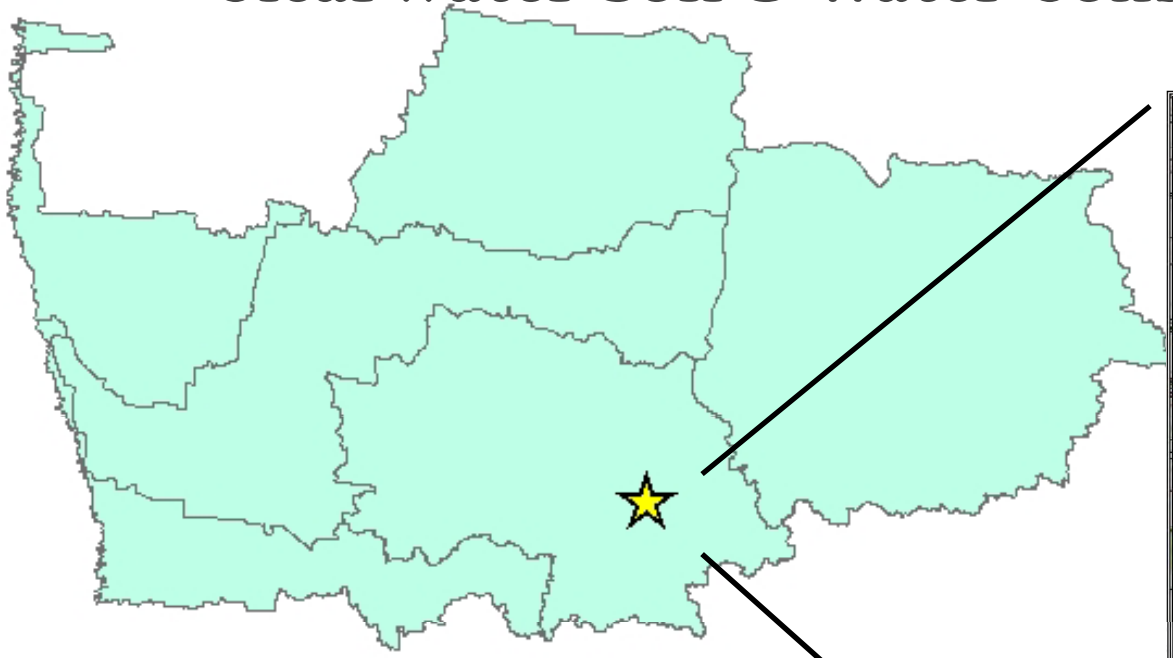
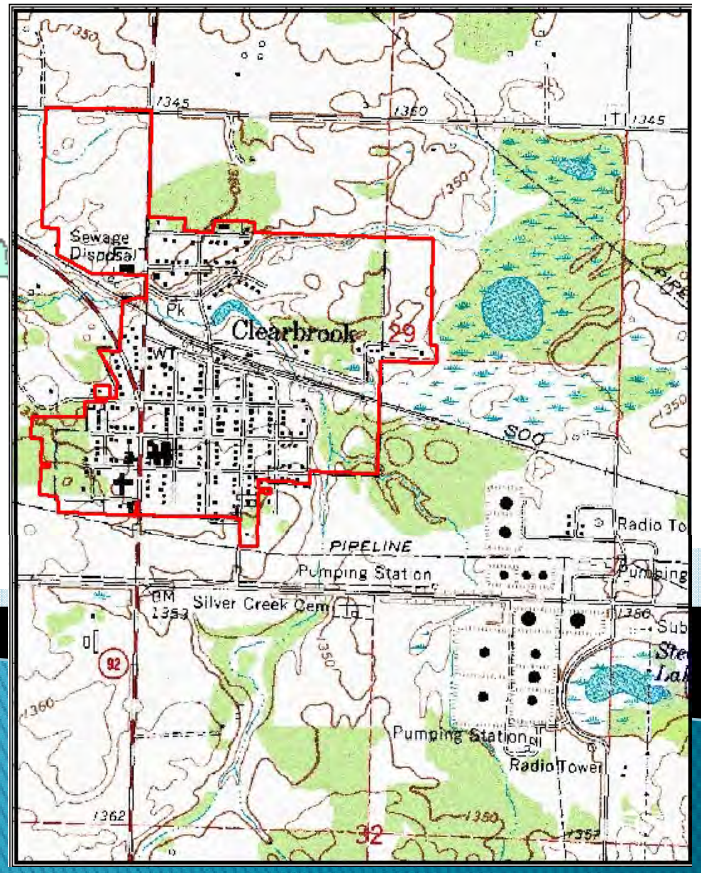
Clearbrook Urban Runoff Study

