnerships				
Bike and Walk	**Office**	**Residential**	**Retail**	**Other**
Secure Parking	–	up to 1%	–	
Showers & Lockers	–	–	–	
End of Trip Repair Stations	–	up to 1%	–	
Pedestrian-Oriented Design				
Bikeshare System & Subsidies				
Ride	**Office**	**Residential**	**Retail**	**Other**
Carpool/Vanpool Incentives				
Ridematch Program	up to 6%	up to 6%	up to 6%	up to 6%
Carshare				
Carshare Subsidy				
Total of All Measures	9% to 38%	13% to 40%	7% to 22%	-

Exhibit 12: Transportation Demand Management Strategies Efficacy in Mitigating Intersection Impacts

ID	Intersection	LOS Standard	Peak Hour	2019 Existing	2044 Alternative A	2044 Alternative B: 2 Driveways	2044 Alternative B: 1 Driveway	2044 Alternative B: 1 Driveway (TDM + Geometric Mitigations)
1	NE 90th Street & 124th Avenue NE	D	PM	C / 21	**F / 83**	**F / 158**	**F / 158**	D / 46
2	NE 85th Street & 6th Street	E	PM	D / 41	**F/109^**	**F / 145^**	**F / 145^**	**F / 139^**
3	NE 85th Street & 120th Avenue NE	D	AM PM	C / 22 C / 21	C / 24 D / 39	**F/ 114** **F/ 113**	**F/ 114^^** **F/ 113**	**F / 85^^** **E/ 80**
7	NE 80th Street & 120th Avenue NE	F	PM	B / 11	B / 14	B / 13	**F / 222**	B / 13

Source: Fehr & Peers.
Notes:
* Signalized without any geometric improvements
** Signalized with EBL, NBL, SBR turn pockets
*** Signalized with EBL, SBR turn pockets
^ Intersection reconfiguration with transit queue jump and dedicated WBR turn pocket
^^ Assumes Option 1 geometric mitigations

TDM Strategy Implementation

As noted above, implementation of TDM strategies would require investments by the City in several forms, including:

- City staff time to develop code revisions and manage compliance, for example requiring developers to provide a transit subsidy to tenants.
- Creation of new staff positions to implement and operate new programs, for example on-street parking policing and management and off-street parking program implementation.
- Capital investments, for example micromobility charging stations.

These costs, both for initial start-up and ongoing program management, should be considered within the financial evaluation of the plan.

Transit Analysis

As of 2021, the Station Area is served by 14 transit routes, as summarized in **Exhibit 13.**

Exhibit 13: Transit Routes in the Station Area Plan (2021)

Route Number	Agency	Route Description	PM Headway (min)
230	King County Metro	North Creek - Bothell - Juanita - Kirkland TC	30 - 32
231	King County Metro	Woodinville - Brickyard - Juanita - Kirkland TC	30 - 33
237	King County Metro	Woodinville P&R - Bellevue TC	47
239	King County Metro	UW/Cascadia Coll - Totem Lake TC - Kirkland TC	27 - 36
245	King County Metro	Kirkland Transit Center - Crossroads - Factoria	14 - 16
250	King County Metro	Avondale - Redmond TC - Kirkland TC - Bellevue TC	15 - 16
255	King County Metro	Totem Lake TC-Kirkand TC-UW Link Sta-Univ Dist	7 - 15
257	King County Metro	Brickyard P&R - Downtown Seattle	22 - 36
311	King County Metro	Woodinville - Downtown Seattle	20 - 25
342	King County Metro	Shoreline P&R - Renton TC	28 - 71
424	Community Transit	Snohomish - Seattle	94
532	Sound Transit	Everett - Bellevue	15 - 30
535	Sound Transit	Lynnwood - Bellevue	30
230	King County Metro	North Creek - Bothell - Juanita - Kirkland TC	30 - 32

Source: Fehr & Peers, 2021

Fehr & Peers considered three primary elements to understand potential change to transit conditions under the different land use alternatives: passenger loads, speed and reliability, and access-to-transit. We briefly describe how the growth anticipated by Alternatives A and B influences these transit elements and then present our analysis of the relative impact of each land use alternative on these elements of the transit environment.

- **Passenger load analysis** provides an understanding into how land use growth may generate additional transit ridership and potentially cause overcrowding on routes that access the area.
- The additional vehicles trips land use growth generated within the subarea may cause challenges with **transit speed and reliability**.
- Land use growth also brings new transit riders and a need for enhanced **access-to-transit** solutions

Ridership and Passenger Loads

To evaluate the impact of the future year action alternatives on the transit passenger loads in the study area, Fehr & Peers utilized the 2042 Sound Transit (ST) Model[6] and bus crowding threshold guidance from King County (KC) Metro[7]. The 2042 ST Model provided PM peak period transit boardings and alightings at stops within a block of NE 85th Street, which were used to determine transit ridership distribution and average transit trips along various routes in the station area. The data was extracted directly from an 'Off-the-shelf ST Model run'; therefore, no new transit ridership modeling was performed for this effort. KC Metro ridership data offered guidance on bus crowding based on available seats on a bus and route frequency to determine if a route can accommodate anticipated passenger loads. However, it should be noted that KC Metro's bus crowding thresholds do not guarantee a seat for every rider on the bus. The thresholds account for an acceptable number of both seated and standing riders.

Consistent with the 85th Station Area Plan DSEIS, an impact was identified based on the following criteria:

- The forecast passenger loads exceed the KC Metro/ST overcrowding threshold on any route in the study area that have passenger loads below the crowding threshold under the No Action Alternative
- The forecast ridership increases the passenger load by at least 5% on a route that already exceeds the guidelines under the No Action Alternative

[6] The 2042 ST Model closely represents projected 2035 land use, as identified by PSRC LUV.2 forecasts, which are consistent with the Kirkland 2035 Comprehensive Plan reflected in No Action Alternative.
[7] Bus seat capacity and crowding thresholds from Fall 2018 KCM Ridership Data.

Out of all the routes that run through the study area, only the I-405 BRT has a passenger load factor that exceeds 1.0 in the No Action Alternative. **Exhibit 14** indicates that all the reviewed action alternatives further impact the I-405 BRT due to the new PM peak hour transit trips; transit ridership growth for these alternatives exceeds 15 percent. There is an additional impact on Route 250 for Alternative 2 as a result of substantial (248%) growth in transit ridership and forecast passenger loads above the King County Metro crowding threshold. Alternative B also sees substantial growth, but does not exceed Metro's crowding threshold.

Exhibit 14: Impacted Transit Ridership

Action Alternative	New PM Peak Hour Transit Trips in Station Area	Routes With Passenger Load Factors Above the Threshold	New PM Peak Hour Riders per Route	Passenger Load Factor^	Transit Ridership Growth
Alternative A	372	I-405 BRT North	11	1.16	15%
Alternative B	603	I-405 BRT North	18	1.25	24%
Alternative 2	669	Route 250	38	1.06	285%
		I-405 BRT North	20	1.28	26%

Source: Fehr & Peers, 2021
Notes:
^ Passenger load factor is a ratio of anticipated ridership compared to KC Metro's crowding threshold.

To address the projected overcrowding of buses along the impacted routes in **Exhibit 14**, some riders may slightly shift their commute time to avoid the peak period or access their destination via different routes. Transit agencies also regularly monitor the passenger load factor and adjust scheduling to best accommodate ridership demand. An expanded safe bicycle network to additional areas within the city and region would also help alleviate transit overcrowding by providing alternatives to riding transit.

Transit Speed and Reliability

As shown in the previous traffic operations section, several intersections along NE 85th Street that transit serves will operate at LOS E or worse with the future land use alternatives, including at the intersections with 6th Street and 120th Avenue NE. Additional delay at these intersections may slow down transit and degrade the reliability of service. A queue jump is currently being planned at NE 85th Street and 6th Street to improve transit operations through that intersection. The project stemmed from an initial project identified in ST3 to fund bus-only lanes along NE 85th Street between the I-405 BRT station and Downtown Kirkland. The Kirkland Transit Implementation Plan (KTIP), adopted in early 2019, identified the 6th Street queue jump along with other transit-supportive projects across the city. Several alternatives were reviewed during the KTIP development to identify optimal transit priority solutions along NE 85th Street, including side and

center-running transit lanes between I-405 and 6th Street. However, the transit lane options were removed for further consideration because the transit lanes would provide limited speed and reliability benefits for the substantial cost while potentially constraining pedestrian access and limiting bus station location options. In addition, the KTIP identified the NE 85th Station as a top priority to provide non-motorized access improvements. The KTIP also evaluated a potential queue jump at NE 85th Street and 124th Avenue NE, but the project was not advanced to the final project list in the plan.

Transit Access

The next section of the memo focuses on infrastructure for people walking and bicycling. Many of the improvements have been identified for the purpose of enhancing transit access. Key improvements include:

- Construction of shared use trail connections to transit stops along 85th Street and the BRT station
- Complete street and greenway improvements on key routes accessing transit stops along 85th Street and the BRT station, including 5th Avenue, 7th Avenue/87th Street, 116th Avenue, and 90th Street
- Widened sidewalks along 85th Street throughout the SAP

To create a seamless system of transit access for all users, these investments could be paired with first/last mile rideshare services and enhanced stop amenities along NE 85th Street, recognizing the waiting conditions along a busy corridor (at Kirkland Way, 120th Ave NE, etc.)

Comfort for People Walking and Biking

Fehr & Peers evaluated how well the study area can accommodate people walking and biking under two scenarios:

- **Existing Plus Committed Project Conditions:** This scenario considers transportation infrastructure on the ground today, as well as transportation infrastructure that is likely to be constructed independent of the SAP. Infrastructure assumed under this scenario is mapped in **Exhibit 15**.
- **Recommended Station Area Investments:** This scenario considers all of transportation infrastructure from the prior scenario plus capital investments recommended as part of the SAP to accommodate trip growth anticipated with development, better connect to the BRT station, and/or provide a more complete and low-stress active transportation network. Infrastructure assumed under this scenario is listed below and mapped in **Exhibit 16** and more fully described in the Factsheets, which are **Appendix B** to this memo.

Project Number	*Recommended Station Area Investment*
1	Lee Johnson East Access (Including 120th Corridor from NE 83rd to NE 85th Street)
2	Lee Johnson South Access
3	NE 80th Street/120th Avenue NE Signal Improvement (Including 120th Corridor from NE 80th to NE 83rd Street)
4	124th Avenue NE Widening
5	NE 85th Street/120th Avenue NE Improvements
6	5th Avenue to Kirkland Way Shared Use Trail
7	5th Avenue Greenway
8	6th Street Widened Sidewalks
9	Kirkland Way Complete Street
10	7th Avenue/NE 87th Street Complete Street
11	NE 87th Street/116th Avenue NE Complete Street
12	116th Avenue NE Greenway
13A	405 Interchange Path (SW)
13B	405 Interchange Path (NE)
13C	405 Interchange Path (SE)
14	NE 90th Street Complete Street
15	NE 90th Street Greenway
16	122nd Avenue NE Bike Route
17	120th Avenue NE to 122nd Avenue NE Ped-Bike Connection
18A	NE 85th Street Enhanced Sidewalks
18B	NE 85th Street Enhanced Sidewalks
18C	NE 85th Street Enhanced Sidewalks
18D	NE 85th Street Enhanced Sidewalks
18E	NE 85th Street Enhanced Sidewalks
19	116th Avenue NE Pedestrian/Bike Access to Overcrossing
20	120th Avenue NE improvements (NE 85th Street to NE 90th Street)
P1	6th Street/7th Avenue Intersection Treatment
P2	NE 85th Street / 122nd Avenue NE Bicycle Signal Improvements
P3	NE 87th Street/116th Avenue NE Enhanced Intersection
P4	122nd Avenue NE and NE 80th Street Intersection Treatment

Exhibit 15: Existing Plus Committed Projects

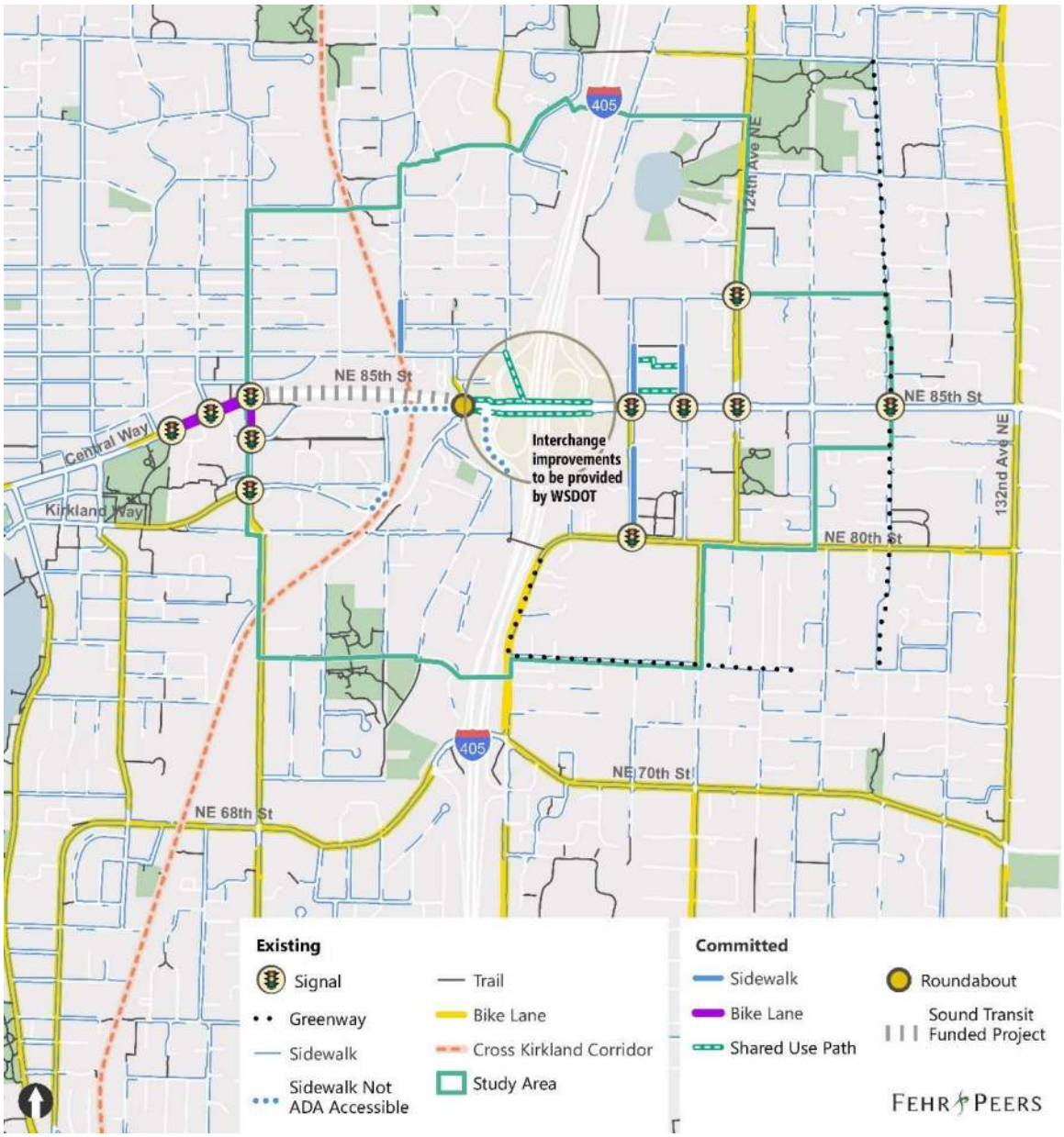
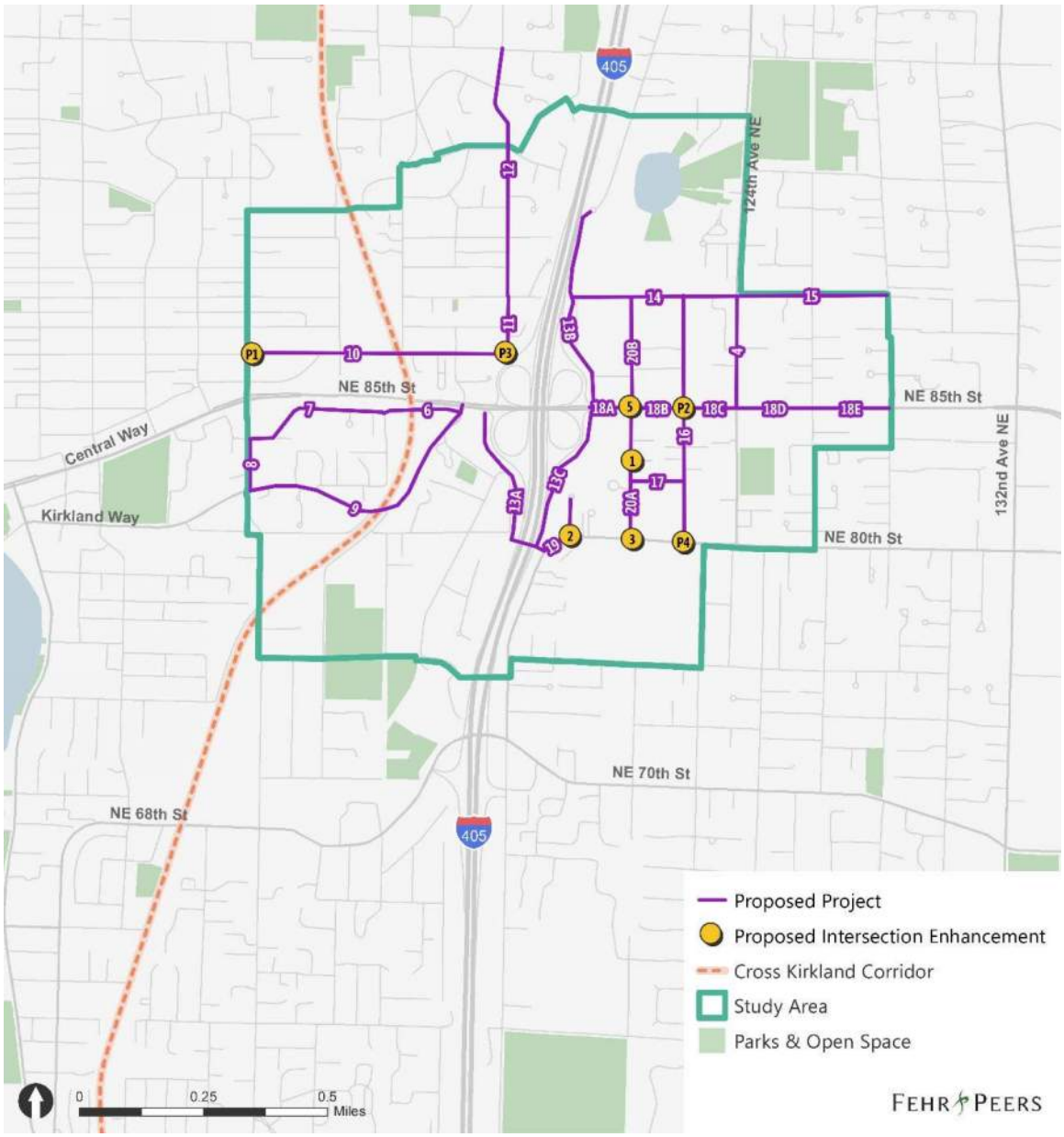
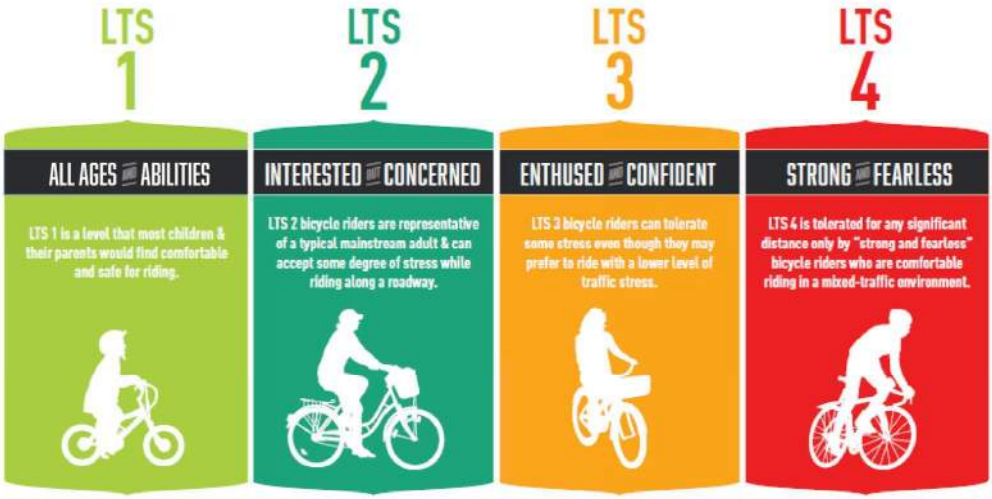


Exhibit 16: Recommended Station Area Investments



The comfort of facilities for people walking and biking is measured quantitatively using a metric called "level of traffic stress." This metric describes conditions for on a scale of 1-4, with level 1 representing conditions that are comfortable for people of all ages and all abilities and level 4 representing conditions that are stressful for almost everyone (see **Exhibit 17**). To increase the number of people who choose to walk or bike, communities should strive to provide the most comfortable facilities possible within given constraints such as right of way, slope, environmental feasibility, modal conflicts, and cost.

Exhibit 17: Level of Traffic Stress Concept



Exhibits 18-**19** present the criteria that was used to screen level of traffic stress for people walking under the Existing Plus Committed Infrastructure scenario. These criteria recognize that increases in the number of travel lanes and posted speeds lead to a more stressful network, as does a narrower sidewalk environment.

It should be noted that this screening methodology identifies areas of potential high stress for people walking, but is not an algorithm intended to be employed once a low-stress intervention, such as wider, physically separated sidewalks buffered from vehicle traffic are in place. It is assumed that the treatments recommended for the station area, which include wider sidewalks and buffering from vehicle traffic by bike facilities, landscaping, and on-street parking would provide a low-stress environment that fits the context of the overall station area plan vision. The measured comfort levels of transportation facilities in the study area under the Existing Plus Committed Conditions and with Recommended Station Area Investments scenarios are shown in **Appendix C** of this memo.

Exhibit 18: Pedestrian LTS – Detached[1] Sidewalk Screening Criteria

Criteria	LTS 1	LTS 2	LTS 3	LTS 4
# of Travel Lanes	2-3 lanes	4-5 lanes	6+ lanes	(no effect)
Usable Sidewalk Width	>= 10 feet	9 to 8 feet	6 to 7 feet	< 6 feet
Posted Speed Limit	<= 25 MPH	26-30 MPH	31-35 MPH	>=36 MPH

Source: Fehr & Peers, 2021
Notes:
1 Detached sidewalks have a buffer between the sidewalk and the adjacent curb, which could include on-street or off-street bicycle facilities, on-street parking, landscaping, or an amenity zone.

Exhibit 19: Pedestrian LTS – Attached[1] Sidewalk Screening Criteria

Criteria	LTS 1	LTS 2	LTS 3	LTS 4
# of Travel Lanes	2-3 lanes	(no effect)	4-5 lanes	6+ lanes
Usable Sidewalk Width	>= 10 feet	9 to 8 feet	6 to 7 feet	< 6 feet
Posted Speed Limit	<= 20 MPH	21-25 MPH	26 - 30 MPH	31 – 35 MPH

Source: Fehr & Peers, 2021
Notes:
1 Attached sidewalks are directly adjacent to the travel-way and separated by only a curb.

Exhibit 20 presents the criteria used to evaluate level of traffic stress for biking. These criteria were applied to evaluate comfort levels of cyclists under both the Existing Plus Committed Infrastructure and Recommended Station Area Improvements scenarios. The measured comfort levels of transportation facilities in the study area under the Existing Plus Committed Conditions and with Recommended Station Area Investments scenarios are shown in **Appendix C** of this memo.

Exhibit 20: Bicycle LTS and Roadway Characteristics

Speed Limit (mph)	Arterial Traffic Volume	No Marking	Sharrow Lane Marking	Striped Bike Lane	Buffered Bike Lane	Protected Bike Lane	Physically Separated Bikeway
≤25	<3k	1	1	1	1	1	1
	3-7k	3	2	2	2	1	1
	≥7k	3	3	2	2	1	1
30	<15k	4	3	2	2	1	1
	15-25k	4	4	3	3	3	1
	≥25k	4	4	3	3	3	1
35	<25k	4	4	3	3	3	1
	≥25k	4	4	4	3	3	1
40	Any volume	4	4	4	4	3	1

Source: Fehr & Peers, 2021

Accessibility Analysis

Fehr & Peers evaluated how accessible the study area will be under from the perspective of people walking and biking. To make this determination, we considered how far someone could get traveling to or from the proposed station (assumed to be at the I-405/NE 85th Street interchange) on foot or by bike under the Existing Plus Committed Conditions and with Recommended Station Area Investments Scenarios. Our specific study parameters for each analysis are documented below and the results are mapped in **Appendix D**.

Pedestrian Walkshed Assumptions

Pedestrians are assumed to use sidewalks, trails, and/or low volume/speed residential roads (with or without sidewalks). Arterials without sidewalks were not included in the network. Existing sidewalks, trails, and committed projects were included to create walksheds based on the actual walking path of a pedestrian both to and from the station. Walk time (in minutes) along each segment in the network is calculated by dividing the length of each sidewalk by an assumed walking speed of 3 mph (265 feet per minute). Walksheds were created for the full network, and a network that excludes ADA non-compliant facilities.

Bicycle Walkshed Assumptions

To plan for the broader cycling population, cyclists are assumed to only use low stress networks (LTS 1 and LTS 2). It is assumed that cyclists will walk their bike on the sidewalk of any LTS 3 or LTS 4 portion of a network. Existing bicycle infrastructure and committed projects were included to create bikesheds based on the actual biking path of a cyclist to and from the station. Bicycle travel time (in minutes) along each segment in the network is calculated by dividing the length of each segment by an assumed cycling speed of 10 mph. On LTS 3 or LTS 4 portions of the network, cyclists are assumed to walk their bike on a sidewalk at a walking speed of 3 mph (265 feet per minute.

It was assumed that the baseline speed of bicyclists on flat terrain is 10 MPH. Bicycle impedances were introduced if a slope was encountered in the direction of travel. The impedance (minutes of travel time) was inflated along the segment based on the change in energy requirements to bicycle uphill relative to the energy requirement to bicycle up a 2% slope. Slopes less than 2% are assumed to be at a speed that is the same as the baseline speed of 10 MPH. The equations used to compute changes in energy requirements are based on literature from sports science[8] looking at changes in energy requirements in response to slopes. In our equation, we only accounted for changes in rolling resistance and gravitation potential energy based on the following equation:

$$Watts = k^r * M * s + g * i * M * s$$

[8] Cycling Uphill and Downhill. David Swan. Wellness Institute & Research Center. Sports Science, 1998.

- K^r – is the coefficient of rolling resistance, in our case for bitumen we used 0.005
- M – is the mass of the cyclist and the bike, in our case 90 kg.
- s – is the speed of the cyclists going uphill, we used 5.5 mph
- g – is the gravitation acceleration of earth at 9.8 m/s^2 at sea level
- i – is the incline or grade of the slope, this is an approximation since the sine of the road angle should be technically used

Based on a comparison of a segment slope to the energy required for a 2% incline, a ratio is derived that is used to inflate the impedance values for the uphill slope of the segment. All downhill slopes were assumed to have no significant change in impedances.

Proposed Package of Investment Strategies

In this section, we describe the full package of improvements recommended to provide safe and comfortable mobility for all within the SAP should the City move to selected growth aligned with June Alternative B.

Roadway and Geometric Changes

The following modifications are recommended to provide capacity to lessen or fully mitigate impacts on the roadway system:

- **NE 90th Street & 124th Avenue NE (Alternatives A and B):** Identified mitigation for this intersection includes adding northbound and southbound through lanes and restriping the eastbound through lane to be an eastbound through/left/right lane with east/west split phasing. The additional northbound lane would need to be carried through to north of NE 90th Street. With these improvements in place, the intersection would meet the City's LOS standard under both Alternatives A and B.
- **NE 85th Street & 120th Avenue NE (Alternative B):** Based on a site visit, as well as feedback from City staff and the Transportation Commission, two potential geometric mitigation options were identified:
    - Option 1:
        - Adding an eastbound right turn lane from the I-405 off ramp to 120th Avenue NE to facilitate trips for future intensive development
        - Removal of the western crosswalk of NE 85th Street (since pedestrians would have to cross at least eight vehicle travel lanes with planned widening related to both the interchange and eastbound right turn lane proposed above)
        - Restriping the northbound approach to include a left turn lane and a shared left/through/right turn lane

        - Restriping the southbound approach to include dedicated left, through, and right lanes, with the right turn lane protected by a "pork chop" to create a free movement[9]
        - Revising the signal to provide northbound/southbound split phasing to allow for left turn movements out of either lane from the south approach
    - Option 2:
        - Restriping the northbound approach to include a left turn lane and a shared left/through/right turn lane
        - Restriping the southbound approach to include dedicated left, through, and right lanes, with the right turn lane protected by a "pork chop." Unlike Option 1, the right turn would not be a free movement since the western crosswalk would remain.
        - Revising the signal to provide northbound/southbound split phasing to allow for left turn movements out of either lane from the south approach
- **NE 83rd Street & 120th Avenue NE (Alternative B):** With the intensive allowed development of 250 feet of maximum height allowed in the southeast quadrant, this intersection would need to be signalized. If this intersection serves as the only primary entrance (and a southern entrance via 118th Avenue NE is not provided), this intersection requires additional geometric modification. There are various ways that this intersection could be configured. For the purposes of this modeling, it was assumed that the west leg would include a left-turn pocket, plus a shared left/through/right lane with all other approaches served by one lane. This would require that the northbound left turn lane at the 85th Street intersection be extended to provide a second northbound receiving lane.
- **NE 80th Street & 118th Avenue NE (Alternative B):** Based on delay analysis, this intersection would require mitigation regardless of whether 118th Avenue NE serves as a primary access point. This is due to additional traffic passing through the intersection along 80th Avenue. It should be noted that this intersection is located on a curve and may require additional treatments to ensure safe sight distance. Before constructing a signal, it would also be important to conduct a signal warrant analysis.
- **NE 80th Street & 120th Avenue NE (Alternative B):** If the Lee Johnson site has only one primary entrance (via 83rd Street & 120th Avenue NE), this intersection would require geometric mitigation (a southbound left turn pocket) to maintain the City's LOS standard. It should be noted that this improvement, while necessary to mitigate impacts of the intensive allowed development contemplated by Alternative B, could be a standalone improvement, as it would better serve areawide circulation.

[9] In designing this improvement it would be important to consider weaving interactions between traffic making the southbound free right and westbound traffic accessing northbound I-405. The viability of installing a pork chop should also be evaluated in final intersection design.

Transportation Demand Management

This report identifies a suite of TDM strategies that could be implemented by the City or required of development over time within the SAP. Implementation of these strategies would not only help to reduce driving, which in turn lessens traffic congestion and greenhouse gas impacts, but fundamentally align with the City's values and vision for the station area. It is recommended that these strategies be implemented as part of **Alternative B**.

Implementation of TDM strategies would require investments by the City in several forms, including:

- City staff time to develop code revisions and manage compliance, for example requiring developers to provide a transit subsidy to tenants.
- Creation of new staff positions to implement and operate new programs, for example on-street parking policing and management and off-street parking program implementation.
- Capital investments, for example micromobility charging stations.

These costs, both for initial start-up and ongoing program management, should be considered within the financial evaluation of the plan.

Transit Access & Speed and Reliability Improvements

This report considers evolution of a Station Area Plan, thus consideration of high-quality transit service, speed and reliability, and stop and station access should always be front of mind. The following recommendations apply to either **Alternative A or Alternative B**:

- Continue to support King County Metro in moving forward with implementation of the Metro K-Line Rapid Ride.
- Consider incorporation of transit priority infrastructure such as queue jumps and signal priority at NE 85th Street and 120th Avenue NE, NE 85th Street and 124th Avenue NE, and signal priority along the full extent of the NE 85th Street corridor within Kirkland
- Transit access strategies, such as first-last mile rideshare connections, bikeshare support, and specific pedestrian and bicycle infrastructure projects (perhaps identified in the walking/biking section)
- Coordination with King County Metro and Sound Transit to plan for and implement a pilot first/last mile shuttle connection for residents, visitors, and employees within the subarea to access the NE 85th Street BRT station
- Enhanced amenities at stops along NE 85th Street such as real-time arrival signage, expanded shelters, and bike parking and re-balanced stop locations to better align with safe signalized crossing locations.

Building a Robust System for Walking and Biking

Exhibit 16 summarizes the transportation capital investments recommended as part of the SAP to accommodate trip growth anticipated with development, better connect to the BRT station, and/or provide a more complete and low-stress active transportation network. These investments are more fully described in the Factsheets, which are **Appendix B** to this memo.

Appendix A

Kirkland 85th Interchange Analysis

The operations at the I-405/NE 85th St interchange were evaluated using the microsimulation traffic models developed by WSDOT for their interchange study. This sensitivity test was conducted to determine whether the additional land use growth allowed under the 85th Station Area Plan would affect the operations at the redesigned interchange. The Vissim model provided by WSDOT simulates NE 85th St between 6th St and 124th Ave NE, including the freeway ramps to and from I-405 as well as the BRT station and access points.

The sensitivity analysis started with the 2045 PM peak hour model for the proposed interchange project. The input volumes were then adjusted to reflect the anticipated demand and travel patterns forecasted for the 2044 June Alternative B. These adjustments increased the total demand within the model by approximately 400 PM peak hour trips or about 4% higher than the initial assumptions in WSDOT's model. A second scenario was evaluated that assumed that TDM implementation would reduce the growth associated with the Station Area Plan. For this scenario, the forecasted growth between 2018 and 2044 was reduced by 20%, which resulted in 500 less peak hour trips in the network. These two demand scenarios provide high and low bookends for the anticipated operations along NE 85th St and at the interchange. No other adjustments to the WSDOT models were made beyond updating the demand volumes.

Using the microsimulation models, the LOS was calculated at 5 intersections along NE 85th St. The LOS grade and average control delay are shown in the table below for each of the scenarios. The results show increased delay west of the interchange along NE 85th St. The 2044 SAP scenario has higher eastbound demand than the 2045 WSDOT scenario heading towards and through the I-405 interchange. This results in queuing along NE 85th St between the interchange and 6th St affecting operations are these locations. The volume reductions associated with the implementation of some TDM measures mitigates these concerns and reduces the delay and queuing. The average delay at the roundabout at Kirkland Way is still higher than was assumed in the WSDOT scenario and there is some eastbound queuing at this location, though it does extend to the intersection at 6th St.

Level of Service and Average Control Delay

Intersection	Control	2045 WSDOT	2044 85th SAP	2044 85th SAP w/ TDM
6th St / NE 85th St	Signal	E / 68 sec	F / 128 sec	D / 52 sec
Kirkland Way / NE 85th St	Roundabout	C / 18 sec	F / 75 sec	E / 37 sec
120th Ave NE / NE 85th St	Signal	D / 39 sec	D / 54 sec	D / 52 sec
122nd Ave NE / NE 85th St	Signal	C / 28 sec	C / 33 sec	C / 27 sec
124th Ave NE / NE 85th St	Signal	F / 93 sec	F / 94 sec	E / 63 sec

The average and maximum queue lengths, estimated using the microsimulation models, are shown in the following table for several locations. The first two locations show the eastbound queues at the Kirkland Way and 120th Ave NE intersections. The anticipated queue lengths are longer than in the

WSDOT scenario for both of the Station Area Plan scenarios. The scenario with TDM reductions does significantly reduce the average queue eastbound at Kirkland Way.

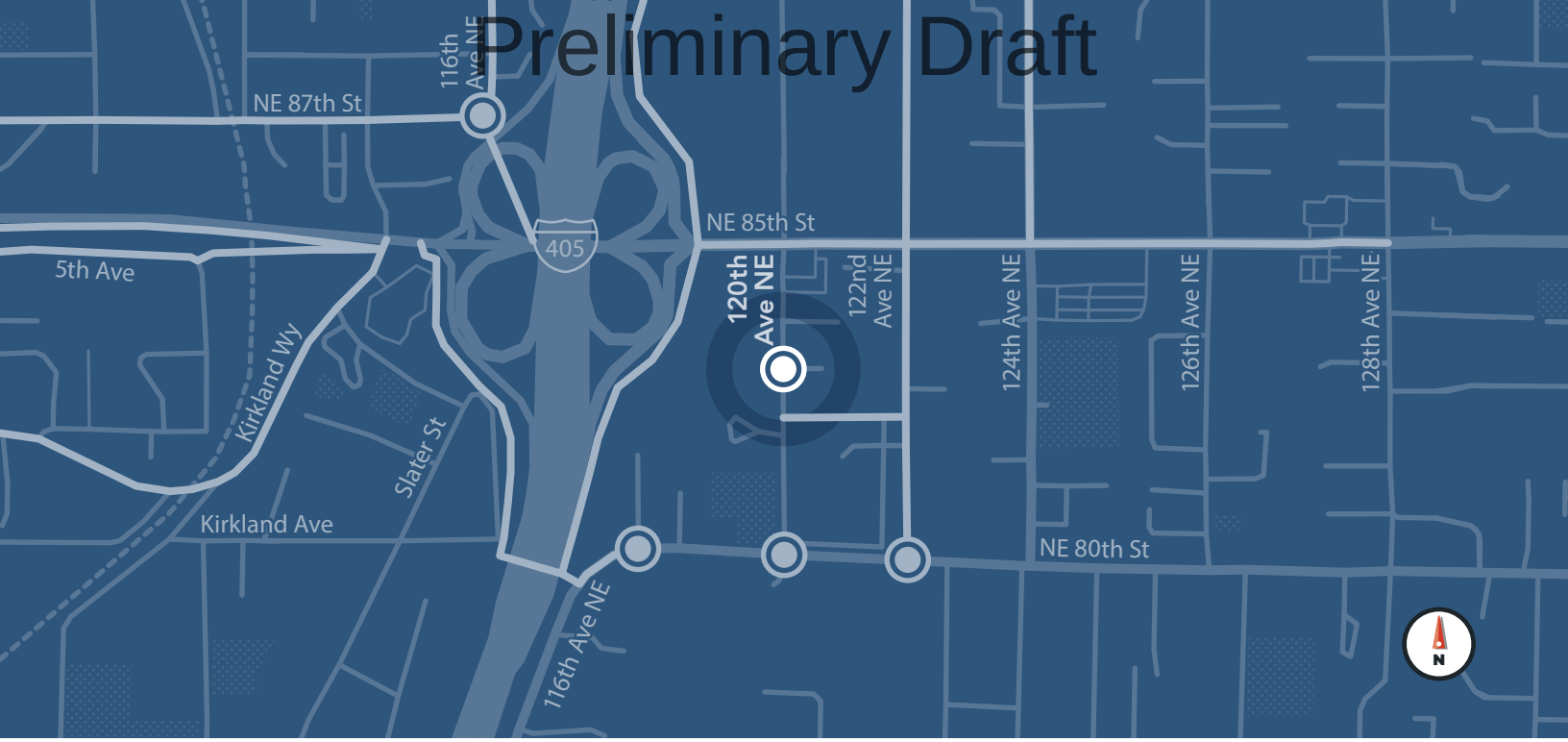
The last two locations show the queue lengths on the northbound and southbound off-ramps from I-405. There is over 1,500 feet of available storage on both ramps and the maximum queues do not spill back onto the freeway mainline in any of the scenarios.

