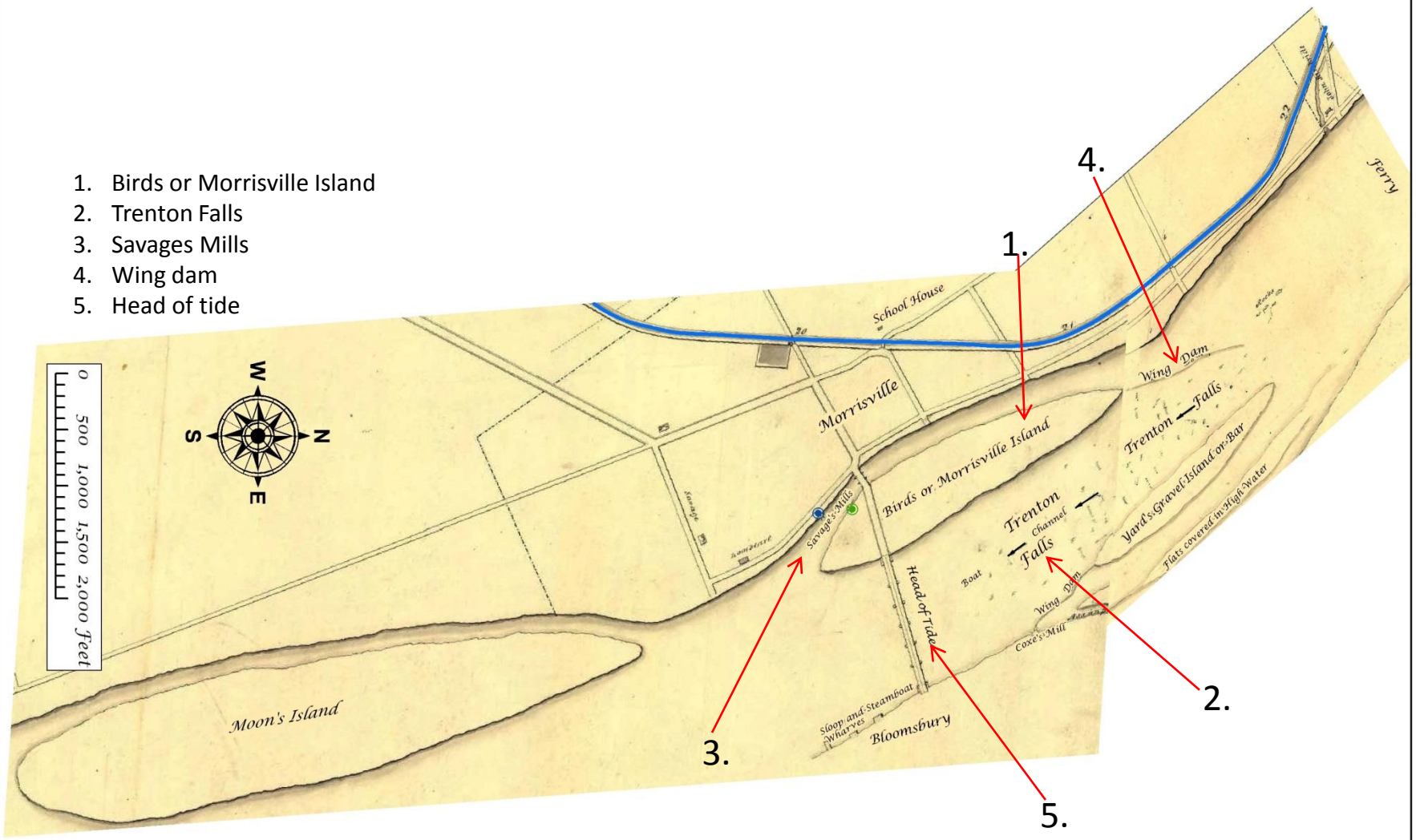
Setting, Hydrology, and History of Williamson Park

Setting:

Morrisville is located next to the “Trenton Falls” or the “Falls of the Delaware River”

