City of Bellevue

MEMORANDUM

TO: David Pyle, City of Bellevue

FROM: Bellevue Transportation Department

DATE: November 15, 2011

SUBJECT: NE 4th/120th Avenue NE Corridor Project –Storm Drainage Analysis

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Attached is a revised Storm Drainage analysis for the NE4th/120th Avenue NE Corridor Project. The following analysis is prepared to show the range of impacts expected in the design and construction of roadway improvements on NE 4th Street and 120th Avenue NE. This analysis is based on the current storm water requirements and the current roadway planed layout. Since the NE 4th/120th Corridor improvements will be constructed in stages, specific storm water drainage requirements will need to be updated at the submission of building permit for each stage. The attached analysis is intended to illustrate the range of project impacts and provide a potential project design approach that is technically feasible and consistent with current codes and standards.

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Memorandum

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Date: November 15, 2011

To: Paul Krawczyk and Marina Arakelyan
City of Bellevue Department of Transportation

From: Carmen O. Vanier, P.E.
Drainage & Utility Lead
Parsons Brinckerhoff

Subject: Final Revisions to the NE 4th Street/120th Avenue NE Corridor Project SEPA Checklist Request for Additional Information Regarding Corridor Drainage Approach

Brief Project Overview

The NE 4th Street/120th Avenue NE Corridor Project extends between the intersection of NE 4th Street and 116th Avenue NE at the southern end to the intersection of 120th Avenue NE and Northup Way at the northern end.

The proposed project includes a new roadway extension of NE 4th Street from its current terminus at 116th Avenue NE eastward to 120th Avenue NE, and new construction and widening of 120th Avenue NE from the new intersection created with the extension of NE 4th Street northward to Northup Way. The required improvements will be constructed in as many as six different stages.

Purpose of this Technical Memo

The required drainage thresholds will be determined for the entire corridor, rather than individual stages, to address potential impacts and to ensure all stormwater mitigation complies with current City of Bellevue Code. The purpose of this memo is to determine the stormwater minimum requirements for the entire NE 4th Street/120th Avenue NE Corridor project. .

Corridor TDAs

The determination of minimum requirements for a project begins with the delineation of Threshold Discharge Areas, or TDAs. The NE 4th Street/120th Avenue NE Corridor has multiple drainage discharge locations, so it must be evaluated to determine the number and limits of TDAs. A TDA is defined in Section D2-05.1 of the City of Bellevue January 2011 Surface Water Engineering Standards (SWES) as:

> *"An onsite area draining to a single natural discharge location or multiple natural discharge locations that combine within one-quarter mile downstream (as determined by the shortest flowpath)"*

The evaluation of TDAs begins at the most upstream ¼ mile discharge length. It is also important to note that TDAs are based on existing site and flow conditions, not proposed

conditions. If the project acquires new right-of-way, then TDA is based on new right of way limits. Otherwise, TDA is based on existing right of way limits.

Based on this criteria, and the definition above, the NE 4th Street/120th Avenue NE Corridor consists of four TDAs. Please refer to Figure 1 for delineation of the corridor TDAs. Of the four TDAs, the northernmost drains to the West Tributary of Kelsey Creek. The remaining three TDAs ultimately drain to Sturtevant Creek. However, because the downstream drainage systems of these TDAs do not combine within ¼ mile downstream of each other, they have been delineated as separate TDAs.

The TDA draining to the West Tributary of Kelsey Creek will be referred to as the West Tributary TDA. The TDAs draining to Sturtevant Creek will be referred to as the Lake Bellevue TDA, the NE 8th Street TDA and the 120th Avenue NE TDA as shown on Figure 1. These TDAs are described in additional detail below.

West Tributary TDA
Drainage within the West Tributary TDA consists of runoff originating along 120th Avenue NE between approximately NE 15th/16th Streets north to Northup Way. Flow from this TDA discharges to the West Tributary of Kelsey Creek, which crosses under 120th Avenue NE roughly 700 feet south of the 120th Avenue NE and Northup Way intersection. Please refer to Figure 2 for a delineation of the West Tributary TDA.