Average and Maximum Queue Lengths

Location	2045 WSDOT	2044 85th SAP	2044 85th SAP w/ TDM
EB at Kirkland Way / NE 85th St	175ft / 625ft	1,275ft / 2,150ft	340ft / 1,150ft
EB at 120th Ave NE / NE 85th St	175ft / 675ft	475ft / 1,250ft	325ft / 1,100ft
I-405 NB off-ramp	50ft / 250ft	125ft / 350ft	125ft / 375ft
I-405 SB off-ramp	50ft / 275ft	375ft / 1,025ft	110 ft / 400ft

Overall, the Station Area Plan will result in slightly higher delays and queuing along NE 85th St in the future than estimated by WSDOT in their interchange analysis. However, the increases do not significantly affect the operations of the interchange or the freeway mainline.

Appendix B: Potential Station Area Investments Factsheets



Project #1

LEE JOHNSON EAST ACCESS (INCLUDING 120TH CORRIDOR FROM NE 83RD TO NE 85TH STREET)

PROJECT DESCRIPTION

New complete street and signalized connection to 120th Avenue NE, as well as a new northbound lane on 120th Avenue NE connecting to NE 85th Street.

Project Catalyst

Station Access

Complete Network

Capacity for Growth

Implementation Considerations

- Cost
- Right-of-way

Planning-level Cost

Low
$1,140,000

High
1,650,000

Project #2

LEE JOHNSON SOUTH ACCESS

PROJECT DESCRIPTION

New complete street and signalized connection to NE 80th Street via 118th Avenue NE

Project Catalyst

- Station Access
- Complete Network
- **Capacity for Growth**

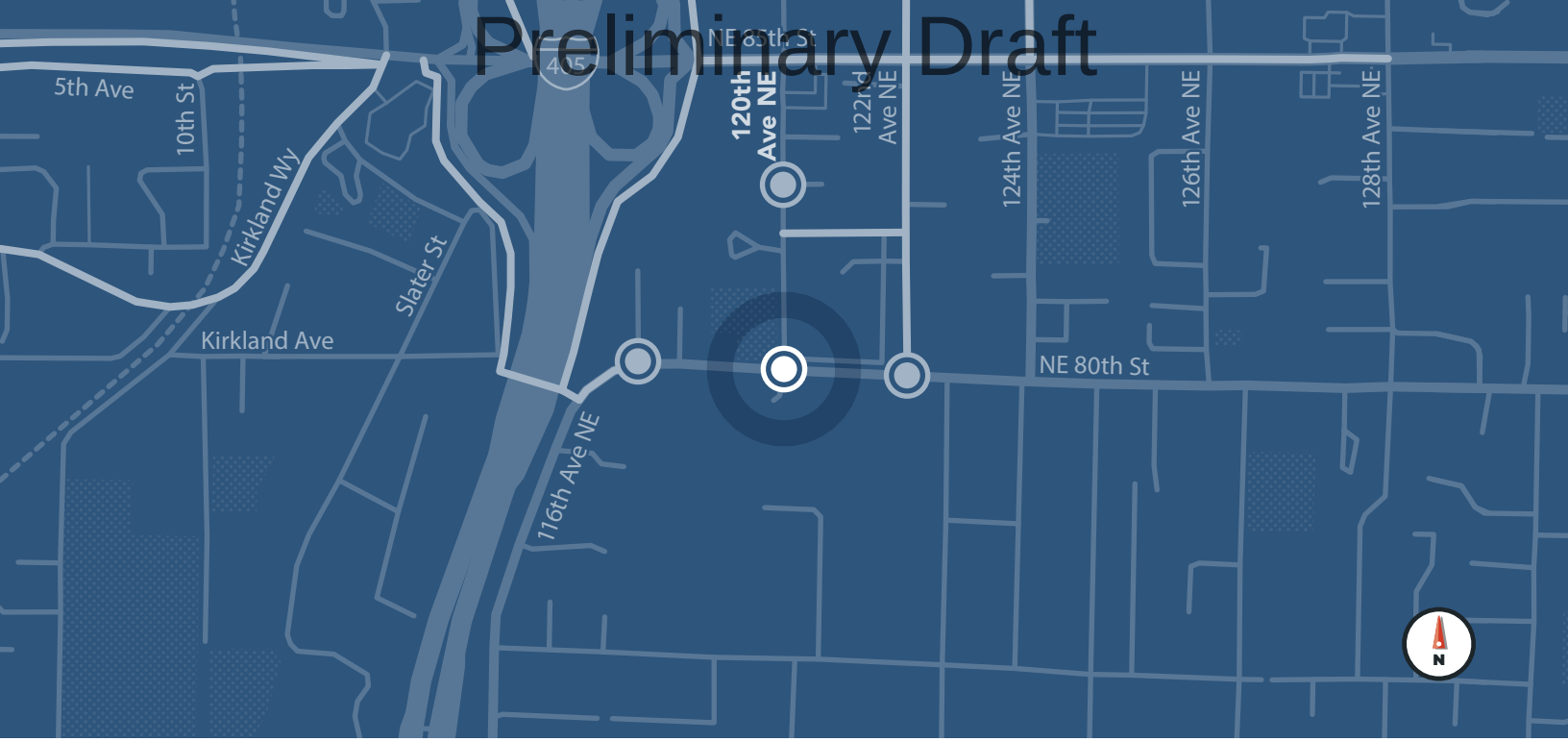
Implementation Considerations

- Cost
- Right-of-way
- Neighborhood impacts
- Sight distance at NE 80th Street intersection

Planning-level Cost

Low
$1,500,000

High
$2,160,000



Project #3

NE 80TH STREET/120TH AVENUE NE SIGNAL IMPROVEMENT

(INCLUDING 120TH CORRIDOR FROM NE 80TH TO NE 83RD STREET)

PROJECT DESCRIPTION

Improve 120th Avenue between NE 80th Street and NE 83rd Street and improve intersection with NE 80th Street to add southbound left turn pocket to separate left and right turning movements.

Project Catalyst

- Station Access
- Complete Network
- **Capacity for Growth**

Implementation Considerations

- Cost
- Right-of-way

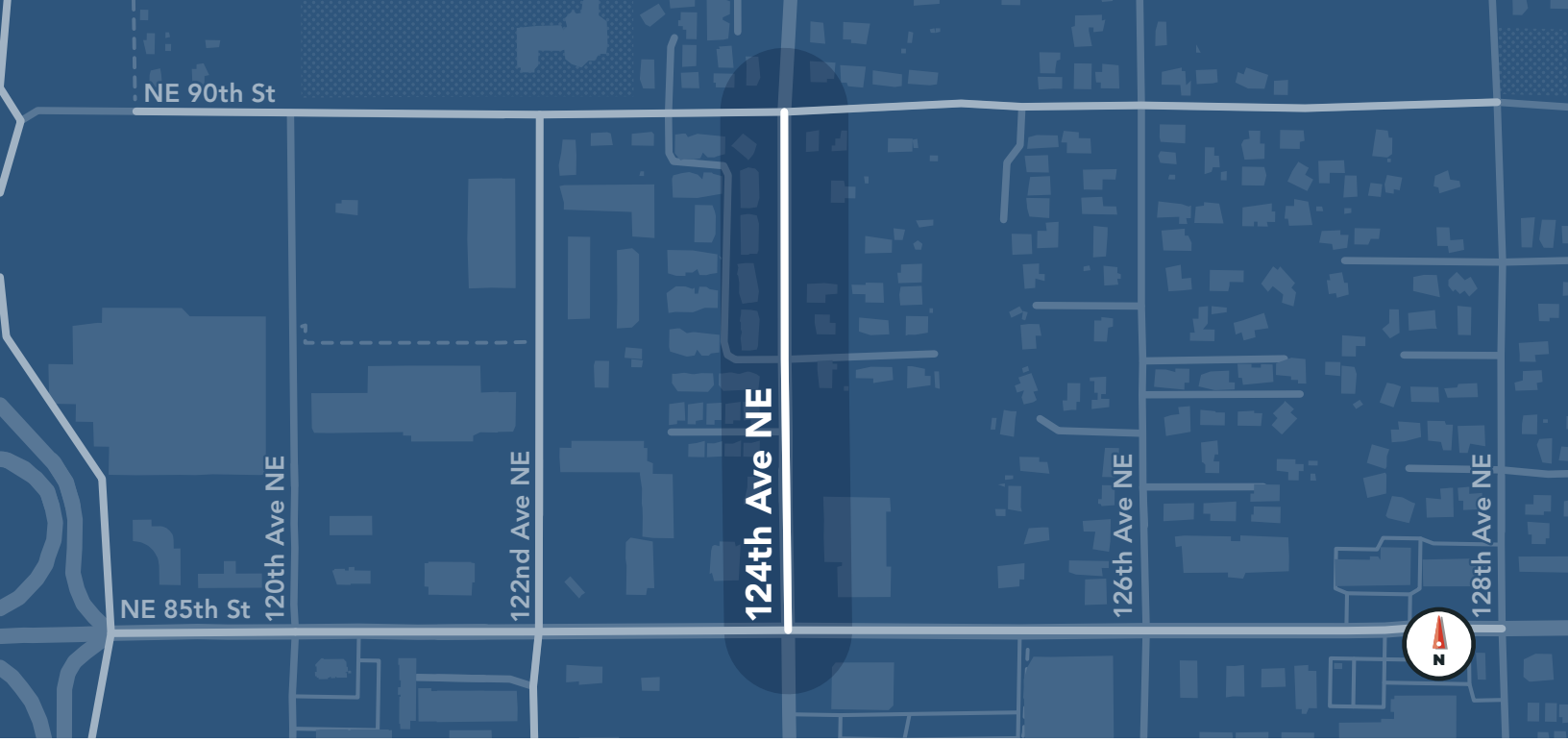
Planning-level Cost

Low

$970,000

High

$1,400,000



Project #4

124TH AVENUE NE WIDENING

PROJECT DESCRIPTION

Widen 124th Avenue NE to five lanes plus physically-separated bike lanes from NE 85th Street through the NE 90th Street intersection.

Project Catalyst

Station Access

Complete Network

Capacity for Growth

Implementation Considerations

- Right-of-way constraints
- Cost

Planning-level Cost

Low

$8,300,000

High

$11,980,000

Project #5

NE 85TH STREET/120th (OPTION 1)

PROJECT DESCRIPTION

New eastbound right turn lane on NE 85th Street from I-405 off ramp to 120th Avenue NE provides additional access to Lee Johnson site

Project Catalyst

Station Access

Complete Network

Capacity for Growth

Implementation Considerations

- Right-of-way constraints
- Cost
- Impact on pedestrian environment (longer crossings)

Planning-level Cost

Low
$1,550,000

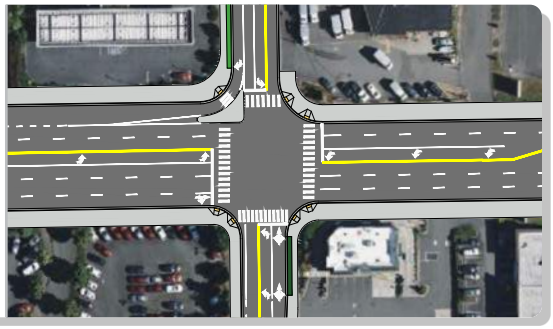
High
$2,240,000

Project #5

NE 85TH STREET/120th (OPTION 2)

PROJECT DESCRIPTION

Modifications to NE 85th Street and 120th Avenue NE intersection to provide additional access to Lee Johnson site.



Project Catalyst

- Station Access
- Complete Network
- **Capacity for Growth**

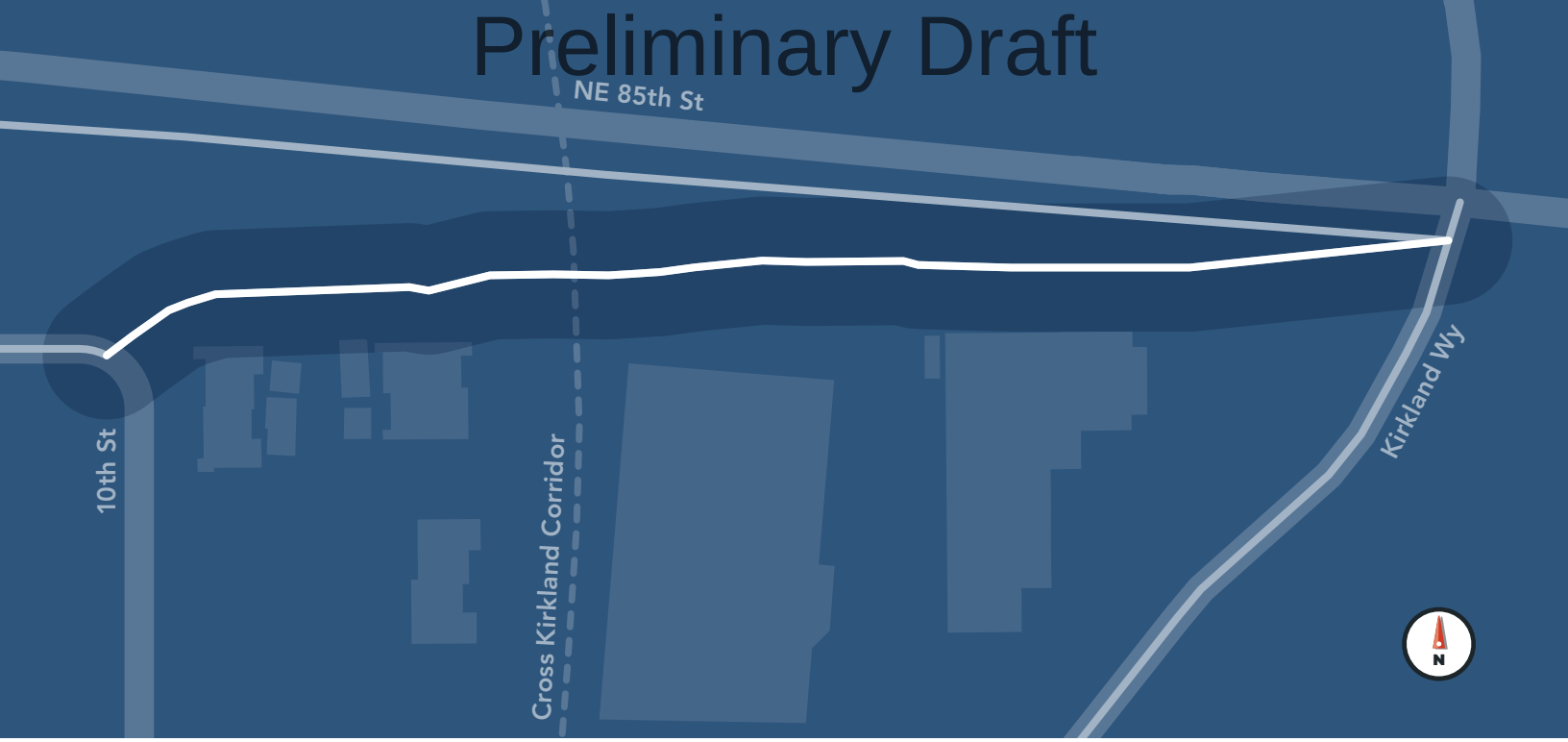
Implementation Considerations

- Right-of-way constraints
- Cost
- Additional intersection delay

Planning-level Cost

Low
$1,550,000

High
$2,240,000



Project #6

5TH AVENUE TO KIRKLAND WAY SHARED USE TRAIL

PROJECT DESCRIPTION

Improve shared use trail from 5th Avenue to Kirkland Way by widening to 12 feet, minimizing grade, and adding lighting

Project Catalyst

- Station Access
- Complete Network
- Capacity for Growth

Implementation Considerations

- Right-of-way constraints
- Cost
- Grade

Planning-level Cost

Low
$4,010,000

High
$5,790,000

Project #7

5TH AVENUE GREENWAY

PROJECT DESCRIPTION

Add sharrows and signage to make these quiet streets serve as a greenway

Project Catalyst

- Station Access
- Complete Network
- Capacity for Growth

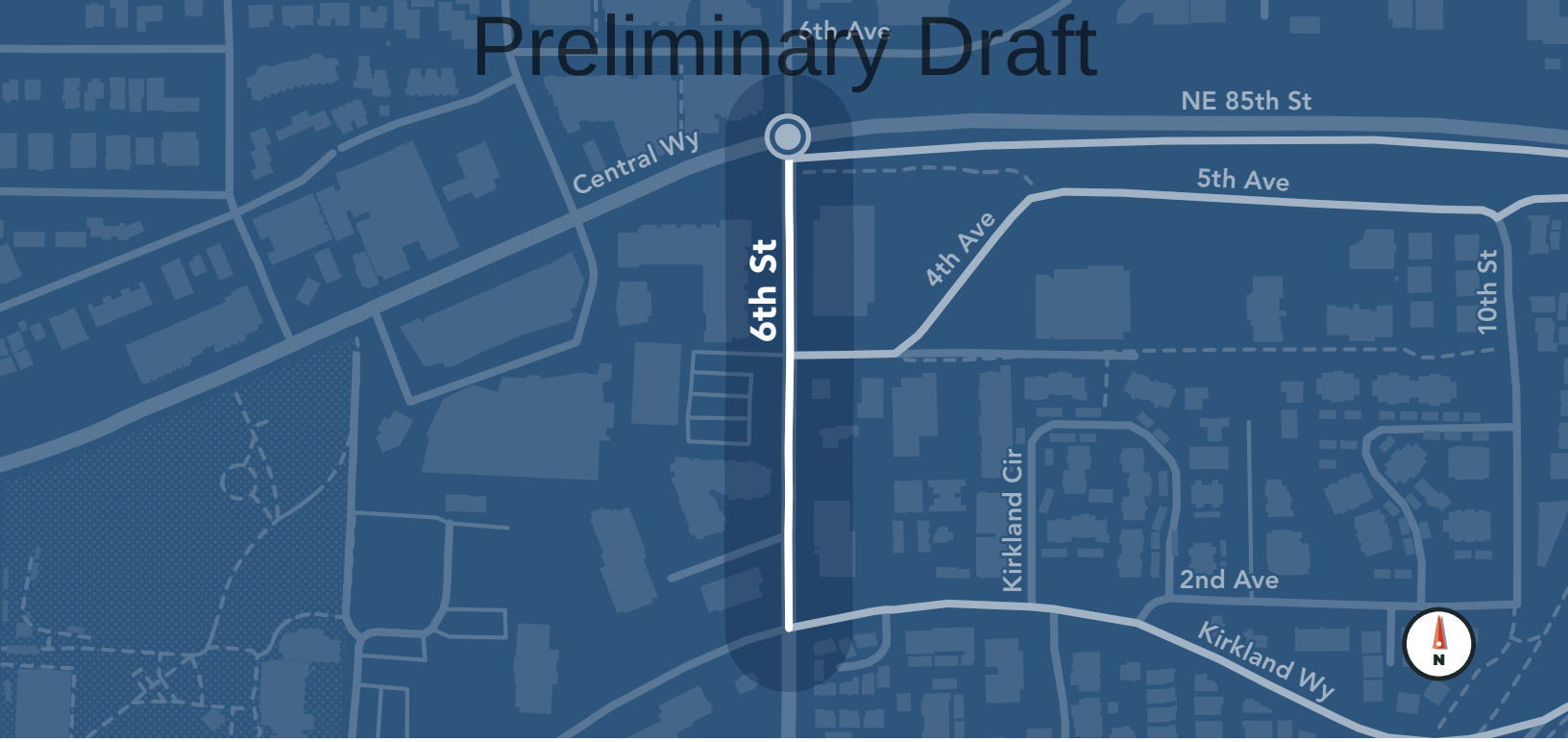
Implementation Considerations

- May require enhanced treatment on west end of corridor

Planning-level Cost

Low
$10,000

High
$15,000



Project #8

6TH STREET WIDENED SIDEWALKS

PROJECT DESCRIPTION

Add widened sidewalk on the east side of 6th Street between Kirkland Way and Central Avenue so that northbound bicyclists can share the facility with pedestrians

Project Catalyst

- Station Access
- **Complete Network**
- Capacity for Growth

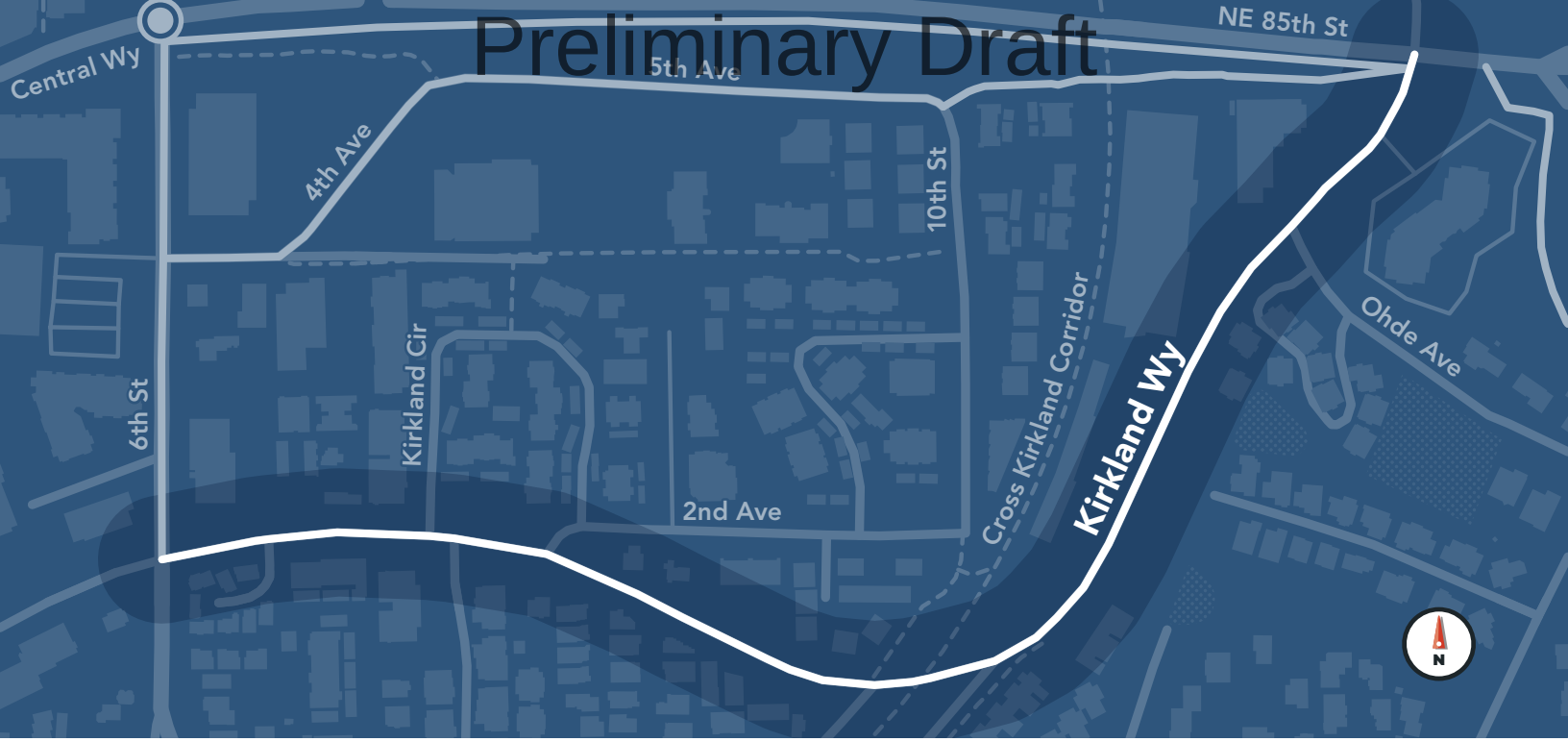
Implementation Considerations

- Right-of-way constraints
- Cost
- Phasing with planned developments

Planning-level Cost

Low
$1,870,000

High
$2,700,000

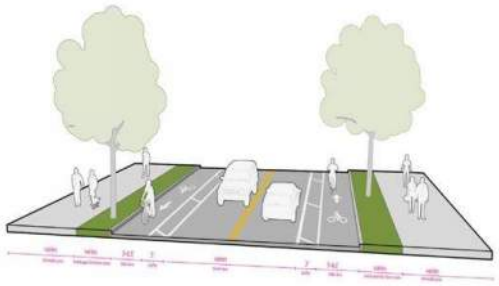


Project #9

KIRKLAND WAY COMPLETE STREET

PROJECT DESCRIPTION

Provide buffered bike lanes and standard sidewalks (both sides of street) between 6th Avenue NE and NE 85th Street



Project Catalyst

~~Station Access~~

Complete Network

~~Capacity for Growth~~

Implementation Considerations

- Right-of-way constraints
- Cost
- Need to replace the CKC bridge

Planning-level Cost

Low
$14,200,000

High
$20,500,000

Project #10

7TH AVENUE/NE 87TH STREET COMPLETE STREET

PROJECT DESCRIPTION

Reconfigure street to provide parking-protected bike lanes and sidewalks between 6th Street and 116th Avenue NE.

Project Catalyst

- Station Access
- Complete Network
- Capacity for Growth

Implementation Considerations

- Cost
- Grade
- Treatments at intersections

Planning-level Cost

Low
$2,290,000

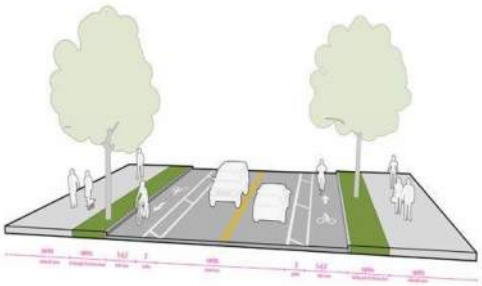
High
$3,310,000

Project #11

NE 87TH STREET/116TH AVENUE NE COMPLETE STREET

PROJECT DESCRIPTION

Provide buffered bike lanes and standard sidewalks (both sides of street) north of the station access to NE 90th Street



Project Catalyst

- **Station Access**
- Complete Network
- Capacity for Growth

Implementation Considerations

- Right-of-way constraints

Planning-level Cost

Low

$450,000

High

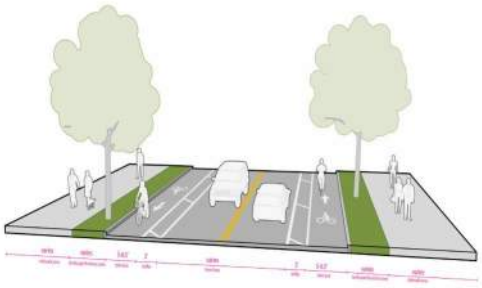
$650,000

Project #12

116TH AVENUE NE GREENWAY

PROJECT DESCRIPTION

Provide buffered bike lanes and standard sidewalks (both sides of street) north of NE 90th Street



Project Catalyst

- Station Access
- Complete Network
- Capacity for Growth

Implementation Considerations

- Right-of-way constraints

Planning-level Cost

Low
$1,990,000

High
$2,880,000

Project #13A

405 INTERCHANGE PATH (SW)

PROJECT DESCRIPTION

Shared-use trail connecting BRT station to 116th Avenue NE

Project Catalyst

- Station Access
- Complete Network
- Capacity for Growth

Implementation Considerations

- Right-of-way
- Cost

Planning-level Cost

Low

$1,530,000

High

$2,210,000

Project #13B

405 INTERCHANGE PATH (NE)

PROJECT DESCRIPTION

Shared-use trail connecting BRT station to Slater Avenue

Project Catalyst

- Station Access
- Complete Network
- Capacity for Growth

Implementation Considerations

- Right-of-way
- Cost

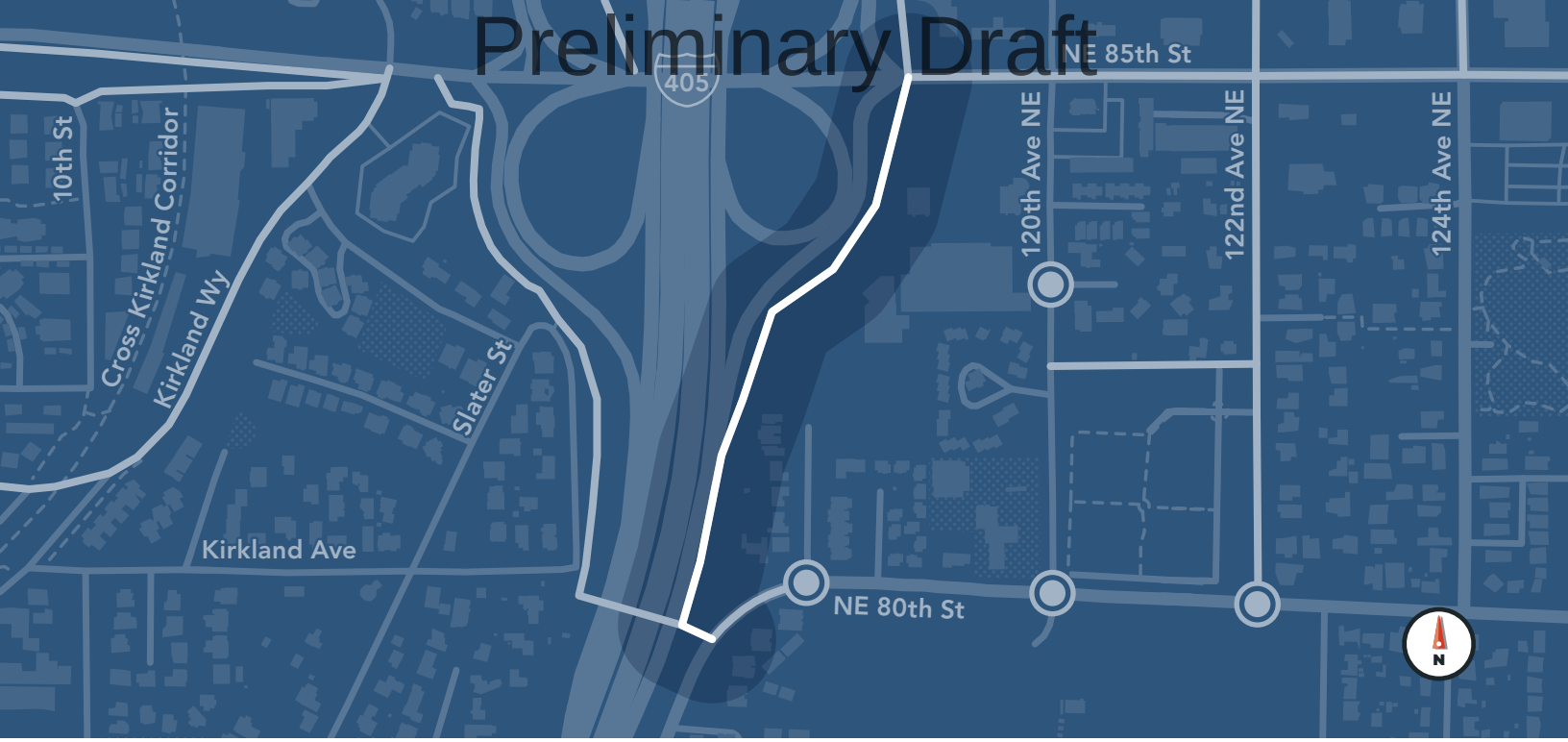
Planning-level Cost

Low

$1,910,000

High

$2,750,000



Project #13C

405 INTERCHANGE PATH (SE)

PROJECT DESCRIPTION

Shared-use trail connecting BRT station to NE 80th Street

Project Catalyst

- Station Access
- Complete Network
- Capacity for Growth

Implementation Considerations

- Right-of-way
- Cost

Planning-level Cost

Low

$1,500,000

High

$2,160,000

Project #14

NE 90TH STREET COMPLETE STREET

PROJECT DESCRIPTION

Reconfigure street to provide parking-protected bike lanes and sidewalks between the planned 405 Interchange Path and124th Avenue NE

Project Catalyst

- Station Access
- Complete Network
- Capacity for Growth

Implementation Considerations

- Right-of-way
- Cost
- Treatments at intersections

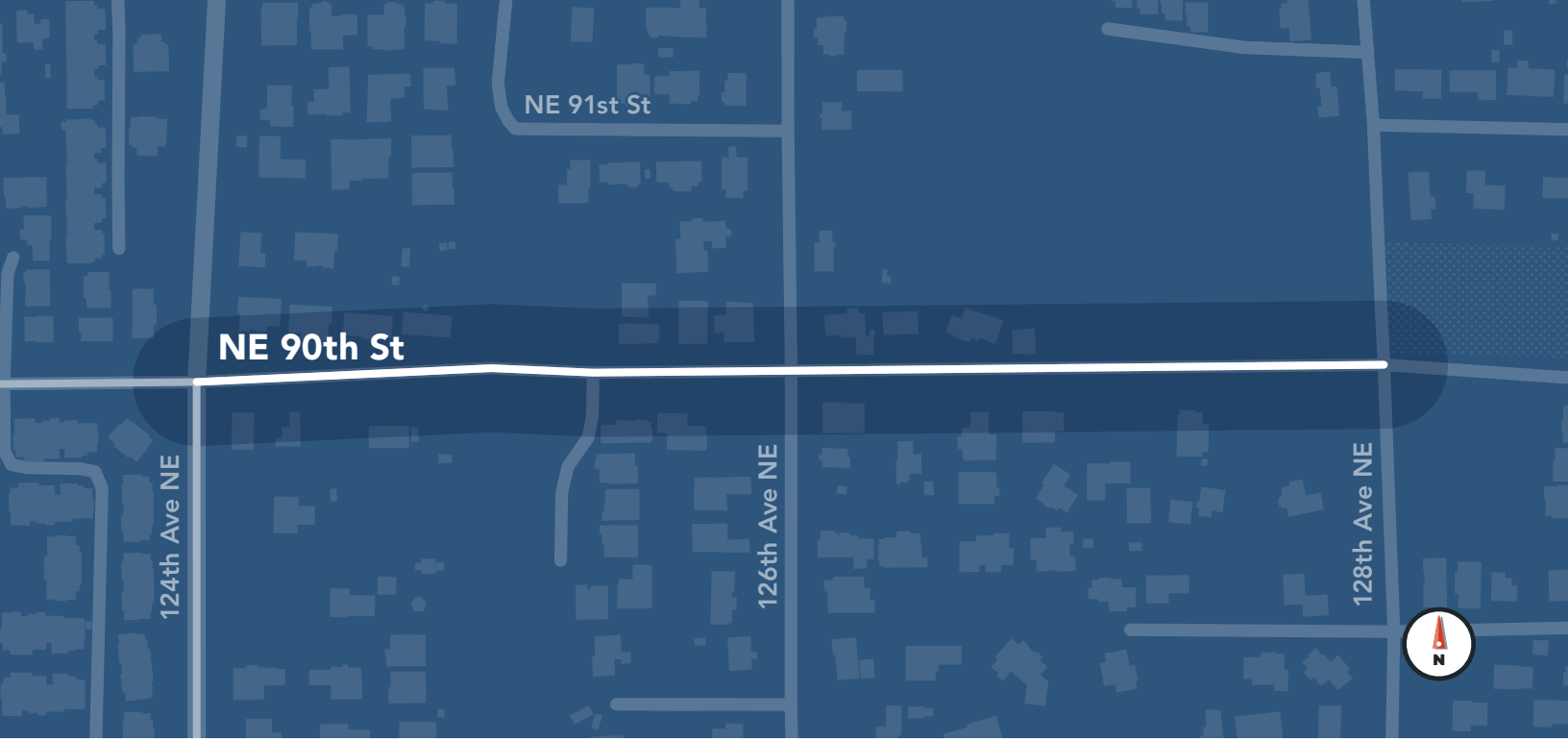
Planning-level Cost

Low

$4,270,000

High

$6,170,000

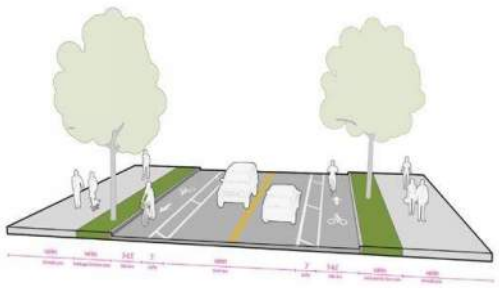


Project #15

NE 90TH STREET GREENWAY

PROJECT DESCRIPTION

Provide buffered bike lanes and standard sidewalks (at least one side of the street) between 124th Avenue NE and 128th Avenue NE



Project Catalyst

Station Access

Complete Network

Capacity for Growth

Implementation Considerations

- Right-of-way
- Cost
- Treatments through wetlands

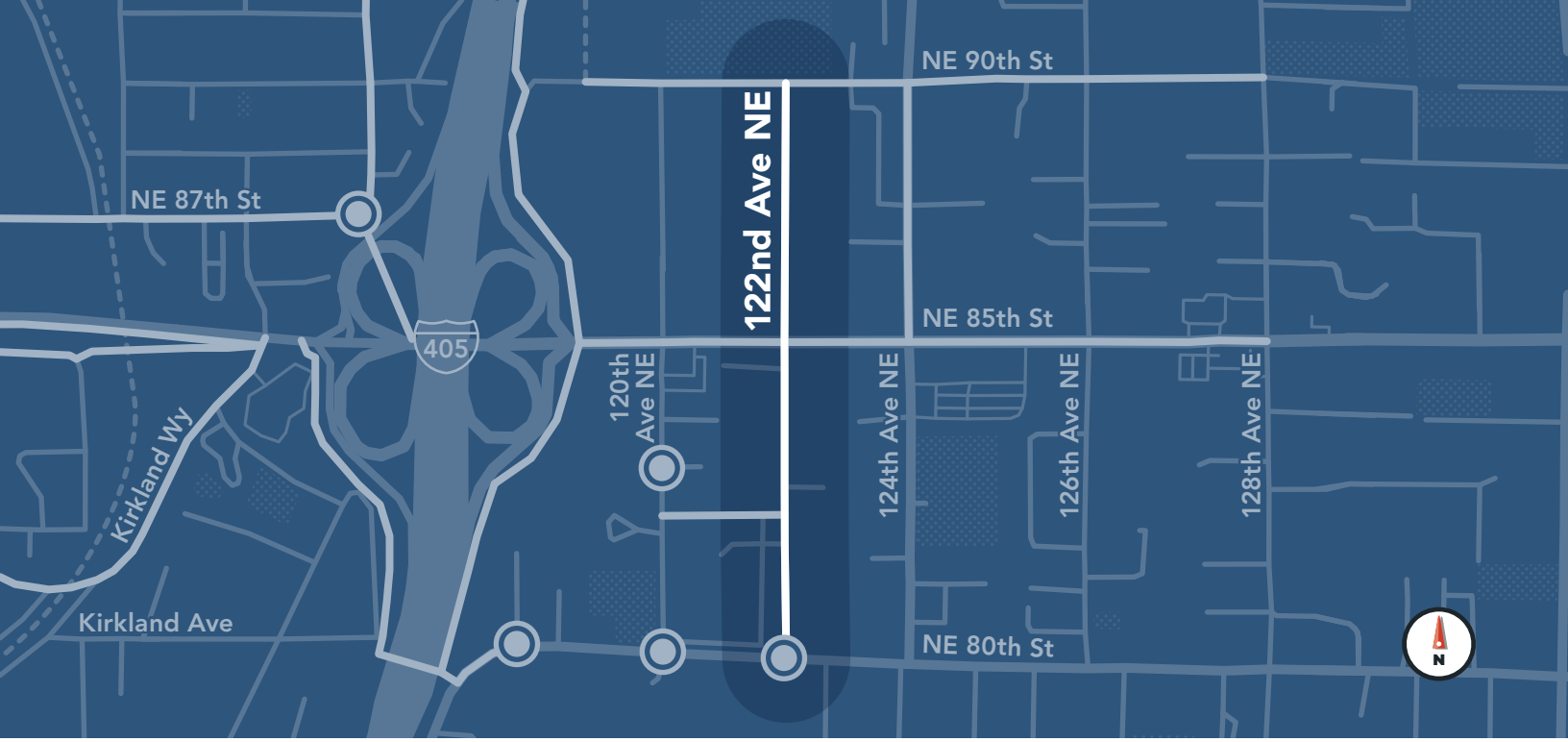
Planning-level Cost

Low

$4,780,000

High

$6,900,000

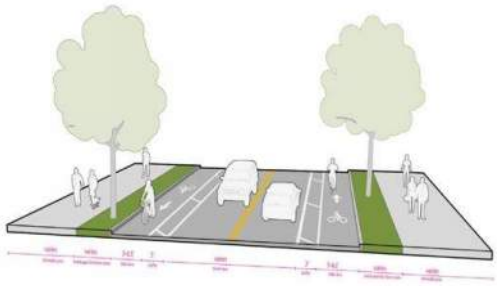


Project #16

122ND AVENUE NE BIKE ROUTE

PROJECT DESCRIPTION

Provide buffered bike lanes and standard sidewalks (both sides of street) between NE 80th Street and NE 90th Street



Project Catalyst

Station Access

Complete Network

Capacity for Growth

Implementation Considerations

- Right-of-way
- Cost
- Grade

Planning-level Cost

Low

$2,890,000

High

$4,180,000

Project #17

120TH AVENUE NE TO 122ND AVENUE NE PED-BIKE CONNECTION

PROJECT DESCRIPTION

Provide a 12-foot path for walking and biking in the vicinity of NE 82nd Street.