Clearwater Soil & Water Conservation District



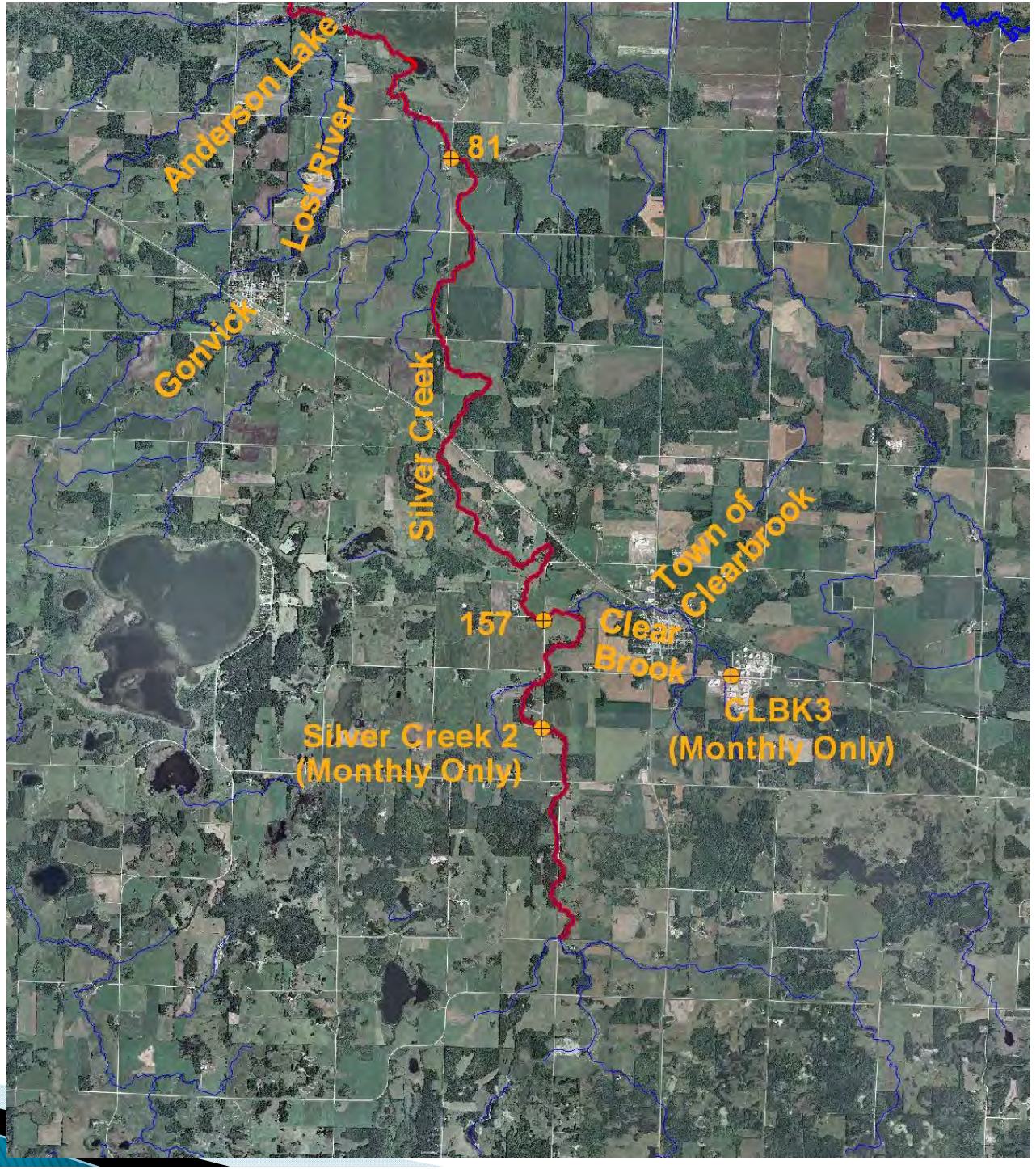


Presentation Prepared for the Red Lake Watershed District

Project Need

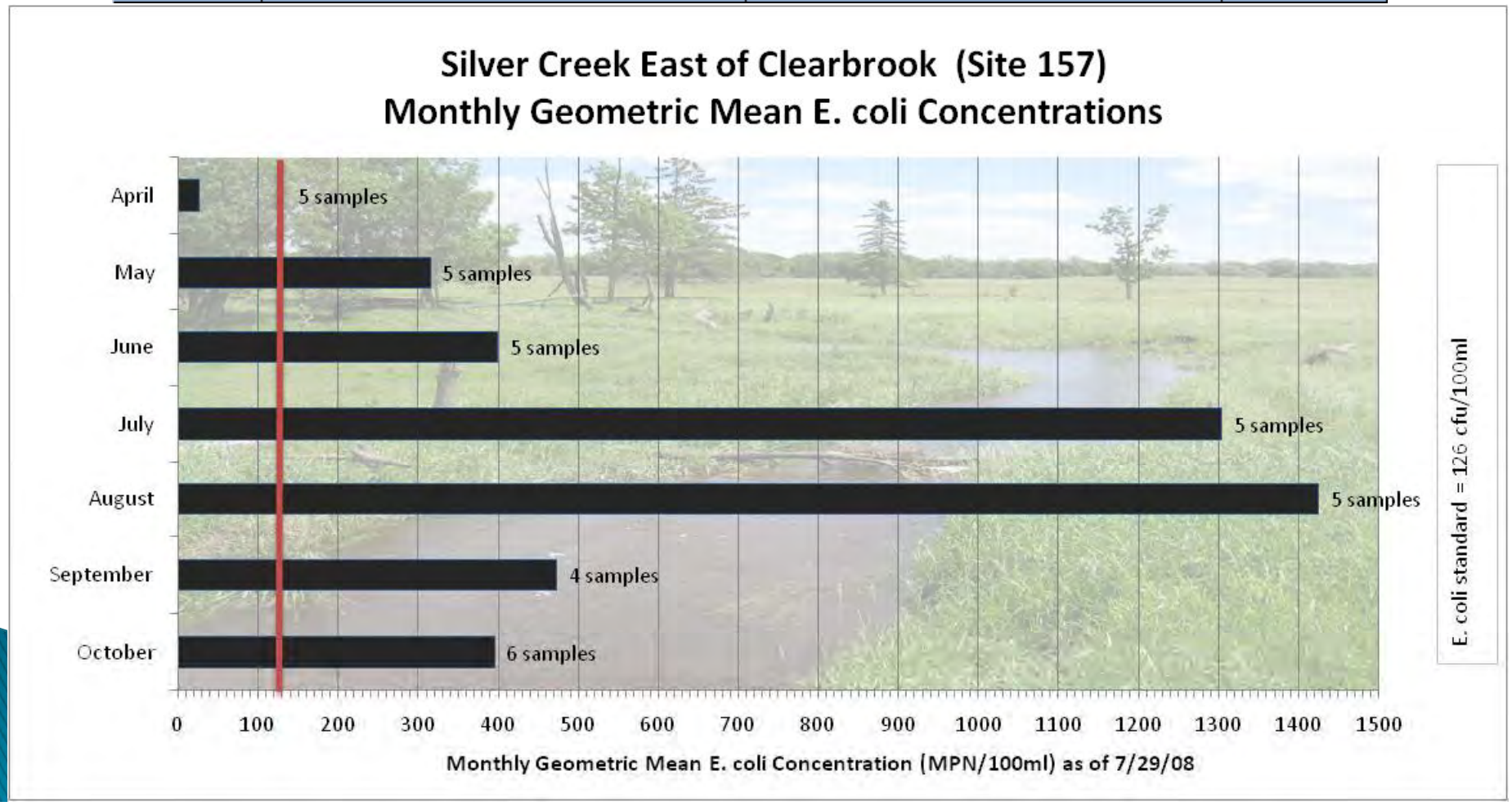
- RLWD Clearwater River Small Cities Stormwater Study – WQ Monitoring
- Gonvick OK
- Town of Clearbrook clearly impacting stream of the same name that runs through town
- Off the charts fecal coliform downstream of town
- Extremely high sediment and nutrients in stormwater outlet sample

Silver Creek Impairment

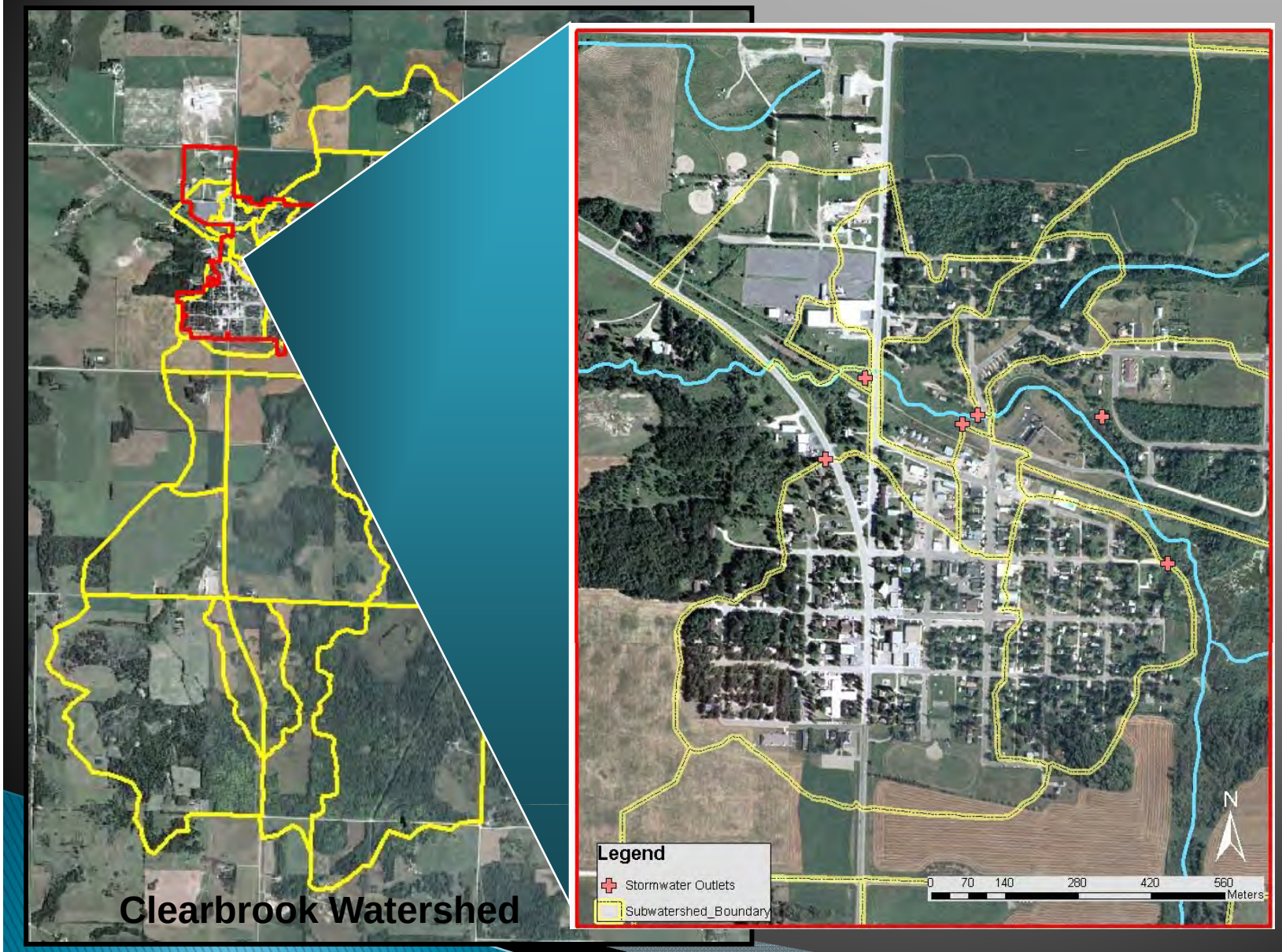


Silver Creek E. coli Impairment Data Assessment

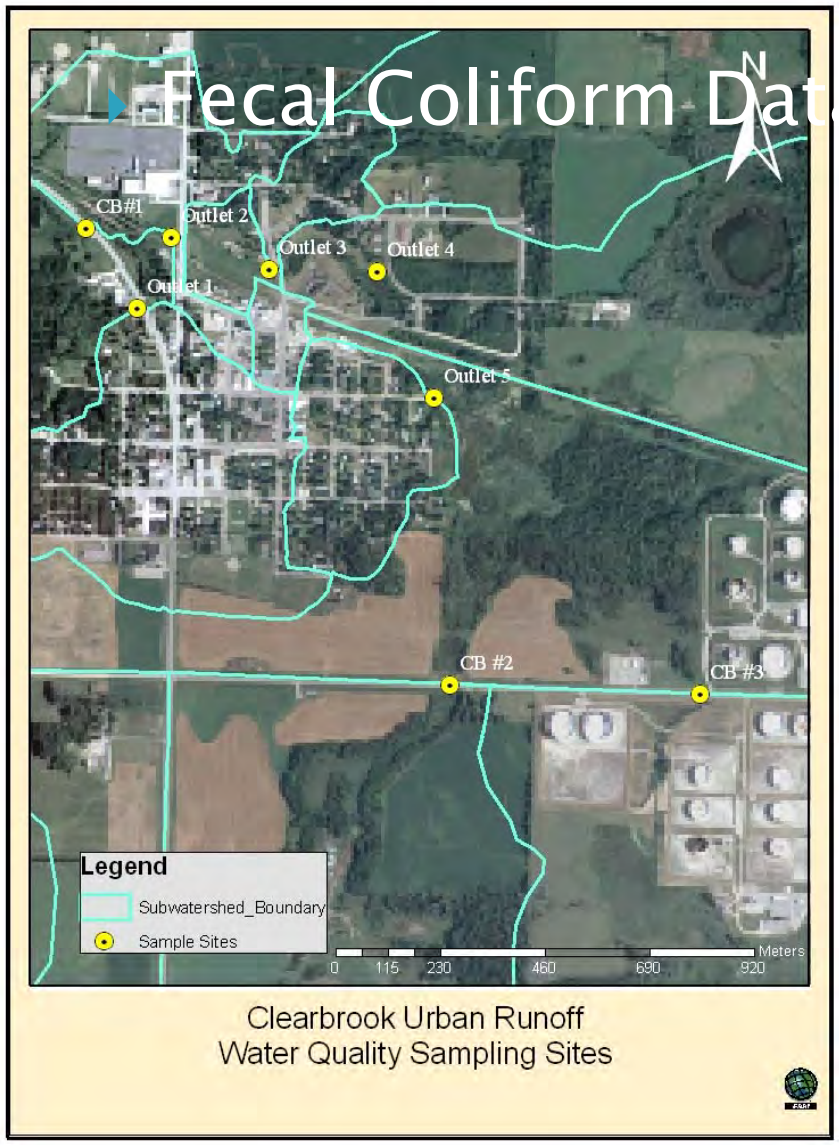
E. coli - Step 1			
# of Measuren	# of Exceedances	% Exceedance	Standard
35	28	80%	126 CFU/100ml
35	7	20%	1260 CFU/100ml



