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## Memorandum

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Subject Economic Cost Benefit Analysis and Methodology for Foster Floodplain Redevelopment

Project 5153.2 Foster Lents Integration Partnership

### People Places Prosperity

Revitalizing Downtowns  
Creating Partnerships  
Targeting Real Estate Success  
Shaping Financial Strategies  
Strengthening Community  
Enabling Sustainability & Livability  
Making Cities Work

This memo presents the economic development costs and benefits associated with the potential floodplain mitigation north of Foster Road, east of I-205. It also provides a detailed description of the methodology used to produce the analysis. The area currently contains a mix of residential, dispersed industrial, open space, and a small amount of commercial properties. By raising Foster Road and mitigating the effects of the floodplain, it is reasonable to assume that the dispersed industrial lands in the area would intensify and that the residential property values would increase. This is an initial exploration of the feasibility of additional flood mitigation work in the area. Additional analysis will be necessary if the project team decides to move forward with one of the Alternate scenarios. Items for further consideration are noted throughout this memorandum and listed in the conclusion.

This work will be combined with the analysis of the infrastructure improvements required to realize flood storage and 100-year flood mitigation, resulting in a series of cost-benefit analyses of the four scenarios being analyzed by the team (do nothing plus three alternatives).

### ECONOMIC COSTS AND BENEFITS

The costs and benefits associated with each of the Alternatives are summarized in Table 1 below. Detailed methodologies for each element are described in the Methodology section of this memorandum. The costs and benefits analyzed include:

- Acquisition costs of property for new flood storage areas and fill receiving areas.
- Annual flood insurance cost avoidance. By removing properties from the floodplain, owners will no longer have to purchase flood insurance, which effectively increases the disposable income of property owners and is a net economic benefit for the region.

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- Net new annual wages from the increase in jobs in the area, which is also a net economic benefit for the region.
- Net new employment building value from redevelopment and increased employment density in the area.
- Estimated increase in total residential property value associated with being removed from the floodplain, since being in a floodplain depresses property values.

The assumptions used to produce the analysis are discussed in greater detail in the methodology section below. This analysis assumes that development-ready parcels are available after the acquisition, fill, and public infrastructure improvements have been completed. New construction costs do include internal circulation, but does not take into account any offsite costs that might be needed for local roads or other offsite infrastructure.

These alternatives provide the baseline analysis. There are still many factors to consider and subsequent policy decisions that could impact the costs and benefits. For example, this analysis assumes that the land that will be filled and redeveloped will redevelop under the same zoning as the current designation. However, much of the residential land in the area is currently zoned R7 and R10. Considering the significant investment it will take to raise Foster and increase flood storage capacity, the city may want to consider upzoning this area in order to increase the leverage of the floodplain mitigation investment.

This analysis notes the amount of industrial land lost to provide new flood storage. This has policy impacts that will need to be considered, since a shortage of industrial land is a documented issue within the city and the region. Additionally, some of the acquisition costs could be reduced if the industrial parcels could be filled without having to purchase the land. Perhaps a more cost effective solution could be reached with the current owners that would not require outright acquisition of the property by the city. All dollars are expressed as 2013 dollars and are not adjusted for inflation in the future.

## ALTERNATIVE 1A

Alternative 1A reduces a majority of the floodplain (with the exception of the new storage areas) with minimal land converted to flood storage. This scenario maximizes the employment redevelopment potential and minimizes the overall acquisition costs, but does not remove all of the residential areas from the floodplain. The West Holgate area will still be in the 100-year floodplain.

- This scenario has the lowest insurance cost avoidance because the West Holgate area remains in the 100-year floodplain.
- This scenario has the same impact on employment as Alternate 1B, because the industrial land removed for flood storage and the industrial land that would redevelop is the same under both scenarios. The difference in the two scenarios impacts residential areas, not industrial areas.
- This scenario has the lowest net acquisition costs, as it requires the least amount of flood storage and the least amount of land to be purchased for fill and redevelopment in order to balance regional cut and fill.
- This scenario has only slightly lower potential property tax value to the city and increment to the urban renewal district than Alternate 1B.

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## ALTERNATIVE 1B

Alternative 1B eliminates the 100-year floodplain north of Foster (with the exception of the new storage areas) while maximizing industrial redevelopment.