Project Catalyst

Station Access

Complete Network

Capacity for Growth

Implementation Considerations

- Cost

Planning-level Cost

Low

$660,000

High

$1,000,000

Project #18A

NE 85TH STREET ENHANCED SIDEWALKS

PROJECT DESCRIPTION

Provide 15-20 foot sidewalks (including amenity zones) on both sides of NE 85th Street to provide a high-quality experience for walking and opportunity for last-mile bike connections between I-405 and 120th Avenue NE.

Project Catalyst

- **Station Access**
- Complete Network
- Capacity for Growth

Implementation Considerations

- Cost
- Right-of-way

Planning-level Cost

Low

$1,460,000

High

$2,120,000

Project #18B

NE 85TH STREET ENHANCED SIDEWALKS

PROJECT DESCRIPTION

Provide 15-20 foot sidewalks (including amenity zones) on both sides of NE 85th Street to provide a high-quality experience for walking and opportunity for last-mile bike connections between 120th Avenue NE and 122nd Avenue NE.

Project Catalyst

- **Station Access**
- Complete Network
- Capacity for Growth

Implementation Considerations

- Cost
- Right-of-way

Planning-level Cost

Low

$1,290,000

High

$1,870,000

Project #18C

NE 85TH STREET ENHANCED SIDEWALKS

PROJECT DESCRIPTION

Provide 15-20 foot sidewalks (including amenity zones) on both sides of NE 85th Street to provide a high-quality experience for walking and opportunity for last-mile bike connections between 122nd Avenue NE and 124th Avenue NE.

Project Catalyst

- Station Access
- Complete Network
- Capacity for Growth

Implementation Considerations

- Cost
- Right-of-way

Planning-level Cost

Low

$1,120,000

High

$1,610,000

Project #18D

NE 85TH STREET ENHANCED SIDEWALKS

PROJECT DESCRIPTION

Provide 15-20 foot sidewalks (including amenity zones) on both sides of NE 85th Street to provide a high-quality experience for walking and opportunity for last-mile bike connections between 124th Avene NE and 126th Avenue NE.

Project Catalyst

- Station Access
- Complete Network
- Capacity for Growth

Implementation Considerations

- Cost
- Right-of-way

Planning-level Cost

Low

$2,680,000

High

$3,871,000

Project #18E

NE 85TH STREET ENHANCED SIDEWALKS

PROJECT DESCRIPTION

Provide 15-20 foot sidewalks (including amenity zones) on both sides of NE 85th Street to provide a high-quality experience for walking and opportunity for last-mile bike connections between 126th Avenue NE and 128th Avenue NE.

Project Catalyst

- Station Access
- Complete Network
- Capacity for Growth

Implementation Considerations

- Cost
- Right-of-way

Planning-level Cost

Low

$2,740,000

High

$3,960,000

Project #19

116TH AVENUE NE PEDESTRIAN/BIKE ACCESS TO OVERCROSSING

PROJECT DESCRIPTION

Improve space allocated for bikes and pedestrians on west side of NE 116th to provide a more comfortable connection, including provision of an enhanced crossing of NE 116th Avenue to the south.

Project Catalyst

Station Access

Complete Network

Capacity for Growth

Implementation Considerations

- Right-of-way
- Cost

Planning-level Cost

Low

$190,000

High

$280,000

Project #20

120TH AVENUE NE IMPROVEMENTS (NE 85TH STREET TO NE 90TH STREET)

PROJECT DESCRIPTION

Overlay and sidewalk infill between along 120th Avenue NE between NE 85th Street and NE 90th Street

Project Catalyst

Station Access

Complete Network

Capacity for Growth

Implementation Considerations

- Right-of-way
- Cost

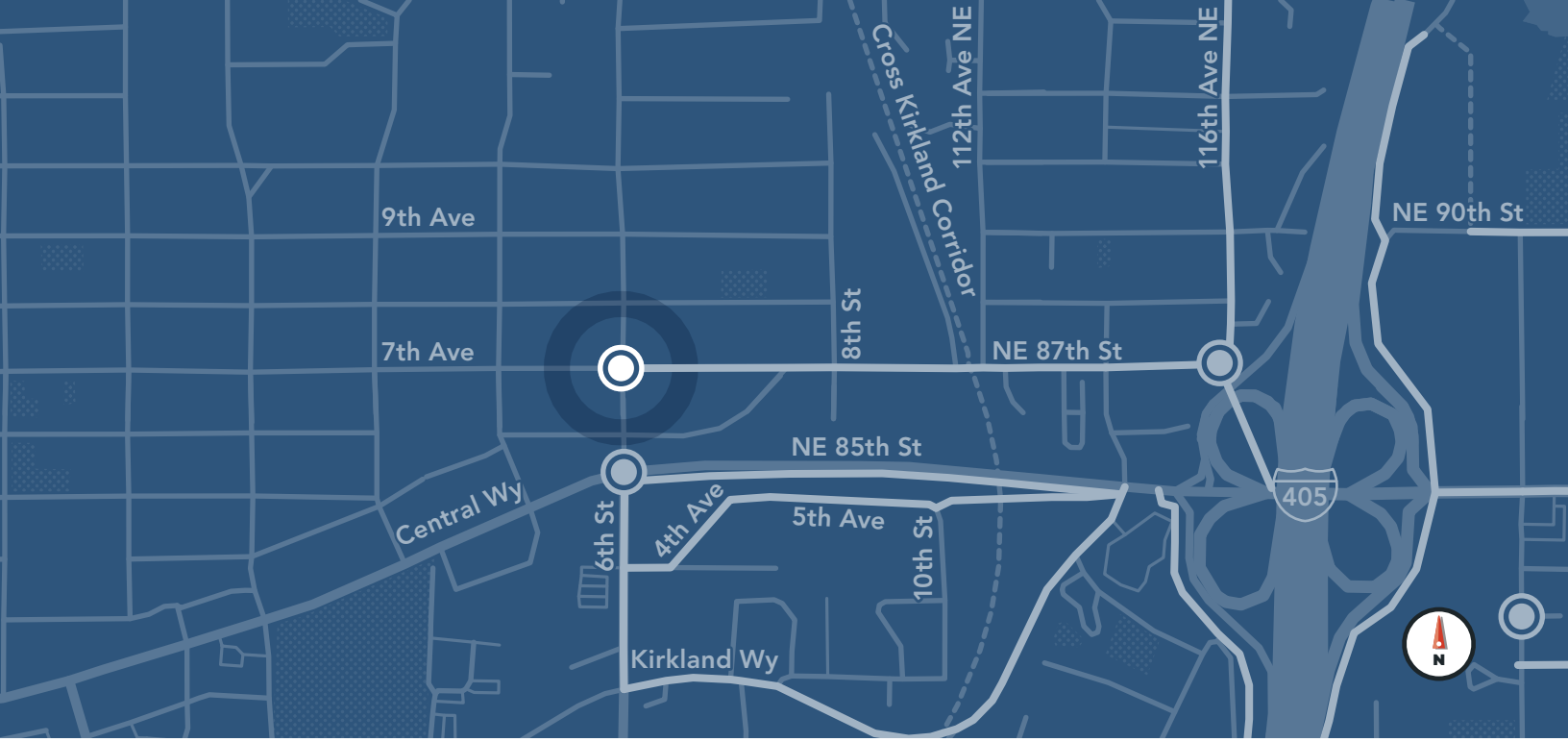
Planning-level Cost

Low

$500,000

High

$720,000



Project #P1

6TH STREET/7TH AVENUE INTERSECTION TREATMENT

PROJECT DESCRIPTION

Improve treatments for people walking and biking

Project Catalyst

Station Access

Complete Network

Capacity for Growth

Implementation Considerations

- Right-of-way

Planning-level Cost

Low

$610,000

High

$880,000

Project #P2

NE 85TH STREET / 122ND AVENUE NE BICYCLE SIGNAL IMPROVEMENTS

PROJECT DESCRIPTION

Improve intersection and signal to better accommodate bikes along 122nd Avenue NE and in crossing NE 85th Street

Project Catalyst

Station Access

Complete Network

Capacity for Growth

Implementation Considerations

- Right-of-way
- Cost
- Treatments at intersections

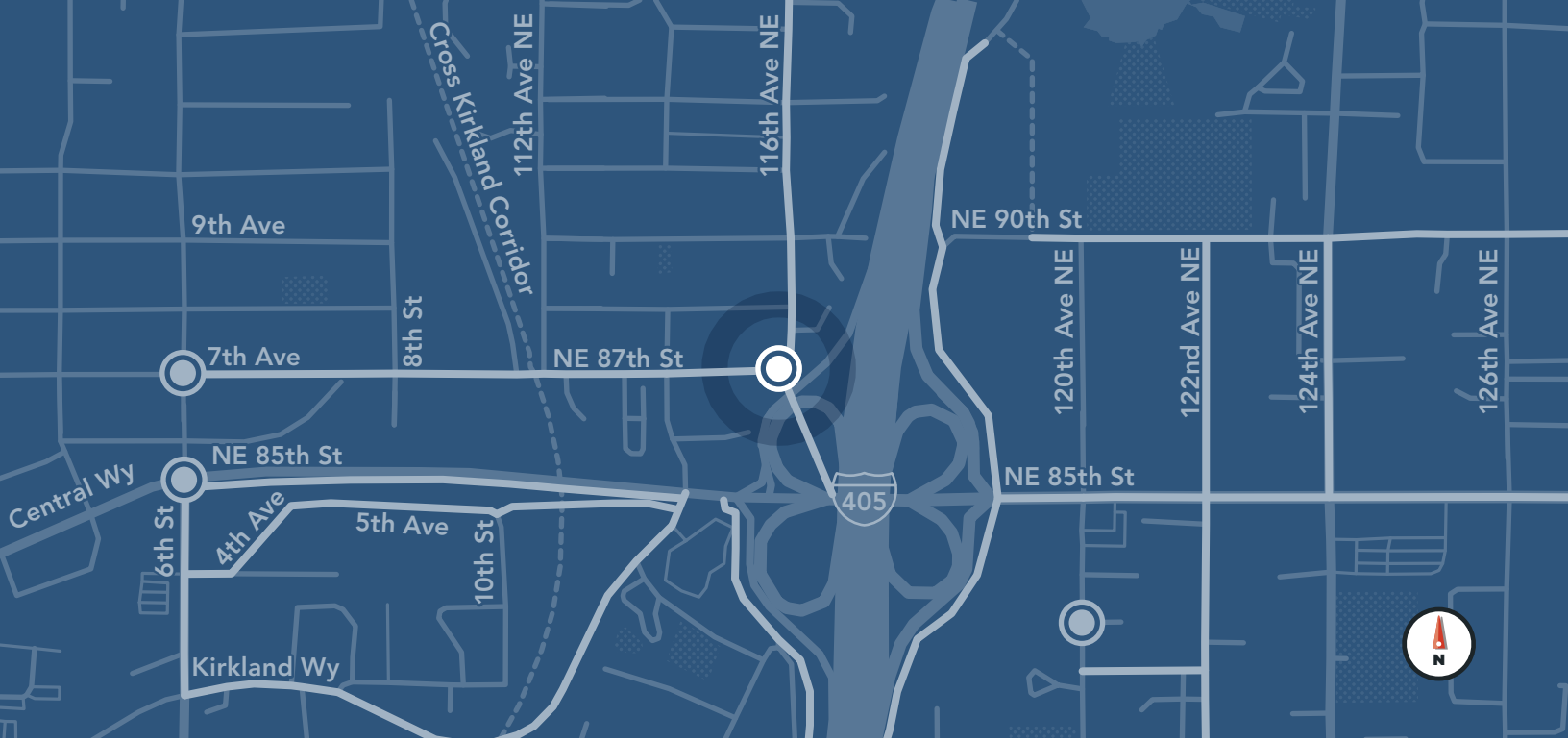
Planning-level Cost

Low

$320,000

High

$470,000



Project #P3

NE 87TH STREET/116TH AVENUE NE ENHANCED INTERSECTION

PROJECT DESCRIPTION

Improve treatments for people walking and biking at this challenging intersection in front of the BRT station. Treatments may include a raised intersection with all-way stop or a mini-roundabout.

Project Catalyst

- Station Access
- Complete Network
- Capacity for Growth

Implementation Considerations

- Right-of-way
- Sight distance
- Cost

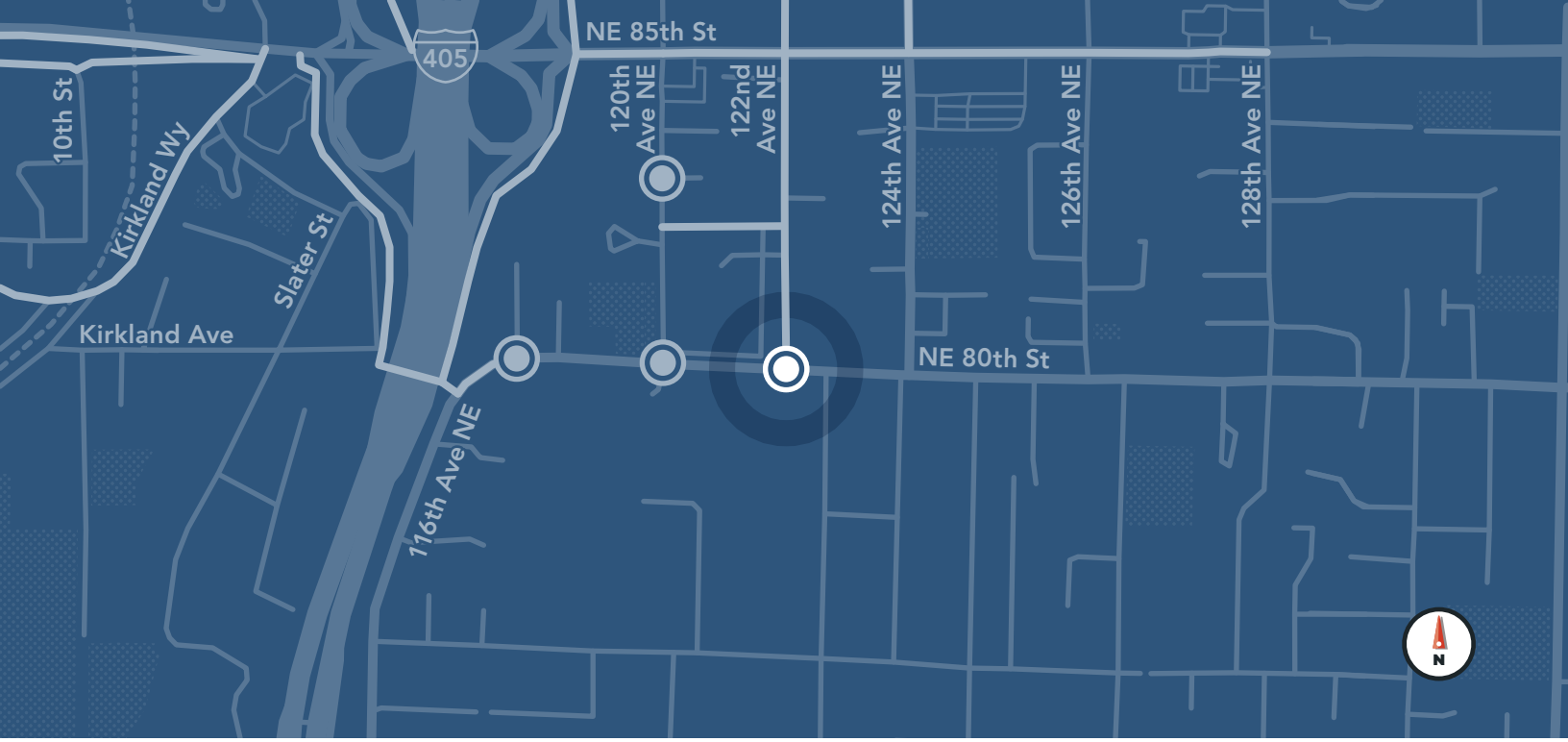
Planning-level Cost

Low

$840,000

High

$1,210,000



Project #P4

122ND AVENUE NE AND NE 80TH STREET INTERSECTION TREATMENT

PROJECT DESCRIPTION

Add treatments, including a RRFB, to improve crossing comfort for people walking and biking

Project Catalyst

Station Access

Complete Network

Capacity for Growth

Implementation Considerations

- Right-of-way

Planning-level Cost

Low

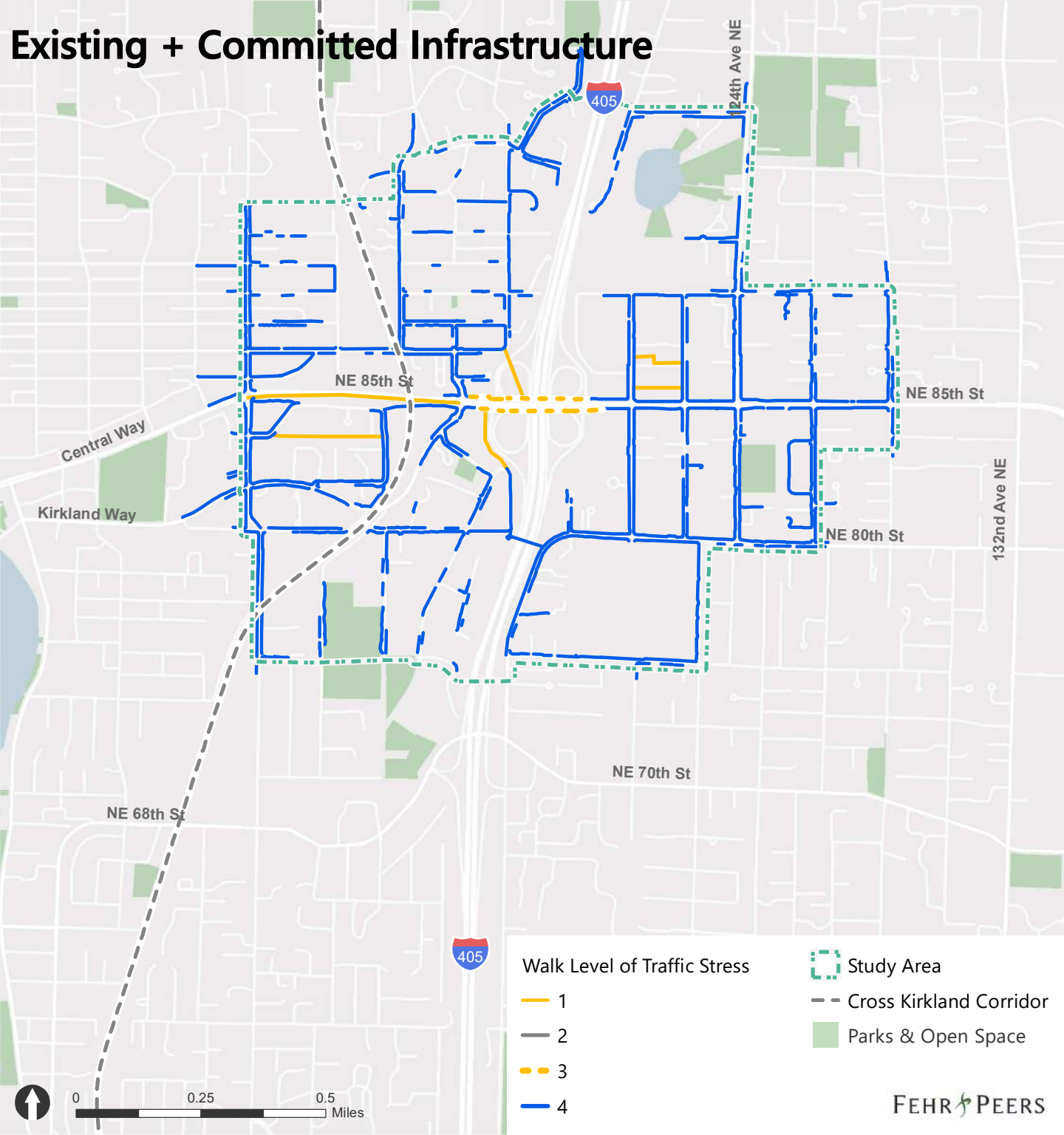
$330,000

High

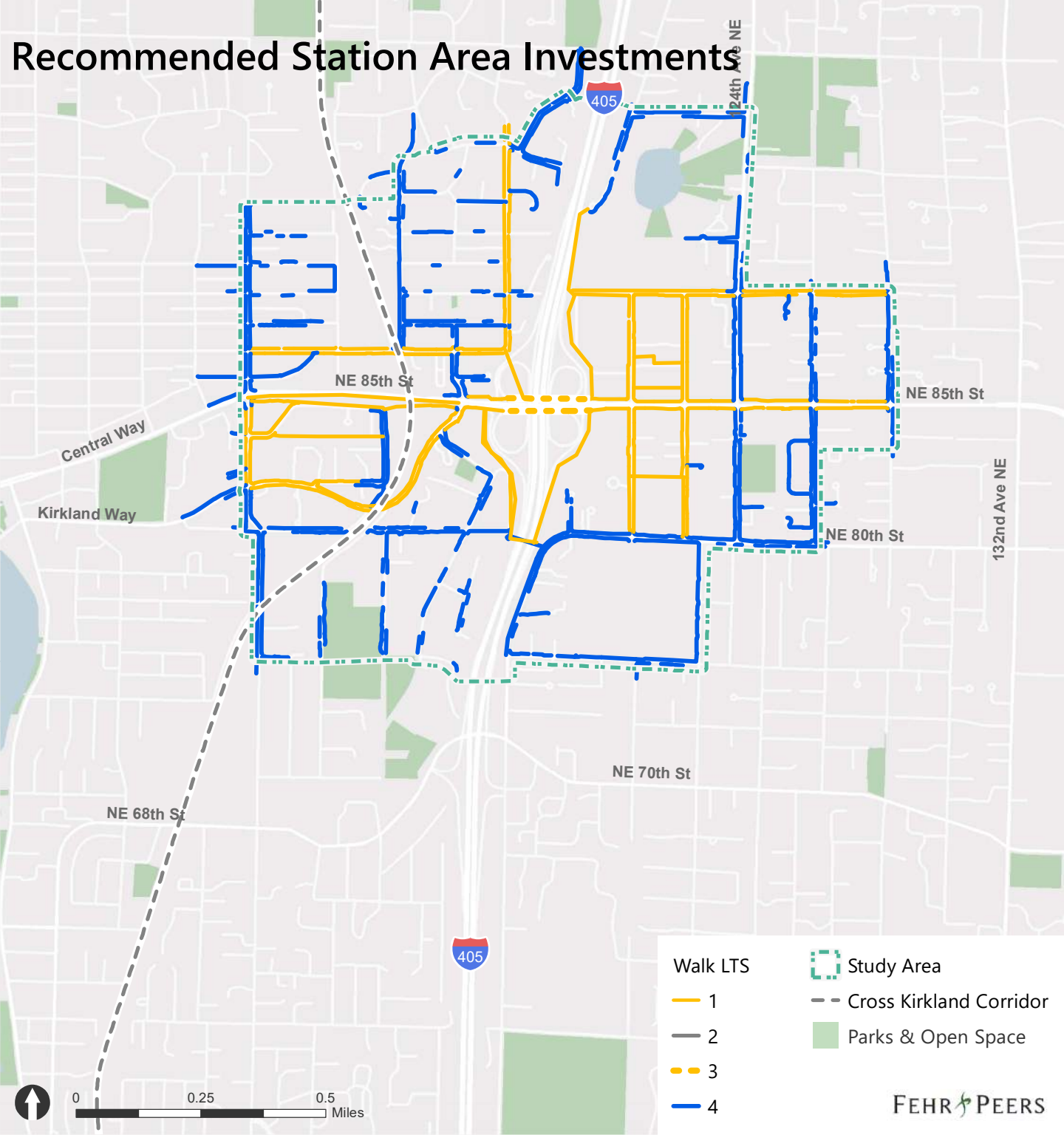
$480,000

Appendix C: Level of Traffic Stress Analysis for Walking and Biking

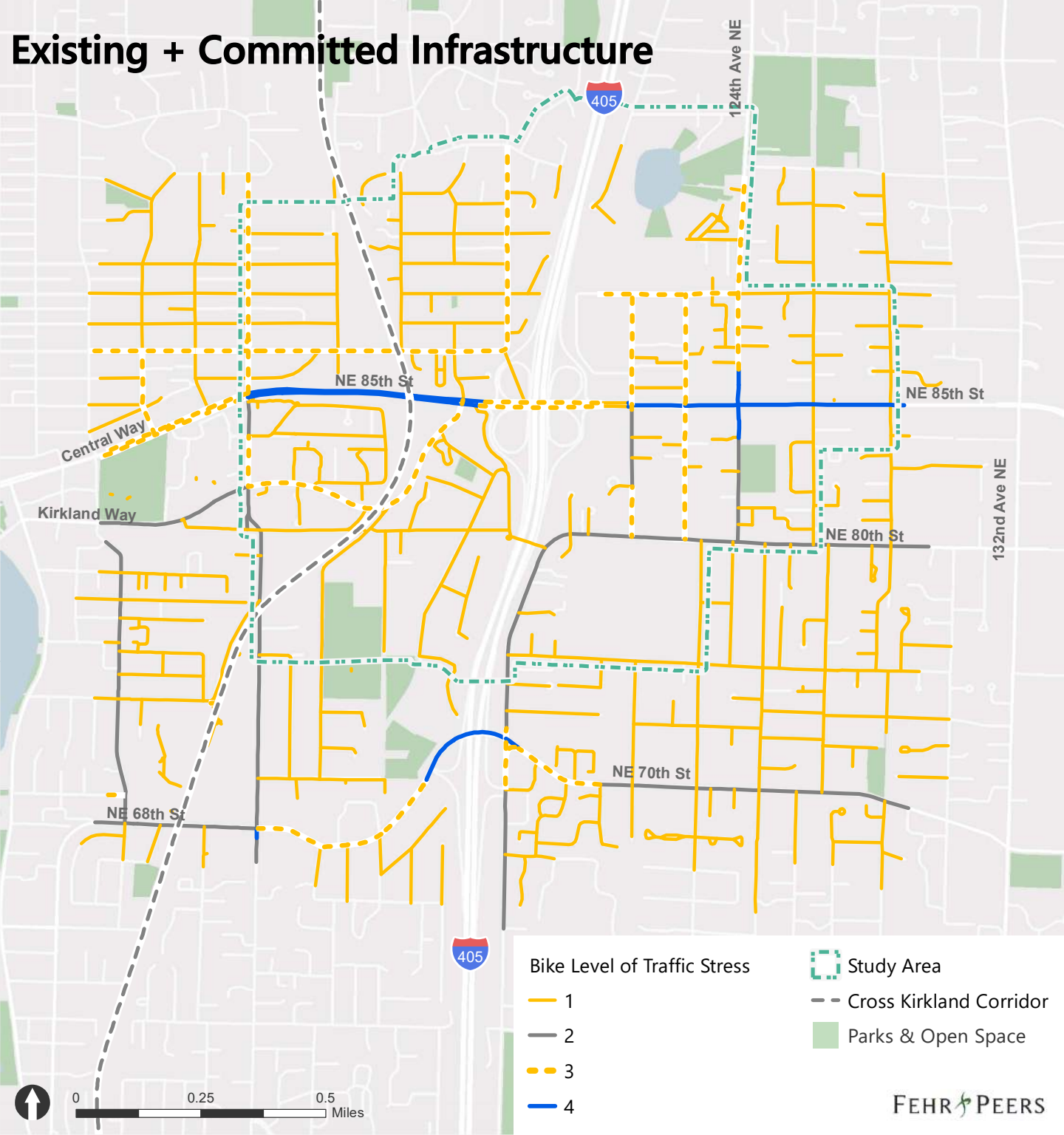
Existing + Committed Infrastructure



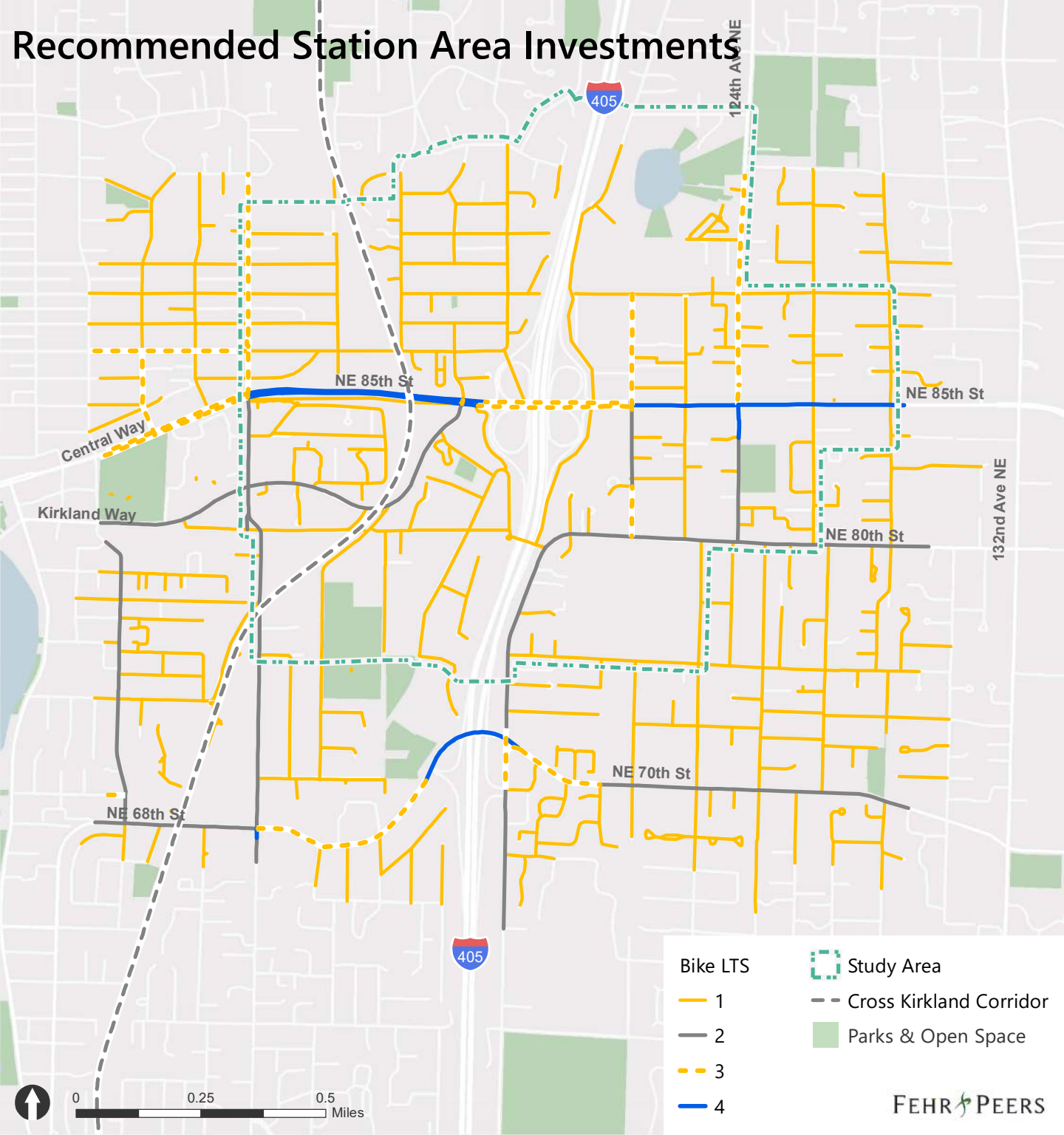
Recommended Station Area Investments



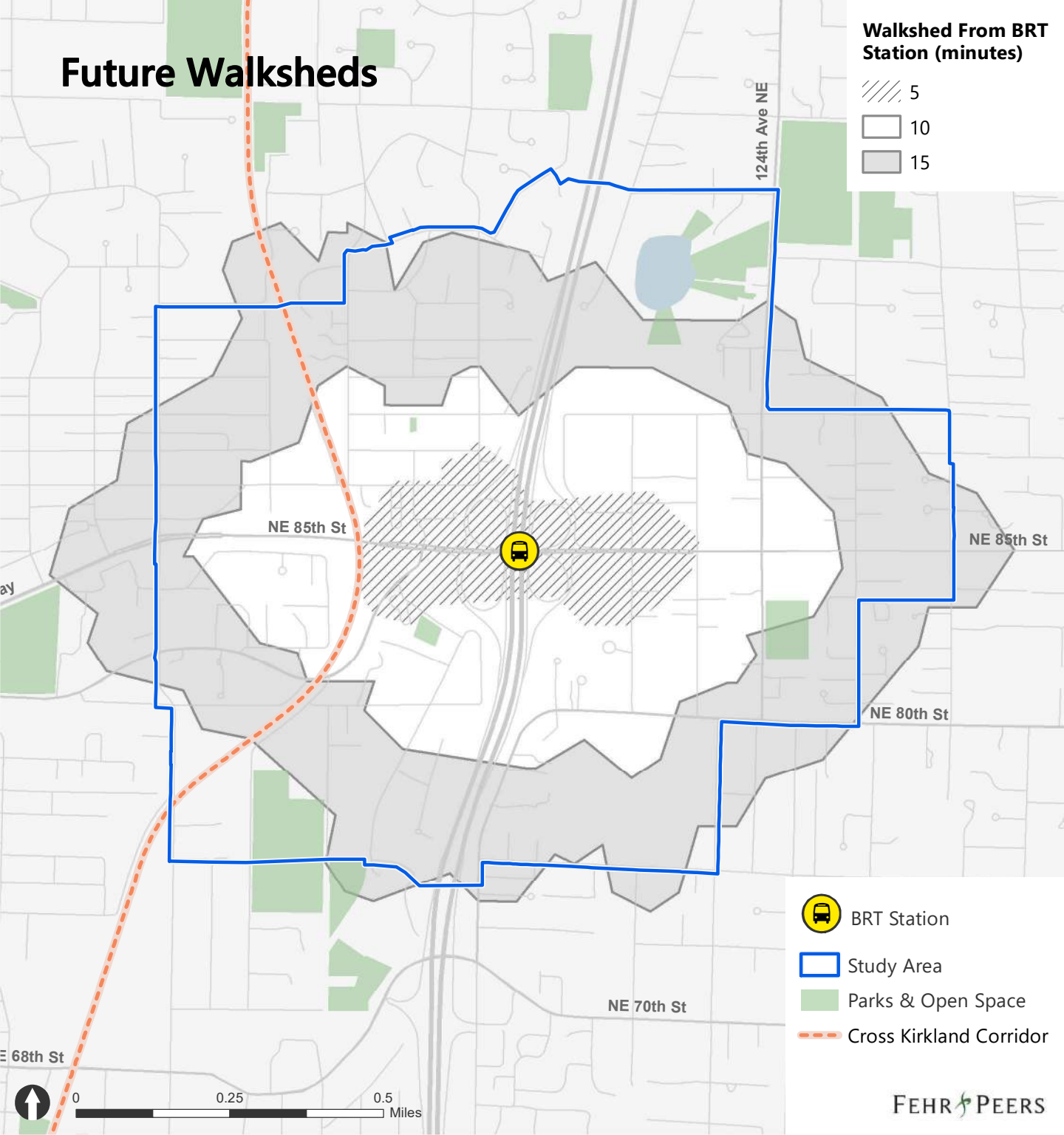
Existing + Committed Infrastructure

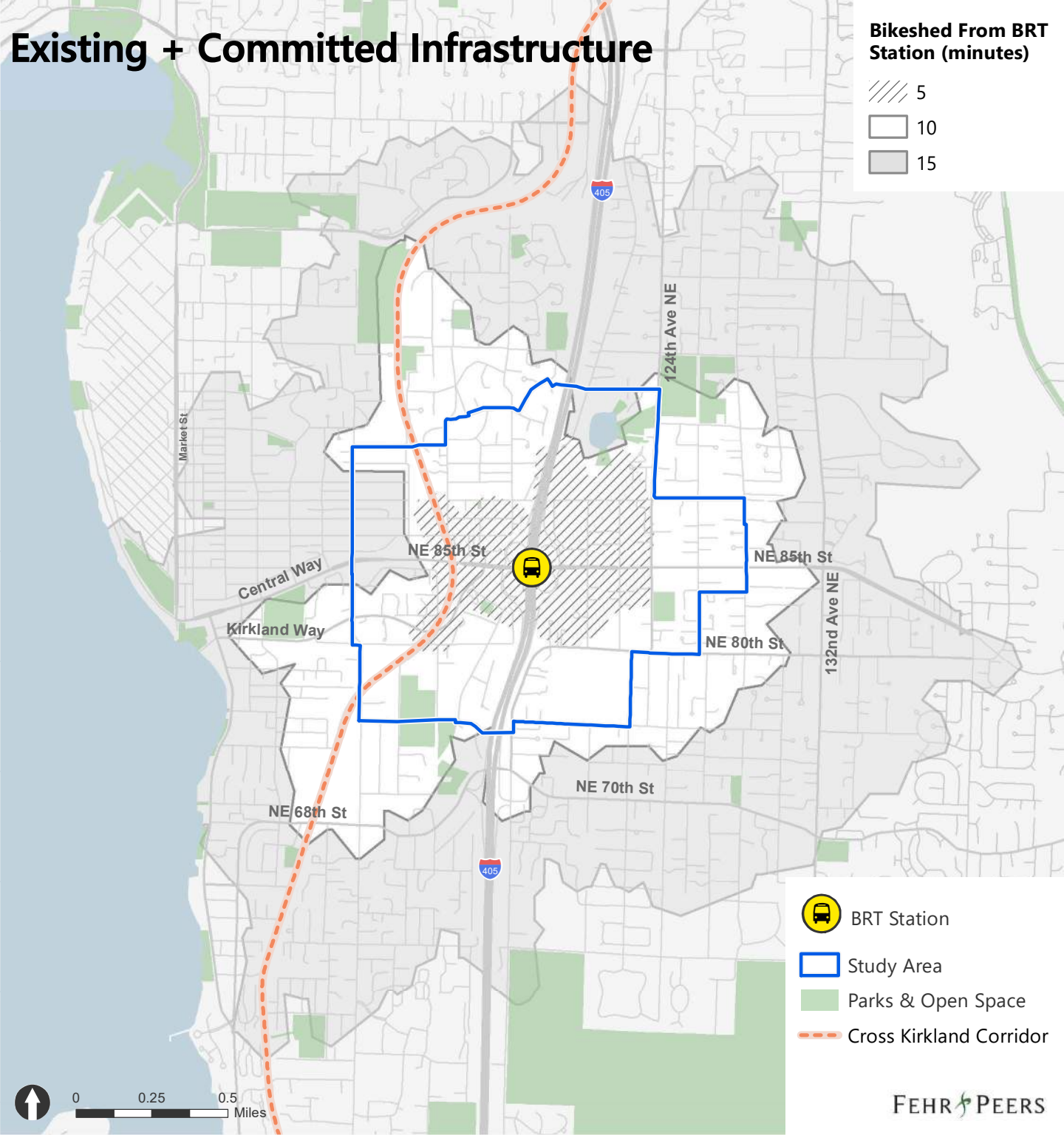


Recommended Station Area Investments

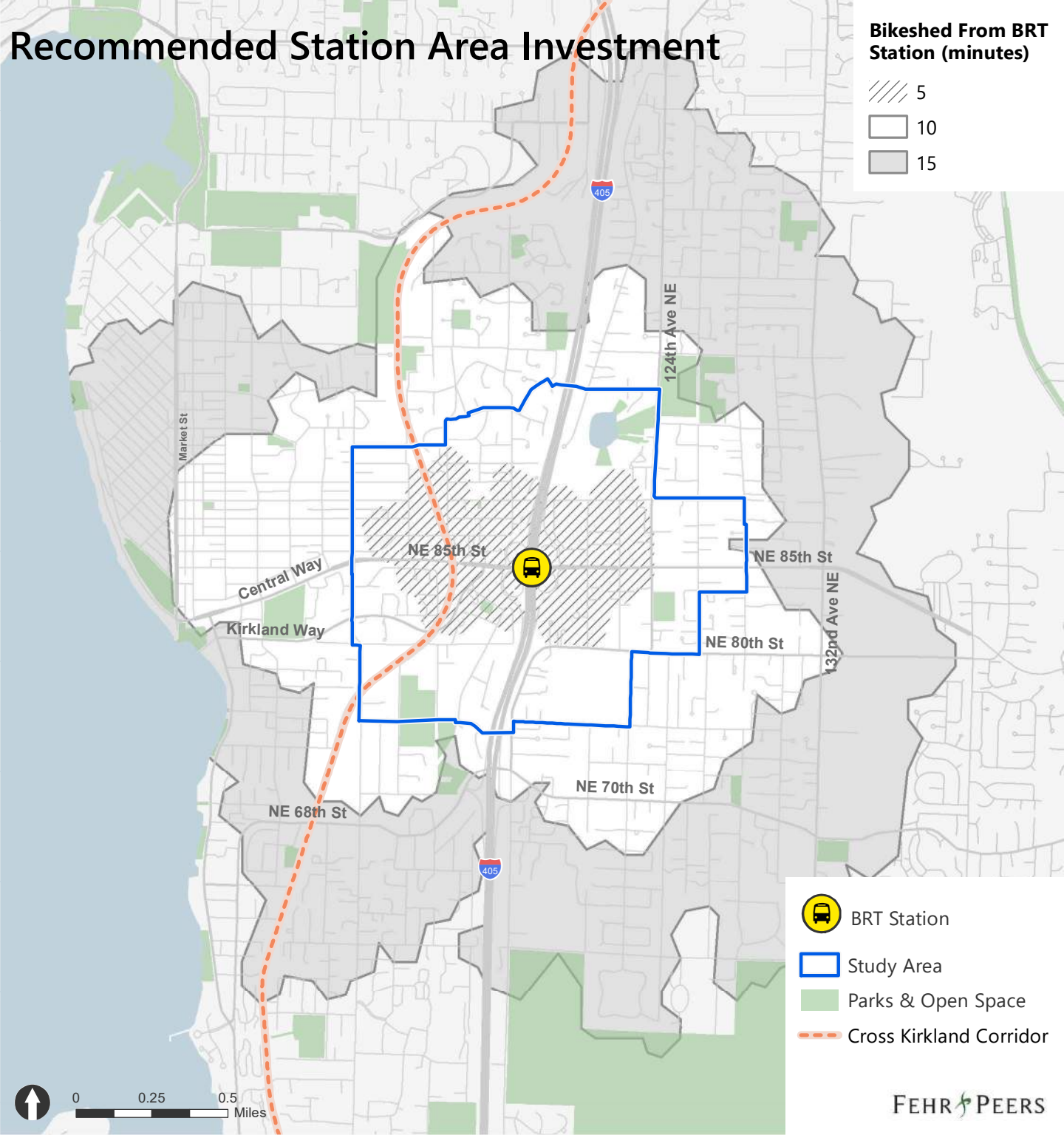


Appendix D: Travelshed Analysis for Walking and Biking


Future Walksheds
Walkshed From BRT Station (minutes)
5
10
15
124th Ave NE
NE 85th St
NE 85th St
NE 80th St
NE 70th St
68th St
BRT Station
Study Area
Parks & Open Space
Cross Kirkland Corridor
0
0.25
0.5
Miles
FEHR PEERS