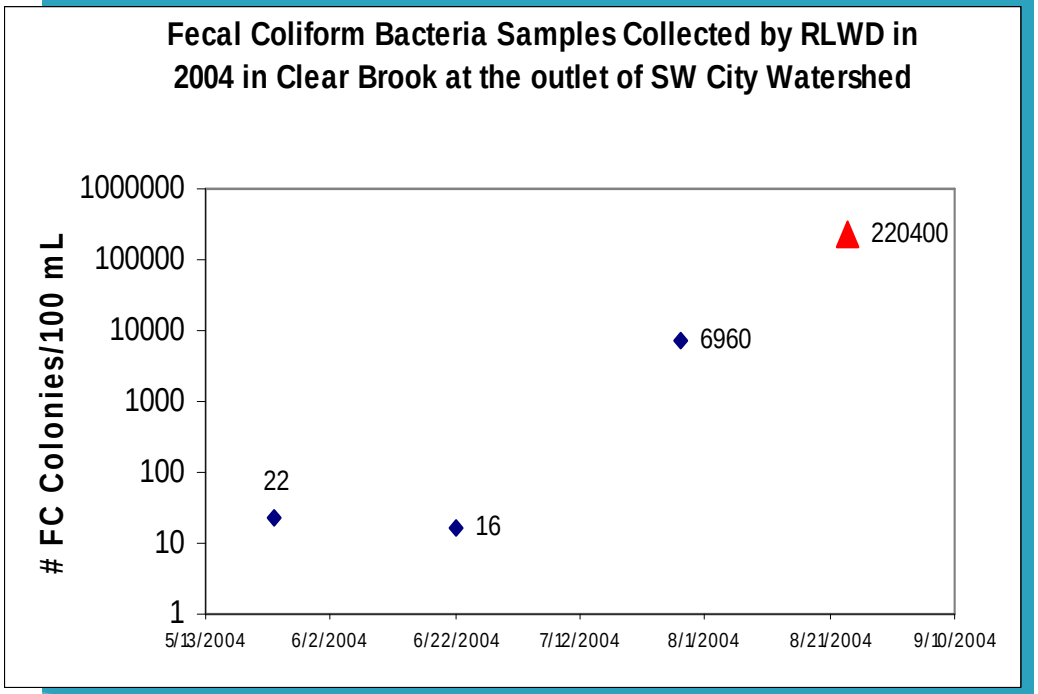
Urban Runoff Study Areas



Water Quality Results



Dates sampled	7/28/04	8/24/04
CB #1- Downstream	>6960	197400
CB #3 Upstream of City	3248	928



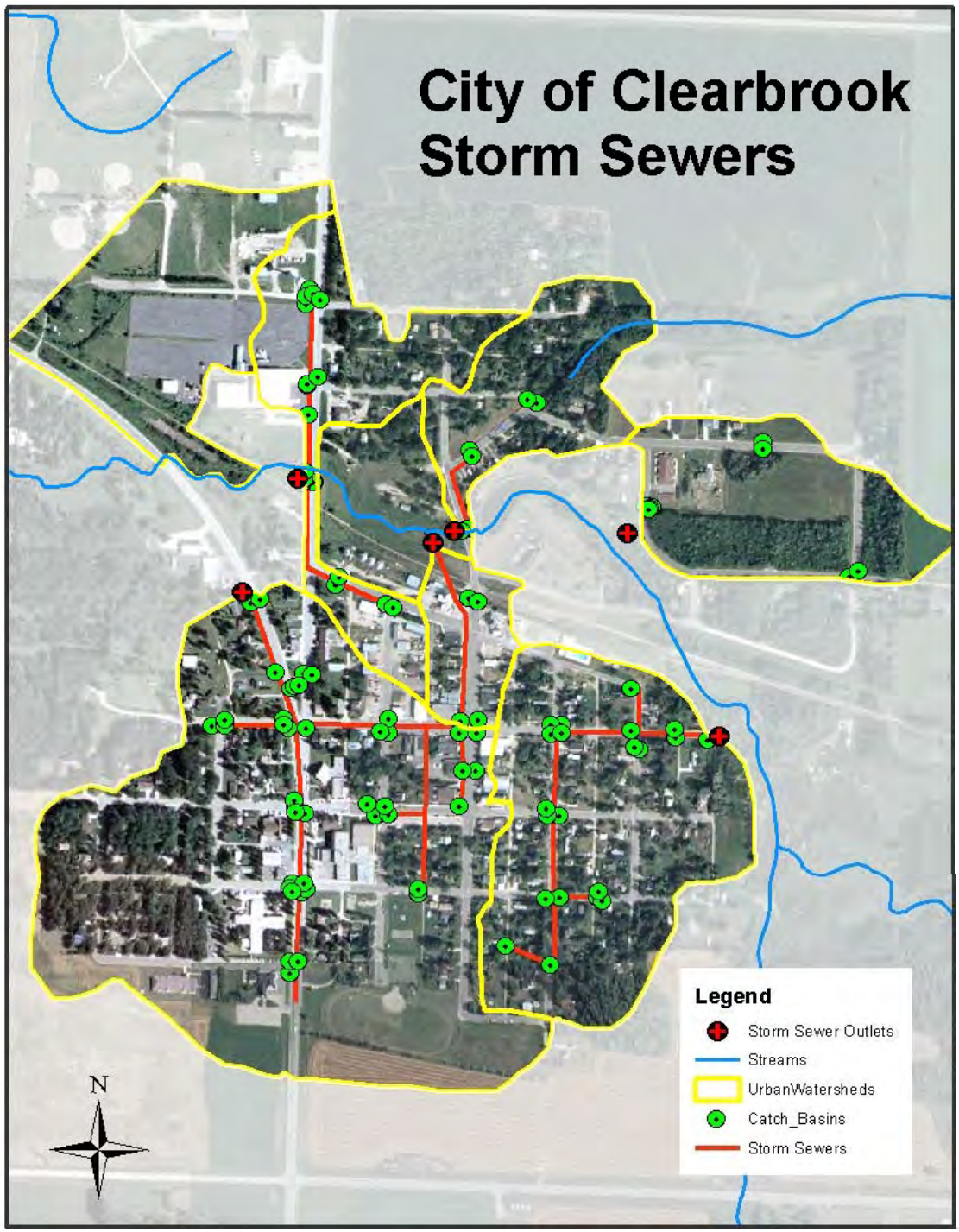
Water Quality Data at Storm Sewer Outlets

Clearbrook Water Quality Data At Storm Sewer Outlets

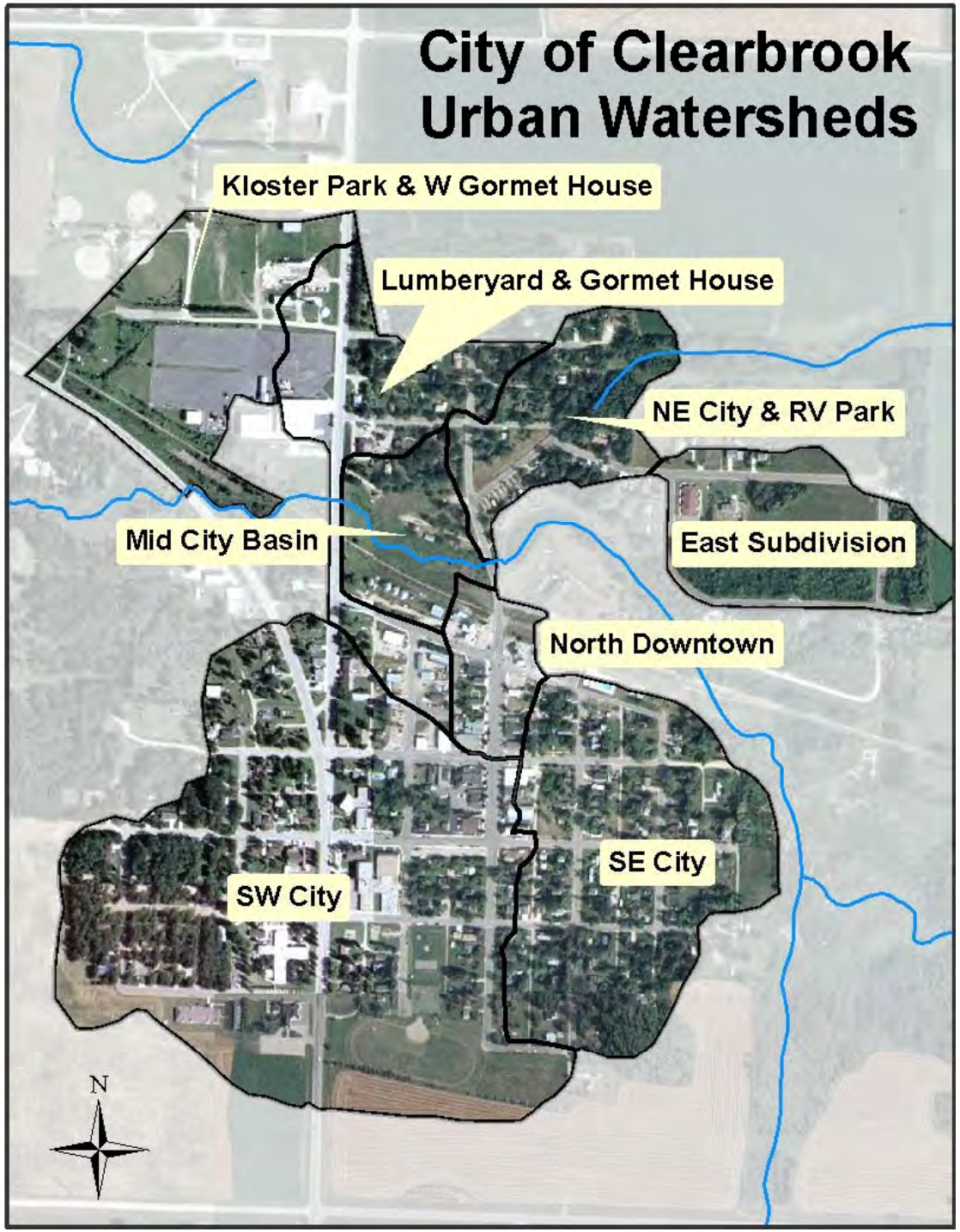
Outlet	Location	Date	Time	Stage Tape MD	State Samples Collected	TP	OP	TSS	Comments
1	near body shop	9/15/2004	14:10	2.21	TP, OP, TSS	0.151	0.098	14	Steady rain while sampling
2	Outlet near wild rice plant and CR5 crossing	9/15/2004	14:15	2.51	TP, OP, TSS	2.63	1.98	92	Steady rain while sampling
3	Outlet in park	9/15/2004							Unable to locate - outlet is in the stream
4	Outlet on NE side of town	8/15/2004	14:25	2.31'	TP, OP, TSS	0.06	0.042	8	Steady rain while sampling
5	Furthest upstream outlet on the SE side of town	9/15/2004	14:35	0.37	TP, OP, TSS	0.192	0.112	37	Steady rain while sampling

