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Historical Mapping and Flood Mitigation in Green Island

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Introduction

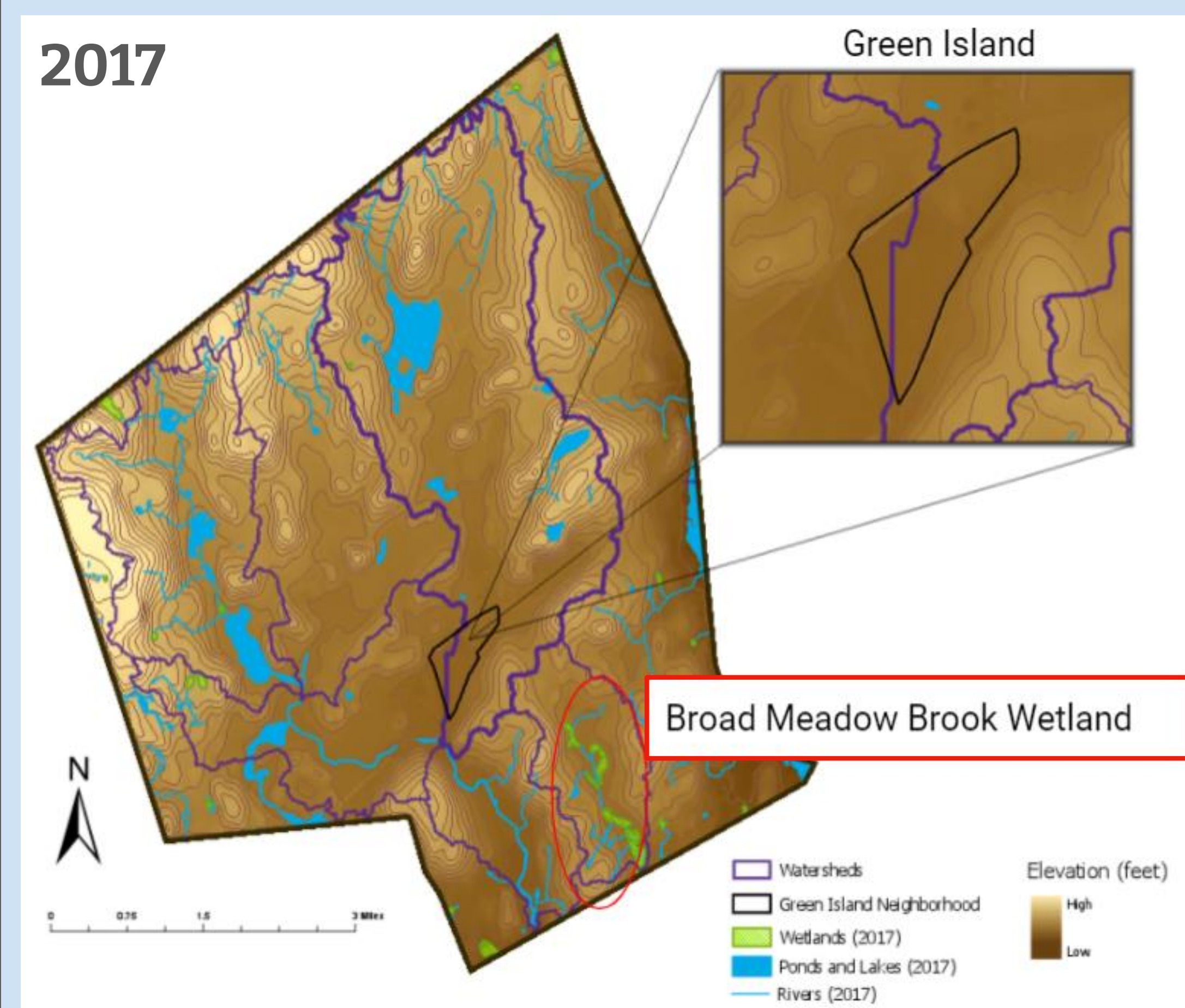
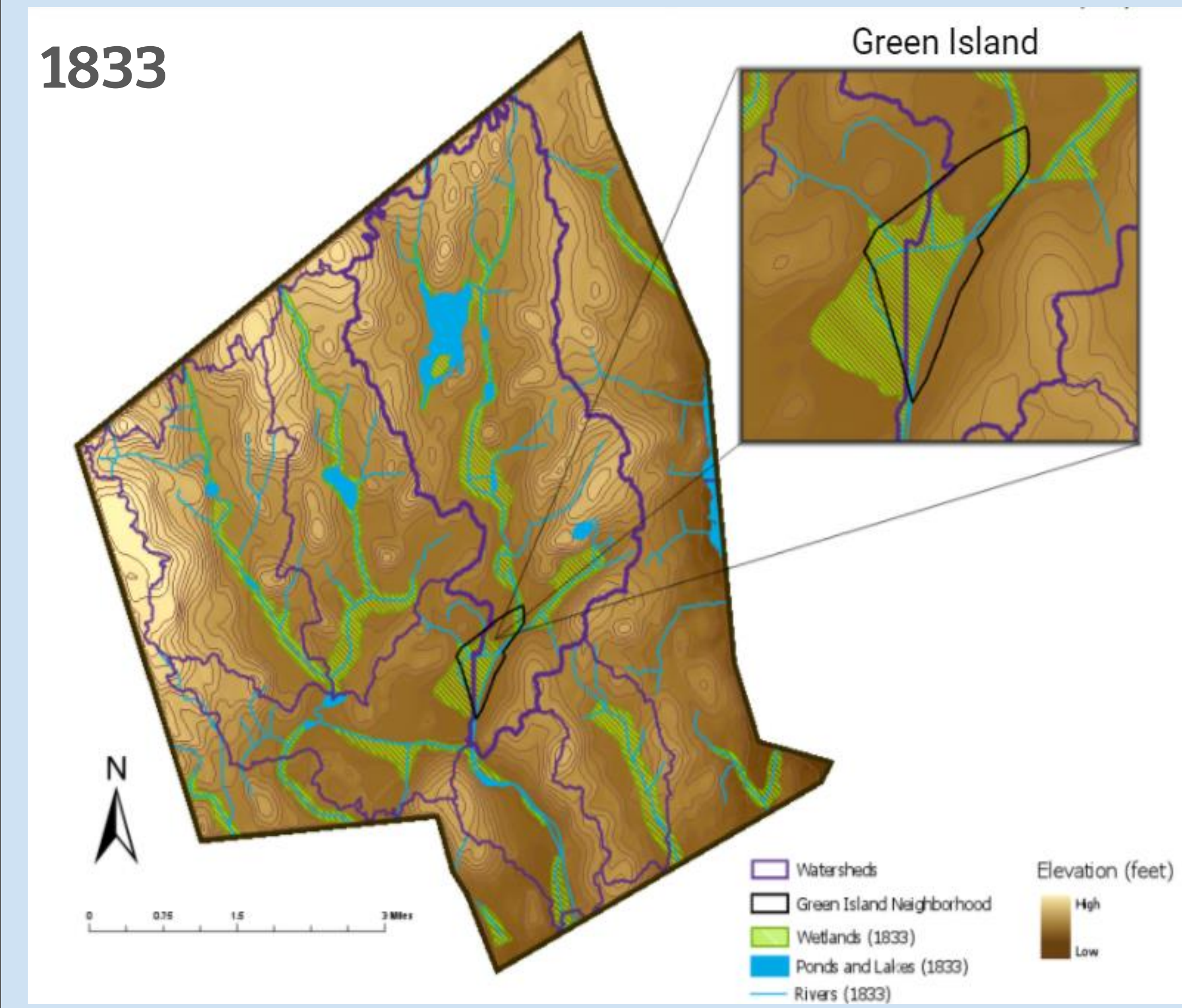
We explored the historical hydrology of the Green Island neighborhood in Worcester, MA. We aimed to 1) delineate historical wetlands in Worcester and compare them with modern day floodplain characteristics, and 2) identify potential green infrastructure solutions for flood mitigation in Green Island.