Existing + Committed Infrastructure
Bikeshed From BRT Station (minutes)
5
10
15
405
124th Ave NE
Market St
NE 85th St
Central Way
Kirkland Way
NE 85th St
132nd Ave NE
NE 80th St
NE 70th St
NE 68th St
405
BRT Station
Study Area
Parks & Open Space
Cross Kirkland Corridor
0
0.25
0.5
Miles
FEHR PEERS

Recommended Station Area Investment



Representative Infrastructure Studies

(Published October 2021)

Appendix 2. Supplemental Water and Sewer Study

This Study is an Appendix to the **NE 85th Street Station Area Plan project** **Fiscal Impacts and Community Benefits Analysis Study Technical Memo (Technical Memo).** The Station Area Fiscal Impacts and Community Benefits Analysis was scoped to answer this question: If the City were to implement its vision of the Station Area as a thriving, walkable urban center with plentiful affordable housing, jobs, sustainable development, and shops and restaurants linked by transit, can the City afford the investments necessary to address increased demand on public services, especially schools, parks/open spaces, transportation, and utilities, and avoid a reduction in service for existing community members and businesses?

Study Purpose

To support the Technical Memo's assumptions, planning level **Representative Infrastructure Studies** were conducted to determine a set of representative infrastructure investments needed to maintain service levels in transportation, water and sewer, and stormwater, in alignment with the full 23-year buildout scenarios described for the two key development alternatives analyzed in the Technical Memo – June Alternatives A and B. The purpose of the Infrastructure Studies was to inform an understanding of area-wide representative infrastructure and service needs and costs and for incorporation as assumptions in the fiscal analysis. Note that as "representative infrastructure," these identified investments are ones that are likely to be similar in scale and type to those needed to support future Station Area development, but are likely to differ somewhat from the specific infrastructure investments that will ultimately be adopted for the Station Area. Information about the Representative Infrastructure Studies is presented in Section 3 of the Fiscal Impacts and Community Benefits Technical Memo. The Fiscal Impact model assigns all representative infrastructure investments either to development projects or to the City, roughly following City policy. Any assumptions about parcel- and quadrant-level development and phasing included in the studies are hypothetical and not meant to presuppose decision- making by private landowners or the actions of the market. The representative investments identified in the Infrastructure Studies are distinct from and should not be construed as preferred plan recommendations or final project configurations, which will be developed in later stages of planning and are subject to City Council approval.

Key Contacts

City of Kirkland Project Lead: Allison Zike

Consultant Project Lead: Mithun

Fiscal Impacts and Community Benefits Supplemental Study Technical Memo

Lead Author: BERK; Contributors: EcoNorthwest, Fehr and Peers, Mithun

Representative Infrastructure Studies

Appendix 1. Supplemental Transportation Study Lead Author: Fehr and Peers

Appendix 2. Supplemental Water and Sewer Study Lead Author: RH2

Appendix 3. Supplemental Stormwater Memo Lead Author: RKI

City of Kirkland
NE 85th Street Station Area Plan Water and Sewer System Analyses

- **Background:** The City has published a Draft Supplemental Environmental Impact Statement (DSEIS) for the NE 85th Street Station Area Plan (SAP). The DSEIS presents several alternatives that consider rezoning most of the area to allow it to develop more residential units and jobs. The alternatives being evaluated in this analysis include June Alternatives A and B; the June Alternatives are derivatives of the No-Action Alternative and Alternative 2 from the DSEIS.
- **Analysis:**
  - **Objective:**
    - Determine water and sewer system improvements required above and beyond the City's existing CIPs to support the SAP development (June Alternative B).
  - **Improvement Alternative Analyses:**
    - Water and sewer system improvements were identified to determine what is needed to support the following scenarios for development in the Station Area:
      - Existing system with redevelopment at the Lee Johnson site.
      - Existing system with redevelopment at the Lee Johnson and Costco sites.
      - Growth based on *2035 Comprehensive Plan*, which is similar to June Alternative A.
      - June Alternative B.
    - All identified improvements were classified and phased based on the following:
      - Those required to be constructed in conjunction with the Bus Rapid Transit (BRT) station.
      - Those required to be constructed to support each of the service areas defined by BERK (Lee Johnson site, Costco site, and NE, NW, SE, and SW quadrants).
- **Results and Cost Estimates:**
  - **Results:** The existing systems cannot support the potential growth analyzed in June Alternative B at the Lee Johnson and Costco sites without the implementation of improvements. With the implementation of the City's existing CIPs as shown in the 2015 WSP and 2018 GSP, the water and sewer systems cannot support the full redevelopment analyzed under SAP June Alternative B. Additional water and sewer system improvements are identified in these analyses to serve the buildout growth studied in SAP June Alternative B.
    - The water system would not be able to support the rezoned fire flow requirements without additional improvements.
    - The sewer system would not be able to support the additional flows from the Station Area without additional improvements.
  - **Cost Estimates:**
    - **Table 1** and **Chart 1** summarize the project costs for several of the scenarios evaluated. The sum of the costs for the Base CIP and the SAP June Alternative B additional improvements may be added to determine the total cost to support the full development proposed for SAP June Alternative B.
    - Each CIP project was assigned an estimate for the portion of the cost that should be funded by the City or by a developer. Based on input from the City, projects were identified as City-funded if the improvement was triggered by a maintenance concern. Projects that were noted with a capacity-related improvement trigger were identified as developer-funded. The funding cost allocations are summarized in **Chart 2** for the total cost of improvements to the existing system to support the full development proposed for SAP June Alternative B.
  - **BRT-Related Projects:**
    - Water system CIP improvement WM2 should be completed in conjunction with the BRT construction. WM2 proposes realigning the existing 24-inch water main that crosses I-405 at NE 85th Street.

- Sewer system improvement SAP-8 should be completed in conjunction with the BRT construction. SAP-8 proposes installing a new I-405 crossing to mitigate additional flows due to the Station Area growth. This project is assumed to be developer-funded as it adds necessary capacity to serve redevelopment; however, if redevelopment does not occur before the BRT station is constructed, the City may need to fund and construct the project and determine the appropriate mechanism to recover the cost from redevelopment when it occurs.

Table 1
Estimated Total Project Costs for SAP Alternative CIPs

Scenario	Estimated Total Project Costs	
	Water	Sewer
Existing System with Redevelopment at Lee Johnson and Costco Sites*	$4,162,000	$7,481,000
Base Scenario Improvements	$27,552,000	$45,756,000
SAP June Alternative B Additional Improvements	$559,000	$12,613,000

* Note these improvements are included in the Base CIP costs for water, and SAP June Alternative B costs for sewer.

Chart 1
Estimated Total Utility CIP Costs for Station Area Alternatives

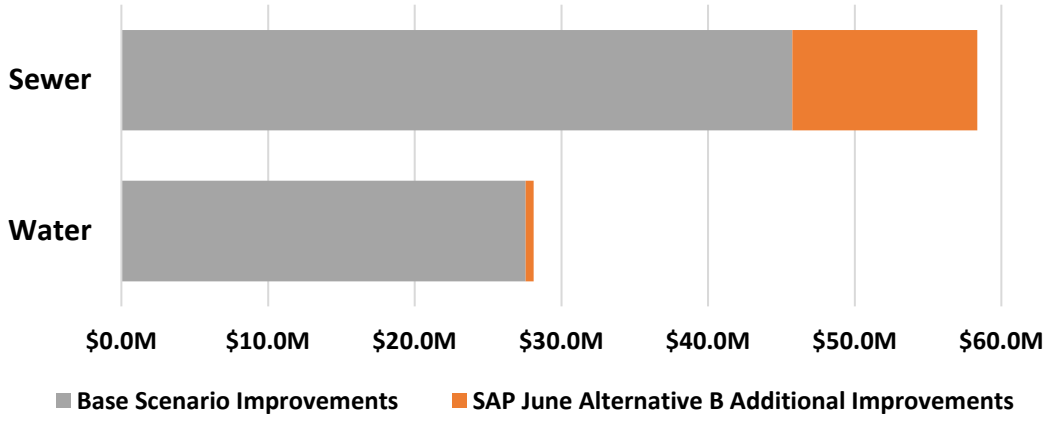
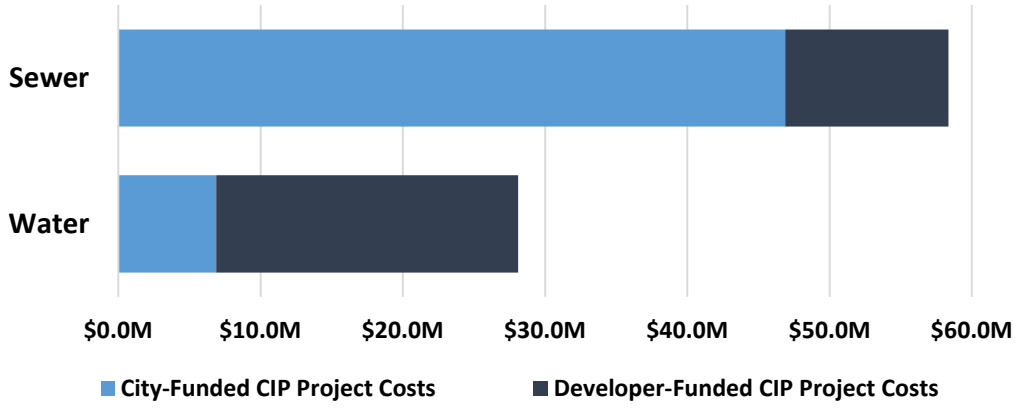


Chart 2
Estimated City- and Developer-Funded CIP Cost Allocation for Station Area June Alternative B



TECHNICAL MEMORANDUM

Client:	City of Kirkland		
Project:	NE 85th Street Station Area Plan Water and Sewer System Analyses		
Project File:	KIR 119.168.0001.0106	Project Manager:	Michele Campbell, PE
Composed by:	Dylan Bright		
Reviewed by:	Michele Campbell, PE, and Kenny Gomez, PE		
Subject:	NE 85th Street Station Area Plan Water and Sewer System Analyses		
Date:	October 18, 2021		

Signed:
10/18/2021

Executive Summary

To help guide transit-oriented growth in the vicinity of the proposed Inline Stride Bus Rapid Transit (BRT) Station at the Interstate 405 (I-405)/NE 85th Street interchange, the City of Kirkland (City) is developing a Station Area Plan (SAP) that considers rezoning within a ½-mile radius of the new BRT Station. Prior to adopting a preferred direction for the SAP, the City is evaluating the fiscal impacts and community benefits of development alternatives for the study area.

This technical memorandum documents the results of water and sewer system analyses performed by RH2 Engineering, Inc., (RH2) to support the SAP evaluation. The alternatives include a Base Scenario that is projected to approximately triple the existing water demands and sanitary sewer flows in the Station Area by the end of the planning horizon. The Base Scenario is slightly modified from the June Alterative A scenario of the SAP. The June Alternative B growth scenario projects water demands and sanitary sewer flows in the Station Area to increase to nearly ten times the current levels. Planning-level flow requirements also are expected to increase under the June Alternative B growth scenario.

The results of the RH2 analyses indicate that the existing water distribution system and sewer collection system infrastructure cannot support the developments associated with the land use

changes and potential redevelopment contemplated for the parcels east of, and nearest to, the I-405 interchange (e.g., existing Lee Johnson and Costco properties) without additional piping improvements. Water and sewer system improvements have been identified in previous planning studies by RH2 to support the growth identified for the Base Scenario. Additional improvements above those required for the Base Scenario are needed to increase system capacity to meet the projected water demands and sanitary sewer flows estimated for the SAP June Alternative B growth scenario.

A summary of the costs for the identified improvements is shown in **Table ES-1**. The sum of the costs for the Base Scenario Capital Improvement Program (CIP) and the SAP June Alternative B additional improvements in the table may be added to determine the total cost for improvements to the existing system to support the full development proposed for SAP June Alternative B. These total costs also are shown in **Chart ES-1**.

Table ES-1

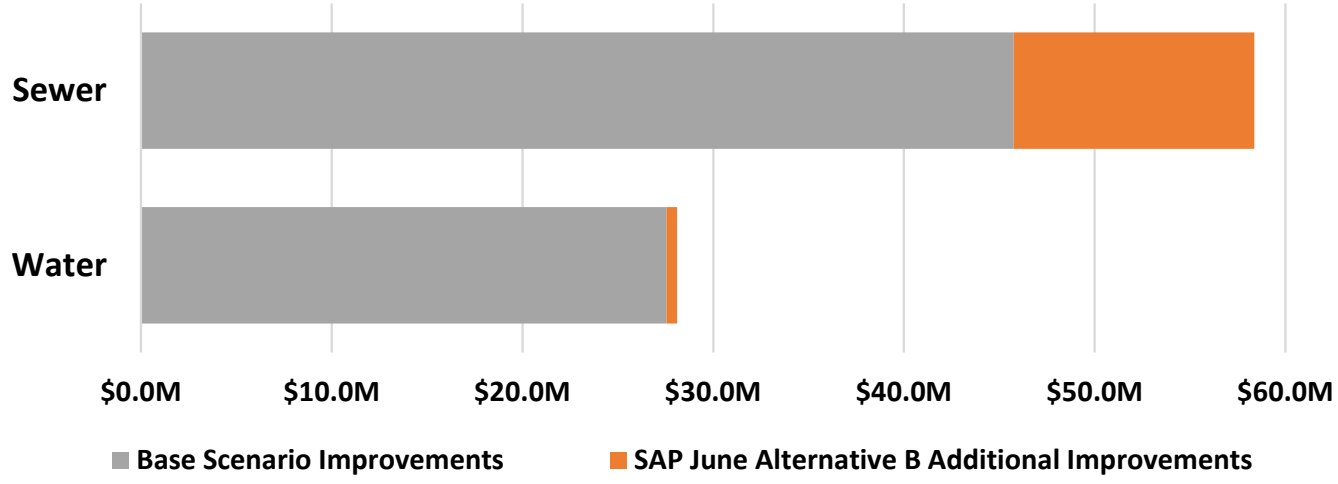
Estimated Total Project Costs for SAP Alternative CIPs

Scenario	Estimated Total Project Costs	
	Water	Sewer
Existing System with Redevelopment at Lee Johnson and Costco Sites*	$4,162,000	$7,481,000
Base Scenario Improvements	$27,552,000	$45,756,000
SAP June Alternative B Additional Improvements	$559,000	$12,613,000

* Note these improvements are included in the Base CIP costs for water, and SAP June Alternative B costs for sewer.

Chart ES-1

Estimated Total Utility CIP Costs for Station Area Alternatives



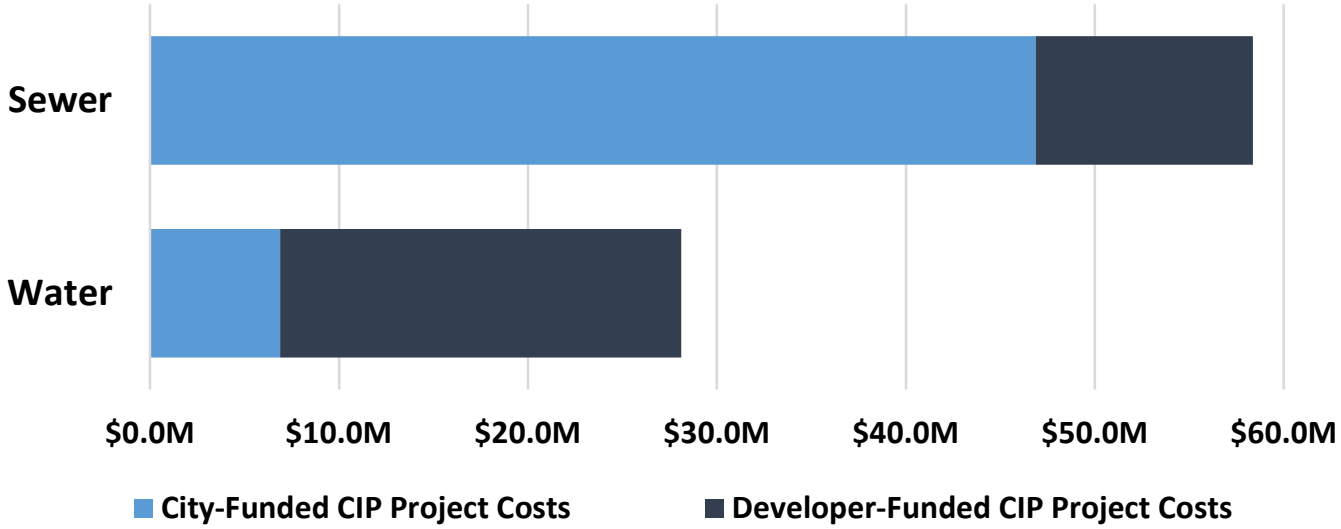
Each CIP project was assigned an estimate for the portion of the cost that should be funded by the City or by a developer. Based on input from the City, projects were identified as City-funded if the improvement was triggered by a maintenance concern. An example of a project that is considered to be a maintenance concern is sewer alignments that were flagged in the City's

2018 *General Sewer Plan* as needing to be upsized from 6-inch alignments to the minimum design standard of 8 inches. Projects that were noted with a capacity-related improvement trigger were identified as developer-funded. The funding cost allocations are summarized in **Chart ES-2** for the total cost of improvements to the existing system to support the full development proposed for SAP June Alternative B.

Chart ES-2

Estimated City- and Developer-Funded CIP Cost Allocation

for Station Area June Alternative B



Several projects are identified to be constructed in coordination with the BRT Station design and project schedule. Water system CIP WM2, which proposes to realign the existing 24-inch water main that crosses I-405 at NE 85th Street, is required because the BRT Station design conflicts with the existing water main. Sewer system CIP SAP-8 also should be completed in coordination with the BRT construction. SAP-8 proposes installing a new I-405 crossing to mitigate additional flows due to the Station Area growth. A feasibility analysis should be performed to confirm the constructability of the proposed SAP-8 sewer improvements and to compare the cost/benefit of other potential alternative capacity improvements. This project is assumed to be developer-funded as it adds necessary capacity to serve redevelopment; however, if redevelopment does not occur before the BRT Station is constructed, the City may need to fund and construct the project and determine the appropriate mechanism to recover the cost from redevelopment when it occurs.

Background

The City of Kirkland (City) is a municipal corporation that is responsible for providing sanitary sewer and drinking water service within its utility service areas. The City's most recent *Water System Plan* (WSP) and *General Sewer Plan* (GSP) were completed in 2015 and 2018, respectively.

The Washington State Department of Transportation (WSDOT) and Sound Transit are currently planning a new Interstate 405 (I-405)/NE 85th Street Interchange and Inline Stride Bus Rapid Transit (BRT) Station that will be designed to connect the City to major regional transit lines. To help guide transit-oriented growth in the vicinity of the BRT Station, the City is developing a Station Area Plan (SAP) that considers rezoning most of the area from NE 97th Street to NE 75th Street and from 6th Street to 128th Avenue NE, herein referred to as the Station Area and shown on **Figure 1**. The considered rezoning would concentrate more jobs and households in this area with access to high-capacity regional transit.

The City published a Draft Supplemental Environmental Impact Statement (DSEIS) in January 2021, which presents one no-action and two action alternatives for growth within the Station Area through the year 2044. Based on public comment and community feedback on the DSEIS, a charette held with City staff, and guidance from the City Council and Planning Commission, two growth scenarios (June Alternatives A and B) were developed to inform a supplemental scope of work to provide additional detail ahead of choosing a preferred alternative for the Station Area. The June Alternatives are being studied to analyze the fiscal impacts and community benefits of each growth scenario presented therein. The results of the fiscal impacts and community benefits analysis will inform the City's selection of a preferred plan direction that comprehensively considers land use, urban design, open space, transportation, utilities, and sustainability.

The additional growth proposed in the June Alternatives is greater than what had been previously planned for in the City's WSP and GSP. Analyses are needed to determine the impact of the growth on the water and sewer utilities.

Purpose

The City requested RH2 Engineering, Inc., (RH2) to perform analyses to evaluate the impact of the proposed rezoning on the water and sewer utilities. The analyses evaluated whether the City's water and sewer systems have adequate capacity to serve the proposed rezoning alternatives contemplated in the SAP, and identified capital improvements beyond those described in the WSP and GSP to serve the future Station Area through the year 2044 planning horizon.

This technical memorandum documents the analyses performed using the City's water and sewer system hydraulic models to determine the capital improvements required to support the rezoning alternatives contemplated in the SAP.

Growth Alternatives

SAP Alternatives

The DSEIS identified three different growth alternatives that were evaluated for future development in the Station Area through the year 2044 planning horizon. The three DSEIS

alternatives included a No Action Alternative 1, and two action alternatives that would allow for moderate to high growth to maximize transit-oriented development, community benefits, including affordable housing, and quality of life. Alternative 2 growth would be primarily focused on existing commercial areas such as Rose Hill and would allow for a range of mid-rise, mixed-use office/residential with incremental infill in established residential neighborhoods. Alternative 3 would include mixed-use residential and office buildings up to 20 stories in select commercial areas, mid-rise residential mixed-use along NE 85th Street and adjacent to the office mixed-use areas, and smaller scale infill in low-density residential areas.

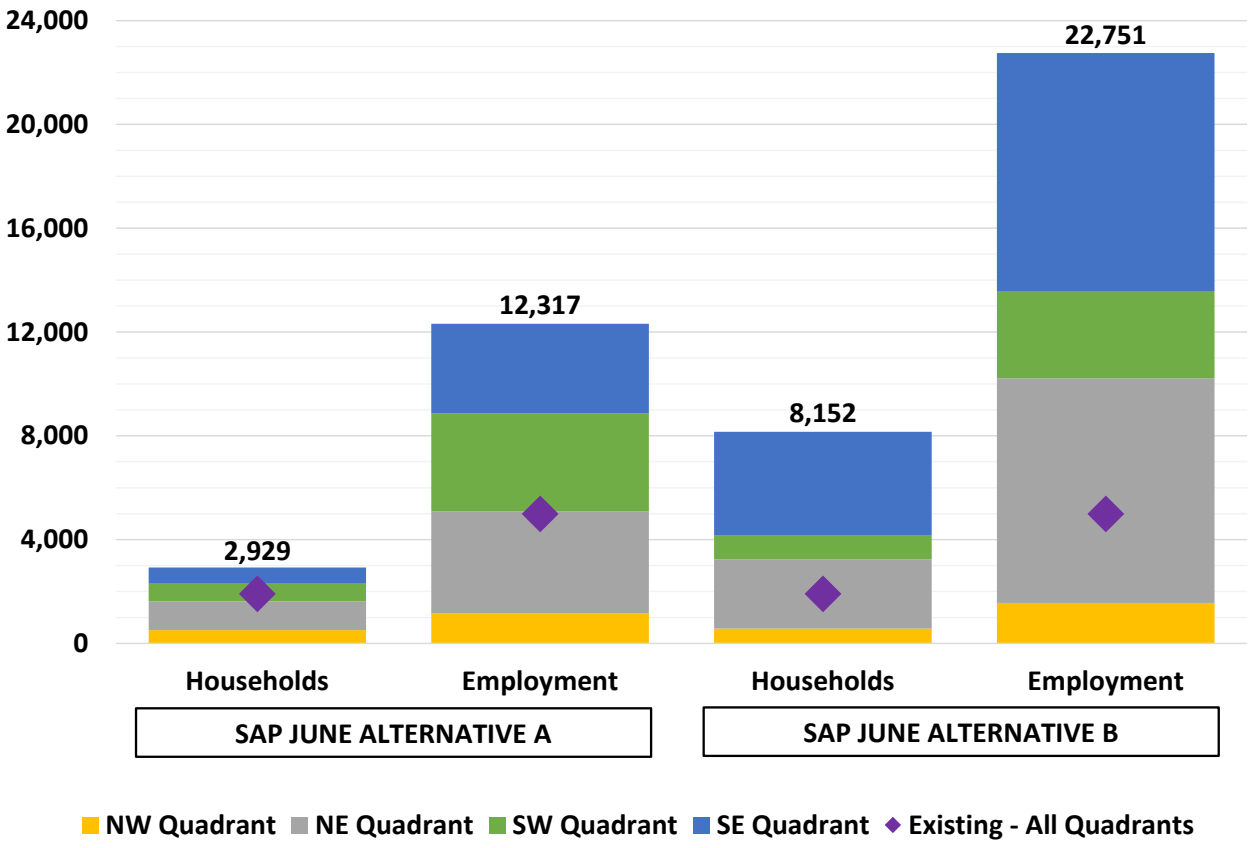
Public comment and community feedback on the DSEIS, a charette held with City staff, and guidance from the City Council and Planning Commission led to the development of two alternatives to inform a fiscal impacts and community benefits analysis, which fall within the bookends of the DSEIS alternatives. These new alternatives, known as the June Alternatives, narrow the range of the alternatives studied in the DSEIS in the following ways:

- Remove the level of growth shown in DSEIS Alternative 3 from further consideration.
- Use a revised version of DSEIS Alternative 1 as the lower limit of growth to be studied (June Alternative A: Current Trends).
- Use a reduced version of DSEIS Alternative 2 as the upper limit of growth to be studied (June Alternative B: Transit-Connected Growth).

The projected year 2044 household and employment for the June Alternatives was provided to RH2 by Mithun, Inc., and is shown in **Chart 1** based on service area quadrants spatially separated by I-405 and NE 85th Street. The numbers in the chart represent the total planned number of households and employees within the Station Area boundary at the end of the planning horizon.

Chart 1

Total Future June Alternatives Household and Employment



Source: Mithun/EcoNW, 2021

RH2 Alternatives

The growth alternatives used by RH2 were slightly modified from the SAP June Alternatives to take advantage of water and sewer planning efforts recently performed by RH2. These efforts included the following.

- 2015 WSP
- 2018 GSP
- 2021 Water Capital Improvement Program (CIP) Update
- Letter report to the City regarding the Water and Sewer Flow Analyses for the Continental Divide Development, dated June 30, 2017, from RH2. The proposed development is located immediately north of NE 85th Street between 131st Avenue NE and 132nd Avenue NE.

- Letter report to the City regarding the Water and Sewer Flow Analyses for the Rose Hill Development, dated December 18, 2020, from RH2. The proposed development also is known as the Petco Development and is located immediately north of NE 85th Street between 120th Avenue NE and 122nd Avenue NE.

RH2's hydraulic analyses were performed under the following two development scenarios.

1. **Base Scenario**. The Base Scenario uses the future growth analyses and CIP planning performed for the WSP, the 2021 Water CIP Update, and the GSP, which reflect the City's current *Comprehensive Plan* growth targets for year 2035. The Base Scenario also includes growth and capital improvements identified for the Petco and Continental Divide developments. It has been noted by the City that this scenario closely aligns with SAP June Alternative A.
2. **June Alternative B**. RH2's second scenario is based on the SAP June Alternative B as presented by Mithun.

Projected Demands and Flow Rates

The City's prime consultant for the Station Area Plan, Mithun, provided a database and GIS data for the year 2044 growth associated with June Alternatives A and B shown in **Chart 1**. The data contained the residential and employment growth between the existing scenario and June Alternatives A and B both on a parcel and traffic analysis zone level. For the purposes of these analyses and assigning demands/flows to the hydraulic models, only the June Alternative B parcel level data was utilized to develop demand and flow projections for the Station Area from the identified household and employment growth numbers provided by Mithun. Demands and flows for the June Alternative A were not projected for this study since they were estimated for the Base Scenario in previous planning work.

Water Demands

To develop water demands for use in the hydraulic model for June Alternative B, the population growth projections were multiplied by a demand per person value, and the employment growth was multiplied by a demand per employee value. The City provided a household size of 1.59, which was used to convert households to population. The calculated commercial demand per employee values were developed using the same data and assumptions used in the City's WSP. These assumptions estimated that 85 percent of the City's employees are located within the City's water service area, and that these employees use approximately 925,000 gallons of water per year, resulting in approximately 29 gallons per employee per day, with distribution system leakage (DSL) factored in. A similar methodology was used to calculate the residential demand per person, which resulted in approximately 66 gallons per person per day.

Applying the demand per person and demand per employee values to the growth projections yielded a total of 808 gallons per minute (gpm) of growth between the existing system scenario

and SAP June Alternative B. **Table 1** shows the residential and employment demands associated with the Station Area growth between the existing system and the SAP scenario.

Table 1

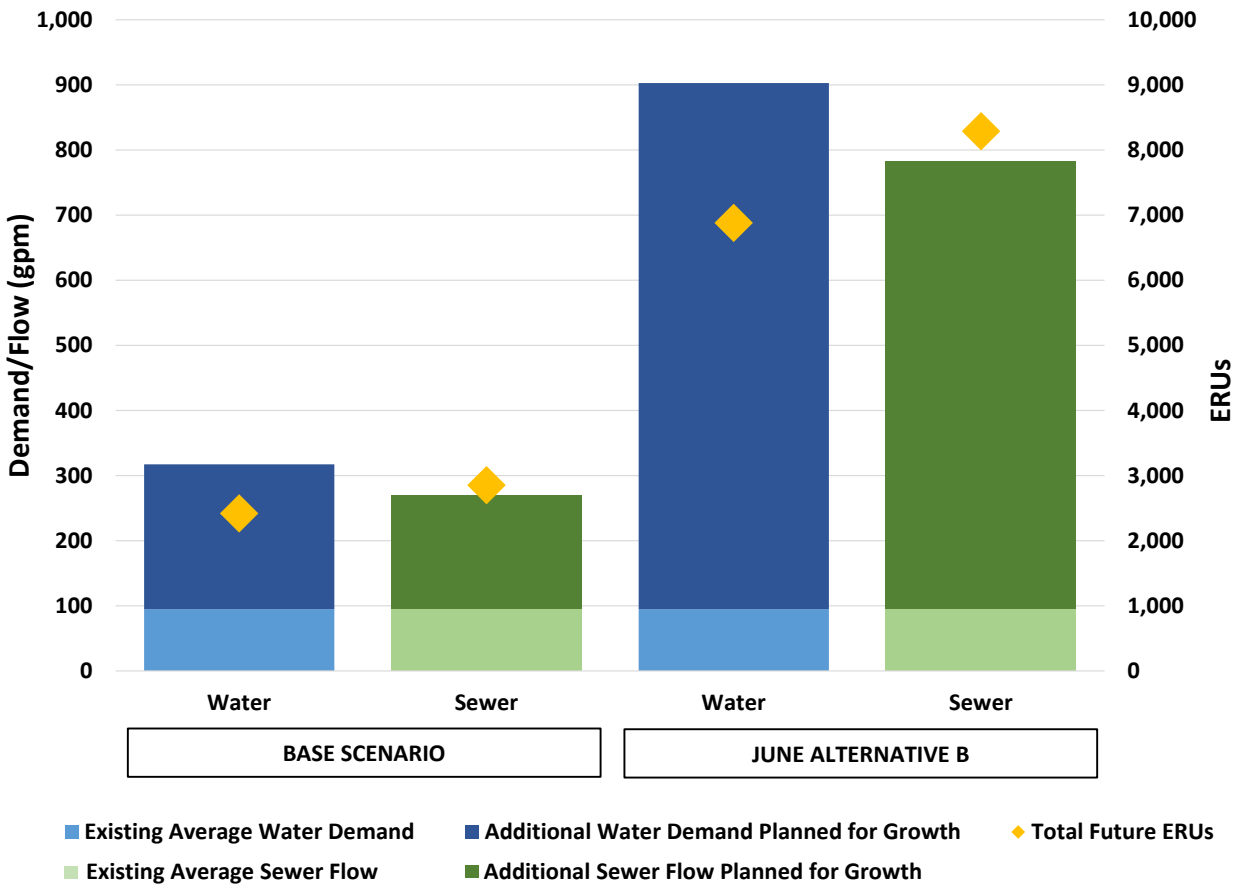
June Alternative B Growth in Demand and Flow Above Existing

Utility	Households	Population	Employment	Residential Demand/Flow (gpm)	Commercial Demand/Flow (gpm)	Total Additional Demand/Flow (gpm)
Water	6,243	9,926	17,763	455	353	808
Sewer				441	247	688

The June Alternative B water demands in **Table 1** may be added to the existing water system demands to estimate the total projected water demand in the Station Area. The total projected water demand for the Base Scenario and June Alternative B is shown graphically in **Chart 2**.

Chart 2

Station Area Projected Water Demand/Sewer Flows and ERUs



Fire Flow Demands

In addition to domestic water demands, the water system infrastructure must also have sufficient capacity to convey fire flow demands. Planning-level fire flow requirements are designated in the hydraulic model based on the different land use categories to provide a target level of service for planning and sizing future water facilities. Actual existing or future fire flow requirements do not necessarily equate to the planning-level fire flow requirements at all buildings, since this is typically based on actual building size, construction type, and fire suppression systems provided for the proposed development.

The existing planning-level fire flow requirements as stated in the WSP and utilized in previous planning studies are shown in **Table 2**. These fire flow requirements also were utilized for the Base Scenario analyses and are allocated based on the land use presented in WSP Figure 3-1. Planning-level fire flow requirements for the June Alternative B were updated based on the rezoned parcel GIS data provided by Mithun and input from the City's Fire Marshal and are shown in **Table 2**. The increased fire flow rates and duration provide consideration for multiple fires, fire spreading outside the sprinkler design area, exposure fires, or fires in buildings under construction (without the benefit of a fire sprinkler system) in the planning for water system capacity. The zoning for June Alternative B that these fire flow rates are based on is presented in **Attachment 1**.

Table 2

Planning-Level Fire Flow Requirements

Land Use Type	2015 Water System Plan		SAP June Alternative B	
	Fire Flow Requirement (gpm)	Duration (hrs)	Fire Flow Requirement (gpm)	Duration (hrs)
Medium Density Residential	1,500 - 2,000	2	1,500 - 2,000	2 - 3
High Density Residential	2,000 - 2,500	2	2,500 - 3,500	3 - 4
Office/Multi-Family Residential	2,500 - 3,500	2 - 3	2,500 - 3,500	3 - 4
Office	2,500 - 3,500	2 - 3	2,500 - 3,500	3 - 4

Sewer Demands

Similar to the water demands, sanitary sewer flows for the residential and employment growth associated with the Station Area were developed to represent future conditions under June Alternative B. The commercial flow per employee and residential flow per person values were calculated using the same assumptions and methodologies used for the water demands, described in the **Water Demands** section, but for water consumption instead of water demand so that DSL is not included in the sewer flows. This resulted in a sanitary sewer flow rate of approximately 20 gallons per employee per day and 64 gallons per residential person per day. Applying these factors to the growth associated with the Station Area projections yielded a total of approximately 688 gpm of growth between the existing system scenario and June Alternative B, as shown in **Table 1**.