Lake Bellevue TDA
Drainage within the Lake Bellevue TDA consists of runoff originating along 120th Avenue NE between the high point located just north of Bel-Red Road, and the high point located at approximately NE 15th/16th Street. Flow from the Lake Bellevue TDA exits the corridor just south of NE 12th Street, and is tributary to the existing 48" diameter storm pipe that outfalls to Lake Bellevue. Lake Bellevue discharges to Sturtevant Creek through an outfall located in the southwest corner of the lake. Flow continues southerly in Sturtevant Creek along the BNSF railroad corridor before the creek enters a closed drainage system at an existing manhole that has been designated as the Point of Combination. This is the point where flow from the Lake Bellevue TDA combines with flow from the NE 8th Street TDA. This manhole is located approximately 1,550 lineal feet downstream of the Lake Bellevue TDA. Because flow from the Lake Bellevue TDA combines with flow from the NE 8th Street TDA beyond the ¼ mile point downstream, these are considered to be separate TDAs. Please refer to Figure 3 for a delineation of the Lake Bellevue TDA.

NE 8th Street TDA
Drainage within the NE 8th Street TDA consists of runoff originating along 120th Avenue NE from the north side of the intersection with NE 8th Street to the high point located just north of Bel-Red Road. Flow exiting the NE 8th Street TDA is tributary to the existing underground drainage system located on the north side of NE 8th Street. Flow is conveyed westerly in this system 594 lineal feet before changing direction at the BNSF railroad corridor and continuing north an additional 146 lineal feet along the east side of the BNSF corridor to an existing manhole. This existing manhole is the Point of Combination for flow from the Lake Bellevue TDA and the NE 8th Street TDA. Again, because flow from the Lake Bellevue TDA and NE 8th Street TDA do not combine within ¼ mile downstream (as measured from the

discharge point of the Lake Bellevue TDA), these are considered to be separate TDAs. Please refer to Figure 3 for a delineation of the NE 8th Street TDA.

120th Avenue NE TDA
Drainage within the 120th Avenue NE TDA consists of runoff originating along 120th Avenue NE from the south side of the NE 8th Street/120th Avenue NE intersection to approximately NE 4th Street. This TDA also includes the proposed NE 4th Street Extension. Please refer to Figure 4 for a delineation of the 120th Avenue NE TDA. Flow from the 120th Avenue NE TDA exits the corridor at 116th Avenue NE prior to discharging to Sturtevant Creek.

Flow from the 120th Avenue NE TDA eventually combines with flow from the NE 8th Street TDA and the Lake Bellevue TDA in Sturtevant Creek. However, the point where these flows combine is well beyond ¼ mile downstream.

Corridor Minimum Requirements
An analysis was performed for each corridor TDA in order to determine the applicable minimum requirements. There are nine minimum requirements that must be met by the project:

- MR1 – Preparation of Stormwater Site Plans
- MR2 – Construction Stormwater Pollution Prevention Plan (SWPPP)
- MR3 – Source Control of Pollution
- MR4 – Preservation of Natural Drainage Systems and Outfalls
- MR5 – On-Site Stormwater Management
- MR6 – Runoff Treatment
- MR7 – Flow Control
- MR8 – Wetlands Protection
- MR9 – Operations and Maintenance

The results of this analysis are presented in Table 1. Table 1 provides a breakdown of the minimum requirements by corridor TDA, and identifies the surfaces they apply to.

Since MR1-MR9 are triggered for all four corridor TDAs, an additional analysis is required by Chapter D2 of the SWES to determine the extent of the flow control (MR7) and runoff treatment (MR6) requirements. The results of this analysis are provided in Table 2.

The information provided in Table 2 demonstrates that MR6-Runoff Treatment is required for all four corridor TDAs. MR7-Flow Control is required only for the West Tributary, Lake Bellevue and 120th Avenue NE TDAs. MR7-Flow Control is not required for the NE 8th Street TDA because the new impervious surfaces are less than 10,000 SF.

In those corridor TDAs where MR6 – Runoff Treatment is required, enhanced water quality will be provided. The enhanced water quality facility and sizing will comply with Chapter D5 of the SWES.

In those corridor TDAs where MR7 – Flow Control is required, it will be met using an approved flow control facility as outlined in Chapter D4 of the SWES. The stormwater discharges from flow control facilities shall be as outlined in Section D3-03 of the SWES with the exception of flow control facilities discharging to Sturtevant Creek. The Sturtevant Creek Basin has been 40% impervious for at least the last 20 years. As a result, a Department of Ecology exemption allows for the use of actual land cover conditions in the sizing of the required flow control facilities. This is known in the City of Bellevue as the "40/20 Rule."

