TRIECA 2018 CONFERENCE

Thank you to all of our 2018 gold sponsors:

AQUATECH DEWATERING COMPANY

BIOCOMPOSITES GROUP

AECOM

terrafix geosynthetics inc.

R&M CONSTRUCTION

UNILOCK DESIGNED TO CONNECT.

Hydro International

filtrexx CANADA SUSTAINABLE TECHNOLOGIES let nature do it.

SOLENO Mastering Storm Water

GEMS

Credit Valley Conservation inspired by nature

TITAN ENVIRONMENTAL CONTAINMENT

armtec Solutions for a Better World

York Region

Lake Simcoe Region conservation authority

Media Partners

WATER CANADA THE COMPLETE WATER MAGAZINE

Hosts

CANIECA CANADIAN CHAPTER

Toronto and Region Conservation for The Living City

trieca.com | @TRCA_TRIECA

Stantec

TRIECA 2018

How Cool Are Cooling Trenches? Trench Monitoring in KW

Trevor Fraser

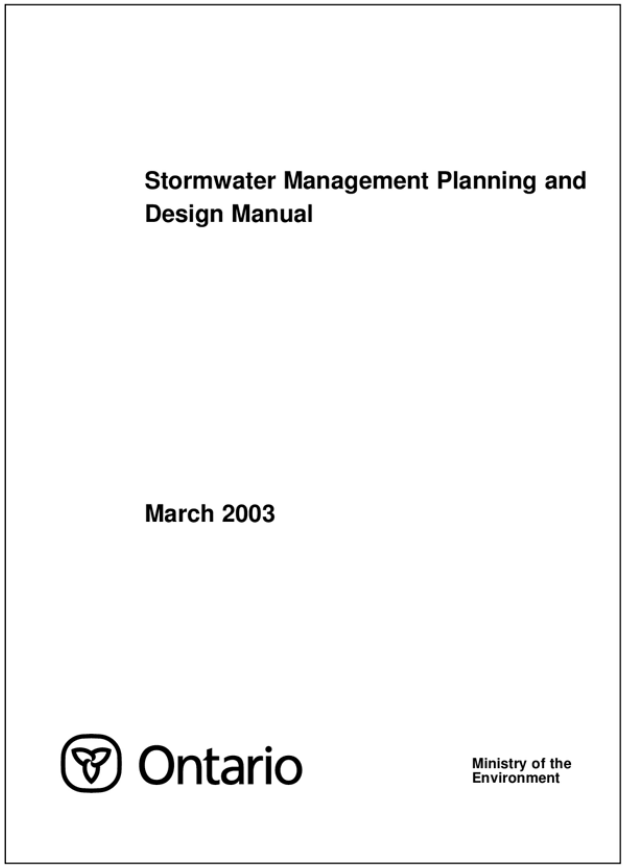
Agenda

1. A Cold Topic
2. Cooling Down – W+H?
3. A Refreshing Program
4. Interpretation
5. Other Techniques
6. Moving Forward

Introduction

A Cold Topic

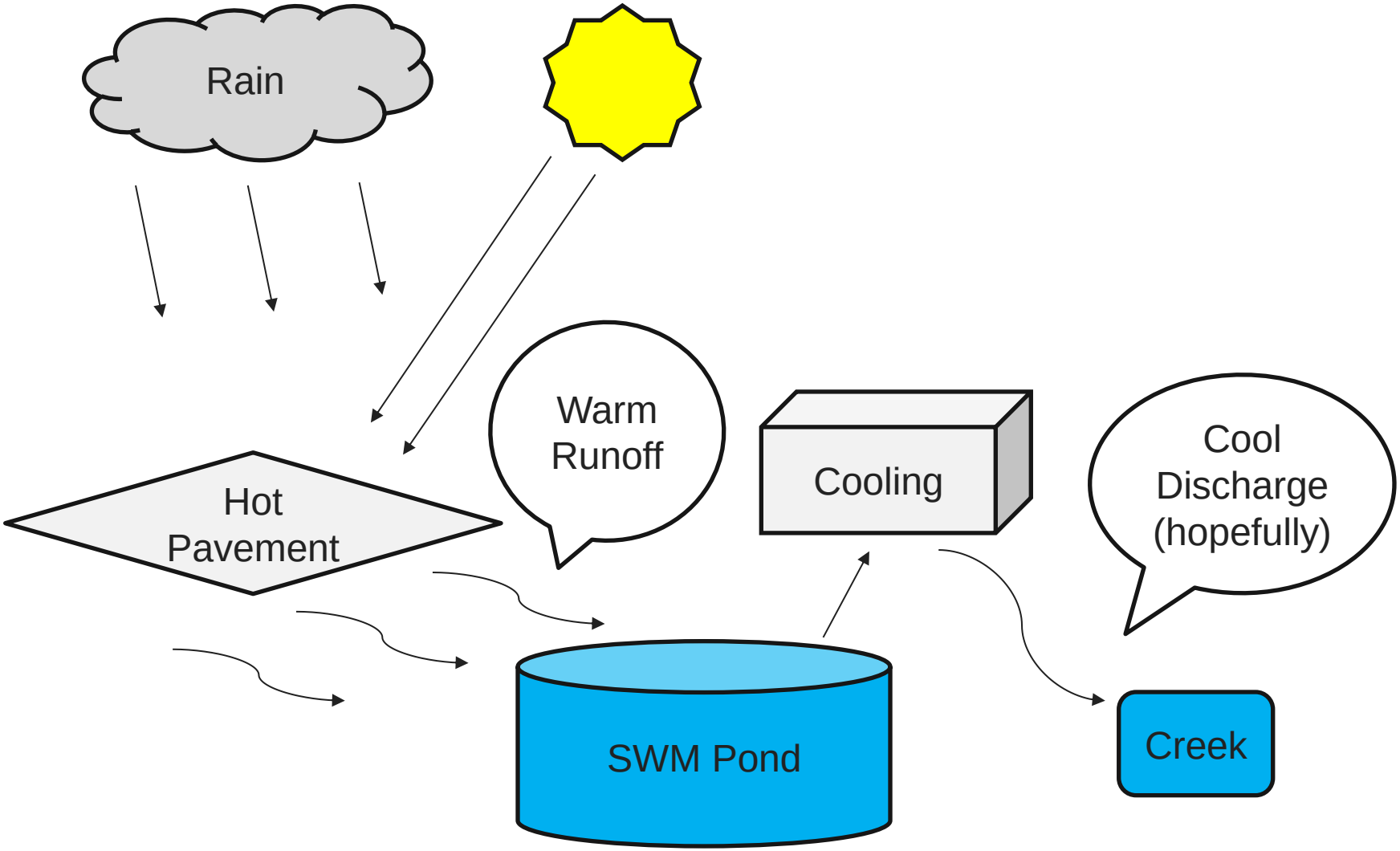
A Cool Introduction



- What is thermal mitigation?

- MOE (2003)
  - Pond Configuration
  - Riparian Planting Strategies
  - Bottom Draw Outlets
  - Subsurface Trench Outlet
  - Night-time Release
  - Outlet Channel Design

The Process – Simple Stuff



Cooling Down

The Why and the How

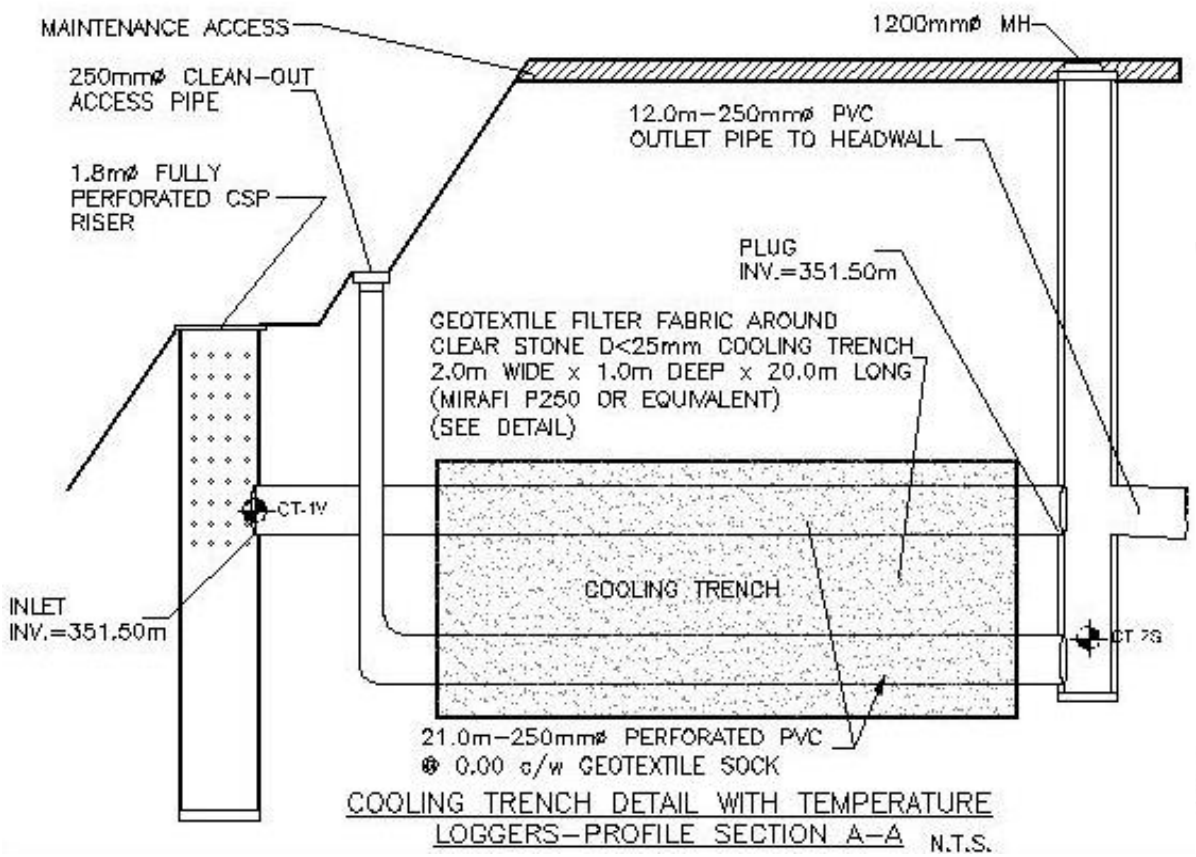
Why Be Cool in KW?