The total projected sanitary sewer flow for the Base Scenario and June Alternative B are shown graphically in **Chart 2**.

Equivalent Residential Units

Water and sewer utility capacity is often expressed in terms of Equivalent Residential Units (ERUs) for demand forecasting and planning purposes. One average day of consumption per ERU is equivalent to the amount of water consumed by a single-family residence on an average day. The demand of a multi-family unit is typically less than a single-family residence; therefore, the number of ERUs represented by a single multi-family unit is typically less than 1 ERU. Conversely, the number of ERUs represented by a commercial connection is typically much larger than 1 ERU. The City's WSP estimated the water demand per ERU at 189 gallons per day (gpd), which was used to estimate the projected ERUs for this project. The City's GSP estimated the domestic sewer annual average flow per ERU to be 136 gpd. The total projected ERUs estimated to be served under the Base Scenario and June Alternative B are shown graphically in **Chart 2**. The estimated future water system ERU capacity analyses are presented later in this technical memorandum and are based on ERU capacity analyses performed in the 2015 WSP. The future sewer system capacity was not evaluated based on ERUs in the 2018 GSP; therefore, future sewer ERU capacity for the SAP was not evaluated in this technical memorandum.

Hydraulic Analyses

Hydraulic analyses were performed to evaluate whether the City's water distribution system and sewer collection system have adequate capacity to serve the proposed growth under the rezoning alternatives, and to identify capital improvements beyond those identified in the WSP and GSP that are needed to serve the future Station Area.

The analyses also identified which projects were prompted by growth in various service areas. The service areas, defined by BERK Consulting, Inc., (BERK) include: the parcels nearest the I-405 interchange in the northeast SAP quadrant (currently Costco site); the parcels nearest the I-405 interchange in the southeast SAP quadrant (currently Lee Johnson car dealership site); parcels in the northeast quadrant excluding the Costco site; parcels in the southeast quadrant excluding the Lee Johnson site; parcels in the northwest quadrant; and parcels in the southwest quadrant. The purpose of this task was to gain a better understanding of how the water and sewer system improvements could be phased into the Station Area development, and how these improvements could be linked to other infrastructure projects to optimize construction costs and schedules.

The hydraulic model scenarios that were evaluated for the water and sewer systems were established to identify the following:

- CIP improvements that are needed to upgrade the existing system to support intensive development nearest the I-405 interchange in the southeast SAP quadrant with redevelopment of the Lee Johnson site.

- CIP improvements that are needed to upgrade the existing system to support intensive development nearest to the I-405 interchange, including redevelopment of the Costco site with redevelopment of the Lee Johnson site.
- CIP improvements required to support all growth under the Base Scenario and allocate those improvements to the service area they support.
- CIP improvements required above and beyond the Base Scenario CIP to support the additional growth planned for June Alternative B and allocate those improvements to the service area they support.
- For each CIP project, if it is needed to resolve existing maintenance concerns or future development capacity needs would be triggered by the construction of the BRT Station.

Water System Model Description and Criteria

The City's WaterCAD hydraulic model, which was recently updated as a part of the Water System Model Calibration and Analyses project, was utilized as the basis for the Station Area analyses. The City's hydraulic model has been updated to include recently constructed water mains, updated existing water main property data, current facility setpoints, current demand data, and updated elevation data. The scenarios in the hydraulic model used for the Station Area analyses were developed using the existing system scenario, and then applying the growth between the existing system and future projections on a parcel-by-parcel basis in the Station Area. The demands in the remainder of the system were scaled up to year 2035 demands presented in the City's WSP. Peaking factors identified in the WSP were used to scale up the projected demands in the model from the average day demands shown in **Chart 2** to maximum day demands (MDD) and peak hour demands (PHD) used for the model analyses.

The hydraulic model was run with the projected demands under steady state conditions. Pipe velocities and service pressures in and near the Station Area were evaluated to confirm that the minimum service pressure of 30 pounds per square inch (psi) could be maintained under PHD conditions. Fire flow analyses were conducted based on a minimum residual pressure of 20 psi in the water main adjacent to the hydrant, water velocities in the distribution system of 8 feet per second (fps) or less, and the system operating under a MDD scenario.

A summary of the operational conditions used in in the hydraulic model to perform the water system analyses is shown in **Table 3**.

Table 3

Water System Hydraulic Analyses Operational Conditions

Description	Fire Flow Analyses
Demands	Buildout MDD + SAP Growth MDD
Supply Station S1 Head (feet)	544.1
Supply Station S2 Head (feet)	530.6
Supply Station S3 Head (feet)	533.1
North Reservoir HGL (feet)	420.3
South Reservoir HGL (feet)	531.3
650 Zone BPS Status	Three Large Pumps Operating
545 Zone BPS Status	Off

HGL = Hydraulic grade line

Sewer System Model Description and Criteria

The City's existing SewerCAD hydraulic model was utilized as the basis for the Station Area sewer analyses. Sanitary sewer flows associated with the Station Area growth were applied to the specific parcels to which they referred to using SewerCAD's LoadBuilder tool. For areas outside of the Station Area, sanitary sewer flows for the Eastside Interceptor and Kirkland sewer drainage basins were adjusted to represent the future sanitary sewer loadings for the planning horizon in the City's GSP through year 2035.

The SewerCAD model also was updated to address parcels that have existing septic sewer service. Sanitary sewer flows associated with parcels that are currently on septic sewer systems were added to the Station Area scenario, assuming that these parcels would transition to being served by the City's sanitary sewer system by the end of the planning period. The sanitary sewer flows were then multiplied by the peaking factor associated with the major sewer drainage basin in which the growth was located to develop peak hour flows (PHFs). **Table 4** shows the City's major sewer drainage basins and the peaking factors associated with them.

Table 4

Sewer System Peaking Factors

Major Sewer Drainage Basin Name	Domestic PHF Peaking Factor (PHF/AAF)
116th Avenue NE	4.19
Eastside Interceptor	2.67
Juanita	3.40
Juanita Bay	4.04
Kirkland	3.02
NE 124th Street	4.07
Lake Plaza	3.51
Rose Point	4.09
South Bay	4.29
Trend	4.25
Watershed Park	4.24
Waverly Park	4.14
Yarrow Bay	3.48
Yarrow Bay II	4.30

Projected 2035 inflow and infiltration (I/I) rates from the City's GSP for a 20-year storm peak hour event were used for the June Alternative B analyses. This assumed existing I/I rates and an additional 2,000 gallons per acre per day (gpad) for areas currently unsewered that could be potentially sewered. The sewer model was run with the projected PHFs. Pipe capacities in and downstream of the Station Area were evaluated to confirm that they flow below 80 percent of the pipe's full flow capacity with existing and projected PHFs.

Hydraulic Analyses Results

For both the City's water and sewer systems, it was found that additional improvements above those identified in previous planning studies for the Base Scenario are required to support the growth projected under June Alternative B. This section of the technical memorandum describes the required improvements for each modelled scenario. **Figure 2** shows all improvements required for the City's water system, including the Base Scenario CIP improvements and the improvements identified above and beyond the Base Scenario CIP to support the growth under June Alternative B. **Figure 3** shows all improvements required for the City's sewer system, including the Base Scenario CIP improvements and the improvements identified above and beyond the Base Scenario CIP to support the growth under June Alternative B.

Water Modeling Results

Table 5 lists the June Alternative B improvements required for the hydraulic model scenario of the existing water system with only the growth of either the Costco or the Lee Johnson sites.

The Service Area column of **Table 5** refers to the development that the improvement is prompted by, not necessarily where the project is physically located. For example, CIP 137 is needed to support the Costco development, but the project is in the right-of-way (ROW) and not on the Costco site. Project 180 in **Table 5** is required for both the Lee Johnson and Costco developments, meaning that if either project were to develop, this project would need to be completed to support that development.

Table 5

Proposed Water CIP for Potential Redevelopment of the Lee Johnson and Costco Sites

Existing CIP Number	Improvement Trigger	City vs. Developer Funded	Location			Diameter (in)		Length (ft)	Service Area [1]	Total Project Cost	City Cost	Developer Funded Cost
			In	From	To	Ex.	Prop.					
Existing System with Redevelopment at the Lee Johnson Site												
180	Capacity	Developer	Taco Time NW, 12005 NE 85th St	120th Ave NE	dead end	8	8	5	Lee Johnson	$301,000		$301,000
						8	16	184				
			NE 80th St	120th Ave NE	118th Ct NE	12	12	505				
						12	20	25				
184	Capacity	Developer	~118th Ave NE	NE 80th St	120th Ave NE	8	12	1,451	Lee Johnson	$766,000		$766,000
185	Capacity	Developer	118th Ct NE	NE 80th St	dead end	2	12	30	Lee Johnson	$214,000		$214,000
						8	12	1,206				
Existing System with Redevelopment at the Lee Johnson and Costco Sites												
134	Capacity	Developer	NE 92nd St	124th Ave NE	dead end	8	12	1,439	Costco	$760,000		$760,000
136	Capacity	Developer	Slater Ave/Costco	120th Ave NE	120th Ave NE	8	12	2,503	Costco	$1,213,000		$1,213,000
						8	16	123				
137	Capacity	Developer	76 Gas Station, 11848 NE 85th St	120th Ave NE	dead end	8	20	507	Costco	$365,000		$365,000
			120th Ave NE	NE 85th St	76 Gas Station	12	20	201				
536	Capacity	Developer	~120th Ave NE	12020 NE 85th St PRV	Fire lane south of Costco	12	20	91	Costco	$47,000		$47,000
537	Capacity	Developer	Costco, 8629 120th Ave NE	120th Ave NE	-	12	16	838	Costco	$496,000		$496,000
Total										**$4,162,000**	**$0**	**$4,162,000**

1 = The quadrants described herein do not necessarily represent the geographical location of the project, but instead represent the quadrant driving the improvement.

Table 6 shows all required water CIPs to support the Base Scenario. As with **Table 5**, **Table 6** indicates the service area that drives the required improvement. The Improvement Trigger column in the table indicates whether the identified improvement is required to resolve an existing maintenance concern, accommodate future development capacity needs, or would be triggered by the construction of the BRT Station. It is recommended that any project crossing I-405 be constructed concurrently with the BRT Station to take advantage of the major construction already planned. The improvement triggers are used in the cost estimates to allocate the project for funding either by the City or by a developer.

Table 6

Proposed Water CIP for the Base Scenario

Existing CIP Number	Improvement Trigger	City vs. Developer Funded	Location			Diameter (in)		Length (ft)	Service Area [1]	Total Project Cost	City Cost	Developer Funded Cost
			In	From	To	Ex.	Prop.					
WM2	BRT	City	405	NE 85th St	~NE 87th St	24	24	2110	-	$6,510,000	$6,510,000	
97-R	Capacity	Developer	~I-405 Off-ramp	~NE 87th St	NE 85th St	8	24	459	NW Quadrant/SW Quadrant	$332,000		$332,000
133	Capacity	Developer	~124th Ave NE	NE 85th St	Honda of Kirkland, 12420 NE 85th St	6	16	34	NE Quadrant	$416,000		$416,000
						8	16	668				
134	Capacity	Developer	NE 92nd St	124th Ave NE	dead end	8	12	1,439	Costco	$760,000		$760,000
135-R	Capacity	Developer	122nd Ave NE	NE 85th St	NE 90th St	3	16	10	NE Quadrant	$1,893,000		$1,893,000
						4	16	45				
						6	16	19				
						8	12	559				
						8	16	2,628				
136	Capacity	Developer	Slater Ave/Costco	120th Ave NE	120th Ave NE	8	12	2,503	Costco	$1,213,000		$1,213,000
						8	16	123				
137	Capacity	Developer	76 Gas Station, 11848 NE 85th St	120th Ave NE	dead end	8	16	507	Costco/NE Quadrant	$365,000		$365,000
			120th Ave NE	NE 85th St	76 Gas Station	12	16	201				
146	Capacity	Developer	McLeod Auto Body, 1015 7th Ave #220	NE 87th St	dead end	8	16	365	NW Quadrant	$216,000		$216,000
150-R	Capacity	Developer	6th St, Central Ave, and 6th Ave	15th Ave	7th Ave	8	8	6	NW Quadrant	$1,556,000		$1,556,000
						8	12	1,432				
						8	16	1,349				
153	Capacity	Developer	~8th St	7th Ave	12th Ave	4	16	130	NW Quadrant	$1,355,000		$1,355,000
						6	8	34				
						8	16	2,134				
169	Capacity	Developer	7th Ave	3rd St	8th St	6	12	1,448	NW Quadrant	$1,529,000		$1,529,000
						6	16	6				
						8	12	201				
						8	16	562				
						8	20	478				
170	Capacity/ Maintenance	City & Developer	6th St	7th Ave	Central Way	8	12	255	SW Quadrant	$346,000	$101,000	$245,000
						8	16	186				
						16	16	171				
174	Capacity	Developer	NE 85th St	~116th Ave NE	~114th Ave NE	10	24	0	NW Quadrant/SW Quadrant	$207,000		$207,000
						16	24	287				
175	Capacity	Developer	128th Ave NE/NE 83rd Ct/Rose Park Condominium	NE 85th St	126th Ave NE	8	12	1,663	SE Quadrant	$878,000		$878,000
176	Capacity	Developer	126th Ave NE	NE 85th St	NE 80th St	6	8	896	NE Quadrant/SE Quadrant	$735,000		$735,000
						6	12	327				
						8	12	227				
						8	16	20				
177-R	Capacity	Developer	Safeway parcel, 12519 NE 85th St	124th Ave NE	126th Ave NE	6	12	55	SE Quadrant	$608,000		$608,000
						6	16	21				
						8	12	1,073				
178	Capacity	Developer	124th Ave NE	NE 85th St	NE 80th St	8	12	1,493	SE Quadrant	$788,000		$788,000
179	Capacity	Developer	122nd Ave NE	NE 85th St	NE 80th St	6	12	1,039	SE Quadrant	$1,006,000		$1,006,000
						8	12	403				
			Unnnamed road south of 8244 122nd Ave NE	122nd Ave NE	dead ends	8	16	413				
180	Capacity/ Maintenance	City & Developer	Taco Time NW, 12005 NE 85th St	120th Ave NE	dead end	8	8	5	Costco/Lee Johnson/NE Quadrant/SE Quadrant	$301,000	$267,000	$34,000
						8	16	184				
			NE 80th St	120th Ave NE	118th Ct NE	12	12	412				
						12	20	25				
184	Capacity	Developer	~118th Ave NE	NE 80th St	120th Ave NE	8	12	1,451	Lee Johnson	$766,000		$766,000
185	Capacity	Developer	118th Ct NE	NE 80th St	dead end	2	12	30	Lee Johnson	$214,000		$214,000
						8	12	435				
186	Capacity	Developer	114th Ave NE, Kikrland Way, Ohde Ave, Slater St S	NE 85th St	Kirkland Ave	6	16	428	SW Quadrant	$1,859,000		$1,859,000
						8	12	522				
						8	16	714				
						10	16	285				
						12	16	815				
						12	20	218				
						16	20	164				
187	Capacity	Developer	4th Ave, 5th Ave, 10th St, 3rd Ave, 9th St, 2nd Ave, 9th Ln	Kikrland Way	6th St	6	12	132	SW Quadrant	$3,156,000		$3,156,000
						8	12	5,675				
						8	16	155				
536	Capacity	Developer	~120th Ave NE	12020 NE 85th St PRV	Fire lane south of Costco	12	16	91	Costco	$47,000		$47,000
537	Capacity	Developer	Costco, 8629 120th Ave NE	120th Ave NE	-	12	16	838	Costco	$496,000		$496,000
Total										**$27,552,000**	**$6,878,000**	**$20,674,000**

1 = The quadrants described herein do not necessarily represent the geographical location of the project, but instead represent the quadrant driving the improvement.

Table 7 shows additional water system improvements above and beyond the Base Scenario CIP that are needed to support the projected growth under June Alternative B. **Table 7** lists CIP numbers already shown in **Tables 5** and **6** because the improvements identified in **Table 7** have been expanded from the Base Scenario CIP to support the additional June Alternative B growth. Therefore, the costs shown in **Table 7** are only the costs associated with upsizing of the water main above the size requirement for the Base Scenario. The CIP projects listed in **Tables 6** and **7** may be combined to identify the full scope of improvements to the existing water system required to support the June Alternative B development through the planning horizon.

Table 7

Proposed Additional Water CIP for June Alternative B

Existing CIP Number [1]	Improvement Trigger	City vs. Developer Funded	Location			Diameter (in)		Length (ft)	Service Area [2]	Total Project Cost for Upsizing	Total City Cost for Upsizing	Total Developer Funded Cost for Upsizing
			In	From	To	Ex.	Prop.					
136	Capacity	Developer	Slater Ave/Costco	120th Ave NE	120th Ave NE	8	16	477	Costco	$32,000		$32,000
137	Capacity	Developer	76 Gas Station, 11848 NE 85th St	120th Ave NE	dead end	8	20	507	Costco/NE Quadrant	$60,000		$60,000
			120th Ave NE	NE 85th St	76 Gas Station	12	20	201				
180	Capacity	Developer	NE 80th St	120th Ave NE	118th Ct NE	8	12	93	Costco/Lee Johnson/NE Quadrant/SE Quadrant	$50,000		$50,000
185	Capacity	Developer	118th Ct NE	NE 80th St	dead end	8	12	771	Lee Johnson	$408,000		$408,000
536	Capacity	Developer	~120th Ave NE	12020 NE 85th St PRV	Fire lane south of Costco	12	20	91	Costco	$9,000		$9,000
Total										**$559,000**	**$0**	**$559,000**

1 = These projects were altered from the Base Scenario CIP to support additional growth planned for June Alternative B.

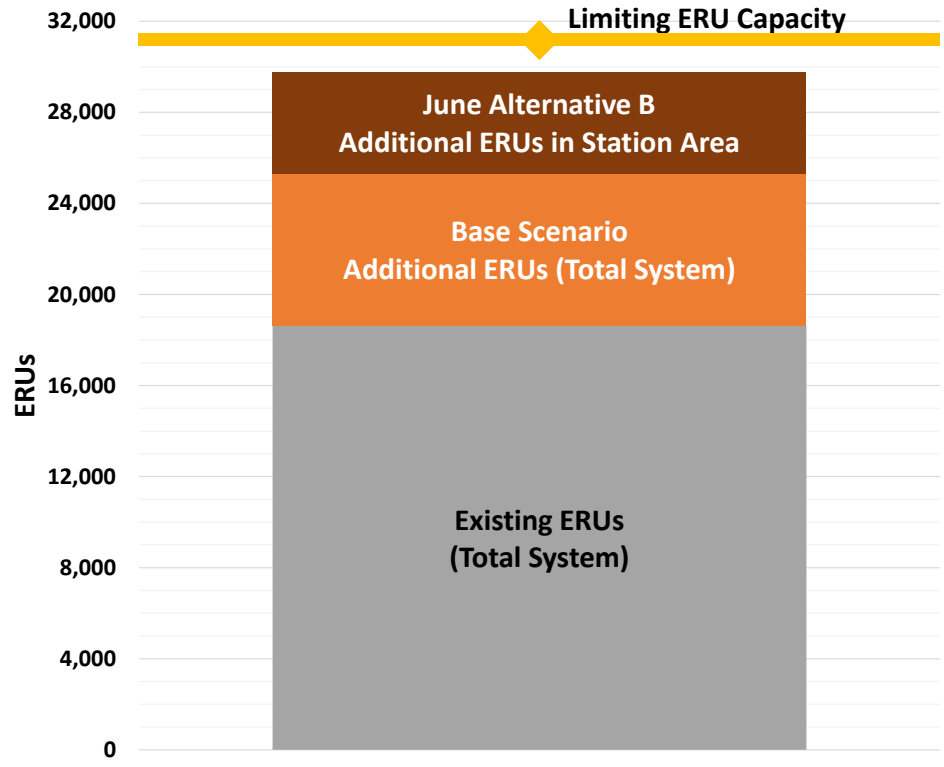
2 = The quadrants described herein do not necessarily represent the geographical location of the project, but instead represent the quadrant driving the improvement.

Water System ERU Capacity Analysis

Additional analyses were performed to evaluate the water system capacity in terms of ERUs and confirm that the water system supply, storage, and transmission infrastructure has capacity to serve the additional ERUs shown in **Chart 2**. The City's WSP Table 7-13 identified that the existing water system has a capacity of 31,170 ERUs, which is limited by the existing storage capacity of the City's reservoirs. The number of ERUs that is anticipated to be served by the water system though the planning horizon for the Base Scenario is 25,315 ERUs in 2025, as shown in WSP Table 4-12. When added to the ERU projections for the Station Area under June Alternative B, the existing water system is estimated to have an excess capacity of 1,394 ERUs through the planning horizon, as shown in **Chart 3**.

Chart 3

Water System ERU Capacity



If June Alternative B is the selected growth alternative, the City should begin planning for where future storage could be located because there are very few options for siting additional storage in the City. Considerations may include building new, larger tanks on existing reservoir sites. Any proposed improvements on existing reservoir sites should consider potential conflicts and opportunities to accommodate these future storage needs.

Sewer Modeling Results

Table 8 lists the June Alternative B improvements required for the hydraulic model scenario of the existing sewer system with only the growth of either the Costco or the Lee Johnson sites.

Table 8 has two sections of improvements: the first section describes improvements that were identified only for the existing system with the additional flows due to the Lee Johnson development; the second section describes the required improvements with both the Costco and Lee Johnson developments. To clarify, the improvements associated with the first section in **Table 8** are included in the second section of **Table 8**. The existing pipe in the SAP-6 alignment, which is located along the northerly property line of the Lee Johnson site, is very near capacity with the flows associated with the Lee Johnson and Costco developments added to the existing system flows. If any other development projects were to occur in the near term, or if the flow assumptions for the Lee Johnson or Costco developments change, it is likely to trigger the SAP-6 project.

SAP-8 is identified to increase sewer capacity in NE 85th Street, crossing the I-405 corridor. It is envisioned to connect the existing sewer system on NE 90th Street near the Costco site, west across I-405 to the existing pipe in NE 87th Street, and west of NE 116th Avenue NE. These improvements are recommended to be coordinated with the design and construction schedule for the BRT Station. A feasibility analysis should be performed to confirm the constructability of the proposed improvements and to compare the cost/benefit of other potential alternative capacity improvements. This project is assumed to be developer-funded as it adds necessary capacity to serve redevelopment; however, if redevelopment does not occur before the BRT Station is constructed, the City may need to fund and construct the project and determine the appropriate mechanism to recover the cost from redevelopment when it occurs.

Table 8

Proposed Sewer CIP for Potential Redevelopment of Lee Johnson and Costco Sites

SAP Project Number	Existing CIP Number	Improvement Trigger	City vs. Developer Funded	Location In	Location From	Location To	Diameter (in) Ex.	Diameter (in) Prop.	Length (ft)	Service Area [1]	Total Project Cost	City Cost	Developer Funded Cost
Existing System with Redevelopment at the Lee Johnson Site													
Portion of SAP-7	-	Capacity	Developer	120th Ave NE	MH No. 1877	NE 90th St	8	12	393	Lee Johnson	$418,000	-	$418,000
Existing System with Redevelopment at the Lee Johnson and Costco Sites [2]													
Portion of SAP-7 [3]	-	Capacity	Developer	120th Ave NE	MH No. 1879	NE 90th St	8	12	865	Lee Johnson/Costco	$920,000	-	$920,000
SAP-8	-	Capacity/BRT	Developer	I-405 and NE 87th St	Costco (NE 90th St/Slater Ave)	MH No. 2322	-	18	1821	Lee Johnson/Costco	$5,744,000	-	$5,744,000
SAP-9	172	Capacity & Maintenance	Developer & City	NE 87th St	King County - East Side Interceptor	MH No. 2322	8	18	736	Lee Johnson/Costco	$817,000	$709,000	$109,000
Total											**$7,481,000**	**$709,000**	**$6,773,000**

1 = The quadrants described herein do not necessarily represent the geographical location of the project, but instead represent the quadrant driving the improvement.

2 = For project SAP-6, the existing pipe is very near capacity under this scenario; however, a capacity deficiency is only triggered during the June Alternative B scenario.

3 = The portion of SAP-7 that is described in the "Existing System with Redevelopment at the Lee Johnson Site" section is included in this project.

Table 9 shows all required CIPs to support the Base Scenario. **Table 9** has two sections: section one includes the projects that are within the Station Area boundary (shown in **Figure 3**); and section two includes projects downstream of the Station Area that are required to increase the capacity of the City's sewer mains to support the City's projected flows, including existing flows from the Station Area.

The Improvement Trigger column in the table indicates whether the identified improvement is required to resolve an existing maintenance concern, accommodate future development capacity needs, or would be triggered by the construction of the BRT Station. It is recommended that any project crossing I-405 be constructed concurrently with the BRT Station to take advantage of the major construction already planned. The improvement triggers are used in the cost estimates to allocate the project for funding either by the City or by a developer.

Table 9

Proposed Sewer CIP for the Base Scenario

Existing CIP Number	Improvement Trigger	City vs. Developer Funded	Location			Diameter (in)		Length (ft)	Service Area [1]	Total Project Cost	City Cost	Developer Funded Cost
			In	From	To	Ex.	Prop.					
102	Maintenance	City	6th St	11th Ave	12th Ave	8	8	322	NW Quadrant	$335,000	$335,000	
114	Maintenance	City	11th Ave	6th St	~310' W of 8th St	6	8	650	NW Quadrant	$676,000	$676,000	
115	Maintenance	City	10th Ave	~175' E of 5th St	~330' W of 8th St	6	8	1,025	NW Quadrant	$1,066,000	$1,066,000	
117	Capacity + Maintenance	City	6th St	Central Way	10th Ave	8	8	1,350	NW Quadrant	$1,404,000	$1,404,000	
118	Maintenance	City	9th Ave	6th St	~390' E of 6th St	6	8	400	NW Quadrant	$416,000	$416,000	
119	Maintenance	City	8th St	7th Ave	11th Ave	8	8	1,300	NW Quadrant	$1,352,000	$1,352,000	
120	Maintenance	City	9th Ave	~4,555' E of 6th St	~275' E of 8th St	8, 6	8	775	NW Quadrant	$806,000	$806,000	
121	Maintenance	City	112th Ave NE	NE 87th St	~135' N of NE 95th St	12, 8	12, 8	2,069	NW Quadrant	$1,511,000	$1,511,000	
123	Maintenance	City	NE 95th St	MH - 1543	~130' W of 116th Ave NE	8	8	863	NW Quadrant	$897,000	$897,000	
124	Maintenance	City	116th Ave NE	~90' S of NE 88th St	NE 95th St	8	8	1,887	NW Quadrant	$1,962,000	$1,962,000	
125	Maintenance	City	NE 94th St	112th Ave NE	~195' S of NE 95th St	8	8	850	NW Quadrant	$884,000	$884,000	
126	Maintenance	City	114th Ave NE NE 94th St ~290' W of 116th Ave NE	NE 94th St 114th Ave NE NE 94th St	NE 94th St ~290' W of 116th Ave NE ~NE 94th Pl	8	8	625	NW Quadrant	$650,000	$650,000	
127	Maintenance	City	NE 92nd St	112th Ave NE	~140' W of 116th Ave NE	8	8	1,000	NW Quadrant	$1,040,000	$1,040,000	
128	Maintenance	City	NE 91st St	112th Ave NE	~180' E of 114th Ave NE	8	8	750	NW Quadrant	$780,000	$780,000	
129	Maintenance	City	NE 91st St	116th Ave NE	~265' W of 116th Ave NE	8	8	300	NW Quadrant	$312,000	$312,000	
130	Maintenance	City	NE 90th St	112th Ave NE	~180' W of 116th Ave NE	8	8	975	NW Quadrant	$1,014,000	$1,014,000	
131	Maintenance	City	NE 90th St Slater Ave NE ~117th Ave NE	116th Ave NE NE 90th St Slater Ave NE	Slater Ave NE ~117th Ave NE ~265' S of NE 95th St	8	8	1,500	NW Quadrant	$1,559,000	$1,559,000	
132	Maintenance	City	NE 92nd St	~117th Ave NE	~NE 90th St	8	8	375	NW Quadrant	$390,000	$390,000	
133	Capacity	City	~Slater Ave NE	~NE 92nd St	~NE 91st St	15	18	325	NE Quadrant/SE Quadrant	$361,000	$361,000	
134	Capacity	City	NE 90th St	~245' W of 120th Ave NE	120th Ave NE	15	24	300	NE Quadrant/SE Quadrant	$341,000	$341,000	
159	Maintenance	City	8th Ave	6th St	~360' E of 6th St	6	8	375	NW Quadrant	$390,000	$390,000	
160	Maintenance	City	7th Ave	6th St	~8th St	8, 6	8	770	NW Quadrant	$801,000	$801,000	
166	Maintenance	City	6th St	~5th Ave W	1st Ave S	12, 6	12, 8	1,675	NW Quadrant/SW Quadrant	$1,774,000	$1,774,000	
167	Maintenance	City	6th Ave	6th St	7th Ave	8	8	850	NW Quadrant	$884,000	$884,000	
168	Maintenance	City	Kirkland Way	6th St	~9th Ln	8, 6	8, 6	1,025	SW Quadrant	$1,035,000	$1,035,000	
169	Maintenance	City	Residential Easement	~3rd Ave	~55' S of 3rd Ave	8	8	75	SW Quadrant	$78,000	$78,000	
170	Maintenance	City	NE 88th St	112th Ave NE	~113th Ln NE	8	8	450	NW Quadrant	$468,000	$468,000	

1 = The quadrants described herein do not necessarily represent the geographical location of the project, but instead represent the quadrant driving the improvement.

Table 9

Proposed Sewer CIP for the Base Scenario (Continued)

Existing CIP Number	Improvement Trigger	City vs. Developer Funded	Location			Diameter (in)		Length (ft)	Service Area [1]	Total Project Cost	City Cost	Developer Funded Cost
			In	From	To	Ex.	Prop.					
171	Maintenance	City	114th Ave NE NE 88th St	NE 87th St 114th Ave NE	NE 88th St 116th Ave NE	8	8	900	NW Quadrant	$936,000	$936,000	
172	Maintenance	City	NE 87th St	112th Ave NE	~95 W of 116th Ave NE	8, 6	8, 6	1,025	NW Quadrant	$1,043,000	$1,043,000	
173	Maintenance	City	114th Ave NE NE 86th St	NE 87th St 114th Ave NE	NE 86th St NE 86th St cul-de-sac	8	8	600	NW Quadrant	$624,000	$624,000	
174	Maintenance	City	~NE 85th St	Cross Kirkland Corridor	~80' E of Cross Kirkland Corridor	8	8	100	SW Quadrant	$104,000	$104,000	
175	Maintenance	City	~3rd Ave	Cross Kirkland Corridor	~80' E of Cross Kirkland Corridor	8	8	100	SW Quadrant	$104,000	$104,000	
176	Maintenance	City	Slater St	Kirkland Ave	Ohde Ave	6	8	675	SW Quadrant	$702,000	$702,000	
180	Maintenance	City	128th Ave NE	NE 84th St	NE 83rd St	8	8	354	SW Quadrant	$368,000	$368,000	
196	Maintenance	City	Kirkland Ave	6th St	Cross Kirkland Corridor	12, 10, 8	12, 8	1,275	SW Quadrant	$1,349,000	$1,349,000	
197	Maintenance	City	6th St S	Kirkland Ave	3rd Ave S	12	12	775	SW Quadrant	$824,000	$824,000	
198	Maintenance	City	~410' N of 5th Ave S	6th St S	8th St S	8	8	675	SW Quadrant	$702,000	$702,000	
199	Maintenance	City	6th St S	~410' N of 5th Ave S	5th Ave S	10, 8	12, 8	411	SW Quadrant	$428,000	$428,000	
200	Maintenance	City	5th Ave S 7th St S	6th St S 5th Ave S	7th St S ~8th Ave S	8	8	1,375	SW Quadrant	$768,000	$768,000	
201	Maintenance	City	8th St S	~3rd Ave S	~130' N of 9th Ave S	8	8	1,850	SW Quadrant	$929,000	$929,000	
202	Maintenance	City	10th St S	Kirkland Ave	~4th Ave S	8	8	1,025	SW Quadrant	$1,066,000	$1,066,000	
203	Maintenance	City	~340' S of Kirkland Ave	10th St S	~380' E of 10th St S	8, 6	8	400	SW Quadrant	$416,000	$416,000	
204	Maintenance	City	Slater St S North Ave 115th Pl NE	Kirkland Ave Slater St S ~600' N of North Ave	North Ave 115th Pl NE NE 75th St	8	8	1,950	SW Quadrant	$2,027,000	$2,027,000	
205	Maintenance	City	NE 80th St (Freeway Crossing)	116th Ave NE	~Kirkland Cemetery	12, 10, 8	12	1,700	SE Quadrant	$1,807,000	$1,807,000	
206	Maintenance	City	116th Ave NE	NE 80th St	NE 74th St	12, 8	12, 8	1,525	SE Quadrant	$1,615,000	$1,615,000	
207	Maintenance	City	Lake Washington High School			8	8	475	SE Quadrant	$494,000	$494,000	
208	Maintenance	City	~115' N of NE 75th St	116th Ave NE	118th Ave NE	8	8	475	SE Quadrant	$494,000	$494,000	
209	Maintenance	City	NE 75th St	116th Ave NE	~245' E of 118th Ave NE	8	8	1,600	SE Quadrant	$1,663,000	$1,663,000	
211	Maintenance	City	120th Ave NE	NE 75th St	~195' S of NE 73rd St	8	8	850	SE Quadrant	$324,000	$324,000	
215	Capacity + Maintenance	City	NE 80th St	123rd Ave NE	128th Ave NE	10, 8	12, 8	1,675	SE Quadrant	$1,050,000	$1,050,000	
SM7	Capacity + Maintenance	City	Kirkland Avenue Sewer Main Replacement (SS 0072)			8	12	1,550	SW Quadrant/SE Quadrant	$1,648,000	$1,648,000	
Outside of SAP Boundary												
22	Capacity	City	~NE 112th St	I-405	Slater Ave NE	18	24	225	Lee Johnson/Costco/NE Quadrant/SE Quadrant	$256,000	$256,000	
48	Capacity	Developer & City	Slater Ave NE	NE 106th St	NE 105th St	21	30	175	Lee Johnson/Costco/NE Quadrant/SE Quadrant	$211,000	$199,000	$12,000
75	Capacity	City	Slater Ave NE	~NE 100th Pl	NE 100th Pl	21	24	225	Lee Johnson/Costco/NE Quadrant/SE Quadrant	$256,000	$256,000	
SM9	Capacity	City	3rd and Central Way Sanitary Sewer Crossing (SS 0082)			24	30	90	NW Quadrant/SW Quadrant	$362,000	$362,000	
Total										**$45,756,000**	**$45,744,000**	**$12,000**

1 = The quadrants described herein do not necessarily represent the geographical location of the project, but instead represent the quadrant driving the improvement.

Table 10 shows additional sewer system improvements above and beyond the Base Scenario CIP that are needed to support the projected growth under June Alternative B. Most projects shown in **Table 10** are newly recommended improvements required to support the June Alternative B growth, so these projects have the total planning-level project cost listed. However, some projects, such as SAP-9, SAP-10, and SAP-11, include portions of previously identified CIP projects. The CIP projects listed in **Tables 9** and **10** may be combined to identify the full scope of improvements to the existing sewer system required to support the June Alternative B development through the planning horizon.

Table 10

Proposed Additional Sewer CIP for June Alternative B

SAP Project Number	Existing CIP Number	Improvement Trigger	City vs. Developer Funded	Location			Diameter (in)		Length (ft)	Service Area [1]	Total Project Cost	City Cost	Developer Funded Cost
				In	From	To	Ex.	Prop.					
SAP-1	-	Capacity	Developer	Walgreens (12405 NE 85th St)	NE 85th St	MH No. 2837	8	12	189	SE Quadrant	$201,000	-	$201,000
SAP-2	-	Capacity	Developer	NE 85th St	124th Ave NE	MH No. 2835	8	12	256	SE Quadrant/NE Quadrant	$272,000	-	$272,000
SAP-3	-	Capacity	Developer	124th Ave NE	NE 85th St	NE 90th St	8	12	1116	SE Quadrant/NE Quadrant	$1,187,000	-	$1,187,000
SAP-4	-	Capacity	Developer	NE 90th St	124th Ave NE	122nd Ave NE	8	12	581	Lee Johnson/Costco/NE Quadrant	$618,000	-	$618,000
	-	Capacity	Developer	NE 90th St	122nd Ave NE	120th Ave NE	8, 10	15	565		$611,000	-	$611,000
	-	Capacity	Developer	NE 90th St	120th Ave NE	I-405	15	21	567		$635,000	-	$635,000
SAP-5	-	Capacity	Developer	122nd Ave NE	NE 90th St	MH No. 2669	8	12	270	SE Quadrant/NE Quadrant	$287,000	-	$287,000
SAP-6	-	Capacity	Developer	Lee Johnson (11845 NE 85th St)	MH No. 2554	MH No. 2578	8	12	418	Lee Johnson/SE Quadrant	$444,000	-	$444,000
SAP-7	-	Capacity	Developer	120th Ave NE	~NE 85th St	NE 90th St	8	12	1263	Lee Johnson/SE Quadrant	$1,343,000	-	$1,343,000
SAP-8	-	Capacity/BRT	Developer	I-405 and NE 87th St	Costco (NE 90th St/Slater Ave)	MH No. 2322	-	18	1822	Lee Johnson/Costco/NEQuadrant	$5,744,000	-	$5,744,000
SAP-9	172	Capacity	Developer & City	NE 87th St	King County - East Side Interceptor	MH No. 2322	8	18	736	Lee Johnson/Costco/NEQuadrant/SEQuadrant	$817,000	$709,000	$108,000
SAP-10	117	Capacity	Developer & City	6th St	7th Ave	Central Way	8	12	427	NW Quadrant	$454,000	$421,000	$33,000
Total											**$12,613,000**	**$1,130,000**	**$11,483,000**

1 = The quadrants described herein do not necessarily represent the geographical location of the project, but instead represent the quadrant driving the improvement.

Estimating Costs of Improvements

Planning-level conceptual project cost estimates were prepared to assist the City's SAP consultants with the fiscal impact analyses. The estimated total project costs for the identified CIP projects are shown in **Tables 5** through **10**.

Project costs for the proposed water and sewer system improvements were estimated based on costs of similar, recently constructed projects in the Puget Sound Area and are presented in 2021 dollars. The project cost estimates include the estimated construction cost of the improvement, sales tax of 10.2 percent, and a 20-percent contingency, as well as indirect costs estimated at 35 percent of the construction cost for engineering preliminary design, final design, and construction management services, permitting, legal, and administrative services, and an additional 15 percent to account for the in-house work for City staff to implement these projects. No costs are included for extraordinary circumstances, such as potential discovery and remediation of contaminated materials or actions that may be required to address the existence of cultural artifacts. The project costs presented in the CIP tables are capital cost estimates and do not represent life-cycle cost estimates.

Cost estimates for projects in the CIP are considered to be Class 5 estimates based on standards established by the American Association of Cost Engineers. Class 5 estimates are described as generally being prepared with very limited information and subsequently have wide accuracy ranges. The typical accuracy range for this cost estimate class is from -20 percent to -50 percent on the low side and from +30 percent to +100 percent on the high side. Class 5 estimates are prepared for any number of strategic business planning purposes including, but not limited to, market studies, assessment of initial viability, evaluation of alternate schemes, project screening, project location studies, evaluation of resource needs and budgeting, long-range capital planning, etc.