Flow control facilities located within the Lake Bellevue TDA and the 120th Avenue NE TDA may use the "40/20 Rule" exemption.

Any stage of the corridor that is located within one or more of the designated corridor TDAs shall comply with the minimum requirements established for that TDA, regardless of stage specific thresholds. City of Bellevue Storm Drainage Reports shall be prepared for each stage and shall adequately demonstrate how the corridor wide criteria has been met.

Conclusion

The information provided in this technical memo demonstrates how the corridor, along with each stage within the proposed corridor, will comply with City of Bellevue Code. By fully complying with City of Bellevue Code, any anticipated impacts resulting from increases in new impervious surfaces and/or new pollution-generating impervious surfaces will be mitigated through the use of approved flow control and/or runoff treatment facilities.

Table 1 – Minimum Requirements Breakdown by Corridor TDA

Corridor TDA	Existing Impervious Surfaces (SF)	New Impervious Surfaces (SF)	Do the new, replaced, or new plus replaced impervious surfaces total 2,000 SF or more?	MR1-MR5	Applied To	Does the project add 5,000 SF or more of new impervious surfaces?	Does MR1–MR9 apply to NEW impervious surfaces and converted pervious surfaces?	Do new impervious surfaces add 50% or more to the existing impervious surfaces within the project limits?	Does MR1-MR9 apply to REPLACED impervious surfaces?
West Tributary	184,179	45,731	YES	REQUIRED	New impervious surfaces Replaced impervious surfaces Land disturbed	YES	YES	NO (24.83%)	NO
Lake Bellevue	151,421	47,252	YES	REQUIRED	New impervious surfaces Replaced impervious surfaces Land disturbed	YES	YES	NO (31.21%)	NO
NE 8th St	26,588	6,117	YES	REQUIRED	New impervious surfaces Replaced impervious surfaces Land disturbed	YES	YES	NO (23.01%)	NO
120th Ave NE	201,382	48,441	YES	REQUIRED	New impervious surfaces Replaced impervious surfaces Land disturbed	YES	YES	NO (24.05%)	NO

Table 2: Secondary Thresholds for MR6 & MR7 by Corridor TDA

Corridor TDA	New Impervious Surfaces	MR7 Flow Control	MR7 Applies To	Effective Impervious Surfaces	Flow Control Facilities	Total Effective PGIS	MR6 Runoff Treatment	Treatment Facilities	MR6 Applies To
West Tributary	45,731 SF	REQUIRED	New Impervious Surfaces Converted Pervious Surfaces	45,731 SF	REQUIRED	20,705 SF	REQUIRED	REQUIRED	New PGIS Converted PGPS
Lake Bellevue	47,252 SF	REQUIRED	New Impervious Surfaces Converted Pervious Surfaces	47,252 SF	REQUIRED	32,151 SF	REQUIRED	REQUIRED	New PGIS Converted PGPS
NE 8th St	6,117 SF	REQUIRED	New Impervious Surfaces Converted Pervious Surfaces	6,117 SF	NOT REQUIRED	5,617 SF	REQUIRED	REQUIRED	New PGIS Converted PGPS
120th Ave NE	48,441 SF	REQUIRED	New Impervious Surfaces Converted Pervious Surfaces	48,441 SF	REQUIRED	47,766 SF	REQUIRED	REQUIRED	New PGIS Converted PGPS

MR7 is REQUIRED if New Impervious Surfaces are $\geq$ 5,000 SF.
Flow Control Facilities are REQUIRED if Effective Impervious Surfaces are $\geq$ 10,000 SF.

MR6 is REQUIRED if Total Effective PGIS is $\geq$ 5,000 SF
Treatment Facilities are REQUIRED if Total Effective PGIS $\geq$ 5,000 SF.