- This scenario has the highest flood insurance cost avoidance, as it removes the same residential properties from the floodplain in the West Holgate area as Alternate 2, while maintaining the same industrial properties as Alternate 1A.
- This scenario has the same \$24.9 million in estimated net new annual wages, as Alternate 1A, because the employment redevelopment is the same for both scenarios.
- The net acquisition costs of \$27 million are much higher than the \$15.2 million in Alternative 1A, but significantly lower than the \$38.7 million in Alternate 2. Each scenario has different acquisition requirements for flood storage and fill areas as shown in Map 1 and Map 2 below.
- The redevelopment and property value increases would result in \$739,000 annually in potential new property taxes for the city.

## ALTERNATE 2

Alternate 2 eliminates the 100-year floodplain north of Foster (with the exception of the new storage areas) while maximizing the wetland and ecosystem connection between areas south and north of Foster Road.

- This scenario has the highest acquisition costs due to the additional land purchased for flood storage and open space. Of all the scenarios it has the lowest benefit in terms of redevelopment for employment, because it necessitates the use of employment land for flood storage and open space. It provides the least net new employment property value and net new wages. However, this analysis does not provide an economic accounting of the additional ecological benefits proved by the additional flood storage and open space. Such an analysis is beyond the scope of this project.
- This scenario provides a greater benefit than Alternate 1A in terms of insurance cost avoidance and increased residential property value, because the additional flood storage eliminates the 100-year floodplain for residences in the West Holgate area.

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**Table 1. Summary of Costs and Benefits**

Summary of Costs and Benefits	Alternate 1A	Alternate 1B	Alternate 2
Total annual insurance cost avoidance	\$1,028,000	\$1,396,000	\$1,341,000
Net new annual wages	\$24,897,000	\$24,897,000	\$10,047,000
<b>Net Annual Benefit</b>	<b>\$25,925,000</b>	<b>\$26,293,000</b>	<b>\$11,388,000</b>
Acquisition Costs	(\$22,011,000)	(\$33,786,000)	(\$43,521,000)
20% relocation allowance	(\$4,402,000)	(\$6,757,000)	(\$8,704,000)
<b>Total Acquisition Costs</b>	<b>(\$26,413,000)</b>	<b>(\$40,543,000)</b>	<b>(\$52,225,000)</b>
Potential Land Resale Value for Redevelopment	\$11,233,000	\$13,534,000	\$13,534,000
<b>Net Acquisition Costs</b>	<b>(\$15,180,000)</b>	<b>(\$27,009,000)</b>	<b>(\$38,691,000)</b>
Net new employment property value	\$102,633,000	\$102,633,000	\$56,625,000
Increase in total residential property value	\$3,600,000	\$5,166,000	\$5,166,000
<b>Net Property Value Benefit</b>	<b>\$106,233,000</b>	<b>\$107,799,000</b>	<b>\$61,791,000</b>
Net new employment and residential property value	\$106,233,000	\$107,799,000	\$61,791,000
<b>Annual Net New Property Tax Potential</b>	<b>\$728,000</b>	<b>\$739,000</b>	<b>\$423,000</b>

Net annual property tax based on the City of Portland's limited rate of \$6.8522 per \$1,000 per the Multnomah County Table of Consolidated Tax Rates for Levy Code Areas, 2012-2013

Source: Leland Consulting Group

The methodology section below includes a more detailed analysis of each of the items in this summary table and a thorough discussion of the assumptions behind the analysis.

## METHODOLOGY

Using cut, fill, and flood storage maps provided by SERA Architects and Arup, Leland Consulting Group gathered critical pieces of data in GIS using detailed parcel level inventory of information for each scenario presented, including:

- Total acres of land by land use designation<sup>1</sup>
- Total acres of land removed from inventory for flood storage
- Total acres of land receiving fill from the excavation of land for flood storage in order to balance the regional cut and fill
- Total existing number of jobs and total annual wages
- Number of residential properties currently in the 100-year floodplain
- Real market value of all of the properties as identified by the Multnomah County Assessor

<sup>1</sup> As this methodology discusses the economic benefits of the floodplain mitigation, the acreage count includes the full acreage of parcels that have roughly 10 percent or more of their area within the floodplain. An acreage count that disregards lot lines may be slightly lower than the count represented here.