The final cost of the projects will depend on actual labor and material costs, actual site conditions, productivity, competitive market conditions, final project scope, final project schedule, and other variable factors. As a result, the final project costs likely will vary from those presented. Because of these factors, funding needs must be carefully reviewed prior to making specific financial decisions or establishing final budgets.

Water Main Unit Costs

The total project cost estimates for proposed water main projects were determined from the water main unit costs (i.e., cost per lineal foot [LF]) shown in **Table 11** and the proposed diameter and approximate length of each improvement.

Table 11

Water Main Unit Costs (Total Project Cost)

Water Main Diameter (inches)	Project Cost Per Foot Length (2021 $/LF)
6	$435
8	$481
12	$528
16	$591
18	$627
20	$674
24	$721

The unit costs for each water main size are based on estimates of all construction-related improvements, such as materials and labor for the water main installation, water services, fire hydrants, fittings, valves, connections to the existing system, trench restoration, asphalt surface restoration, and other work necessary for a complete installation.

Sewer Main Unit Costs

The total project cost estimates for proposed sewer main projects were determined from the sewer main unit costs (i.e., cost per LF) shown in **Table 12** and the proposed diameter and approximate length of each improvement.

Table 12

Sewer Main Unit Costs (Total Project Cost)

Sewer Main Diameter (inches)	Project Cost Per Foot Length (2021 $/LF)
6	$961
8	$1,039
10	$1,051
12	$1,063
15	$1,080
18	$1,110
21	$1,120
24	$1,136
30	$1,204
36	$1,250

The unit costs for each sewer main size are based on estimates of all construction-related improvements, such as materials and labor for the sewer main installation, side-sewer

connections, manholes, connections to the existing system, trench restoration, asphalt surface restoration, and other work necessary for a complete installation.

Project Cost Allocation

Each CIP project cost was allocated to estimate the portion that may be funded by the City or by a developer. Projects that were noted in **Tables 5** through **10** with an improvement trigger that was maintenance related were identified as City-funded projects. An example of a project that is considered to be a maintenance concern is a sewer alignment that was flagged in the GSP as needing to be upsized from 6 inches to the minimum design standard of 8 inches.

Projects that were noted with a capacity-related improvement trigger were identified as developer-funded. If a CIP project was identified in the Base Scenario as a maintenance-related project and was required to be upsized to meet capacity requirements for June Alternative B, then only the cost for the upsizing was allocated for funding by a developer. The SAP-8 project that crosses I-405, for example, is assumed to be developer-funded as it adds necessary capacity to serve redevelopment; however, if redevelopment does not occur before the BRT Station is constructed, the City may need to fund and construct the project and determine the appropriate mechanism to recover the cost from redevelopment when it occurs. The funding cost allocations are identified in **Tables 5** through **10**.

Conclusion

The existing water distribution system and sewer collection system cannot support the projected growth and rezoned fire flow requirements associated with the Station Area development in their current states. Based on the analyses described in this technical memorandum, implementation of current water and sewer system CIPs identified in previous planning studies by RH2 will not fully support the growth and fire flow requirements associated with SAP June Alternative B. The improvements described in **Tables 7** and **10** should be completed along with those described in **Tables 6** and **9** for the Station Area to be fully supported by the City's water and sewer systems through the planning horizon under SAP June Alternative B.

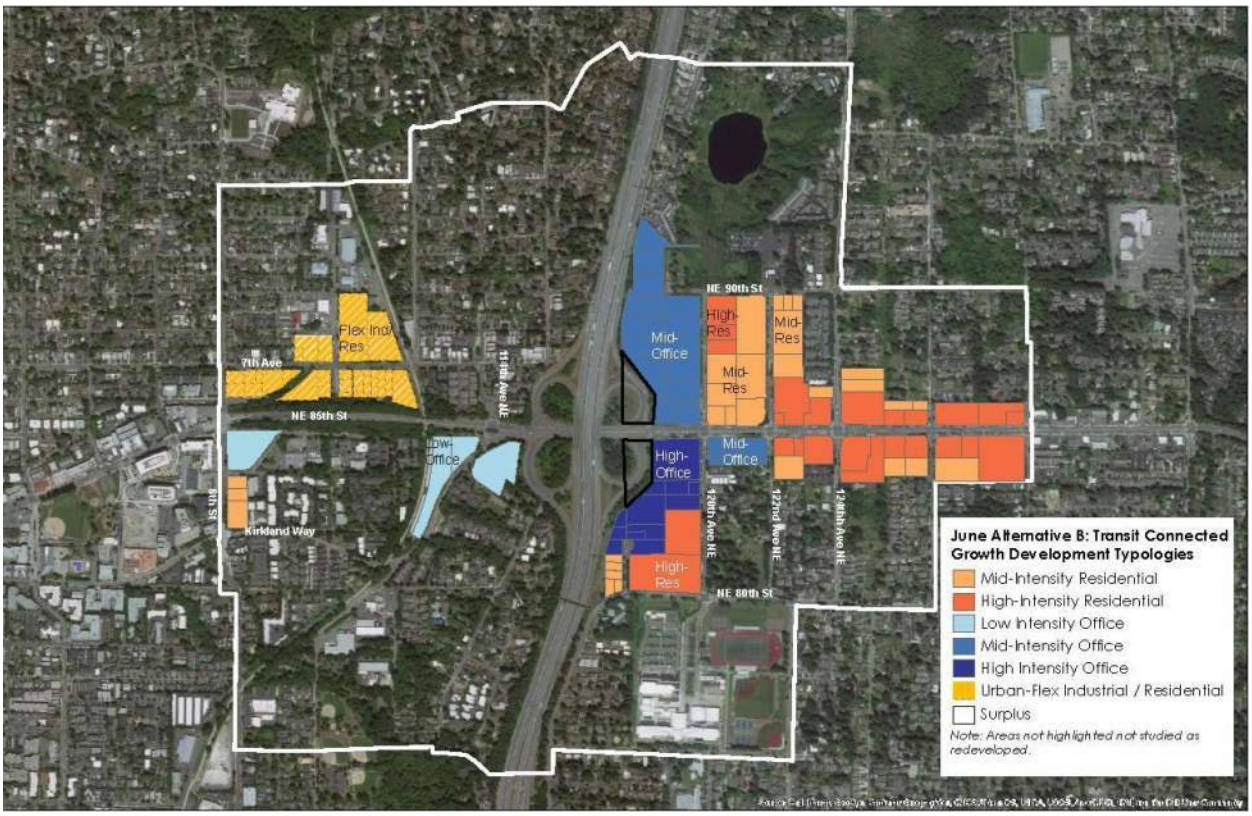
Improvement SAP-8 and WM2 involve the crossing of I-405 and are recommended to be constructed in conjunction with the BRT Station. It is recommended that a study be performed to evaluate the feasibility and cost/benefits of constructing the SAP-8 alignment shown on **Figure 3** against other potential alternative capacity improvements. This project is assumed to be developer-funded as it adds necessary capacity to serve redevelopment; however, if redevelopment does not occur before the BRT Station is constructed, the City may need to fund and construct the project and determine the appropriate mechanism to recover the cost from redevelopment when it occurs.

Attachments

Attachment 1 – SAP June Alternative B Zoning
Figure 1 – Station Area
Figure 2 – Water System Proposed Improvements
Figure 3 – Sewer System Proposed Improvements

Attachments

Attachment 1
SAP June Alternative B Zoning



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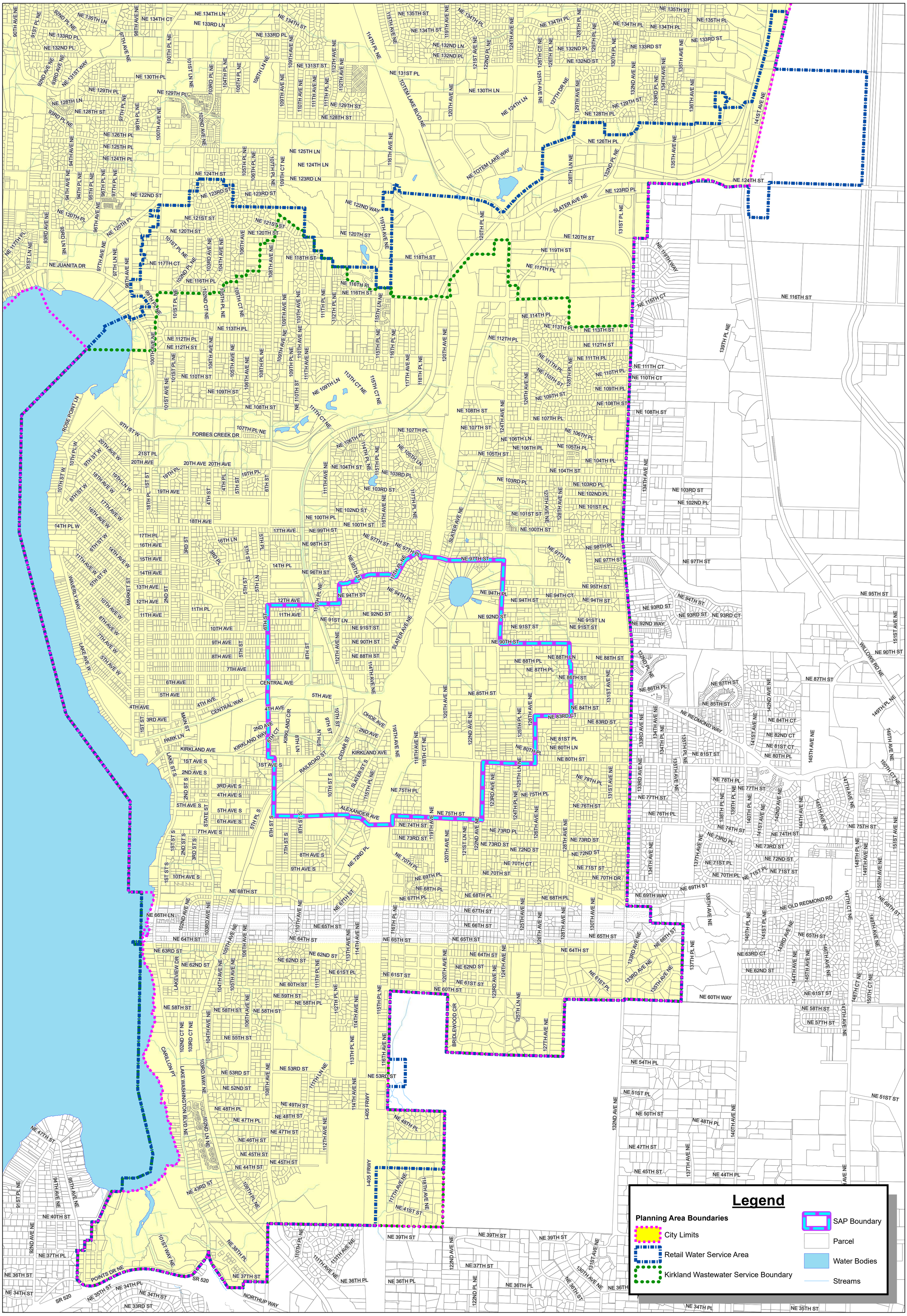

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RH2 NORTH

1 inch = 1,000 feet

0 500 1,000 2,000 Feet

DRAWING IS FULL SCALE WHEN BAR MEASURES 2”

CITY OF KIRKLAND WASHINGTON

Figure 1
Station Area Plan Extents
City of Kirkland

Vicinity Map

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

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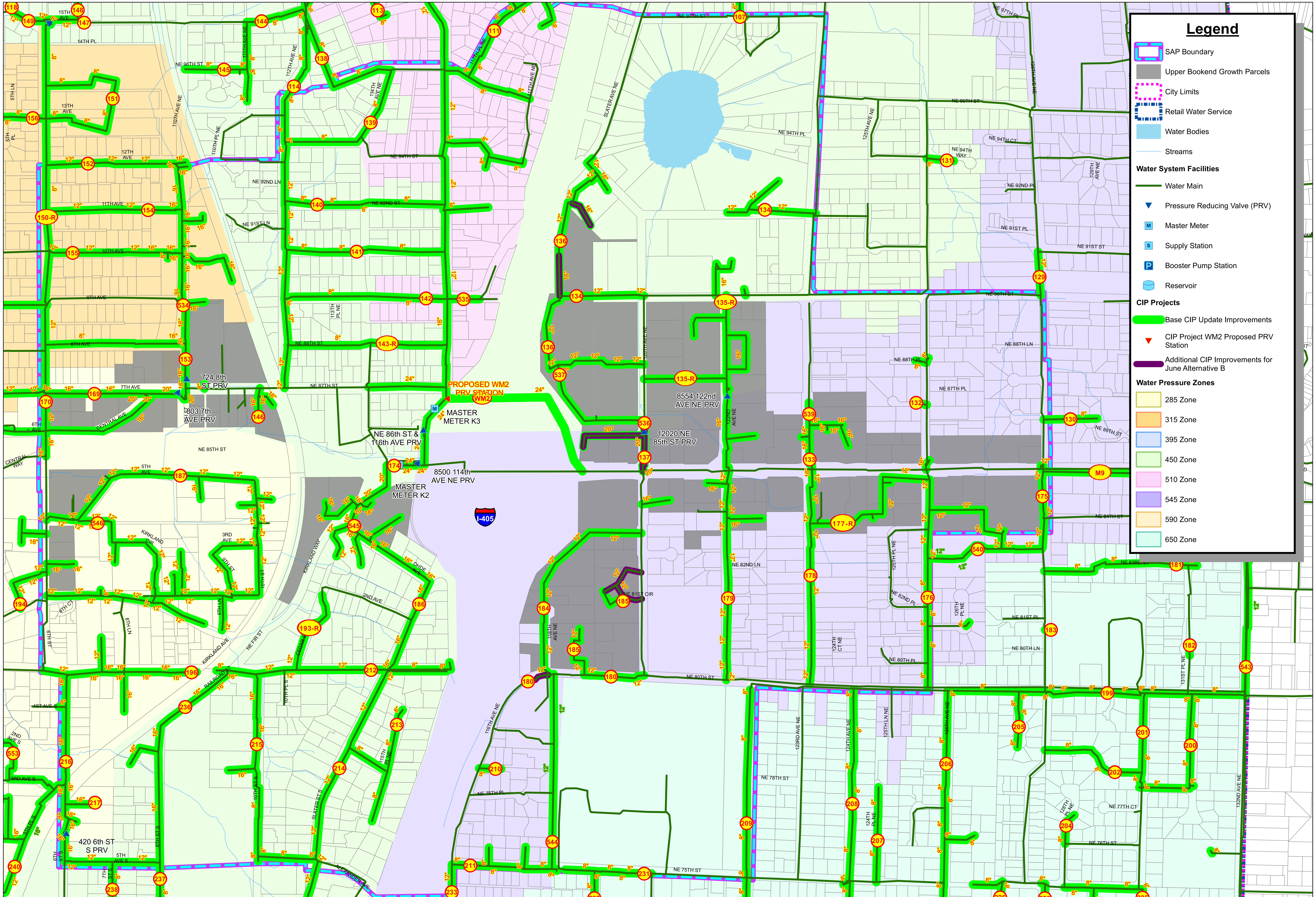

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Vicinity Map

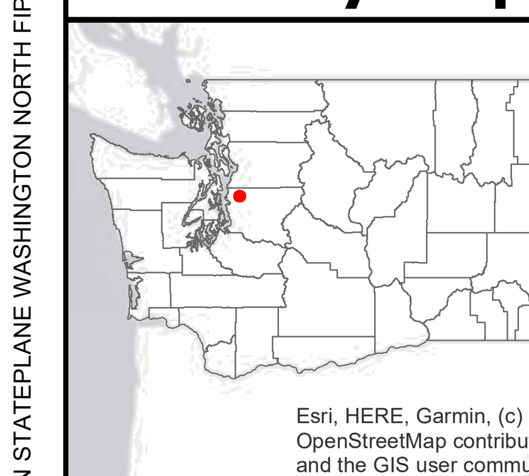

Figure 2
Station Area Plan
Water System Improvements
City of Kirkland

C:\USERS\DBRIGHT\ONEDRIVE - RH2 ENGINEERING, INC\DESKTOP\SAP FIGURES\COLOR BLIND FIGURES\FIGURE 2 - KIR SAP - WATER IMPROVEMENTS.MXD BY: DBRIGHT PLOT DATE: OCT 18, 2021 COORDINATE SYSTEM: NAD 1983 HARN STATEPLANE WASHINGTON NORTH FIPS 4601 FEET

CITY OF KIRKLAND WASHINGTON

1 inch = 300 feet

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DRAWING IS FULL SCALE WHEN BAR MEASURES 2"

RH2

NORTH

Legend

- SAP Boundary
- Upper Bookend Growth Parcels
- City Limits
- Kirkland Wastewater Service Boundary
- Water Bodies
- Streams

Sewer infrastructure

- City of Kirkland Gravity Main
- King County Gravity Main
- King County Force Main
- King County Lift Station

CIP Projects

- Base CIP Improvements
- Additional CIP Improvements for June Alternative B

Major Sewer Drainage Basins

- Eastside Interceptor
- Kirkland
- Lake Plaza

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Vicinity Map

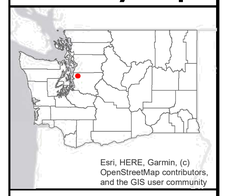

Figure 3
Station Area Plan
Sewer System Improvements

City of Kirkland

CITY OF KIRKLAND WASHINGTON

1 inch = 300 feet

0 150 300 600 Feet

DRAWING IS FULL SCALE WHEN BAR MEASURES 2"

RH2

NORTH

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Representative Infrastructure Studies

(Published October 2021)

Appendix 3. Supplemental Stormwater Study

This Study is an Appendix to the **NE 85th Street Station Area Plan project** **Fiscal Impacts and Community Benefits Analysis Study Technical Memo (Technical Memo).** The Station Area Fiscal Impacts and Community Benefits Analysis was scoped to answer this question: If the City were to implement its vision of the Station Area as a thriving, walkable urban center with plentiful affordable housing, jobs, sustainable development, and shops and restaurants linked by transit, can the City afford the investments necessary to address increased demand on public services, especially schools, parks/open spaces, transportation, and utilities, and avoid a reduction in service for existing community members and businesses?

Study Purpose

To support the Technical Memo's assumptions, planning level **Representative Infrastructure Studies** were conducted to determine a set of representative infrastructure investments needed to maintain service levels in transportation, water and sewer, and stormwater, in alignment with the full 23-year buildout scenarios described for the two key development alternatives analyzed in the Technical Memo – June Alternatives A and B. The purpose of the Infrastructure Studies was to inform an understanding of area-wide representative infrastructure and service needs and costs and for incorporation as assumptions in the fiscal analysis. Note that as "representative infrastructure," these identified investments are ones that are likely to be similar in scale and type to those needed to support future Station Area development, but are likely to differ somewhat from the specific infrastructure investments that will ultimately be adopted for the Station Area. Information about the Representative Infrastructure Studies is presented in Section 3 of the Fiscal Impacts and Community Benefits Technical Memo. The Fiscal Impact model assigns all representative infrastructure investments either to development projects or to the City, roughly following City policy. Any assumptions about parcel- and quadrant-level development and phasing included in the studies are hypothetical and not meant to presuppose decision- making by private landowners or the actions of the market. The representative investments identified in the Infrastructure Studies are distinct from and should not be construed as preferred plan recommendations or final project configurations, which will be developed in later stages of planning and are subject to City Council approval.

Key Contacts

City of Kirkland Project Lead: Allison Zike

Consultant Project Lead: Mithun

Fiscal Impacts and Community Benefits Supplemental Study Technical Memo

Lead Author: BERK; Contributors: EcoNorthwest, Fehr and Peers, Mithun

Representative Infrastructure Studies

Appendix 1. Supplemental Transportation Study Lead Author: Fehr and Peers

Appendix 2. Supplemental Water and Sewer Study Lead Author: RH2

Appendix 3. Supplemental Stormwater Memo Lead Author: RKI

CITY OF KIRKLAND
123 Fifth Avenue, Kirkland, WA 98033 425.587.3000
www.kirklandwa.gov

MEMORANDUM

To: Kevin Pelstring, Budget Analyst

From: Robert O'Brien, Senior Surface Water Engineer
Kelli Jones, Surface Water Program Supervisor

Date: September 30, 2021

Subject: NE 85th St Station Area Plan – Stormwater Fiscal Analysis Summary

BACKGROUND

Sound Transit's ST3 Regional Transit System Plan is bringing a transportation investment to Kirkland by redeveloping the interchange at NE 85th Street and Interstate (I)-405. The new interchange will include a new Bus Rapid Transit Station, expected to be complete in 2025. Kirkland's Station Area Plan will look at how the City of Kirkland (City) can make the most of this regional investment to create the best value and quality of life for Kirkland and its residents.

As part of the Station Area Plan, the City is conducting a fiscal analysis to understand the potential impacts of the changes proposed within the plan across City departments. As part of that analysis, the City is evaluating the capacity of the existing stormwater main line on 120th Ave NE between NE 85th St and NE 90th St. This line would serve the majority of the proposed changes within NE 85th St Station Area Plan Study Area (Study Area).

ANALYSIS

A high-level analysis was performed to determine potential flooding impacts to the stormwater main line along 120th Ave NE with various redevelopment scenarios.

The three scenarios that were analyzed included:

1. a baseline condition with existing land cover,
2. a developed "a" condition which evaluated fully developed land cover under current zoning standards, and
3. a developed "b" condition which evaluated fully developed land cover to a potentially new zoning standard within the Study Area. This standard would allow an increase in lot coverage on certain parcels, therefore increasing impervious surface.

After determining the potential flooding locations for each developed scenario, stormwater mitigation options were then evaluated to determine their effectiveness at reducing runoff along the stormwater main line for each developed scenario. Mitigation options that were applied

included stormwater conveyance system improvements (larger pipe diameters, or change in pipe material), and incorporation of detention facilities (vaults). In addition, "blue/green" streets (a combination of rain gardens and vault-type structures) were evaluated as a mitigation alternative for developed condition "b" within the Study Area.

RESULTS

The results of the analysis are summarized below.

1. Development of the Study Area and any associated increases in impervious surface area will not have any negative downstream impacts. This is due to current stormwater mitigation requirements that will require these parcels to install large detention systems (such as tanks and vaults) to reduce the flow off their development and help existing flooding issues.
2. Outside of the Study Area, the analysis showed an increase in runoff from the upstream residential areas causing potential flooding. Residential parcels are smaller in size and tend to be under the mitigation requirement and therefore are exempt from the requirement to construct large stormwater facilities.
3. Green/Blue Street stormwater infrastructure modeled within the Study Area are very costly and provide very little benefit for the capacity of the stormwater system. Much of the potential flooding is resolved with the stormwater mitigation from redevelopment. Other types of green streets or stormwater expression, that were not included in the study and may have lower maintenance costs, could continue to be considered as urban design features with water treatment benefits.

FUTURE PROJECT

The only proposed stormwater project within the Study Area consists of replacing 520 feet of 36-inch piped stream along 120th Ave NE with a smoother pipe material. This will increase capacity through the stormwater main line, helping in all scenarios. The estimated cost of this project is $600,000. This estimate assumes construction occurs during the drier summer season and external permitting agencies allow the pipe to be replaced without needing to meet fish passage requirements.

CONCLUSION

This analysis shows that development and any associated land use code changes within the Study Area will not negatively impact existing stormwater conveyance through the stormwater main line on 120th Ave NE between NE 85th St and NE 90th St. Redevelopment in this area should reduce stormwater runoff with the implementation of required onsite stormwater control facilities.

CITY OF KIRKLAND

NE 85TH STREET STATION AREA PLAN: 120TH AVE NE BASIN STORMWATER ANALYSIS

RKI planning engineering

Revised: October 7, 2021

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CITY OF KIRKLAND PUBLIC WORKS

85TH AVENUE STATION AREA PLAN

Date:	October 7, 2021
Prepared By:	Robin Kirschbaum, Inc.
Prepared For:	Robert O'Brien / City of Kirkland
	Kelli Jones / City of Kirkland
Subject:	120th Avenue NE Basin Stormwater Analysis (Revised)

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EXECUTIVE SUMMARY

Background

The City of Kirkland (City) is evaluating potential capacity impacts to the existing stormwater conveyance trunk drainage system serving the proposed NE 85th Street (St) Station Area near the intersection of NE 85th St and Interstate (I)-405 (Study Area). The City has retained Robin Kirschbaum, Inc. (RKI) to work collaboratively with City staff to develop a hydrologic/hydraulic model in PCSWMM modeling software to identify and evaluate conveyance capacity issues resulting from potential zoning changes being considered under the Station Area Plan.

Model Development

A total of six (6) models were developed and evaluated for the purposes of this study, including an existing conditions model and five (5) alternative models as follows:

- **Alternative A:** Full Build-out Based on Existing City Zoning (Unmitigated and Mitigated)
- **Alternative B:** Redeveloped Conditions (Unmitigated and Mitigated)
- **Alternative C:** Redeveloped Conditions with Blue-Green Streets (Mitigated)

For each of the models, rainfall runoff timeseries were developed using long-term continuous hydrologic modeling in Western Washington Hydrology Model version 2012 (WWHM). Modeled storms with peak flow rates matching the 25-year recurrence interval were extracted from the WWHM timeseries and input into PCSWMM.

The models include stormwater trunk conveyance elements (e.g., pipes and channels) only, with no lateral stormwater conveyance pipes included. Seven subbasins were delineated for the study area (see Figure 1 in the main report), with all stormwater flows assumed to enter the trunk drainage system at the downstream end of each of those 7 subbasins.

Results

The modeling results for this study indicate that development of the Station Area Plan and any associated impervious limit increases will not negatively impact downstream flooding. On the contrary, redevelopment is expected to benefit existing flooding due to the flow control facilities that will be required for the redeveloping parcels.

Future conveyance improvements may be required upstream due to residential development that may increase the upstream basin impervious surface by 15% to 20% without requiring addition of flow control facilities. Any such upstream mitigation requirements are not due to the Station Area Plan.

Blue-green streets provide only minor benefits at their proposed locations due to extensive flow control improvements occurring with redevelopment within the basin. The cost to construct these facilities will be high due to required construction depths, expected dewatering needs, and steep slopes, which may require the addition of weirs and additional length to achieve desired storage volumes. While maintenance costs were not evaluated as part of this study, the cost of maintaining blue-green street improvements is also expected to be higher than that of traditional grey infrastructure due to the distributed nature and lack of economies of scale proposed under the Station Area Plan.

The models are considered suitable for purposes of this planning-level study, in which the relative changes in modeled flooding between the existing condition and the various alternatives are being compared. However, due to their coarse resolution, with the 7 relatively large subbasins and simplified drainage trunk conveyance system, the models should not be used to predict the absolute value of modeled flood depth or duration for any given existing or alternative condition scenario without further model refinement, as recommended in Section 9 of the main report (Recommended Next Steps).

1 INTRODUCTION

1.1 Project Description

Sound Transit's ST3 Regional Transit System Plan is bringing a transportation investment to Kirkland by redeveloping the interchange at NE 85th Street (St) and Interstate (I)-405 (Figure 1). The new interchange will include a new Bus Rapid Transit (BRT) Station, expected to be complete in 2025. Kirkland's Station Area Plan will look at how the City of Kirkland (City) can make the most of this regional investment to create the best value and quality of life for Kirkland and its residents.

The Station Area Plan will encourage an equitable and sustainable transit-oriented community as part of the significant growth expected in Greater Downtown Kirkland. It will build on recent efforts such as the Kirkland 2035 Comprehensive Plan, the Greater Downtown Kirkland Urban Center proposal, and other city-wide initiatives addressing housing, mobility, and sustainability. The final plan will provide a visual and policy framework for future redevelopment and growth within approximately a half-mile radius of the BRT station (City of Kirkland 2021).

As part of the Station Area Plan, the City is conducting a fiscal analysis to understand the potential impacts of the changes proposed within the plan across City departments (including Public Works, Planning and Building, Parks, Fire, and Police). As part of that analysis, the City is evaluating the capacity of the existing stormwater conveyance trunk system serving the proposed NE 85th St Station Area near the intersection of NE 85th St and I-405 (Study Area). The City retained Robin Kirschbaum, Inc. (RKI) to work collaboratively with City staff to develop a hydrologic/hydraulic model in PCSWMM modeling software to identify and evaluate conveyance capacity issues resulting from potential zoning changes being considered for the station area.

Flooding issues identified in the model were used as a basis for developing high-level planning concepts for flood mitigation. Associated planning-level construction cost estimates were developed for the following mitigation strategies considered in this study:

- Conveyance pipe upgrades (e.g., material improvements, realignment, and/or increased diameter)
- Underground detention vaults/Blue-Green Streets
- Rain gardens

These mitigation concepts are based on the Action Alternatives described in *Kirkland NE 85th St Station Area Plan and Planned Action: Draft Supplemental Environmental Impact Statement,* Section 3: Environment, Impacts and Mitigation (*SEIS*; BERK 2021b) and conceptual designs prepared by City staff for use in this analysis.

1.2 Purpose of this Report

This report documents the methods, assumptions, and results of hydrologic/hydraulic modeling performed to evaluate the stormwater conveyance trunk system capacity for conveying storms with recurrence intervals up to 25 years under existing and various redevelopment alternatives (Section 4, Section 5, and Section 6). The modeling was used to identify locations within the study area (Section 2) where system upgrades (or mitigation) would be needed to provide the desired 25-year conveyance capacity under each alternative and to verify the effectiveness of the proposed mitigation measures.

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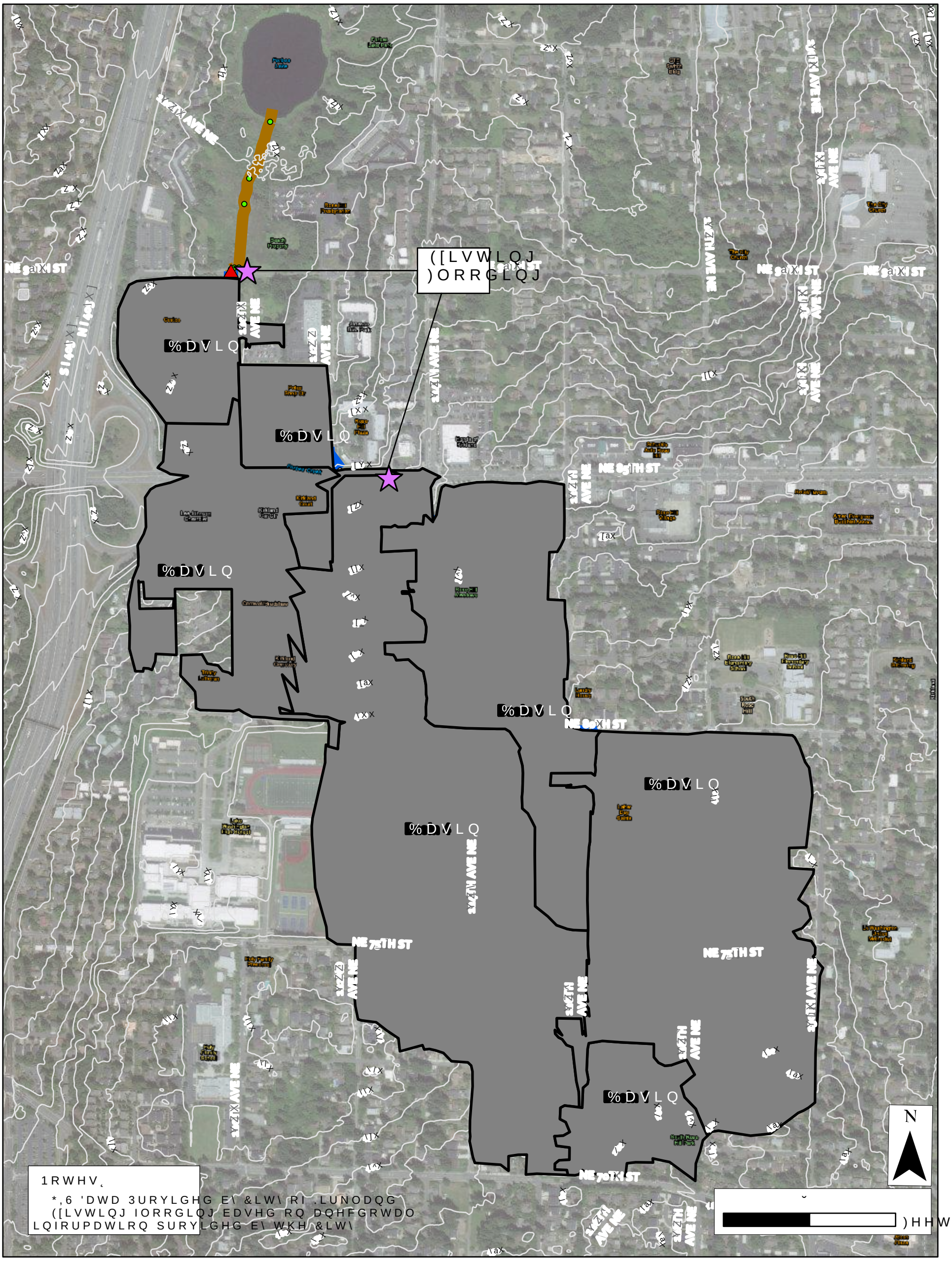

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CITY OF KIRKLAND WASHINGTON

RKI planning engineering

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2 STUDY AREA DESCRIPTION

The Study Area, located east of I-405 and mostly south of NE 85th St, covers approximately 244.2 acres of tributary drainage area within the City's Forbes Creek Drainage Basin. Using Geographic Information System (GIS) data provided by the City, the study area is divided into seven subbasins, as shown in Figure 1.

The main trunkline through the Study Area flows south to north and begins near the intersection of NE 73rd St and 126th Avenue (Ave) NE. Through a series of pipes and ditches, stormwater is conveyed north to NE 80th St, where flow then enters Rose Hill Meadows Park. Stormwater is then conveyed through the park via a series of streams and pipes before passing under a private commercial parcel at the intersection of NE 85th St and 120th Ave NE. Stormwater is then conveyed north along 120th Ave NE, where flow crosses beneath NE 90th St and enters the Forbes Lake Wetland complex that then drains to Forbes Lake.

There are two areas of flooding in the Study Area documented by City maintenance personnel and resident complaints. These areas include 1) the parking lot at Costco, located west of 120th Ave NE between NE 90th St and NE 85th St; and 2) the stormwater channel behind Jiffy Lube, located near the intersection of 124th Ave NE and NE 85th St. The latter location is known to flood only when the privately-owned stormwater channel trash rack is not regularly maintained (see Photo 1). Both flooding locations are noted on Figure 1.

Photo 1. Stormwater Channel Behind Jiffy Lube

3 RELEVANT STANDARDS

The Study Area conveyance system was evaluated for 25-year peak flow capacity based on requirements outlined in the *King County Surface Water Design Manual* (KCSWDM; King County 2016) *Section 1.2.4.1: Conveyance Requirements for New Systems*.

For proposed redevelopment projects that would trigger flow control requirements (see Section 5.2), it was assumed those project sites would be designed to meet the King County Level 2 Flow Control standard (KCSWDM, Section 1.2.3: Core Requirement #3: Flow Control Facilities).

As required by the *City of Kirkland Addendum to the 2016 King County Surface Water Design Manual* (Kirkland 2020), the historic (forested) condition was used for pre-developed runoff modeling of all projects in Level 2 flow control areas.

4 METHODS AND ASSUMPTIONS

This section documents the methods and key assumptions used for hydrologic and hydraulic modeling for this study.

4.1 Hydrologic Modeling

Long-term continuous hydrologic modeling was conducted using the Western Washington Hydrology Model Version 2012 Version 4.2.17 (WWHM), with 15-minute rainfall data from the SeaTac rain gauge and a

precipitation scaling factor of 1.0. The purpose of this modeling was to develop rainfall runoff time series for input into the hydraulic model, described further below.

The following general assumptions were made for hydrologic modeling:

- **Impervious Areas:** All impervious areas in the Study Area were assumed to be effective impervious area; that is, stormwater runoff from impervious areas was assumed to flow directly into the conveyance system with no incidental infiltration nor detention that may occur through vegetated areas or stormwater channels. This is considered a conservative assumption. See Section 9 Recommended Next Steps on considering effective impervious area in future models.
- **Soils:** Type C soils were assumed for the entire Study Area. This is considered a conservative assumption.
- **Groundwater:** Groundwater was not considered in either the hydrologic or hydraulic modeling (Section 4.2). However, extensive groundwater pumping may be expected under the future redevelopment alternatives (Section 5.2). Recommendations regarding groundwater pumping policies are provided in Section 9.
- **Slopes:** The average surface slope for each basin within the Study Area was calculated using a 32-Bit LiDAR Digital Elevation Model (DEM) provided by the City and clipped to the Study Area. This data was used to select slope inputs for modeling subbasins in WWHM. The WWHM User Manual (Clear Creek 2016) provides the slope categories below for hydrologic modeling. See Section 5 for a summary of WWHM basin slope inputs for the Study Area.
    - Flat (0-5% grade)
    - Moderate (5-15% grade)
    - Steep (>15% grade)

The WWHM output long-term continuous runoff timeseries was post-processed to identify and extract single-event storm on record with a peak flow rate roughly matching the 25-year recurrence interval storm. The following steps were used to identify and extract the storm event from the WWHM output record. These steps were followed for each of the seven subbasins:

1. Identify the modeled storm on record that most closely matches the 25-year peak flow rate for that subbasin.
2. Extract the identified storm event, with two days centered around the timing of the peak.
3. Because the 25-year peak flow rate is estimated in WWHM based on statistical analysis (Log Pearson Type III) of yearly modeled peak flow values, there is no storm on record that precisely matches that computed rate. Therefore, the extracted storm event was scaled by the ratio (r) of the 25-year peak flow rate (Q25) to the maximum simulated flow rate for the extracted storm (Qevent max). This resulted in an average ratio (r) of 1.04 for this project.

See Section 5 for additional discussion of WWHM inputs and Appendix A for WWHM output reports.

4.2 Hydraulic Modeling

Hydraulic modeling was conducted using PCSWMM 2020 Professional hydraulic modeling software. Key inputs to the PCSWMM conveyance network model were derived from the following sources:

- **Geographic Information System (GIS) Data:** City-provided GIS data contained stormwater channels, stormwater pipes, manholes, and miscellaneous stormwater components. See Section 9: Recommended Next Steps for discussion of the available data and recommended next steps for filling data gaps.
- **Record Drawings:** Gaps in the GIS data were supplemented with record drawings, where applicable and available.

Where record drawings were not readily available to fill data gaps, the following assumptions were made in agreement with City staff:

- Stormwater Channel #7582 (behind Jiffy Lube at 124th Ave NE and NE 85th St) was assumed to be 2.5-feet-wide by 2-feet-deep (see Photo 2).
- Manhole rim elevations were assumed from the 32-Bit LiDAR DEM layer provided by the City (no photo available).
- Pipe invert elevations were assumed to be depths provided in the GIS data, in reference to rim elevations.
- The tailwater elevation at the 120th Ave NE outfall was assumed to be at the crown of the pipe (see Photo 3).

Table 1 summarizes Manning's N roughness values used in the PCSWMM model. Roughness values were based on KCSWDM, Section 4.2, Table 4.2.1.D and Section 4.4, Table 4.4.1.B. Pipe materials were provided in the City's GIS data and supplemented by City review of the available as-built data. See the PCSWMM Model Reports in Appendix B for additional information.