Clearwater SWCD BWSR Challenge Grant

- Storm-shed mapping and assesment
- Public involvement and collection of stormwater data
- P8 Modeling
- Survey and Design

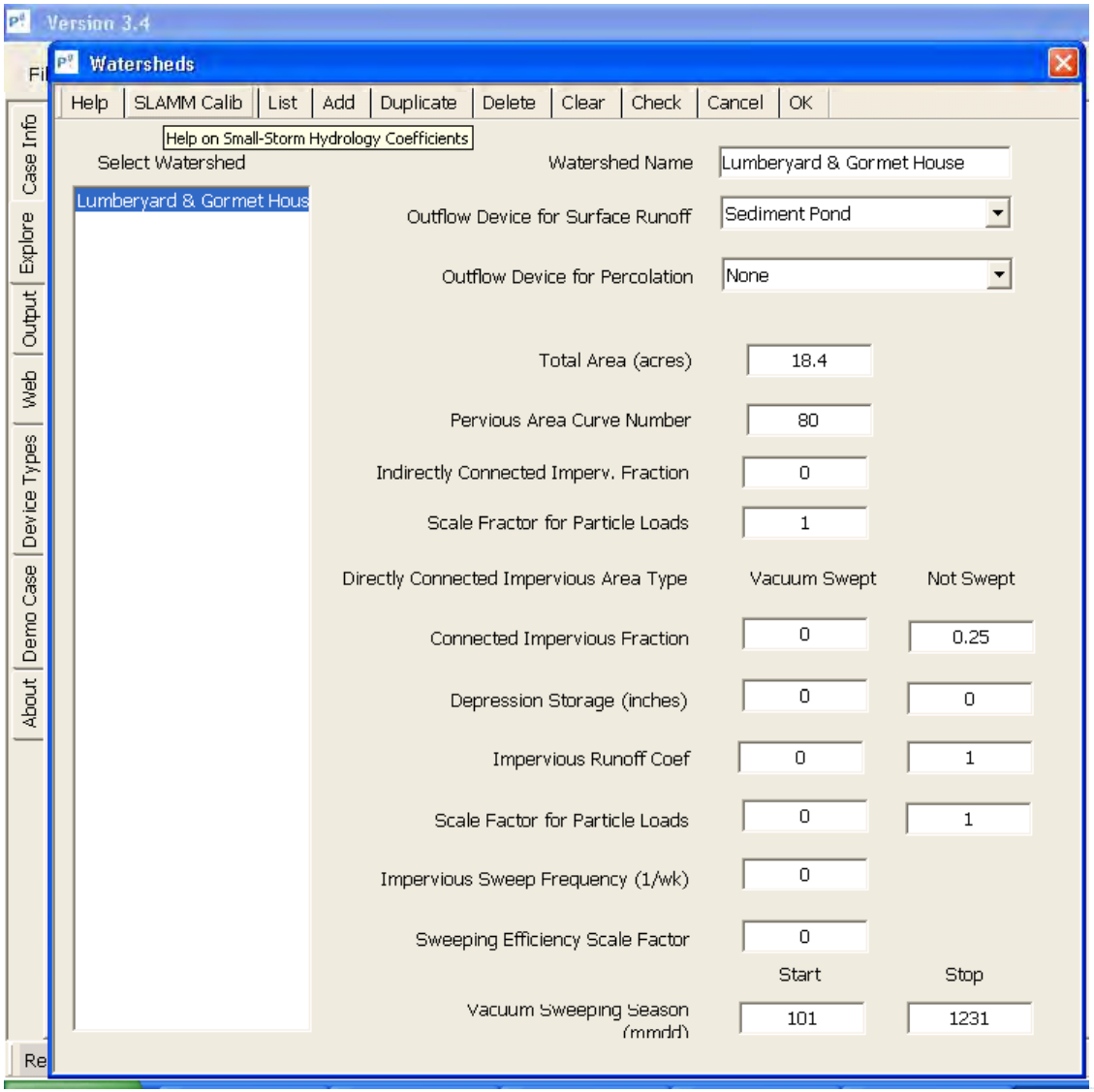

City of Clearbrook
Storm Sewers
Legend
Storm Sewer Outlets
Streams
UrbanWatersheds
Catch_Basins
Storm Sewers
N