Methods

- Historical Map Collection: We found historical maps both online and at the Burnham Map Library at Clark University. We took high resolution pictures of the physical maps we found.
- Georeferencing: We then georeferenced these historical maps using ArcGIS to make them usable for data analysis.
- Digitizing Features: We used QGIS to digitize the historic hydrological features and added them to current maps for analysis.

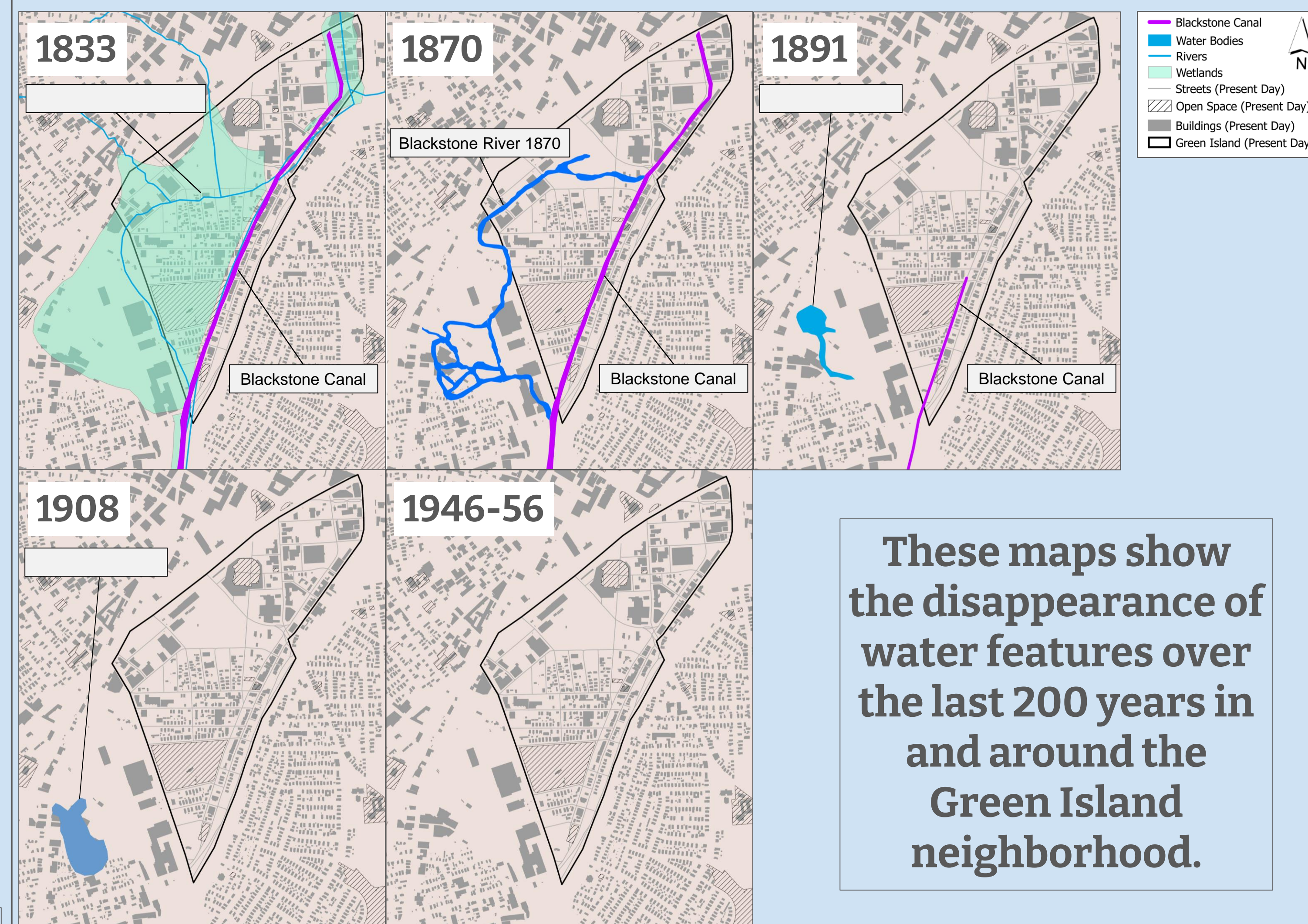
Historical Hydrology

These two hydrology maps show the change in water features in Worcester over a span of 184 years - between 1833 and 2017. In that time, 1,853.3 acres of wetland were lost in Worcester.



Low elevation: Green Island has the second lowest elevation out of all 38 neighborhoods in Worcester, MA. Sitting at the southern portion of the largest watershed, Green Island receives much of the water from surrounding areas during precipitation events.

