

# LID Treatment Train Tool

## Case Studies

# Case Studies

- **Three Land Use Types**
  - Road Right of Way – Elm Drive, Mississauga
  - Commercial – Honda Canada, Markham
  - Residential Subdivision – Mosaik, Newmarket
- **We will present:**
  - Model set-up (method, limitations)
  - Compare Targets to Modelled and Monitored Results

# Road Right of Way: Elm Drive Site

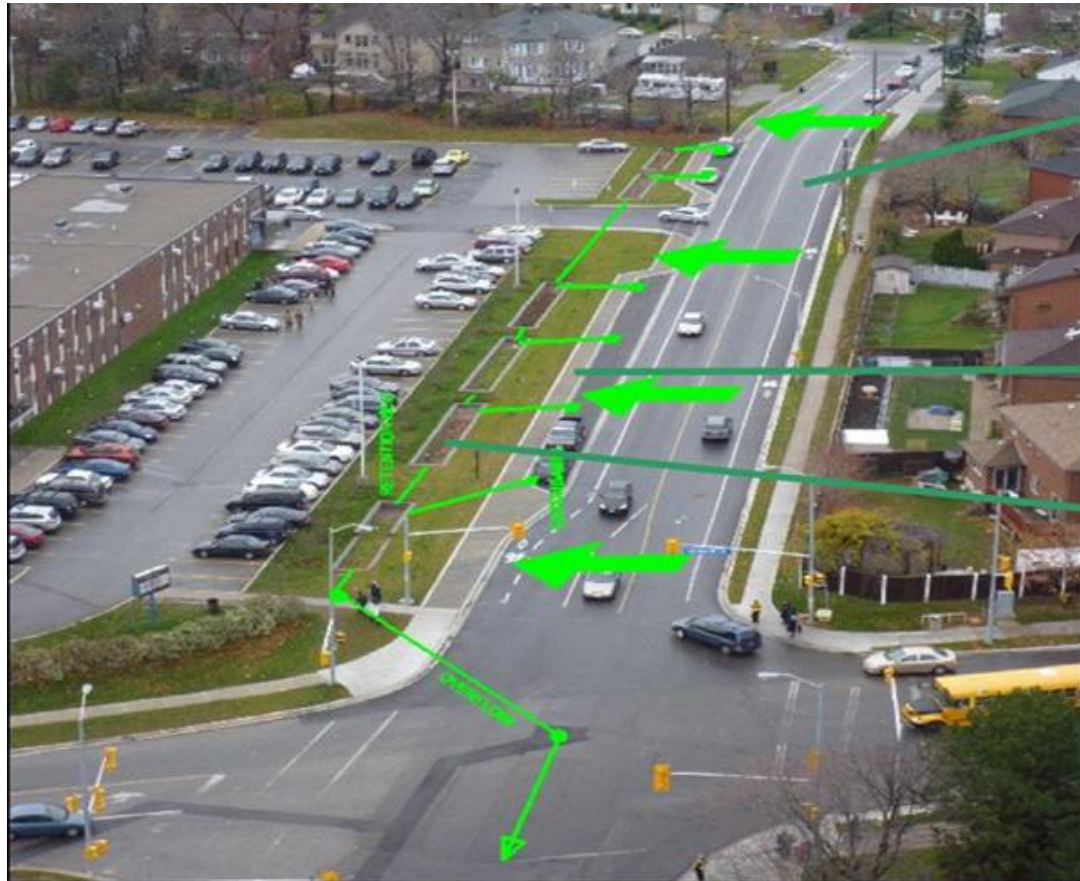


**Before Retrofit**

**After Retrofit**



# Road Right of Way: Elm Drive Site



Road re-graded so all runoff goes to the LID facility.

Permeable pavement parking lay-bys and sidewalk.