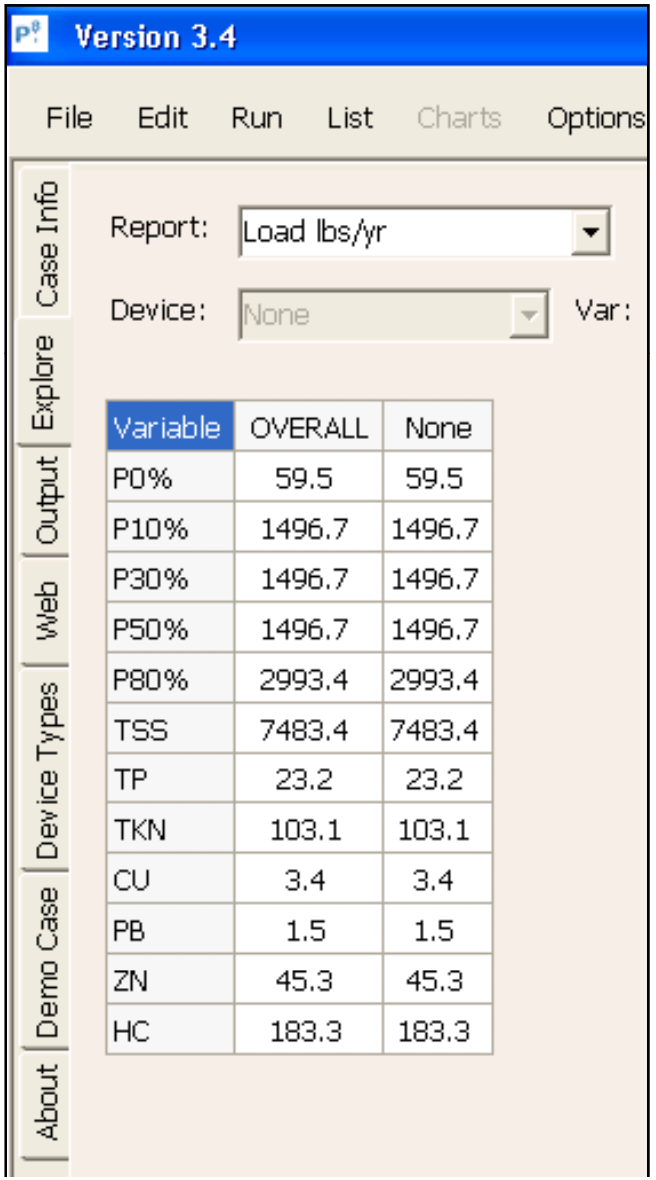
Clearbrook Storm-sheds



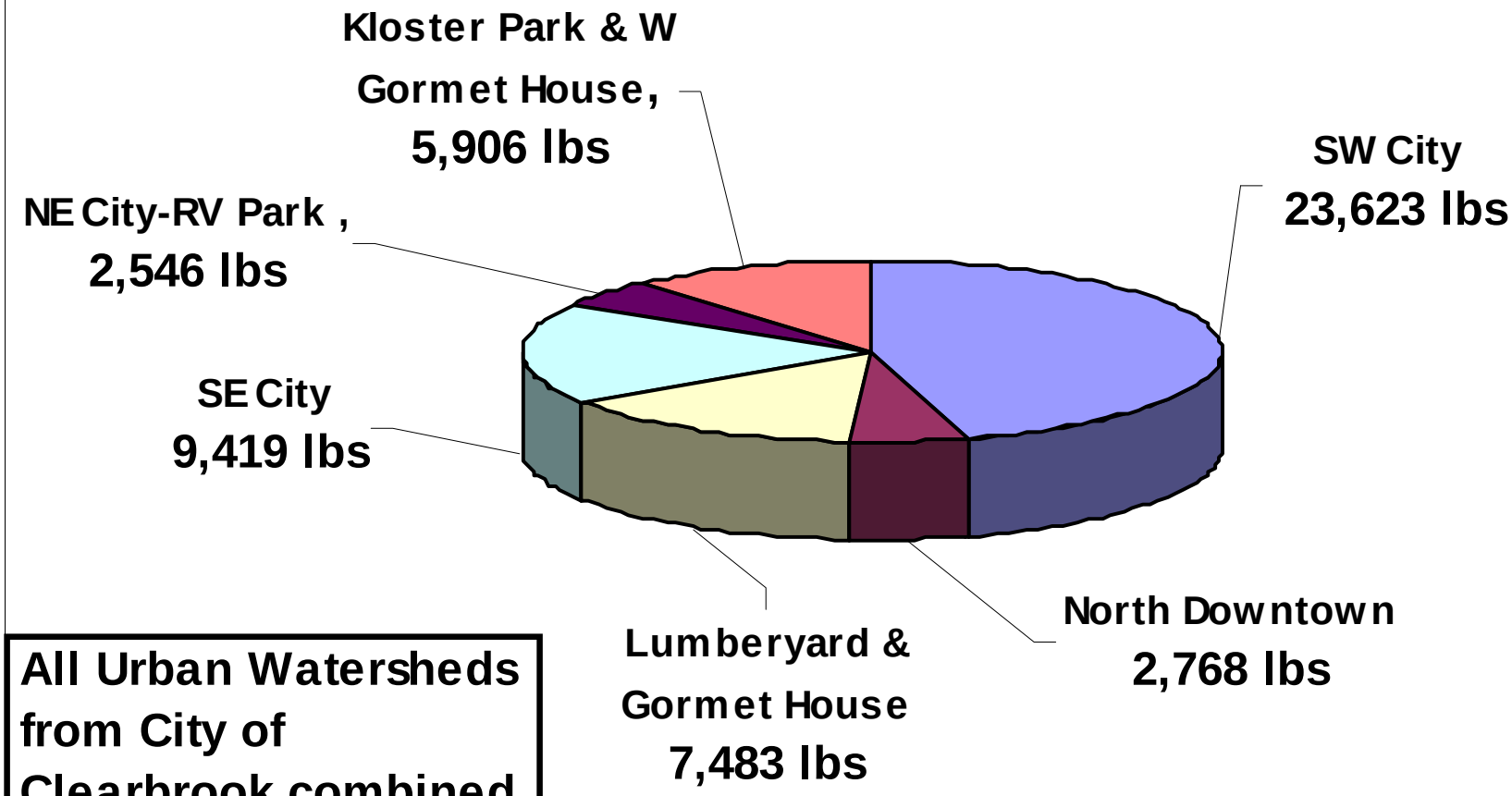
P8 Urban Catchment Model

Program for predicting polluting particle passage through pits ponds, and puddles.





Pounds of Sediment Coming from each Urban Watershed Annually.



All Urban Watersheds from City of Clearbrook combined Contribute 51,745 lbs of sediment to Clear Brook Annually

"That's almost 2 full dumptrucks of sediment entering the stream each year from the City of Clearbrook."

Top Priority Watersheds

Gormet House & Lumberyard

-50% Impervious

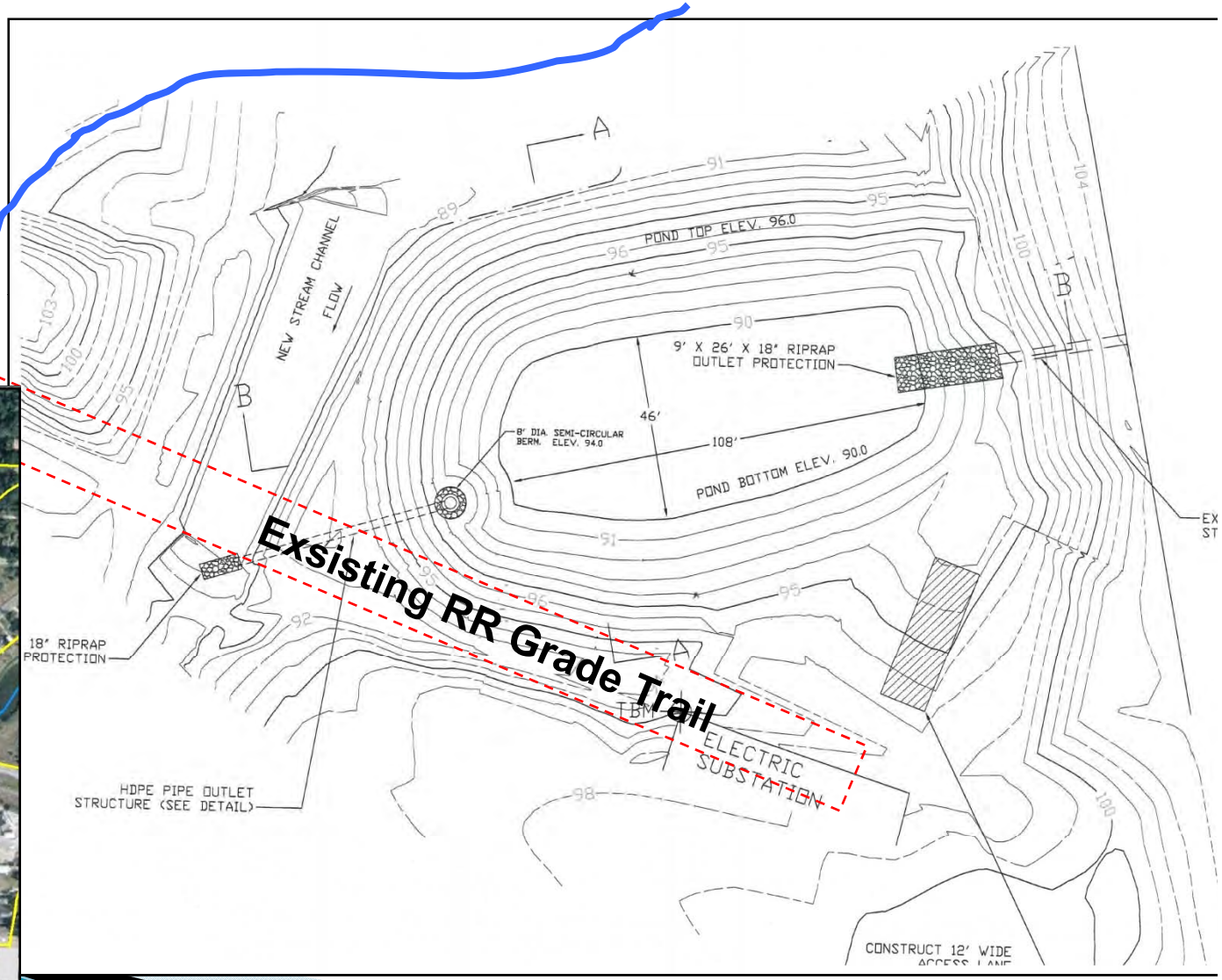
-Water Quality Samples Suggested High level of Nitrogen coming from this watershed.

-Gourmet House, NCS, City Garage, Lumberyard, Charp's Welding shop, are all found in this watershed.

-Incorporated pond design with flood reduction component in mind, removal of culverts under old RR grade trail.

-City owned Property.