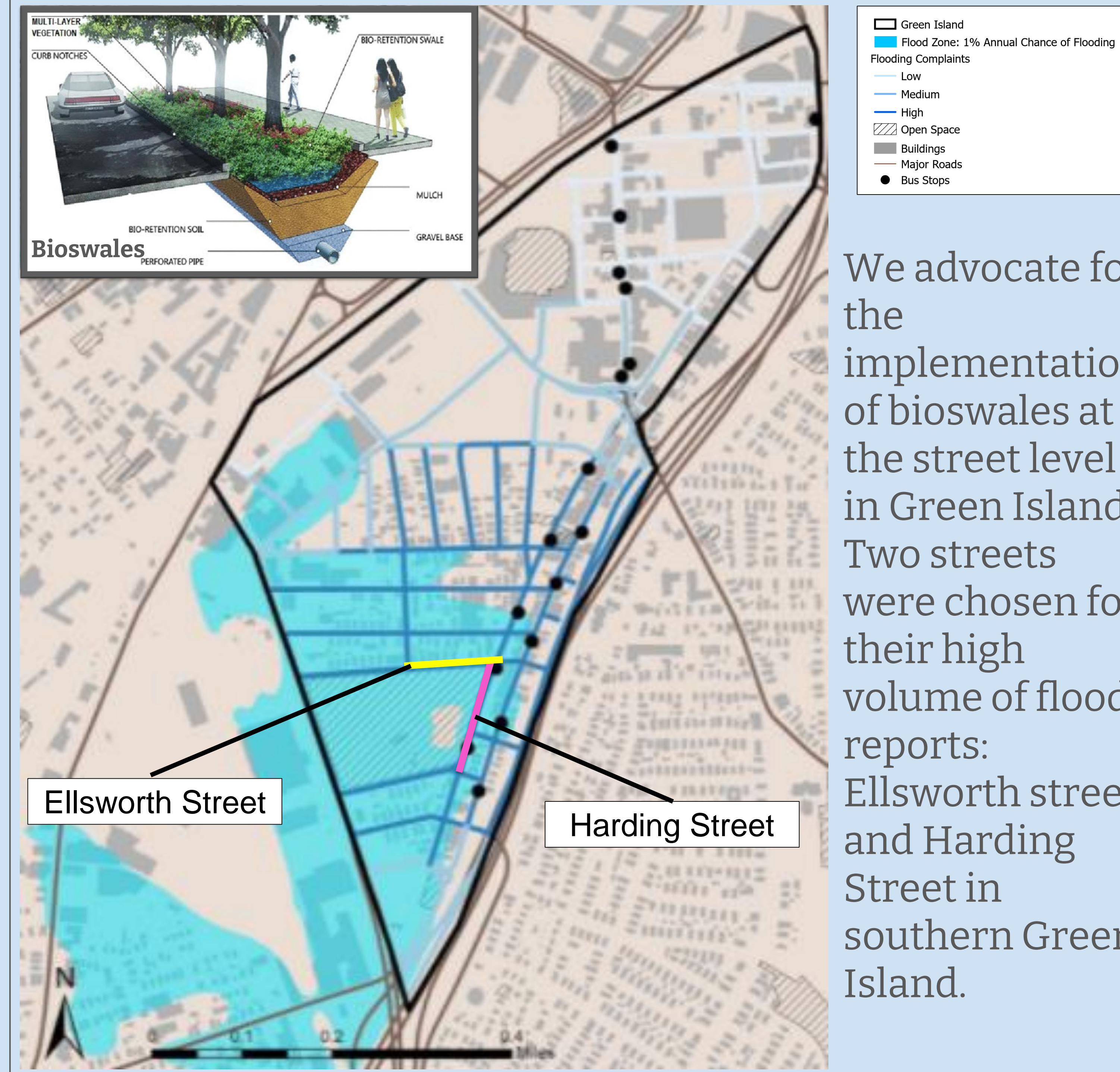
Disappearing Water Features



These maps show the disappearance of water features over the last 200 years in and around the Green Island neighborhood.

Flood Mitigation: Localized Approach

This map shows 1) the FEMA flood zone delineation in southern Green Island, 2) the number of flood reports by citizens at the street level, and 3) the two streets experiencing some of the most severe flooding chosen for bioswale recommendation to the city.