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Based on the set of assumptions discussed below, this baseline data was then used to model the effects of redevelopment and resulted in several output measures feeding into the cost-benefit analysis, including:

- Number of residential properties and businesses removed from the floodplain
- Total acres of land available for redevelopment by zoning designation
- Net new acres of open space
- Net new jobs
- Net new wages
- Net increase in property value due to removal of floodplain designation

## ASSUMPTIONS

Following is an explanation of the assumptions used in the model. It is based on research conducted by the consultant team and discussions with various FLIP team members.

- **Residences removed from the floodplain.** “On July 6, 2012, a law took effect that made significant reforms to the National Flood Insurance Program (NFIP). Among other things, this law requires FEMA to take immediate steps to eliminate a variety of existing flood insurance premium subsidies.”<sup>2</sup> More than half of the residential properties in the area are covered under pre-FIRM (built before 10-15-1980) subsidized flood insurance rates. Over the next few years, as the subsidy is phased out, these properties will be subject to a much higher rate of flood insurance. Properties that are non-primary residences (rentals) or those that have experienced severe repetitive losses will begin to phase into the higher rate beginning in 2013, with a rate increase of up 25 percent per year until they reach the full unsubsidized rate. Primary residences that receive a subsidized rate will be subject to the full unsubsidized rate when sold, or if the policy lapses. Otherwise primary residences that have been grandfathered in under this subsidized rate will be phased into the full rate, with increases of 20 percent per year for five years, starting in 2014 (essentially doubling over a five year period). This analysis therefore assumes an average annual premium of \$2,034<sup>3</sup> for residential properties in the area, double the average for homes in the Portland area that are in the FEMA designated Zone AH<sup>4</sup>, the prominent flood insurance hazard zone in the study area.

Under the flood mitigation scenarios, this insurance cost could be eliminated for some or all of the homes in the study area, creating a considerable annual cost savings for homeowners in the area, not to mention claims paid by FEMA. An additional consideration, not accounted for in this analysis, is the fact that without flood mitigation the area may be subject to future disinvestment as insurance rates rise beyond the

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<sup>2</sup> Source: Federal Emergency Management Agency (FEMA) Talking Points HR 5740 and Section 100205 of BW-12

<sup>3</sup> Source: Flood insurance premium provided by FEMA via Bureau of Environmental Services. This rate is the current average multiplied by a contingency factor of 100%. Over half of the homes in the area are currently considered pre-FIRM (built before 10-15-1980) these properties are currently on a subsidized insurance rate, which will be phased out starting this year, 2013.

<sup>4</sup> Zone AH is a FEMA designation with the following definition. “Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between one and three feet. Base Flood Elevations (BFEs) derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements and floodplain management standards apply.”

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financial capacity of current owners. This increase in flood insurance rates may also discourage future buyers, making it harder for current residents to sell their homes, also negatively impacting the neighborhood.

- Increase in property values.** Studies have shown that properties in a floodplain have a lower value than properties outside of a floodplain, often by a margin that is greater than the value of the additional flood insurance. One research study in particular noted that “An average house located in a floodplain is discounted by 6.6 percent of the property value, while the capitalized insurance premium value represents approximately 4 percent of the house’s selling price.”<sup>5</sup> This analysis therefore assumes a onetime increase in property values of 6.6 percent once removed from the floodplain. For the properties purchased for fill and redevelopment, this would be recaptured when the properties were sold for redevelopment. Due to limits in increases in assessed values imposed by Measure 50 (which caps such increases at 3 percent annually), the increases in real market value (and sales prices) in the area may not be fully captured by increases in property taxes. Properties currently in public ownership were excluded from this analysis.