1. Birds or Morrisville Island
2. Trenton Falls
3. Savages Mills
4. Wing dam
5. Head of tide

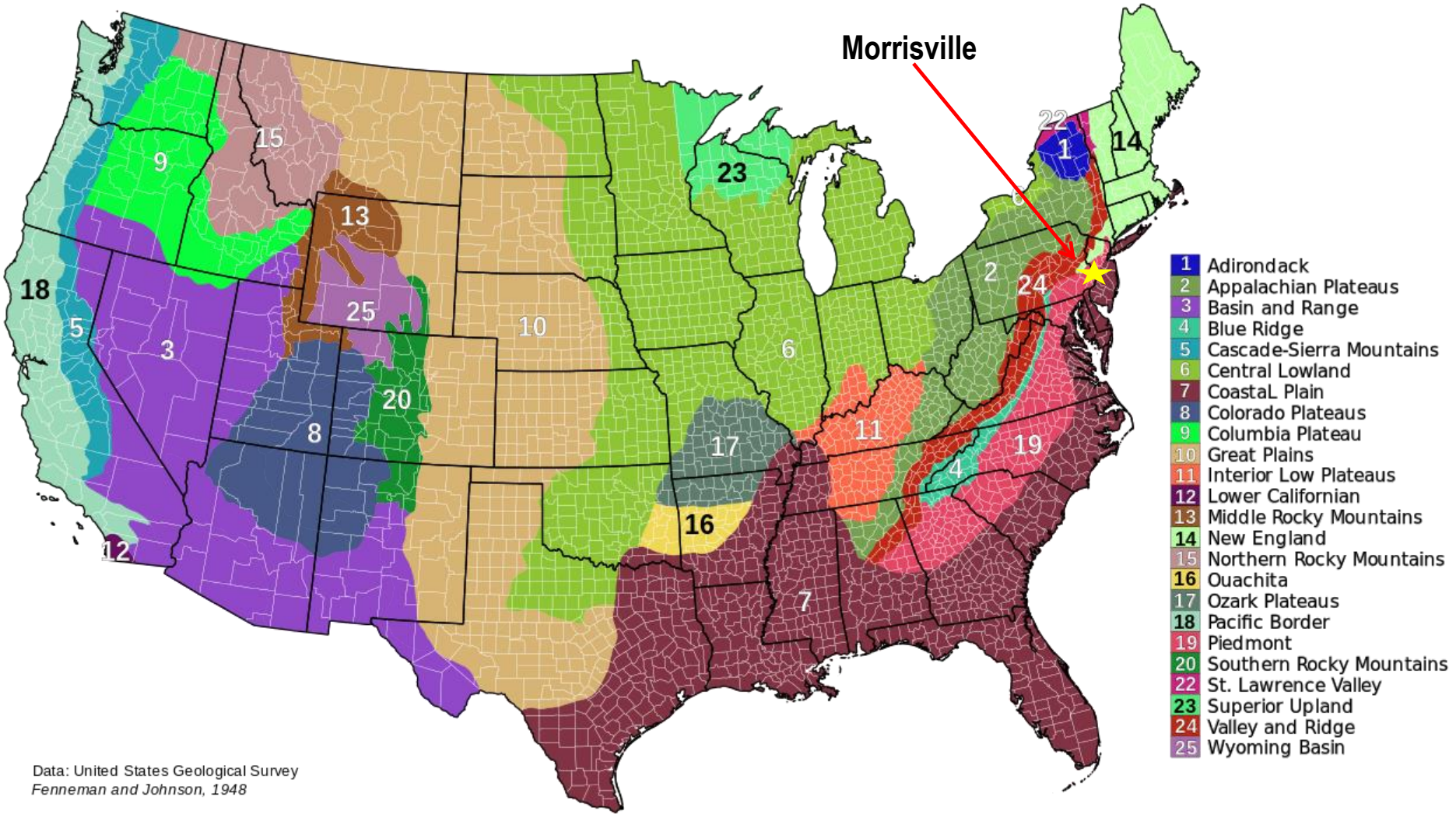


This map was made using 2 maps from an 1838 map of the, “Delaware Division of the Pennsylvania Canal”

Trenton Falls is the area between the Calhoun Street and Trenton Makes Bridges.

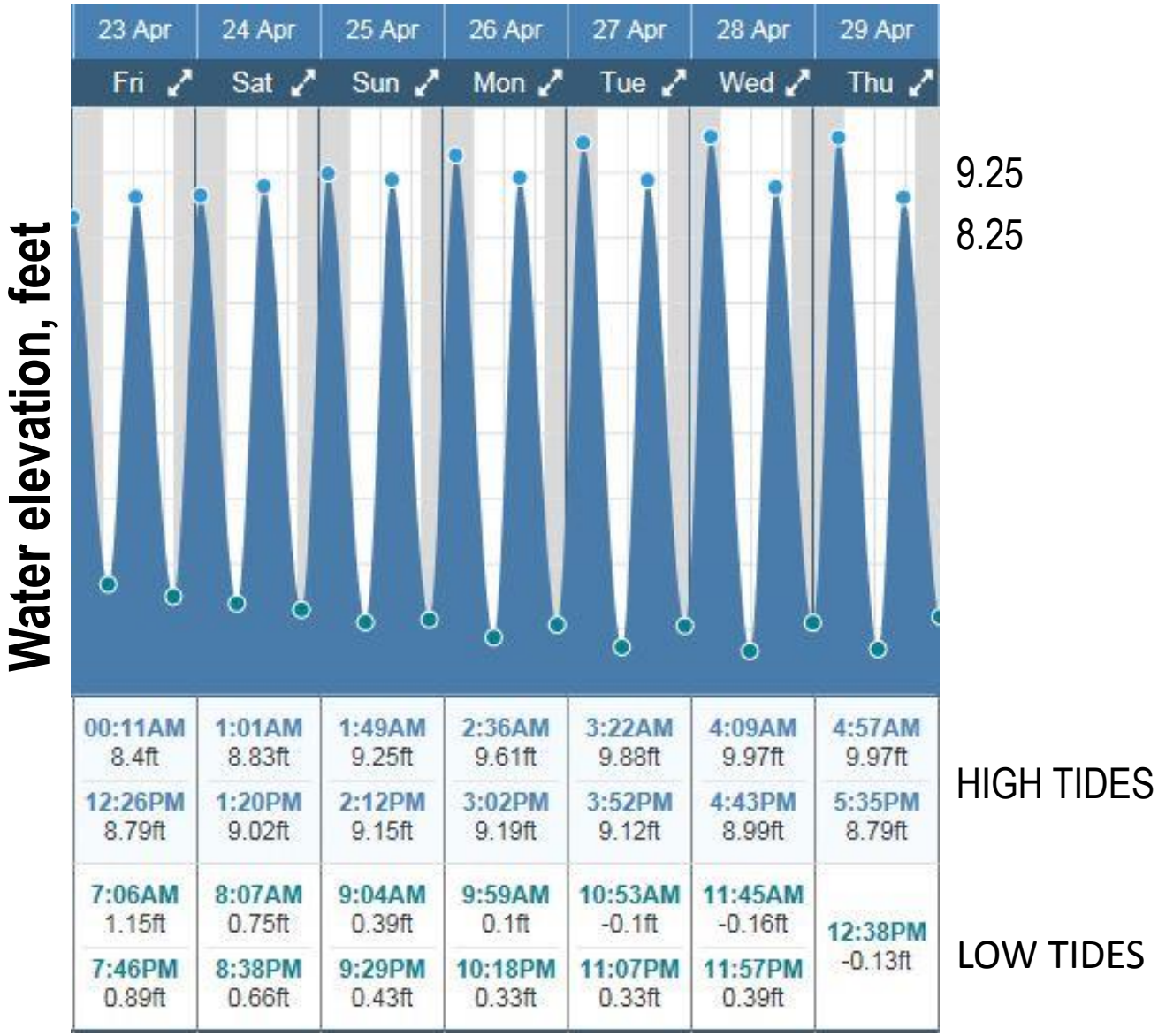
- Trenton Falls is a result of the erosion of the river bed just above the **boundary between the Piedmont and Coastal Plain physiographic provinces which is beneath the Trenton Makes bridge**.
- Trenton Falls marks the upstream navigable limit of the Delaware River, and it is why Morrisville and Trenton are at this location on the Delaware River

Physiographic of the United States



The Delaware River at Morrisville is the only location on the river where the Piedmont and Coastal Plain meet. The Coastal Plain is characterized by subsurface sediments. The Piedmont is characterized by subsurface rock