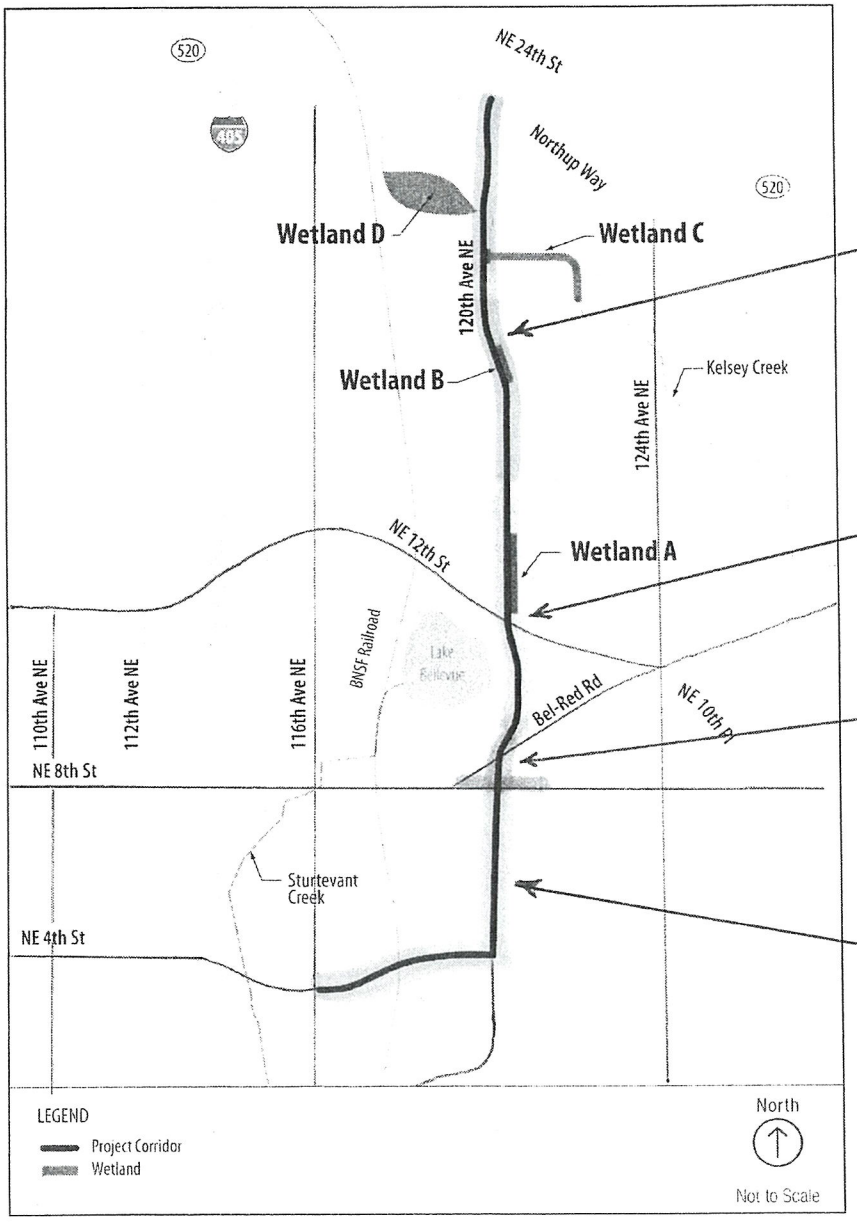
The values provided in Table 1 are taken from the following sources:

- Surface Water Management Report for City of Bellevue 120th Avenue NE Phase 1 (300 Block to 700 Block) 60% Preliminary Design prepared by Inca Engineers, Inc. dated April 2010
- 60% Storm Drainage Report for City of Bellevue NE 4th St/120th Ave NE Corridor Project NE 4th Street Extension – Phase 2 prepared by Parsons Brinckerhoff dated June 1, 2011
- 60% Storm Drainage Report for City of Bellevue NE 4th St/120th Ave NE Corridor Project – NE 7th St to NE 12th St prepared by Parsons Brinckerhoff dated April 2011
- 60% Storm Drainage Report for City of Bellevue NE 4th St/120th Ave NE Corridor Project – Segment 3 prepared by Parsons Brinckerhoff dated December 6, 2010

Definitions: PGIS = Pollution Generating Impervious Surfaces
PGPS = Pollution Generating Pervious Surfaces

FIGURES

TDA ANALYSIS



WEST TRIBUTARY TDA
(DRAINS TO WEST TRIBUTARY OF KELSEY CREEK)

LAKE BELLEVUE TDA
(DRAINS TO STURTEVANT CREEK VIA LAKE BELLEVUE)

NE 8TH ST TDA
(DRAINS TO STURTEVANT CREEK VIA NE 8TH ST)

120TH AVE NE TDA
(DRAINS TO STURTEVANT CREEK VIA 120TH AVE NE)