**Table 2. Flood Insurance Avoidance**

Flood Insurance Avoidance	Alternate 1A		Alternate 1B		Alternate 2	
	single family	multifamily	single family	multifamily	single family	multifamily
<b>Residential Flood Insurance Avoidance</b>						
Number of existing residential properties no longer requiring flood insurance	430	-	559	19	559	19
Total annual insurance cost avoided	\$875,000	-	\$1,137,000	\$106,000	\$1,137,000	\$106,000
Increase in total property value (due to removal from floodplain)	\$3,600,000	-	\$5,043,000	\$123,000	\$5,043,000	\$123,000
<b>Business Flood Insurance Avoidance</b>						
Number of existing businesses no longer requiring flood insurance	36		36		23	
Total annual insurance cost avoided	\$153,000		\$153,000		\$98,000	
<b>Total Annual Insurance Cost Avoidance</b>	<b>\$1,028,000</b>		<b>\$1,396,000</b>		<b>\$1,341,000</b>	
<small>Business property value increase captured in the redevelopment potential.            Multifamily properties are 2 to 4 units. An average of 3 units per property was used to calculate insurance costs.            Number of firms excludes businesses located in residential zones.</small>						

Source: Leland Consulting Group

<sup>5</sup> Dei-Tutu, Viewu Afua. December, 2002. *Flood Hazards, Insurance and House Prices – A Hedonic Property Price Analysis.*

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**Table 3. Property Acquisition and Flood Storage Analysis**

Property Acquisition and New Flood Storage Analysis	Alternate 1A		Alternate 1B		Alternate 2	
	Acres/ taxlots	Real Market Value	Acres/ taxlots	Real Market Value	Acres/ taxlots	Real Market Value
<b>Property acquired for fill and redevelopment</b>	<b>36.7</b>	<b>\$20,813,000</b>	<b>39.3</b>	<b>\$24,045,000</b>	<b>39.3</b>	<b>\$24,045,000</b>
Industrial	12.7	\$8,075,000	14.0	\$8,209,000	14.0	\$8,209,000
Commercial	0.7	\$717,000	0.7	\$717,000	0.7	\$717,000
Residential	23.3	\$12,021,000	24.6	\$15,119,000	24.6	\$15,119,000
Residential taxlots displaced for fill and redevelopment	110		134		134	
<b>Property acquired for flood storage</b> (removed from inventory/converted to greenspace)	<b>8.7</b>	<b>\$1,198,000</b>	<b>29.8</b>	<b>\$9,741,000</b>	<b>50.1</b>	<b>\$19,476,000</b>
Industrial	8.7	\$1,198,000	8.7	\$1,198,000	29.0	\$10,933,000
Commercial	-	-	-	-	-	-
Residential	-	-	21.1	\$8,543,000	21.1	\$8,543,000
Residential taxlots removed for flood storage	-		74		74	
Acquisition Costs		(\$22,011,000)		(\$33,786,000)		(\$43,521,000)
20% Relocation Allowance		(\$4,402,000)		(\$6,757,000)		(\$8,704,000)
<b>Total Acquisition and Relocation Costs</b>		<b>(\$26,413,000)</b>		<b>(\$40,543,000)</b>		<b>(\$52,225,000)</b>
Potential Land Resale Value for Redevelopment		\$11,233,000		\$13,534,000		\$13,534,000
<b>Net Acquisition Costs</b>		<b>(\$15,180,000)</b>		<b>(\$27,009,000)</b>		<b>(\$38,691,000)</b>
<i>May not sum due to rounding</i>						
<i>Property acquisition and redevelopment excludes properties currently in public ownership.</i>						
<i>Property value for acquisition includes land and building. Potential land resale value only includes current land value increased by a flood mitigation factor of 6.6%.</i>						

Source: Leland Consulting Group

- Intensification of Industrial land.** According to the Portland Economic Opportunities Analysis (EOA) update, the target Floor Area Ratio (FAR) for industrial properties is in the range of 0.3 to 0.35 FAR<sup>6</sup>. Although the study area is considered to be built out and houses many operational businesses, many of the properties are currently built at densities well below this range. This analysis assumes that given flood mitigation, the properties would intensify over time to an average FAR of 0.3, increasing the building value in the area. The analysis used a cost of \$180 per square foot<sup>7</sup> to estimate the net new building value that could be realized in the area. This would also increase the number of jobs and therefore annual wages in the area.
- Net new jobs.** This analysis assumed that with an intensification of the industrial properties in the area, the number of jobs in the area would also increase. This analysis assumed an average of 800 square feet per employee<sup>8</sup>, based on the potential new building square footage, assuming that it will encompass a mix of employment uses, including some office and retail space necessary to the particular business, but would mostly fall under a general industrial type use and therefore need a higher amount of space per employee. The existing jobs were subtracted from this number under each scenario in order to calculate the net new jobs in the area.
- Net new wages.** Based on the number of net new jobs in the area, an average annual wage of \$45,000 was applied in order to calculate potential net new annual wages for the study area. This annual average wage is consistent with average wages in 2013

