



August 28, 2023

Project No. 3119A

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Sr. Project Manager
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RE: East Side Lands Constraints Analysis

On behalf of Natural Resource Solutions Inc. (NRSI), I am pleased to provide you with the results of our constraints analysis for the East Side Lands Pumping Station. The results of this analysis will allow a conservative estimate of the peak sanitary design flow.

The following memo discusses the recommended development constraint limits. These limits incorporate: elements of the Greenlands Network, including Core Environmental Features (CEFs), supporting features, and other designated features (e.g., Locally Significant Features, etc.) and recommended feature setbacks. Features were assessed through a desktop analysis only. Final setbacks and removal of natural heritage features would require a submission of an Environmental Impact Study to the satisfaction of the review agencies with further consideration of the following:

- Species composition and diversity;
- Species sensitivity and requirements;
- Habitat sensitivity, including dependence on surface or groundwater inputs;
- Feature form and function;
- Enhancement opportunities (e.g., corridor enhancements);and
- Slope stability assessments (if / as required) to determine stable top of bank for Significant ValleySetback recommendations.

Development Setbacks

The following setback recommendations have been developed through an analysis of existing natural heritage features within the study area (provided by Duane Linder) and relevant policy and guideline documents (e.g., Natural Heritage Reference Manual (OMNR 2010); Greenlands Network Implementation Guideline. Guideline for Determining Buffers around Environmental Features (Region of Waterloo 2016) and the Region of Waterloo Official Plan (2015).

Wetlands

- Provincially Significant Wetlands (PSW): 30 m
- Evaluated Non-PSW Wetland: 15 m

As part of the constraints analysis, non-PSW wetlands were removed (added to developable area) if they were less than 0.5 ha and were not adjacent to PSW complexes.

Woodlands and Hedgerows

- Woodlands: 10 m

Woodlands are considered significant if they are greater than 4 ha, consist primarily of native species and meet the regional definitions of a woodland. All other woodlands that are greater than 1 ha are protected under the Regional Woodland Conservation By-law.

As part of the constraints analysis, woodland less than 1 ha and communities that would be classified as hedgerows were added to the developable area. All removals are subject to the completion of Tree Inventory and Preservation Plan and regional permitting processes.

Watercourses and Waterbodies

- Waterbodies connected to watercourse features: 15 m
- Significant Watercourses (within CEF's and or provincial NHS): 30 m wide
- Permanent watercourses (not within CEF's and or provincial NHS): 15 m wide

As part of the constraints analysis, intermittent watercourses, and headwater drainage features (HDF's) not protected or within CEF's and or provincial NHS were added to the developable area. These features are subject to further studies and surveys to confirm if they can be removed and or functions replicated. All watercourses and HDF's are regulated by the GRCA under [ONTARIO REGULATION 150/06 \(DEVELOPMENT, INTERFERENCE WITH WETLANDS AND ALTERATIONS TO SHORELINES AND WATERCOURSES REGULATIONS\)](#). Any future development, construction, reconstruction and /or site alteration within the regulated areas will require the prior issuance of a permit pursuant to Ontario Regulation 150/06 from the GRCA. The permit process involves the submission of a Permit Application to the GRCA for their review and approval.

Where features overlap, the largest buffer was used to determine the non-developable area.