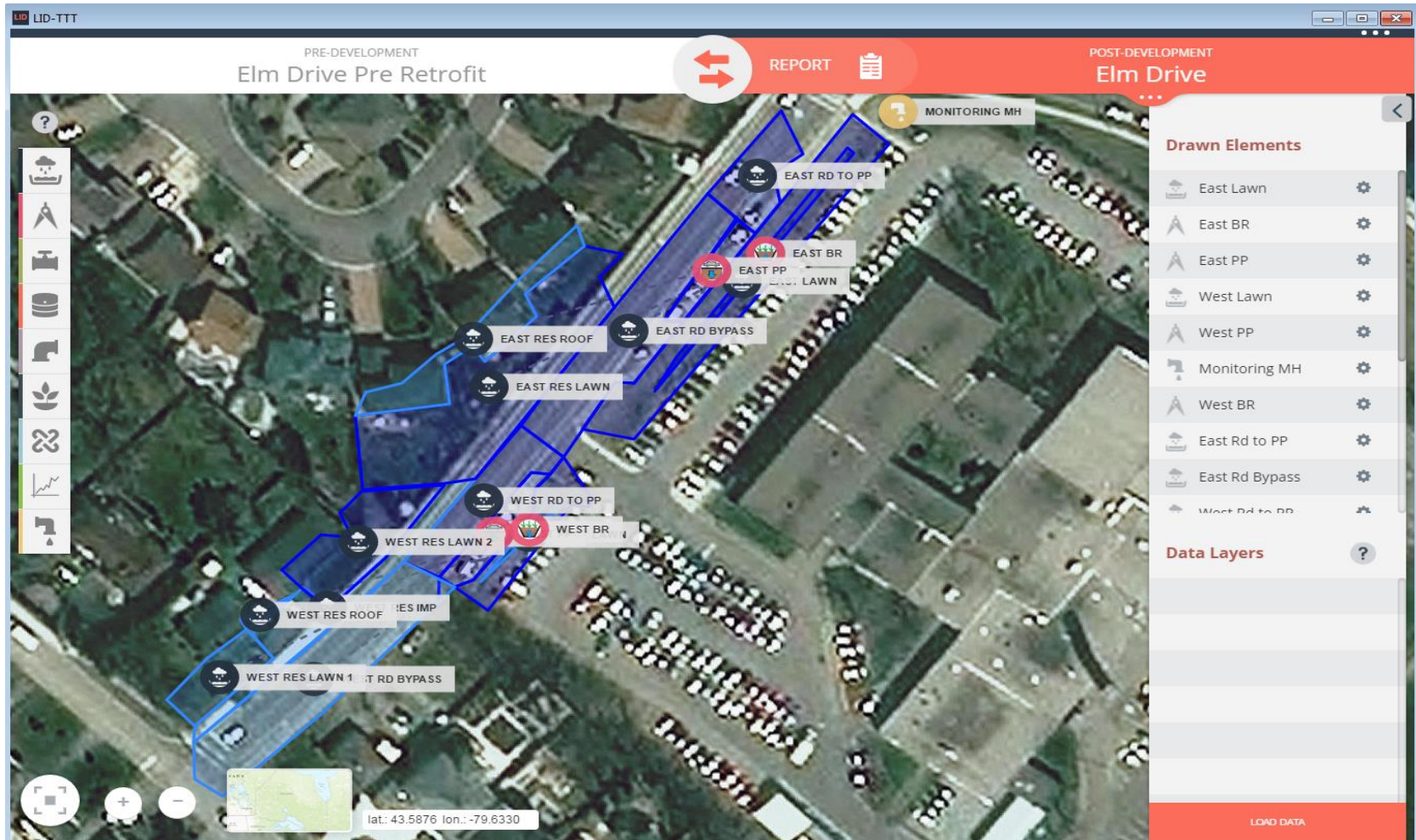
Bioretention planters



# Stormwater Management Targets

Parameter	CRITERIA
Erosion Control (runoff volume control)	Reduce runoff volumes relative to pre-retrofit condition
Runoff Volume Reduction	Best efforts (> 3 mm reduction)
Peak Flow Control	Reduce peak flows relative to pre-retrofit condition
Water Quality	80% TSS load reduction
Water Balance	Match pre-development infiltration

# Elm Drive Model Set-up



# Erosion Control and Runoff Volume Reduction

Parameter	Criteria	Pre-Retrofit Conditions	LID TTT Results	Monitoring Results
Erosion Control and Runoff Volume Reduction	Reduce runoff volumes relative to pre-retrofit condition (min 3 mm)	2 yr (33 mm) - 29% 5 yr (45 mm) - 19% 10 yr (55 mm) - 13% 25 yr (64 mm) - 11% 50 yr (71 mm) - 9% 100 yr (79 mm) - 8%	2 yr (33 mm) - 73% 5 yr (45 mm) - 65% 10 yr (55 mm) - 62% 25 yr (64 mm) - 58% 50 yr (71 mm) - 57% 100 yr (79 mm) - 55%	2 – 5 yr – 81% 5 – 10 yr – 80% 10 – 50 yr – 80%