Storm water pond site & design



Top Priority Watersheds

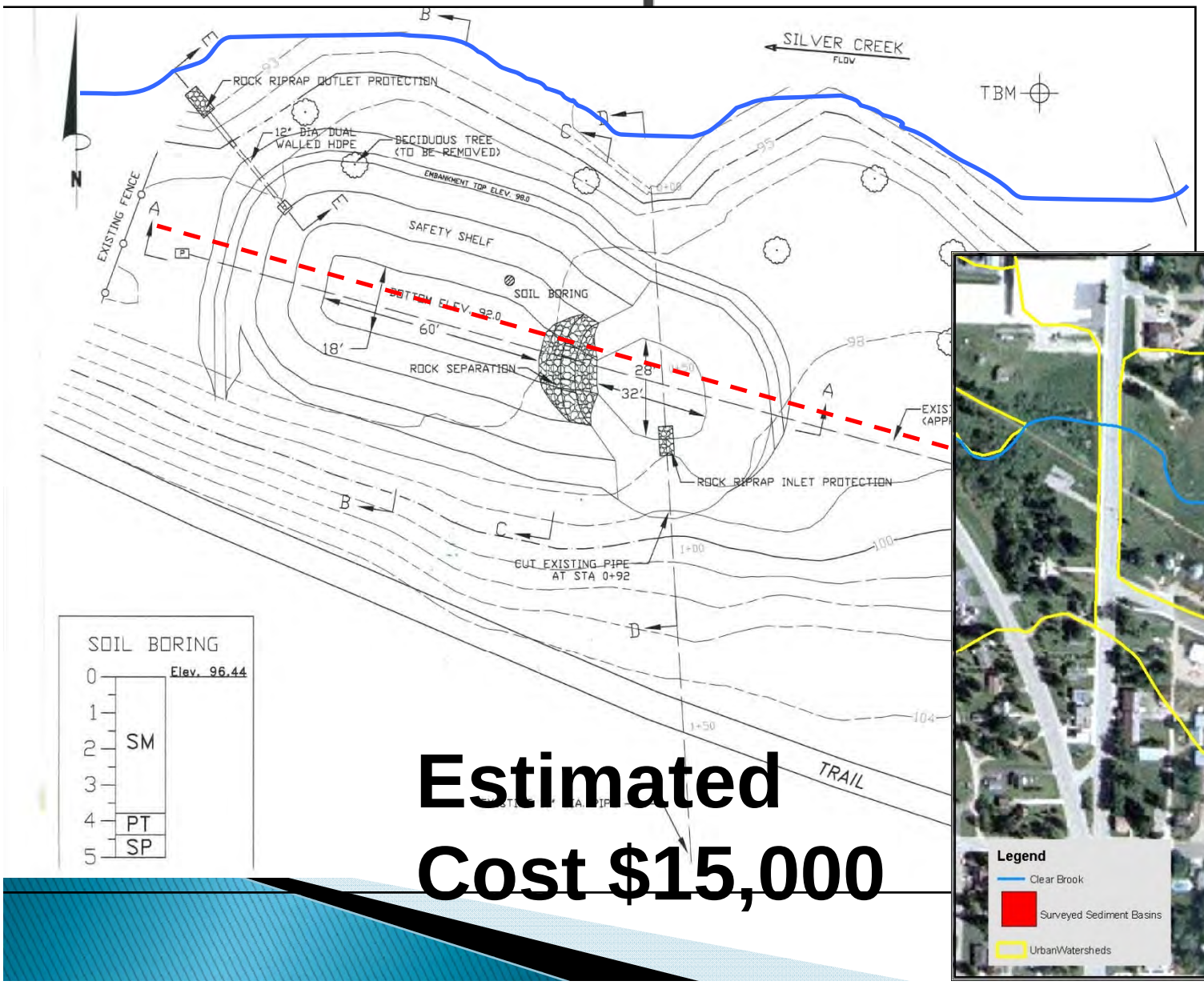
North Downtown

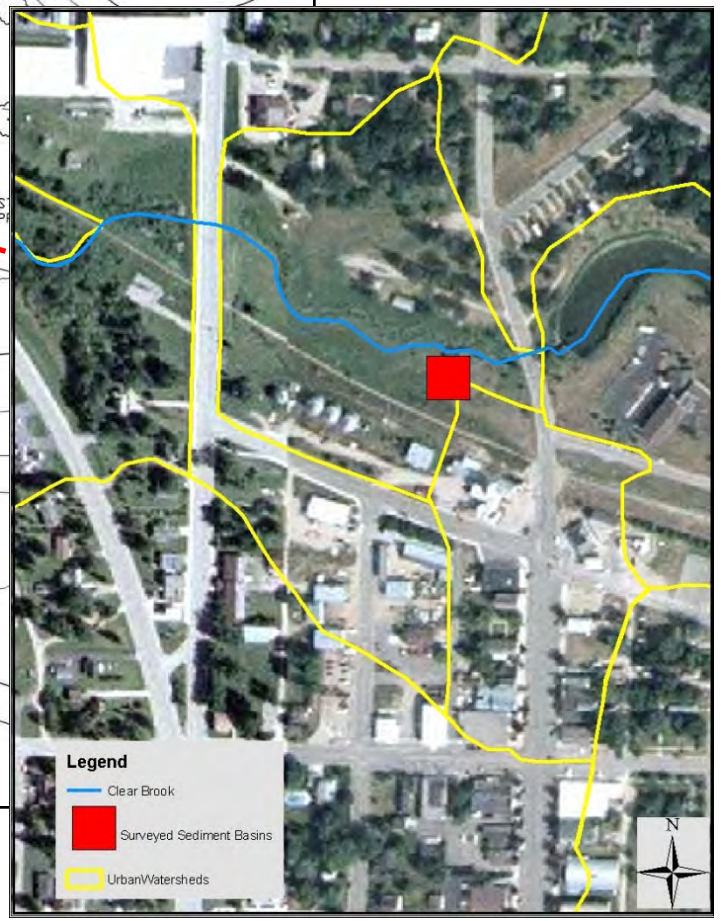
-82% Impervious

-Area of watershed covers only 3% of total Clearbrook urban watershed area, but because of it's highly impervious land use it contributes 16% Runoff during a 1" rain event

- Easy end of pipe treatment, upland with room to spare, city owned property.

Storm water pond site & design





Estimated Cost $15,000

Table showing Storm Water Ponds Performances

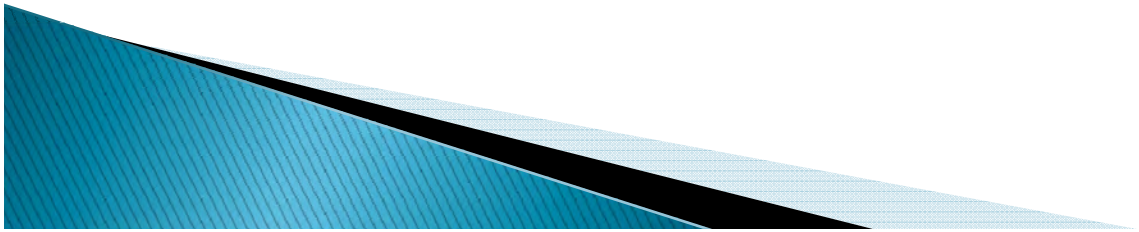
Two Watersheds After Treatment with Proposed Sediment Basins

Storm Runoff Loads & Removal Efficiencies of Designed Sediment Ponds From a 1 inch Rainfall Event to Clearbrook Creek from 6 Watershed in the City of Clearbrook. **P8 data based on a simulated mid-summer one-inch rainfall event spanning 72 hrs.**

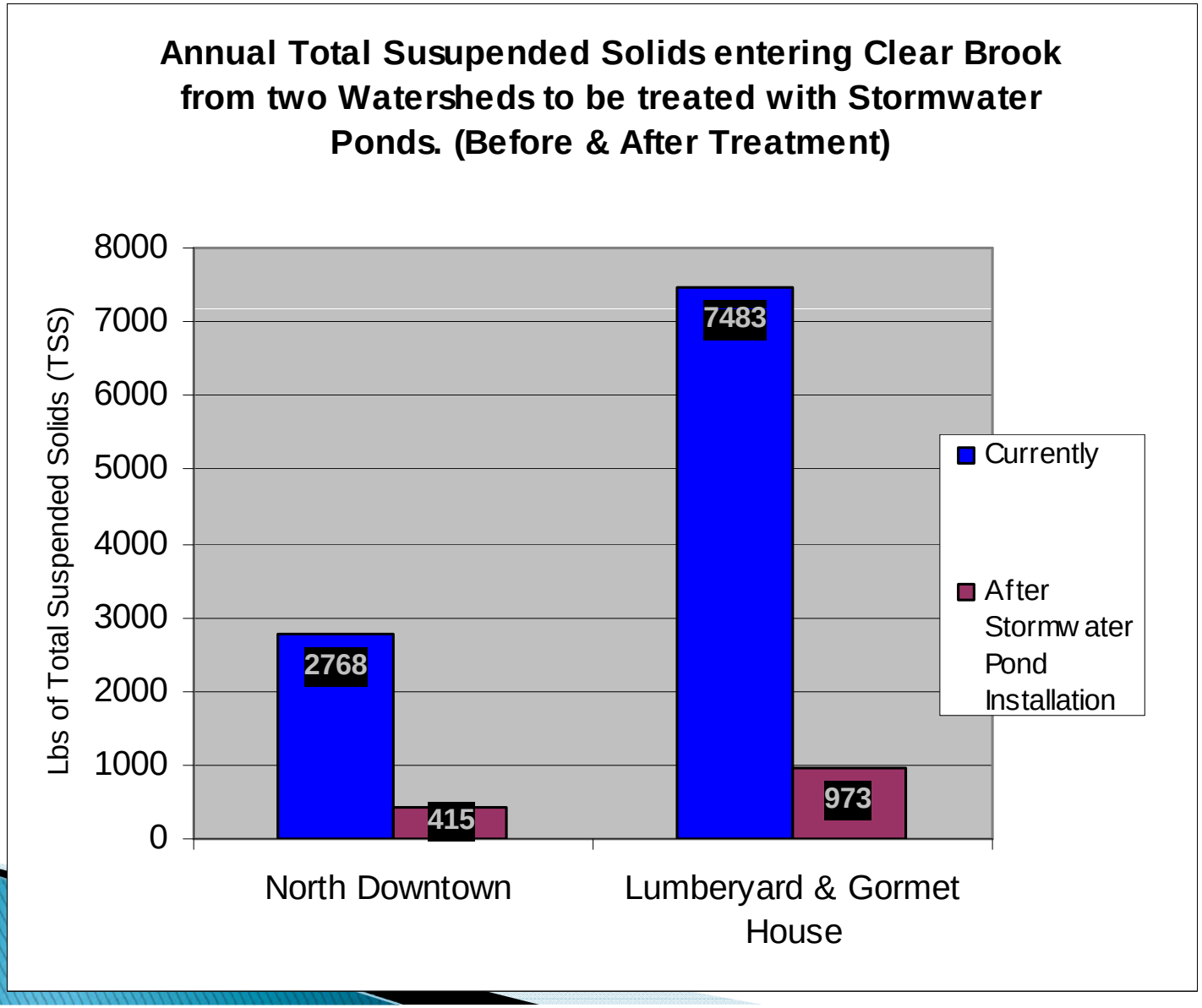
Watershed	Acres	Impervious Percent**	Run-off (Ac-ft)	Sediment Loading (TSS-lbs)	Designed pond removal efficencies	lbs of TSS after treatment	Phosphorous Loading (TP-lbs)	Designed pond removal efficencies	lbs of TP after treatment	Nitrogen Loading (TKN-lbs)	Designed pond removal efficencies	lbs of TKN after treatment
North Downtown	6.4	82%	1.4	89	73%	24.03	0.3	37%	0.19	1.5	30%	1.05
Lumberyard & Gourmet House	18.4	50%	1.1	234	78%	51.48	0.8	42%	0.46	4	35%	2.6

