SiDE

Silver Brook Daylighting Effort

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SiDE Goals

- *Mission Statement: Accomplish daylighting the Silver Brook and transform its surroundings to a greener setting by the year 2030.*
- Excavate Silver Brook
- Increase green space on STAR Campus around Sil
  connect to other green spaces on campus
- Improve water quality of the Silver Brook
- Improve the ecological conditions of the Silver Brook and the landscape around the Silver Brook by decreasing impervious areas
- Decrease flooding on STAR Campus by adding more green space and reducing runoff

Silver Brook Stream North of Science and Technology Campus

History of Silver Brook

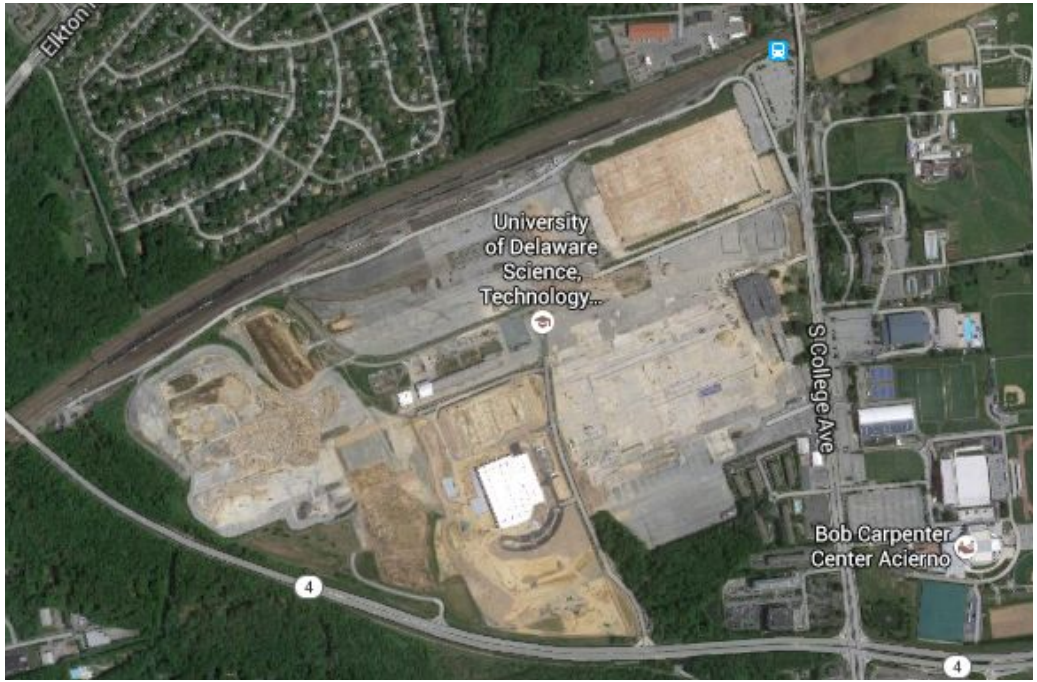
- Proposal focuses on underground segment of Silver Brook
- Restoration site was location of a Chrysler Plant (1951 - 2008)
    - When Chrysler plant was built, Silver Brook was relocated underground in an 84” culvert
- 2009: University of Delaware purchased the site, began redeveloping as the Science and Technology Campus (STAR Campus)
- The Silver Brook drains:
    - areas of the University’s main campus
    - STAR Campus
    - residential neighborhoods
    - over 100 acres of industrial impervious surfaces from the former Chrysler plant site

Location of Silver Brook

- Currently underneath STAR campus in underground culvert
    - The stream enters the culvert on the north side of the railway and continues south toward Route 4, where it resurfaces
- Directly west of the University of Delaware College of Agriculture and Natural Resources
- Site is bounded:
    - to the north by the Norfolk Southern and Amtrak train lines
    - to the east by South College Avenue and the south by Route 4
    - to the west by where Route 4 and train lines come together

Characteristics

- Silver Brook is a tributary of the Christina River
  - Silver Brook flows into Christina Creek then discharges into Christina River
  - Christina River is one of four drinking water intake streams in Delaware
  - Christina river is 1 of only 6 trout streams in Delaware and is overseen by the Christina Conservancy
  - Many segments of the Christina river do not meet water quality standards for dissolved oxygen, nutrients, and bacteria
- Silver Brook watershed currently consists of 43% urban and 57% pervious material
- Total watershed area: 736 square acres