- A consequence of the coastal plain and piedmont boundary at the Trenton Makes bridge is that **this location is the head of tide** for the Delaware River.
- The difference in elevation between high and low tide on the Delaware River is greatest here. **The average high tide is approximately 8 feet higher than low tide.**
- Note, in the above photo, all the rocks (washed down from Trenton Falls) downstream of the Trenton Makes. You will only see these at low tide.
- To state the obvious – **when the tide is going out water is flowing down the river; when the tide is coming in water is flowing up the river**; and the tide is slack for a short period at high and low tide



- This is a **tide chart for the Delaware River at the Trenton Makes** bridge.
- April 28 has an exceptionally high tide difference from 9.97 feet at 4:09 AM to -0.16 feet at 11:45 AM, **a difference of 10.13 feet**

HISTORY

- Morrisville Island created by the great flood of 1687
- Late 1700s grist mill and lumber mill on island channel
- 1870's Rowan and Vansant own and operate mills

- 1885 Andrew Rowan and Edna Vansant use deed of trust to give Island land to 3 churches
- 1900s mills cease operations
- 1918 Henry S. Williamson dies and gives Morrisville money to purchase park land
- 1938 Morrisville receives Williamson's money after death of his wife
- 1938-39 Williamson Park land acquired; levee built
- 1939 Morrisville signs 99 year lease with 3 churches for use of their land in park
- 1939 Williamson Park opens

1923 aerial photograph from collection of Ronald L. Stockham

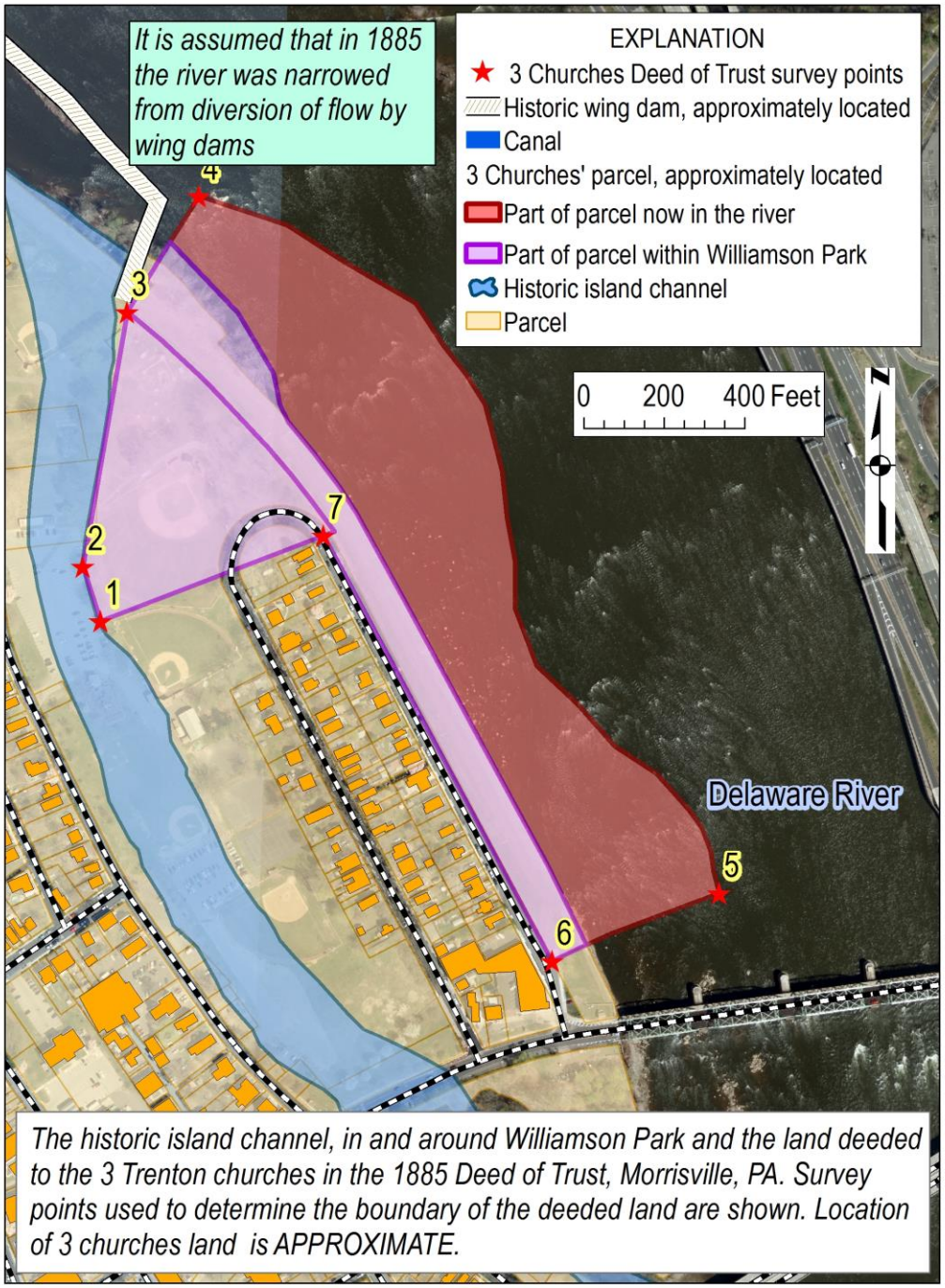
The lease between the 3 churches and the Borough quotes the deed of trust in describing the property being leased:

"Beginning at a stone for a corner on the high ground corner to other lands of Andrew K. Rowan and Edna Vansant and runs [1] thence north 18 west, 141 feet to a stone on the high ground, [2] thence north 9½ east, 644 feet to a stone on the high ground, [3] thence north 29½ east to low water mark in the river Delaware, [4] thence by low water mark down the said river Delaware 2506 feet more or less to lot of land belonging to the Delaware Bridge Company, [5]thence by land of the Delaware Bridge Company south 69 ½ west, 450 feet to a stone in the easterly line of 70 foot avenue called Park Avenue, [6] ***thence up the river Delaware bounded by the easterly line of Park Avenue 1206 feet to a stone for a corner at the end of Park Avenue,*** [7] thence south 69 ½ west by other lands of the said Andrew K. Rowan and the said Edna Vansant and crossing over several stones 593 feet to a stone for a corner on the high ground the place of beginning."