FIGURE 1

FIGURE 2

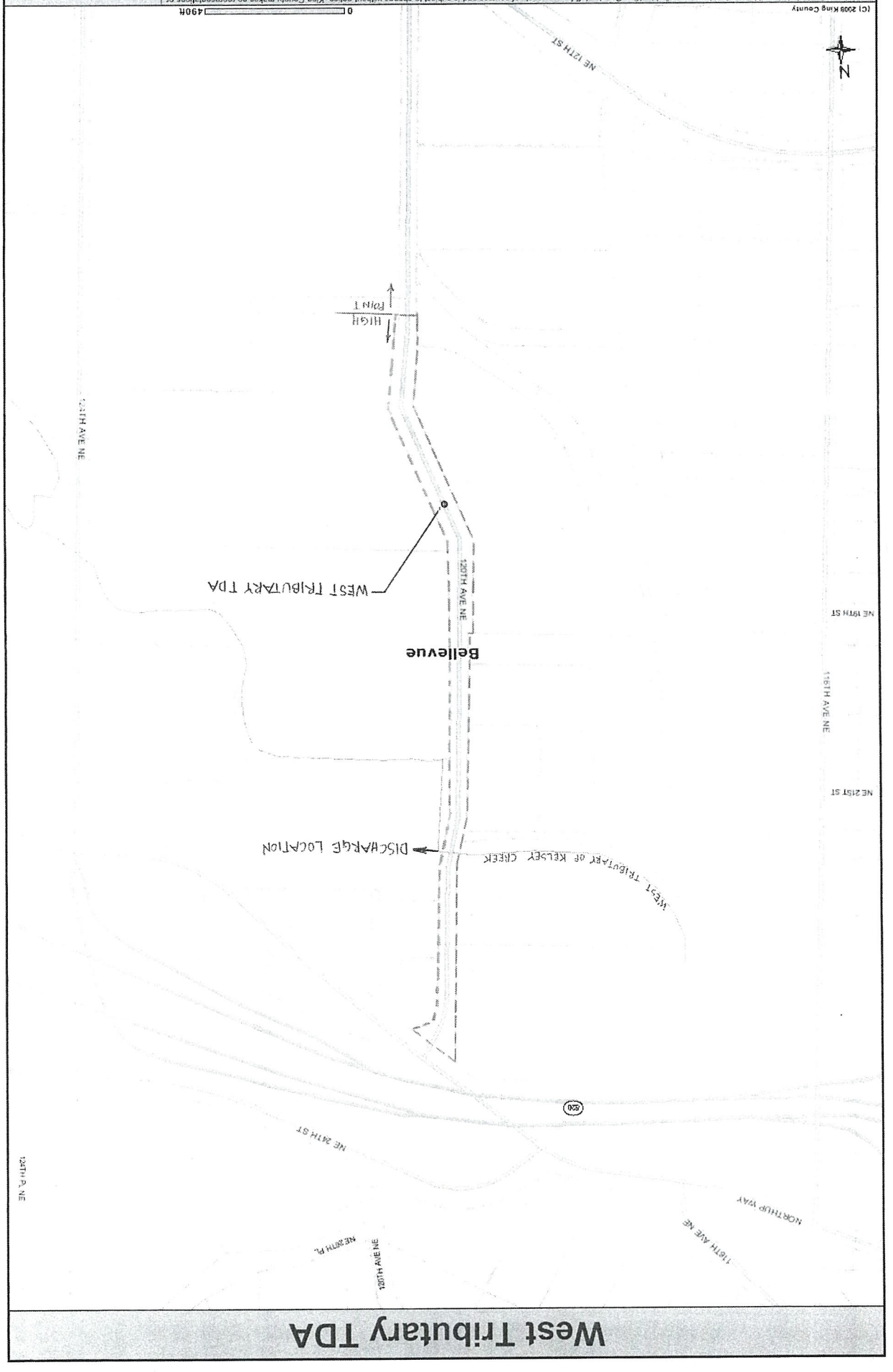
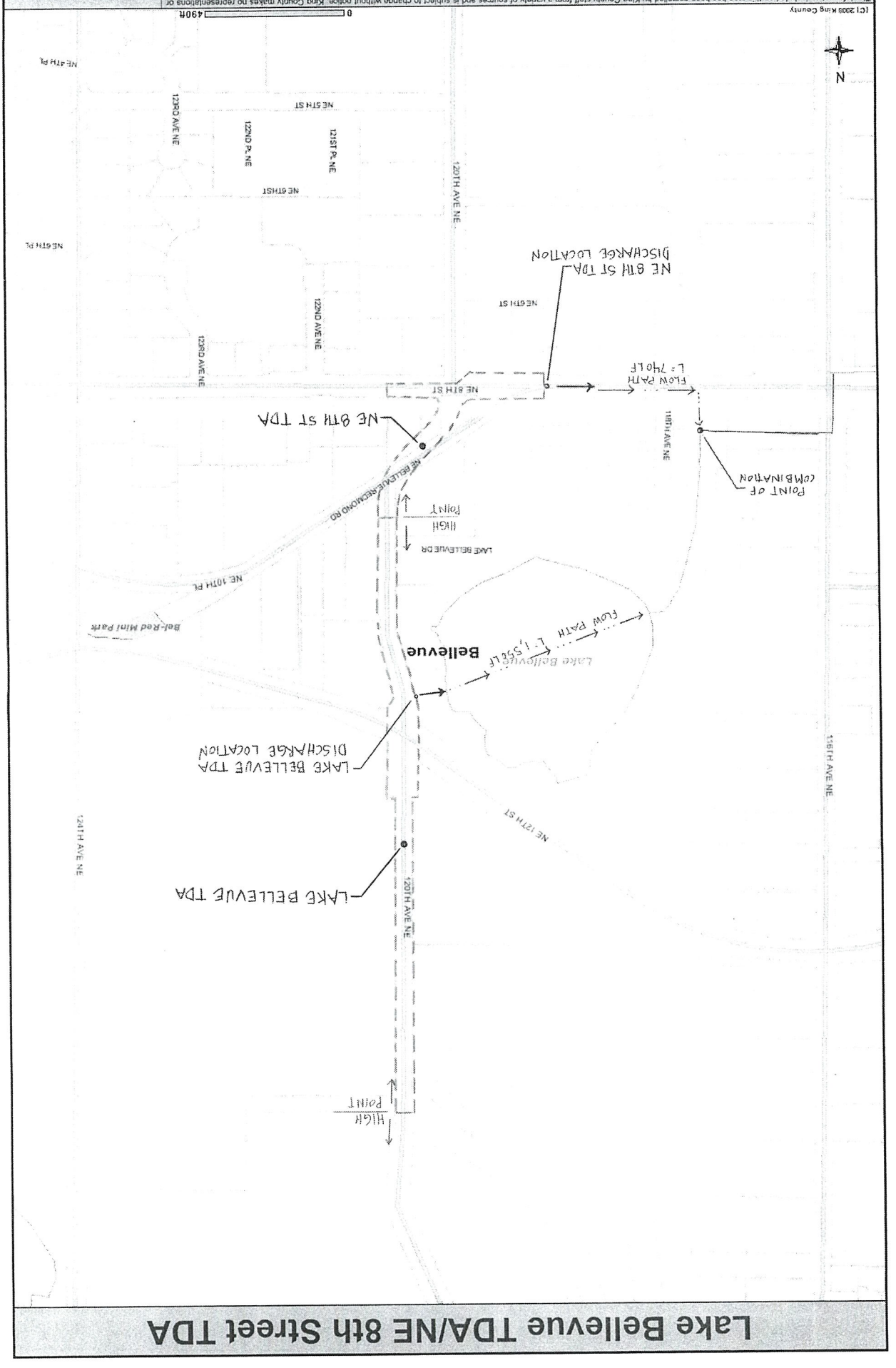