Average Annual Storm Runoff Loads to Clearbrook Creek from 6 Watersheds in the City of Clearbrook. **P8 data based on Hourly Precipitation and Dail Average Temperature Data from MRCC weather Station in Fosston, MN (1989-1993 April-October).**

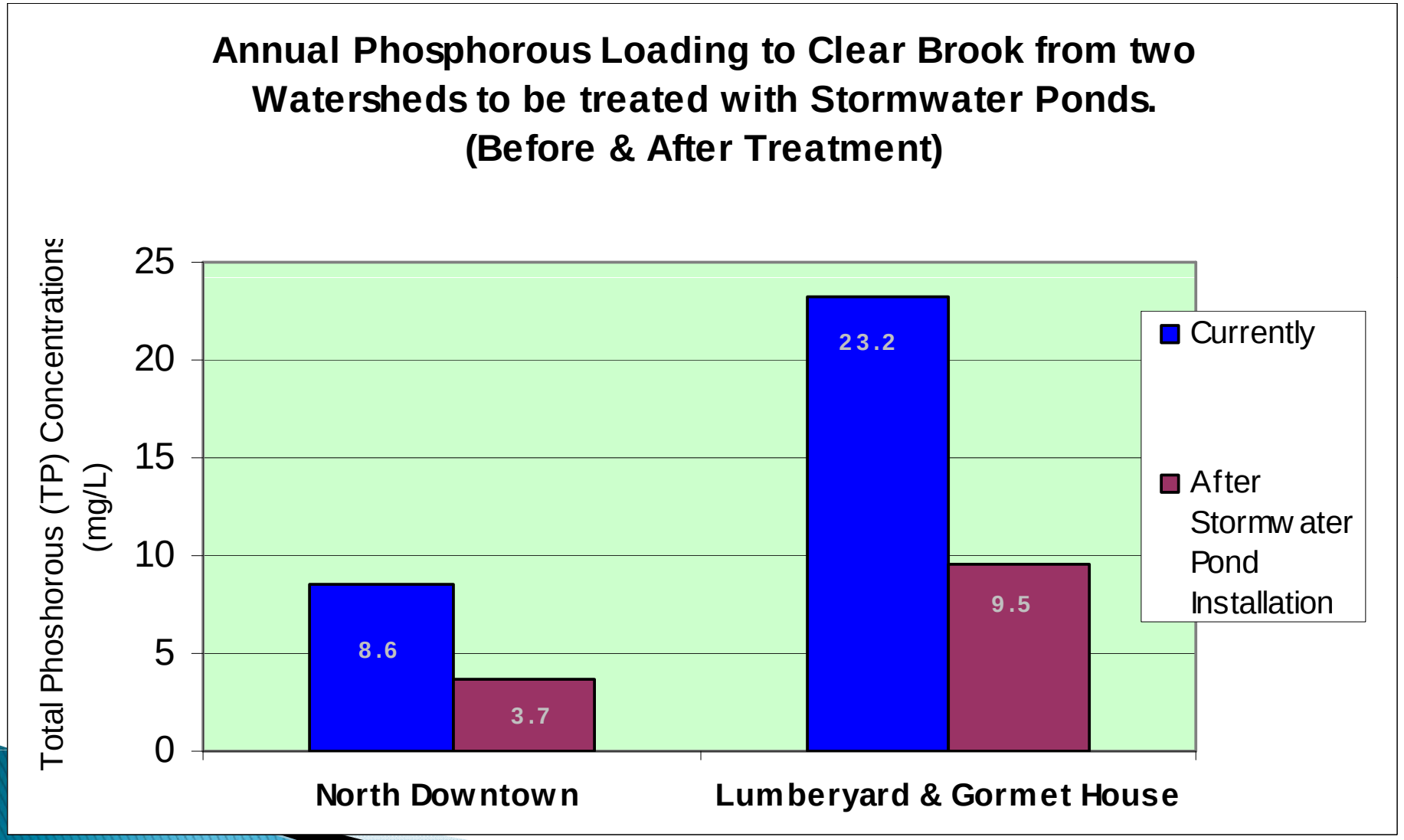
Watershed	Acres	Impervious Percent**	Run-off (Ac-ft)	Average Loading (TSS-lbs/yr)	Designed pond removal efficencies	lbs of TSS after treatment	Average Loading (TP-lbs/yr)	Designed pond removal efficencies	lbs of TP after treatment	Average Loading (TKN-lbs/yr)	Designed pond removal efficencies	lbs of TKN after treatment
North Downtown	6.4	82%	26.8	2768	85%	415.20	8.6	57%	3.70	38.2	50%	19.1
Lumberyard & Gourmet House	18.4	50%	72.6	7483	87%	972.79	23.2	59%	9.50	103.1	51%	50.5



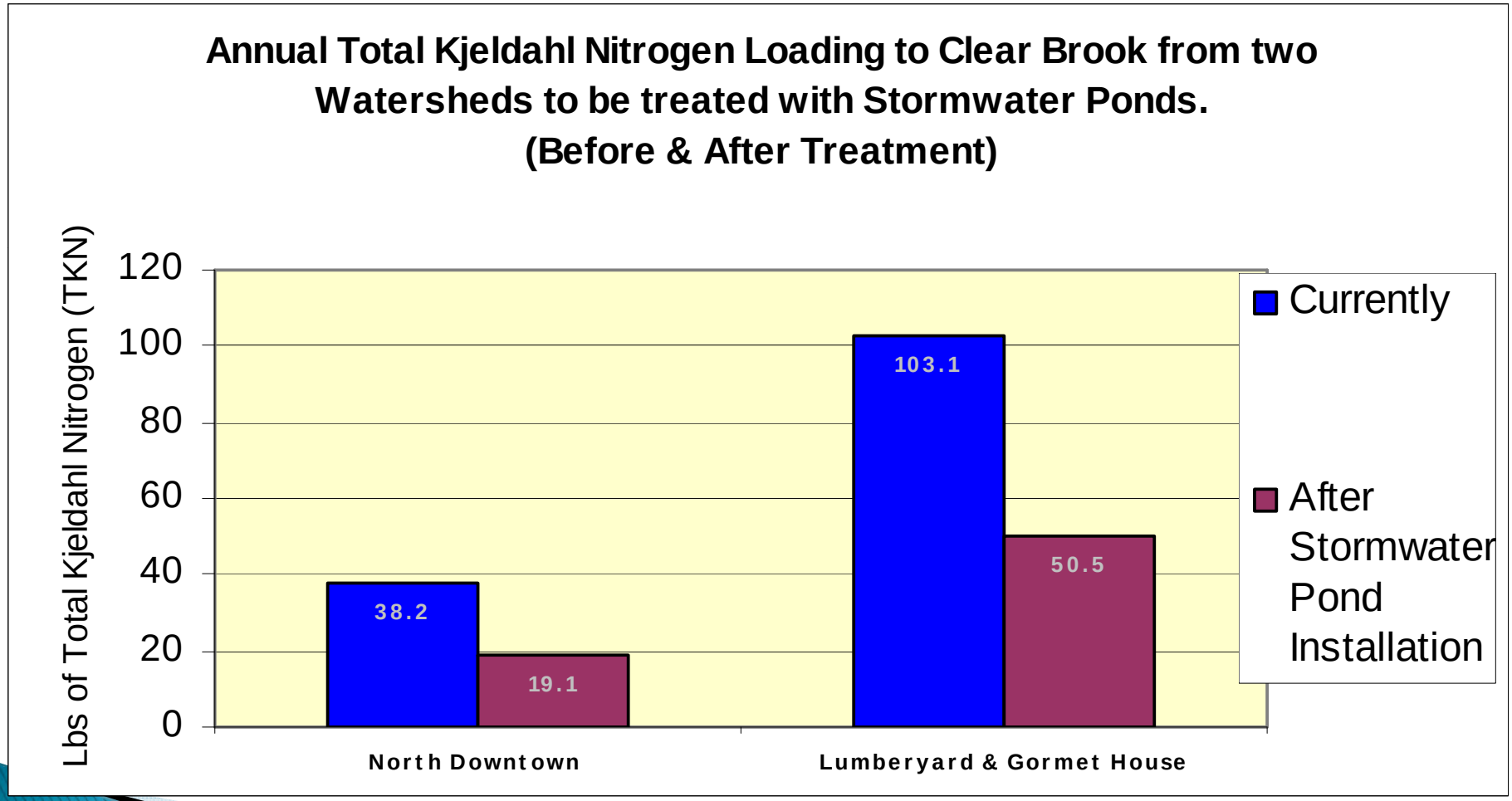
Storm water ponds (TSS) Total Suspended Solids removal efficiencies



Storm water ponds (P) Phosphorus reduction efficiencies



Storm water ponds (TKN) Nitrogen reduction efficiencies



Top Priority Watersheds ***SW City***

-Largest Urban Watershed at 78 Acres

-30% Impervious

-Contributes 47% Runoff during a 1" rain event

-Annually Contributes an average of 24,000 lbs of Suspended Solids to Clear Brook, 74lbs of Phosphorous, and 326 lbs of Nitrogen to Clear Brook, which is a tributary to the already Impaired Silver Creek.