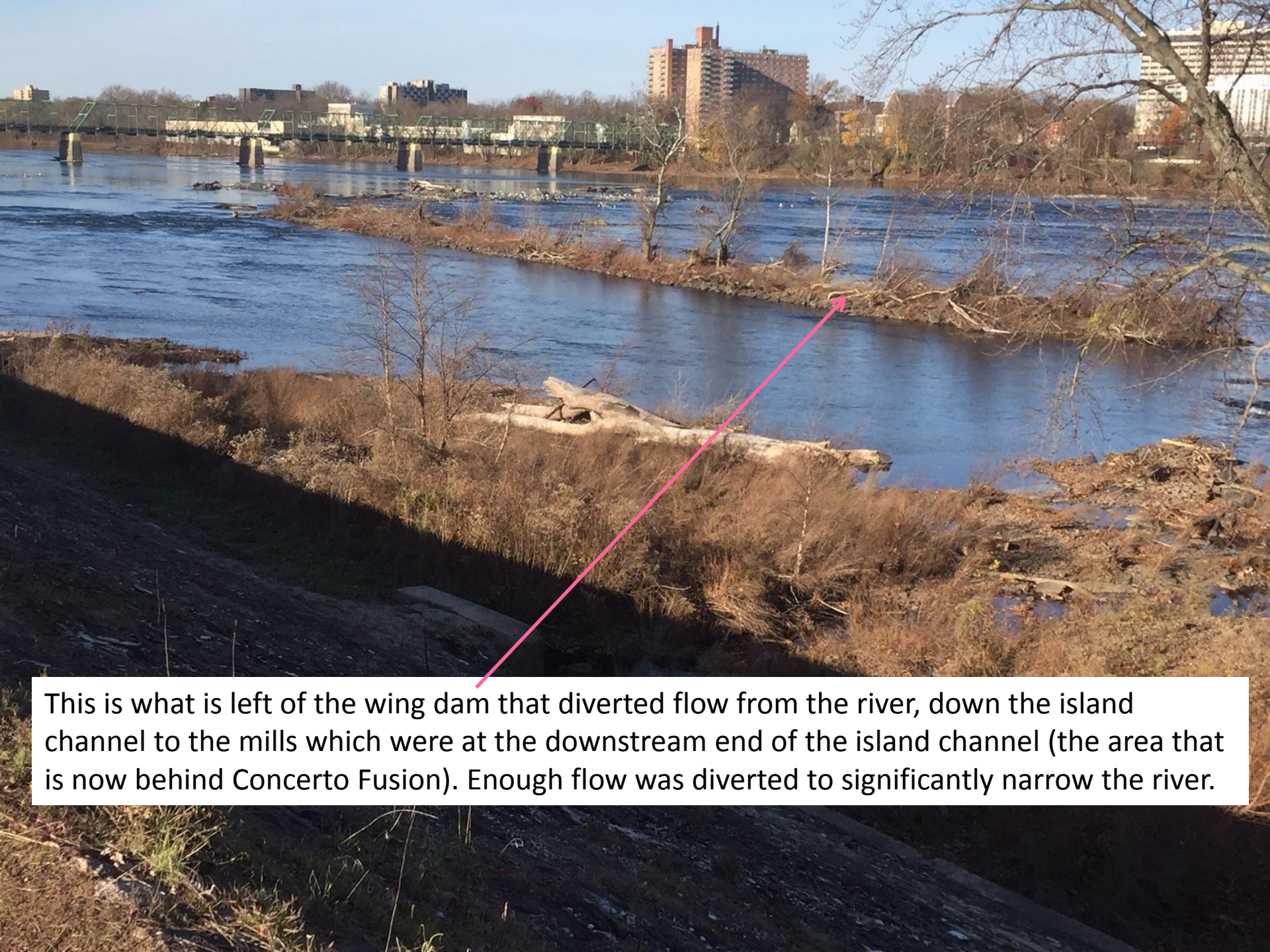
- The term of the lease is 99 years. The lease expires in 17 years in 2038
- The rent is $1 per year

Some conditions:

- they (the churches) shall hold the same in trust as a park for the use of the several churches and Sabbath schools of the City of Trenton, the Borough of Chambersburg and Morrisville, Pennsylvania.
- (The) park shall be open for recreational purposes to the inhabitants of the Borough of Morrisville and for the persons and uses mentioned in the aforesaid terms of trust
- that when trees are removed in the beautifying or improving of the said park, that young shade or nut trees of equal number shall be planted



The historic island channel, in and around Williamson Park and the land deeded to the 3 Trenton churches in the 1885 Deed of Trust, Morrisville, PA. Survey points used to determine the boundary of the deeded land are shown. Location of 3 churches land is APPROXIMATE.



This is what is left of the wing dam that diverted flow from the river, down the island channel to the mills which were at the downstream end of the island channel (the area that is now behind Concerto Fusion). Enough flow was diverted to significantly narrow the river.

HYDROLOGY OF WILLIAMSON PARK

- **Delaware River** – It is a discharge area for groundwater moving through the park

- **The levee** – It contains Delaware River floodwater between the bridges.

- **Elevation** – The park is located within a closed depression. This makes it vulnerable to flooding

- **Delaware Canal** – The canal discharges water through a spillway to a channel that passes through the levee to the Delaware River. This can be problematic in flood conditions.

- **Underground stream** - It is contained within drainage pipe; it flows beneath Bridge Street, to the old mill channel. The underground stream is located within the extent of the old Island channel. Because it is located adjacent to head of tide, the underground stream's **flow is tidally influenced**