West Tributary TDA
King County
(C) 2008 King County
0
490ft
N
NE 12TH ST
HIGH POINT
124TH AVE NE
WEST TRIBUTARY TDA
120TH AVE NE
Bellevue
NE 19TH ST
116TH AVE NE
NE 21ST ST
DISCHARGE LOCATION
WEST TRIBUTARY OF KELSEY CREEK
NE 24TH ST
NORTHUP WAY
116TH AVE NE
NE 26TH PL
120TH AVE NE
124TH PL NE

FIGURE 3


Lake Bellevue TDA/NE 8th Street TDA
HIGH POINT
LAKE BELLEVUE TDA
LAKE BELLEVUE TDA DISCHARGE LOCATION
Bellevue
Lake Bellevue
L = 1,550 LF
FLOW PATH
Bel-Red Mini Park
NE 10TH PL
LAKE BELLEVUE DR
NE BELLEVUE-REDMOND RD
HIGH POINT
NE 8TH ST TDA
NE 8TH ST
FLOW PATH
L = 740 LF
NE 8TH ST TDA DISCHARGE LOCATION
POINT OF COMBINATION
118TH AVE NE
116TH AVE NE
120TH AVE NE
124TH AVE NE
NE 12TH ST
NE 6TH ST
NE 6TH PL
NE 4TH PL
NE 5TH ST
123RD AVE NE
122ND PL NE
121ST PL NE
122ND AVE NE
N
0
490ft
(C) 2005 King County
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120th Avenue NE TDA