# Peak Flow, Water Quality and Water Balance

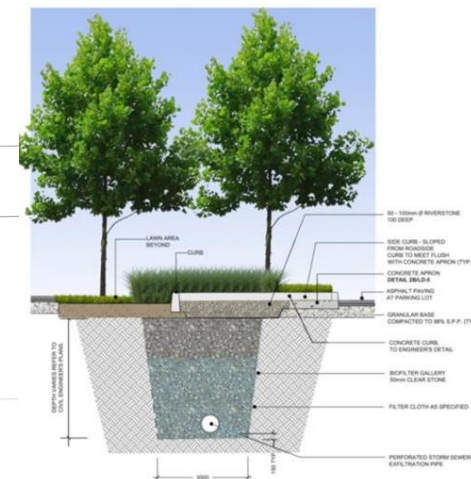
Param.	Criteria	LID TTT Results	Monitoring Results
Peak Flow Control	Reduce relative to Pre-retrofit: 2 yr (33 mm) - 37% 5 yr (45 mm) - 27% 10 yr (55 mm) - 8% 25 yr (64 mm) - 5% 50 yr (71 mm) - 10% 100 yr (79 mm) - 13%	2 yr (33 mm) - 83% 5 yr (45 mm) - 66% 10 yr (55 mm) - 62% 25 yr (64 mm) - 57% 50 yr (71 mm) - 56% 100 yr (79 mm) - 56%	2 – 5 yr – 88-90% 5 – 10 yr – 54-79% 10 – 50 yr – 66-95%
Water Quality	80% TSS load reduction	TSS removal = 83% TP removal = 97%	TSS removal = 88% TP removal = 91%
Water Balance	Match pre-dev. infiltration	Infiltration Pre: 41 mm Post: 346 mm	100% retention of rainfall < 5 mm