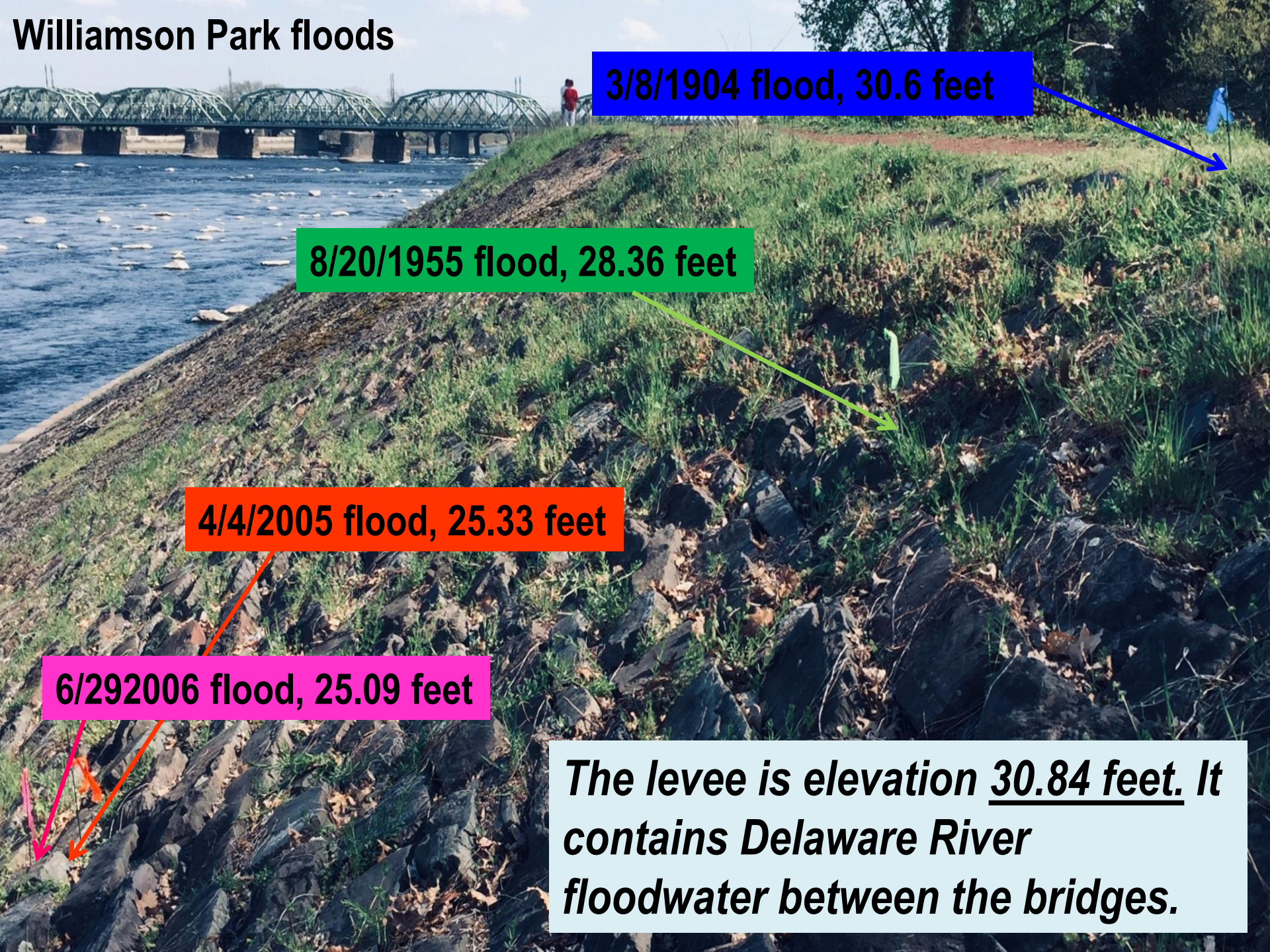
The Delaware River is a discharge area for groundwater flowing through the park

- The basic rule of groundwater flow: **All water flows down hill** – from areas of higher elevation to areas of lower elevation.

- Groundwater discharge to the river keeps the river flowing, even during droughts. Groundwater generally moves from the west (higher elevation) through the park to the river (lower elevation).

- Groundwater flow in the park is complicated by the buried island channel. Groundwater may discharge into buried island channel drains. These drains discharge into the river behind Concerto Fusion.

- ***DURING FLOOD EVENTS, the river is higher in elevation than land surface*** *in the park which may allow river water to flow downward through the river bed to the underlying aquifer and back into the park*. **This is not proven**, a field investigation is needed to prove or disprove this theory. The damaged pool after the 2005 flood may be a result of groundwater pushing up (discharging) with enough force to crack the concrete pool.


Williamson Park floods
3/8/1904 flood, 30.6 feet
8/20/1955 flood, 28.36 feet
4/4/2005 flood, 25.33 feet
6/292006 flood, 25.09 feet
The levee is elevation 30.84 feet. It contains Delaware River floodwater between the bridges.

Flooding in Williamson Park

4 factors converge to cause Park flooding:

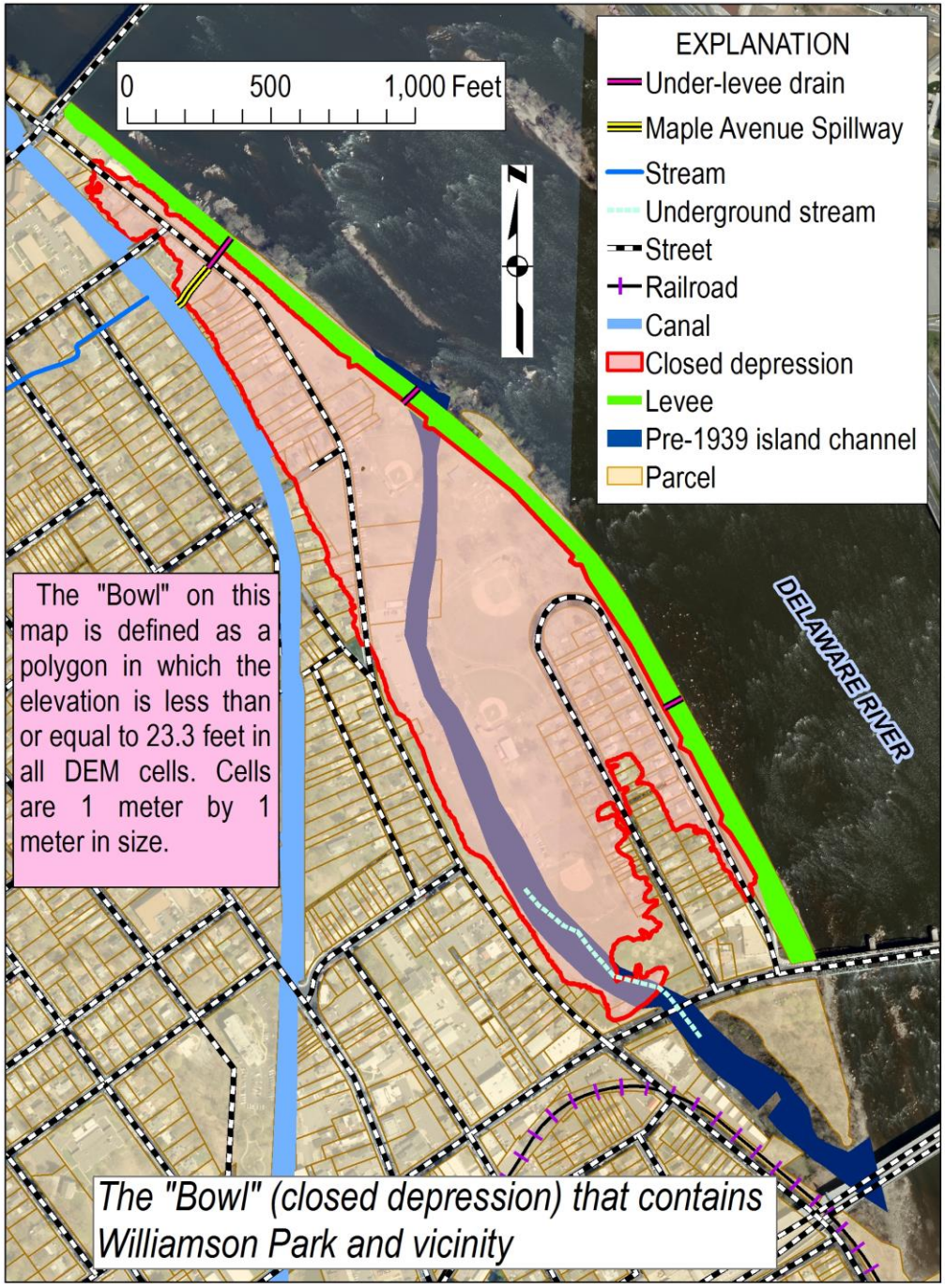
- ***The Delaware River elevation must be very high***, for example in the 2005 and 2006 floods the River surface elevation (stage) was greater than 25 feet.