<sup>6</sup> *Employment Demand Factors and Trends, Metro, ED Hovee, March 2009.*

<sup>7</sup> *Based on a survey of current construction costs for basic tilt-up concrete, flex style buildings typical for dispersed industrial areas.*

<sup>8</sup> *Employment per square foot for dispersed industrial areas in Portland ranges greatly, as do the actual uses, from 350 square feet per employee for office uses to just over 1,200 for warehouse uses. City of Portland, Economic Opportunities Analysis, Metro, ED Hovee, March 2012.*

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dollars for industrial/manufacturing jobs in the Multnomah and Washington County region (Region 2), such as machinists, according to OLMIS.<sup>9</sup> The average wage of existing jobs in the study area is currently \$43,000 according to the QCEW data.<sup>10</sup>

**Table 4. Employment Redevelopment Potential**

Employment Redevelopment Potential	Alternate 1A	Alternate 1B	Alternate 2
Total acres of existing employment land	59.9	59.9	59.9
<b>Area to be Removed for Flood Storage/Open Space</b>			
Acres of employment land converted to flood storage	8.7	8.7	29.0
Existing building value	\$0	\$0	\$5,601,000
Existing land value	\$1,198,120	\$1,198,120	\$5,332,000
# Existing employees	0	0	80
Total annual existing wages	\$0	\$0	\$3,599,000
<b>Existing Conditions of Area to be Redeveloped</b>			
Total existing building value	\$17,232,000	\$17,232,000	\$5,532,000
Total existing land value	\$9,740,000	\$9,740,000	\$5,606,000
# Existing employees	300	300	220
Total annual existing wages	\$12,903,000	\$12,903,000	\$9,304,000
Average existing wages	\$43,000	\$43,000	\$42,000
<b>Redevelopment Future Conditions</b>			
Acres of employment land to be redeveloped	51.2	51.2	30.9
Average FAR	0.3	0.3	0.3
Total new building area (sf)	669,000	669,000	404,000
Total new building value	\$120,420,000	\$120,420,000	\$72,720,000
Total new land value	\$10,383,000	\$10,383,000	\$5,976,000
Total # of new employees	840	840	510
Total new annual wages	\$37,800,000	\$37,800,000	\$22,950,000
<b>Net Change</b>			
Net new employment building value	\$103,188,000	\$103,188,000	\$61,587,000
Net new employment land value	(\$555,000)	(\$555,000)	(\$4,962,000)
Net new total employment property value	\$102,633,000	\$102,633,000	\$56,625,000
Net new employees	540	540	210
Net new annual wages	\$24,897,000	\$24,897,000	\$10,047,000
<small>Property values based on assessor's data from September, 2012. Average annual wage of \$45,000 based on a survey of industrial/manufacturing jobs in the Multnomah and Washington County region (Region 2), such as machinists, according to OLMIS, April 2013. FAR based on the average for industrial properties according to Employment Demand Factors and Trends, Metro, ED Hovee, March 2009.</small>			
<small>800 square feet per employee average used to estimate the number of new employees. Employment per square foot for dispersed industrial areas in Portland ranges from 350 sf per employee for office uses to just over 1,200 for warehouse uses. City of Portland, Economic Opportunities Analysis, Metro, ED Hovee, March 2012.</small>			
<small>Under Alternate 1A and 1B the area removed for flood storage currently houses an auto salvage lot that supports a functioning business. However the employees are geocoded to an adjacent taxlot that is part of the redevelopment analysis.</small>			

Source: Leland Consulting Group

<sup>9</sup> OLMIS Occupational Reports

<sup>10</sup> Quarterly Census of Employment and Wages (QCEW) fourth quarter, 2010

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## AREAS OF ANALYSIS

The following maps show the areas that were considered in this analysis based on Arup's analysis of the flood storage and regional balance of cut and fill in the area. For the purposes of this economic analysis, the areas were expanded slightly beyond the bubble diagram represented on the map, to incorporate full tax lots in the areas. For example, in this analysis, area F5 in Map 1 includes all of the tax lots between Foster and the Springwater corridor to 111<sup>th</sup> on the east.