# Honda Campus Case Study







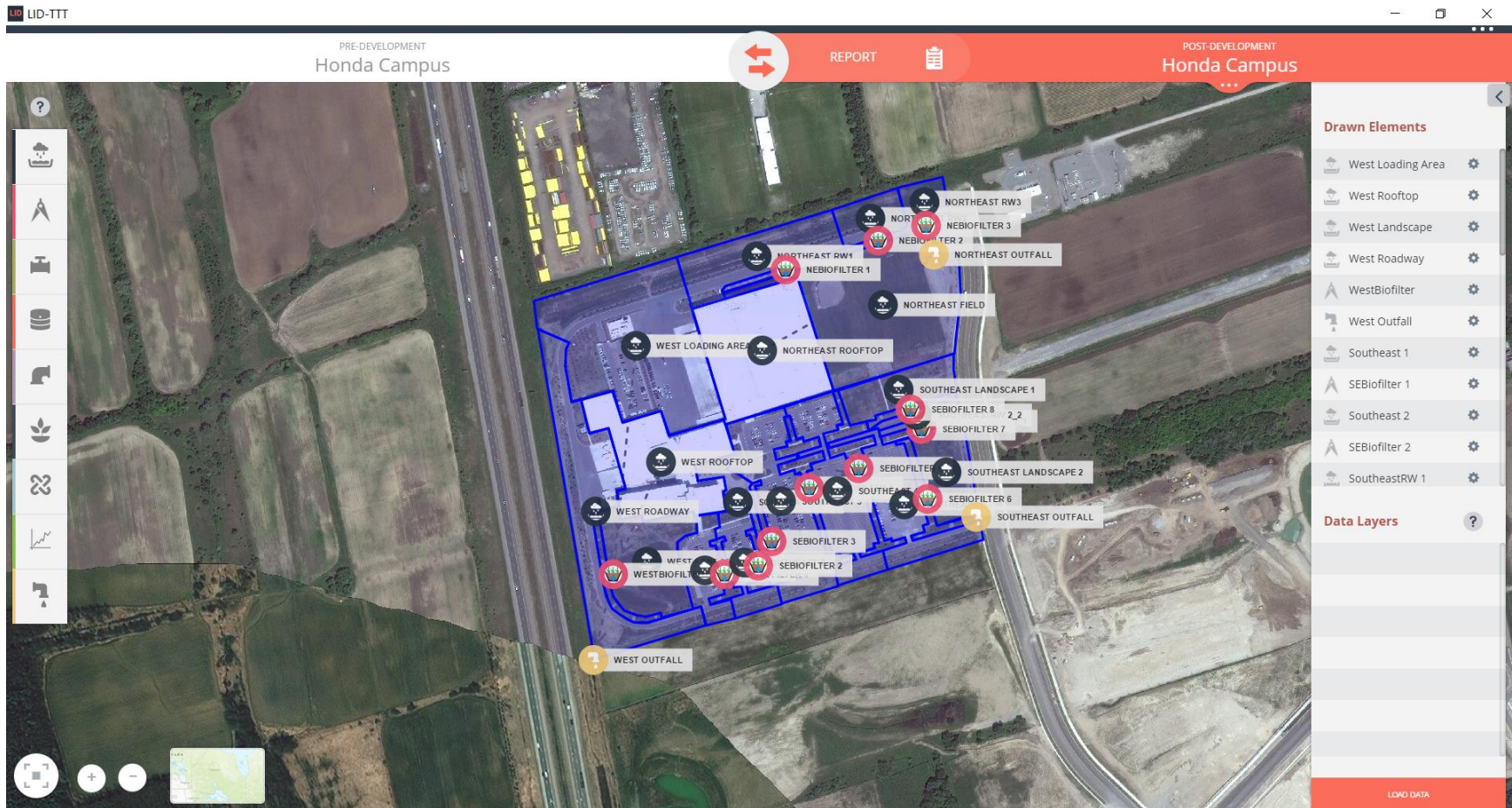
## Biofilter Cross Section

# Stormwater Management Targets

Parameter	CRITERIA
Water Balance	At least 5 mm reduction relative to pre-development
Peak Flow Control	Control outflows to unit release rate of 180 L/s/ha
Water Quality	80% TSS load reduction (aspirational target)