- Fish!
- Subwatershed Studies
- Regulations/Policies
- Development

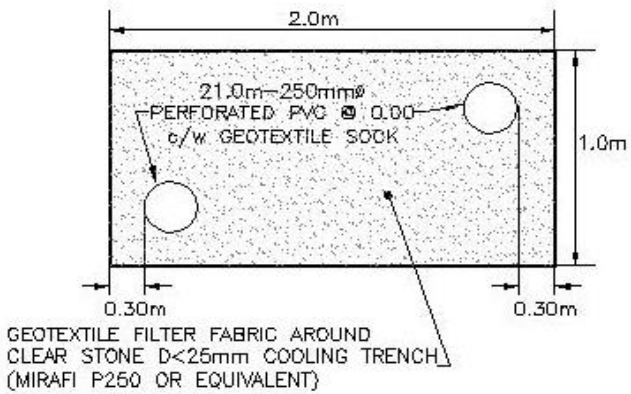
How To Be Cool in KW

- Different approaches over the years
  - Subsurface outlet
  - Residence time calculations
  - Heat transfer calculations
  - Groundwater
  - Design Storm Event
- Consistency

A Cross-Section



COOLING TRENCH DETAIL WITH TEMPERATURE LOGGERS-PROFILE SECTION A-A N.T.S.



COOLING TRENCH DETAIL CROSS-SECTION C-C N.T.S.


DEERE


DEERE


DEERE

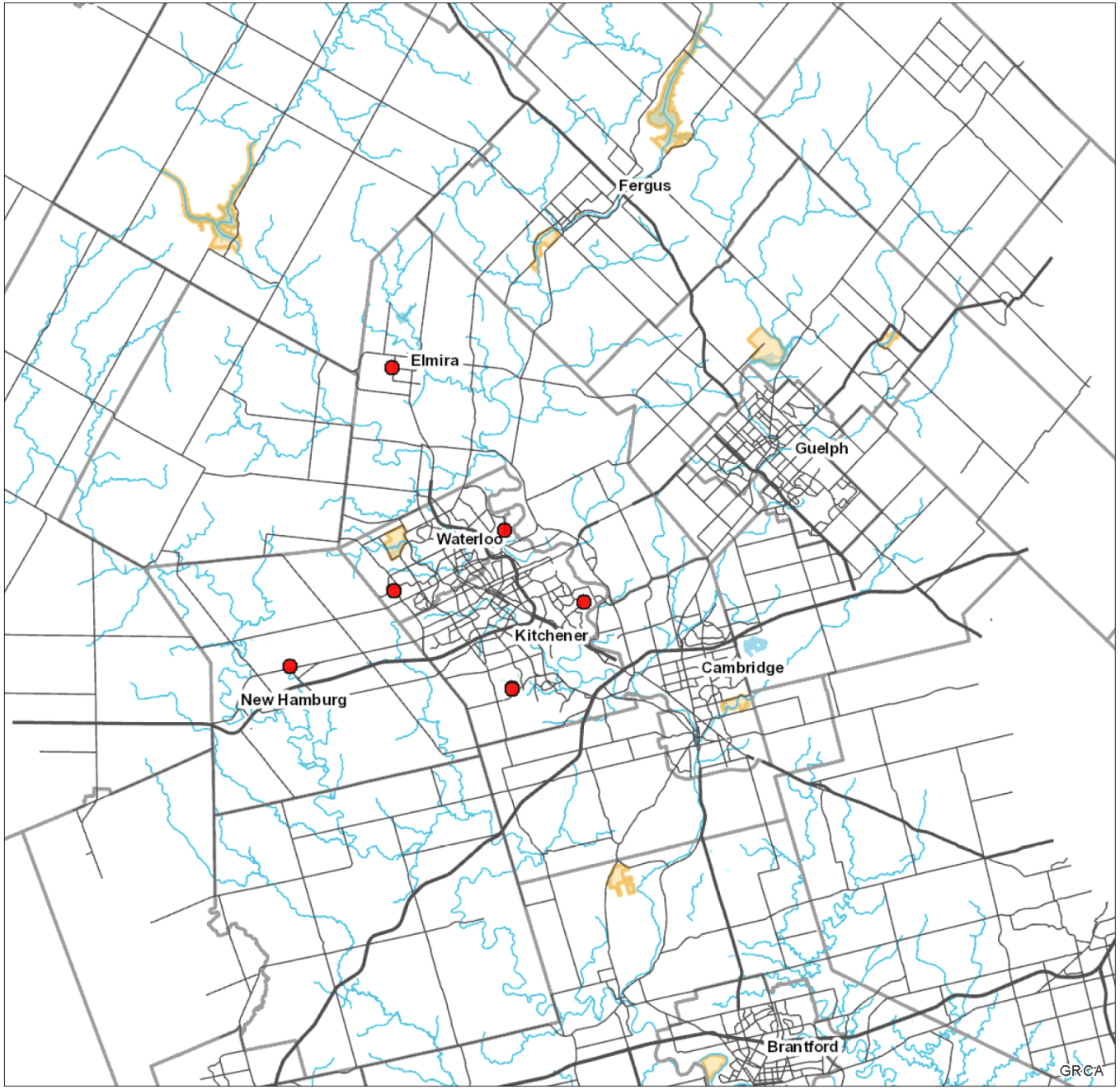

CHICOPEE HILLS

A Refreshing Program

Monitoring Program

Specifics!