Areas considered for fill and redevelopment assumed that all taxlots not currently in public ownership would be purchased, filled on a regional basis and then sold for redevelopment. In reality it may not be necessary to purchase every property, especially large industrial lots, if property owners were willing to accept fill while maintaining ownership. This approach could reduce the acquisition costs and therefore the overall cost of this scenario, and bears further investigation in a subsequent analysis. This analysis takes a conservative approach, analyzing the worst case cost scenario.

### Alternate 1A

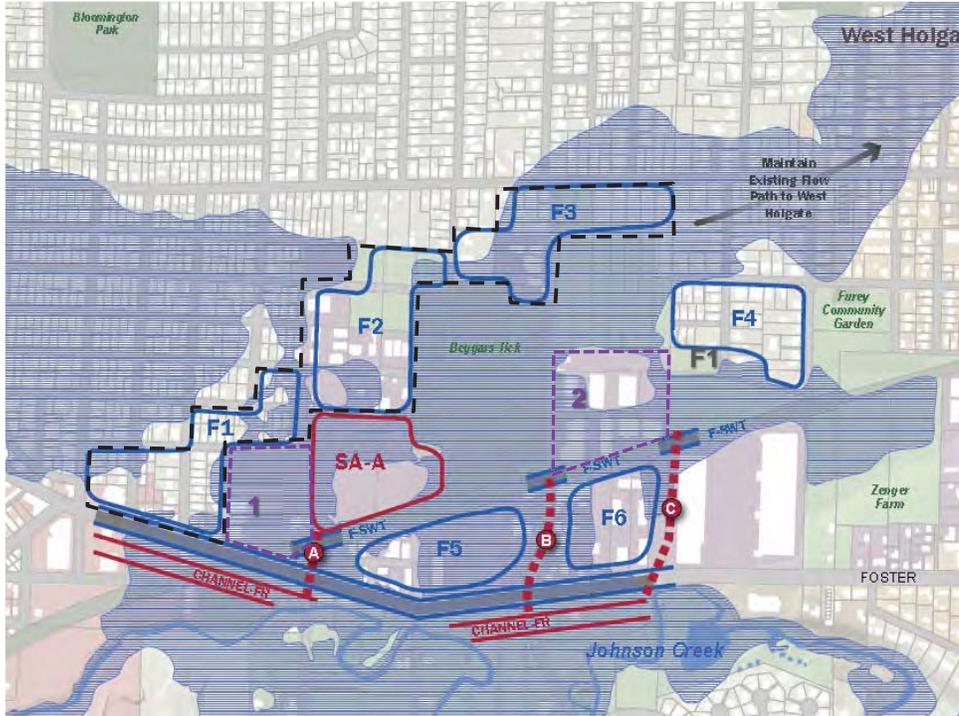
Map 1 below shows the areas considered for Alternate 1A and the existing floodplain. In this scenario the floodplain to the west disappears while the West Holgate area remains in the 100-year floodplain (see Arup's *Figure 3 Area Relieved from 100-Year Floodplain (Alt 1A)* for more details).

SA-A is the new flood storage area. For the purpose of this analysis, the fill areas F1, F2, F3 were merged into one large area of fill, represented by the black dashed outline. This combined area and F4 (also expanded slightly to incorporate full tax lots) were considered as properties for acquisition, fill, and subsequent redevelopment. Areas F-5 and F-6 were considered strictly as areas that would redevelop after completion of the floodplain work, not to be purchased for fill. Fill could be requested by the property owners, if they so desired, but it was not considered necessary to fill these two areas in order to balance the regional cut and fill. The areas 1 and 2 outlined in purple, received no cut or fill, but were considered as areas that would redevelop once the floodplain work was completed, as well as a small industrial parcel in the floodplain just north of F2.

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Map 1. Alternate 1A, Areas of Analysis



Source: SERA, Arup, Leland Consulting Group

## Alternate 1B and 2

Map 2 below shows the area of analysis used for both Alternate 1B and 2, although some of the areas were treated differently in each analysis. In both scenarios the floodplain is fully removed including the West Holgate area (see Arup's *Figure 6 Area Relieved from 100-Year Floodplain (Alt 1B)* and *Figure 9 Area Relieved from 100-Year Floodplain (Alt 2)* for more details).