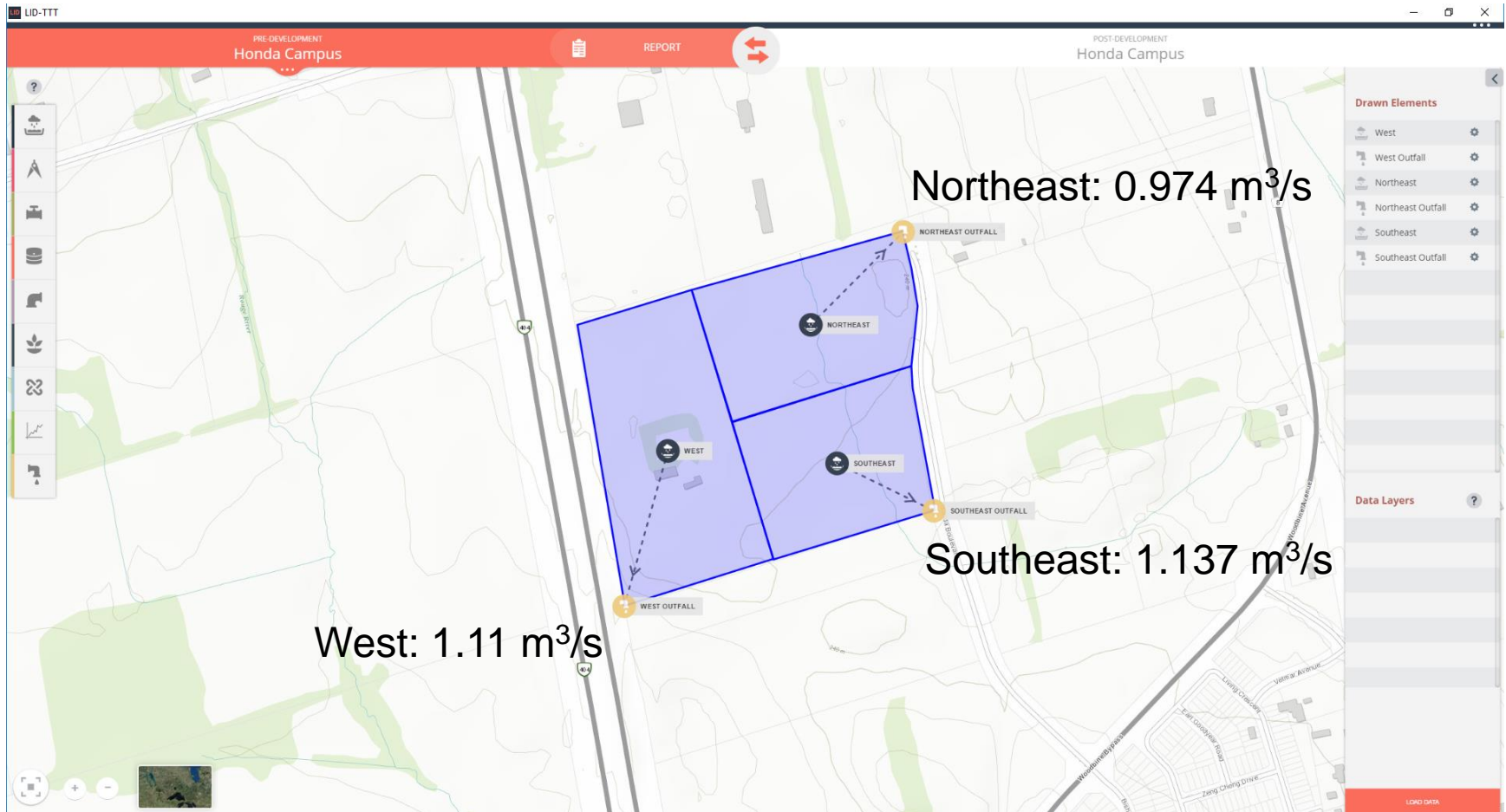


# Model Set-up





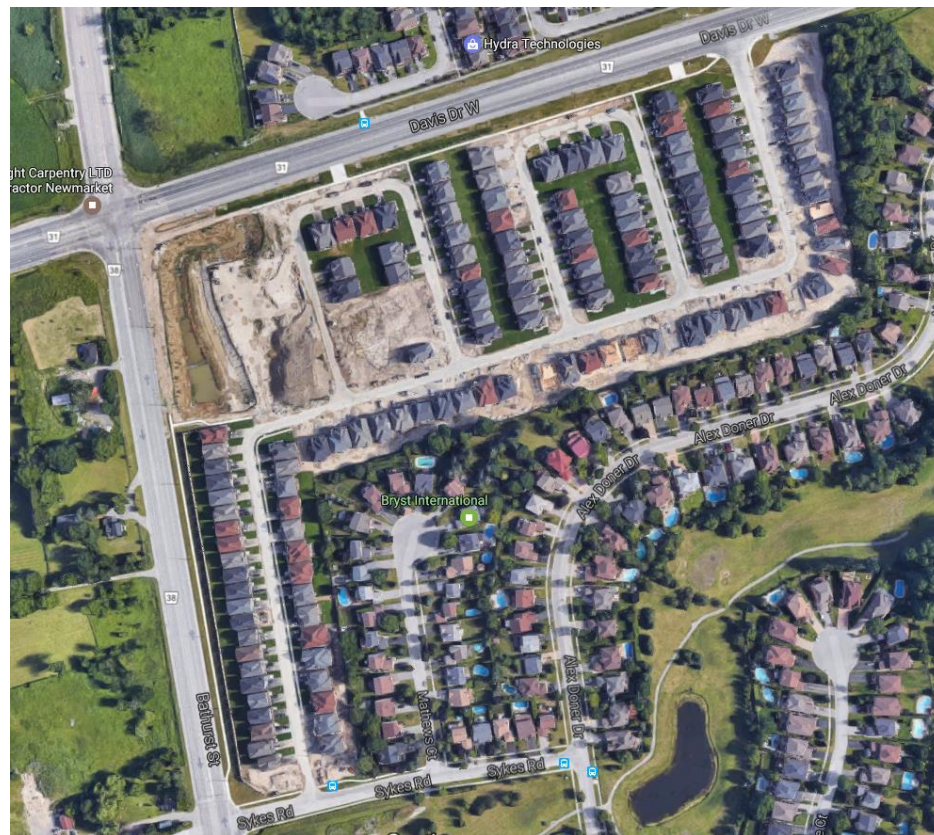
# Unit Release Rates



# Peak Flow, Water Quality and Water Balance

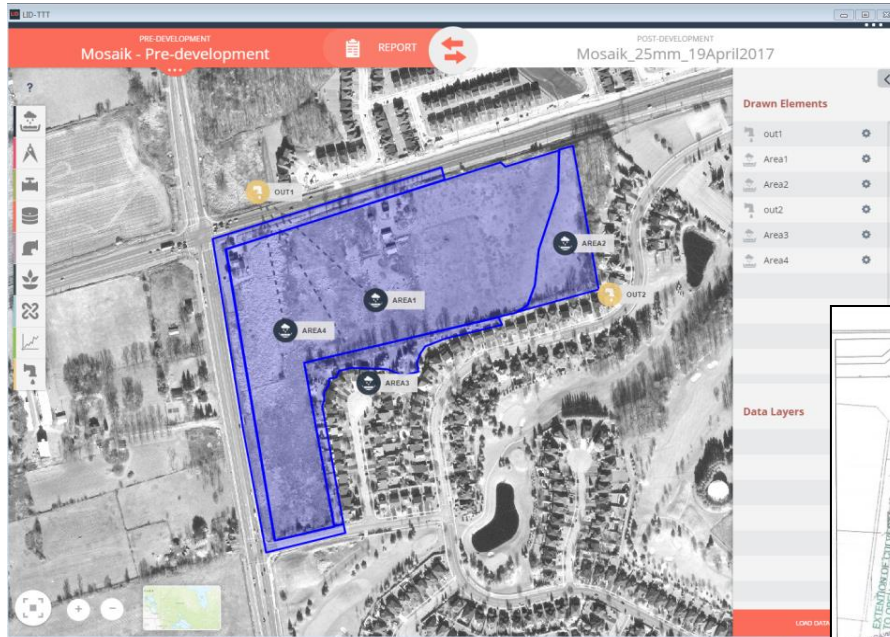
Param.	Criteria	LID TTT Results	Monitoring Results
Peak Flow Control	Unit Release Rates:  0.180 m³/s/ha	Without orifice controls:  Northeast: met up to 100 yr event Southeast: met up to 5 yr event West: met up to 10 yr event	No surface back-up for events up to 2 yr return period
Water Quality	80% TSS load reduction for 25 mm event	TSS removal assumed similar to runoff reduction (79.6%)	Water quality assumed to be similar to runoff reduction (approx 76%)
Water Balance	Retention of 5 mm of rainfall	< 10 mm: 92.7% 10 – 20 mm: 80.4% 20 – 30 mm: 79.6% > 30 mm: 72.5%	< 10 mm: 87.1% 10 – 20 mm: 80.4% 20 – 30 mm: 76.0% > 30 mm: 65.0%