- 2 Trenches in the City of Waterloo
- 3 Trenches in the City of Kitchener
- 1 Trench in Elmira (north of Waterloo)
- 1 Trench in the Booming Metropolis of Baden (west of Kitchener)
- 2 years (minimum)



Grand River Conservation Authority

Date: Mar 18, 2018

Author: Stantec

Cooling Trench Locations in RMOW

Mapping from Grand River Conservation Authority

Legend

- Municipal Boundary (GRCA)
- Watercourse - Regional (GRCA)
- Park - Regional (GRCA)
- Waterbody - Major (GRCA)
- Great Lakes - Regional (GRCA)

0 2,375 4,750 9,500 14,250 Metres

N

Map Centre (UTM NAD83 z17): 545,807.38 4,814,436.36

This map is not to be used for navigation

NAD 1983 UTM Zone 17N

Scale: 392,313


STAR

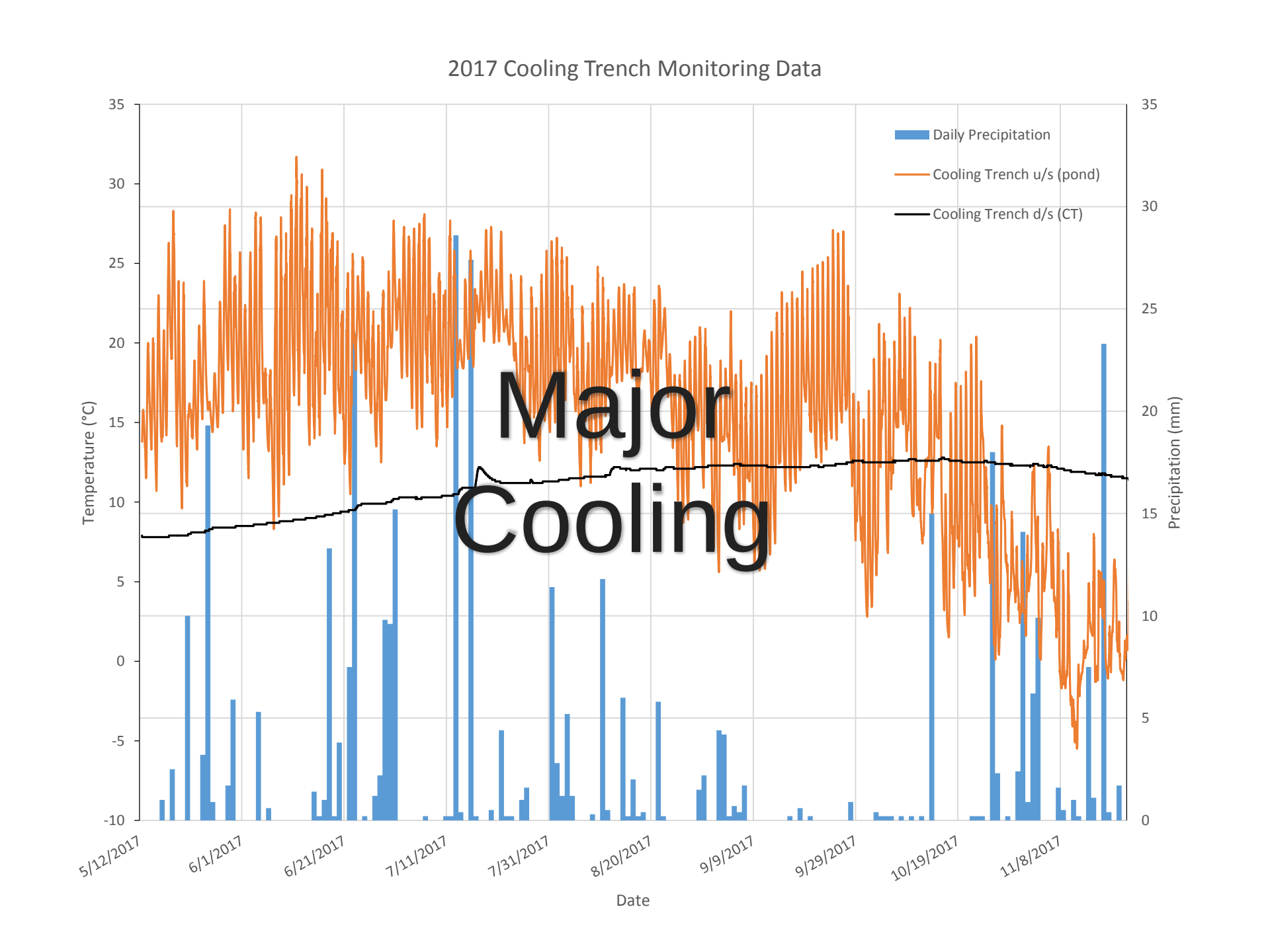

STANTEC

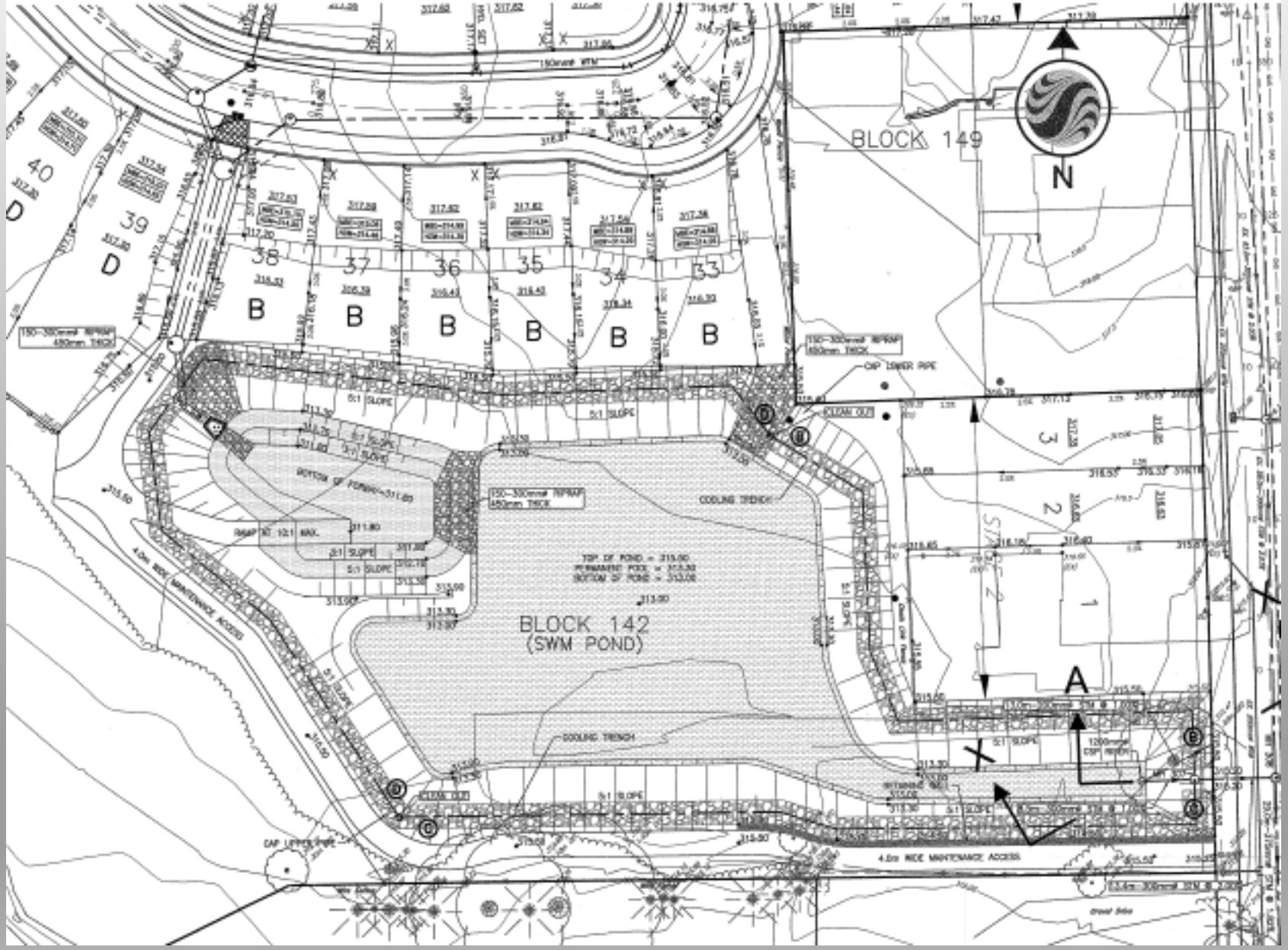
Design Parameters - Effectiveness

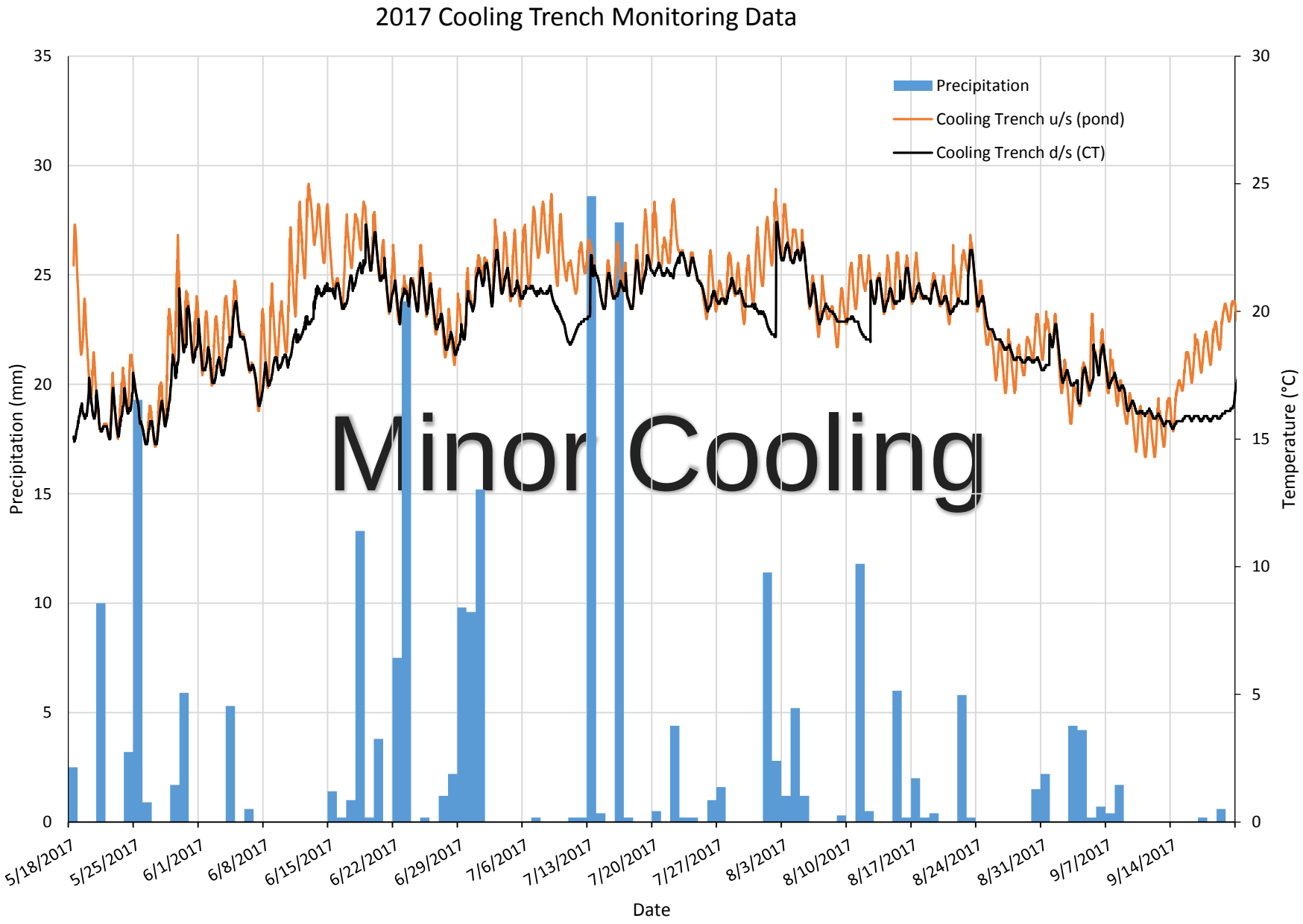
- Upstream catchment area characteristics
- Groundwater
- Residence time/flow path
- Length : Width
- Outlet design of pond
- Cost