References

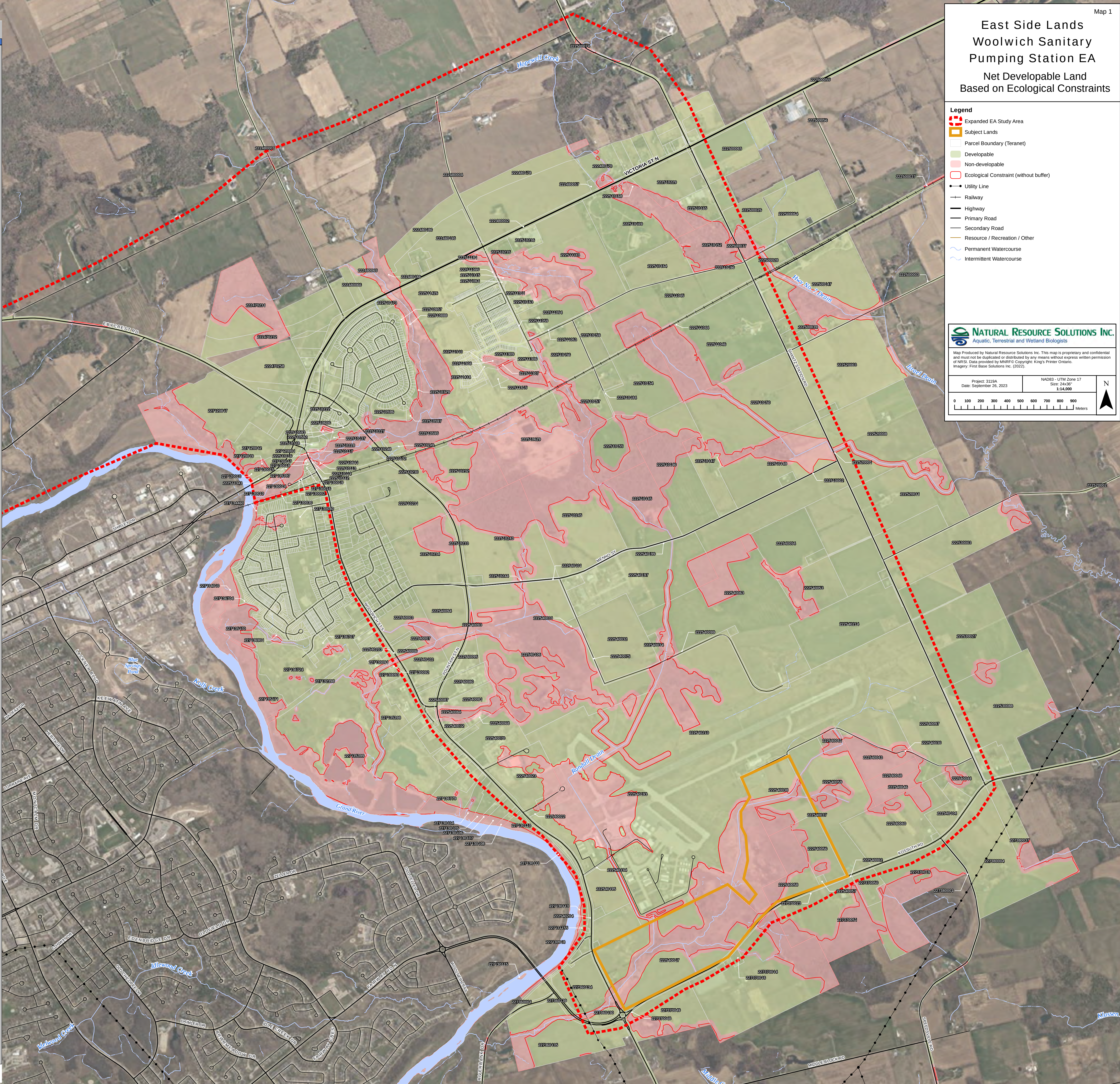
Government of Ontario. 2013. O. Reg. 150/06: Grand River Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses. <https://www.ontario.ca/laws/regulation/060150>

Ontario Ministry of Natural Resources, 2010. Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005 Second Edition. Toronto: Queen's Printer for Ontario.

Regional Municipality of Waterloo (RMOW). 2015. Regional Official Plan.
<http://www.regionofwaterloo.ca/en/regionalGovernment/PreviousROP.asp>

Regional Municipality of Waterloo (RMOW). 2016. Region of Waterloo Greenland's Network Implementation Guideline.