- When the River stage is that high***, it forces the Maple Avenue spillway outlet to cover closed*.**

- The high river stage also results in greater flow in the Delaware Canal. To prevent overtopping of the canal ***the spillway is opened and there is discharge from the canal to the spillway that is much greater than normal.***

- BUT ***there is nowhere for the water in the spillway to go but over its banks into a big BOWL***, which is the closed depression that encircles Williamson park and extends north on Delmor Avenue to the old water plant.

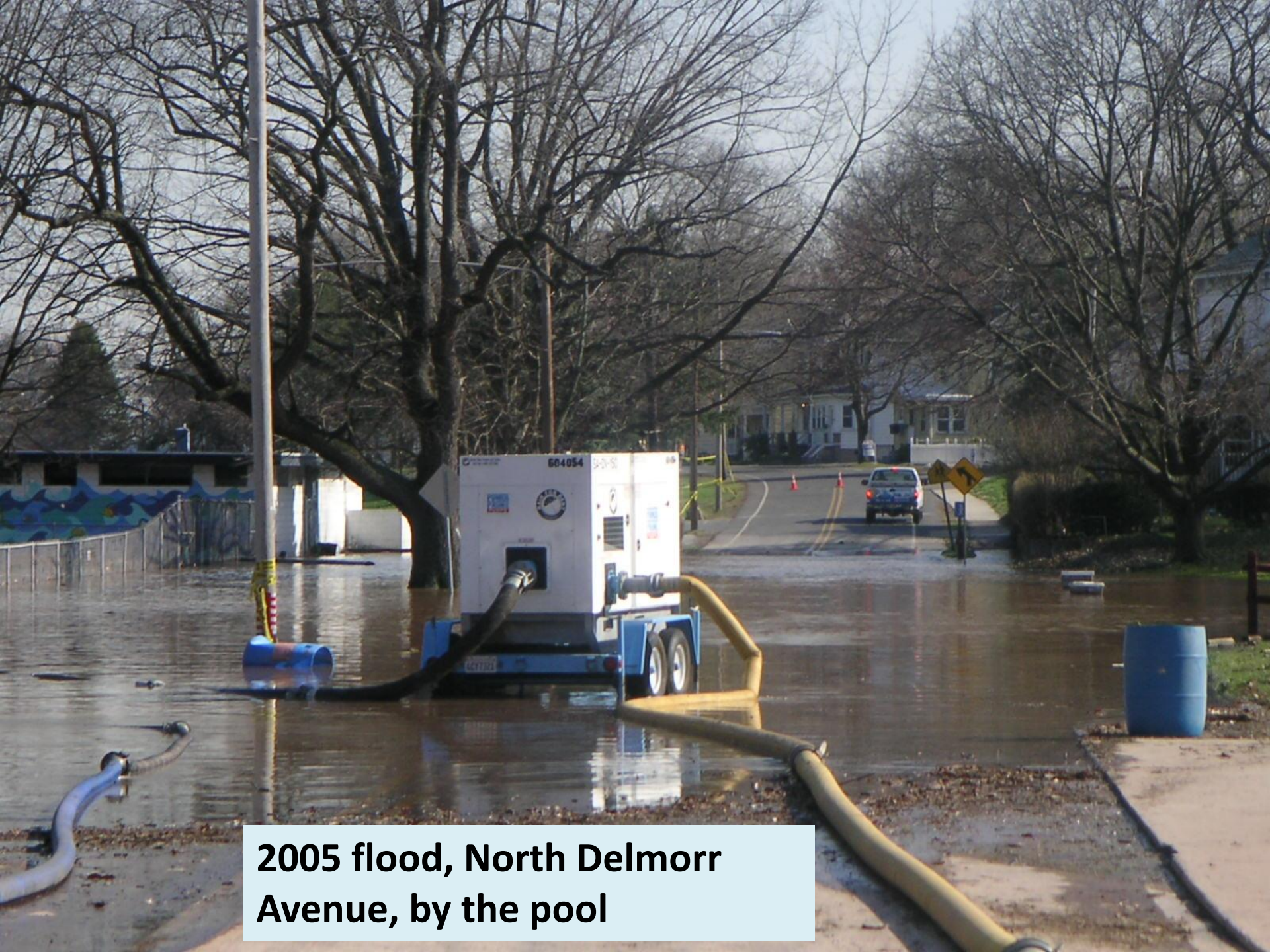
High flow in the Maple Avenue Spillway. It has almost filled the culvert under Delmorr Ave