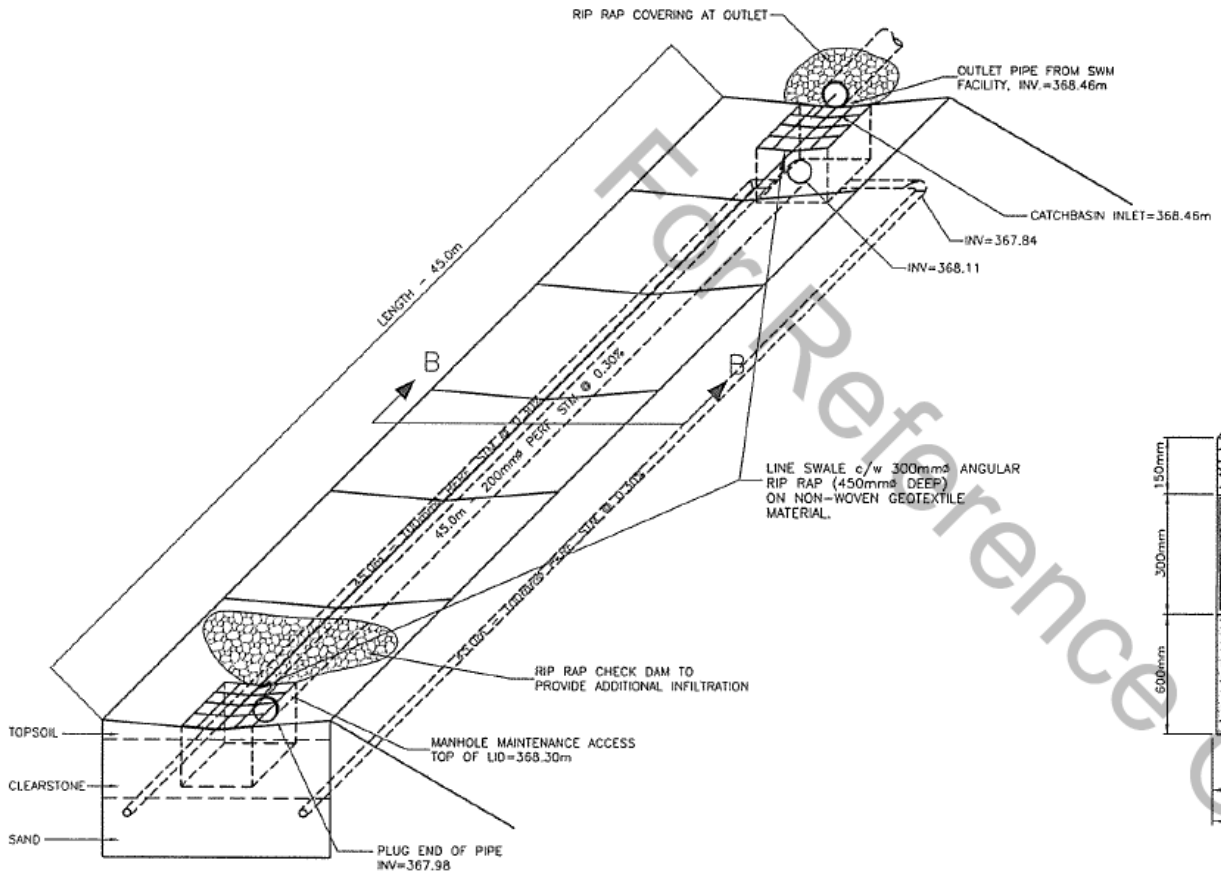
Interpretation

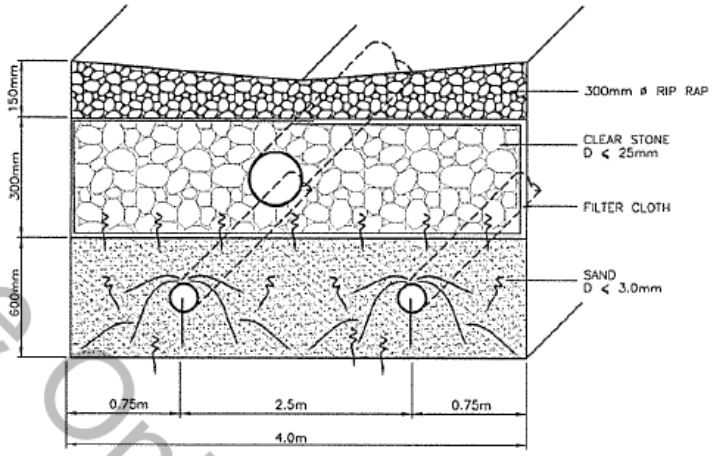
Results, Graphs, Numbers, Etc.


2017 Cooling Trench Monitoring Data
Daily Precipitation
Cooling Trench u/s (pond)
Cooling Trench d/s (CT)
Major Cooling
Temperature (°C)
Precipitation (mm)
Date
35
30
25
20
15
10
5
0
-5
-10
5/12/2017
6/1/2017
6/21/2017
7/11/2017
7/31/2017
8/20/2017
9/9/2017
9/29/2017
10/19/2017
11/8/2017