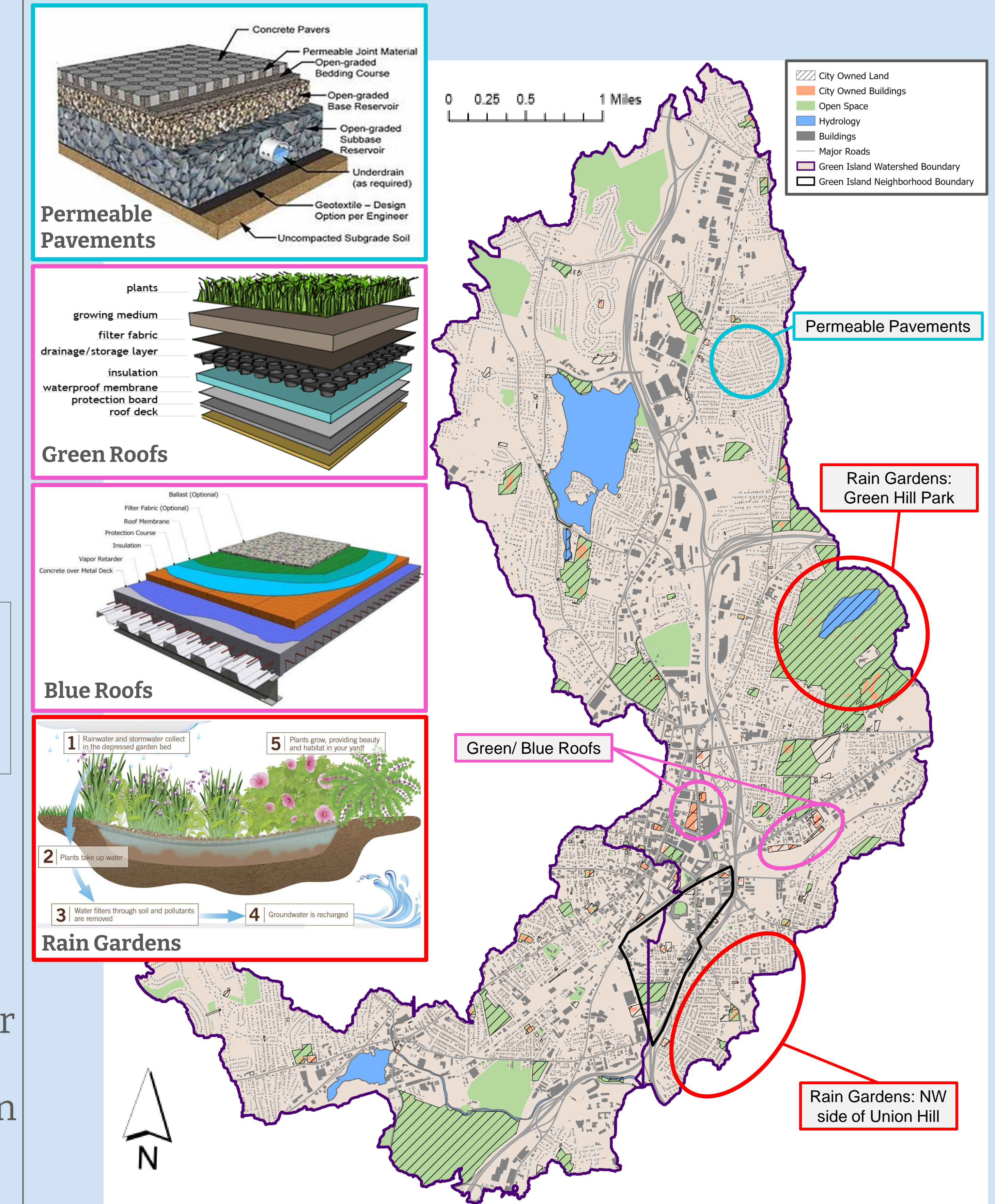
We advocate for the implementation of bioswales at the street level in Green Island. Two streets were chosen for their high volume of flood reports: Ellsworth street and Harding Street in southern Green Island.

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Flood Mitigation: Watershed Approach

Green Island lies within two watersheds, and because of its low elevation, all the water that falls within these boundaries drains directly into the Green Island neighborhood. We identified opportunities for green infrastructure at the watershed scale to decrease the severe flood rates.



Conclusion

- Many of Worcester's current water bodies were formally wetlands.
- Green Island's low elevation, high impervious cover, and hydrologic history explain today's high flooding rates.
- There is consistent flooding in southern Green Island, specifically around Harding, Endicott, & Sigel Streets.
- We can approach flood mitigation in Green Island at a localized scale using bioswales, or at a watershed scale using pervious pavements, green/blue roofs, and rain gardens.
- Change from gray to green infrastructure is key for long term resilience.
- Each solution is case by case; implementing green infrastructure on city owned land and buildings is a good place to start.