Photo 2. Bottom Area, Stormwater Channel behind Jiffy Lube

Photo 3 Outfall Tailwater Conditions

Table 1. Manning's N Values for PCSWMM Model

Pipe Material/Open Channel Type	Manning's N Value
Corrugated Aluminum Pipe (CAP) [a]	0.024
Concrete	0.012
Corrugated Polyethylene (CPE) [b]	0.012
Ductile Iron [c]	0.012
Polyvinyl Chloride (PVC)	0.011
Reinforced Concrete Pipe (RCP)	0.012
Solid Wall Polyethylene (SWPE) [d]	0.009

Ditches and Channels [e]	0.027
Not Available [f]	0.011

Notes:

a CAP is assumed to have 2-2/3-inch-by-1/2-inch corrugations and are assumed to be fully coated.
b CPE is assumed to be lined.
c Ductile iron pipes are assumed to be cement-lined.
d SWPE is assumed to be butt-fused.
e Ditches and Channels are assumed to be constructed channels with short grass and few weeds.
f Not Available. only pertains to one 63-linear foot 12-inch diameter pipe located in Basin 2. Due to the unavailable pipe material data for this pipe, a Manning's N value of 0.011 was assumed (PVC) based on material of surrounding pipes.

5 ANALYSIS

This section describes the hydrologic/hydraulic modeling analysis performed for existing conditions and three future redevelopment condition alternative scenarios developed for this study.

5.1 Existing Conditions

5.1.1 Model Resolution, Intended Use, and Limitations

As shown in Figure 1, stormwater runoff is assumed to enter the stormwater trunk drainage system at the downstream end of each subbasin. This results in relatively large, abrupt additions of flow at just seven discrete locations in the model network. As a result of this relatively low model resolution of the trunk drainage system, as well as the lumped subbasin delineation, lack of model calibration, and data gaps and general assumptions made to fill the data gaps, the existing condition model is considered suitable for high-level planning purposes only. Absolute values of modeled flood depth and duration should not be used without further model development, calibration, and validation, as discussed in Section 9 (Recommended Next Steps). However, the relative changes in modeled flood depth and duration between the existing condition and various alternatives analyzed (Section 5.2) are considered reasonable for the high-level planning purposes of this study, as discussed further in Section 6 (Results).

5.1.2 Land Use Assumptions and Existing Flow Control

The City provided the existing condition land use assumptions to be used in hydrologic modeling for this study (Figure 2), based on their review of available GIS data and Record Drawings. In addition to land use, the City also provided a GIS layer depicting parcels they deem to have flow control under existing conditions. The flow control designations provided by the City include the following (Figure 1):

- **100% Forest:** Includes areas with infiltration facilities designed for 100% infiltration (with overflow connection to the City's stormwater trunk conveyance system) or flow control facilities with low orifice diameter of approximately 0.5-inch (assumed to provide Level 2 Flow Control).
- **20% Grass / 80% Forest:** Includes areas with LID implementation and infiltration facilities (with overflow connection to City's stormwater trunk conveyance system).
- **100% Grass:** Includes areas with flow control facilities with low orifice diameter of approximately 1-inch.
- **10% Grass / 90% Impervious:** Includes areas with flow control facilities constructed prior to 2012, with low orifice diameter less than 1-inch.

5.1.3 Existing Flood Storage

Each junction in the PCSWMM model was assigned a flood storage area of 1,320 square feet (SF). This flood storage area was based on an assumed average 660-linear-foot typical block length with up to 2 feet of ponding width allowed. One exception was made for junction 10968 (on 120th Ave NE near the Costco parking lot), where a much larger flood storage area of 260,000 SF was used to account for the existing flooding that occurs within the Costco parking lot. This modeled flood storage area assumes the entire parking lot surface floods during major storms such as those with recurrence intervals of 25 years or greater.

5.2 Alternatives

Three main alternatives were analyzed for this study, with a total of five models developed as follows:

- **Alternative A:** Full Build-out Based on Existing City Zoning
    - Unmitigated – Assumes land uses based on full-build conditions under existing City zoning. Assumes existing flow control (Section 5.1.2) will remain in place and new flow control will be installed to meet the Level 2 flow control standard (Section 3) for all parcels at least 16,000 SF in size. The 16,000 SF threshold was developed by the City based on WWHM modeling results that showed that redevelopment of parcels that size or greater with an assumed 60% impervious/40% lawn coverage would increase the 100-year peak flow rate by more than 0.15 cfs, therefore requiring Level 2 Flow Control. The resulting Level 2 flow control parcels were modeled as 100% forested condition (Figure 3).
    - Mitigated – Same land use assumptions as the unmitigated model, with additional mitigation to resolve all flooding under Alternative A. Mitigation strategies considered included conveyance system improvements and installation of detention vaults, as summarized in Table 2.
- **Alternative B:** Redeveloped Conditions
    - Unmitigated – Assumes future zoning under redevelopment conditions based on data provided by BERK (2021c). As with Alternative A, assumes existing flow control (Section 5.1.2) will remain in place and new Level 2 flow control will be added for all parcels at least 16,000 SF in size.
    - Mitigated – Same land use and flow control assumptions as the unmitigated model, with additional mitigation to resolve all flooding under Alternative B. Since the Alternative B land uses (Figure 2) and modeled peak flow rates (Table 4) were nearly identical to Alternative A, the same mitigation measures were used for both alternatives (Table 2).
- **Alternative C:** Redeveloped Conditions with Blue-Green Streets
    - Mitigated – Same land use and flow control assumptions as the Alternative B Mitigated model, but with addition of blue-green streets and rain gardens, as summarized in Table 2.

The City conducted modeling in WWHM and PCSWMM to size mitigation as needed to eliminate flooding under each alternative (Table 2).

As shown in Figure 2, Alternative A and Alternatives B/C are extremely similar in their resulting land use distribution (e.g., 96.7 acres impervious in Alternative A versus 97.6 acres impervious in Alternative B; Table 3), due to the large number of parcels that trigger the Level 2 flow control designation.

Figure 3 shows the land use and flow control assumptions for Alternative A, while Figure 4 shows the corresponding information for Alternatives B/C. Alternatives B/C are shown together in the latter figure because their land use assumptions are the same.

As shown in Figure 4, there are a total of 11 land use classifications within the Study Area provided in the BERK (2021c) data. These were simplified for this study by grouping them into the following four categories based on percentage impervious area assumed for each:

- **Re-Zoned Class 1 (100% Impervious):**
    - Surplus
- **Re-Zoned Class 2 (90% Impervious):**
    - Multi-Unit (MU) Office Tower 17 Rental 50k - Low Public (PU) 1
    - MU Office Tower 9 Rental 50k - Medium (PU1)
    - Office Tower 12 Rental 75k - Medium (PU1)
    - Residential Mid 5 Rental 50k - Medium (PS)
    - Residential Mid 7 Rental 75k - Medium (PS)
- **Re-Zoned Class 3 (80% Impervious):**
    - MU Residential Mid 7 Rental 50k - High (PU1)
    - MU Residential Tower 8 Rental 50k - Medium (PU)
    - Mid 7 Rental 50k - Medium (PU1)
    - Residential Mid 6 Rental 50k - Medium (PS)
- **Re-Zoned Class 4 (70% Impervious):**
    - Residential Low 4 Rental 50k - High (SS)

See Appendix C for summary of Flow Control Designations, Zoning Designations, and Re-Zoned Designations and resulting land use used to develop WWHM inputs in Table 3.

Table 2. Summary of Modeled Land Uses, Flow Control, and Mitigation Measures by Alternative

Model	Land Use Assumptions	Flow Control Assumptions	Mitigation Measures [a]
Existing Condition	Land use inputs provided by the City (Figure 2) [b]	• See flow control designations in Figure 1, based on City evaluation of available GIS data and record drawings	• None
Alternative A	Full build-out condition based on current City zoning [b]	• Existing condition flow control designations • New flow control (modeled as 100% forested conditions) assumed for parcels > 16,000 SF [c]	• Installation of a 26,570 sf Detention Vault (185,990 cubic feet, 7-foot depth) in Basin 2 to manage 7.5 acres impervious area • Installation of a 35,350 sf Detention Vault (247,450 cubic feet, 7-foot depth) in Basin 4 to manage 10.0 acres impervious area • Increased the following conveyance pipe diameters: ○ Pipe 7493 (near PETCO) from 18- to 30-inch based on development project currently in design ○ Pipe 40640 to Pipe -5 (along 124th Ave NE) from 12- to 18-inch ○ Pipes 23048, 23047 and 23018 (north of NE 80th St) from 16- to 18-inch ○ Pipes 45955 and 7563 from 18- to 24-inch • Modified the following conveyance pipe materials: ○ Pipes 6496, 6462, and 6460 (last three pipe segments in model) from CAP to RCP ○ Pipes C1 and 40642 (along 124th Ave NE) from CAP to SWPE ○ Pipes 40640 to Pipe -5 (along 124th Ave NE) from CAP, RCP, and PVC to SWPE ○ Pipes 45955 and 7606 (along NE 80th St) from CAP to SWPE
Alternative B	Same as Alternative A, with the addition of a Redevelopment Area along the NE 85th St Commercial Corridor [d]	• Existing condition flow control designations • New flow control (modeled as 100% forested conditions) assumed for parcels > 16,000 SF [c]	
Alternative C	Same as Alternative B		• All Alternative A/B mitigation measures, plus: ○ Installation of blue-green streets in Basin 6 (represented as a 4,250 SF [29,750 cubic feet, 7-foot-depth] and a 1,800 SF [2,600 cubic feet, 7-foot-depth] Detention Vault in WWHM); and ○ Installation of a 3,100 SF and 600 SF rain garden in Basin 4 (represented as storage nodes in PCSWMM with one-foot-depths, see Appendix B).

Notes:

a The City developed the mitigation scenarios via modeling in WWHM and provided the documentation provided in this table. The City also provided runoff timeseries to RKI for incorporation into the PCSWMM model. See Appendix B for pipe locations.

b Imperviousness and Current Zoning GIS data provided by the City.

c Flow Control Threshold of 16,000 SF was developed by the City based on WWHM modeling analysis.

d Redevelopment Area data for Alternatives B & C provided by BERK Consulting for analysis purposes only and is not intended to represent site-level proposals for regulatory or development activities. (BERK 2021a).

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Table 3. WWHM Land Use Input Summary by Model and by Subbasin

All Scenarios				Existing Conditions [a]				Alternative A [b]				Alternative B/Alternative C [c]			
Basin #	Average Basin Slope [d] (%)	WWHM Slope Input [e]	Soil Type [f]	Impervious Area (acres)	Lawn Area (acres)	Forest Area (acres)	Total Area (acres)	Impervious Area (acres)	Lawn Area (acres)	Forest Area (acres)	Total Area (acres)	Impervious Area (acres)	Lawn Area (acres)	Forest Area (acres)	Total Area (acres)
Basin 1	4.22	Flat	C	4.02	4.37	2.86	11.25	6.15	2.79	2.31	11.25	6.15	2.79	2.31	11.25
Basin 2	3.80	Flat	C	18.75	18.93	25.02	62.70	19.85	9.13	33.72	62.70	19.85	9.13	33.72	62.7
Basin 3	5.85	Moderate	C	15.92	19.15	1.56	36.63	13.79	7.77	15.07	36.63	14.69	8.21	13.74	36.64
Basin 4	3.69	Flat	C	33.71	49.40	0.00	83.11	45.71	21.06	16.34	83.11	45.68	21.09	16.34	83.11
Basin 5	6.58	Moderate	C	7.20	2.05	0.17	9.42	2.17	0.21	7.05	9.43	2.17	0.21	7.05	9.43
Basin 6	8.20	Moderate	C	17.15	11.12	0.00	28.27	8.07	0.76	19.43	28.26	8.13	0.7	19.43	28.26
Basin 7	2.10	Flat	C	11.22	1.55	0.00	12.77	0.92	0.00	11.84	12.76	0.92	0	11.84	12.76
Total	--	--	--	**107.96**	**106.58**	**29.61**	**244.15**	**96.66**	**41.72**	**105.76**	**244.14**	**97.59**	**42.13**	**104.43**	**244.15**

Abbreviations:

DEM Digital Elevation Model
GIS Geographic Information System
WWHM Western Washington Hydrology Model

Notes:

a Existing Conditions values provided by the City and are based on GIS data and Flow Control Designations from Record Drawing evaluation of parcel groups within the 120th Avenue NE Basin. See Section 5.1.

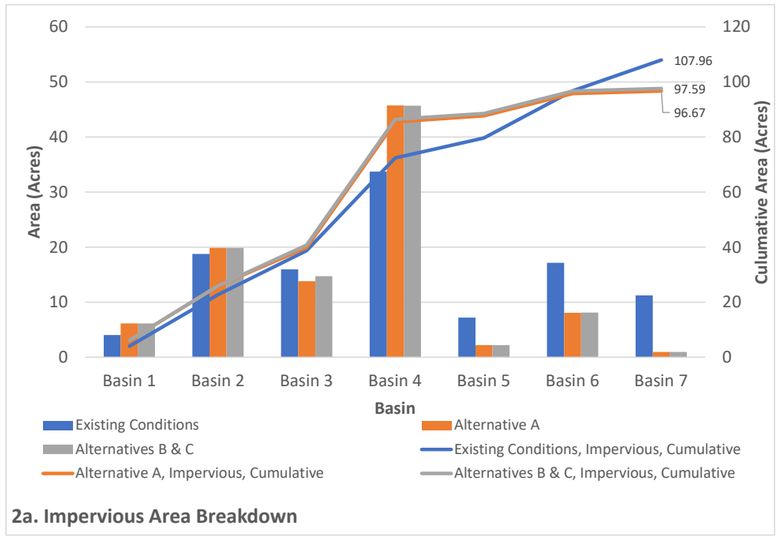
b Alternative A values are based on a combination of current zoning and Flow Control Designations for Existing Conditions and Redeveloped-Mitigated Conditions. See Section 5.2.

c Alternative B and Alternative C values are based on a combination of current zoning designations, Flow Control Designations for Existing Conditions and Redeveloped-Mitigated Conditions, and with Re-Zoned Designations provided by BERK Consulting. See Section 5.2.

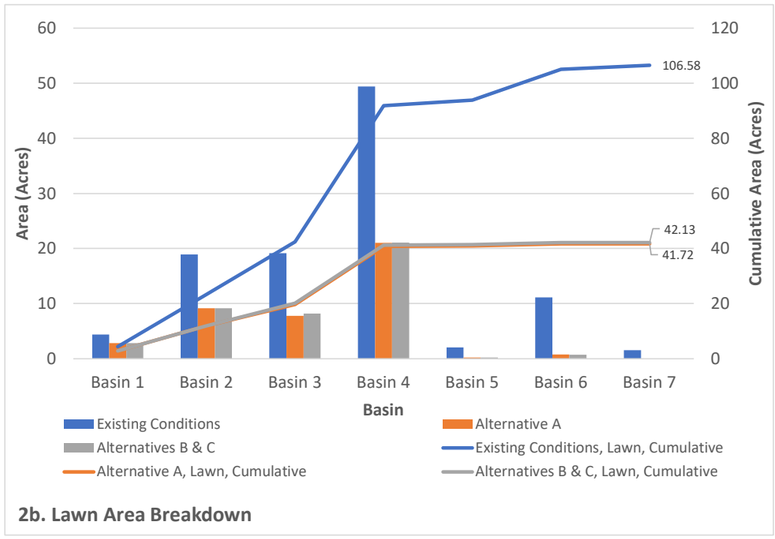
d Average Basin Slope calculated in PCSWMM using 32-Bit LiDAR Digital Elevation Model (DEM) layer provided by the City.

e WWHM Slope Categories include (See Section 4.1):
-Flat (0 – 5% Slope)
-Moderate (5 – 15% Slope)
-Steep (>15%)

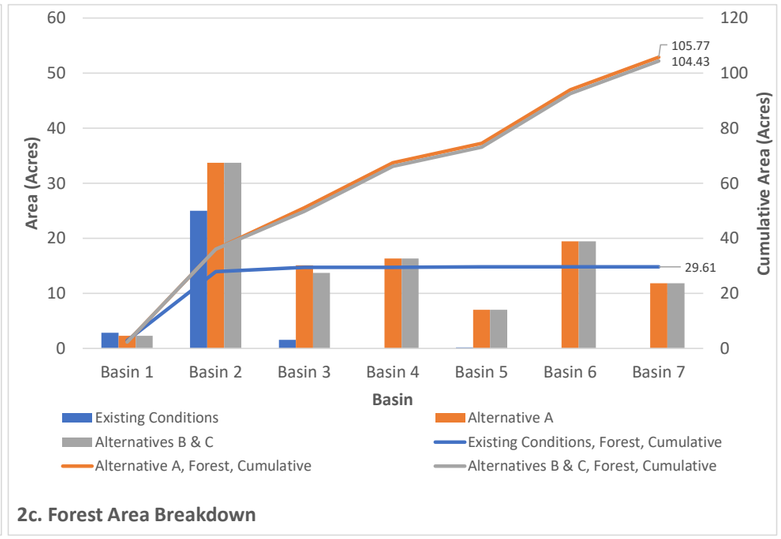
f Type C soils assumed for the entire 120th Ave NE Basin. See Section 4.1.



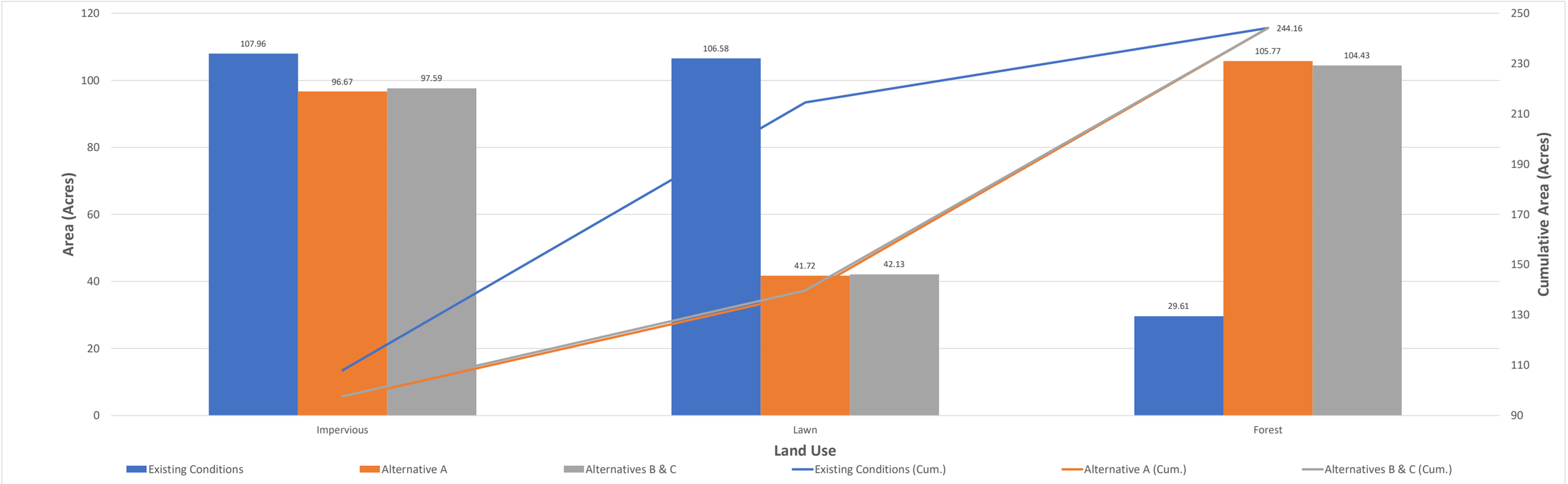
2a. Impervious Area Breakdown



2b. Lawn Area Breakdown



2c. Forest Area Breakdown



2d. Grand Summary of Land Use for Existing Conditions, Alternative A, and Alternatives B & C

Figure 2. Breakdown of Land Use by Basin for Existing Conditions, Alternative A and Alternatives B & C

City of Kirkland: 85th Street Station Area Plan

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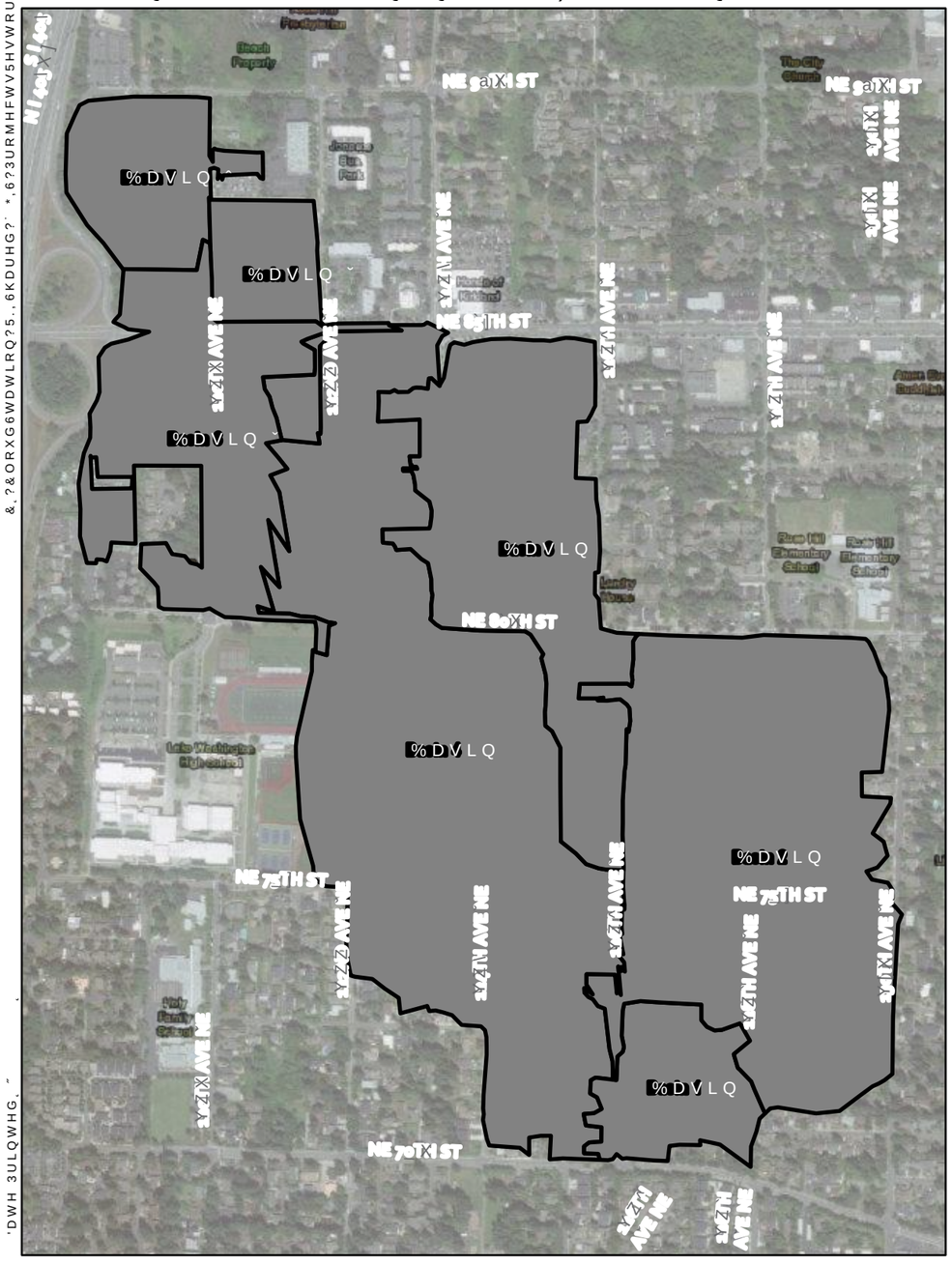

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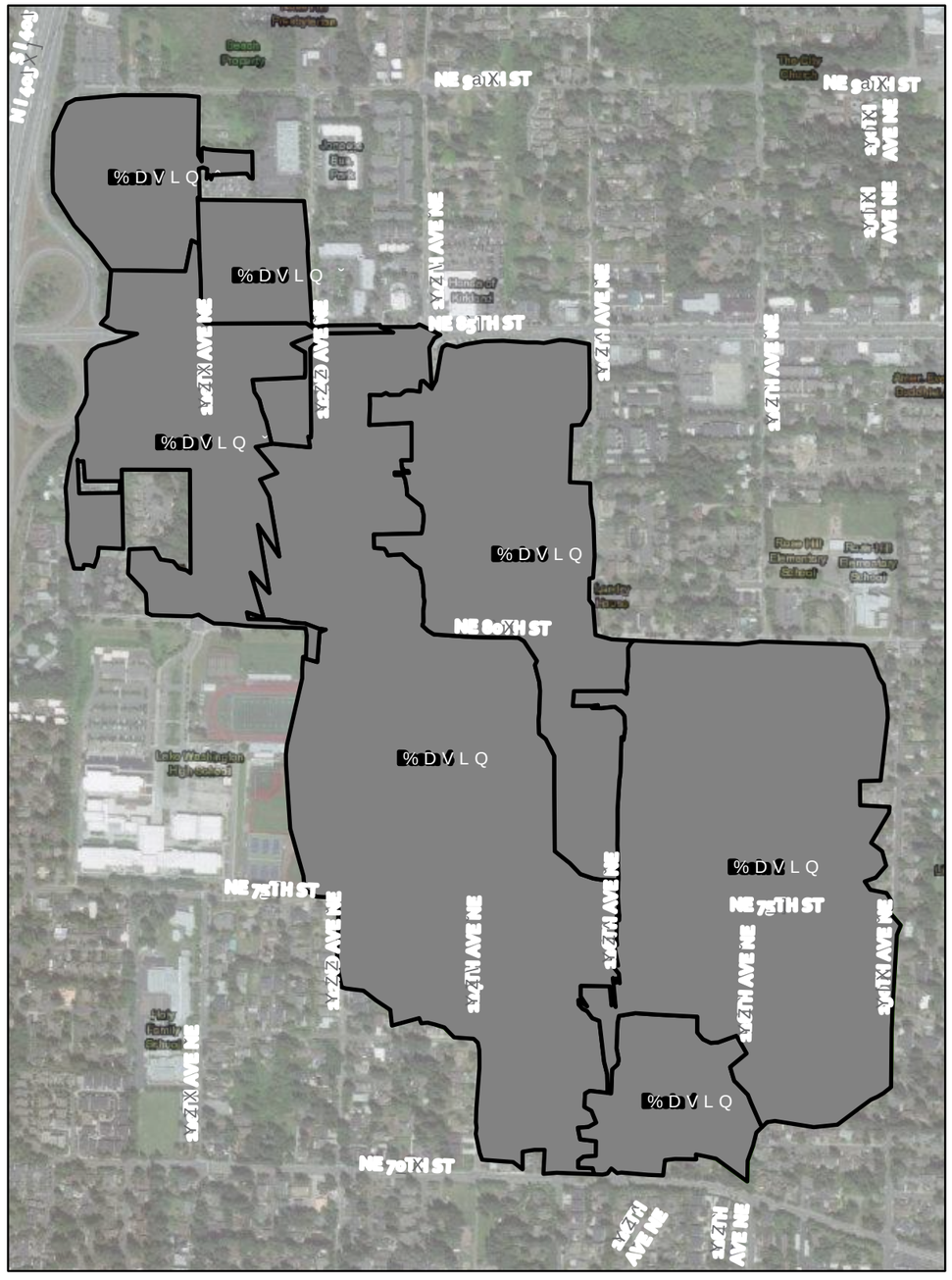

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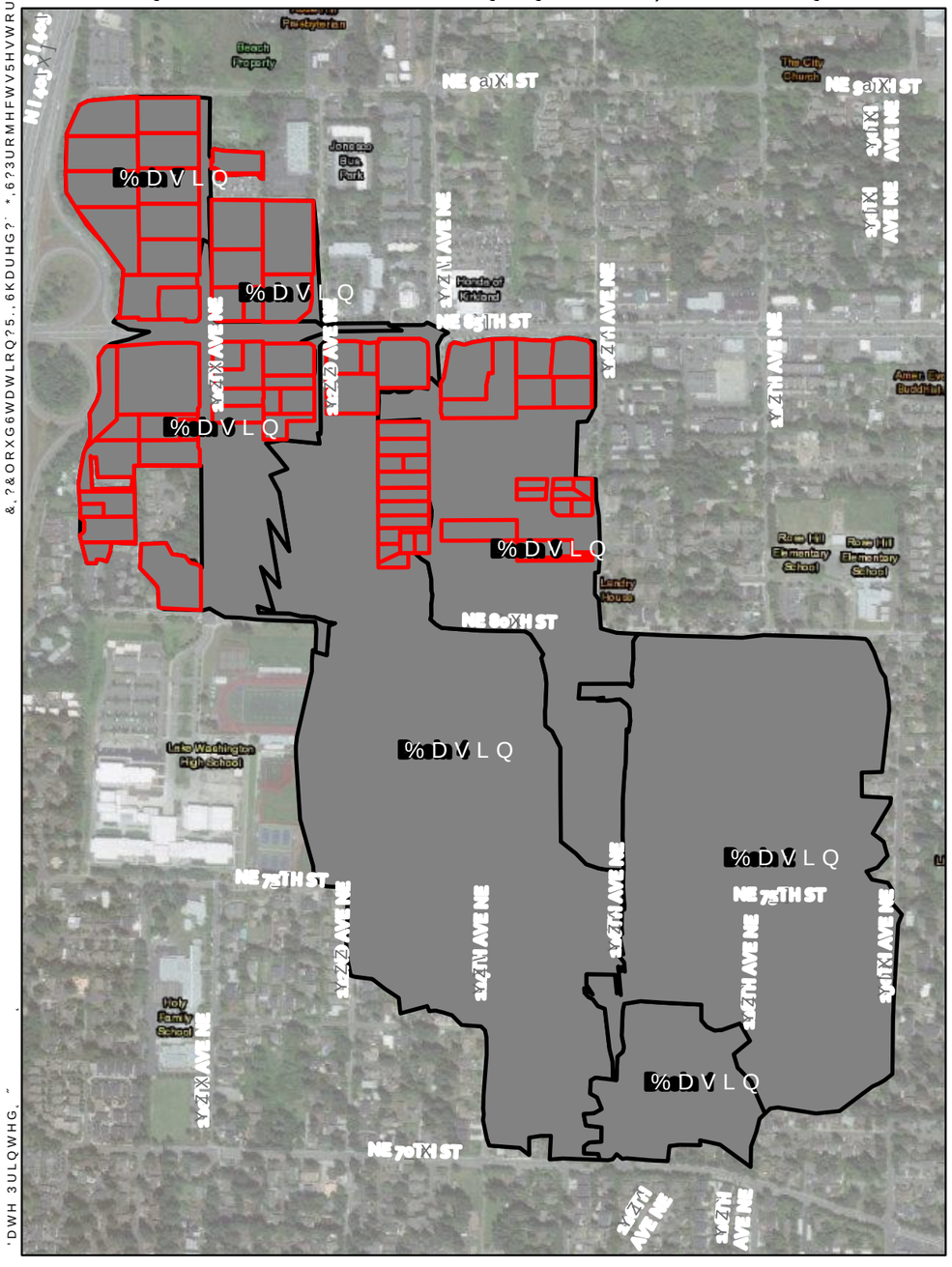

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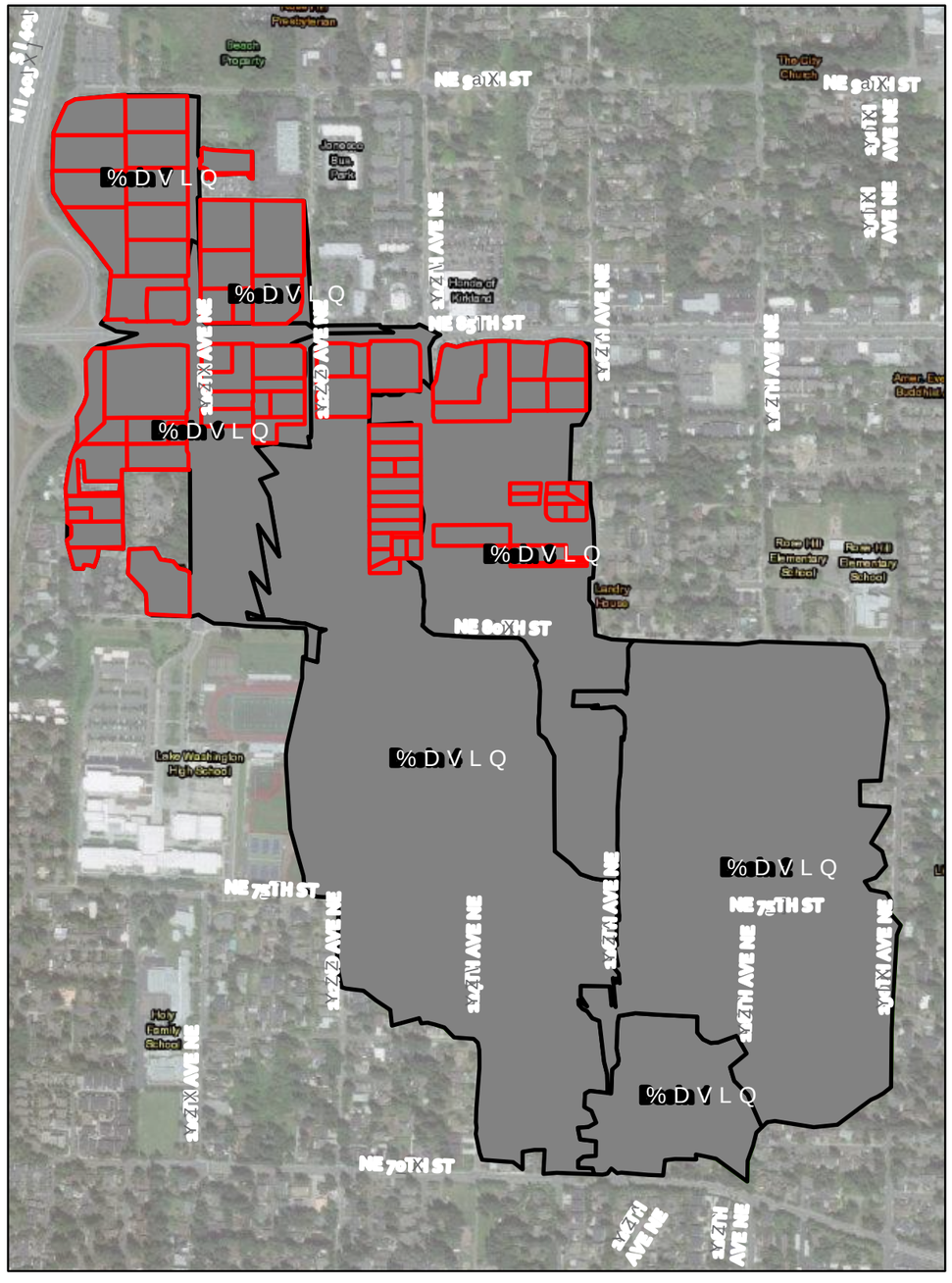

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6 RESULTS

6.1 Modeled Peak Flow Rates

The modeled 25-year peak flow rates for each subbasin are summarized in Table 4, with bar graph plots provided in Figure 5. As shown in the below table, the total 25-year peak flow rate for the Study Area is predicted to decrease from 114 cubic feet per section (cfs) under the existing condition to approximately 89 cfs for each of the future redevelopment alternatives. This decrease in modeled peak flow rate is attributed to the extensive flow control assumed for large, redeveloping parcels (Section 5.1.2). See Appendix A for WWHM output reports for the existing condition and each alternative model.

Table 4. 25-Year Peak Flow by Basin and by Alternative (all units in cubic feet per second [cfs])

	Existing Conditions		Alternative A [a]		Alternative B/C [b]	
Basin	**By Basin**	**Cumulative**	**By Basin**	**Cumulative**	**By Basin**	**Cumulative**
Basin 1	4.12	4.12	5.29	5.29	5.29	5.29
Basin 2	19.22	23.34	17.84	23.13	17.84	23.13
Basin 3	19.30	42.64	14.81	37.95	15.69	38.82
Basin 4	37.32	79.96	39.40	77.35	39.39	78.21
Basin 5	7.03	86.99	2.25	79.60	2.25	80.45
Basin 6	18.19	105.18	8.10	87.70	8.14	88.59
Basin 7	8.82	114.00	1.26	88.96	1.26	89.85
Total	**114.00**	**--**	**88.96**	**--**	**89.85**	**--**

Notes:

a Alternative A modeled peak flow rates do not incorporate mitigation measures (Section 5.2).

b Alternative B/C peak flow rates are the same due to the same land use and flow control assumptions applied. The modeled peak flow rates do not incorporate mitigation measures (Section 5.2).

Modeled Flooding

Table 5 summarizes modeled flood depths and durations. Figure 6 through Figure 10 show the locations and depths of modeled flooding where flooding is modeled to last at least 15 minutes. Any modeled flooding shorter than 15 minutes in duration was assumed to be negligible for purposes of this planning level study.

As discussed in Section 4, the absolute values of modeled flood depth or duration should not be relied upon without further model refinement. Only the change in modeled flood depth from existing conditions to the future redevelopment conditions under Alternatives A through C should be considered reliable for this study.

As shown in Figure 6 through Figure 10, modeled flooding is expected to reduce in each of the alternatives as compared to the existing condition. This is due to the flow control assumed to be provided for the large parcels under the future redevelopment conditions for each of the alternatives (Section 5.1.2).

Because Alternatives A and B use such similar land use and flow control assumptions, and since the mitigation measures were the same for both, there was very little change in modeled flooding from Alternative A (mitigated; Figure 8) to Alternative B (mitigated; Figure 9). While some flooding does remain in those alternatives, no flooding is modeled in Alternative C due to the addition of blue-green streets (Figure 10), in

addition to proposed mitigation measures in Alternative and B. See the PCSWMM model output reports provided in Appendix B for additional information.