Without Constraint Buffer				Without Constraint Buffer				Without Constraint Buffer				Without Constraint Buffer			
Item No.	Area (ha)	Percentage	Percentage Buffer	Item No.	Area (ha)	Percentage	Percentage Buffer	Item No.	Area (ha)	Percentage	Percentage Buffer	Item No.	Area (ha)	Percentage	Percentage Buffer
22247001				22251027				22254002				22271017			
Developable	12.38	92.14%	97.8%	Developable	0.30	0.14%	6.52%	Developable	7.901	87.74%	99.70%	Developable	21.864	55.00%	57.31%
Non-developable	1.049	7.86%	2.02%	Non-developable	1.954	0.94%	93.48%	Non-developable	0.903	10.26%	0.30%	Non-developable	17.971	45.00%	42.69%
22247002				22251028				22254003				22271018			
Developable	11.657	39.84%	44.64%	Developable	0.040	0.80%	3.40%	Developable	5.525	76.50%	91.62%	Developable	0.076	74.11%	74.13%
Non-developable	17.574	60.12%	55.36%	Non-developable	0.500	99.20%	96.60%	Non-developable	1.697	23.50%	8.38%	Non-developable	0.294	25.88%	25.87%
22247003				22251029				22254004				22271019			
Developable	8.907	78.07%	89.34%	Developable	10.722	87.38%	90.43%	Developable	0.000	74.32%	74.32%	Developable	0.049	3.71%	3.71%
Non-developable	2.503	21.93%	10.66%	Non-developable	1.520	12.42%	9.55%	Non-developable	0.207	25.68%	25.68%	Non-developable	1.276	96.29%	96.29%
22247004				22251030				22254005				22271020			
Developable	11.545	98.29%	99.63%	Developable	2.036	91.31%	99.57%	Developable	1.736	50.48%	99.79%	Developable	0.036	2.41%	2.41%
Non-developable	0.236	1.71%	0.33%	Non-developable	0.194	8.69%	0.43%	Non-developable	1.702	49.52%	40.73%	Non-developable	1.479	97.59%	97.59%
22247005				22251031				22254006				22271021			
Developable	4.386	96.33%	96.33%	Developable	0.060	96.89%	98.61%	Developable	27.669	48.78%	54.59%	Developable	0.207	77.79%	78.47%
Non-developable	0.167	3.67%	3.67%	Non-developable	0.243	3.11%	1.39%	Non-developable	29.053	51.22%	45.41%	Non-developable	0.059	22.21%	21.53%
22247006				22251032				22254007				22271022			
Developable	9.759	87.59%	94.54%	Developable	18.194	30.51%	45.66%	Developable	0.299	79.56%	79.56%	Developable	0.323	13.25%	19.81%
Non-developable	1.383	12.41%	5.46%	Non-developable	8.624	69.47%	54.34%	Non-developable	0.077	20.44%	20.44%	Non-developable	1.280	88.71%	80.19%
22247007				22251033				22254008				22271023			
Developable	1.094	75.87%	87.24%	Developable	1.936	77.17%	91.69%	Developable	10.928	65.88%	65.88%	Developable	0.027	39.86%	100.0%
Non-developable	0.348	24.13%	12.76%	Non-developable	0.570	22.83%	8.31%	Non-developable	5.600	34.12%	34.12%	Non-developable	0.041	60.14%	
22247008				22251034				22254009				22271024			
Developable	0.378	90.25%	100.0%	Developable	13.628	68.8%	75.32%	Developable	0.380	31.72%	95.10%	Developable	0.000	94.45%	100.0%
Non-developable	0.041	9.75%		Non-developable	6.157	31.12%	24.68%	Non-developable	0.817	68.28%	4.90%	Non-developable	0.000	5.55%	
22247009				22251035				22254010				22271025			
Developable	3.534	39.81%	45.6%	Developable	1.435	50.75%	80.11%	Developable	0.465	57.48%	72.40%	Developable	0.688	82.88%	99.23%
Non-developable	0.011	69.19%	53.03%	Non-developable	2.256	47.01%	19.89%	Non-developable	0.344	42.52%	27.60%	Non-developable	0.005	17.72%	0.79%
22247010				22251036				22254011				22271026			
Developable	2.189	94.92%	100.0%	Developable	3.282	91.42%	99.80%	Developable	23.835	99.19%	100.0%	Developable	1.588	66.60%	78.20%
Non-developable	0.117	5.08%		Non-developable	0.308	8.58%	0.20%	Non-developable	0.136	6.83%		Non-developable	0.798	31.68%	21.80%
22247011				22251037				22254012				22271027			
Developable	5.567	79.21%	89.16%	Developable	0.188	47.77%	59.08%	Developable	0.081	48.23%	82.20%	Developable	3.366	99.88%	100.0%
Non-developable	1.461	20.79%	10.83%	Non-developable	0.208	52.23%	40.92%	Non-developable	0.733	51.77%	17.80%	Non-developable	0.001	0.02%	
22247012				22251038				22254013				22271028			
Developable	9.363	90.53%	91.74%	Developable	0.045	99.56%	4.35%	Developable	1.659	81.48%	98.95%	Developable	1.181	72.96%	73.86%
Non-developable	0.979	9.47%	8.27%	Non-developable	0.268	0.43%		Non-developable	0.377	18.52%	1.05%	Non-developable	0.418	26.04%	26.04%
22247013				22251039				22254014				22271029			
Developable	8.553	94.97%	91.39%	Developable	0.740	49.56%	57.81%	Developable	11.299	59.00%	72.52%	Developable	0.558	50.34%	50.34%
Non-developable	0.549	6.03%	6.03%	Non-developable	1.218	50.44%	42.18%	Non-developable	7.852	41.00%	27.48%	Non-developable	0.155	45.66%	49.60%
22247014				22251040				22254015				22271030			
Developable	0.005	1.04%	3.04%	Developable	22.148	90.95%	99.73%	Developable	0.221	3.06%	29.63%	Developable	1.851	82.08%	82.08%
Non-developable	0.146	36.96%	96.96%	Non-developable	0.311	9.05%	0.27%	Non-developable	2.142	96.64%	70.35%	Non-developable	0.044	19.92%	17.92%
22247015				22251041				22254016				22271031			
Developable	16.821	97.40%	97.97%	Developable	1.077	68.68%	89.79%	Developable	0.169	9.24%	6.38%	Developable	1.722	60.06%	79.32%