# Case Study: Mosaik | Vales of Glenway Estates



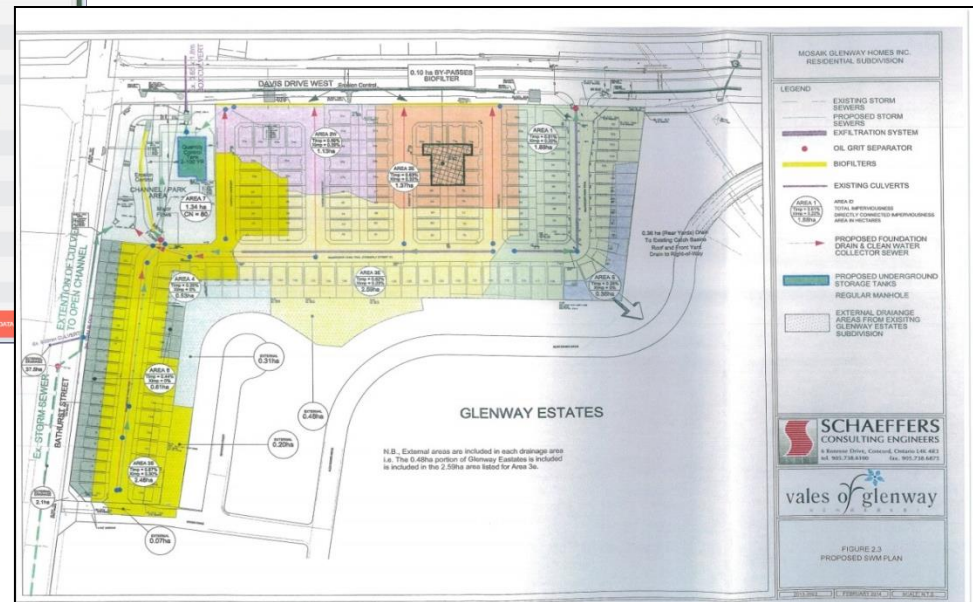


# Pre and post development



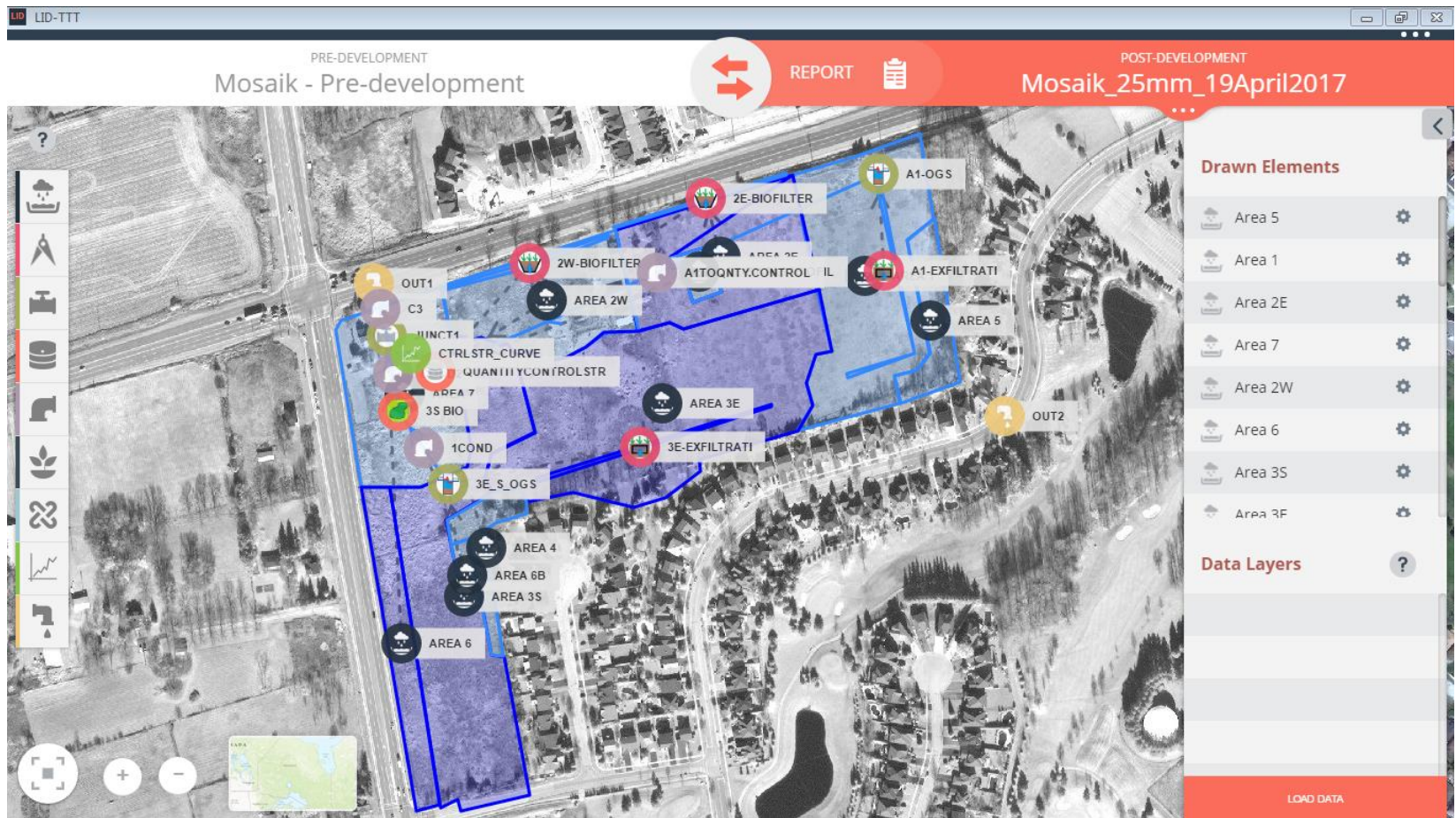
Pre-development

Post development

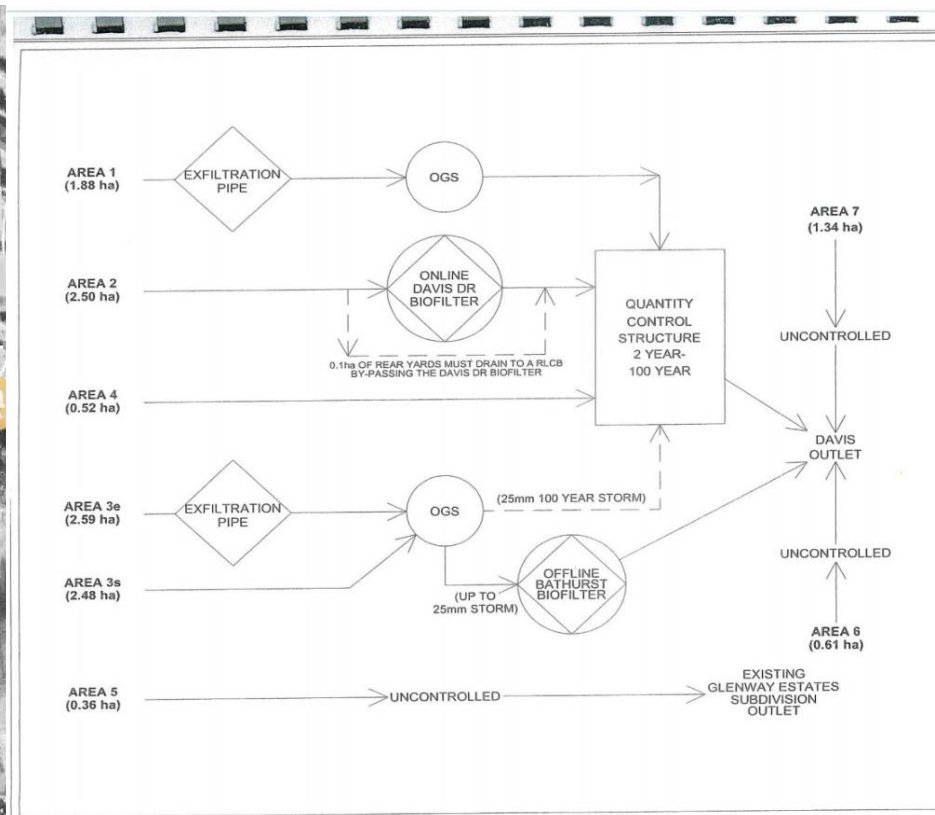
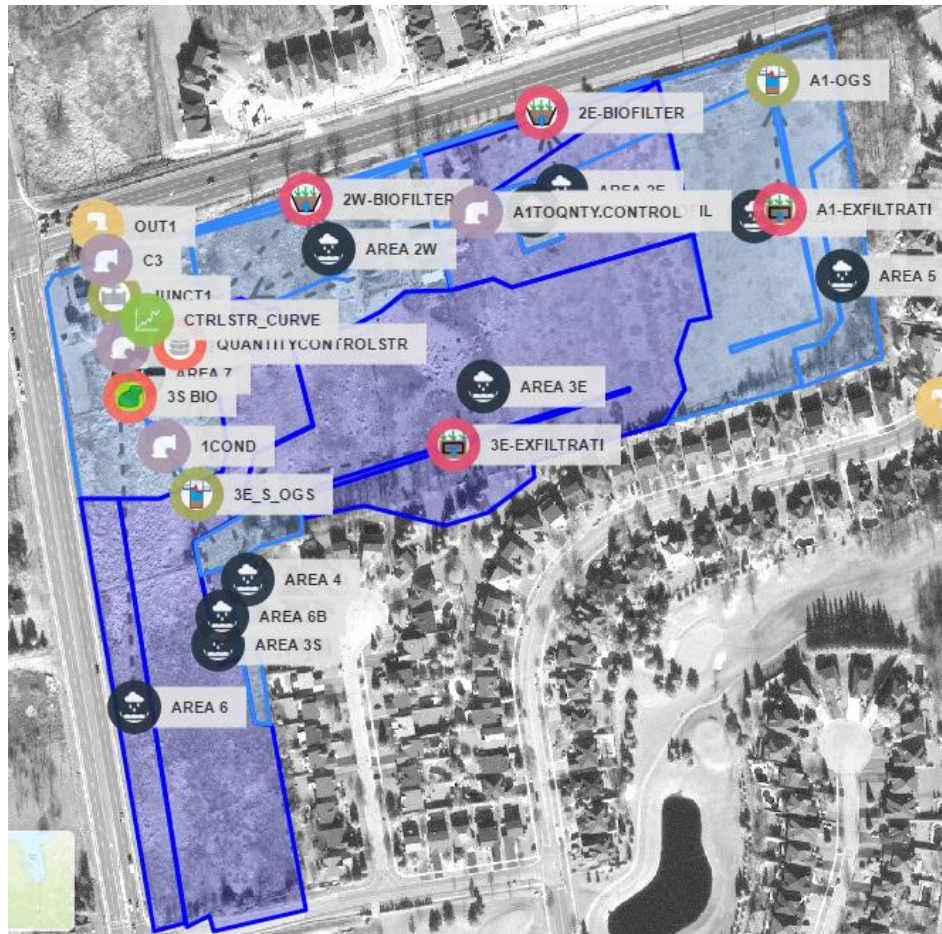




# Model Set-up



# Model Set-up: treatment train





# Stormwater Management Targets

Parameter	CRITERIA
Runoff Volume and Water Balance	12.5 mm on-site retention (25 mm aspirational target)
Peak Flow Control	Match pre-development peak flows
Water Quality	80% TSS load reduction

# Peak Flow, Water Quality and Water Balance

Param.	Criteria	LID TTT Results	Monitoring Results
Runoff Volume and Water Balance	12.5 mm on site retention (aspirational target of 25 mm)	<ul style="list-style-type: none"> <li>- Retained &gt; 12.5 mm and &lt; 25 mm</li> <li>- 79.7 % runoff reduction</li> </ul>	Site currently being monitored
Peak flow control	Post to pre control for 2 to 100-year	<p>Rtrn period, storm depth (mm), pre(m<sup>3</sup>/s), post(m<sup>3</sup>/s)</p> <p>2 yr (33.4 mm), 0.092, 0.352</p> <p>5 yr (44.3 mm), 0.24, 0.486</p> <p>10 yr (51.6 mm), 0.39, 0.597</p> <p>25 yr (60.7 mm), 0.625, 0.763</p> <p>50 yr (67.4 mm), 0.829, 0.914</p> <p>100 yr (74.1 mm), 1.058, 1.107</p>	Site currently being monitored



# Peak Flow, Water Quality and Water Balance

Param.	Criteria	LID TTT Results	Monitoring Results
Water Quality	80% TSS load reduction 80% TP load reduction	TSS: 78% reduction TP: 68% reduction	Site currently being monitored