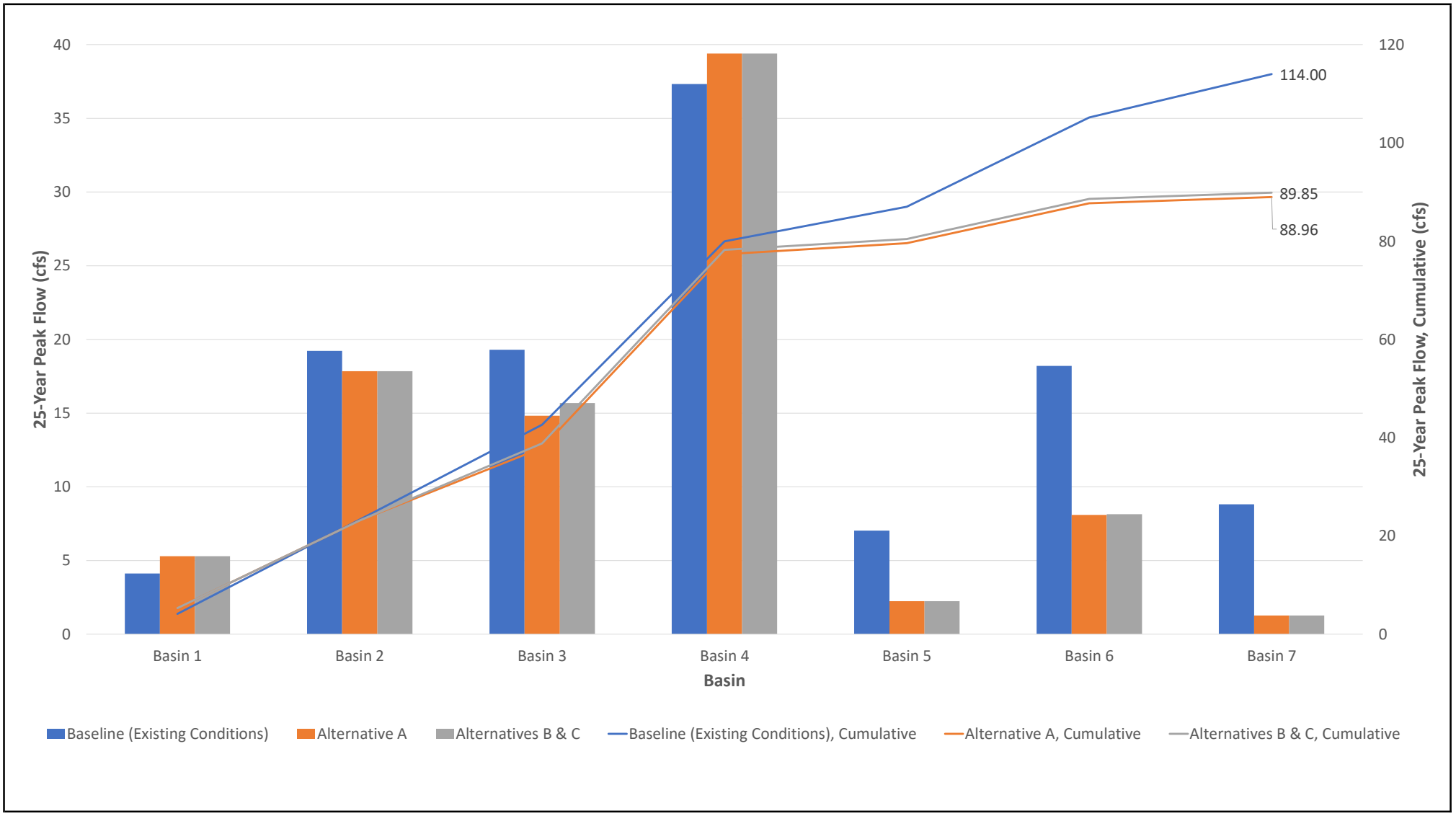

Figure 5. 25-Year Peak Flow by Basin for Baseline (Existing Conditions), Alternative A and Alternatives B & C

City of Kirkland: 85th Street Station Area Plan

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Table 5. Modeled 25-Year Flood Depth and Duration by Alternative.

Node [a,b,c]	Existing Conditions		Alternative A (Unmitigated)		Alternative A (Mitigated)		Alternative B (Unmitigated)		Alternative B (Mitigated)		Alternative C (Mitigated)	
	Max Flood Depth (ft) [d]	Hours Flooded (hr) [d]	Max Flood Depth (ft) [d]	Hours Flooded (hr) [d]	Max Flood Depth (ft) [d]	Hours Flooded (hr) [d]	Max Flood Depth (ft) [d]	Hours Flooded (hr) [d]	Max Flood Depth (ft) [d]	Hours Flooded (hr) [d]	Max Flood Depth (ft) [d]	Hours Flooded (hr) [d]
10968	0.06	0.86	--	--	--	--	--	--	--	--	--	--
10975	0.55	0.33	--	--	--	--	--	--	--	--	--	--
11236	--	--	--	--	0.47	0.25	--	--	0.61	0.28	--	--
11293	3.76	0.68	4.17	0.67	5.27	0.49	4.27	0.68	5.54	0.50	--	--
11428	2.95	0.52	3.31	0.52	--	--	3.39	0.53	--	--	--	--
11429	3.79	0.60	4.12	0.58	--	--	4.19	0.59	--	--	--	--
11843	1.10	0.46	--	--	--	--	--	--	--	--	--	--
11844	2.82	0.66	1.40	0.45	--	--	1.75	0.49	--	--	--	--
12645	2.24	1.14	2.06	1.37	--	--	2.06	1.37	--	--	--	--
12708	2.07	0.82	1.86	1.03	--	--	1.86	1.03	--	--	--	--
12716	2.16	0.86	1.95	1.18	--	--	1.95	1.18	--	--	--	--
33729	0.14	0.28	0.58	0.58	--	--	0.58	0.58	--	--	--	--
33731	--	--	0.29	0.56	--	--	0.29	0.55	--	--	--	--

Abbreviations:

ft	feet
hr	hour

Notes:

a	Flooding was modeled using PCSWMM with runoff time series developed in Western Washington Hydrology Model version 2012 (WWHM). WWHM was run using 15-minute rainfall data from the SeaTac gauge with a precipitation scaling factor of 1.0.
b	Modeled flood depths should be used as a basis for comparison between existing conditions and each of the alternatives only.
c	Nodes listed in order of model conveyance from upstream to downstream.
d	Only modeled flooding with at least a 15-minute duration is reported. Shorter-duration flooding is considered negligible for purposes of this study.

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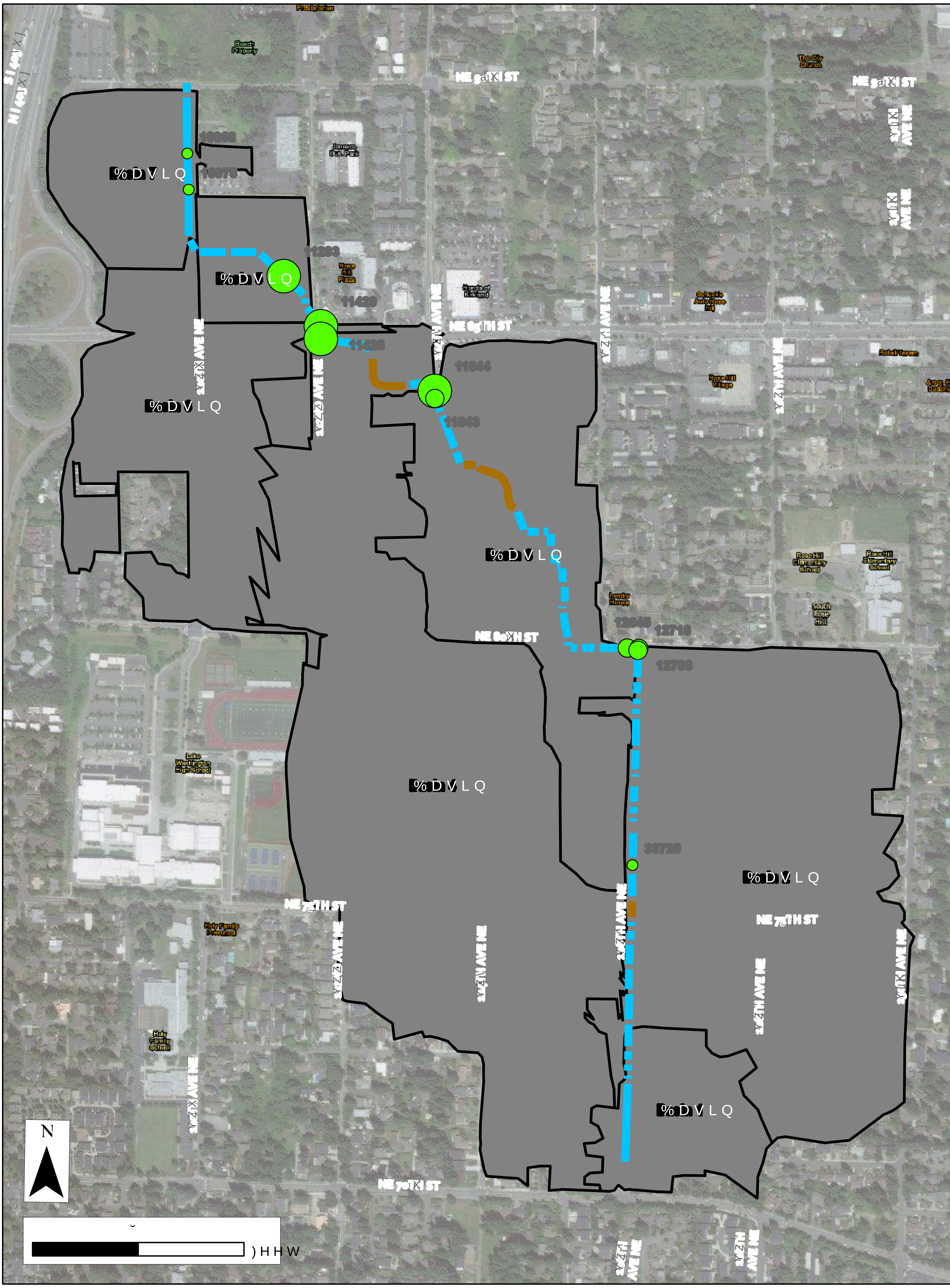

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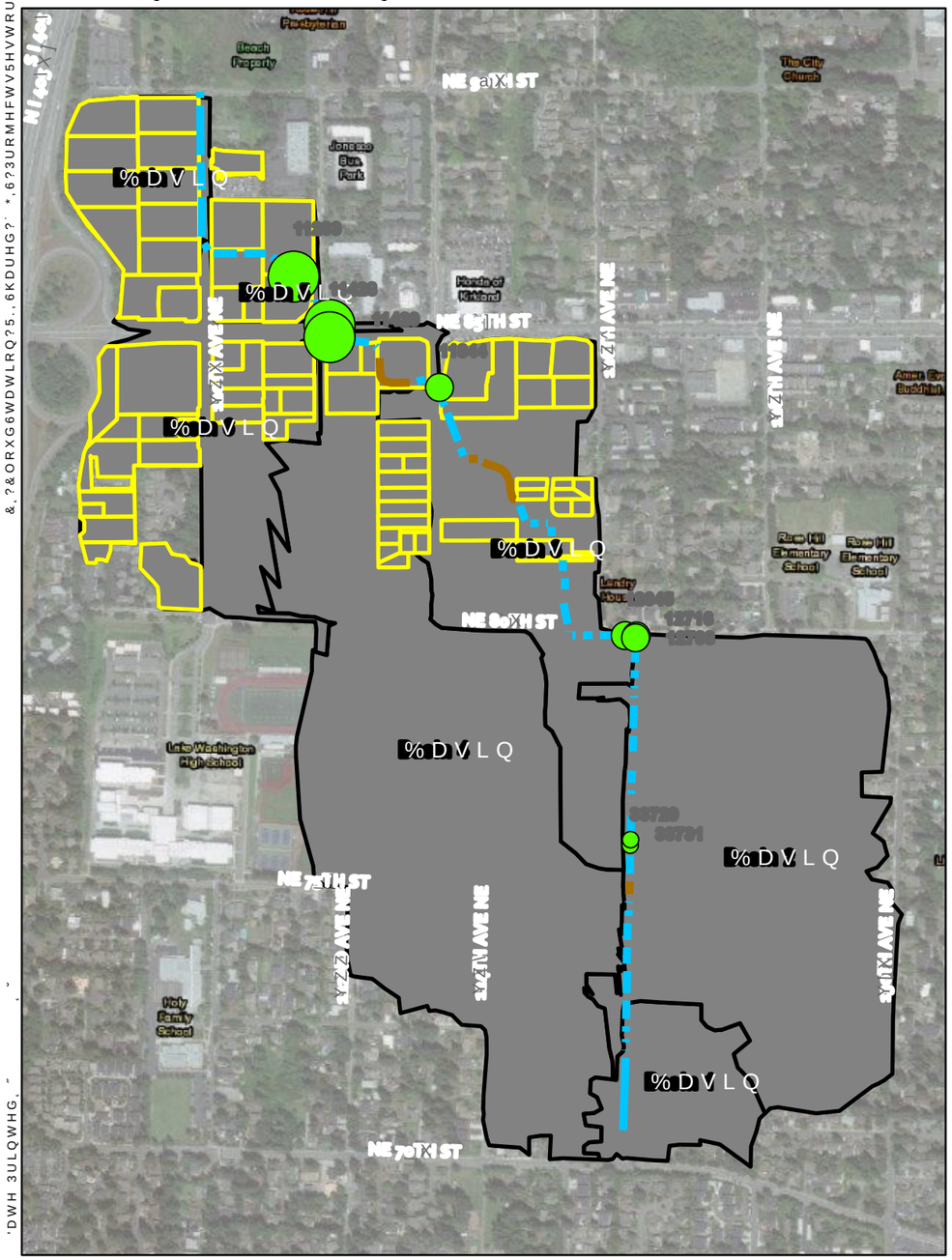

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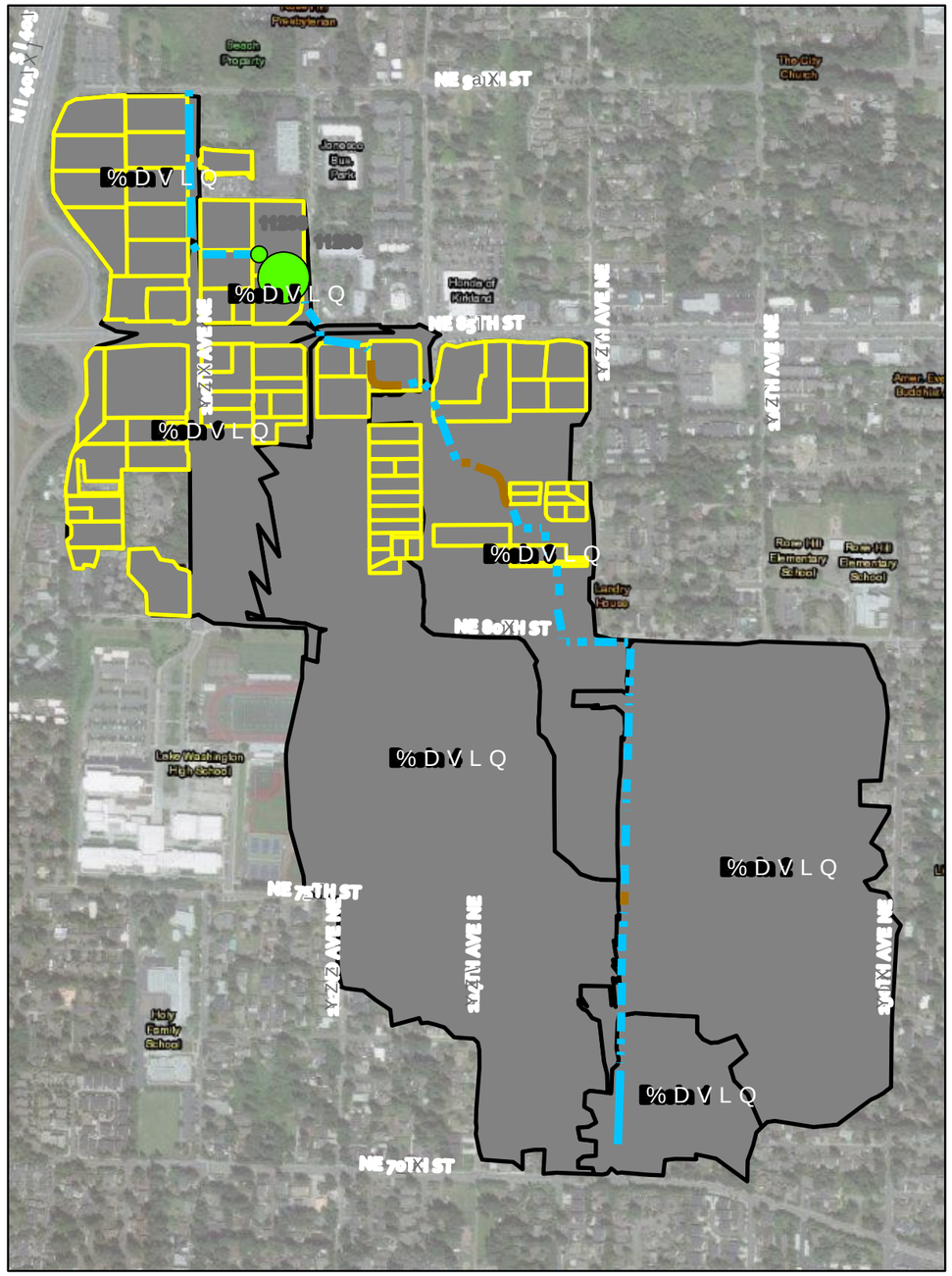

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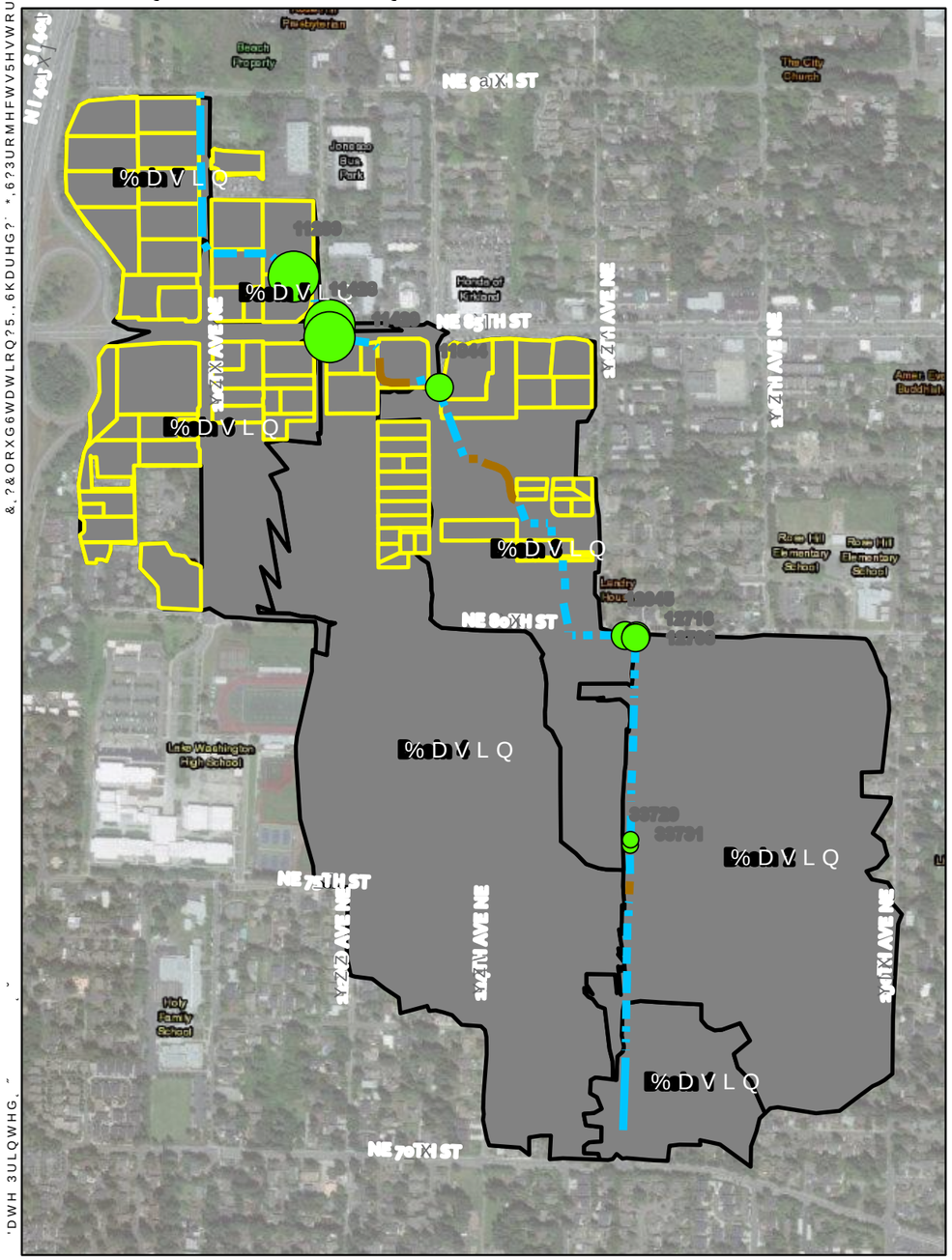

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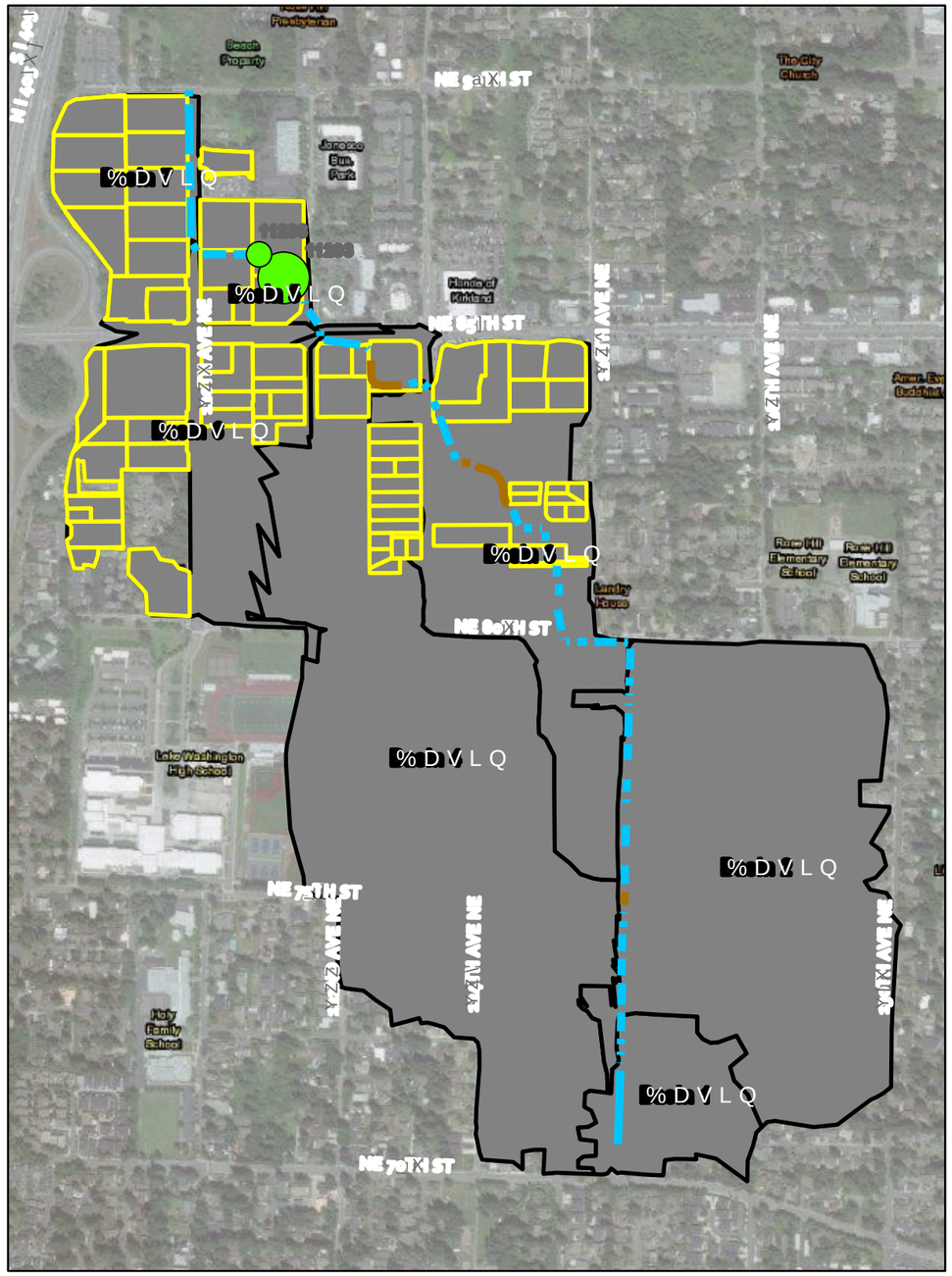

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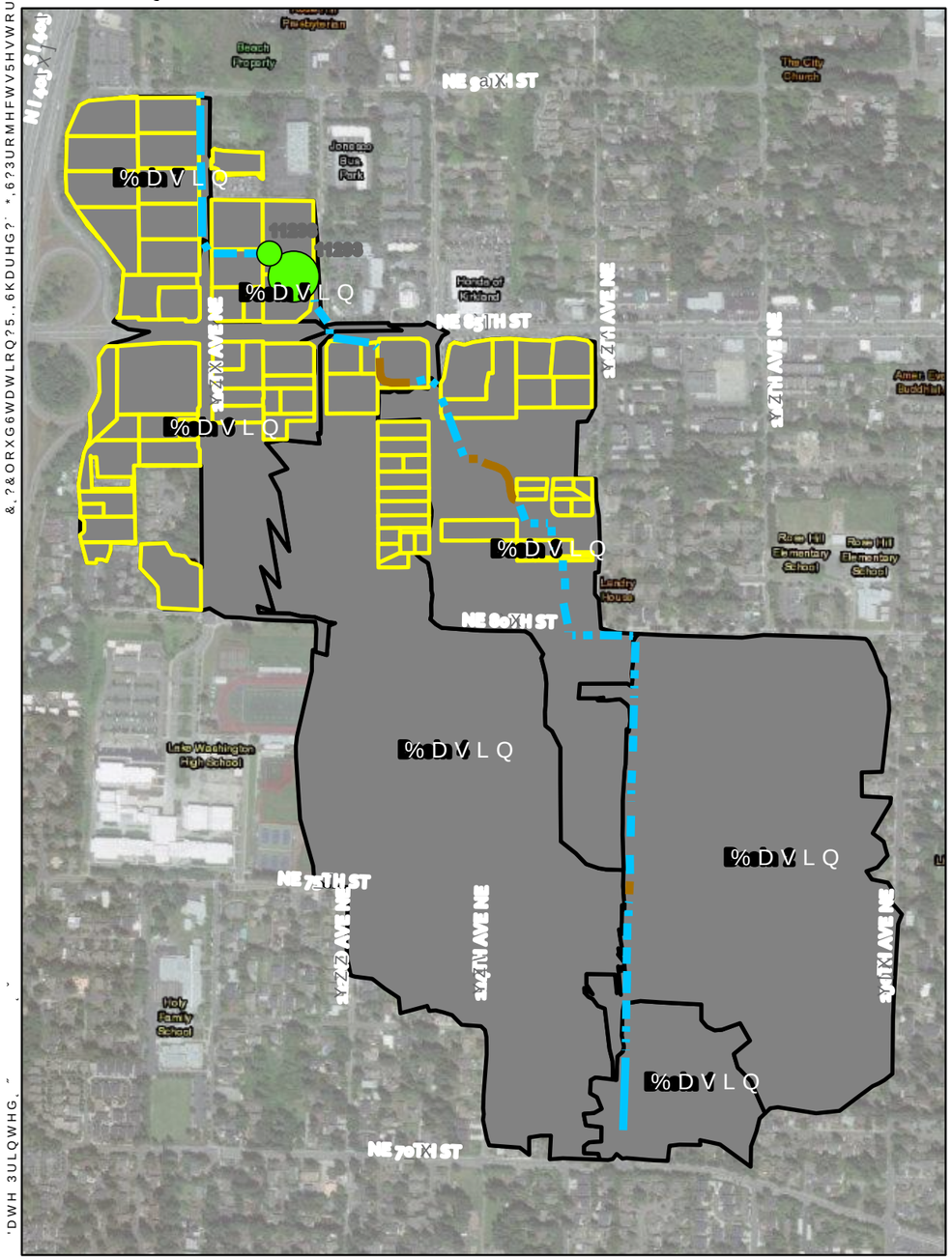

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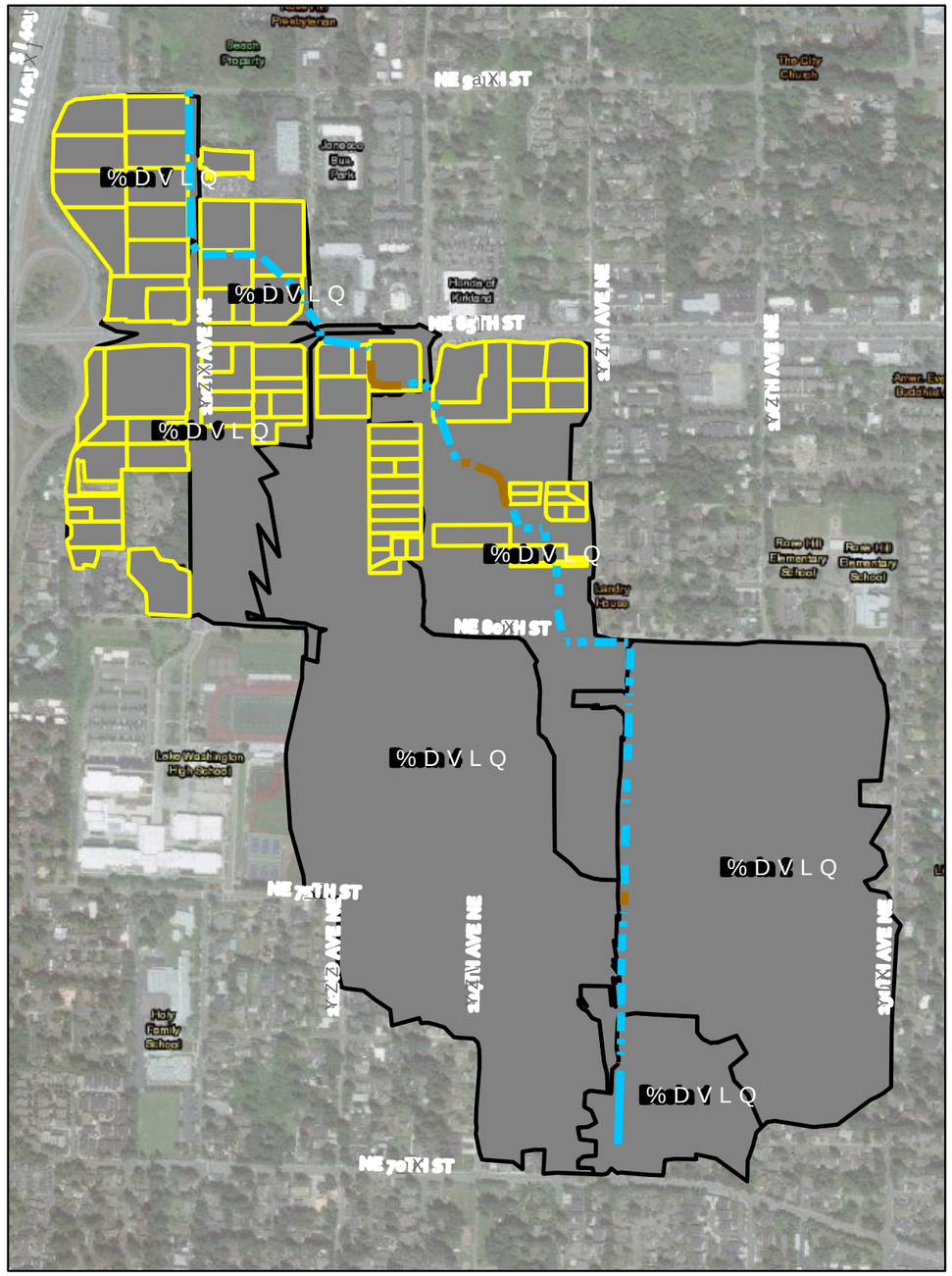

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7 MITIGATION COSTS

Table 6 summarizes the total project costs assumed for the mitigation measures evaluated for this study. Total project costs include hard costs and soft costs, such as planning, design, and project close-out.

The total project costs for detention vaults, stormwater conveyance pipe improvements, and blue-green streets were provided by the City. Total project costs for rain gardens were based on a cost relationship developed for bioretention with underdrains for Seattle Public Utilities' (SPU's) Longfellow Starts Here (LSH; 2021) project. SPU's LSH developed a toolkit of stormwater Best Management Practices suitable for high-level, basin-scale planning studies such as this. The LSH cost estimating relationship used is as follows:

$y=7787.8*x^{-0.289}$, where

y is the total project cost of bioretention with underdrains per square foot of bottom area, and

x is the bioretention bottom area in square feet

As illustrated in the below table, the cost to construct these mitigation measures is very high, due to factors such as required construction depth, dewatering, and steep slopes requiring weirs in the case of rain gardens.

Table 6. Summary of Mitigation Project Total Cost Estimates

Component	Bottom Footprint (SF) or Length (LF)	$/SF Bottom Area	Total Cost [a]
Alternatives A and B			
Basin 2 160k CF Detention Vault [b]	26,570 SF	$75 to $150	$2 to $4 million
Basin 4 210k CF Detention Vault [b]	35,350 SF	$85 to $200	$3 to $7 million
Stormwater Conveyance Improvements (Within Station Area Plan) [b]	520 LF	N/A	$600,000
Stormwater Conveyance Improvements (Upstream of Station Area Plan) [b]	685 LF	N/A	$400,000
Subtotal	**N/A**	**N/A**	**$6 to $12 million**
Alternative C (Additional GSI)			
Rain Garden 1 (with weirs) [c]	3,100 SF	$763	$2,364,683
Rain Garden 2 (with weirs) [c]	600 SF	$1,226	$735,665
Blue-Green Streets (2 vaults) [d]	6,050 SF	$530	$3.2 million
Subtotal	**9,750 SF**	**N/A**	**$6.3 million**

Abbreviations:

N/A Not Applicable LF Lineal Feet SF Square Feet

Notes:

a Total Cost includes hard and soft costs, such as planning, design, and project close-out.

b Detention vault and stormwater conveyance improvement costs are preliminary, developed by the City by scaling from recently completed projects. Detention vault costs include potential parcel acquisition.

c Cost data for Rain Gardens based on SPU's Longfellow Starts Here (LSH) project.

d Blue-Green streets estimated by the City using vaults as "grey infrastructure" within roadway prism. Due to construction depths, locations and potential of utility relocations cost estimate includes high contingency factor.

8 SUMMARY & CONCLUSIONS

The modeling results for this study indicate that development of the Station Area Plan and any associated impervious limit increases will not negatively impact downstream flooding. On the contrary, redevelopment is expected to help existing flooding due to the flow control that will be required for the redeveloping parcels.

Future conveyance improvements may be required upstream due to development that may increase impervious surface by and estimated 15% to 20% without triggering flow control requirements. Any such upstream mitigation requirements are not due to the Station Area Plan.

Blue-green streets provide very little benefit at the proposed location due to being located in basins where flow control will be implemented as part of redevelopment. The cost to construct these facilities will be high due to required construction depths, expected dewatering needs, and steep slopes, which may require the addition of weirs and additional length to achieve desired storage volumes. While maintenance costs were not evaluated as part of this study, the cost of maintaining blue-green street improvements is also expected to be higher than that of traditional grey infrastructure due to the distributed nature and lack of economies of scale proposed under the Station Area Plan.

9 RECOMMENDED NEXT STEPS

This section provides recommended next steps that should be considered for future phases of study.

9.1 Complete the GIS Database

Survey will be needed at locations where the stormwater GIS data gaps exist to complete a more accurate basin model. Items to be surveyed include:

- Manhole and miscellaneous component rim elevations
- Stormwater channel/ditch invert elevations, channel/ditch size
- Missing and/or unknown pipe invert elevations, resulting in negative-sloped pipes
- Pipe materials

9.2 Refine the Model for Future Use

If the models developed for this study will be used for any other purpose, they must be refined as needed to suit the intended purpose. Necessary model refinements may include, for example:

- Incorporate refined GIS data (Section 9.1) and/or more information from additional review of record drawings and/or site visits;
- Refine the subbasin delineation;
- Incorporate effective impervious area assumptions (as opposed to assuming all impervious area is effective); and
- Revise hydrology as appropriate.

9.3 Consider Climate Change

Based on the Climate Impacts Group *Projected Changes in Extreme Precipitation* (CIG 2021), the average modeled change in 25-year, 1-hour storm intensity would be 18% to 22% higher in the 2030s as compared to

the period 1981 to 2010 (these values are based on an average of several different models with Representative Concentration Pathway [RCP] 8.5, which assumes little change in greenhouse gas emissions). Due to future impacts of climate change, the City may consider re-evaluating the conveyance standards used for this study (Section 3) to provide for more resilient design and construction of stormwater systems to handle increased storm intensity under future climate change scenarios.

9.4 Develop a Groundwater Management Policy

Although groundwater pumping into the conveyance system (dewatering) was not evaluated in this study (Section 4), significant dewatering may be necessary due to the large number of deep excavations being considered for the redevelopment plan. The City should develop a policy for managing groundwater in the stormwater conveyance system to preserve system capacity and provide helpful guidance for developers and plan reviewers alike. Elements of a groundwater management policy should include but not necessarily be limited to:

- **Water Quality:** Groundwater can potentially contain contamination, thus dewatering directly to a Municipal Separate Storm Sewer System (MS4) should not be considered unless water quality is addressed. The City may consider adopting a policy similar to King County, that is, if the pumped groundwater does not meet King County water quality criteria or if direct or indirect discharge is not available, the pumped water may be sent to the sanitary sewer with County permission (King County 2021).
- **Times/Seasons:** During the wet season in western Washington (October through March), stormwater conveyance systems can quickly become overwhelmed from large and/or long-duration storm events. The City may consider implementing a discharge policy similar to the City of Seattle, which limits discharge rates [to its sanitary or combined sewers] during the wet season to 25,000 gallons per day (SPU 2011). Although the City's policy would pertain to the stormwater conveyance system, not the sewer system, similar considerations of timing and seasonality would apply.
- **Maximum flow rates / volumes:** The City may consider posing an overall maximum flow rate or allowable dewatering volume regardless of time or season to reduce the possibility of surcharging or flooding.

10 REFERENCES

BERK Consulting (BERK) 2021a. *June Alternatives Usage Notes & Data Dictionary*. June.

BERK Consulting, et al. (BERK) 2021b. *Kirkland NE 85th St Station Area Plan and Planned Action: Draft Supplemental Environmental Impact Statement.* Prepared by BERK Consulting, et al. for The City of Kirkland, Washington. January.

BERK Consulting (BERK) 2021c. *Personal Communication via e-mail Regarding BERK Redevelopment Data.* Correspondence between Robert O'Brien and Kelli Jones, City of Kirkland, and Steven Demmer and Robin Kirschbaum, RKI. July 16.

City of Kirkland (Kirkland) 2020. *Policy D-10: Addendum to the 2016 King County Surface Water Design Manual*. Revised January.

City of Kirkland (Kirkland) 2021. Website https://www.kirklandwa.gov/Government/Departments/Planning-and-Building/Code-and-Plan-Amendment-Projects/NE-85th-Street-Station-Area-Plan. Accessed on August 17.

City of Seattle Department of Planning and Development, Seattle Public Utilities (SPU) 2011. *Joint Ruling: DPD Director's Rule 12-2010, SPU Director's Rune 2010-005: Groundwater / Dewatering.* Effective September 28.

Clear Creek Solutions, Inc. (Clear Creek) 2016. *Western Washington Hydrology Model 2012.* Prepared by Clear Creek Solutions, Inc. for the Washington State Department of Ecology. February.

Climate Impacts Group (CIG) 2021. *Projected Changes in Extreme Precipitation*. https://data.cig.uw.edu/picea/stormwater/pub/viz/. Accessed August 13, 2021.

King County 2016. *King County, Washington Surface Water Design Manual (KCSWDM).* April 24.

King County 2021. *Construction dewatering.* https://kingcounty.gov/services/environment/wastewater/industrial-waste/business/construction.aspx. Updated January 12. Accessed August 13, 2021.

Seattle Public Utilities (SPU) 2021. DRAFT *Longfellow Starts Here: Building, Testing & Transforming: Phase A Summary*. February 19.

Appendices
See Full Copy at:
https://www.kirklandwa.gov/files/sharedassets/public/planning-amp-building/station-area-materials/stationarea-fiscalimpactcommunitybenefitstechmemo-appendix3-stormwaterstudyoct2021.pdf