Non-developable	0.396	2.60%	2.06%	Non-developable	0.491	31.32%	10.21%	Non-developable	8.595	98.81%	93.62%	Non-developable	1.103	39.94%	27.08%
22247016				22251042				22254017				22271032			
Developable	2.440	75.76%	80.63%	Developable	1.044	82.63%	98.43%	Developable	3.896	68.01%	84.30%	Developable	2.441	87.14%	87.14%
Non-developable	0.781	24.24%	19.37%	Non-developable	0.295	17.37%	1.55%	Non-developable	2.114	36.99%	15.70%	Non-developable	0.800	12.88%	12.88%
22247017				22251043				22254018				22271033			
Developable	7.487	91.04%	95.4%	Non-developable	0.297	100.0%	46.93%	Developable	1.814	26.78%	34.62%	Developable	0.817	72.16%	72.16%
Non-developable	0.560	6.96%	4.54%	Non-developable	0.133	53.08%		Non-developable	4.960	73.22%	65.38%	Non-developable	1.315	27.84%	27.84%
22247018				22251044				22254019				22271034			
Developable	4.105	88.37%	88.37%	Developable	1.039	84.34%	11.34%	Developable	0.002	0.06%	0.61%	Developable	1.408	66.48%	66.48%
Non-developable	0.540	11.63%	11.63%	Non-developable	0.200	0.02%	86.66%	Non-developable	3.991	99.94%	99.99%	Non-developable	0.710	33.52%	33.52%
22247019				22251045				22254020				22271035			
Developable	8.769	79.31%	87.69%	Developable	2.199	99.88%	100.0%	Developable	8.755	60.59%	69.95%	Developable	0.538	65.18%	65.18%
Non-developable	2.287	20.69%	12.31%	Non-developable	0.000	0.02%		Non-developable	5.234	37.41%	30.05%	Non-developable	2.187	34.82%	84.82%
22247020				22251046				22254021				22271036			
Developable	4.084	59.08%	72.05%	Developable	0.283	45.89%	68.04%	Developable	15.997	80.03%	91.76%	Developable	1.287	54.58%	60.35%
Non-developable	2.828	40.92%	27.95%	Non-developable	0.348	55.12%	31.96%	Non-developable	2.175	11.97%	8.24%	Non-developable	0.995	45.42%	39.75%
22247021				22251047				22254022				22271037			
Developable	9.807	95.60%	99.93%	Developable	0.805	89.44%	100.0%	Developable	7.066	68.64%	85.09%	Developable	0.786	35.03%	82.78%
Non-developable	0.424	4.40%	0.01%	Non-developable	0.995	10.56%		Non-developable	1.228	31.36%	14.91%	Non-developable	1.420	69.97%	17.22%
22247022				22251048				22254023				22271038			
Developable	2.738	90.90%	96.72%	Developable	0.887	11.49%	18.91%	Developable	0.403	99.00%	100.0%	Developable	1.000	45.46%	76.47%
Non-developable	0.278	9.10%	3.28%	Non-developable	24.935	86.52%	80.20%	Non-developable	0.000	0.00%		Non-developable	1.158	59.54%	23.53%
22247023				22251049				22254024				22271039			
Developable	19.184	87.76%	89.45%	Developable	0.399	24.14%	51.08%	Developable	3.056	24.87%	33.55%	Non-developable	6.739	100.0%	0.04%
Non-developable	2.668	12.24%	10.54%	Non-developable	1.255	79.40%	48.92%	Non-developable	9.354	75.13%	66.43%	Non-developable			99.96%
22247024				22251050				22254025				22271040			
Developable	17.011	99.53%	100.0%	Developable	4.768	86.44%	97.36%	Developable	22.838	73.22%	89.31%	Developable	0.955	22.97%	74.73%
Non-developable	0.035	0.48%		Non-developable	0.682	13.56%	2.64%	Non-developable	8.355	26.78%	10.69%	Non-developable	1.997	77.63%	25.27%
22247025				22251051				22254026				22271041			
Developable	3.474	80.16%	88.1%	Non-developable	1.906	100.0%	0.92%	Developable	22.441	81.29%	88.60%	Developable	0.024	96.47%	100.0%
Non-developable	0.860	19.84%	11.81%	Non-developable	0.000			Non-developable	5.166	18.71%	11.40%	Non-developable	1.200	1.53%	
22247026				22251052				22254027				22271042			
Developable	2.106	90.38%	99.17%	Developable	0.845	47.70%	82.83%	Developable	79.514	84.43%	87.88%	Developable	3.286	88.11%	90.31%
Non-developable	0.224	9.62%	0.83%	Non-developable	0.960	52.30%	17.17%	Non-developable	14.660	15.57%	12.62%	Non-developable	0.530	18.89%	5.49%
22247027				22251053				22254028				22271043			
Developable	26.886	75.78%	76.82%	Developable	0.598	49.56%	82.99%	Developable	0.815	60.01%	100.0%	Developable	0.604	25.43%	43.41%
Non-developable	9.230	24.22%	23.18%	Non-developable	0.407	50.44%	17.01%	Non-developable	5.500	39.86%		Non-developable	2.035	74.57%	56.59%
22247028				22251054				22254029				22271044			
Developable	5.017	96.70%	99.3%	Developable	28.112	81.20%	86.3%	Developable	12.083	88.49%	94.61%	Developable	0.577	18.06%	23.40%
Non-developable	0.171	3.30%	0.23%	Non-developable	6.999	18.80%	13.63%	Non-developable	1.572	11.51%	5.93%	Non-developable	3.105	86.94%	76.60%
22247029				22251055				22254030				22271045			
Developable	0.005	12.56%	100.0%	Developable	31.894	67.15%	72.76%	Developable	1.265	68.55%	97.24%	Developable	0.220	49.95%	65.45%
Non-developable	0.033	87.44%		Non-developable	15.065	32.85%	27.22%	Non-developable	0.581	31.45%	2.26%	Non-developable	0.220	50.05%	84.55%
22251011				22251056				22254031				22271046			
Developable	0.009	3.15%	48.73%	Developable	0.100	80.89%	100.0%	Developable	0.106	56.06%	100.0%	Developable	1.529	12.70%	23.49%
Non-developable	0.272	96.85%	51.27%	Non-developable	0.024	19.11%		Non-developable	0.083	43.94%		Non-developable	0.120	87.30%	76.51%
22251012															