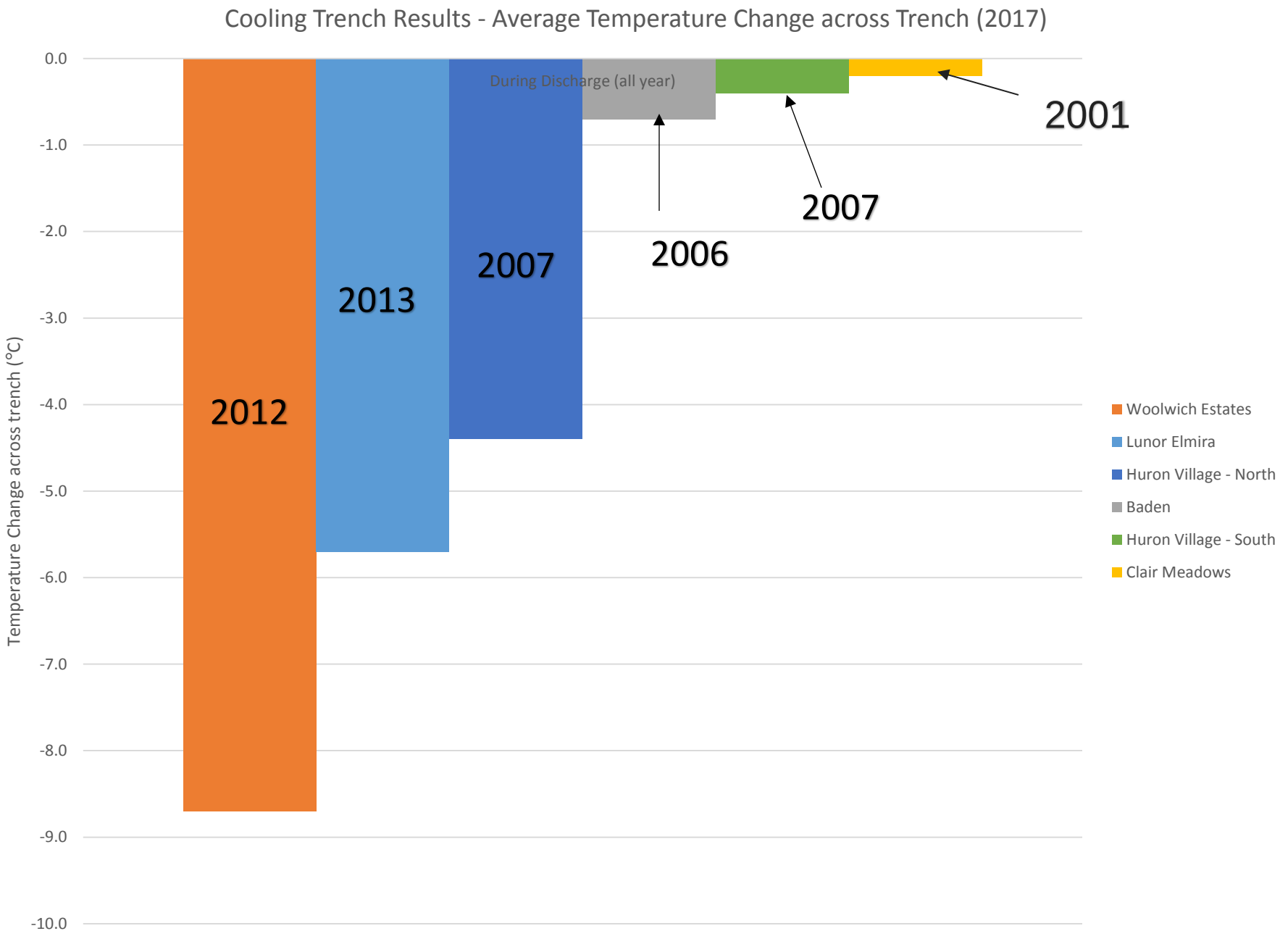

BLOCK 149
N
BLOCK 142
(SWM POND)
TOP OF POND = 315.00
PERMANENT POOL = 313.50
BOTTOM OF POND = 313.00
COOLING TRENCH
4.0m WIDE MAINTENANCE ACCESS
5:1 SLOPE
CAP LOWER PIPE
A
B
C
D
X
38
37
36
35
34
33
39
40
3
2
1


2017 Cooling Trench Monitoring Data
Precipitation
Cooling Trench u/s (pond)
Cooling Trench d/s (CT)
Minor Cooling
Precipitation (mm)
Temperature (°C)
Date
35
30
25
20
15
10
5
0
30
25
20
15
10
5
0
5/18/2017
5/25/2017
6/1/2017
6/8/2017
6/15/2017
6/22/2017
6/29/2017
7/6/2017
7/13/2017
7/20/2017
7/27/2017
8/3/2017
8/10/2017
8/17/2017
8/24/2017
8/31/2017
9/7/2017
9/14/2017





SECTION 'B'–'B'
TYPICAL CROSS–SECTION


Cooling Trench Results - Average Temperature Change across Trench (2017)
Temperature Change across trench (°C)
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
-6.0
-7.0
-8.0
-9.0
-10.0
2012
2013
2007
During Discharge (all year)
2006
2007
2001
Woolwich Estates
Lunor Elmira
Huron Village - North
Baden
Huron Village - South
Clair Meadows

What Have We Found?

- Groundwater
  - Effective
- Outlet design of pond
  - Bottom draw outlet may also contribute to cooling
- Residence time/flow path
  - Longer flow path = longer residence time = cooler temp
- Cost
  - More money = less problems = cooler temps (to a point)

Next Steps

Where Next?

Next Steps

- Low Impact Development (LID) – treat at-source is preferred
- MOECC Design Guidelines (20XX?)
- Multi-component approach is probably best
- Is there a place for cooling trenches?

Stantec

TRIECA 2018

How Cool Are Cooling Trenches? Trench Monitoring in KW

Trevor Fraser

TRIECA 2018 CONFERENCE

Thank you to all of our 2018 gold sponsors:

AQUATECH DEWATERING COMPANY

BIOCOMPOSITES GROUP

AECOM

terrafix geosynthetics inc.

R&M CONSTRUCTION

UNILOCK DESIGNED TO CONNECT.

Hydro International

filtrexx CANADA SUSTAINABLE TECHNOLOGIES let nature do it.

SOLENO Mastering Storm Water

GEMS

Credit Valley Conservation inspired by nature

TITAN ENVIRONMENTAL CONTAINMENT

armtec Solutions for a Better World

York Region

Lake Simcoe Region conservation authority

Media Partners

WATER CANADA THE COMPLETE WATER MAGAZINE

Hosts

CANIECA CANADIAN CHAPTER

Toronto and Region Conservation for The Living City

trieca.com | @TRCA_TRIECA