The "Bowl" (closed depression) that contains Williamson Park and vicinity


2005 flood, Maple Avenue spillway

2005 flood, North Delmorr Avenue

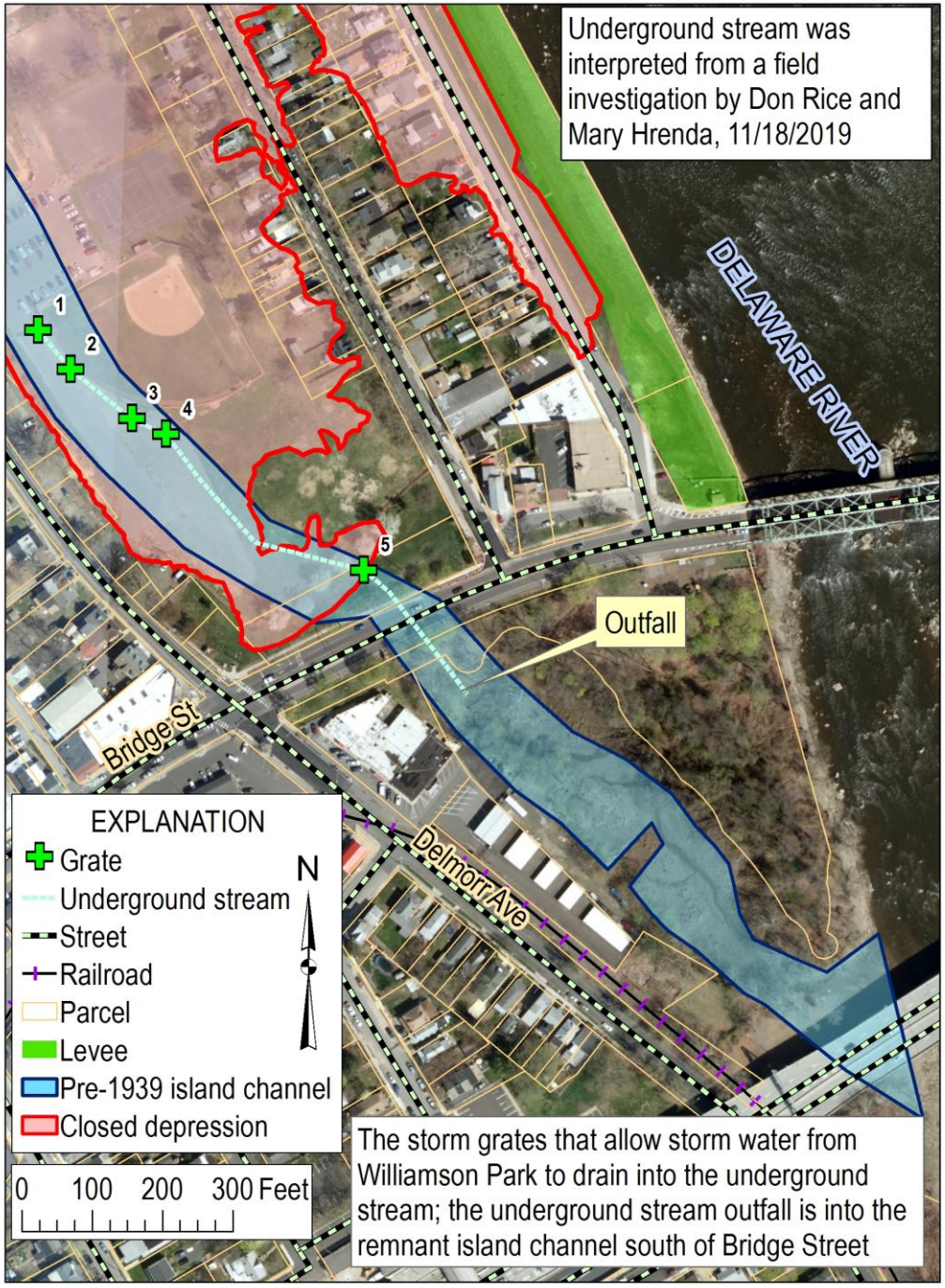


2005 flood, North Delmorr Avenue, by the pool

2005 flood, Williamson Park

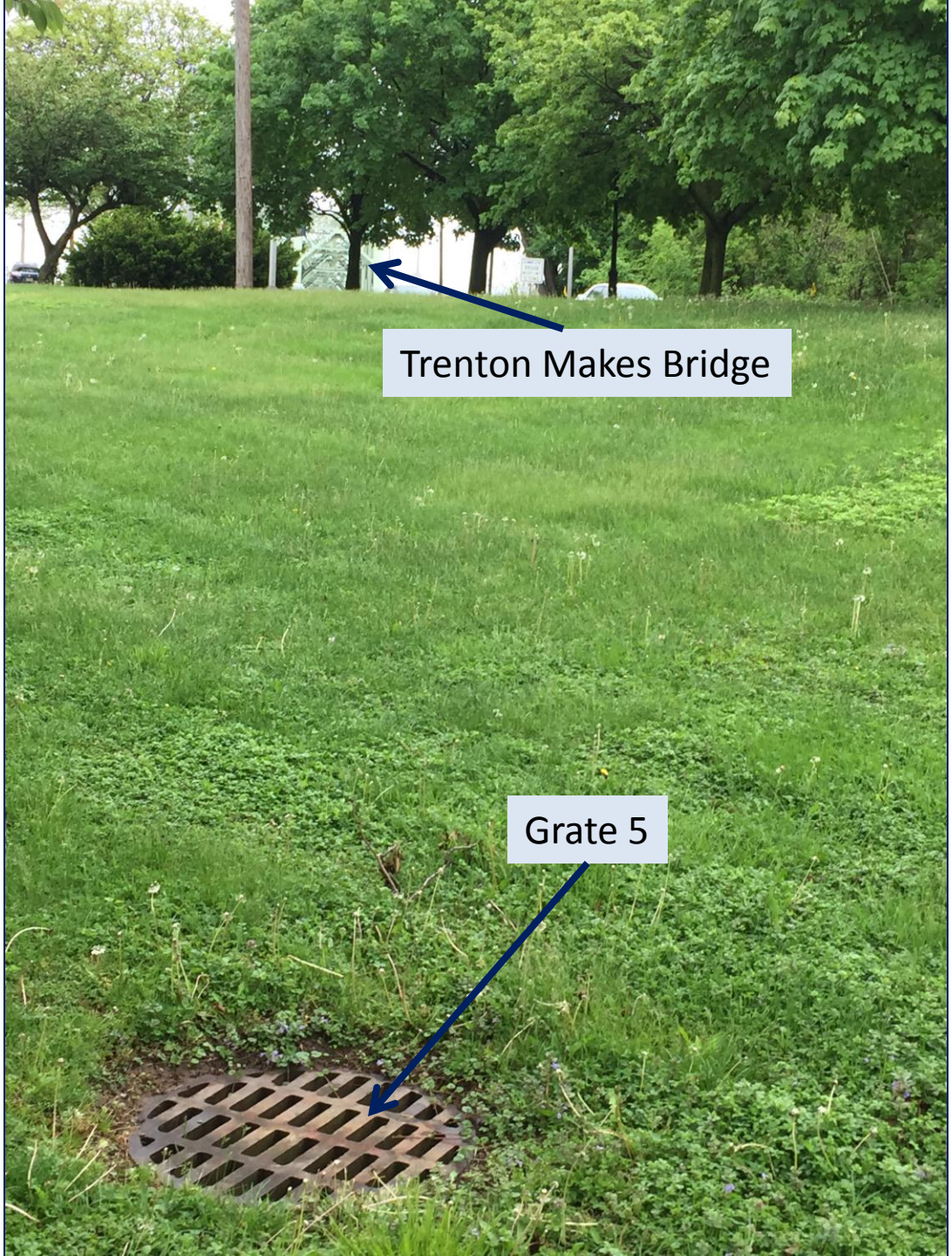
2005 flood, Park Avenue

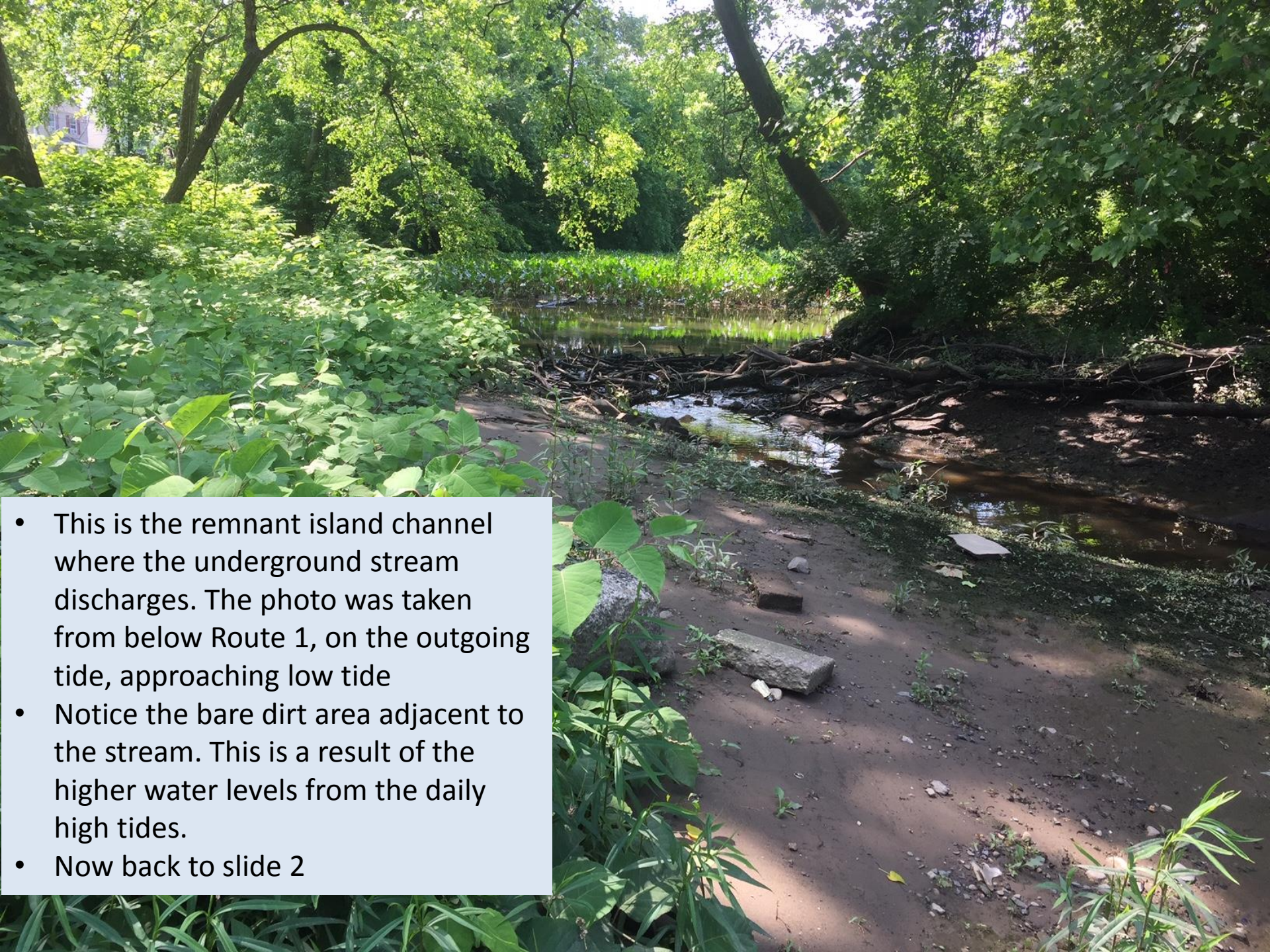
2005 flood, South Delmorr Avenue


Underground stream was interpreted from a field investigation by Don Rice and Mary Hrenda, 11/18/2019
DELAWARE RIVER
1
2
3
4
5
Outfall
Bridge St
Delmorr Ave
EXPLANATION
Grate
Underground stream
Street
Railroad
Parcel
Levee
Pre-1939 island channel
Closed depression
N
0 100 200 300 Feet
The storm grates that allow storm water from Williamson Park to drain into the underground stream; the underground stream outfall is into the remnant island channel south of Bridge Street


4
3
2
1

- Grate 5 lines up with the Trenton Makes Bridge
- The Trenton Makes Bridge is at the head of tide of the Delaware River
- The water in the underground stream beneath grate 5 discharges to the Delaware River
- Therefore grate 5 is also at the head of tide
- Field work confirms this
- This means water and stormwater in the underground stream only reaches the Delaware River on the outgoing tide





- This is the remnant island channel where the underground stream discharges. The photo was taken from below Route 1, on the outgoing tide, approaching low tide
- Notice the bare dirt area adjacent to the stream. This is a result of the higher water levels from the daily high tides.
- Now back to slide 2

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2. Trenton Falls
3. Savages Mills
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5. Head of tide

This is the second slide. Note the “3” arrow. This is the exact location of the last slide. What goes around comes around. THANK YOU FOR YOUR TIME!!