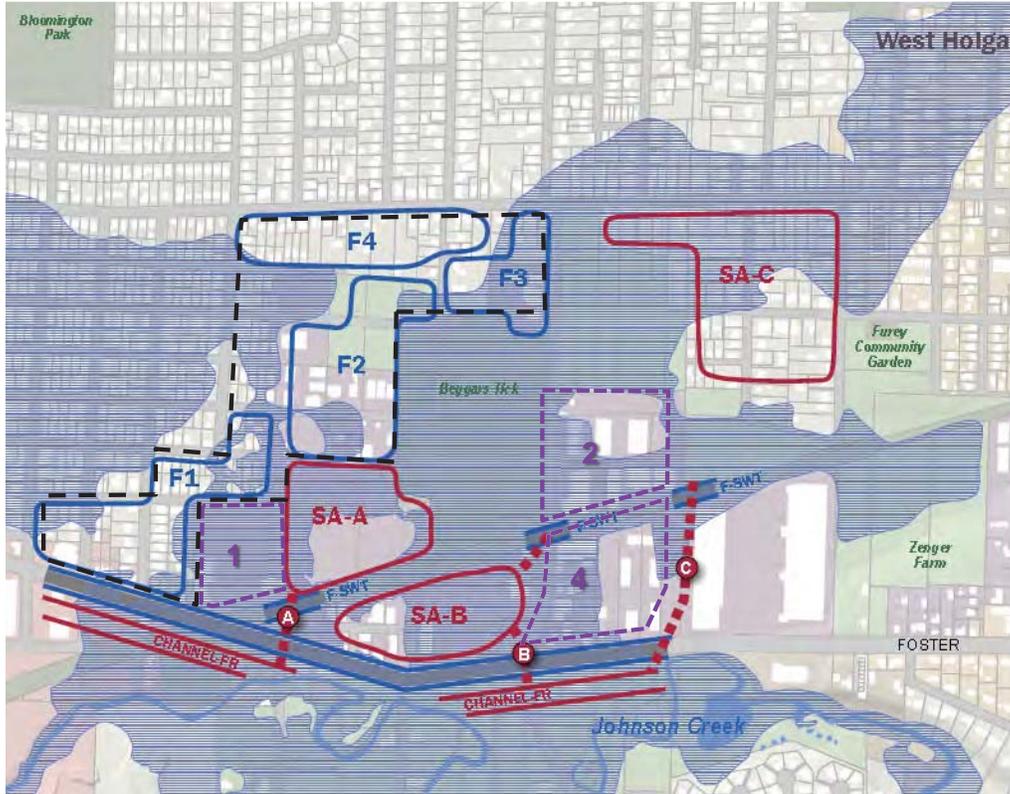
In both scenarios, the areas F1, F2, F3 and F4 were merged together as shown by the black dashed outline, and considered as acquisition for fill and subsequent redevelopment. The areas 1 and 2 outlined in purple, received no cut or fill, but were considered as areas that would redevelop once the floodplain work was completed, just like Alternate 1A. The main storage areas under both Alternate 1B and Alternate 2 are the areas SA-A and SA-C outlined in red.

Alternate 1B differed in the treatment of SA-B and area 4 outlined in purple. For Alternate 1B, both of these areas were considered as areas of redevelopment, receiving no fill or flood storage. In Alternate 2, area SA-B was considered as a flood storage area, and area 4 was treated as open space, since the purpose of this alternate was to provide a more integrated open space network, for increased ecological benefits, between the wetlands and natural areas north and south of Foster Road.

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Map 2. Alternative 1B and 2, Areas of Analysis



Source: SERA, Arup, Leland Consulting Group

## CONCLUSION

A summary of the findings from the analysis, combined with cost information about the flood mitigation construction, is included in a separate report, the *6.4 Neighborhood Economic Development Opportunities* and summary matrix, the *Comparison of Foster Flood Mitigation Alternatives*.

Some considerations, should this project move forward into another phase include:

- A master plan for the future of this area.
- Rezoning according to the master plan for the area.
- Reconciliation of industrial land lost to flood storage.
- The placement of fill without the need to acquire property.
- The level of interest on the part of Portland Parks and Recreation in acquiring park space in this area.