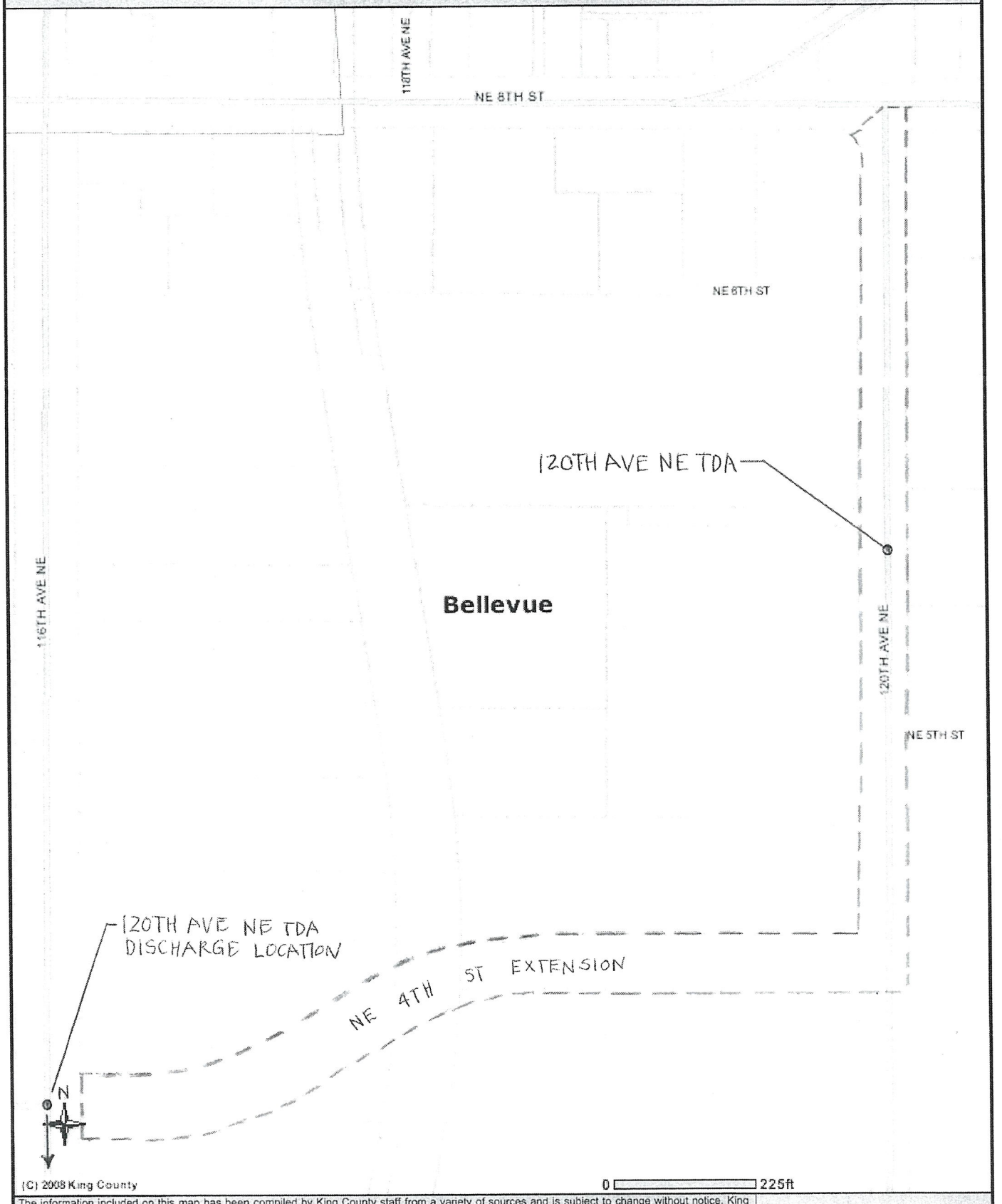

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FIGURE 4