Land Use (Non-Residential)	Population Density	Average Daily Flow
Industrial	40	275
Institutional	40	275
Airport	40	275
GO Station	40	275
Park	40	275

Extraneous Flows	
As % of Peak	46%
L/s/ha	0.15

I&I FLOWS (L/ha)	
Extraneous Flow Factor	Extraneous Flow
AK	AL

(L/hais)	(L/s)
0.15	10.1
0.15	0.1
0.15	0.1
0.15	0.1
0.15	0.1
0.15	0.0
0.15	0.0
0.15	0.0
0.15	0.0
0.15	0.0
0.15	0.1
0.15	0.2
0.15	0.1
0.15	0.2
0.15	0.1
0.15	0.4
0.15	0.1
0.15	0.2
0.15	0.1
0.15	0.2
0.15	0.1
0.15	0.0
0.15	0.0
0.15	0.2
0.15	0.1
0.15	1.3
0.15	0.8
0.15	0.1
0.15	2.8
0.15	1.3
0.15	0.1
0.15	0.1
0.15	0.1
0.15	0.1
0.15	0.0
0.15	0.1
0.15	0.7
0.15	5.2
0.15	0.1
0.15	0.2
0.15	0.0
0.15	0.2
0.15	0.3
0.15	0.1
0.15	0.0
0.15	1.1
0.15	0.9
0.15	2.0
0.15	0.2