Hydrologic Soil Groups

Hydrologic Soil Group— Summary by Map Unit — New Castle County, Delaware (DE003)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
ErB	Elsinboro-Delanco-Urban land complex, 0 to 8 percent slopes	B	205.4	27.9%
GhB	Glenelg-Wheaton-Urban land complex, 0 to 8 percent slopes	B	33.2	4.5%
Hw	Hatboro-Codorus complex, 0 to 3 percent slopes, frequently flooded	B/D	7.1	1.0%
MtB	Mattapex silt loam, 2 to 5 percent slopes	C	10.7	1.5%
MuB	Mattapex-Urban land complex, 0 to 5 percent slopes	C	88.0	12.0%
OtA	Othello silt loam, 0 to 2 percent slopes	C/D	9.3	1.3%
Up	Urban land		311.3	42.3%
UzC	Udorthents, 0 to 10 percent slopes	A	29.9	4.1%
VoB	Urban land-Othello complex, 0 to 5 percent slopes		31.5	4.3%
WoB	Woodstown loam, 2 to 5 percent slopes	C	9.6	1.3%
Totals for Area of Interest			**736.1**	**100.0%**

Regulations: The Final Plan of Remedial Action

- Set by DNREC as of April 18, 2012 meets the requirements of the Hazardous Substance Cleanup Act.
  - Includes implementation of a Contaminated Materials Management Plan to ensure all contaminated materials encountered during intrusive activities are handled properly.

- Many environmental investigations have been carried out on the site
  - **1985:** DNREC Preliminary Assessment of site on behalf of EPA due to detection of perchloroethylene and trichloroethylene in the Newark municipal wells
  - **2008:** ATC environmental consulting firm conducted Phase I and II Environmental Site Assessments on behalf of Chrysler
  - **2008:** Duffield Associates conducted Phase I and II Environmental Site Assessments on behalf of 1743 Holdings, LLC
  - **2011:** Duffield Associates conducted Limited Current Conditions Assessment to assess the potential of substances of concern migrating which concluded there was no migration

Brownfield Investigation

- **2011:** Duffield Associates conduct Brownfield Investigation using 44 soil and 13 groundwater samples
  - Groundwater throughout the area contain contaminants including arsenic, barium, cobalt, iron, manganese, xylenes, toluene, ethyl benzene, and vinyl chloride…
  - The soils contained Contaminants of Concern exceeding the DE URS values include: arsenic, aluminum, antimony, copper, iron, lead, manganese, selenium, thallium, vanadium, zinc, and polynuclear aromatic hydrocarbons.

Problem 1. Runoff

- Runoff diverted by pipe will increase once the Silver Brook is daylighted
- 43% of Silver Brook watershed is impervious which increases the likelihood of contamination getting into the river
- **Solutions:** Turn concrete areas into green space, add a Riparian buffer to solve erosion, create green corridors (greenways for pedestrian and bicycle paths)

Problem 2. Disposal of Hazardous Material

- Coal, ash and slag were used in insulation of culvert piping for the Silver Brook
- Paint purge solvent such as xylenes, toluene and methyl ethyl ketone were released from a 7,500 gallon underground storage tank adjacent to the Former Paint Mix Building
- **Solutions:** Involvement of outside organizations to properly dispose of hazardous material, Complete Brownfield Investigation to make sure there is no more contamination in those areas

Problem 3. Logistics

- Planners, engineers, and environmental scientists need to be funded to prevent further groundwater contamination
- Construction is expensive
- **Solutions:** The EPA has a Brownfields Program and Land Revitalization Program which provide financial aid to projects involving clean-up and restoration of areas containing hazardous waste so that they may be sustainably used

Brownfield Remediation

- Abandoned industrial sites with hazardous materials in the soil can contaminate groundwater and reduce property values
- There are over 450,000 brownfield sites in the United States
- The EPA has awarded a total of $190 million through grants
- The average grant is $200,000 while the average per-site cost of brownfield remediation is $602,000, according to the Northeast Midwest Institute

Conclusion

- The Silver Brook runs through an area formerly occupied by Chrysler and contaminated by hazardous materials leached in the soil
- Part of the Silver Brook is confined to a pipe lined with coal, ash, and slag
- Numerous site assessments have been conducted to evaluate the Silver Brook
- There are plans to convert areas of the watershed to green space
- Riparian buffers will be used to reduce runoff from STAR campus' impervious surfaces
- Hopefully, the Silver Brook has a successful remediation and is daylighted

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Whose SIDE are you on?

Works Cited

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