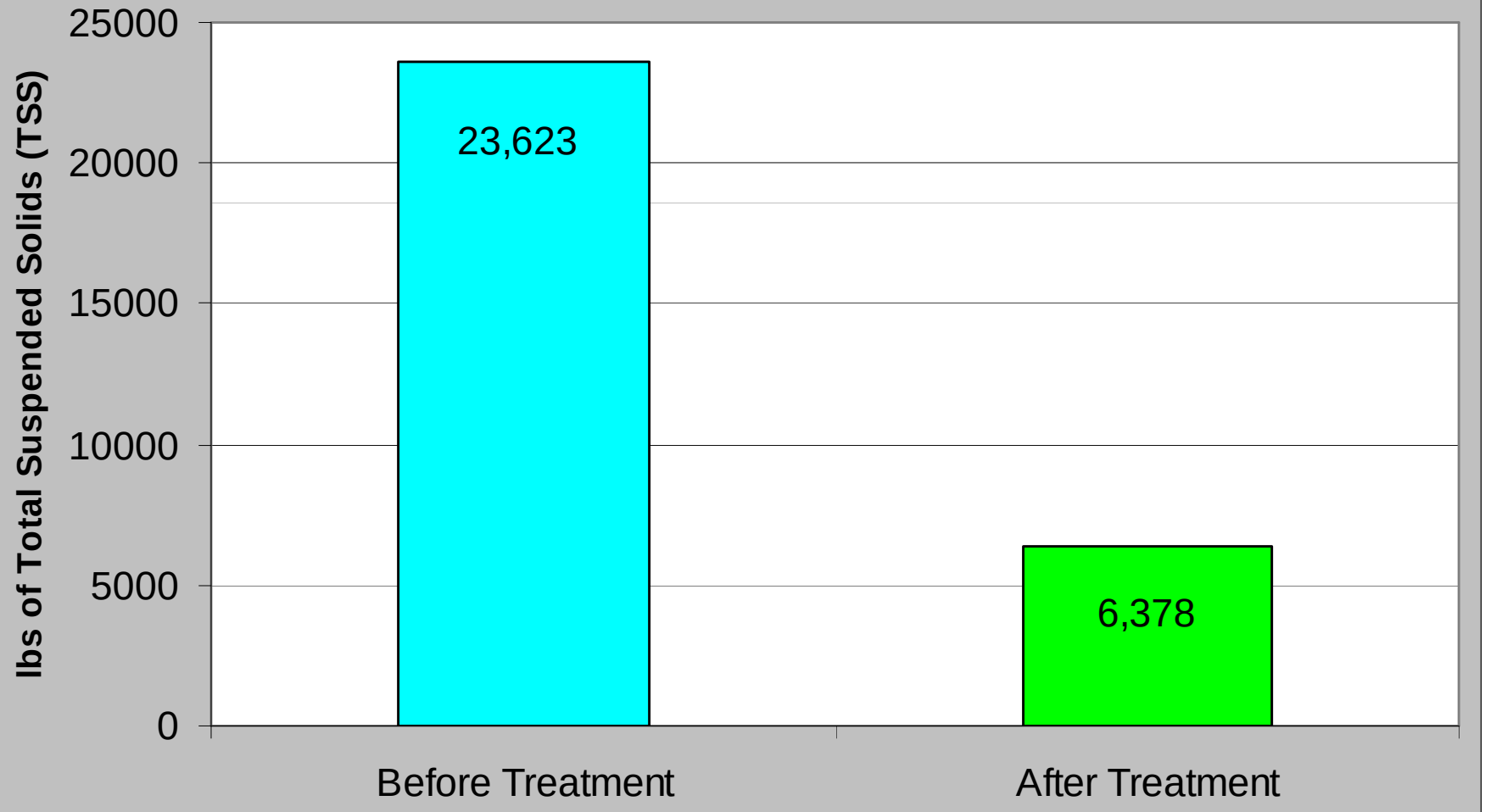
High Levels of Fecal Coliform Bacteria found coming from this watershed!

What Was Done

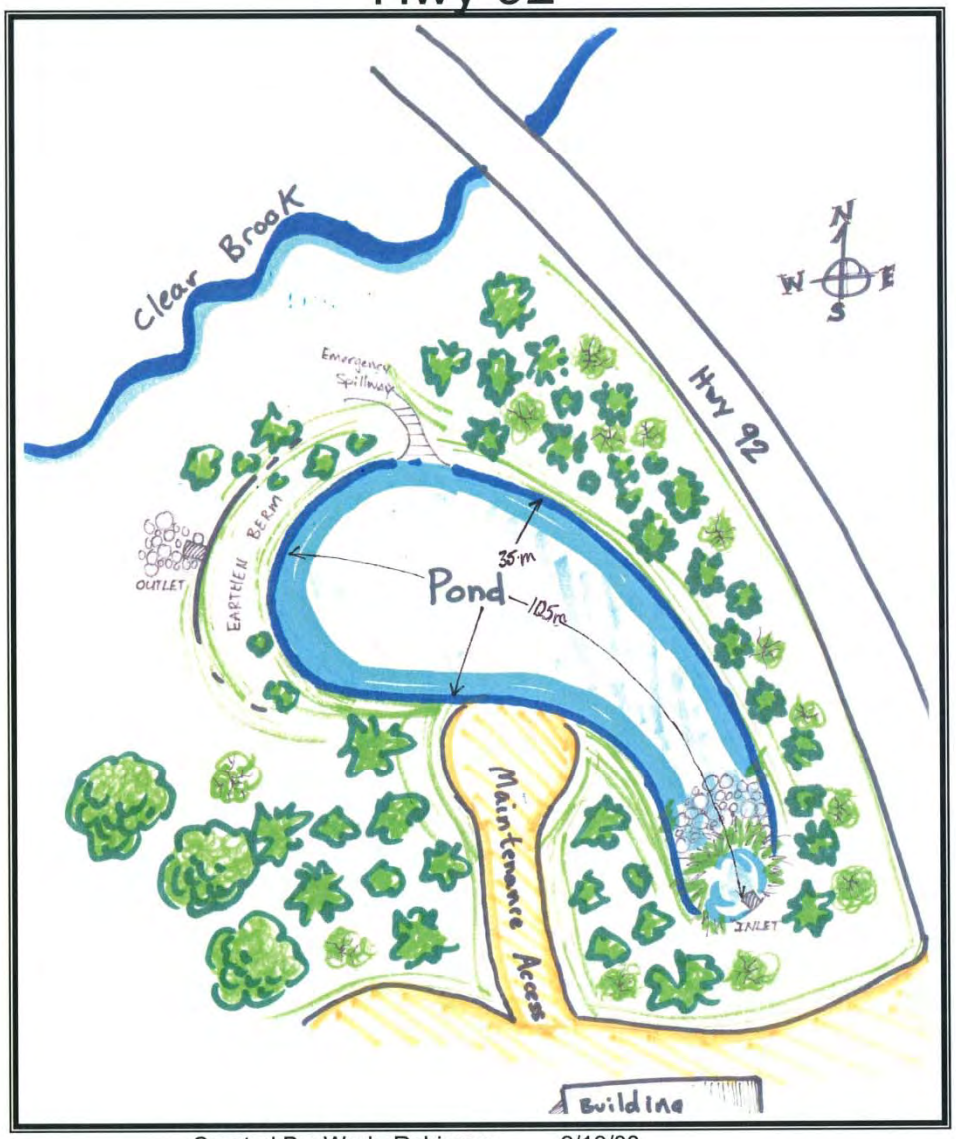
- Explored end-of-pipe treatment of constructing a sediment basin.
  - Ideal location lies on property of a landowner that is NOT interested in constructing sediment basin on it, or selling it for that purpose.
  - He does own property with nearly enough space on other side of Hwy 92 that would be willing to sell to City for the construction of a sediment basin.

This is the ideal location to put a pond. Landowner not interested in selling or changing his land in any way

Pounds of Total Suspended Solids entering Clear Brook on an annual basis, Before & After Sediment Pond Treatment for the South West City Urban Watershed in the City of Clearbrook



Schematic of Proposed Sediment Basin on Ernie Stoker's Land west of Hwy 92



Created By: Wade Robinson 2/19/08

What Else Was Done (Alternatives)!

1. Rain garden Workshop and installation at Good Samaritan Center
2. Explored options of Inline Sediment Traps
3. Completed a feasibility study for an infiltration basin upstream of storm sewers in playground near old High School

In Conclusion

- With about $66,000 we'd be able to construct two storm water ponds in City of Clearbrook.
  - Also remove culverts, alleviate some flooding in City, and possibly build earthen dike with dirt take out for storm water pond.
  - On an annual basis these 2 designed ponds could remove roughly 86% of TSS, 58% phosphorus, and 33% of Nitrogen entering Clear Brook, and Silver Creek from their respective watersheds.
  - We'd only be treating 24 acres of Urban watersheds in the City of Clearbrook.
  - Need to consider treating the large 78 acre watershed that the majority of the City lies within.
  - Continue WQ monitoring, need more samples collected from Storm Sewer outlets in the city.