Land Use (Non-Residential)	Population Density	Average Daily Flow
Industrial	40	275
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Airport	40	275
GO Station	40	275
Park	40	275

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As % of Peak	46%
L/s/ha	0.15

I&I FLOWS (L/ha)	
Extraneous Flow Factor	Extraneous Flow
AK	AL

(L/hais)	(L/s)
0.15	7.3
0.15	1.8
0.15	0.3
0.15	0.3
0.15	0.0
0.15	0.1
0.15	0.0
0.15	0.7
0.15	0.9
0.15	0.1
0.15	0.0
0.15	3.1
0.15	0.0
0.15	3.4
0.15	1.6
0.15	0.8
0.15	1.1
0.15	3.1
0.15	3.1
0.15	11.5
0.15	0.1
0.15	0.4
0.15	0.3
0.15	3.5
0.15	2.1
0.15	0.2
0.15	4.8
0.15	9.6
0.15	1.1
0.15	2.5
0.15	0.9
0.15	0.0
0.15	0.8
0.15	0.4
0.15	3.3
0.15	0.6
0.15	5.9
0.15	0.2
0.15	0.7
0.15	2.0
0.15	0.1
0.15	1.2
0.15	0.0
0.15	1.7
0.15	7.9
0.15	0.0
0.15	0.2
0.15	0.3
0.15	0.0
0.15	0.2
0.15	0.6
0.15	0.6
0.15	0.9
0.15	0.6
0.15	3.2
0.15	0.5
0.15	0.6
0.15	0.3
0.15	0.0

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I&I FLOWS (L/ha)	
Extraneous Flow Factor	Extraneous Flow
AK	AL

(L/min/s)	(L/s)
0.15	5.8
0.15	0.0
0.15	0.1
0.15	0.0
0.15	0.3
0.15	0.1
0.15	0.0
0.15	0.0
0.15	0.3
0.15	0.1
0.15	0.0
0.15	0.5
0.15	0.3
0.15	0.7
0.15	0.6
0.15	0.1
0.15	0.1
0.15	2.6
0.15	0.4
0.15	0.2
0.15	0.1
0.15	0.1
0.15	1.3
0.15	0.1
0.15	0.4
0.15	0.8
0.15	0.0
0.15	1.4
0.15	0.1
0.15	0.0
0.15	0.4
0.15	0.4
0.15	0.1
0.15	0.4
0.15	2.4
0.15	0.5
0.15	1.9
0.15	0.0
0.15	0.0
0.15	0.0
0.15	3.3
0.15	0.3
0.15	2.9

2024-10-11

2024-10-11

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Industrial	40	275
Institutional	40	275
Airport	40	275
GO Station	40	275
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Extraneous Flows	
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I&I FLOWS (L/ha)	
Extraneous Flow Factor	Extraneous Flow
AK	AL

(L/hais)	(L/s)
0.15	7.8
0.15	0.1
0.15	0.1
0.15	1.8
0.15	0.2
0.15	0.8
0.15	0.5
0.15	0.2
0.15	0.0
0.15	0.1
0.15	0.1
0.15	0.1
0.15	0.2
0.15	0.2
0.15	0.8
0.15	0.4
0.15	0.1
0.15	0.1
0.15	0.1
0.15	0.1
0.15	0.2
0.15	0.6
0.15	0.1
0.15	0.1
0.15	0.5
0.15	8.1
0.15	0.3
0.15	0.4
0.15	0.1
0.15	0.2
0.15	0.1
0.15	0.0
0.15	1.4
0.15	0.0
0.15	0.1
0.15	0.1
0.15	0.4
0.15	4.0
0.15	1.0
0.15	1.2
0.15	0.5
0.15	0.7
0.15	0.7
0.15	0.1
0.15	0.7
0.15	2.6
0.15	2.6
0.15	0.0
0.15	0.4
0.15	0.4
0.15	2.7
0.15	2.7
0.15	4.9
0.15	4.9
0.15	4.4
0.15	1.7
0.15	2.7

2024-10-11